

SUNDB数据库管理系统
V5.0-管理手册
Administration Manual

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1.SUNDB数据库管理基础

1.1 SUNDB数据库创建与配置

数据库创建

使用SUNDB package中的gcreatedb创建数据库创建数据库之前需要考虑以下几点

| 考虑事项 | 更多信息索引 |
|---|--|
| 需考虑数据库中的表索引的使用空间大小 | <ul style="list-style-type: none"> • SUNDB数据库结构和存储结构 |
| 需考虑数据库的文件生成位置通过适量分配文件来分散磁盘I/O以此提高数据库性能例如可将重做日志文件存储于单独的磁盘或条带化数据文件分散于多个磁盘分散磁盘I/O并行执行磁盘I/O | <ul style="list-style-type: none"> • Redo日志文件管理 |
| 需要熟练掌握服务器参数文件中的各种参数的概念与操作并持续进行管理 | <ul style="list-style-type: none"> • 指定初始参数 • 使用SUNDB配置文件管理初始参数 • 服务器属性 |

Table 0-1 创建数据库时需要考虑的事项

除以上几点创建数据库还需要参考[Getting Started](#)手册的[创建数据库](#)部分

为了使用SUNDB必须设置\$SUNDB_HOME与\$SUNDB_DATA环境变量数据库创建及运行相关的参数文件（sundb.properties.conf）存储在\$SUNDB_DATA/conf目录下

- SUNDB_HOME: 安装二进制SUNDB产品包的位置在产品升级时可进行overwrite（需要备份License）
- SUNDB_DATA: 默认生成SUNDB使用的日志文件及数据文件控制文件等各种磁盘文件的路径无法overwrite

设置初始参数

SUNDB可通过参数控制运行管理所需的信息

初始参数

创建或启动数据库时可按照如下方法设置参数

1. System Environment Variable（系统环境变量）
 - A. 安装SUNDB后在创建或启动数据库的命令窗口输入并进行变更
 - B. 参数名前必须加前缀前缀为SUNDB_
- 以下为将SHARED_MEMORY_STATIC_SIZE变更为100M的示例

```
export SUNDB_SHARED_MEMORY_STATIC_SIZE=100M
```

2. Property File（参数文件）：直接在参数文件里修改不需要前缀

- 以下为将SHARED_MEMORY_STATIC_SIZE变更为200M的示例
- Shared memory static size (100M ~ 32G)

```
SHARED_MEMORY_STATIC_SIZE = 200M
```

Note:

如果将相同的参数设置到系统环境变量参数文件时应用参数文件的值即系统环境变量里设置为SHARED_MEMORY_STATIC_SIZE=100M在参数文件里设置为200M时数据库启动时将应用SHARED_MEMORY_STATIC_SIZE=200M

使用SUNDB配置文件管理初始参数

参数文件位于\$SUNDB_DATA/conf根据文件类型分为两种

- 文本参数文件（Text property file）
 - 文件名： `sundb.properties.conf`
 - 以"参数名=值"形式构成的文件用户可直接进行编辑
 - 如果有二进制参数文件时不读取文本参数文件
- 二进制参数文件（Binary property file）
 - 由系统生成的文件用户无法直接进行编辑
 - 文件名： `sundb.properties.binary`
 - 使用 `gdump` 工具查询二进制参数文件的内容

Note:

文本参数文件和二进制参数文件同时存在时只读取二进制参数文件即文本参数文件不进行任何处理二进制参数文件通过用户的SQL（ALTER SYSTEM SET）进行管理也只能通过SQL进行编辑

详细内容请参考**ALTER SYSTEM SET property_name, ALTER SYSTEM RESET property_name**

- 编辑文本参数文件
 - 必须使用'PROPERTY_NAME = VALUE'的形式
 - 注释使用'#'
 - 参数类型为以下3种数据类型中的一个
 - 字符型：使用单引号（Single quotation）进行设置字符型的值包含\$SUNDB_DATA的路径时使用为<SUNDB_DATA>
 - 数字型：不可使用运算符（例如 LOG_BUFFER_SIZE=1024 * 1024 (X)）根据情况可选择K (kilobyte), M (megabyte), G (gigabyte), T (terabyte), P (petabyte) 等的大小
 - 逻辑型：可使用ON/OFF, ENABLE/DISABLE, 1/0, TRUE/FALSE, YES/NO

1.2 SUNDB实例的启动与结束

本章节介绍实例的启动与结束

启动实例

拥有SYSDBA权限的用户才可以启动SUNDB实例

可以以D/A (Direct Attach)方式与C/S (Client/Server)的专用方式启动不能以C/S的共享方式启动

多阶段启动

SUNDB实例通过多阶段启动多阶段启动功能是为了使管理员可介入每个阶段更改数据库状态而开发的功能

分为IDLE, NOMOUNT, MOUNT, OPEN阶段每个阶段具有如下特点

Idle阶段

未启动实例的状态

如下在实例未启动的状态下用gsql连接时会连接到idle实例此阶段除了\startup命令外无法执行其他任何命令

```
% gsql sys gliese --as sysdba
```


Connected to an idle instance.

```
gSQL> select * from dual;
```

```
ERR-08003(40044): connection does not exist
```

```
gSQL>
```

- Idle状态下数据库管理员可执行的操作
 - 调整启动实例所需的参数
 - 在gsql使用\startup命令转到NOMOUNT
- 转移到nomount阶段时在实例中执行的操作
 - 启动管理SUNDB实例的守护进程gmaster
 - 启动gmaster内的timer与cleanup线程
 - 分配并初始化SSA（Shared memory static area）

| 名称 | 说明 |
|--------------------|-----------------------|
| CLIENT_MAX_COUNT | 可连接的最大会话数量 |
| CONTROL_FILE_0 ~ 7 | 控制文件的路径 |
| CONTROL_FILE_COUNT | 控制文件的路径中有效路径的数量 |
| DATA_STORE_MODE | SUNDB实例的存储模式 |
| PLAN_CACHE_SIZE | 用于Plan Cache的最大共享内存大小 |
| PROCESS_MAX_COUNT | 可连接的最大进程数量 |

| 名称 | 说明 |
|---------------------------|-------------|
| SHARED_MEMORY_ADDRESS | 共享内存地址 |
| SHARED_MEMORY_STATIC_NAME | 共享内存名称 |
| SHARED_MEMORY_STATIC_KEY | 生成共享内存的Key值 |
| SHARED_MEMORY_STATIC_SIZE | 生成的共享内存大小 |
| SYSTEM_LOGGER_DIR | 系统LOGGER的路径 |

Table 0-2 转移到nomount阶段时应用的参数

Idle状态下无法变更参数管理员可通过下列方式变更相应的参数

通过利用环境变量的方法将SUNDB_[property_name]设置为所需值并转移到nomount阶段相应参数会被应用

```
% export SUNDB_CLIENT_MAX_COUNT=1000
```

使用“SCOPE = FILE”将要更改的参数值写入文件记录的参数将在转移到NOMOUNT阶段时被应用

```
gSQL> alter system set client_max_count = 1000 scope = file;
```

```
System altered.
```

```
gSQL> \shutdown
```

```
Shutdown success
```

```
gSQL> \startup
```

```
Startup success
```

```
gSQL>
```

Nomount阶段

数据库尚未达到mount阶段仅启动了管理SUNDB实例的守护进程gmaster的状态

从idle阶段转移到nomount阶段的方法如下

```
% gsql sys gliese --as sysdba
```

```
Connected to an idle instance.
```

```
gSQL> \startup nomount
```

```
Startup success
```

```
gSQL>
```

- Nomount阶段下管理员可执行的操作
 - 调整nomount参数
 - 详细内容请参考[ALTER SYSTEM {MOUNT | OPEN} DATABASEALTER DATABASE](#)

RESTORE

- 转移到mount阶段时在实例中执行的操作
 - 将控制文件（control file）加载到数据库
 - 准备恢复数据库
 - 启动gmaster中的checkpoint, log flusher, page flusher, IO slave, archive log线程

| 名称 | 说明 |
|--------------------------|---------------------|
| LOG_BUFFER_SIZE | 重做日志缓冲区大小 |
| PARALLEL_LOAD_FACTOR | 用于加载数据库后进行并行操作的线程数量 |
| PARALLEL_IO_FACTOR | 用于加载数据库的并行线程数量 |
| PARALLEL_IO_GROUP_1 ~ 16 | 并行加载时的数据文件组 |
| PENDING_LOG_BUFFER_COUNT | 延迟日志缓冲区的数量 |
| TRANSACTION_TABLE_SIZE | 事务表的大小 |
| UNDO_RELATION_COUNT | UNDO Relation数量 |

Table 0-3 在nomount阶段可变更的参数

Mount阶段

数据库在mount阶段表示数据库已识别控制文件的状态在此阶段可控制控制文件中的所有区域（section）

从nomount阶段转移到mount阶段的操作如下

```
% gsql sys gliese --as sysdba
```

```
Connected to an idle instance.
```

```
gSQL> \startup nomount
```

```
Startup success
```

```
gSQL> alter system mount database;
```

```
System altered.
```

```
gSQL>
```

- Mount阶段下管理员可执行的操作
 - 调整mount参数
 - **ALTER SYSTEM {MOUNT | OPEN} DATABASE**
 - **ALTER DATABASE ADD LOGFILE**
 - **ALTER DATABASE DROP LOGFILE**
 - **ALTER DATABASE RENAME GLOBAL TRANSACTION LOGFILE**
 - **ALTER DATABASE RENAME LOGFILE**
 - **ALTER DATABASE { ARCHIVELOG | NOARCHIVELOG }**
 - **ALTER DATABASE DELETE BACKUP**
 - **ALTER DATABASE REGISTER**
 - **ALTER DATABASE RECOVER**

- ALTER DATABASE RESTORE
- ALTER SESSION SET property_name
- ALTER SYSTEM RESET property_name
- ALTER SYSTEM SWITCH LOGFILE
- ALTER SYSTEM [KILL | DISCONNECT] SESSION
- ALTER TABLESPACE name ADD [DATAFILE|MEMORY]
- ALTER TABLESPACE name RENAME DATAFILE
- ALTER TABLESPACE name [ONLINE|OFFLINE]
- 转移到open阶段时在实例中执行的操作
 - 把实例使用的所有数据文件加载到共享内存
 - 执行恢复实例
 - 创建NOLOGGING索引
 - 整理ager线程未删除的对象或文件
 - 创建字典对象cache
 - "SHARED_SESSION"参数为YES时启动gmaster内的Process Monitor线程
 - Process monitor线程执行balancer process, dispatcher process, shared-server process

| 名称 | 说明 |
|--------------------------------------|--------------------------|
| ARCHIVELOG_FILE | 归档日志文件的前缀名 |
| IN_DOUBT_DECISION | in-doubt事务的决策 |
| LOCK_HASH_TABLE_SIZE | 锁管理员的hash表大小 |
| LOG_MIRROR_MODE | LOG mirroring模式 |
| LOG_MIRROR_SHARED_MEMORY_STATIC_SIZE | 用于LOG mirroring模式的共享内存大小 |

| 名称 | 说明 |
|-----------------------------------|----------------|
| SUPPLEMENTAL_LOG_DATA_PRIMARY_KEY | 是否记录数据库级别的补充日志 |

Table 0-4 Mount阶段中可变更的参数

Open阶段

该阶段为数据库中的所有数据文件加载到内存并可以向用户提供服务的状态此阶段允许执行所有操作

```
% gsql sys gliese --as sysdba
```

```
Connected to an idle instance.
```

```
gSQL> \startup mount
```

```
Startup success
```

```
gSQL> alter system open database;
```

```
System altered.
```

```
gSQL>
```

检测

启动实例时可用一个\startup 命令一次性启动多个阶段如果在特定阶段启动失败时管理员需要知道在哪个阶段出现了失败可通过V\$INSTANCE查看实例的当前启动阶段管理员可继续执行其后续实例启动阶段

以下为\startup失败时将实例启动到OPEN阶段的示例

```
% gsql sys gliese --as sysdba

Connected to an idle instance.

gSQL> \startup

ERR-42000(14051): media recovery required - 'TEST_TBS'

gSQL> select INSTANCE_STATUS from v$instance;

INSTANCE_STATUS
-----
MOUNTED

1 row selected.

...
```



```
gSQL> alter system open database;
```

```
System altered.
```

结束实例

仅有SYSDBA权限的用户能结束SUNDB实例结束过程中不能连接新的会话

可以通过D/A(Direct Attach)方式与C/S(Client/Server)的专用方式结束不能以C/S的共享方式结束

结束实例分别有NORMAL, IMMEDIATE, TRANSACTIONAL, ABORT 4种模式

Shutdown Normal

Shutdown normal时如不指定特定模式就会以默认模式操作用于正常结束实例

```
gSQL> \shutdown normal
```

```
Shutdown success
```

```
gSQL>
```

Shutdown normal具有如下特征

- 不允许新的会话

- 在已连接的会话中允许新事务或statement
- 等待连接在实例的所有会话终止
- 之后启动实例时不执行实例恢复过程

Shutdown Transactional

Shutdown transactional用于即使执行中的会话强制结束正常执行中的事务也能正常结束的情况

```
gSQL> \shutdown transactional
```

```
Shutdown success
```

```
gSQL>
```

Shutdown transactional有以下特点

- 不允许新的会话与事务
- 允许在执行中的事务中处理新的语句
- 等待当前执行中的事务结束
- 当前执行中的事务结束后自动结束会话
- 之后启动实例时不执行实例恢复过程

Shutdown Immediate

Shutdown immediate用于用户无法结束执行中的事务的情况下结束实例

```
gSQL> \shutdown immediate
```

```
Shutdown success
```

```
gSQL>
```

Shutdown immediate有以下特点

- 不允许新的会话与事务
- 强行结束当前执行中的会话与事务
- 等待系统后台线程执行完毕
- 之后启动实例时不执行实例恢复过程

Shutdown Abort

Shutdown abort用于关闭处于异常状态的实例

```
gSQL> \shutdown abort
```

```
Shutdown success
```

```
gSQL>
```

Shutdown abort有以下特点

- 不允许新的会话与事务

- 强行结束当前执行中的会话与事务
- 立即结束系统的后台线程
- 之后启动实例时执行实例恢复过程

CSII

1.3 进程管理

本章介绍SUNDB实例相关的后台（background）进程

主进程

主进程执行数据库性能及监控相关的异步操作由多个线程构成

主进程的执行文件名为gmaster

Checkpoint线程

Checkpoint线程执行log flushing线程引起的异步checkpoint事件每当重做日志文件切换时发生checkpoint事件

Checkpoint事件是异步执行的与用户无关相关日志如下记录在system.trc中

```
[2014-09-11 14:04:34.704465 THREAD(14497,140178383427328)] [INFORMATION]
```

```
[CHECKPOINT] begin
```

```
...
```

```
[2014-09-11 14:04:34.743933 THREAD(14497,140178383427328)] [INFORMATION]
```

```
[CHECKPOINT] save control file
```

```
[2014-09-11 14:04:34.759521 THREAD(14497,140178383427328)] [INFORMATION]
[CHECKPOINT] end
```

Log Flushing线程

用户事务记录的重做日志记录在缓冲区中由log flushing线程定期记录在日志文件

重做日志写满一个日志文件后切换到下一个重做日志文件发生日志文件切换时Checkpoint事件传达至Checkpoint线程

如果发生日志文件切换时无可用的日志文件则除只读查询外的所有查询都将处于等待状态直到创建可用的日志文件

以下为logging blocking时system.trc记录的内容

```
...
[2014-09-11 14:31:44.315871 THREAD(19102,139674683647744)] [INFORMATION]
[LOG FLUSHER] disable logging - blocked lfsn(1)
...
```

Log Archiving线程

Log archiving线程异步归档重做日志该线程仅在数据库以ARCHIVELOG模式运行时执行

日志归档是checkpoint过程中的一部分由checkpoint线程触发的log archiving事件执行

以下为redo_0_0.log被归档为archive_0.log时system.trc中所记录的内容

```
[2014-09-11 14:13:32.515996 THREAD(16913,140631135463168)] [INFORMATION]
[ARCHIVELOG BEGIN]
LOG(/home/test/work/product/Gliese/home/wal/redo_0_0.log(0)) =>
ARCHIVE(/home/test/work/product/Gliese/home/archive_log/archive_0.log)

[2014-09-11 14:13:33.145850 THREAD(16913,140631135463168)] [INFORMATION]
[ARCHIVELOG END]
(/home/test/work/product/Gliese/home/archive_log/archive_0.log) : SUCCESS

...
```

Ager线程

Ager线程物理删除逻辑上被删除的对象

SUNDB在“DROP TABLE”时为了维持语句级别的一致性（statement level consistency）仅执行逻辑删除即即使执行“DROP TABLE”“DROP TABLE”之前执行的语句仍然可以查询已被删除的表记录

以下为物理删除表与表空间时system.trc中所记录的内容

```
[2014-09-11 14:13:37.966788 THREAD(16925,139892990408448)] [INFORMATION]
[AGER] aging table - object scn(4561), object view scn(4562), type(0),
physical id(25043954302976)
```

...

```
[2014-09-11 14:13:37.966917 THREAD(16925,139892990408448)] [INFORMATION]
[AGER] aging tablespace - object scn(4561), object view scn(4564),
tablespace id(61)
```

Timer线程

Timer线程异步设置系统时间以节省用户事务之间的时间测定成本用户事务读取系统设置的时间

时间精度可以使用**TIMER_INTERVAL**参数进行设置默认值为10ms

使用Timer线程中设置的时间的情况有以下几种此时会产生TIMER_INTERVAL值大小的误差比如TIMER_INTERVAL为10ms时误差为10ms

- 超时: QUERY_TIMEOUT, IDLE_TIMEOUT, DDL_LOCK_TIMEOUT
- 跟踪日志的剩余信息记录时间
- 登录语句或事务的开始时间
- 事务完成后记录在重做日志的时间

Page Flusher & IO Slave线程

发生checkpoint时将更改的数据页反映到磁盘更新事项可存储在表空间的多个数据文件中为此页面刷新(page flusher)线程分别按照表空间与数据文件将操作分配到IO slave线程并进行管理IO

slave线程将更新页面并行记录到数据文件中

磁盘表空间中保存的表索引页等缓存到buffer发生了变化后会连接到checkpoint listbuffer缓存中
为了重新使用而更新的页将连接到buffer replace listI/O slave线程在checkpoint时或者周期性的
将IO checkpoint list和buffer replace list的页反映到磁盘中

一次尽量存储更多的已变更页面会有助于提升性能一次记录的页面数量由

MAXIMUM_FLUSH_PAGE_COUNT参数指定

将更改的页面写入数据文件后system.trc记录如下内容

```
[2014-09-11 14:13:38.329162 THREAD(16925,139893221086976)] [INFORMATION]
[IO SLAVE] flush datafile ( tablespace : 0, datafile : 0 )

[2014-09-11 14:13:38.552161 THREAD(16925,139893221086976)] [INFORMATION]
[IO SLAVE] flush datafile ( tablespace : 1, datafile : 0 )

[2014-09-11 14:13:38.587510 THREAD(16925,139893221086976)] [INFORMATION]
[IO SLAVE] flush datafile ( tablespace : 2, datafile : 0 )

[2014-09-11 14:13:38.587831 THREAD(16925,139893221086976)] [INFORMATION]
[IO SLAVE] flush datafile ( tablespace : 62, datafile : 0 )

[2014-09-11 14:13:38.620239 THREAD(16925,139893221086976)] [INFORMATION]
[IO SLAVE] flush datafile ( tablespace : 63, datafile : 0 )
```

Cleanup线程

Cleanup线程异步整理系统的资源并执行如下操作

- 整理正常结束的会话SUNDB在逻辑上处理用户的会话结束由Cleanup线程物理结束会话
- 终止非正常结束的会话如果此会话正在使用事务则进行回滚
- 检查snapshot语句的超时情况如果有超时的会话则强行结束

以下为整理非正常结束的会话时system.trc中所记录的内容

```
[2014-09-12 10:34:38.387349 THREAD(23003,140722556352256)] [WARNING]
```

```
[CLEANUP] cleaning session - env(19), session(20),  
transaction(FFFFFFFFFFFFFFFF), program(gsql), pid(23209),  
thread(140080441665280)
```

```
[2014-09-12 10:34:38.387515 THREAD(23003,140722556352256)] [WARNING]
```

```
[CLEANUP] cleaning up 1 sessions
```

以下为snapshot语句超时时system.trc中所记录的内容

```
[2014-09-12 10:49:21.842179 THREAD(3972,139706316711680)] [WARNING]
```

```
[CLEANUP] long statement timeout - pid(8029), thread(140053960505088),  
program(gsql), statement start time(2014-09-12 10:48:49.963471)
```

非正常结束的会话在获取排他锁（exclusive）latch的情况下变更共享内存时如果被“kill -9”等信号终止则数据库无法再运行这时在system.trc里会记录如下内容并需要使用“SHUTDOWN ABORT”结束实例

```
[2014-09-12 11:12:58.809249 THREAD(15313,140671386121984)] [WARNING]
[CLEANUP] failed to cleaning session - server restart required
..... dead session in critical section - env(3), session(4),
transaction(47001E0004), pid(15296), thread(140178075756288)
```

Process Monitor线程

Process monitor线程执行并监控进程

- 仅在"SHARED_SESSION"参数值为YES时执行
- 执行load-balancer(gbalancer), dispatcher(gdispatcher), shared-server(gserver)并在其非常结束时再次执行
- Listener(glsnr)进程不是该线程的监控对象

Cluster Recover线程

在集群系统环境中启动节点时如果节点逐步进入MOUNT阶段则会创建集群恢复（cluster recover）线程 如果存在in-doubt事务则集群恢复线程将与远程节点上的集群恢复线程进行通信并恢复in-doubt事务

如果存在in-doubt事务集群恢复线程将与远程节点上的集群恢复线程进行通信并分析需要恢复的in-doubt事务的状态如果远程节点重新启动但尚未恢复则会发送请求优先执行恢复的消息并在完成恢复后恢复in-doubt事务的状态

可通过远程节点分析的in-doubt事务状态包含NONEPREPARECOMMIT以及ROLLBACK至少从一个远程节点收到COMMIT或ROLLBACK响应时执行COMMIT或ROLLBACK如果从所有远程节点收

到NONE或PREPARE响应则由于所有集群节点未执行过COMMIT或ROLLBACK因此执行

ROLLBACK

集群恢复（cluster recover）线程恢复了in-doubt事务时system.trc中会记录如下信息

```
[2018-11-22 16:52:00.466805 INSTANCE(G3N2) THREAD(7828,140557371479808)]
```

```
[WARNING]
```

```
[CLUSTER RECOVER] begin recovery
```

```
[2018-11-22 16:52:00.467221 INSTANCE(G3N2) THREAD(7828,140557371479808)]
```

```
[WARNING]
```

```
[CLUSTER RECOVER] commit in-doubt transaction - commit scn(999.0.439),  
global transaction id(1.29294650), local transaction id(4)
```

```
[2018-11-22 16:52:00.468253 INSTANCE(G3N2) THREAD(7828,140557371479808)]
```

```
[WARNING]
```

```
[CLUSTER RECOVER] rollback in-doubt transaction - commit scn(1000.439),  
global transaction id(4.34406459), local transaction id(59)
```

```
[2018-11-22 16:52:00.469198 INSTANCE(G3N2) THREAD(7828,140557371479808)]
```

```
[WARNING]
```

```
[CLUSTER RECOVER] commit in-doubt transaction - commit scn(1001.0.439),  
global transaction id(5.35127356), local transaction id(60)
```

故障转移线程

在集群系统环境中启动节点时如果节点逐步进入LOCAL OPEN阶段则会创建集群故障转移

(failover) 线程集群系统中的特定节点或网络发生故障时集群故障转移线程对故障节点执行脱机或重新选择协调器等故障转移处理

如果出现需要故障转移的情况由获取故障转移lock的一个正常节点与其他节点的故障转移线程进行通信并执行故障转移

故障转移线程执行故障转移时system.trc中记录如下信息

```
[2018-11-22 15:27:34.619208 INSTANCE(G1N1) THREAD(20140,140219957368576)]  
[INFORMATION]  
[FAILOVER] begin - failover member(5)  
  
[2018-11-22 15:27:34.619418 INSTANCE(G1N1) THREAD(20140,140219957368576)]  
[INFORMATION]  
[FAILOVER] acquire failover lock - driver(0), target(5), driver seq(1)  
  
[2018-11-22 15:27:34.619692 INSTANCE(G1N1) THREAD(20183,140317097449216)]  
[INFORMATION]  
[CDISPATCHER-S2] disconnect member - target member(5)  
  
[2018-11-22 15:27:34.619893 INSTANCE(G1N1) THREAD(20183,140317097449216)]  
[INFORMATION]  
[CDISPATCHER-S2] finalize sender socket - member(5)
```

[2018-11-22 15:27:34.621860 INSTANCE(G1N1) THREAD(20140,140219957368576)]

[INFORMATION]

[FAILOVER] acquire failover lock

...

[2018-11-22 15:27:38.726436 INSTANCE(G1N1) THREAD(20140,140219957368576)]

[INFORMATION][FAILOVER] member(5) has failovered

[2018-11-22 15:27:38.728624 INSTANCE(G1N1) THREAD(20140,140219957368576)]

[INFORMATION]

[FAILOVER] release failover lock - driver(-1), target(5), driver seq(1)

[2018-11-22 15:27:38.728786 INSTANCE(G1N1) THREAD(20140,140219957368576)]

[WARNING]

reset remote session map - member(5)

[2018-11-22 15:27:38.729679 INSTANCE(G1N1) THREAD(20140,140219957368576)]

[INFORMATION]

[FAILOVER] finished

监听进程

C/S环境下监听进程允许通过网络进行远程访问监听进程通过LISTEN_PORT等待客户端访问客户端以专用模式访问时启动新的gserver与客户端连接以共享模式访问时通过load-balancer(gbalancer)选择负载小的dispatcher(gdispatcher)与客户端连接

gserver是一种操作服务器执行客户端请求的命令

如果LISTEN_PORT已被使用则发生如下错误

```
% glsnr --start
```

```
ERR-HY000(11077): given address is already in use
```

监听进程的运行与实例无关即不管实例是否为启动状态可随时启动或结束监听进程

1.4 内存管理

SUNDB内存结构

SUNDB使用系统的所有会话共享的内存(SSA)与存储数据库页的共享内存各会话独立使用的Heap专用内存(PSA)

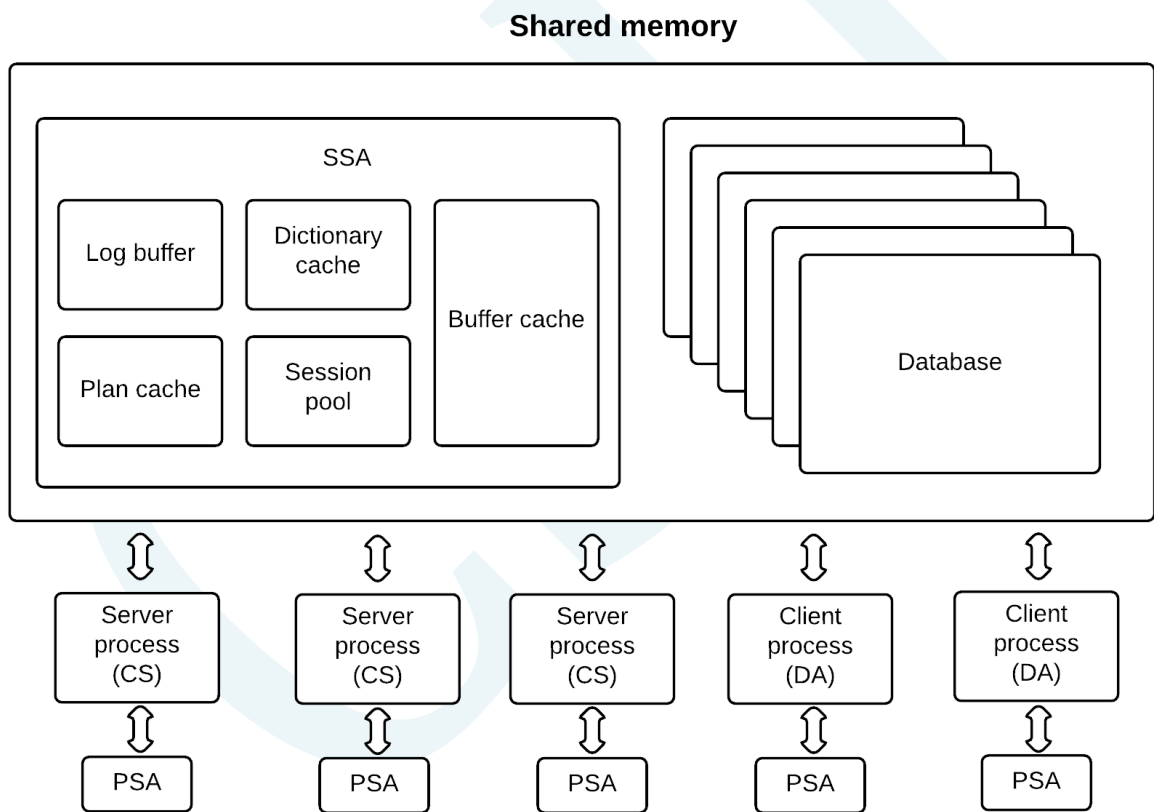


Figure 0-1 Shared memory

SSA管理

Shared Static Area (SSA)是存储系统所有会话共享的信息的内存区域

由于SSA中引用的所有信息位置使用物理地址因此新的进程使用SSA时也需要使用相同的物理地址

SSA的物理开始地址取决于**SHARED_MEMORY_STATIC_KEY**与 **SHARED_MEMORY_ADDRESS**

如果其他应用程序使用同样的SHARED_MEMORY_STATIC_KEY指定的共享内存key和

SHARED_MEMORY_ADDRESS指定的内存地址则发生如下错误

```
% gsql sys gliese --as sysdba

Connected to an idle instance.

gSQL> \startup

ERR-HY000(11029): shared memory segment exists

gSQL>
```

SSA中存储log buffer, dictionary cache, plan cache, session pool, lock pool, transaction pool等的主要信息

SSA大小取决于**SHARED_MEMORY_STATIC_SIZE**Session/ lock/ transaction pool及dictionary cache使用的内存由系统自动管理用户不能随意控制其使用量但用户可以随意控制log buffer与

plan cache

如果增加log buffer与plan cache的默认值则需要相应地增加SHARED_MEMORY_STATIC_SIZE否则发生如下错误

```
% gsql sys gliese --as sysdba

Connected to an idle instance.

gSQL> \startup

ERR-HY000(13010): Insufficient static area

gSQL>
```

PSA管理

Private Static Area (PSA)为各会话独立使用的heap内存领域其最大值取决于

PRIVATE_STATIC_AREA_SIZE

创建会话时仅分配PSA的初始值如果会话需要额外内存则可将PSA分配至最大值以下为超过最大值时的报错信息

```
ERR-HY000(13011): Unable to extend memory: [MAX: 104857600, TOTAL:
102764408, ALLOC: 2097240] DESC: private static area
```

1.5 监控

通过数据库监控不仅能够事先预测并防止未来可能发生的问题也能找到数据库运行中可改进的地方SUNDB数据库为监控提供文本形式的跟踪日志与各种性能视图

通过跟踪日志文件进行监控

SUNDB数据库提供记录从实例启动到结束为止的所有系统错误警告及相关信息的系统日志与XA事务日志DDL日志等跟踪日志以及SQL跟踪日志详细内容请参考[TRACE_LOG_ID](#)

跟踪日志文件管理

SUNDB数据库的跟踪日志文件分为记录系统日志与DDL日志的“system.trc”文件与记录XA事务日志的“xa.trc”文件跟踪日志文件创建于SYSTEM_LOGGER_DIR参数设置的目录下因此默认创建于“SUNDB_DATA”环境变量设置的目录的下级“trc”目录中跟踪日志文件的大小为10 Mbyte空间不足时保存为追加固有文件扩展名的文件并创建新的跟踪日志文件进行记录

监听器的跟踪日志文件生成为“listener.trc”位于“SUNDB_DATA”环境变量设置的目录的下级“trc”目录中日志文件的大小为10 Mbyte使用空间不足时保存为追加固有扩展名的文件并生成新的跟踪日志文件进行记录

除系统日志外XA事务日志和DDL日志可以选择监控ON/OFF开关DDL日志通过将TRACE_DDL参数值设置为“0”关闭DDL日志或设置为“1”开启DDL日志XA日志使用TRACE_XA参数用相同方式进行设置

系统日志

在系统日志中记录从主进程启动到结束为止发生在数据库实例的错误报警以及相关信息

系统日志格式

以如下格式记录系统日志

```
['日志记录日期及时间' THREAD('进程 Id', '线程 handle')] ['log level']
['日志前缀'] 'log body'
```

- “日志记录日期及时间”为记录日志的日期和时间
- THREAD(“进程 Id”, “线程 handle”)为记录日志的进程Id及线程handle信息
- “日志前缀 (log prefix)”为创建日志的主体或功能“日志内容 (log body)”为详细内容
- “日志级别 (log level)”为记录到系统日志的日志级别有FATAL, ABORT, WARNING, INFO并具有如下属性

| 日志级别 | 说明 | 处理 |
|-------|---------------------|---|
| FATAL | 主进程或客户端 非正常结束的状态 | 客户端进程FATAL时需要重连客户端系统FATAL时需要结束数据库实例后重启 需要备份数据文件控制文件重做日志文件系统日志文件并咨询数据库制造商 |
| ABORT | 执行回滚后可继续提供服务的状态 | 为运行数据库的正常状态需在解决回滚问题后重新执行 |

| 日志级别 | 说明 | 处理 |
|---------|---------|------------------------------|
| WARNING | 运行方面的警告 | 数据库实例发生了非正常的情况无运行方面问题但需要分析原因 |
| INFO | 运行方面的信息 | - |

Table 0-5 Log level properties

例如以下为2014年9月11日17时30分55秒左右记录的进程Id为21395（线程handle为139982731163392）的系统日志日志前缀为'STARTUP-SM'表示SUNDB数据库的主进程启动时正在执行存储管理器（storage manager）并在多阶段启动中已转到NO-MOUNT阶段

```
[2014-09-11 17:30:55.758164 THREAD(21395,139982731163392)] [INFORMATION]
[STARTUP-SM] NO-MOUNT PHASE
```

SUNDB数据库运行信息

执行数据库实例的创建多阶段启动与结束数据文件加载重启恢复介质恢复等的日志记录从主进程启动到结束为止用于运行的所需信息

- SUNDB实例生成日志

生成数据库实例时记录如下系统日志为了生成数据库转到NO-MOUNT阶段之后生成控制文件

```
=====
Startup SUNDB
TIME      : 2014-09-03 14:43:17.321020
```

=====

[2014-09-03 14:43:17.321134 THREAD(14979,140542517491456)] [INFORMATION]

[STARTUP-SM] NO-MOUNT PHASE

[2014-09-03 14:43:17.321658 THREAD(14979,140542517491456)] [INFORMATION]

[STARTUP-SM] DATA_STORE_MODE(2)

[2014-09-03 14:43:17.335809 THREAD(14979,140542517491456)] [INFORMATION]

.... copy control file from '/sundb_data/wal/control_0.ctl' to
'/sundb_data/wal/control_1.ctl'

之后转到OPEN阶段并创建系统表空间

[2014-09-03 14:43:17.401356 THREAD(14979,140542517491456)] [INFORMATION]

[STARTUP-SM] MOUNT PHASE

[2014-09-03 14:43:19.319769 THREAD(14979,140542517491456)] [INFORMATION]

[STARTUP-SM] PRE-OPEN PHASE

[2014-09-03 14:43:19.320494 THREAD(14979,140542517491456)] [INFORMATION]

[STARTUP-SM] RECOVER TABLESPACE AND DATAFILE STATE

[2014-09-03 14:43:19.326269 THREAD(14979,140542517491456)] [INFORMATION]

```
[STARTUP-SM] OPEN PHASE
```

```
[2014-09-03 14:43:21.005536 THREAD(14979,140542517491456)] [INFORMATION]
```

```
[TABLESPACE] Create Tablespace(0)
```

```
[2014-09-03 14:43:21.005593 THREAD(14979,140542517491456)] [INFORMATION]
```

```
[TABLESPACE] Create Tablespace(1)
```

```
...
```

创建系统表空间后执行Checkpoint并结束数据库实例

```
[2014-09-03 14:43:21.788129 THREAD(14979,140542517491456)] [INFORMATION]
```

```
[CHECKPOINT] begin - checkpoint lid(0,10128,13), checkpoint lsn(10512),  
oldest lsn(10512)
```

```
[2014-09-03 14:43:21.788188 THREAD(14979,140542517491456)] [INFORMATION]
```

```
[CHECKPOINT] body - checkpoint lid(-1,0,0), checkpoint lsn(-1), active  
transaction count(0)
```

```
[2014-09-03 14:43:21.788203 THREAD(14979,140542517491456)] [INFORMATION]
```

```
[CHECKPOINT] end - checkpoint lid(0,10128,77), checkpoint lsn(10513)
```

```
[2014-09-03 14:43:21.788214 THREAD(14979,140542517491456)] [INFORMATION]
```

```
[CHECKPOINT] flush redo log
```

[2014-09-03 14:43:21.949589 THREAD(14979,140542517491456)] [INFORMATION]

[CHECKPOINT] save control file

[2014-09-03 14:43:21.957563 THREAD(14979,140542517491456)] [INFORMATION]

[SHUTDOWN-SM] CLOSE

[2014-09-03 14:43:21.957595 THREAD(14979,140542517491456)] [INFORMATION]

[SHUTDOWN-SM] POST CLOSE

[2014-09-03 14:43:21.992521 THREAD(14979,140542517491456)] [INFORMATION]

[SHUTDOWN-SM] DISMOUNT

[2014-09-03 14:43:21.992557 THREAD(14979,140542517491456)] [INFORMATION]

[SHUTDOWN-SM] INIT

- SUNDB实例启动日志

主进程记录数据库实例的多阶段启动数据文件加载重启恢复介质恢复等的日志先转到MOUNT阶段后加载数据文件

```
=====
Startup SUNDB
TIME      : 2014-09-03 14:43:22.162601
=====
```


[2014-09-03 14:43:22.162765 THREAD(14982,140025756808960)] [INFORMATION]

[STARTUP-SM] NO-MOUNT PHASE

[2014-09-03 14:43:22.163389 THREAD(14982,140025756808960)] [INFORMATION]

[STARTUP-SM] DATA_STORE_MODE(2)

[2014-09-03 14:43:22.429311 THREAD(14983,140025756808960)] [INFORMATION]

[STARTUP-SM] MOUNT PHASE

[2014-09-03 14:43:22.559395 THREAD(14983,140025756808960)] [INFORMATION]

[EVENT] system startup : SUCCESS

[2014-09-03 14:43:22.568526 THREAD(14981,139649517561600)] [INFORMATION]

[STARTUP] MOUNT PHASE

[2014-09-03 14:43:22.571200 THREAD(14983,140025756808960)] [INFORMATION]

[STARTUP-SM] LOAD DATAFILES

[2014-09-03 14:43:22.571241 THREAD(14983,140025756808960)] [INFORMATION]

.... datafile '/sundb_data/db/system_dict.dbf' assigned to

PARALLEL_IO_GROUP_1

...

```
[2014-09-03 14:43:22.571562 THREAD(14983,140025280841472)] [INFORMATION]
.... LOAD DATAFILE(/sundb_data/db/system_dict.dbf)
...
```

将数据文件加载到内存后执行恢复

```
[2014-09-03 14:43:23.537256 THREAD(14983,140025756808960)] [INFORMATION]
[STARTUP-SM] REFINE TABLESPACE AND DATAFILE

[2014-09-03 14:43:23.631974 THREAD(14983,140025756808960)] [INFORMATION]
[RESTART REDO] begin

[2014-09-03 14:43:23.634374 THREAD(14983,140025756808960)] [INFORMATION]
[RESTART REOD] read checkpoint log - checkpoint log id(0,10128,13), oldest
lsn(10512), system scn(7)

[2014-09-03 14:43:23.756293 THREAD(14983,140025756808960)] [INFORMATION]
[RESTART REDO] ready to redo - start lid(0,10128,13), lsn(10512)

...

[2014-09-03 14:43:24.090755 THREAD(14983,140025756808960)] [INFORMATION]
[RESTART REDO] end - restart lsn(10514), restart scn(7)
```

```
[2014-09-03 14:43:24.091551 THREAD(14983,140025756808960)] [INFORMATION]
```

```
[RESTART UNDO] begin
```

```
[2014-09-03 14:43:24.091598 THREAD(14983,140025756808960)] [INFORMATION]
```

```
[RESTART UNDO] end
```

恢复结束后执行Checkpoint并把恢复的结果反映到磁盘数据文件创建索引后转到OPEN阶段

```
[2014-09-03 14:43:24.111878 THREAD(14983,140025633163008)] [INFORMATION]
```

```
[CHECKPOINT] begin
```

```
...
```

```
[2014-09-03 14:43:24.129995 THREAD(14983,140025633163008)] [INFORMATION]
```

```
[CHECKPOINT] save control file
```

```
[2014-09-03 14:43:24.135864 THREAD(14983,140025633163008)] [INFORMATION]
```

```
[CHECKPOINT] end
```

```
[2014-09-03 14:43:24.144525 THREAD(14983,140025756808960)] [INFORMATION]
```

```
[STARTUP-SM] PRE-OPEN PHASE
```

```
[2014-09-03 14:43:24.202782 THREAD(14983,140025756808960)] [INFORMATION]
```

```
[STARTUP-SM] RECOVER TABLESPACE AND DATAFILE STATE
```

[2014-09-03 14:43:24.210158 THREAD(14983,140025756808960)] [INFORMATION]

[STARTUP-SM] REFINE RELATIONS

[2014-09-03 14:43:24.210304 THREAD(14983,140025756808960)] [INFORMATION]

[STARTUP-SM] REBUILD INDEXES

[2014-09-03 14:43:24.210375 THREAD(14983,140025756808960)] [INFORMATION]

[STARTUP-SM] OPEN PHASE

[2014-09-03 14:43:24.332064 THREAD(14983,140025756808960)] [INFORMATION]

[EVENT] system startup : SUCCESS

[2014-09-03 14:43:24.340843 THREAD(14981,139649517561600)] [INFORMATION]

[STARTUP] OPEN PHASE

- SUNDB实例结束日志

结束数据库实例时需要先把所有数据文件反映到磁盘后执行Checkpoint然后结束主进程

[2014-09-03 14:48:03.467293 THREAD(15416,139855812097792)] [INFORMATION]

[IO SLAVE] flush datafile (tablespace : 0, datafile : 0)

...

[2014-09-03 14:48:03.748958 THREAD(15416,139855908558592)] [INFORMATION]

[PAGE FLUSHER] flushed lsn(137496), flushed page count(9216)]

[2014-09-03 14:48:03.761055 THREAD(15416,139856376227584)] [INFORMATION]

[CHECKPOINT] begin

...

[2014-09-03 14:48:03.780011 THREAD(15416,139856376227584)] [INFORMATION]

[CHECKPOINT] save control file

[2014-09-03 14:48:03.786387 THREAD(15416,139856376227584)] [INFORMATION]

[CHECKPOINT] end

[2014-09-03 14:48:03.791251 THREAD(15416,139856430274304)] [INFORMATION]

[SHUTDOWN-SM] CLOSE

[2014-09-03 14:48:03.791383 THREAD(15416,139856430274304)] [INFORMATION]

[SHUTDOWN-SM] POST CLOSE

[2014-09-03 14:48:03.824445 THREAD(15416,139856430274304)] [INFORMATION]

[SHUTDOWN-SM] DISMOUNT

[2014-09-03 14:48:03.824518 THREAD(15416,139856430274304)] [INFORMATION]

[EVENT] system shutdown : SUCCESS

[2014-09-03 14:48:04.267130 THREAD(15416,139856430274304)] [INFORMATION]

[SHUTDOWN-SM] INIT

使用\shutdown abort 强行终止服务器时既不执行Checkpoint也不执行正常的服务器结束过程

[2014-09-03 14:51:45.353154 THREAD(8989,139949509089024)] [INFORMATION]

[SHUTDOWN] skip CLOSE phase

[2014-09-03 14:51:45.678461 THREAD(8989,139949509089024)] [INFORMATION]

[SHUTDOWN] skip DISMOUNT phase

[2014-09-03 14:51:45.678696 THREAD(8989,139949509089024)] [INFORMATION]

[EVENT] system shutdown : SUCCESS

[2014-09-03 14:51:45.678928 THREAD(8989,139949509089024)] [INFORMATION]

[SHUTDOWN-SM] INIT

- 数据库运行中主进程的CheckpointLog FlusherLog Archiving（日志归档）Ager并行IOCleanup线程相关日志

Checkpoint不会在Checkpoint时反映到磁盘而仅将在内存中变更的所有数据文件反映到磁盘如果使用并行IO则以数据文件为单位执行并行IOCheckpoint日志从“[CHECKPOINT]

begin“到”[CHECKPOINT] end“为一组

[IO SLAVE]是由专门负责并行IO的IO线程记录的日志“[IO SLAVE] flush datafile (tablespace : 0, datafile : 0)”日志将Id为“0”的表空间的数据文件和Id为“0”的数据文件反映到磁盘后记录这样的

数据文件flush日志在Checkpoint时根据数据文件数量反复进行记录

'[PAGE FLUSHER] flushed lsn(139039), flushed page count(9216)']表示反映到磁盘的最小Lsn为139039并反映了9216页而且归档最后日志Lsn小于139039的重做日志文件记录Checkpoint日志与控制文件并反映到磁盘

数据量大时Checkpoint时间会随之变长可以跟踪[IO SLAVE]日志检查是否在持续记录数据文件如果磁盘IO暂停则检查是否在进行日志归档如果磁盘空间不足则增加磁盘空间并确保日志归档正常运行

如果Checkpoint失败则记录'[CHECKPOINT] CHECKPOINT was failed'日志日志文件切换引起的Checkpoint时可省略Checkpoint此时记录'[CHECKPOINT] CHECKPOINT was skipped'日志

```
[2014-09-12 15:54:59.654427 THREAD(13780,140493515450112)] [INFORMATION]
```

```
[CHECKPOINT] begin
```

```
[2014-09-12 15:54:59.654798 THREAD(13780,140493029623552)] [INFORMATION]
```

```
[IO SLAVE] flush datafile ( tablespace : 0, datafile : 0 )
```

```
[2014-09-12 15:54:59.835173 THREAD(13780,140493029623552)] [INFORMATION]
```

```
[IO SLAVE] flush datafile ( tablespace : 1, datafile : 0 )
```

```
[2014-09-12 15:54:59.893991 THREAD(13780,140493029623552)] [INFORMATION]
```

```
[IO SLAVE] flush datafile ( tablespace : 2, datafile : 0 )
```

```
[2014-09-12 15:54:59.926753 THREAD(13780,140493050603264)] [INFORMATION]
```

[PAGE FLUSHER] flushed lsn(138895), flushed page count(9216)]

[2014-09-12 15:54:59.926989 THREAD(13780,140492777965312)] [INFORMATION]

[ARCHIVING] stable lsn(139039)

[2014-09-12 15:54:59.933780 THREAD(13780,140493515450112)] [INFORMATION]

[CHECKPOINT] begin - checkpoint lid(0,55527,13), checkpoint lsn(139040),
oldest lsn(139040)

[2014-09-12 15:54:59.933825 THREAD(13780,140493515450112)] [INFORMATION]

[CHECKPOINT] body - checkpoint lid(0,55527,77), checkpoint lsn(139041),
active transaction count(1)

[2014-09-12 15:54:59.933844 THREAD(13780,140493515450112)] [INFORMATION]

[CHECKPOINT] end - checkpoint lid(0,55527,155), checkpoint lsn(139042)

[2014-09-12 15:54:59.933859 THREAD(13780,140493515450112)] [INFORMATION]

[CHECKPOINT] flush redo log

[2014-09-12 15:54:59.936154 THREAD(13780,140493515450112)] [INFORMATION]

[CHECKPOINT] save control file

[2014-09-12 15:54:59.942850 THREAD(13780,140493515450112)] [INFORMATION]

[CHECKPOINT] end

停止或唤醒日志缓冲区的内容刷新到磁盘时Log Flusher记录系统日志下一个日志组为无法再使用的日志文件时日志记录将一直处于暂停直到可再使用为止以下是重做日志文件序列号为34的重做日志尚未归档而停止日志记录的情况

```
[2014-09-12 16:01:57.514303 THREAD(13780,140573333325568)] [INFORMATION]
[LOG FLUSHER] disable logging - blocked lfsn(34)
```

如果停止日志记录则事务也会被停止因此需要及时执行Checkpoint并归档日志后重新开始进行日记记录

```
[2014-09-12 16:01:58.079236 THREAD(13780,140380267869952)] [INFORMATION]
[ARCHIVING] enable logging - blocked lfsn(34), inactivated lfsn(34)
```

日志归档（log archiving）线程归档ACTIVE状态的重做日志文件并记录系统日志从“[ARCHIVING] stable lsn(...)”到“[ARCHIVING] inactivate group ...”为一组数据库以归档模式运行时记录归档重做日志文件的日志'[ARCHIVELOG BEGIN] ...'到'[ARCHIVELOG END] ...'

```
[2014-09-02 17:41:56.762950 THREAD(20800,140129584793344)] [INFORMATION]
[ARCHIVING] stable lsn(144143)
```

```
[2014-09-02 17:41:56.763549 THREAD(20800,140129584793344)] [INFORMATION]
[ARCHIVELOG BEGIN] LOG(/sundb_data/wal/redo_0_0.log(8)) =>
ARCHIVE(/sundb_data/archive_log/archive_8.log)
```

```
[2014-09-02 17:41:57.385936 THREAD(20800,140129584793344)] [INFORMATION]
[ARCHIVELOG END] (/sundb_data/archive_log/archive_8.log) : SUCCESS
```

```
[2014-09-02 17:41:57.385987 THREAD(20800,140129584793344)] [INFORMATION]
```

```
[ARCHIVING] inactivate group #0(8)
```

'[ARCHIVELOG BEGIN] ...'日志后面显示'Archiving was failed - ...'时表示归档失败需要立即处理可重新使用ACTIVE状态下的重做日志文件并提供服务

如下记录删除Ager的表与对表空间进行Aging的信息删除表时同时删除表的lock（锁）记录表的scn及Aging时可Aging的scn与表Lock的Aging信息如果表中已生成索引删除该表时同时删除索引

```
[2014-09-03 12:13:56.539971 THREAD(5225,139821699815168)] [INFORMATION]
```

```
[AGER] aging index - object scn(224), type(0), physical id(22634477649920)
```

```
[2014-09-03 12:13:56.540388 THREAD(5225,139821699815168)] [INFORMATION]
```

```
[AGER] aging table - object scn(224), object view scn(225), type(0),  
physical id(22630182682624)
```

```
[2014-09-03 12:13:56.540491 THREAD(5225,139821699815168)] [INFORMATION]
```

```
[AGER] aging lock item - object scn(226), agable stmt scn(228), physical  
id(22630182682624)
```

删除表空间时会记录表空间的scn与Aging时可Aging的scn以及已删除的表空间的id

```
[2014-09-03 12:13:56.540553 THREAD(5225,139821699815168)] [INFORMATION]
```

```
[AGER] aging tablespace - object scn(224), object view scn(227),  
tablespace id(5)
```

对于非正常结束的会话如下记录Cleanup线程整理的信息即使用户会话非正常结束因整理会话的资源所以数据库实例或其他用户可继续运行

```
[2014-09-03 13:43:02.220139 THREAD(7768,140298504156928)] [WARNING]
[CLEANUP] snipe at zombie session - pid(7766), thread(139967223228160),
program(gsql)
```

```
[2014-09-03 13:43:02.220211 THREAD(7768,140298504156928)] [WARNING]
[CLEANUP] cleaning session - env(3), session(4),
transaction(FFFFFFFFFFFFFFFF), program(gsql), pid(7766),
thread(139967223228160)
```

```
[2014-09-03 13:43:02.220270 THREAD(7768,140298504156928)] [WARNING]
[CLEANUP] cleaning up 1 sessions
```

- 创建/删除/变更用户自定义表空间的日志

创建/删除/变更用户表空间时记录到系统日志表空间相关DDL与TRACE_DDL ON/OFF设置无关都会默认记录系统日志不记录DDL的失败因此为了查找DDL日志的更加详细的信息与失败原因需将TRACE_DDL参数设置为ON后运行数据库

```
[2014-09-15 10:26:41.649909 THREAD(24881,140468897289984)] [INFORMATION]
[TABLESPACE] Create Tablespace(7)

[2014-09-15 10:26:55.966385 THREAD(24881,140468897289984)] [INFORMATION]
[DATAFILE] add
datafile(/home/zkyungoh/work/product/Gliese/home/db/TEST1.dbf)
```

```
[2014-09-15 10:27:11.325897 THREAD(24881,140468897289984)] [INFORMATION]
```

```
[DATAFILE] Drop
```

```
Datafile(/home/zkyungoh/work/product/Gliese/home/db/TEST1.dbf)
```

```
...
```

```
[2014-09-15 10:32:00.669550 THREAD(24881,140468897289984)] [INFORMATION]
```

```
[TABLESPACE] drop tablespace ( 7 )
```

- 系统内的错误及创建索引失败日志

在SUNDB数据库系统发生错误但无法定义确切原因时会产生内部错误产生内部错误时引起错误的SQL语句被回滚不会影响系统与其他会话因此可继续提供服务

此外如果重新执行报错的SQL语句可能会出现相同的失败也有失败原因消失并成功的可能为了找到确切的原因不应更改失败当时的数据库而应维持当前状态并请求分析原因

创建UNIQUE索引时如果表中已有相同的key创建索引会失败即使创建索引失败也不会影响表与表中已有的索引因此不会影响服务

```
[2014-09-15 11:26:59.640345 THREAD(7819,140737354012416)] [INFORMATION]
```

```
Index creation failed ( physical id : 22638772617216, error code : 14016 )
```

XA日志

记录用于处理分散事务的XA事务接口start, close, end, rollback, prepare, commit, recover, forget

等的成功/失败日志SUNDB数据库默认不记录XA跟踪日志因此为了记录XA跟踪日志需要把TRACE_XA参数设置为ON更多XA事务接口相关规格信息请参考[XA API References](#)

```
gSQL> alter system set trace_xa = yes;
```

```
System altered.
```

'xa.trc'中记录的XA跟踪日志如下首先记录已执行的XA接口后记录成功（complete）或失败（failed）同时记录已执行会话的会话id与XA事务id等信息失败时还记录[XA API References](#)中定义的错误代码

```
[2014-09-15 11:45:19.599018 THREAD(7966,139931504572160)] [INFORMATION]
```

```
xa_start() complete - session(4), xid(0.3231.00), flags(0)
```

```
[2014-09-15 11:45:19.599360 THREAD(7966,139931504572160)] [INFORMATION]
```

```
xa_end() complete - session(4), xid(0.3231.00), flags(4000000)
```

```
[2014-09-15 11:45:19.599418 THREAD(7966,139931504572160)] [INFORMATION]
```

```
xa_prepare() complete - session(4), xid(0.3231.00), flags(0)
```

```
[2014-09-15 11:45:22.864563 THREAD(7966,139931504572160)] [INFORMATION]
```

```
xa_recover() complete - session(4), xid(), flags(1000000)
```

```
[2014-09-15 11:45:22.864829 THREAD(7966,139931504572160)] [INFORMATION]
```

```
xa_commit() complete - session(4), xid(0.3231.00), flags(0)
```

```
[2014-09-15 11:45:22.864887 THREAD(7966,139931504572160)] [INFORMATION]
```

```
xa_rollback() complete - session(4), xid(0.3232.00), flags(0)
```

```
[2014-09-15 11:45:22.885951 THREAD(7966,139931504572160)] [INFORMATION]
```

```
xa_forget() complete - session(4), xid(0.3230.00), flags(0)
```

```
[2014-09-15 11:45:22.886017 THREAD(7966,139931504572160)] [INFORMATION]
```

```
xa_forget() failed - session(4), xid(0.3231.00), flags(0), xa_error(-4)
```

DDL日志

将SUNDB数据库中产生的所有引起DDL（创建删除变更）的会话与所有SQL语句以及成功（success）失败（failure）添加到系统日志SUNDB数据库默认不记录DDL日志因此为了记录DDL跟踪日志需要如下把TRACE_DDL参数设置为ON

```
gSQL> alter system set trace_ddl = yes;
```

```
System altered.
```

例如使用以下DDL语句创建表空间时记录如下DDL日志

```
gSQL> CREATE TABLESPACE TEST_TBS1
```

```
DATAFILE 'TEST_TBS1_01.dbf' SIZE 10M,
```

```
        'TEST_TBS1_02.dbf' SIZE 10M,
```

```
        'TEST_TBS1_03.dbf' SIZE 10M;
```

Tablespace created.

```
[2014-09-15 12:26:29.209210 THREAD(8149,140267442067200)] [INFORMATION]
```

```
[SESSION:11][DDL success] CREATE TABLESPACE TEST_TBS1
```

```
DATAFILE 'TEST_TBS1_01.dbf' SIZE 10M,
```

```
          'TEST_TBS1_02.dbf' SIZE 10M,
```

```
          'TEST_TBS1_03.dbf' SIZE 10M
```

```
[2014-09-15 12:26:29.209277 THREAD(8149,140267442067200)] [INFORMATION]
```

```
[SESSION:11][COMMIT with DDL]
```

DDL语句执行失败时如下记录为'DDL failure'

```
gSQL> ALTER TABLESPACE TEST_TBS1 ADD DATAFILE 'TEST_TBS1_04.dbf' SIZE 10M;
```

```
ERR-42000(16130): file is already exist -
```

```
'/home/zkyungoh/work/product/Gliese/home/db/TEST_TBS1_04.dbf' :
```

```
ALTER TABLESPACE TEST_TBS1 ADD DATAFILE 'TEST_TBS1_04.dbf' SIZE 10M
```

```
*
```

```
ERROR at line 1:
```

```
[2014-09-15 12:45:08.598789 THREAD(8115,140191085913856)] [INFORMATION]
```

```
[SESSION:4][DDL failure] ALTER TABLESPACE TEST_TBS1 ADD DATAFILE  
'TEST_TBS1_01.dbf' SIZE 10M
```

对于表和索引的DDL语句以相同方式记录DDL日志以下为创建表索引后提交的的DDL日志

```
gSQL> CREATE TABLE T1 ( I1 NATIVE_INTEGER ) TABLESPACE TEST_TBS1;
```

```
Table created.
```

```
gSQL> CREATE INDEX T1X ON T1 ( I1 );
```

```
Index created.
```

```
gSQL> COMMIT;
```

```
Commit complete.
```

```
[2014-09-15 12:40:37.887952 THREAD(8115,140191085913856)] [INFORMATION]
```

```
[SESSION:4][DDL success] CREATE TABLE T1 ( I1 NATIVE_INTEGER ) TABLESPACE  
TEST_TBS1
```

```
[2014-09-15 12:40:47.451806 THREAD(8115,140191085913856)] [INFORMATION]
```

```
[SESSION:4][DDL success] CREATE INDEX T1X ON T1 ( I1 )
```



```
[2014-09-15 12:40:51.017975 THREAD(8115,140191085913856)] [INFORMATION]
[SESSION:4][COMMIT with DDL]
```

以下为创建表和索引后回滚的DDL日志

```
[2014-09-15 12:42:27.367722 THREAD(8115,140191085913856)] [INFORMATION]
[SESSION:4][DDL success] CREATE TABLE T1 ( I1 NATIVE_INTEGER ) TABLESPACE
TEST_TBS1

[2014-09-15 12:42:31.317436 THREAD(8115,140191085913856)] [INFORMATION]
[SESSION:4][DDL success] CREATE INDEX T1X ON T1 ( I1 )

[2014-09-15 12:42:34.601738 THREAD(8115,140191085913856)] [INFORMATION]
[SESSION:4][ROLLBACK with DDL]
```

同步跟踪日志

使用SUNDB的同步工具（cyclone与logmirror）时用单独文件记录同步相关跟踪日志有关同步跟踪日志的更多信息请参考CYCLONE的[51.4 运行](#)与 LOGMIRROR的 [53.4 运行](#)

监听日志

监听日志中记录从监听进程启动到结束为止产生的错误及信息

监听日志格式

监听日志格式如下

```
['log recorded date and time' THREAD('process id', 'thread handle')]  
['log prefix'] 'log body'
```

- “log recorded date and time”为记录日志的日期和时间
- THREAD('process id', 'thread handle')为记录该日志的进程id和线程handle信息
- “日志前缀（log prefix）”为创建日志的主体或功能“日志内容（log body）”为日志的详细内容

通过视图监控性能

由于多个用户可同时访问和修改数据库所以需要多用户的并发控制数据库不仅要提供SQL语句的数据并发控制还要提供系统数据以及共享资源的并发控制SUNDB使用latch实现并发控制

基于锁（lock）的并发控制可能在不同事务同时更新同一个数据时发生死锁（deadlock）

SUNDB的基于latch的并发控制也有可能发生死锁由于发生死锁会影响性能因此提供可处理发生死锁的latch的视图

可使用V\$LOCK_WAIT查询引起死锁的事务由管理员监控并解除死锁V\$LOCK_WAIT详细内容请

参考V\$LOCK_WAIT更多关于监控引起死锁的latch项可参考V\$LATCH

2.SUNDB数据库结构和存储结构

2.1 控制文件管理

为了使用SUNDB数据库需要创建数据库实例创建实例时将生成控制文件从SUNDB多阶段启动的nomount阶段转到mount阶段时使用记录在控制文件的信息识别数据库中使用的文件的绝对路径以及文件大小等信息控制文件是二进制文件存储以下数据库信息

控制文件内容

| 项目 | 说明 |
|---------------------|--|
| Data Store Mode | 数据库启动时设置的存储模式（TDSCDS） |
| Server State | 数据库实例的状态（NONE, RECOVERED, RECOVERING, SERVICE, SHUTDOWN） |
| Last Checkpoint Lsn | 数据库最后一次执行的Checkpoint的LSN |

Table 2-1 SUNDB数据库系统信息

| 项目 | 说明 |
|---------------------|--|
| Checkpoint Lid, Lsn | 数据库最后一次执行的Checkpoint的日志信息 (LSN日志位置) |

| 项目 | 说明 |
|------------------------------------|-----------------------|
| Last Inactivated Log File Sequence | 最后变更为inactive的日志文件的序列 |
| Archivelog Mode | 运行中的数据库的归档模式 |
| Creation Time | 创建数据库的时间 |

Table 2-2 日志信息

数据库信息存储数据库的运行信息及使用中的所有表空间信息数据信息以下为存储在控制文件的数据库运行信息

| 项目 | 说明 |
|------------------------|------------------------|
| Transaction Table Size | 数据库使用中的最大事务表的数量 |
| Undo Relation Count | 数据库使用中的undo relation数量 |
| Tablespace Count | 数据库创建并使用中的表空间数量 |
| New Tablespace Id | 下一个创建的表空间Id |

Table 2-3 数据库信息

以下为存储于控制文件的表空间信息

| 项目 | 说明 |
|---------------|----------|
| Tablespace Id | 表空间的唯一id |

| 项目 | 说明 |
|----------------------|---|
| Attributes | 表空间的属性包含存储介质（内存磁盘）是否保障可持续性（temporary, persistent）以及表空间用途（dictionary, undo, data, temporary）等 |
| Page Count In Extent | Extent的page数量 |
| State | 表空间的状态（CREATING, CREATED, DROPPING, DROPPED, AGING） |
| Relation Id | 存储表空间的待运算的关系id |
| New Data File Id | 在表空间中增加新的数据文件时使用的数据文件id |
| Is Logging | 表空间的logging模式（LOGGING, NOLOGGING） |
| Is Online | 表空间是否在线（ONLINE, OFFLINE） |
| Data File Count | 表空间使用中的数据文件的数量 |
| Offline Lsn | 把离线表空间变更为在线表空间时需要恢复时执行恢复的最后一个Lsn |
| Offline State | 离线表空间的状态（CONSISTENT, INCONSISTENT）CONSISTENT 离线表空间把内存上的所有最新数据反映到磁盘后将表空间状态变更为离线因此更改为在线时无需进行恢复相反将INCONSISTENT离线表空间更改为在线时使用日志文件执行恢复后再变更为在线 |

Table 2-4 表空间信息

以下为存储于控制文件的数据文件信息

| 项目 | 说明 |
|------|-------------------|
| Name | 包含存储数据绝对路径的数据文件名称 |

| 项目 | 说明 |
|---------------------|---|
| State | 数据的状态 (CREATING, CREATED, DROPPING, DROPPED, AGING) |
| Data File Id | 表空间中的固有数据文件的id |
| Auto Extend | 写满数据文件时是否自动扩展 |
| Size | 数据文件的大小 |
| Next Size | 写满数据文件时将扩展的大小 |
| Max Size | 数据文件可扩展的最大大小 |
| Timestamp | 生成数据的时间点 |
| Checkpoint Lsn, Lid | 数据文件中最后一次执行Checkpoint时Checkpoint日志的信息 (Lsn日志位置) |
| Creation Lsn, Lid | 生成数据文件时间点的Checkpoint日志的信息 (Lsn日志位置) |

Table 2-5 数据文件信息

存储在数据库执行的各个增量备份的信息SUNDB数据库支持数据库以及表空间的增量备份在控制文件存储增量备份的如下信息

| 项目 | 说明 |
|-----------------|---|
| Backup Lsn, Lid | 在备份开始的时间点最后执行的Checkpoint日志的信息 (Lsn日志位置) |
| Begin Time | 开始增量备份的时间 |
| Completion Time | 完成增量备份的时间 |

| 项目 | 说明 |
|------------------|--|
| Tablespace Id | 执行增量备份的表空间的唯一id对表空间进行增量备份时记录该表空间id 否则记录最大表空间id（65535） |
| Level | 执行的增量备份的级别 |
| Object Type | 增量备份的对象（数据库控制文件表空间） |
| Backup File Name | 增量备份的文件名称 |
| Backup Option | 增量备份的选项（cumulative, differential） |

Table 2-6 增量备份信息

控制文件多路复用

控制文件存储SUNDB数据库的物理结构与数据一致性的重要信息所以出现被损坏或误删等情况时数据库无法运行

因此SUNDB数据库建议至少生成2个以上的控制文件并存放在物理上分开的磁盘空间最多支持8个多路复用通过创建数据库时在参数文件设置控制文件数量并设置各个控制文件的路径来添加控制文件在数据库运行过程中可增加控制文件多路复用数量并设置需增加的控制文件的路径进行添加

控制文件损坏时的解决方法

由于数据库非正常结束等原因控制文件被损坏时可使用多路复用控制文件中正常控制文件复原损坏的控制文件后重启数据库

如果多路复用控制文件全部损坏可恢复备份的控制文件对归档重做日志文件和重做日志文件执行不完全介质恢复并重启更多使用备份控制文件的不完全介质恢复请参考恢复示例中[多路复用的所有控制文件被损坏时](#)

控制文件信息

可通过查询V\$CONTROLFILE性能视图查看控制文件的位置与名称等信息以下为使用V\$CONTROLFILE性能视图查询控制文件名称的示例

```
gSQL> SELECT CONTROLFILE_NAME FROM V$CONTROLFILE;
```

```
CONTROLFILE_NAME
```

```
-----
```

```
/sundb_data/wal/control_0.ctl
```

```
/sundb_data/wal/control_1.ctl
```

```
2 rows selected.
```

使用SUNDB的dump工具'[42. gdump](#)'可查看控制文件记录的准确信息

2.2 重做日志文件管理

SUNDB数据库为了保证持久性而使用重做日志（redo log）即由于多种原因导致SUNDB数据库非正常结束时可通过数据文件与重做日志文件恢复至数据库故障之前的状态

为此SUNDB数据库采用WAL(write ahead logging) 机制记录数据库上执行的所有变更操作的日志

与数据文件记录更新操作变更的数据相比在重做日志文件记录更新操作的日志可更加有效的提升数据库性能如果每次发生更新操作时都要记录数据文件为了记录数据文件就需要进行磁盘的随机访问同时访问同一个数据文件就会引起产生过多的磁盘IO相反更新日志的大小小于更新数据并通过持续追加（append）在日志文件末尾的方式能更有效地执行磁盘IO

SUNDB数据库使用共享内存上的日志缓冲区将更新日志记录到日志缓冲区后一次性把日志缓冲区的内容记录到日志文件从而更有效地执行磁盘IO

重做日志文件结构

SUNDB的重做日志缓冲区与日志文件为循环（circular）架构根据提前定义的日志组的数量生成相应数量的日志文件并记录日志当前的日志文件被写满后使用下一个日志文件日志文件全部被写满则再次使用之前用过的日志文件日志文件是以循环结构形成的日志组一个日志组中有多个成员SUNDB至少使用4个日志文件组来记录日志

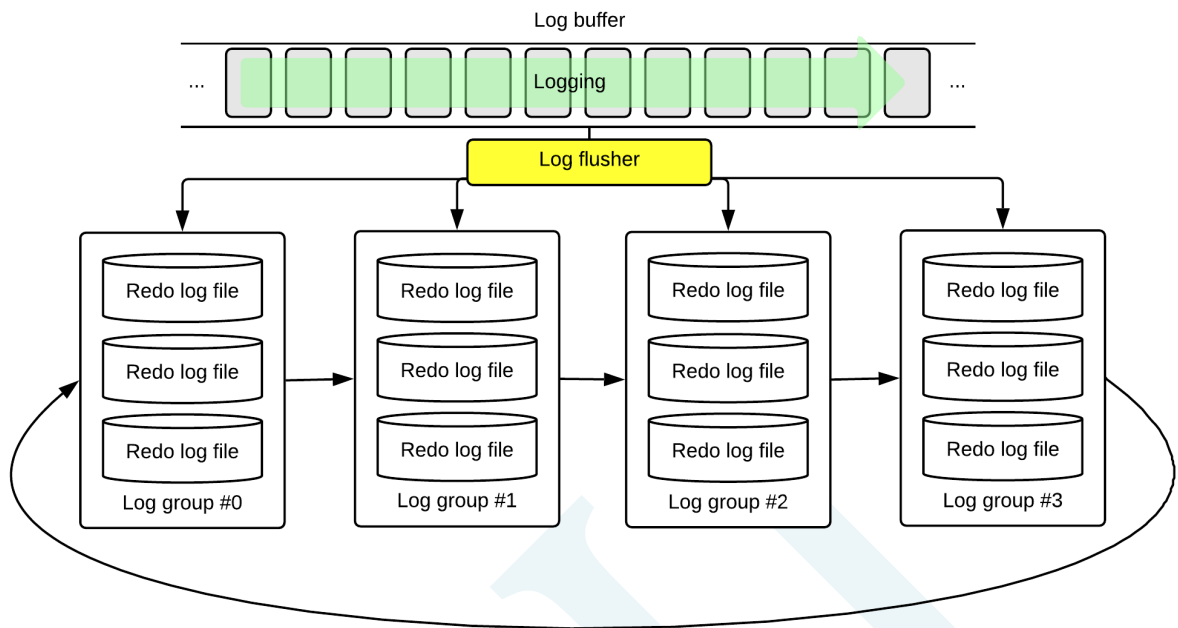


Figure 2-1 SUNDB重做日志文件日志缓冲区架构

重做日志组及其成员

SUNDB数据库使用日志组及其成员将数据库运行中产生的日志记录到磁盘文件中一个重做日志文件即为一个日志组成员多个日志成员构成一个日志文件组多个成员构成一个日志文件组在特定磁盘故障或特定日志成员损坏时通过使用其他日志成员保障高可用性

日志组是循环使用的系统在一个日志组里记录日志当写满当前日志组时切换到下一个日志组系统从当前使用的日志组切换到下一个日志组的过程叫日志切换（switching）

创建数据库时通过参数设置日志组和成员的数量以及对应的位置并且在运行过程中也可通过SQL语句对其进行增加或删除

日志组的状态

创建日志组时的初始状态为'UNUSED'运行中由系统变更为'CURRENT', 'ACTIVE'或'INACTIVE'状态

| 日志组的状态 | 说明 |
|----------|--------------------------|
| UNUSED | 创建后从未使用过的日志组的状态 |
| CURRENT | 当前系统正在使用的日志组的状态 |
| ACTIVE | CURRENT日志组被切换后尚未准备再使用的状态 |
| INACTIVE | ACTIVE状态的日志组已准备好再使用的状态 |

Table 2-7 SUNDB日志组的状态

ACTIVE状态的日志组不能被系统再使用要由归档日志线程将其变更为INACTIVE状态后即可使用归档日志线程在Checkpoint结束前被事件唤醒并将ACTIVE状态的日志组变更为INACTIVE状态为此系统在归档模式（ARCHIVELOG）下归档线程先把ACTIVE状态的日志组的日志文件均归档后再变更为INACTIVE状态如果系统在非归档模式（NOARCHIVELOG）下运行则仅把日志组的状态变更为INACTIVE后立即再使用

增加日志组及日志成员

增加日志组

只有在SUNDB数据库多阶段启动的MOUNT阶段才允许增加日志组在当前使用的日志组增加新的日志组增加在“CURRENT”状态之后例如可遵照以下方式将文件名为'abc.log'文件大小为20 Mbyte

的新日志组增加到id为10的组

```
ALTER DATABASE ADD LOGFILE GROUP 10 ('abc.log') SIZE 20M;
```

增加日志成员

为了确保使用中的日志组的稳定性可增加新的日志成员与增加日志组的方式相同只能在SUNDB数据库多阶段启动的MOUNT阶段执行例如可遵照以下方式在Id为10的日志组里增加'test.log'日志文件由于同一日志组内的成员大小都是一致的因此不描述日志文件的大小

```
ALTER DATABASE ADD LOGFILE MEMBER 'test.log' TO GROUP 10;
```

更改日志成员名称

可在MOUNT阶段变更使用中的日志成员位置及文件名称日志成员的重命名在日志成员所在位置的磁盘出现物理故障或因性能原因需把日志文件成员移动到其他磁盘时执行以下为将'/disk1/sunb_data/wal/redo_0_0.log'日志文件重命名为'/disk2/sunb_data/wal/redo_0_0.log'的示例

```
ALTER DATABASE RENAME LOGFILE '/disk1/sunb_data/wal/redo_0_0.log' TO  
'/disk2/sunb_data/wal/redo_0_0.log';
```

删除日志组或日志成员

需要减少日志组或成员的数量或日志文件当前位置的磁盘出现故障等需要删除当前使用中的日志组及成员时可在MOUNT阶段执行删除如要删除日志组10的所有日志成员可按照如下执行

```
ALTER DATABASE DROP LOGFILE GROUP 10;
```

日志组里存在至少两个以上的成员时才能够删除其日志成员以下为删除

'/disk1/sundb_data/wal/redo_0_0.log'日志成员的示例

```
ALTER DATABASE DROP LOGFILE MEMBER '/disk1/sundb_data/wal/redo_0_0.log';
```

重做日志文件损坏时的解决方法

系统出故障后重做日志文件被损坏时由于重启恢复失败而无法启动系统这时如果损坏的日志组里存在正常的日志成员时则将正常的日志成员的日志文件拷贝到损坏的日志文件进行重启恢复并启动系统

假如日志组的所有日志文件被损坏或只有一个日志成员时可通过执行**不完全恢复**恢复到正常日志文件并重启

重做日志文件信息

可通过查询V\$LOGFILE性能视图来查看重做日志文件的位置与名称可如下使用V\$LOGFILE查询日志文件名称与日志文件所属的日志组id日志组状态以及文件大小

```
gSQL> SELECT FILE_NAME, GROUP_ID, GROUP_STATE, FILE_SIZE FROM V$LOGFILE;
```

```
FILE_NAME                                GROUP_ID GROUP_STATE FILE_SIZE
```

```
-----
```

| | | |
|-----------------------------------|------------|-----------|
| /disk1/sunb_data/wal/redo_0_0.log | 0 INACTIVE | 104857600 |
| /disk1/sunb_data/wal/redo_1_0.log | 1 CURRENT | 104857600 |
| /disk1/sunb_data/wal/redo_2_0.log | 2 UNUSED | 104857600 |
| /disk1/sunb_data/wal/redo_3_0.log | 3 UNUSED | 104857600 |

4 rows selected.

CSII

2.3 管理归档重做日志文件

由于SUNDB重做日志文件通过环形日志组重新使用已使用的日志组为了使用备份进行介质恢复数据库需要以归档日志模式运行这时已完成记录的重做日志文件将被拷贝到归档重做日志文件SUNDB的归档日志模式的详细内容请参考 [归档日志（archivelog）模式](#)

创建归档重做日志文件

为SUNDB数据库系统线程的日志归档线程（log archiving thread）把重做日志文件拷贝到归档重做日志文件目录下执行Checkpoint时由Checkpoint激活日志归档线程并从重做日志文件中查找到需归档的对象后执行归档

归档重做日志文件创建于参数ARCHIVELOG_DIR_1设置的目录下使用ARCHIVELOG_FILE设置的前缀和各个重做日志文件序列号命名归档重做日志文件

保存及删除归档重做日志文件

与重做日志文件相同随意删除归档重做日志文件会导致使用备份的介质恢复失败因此归档重做日志文件要与备份文件一起保存当不再需要备份文件时可同时删除使用备份进行介质恢复时所需的归档重做日志文件

备份是拷贝由最近执行的Checkpoint下载到磁盘的数据文件因此为了使用其备份执行介质恢复需要使用距离Checkpoint时间点最远的Lsn和这之后的归档日志文件重做日志文件发生切换时系统将执行Checkpoint因此除CURRENT状态的重做日志文件外的其他日志文件中至少有一个以上

的Checkpoint日志

使用这些备份文件获取执行介质备份所需的归档重做日志文件的方法如下：

1. 获取备份数据文件头文件中记录的Checkpoint Lsn
2. dump归档重做日志文件获取包含Checkpoint Lsn的归档重做日志文件
3. 执行使用备份的介质恢复时所需的归档重做日志文件是在2中获取的归档重做日志文件之前的日志文件开始算起

为了获得增量备份所需的归档重做日志文件需要dump控制文件后获取Checkpoint Lsn之后的过程与全库备份方法一致

不再需要备份文件时可同时删除使用备份进行介质恢复所需的归档重做日志文件

归档重做日志文件目录多路复用

将归档重做日志文件从ARCHIVELOG_DIR_1设置的目录移动至其他介质或目录时由于无法找到介质恢复所需的归档重做日志文件而导致执行失败这时需要把归档日志重新移动至

ARCHIVELOG_DIR_1设置的目录中或在ARCHIVELOG_DIR_2 ~ ARCHIVELOG_DIR_10中设置存储

归档重做日志文件的目录添加用于介质恢复的归档重做日志文件目录并执行但是使用

ARCHIVELOG_DIR_2 ~ ARCHIVELOG_DIR_10进行介质恢复时需要按照目录数量设置

READABLE_ARCHIVELOG_DIR_COUNT

2.4 表空间管理

数据库使用的所有数据存储在物理磁盘文件为了有效进行数据管理以及提高性能采用数据库的逻辑架构SUNDB通过表空间（tablespace）段（segment）区（extent）页（page）等逻辑结构有效管理磁盘使用空间

一个表空间可以有多个数据文件每个表空间可以独立设置在线/离线状态从而提供数据的高可用性还可以在磁盘分散存储数据文件提高磁盘IO性能减少物理性磁盘的IO竞争

表空间类型

SUNDB的表空间分为数据库创建时创建并只为SUNDB数据库使用并控制的系统表空间与用户自定义创建使用的非系统表空间

系统表空间

创建SUNDB数据库时创建是运行数据库所必须的表空间包括字典（dictionary）表空间撤销（undo）表空间以及系统临时（temporary）表空间

非系统表空间

用户可自定义创建并删除的表空间以保存用于存储数据的表以及索引

表空间及数据文件管理

表空间管理

表空间状态管理

SUNDB数据库的表空间分为在线和离线状态离线状态的表空间是无法访问的用户可将特定表空间自定义设置为离线状态系统可以把非正常状态的表空间变更为离线状态系统表空间无法设置为离线状态

- 离线表空间

表空间变更为离线状态之前SUNDB数据库会把表空间内的所有数据文件写入到磁盘为了写入数据文件需要将相关日志全部写入到磁盘因此之后表空间状态变回在线时不需要再执行恢复只是变更为在线状态时会应用表空间离线状态下产生的DDL

另外将表空间变更为离线状态时可通过执行未写入数据的情况下变更为离线状态的IMMEDIATE模式立即变更为离线状态这时设置为在线状态时需要执行介质恢复后变更为在线状态

| 选项 | 说明 | 将表空间变更为在线状态时 |
|-----------|-------------------------------|--------------|
| NORMAL | 将表空间的所有数据文件与相关日志写入到磁盘后将其变更为离线 | 不需要执行介质恢复 |
| IMMEDIATE | 立即将表空间设置为离线 | 需要执行介质恢复 |

Table 2-8 表空间离线选项

SUNDB可以在MOUNT阶段把表空间改为离线状态由于在数据库启动时排除无法恢复的表空间后执行服务因此提供高可用性仅可在服务器正常结束或以ARCHIVELOG模式运行服务器时可在MOUNT阶段把表空间改为离线状态

```
gSQL> ALTER TABLESPACE TEST_TBS OFFLINE;
```

```
Tablespace altered.
```

```
gSQL> ALTER TABLESPACE TEST_TBS ONLINE;
```

```
Tablespace altered.
```

```
gSQL> ALTER TABLESPACE TEST_TBS OFFLINE IMMEDIATE;
```

```
Tablespace altered.
```

```
gSQL> ALTER TABLESPACE TEST_TBS ONLINE;
```

```
ERR-42000(14051): media recovery required - 'TEST_TBS'
```

```
gSQL> ALTER DATABASE RECOVER TABLESPACE TEST_TBS;
```

Database altered.

```
gSQL> ALTER TABLESPACE TEST_TBS ONLINE;
```

Tablespace altered.

表空间属性

SUNDB数据库的表空间属性如下包含区分是否保障持久性的PERSISTENTTEMPORARY属性根据表空间与存储数据的类型分为的DATAUNDO属性

| 属性 | | 说明 |
|--------|------------|--|
| 永久性 | PERSISTENT | 支持存储于表空间的数据的持久性（恢复对象） |
| | TEMPORARY | 不支持存储于表空间的数据的持久性 |
| 存储数据类型 | DATA | 存储用户输入的数据 |
| | UNDO | 存储数据库MVCC所需的数据 |
| | DICT | 存储数据库运行所需的字典信息 |
| | TEMPORARY | 存储用于处理SQL语句的数据 |
| 存储媒介类型 | DISK | 需要使用buffer cache在磁盘的数据文件读取磁盘表空间的页如果已caching时可在buffer cache访问 |
| | MEMORY | 创建表空间时创建与数据文件的大小相同的专用共享内存并可立即访问内存所需的页 |

Table 2-9 SUNDB数据库的表空间属性

表空间管理

- 创建用户表空间

创建新的用户表空间创建表空间时数据库实例使用的表空间的名称要确保其唯一性每个表空间最多可以有1024个数据文件内存表空间的各个数据文件最多可存储30 Gbyte磁盘表空间可存储磁盘可物理使用的大小数据库最多能创建的表空间数量为65,535个表空间（包括系统表空间）

在包含绝对路径的数据库中数据文件名要具备唯一性为了再次使用已创建但未使用的数据文件需要使用'REUSE'选项表空间中一个区段（extent）的大小可以从64 Kbyte, 128 Kbyte, 256 Kbyte, 512 Kbyte, 1 Mbyte中选择一个默认值为256 Kbyte

```
gSQL> CREATE TABLESPACE TEST_TBS DATAFILE
    '/sundb1/db/TEST_TBS1.dbf' SIZE 20M,
    '/sundb2/db/TEST_TBS2.dbf' SIZE 50M,
    '/sundb3/db/TEST_TBS3.dbf' SIZE 100M REUSE;
```

Tablespace created.

以下为生成磁盘表空间的示例

```
gSQL> CREATE DISK TABLESPACE TEST_TBS DATAFILE
    '/sundb1/db/TEST_DISK_TBS1.dbf' AUTOEXTEND OFF MAXSIZE 20M,
    '/sundb2/db/TEST_DISK_TBS2.dbf' AUTOEXTEND ON NEXT 20M MAXSIZE
UNLIMITED REUSE;
```

Tablespace created.

生成表空间时可以设置表空间的在线或离线状态以及LOGGING或NOLOGGING属性

- 删除表空间

不再需要表空间时可以删除表空间与对应的数据文件由于创建表空间后会在表空间创建增加的磁盘数据文件和内存并保留下来所以若有不使用的表空间会浪费资源因此需要及时删除

```
gSQL> DROP TABLESPACE TEST_TBS;
```

Tablespace dropped.

默认删除表空间不包含生成并使用于表空间的表索引因此删除使用中的表或拥有索引的表空间时需要同时使用'INCLUDING CONTENTS'选项

```
gSQL> DROP TABLESPACE TEST_TBS;
```

```
ERR-42000(16148): tablespace not empty, use INCLUDING CONTENTS option :
```

```
drop tablespace TEST_TBS
```

```
*
```

```
ERROR at line 1:
```

```
gSQL> DROP TABLESPACE TEST_TBS INCLUDING CONTENTS;
```

Tablespace dropped.

通过'AND DATAFILES' 选项删除增加在表空间的数据文件

```
gSQL> DROP TABLESPACE TEST_TBS INCLUDING CONTENTS AND DATAFILES;
```

Tablespace dropped.

- 调整表空间大小

可以通过增加或删除数据文件的方式调整表空间大小数据库运行期间存储空间不足时可在表空间增加新的数据文件释放空间并通过删除不使用的表空间的数据文件来减少空间浪费

```
gSQL> ALTER TABLESPACE TEST_TBS ADD DATAFILE 'TEST_TBS2.dbf' SIZE 20M;
```

Tablespace altered.

```
gSQL> ALTER TABLESPACE TEST_TBS DROP DATAFILE 'TEST_TBS2.dbf';
```

Tablespace altered.

只能删除创建后从未使用过的表空间数据文件无法删除使用过的数据文件即使数据已被全部删除也无法删除数据文件

```
ALTER TABLESPACE TEST_TBS DROP DATAFILE 'TEST_TBS2.dbf';
```

```
ERR-42000(14044): datafile not empty
```

- 临时表空间管理

临时表空间不拥有数据文件只分配指定大小的内存以下为创建临时表空间的示例

```
gSQL> CREATE TEMPORARY TABLESPACE TEST_TBS MEMORY 'TEST_TEMP_TBS' SIZE 10M  
EXTSIZE 256K;
```

Tablespace created.

以下为增加临时表空间的内存的示例

```
gSQL> ALTER TABLESPACE TEST_TBS ADD MEMORY 'TEST_TBS2' SIZE 10M;
```

Tablespace altered.

以下为删除临时表空间中不使用的内存空间的示例

```
gSQL> ALTER TABLESPACE TEST_TBS DROP MEMORY 'TEST_TBS2';
```

Tablespace altered.

以下为删除临时表空间的示例

```
gSQL> DROP TABLESPACE TEST_TBS INCLUDING CONTENTS AND DATAFILES;
```

Tablespace dropped.

移动数据文件

移动存储数据文件的磁盘或变更目录时需变更存储在数据库的数据文件的路径

以下更改路径从而把'TEST_TBS'表空间的'/sundb1/db/TEST_TBS1.dbf'数据文件移动到 '/sundb4/db/TEST_TBS1.dbf'的示例

```
gSQL> ALTER TABLESPACE TEST_TBS RENAME DATAFILE  
      '/sundb1/db/TEST_TBS1.dbf' TO '/sundb4/db/TEST_TBS1.dbf';
```

```
Tablespace altered.
```

表空间信息

更多关于在数据库创建的表空间的信息请参考[V\\$TABLESPACE](#)

```
gSQL> \DESC V$TABLESPACE
```

| COLUMN_NAME | TYPE | IS_NULLABLE |
|---------------|--------------|-------------|
| ----- | ----- | ----- |
| TBS_NAME | VARCHAR(128) | FALSE |
| TBS_ID | NUMBER | FALSE |
| TBS_ATTR | VARCHAR(128) | FALSE |
| IS_LOGGING | BOOLEAN | FALSE |
| IS_ONLINE | BOOLEAN | FALSE |
| OFFLINE_STATE | VARCHAR(32) | FALSE |

| | | |
|-------------|--------|-------|
| EXTENT_SIZE | NUMBER | FALSE |
| PAGE_SIZE | NUMBER | FALSE |

CSII

2.5 数据文件管理

数据文件的完整性

磁盘故障数据库的缺陷用户失误等都有可能破坏数据文件的完整性在未意识到数据文件的完整性被破坏的情况下通过数据库提供服务时可能导致严重的后果

为此SUNDB数据库使用数据文件的各页的CHECKSUM保证数据文件的完整性SUNDB数据库的页CHECKSUM使用Lsn与CRC值创建并存储于各页中用户通过设置PAGE_CHECKSUM_TYPE值来设置页CHECKSUM的类型默认使用Lsn

页CHECKSUM在数据库启动时把数据文件加载到内存时进行check如果CHECKSUM值发生错误则无法启动数据库并提供服务

如下如果用户创建的'TEST_TBS'表空间的'TEST_TBS.dbf'数据文件的完整性被破坏则启动数据库会报以下错误

```
gSQL> \STARTUP MOUNT
```

```
Startup success
```

```
gSQL> ALTER SYSTEM OPEN DATABASE;
```

```
ERR-HY000(14094): datafile recovery required -
```

```
datafile(/sundb/db/TEST_TBS.dbf) of tablespace(TEST_TBS) corrupted
```

数据文件的完整性被破坏时可将数据文件所属的表空间变更为离线状态后启动数据库或执行该数据文件的恢复后启动数据库

以下为将表空间状态改为离线状态后启动数据库的示例

```
gSQL> \STARTUP MOUNT
```

```
Startup success
```

```
gSQL> ALTER SYSTEM OPEN DATABASE;
```

```
ERR-HY000(14094): datafile recovery required -
```

```
datafile(/sundb/db/TEST_TBS.dbf) of tablespace(TEST_TBS) corrupted
```

```
gSQL> ALTER TABLESPACE TEST_TBS OFFLINE IMMEDIATE;
```

```
Tablespace altered.
```

```
gSQL> ALTER SYSTEM OPEN DATABASE;
```

```
System altered.
```

恢复数据文件时需要有数据文件的全部备份或增量备份有备份时可按照如下执行恢复

```
gSQL> \STARTUP MOUNT
```

Startup success

```
gSQL> ALTER SYSTEM OPEN DATABASE;
```

```
ERR-HY000(14094): datafile recovery required -  
datafile(/sundb/db/TEST_TBS.dbf) of tablespace(TEST_TBS) corrupted
```

```
gSQL> ALTER DATABASE RECOVER DATAFILE 'TEST_TBS.dbf' CORRUPTION;
```

Database altered.

```
gSQL> ALTER SYSTEM OPEN DATABASE;
```

System altered.

数据文件信息

更多关于数据库中使用的数据文件信息请参考[V\\$DATAFILE](#)

```
gSQL> \DESC V$DATAFILE
```

| COLUMN_NAME | TYPE | IS_NULLABLE |
|-------------|--------------|-------------|
| ----- | ----- | ----- |
| TBS_NAME | VARCHAR(128) | FALSE |

| | | |
|----------------|--------------------------------|-------|
| DATAFILE_NAME | VARCHAR(1024) | FALSE |
| CHECKPOINT_LSN | NUMBER | FALSE |
| CREATION_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | FALSE |
| FILE_SIZE | NUMBER | FALSE |

2.6 Buffer Cache

SUNDB Buffer Cache结构

为了访问存储在磁盘表空间的表和索引页将磁盘数据文件中所需的页 caching 到 buffer SUNDB 按照 **BUFFER_CACHE_SIZE** 参数设置的大小分配 buffer cache 按照 **BUFFER_HASH_BUCKETS** 参数设置的大小使用 hash 表在 caching 到 buffer cache 的页中查找请求的页每次访问页均增加 touch count buffer cache 中没有多余空间时使用替代 touch count 值小的页的 LRU 策略

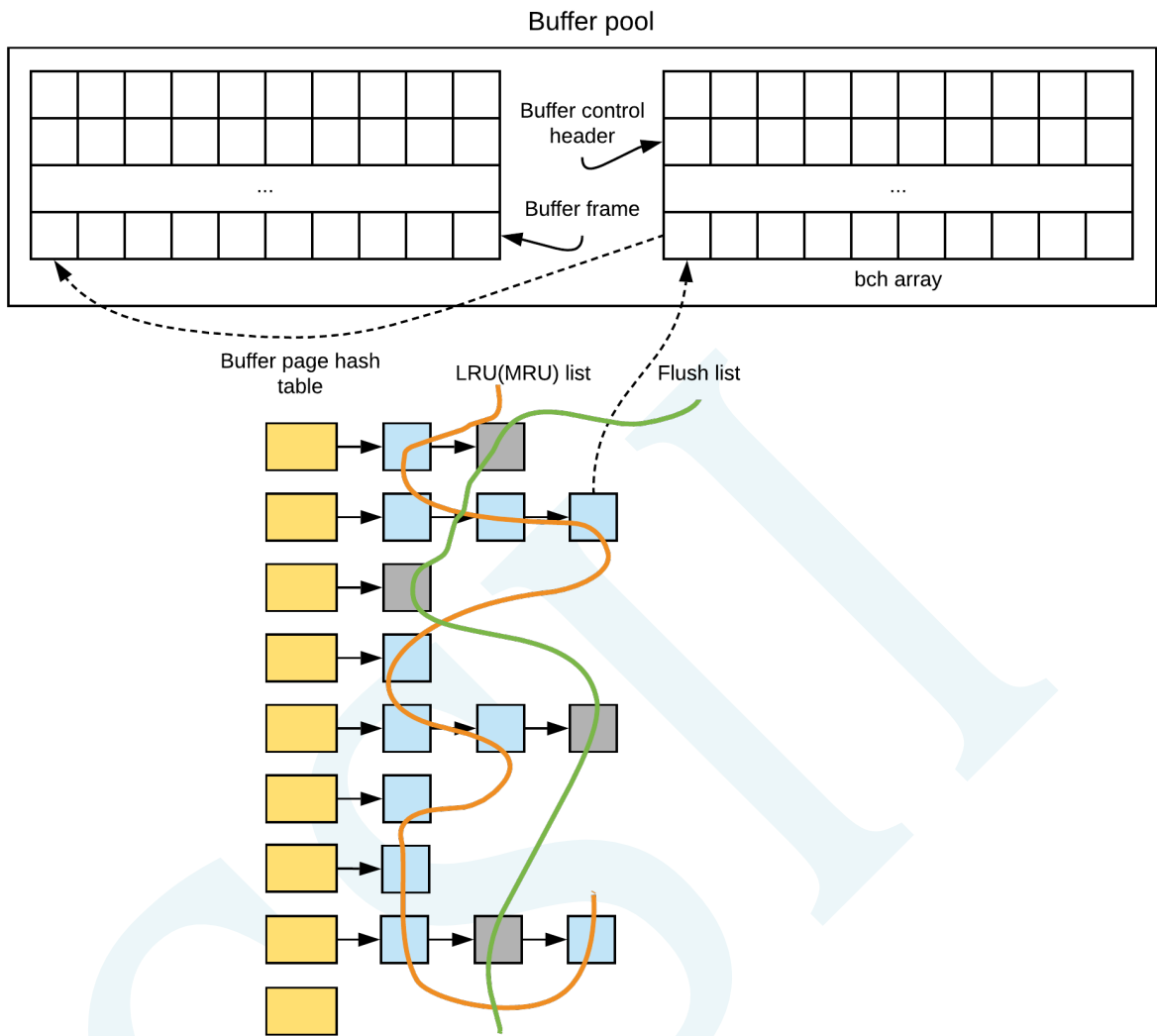


Figure 2-2 SUNDB buffer cache的结构

Buffer Cache List

以下为SUNDB用于buffer cache的list

| List种类 | 说明 | 参数 |
|------------------|-------------------------|------------------------|
| Buffer free list | 可立即使用的buffer frame的list | BUFFER_FREE_LIST_COUNT |

| List种类 | 说明 | 参数 |
|------------------------|--|------------------------------|
| Buffer LRU list | 检索基于touch count可重复使用的页的list | BUFFER_LRU_LIST_COUNT |
| Buffer flush list | 为了在buffer LRU list重复使用用于在数据文件反映更新页的buffer frame的list | BUFFER_FLUSH_THREADS |
| Buffer checkpoint list | checkpoint时要flush到数据文件的更新页frame的list | BUFFER_CHECKPOINT_LIST_COUNT |

Table 2-10 Buffer cache list

系统开始后未使用的page frame连接到buffer free list使用的page frame连接到buffer LRU list在buffer cache更新的page frame连接到buffer checkpoint list不在buffer LRU list删除

在buffer free list使用所有page frame后没有可caching新page的page frame时检索buffer LRU list检索查找可使用的page frame此时已更新但未使用的page frame移动至buffer flush list

除buffer checkpoint list外的buffer free/LRU/flush list中无法重复连接任何page frame即存在于buffer free list的page frame无法同时存在于buffer LRU/flush list存在于buffer LRU list的page frame也无法存在于buffer free/flush list

buffer LRU list分为hot/cold区域cold区域的page frame的touch count大于等于指定值

(**BUFFER_HOT_REGION_CRITERIA**) 时移动至hot区域buffer LRU list的page frame的每次连接均增加touch count所有都属于hot区域时无法查找可替代的page frame因此hot区域的大小限制为**BUFFER_HOT_REGION_PERCENT**参数值

Page Frame状态

Buffer cache的所有page frame状态如下

| list种类 | 说明 | 参数 |
|--------------|--|------|
| FREE | 当前未使用的page frame | 无法访问 |
| PREPARED | 为了page caching而分配但未完成从磁盘读取的状态 | 无法访问 |
| CLEAN | caching到buffer cache但未更新过page frame的状态 | 可访问 |
| DIRTY | caching到buffer cache已更新page frame的状态 | 可访问 |
| FLUSHING | caching到buffer cache更新page frame后正在flush到磁盘数据文件的状态 | 可访问 |
| INCONSISTENT | buffer cache的page frame异常状态 | 无法访问 |

Table 2-11 Buffer frame状态

3.SUNDB数据库备份与恢复

本章介绍SUNDB数据库的备份与恢复以及用于备份与恢复的数据库归档日志(ARCHIVELOG)模式

3.1 归档日志（ARCHIVELOG）模式

SUNDB数据库使用循环(circular) 日志组记录日志一个循环日志组至少包含4个日志组如果当前日志组的日志文件已写满则切换下一个日志组进行记录如果写满所有日志组的日志文件则重新使用第一个日志组覆盖之前的日志记录注意数据库不会生成新的日志文件而是反复循环使用之前已记录的日志文件

如果在非归档日志（NOARCHIVELOG）模式下重新使用已写入过的日志组将丢失之前的日志记录因此以非归档日志模式运行时如果管理员未及时处理已完成记录的日志组则已完成的事务日志会随着时间消失

在归档日志（ARCHIVELOG）模式下当写满当前日志组的日志文件使用下一个日志组时系统将先备份（archive）该日志组后再重新使用该日志组因此完成记录的日志不会默认被删除可永久保存

归档日志模式

使用备份进行恢复时需要数据库保留备份时间点以后的所有日志文件因为随时可能需要使用备

份所以日志文件被覆盖之前需要全部进行归档（archiving）即仅在归档日志模式下支持备份

在归档日志（ARCHIVELOG）模式下运行时在忙碌的系统上进行归档可能会引起服务延迟需要额外的空间来存储归档日志文件

非归档日志模式

非归档模式下由于无法检查是否存在重用之前的日志文件因此非归档模式下不支持备份

但由于系统不用归档日志文件因此在不断记录大量日志的情况下Checkpoint时不会因为归档而引起服务延迟也不需要额外的磁盘空间来存储归档日志文件

创建数据库时由'ARCHIVELOG_MODE'的值决定数据库是归档模式还是非归档模式

'ARCHIVELOG_MODE'为0是非归档日志模式为1是归档日志模式此参数只在创建数据库时有效数据库运行时不再参照该参数

可在SUNDB数据库启动阶段中的MOUNT阶段执行以下命令从而在数据库运行时修改归档日志模式

```
gSQL> ALTER DATABASE ARCHIVELOG;
```

```
Database altered.
```

```
gSQL> ALTER DATABASE NOARCHIVELOG;
```

```
Database altered.
```

可以通过查询性能视图V\$ARCHIVELOG的ARCHIVELOG_MODE查看数据库当前设置的归档日志模式

```
gSQL> SELECT ARCHIVELOG_MODE FROM V$ARCHIVELOG;
```

```
ARCHIVELOG_MODE
```

```
-----
```

```
NOARCHIVELOG
```

```
1 row selected.
```

3.2 备份与恢复

备份

备份和恢复的目的

数据库在发生各种故障或数据损坏时可以保护和恢复数据引起故障的原因有多种为应对数据库出现物理损坏或灾害引起的破损需要留存副本即进行备份

因各种故障导致数据库无法对外提供服务时可通过当前数据库或数据库备份将数据库还原到可服务的状态此操作即为恢复使用当前数据库的恢复叫重启恢复（restart recovery）使用备份文件的恢复叫介质恢复（media recovery）SUNDB自动或手动执行介质恢复还原备份数据文件后用重启恢复的方式执行介质恢复及重启

备份

数据库备份分为物理备份与逻辑备份一般的备份指的是在数据库运行时创建数据文件的副本本节介绍数据库在线状态下的物理备份

| 备份类型 | 备份形式 | 数据库状态 | 特征 |
|------|------|-------|-------------------------|
| 物理备份 | 冷备份 | 离线 | 创建数据文件的副本 为执行备份需中断服务 |

| 备份类型 | 备份形式 | 数据库状态 | 特征 |
|------|----------------|-------|--|
| | 热备份 | 在线 | 创建数据文件的副本 可在数据库运行状态下执行备份 仅在归档日志模式下可用 |
| 逻辑备份 | 导出 (export) 备份 | 在线 | 以表为单位的备份/恢复 不受HW, OS限制均可导出 |

Table 3-1 数据库备份类型

SUNDB正常运行需要使用数据文件与控制文件因而在故障引起损坏时需要恢复数据文件与控制文件控制文件是创建数据库时生成的文件存储数据库运行所需的信息数据文件存储实际数据包括创建数据库时默认生成的系统表空间的数据文件及用户自定义表空间的数据文件如果部分控制文件或数据文件损坏可通过备份文件进行恢复

也就是说为了进行数据库恢复需要备份控制文件与数据文件因此SUNDB支持控制文件备份数据库备份以及表空间备份

根据备份方式分为完全备份 (full backup) 与增量备份 (incremental backup) 完全备份是在备份时间点创建所有数据文件的副本增量备份仅备份自上一次备份之后发生变更的部分进行完全备份时创建数据文件的副本因此每次备份时创建与数据文件大小相同的副本所以每次执行备份将消耗与数据库或表空间大小相同的存储空间

相比之下增量备份的优点是备份文件相对较小因为它仅备份自上次备份以来发生变更的部分

| 区分 | 完全备份 | 增量备份 |
|------|---|---|
| 备份对象 | <ul style="list-style-type: none"> 数据库：数据库使用中的所有数据文件 表空间：数据库的特定表空间的数据文件 | |
| 特点 | <ul style="list-style-type: none"> 备份数据库或表空间使用中的所有数据文件 每一个数据文件生成一个备份文件 发生故障后使用合适的备份方式还原并恢复数据文件 | <ul style="list-style-type: none"> 备份数据库或表空间使用中的数据文件中自上一次备份后发生变更的部分 创建记录变更部分的一个增量备份文件 发生故障后使用多个增量备份还原并恢复 |

Table 3-2 完全备份与增量备份

完全备份

为了备份控制文件及数据文件使用完全备份进行数据库备份表空间备份

控制文件备份

按照如下方式备份控制文件备份控制文件时指定（包含绝对路径在内的）备份控制文件名仅记录备份控制文件名时备份文件将生成于LOG_DIR参数设置的路径下

```
gSQL> ALTER DATABASE BACKUP CONTROLFILE TO
```

```
 '/sundb_data/backup/backup.ctl';
```

```
Database altered.
```

数据库备份

可备份数据库使用的所有数据文件备份数据文件时正在拷贝的数据文件不能被修改如果创建副本时文件被修改则无法保证数据文件的一致性甚至可能破坏同一个page的一致性为了防止出现这种情况如下所示首先把数据库设置为可备份的状态

```
gSQL> ALTER DATABASE BEGIN BACKUP;
```

```
Database altered.
```

在数据库可备份的状态下使用操作系统提供的文件拷贝功能创建数据文件的副本如下所示完成数据库备份之后把数据库改为可写的状态

```
gSQL> ALTER DATABASE END BACKUP;
```

```
Database altered.
```

表空间备份

可备份某个特定表空间所使用的数据文件与数据库备份相同如下所示使用要备份的表空间名称（tablespace_name）设置为可备份的状态

```
gSQL> ALTER TABLESPACE TEST_TBS BEGIN BACKUP;
```


Tablespace altered.

在表空间可备份的状态下使用操作系统支持的文件拷贝功能创建表空间数据文件的副本后如下所示结束表空间备份

```
gSQL> ALTER TABLESPACE TEST_TBS END BACKUP;
```

Tablespace altered.

增量备份

与完全备份相同增量备份支持以数据库为单位和以表空间为单位的增量备份控制文件没有增量备份可以在数据库执行增量备份时同时备份控制文件

SUNDB支持0到4级的增量备份级别首次进行增量备份时必须以级别0备份所有数据文件之后在进行增量备份时可以将备份级别设置为1或大于1以备份自上次备份以来发生变更的部分

给定要进行增量备份的级别在备份之前找到最近相同级别或更小级别的备份时间点然后备份这期间变更的部分

例如在下图中执行level 0 Backup后level 2 Backup(1)仅备份level 0备份之后发生变更的部分level 2 Backup(2)仅备份level 2 Backup(1)备份之后发生变更的部分同样level 2 Backup(3)(4)(5)(6)备份最近一次level 2备份之后发生变更的部分最后执行的level 1 Backup将会备份自level 0备份后的所有变更部分

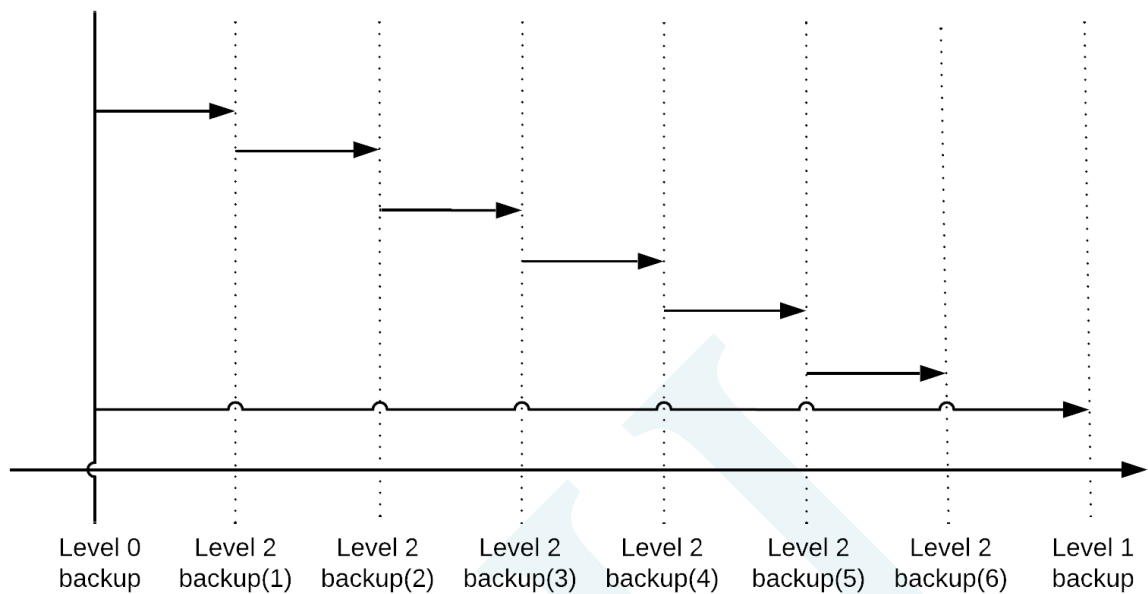


Figure 3-1 SUNDB 增量备份

数据库增量备份

如下所示对数据库全体数据所有执行增量备份首先对数据库所有数据文件进行0级备份

```
gSQL> ALTER DATABASE BACKUP INCREMENTAL LEVEL 0;
```

```
Database altered.
```

接下来对0级备份之后发生变更的部分进行1级备份

```
gSQL> ALTER DATABASE BACKUP INCREMENTAL LEVEL 1;
```

```
Database altered.
```

表空间增量备份

首先与数据库备份相同对表空间的所有数据文件进行0级备份

```
gSQL> ALTER TABLESPACE TEST_TBS BACKUP INCREMENTAL LEVEL 0;
```

```
Tablespace altered.
```

然后对级备份0之后发生变更的部分进行1级备份

```
gSQL> ALTER TABLESPACE TEST_TBS BACKUP INCREMENTAL LEVEL 1;
```

```
Tablespace altered.
```

change tracking

对磁盘表空间执行增量备份时需要扫描所有数据文件并检查上一次备份后是否存在变更的页因此此数据文件大但实际变更部分少时通过扫描整个数据文件导致执行增量备份的时间会有所延迟

change tracking在执行增量备份后仅存储发生变更的页并在下一次增量备份时不需要扫描所有数据文件仅查找发生变更的页并执行备份因此可缩短执行备份的时间

但数据文件的大部分页发生变更时需要备份大部分数据文件因此change tracking的效率会低

change tracking仅可在数据库的归档日志模式下使用无法在非归档日志模式中使用

以下为enable/disable是否使用数据库的change tracking的语句

```
gSQL> ALTER DATABASE ENABLE CHANGE TRACKING;
```

```
Database altered.
```

```
gSQL> ALTER DATABASE DISABLE CHANGE TRACKING;
```

```
Database altered.
```

允许change tracking时生成change tracking文件和共享内存change tracking文件和共享内存的结构相同由存储按照**CHANGE_TRACKING_EXTENT_SIZE**参数中设置的数量的page组合的变更flag的块组成

启用change tracking后首次执行增量备份时初始化变更flag变更page时标记在该page的flag并在下一次执行增量备份时仅检查标记在change tracking文件的变更flag的page组合并仅对变更的page执行备份

启用change tracking时文件默认生成至**CHANGE_TRACKING_FILE**参数设置的位置启用时设置用于change tracking的文件名或存储位置时文件生成在设置的位置未设置存储位置时change tracking文件生成在BACKUP_DIR参数设置的位置

```
gSQL> ALTER DATABASE ENABLE CHANGE TRACKING USING FILE  
'/tmp/change_tracking.ctf';
```

```
Database altered.
```

Change tracking文件的大小为10M由于磁盘数据文件的数量增加而change tracking文件填满时增加10M

恢复

当数据库发生故障或数据损坏时即数据一致性被破坏时数据库通过执行恢复来保障数据一致性

数据库故障主要分以下几种

| 故障类型 | 原因与症状 | 解决方法 |
|---------------------|--|------------|
| Transaction Failure | 逻辑错误（bad input, overflow, data not found）引起的事务执行失败死锁 | 事务中止 |
| System Crash | 数据库或操作系统异常结束（停电）导致的易失性存储介质失效 | 重启恢复 |
| Media Failure | 非易失性存储介质损坏 | 还原 重启恢复 |

Table 3-3 数据库故障类型

发生transaction failure时通过中止执行中的事务回滚已执行的所有数据库更新并释放所有已获取的锁来解决这类故障

发生system crash时数据库进程异常终止导致存放在易失性存储介质中的数据还没来得及写到非易失性存储介质中就丢失了通过重启数据库并将数据库恢复到异常终止之前的一致性状态解决这类故障这种处理过程称为重启恢复（restart recovery）重启恢复使用数据库故障之前使用的控制文件数据文件及日志文件（redo log）进行恢复

如果所有非易失性存储设备均损坏则要恢复的控制文件数据文件和日志文件也均损坏因此无法使用发生故障之前的数据库文件执行恢复在这种情况下可以使用之前的备份和日志文件

(archive log) 来还原数据库文件然后执行恢复

SUNDB支持完全恢复与不完全恢复完全恢复通过应用日志文件将数据文件恢复到最新并且具有一致性的状态完全恢复的对象是数据库表空间和数据文件对于表空间和数据文件即使在数据库服务期间也可以对离线表空间执行完全恢复完全恢复又可分为自动恢复与手动恢复自动恢复是在重启数据库的时候执行手动恢复则是使用SUNDB支持的恢复语句执行恢复操作

仅可对数据库执行不完全恢复恢复至特定点的具备一致性的状态不完全恢复只能通过手动执行能够一次性进行截至特定时间点的不完全恢复或者用户选择可恢复的日志文件后恢复到该文件即用户自定义不完全恢复

如果同时需要完全恢复与不完全恢复则使用重做日志与归档日志文件

| 恢复种类 | 恢复对象 | 区分 |
|-------|--------------------|---|
| 完全恢复 | 数据库 表空间 数据文件 | <ul style="list-style-type: none"> • 自动恢复（在重新启动时恢复） • 手动恢复（手动恢复数据库/表空间/数据文件） |
| 不完全恢复 | 数据库 | <ul style="list-style-type: none"> • 仅执行手动恢复 <ul style="list-style-type: none"> ○ 一次性不完全恢复 ○ 用户自定义不完全恢复 |

Table 3-4 数据库恢复的种类

自动恢复

自动恢复在数据库正常或非正常结束重启时执行大部分使用结束之前的控制文件数据文件日志文件执行一些特殊情况下当最新的数据库文件损坏时也可以还原备份数据库文件并用归档日志文件执行自动恢复

执行恢复分为分析（analysis）重做（redo）撤销（undo）三个阶段

分析阶段（Analysis）

分析阶段执行2个操作第一查找执行重启恢复需要的第一个日志为此首先要找到最近一次执行检查点的日志最近一次执行检查点的日志可以从控制文件记录的日志信息中获取第二初始化系统的事务表（transaction table）使用检查点日志中记录的检查点时执行的事务信息初始化系统事务表

重做恢复阶段（Restart Redo）

重做恢复从分析阶段得到的重启恢复所需的第一个日志到记录在重做日志文件中的最后一个日志在此过程中一个事务结束或开始一个新事务都会更新事务表

撤销恢复阶段（Restart Undo）

结束重做过程后撤销记录在事务表中的所有未完成的事务后执行事务回滚

使用备份进行恢复

控制文件数据文件日志文件被损坏或不存在的情况下需要使用备份文件进行还原后执行恢复使

用备份的控制文件或数据文件执行恢复时查找开始恢复的日志时较复杂

使用备份进行恢复的分析

使用备份进行恢复的分析阶段与自动恢复相同首先查找执行恢复的第一个日志并初始化事务表

查找开始恢复的第一个日志的方法为在所有数据文件的文件头中记录的checkpoint Lsn中获取最

早的Lsn并与记录于控制文件的checkpoint Lsn进行比较选择最小值

数据文件头记录的checkpoint Lsn存储对应数据文件Checkpoint时的Lsn因此当使用备份的数据

文件时选择最早的checkpoint Lsn后与控制文件的checkpoint Lsn进行比较并选择最小值确定用

于恢复的最小checkpoint Lsn

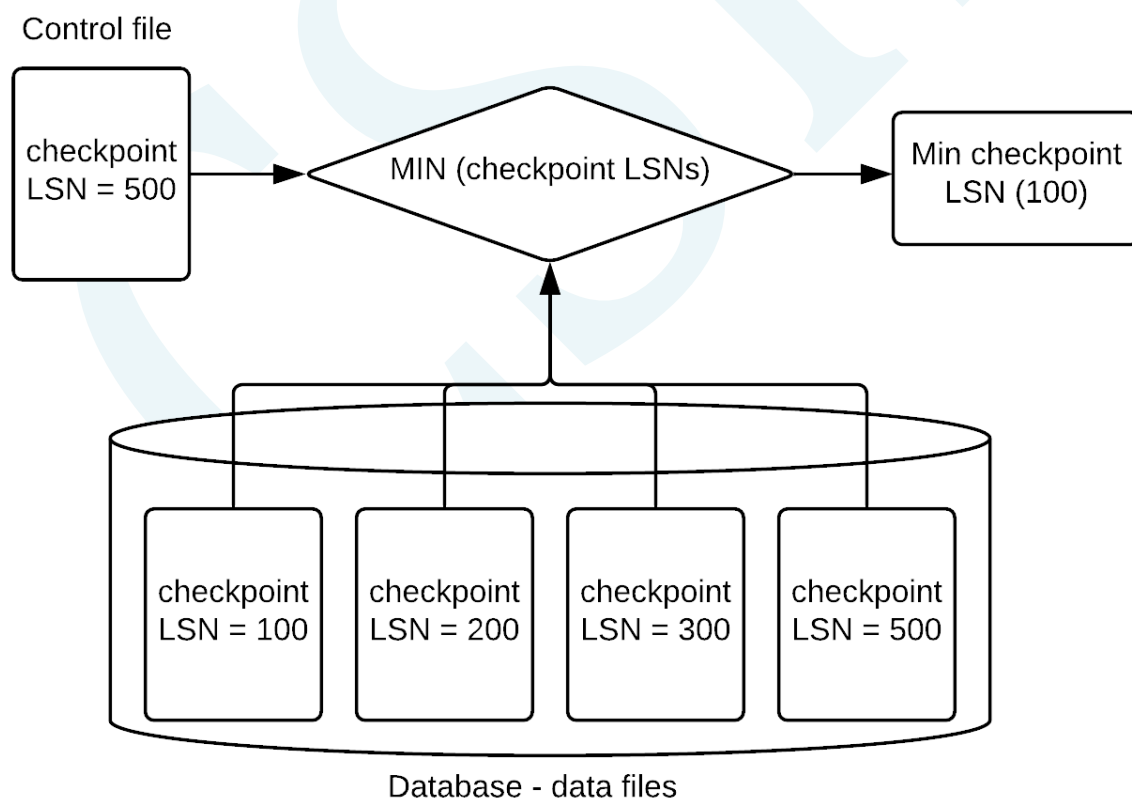


Figure 3-2 Recovery时选择最小checkpoint Lsn的过程

使用归档日志文件的恢复

进行恢复时为了恢复而得出的最小checkpoint Lsn位于归档日志文件中时执行恢复时不仅需要重做日志文件也要使用归档日志文件使用备份进行恢复的对象以数据库表空间及数据文件为单位数据库恢复仅在MOUNT阶段执行表空间及数据文件为单位的恢复在MOUNT,OPEN阶段均可执行

- 还原备份的数据文件（Restore）

可通过完全备份或增量备份还原数据文件使用完全备份的数据文件还原使用操作系统支持的文件拷贝命令并由用户直接执行通过增量备份的还原使用SUNDB支持的语句执行即可为了在OPEN阶段还原数据文件对应表空间应为离线状态

使用增量备份还原数据文件的操作如下：

```
gSQL> ALTER DATABASE RESTORE;
```

```
Database altered.
```

```
gSQL> ALTER DATABASE RESTORE TABLESPACE TEST_TBS;
```

```
Database altered.
```

- 还原数据文件后进行手动恢复

还原数据文件后使用恢复语句执行如下恢复：

```
gSQL> ALTER DATABASE RECOVER;
```

Database altered.

```
gSQL> ALTER DATABASE RECOVER TABLESPACE TEST_TBS;
```

Database altered.

不完全恢复

数据库运行中发生用户操作失误控制文件损坏重做日志或归档日志损坏无法通过重启恢复或即使恢复也无法恢复数据库一致性时可通过不完全恢复（incomplete media recovery）恢复到特定时间点如下情况需要进行不完全恢复

控制文件损坏

控制文件是多重化管理的因此除非多重化的文件全部损坏即可使用未损坏的文件进行恢复但是如果所有文件都损坏则需要使用备份的控制文件来进行恢复在这种情况下控制文件的日志信息可能被更改因此无法进行完全恢复只能恢复至特定时间点

还原备份的控制文件

控制文件被损坏时可以拷贝多路复用管理中的其他控制文件以使控制文件保持最新状态但多路复用的控制文件全部损坏时只能通过还原备份的控制文件来进行恢复使用备份的控制文件执行恢复时无法恢复备份后变更的日志信息

重做日志文件损坏

为了防止日志文件的损坏SUNDB的重做日志文件在日志组中由多个成员进行管理但特定日志文件组里的所有日志成员损坏时无法通过重做日志文件进行恢复这时只能通过不完全恢复恢复未损坏的日志文件

归档日志文件损坏

归档日志文件损坏时与重做日志文件损坏的情况相同只能通过不完全恢复恢复未损坏的日志文件

用户失误

用户误删重要的表或在表中插入/删除/更新错误数据并提交时需要恢复至误操作之前的状态

SUNDB 数据库的不完全恢复

SUNDB支持两种不完全恢复第一种是恢复至管理员指定的特定时间点的不完全恢复第二种是管理员指定的管理员与系统之间通过交互（interactive）方式执行日志文件为单位的恢复

到特定时间点为止的不完全恢复可使用特定日志的Lsn特定时间特定scn指定需要恢复的特定时间点

不完全恢复仅在MOUNT阶段对整个数据库执行以特定表空间为单位的不完全恢复会影响数据库的一致性问题因此不支持

- 恢复到指定LSN的不完全恢复

找到需要执行不完全恢复的日志恢复至该日志的Lsn以下为执行不完全恢复恢复至日志LSN

1000的示例

```
gSQL> ALTER DATABASE RECOVER UNTIL CHANGE 1000;
```

```
Database altered;
```

```
gSQL> ALTER DATABASE RECOVER UNTIL CHANGE LSN 1000;
```

```
Database altered;
```

- 恢复到特定SCN的不完全恢复

找到需要完成不完全恢复的SCN执行恢复至该日志的SCN以下为执行不完全恢复恢复至SCN 300
的示例

```
gSQL> ALTER DATABASE RECOVER UNTIL CHANGE SCN 300;
```

```
Database altered;
```

Note:

SCN不按照顺序记录在日志因此即使执行到SCN300也有可能超过SCN 300

以下为恢复超出指定SCN的示例

日志: --- LSN 90 (SCN 3) -- LSN 91 (SCN 5) -- LSN 92 (SCN 4)

```
gSQL> ALTER DATABASE RECOVER UNTIL CHANGE SCN 3;
```

→ 恢复至LSN 90

```
gSQL> ALTER DATABASE RECOVER UNTIL CHANGE SCN 4;
```

→ 恢复至LSN 92(恢复至有SCN 4的LSN 92)

```
gSQL> ALTER DATABASE RECOVER UNTIL CHANGE SCN 5;
```

→ 恢复至LSN 92 (恢复到SCN5时默认恢复SCN4, SCN5)

- 恢复至特定时间的不完全恢复

查找完成不完全恢复的时间后恢复至特定时间例如以下为执行不完全恢复恢复至“2017-05-18 16:10:10.00000”的示例

```
gSQL> ALTER DATABASE RECOVER UNTIL TIME '2017-05-18 16:10:10.000000';
```

```
Database altered;
```

- Interactive不完全恢复

日志文件损坏时执行恢复恢复至损坏之前的日志文件为此SUNDB向数据库管理员提示所需的日志文件数据库管理员使用SUNDB提示的日志文件或新的日志文件执行不完全恢复

以下为执行SUNDB的interactive不完全恢复的示例首先执行不完全恢复的BEGINSUNDB将提示恢复所需要的日志文件管理员可直接使用SUNDB建议的日志文件执行恢复或可直接描述要执行恢复的日志文件

```
gSQL> ALTER DATABASE BEGIN INCOMPLETE RECOVERY;
```

```
ERR-01000(14104): Warning: suggestion '/sundb/archive_log/archive_0.log'
```

```
ERR-01000(14103): Warning: media recovery needs a logfile including log  
(Lsn 139992)
```

```
Database altered.
```

```
gSQL> ALTER DATABASE RECOVER AUTOMATICALLY;
```

```
ERR-01000(14104): Warning: suggestion '/sundb/archive_log/archive_1.log'
```

```
ERR-01000(14103): Warning: media recovery needs a logfile including log  
(Lsn 144143)
```

```
Database altered.
```

```
gSQL> ALTER DATABASE END INCOMPLETE RECOVERY;
```

```
Database altered.
```

不完全恢复后重启数据库

完成不完全恢复后无法以正常的方法重启数据库因为不完全恢复的SUNDB数据库与当前的重做日志文件无关即数据库是之前时间点的而当前的重做日志文件记录着之后发生的日志因此为了重启数据库需要重置重做日志文件为此不完全恢复后重启数据库之前需要使用RESETLOGS选项

```
gSQL> ALTER SYSTEM OPEN DATABASE;
```

```
ERR-HY000(14083): must use RESETLOGS option for database open
```

```
gSQL> ALTER SYSTEM OPEN DATABASE RESETLOGS;
```

```
System altered.
```

不完全恢复时的注意事项

不完全恢复是把数据库恢复至特定时间点以保证数据库的一致性但很难立即找到特定时间点而且执行不完全恢复后重置所有的重做日志文件因此执行不完全恢复之前要把数据库的控制文件数据文件重做日志文件均离线备份后多次执行不完全恢复并找到准确的时间点

执行不完全恢复时需要归档重做日志文件但不完全恢复成功后会生成新的数据库因此删除之前的数据库创建的归档重做日志

恢复示例

控制文件损坏

SUNDB数据库的控制文件存储有关数据库的物理结构与数据一致性的重要信息因此出现损坏或删除等情况时将无法运行数据库

为此SUNDB数据库多路复用最少2个最多8个控制文件因此只要有一个有效的控制文件即可还原其他控制文件并重启数据库

存在多路复用的有效控制文件时

多路复用的控制文件'/sundb_data/wal/control_1.ctl' 损坏时会如下导致重启失败

```
gSQL> \STARTUP
```

```
ERR-HY000(14097): control file is corrupted -  
'/sundb_data/wal/control_1.ctl'
```

把有效的控制文件'/sundb_data/wal/control_0.ctl'拷贝到'/sundb_data/wal/control_1.ctl'并删除
重启失败的共享内存后重启

```
$ cp /sundb_data/wal/control_0.ctl /sundb_data/wal/control_1.ctl
```

```
gSQL> \SHUTDOWN
```

```
Shutdown success
```

```
gSQL> \STARTUP
```

```
Startup success
```

多路复用的所有控制文件被损坏时

当所有多路复用的控制文件全部被损坏时可以使用备份的控制文件执行数据库不完全恢复并重启由于备份控制文件后数据库的物理结构会发生变化因此使用备份的控制文件恢复控制文件时执行不完全恢复即使执行不完全恢复因为有归档日志文件与重做日志文件因此使用SUNDB interactive不完全恢复数据库管理员可手动还原到'CURRENT'状态的重做日志文件从而执行完全恢复

备份的控制文件可以使用操作系统的拷贝功能拷贝到多路复用的控制文件或使用SUNDB数据库

支持的控制文件还原功能进行如下还原控制文件的还原只能在SUNDB数据库多阶段启动中的NOMOUNT阶段执行

```
gSQL> \STARTUP NOMOUNT
```

```
Startup success
```

```
gSQL> ALTER DATABASE RESTORE CONTROLFILE FROM  
'/sundb_data/backup/backup.ctl';
```

```
Database altered.
```

还原备份控制文件后在MOUNT阶段执行如下不完全恢复

```
gSQL> ALTER SYSTEM MOUNT DATABASE;
```

```
System altered.
```

```
gSQL> ALTER DATABASE BEGIN INCOMPLETE RECOVERY;
```

```
ERR-01000(14104): Warning: suggestion '/sundb/archive_log/archive_0.log'
```

```
ERR-01000(14103): Warning: media recovery needs a logfile including log  
(Lsn 137499)
```

```
Database altered.
```

```
gSQL> ALTER DATABASE RECOVER AUTOMATICALLY;
```

```
ERR-01000(14104): Warning: suggestion '/sundb/archive_log/archive_1.log'
```

```
ERR-01000(14103): Warning: media recovery needs a logfile including log  
(Lsn 137667)
```

```
Database altered.
```

```
gSQL> ALTER DATABASE RECOVER '/sundb/wal/redo_1_0.log';
```

```
ERR-01000(14104): Warning: suggestion '/sundb/archive_log/archive_2.log'
```

```
ERR-01000(14103): Warning: media recovery needs a logfile including log  
(Lsn 137672)
```

```
Database altered.
```

```
gSQL> ALTER DATABASE END INCOMPLETE RECOVERY;
```

```
Database altered.
```

```
gSQL> ALTER SYSTEM OPEN DATABASE RESETLOGS;
```

```
System altered.
```

数据文件损坏

数据文件损坏或被删除时使用备份的数据文件执行完全恢复完全备份通过拷贝备份文件进行还原增量备份通过SUNDB的还原功能进行还原数据文件的还原及恢复可以以数据库为单位执行还

原恢复也可以以该数据文件的表空间为单位执行还原恢复以表空间为单位的还原及恢复可在 MOUNTOPEN阶段执行在OPEN阶段执行还原及恢复时表空间应为离线状态

- 在MOUNT阶段使用完全备份恢复损坏的数据文件

将备份的数据文件('/sundb/backup/test.dbf')复制到 '/sundb/db/test.dbf'后执行完全恢复

```
$ cp /sundb/backup/test.dbf /sundb/db/test.dbf
```

```
gSQL> \STARTUP MOUNT
```

```
System altered.
```

```
gSQL> ALTER DATABASE RECOVER;
```

```
Database altered.
```

```
gSQL> ALTER SYSTEM OPEN DATABASE;
```

```
System altered.
```

- 在OPEN阶段使用完全备份恢复损坏的数据文件

```
gSQL> SELECT IS_ONLINE FROM V$TABLESPACE WHERE TBS_NAME = 'TEST_TBS';
```

```
IS_ONLINE
```

```
-----
```

```
FALSE
```

```
1 row selected.
```

```
$ cp /sundb/backup/test.dbf /sundb/db/test.dbf
```

```
gSQL> ALTER DATABASE RECOVER TABLESPACE TEST_TBS;
```

```
Database altered.
```

```
gSQL> ALTER TABLESPACE TEST_TBS ONLINE;
```

```
Tablespace altered.
```

- 在MOUNT阶段使用增量备份恢复损坏的数据文件

```
gSQL> \STARTUP MOUNT
```

```
System altered.
```

```
gSQL> ALTER DATABASE RESTORE;
```

```
Database altered.
```

```
gSQL> ALTER SYSTEM OPEN DATABASE;
```

```
System altered.
```

- 在OPEN阶段使用增量备份恢复损坏的数据文件

```
gSQL> SELECT IS_ONLINE FROM V$TABLESPACE WHERE TBS_NAME = 'TEST_TBS';
```

```
IS_ONLINE
```

```
-----
```

```
FALSE
```

```
1 row selected.
```

```
gSQL> ALTER DATABASE RESTORE TABLESPACE TEST_TBS;
```

```
Database altered.
```

```
gSQL> ALTER TABLESPACE TEST_TBS ONLINE;
```

```
Tablespace altered.
```

用户误删表或执行错误的插入/删除/更新时

在使用名为'TEST'的表的过程中误删表时SUNDB数据库提供表索引的DDL回滚功能即如下所示

即使误删表也可以不提交（COMMIT）并通过回滚取消删除表

```
gSQL> DROP TABLE TEST;
```

Table dropped.

```
gSQL> ROLLBACK;
```

Rollback complete.

```
gSQL> \DESC TEST
```

| COLUMN_NAME | TYPE | IS_NULLABLE |
|-------------|---------------|-------------|
| I1 | NUMBER(10,0) | TRUE |
| I2 | CHARACTER(10) | TRUE |

```
gSQL> DROP TABLE TEST;
```

Table dropped.

```
gSQL> COMMIT;
```

Commit complete.

```
gSQL> \DESC TEST
```

```
ERR-42000(16040): table or view does not exist :
```

```
SELECT * FROM TEST WHERE 1 = 0
```

```
*
```

```
ERROR at line 1:
```

如果删除表后已提交则无法回滚因此执行SUNDB的不完全恢复功能恢复至删除表之前的时间点并重启数据库

如上所述使用删除表之前时间点的备份文件执行不完全恢复时为了找到删除表的时间点可以多次重复过程来找到准确的时间点这时使用gdump工具dump日志文件后分析日志

假设删除表之后的Lsn为'1000'则如下所示执行不完全恢复

```
gSQL> \STARTUP MOUNT
```

```
System altered.
```

```
gSQL> ALTER DATABASE RECOVER UNTIL CHANGE 1000;
```

```
Database altered.
```

```
gSQL> ALTER SYSTEM OPEN DATABASE RESETLOGS;
```

```
System altered
```

```
gSQL> \DESC TEST
```

| COLUMN_NAME | TYPE | IS_NULLABLE |
|-------------|---------------|-------------|
| I1 | NUMBER(10,0) | TRUE |
| I2 | CHARACTER(10) | TRUE |

日志文件损坏（归档日志重做日志文件）

- 恢复时归档日志文件损坏

假设当数据文件损坏通过备份数据文件执行恢复时特定归档日志文件在恢复过程中被损坏而无法完成恢复

例如有'archive_0.log', 'archive_1.log', 'archive_2.log', 'archive_3.log'归档日志文件但'archive_3.log'文件被损坏而无法执行恢复时执行不完全恢复恢复至'archive_2.log'后并重启数据库

```
gSQL> \STARTUP MOUNT
```

```
System altered
```

```
gSQL> ALTER DATABASE BEGIN INCOMPLETE RECOVERY;
```

```
ERR-01000(14104): Warning: suggestion '/sundb/archive_log/archive_0.log'
```

```
ERR-01000(14103): Warning: media recovery needs a logfile including log
```

```
(Lsn 139992)
```


Database altered.

```
gSQL> ALTER DATABASE RECOVER AUTOMATICALLY;
```

```
ERR-01000(14104): Warning: suggestion '/sundb/archive_log/archive_3.log'
```

```
ERR-01000(14103): Warning: media recovery needs a logfile including log  
(Lsn 194143)
```

Database altered.

```
gSQL> ALTER DATABASE END INCOMPLETE RECOVERY;
```

Database altered.

```
gSQL> ALTER SYSTEM OPEN DATABASE RESETLOGS;
```

System altered

- 重做日志文件损坏

假设数据库在服务的过程中发生故障被flush的CURRENT日志组被损坏

例如在如下日志组的状态下发生异常终止时由于日志组3和0尚未归档因此需要手动执行恢复并
完成不完全恢复

| 日志组 | 日志组状态 | 日志文件序列号 | Prev Last Lsn |
|-------|----------|---------|---------------|
| 日志组 0 | ACTIVE | 8 | 80000 |
| 日志组 1 | CURRENT | 9 | 90000 |
| 日志组 2 | INACTIVE | 6 | 60000 |
| 日志组 3 | ACTIVE | 7 | 70000 |

Table 3-5 日志组状态

```
gSQL> \STARTUP MOUNT
```

```
System altered
```

```
gSQL> ALTER DATABASE BEGIN INCOMPLETE RECOVERY;
```

```
ERR-01000(14104): Warning: suggestion '/sundb/archive_log/archive_0.log'
```

```
ERR-01000(14103): Warning: media recovery needs a logfile including log
```

```
(Lsn 1000)
```

```
Database altered.
```

```
gSQL> ALTER DATABASE RECOVER AUTOMATICALLY;
```

```
ERR-01000(14104): Warning: suggestion '/sundb/archive_log/archive_7.log'
```

```
ERR-01000(14103): Warning: media recovery needs a logfile including log
```

```
(Lsn 70001)
```

Database altered.

```
gSQL> ALTER DATABASE RECOVER '/sundb/wal/redo_3_0.log';
```

```
ERR-01000(14104): Warning: suggestion '/sundb/archive_log/archive_8.log'
```

```
ERR-01000(14103): Warning: media recovery needs a logfile including log  
(Lsn 80001)
```

Database altered.

```
gSQL> ALTER DATABASE RECOVER '/sundb/wal/redo_0_0.log';
```

```
ERR-01000(14104): Warning: suggestion '/sundb/archive_log/archive_9.log'
```

```
ERR-01000(14103): Warning: media recovery needs a logfile including log  
(Lsn 90001)
```

Database altered.

```
gSQL> ALTER DATABASE END INCOMPLETE RECOVERY;
```

Database altered.

```
gSQL> ALTER SYSTEM OPEN DATABASE RESETLOGS;
```

System altered

数据文件比日志更新的情况

在SUNDB数据库中创建的所有表空间的数据文件均由页组成并且每页将最后更新该页的事务记录的日志Lsn设置为页Lsn因此数据文件的所有页LSN可能小于或等于记录在日志组重做日志文件的最新日志的Lsn

重新启动数据库时如果数据文件的特定页的LSN的值大于日志组最新日志的LSN则会破坏数据库的一致性并无法提供正常服务SUNDB数据库在重新启动时检查数据文件与日志从而防止出现这种异常情况

如果数据文件中某一页的LSN值大于最新日志的Lsn时如下所示重启数据库失败

```
gSQL> \STARTUP
```

```
ERR-HY000(14114): exist inconsistent datafiles; need to restore more older  
backup datafiles or more recent redo logfiles
```

为了解决这种问题需要还原由比最新日志LSN更小的页LSN组成的备份数据文件或者还原记录着比数据文件更大的LSN日志的日志文件后重新启动通过跟踪文件查看需还原的对象数据文件

例如重启失败时在跟踪文件上输出以下消息则'/data/db/system_dic.dbf'数据文件中有页LSN为“126787”的页该值大于最新日志文件Lsn'126652'因此为了重新启动需还原之前备份的数据文件或还原记录日志的LSN大于或等于'126787'的日志文件后进行重启此外如果数据文件的几个页面的Lsn值大于日志文件的LSN值则还原大于其中最大值的日志文件即可执行重启并提供服务

```
[2016-01-15 12:41:14.045679 THREAD(10581,139799401453312)] [INFORMATION]
```

```
[STARTUP_SM] the max page lsn '126787' of datafile  
'/data/db/system_dict.dbf' is more recent than the latest redo log lsn  
'126652'.
```

```
[2016-01-15 12:41:14.045705 THREAD(10581,139799401453312)] [INFORMATION]
```

```
[STARTUP_SM] the max page lsn '126830' of datafile  
'/data/db/system_undo.dbf' is more recent than the latest redo log lsn  
'126652'.
```

```
[2016-01-15 12:41:14.045729 THREAD(10581,139799401453312)] [INFORMATION]
```

```
[STARTUP_SM] the max page lsn '126829' of datafile '/data/db/test_log.dbf'  
is more recent than the latest redo log lsn '126652'.
```

集群环境下的In Doubt事务恢复

集群环境中的事务分为在两个以上的集群群组中执行的全局事务在一个集群群组中执行的domain事务在一个集群成员中执行的本地事务

本地事务在执行恢复时仅使用本地成员的日志domain事务在执行恢复时使用本地成员的日志在事务未完成的情况下发生异常终止时进行回滚并在需要时通过重新平衡执行与群组成员的同步

全局事务使用二阶段提交协议执行提交SUNDB的全局事务如下执行二阶段提交

- 准备阶段
 - 在驱动程序成员向所有成员发送PREPARE消息后等待响应消息
 - 当从所有成员接收到PREPARE的响应消息时进入COMMIT阶段至少有一个成员失败或

无响应则回滚

- 提交阶段
 - 在驱动程序成员向所有成员发送COMMIT消息后等待响应消息
 - 即使有成员失败也会执行提交

在COMMIT阶段未记录提交日志并异常终止的成员在重新启动时无法确认其提交还是回滚了‘PREPARE’状态的全局事务因此需要从其他成员获取状态

为此SUNDB以事务记录形式在MEM_TRANS_TBS中记录提交的全局事务信息当在该record中记录新record时根据需求将之前的record记录在全局事务日志文件中之后异常终止的成员使用日志执行重启恢复或手动恢复当仍然存在‘PREPARE’状态的in doubt事务时从服务中的成员获取该事务的COMMIT/ROLLBACK信息后执行恢复

SUNDB在创建数据库时会预先创建由两个日志组组成的全局事务日志文件将in doubt事务的信息记录到日志文件中如果此时日志文件已满则使用下一个日志文件记录满的日志文件通过归档系统线程进行归档后重新使用全局事务日志文件在集群环境中无条件进行归档与归档日志模式无关这是为了可以参考之前in doubt事务中的信息

4.SUNDB数据库复制

4.1 复制简介

本章介绍CYCLONE与LOGMIRRORCYFILE

SUNDB的复制支持采用CDC方式复制事务的CYCLONE与复制源数据库的重做日志（redo log file）的LOGMIRROR

CYFILE将使用CDC方式反映到源数据库的事务以Comma-Separated Values (CSV)形式的文件存储/记录

| 名称 | 复制对象 | 说明 |
|-----------|---------------|-------------------------------------|
| CYCLONE | Transaction | 采用CDC方式将反映到Master的事务复制到slave |
| LOGMIRROR | Redo log file | 把主数据库（master）的重做日志文件复制到从属数据库（slave） |
| CYFILE | Transaction | 使用CDC方式以CSV形式的文件存储/记录事务 |

Table 4-1 复制工具介绍

- CYCLONE
 - 使用Change Data Capture(CDC)方式分析及加工源数据库的重做日志文件并反映到远程数据库

- 由于分析存储于数据库的重做日志文件的内容因此仅支持异步（Async）模式
- LOGMIRROR
 - 把源数据库中存储的重做日志文件复制到远程数据库
 - 为了防止异步模式运行的CYCLONE引起数据丢失而执行
- CYFILE
 - 以CDC方式分析数据库的重做日志文件并以CSV形式的数据文件存储
 - 根据用户所需的开发目的使用该文件进行复制或执行ETL

4.2 运行方法

CYCLONE

一般的运行方法及选项说明参考[CYCLONE](#)

节点的增加与删除

CYCLONE以组为单位运行与复制节点相同即增加节点时增加组删除节点时删除组

增加节点示例

- 在主配置文件（Master configuration file）中记录要增加的 Group 2
 - 每个组设置其唯一端口
 - 默认主配置文件：\$SUNDB_DATA/conf/cyclone.master.conf
 - 以下为已运行中的group 1节点

```
...
```

```
...
```

```
GROUP_NAME = Group1
```

```
{
```

```
    PORT = 21102
```

```
    CAPTURE_TABLE =
```

```
    (
```

```
        testTable1,  
        testTable2  
    )  
}
```

- 以下为要添加的group 2节点

```
GROUP_NAME = Group2  
{  
    PORT = 21103  
    CAPTURE_TABLE =  
    (  
        testTable5,  
        testTable6  
    )  
}
```

- 在从属（Slave）配置文件中记录要增加的Group2
 - 与添加在主配置文件(Master)的Group2的端口一致
 - 默认从属配置文件：\$SUNDB_DATA/conf/cyclone.slave.conf
 - 以下为已运行中group 1节点

```
...  
...  
GROUP_NAME = Group1  
{
```

```
PORT = 21102

APPLY_TABLE =

(
    testTable1 To testTable3,
    testTable2 To testTable4
)
}
```

- 。 以下为要添加的group 2节点

```
GROUP_NAME = Group2
{
    PORT = 21103
    APPLY_TABLE =
    (
        testTable5 To testTable7,
        testTable6 To testTable8
    )
}
```

- 在主（master）设备中执行并查看增加的group2节点

```
prompt> cyclone --master --start --group Group2
```

```
[GROUP2] Startup done as Master.
```

```
prompt> cyclone --master --status
```

```

=====
|          CYCLONE STATUS - MASTER          |
=====
GROUP1 Running...
GROUP2 Running...
-----

```

- 在从属（slave）设备中执行并查看增加的group2节点

```
prompt> cyclone --slave --start --group Group2
```

```
[GROUP2] Startup done as Slave.
```

```
prompt> cyclone --slave --status
```

```

=====
          CYCLONE STATUS - SLAVE
=====
GROUP1 Running...
GROUP2 Running...
-----

```

删除节点示例

- 在从属（slave）设备中结束要删除的group2节点

```
prompt> cyclone --slave --stop --group Group2
```

```
stop done.
```

```
prompt> cyclone --slave --status
=====
CYCLONE STATUS - SLAVE
=====
GROUP1 Running...
-----
```

- 在主（master）设备中结束要删除的group2节点

```
prompt> cyclone --master --stop --group Group2
stop done.
```

```
prompt> cyclone --master --status
=====
CYCLONE STATUS - MASTER
=====
GROUP1 Running...
-----
```

- 在主配置文件中删除group2节点
 - 默认的主配置文件：`$SUNDB_DATA/conf/cyclone.master.conf`
 - 以下为已运行中group 1节点

...

...

```
GROUP_NAME = Group1
{
    PORT = 21102
    CAPTURE_TABLE =
    (
        testTable1,
        testTable2
    )
}
```

- 删除group 2节点

```
GROUP_NAME = Group2
{
    PORT = 21103
    CAPTURE_TABLE =
    (
        testTable5,
        testTable6
    )
}
```

- 在从属配置文件中删除group2节点
 - 默认从属配置文件：\$SUNDB_DATA/conf/cyclone.slave.conf
 - 以下为已运行中group 1节点

```
...  
...  
GROUP_NAME = Group1  
{  
    PORT = 21102  
    APPLY_TABLE =  
    (  
        testTable1 To testTable3,  
        testTable2 To testTable4  
    )  
}
```

- 删除group 2节点

```
GROUP_NAME = Group2  
{  
    PORT = 21103  
    APPLY_TABLE =  
    (  
        testTable5 To testTable7,  
        testTable6 To testTable8  
    )  
}
```

复制初始化

当执行复制的现有节点或组的表由于DDL操作等原因放弃执行复制时可执行复制初始化可以初始化特定节点或整个节点

复制初始化通过对在slave端执行的复制使用--reset选项进行重启来实现Master端不需要另行进行操作

特定节点的复制初始化示例

- 在从属设备端结束要初始化的group2节点

```
prompt> cyclone --slave --stop --group Group2
```

```
stop done.
```

```
prompt> cyclone --slave --status
```

```
=====
```

```
          CYCLONE STATUS - SLAVE
```

```
=====
```

```
GROUP1 Running...
```

```
-----
```

- 在从属设备端使用--reset选项重启group2节点
 - 在主设备端不用另外操作
 - 从当前时间点开始重启复制

```
prompt> cyclone --slave --start --reset --group Group2
```



```
[GROUP2] Startup done as Slave.
```

```
prompt> cyclone --slave --status
```

```
=====
```

```
                CYCLONE STATUS - SLAVE
```

```
=====
```

```
GROUP1 Running...
```

```
GROUP2 Running...
```

```
-----
```

所有节点的复制初始化示例

- 在从属设备端结束运行中的所有cyclone

```
prompt> cyclone --slave --stop
```

- 在从属设备端使用--reset选项重启
 - 在主设备端不用另外操作
 - 从当前时间点开始重启复制

```
prompt> cyclone --slave --start --reset
```

```
[GROUP1] Startup done as Slave.
```

```
[GROUP2] Startup done as Slave.
```

```
prompt> cyclone --slave --status
```

```
=====
```

```
CYCLONE STATUS - SLAVE
```

```
=====
GROUP1 Running...
GROUP2 Running...
-----
```

LOGMIRROR

一般的运行方法及选项说明参考[LOGMIRROR](#)

查看LOGMIRROR状态

联动LOGMIRROR时SUNDB会包含LOGMIRROR的响应等待过程如果LOGMIRROR处于等待响应的状态则SUNDB也会以blocked状态等待相关状态可以在 v\$system_stat中查看

```
gSQL> SELECT * FROM V$SYSTEM_STAT WHERE STAT_NAME='LOG_MIRROR_SYNC_STATE';
```

| STAT_NAME | STAT_VALUE | COMMENTS |
|-----------------------|------------|---|
| LOG_MIRROR_SYNC_STATE | 0 | logmirror sync state(0 : sync, 1 : blocked) |

```
1 row selected.
```

STAT_VALUE为'0'时表示非等待状态的一般状态'1'为等待响应的blocked状态若在等待响应的状

态下重启SUNDB服务会变更LOG_MIRROR_TIMEOUT从而中断LOGMIRROR服务

```
gSQL> ALTER SYSTEM SET LOG_MIRROR_TIMEOUT = 20;
```

```
System altered.
```

复制初始化

需手动执行LogMirror的复制初始化这是为了防止用户操作不当导致误删数据或出现无法恢复的状态

Note:

LOGMIRROR的Slave端存储控制文件和重做日志文件其中在控制文件中存储及更新运行所需的相关信息

复制初始化示例

- 在从属设备端结束运行中的LOGMIRROR

```
prompt> logmirror --slave --stop  
stop done.
```

- 在主设备端结束运行中的LOGMIRROR

```
prompt> logmirror --master --stop  
stop done.
```

- 在从属设备端删除控制文件与重做日志文件
 - 相关路径参考从属配置文件中描述的'LOG_PATH'选项
 - 默认LOGMIRROR从属配置文件 : \$SUNDB_DATA/conf/logmirror.slave.conf

CYFILE

一般的运行方法与选项相关详细内容参考[CYFILE](#)

Cyfile开始与终止查看状态

运行示例

- 使用默认环境文件从当前时间点开始cyfile

```
prompt> cyfile --start --reset all
```

```
Startup done.
```

- 终止cyfile

```
prompt> cyfile --stop
```

```
Stop done.
```

- CYFILE以group为单位执行数据文件也以group为单位创建

```
prompt> cyfile --status
```

```
cyfile --status
```

```
=====
|          CYFILE STATUS          |
=====
GROUP1 Running...
=====
```



4.3 跟踪日志

以下为Trace log的详细信息

| 名称 | 区分 | 文件名 |
|-----------|--------|-------------------------------|
| CYCLONE | Master | cyclone_master_GROUP_NAME.trc |
| | Slave | cyclone_slave_GROUP_NAME.trc |
| LOGMIRROR | Master | LogMirror_master.trc |
| | Slave | LogMirror_slave.trc |
| CYFILE | - | cyfile_GROUP_NAME.trc |

CYCLONE报错信息及处理方法

以下为CYCLONE的报错信息以及处理方法

| 报错信息 | 处理方法 |
|------------------------------------|--------------------|
| Service is not available | 查看SUNDB是否正常运行 |
| table does not exist | 查看配置文件里描述的表名称 |
| schema does not exist | 查看配置文件里描述的schema名称 |
| previously added. Maybe duplicated | 查看配置文件里描述的表是否重复 |

| 报错信息 | 处理方法 |
|---|--|
| table must have a primary key | 查看配置文件里描述的表是否有主键 |
| internal error occurred. | 查看详细报错信息 |
| table must set supplemental log | 查看SUNDB是否执行了Supplemental Logging |
| group XXX is already running | 查看对应群组是否已运行 |
| SUNDB_DATA system environment is invalid | 查看是否已设置SUNDB_DATA环境变量 |
| log file reused or invalid. restart cyclone with '--reset' option | 重做日志文件已被再使用或没有归档的重做日志文件 应当初始化并重启cyclone |
| fail to analyze flow | 分析异常重做日志时发生的错误查看 Master端与Slave端的SUNDB release版本是否一致 |
| Communication link failure | 查看网络状态重启Cyclone |
| Master disconnect abnormally | 查看网络状态重启Cyclone |
| Protocol error occurred | 查看详细报错信息 |
| Already slave connected | 查看slave是否已运行 |
| Invalid group name | 开始/结束时查看群组名称要与配置文件定义的群组名一致 |

| 报错信息 | 处理方法 |
|------------------------------|--|
| Invalid capture information | 现有的运行信息异常时需要初始化并重启 cyclone |
| Redo log file read timeout | 查看归档的重做日志文件是否正常存在 |
| Invalid archive log file | 归档的重做日志文件异常的状态需要初始化并重启 cyclone |
| Fail to write file | 查看磁盘剩余空间后重启 cyclone |
| Invalid Meta File | Cyclone管理的Meta文件损坏时会出现这种报错需要初始化并重启 cyclone |
| Redo log file does not exist | 查看以Master运行的SUNDB是否在正常运行 |
| [APPLIER-INSERT] XXX | 由于该原因INSERT失败 |
| [APPLIER-DELETE] XXX | 由于该原因DELETE失败 |
| [APPLIER-UPDATE] XXX | 由于该原因UPDATE失败 |

LOGMIRROR报错信息及处理方法

以下为LOGMIRROR的报错信息以及处理方法

| 报错信息 | 处理方法 |
|--|--|
| Service is not available | 查看SUNDB是否正常运行 |
| Invalid Protocol value | 查看详细报错信息 |
| file does not exist | 查看对应文件是否正常存在 |
| invalid Control file | 控制文件已损坏的状态初始化并重启LOGMIRROR |
| Communication link failure | 查看网络状态重启LOGMIRROR |
| SUNDB_DATA system environment is invalid | 查看是否已设置SUNDB_DATA环境变量 |
| There is no Shared Memory Area for LogMirror | 查看以Master运行的SUNDB的参数中是否已正常 Enable LOG_MIRROR_MODE |
| Master disconnect abnormally | 查看网络状态重启LOGMIRROR |
| Invalid Log File | 查看对应文件是否正常存在 |
| Connection Information does not exist | 查看配置文件中的SUNDB访问信息是否正常 |
| Archive Log File does not exist | 查看是否正常设置以Master运行的SUNDB的 ARCHIVELOG_MODE |

CYFILE报错信息及处理方法

以下为CYFILE的报错信息以及处理方法

| 报错信息 | 处理方法 |
|---|--|
| Service is not available | 查看SUNDB是否正常运行 |
| table does not exist | 查看环境文件中描述的table名 |
| schema does not exist | 查看环境文件中描述的schema名 |
| previously added. Maybe duplicated | 查看环境文件中描述的table是否重复 |
| table must have a primary key | 查看环境文件中描述的table是否有 primary key |
| internal error occurred. | 查看详细错误 |
| table must set supplemental log | 查看SUNDB是否supplemental logging |
| group XXX is already running | 查看该group是否已执行 |
| SUNDB_DATA system environment is invalid | 查看是否设置SUNDB_DATA环境变量 |
| log file reused or invalid. restart cyfile with '--reset' option | 重复使用了redo log file或没有archiving的 redo log file 初始化cyfile后重新开始 |
| fail to analyze flow | 分析异常重做日志时产生的错误查看 master和slave的SUNDB release版本是否一 致 |
| Invalid group name | 查看 开启/终止 时指定的group名应与环 境文件中描述的名称相同 |

| 报错信息 | 处理方法 |
|-------------------------------|--------------------------------------|
| Invalid capture information | 原有的运营信息异常的情况初始化cyfile后重启 |
| Redo log file read timeout | 查看archiving的重做日志文件是否正常存在 |
| Invalid archive log file | archiving的该文件异常的情况要初始化cyfile后重启 |
| Fail to write file | 查看磁盘的冗余容量后重启cyfile |
| Invalid Meta File | Cyfile管理的meta文件损坏时产生的错误要初始化cyfile后重启 |
| Redo log file does not exist | 查看SUNDB是否正常运行 |
| Control has broken(CRC Error) | Cyfile的control file损坏的情况使用mirror文件重试 |

5. 数据库信息

5.1 DICTIONARY_SCHEMA

DICTIONARY_SCHEMA包含系统中的SQL对象与用于获取与此相关的信息的视图或表

Note:

从OPEN阶段开始可查询DICTIONARY_SCHEMA的视图和表

为了使用该视图需如下执行DictionarySchema.sql

- Standalone的情况

```
% gsql sys gliese --as sysdba --import  
$SUNDB_HOME/admin/standalone/DictionarySchema.sql
```

- Cluster的情况

```
% gsql sys gliese --as sysdba --import  
$SUNDB_HOME/admin/cluster/DictionarySchema.sql
```

通过视图或表的名称可获取如下信息

- ALL视图

- 名称以ALL_开头的视图
- 当前用户可访问的对象信息
- DBA视图
 - 名称以DBA_开头的视图
 - 拥有DBA权限（ACCESS CONTROL ON DATABASE）的当前用户的所有对象信息
- USER视图
 - 名称以USER_开头的视图
 - 当前用户拥有的对象信息

ALL视图

可获取当前用户可访问的对象信息

ALL_ALL_TABLES

ALL_ALL_TABLES描述当前用户可以访问的对象表与关系表

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the table |
| CLUSTER_NAME | VARCHAR(128) | Name of the cluster <ul style="list-style-type: none">reserved |
| IOT_NAME | VARCHAR(128) | Name of the index-organized table <ul style="list-style-type: none">reserved |

| 列名称 | 数据类型 | 说明 |
|----------------|-------------|--|
| STATUS | VARCHAR(32) | If a previous DROP TABLE operation failed, indicates whether the table is unusable (UNUSABLE) or valid (VALID) |
| PCT_FREE | NUMBER | Minimum percentage of free space in a block |
| PCT_USED | NUMBER | Minimum percentage of used space in a block |
| INI_TRANS | NUMBER | Initial number of transactions |
| MAX_TRANS | NUMBER | Maximum number of transactions |
| INITIAL_EXTENT | NUMBER | Size of the initial extent (in bytes) |
| NEXT_EXTENT | NUMBER | Size of secondary extents (in bytes) |
| MIN_EXTENTS | NUMBER | Minimum number of extents allowed in the segment |
| MAX_EXTENTS | NUMBER | Maximum number of extents allowed in the segment |
| PCT_INCREASE | NUMBER | Percentage increase in extent size <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|------------|---|
| FREELISTS | NUMBER | Number of process freelists allocated to the segment • reserved |
| FREELIST_GROUPS | NUMBER | Number of freelist groups allocated to the segment • reserved |
| LOGGING | VARCHAR(3) | Indicates whether or not changes to the table are logged |
| BACKED_UP | VARCHAR(1) | Indicates whether the table has been backed up since the last modification (Y) or not (N) • reserved |
| NUM_ROWS | NUMBER | Number of rows in the table |
| BLOCKS | NUMBER | Number of used blocks in the table |
| ANAL_BLOCKS | NUMBER | Number of used blocks in the table when most recently analyzed |

| 列名称 | 数据类型 | 说明 |
|---------------------------|--------|--|
| EMPTY_BLOCKS | NUMBER | Number of empty (never used) blocks in the table <ul style="list-style-type: none">reserved |
| AVG_SPACE | NUMBER | Average available free space in the table <ul style="list-style-type: none">reserved |
| CHAIN_CNT | NUMBER | Number of rows in the table that are chained from one data block to another or that have migrated to a new block, requiring a link to preserve the old rowid <ul style="list-style-type: none">reserved |
| AVG_ROW_LEN | NUMBER | Average row length, including row overhead <ul style="list-style-type: none">reserved |
| AVG_SPACE_FREELIST_BLOCKS | NUMBER | Average freespace of all blocks on a freelist <ul style="list-style-type: none">reserved |

| 列名称 | 数据类型 | 说明 |
|---------------------|-------------|--|
| NUM_FREELIST_BLOCKS | NUMBER | Number of blocks on the freelist <ul style="list-style-type: none"> reserved |
| DEGREE | VARCHAR(32) | Number of threads per instance for scanning the table, or DEFAULT <ul style="list-style-type: none"> reserved |
| INSTANCES | VARCHAR(32) | Number of instances across which the table is to be scanned, or DEFAULT <ul style="list-style-type: none"> reserved |
| CACHE | VARCHAR(1) | Indicates whether the table is to be cached in the buffer cache (Y) or not (N) <ul style="list-style-type: none"> reserved |
| TABLE_LOCK | VARCHAR(32) | Indicates whether table locking is enabled (ENABLED) or disabled (DISABLED) |
| SAMPLE_SIZE | NUMBER | Sample size used in analyzing the table |

| 列名称 | 数据类型 | 说明 |
|------------------|--------------------------------------|---|
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which the table was most recently analyzed |
| PARTITIONED | VARCHAR(3) | Indicates whether the table is partitioned (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| IOT_TYPE | VARCHAR(32) | If the table is an index-organized table, then IOT_TYPE is IOT, IOT_OVERFLOW, or IOT_MAPPING. <ul style="list-style-type: none"> reserved |
| OBJECT_ID_TYPE | VARCHAR(32) | Indicates whether the object ID (OID) is USER-DEFINED or SYSTEM GENERATED <ul style="list-style-type: none"> reserved |
| TABLE_TYPE_OWNER | VARCHAR(128) | If an object table, owner of the type from which the table is created <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|--|
| TABLE_TYPE | VARCHAR(128) | If an object table, type of the table <ul style="list-style-type: none"> reserved |
| TEMPORARY | VARCHAR(1) | Indicates whether the table is temporary (Y) or not (N) |
| SECONDARY | VARCHAR(1) | Indicates whether the table is a secondary object created by cartridge <ul style="list-style-type: none"> reserved |
| NESTED | VARCHAR(3) | Indicates whether the table is a nested table (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| BUFFER_POOL | VARCHAR(32) | Buffer pool to be used for table blocks <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|------------------|-------------|--|
| FLASH_CACHE | VARCHAR(32) | Database Smart Flash Cache hint to be used for table blocks <ul style="list-style-type: none"> reserved |
| CELL_FLASH_CACHE | VARCHAR(32) | Cell flash cache hint to be used for table blocks |
| ROW_MOVEMENT | VARCHAR(32) | If a partitioned table, indicates whether row movement is enabled (ENABLED) or disabled (DISABLED) <ul style="list-style-type: none"> reserved |
| GLOBAL_STATS | VARCHAR(3) | For partitioned tables, indicates whether statistics for the table as a whole (global statistics) are accurate (YES) <ul style="list-style-type: none"> reserved |
| USER_STATS | VARCHAR(3) | Indicates whether statistics were entered directly by the user (YES) or not (NO) <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|--|
| DURATION | VARCHAR(32) | Indicates the duration of a temporary table, the value is in (TRANSACTION, SESSION) |
| SKIP_CORRUPT | VARCHAR(32) | Indicates whether Database ignores blocks marked corrupt during table and index scans (ENABLED) or raises an error (DISABLED) <ul style="list-style-type: none"> reserved |
| MONITORING | VARCHAR(3) | Indicates whether the table has the MONITORING attribute set (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| CLUSTER_OWNER | VARCHAR(128) | Owner of the cluster, if any <ul style="list-style-type: none"> reserved |
| DEPENDENCIES | VARCHAR(32) | Indicates whether row-level dependency tracking is enabled (ENABLED) or disabled (DISABLED) <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|--|
| COMPRESSION | VARCHAR(32) | Indicates whether table compression is enabled (ENABLED) or not (DISABLED) • reserved |
| COMPRESS_FOR | VARCHAR(32) | Default compression for what kind of operations • reserved |
| DROPPED | VARCHAR(3) | Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO) |
| READ_ONLY | VARCHAR(3) | Indicates whether the table IS READ-ONLY (YES) or not (NO) |
| SEGMENT_CREATED | VARCHAR(3) | Indicates whether the table segment has been created (YES) or not (NO) |

Table 5-1 列信息

ALL_ARGUMENTS

ALL_ARGUMENTS列出函数过程的所有参数

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of function, procedures or package |
| SCHEMA_NAME | VARCHAR(128) | Schema Name of function, procedures or package |
| OBJECT_NAME | VARCHAR(128) | Name of function,procedures |
| PACKAGE_NAME | VARCHAR(128) | Package Name of function,procedures |
| OBJECT_ID | NUMBER | ID of a function,procedures |
| SUBPROGRAM_ID | NUMBER | ID of procedures in pacakage |
| ARGUMENT_NAME | VARCHAR(128) | Name of argument or attribute name of record type argument |
| POSITION | NUMBER | Position of argument or position of attribute in record type |
| SEQUENCE | NUMBER | Sequential order of argument and its attributes |
| DATA_LEVEL | NUMBER | Nesting depth of the argument for composite types |
| DATA_TYPE | VARCHAR(128) | Data type of the argument |
| DEFAULTED | VARCHAR(1) | Whether or not the argument is defaulted |
| DEFAULT_VALUE | VARCHAR(1) | Reserved for future use |

| 列名称 | 数据类型 | 说明 |
|--------------------|--------------|---|
| DEFAULT_LENGTH | VARCHAR(1) | Reserved for future use |
| IN_OUT | VARCHAR(32) | Direction of the argument (IN, OUT, IN/OUT) |
| DATA_LENGTH | NUMBER | Length of the column(in bytes) |
| DATA_PRECISION | NUMBER | Length in decimal digits(NUMBER) or binary digits(FLOAT) |
| DATA_SCALE | NUMBER | Digits to the right of the decimal point in a number |
| RADIX | NUMBER | Argument radix for a number |
| CHARACTER_SET_NAME | VARCHAR(128) | Character set name for the argument |
| TYPE_OWNER | VARCHAR(128) | Owner of the type of the argument |
| TYPE_NAME | VARCHAR(128) | Name of the type of the argument |
| TYPE_SUBNAME | VARCHAR(128) | Name of the type of the argument declared in package |
| TYPE_LINK | VARCHAR(128) | Name of the type of the argument declared in a remote package |
| PLS_TYPE | VARCHAR(128) | Name of the type of the argument at PSM |
| CHAR_LENGTH | NUMBER | Character limit for string datatypes |
| CHAR_USED | VARCHAR(1) | Whether the byte limit(B) or char limit(C) is official for the string |
| ORIGIN_CON_ID | VARCHAR(256) | ID of the container where the data originates |

Table 5-2 列信息

ALL_CATALOG

ALL_CATALOG显示当前用户可访问的表视图同义词以及序列

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the TABLE, VIEW, SYNONYM, SEQUENCE, or UNDEFINED |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the TABLE, VIEW, SYNONYM, SEQUENCE, or UNDEFINED |
| TABLE_NAME | VARCHAR(128) | Name of the TABLE, VIEW, SYNONYM, SEQUENCE, or UNDEFINED |
| TABLE_TYPE | VARCHAR(32) | Type of the TABLE, VIEW, SYNONYM, SEQUENCE, or UNDEFINED |

Table 5-3 列信息

ALL_CLUSTER_TABLES

ALL_CLUSTER_TABLES描述集群系统中当前用户可访问的所有集群表

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| SHARD_STRATEGY | VARCHAR(32) | Sharding strategy of the table: the value in (CLONED, HASH SHARDING, RANGE SHARDING, LIST SHARDING) |
| SHARD_PLACEMENT | VARCHAR(32) | Shard placement of the table: the value in (AT CLUSTER WIDE or AT CLUSTER GROUP) |
| SHARD_COUNT | NUMBER | Shard count of the table (if cloned table, the value is null) |
| SHARD_KEY_COUNT | NUMBER | Shard key column count of the table (if cloned table, the value is null) |

| 列名称 | 数据类型 | 说明 |
|---------|------------|---|
| HAS_GSI | VARCHAR(3) | Indicate whether the table has global secondary index: (YES) or (NO) |
| DROPPED | VARCHAR(3) | Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-4 列信息

ALL_COL_COMMENTS

ALL_COL_COMMENTS显示当前用户可访问的表与视图的列上的注释

| 列名称 | 数据类型 | 说明 |
|--------------|---------------|-----------------------|
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Name of the column |
| COMMENTS | VARCHAR(1024) | Comment on the column |

Table 5-5 列信息

ALL_COL_PRIVS

ALL_COL_PRIVS描述当前用户为对象的所有者对象的授权者或对象的被授权者的对象授权情况或者当前用户已启用的角色或PUBLIC角色是被授权者的对象授权情况

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Name of the column |
| PRIVILEGE | VARCHAR(32) | Privilege on the column |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-6 列信息

ALL_COL_PRIVS_MADE

ALL_COL_PRIVS_MADE描述当前用户为对象所有者或授权者的列对象授权情况

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Name of the column |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the column |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-7 列信息

ALL_COL_PRIVS_REC'D

ALL_COL_PRIVS_REC'D描述当前用户为被授权者或者当前用户启用的角色或PUBLIC角色是被授权者的列对象授权情况

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Name of the column |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the column |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-8 列信息

ALL_CONSTRAINTS

ALL_CONSTRAINTS描述对当前用户可访问的表的约束定义

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the constraint definition |
| CONSTRAINT_SCHEMA | VARCHAR(128) | Schema of the constraint definition |
| CONSTRAINT_NAME | VARCHAR(128) | Name of the constraint definition |
| CONSTRAINT_TYPE | VARCHAR(1) | Type of the constraint definition: the value in (C: check constraint, P: Primary key, U: Unique Key, R: Referential integrity) |
| TABLE_OWNER | VARCHAR(128) | Owner of the table (or view) associated with the constraint definition |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table (or view) associated with the constraint definition |
| TABLE_NAME | VARCHAR(128) | Name of the table (or view) associated with the constraint definition |
| SEARCH_CONDITION | LONG VARCHAR | Text of search condition for a check constraint |
| R_OWNER | VARCHAR(128) | Owner of the unique constraint definition for the referenced table |
| R_SCHEMA | VARCHAR(128) | Schema of the unique constraint definition for the referenced table |

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|---|
| R_CONSTRAINT_NAME | VARCHAR(128) | Name of the unique constraint definition for the referenced table |
| DELETE_RULE | VARCHAR(32) | Delete rule for a referential constraint: the value in (NO ACTION, RESTRICT, CASCADE, SET NULL, SET DEFAULT) |
| UPDATE_RULE | VARCHAR(32) | Update rule for a referential constraint: the value in (NO ACTION, RESTRICT, CASCADE, SET NULL, SET DEFAULT) |
| STATUS | VARCHAR(32) | Enforcement status of the constraint: the value in (ENABLED, DISABLE) |
| DEFERRABLE | VARCHAR(32) | Indicates whether the constraint is deferrable (DEFERRABLE) or not (NOT DEFERRABLE) |
| DEFERRED | VARCHAR(32) | Indicates whether the constraint was initially deferred (DEFERRED) or not (IMMEDIATE) |
| VALIDATED | VARCHAR(32) | Indicates whether all data may obey the constraint or not: the value in (VALIDATED, NOT VALIDATED) |
| GENERATED | VARCHAR(32) | Indicates whether the name of the constraint is user-generated (USER NAME) or system-generated (GENERATED NAME) |

| 列名称 | 数据类型 | 说明 |
|--------------|--------------------------------------|---|
| BAD | VARCHAR(32) | Indicates whether this constraint specifies a century in an ambiguous manner (BAD) or not (NULL) <ul style="list-style-type: none"> reserved |
| RELY | VARCHAR(32) | When NOT VALIDATED, indicates whether the constraint is to be taken into account for query rewrite (RELY) or not (NULL) <ul style="list-style-type: none"> reserved |
| LAST_CHANGE | TIMESTAMP(6) WITHOUT TIME ZONE | When the constraint was last enabled or disabled |
| INDEX_OWNER | VARCHAR(128) | Owner of the index associated with the key constraint |
| INDEX_SCHEMA | VARCHAR(128) | Schema of the index associated with the key constraint |
| INDEX_NAME | VARCHAR(128) | Name of the index associated with the key constraint |
| INVALID | VARCHAR(32) | Indicates whether the constraint is invalid (INVALID) or not (NULL) |
| VIEW_RELATED | VARCHAR(32) | Indicates whether the constraint depends on a view (DEPEND ON VIEW) or not (NULL) |

| 列名称 | 数据类型 | 说明 |
|----------|---------------|---|
| DROPPED | VARCHAR(3) | Indicates whether the constraint has been dropped and is in the recycle bin (YES) or not (NO) |
| COMMENTS | VARCHAR(1024) | Comments of the constraint definition |

Table 5-9 列信息

ALL_CONS_COLUMNS

ALL_CONS_COLUMNS描述当前用户可以访问的在约束中指定的列

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of the constraint definition |
| CONSTRAINT_SCHEMA | VARCHAR(128) | Schema of the constraint definition |
| CONSTRAINT_NAME | VARCHAR(128) | Name of the constraint definition |
| TABLE_OWNER | VARCHAR(128) | Owner of the table with the constraint definition |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table with the constraint definition |
| TABLE_NAME | VARCHAR(128) | Name of the table with the constraint definition |
| COLUMN_NAME | VARCHAR(128) | Name of the column or attribute of the object type column specified in the constraint definition |
| POSITION | NUMBER | Original position of the column or attribute in the definition of the object |

Table 5-10 列信息

ALL_DB_PRIVS

ALL_DB_PRIVS描述当前用户为授权者或被授权者或者当前用户启用的角色或PUBLIC角色是被授权者的数据库授权情况

| 列名称 | 数据类型 | 说明 |
|-----------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PRIVILEGE | VARCHAR(32) | Privilege on the database |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-11 列信息

ALL_DB_PRIVS_MADE

ALL_DB_PRIVS_MADE描述当前用户为授权者的数据库授权情况

| 列名称 | 数据类型 | 说明 |
|-----------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the database |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-12 列信息

ALL_DB_PRIVS_REC'D

ALL_DB_PRIVS_REC'D描述当前用户为被授权者或者当前用户启用的角色或PUBLIC角色是被授权者的数据库授权情况

| 列名称 | 数据类型 | 说明 |
|-----------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the database |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-13 列信息

ALL_DEPENDENCIES

ALL_DEPENDENCIES描述当前用户可访问的对象之间的依赖关系

| 列名称 | 数据类型 | 说明 |
|------------------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of object |
| SCHEMA_NAME | VARCHAR(128) | Schema Name of object |
| NAME | VARCHAR(128) | Name of object |
| TYPE | VARCHAR(32) | Type of object: FUNCTION, PROCEDURE, VIEW, PACKAGE, PACKAGE BODY, TRIGGER |
| REFERENCED_OWNER | VARCHAR(128) | Owner of the referenced object |
| REFERENCED_SCHEMA_NAME | VARCHAR(128) | Schema Name of the referenced object |
| REFERENCED_TYPE | VARCHAR(32) | Type of the referenced object: FUNCTION, PROCEDURE, TABLE, VIEW, SEQUENCE, PACKAGE, PACKAGE BODY, TRIGGER |
| REFERENCED_LINK_NAME | VARCHAR(128) | Name of the link to the parent object |
| REFERENCED_NAME | VARCHAR(128) | Name of the referenced object |
| DEPENDENCY_TYPE | VARCHAR(32) | Indicates whether the dependency is a REF dependency(REF) or not (HARD) |

Table 5-14 列信息

ALL_GLOBAL_SECONDARY_INDEXES

ALL_GLOBAL_SECONDARY_INDEXES描述当前用户可访问的表上的全局二级索引

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| TABLE_OWNER | VARCHAR(128) | Owner of the global secondary indexed object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the global secondary indexed object |
| TABLE_NAME | VARCHAR(128) | Name of the global secondary indexed object |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the global secondary index |
| INI_TRANS | NUMBER | Initial number of transactions |
| MAX_TRANS | NUMBER | Maximum number of transactions |
| INITIAL_EXTENT | NUMBER | Size of the initial extent |
| NEXT_EXTENT | NUMBER | Size of secondary extents |
| MIN_EXTENTS | NUMBER | Minimum number of extents allowed in the segment |
| MAX_EXTENTS | NUMBER | Maximum number of extents allowed in the segment |
| PCT_FREE | NUMBER | Minimum percentage of free space in a block |

| 列名称 | 数据类型 | 说明 |
|--------------|------------|---|
| LOGGING | VARCHAR(3) | Indicates whether or not changes to the global secondary index are logged: (YES) or (NO) |
| BLOCKS | NUMBER | Number of used blocks in the global secondary index |
| EMPTY_BLOCKS | NUMBER | Number of empty blocks in the global secondary index |
| DROPPED | VARCHAR(3) | Indicates whether the global secondary index has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-15 列信息

ALL_GSI_PLACE

ALL_GSI_PLACE描述集群系统中当前用户可访问的表的所有全局二级索引的节点位置

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| TABLE_OWNER | VARCHAR(128) | Owner of the global secondary indexed object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the global secondary indexed object |
| TABLE_NAME | VARCHAR(128) | Name of the global secondary indexed object |
| GROUP_ID | NUMBER | Group identifier of the node where the global secondary index placed |
| GROUP_NAME | VARCHAR(128) | Group name of the node where the global secondary index placed |
| MEMBER_ID | NUMBER | Member identifier of the node where the global secondary index placed |
| MEMBER_NAME | VARCHAR(128) | Member name of the node where the global secondary index placed |
| MEMBER_OFFLINE | BOOLEAN | data of the cluster member is offline or not |

| 列名称 | 数据类型 | 说明 |
|---------|------------|---|
| DROPPED | VARCHAR(3) | Indicates whether the global secondary index has been dropped and is in the recycle bin (YES) or not (NO) |
| BLOCKS | NUMBER | Number of used blocks of the node where the global secondary index placed |

Table 5-16 列信息

ALL_INDEXES

ALL_INDEXES描述当前用户可访问的表的索引

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the index |
| INDEX_SCHEMA | VARCHAR(128) | Schema of the index |
| INDEX_NAME | VARCHAR(128) | Name of the index |
| INDEX_TYPE | VARCHAR(32) | Type of the index: the value in (NORMAL, NORMAL/REV, BITMAP, FUNCTION-BASED NORMAL, FUNCTION-BASED NORMAL/REV, FUNCTION-BASED BITMAP, IOT - TOP, DOMAIN) |
| TABLE_OWNER | VARCHAR(128) | Owner of the indexed object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the indexed object |
| TABLE_NAME | VARCHAR(128) | Name of the indexed object |
| TABLE_TYPE | VARCHAR(32) | Type of the indexed object: the value in (NEXT OBJECT, INDEX, TABLE, VIEW, SYNONYM, SEQUENCE) |
| UNIQUENESS | VARCHAR(32) | Indicates whether the index is unique (UNIQUE) or nonunique (NONUNIQUE) |

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| COMPRESSION | VARCHAR(32) | Indicates whether index compression is enabled (ENABLED) or not (DISABLED) <ul style="list-style-type: none"> reserved |
| PREFIX_LENGTH | NUMBER | Number of columns in the prefix of the compression key <ul style="list-style-type: none"> reserved |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the index |
| INI_TRANS | NUMBER | Initial number of transactions |
| MAX_TRANS | NUMBER | Maximum number of transactions |
| INITIAL_EXTENT | NUMBER | Size of the initial extent |
| NEXT_EXTENT | NUMBER | Size of secondary extents |
| MIN_EXTENTS | NUMBER | Minimum number of extents allowed in the segment |
| MAX_EXTENTS | NUMBER | Maximum number of extents allowed in the segment |

| 列名称 | 数据类型 | 说明 |
|----------------|--------|---|
| PCT_INCREASE | NUMBER | Percentage increase in extent size <ul style="list-style-type: none"> reserved |
| PCT_THRESHOLD | NUMBER | Threshold percentage of block space allowed per index entry <ul style="list-style-type: none"> reserved |
| INCLUDE_COLUMN | NUMBER | Column ID of the last column to be included in index-organized table primary key (non-overflow) index <ul style="list-style-type: none"> reserved |
| FREELISTS | NUMBER | Number of process freelists allocated to this segment <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|------------|---|
| FREELIST_GROUPS | NUMBER | Number of freelist groups allocated to this segment <ul style="list-style-type: none"> reserved |
| PCT_FREE | NUMBER | Minimum percentage of free space in a block |
| LOGGING | VARCHAR(3) | Indicates whether or not changes to the index are logged: (YES) or (NO) |
| BLOCKS | NUMBER | Number of used blocks in the index |
| ANAL_BLOCKS | NUMBER | Number of used blocks in the index when most recently analyzed |
| EMPTY_BLOCKS | NUMBER | Number of empty blocks in the index |
| BLEVEL | NUMBER | B-Tree level (depth of the index from its root block to its leaf blocks) |
| LEAF_BLOCKS | NUMBER | Number of leaf blocks in the index |
| DISTINCT_KEYS | NUMBER | Number of distinct indexed values. |

| 列名称 | 数据类型 | 说明 |
|-------------------------|-------------|--|
| AVG_LEAF_BLOCKS_PER_KEY | NUMBER | <p>Average number of leaf blocks in which each distinct value in the index appears, rounded to the nearest integer</p> <ul style="list-style-type: none"> reserved |
| AVG_DATA_BLOCKS_PER_KEY | NUMBER | <p>Average number of data blocks in the table that are pointed to by a distinct value in the index rounded to the nearest integer</p> <ul style="list-style-type: none"> reserved |
| CLUSTERING_FACTOR | NUMBER | Indicates the amount of order of the rows in the table based on the values of the index |
| STATUS | VARCHAR(32) | Indicates whether a nonpartitioned index is VALID or UNUSABLE |
| NUM_ROWS | NUMBER | <p>Number of rows in the index</p> <ul style="list-style-type: none"> reserved |
| SAMPLE_SIZE | NUMBER | Size of the sample used to analyze the index |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------------------------------|--|
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which this index was most recently analyzed |
| DEGREE | VARCHAR(32) | Number of threads per instance for scanning the index, or DEFAULT • reserved |
| INSTANCES | VARCHAR(32) | Number of instances across which the indexes to be scanned, or DEFAULT • reserved |
| PARTITIONED | VARCHAR(3) | Indicates whether the index is partitioned (YES) or not (NO) • reserved |
| TEMPORARY | VARCHAR(1) | Indicates whether the index is on a temporary table (Y) or not (N) |
| GENERATED | VARCHAR(1) | Indicates whether the name of the index is system-generated (Y) or not (N) |

| 列名称 | 数据类型 | 说明 |
|------------------|-------------|---|
| SECONDARY | VARCHAR(1) | Indicates whether the index is a secondary object created by the method of the Data Cartridge (Y) or not (N) |
| BUFFER_POOL | VARCHAR(32) | Buffer pool to be used for index blocks <ul style="list-style-type: none"> reserved |
| FLASH_CACHE | VARCHAR(32) | Database Smart Flash Cache hint to be used for index blocks <ul style="list-style-type: none"> reserved |
| CELL_FLASH_CACHE | VARCHAR(32) | Cell flash cache hint to be used for index blocks <ul style="list-style-type: none"> reserved |
| USER_STATS | VARCHAR(3) | Indicates whether statistics were entered directly by the user (YES) or not (NO) <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-------------------|---------------|--|
| DURATION | VARCHAR(32) | Indicates the duration of a temporary table, the value is in (TRANSACTION, SESSION) |
| PCT_DIRECT_ACCESS | NUMBER | For a secondary index on an index-organized table, the percentage of rows with VALID guess <ul style="list-style-type: none"> reserved |
| ITYP_OWNER | VARCHAR(128) | For a domain index, the owner of the indextype <ul style="list-style-type: none"> reserved |
| ITYP_NAME | VARCHAR(128) | For a domain index, the name of the indextype <ul style="list-style-type: none"> reserved |
| PARAMETERS | VARCHAR(1024) | For a domain index, the parameter string <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|---|
| GLOBAL_STATS | VARCHAR(3) | For partitioned indexes, indicates whether statistics were collected by analyzing the index as a whole (YES) or were estimated from statistics on underlying index partitions and subpartitions (NO) <ul style="list-style-type: none">• reserved |
| DOMIDX_STATUS | VARCHAR(32) | Status of a domain index <ul style="list-style-type: none">• reserved |
| DOMIDX_OPSTATUS | VARCHAR(32) | Status of the operation on a domain index <ul style="list-style-type: none">• reserved |
| FUNCIDX_STATUS | VARCHAR(32) | Status of a function-based index <ul style="list-style-type: none">• reserved |

| 列名称 | 数据类型 | 说明 |
|-------------------------|------------|---|
| JOIN_INDEX | VARCHAR(3) | <p>Indicates whether the index is a join index (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| IOT_REDUNDANT_PKEY_ELIM | VARCHAR(3) | <p>Indicates whether redundant primary key columns are eliminated from secondary indexes on index-organized tables (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DROPPED | VARCHAR(3) | <p>Indicates whether the index has been dropped and is in the recycle bin (YES) or not (NO)</p> |
| VISIBILITY | VARCHAR(3) | <p>Indicates whether the index is VISIBLE or INVISIBLE to the optimizer</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-------------------|---------------|--|
| DOMIDX_MANAGEMENT | VARCHAR(32) | If this is a domain index, indicates whether the domain index is system-managed (SYSTEM_MANAGED) or user-managed (USER_MANAGED) <ul style="list-style-type: none">reserved |
| SEGMENT_CREATED | VARCHAR(3) | Indicates whether the index segment has been created (YES) or not (NO) |
| COMMENTS | VARCHAR(1024) | Comments of the index |
| EMPTY_BLOCKS | NUMBER | Number of empty blocks in the index |

Table 5-17 列信息

ALL_IND_COLUMNS

ALL_IND_COLUMNS描述当前用户可访问的所有表的索引列

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| INDEX_OWNER | VARCHAR(128) | Owner of the index |
| INDEX_SCHEMA | VARCHAR(128) | Schema of the index |
| INDEX_NAME | VARCHAR(128) | Name of the index |
| TABLE_OWNER | VARCHAR(128) | Owner of the table or cluster |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table or cluster |
| TABLE_NAME | VARCHAR(128) | Name of the table or cluster |
| COLUMN_NAME | VARCHAR(128) | Column name or attribute of the object type column |
| COLUMN_POSITION | NUMBER | Position of the column or attribute within the index |
| COLUMN_LENGTH | NUMBER | Indexed length of the column |
| CHAR_LENGTH | NUMBER | Maximum codepoint length of the column |
| DESCEND | VARCHAR(32) | Indicates whether the column is sorted in descending order (DESC) or ascending order (ASC) |
| NULL_ORDER | VARCHAR(32) | Indicates whether the null value of the column is sorted in nulls first order (NULLS FIRST) or nulls last order (NULLS LAST) |

Table 5-18 列信息

ALL_IND_PLACE

ALL_IND_PLACE描述集群系统中当前用户可访问的表的索引的节点位置

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the index |
| INDEX_SCHEMA | VARCHAR(128) | Schema of the index |
| INDEX_NAME | VARCHAR(128) | Name of the index |
| TABLE_OWNER | VARCHAR(128) | Owner of the indexed object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the indexed object |
| TABLE_NAME | VARCHAR(128) | Name of the indexed object |
| GROUP_ID | NUMBER | Group identifier of the node where the index placed |
| GROUP_NAME | VARCHAR(128) | Group name of the node where the index placed |
| MEMBER_ID | NUMBER | Member identifier of the node where the index placed |
| MEMBER_NAME | VARCHAR(128) | Member name of the node where the index placed |
| MEMBER_OFFLINE | BOOLEAN | data of the cluster member is offline or not |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------------------------------|--|
| DROPPED | VARCHAR(3) | Indicates whether the index has been dropped and is in the recycle bin (YES) or not (NO) |
| DISTINCT_KEYS | NUMBER | (deprecated) |
| SAMPLE_SIZE | NUMBER | (deprecated) |
| BLOCKS | NUMBER | Number of used blocks of the node where the index placed |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | (deprecated) |

Table 5-19 列信息

ALL_NONSCHEMA_COMMENTS

ALL_NONSCHEMA_COMMENTS显示当前用户访问的所有非模式对象(数据库权限模式表空间)的注释

| 列名称 | 数据类型 | 说明 |
|-------------|---------------|--|
| OBJECT_NAME | VARCHAR(128) | Name of the non-schema object |
| OBJECT_TYPE | VARCHAR(32) | Type of the non-schema object: DATABASE, AUTHORIZATION, SCHEMA, TABLESPACE |
| COMMENTS | VARCHAR(1024) | Comments of the non-schema object |

Table 5-20 列信息

ALL_OBJECTS

ALL_OBJECTS描述当前用户可以访问的所有对象

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the object |
| SCHEMA_NAME | VARCHAR(128) | Schema of the object |
| OBJECT_NAME | VARCHAR(128) | Name of the object |
| SUBOBJECT_NAME | VARCHAR(128) | Name of the subobject (for example, partition) |
| OBJECT_ID | NUMBER | Dictionary object number of the object |

| 列名称 | 数据类型 | 说明 |
|----------------|--------------------------------------|--|
| DATA_OBJECT_ID | NUMBER | Dictionary object number of the segment that contains the object |
| OBJECT_TYPE | VARCHAR(32) | Type of the object (such as TABLE, INDEX) |
| CREATED | TIMESTAMP(6) WITHOUT TIME ZONE | Timestamp for the creation of the object |
| LAST_DDL_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Timestamp for the last modification of the object resulting from a DDL statement |
| TIMESTAMP | VARCHAR(32) | Timestamp for the specification of the object (character data) |
| STATUS | VARCHAR(32) | Status of the object: the value in (VALID, INVALID, N/A) |
| TEMPORARY | VARCHAR(1) | Indicates whether the object is temporary (the current session can see only data that it placed in this object itself) (Y) or not (N) |
| GENERATED | VARCHAR(1) | Indicates whether the name of this object was system-generated (Y) or not (N) <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|--|
| SECONDARY | VARCHAR(1) | Indicates whether this is a secondary object created by the ODCIIndexCreate method of the Oracle Data Cartridge (Y) or not (N) <ul style="list-style-type: none">reserved |
| NAMESPACE | NUMBER | Namespace for the object |
| EDITION_NAME | VARCHAR(128) | Name of the edition in which the object is actual <ul style="list-style-type: none">reserved |
| DROPPED | VARCHAR(3) | Indicates whether the object has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-21 列信息

ALL_PACKAGE_PRIVS

ALL_PACKAGE_PRIVS描述包授权其中当前用户是包所有者授权者或被授权者或者启用的角色或PUBLIC是被授权者

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the package |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the package |
| PROCEDURE_NAME | VARCHAR(128) | Name of the package |
| PRIVILEGE | VARCHAR(32) | Privilege on the package |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-22 列信息

ALL_PACKAGE_PRIVS_MADE

ALL_PACKAGE_PRIVS_MADE描述当前用户是包所有者或授权者的包授权

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the package |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the package |
| PROCEDURE_NAME | VARCHAR(128) | Name of the package |
| PRIVILEGE | VARCHAR(32) | Privilege on the package |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-23 列信息

ALL_PACKAGE_PRIVS_REC

ALL_PACKAGE_PRIVS_REC描述包授权其中当前用户是被授权者或者启用的角色或PUBLIC是被授权者

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the package |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the package |
| PROCEDURE_NAME | VARCHAR(128) | Name of the package |
| PRIVILEGE | VARCHAR(32) | Privilege on the package |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-24 列信息

ALL_PROCEDURES

ALL_PROCEDURES列出所有函数过程或包

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of function, procedures or pacakage |
| SCHEMA_NAME | VARCHAR(128) | Schema Name of function, procedures or package |
| OBJECT_NAME | VARCHAR(128) | Name of function, procedures or pacakage |
| PROCEDURE_NAME | VARCHAR(128) | Name when a procedures in pacakage |
| OBJECT_ID | NUMBER | ID of a function, procedures or pacakage |
| SUBPROGRAM_ID | NUMBER | ID of procedures in pacakage |
| OVERLOAD | VARCHAR(32) | ID of overloading procedure in pacakage |
| OBJECT_TYPE | VARCHAR(32) | Type of function, procedures or package |
| AGGREGATE | VARCHAR(3) | Indicate whether the procedure is an aggreage function(YES) or not(NO) |
| PIPELINED | VARCHAR(3) | Indicate whether the procedure is a pipelined table function(YES) or not(NO) |
| IMPLTYPEOWNER | VARCHAR(128) | Name of the owner of the implementation type, if any |
| IMPLTYPENAME | VARCHAR(128) | Name of the implementation type, if any |
| PARALLEL | VARCHAR(3) | Indicates whether the procedure or function is parallel-enabled (YES) or not (NO) |

| 列名称 | 数据类型 | 说明 |
|---------------|-------------|---|
| INTERFACE | VARCHAR(3) | YES, if the procedure/function is a table function implemented using the SQLCLI interface; otherwise NO |
| DETERMINISTIC | VARCHAR(3) | YES, if the procedure/function is declared to be deterministic; otherwise NO |
| AUTHID | VARCHAR(32) | Indicates whether the procedure/function is declared to execute as DEFINER or CURRENT_USER (invoker) |

Table 5-25 列信息

ALL_PROC_PRIVS

ALL_PROC_PRIVS描述当前用户为存储过程的所有者授权者或被授权者或者当前用户启用的角色或PUBLIC角色是被授权者的所有存储过程的授权情况

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the procedure and function |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the procedure and function |
| PROCEDURE_NAME | VARCHAR(128) | Name of the procedure and function |
| PRIVILEGE | VARCHAR(32) | Privilege on the procedure and function |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-26 列信息

ALL_PROC_PRIVS_MADE

ALL_PROC_PRIVS_MADE描述当前用户为存储过程的所有者或授权者的所有存储过程的授权情况

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the procedure and function |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the procedure and function |
| PROCEDURE_NAME | VARCHAR(128) | Name of the procedure and function |
| PRIVILEGE | VARCHAR(32) | Privilege on the procedure and function |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-27 列信息

ALL_PROC_PRIVS_REC'D

ALL_PROC_PRIVS_REC'D描述当前用户为被授权者或者当前用户启用的角色或PUBLIC角色是被授权者的所有存储过程的授权情况

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the procedure and function |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the procedure and function |
| PROCEDURE_NAME | VARCHAR(128) | Name of the procedure and function |
| PRIVILEGE | VARCHAR(32) | Privilege on the procedure and function |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-28 列信息

ALL_SCHEMAS

ALL_SCHEMAS显示给定用户所拥有的或者给定用户或角色可访问的所有模式的目录

| 列名称 | 数据类型 | 说明 |
|---------------|-----------------------------------|----------------------------------|
| SCHEMA_OWNER | VARCHAR(128) | Owner of the schema |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| CREATED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Created time of the schema |
| MODIFIED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Last modified time of the schema |
| COMMENTS | VARCHAR(1024) | Comments of the schema |

Table 5-29 列信息

ALL_SCHEMA_PATH

ALL_SCHEMA_PATH描述当前用户和公共的模式搜索顺序用于为不合格的SQL schema对象命名解析

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|--|
| AUTH_NAME | VARCHAR(128) | Name of the authorization |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| SEARCH_ORDER | NUMBER | Schema search order of the authorization |

Table 5-30 列信息

ALL_SCHEMA_PRIVS

ALL_SCHEMA_PRIVS描述当前用户为模式所有者授权者或被授权者或者当前用户启用的角色或PUBLIC角色是被授权者的模式的授权信息

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the schema |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| PRIVILEGE | VARCHAR(32) | Privilege on the schema |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-31 列信息

ALL_SCHEMA_PRIVS_MADE

ALL_SCHEMA_PRIVS_MADE描述当前用户为授权者的所有模式的授权信息

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the schema |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| PRIVILEGE | VARCHAR(32) | Privilege on the schema |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-32 列信息

ALL_SCHEMA_PRIVS_REC'D

ALL_SCHEMA_PRIVS_REC'D描述当前用户为被授权者或者当前用户启用的角色或公共角色

(PUBLIC) 是被授权者的所有模式的授权信息

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the schema |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| PRIVILEGE | VARCHAR(32) | Privilege on the schema |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-33 列信息

ALL_SEQUENCES

ALL_SEQUENCES描述当前用户可访问的所有序列

| 列名称 | 数据类型 | 说明 |
|-----------------|---------------|---|
| SEQUENCE_OWNER | VARCHAR(128) | Owner of the sequence |
| SEQUENCE_SCHEMA | VARCHAR(128) | Schema of the sequence |
| SEQUENCE_NAME | VARCHAR(128) | Sequence name |
| MIN_VALUE | NUMBER | Minimum value of the sequence |
| MAX_VALUE | NUMBER | Maximum value of the sequence |
| INCREMENT_BY | NUMBER | Value by which sequence is incremented |
| CYCLE_FLAG | VARCHAR(1) | Indicates whether the sequence wraps around on reaching the limit (Y) or not (N) |
| ORDER_FLAG | VARCHAR(1) | Indicates whether sequence numbers are generated in order (Y) or not (N) |
| CACHE_SIZE | NUMBER | Number of sequence numbers to cache |
| LAST_NUMBER | NUMBER | Last sequence number written to database. If a sequence uses caching, the number written to database is the last number placed in the sequence cache. |
| COMMENTS | VARCHAR(1024) | Comments of the sequence |

Table 5-34 列信息

ALL_SEQ_PRIVS

ALL_SEQ_PRIVS描述当前用户为序列所有者授权者或被授权者或者当前用户启用的角色或

PUBLIC角色是被授权者的所有序列的授权信息

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| SEQUENCE_OWNER | VARCHAR(128) | Owner of the sequence |
| SEQUENCE_SCHEMA | VARCHAR(128) | Schema of the sequence |
| SEQUENCE_NAME | VARCHAR(128) | Name of the sequence |
| PRIVILEGE | VARCHAR(32) | Privilege on the sequence |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-35 列信息

ALL_SEQ_PRIVS_MADE

ALL_SEQ_PRIVS_MADE描述当前用户为序列所有者或授权者的所有序列的授权信息

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| SEQUENCE_OWNER | VARCHAR(128) | Owner of the sequence |
| SEQUENCE_SCHEMA | VARCHAR(128) | Schema of the sequence |
| SEQUENCE_NAME | VARCHAR(128) | Name of the sequence |
| PRIVILEGE | VARCHAR(32) | Privilege on the sequence |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-36 列信息

ALL_SEQ_PRIVS_REC'D

ALL_SEQ_PRIVS_REC'D描述当前用户为被授权者或者当前用户启用的角色或PUBLIC角色是被授权者的所有序列的授权信息

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| SEQUENCE_OWNER | VARCHAR(128) | Owner of the sequence |
| SEQUENCE_SCHEMA | VARCHAR(128) | Schema of the sequence |
| SEQUENCE_NAME | VARCHAR(128) | Name of the sequence |
| PRIVILEGE | VARCHAR(32) | Privilege on the sequence |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-37 列信息

ALL_SHARD_KEY_COLUMNS

ALL_SHARD_KEY_COLUMNS描述集群系统中当前用户可访问的所有分片表的分片键所在的列

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| COLUMN_NAME | VARCHAR(128) | Column name of the shard key |
| COLUMN_POSITION | NUMBER | Position of the column within the shard key |

Table 5-38 列信息

ALL_SOURCE

ALL_SOURCE描述当前用户可访问的存储对象的文本源

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of object |
| SCHEMA_NAME | VARCHAR(128) | Schema Name of object |
| NAME | VARCHAR(128) | Name of object |
| TYPE | VARCHAR(32) | Type of object: FUNCTION, PROCEDURE, PACKAGE,PACKAGE BODY, TRIGGER |
| LINE | NUMBER | Line number of this line of source |
| TEXT | LONG VARCHAR | Text source of the stored object |
| ORIGIN_CON_ID | VARCHAR(256) | ID of the container where the data originates |

Table 5-39 列信息

ALL_SYNONYMS

ALL_SYNONYMS描述所有同义词

| 列名称 | 数据类型 | 说明 |
|--------------------|--------------|-------------------------|
| SYNONYM_OWNER | VARCHAR(128) | Owner of the synonym |
| SYNONYM_SCHEMA | VARCHAR(128) | Schema of the synonym |
| SYNONYM_NAME | VARCHAR(128) | Synonym name |
| OBJECT_SCHEMA_NAME | VARCHAR(128) | Object schema name |
| OBJECT_NAME | VARCHAR(128) | Object name |
| DB_LINK | VARCHAR(128) | Reserved for future use |

Table 5-40 列信息

ALL_TABLES

ALL_TABLES描述当前用户可访问的关系表

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the table |
| CLUSTER_NAME | VARCHAR(128) | Name of the cluster <ul style="list-style-type: none"> reserved |
| IOT_NAME | VARCHAR(128) | Name of the index-organized table <ul style="list-style-type: none"> reserved |
| STATUS | VARCHAR(32) | If a previous DROP TABLE operation failed, indicates whether the table is unusable (UNUSABLE) or valid (VALID) <ul style="list-style-type: none"> reserved |
| PCT_FREE | NUMBER | Minimum percentage of free space in a block |

| 列名称 | 数据类型 | 说明 |
|----------------|--------|--|
| PCT_USED | NUMBER | Minimum percentage of used space in a block |
| INI_TRANS | NUMBER | Initial number of transactions |
| MAX_TRANS | NUMBER | Maximum number of transactions |
| INITIAL_EXTENT | NUMBER | Size of the initial extent (in bytes) |
| NEXT_EXTENT | NUMBER | Size of secondary extents (in bytes) |
| MIN_EXTENTS | NUMBER | Minimum number of extents allowed in the segment |
| MAX_EXTENTS | NUMBER | Maximum number of extents allowed in the segment |
| PCT_INCREASE | NUMBER | Percentage increase in extent size <ul style="list-style-type: none"> reserved |
| FREELISTS | NUMBER | Number of process freelists allocated to the segment <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|------------|---|
| FREELIST_GROUPS | NUMBER | <p>Number of freelist groups allocated to the segment</p> <ul style="list-style-type: none"> reserved |
| LOGGING | VARCHAR(3) | <p>Indicates whether or not changes to the table are logged</p> |
| BACKED_UP | VARCHAR(1) | <p>Indicates whether the table has been backed up since the last modification (Y) or not (N)</p> <ul style="list-style-type: none"> reserved |
| NUM_ROWS | NUMBER | <p>Number of rows in the table</p> |
| BLOCKS | NUMBER | <p>Number of used blocks in the table</p> |
| ANAL_BLOCKS | NUMBER | <p>Number of used blocks in the table when most recently analyzed</p> |
| EMPTY_BLOCKS | NUMBER | <p>Number of empty (never used) blocks in the table</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------------------|--------|--|
| AVG_SPACE | NUMBER | <p>Average available free space in the table</p> <ul style="list-style-type: none"> reserved |
| CHAIN_CNT | NUMBER | <p>Number of rows in the table that are chained from one data block to another or that have migrated to a new block, requiring a link to preserve the old rowid</p> <ul style="list-style-type: none"> reserved |
| AVG_ROW_LEN | NUMBER | <p>Average row length, including row overhead</p> <ul style="list-style-type: none"> reserved |
| AVG_SPACE_FREELIST_BLOCKS | NUMBER | <p>Average freespace of all blocks on a freelist</p> <ul style="list-style-type: none"> reserved |
| NUM_FREELIST_BLOCKS | NUMBER | <p>Number of blocks on the freelist</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------------------------------|--|
| DEGREE | VARCHAR(32) | <p>Number of threads per instance for scanning the table, or DEFAULT</p> <ul style="list-style-type: none"> reserved |
| INSTANCES | VARCHAR(32) | <p>Number of instances across which the table is to be scanned, or DEFAULT</p> <ul style="list-style-type: none"> reserved |
| CACHE | VARCHAR(1) | <p>Indicates whether the table is to be cached in the buffer cache (Y) or not (N)</p> <ul style="list-style-type: none"> reserved |
| TABLE_LOCK | VARCHAR(32) | <p>Indicates whether table locking is enabled (ENABLED) or disabled (DISABLED)</p> |
| SAMPLE_SIZE | NUMBER | Sample size used in analyzing the table |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which the table was most recently analyzed |

| 列名称 | 数据类型 | 说明 |
|-------------|-------------|---|
| PARTITIONED | VARCHAR(3) | <p>Indicates whether the table is partitioned (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| IOT_TYPE | VARCHAR(32) | <p>If the table is an index-organized table, then IOT_TYPE is IOT, IOT_OVERFLOW, or IOT_MAPPING.</p> <ul style="list-style-type: none"> reserved |
| TEMPORARY | VARCHAR(1) | <p>Indicates whether the table is temporary (Y) or not (N)</p> |
| SECONDARY | VARCHAR(1) | <p>Indicates whether the table is a secondary object created by cartridge</p> <ul style="list-style-type: none"> reserved |
| NESTED | VARCHAR(3) | <p>Indicates whether the table is a nested table (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|------------------|-------------|--|
| BUFFER_POOL | VARCHAR(32) | Buffer pool to be used for table blocks <ul style="list-style-type: none">reserved |
| FLASH_CACHE | VARCHAR(32) | Database Smart Flash Cache hint to be used for table blocks <ul style="list-style-type: none">reserved |
| CELL_FLASH_CACHE | VARCHAR(32) | Cell flash cache hint to be used for table blocks <ul style="list-style-type: none">reserved |
| ROW_MOVEMENT | VARCHAR(32) | If a partitioned table, indicates whether row movement is enabled (ENABLED) or disabled (DISABLED) <ul style="list-style-type: none">reserved |

| 列名称 | 数据类型 | 说明 |
|--------------|-------------|---|
| GLOBAL_STATS | VARCHAR(3) | <p>For partitioned tables, indicates whether statistics for the table as a whole (global statistics) are accurate (YES)</p> <ul style="list-style-type: none"> reserved |
| USER_STATS | VARCHAR(3) | <p>Indicates whether statistics were entered directly by the user (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DURATION | VARCHAR(32) | <p>Indicates the duration of a temporary table, the value is in (TRANSACTION, SESSION)</p> |
| SKIP_CORRUPT | VARCHAR(32) | <p>Indicates whether Database ignores blocks marked corrupt during table and index scans (ENABLED) or raises an error (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| MONITORING | VARCHAR(3) | <p>Indicates whether the table has the MONITORING attribute set (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| CLUSTER_OWNER | VARCHAR(128) | Owner of the cluster, if any • reserved |
| DEPENDENCIES | VARCHAR(32) | Indicates whether row-level dependency tracking is enabled (ENABLED) or disabled (DISABLED) • reserved |
| COMPRESSION | VARCHAR(32) | Indicates whether table compression is enabled (ENABLED) or not (DISABLED) • reserved |
| COMPRESS_FOR | VARCHAR(32) | Default compression for what kind of operations • reserved |
| DROPPED | VARCHAR(3) | Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO) |

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|--|
| READ_ONLY | VARCHAR(3) | Indicates whether the table IS READ-ONLY (YES) or not (NO) |
| SEGMENT_CREATED | VARCHAR(3) | Indicates whether the table segment has been created (YES) or not (NO) |
| RESULT_CACHE | VARCHAR(32) | Result cache mode annotation for the table: the value in (NULL, DEFAULT, FORCE, MANUAL) <ul style="list-style-type: none">reserved |

Table 5-41 列信息

ALL_TAB_COLS

ALL_TAB_COLS描述当前用户可访问的表视图和集群的列(包括隐藏列)

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Column name |
| DATA_TYPE | VARCHAR(128) | Datatype of the column |
| DATA_TYPE_MOD | VARCHAR(3) | Datatype modifier of the column <ul style="list-style-type: none"> reserved |
| DATA_TYPE_OWNER | VARCHAR(128) | Owner of the datatype of the column <ul style="list-style-type: none"> reserved |
| DATA_LENGTH | NUMBER | Length of the column (in bytes) |
| DATA_PRECISION | NUMBER | Decimal precision for NUMBER datatype; binary precision for FLOAT datatype; NULL for all other datatypes |

| 列名称 | 数据类型 | 说明 |
|----------------|---------------|--|
| DATA_SCALE | NUMBER | Digits to the right of the decimal point in a number |
| NULLABLE | VARCHAR(1) | Indicates whether a column allows NULLs. |
| COLUMN_ID | NUMBER | Sequence number of the column as created |
| DEFAULT_LENGTH | NUMBER | Length of the default value for the column |
| DATA_DEFAULT | LONG VARCHAR | Default value for the column |
| NUM_DISTINCT | NUMBER | Number of distinct values in the column |
| LOW_VALUE | VARBINARY(32) | Low value in the column |
| HIGH_VALUE | VARBINARY(32) | High value in the column |
| DENSITY | NUMBER | <p>If a histogram is available on COLUMN_NAME, then this column displays the selectivity of a value that spans fewer than 2 endpoints in the histogram.</p> <ul style="list-style-type: none"> reserved |
| NUM_NULLS | NUMBER | Number of NULLs in the column |

| 列名称 | 数据类型 | 说明 |
|----------------------|--------------------------------------|--|
| NUM_BUCKETS | NUMBER | <p>Number of buckets in the histogram for the column</p> <ul style="list-style-type: none"> reserved |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which this column was most recently analyzed |
| SAMPLE_SIZE | NUMBER | Sample size used in analyzing this column |
| CHARACTER_SET_NAME | VARCHAR(128) | <p>Name of the character set</p> <ul style="list-style-type: none"> reserved |
| CHAR_COL_DECL_LENGTH | NUMBER | <p>Declaration length of the character type column</p> <ul style="list-style-type: none"> reserved |
| GLOBAL_STATS | VARCHAR(3) | <p>For partitioned tables, indicates whether column statistics were collected for the table</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|------------|---|
| USER_STATS | VARCHAR(3) | <p>Indicates whether statistics were entered directly by the user (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| AVG_COL_LEN | NUMBER | Average length of the column (in bytes) |
| CHAR_LENGTH | NUMBER | Displays the length of the column in characters. |
| CHAR_USED | VARCHAR(1) | Indicates that the column uses BYTE length semantics (B) or CHAR length semantics (C) |
| V80_FMT_IMAGE | VARCHAR(3) | <p>Indicates whether the column data is in release older image format (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DATA_UPGRADED | VARCHAR(3) | <p>Indicates whether the column data has been upgraded to the latest type version format (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| HIDDEN_COLUMN | VARCHAR(3) | Indicates whether the column is a hidden column (YES) or not (NO) |

| 列名称 | 数据类型 | 说明 |
|--------------------|---------------|--|
| VIRTUAL_COLUMN | VARCHAR(3) | Indicates whether the column is a virtual column (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| SEGMENT_COLUMN_ID | NUMBER | Sequence number of the column in the segment |
| INTERNAL_COLUMN_ID | NUMBER | Internal sequence number of the column |
| HISTOGRAM | VARCHAR(32) | Indicates existence/type of histogram <ul style="list-style-type: none"> reserved |
| QUALIFIED_COL_NAME | VARCHAR(4000) | Qualified column name |
| IDENTITY_COLUMN | VARCHAR(3) | Indicates whether this is an identity column (YES) or not (NO) |

Table 5-42 列信息

ALL_TAB_COLUMNS

ALL_TAB_COLUMNS描述当前用户可访问的表视图和集群的列

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Column name |
| DATA_TYPE | VARCHAR(128) | Datatype of the column |
| DATA_TYPE_MOD | VARCHAR(3) | Datatype modifier of the column <ul style="list-style-type: none"> reserved |
| DATA_TYPE_OWNER | VARCHAR(128) | Owner of the datatype of the column <ul style="list-style-type: none"> reserved |
| DATA_LENGTH | NUMBER | Length of the column (in bytes) |
| DATA_PRECISION | NUMBER | Decimal precision for NUMBER datatype; binary precision for FLOAT datatype; NULL for all other datatypes |

| 列名称 | 数据类型 | 说明 |
|----------------|---------------|--|
| DATA_SCALE | NUMBER | Digits to the right of the decimal point in a number |
| NULLABLE | VARCHAR(1) | Indicates whether a column allows NULLs. |
| COLUMN_ID | NUMBER | Sequence number of the column as created |
| DEFAULT_LENGTH | NUMBER | Length of the default value for the column |
| DATA_DEFAULT | LONG VARCHAR | Default value for the column |
| NUM_DISTINCT | NUMBER | Number of distinct values in the column |
| LOW_VALUE | VARBINARY(32) | Low value in the column |
| HIGH_VALUE | VARBINARY(32) | High value in the column |
| DENSITY | NUMBER | <p>If a histogram is available on COLUMN_NAME, then this column displays the selectivity of a value that spans fewer than 2 endpoints in the histogram.</p> <ul style="list-style-type: none"> reserved |
| NUM_NULLS | NUMBER | Number of NULLs in the column |

| 列名称 | 数据类型 | 说明 |
|----------------------|--------------------------------------|--|
| NUM_BUCKETS | NUMBER | <p>Number of buckets in the histogram for the column</p> <ul style="list-style-type: none"> reserved |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which this column was most recently analyzed |
| SAMPLE_SIZE | NUMBER | Sample size used in analyzing this column |
| CHARACTER_SET_NAME | VARCHAR(128) | <p>Name of the character set</p> <ul style="list-style-type: none"> reserved |
| CHAR_COL_DECL_LENGTH | NUMBER | Declaration length of the character type column |
| GLOBAL_STATS | VARCHAR(3) | <p>For partitioned tables, indicates whether column statistics were collected for the table</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|------------|---|
| USER_STATS | VARCHAR(3) | <p>Indicates whether statistics were entered directly by the user (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| AVG_COL_LEN | NUMBER | Average length of the column (in bytes) |
| CHAR_LENGTH | NUMBER | Displays the length of the column in characters. |
| CHAR_USED | VARCHAR(1) | Indicates that the column uses BYTE length semantics (B) or CHAR length semantics (C) |
| V80_FMT_IMAGE | VARCHAR(3) | <p>Indicates whether the column data is in release older image format (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DATA_UPGRADED | VARCHAR(3) | <p>Indicates whether the column data has been upgraded to the latest type version format (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|---|
| HISTOGRAM | VARCHAR(32) | Indicates existence/type of histogram <ul style="list-style-type: none">reserved |
| IDENTITY_COLUMN | VARCHAR(3) | Indicates whether this is an identity column (YES) or not (NO) |

Table 5-43 列信息

ALL_TAB_COMMENTS

ALL_TAB_COMMENTS显示当前用户可访问的表和视图上的注释

| 列名称 | 数据类型 | 说明 |
|--------------|---------------|-----------------------|
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| TABLE_TYPE | VARCHAR(32) | Type of the object |
| COMMENTS | VARCHAR(1024) | Comment on the object |

Table 5-44 列信息

ALL_TAB_IDENTITY_COLS

ALL_TAB_IDENTITY_COLS描述所有表标识列

| 列名称 | 数据类型 | 说明 |
|------------------|---------------|--|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| COLUMN_NAME | VARCHAR(128) | Name of the identity column |
| GENERATION_TYPE | VARCHAR(32) | Generation type of the identity column. Possible values are ALWAYS or BY DEFAULT |
| IDENTITY_OPTIONS | VARCHAR(1024) | Options for the identity column sequence generator |

Table 5-45 列信息

ALL_TAB_PLACE

ALL_TAB_PLACE描述集群系统中当前用户可访问的所有集群表的节点位置

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| GROUP_ID | NUMBER | Group identifier of the node where the table placed |
| GROUP_NAME | VARCHAR(128) | Group name of the node where the table placed |
| MEMBER_ID | NUMBER | Member identifier of the node where the table placed |
| MEMBER_NAME | VARCHAR(128) | Member name of the node where the table placed |
| MEMBER_POSITION | NUMBER | Member position of the node where the table placed |
| MEMBER_OFFLINE | BOOLEAN | data of the cluster member is offline or not |
| IS_UPDATE_MASTER | BOOLEAN | whether the cluster member is update master or not |
| DROPPED | VARCHAR(3) | Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO) |

| | | |
|---------------|-------------------------------------|--|
| SCN | VARCHAR(64) | table scn of the node where the table placed |
| NUM_ROWS | NUMBER | Number of rows in the table |
| BLOCKS | NUMBER | Number of used blocks of the node where the table placed |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIMEZONE | Date on which the table was most recently analyzed |

Table 5-46 列信息

ALL_TAB_SHARDS

ALL_TAB_SHARDS描述集群系统中当前用户可访问的分片表的分片信息

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---------------------|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |

| | | |
|------------------|--------------|--|
| SHARD_STRATEGY | VARCHAR(32) | Sharding strategy of the table:the value in (HASH SHARDING, RANGE SHARDING, LIST SHARDING) |
| SHARD_NAME | VARCHAR(128) | Shard name |
| SHARD_NUMBER | NUMBER | Shard number |
| SHARD_DEFINITION | LONG VARCHAR | Shard definition (if hash sharded, the value is null) |
| GROUP_ID | NUMBER | Group identifier where the shard placed |
| GROUP_NAME | VARCHAR(128) | Group name where the shard placed |
| DROPPED | VARCHAR(3) | Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-47 列信息

ALL_TAB_PRIVS

ALL_TAB_PRIVS描述当前用户为对象所有者授权者或被授权者或者当前用户启用的角色或

PUBLIC角色是被授权者的所有对象的授权信息

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| PRIVILEGE | VARCHAR(32) | Privilege on the object |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |
| HIERARCHY | VARCHAR(3) | Indicates whether the privilege was granted with the HIERARCHY OPTION (YES) or not (NO) |

Table 5-48 列信息

ALL_TAB_PRIVS_MADE

ALL_TAB_PRIVS_MADE描述当前用户为对象所有者或授权者的所有对象的授权信息

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the object |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |
| HIERARCHY | VARCHAR(3) | Indicates whether the privilege was granted with the HIERARCHY OPTION (YES) or not (NO) |

Table 5-49 列信息

ALL_TAB_PRIVS_RECD

ALL_TAB_PRIVS_RECD描述当前用户为被授权者或者当前用户启用的角色或PUBLIC角色是被授权者的所有对象的授权信息

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the object |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |
| HIERARCHY | VARCHAR(3) | Indicates whether the privilege was granted with the HIERARCHY OPTION (YES) or not (NO) |

Table 5-50 列信息

ALL_TBS_PRIVS

ALL_TBS_PRIVS描述当前用户为授权者或被授权者或者当前用户启用的角色或PUBLIC角色是被授权者的所有表空间的授权信息

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace |
| PRIVILEGE | VARCHAR(32) | Privilege on the tablespace |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-51 列信息

ALL_TBS_PRIVS_MADE

ALL_TBS_PRIVS_MADE描述当前用户为授权者的所有表空间的授权信息

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace |
| PRIVILEGE | VARCHAR(32) | Privilege on the tablespace |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-52 列信息

ALL_TBS_PRIVS_REC'D

ALL_TBS_PRIVS_REC'D描述当前用户为被授权者或者当前用户启用的角色或PUBLIC角色是被授权者的所有表空间的授权信息

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace |
| PRIVILEGE | VARCHAR(32) | Privilege on the tablespace |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-53 列信息

ALL_USERS

ALL_USERS列出当前用户可见的数据库的所有用户

| 列名称 | 数据类型 | 说明 |
|----------|--------------------------------|-------------------------|
| USERNAME | VARCHAR(128) | Name of the user |
| USER_ID | NUMBER | ID number of the user |
| CREATED | TIMESTAMP(6) WITHOUT TIME ZONE | User creation timestamp |

Table 5-54 列信息

ALL_VIEWS

ALL_VIEWS描述当前用户可访问的视图

| 列名称 | 数据类型 | 说明 |
|------------------|---------------|---|
| OWNER | VARCHAR(128) | Owner of the view |
| VIEW_SCHEMA | VARCHAR(128) | Schema of the view |
| VIEW_NAME | VARCHAR(128) | Name of the view |
| TEXT_LENGTH | NUMBER | Length of the view text |
| TEXT | LONG VARCHAR | View text |
| TYPE_TEXT_LENGTH | NUMBER | Length of the type clause of the typed view <ul style="list-style-type: none"> reserved |
| TYPE_TEXT | VARCHAR(4000) | Type clause of the typed view <ul style="list-style-type: none"> reserved |
| OID_TEXT_LENGTH | NUMBER | Length of the WITH OID clause of the typed view <ul style="list-style-type: none"> reserved |

| | | |
|-----------------|---------------|---|
| OID_TEXT | VARCHAR(4000) | <p>WITH OID clause of the typed view</p> <ul style="list-style-type: none"> reserved |
| VIEW_TYPE_OWNER | VARCHAR(128) | <p>Owner of the type of the view if the view is a typed view</p> <ul style="list-style-type: none"> reserved |
| VIEW_TYPE | VARCHAR(32) | <p>Type of the view if the view is a typed view</p> <ul style="list-style-type: none"> reserved |
| SUPERVIEW_NAME | VARCHAR(128) | <p>Name of the superview</p> <ul style="list-style-type: none"> reserved |
| EDITIONING_VIEW | VARCHAR(1) | <p>Reserved for future use</p> <ul style="list-style-type: none"> reserved |
| READ_ONLY | VARCHAR(1) | <p>Indicates whether the view is read-only (Y) or not (N)</p> |

Table 5-55 列信息

DBA_视图

可获取拥有DBA权限（ACCESS CONTROL ON DATABASE）的当前用户的所有对象信息

DBA_ALL_TABLES

DBA_ALL_TABLES描述数据库中的所有对象表和关系表

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the table |
| CLUSTER_NAME | VARCHAR(128) | Name of the cluster <ul style="list-style-type: none">reserved |
| IOT_NAME | VARCHAR(128) | Name of the index-organized table <ul style="list-style-type: none">reserved |

| 列名称 | 数据类型 | 说明 |
|----------------|-------------|--|
| STATUS | VARCHAR(32) | <p>If a previous DROP TABLE operation failed, indicates whether the table is unusable (UNUSABLE) or valid (VALID)</p> <ul style="list-style-type: none"> reserved |
| PCT_FREE | NUMBER | Minimum percentage of free space in a block |
| PCT_USED | NUMBER | Minimum percentage of used space in a block |
| INI_TRANS | NUMBER | Initial number of transactions |
| MAX_TRANS | NUMBER | Maximum number of transactions |
| INITIAL_EXTENT | NUMBER | Size of the initial extent (in bytes) |
| NEXT_EXTENT | NUMBER | Size of secondary extents (in bytes) |
| MIN_EXTENTS | NUMBER | Minimum number of extents allowed in the segment |
| MAX_EXTENTS | NUMBER | Maximum number of extents allowed in the segment |
| PCT_INCREASE | NUMBER | <p>Percentage increase in extent size</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|------------|---|
| FREELISTS | NUMBER | Number of process freelists allocated to the segment • reserved |
| FREELIST_GROUPS | NUMBER | Number of freelist groups allocated to the segment • reserved |
| LOGGING | VARCHAR(3) | Indicates whether or not changes to the table are logged |
| BACKED_UP | VARCHAR(1) | Indicates whether the table has been backed up since the last modification (Y) or not (N) • reserved |
| NUM_ROWS | NUMBER | Number of rows in the table |
| BLOCKS | NUMBER | Number of used blocks in the table |
| ANAL_BLOCKS | NUMBER | Number of used blocks in the table when most recently analyzed |

| 列名称 | 数据类型 | 说明 |
|---------------------------|--------|--|
| EMPTY_BLOCKS | NUMBER | <p>Number of empty (never used) blocks in the table</p> <ul style="list-style-type: none"> reserved |
| AVG_SPACE | NUMBER | <p>Average available free space in the table</p> <ul style="list-style-type: none"> reserved |
| CHAIN_CNT | NUMBER | <p>Number of rows in the table that are chained from one data block to another or that have migrated to a new block, requiring a link to preserve the old rowid</p> <ul style="list-style-type: none"> reserved |
| AVG_ROW_LEN | NUMBER | <p>Average row length, including row overhead</p> <ul style="list-style-type: none"> reserved |
| AVG_SPACE_FREELIST_BLOCKS | NUMBER | <p>Average freespace of all blocks on a freelist</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------------|-------------|--|
| NUM_FREELIST_BLOCKS | NUMBER | Number of blocks on the freelist <ul style="list-style-type: none"> reserved |
| DEGREE | VARCHAR(32) | Number of threads per instance for scanning the table, or DEFAULT <ul style="list-style-type: none"> reserved |
| INSTANCES | VARCHAR(32) | Number of instances across which the table is to be scanned, or DEFAULT <ul style="list-style-type: none"> reserved |
| CACHE | VARCHAR(1) | Indicates whether the table is to be cached in the buffer cache (Y) or not (N) <ul style="list-style-type: none"> reserved |
| TABLE_LOCK | VARCHAR(32) | Indicates whether table locking is enabled (ENABLED) or disabled (DISABLED) |
| SAMPLE_SIZE | NUMBER | Sample size used in analyzing the table |

| 列名称 | 数据类型 | 说明 |
|------------------|--------------------------------------|---|
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which the table was most recently analyzed |
| PARTITIONED | VARCHAR(3) | Indicates whether the table is partitioned (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| IOT_TYPE | VARCHAR(32) | If the table is an index-organized table, then IOT_TYPE is IOT, IOT_OVERFLOW, or IOT_MAPPING. <ul style="list-style-type: none"> reserved |
| OBJECT_ID_TYPE | VARCHAR(32) | Indicates whether the object ID (OID) is USER-DEFINED or SYSTEM GENERATED <ul style="list-style-type: none"> reserved |
| TABLE_TYPE_OWNER | VARCHAR(128) | If an object table, owner of the type from which the table is created <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|--|
| TABLE_TYPE | VARCHAR(128) | <p>If an object table, type of the table</p> <ul style="list-style-type: none"> reserved |
| TEMPORARY | VARCHAR(1) | <p>Indicates whether the table is temporary (Y) or not (N)</p> |
| SECONDARY | VARCHAR(1) | <p>Indicates whether the table is a secondary object created by cartridge</p> <ul style="list-style-type: none"> reserved |
| NESTED | VARCHAR(3) | <p>Indicates whether the table is a nested table (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| BUFFER_POOL | VARCHAR(32) | <p>Buffer pool to be used for table blocks</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|------------------|-------------|--|
| FLASH_CACHE | VARCHAR(32) | <p>Database Smart Flash Cache hint to be used for table blocks</p> <ul style="list-style-type: none"> reserved |
| CELL_FLASH_CACHE | VARCHAR(32) | <p>Cell flash cache hint to be used for table blocks</p> <ul style="list-style-type: none"> reserved |
| ROW_MOVEMENT | VARCHAR(32) | <p>If a partitioned table, indicates whether row movement is enabled (ENABLED) or disabled (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| GLOBAL_STATS | VARCHAR(3) | <p>For partitioned tables, indicates whether statistics for the table as a whole (global statistics) are accurate (YES)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| USER_STATS | VARCHAR(3) | <p>Indicates whether statistics were entered directly by the user (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DURATION | VARCHAR(32) | <p>Indicates the duration of a temporary table, the value is in (TRANSACTION, SESSION)</p> |
| SKIP_CORRUPT | VARCHAR(32) | <p>Indicates whether Database ignores blocks marked corrupt during table and index scans (ENABLED) or raises an error (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| MONITORING | VARCHAR(3) | <p>Indicates whether the table has the MONITORING attribute set (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| CLUSTER_OWNER | VARCHAR(128) | <p>Owner of the cluster, if any</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|---|
| DEPENDENCIES | VARCHAR(32) | <p>Indicates whether row-level dependency tracking is enabled (ENABLED) or disabled (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| COMPRESSION | VARCHAR(32) | <p>Indicates whether table compression is enabled (ENABLED) or not (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| COMPRESS_FOR | VARCHAR(32) | <p>Default compression for what kind of operations</p> <ul style="list-style-type: none"> reserved |
| DROPPED | VARCHAR(3) | <p>Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO)</p> |
| READ_ONLY | VARCHAR(3) | <p>Indicates whether the table IS READ-ONLY (YES) or not (NO)</p> |
| SEGMENT_CREATED | VARCHAR(3) | <p>Indicates whether the table segment has been created (YES) or not (NO)</p> |

Table 5-56 列信息



DBA_ARGUMENTS

DBA_ARGUMENTS列出函数程序的所有参数

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of functionprocedures or package |
| SCHEMA_NAME | VARCHAR(128) | Schema Name of function, procedures or package |
| OBJECT_NAME | VARCHAR(128) | Name of function, procedures |
| PACKAGE_NAME | VARCHAR(128) | Package Name of function, procedures |
| OBJECT_ID | NUMBER | ID of a function, procedures |
| SUBPROGRAM_ID | NUMBER | ID of procedures in pacakage |
| ARGUMENT_NAME | VARCHAR(128) | Name of argument or attribute name of record type argument |
| POSITION | NUMBER | Position of argument or position of attribute in record type |
| SEQUENCE | NUMBER | Sequential order of argument and its attributes |
| DATA_LEVEL | NUMBER | Nesting depth of the argument for composite types |
| DATA_TYPE | VARCHAR(128) | Data type of the argument |
| DEFAULTED | VARCHAR(1) | Whether or not the argument is defaulted |
| DEFAULT_VALUE | VARCHAR(1) | Reserved for future use |

| | | |
|--------------------|--------------|---|
| DEFAULT_LENGTH | VARCHAR(1) | Reserved for future use |
| IN_OUT | VARCHAR(32) | Direction of the argument (IN, OUT, IN/OUT) |
| DATA_LENGTH | NUMBER | Length of the column(in bytes) |
| DATA_PRECISION | NUMBER | Length in decimal digits(NUMBER) or binary digits(FLOAT) |
| DATA_SCALE | NUMBER | Digits to the right of the decimal point in a number |
| RADIX | NUMBER | Argument radix for a number |
| CHARACTER_SET_NAME | VARCHAR(128) | Character set name for the argument |
| TYPE_OWNER | VARCHAR(128) | Owner of the type of the argument |
| TYPE_NAME | VARCHAR(128) | Name of the type of the argument |
| TYPE_SUBNAME | VARCHAR(128) | Name of the type of the argument declared in package |
| TYPE_LINK | VARCHAR(128) | Name of the type of the argument declared in a remote package |
| PLS_TYPE | VARCHAR(128) | Name of the type of the argument at PSM |
| CHAR_LENGTH | NUMBER | Character limit for string datatypes |
| CHAR_USED | VARCHAR(1) | Whether the byte limit(B) or char limit(C) is official for the string |
| ORIGIN_CON_ID | VARCHAR(256) | ID of the container where the data originates |

Table 5-57 列信息

DBA_CATALOG

DBA_CATALOG列出数据库中的所有表视图同义词和序列

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the TABLE, VIEW, SYNONYM, SEQUENCE, or UNDEFINED |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the TABLE, VIEW, SYNONYM, SEQUENCE, or UNDEFINED |
| TABLE_NAME | VARCHAR(128) | Name of the TABLE, VIEW, SYNONYM, SEQUENCE, or UNDEFINED |
| TABLE_TYPE | VARCHAR(32) | Type of the TABLE, VIEW, SYNONYM, SEQUENCE, or UNDEFINED |

Table 5-58 列信息

DBA_CLUSTER

DBA_CLUSTER描述集群系统中的所有集群成员

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| GROUP_ID | NUMBER | Group identifier of the cluster member |
| GROUP_NAME | VARCHAR(128) | Group name of the cluster member |
| MEMBER_ID | NUMBER | Member identifier of the cluster member |
| MEMBER_NAME | VARCHAR(128) | Member name of the cluster member |
| MEMBER_HOST | VARCHAR(256) | Host name or IP address of the cluster member |
| MEMBER_PORT | NUMBER | Port number of the cluster member |
| MEMBER_POSITION | NUMBER | Member position number of the cluster member |

Table 5-59 列信息

DBA_CLUSTER_COMMENTS

DBA_CLUSTER_COMMENTS显示集群系统中集群对象的注释

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|-------------|---------------|---|
| OBJECT_NAME | VARCHAR(128) | Name of the cluster object |
| OBJECT_TYPE | VARCHAR(32) | Type of the cluster object: CLUSTER GROUP, CLUSTER MEMBER |
| COMMENTS | VARCHAR(1024) | Comment on the cluster object |

Table 5-60 列信息

DBA_CLUSTER_TABLES

DBA_CLUSTER_TABLES描述集群系统中的所有集群表

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| SHARD_STRATEGY | VARCHAR(32) | Sharding strategy of the table: the value in (CLONED, HASH SHARDING,RANGE SHARDING, LIST SHARDING) |
| SHARD_PLACEMENT | VARCHAR(32) | Shard placement of the table: the value in (AT CLUSTER WIDE or AT CLUSTER GROUP) |
| SHARD_COUNT | NUMBER | Shard count of the table (if cloned table, the value is null) |
| SHARD_KEY_COUNT | NUMBER | Shard key column count of the table (if cloned table, the value is null) |

| | | |
|---------|------------|--|
| HAS_GSI | VARCHAR(3) | Indicate whether the table has global secondary index:(YES) or (NO) |
| DROPPED | VARCHAR(3) | Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-61 列信息

DBA_COL_COMMENTS

DBA_COL_COMMENTS显示数据库中所有表和视图的列上的注释

| 列名称 | 数据类型 | 说明 |
|--------------|---------------|-----------------------|
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Name of the column |
| COMMENTS | VARCHAR(1024) | Comment on the column |

Table 5-62 列信息

DBA_COL_PRIVS

DBA_COL_PRIVS描述数据库中所有列对象的授权

| 列名称 | 数据类型 | 说明 |
|--------------|---------------------------|---|
| GRANTOR | CHARACTER VARYING(128) | Name of the user who performed the grant |
| GRANTEE | CHARACTER VARYING(128) | Name of the user or role to whom access was granted |
| OWNER | CHARACTER VARYING(128) | Owner of the object |
| TABLE_SCHEMA | CHARACTER VARYING(128) | Schema of the object |
| TABLE_NAME | CHARACTER VARYING(128) | Name of the object |
| COLUMN_NAME | CHARACTER VARYING(128) | Name of the column |
| PRIVILEGE | CHARACTER VARYING(32) | Privilege on the column |
| GRANTABLE | CHARACTER VARYING(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-63 列信息

DBA_CONSTRAINTS

DBA_CONSTRAINTS描述数据库中所有表上的所有约束定义

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the constraint definition |
| CONSTRAINT_SCHEMA | VARCHAR(128) | Schema of the constraint definition |
| CONSTRAINT_NAME | VARCHAR(128) | Name of the constraint definition |
| CONSTRAINT_TYPE | VARCHAR(1) | Type of the constraint definition: the value in (C: check constraint, P: Primary key, U: Unique Key, R: Referential integrity) |
| TABLE_OWNER | VARCHAR(128) | Owner of the table (or view) associated with the constraint definition |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table (or view) associated with the constraint definition |
| TABLE_NAME | VARCHAR(128) | Name of the table (or view) associated with the constraint definition |
| SEARCH_CONDITION | LONG VARCHAR | Text of search condition for a check constraint |
| R_OWNER | VARCHAR(128) | Owner of the unique constraint definition for the referenced table |
| R_SCHEMA | VARCHAR(128) | Schema of the unique constraint definition for the referenced table |

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|---|
| R_CONSTRAINT_NAME | VARCHAR(128) | Name of the unique constraint definition for the referenced table |
| DELETE_RULE | VARCHAR(32) | Delete rule for a referential constraint: the value in (NO ACTION, RESTRICT, CASCADE, SET NULL, SET DEFAULT) |
| UPDATE_RULE | VARCHAR(32) | Update rule for a referential constraint: the value in (NO ACTION, RESTRICT, CASCADE, SET NULL, SET DEFAULT) |
| STATUS | VARCHAR(32) | Enforcement status of the constraint: the value in (ENABLED, DISABLE) |
| DEFERRABLE | VARCHAR(32) | Indicates whether the constraint is deferrable (DEFERRABLE) or not (NOT DEFERRABLE) |
| DEFERRED | VARCHAR(32) | Indicates whether the constraint was initially deferred (DEFERRED) or not (IMMEDIATE) |
| VALIDATED | VARCHAR(32) | Indicates whether all data may obey the constraint or not: the value in (VALIDATED, NOT VALIDATED) |
| GENERATED | VARCHAR(32) | Indicates whether the name of the constraint is user-generated (USER NAME) or system-generated (GENERATED NAME) |

| 列名称 | 数据类型 | 说明 |
|--------------|--------------------------------------|---|
| BAD | VARCHAR(32) | <p>Indicates whether this constraint specifies a century in an ambiguous manner (BAD) or not (NULL)</p> <ul style="list-style-type: none"> reserved |
| RELY | VARCHAR(32) | <p>When NOT VALIDATED, indicates whether the constraint is to be taken into account for query rewrite (RELY) or not (NULL)</p> <ul style="list-style-type: none"> reserved |
| LAST_CHANGE | TIMESTAMP(6) WITHOUT TIME ZONE | When the constraint was last enabled or disabled |
| INDEX_OWNER | VARCHAR(128) | Owner of the index associated with the key constraint |
| INDEX_SCHEMA | VARCHAR(128) | Schema of the index associated with the key constraint |
| INDEX_NAME | VARCHAR(128) | Name of the index associated with the key constraint |
| INVALID | VARCHAR(32) | Indicates whether the constraint is invalid (INVALID) or not (NULL) |

| 列名称 | 数据类型 | 说明 |
|--------------|---------------|---|
| VIEW_RELATED | VARCHAR(32) | Indicates whether the constraint depends on a view (DEPEND ON VIEW) or not (NULL) <ul style="list-style-type: none">reserved |
| DROPPED | VARCHAR(3) | Indicates whether the constraint has been dropped and is in the recycle bin (YES) or not (NO) |
| COMMENTS | VARCHAR(1024) | Comments of the constraint definition |

Table 5-64 列信息

DBA_CONS_COLUMNS

DBA_CONS_COLUMNS描述在约束中指定的数据库中的所有列

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of the constraint definition |
| CONSTRAINT_SCHEMA | VARCHAR(128) | Schema of the constraint definition |
| CONSTRAINT_NAME | VARCHAR(128) | Name of the constraint definition |
| TABLE_OWNER | VARCHAR(128) | Owner of the table with the constraint definition |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table with the constraint definition |
| TABLE_NAME | VARCHAR(128) | Name of the table with the constraint definition |
| COLUMN_NAME | VARCHAR(128) | Name of the column or attribute of the object type column specified in the constraint definition |
| POSITION | NUMBER | Original position of the column or attribute in the definition of the object |

Table 5-65 列信息

DBA_DB_PRIVS

DBA_DB_PRIVS描述数据库中所有的数据库授权

| 列名称 | 数据类型 | 说明 |
|-----------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PRIVILEGE | VARCHAR(32) | Privilege on the database |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-66 列信息

DBA_DEPENDENCIES

DBA_DEPENDENCIES描述数据库中对象之间的所有依赖关系

| 列名称 | 数据类型 | 说明 |
|------------------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of object |
| SEGMENT_NAME | VARCHAR(128) | Schema Name of object |
| NAME | VARCHAR(128) | Name of object |
| TYPE | VARCHAR(32) | Type of object: FUNCTION, PROCEDURE, VIEW, PACKAGE, PACKAGE BODY, TRIGGER |
| REFERENCED_OWNER | VARCHAR(128) | Owner of the referenced object |
| REFERENCED_SCHEMA_NAME | VARCHAR(128) | Schema Name of the referenced object |
| REFERENCED_TYPE | VARCHAR(32) | Type of the referenced object: FUNCTION, PROCEDURE, TABLE, VIEW, SEQUENCE, PACKAGE, PACKAGE BODY, TRIGGER |
| REFERENCED_LINK_NAME | VARCHAR(128) | Name of the link to the parent object |
| REFERENCED_NAME | VARCHAR(128) | Name of the referenced object |
| DEPENDENCY_TYPE | VARCHAR(32) | Indicates whether the dependency is a REF dependency(REF) or not (HARD) |

Table 5-67 列信息

DBA_EXTENTS

DBA_EXTENTS描述组成数据库中所有表空间段（segments）的区段（extents）

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of the segment associated with the extent |
| SEGMENT_SCHEMA | VARCHAR(128) | Schema of the segment associated with the extent |
| SEGMENT_NAME | VARCHAR(128) | Name of the segment associated with the extent |
| PARTITION_NAME | VARCHAR(128) | Object Partition Name (Set to NULL for non-partitioned objects) <ul style="list-style-type: none"> reserved |
| SEGMENT_TYPE | VARCHAR(32) | Type of the segment: TABLE, INDEX |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the extent |
| EXTENT_ID | NUMBER | Extent number in the segment <ul style="list-style-type: none"> reserved |
| FILE_ID | NUMBER | File identifier number of the file containing the extent <ul style="list-style-type: none"> reserved |

| | | |
|--------------|--------|--|
| BLOCK_ID | NUMBER | Starting block number of the extent <ul style="list-style-type: none">• reserved |
| BYTES | NUMBER | Size of the extent in bytes |
| BLOCKS | NUMBER | Size of the extent in Oracle blocks |
| RELATIVE_FNO | NUMBER | Relative file number of the first extent block <ul style="list-style-type: none">• reserved |

Table 5-68 列信息

DBA_GLOBAL_SECONDARY_INDEXES

DBA_GLOBAL_SECONDARY_INDEXES描述数据库中的所有全局二级索引

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| TABLE_OWNER | VARCHAR(128) | Owner of the global secondary indexed object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the global secondary indexed object |
| TABLE_NAME | VARCHAR(128) | Name of the global secondary indexed object |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the global secondary index |
| INI_TRANS | NUMBER | Initial number of transactions |
| MAX_TRANS | NUMBER | Maximum number of transactions |
| INITIAL_EXTENT | NUMBER | Size of the initial extent |
| NEXT_EXTENT | NUMBER | Size of secondary extents |
| MIN_EXTENTS | NUMBER | Minimum number of extents allowed in the segment |
| MAX_EXTENTS | NUMBER | Maximum number of extents allowed in the segment |
| PCT_FREE | NUMBER | Minimum percentage of free space in a block |

| | | |
|--------------|------------|---|
| LOGGING | VARCHAR(3) | Indicates whether or not changes to the global secondary index are logged: (YES) or (NO) |
| BLOCKS | NUMBER | Number of used blocks in the global secondary index |
| EMPTY_BLOCKS | NUMBER | Number of empty blocks in the global secondary index |
| DROPPED | VARCHAR(3) | Indicates whether the global secondary index has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-69 列信息

DBA_GSI_PLACE

DBA_GSI_PLACE描述集群系统中所有全局二级索引的节点放置

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| TABLE_OWNER | VARCHAR(128) | Owner of the global secondary indexed object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the global secondary indexed object |
| TABLE_NAME | VARCHAR(128) | Name of the global secondary indexed object |
| GROUP_ID | NUMBER | Group identifier of the node where the global secondary index placed |
| GROUP_NAME | VARCHAR(128) | Group name of the node where the global secondary index placed |
| MEMBER_ID | NUMBER | Member identifier of the node where the global secondary index placed |
| MEMBER_NAME | VARCHAR(128) | Member name of the node where the global secondary index placed |
| MEMBER_OFFLINE | BOOLEAN | data of the cluster member is offline or not |

| | | |
|---------|------------|---|
| DROPPED | VARCHAR(3) | Indicates whether the global secondary index has been dropped and is in the recycle bin (YES) or not (NO) |
| BLOCKS | NUMBER | Number of used blocks of the node where the global secondary index placed |

Table 5-70 列信息

DBA_INDEXES

DBA_INDEXES描述数据库中的所有索引

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the index |
| INDEX_SCHEMA | VARCHAR(128) | Schema of the index |
| INDEX_NAME | VARCHAR(128) | Name of the index |
| INDEX_TYPE | VARCHAR(32) | Type of the index: the value in (NORMAL, NORMAL/REV, BITMAP, FUNCTION-BASED NORMAL, FUNCTION-BASED NORMAL/REV, FUNCTION-BASED BITMAP, IOT - TOP, DOMAIN) |
| TABLE_OWNER | VARCHAR(128) | Owner of the indexed object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the indexed object |
| TABLE_NAME | VARCHAR(128) | Name of the indexed object |
| TABLE_TYPE | VARCHAR(32) | Type of the indexed object: the value in (NEXT OBJECT, INDEX, TABLE, VIEW, SYNONYM, SEQUENCE) |
| UNIQUENESS | VARCHAR(32) | Indicates whether the index is unique (UNIQUE) or nonunique (NONUNIQUE) |

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| COMPRESSION | VARCHAR(32) | Indicates whether index compression is enabled (ENABLED) or not (DISABLED) <ul style="list-style-type: none"> reserved |
| PREFIX_LENGTH | NUMBER | Number of columns in the prefix of the compression key <ul style="list-style-type: none"> reserved |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the index |
| INI_TRANS | NUMBER | Initial number of transactions |
| MAX_TRANS | NUMBER | Maximum number of transactions |
| INITIAL_EXTENT | NUMBER | Size of the initial extent |
| NEXT_EXTENT | NUMBER | Size of secondary extents |
| MIN_EXTENTS | NUMBER | Minimum number of extents allowed in the segment |
| MAX_EXTENTS | NUMBER | Maximum number of extents allowed in the segment |

| 列名称 | 数据类型 | 说明 |
|----------------|--------|---|
| PCT_INCREASE | NUMBER | <p>Percentage increase in extent size</p> <ul style="list-style-type: none"> reserved |
| PCT_THRESHOLD | NUMBER | <p>Threshold percentage of block space allowed per index entry</p> <ul style="list-style-type: none"> reserved |
| INCLUDE_COLUMN | NUMBER | <p>Column ID of the last column to be included in index-organized table primary key (non-overflow) index</p> <ul style="list-style-type: none"> reserved |
| FREELISTS | NUMBER | <p>Number of process freelists allocated to this segment</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|------------|---|
| FREELIST_GROUPS | NUMBER | Number of freelist groups allocated to this segment <ul style="list-style-type: none"> reserved |
| PCT_FREE | NUMBER | Minimum percentage of free space in a block |
| LOGGING | VARCHAR(3) | Indicates whether or not changes to the index are logged: (YES) or (NO) |
| BLOCKS | NUMBER | Number of used blocks in the index |
| ANAL_BLOCKS | NUMBER | Number of used blocks in the index when most recently analyzed |
| EMPTY_BLOCKS | NUMBER | Number of empty blocks in the index |
| BLEVEL | NUMBER | B-Tree level (depth of the index from its root block to its leaf blocks) |
| LEAF_BLOCKS | NUMBER | Number of leaf blocks in the index |
| DISTINCT_KEYS | NUMBER | Number of distinct indexed values. |

| 列名称 | 数据类型 | 说明 |
|-------------------------|-------------|--|
| AVG_LEAF_BLOCKS_PER_KEY | NUMBER | <p>Average number of leaf blocks in which each distinct value in the index appears, rounded to the nearest integer</p> <ul style="list-style-type: none"> reserved |
| AVG_DATA_BLOCKS_PER_KEY | NUMBER | <p>Average number of data blocks in the table that are pointed to by a distinct value in the index rounded to the nearest integer</p> <ul style="list-style-type: none"> reserved |
| CLUSTERING_FACTOR | NUMBER | <p>Indicates the amount of order of the rows in the table based on the values of the index</p> |
| STATUS | VARCHAR(32) | <p>Indicates whether a nonpartitioned index is VALID or UNUSABLE</p> <ul style="list-style-type: none"> reserved |
| NUM_ROWS | NUMBER | <p>Number of rows in the index</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------------------------------|--|
| SAMPLE_SIZE | NUMBER | Size of the sample used to analyze the index |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which this index was most recently analyzed |
| DEGREE | VARCHAR(32) | Number of threads per instance for scanning the index, or DEFAULT <ul style="list-style-type: none"> reserved |
| INSTANCES | VARCHAR(32) | Number of instances across which the indexes to be scanned, or DEFAULT <ul style="list-style-type: none"> reserved |
| PARTITIONED | VARCHAR(3) | Indicates whether the index is partitioned (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| TEMPORARY | VARCHAR(1) | Indicates whether the index is on a temporary table (Y) or not (N) |
| GENERATED | VARCHAR(1) | Indicates whether the name of the index is system-generated (Y) or not (N) |

| 列名称 | 数据类型 | 说明 |
|------------------|-------------|--|
| SECONDARY | VARCHAR(1) | <p>Indicates whether the index is a secondary object created by the method of the Data Cartridge (Y) or not (N)</p> <ul style="list-style-type: none"> reserved |
| BUFFER_POOL | VARCHAR(32) | <p>Buffer pool to be used for index blocks</p> <ul style="list-style-type: none"> reserved |
| FLASH_CACHE | VARCHAR(32) | <p>Database Smart Flash Cache hint to be used for index blocks</p> <ul style="list-style-type: none"> reserved |
| CELL_FLASH_CACHE | VARCHAR(32) | <p>Cell flash cache hint to be used for index blocks</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|--|
| USER_STATS | VARCHAR(3) | <p>Indicates whether statistics were entered directly by the user (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DURATION | VARCHAR(32) | <p>Indicates the duration of a temporary table, the value is in (TRANSACTION, SESSION)</p> |
| PCT_DIRECT_ACCESS | NUMBER | <p>For a secondary index on an index-organized table, the percentage of rows with VALID guess</p> <ul style="list-style-type: none"> reserved |
| ITYP_OWNER | VARCHAR(128) | <p>For a domain index, the owner of the indextype</p> <ul style="list-style-type: none"> reserved |
| ITYP_NAME | VARCHAR(128) | <p>For a domain index, the name of the indextype</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|---------------|---|
| PARAMETERS | VARCHAR(1024) | For a domain index, the parameter string <ul style="list-style-type: none"> reserved |
| GLOBAL_STATS | VARCHAR(3) | For partitioned indexes, indicates whether statistics were collected by analyzing the index as a whole (YES) or were estimated from statistics on underlying index partitions and subpartitions (NO) <ul style="list-style-type: none"> reserved |
| DOMIDX_STATUS | VARCHAR(32) | Status of a domain index <ul style="list-style-type: none"> reserved |
| DOMIDX_OPSTATUS | VARCHAR(32) | Status of the operation on a domain index <ul style="list-style-type: none"> reserved |
| FUNCIDX_STATUS | VARCHAR(32) | Status of a function-based index <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-------------------------|------------|---|
| JOIN_INDEX | VARCHAR(3) | <p>Indicates whether the index is a join index (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| IOT_REDUNDANT_PKEY_ELIM | VARCHAR(3) | <p>Indicates whether redundant primary key columns are eliminated from secondary indexes on index-organized tables (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DROPPED | VARCHAR(3) | <p>Indicates whether the index has been dropped and is in the recycle bin (YES) or not (NO)</p> |
| VISIBILITY | VARCHAR(3) | <p>Indicates whether the index is VISIBLE or INVISIBLE to the optimizer</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-------------------|---------------|---|
| DOMIDX_MANAGEMENT | VARCHAR(32) | <p>If this is a domain index, indicates whether the domain index is system-managed (SYSTEM_MANAGED) or user-managed (USER_MANAGED)</p> <ul style="list-style-type: none"> reserved |
| SEGMENT_CREATED | VARCHAR(3) | Indicates whether the index segment has been created (YES) or not (NO) |
| COMMENTS | VARCHAR(1024) | Comments of the index |
| EMPTY_BLOCKS | NUMBER | Number of empty blocks in the index |

Table 5-71 列信息

DBA_IND_COLUMNS

DBA_IND_COLUMNS描述数据库中所有表和集群上所有索引的列

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| INDEX_OWNER | VARCHAR(128) | Owner of the index |
| INDEX_SCHEMA | VARCHAR(128) | Schema of the index |
| INDEX_NAME | VARCHAR(128) | Name of the index |
| TABLE_OWNER | VARCHAR(128) | Owner of the table or cluster |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table or cluster |
| TABLE_NAME | VARCHAR(128) | Name of the table or cluster |
| COLUMN_NAME | VARCHAR(128) | Column name or attribute of the object type column |
| COLUMN_POSITION | NUMBER | Position of the column or attribute within the index |
| COLUMN_LENGTH | NUMBER | Indexed length of the column |
| CHAR_LENGTH | NUMBER | Maximum codepoint length of the column <ul style="list-style-type: none"> reserved |
| DESCEND | VARCHAR(32) | Indicates whether the column is sorted in descending order (DESC) or ascending order (ASC) |

| | | |
|------------|-------------|--|
| NULL_ORDER | VARCHAR(32) | Indicates whether the null value of the column is sorted in nulls first order (NULLS FIRST) or nulls last order (NULLS LAST) |
|------------|-------------|--|

Table 5-72 列信息

DBA_IND_PLACE

DBA_IND_PLACE描述集群系统中所有索引的节点放置

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the index |
| INDEX_SCHEMA | VARCHAR(128) | Schema of the index |
| INDEX_NAME | VARCHAR(128) | Name of the index |
| TABLE_OWNER | VARCHAR(128) | Owner of the indexed object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the indexed object |
| TABLE_NAME | VARCHAR(128) | Name of the indexed object |
| GROUP_ID | NUMBER | Group identifier of the node where the index placed |
| GROUP_NAME | VARCHAR(128) | Group name of the node where the index placed |
| MEMBER_ID | NUMBER | Member identifier of the node where the index placed |
| MEMBER_NAME | VARCHAR(128) | Member name of the node where the index placed |
| MEMBER_OFFLINE | BOOLEAN | data of the cluster member is offline or not |

| | | |
|---------------|--------------------------------------|--|
| DROPPED | VARCHAR(3) | Indicates whether the index has been dropped and is in the recycle bin (YES) or not (NO) |
| DISTINCT_KEYS | NUMBER | (deprecated) |
| SAMPLE_SIZE | NUMBER | (deprecated) |
| BLOCKS | NUMBER | Number of used blocks of the node where the index placed |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | (deprecated) |

Table 5-73 列信息

DBA_NONSCHEMA_COMMENTS

DBA_NONSCHEMA_COMMENTS显示所有非模式对象(数据库授权模式表空间)的注释

| 列名称 | 数据类型 | 说明 |
|-------------|---------------|---|
| OBJECT_NAME | VARCHAR(128) | Name of the non-schema object |
| OBJECT_TYPE | VARCHAR(32) | Type of the non-schema object: DATABASE, PROFILE, AUTHORIZATION, SCHEMA, TABLESPACE |
| COMMENTS | VARCHAR(1024) | Comments of the non-schema object |

Table 5-74 列信息

DBA_OBJECTS

DBA_OBJECTS描述数据库中的所有对象

| 列名称 | 数据类型 | 说明 |
|----------------|--------------------------------------|--|
| OWNER | VARCHAR(128) | Owner of the object |
| SCHEMA_NAME | VARCHAR(128) | Schema of the object |
| OBJECT_NAME | VARCHAR(128) | Name of the object |
| SUBOBJECT_NAME | VARCHAR(128) | Name of the subobject (for example, partition) |
| OBJECT_ID | NUMBER | Dictionary object number of the object |
| DATA_OBJECT_ID | NUMBER | Dictionary object number of the segment that contains the object |
| OBJECT_TYPE | VARCHAR(32) | Type of the object (such as TABLE, INDEX) |
| CREATED | TIMESTAMP(6) WITHOUT TIME ZONE | Timestamp for the creation of the object |
| LAST_DDL_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Timestamp for the last modification of the object resulting from a DDL statement |
| TIMESTAMP | VARCHAR(32) | Timestamp for the specification of the object (character data) |

| | | |
|--------------|--------------|---|
| STATUS | VARCHAR(32) | Status of the object: the value in (VALID, INVALID, N/A) |
| TEMPORARY | VARCHAR(1) | Indicates whether the object is temporary (the current session can see only data that it placed in this object itself) (Y) or not (N) |
| GENERATED | VARCHAR(1) | Indicates whether the name of this object was system-generated (Y) or not (N) |
| SECONDARY | VARCHAR(1) | Indicates whether this is a secondary object created by the ODCIIndexCreate method of the Oracle Data Cartridge (Y) or not (N) |
| NAMESPACE | NUMBER | Namespace for the object |
| EDITION_NAME | VARCHAR(128) | Name of the edition in which the object is actual <ul style="list-style-type: none"> reserved |
| DROPPED | VARCHAR(3) | Indicates whether the object has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-75 列信息

DBA_PACKAGE_PRIVS

DBA_PACKAGE_PRIVS描述数据库中授权的所有包

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the procedure, function or package |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the procedure, function or package |
| PROCEDURE_NAME | VARCHAR(128) | Name of the procedure, function or package |
| PRIVILEGE | VARCHAR(32) | Privilege on the procedure, function or package |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-76 列信息

DBA_PROCEDURES

DBA_PROCEDURES列出所有函数过程或包

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of function, procedures or package |
| SCHEMA_NAME | VARCHAR(128) | Schema Name of function, procedures or package |
| OBJECT_NAME | VARCHAR(128) | Name of function, procedures or package |
| PROCEDURE_NAME | VARCHAR(128) | Name when a procedures in package |
| OBJECT_ID | NUMBER | ID of a function, procedures or package |
| SUBPROGRAM_ID | NUMBER | ID of procedures in package |
| OVERLOAD | VARCHAR(32) | ID of overloading procedure in package |
| OBJECT_TYPE | VARCHAR(32) | Type of function, procedures or package |
| AGGREGATE | VARCHAR(3) | Indicate whether the procedure is an aggregate function(YES) or not(NO) |
| PIPELINED | VARCHAR(3) | Indicate whether the procedure is a pipelined table function(YES) or not(NO) |
| IMPLTYPEOWNER | VARCHAR(128) | Name of the owner of the implementation type, if any |
| IMPLTYPE_NAME | VARCHAR(128) | Name of the implementation type, if any |
| PARALLEL | VARCHAR(3) | Indicates whether the procedure or function is parallel-enabled (YES) or not (NO) |

| | | |
|---------------|-------------|---|
| INTERFACE | VARCHAR(3) | YES, if the procedure/function is a table function implemented using the SQLCLI interface; otherwise NO |
| DETERMINISTIC | VARCHAR(3) | YES, if the procedure/function is declared to be deterministic; otherwise NO |
| AUTHID | VARCHAR(32) | Indicates whether the procedure/function is declared to execute as DEFINER or CURRENT_USER (invoker) |

Table 5-77 列信息

DBA_PROC_PRIVS

DBA_PROC_PRIVS描述当前用户为过程所有者授权者或被授权者或者某已启用的角色或PUBLIC
是被授权者的过程授权

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the procedure, function or package |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the procedure, function or package |
| PROCEDURE_NAME | VARCHAR(128) | Name of the procedure, function or package |
| PRIVILEGE | VARCHAR(32) | Privilege on the procedure, function or package |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-78 列信息

DBA_PROFILES

DBA_PROFILES显示所有配置文件及其限制

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|--|
| PROFILE_NAME | VARCHAR(128) | Profile name |
| RESOURCE_NAME | VARCHAR(128) | Resource name |
| RESOURCE_TYPE | VARCHAR(32) | Indicates whether the resource profile is a KERNEL or a PASSWORD parameter |
| LIMIT_VALUE | LONG VARCHAR | Limit placed on this resource for this profile |
| COMMON | VARCHAR(3) | Indicates whether a given profile is common. (YES or NO) |

Table 5-79 列信息

DBA_RECYCLEBIN

DBA_RECYCLEBIN描述数据库中的所有回收站

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------------------------------|---|
| OWNER | VARCHAR(128) | Owner of the schema |
| SCHEMA_NAME | VARCHAR(128) | Schema name of the object |
| OBJECT_NAME | VARCHAR(128) | Name of the object |
| ORIGINAL_NAME | VARCHAR(128) | Original name of the object |
| OPERATION | VARCHAR(4) | Operation carried out on the object |
| OBJECT_TYPE | VARCHAR(32) | Type of the object |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the object |
| CREATED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Created time of the object |
| DROPPED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Dropped time of the object |
| DROP_SCN | VARCHAR(128) | System change number (SCN) of the transaction which moved the object to the recycle bin |

| | | |
|--------------|------------|---|
| DROP_GCN | NUMBER | System change number (GCN) of the transaction which moved the object to the recycle bin |
| DROP_DCN | NUMBER | System change number (DCN) of the transaction which moved the object to the recycle bin |
| DROP_LCN | NUMBER | System change number (LCN) of the transaction which moved the object to the recycle bin |
| CAN_UNDROP | VARCHAR(3) | Indicates whether the object can be undropped (YES) or not (NO) |
| CAN_PURGE | VARCHAR(3) | Indicates whether the object can be purged (YES) or not (NO) |
| BASE_OBJECT | NUMBER | Object number of the base object |
| PURGE_OBJECT | NUMBER | Object number for the object which gets purged |

Table 5-80 列信息

DBA_SCHEMAS

DBA_SCHEMAS识别数据库中的模式

| 列名称 | 数据类型 | 说明 |
|---------------|-----------------------------------|----------------------------------|
| SCHEMA_OWNER | VARCHAR(128) | Owner of the schema |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| CREATED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Created time of the schema |
| MODIFIED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Last modified time of the schema |
| COMMENTS | VARCHAR(1024) | Comments of the schema |

Table 5-81 列信息

DBA_SCHEMA_PATH

DBA_SCHEMA_PATH描述数据库中所有授权的模式搜索顺序

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|--|
| AUTH_NAME | VARCHAR(128) | Name of the authorization |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| SEARCH_ORDER | NUMBER | Schema search order of the authorization |

Table 5-82 列信息

DBA_SCHEMA_PRIVS

DBA_SCHEMA_PRIVS描述数据库中的所有模式授权

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the schema |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| PRIVILEGE | VARCHAR(32) | Privilege on the schema |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-83 列信息

DBA_SEQUENCES

DBA_SEQUENCES描述数据库中的所有序列

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| SEQUENCE_OWNER | VARCHAR(128) | Owner of the sequence |
| SEQUENCE_SCHEMA | VARCHAR(128) | Schema of the sequence |
| SEQUENCE_NAME | VARCHAR(128) | Sequence name |
| MIN_VALUE | NUMBER | Minimum value of the sequence |
| MAX_VALUE | NUMBER | Maximum value of the sequence |
| INCREMENT_BY | NUMBER | Value by which sequence is incremented |
| CYCLE_FLAG | VARCHAR(1) | Indicates whether the sequence wraps around on reaching the limit (Y) or not (N) |
| ORDER_FLAG | VARCHAR(1) | Indicates whether sequence numbers are generated in order (Y) or not (N) <ul style="list-style-type: none"> reserved |
| CACHE_SIZE | NUMBER | Number of sequence numbers to cache |
| LAST_NUMBER | NUMBER | Last sequence number written to database. If a sequence uses caching, the number written to database is the last number placed in the sequence cache. |

| | | |
|----------|---------------|--------------------------|
| COMMENTS | VARCHAR(1024) | Comments of the sequence |
|----------|---------------|--------------------------|

Table 5-84 列信息

CSII

DBA_SEQ_PRIVS

DBA_SEQ_PRIVS描述数据库中的所有序列授权

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| SEQUENCE_OWNER | VARCHAR(128) | Owner of the sequence |
| SEQUENCE_SCHEMA | VARCHAR(128) | Schema of the sequence |
| SEQUENCE_NAME | VARCHAR(128) | Name of the sequence |
| PRIVILEGE | VARCHAR(32) | Privilege on the sequence |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-85 列信息

DBA_SHARD_KEY_COLUMNS

DBA_SHARD_KEY_COLUMNS描述集群系统中所有分片表的分片键列

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| COLUMN_NAME | VARCHAR(128) | Column name of the shard key |
| COLUMN_POSITION | NUMBER | Position of the column within the shard key |

Table 5-86 列信息

DBA_SOURCE

DBA_SOURCE描述当前用户可访问的存储对象的文本源

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of object |
| SCHEMA_NAME | VARCHAR(128) | Schema Name of object |
| NAME | VARCHAR(128) | Name of object |
| TYPE | VARCHAR(32) | Type of object: FUNCTION, PROCEDURE, PACKAGE,PACKAGE BODY, TRIGGER |
| LINE | NUMBER | Line number of this line of source |
| TEXT | LONG VARCHAR | Text source of the stored object |
| ORIGIN_CON_ID | VARCHAR(256) | ID of the container where the data originates |

Table 5-87 列信息

DBA_STAT_SYSTEM

DBA_STAT_SYSTEM描述已分析的系统统计信息

| 列名称 | 数据类型 | 说明 |
|---------------------|--------------------------------------|---|
| CPU_OPS | NATIVE_BIGINT | OPS(operations per second) of CPU |
| NETWORK_IOPS | NATIVE_BIGINT | IOPS(I/O operations per second) of Cluster NETWORK |
| NETWORK_BUFSIZE | NATIVE_BIGINT | buffer size of Cluster NETWORK when analyzed |
| BUFFER_MISS_PERCENT | NATIVE_BIGINT | disk buffer miss percent |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which the table was most recently analyzed |

Table 5-88 列信息

DBA_SYS_PRIVS

DBA_SYS_PRIVS描述数据库中的所有系统(数据库表空间模式)权限

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the grantee |
| PRIVILEGE | VARCHAR(256) | System(database, tablespace, schema) privilege |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |
| ADMIN_OPTION | VARCHAR(3) | equal to GRANTABLE column |

Table 5-89 列信息

DBA_SYNONYMS

DBA_SYNONYMS描述数据库中的所有同义词

| 列名称 | 数据类型 | 说明 |
|--------------------|--------------|-------------------------|
| SYNONYM_OWNER | VARCHAR(128) | Owner of the synonym |
| SYNONYM_SCHEMA | VARCHAR(128) | Schema of the synonym |
| SYNONYM_NAME | VARCHAR(128) | Synonym name |
| OBJECT_SCHEMA_NAME | VARCHAR(128) | Object schema name |
| OBJECT_NAME | VARCHAR(128) | Object name |
| DB_LINK | VARCHAR(128) | Reserved for future use |

Table 5-90 列信息

DBA_TABLES

DBA_TABLES描述数据库中的所有关系表

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the table |
| CLUSTER_NAME | VARCHAR(128) | Name of the cluster <ul style="list-style-type: none"> reserved |
| IOT_NAME | VARCHAR(128) | Name of the index-organized table <ul style="list-style-type: none"> reserved |
| STATUS | VARCHAR(32) | If a previous DROP TABLE operation failed, indicates whether the table is unusable (UNUSABLE) or valid (VALID) <ul style="list-style-type: none"> reserved |
| PCT_FREE | NUMBER | Minimum percentage of free space in a block |

| 列名称 | 数据类型 | 说明 |
|----------------|--------|--|
| PCT_USED | NUMBER | Minimum percentage of used space in a block |
| INI_TRANS | NUMBER | Initial number of transactions |
| MAX_TRANS | NUMBER | Maximum number of transactions |
| INITIAL_EXTENT | NUMBER | Size of the initial extent (in bytes) |
| NEXT_EXTENT | NUMBER | Size of secondary extents (in bytes) |
| MIN_EXTENTS | NUMBER | Minimum number of extents allowed in the segment |
| MAX_EXTENTS | NUMBER | Maximum number of extents allowed in the segment |
| PCT_INCREASE | NUMBER | Percentage increase in extent size <ul style="list-style-type: none"> reserved |
| FREELISTS | NUMBER | Number of process freelists allocated to the segment <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|------------|---|
| FREELIST_GROUPS | NUMBER | <p>Number of freelist groups allocated to the segment</p> <ul style="list-style-type: none"> reserved |
| LOGGING | VARCHAR(3) | <p>Indicates whether or not changes to the table are logged</p> |
| BACKED_UP | VARCHAR(1) | <p>Indicates whether the table has been backed up since the last modification (Y) or not (N)</p> <ul style="list-style-type: none"> reserved |
| NUM_ROWS | NUMBER | <p>Number of rows in the table</p> |
| BLOCKS | NUMBER | <p>Number of used blocks in the table</p> |
| ANAL_BLOCKS | NUMBER | <p>Number of used blocks in the table when most recently analyzed</p> |
| EMPTY_BLOCKS | NUMBER | <p>Number of empty (never used) blocks in the table</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------------------|--------|--|
| AVG_SPACE | NUMBER | <p>Average available free space in the table</p> <ul style="list-style-type: none"> reserved |
| CHAIN_CNT | NUMBER | <p>Number of rows in the table that are chained from one data block to another or that have migrated to a new block, requiring a link to preserve the old rowid</p> <ul style="list-style-type: none"> reserved |
| AVG_ROW_LEN | NUMBER | <p>Average row length, including row overhead</p> <ul style="list-style-type: none"> reserved |
| AVG_SPACE_FREELIST_BLOCKS | NUMBER | <p>Average freespace of all blocks on a freelist</p> <ul style="list-style-type: none"> reserved |
| NUM_FREELIST_BLOCKS | NUMBER | <p>Number of blocks on the freelist</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------------------------------|--|
| DEGREE | VARCHAR(32) | <p>Number of threads per instance for scanning the table, or DEFAULT</p> <ul style="list-style-type: none"> reserved |
| INSTANCES | VARCHAR(32) | <p>Number of instances across which the table is to be scanned, or DEFAULT</p> <ul style="list-style-type: none"> reserved |
| CACHE | VARCHAR(1) | <p>Indicates whether the table is to be cached in the buffer cache (Y) or not (N)</p> <ul style="list-style-type: none"> reserved |
| TABLE_LOCK | VARCHAR(32) | <p>Indicates whether table locking is enabled (ENABLED) or disabled (DISABLED)</p> |
| SAMPLE_SIZE | NUMBER | Sample size used in analyzing the table |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which the table was most recently analyzed |

| 列名称 | 数据类型 | 说明 |
|-------------|-------------|---|
| PARTITIONED | VARCHAR(3) | <p>Indicates whether the table is partitioned (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| IOT_TYPE | VARCHAR(32) | <p>If the table is an index-organized table, then IOT_TYPE is IOT, IOT_OVERFLOW, or IOT_MAPPING.</p> <ul style="list-style-type: none"> reserved |
| TEMPORARY | VARCHAR(1) | <p>Indicates whether the table is temporary (Y) or not (N)</p> |
| SECONDARY | VARCHAR(1) | <p>Indicates whether the table is a secondary object created by cartridge</p> <ul style="list-style-type: none"> reserved |
| NESTED | VARCHAR(3) | <p>Indicates whether the table is a nested table (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|------------------|-------------|--|
| BUFFER_POOL | VARCHAR(32) | Buffer pool to be used for table blocks <ul style="list-style-type: none">reserved |
| FLASH_CACHE | VARCHAR(32) | Database Smart Flash Cache hint to be used for table blocks <ul style="list-style-type: none">reserved |
| CELL_FLASH_CACHE | VARCHAR(32) | Cell flash cache hint to be used for table blocks <ul style="list-style-type: none">reserved |
| ROW_MOVEMENT | VARCHAR(32) | If a partitioned table, indicates whether row movement is enabled (ENABLED) or disabled (DISABLED) <ul style="list-style-type: none">reserved |

| 列名称 | 数据类型 | 说明 |
|--------------|-------------|---|
| GLOBAL_STATS | VARCHAR(3) | <p>For partitioned tables, indicates whether statistics for the table as a whole (global statistics) are accurate (YES)</p> <ul style="list-style-type: none"> reserved |
| USER_STATS | VARCHAR(3) | <p>Indicates whether statistics were entered directly by the user (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DURATION | VARCHAR(32) | <p>Indicates the duration of a temporary table, the value is in (TRANSACTION, SESSION)</p> |
| SKIP_CORRUPT | VARCHAR(32) | <p>Indicates whether Database ignores blocks marked corrupt during table and index scans (ENABLED) or raises an error (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| MONITORING | VARCHAR(3) | <p>Indicates whether the table has the MONITORING attribute set (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| CLUSTER_OWNER | VARCHAR(128) | Owner of the cluster, if any • reserved |
| DEPENDENCIES | VARCHAR(32) | Indicates whether row-level dependency tracking is enabled (ENABLED) or disabled (DISABLED) • reserved |
| COMPRESSION | VARCHAR(32) | Indicates whether table compression is enabled (ENABLED) or not (DISABLED) • reserved |
| COMPRESS_FOR | VARCHAR(32) | Default compression for what kind of operations • reserved |
| DROPPED | VARCHAR(3) | Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO) |

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|--|
| READ_ONLY | VARCHAR(3) | Indicates whether the table IS READ-ONLY (YES) or not (NO) |
| SEGMENT_CREATED | VARCHAR(3) | Indicates whether the table segment has been created (YES) or not (NO) |
| RESULT_CACHE | VARCHAR(32) | Result cache mode annotation for the table: the value in (NULL, DEFAULT, FORCE, MANUAL) <ul style="list-style-type: none">reserved |

Table 5-91 列信息

DBA_TABLESPACES

DBA_TABLESPACES描述数据库中的所有表空间

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace |
| BLOCK_SIZE | NUMBER | Tablespace block size |
| INITIAL_EXTENT | NUMBER | Default initial extent size (in bytes) <ul style="list-style-type: none">reserved |
| NEXT_EXTENT | NUMBER | Default incremental extent size (in bytes) <ul style="list-style-type: none">reserved |
| MIN_EXTENTS | NUMBER | Default minimum number of extents <ul style="list-style-type: none">reserved |
| MAX_EXTENTS | NUMBER | Default maximum number of extents <ul style="list-style-type: none">reserved |

| 列名称 | 数据类型 | 说明 |
|--------------|-------------|--|
| MAX_SIZE | NUMBER | Default maximum size of segments <ul style="list-style-type: none"> reserved |
| PCT_INCREASE | NUMBER | Default percent increase for extent size <ul style="list-style-type: none"> reserved |
| MIN_EXTLEN | NUMBER | Minimum extent size for this tablespace (in bytes) <ul style="list-style-type: none"> reserved |
| STATUS | VARCHAR(32) | Tablespace status: the value in (ONLINE, OFFLINE, READ ONLY) |
| CONTENTS | VARCHAR(32) | Tablespace contents: the value in (SYSTEM, DATA, TEMPORARY, UNDO) |
| LOGGING | VARCHAR(32) | Default logging attribute: LOGGING, NOLOGGING |

| 列名称 | 数据类型 | 说明 |
|-------------------|-------------|--|
| FORCE_LOGGING | VARCHAR(3) | <p>Indicates whether the tablespace is under force logging mode (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| EXTENT_MANAGEMENT | VARCHAR(32) | <p>Indicates whether the extents in the tablespace are dictionary managed (DICTIONARY) or locally managed (LOCAL)</p> <ul style="list-style-type: none"> reserved |
| ALLOCATION_TYPE | VARCHAR(32) | <p>Type of extent allocation in effect for the tablespace: the value in (SYSTEM, UNIFORM, USER)</p> <ul style="list-style-type: none"> reserved |
| PLUGGED_IN | VARCHAR(3) | <p>Indicates whether the tablespace is plugged in (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|--------------------------|-------------|--|
| SEGMENT_SPACE_MANAGEMENT | VARCHAR(32) | <p>Indicates whether the free and used segment space in the tablespace is managed using free lists (MANUAL) or bitmaps (AUTO)</p> <ul style="list-style-type: none"> reserved |
| DEF_TAB_COMPRESSION | VARCHAR(32) | <p>Indicates whether default table compression is enabled (ENABLED) or not (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| RETENTION | VARCHAR(32) | <p>Undo tablespace retention: the value in (GUARANTEE, NOGUARANTEE, NOT APPLY)</p> <ul style="list-style-type: none"> reserved |
| BIGFILE | VARCHAR(3) | <p>Indicates whether the tablespace is a bigfile tablespace (YES) or a smallfile tablespace (NO)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|----------------------|-------------|--|
| PREDICATE_EVALUATION | VARCHAR(32) | Indicates whether predicates are evaluated by host (HOST) or by storage (STORAGE) <ul style="list-style-type: none">reserved |
| ENCRYPTED | VARCHAR(3) | Indicates whether the tablespace is encrypted (YES) or not (NO) <ul style="list-style-type: none">reserved |
| COMPRESS_FOR | VARCHAR(32) | Indicates whether the tablespace is encrypted (YES) or not (NO) <ul style="list-style-type: none">reserved |

Table 5-92 列信息

DBA_TAB_COLS

DBA_TAB_COLS描述数据库中所有表视图和集群的列(包括隐藏列)

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Column name |
| DATA_TYPE | VARCHAR(128) | Datatype of the column |
| DATA_TYPE_MOD | VARCHAR(3) | Datatype modifier of the column <ul style="list-style-type: none"> reserved |
| DATA_TYPE_OWNER | VARCHAR(128) | Owner of the datatype of the column <ul style="list-style-type: none"> reserved |
| DATA_LENGTH | NUMBER | Length of the column (in bytes) |
| DATA_PRECISION | NUMBER | Decimal precision for NUMBER datatype; binary precision for FLOAT datatype; NULL for all other datatypes |

| 列名称 | 数据类型 | 说明 |
|----------------|---------------|--|
| DATA_SCALE | NUMBER | Digits to the right of the decimal point in a number |
| NULLABLE | VARCHAR(1) | Indicates whether a column allows NULLs. |
| COLUMN_ID | NUMBER | Sequence number of the column as created |
| DEFAULT_LENGTH | NUMBER | Length of the default value for the column |
| DATA_DEFAULT | LONG VARCHAR | Default value for the column |
| NUM_DISTINCT | NUMBER | Number of distinct values in the column |
| LOW_VALUE | VARBINARY(32) | Low value in the column |
| HIGH_VALUE | VARBINARY(32) | High value in the column |
| DENSITY | NUMBER | <p>If a histogram is available on COLUMN_NAME, then this column displays the selectivity of a value that spans fewer than 2 endpoints in the histogram.</p> <ul style="list-style-type: none"> reserved |
| NUM_NULLS | NUMBER | Number of NULLs in the column |

| 列名称 | 数据类型 | 说明 |
|----------------------|--------------------------------------|--|
| NUM_BUCKETS | NUMBER | <p>Number of buckets in the histogram for the column</p> <ul style="list-style-type: none"> reserved |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which this column was most recently analyzed |
| SAMPLE_SIZE | NUMBER | Sample size used in analyzing this column |
| CHARACTER_SET_NAME | VARCHAR(128) | <p>Name of the character set</p> <ul style="list-style-type: none"> reserved |
| CHAR_COL_DECL_LENGTH | NUMBER | Declaration length of the character type column |
| GLOBAL_STATS | VARCHAR(3) | <p>For partitioned tables, indicates whether column statistics were collected for the table</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|------------|---|
| USER_STATS | VARCHAR(3) | <p>Indicates whether statistics were entered directly by the user (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| AVG_COL_LEN | NUMBER | Average length of the column (in bytes) |
| CHAR_LENGTH | NUMBER | Displays the length of the column in characters. |
| CHAR_USED | VARCHAR(1) | Indicates that the column uses BYTE length semantics (B) or CHAR length semantics (C) |
| V80_FMT_IMAGE | VARCHAR(3) | <p>Indicates whether the column data is in release older image format (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DATA_UPGRADED | VARCHAR(3) | <p>Indicates whether the column data has been upgraded to the latest type version format (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| HIDDEN_COLUMN | VARCHAR(3) | Indicates whether the column is a hidden column (YES) or not (NO) |

| 列名称 | 数据类型 | 说明 |
|--------------------|---------------|--|
| VIRTUAL_COLUMN | VARCHAR(3) | Indicates whether the column is a virtual column (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| SEGMENT_COLUMN_ID | NUMBER | Sequence number of the column in the segment |
| INTERNAL_COLUMN_ID | NUMBER | Internal sequence number of the column |
| HISTOGRAM | VARCHAR(32) | Indicates existence/type of histogram <ul style="list-style-type: none"> reserved |
| QUALIFIED_COL_NAME | VARCHAR(4000) | Qualified column name |
| IDENTITY_COLUMN | VARCHAR(3) | Indicates whether this is an identity column (YES) or not (NO) |

Table 5-93 列信息

DBA_TAB_COLUMNS

DBA_TAB_COLUMNS描述当前用户可访问的表视图和集群的列

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Column name |
| DATA_TYPE | VARCHAR(128) | Datatype of the column |
| DATA_TYPE_MOD | VARCHAR(3) | Datatype modifier of the column <ul style="list-style-type: none"> reserved |
| DATA_TYPE_OWNER | VARCHAR(128) | Owner of the datatype of the column <ul style="list-style-type: none"> reserved |
| DATA_LENGTH | NUMBER | Length of the column (in bytes) |
| DATA_PRECISION | NUMBER | Decimal precision for NUMBER datatype; binary precision for FLOAT datatype; NULL for all other datatypes |

| 列名称 | 数据类型 | 说明 |
|----------------|---------------|--|
| DATA_SCALE | NUMBER | Digits to the right of the decimal point in a number |
| NULLABLE | VARCHAR(1) | Indicates whether a column allows NULLs. |
| COLUMN_ID | NUMBER | Sequence number of the column as created |
| DEFAULT_LENGTH | NUMBER | Length of the default value for the column |
| DATA_DEFAULT | LONG VARCHAR | Default value for the column |
| NUM_DISTINCT | NUMBER | Number of distinct values in the column |
| LOW_VALUE | VARBINARY(32) | Low value in the column |
| HIGH_VALUE | VARBINARY(32) | High value in the column |
| DENSITY | NUMBER | <p>If a histogram is available on COLUMN_NAME, then this column displays the selectivity of a value that spans fewer than 2 endpoints in the histogram.</p> <ul style="list-style-type: none"> reserved |
| NUM_NULLS | NUMBER | Number of NULLs in the column |

| 列名称 | 数据类型 | 说明 |
|----------------------|--------------------------------------|--|
| NUM_BUCKETS | NUMBER | <p>Number of buckets in the histogram for the column</p> <ul style="list-style-type: none"> reserved |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which this column was most recently analyzed |
| SAMPLE_SIZE | NUMBER | Sample size used in analyzing this column |
| CHARACTER_SET_NAME | VARCHAR(128) | <p>Name of the character set</p> <ul style="list-style-type: none"> reserved |
| CHAR_COL_DECL_LENGTH | NUMBER | Declaration length of the character type column |
| GLOBAL_STATS | VARCHAR(3) | <p>For partitioned tables, indicates whether column statistics were collected for the table</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|------------|---|
| USER_STATS | VARCHAR(3) | <p>Indicates whether statistics were entered directly by the user (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| AVG_COL_LEN | NUMBER | Average length of the column (in bytes) |
| CHAR_LENGTH | NUMBER | Displays the length of the column in characters. |
| CHAR_USED | VARCHAR(1) | Indicates that the column uses BYTE length semantics (B) or CHAR length semantics (C) |
| V80_FMT_IMAGE | VARCHAR(3) | <p>Indicates whether the column data is in release older image format (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DATA_UPGRADED | VARCHAR(3) | <p>Indicates whether the column data has been upgraded to the latest type version format (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|---|
| HISTOGRAM | VARCHAR(32) | Indicates existence/type of histogram • reserved |
| IDENTITY_COLUMN | VARCHAR(3) | Indicates whether this is an identity column (YES) or not (NO) |

Table 5-94 列信息

DBA_TAB_COMMENTS

DBA_TAB_COMMENTS显示数据库中所有表和视图的注释

| 列名称 | 数据类型 | 说明 |
|--------------|---------------|-----------------------|
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| TABLE_TYPE | VARCHAR(32) | Type of the object |
| COMMENTS | VARCHAR(1024) | Comment on the object |

Table 5-95 列信息

DBA_TAB_IDENTITY_COLS

DBA_TAB_IDENTITY_COLS描述所有表标识列

| 列名称 | 数据类型 | 说明 |
|------------------|---------------|--|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| COLUMN_NAME | VARCHAR(128) | Name of the identity column |
| GENERATION_TYPE | VARCHAR(32) | Generation type of the identity column. Possible values are ALWAYS or BY DEFAULT |
| IDENTITY_OPTIONS | VARCHAR(1024) | Options for the identity column sequence generator |

Table 5-96 列信息

DBA_TAB_PLACE

DBA_TAB_PLACE描述集群系统中所有集群表的节点放置

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| GROUP_ID | NUMBER | Group identifier of the node where the table placed |
| GROUP_NAME | VARCHAR(128) | Group name of the node where the table placed |
| MEMBER_ID | NUMBER | Member identifier of the node where the table placed |
| MEMBER_NAME | VARCHAR(128) | Member name of the node where the table placed |
| MEMBER_POSITION | NUMBER | Member position of the node where the table placed |
| MEMBER_OFFLINE | BOOLEAN | data of the cluster member is offline or not |
| IS_UPDATE_MASTER | BOOLEAN | whether the cluster member is update master or not |
| DROPPED | VARCHAR(3) | Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO) |

| | | |
|---------------|--------------------------------------|--|
| SCN | VARCHAR(64) | table scn of the node where the table placed |
| NUM_ROWS | NUMBER | Number of rows in the table |
| BLOCKS | NUMBER | Number of used blocks of the node where the table placed |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which the table was most recently analyzed |

Table 5-97 列信息

DBA_TAB_PRIVS

DBA_TAB_PRIVS描述数据库中的所有对象授权

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the object |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |
| HIERARCHY | VARCHAR(3) | Indicates whether the privilege was granted with the HIERARCHY OPTION (YES) or not (NO) |

Table 5-98 列信息

DBA_TAB_SHARDS

DBA_TAB_SHARDS描述集群系统中所有分片表的分片信息

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the table |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| SHARD_STRATEGY | VARCHAR(32) | Sharding strategy of the table: the value in (HASH SHARDING, RANGE SHARDING, LIST SHARDING) |
| SHARD_NAME | VARCHAR(128) | Shard name |
| SHARD_NUMBER | NUMBER | Shard number |
| SHARD_DEFINITION | LONG VARCHAR | Shard definition (if hash sharded, the value is null) |
| GROUP_ID | NUMBER | Group identifier where the table placed |
| GROUP_NAME | VARCHAR(128) | Group name where the table placed |
| DROPPED | VARCHAR(3) | Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-99 列信息

DBA_TBS_PRIVS

DBA_TBS_PRIVS描述数据库中的所有表空间授权

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace |
| PRIVILEGE | VARCHAR(32) | Privilege on the tablespace |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-100 列信息

DBA_USERS

DBA_USERS描述数据库的所有用户

| 列名称 | 数据类型 | 说明 |
|-----------------------|--------------------------------------|---|
| USERNAME | VARCHAR(128) | Name of the user |
| USER_ID | NUMBER | ID number of the user |
| PASSWORD | VARCHAR(128) | encrypted password |
| ACCOUNT_STATUS | VARCHAR(32) | Account status: the value in (OPEN, EXPIRED, EXPIRED(GRACE), LOCKED(TIMED), LOCKED, EXPIRED & LOCKED(TIMED), EXPIRED(GRACE) & LOCKED(TIMED), EXPIRED & LOCKED, EXPIRED(GRACE) & LOCKED) |
| LOCK_DATE | TIMESTAMP(6) WITHOUT TIME ZONE | Timestamp the account was locked if account status was LOCKED |
| EXPIRY_DATE | TIMESTAMP(6) WITHOUT TIME ZONE | Timestamp of expiration of the account |
| FAILED_LOGIN_ATTEMPTS | NUMBER | Consecutive failed login attempts count |
| DEFAULT_TABLESPACE | VARCHAR(128) | Default tablespace for data |

| 列名称 | 数据类型 | 说明 |
|-----------------------------|--------------------------------------|---|
| TEMPORARY_TABLESPACE | VARCHAR(128) | Name of the default tablespace for temporary tables or the name of a tablespace group |
| INDEX_TABLESPACE | VARCHAR(128) | Default tablespace for index |
| CREATED | TIMESTAMP(6) WITHOUT TIME ZONE | User creation timestamp |
| PROFIL_NAME | VARCHAR(128) | User resource profile name |
| INITIAL_RSRC_CONSUMER_GROUP | VARCHAR(128) | Initial resource consumer group for the user <ul style="list-style-type: none"> reserved |
| EXTERNAL_NAME | VARCHAR(128) | User external name <ul style="list-style-type: none"> reserved |
| PASSWORD_VERSIONS | VARCHAR(32) | Shows the list of versions of the password hashes (verifiers). <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------------|-------------|---|
| EDITIONS_ENABLED | VARCHAR(1) | Indicates whether editions have been enabled for the corresponding user (Y) or not (N). |
| AUTHENTICATION_TYPE | VARCHAR(32) | Indicates the authentication mechanism for the user. <ul style="list-style-type: none">• reserved |

Table 5-101 列信息

DBA_VIEWS

DBA_VIEWS描述数据库中的所有视图

| 列名称 | 数据类型 | 说明 |
|------------------|---------------|---|
| OWNER | VARCHAR(128) | Owner of the view |
| VIEW_SCHEMA | VARCHAR(128) | Schema of the view |
| VIEW_NAME | VARCHAR(128) | Name of the view |
| TEXT_LENGTH | NUMBER | Length of the view text |
| TEXT | LONG VARCHAR | View text |
| TYPE_TEXT_LENGTH | NUMBER | Length of the type clause of the typed view <ul style="list-style-type: none"> reserved |
| TYPE_TEXT | VARCHAR(4000) | Type clause of the typed view <ul style="list-style-type: none"> reserved |
| OID_TEXT_LENGTH | NUMBER | Length of the WITH OID clause of the typed view <ul style="list-style-type: none"> reserved |

| | | |
|-----------------|---------------|---|
| OID_TEXT | VARCHAR(4000) | <p>WITH OID clause of the typed view</p> <ul style="list-style-type: none"> reserved |
| VIEW_TYPE_OWNER | VARCHAR(128) | <p>Owner of the type of the view if the view is a typed view</p> <ul style="list-style-type: none"> reserved |
| VIEW_TYPE | VARCHAR(32) | <p>Type of the view if the view is a typed view</p> <ul style="list-style-type: none"> reserved |
| SUPERVIEW_NAME | VARCHAR(128) | <p>Name of the superview</p> <ul style="list-style-type: none"> reserved |
| EDITIONING_VIEW | VARCHAR(1) | Reserved for future use |
| READ_ONLY | VARCHAR(1) | Indicates whether the view is read-only (Y) or not (N) |

Table 5-102 列信息

USER_视图

可获取当前用户拥有的对象信息

USER_ALL_TABLES

USER_ALL_TABLES描述当前用户拥有的对象表和关系表

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the table |
| CLUSTER_NAME | VARCHAR(128) | Name of the cluster <ul style="list-style-type: none">reserved |
| IOT_NAME | VARCHAR(128) | Name of the index-organized table <ul style="list-style-type: none">reserved |

| 列名称 | 数据类型 | 说明 |
|----------------|-------------|--|
| STATUS | VARCHAR(32) | <p>If a previous DROP TABLE operation failed, indicates whether the table is unusable (UNUSABLE) or valid (VALID)</p> <ul style="list-style-type: none"> reserved |
| PCT_FREE | NUMBER | Minimum percentage of free space in a block |
| PCT_USED | NUMBER | Minimum percentage of used space in a block |
| INI_TRANS | NUMBER | Initial number of transactions |
| MAX_TRANS | NUMBER | Maximum number of transactions |
| INITIAL_EXTENT | NUMBER | Size of the initial extent (in bytes) |
| NEXT_EXTENT | NUMBER | Size of secondary extents (in bytes) |
| MIN_EXTENTS | NUMBER | Minimum number of extents allowed in the segment |
| MAX_EXTENTS | NUMBER | Maximum number of extents allowed in the segment |
| PCT_INCREASE | NUMBER | <p>Percentage increase in extent size</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|------------|---|
| FREELISTS | NUMBER | Number of process freelists allocated to the segment • reserved |
| FREELIST_GROUPS | NUMBER | Number of freelist groups allocated to the segment • reserved |
| LOGGING | VARCHAR(3) | Indicates whether or not changes to the table are logged |
| BACKED_UP | VARCHAR(1) | Indicates whether the table has been backed up since the last modification (Y) or not (N) • reserved |
| NUM_ROWS | NUMBER | Number of rows in the table |
| BLOCKS | NUMBER | Number of used blocks in the table |
| ANAL_BLOCKS | NUMBER | Number of used blocks in the table when most recently analyzed |

| 列名称 | 数据类型 | 说明 |
|---------------------------|--------|--|
| EMPTY_BLOCKS | NUMBER | <p>Number of empty (never used) blocks in the table</p> <ul style="list-style-type: none"> reserved |
| AVG_SPACE | NUMBER | <p>Average available free space in the table</p> <ul style="list-style-type: none"> reserved |
| CHAIN_CNT | NUMBER | <p>Number of rows in the table that are chained from one data block to another or that have migrated to a new block, requiring a link to preserve the old rowid</p> <ul style="list-style-type: none"> reserved |
| AVG_ROW_LEN | NUMBER | <p>Average row length, including row overhead</p> <ul style="list-style-type: none"> reserved |
| AVG_SPACE_FREELIST_BLOCKS | NUMBER | <p>Average freespace of all blocks on a freelist</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------------|-------------|--|
| NUM_FREELIST_BLOCKS | NUMBER | Number of blocks on the freelist <ul style="list-style-type: none"> reserved |
| DEGREE | VARCHAR(32) | Number of threads per instance for scanning the table, or DEFAULT <ul style="list-style-type: none"> reserved |
| INSTANCES | VARCHAR(32) | Number of instances across which the table is to be scanned, or DEFAULT <ul style="list-style-type: none"> reserved |
| CACHE | VARCHAR(1) | Indicates whether the table is to be cached in the buffer cache (Y) or not (N) <ul style="list-style-type: none"> reserved |
| TABLE_LOCK | VARCHAR(32) | Indicates whether table locking is enabled (ENABLED) or disabled (DISABLED) |
| SAMPLE_SIZE | NUMBER | Sample size used in analyzing the table |

| 列名称 | 数据类型 | 说明 |
|------------------|--------------------------------------|---|
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which the table was most recently analyzed |
| PARTITIONED | VARCHAR(3) | Indicates whether the table is partitioned (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| IOT_TYPE | VARCHAR(32) | If the table is an index-organized table, then IOT_TYPE is IOT, IOT_OVERFLOW, or IOT_MAPPING. <ul style="list-style-type: none"> reserved |
| OBJECT_ID_TYPE | VARCHAR(32) | Indicates whether the object ID (OID) is USER-DEFINED or SYSTEM GENERATED <ul style="list-style-type: none"> reserved |
| TABLE_TYPE_OWNER | VARCHAR(128) | If an object table, owner of the type from which the table is created <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|--|
| TABLE_TYPE | VARCHAR(128) | <p>If an object table, type of the table</p> <ul style="list-style-type: none"> reserved |
| TEMPORARY | VARCHAR(1) | <p>Indicates whether the table is temporary (Y) or not (N)</p> |
| SECONDARY | VARCHAR(1) | <p>Indicates whether the table is a secondary object created by cartridge</p> <ul style="list-style-type: none"> reserved |
| NESTED | VARCHAR(3) | <p>Indicates whether the table is a nested table (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| BUFFER_POOL | VARCHAR(32) | <p>Buffer pool to be used for table blocks</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|------------------|-------------|--|
| FLASH_CACHE | VARCHAR(32) | <p>Database Smart Flash Cache hint to be used for table blocks</p> <ul style="list-style-type: none"> reserved |
| CELL_FLASH_CACHE | VARCHAR(32) | <p>Cell flash cache hint to be used for table blocks</p> <ul style="list-style-type: none"> reserved |
| ROW_MOVEMENT | VARCHAR(32) | <p>If a partitioned table, indicates whether row movement is enabled (ENABLED) or disabled (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| GLOBAL_STATS | VARCHAR(3) | <p>For partitioned tables, indicates whether statistics for the table as a whole (global statistics) are accurate (YES)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| USER_STATS | VARCHAR(3) | <p>Indicates whether statistics were entered directly by the user (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DURATION | VARCHAR(32) | <p>Indicates the duration of a temporary table, the value is in (TRANSACTION, SESSION)</p> |
| SKIP_CORRUPT | VARCHAR(32) | <p>Indicates whether Database ignores blocks marked corrupt during table and index scans (ENABLED) or raises an error (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| MONITORING | VARCHAR(3) | <p>Indicates whether the table has the MONITORING attribute set (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| CLUSTER_OWNER | VARCHAR(128) | <p>Owner of the cluster, if any</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|---|
| DEPENDENCIES | VARCHAR(32) | <p>Indicates whether row-level dependency tracking is enabled (ENABLED) or disabled (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| COMPRESSION | VARCHAR(32) | <p>Indicates whether table compression is enabled (ENABLED) or not (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| COMPRESS_FOR | VARCHAR(32) | <p>Default compression for what kind of operations</p> <ul style="list-style-type: none"> reserved |
| DROPPED | VARCHAR(3) | <p>Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO)</p> |
| READ_ONLY | VARCHAR(3) | <p>Indicates whether the table IS READ-ONLY (YES) or not (NO)</p> |
| SEGMENT_CREATED | VARCHAR(3) | <p>Indicates whether the table segment has been created (YES) or not (NO)</p> |

Table 5-103 列信息

USER_ARGUMENTS

USER_ARGUMENTS列出函数过程的所有参数

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| SCHEMA_NAME | VARCHAR(128) | Schema Name of function, procedures or package |
| OBJECT_NAME | VARCHAR(128) | Name of function, procedures |
| PACKAGE_NAME | VARCHAR(128) | Package Name of function, procedures |
| OBJECT_ID | NUMBER | ID of a function, procedures |
| SUBPROGRAM_ID | NUMBER | ID of procedures in pacakage |
| ARGUMENT_NAME | VARCHAR(128) | Name of argument or attribute name of record type argument |
| POSITION | NUMBER | Position of argument or position of attribute in record type |
| SEQUENCE | NUMBER | Sequential order of argument and its attributes |
| DATA_LEVEL | NUMBER | Nesting depth of the argument for composite types |
| DATA_TYPE | VARCHAR(128) | Data type of the argument |
| DEFAULTED | VARCHAR(1) | Whether or not the argument is defaulted |
| DEFAULT_VALUE | VARCHAR(1) | Reserved for future use |
| DEFAULT_LENGTH | VARCHAR(1) | Reserved for future use |

| | | |
|--------------------|--------------|---|
| IN_OUT | VARCHAR(32) | Direction of the argument (IN, OUT, IN/OUT) |
| DATA_LENGTH | NUMBER | Length of the column(in bytes) |
| DATA_PRECISION | NUMBER | Length in decimal digits(NUMBER) or binary digits(FLOAT) |
| DATA_SCALE | NUMBER | Digits to the right of the decimal point in a number |
| RADIX | NUMBER | Argument radix for a number |
| CHARACTER_SET_NAME | VARCHAR(128) | Character set name for the argument |
| TYPE_OWNER | VARCHAR(128) | Owner of the type of the argument |
| TYPE_NAME | VARCHAR(128) | Name of the type of the argument |
| TYPE_SUBNAME | VARCHAR(128) | Name of the type of the argument declared in package |
| TYPE_LINK | VARCHAR(128) | Name of the type of the argument declared in a remote package |
| PLS_TYPE | VARCHAR(128) | Name of the type of the argument at PSM |
| CHAR_LENGTH | NUMBER | Character limit for string datatypes |
| CHAR_USED | VARCHAR(1) | Whether the byte limit(B) or char limit(C) is official for the string |
| ORIGIN_CON_ID | VARCHAR(256) | ID of the container where the data originates |

Table 5-104 列信息

USER_CATALOG

USER_CATALOG列出当前用户拥有的表视图同义词和序列

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|--|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the TABLE, VIEW, SYNONYM, SEQUENCE, or UNDEFINED |
| TABLE_NAME | VARCHAR(128) | Name of the TABLE, VIEW, SYNONYM, SEQUENCE, or UNDEFINED |
| TABLE_TYPE | VARCHAR(32) | Type of the TABLE, VIEW, SYNONYM, SEQUENCE, or UNDEFINED |

Table 5-105 列信息

USER_COL_COMMENTS

USER_COL_COMMENTS显示当前用户拥有的表和视图的列上的注释

| 列名称 | 数据类型 | 说明 |
|--------------|---------------|-----------------------|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Name of the column |
| COMMENTS | VARCHAR(1024) | Comment on the column |

Table 5-106 列信息

USER_CLUSTER_TABLES

USER_CLUSTER_TABLES描述集群系统中当前用户拥有的所有集群表

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| SHARD_STRATEGY | VARCHAR(32) | Sharding strategy of the table: the value in (CLONED, HASH SHARDING, RANGE SHARDING, LIST SHARDING) |
| SHARD_PLACEMENT | VARCHAR(32) | Shard placement of the table: the value in (AT CLUSTER WIDE or AT CLUSTER GROUP) |
| SHARD_COUNT | NUMBER | Shard count of the table (if cloned table, the value is null) |
| SHARD_KEY_COUNT | NUMBER | Shard key column count of the table (if cloned table, the value is null) |
| HAS_GSI | VARCHAR(3) | Indicate whether the table has global secondary index:(YES) or (NO) |

| | | |
|---------|------------|--|
| DROPPED | VARCHAR(3) | Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO) |
|---------|------------|--|

Table 5-107 列信息

CSII

USER_COL_PRIVS

USER_COL_PRIVS描述当前用户为对象所有者授权者或被授权者的列对象授权

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Name of the column |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the column |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-108 列信息

USER_COL_PRIVS_MADE

USER_COL_PRIVS_MADE描述当前用户为对象所有者的列对象授权

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Name of the column |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the column |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-109 列信息

USER_COL_PRIVS_RECD

USER_COL_PRIVS_RECD描述当前用户为被授权者的列对象授权

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Name of the column |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the column |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-110 列信息

USER_CONSTRAINTS

USER_CONSTRAINTS描述当前用户拥有的表上的所有约束定义

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|--|
| OWNER | VARCHAR(128) | Owner of the constraint definition |
| CONSTRAINT_SCHEMA | VARCHAR(128) | Schema of the constraint definition |
| CONSTRAINT_NAME | VARCHAR(128) | Name of the constraint definition |
| CONSTRAINT_TYPE | VARCHAR(1) | Type of the constraint definition: the value in (C: check constraint, P: Primary key, U: Unique Key, R: Referential integrity) |
| TABLE_OWNER | VARCHAR(128) | Owner of the table (or view) associated with the constraint definition |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table (or view) associated with the constraint definition |
| TABLE_NAME | VARCHAR(128) | Name of the table (or view) associated with the constraint definition |
| SEARCH_CONDITION | LONG VARCHAR | Text of search condition for a check constraint |
| R_OWNER | VARCHAR(128) | Owner of the unique constraint definition for the referenced table |
| R_SCHEMA | VARCHAR(128) | Schema of the unique constraint definition for the referenced table |

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|---|
| R_CONSTRAINT_NAME | VARCHAR(128) | Name of the unique constraint definition for the referenced table |
| DELETE_RULE | VARCHAR(32) | Delete rule for a referential constraint: the value in (NO ACTION, RESTRICT, CASCADE, SET NULL, SET DEFAULT) |
| UPDATE_RULE | VARCHAR(32) | Update rule for a referential constraint: the value in (NO ACTION, RESTRICT, CASCADE, SET NULL, SET DEFAULT) |
| STATUS | VARCHAR(32) | Enforcement status of the constraint: the value in (ENABLED, DISABLE) |
| DEFERRABLE | VARCHAR(32) | Indicates whether the constraint is deferrable (DEFERRABLE) or not (NOT DEFERRABLE) |
| DEFERRED | VARCHAR(32) | Indicates whether the constraint was initially deferred (DEFERRED) or not (IMMEDIATE) |
| VALIDATED | VARCHAR(32) | Indicates whether all data may obey the constraint or not: the value in (VALIDATED, NOT VALIDATED) |
| GENERATED | VARCHAR(32) | Indicates whether the name of the constraint is user-generated (USER NAME) or system-generated (GENERATED NAME) |

| 列名称 | 数据类型 | 说明 |
|--------------|--------------------------------------|--|
| BAD | VARCHAR(32) | Indicates whether this constraint specifies a century in an ambiguous manner (BAD) or not (NULL) <ul style="list-style-type: none"> reserved |
| RELY | VARCHAR(32) | When NOT VALIDATED, indicates whether the constraint is to be taken into account for query rewrite (RELY) or not (NULL) <ul style="list-style-type: none"> reserved |
| LAST_CHANGE | TIMESTAMP(6) WITHOUT TIME ZONE | When the constraint was last enabled or disabled |
| INDEX_OWNER | VARCHAR(128) | Owner of the index associated with the key constraint |
| INDEX_SCHEMA | VARCHAR(128) | Schema of the index associated with the key constraint |
| INDEX_NAME | VARCHAR(128) | Name of the index associated with the key constraint |
| INVALID | VARCHAR(32) | Indicates whether the constraint is invalid (INVALID) or not (NULL) |

| 列名称 | 数据类型 | 说明 |
|--------------|---------------|---|
| VIEW_RELATED | VARCHAR(32) | Indicates whether the constraint depends on a view (DEPEND ON VIEW) or not (NULL) <ul style="list-style-type: none">reserved |
| DROPPED | VARCHAR(3) | Indicates whether the constraint has been dropped and is in the recycle bin (YES) or not (NO) |
| COMMENTS | VARCHAR(1024) | Comments of the constraint definition |

Table 5-111 列信息

USER_CONS_COLUMNS

USER_CONS_COLUMNS描述由当前用户所有并且在约束定义中指定的列

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of the constraint definition |
| CONSTRAINT_SCHEMA | VARCHAR(128) | Schema of the constraint definition |
| CONSTRAINT_NAME | VARCHAR(128) | Name of the constraint definition |
| TABLE_OWNER | VARCHAR(128) | Owner of the table with the constraint definition |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table with the constraint definition |
| TABLE_NAME | VARCHAR(128) | Name of the table with the constraint definition |
| COLUMN_NAME | VARCHAR(128) | Name of the column or attribute of the object type column specified in the constraint definition |
| POSITION | NUMBER | Original position of the column or attribute in the definition of the object |

Table 5-112 列信息

USER_DEPENDENCIES

USER_DEPENDENCIES描述当前用户可访问的对象之间的依赖关系

| 列名称 | 数据类型 | 说明 |
|------------------------|--------------|--|
| SCHEMA_NAME | VARCHAR(128) | Schema Name of object |
| NAME | VARCHAR(128) | Name of object |
| TYPE | VARCHAR(32) | Type of object: FUNCTION, PROCEDURE, VIEW,PACKAGE, PACKAGE BODY, TRIGGER |
| REFERENCED_OWNER | VARCHAR(128) | Owner of the referenced object |
| REFERENCED_SCHEMA_NAME | VARCHAR(128) | Schema Name of the referenced object |
| REFERENCED_TYPE | VARCHAR(32) | Type of the referenced object: FUNCTION, PROCEDURE, TABLE, VIEW, SEQUENCE, PACKAGE, PACKAGE BODY,TRIGGER |
| REFERENCED_LINK_NAME | VARCHAR(128) | Name of the link to the parent object |
| REFERENCED_NAME | VARCHAR(128) | Name of the referenced object |
| DEPENDENCY_TYPE | VARCHAR(32) | Indicates whether the dependency is a REF dependency(REF) or not (HARD) |

Table 5-113 列信息

USER_EXTENTS

USER_EXTENTS描述由当前用户对象所有的段（segments）的区段（extents）

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| SEGMENT_SCHEMA | VARCHAR(128) | Schema of the segment associated with the extent |
| SEGMENT_NAME | VARCHAR(128) | Name of the segment associated with the extent |
| PARTITION_NAME | VARCHAR(128) | Object Partition Name (Set to NULL for non-partitioned objects) <ul style="list-style-type: none"> reserved |
| SEGMENT_TYPE | VARCHAR(32) | Type of the segment: TABLE, INDEX |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the extent |
| EXTENT_ID | NUMBER | Extent number in the segment <ul style="list-style-type: none"> reserved |
| BYTES | NUMBER | Size of the extent in bytes |
| BLOCKS | NUMBER | Size of the extent in Oracle blocks |

Table 5-114 列信息

USER_GLOBAL_SECONDARY_INDEXES

USER_GLOBAL_SECONDARY_INDEXES描述当前用户所拥有的表上的全局二级索引

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the global secondary indexed object |
| TABLE_NAME | VARCHAR(128) | Name of the global secondary indexed object |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the global secondary index |
| INI_TRANS | NUMBER | Initial number of transactions |
| MAX_TRANS | NUMBER | Maximum number of transactions |
| INITIAL_EXTENT | NUMBER | Size of the initial extent |
| NEXT_EXTENT | NUMBER | Size of secondary extents |
| MIN_EXTENTS | NUMBER | Minimum number of extents allowed in the segment |
| MAX_EXTENTS | NUMBER | Maximum number of extents allowed in the segment |
| PCT_FREE | NUMBER | Minimum percentage of free space in a block |
| LOGGING | VARCHAR(3) | Indicates whether or not changes to the global secondary index are logged: (YES) or (NO) |

| | | |
|--------------|------------|---|
| BLOCKS | NUMBER | Number of used blocks in the global secondary index |
| EMPTY_BLOCKS | NUMBER | Number of empty blocks in the global secondary index |
| DROPPED | VARCHAR(3) | Indicates whether the global secondary index has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-115 列信息

USER_GSI_PLACE

USER_GSI_PLACE描述集群系统中当前用户所拥有的表上所有全局二级索引的节点放置

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the global secondary indexed object |
| TABLE_NAME | VARCHAR(128) | Name of the global secondary indexed object |
| GROUP_ID | NUMBER | Group identifier of the node where the global secondary index placed |
| GROUP_NAME | VARCHAR(128) | Group name of the node where the global secondary index placed |
| MEMBER_ID | NUMBER | Member identifier of the node where the global secondary index placed |
| MEMBER_NAME | VARCHAR(128) | Member name of the node where the global secondary index placed |
| MEMBER_OFFLINE | BOOLEAN | data of the cluster member is offline or not |
| DROPPED | VARCHAR(3) | Indicates whether the global secondary index has been dropped and is in the recycle bin (YES) or not (NO) |

| BLOCKS | NUMBER | Number of used blocks of the node where the global secondary index placed |
|--------|--------|---|
|--------|--------|---|

Table 5-116 列信息

CSII

USER_INDEXES

USER_INDEXES描述当前用户拥有的索引

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|--|
| INDEX_SCHEMA | VARCHAR(128) | Schema of the index |
| INDEX_NAME | VARCHAR(128) | Name of the index |
| INDEX_TYPE | VARCHAR(32) | Type of the index: the value in (NORMAL, NORMAL/REV, BITMAP, FUNCTION-BASED NORMAL, FUNCTION-BASED NORMAL/REV, FUNCTION-BASED BITMAP, IOT - TOP, DOMAIN) |
| TABLE_OWNER | VARCHAR(128) | Owner of the indexed object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the indexed object |
| TABLE_NAME | VARCHAR(128) | Name of the indexed object |
| TABLE_TYPE | VARCHAR(32) | Type of the indexed object: the value in (NEXT OBJECT, INDEX, TABLE, VIEW, SYNONYM, SEQUENCE) |
| UNIQUENESS | VARCHAR(32) | Indicates whether the index is unique (UNIQUE) or nonunique (NONUNIQUE) |

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| COMPRESSION | VARCHAR(32) | Indicates whether index compression is enabled (ENABLED) or not (DISABLED) <ul style="list-style-type: none"> reserved |
| PREFIX_LENGTH | NUMBER | Number of columns in the prefix of the compression key <ul style="list-style-type: none"> reserved |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the index |
| INI_TRANS | NUMBER | Initial number of transactions |
| MAX_TRANS | NUMBER | Maximum number of transactions |
| INITIAL_EXTENT | NUMBER | Size of the initial extent |
| NEXT_EXTENT | NUMBER | Size of secondary extents |
| MIN_EXTENTS | NUMBER | Minimum number of extents allowed in the segment |
| MAX_EXTENTS | NUMBER | Maximum number of extents allowed in the segment |

| 列名称 | 数据类型 | 说明 |
|----------------|--------|---|
| PCT_INCREASE | NUMBER | Percentage increase in extent size <ul style="list-style-type: none">reserved |
| PCT_THRESHOLD | NUMBER | Threshold percentage of block space allowed per index entry <ul style="list-style-type: none">reserved |
| INCLUDE_COLUMN | NUMBER | Column ID of the last column to be included in index-organized table primary key (non-overflow) index <ul style="list-style-type: none">reserved |
| FREELISTS | NUMBER | Number of process freelists allocated to this segment <ul style="list-style-type: none">reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|------------|--|
| FREELIST_GROUPS | NUMBER | Number of freelist groups allocated to this segment • reserved |
| PCT_FREE | NUMBER | Minimum percentage of free space in a block |
| LOGGING | VARCHAR(3) | ndicates whether or not changes to the index are logged: (YES) or (NO) |
| BLOCKS | NUMBER | Number of used blocks in the index |
| ANAL_BLOCKS | NUMBER | Number of used blocks in the index when most recently analyzed |
| EMPTY_BLOCKS | NUMBER | Number of empty blocks in the index |
| BLEVEL | NUMBER | B-Tree level (depth of the index from its root block to its leaf blocks) |
| LEAF_BLOCKS | NUMBER | Number of leaf blocks in the index |
| DISTINCT_KEYS | NUMBER | Number of distinct indexed values. |

| 列名称 | 数据类型 | 说明 |
|-------------------------|-------------|--|
| AVG_LEAF_BLOCKS_PER_KEY | NUMBER | <p>Average number of leaf blocks in which each distinct value in the index appears, rounded to the nearest integer</p> <ul style="list-style-type: none"> reserved |
| AVG_DATA_BLOCKS_PER_KEY | NUMBER | <p>Average number of data blocks in the table that are pointed to by a distinct value in the index rounded to the nearest integer</p> <ul style="list-style-type: none"> reserved |
| CLUSTERING_FACTOR | NUMBER | <p>Indicates the amount of order of the rows in the table based on the values of the index</p> |
| STATUS | VARCHAR(32) | <p>Indicates whether a nonpartitioned index is VALID or UNUSABLE</p> <ul style="list-style-type: none"> reserved |
| NUM_ROWS | NUMBER | <p>Number of rows in the index</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------------------------------|--|
| SAMPLE_SIZE | NUMBER | Size of the sample used to analyze the index |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which this index was most recently analyzed |
| DEGREE | VARCHAR(32) | Number of threads per instance for scanning the index, or DEFAULT <ul style="list-style-type: none"> reserved |
| INSTANCES | VARCHAR(32) | Number of instances across which the indexes to be scanned, or DEFAULT <ul style="list-style-type: none"> reserved |
| PARTITIONED | VARCHAR(3) | Indicates whether the index is partitioned (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| TEMPORARY | VARCHAR(1) | Indicates whether the index is on a temporary table (Y) or not (N) |
| GENERATED | VARCHAR(1) | Indicates whether the name of the index is system-generated (Y) or not (N) |

| 列名称 | 数据类型 | 说明 |
|------------------|-------------|--|
| SECONDARY | VARCHAR(1) | <p>Indicates whether the index is a secondary object created by the method of the Data Cartridge (Y) or not (N)</p> <ul style="list-style-type: none"> reserved |
| BUFFER_POOL | VARCHAR(32) | <p>Buffer pool to be used for index blocks</p> <ul style="list-style-type: none"> reserved |
| FLASH_CACHE | VARCHAR(32) | <p>Database Smart Flash Cache hint to be used for index blocks</p> <ul style="list-style-type: none"> reserved |
| CELL_FLASH_CACHE | VARCHAR(32) | <p>Cell flash cache hint to be used for index blocks</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|--|
| USER_STATS | VARCHAR(3) | <p>Indicates whether statistics were entered directly by the user (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DURATION | VARCHAR(32) | <p>Indicates the duration of a temporary table, the value is in (TRANSACTION, SESSION)</p> |
| PCT_DIRECT_ACCESS | NUMBER | <p>For a secondary index on an index-organized table, the percentage of rows with VALID guess</p> <ul style="list-style-type: none"> reserved |
| ITYP_OWNER | VARCHAR(128) | <p>For a domain index, the owner of the indextype</p> <ul style="list-style-type: none"> reserved |
| ITYP_NAME | VARCHAR(128) | <p>For a domain index, the name of the indextype</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|---------------|--|
| PARAMETERS | VARCHAR(1024) | <p>For a domain index, the parameter string</p> <ul style="list-style-type: none"> reserved |
| GLOBAL_STATS | VARCHAR(3) | <p>For partitioned indexes, indicates whether statistics were collected by analyzing the index as a whole (YES) or were estimated from statistics on underlying index partitions and subpartitions (NO)</p> <ul style="list-style-type: none"> reserved |
| DOMIDX_STATUS | VARCHAR(32) | <p>Status of a domain index</p> <ul style="list-style-type: none"> reserved |
| DOMIDX_OPSTATUS | VARCHAR(32) | <p>Status of the operation on a domain index</p> <ul style="list-style-type: none"> reserved |
| FUNCIDX_STATUS | VARCHAR(32) | <p>Status of a function-based index</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-------------------------|------------|---|
| JOIN_INDEX | VARCHAR(3) | Indicates whether the index is a join index (YES) or not (NO) <ul style="list-style-type: none">reserved |
| IOT_REDUNDANT_PKEY_ELIM | VARCHAR(3) | Indicates whether redundant primary key columns are eliminated from secondary indexes on index-organized tables (YES) or not (NO) <ul style="list-style-type: none">reserved |
| DROPPED | VARCHAR(3) | Indicates whether the index has been dropped and is in the recycle bin (YES) or not (NO) |
| VISIBILITY | VARCHAR(3) | Indicates whether the index is VISIBLE or INVISIBLE to the optimizer <ul style="list-style-type: none">reserved |

| 列名称 | 数据类型 | 说明 |
|-------------------|---------------|--|
| DOMIDX_MANAGEMENT | VARCHAR(32) | If this is a domain index, indicates whether the domain index is system-managed (SYSTEM_MANAGED) or user-managed (USER_MANAGED) <ul style="list-style-type: none">reserved |
| SEGMENT_CREATED | VARCHAR(3) | Indicates whether the index segment has been created (YES) or not (NO) |
| COMMENTS | VARCHAR(1024) | Comments of the index |
| EMPTY_BLOCKS | NUMBER | Number of empty blocks in the index |

Table 5-117 列信息

USER_IND_COLUMNS

USER_IND_COLUMNS描述当前用户拥有的索引的列及当前用户拥有的表上索引的列

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| INDEX_SCHEMA | VARCHAR(128) | Schema of the index |
| INDEX_NAME | VARCHAR(128) | Name of the index |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table or cluster |
| TABLE_NAME | VARCHAR(128) | Name of the table or cluster |
| COLUMN_NAME | VARCHAR(128) | Column name or attribute of the object type column |
| COLUMN_POSITION | NUMBER | Position of the column or attribute within the index |
| COLUMN_LENGTH | NUMBER | Indexed length of the column |
| CHAR_LENGTH | NUMBER | <p>Maximum codepoint length of the column</p> <ul style="list-style-type: none"> reserved |
| DESCEND | VARCHAR(32) | Indicates whether the column is sorted in descending order (DESC) or ascending order (ASC) |
| NULL_ORDER | VARCHAR(32) | Indicates whether the null value of the column is sorted in nulls first order (NULLS FIRST) or nulls last order (NULLS LAST) |

Table 5-118 列信息

USER_IND_PLACE

USER_IND_PLACE描述集群系统中当前用户拥有的索引的节点位置

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| INDEX_SCHEMA | VARCHAR(128) | Schema of the index |
| INDEX_NAME | VARCHAR(128) | Name of the index |
| TABLE_OWNER | VARCHAR(128) | Owner of the indexed object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the indexed object |
| TABLE_NAME | VARCHAR(128) | Name of the indexed object |
| GROUP_ID | NUMBER | Group identifier of the node where the index placed |
| GROUP_NAME | VARCHAR(128) | Group name of the node where the index placed |
| MEMBER_ID | NUMBER | Member identifier of the node where the index placed |
| MEMBER_NAME | VARCHAR(128) | Member name of the node where the index placed |
| MEMBER_OFFLINE | BOOLEAN | data of the cluster member is offline or not |
| DROPPED | VARCHAR(3) | Indicates whether the global secondary index has been dropped and is in the recycle bin (YES) or not (NO) |

| | | |
|---------------|--------------------------------------|--|
| DISTINCT_KEYS | NUMBER | (deprecated) |
| SAMPLE_SIZE | NUMBER | (deprecated) |
| BLOCKS | NUMBER | Number of used blocks of the node where the index placed |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | (deprecated) |

Table 5-119 列信息

USER_OBJECTS

USER_OBJECTS描述当前用户拥有的所有对象

| 列名称 | 数据类型 | 说明 |
|----------------|--------------------------------------|--|
| SCHEMA_NAME | VARCHAR(128) | Schema of the object |
| OBJECT_NAME | VARCHAR(128) | Name of the object |
| SUBOBJECT_NAME | VARCHAR(128) | Name of the subobject (for example, partition) |
| OBJECT_ID | NUMBER | Dictionary object number of the object |
| DATA_OBJECT_ID | NUMBER | Dictionary object number of the segment that contains the object |
| OBJECT_TYPE | VARCHAR(32) | Type of the object (such as TABLE, INDEX) |
| CREATED | TIMESTAMP(6) WITHOUT TIME ZONE | Timestamp for the creation of the object |
| LAST_DDL_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Timestamp for the last modification of the object resulting from a DDL statement |
| TIMESTAMP | VARCHAR(32) | Timestamp for the specification of the object (character data) |

| | | |
|--------------|--------------|--|
| STATUS | VARCHAR(32) | Status of the object: the value in (VALID, INVALID, N/A) <ul style="list-style-type: none"> reserved |
| TEMPORARY | VARCHAR(1) | Indicates whether the object is temporary (the current session can see only data that it placed in this object itself) (Y) or not (N) |
| GENERATED | VARCHAR(1) | Indicates whether the name of this object was system-generated (Y) or not (N) |
| SECONDARY | VARCHAR(1) | Indicates whether this is a secondary object created by the ODCIIndexCreate method of the Oracle Data Cartridge (Y) or not (N) <ul style="list-style-type: none"> reserved |
| NAMESPACE | NUMBER | Namespace for the object |
| EDITION_NAME | VARCHAR(128) | Name of the edition in which the object is actual <ul style="list-style-type: none"> reserved |
| DROPPED | VARHAR(3) | Indicates whether the global secondary index has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-120 列信息

USER_PACKAGE_PRIVS

USER_PACKAGE_PRIVS描述当前用户是包所有者授权者或被授权者的包授权

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the package |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the package |
| PROCEDURE_NAME | VARCHAR(128) | Name of the package |
| PRIVILEGE | VARCHAR(32) | Privilege on the package |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-121 列信息

USER_PACKAGE_PRIVS_MADE

USER_PACKAGE_PRIVS_MADE描述当前用户是包所有者的包授予

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the package |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the package |
| PROCEDURE_NAME | VARCHAR(128) | Name of the package |
| PRIVILEGE | VARCHAR(32) | Privilege on the package |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-122 列信息

USER_PACKAGE_PRIVS_REC'D

USER_PACKAGE_PRIVS_REC'D描述当前用户是被授权人的包授权

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the package |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the package |
| PROCEDURE_NAME | VARCHAR(128) | Name of the package |
| PRIVILEGE | VARCHAR(32) | Privilege on the package |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-123 列信息

USER_PROCEDURES

USER_PROCEDURES列出当前用户拥有的过程

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| SCHEMA_NAME | VARCHAR(128) | Schema Name of function, procedures or package |
| OBJECT_NAME | VARCHAR(128) | Name of function, procedures or pacakage |
| PROCEDURE_NAME | VARCHAR(128) | Name when a procedures in pacakage |
| OBJECT_ID | NUMBER | ID of a function, procedures or pacakage |
| SUBPROGRAM_ID | NUMBER | ID of procedures in pacakage |
| OVERLOAD | VARCHAR(32) | ID of overloading procedure in pacakage |
| OBJECT_TYPE | VARCHAR(32) | Type of function, procedures or package |
| AGGREGATE | VARCHAR(3) | Indicate whether the procedure is an aggreage function(YES) or not(NO) |
| PIPELINED | VARCHAR(3) | Indicate whether the procedure is a pipelined table function(YES) or not(NO) |
| IMPLTYPEOWNER | VARCHAR(128) | Name of the owner of the implementation type, if any |
| IMPLTYPENAME | VARCHAR(128) | Name of the implementation type, if any |
| PARALLEL | VARCHAR(3) | Indicates whether the procedure or function is parallel-enabled (YES) or not (NO) |

| | | |
|---------------|-------------|---|
| INTERFACE | VARCHAR(3) | YES, if the procedure/function is a table function implemented using the SQLCLI interface; otherwise NO |
| DETERMINISTIC | VARCHAR(3) | YES, if the procedure/function is declared to be deterministic; otherwise NO |
| AUTHID | VARCHAR(32) | Indicates whether the procedure/function is declared to execute as DEFINER or CURRENT_USER (invoker) |

Table 5-124 列信息

USER_PROC_PRIVS

USER_PROC_PRIVS描述当前用户为过程所有者授权者或被授权者的过程授权

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the procedure and function |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the procedure and function |
| PROCEDURE_NAME | VARCHAR(128) | Name of the procedure and function |
| PRIVILEGE | VARCHAR(32) | Privilege on the procedure and function |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-125 列信息

USER_PROC_PRIVS_MADE

USER_PROC_PRIVS_MADE描述当前用户为过程所有者或授权者的过程授权

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the procedure and function |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the procedure and function |
| PROCEDURE_NAME | VARCHAR(128) | Name of the procedure and function |
| PRIVILEGE | VARCHAR(32) | Privilege on the procedure and function |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-126 列信息

USER_PROC_PRIVS_RECD

USER_PROC_PRIVS_RECD描述当前用户为被授权者或者某启用的角色或PUBLIC是被授权者的过程授权

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| PROCEDURE_OWNER | VARCHAR(128) | Owner of the procedure and function |
| PROCEDURE_SCHEMA | VARCHAR(128) | Schema of the procedure and function |
| PROCEDURE_NAME | VARCHAR(128) | Name of the procedure and function |
| PRIVILEGE | VARCHAR(32) | Privilege on the procedure and function |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-127 列信息

USER_RECYCLEBIN

USER_RECYCLEBIN描述当前用户拥有的回收站

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------------------------------|---|
| SCHEMA_NAME | VARCHAR(128) | Schema name of the object |
| OBJECT_NAME | VARCHAR(128) | Name of the object |
| ORIGINAL_NAME | VARCHAR(128) | Original name of the object |
| OPERATION | VARCHAR(4) | Operation carried out on the object |
| OBJECT_TYPE | VARCHAR(32) | Type of the object |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the object |
| CRATED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Created time of the object |
| DROPPED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Dropped time of the object |
| DROP_SCN | VARCHAR(128) | System change number (SCN) of the transaction which moved the object to the recycle bin |
| DROP_GCN | NUMBER | Global change number (GCN) of the transaction which moved the object to the recycle bin |

| | | |
|--------------|------------|---|
| DROP_DCN | NUMBER | Domain change number (DCN) of the transaction which moved the object to the recycle bin |
| DROP_LCN | NUMBER | Local change number (LCN) of the transaction which moved the object to the recycle bin |
| CAN_UNDROP | VARCHAR(3) | Indicates whether the object can be undropped (YES) or not (NO) |
| CAN_PURGE | VARCHAR(3) | Indicates whether the object can be purged (YES) or not (NO) |
| BASE_OBJECT | NUMBER | Object number of the base object |
| PURGE_OBJECT | NUMBER | Object number for the object which gets purged |

Table 5-128 列信息

USER_SCHEMAS

USER_SCHEMAS标识当前用户拥有的目录中的模式

| 列名称 | 数据类型 | 说明 |
|---------------|-----------------------------------|----------------------------------|
| SCHEMA_OWNER | VARCHAR(128) | Owner of the schema |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| CREATED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Created time of the schema |
| MODIFIED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | Last modified time of the schema |
| COMMENTS | VARCHAR(1024) | Comments of the schema |

Table 5-129 列信息

USER_SCHEMA_PATH

USER_SCHEMA_PATH描述当前用户的模式搜索顺序用于为不合格的SQL schema对象命名解析

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---------------------------------|
| AUTH_NAME | VARCHAR(128) | Name of the user |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| SEARCH_ORDER | NUMBER | Schema search order of the user |

Table 5-130 列信息

USER_SCHEMA_PRIVS

USER_SCHEMA_PRIVS描述当前用户为模式所有者授权者或被授权者的模式授权

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the schema |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| PRIVILEGE | VARCHAR(32) | Privilege on the schema |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-131 列信息

USER_SCHEMA_PRIVS_MADE

USER_SCHEMA_PRIVS_MADE描述当前用户为模式所有者的模式授权

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the schema |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| PRIVILEGE | VARCHAR(32) | Privilege on the schema |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-132 列信息

USER_SCHEMA_PRIVS_REC'D

USER_SCHEMA_PRIVS_REC'D描述当前用户为被授权者的模式授权

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the schema |
| SCHEMA_NAME | VARCHAR(128) | Name of the schema |
| PRIVILEGE | VARCHAR(32) | Privilege on the schema |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-133 列信息

USER_SEQUENCES

USER_SEQUENCES描述当前用户拥有的所有序列

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| SEQUENCE_OWNER | VARCHAR(128) | Owner of the sequence |
| SEQUENCE_SCHEMA | VARCHAR(128) | Schema of the sequence |
| SEQUENCE_NAME | VARCHAR(128) | Sequence name |
| MIN_VALUE | NUMBER | Minimum value of the sequence |
| MAX_VALUE | NUMBER | Maximum value of the sequence |
| INCREMENT_BY | NUMBER | Value by which sequence is incremented |
| CYCLE_FLAG | VARCHAR(1) | Indicates whether the sequence wraps around on reaching the limit (Y) or not (N) |
| ORDER_FLAG | VARCHAR(1) | Indicates whether sequence numbers are generated in order (Y) or not (N) <ul style="list-style-type: none"> reserved |
| CACHE_SIZE | NUMBER | Number of sequence numbers to cache |
| LAST_NUMBER | NUMBER | Last sequence number written to database. If a sequence uses caching, the number written to database is the last number placed in the sequence cache. |

| | | |
|----------|---------------|--------------------------|
| COMMENTS | VARCHAR(1024) | Comments of the sequence |
|----------|---------------|--------------------------|

Table 5-134 列信息

CSII

USER_SEQ_PRIVS

USER_SEQ_PRIVS描述当前用户为序列所有者授权者或被授权者的序列授权

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| SEQUENCE_OWNER | VARCHAR(128) | Owner of the sequence |
| SEQUENCE_SCHEMA | VARCHAR(128) | Schema of the sequence |
| SEQUENCE_NAME | VARCHAR(128) | Name of the sequence |
| PRIVILEGE | VARCHAR(32) | Privilege on the sequence |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-135 列信息

USER_SEQ_PRIVS_MADE

USER_SEQ_PRIVS_MADE描述当前用户为序列所有者的序列授权

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| SEQUENCE_OWNER | VARCHAR(128) | Owner of the sequence |
| SEQUENCE_SCHEMA | VARCHAR(128) | Schema of the sequence |
| SEQUENCE_NAME | VARCHAR(128) | Name of the sequence |
| PRIVILEGE | VARCHAR(32) | Privilege on the sequence |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-136 列信息

USER_SEQ_PRIVS_REC'D

USER_SEQ_PRIVS_REC'D描述当前用户为被授权者的序列授权

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| SEQUENCE_OWNER | VARCHAR(128) | Owner of the sequence |
| SEQUENCE_SCHEMA | VARCHAR(128) | Schema of the sequence |
| SEQUENCE_NAME | VARCHAR(128) | Name of the sequence |
| PRIVILEGE | VARCHAR(32) | Privilege on the sequence |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |

Table 5-137 列信息

USER_SHARD_KEY_COLUMNS

USER_SHARD_KEY_COLUMNS描述群集系统中当前用户拥有的分片表的分片键列

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| COLUMN_NAME | VARCHAR(128) | Column name of the shard key |
| COLUMN_POSITION | NUMBER | Position of the column within the shard key |

Table 5-138 列信息

USER_SOURCE

USER_SOURCE描述当前用户可访问的存储对象的文本源

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| SCHEMA_NAME | VARCHAR(128) | Schema of the table |
| NAME | VARCHAR(128) | Name of the table |
| TYPE | VARCHAR(32) | Type of object: FUNCTION, PROCEDURE, PACKAGE,PACKAGE BODY, TRIGGER |
| LINE | NUMBER | Line number of this line of source |
| TEXT | LONG VARCHAR | Text source of the stored object |
| ORIGIN_CON_ID | VARCHAR(256) | ID of the container where the data originates |

Table 5-139 列信息

USER_SYNONYMS

USER_SYNONYMS描述当前用户拥有的所有同义词

| 列名称 | 数据类型 | 说明 |
|--------------------|--------------|-------------------------|
| SYNONYM_OWNER | VARCHAR(128) | Owner of the synonym |
| SYNONYM_SCHEMA | VARCHAR(128) | Schema of the synonym |
| SYNONYM_NAME | VARCHAR(128) | Synonym name |
| OBJECT_SCHEMA_NAME | VARCHAR(128) | Object schema name |
| OBJECT_NAME | VARCHAR(128) | Object name |
| DB_LINK | VARCHAR(128) | Reserved for future use |

Table 5-140 列信息

USER_SYS_PRIVS

USER_SYS_PRIVS描述授予当前用户或PUBLIC的系统(数据库表空间模式)权限

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| USERNAME | VARCHAR(128) | Name of the user, or PUBLIC |
| PRIVILEGE | VARCHAR(256) | System(database, tablespace, schema) privilege |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |
| ADMIN_OPTION | VARCHAR(3) | equal to GRANTABLE column |

Table 5-141 列信息

USER_TABLES

USER_TABLES描述当前用户拥有的关系表

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace containing the table |
| CLUSTER_NAME | VARCHAR(128) | Name of the cluster <ul style="list-style-type: none"> reserved |
| IOT_NAME | VARCHAR(128) | Name of the index-organized table <ul style="list-style-type: none"> reserved |
| STATUS | VARCHAR(32) | If a previous DROP TABLE operation failed, indicates whether the table is unusable (UNUSABLE) or valid (VALID) <ul style="list-style-type: none"> reserved |
| PCT_FREE | NUMBER | Minimum percentage of free space in a block |
| PCT_USED | NUMBER | Minimum percentage of used space in a block |

| 列名称 | 数据类型 | 说明 |
|-----------------|--------|--|
| INI_TRANS | NUMBER | Initial number of transactions |
| MAX_TRANS | NUMBER | Maximum number of transactions |
| INITIAL_EXTENT | NUMBER | Size of the initial extent (in bytes) |
| NEXT_EXTENT | NUMBER | Size of secondary extents (in bytes) |
| MIN_EXTENTS | NUMBER | Minimum number of extents allowed in the segment |
| MAX_EXTENTS | NUMBER | Maximum number of extents allowed in the segment |
| PCT_INCREASE | NUMBER | Percentage increase in extent size <ul style="list-style-type: none"> reserved |
| FREELISTS | NUMBER | Number of process freelists allocated to the segment <ul style="list-style-type: none"> reserved |
| FREELIST_GROUPS | NUMBER | Number of freelist groups allocated to the segment <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|--------------|------------|---|
| LOGGING | VARCHAR(3) | Indicates whether or not changes to the table are logged |
| BACKED_UP | VARCHAR(1) | Indicates whether the table has been backed up since the last modification (Y) or not (N) <ul style="list-style-type: none"> reserved |
| NUM_ROWS | NUMBER | Number of rows in the table |
| BLOCKS | NUMBER | Number of used blocks in the table |
| ANAL_BLOCKS | NUMBER | Number of used blocks in the table when most recently analyzed |
| EMPTY_BLOCKS | NUMBER | Number of empty (never used) blocks in the table <ul style="list-style-type: none"> reserved |
| AVG_SPACE | NUMBER | Average available free space in the table <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------------------|-------------|--|
| CHAIN_CNT | NUMBER | <p>Number of rows in the table that are chained from one data block to another or that have migrated to a new block, requiring a link to preserve the old rowid</p> <ul style="list-style-type: none"> reserved |
| AVG_ROW_LEN | NUMBER | <p>Average row length, including row overhead</p> <ul style="list-style-type: none"> reserved |
| AVG_SPACE_FREELIST_BLOCKS | NUMBER | <p>Average freespace of all blocks on a freelist</p> <ul style="list-style-type: none"> reserved |
| NUM_FREELIST_BLOCKS | NUMBER | <p>Number of blocks on the freelist</p> <ul style="list-style-type: none"> reserved |
| DEGREE | VARCHAR(32) | <p>Number of threads per instance for scanning the table, or DEFAULT</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------------------------------|--|
| INSTANCES | VARCHAR(32) | <p>Number of instances across which the table is to be scanned, or DEFAULT</p> <ul style="list-style-type: none"> reserved |
| CACHE | VARCHAR(1) | <p>Indicates whether the table is to be cached in the buffer cache (Y) or not (N)</p> <ul style="list-style-type: none"> reserved |
| TABLE_LOCK | VARCHAR(32) | <p>Indicates whether table locking is enabled (ENABLED) or disabled (DISABLED)</p> |
| SAMPLE_SIZE | NUMBER | <p>Sample size used in analyzing the table</p> |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | <p>Date on which the table was most recently analyzed</p> |
| PARTITIONED | VARCHAR(3) | <p>Indicates whether the table is partitioned (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-------------|-------------|---|
| IOT_TYPE | VARCHAR(32) | <p>If the table is an index-organized table, then IOT_TYPE is IOT, IOT_OVERFLOW, or IOT_MAPPING.</p> <ul style="list-style-type: none"> reserved |
| TEMPORARY | VARCHAR(1) | <p>Indicates whether the table is temporary (Y) or not (N)</p> |
| SECONDARY | VARCHAR(1) | <p>Indicates whether the table is a secondary object created by cartridge</p> <ul style="list-style-type: none"> reserved |
| NESTED | VARCHAR(3) | <p>Indicates whether the table is a nested table (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| BUFFER_POOL | VARCHAR(32) | <p>Buffer pool to be used for table blocks</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|------------------|-------------|--|
| FLASH_CACHE | VARCHAR(32) | <p>Database Smart Flash Cache hint to be used for table blocks</p> <ul style="list-style-type: none"> reserved |
| CELL_FLASH_CACHE | VARCHAR(32) | <p>Cell flash cache hint to be used for table blocks</p> <ul style="list-style-type: none"> reserved |
| ROW_MOVEMENT | VARCHAR(32) | <p>If a partitioned table, indicates whether row movement is enabled (ENABLED) or disabled (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| GLOBAL_STATS | VARCHAR(3) | <p>For partitioned tables, indicates whether statistics for the table as a whole (global statistics) are accurate (YES)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| USER_STATS | VARCHAR(3) | <p>Indicates whether statistics were entered directly by the user (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| DURATION | VARCHAR(32) | <p>Indicates the duration of a temporary table, the value is in (TRANSACTION, SESSION)</p> |
| SKIP_CORRUPT | VARCHAR(32) | <p>Indicates whether Database ignores blocks marked corrupt during table and index scans (ENABLED) or raises an error (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| MONITORING | VARCHAR(3) | <p>Indicates whether the table has the MONITORING attribute set (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| CLUSTER_OWNER | VARCHAR(128) | <p>Owner of the cluster, if any</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|---|
| DEPENDENCIES | VARCHAR(32) | <p>Indicates whether row-level dependency tracking is enabled (ENABLED) or disabled (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| COMPRESSION | VARCHAR(32) | <p>Indicates whether table compression is enabled (ENABLED) or not (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| COMPRESS_FOR | VARCHAR(32) | <p>Default compression for what kind of operations</p> <ul style="list-style-type: none"> reserved |
| DROPPED | VARCHAR(3) | <p>Indicates whether the table has been dropped and is in the recycle bin (YES) or not (NO)</p> |
| READ_ONLY | VARCHAR(3) | <p>Indicates whether the table IS READ-ONLY (YES) or not (NO)</p> |
| SEGMENT_CREATED | VARCHAR(3) | <p>Indicates whether the table segment has been created (YES) or not (NO)</p> |

| 列名称 | 数据类型 | 说明 |
|--------------|-------------|---|
| RESULT_CACHE | VARCHAR(32) | Result cache mode annotation for the table: the value in (NULL, DEFAULT, FORCE, MANUAL) <ul style="list-style-type: none">reserved |

Table 5-142 列信息

USER_TABLESPACES

USER_TABLESPACES描述当前用户可访问的表空间

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| TABLESPACE_NAME | VARCHAR(128) | Name of the tablespace |
| BLOCK_SIZE | NUMBER | Tablespace block size |
| INITIAL_EXTENT | NUMBER | Default initial extent size (in bytes) <ul style="list-style-type: none">• reserved |
| NEXT_EXTENT | NUMBER | Default incremental extent size (in bytes) <ul style="list-style-type: none">• reserved |
| MIN_EXTENTS | NUMBER | Default minimum number of extents <ul style="list-style-type: none">• reserved |
| MAX_EXTENTS | NUMBER | Default maximum number of extents <ul style="list-style-type: none">• reserved |

| 列名称 | 数据类型 | 说明 |
|--------------|-------------|---|
| MAX_SIZE | NUMBER | Default maximum size of segments <ul style="list-style-type: none"> reserved |
| PCT_INCREASE | NUMBER | Default percent increase for extent size <ul style="list-style-type: none"> reserved |
| MIN_EXTLEN | NUMBER | Minimum extent size for this tablespace (in bytes) <ul style="list-style-type: none"> reserved |
| STATUS | VARCHAR(32) | Tablespace status: the value in (ONLINE, OFFLINE, READ ONLY) |
| CONTENTS | VARCHAR(32) | Tablespace contents: the value in (SYSTEM, DATA, TEMPORARY, UNDO) |
| LOGGING | VARCHAR(32) | Default logging attribute: LOGGING, NOLOGGING |

| 列名称 | 数据类型 | 说明 |
|--------------------------|-------------|--|
| FORCE_LOGGING | VARCHAR(3) | <p>Indicates whether the tablespace is under force logging mode (YES) or not (NO)</p> <ul style="list-style-type: none"> reserved |
| EXTENT_MANAGEMENT | VARCHAR(32) | <p>Indicates whether the extents in the tablespace are dictionary managed (DICTIONARY) or locally managed (LOCAL)</p> <ul style="list-style-type: none"> reserved |
| ALLOCATION_TYPE | VARCHAR(32) | <p>Type of extent allocation in effect for the tablespace: the value in (SYSTEM, UNIFORM, USER)</p> <ul style="list-style-type: none"> reserved |
| SEGMENT_SPACE_MANAGEMENT | VARCHAR(32) | <p>Indicates whether the free and used segment space in the tablespace is managed using free lists (MANUAL) or bitmaps (AUTO)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|----------------------|-------------|---|
| DEF_TAB_COMPRESSION | VARCHAR(32) | <p>Indicates whether default table compression is enabled (ENABLED) or not (DISABLED)</p> <ul style="list-style-type: none"> reserved |
| RETENTION | VARCHAR(32) | <p>Undo tablespace retention: the value in (GUARANTEE, NOGUARANTEE, NOT APPLY)</p> <ul style="list-style-type: none"> reserved |
| BIGFILE | VARCHAR(3) | <p>Indicates whether the tablespace is a bigfile tablespace (YES) or a smallfile tablespace (NO)</p> <ul style="list-style-type: none"> reserved |
| PREDICATE_EVALUATION | VARCHAR(32) | <p>Indicates whether predicates are evaluated by host (HOST) or by storage (STORAGE)</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|--------------|-------------|---|
| ENCRYPTED | VARCHAR(3) | Indicates whether the tablespace is encrypted (YES) or not (NO) <ul style="list-style-type: none">reserved |
| COMPRESS_FOR | VARCHAR(32) | Indicates whether the tablespace is encrypted (YES) or not (NO) <ul style="list-style-type: none">reserved |

Table 5-143 列信息

USER_TAB_COLS

USER_TAB_COLS描述当前用户拥有的表视图和集群的列(包括隐藏列)

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Column name |
| DATA_TYPE | VARCHAR(128) | Datatype of the column |
| DATA_TYPE_MOD | VARCHAR(3) | Datatype modifier of the column <ul style="list-style-type: none"> reserved |
| DATA_TYPE_OWNER | VARCHAR(128) | Owner of the datatype of the column <ul style="list-style-type: none"> reserved |
| DATA_LENGTH | NUMBER | Length of the column (in bytes) |
| DATA_PRECISION | NUMBER | Decimal precision for NUMBER datatype; binary precision for FLOAT datatype; NULL for all other datatypes |
| DATA_SCALE | NUMBER | Digits to the right of the decimal point in a number |

| 列名称 | 数据类型 | 说明 |
|----------------|---------------|--|
| NULLABLE | VARCHAR(1) | Indicates whether a column allows NULLs. |
| COLUMN_ID | NUMBER | Sequence number of the column as created |
| DEFAULT_LENGTH | NUMBER | Length of the default value for the column |
| DATA_DEFAULT | LONG VARCHAR | Default value for the column |
| NUM_DISTINCT | NUMBER | Number of distinct values in the column |
| LOW_VALUE | VARBINARY(32) | Low value in the column |
| HIGH_VALUE | VARBINARY(32) | High value in the column |
| DENSITY | NUMBER | <p>If a histogram is available on COLUMN_NAME, then this column displays the selectivity of a value that spans fewer than 2 endpoints in the histogram.</p> <ul style="list-style-type: none"> reserved |
| NUM_NULLS | NUMBER | Number of NULLs in the column |
| NUM_BUCKETS | NUMBER | <p>Number of buckets in the histogram for the column</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|----------------------|--------------------------------------|--|
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which this column was most recently analyzed |
| SAMPLE_SIZE | NUMBER | Sample size used in analyzing this column |
| CHARACTER_SET_NAME | VARCHAR(128) | Name of the character set <ul style="list-style-type: none"> reserved |
| CHAR_COL_DECL_LENGTH | NUMBER | Declaration length of the character type column |
| GLOBAL_STATS | VARCHAR(3) | For partitioned tables, indicates whether column statistics were collected for the table <ul style="list-style-type: none"> reserved |
| USER_STATS | VARCHAR(3) | Indicates whether statistics were entered directly by the user (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| AVG_COL_LEN | NUMBER | Average length of the column (in bytes) |
| CHAR_LENGTH | NUMBER | Displays the length of the column in characters. |

| 列名称 | 数据类型 | 说明 |
|--------------------|------------|--|
| CHAR_USED | VARCHAR(1) | Indicates that the column uses BYTE length semantics (B) or CHAR length semantics (C) |
| V80_FMT_IMAGE | VARCHAR(3) | Indicates whether the column data is in release older image format (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| DATA_UPGRADED | VARCHAR(3) | Indicates whether the column data has been upgraded to the latest type version format (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| HIDDEN_COLUMN | VARCHAR(3) | Indicates whether the column is a hidden column (YES) or not (NO) |
| VIRTUAL_COLUMN | VARCHAR(3) | Indicates whether the column is a virtual column (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| SEGMENT_COLUMN_ID | NUMBER | Sequence number of the column in the segment |
| INTERNAL_COLUMN_ID | NUMBER | Internal sequence number of the column |

| 列名称 | 数据类型 | 说明 |
|--------------------|---------------|---|
| HISTOGRAM | VARCHAR(32) | Indicates existence/type of histogram <ul style="list-style-type: none">reserved |
| QUALIFIED_COL_NAME | VARCHAR(4000) | Qualified column name |
| IDENTITY_COLUMN | VARCHAR(3) | Indicates whether this is an identity column (YES) or not (NO) |

Table 5-144 列信息

USER_TAB_COLUMNS

USER_TAB_COLUMNS描述当前用户拥有的表视图和集群的列

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COLUMN_NAME | VARCHAR(128) | Column name |
| DATA_TYPE | VARCHAR(128) | Datatype of the column |
| DATA_TYPE_MOD | VARCHAR(3) | Datatype modifier of the column <ul style="list-style-type: none"> reserved |
| DATA_TYPE_OWNER | VARCHAR(128) | Owner of the datatype of the column <ul style="list-style-type: none"> reserved |
| DATA_LENGTH | NUMBER | Length of the column (in bytes) |
| DATA_PRECISION | NUMBER | Decimal precision for NUMBER datatype; binary precision for FLOAT datatype; NULL for all other datatypes |
| DATA_SCALE | NUMBER | Digits to the right of the decimal point in a number |

| 列名称 | 数据类型 | 说明 |
|----------------|---------------|--|
| NULLABLE | VARCHAR(1) | Indicates whether a column allows NULLs. |
| COLUMN_ID | NUMBER | Sequence number of the column as created |
| DEFAULT_LENGTH | NUMBER | Length of the default value for the column |
| DATA_DEFAULT | LONG VARCHAR | Default value for the column |
| NUM_DISTINCT | NUMBER | Number of distinct values in the column |
| LOW_VALUE | VARBINARY(32) | Low value in the column |
| HIGH_VALUE | VARBINARY(32) | High value in the column |
| DENSITY | NUMBER | <p>If a histogram is available on COLUMN_NAME, then this column displays the selectivity of a value that spans fewer than 2 endpoints in the histogram.</p> <ul style="list-style-type: none"> reserved |
| NUM_NULLS | NUMBER | Number of NULLs in the column |
| NUM_BUCKETS | NUMBER | <p>Number of buckets in the histogram for the column</p> <ul style="list-style-type: none"> reserved |

| 列名称 | 数据类型 | 说明 |
|----------------------|--------------------------------------|--|
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which this column was most recently analyzed |
| SAMPLE_SIZE | NUMBER | Sample size used in analyzing this column |
| CHARACTER_SET_NAME | VARCHAR(128) | Name of the character set <ul style="list-style-type: none"> reserved |
| CHAR_COL_DECL_LENGTH | NUMBER | Declaration length of the character type column |
| GLOBAL_STATS | VARCHAR(3) | For partitioned tables, indicates whether column statistics were collected for the table <ul style="list-style-type: none"> reserved |
| USER_STATS | VARCHAR(3) | Indicates whether statistics were entered directly by the user (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| AVG_COL_LEN | NUMBER | Average length of the column (in bytes) |
| CHAR_LENGTH | NUMBER | Displays the length of the column in characters. |

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|--|
| CHAR_USED | VARCHAR(1) | Indicates that the column uses BYTE length semantics (B) or CHAR length semantics (C) |
| V80_FMT_IMAGE | VARCHAR(3) | Indicates whether the column data is in release older image format (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| DATA_UPGRADED | VARCHAR(3) | Indicates whether the column data has been upgraded to the latest type version format (YES) or not (NO) <ul style="list-style-type: none"> reserved |
| HISTOGRAM | VARCHAR(32) | Indicates existence/type of histogram <ul style="list-style-type: none"> reserved |
| IDENTITY_COLUMN | VARCHAR(3) | Indicates whether this is an identity column (YES) or not (NO) |

Table 5-145 列信息

USER_TAB_COMMENTS

USER_TAB_COMMENTS显示当前用户拥有的表和视图上的注释

| 列名称 | 数据类型 | 说明 |
|--------------|---------------|-----------------------|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| TABLE_TYPE | VARCHAR(32) | Type of the object |
| COMMENTS | VARCHAR(1024) | Comment on the object |

Table 5-146 列信息

USER_TAB_IDENTITY_COLS

USER_TAB_IDENTITY_COLS描述所有表标识列

| 列名称 | 数据类型 | 说明 |
|------------------|---------------|--|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| COLUMN_NAME | VARCHAR(128) | Name of the identity column |
| GENERATION_TYPE | VARCHAR(32) | Generation type of the identity column. Possible values are ALWAYS or BY DEFAULT |
| IDENTITY_OPTIONS | VARCHAR(1024) | Options for the identity column sequence generator |

Table 5-147 列信息

USER_TAB_PLACE

USER_TAB_PLACE描述集群系统中当前用户拥有的集群表的节点位置

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the table |
| TABLE_NAME | VARCHAR(128) | Name of the table |
| GROUP_ID | NUMBER | Group identifier of the node where the table placed |
| GROUP_NAME | VARCHAR(128) | Group name of the node where the table placed |
| MEMBER_ID | NUMBER | Member identifier of the node where the table placed |
| MEMBER_NAME | VARCHAR(128) | Member name of the node where the table placed |
| MEMBER_POSITION | NUMBER | Member position of the node where the table placed |
| MEMBER_OFFLINE | BOOLEAN | data of the cluster member is offline or not |
| IS_UPDATE_MASTER | BOOLEAN | whether the cluster member is update master or not |
| DROPPED | VARCHAR(3) | Indicates whether the global secondary index has been dropped and is in the recycle bin (YES) or not (NO) |
| SCN | VARCHAR(64) | table scn of the node where the table placed |

| | | |
|---------------|--------------------------------------|--|
| NUM_ROWS | NUMBER | Number of rows in the table |
| BLOCKS | NUMBER | Number of used blocks of the node where the table placed |
| LAST_ANALYZED | TIMESTAMP(6) WITHOUT TIME ZONE | Date on which the table was most recently analyzed |

Table 5-148 列信息

USER_TAB_PRIVS

USER_TAB_PRIVS描述当前用户为对象所有者授权者或被授权者的对象授权

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the object |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |
| HIERARCHY | VARCHAR(3) | Indicates whether the privilege was granted with the HIERARCHY OPTION (YES) or not (NO) |

Table 5-149 列信息

USER_TAB_PRIVS_MADE

USER_TAB_PRIVS_MADE描述当前用户为对象所有者的对象授权

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| GRANTEE | VARCHAR(128) | Name of the user or role to whom access was granted |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the object |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |
| HIERARCHY | VARCHAR(3) | Indicates whether the privilege was granted with the HIERARCHY OPTION (YES) or not (NO) |

Table 5-150 列信息

USER_TAB_PRIVS_RECD

USER_TAB_PRIVS_RECD描述当前用户为被授权者的对象授权

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| OWNER | VARCHAR(128) | Owner of the object |
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| GRANTOR | VARCHAR(128) | Name of the user who performed the grant |
| PRIVILEGE | VARCHAR(32) | Privilege on the object |
| GRANTABLE | VARCHAR(3) | Indicates whether the privilege was granted with the GRANT OPTION (YES) or not (NO) |
| HIERARCHY | VARCHAR(3) | Indicates whether the privilege was granted with the HIERARCHY OPTION (YES) or not (NO) |

Table 5-151 列信息

USER_TAB_SHARDS

USER_TAB_SHARDS描述集群系统中当前用户拥有的分片表的分片信息

Note:

仅可在集群上使用

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| SHARD_STRATEGY | VARCHAR(32) | Sharding strategy of the table: the value in (HASH SHARDING, RANGE SHARDING, LIST SHARDING) |
| SHARD_NAME | VARCHAR(128) | Shard name |
| SHARD_NUMBER | NUMBER | Shard number |
| SHARD_DEFINITION | LONG VARCHAR | Shard definition (if hash sharded, the value is null) |
| GROUP_ID | NUMBER | Group identifier where the shard placed |
| GROUP_NAME | VARCHAR(128) | Group Name where the shard placed |
| DROPPED | VARCHAR(3) | Indicates whether the global secondary index has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-152 列信息

USER_USERS

USER_USERS描述当前用户

| 列名称 | 数据类型 | 说明 |
|----------------------|--------------------------------------|---|
| USERNAME | VARCHAR(128) | Name of the user |
| USER_ID | NUMBER | ID number of the user |
| ACCOUNT_STATUS | VARCHAR(32) | Account status: the value in (OPEN, EXPIRED, EXPIRED(GRACE), LOCKED(TIMED), LOCKED, EXPIRED & LOCKED(TIMED), EXPIRED(GRACE) & LOCKED(TIMED), EXPIRED & LOCKED, EXPIRED(GRACE) & LOCKED) |
| LOCK_DATE | TIMESTAMP(6) WITHOUT TIME ZONE | Timestamp the account was locked if account status was LOCKED |
| EXPIRY_DATE | TIMESTAMP(6) WITHOUT TIME ZONE | Timestamp of expiration of the account |
| DEFAULT_TABLESPACE | VARCHAR(128) | Default tablespace for data |
| TEMPORARY_TABLESPACE | VARCHAR(128) | Name of the default tablespace for temporary tables or the name of a tablespace group |

| | | |
|-----------------------------|--------------------------------------|--|
| INDEX_TABLESPACE | VARCHAR(128) | Default tablespace for index |
| CREATED | TIMESTAMP(6) WITHOUT TIME ZONE | User creation timestamp |
| INITIAL_RSRC_CONSUMER_GROUP | VARCHAR(128) | Initial resource consumer group for the user <ul style="list-style-type: none">• reserved |
| EXTERNAL_NAME | VARCHAR(128) | User external name <ul style="list-style-type: none">• reserved |

Table 5-153 列信息

USER_VIEWS

USER_VIEWS描述当前用户拥有的视图

| 列名称 | 数据类型 | 说明 |
|------------------|---------------|---|
| VIEW_SCHEMA | VARCHAR(128) | Schema of the view |
| VIEW_NAME | VARCHAR(128) | Name of the view |
| TEXT_LENGTH | NUMBER | Length of the view text |
| TEXT | LONG VARCHAR | View text |
| TYPE_TEXT_LENGTH | NUMBER | Length of the type clause of the typed view <ul style="list-style-type: none"> reserved |
| TYPE_TEXT | VARCHAR(4000) | Type clause of the typed view <ul style="list-style-type: none"> reserved |
| OID_TEXT_LENGTH | NUMBER | Length of the WITH OID clause of the typed view <ul style="list-style-type: none"> reserved |

| | | |
|-----------------|---------------|---|
| OID_TEXT | VARCHAR(4000) | <p>WITH OID clause of the typed view</p> <ul style="list-style-type: none"> reserved |
| VIEW_TYPE_OWNER | VARCHAR(128) | <p>Owner of the type of the view if the view is a typed view</p> <ul style="list-style-type: none"> reserved |
| VIEW_TYPE | VARCHAR(32) | <p>Type of the view if the view is a typed view</p> <ul style="list-style-type: none"> reserved |
| SUPERVIEW_NAME | VARCHAR(128) | <p>Name of the superview</p> <ul style="list-style-type: none"> reserved |
| EDITIONING_VIEW | VARCHAR(1) | Reserved for future use |
| READ_ONLY | VARCHAR(1) | Indicates whether the view is read-only (Y) or not (N) |

Table 5-154 列信息

其他视图

不属于All_DBA_或USER_的其它视图或表

AUDIT_POLICIES

AUDIT_POLICIES 包括每个审计策略(audit policy)的一行

| 列名称 | 数据类型 | 说明 |
|---------------|--------------------------------------|---|
| POLICY_NAME | VARCHAR(128) | audit policy name |
| ENABLED | VARCHAR(3) | indicates whether the audit policy is enabled (YES) or not (NO) |
| CREATED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | created time of the audit policy |
| MODIFIED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | last modified time of the audit policy |
| COMMENTS | VARCHAR(1024) | comments of the audit policy |

Table 5-155 列信息

AUDIT_POLICY_OPTIONS

AUDIT_POLICY_OPTIONS描述数据库中创建的所有审计策略

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|---|
| POLICY_NAME | VARCHAR(128) | audit policy name |
| AUDIT_OPTION | VARCHAR(32) | auditing option defined in the audit policy |
| AUDIT_OPTION_TYPE | VARCHAR(32) | The values of AUDIT_OPTION_TYPE_NAME in ('DATABASE PRIVILEGE', 'SYSTEM ACTION', 'OBJECT ACTION') |
| OBJECT_SCHEMA | VARCHAR(128) | schema name, for an object-specific auditing option |
| OBJECT_NAME | VARCHAR(128) | object name, for an object-specific auditing option |
| OBJECT_TYPE | VARCHAR(32) | object type name, for an object-specific auditing option |
| DROPPED | VARCHAR(3) | Indicates whether the global secondary index has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-156 列信息

AUDIT_POLICY_ENABLED

AUDIT_POLICY_ENABLE 描述数据库中启用的所有审计策略

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|--|
| POLICY_NAME | VARCHAR(128) | audit policy name |
| ENABLED_OPT | VARCHAR(32) | enable option of the audit policy, the possible values are BY, EXCEPT |
| USER_NAME | VARCHAR(128) | user name for whom the audit policy is enable |
| WHEN_SUCCESS | VARCHAR(3) | indicates whether the audit policy is enable for auditing successful events or not |
| WHEN_FAILURE | VARCHAR(3) | indicates whetehr the audit policy is enable for auditing unsuccessful events or not |

Table 5-157 列信息

AUDIT_TRAIL

AUDIT_TRAIL 显示审计跟踪 (audit trail) 中的审计记录 (audit record)

| 列名称 | 数据类型 | 说明 |
|---------------------|--------------|--|
| MEMBER_NAME | VARCHAR(128) | cluster member name |
| SESSION_ID | NUMBER | session identifier |
| SESSION_SERIAL | NUMBER | session serial number |
| LOGON_USERNAME | VARCHAR(128) | logon user name of the user whose actions were audited |
| CURRENT_USERNAME | VARCHAR(128) | effective user for the statement execution |
| SERVER_PROCESS | NUMBER | server process identifier for session |
| CLIENT_PROGRAM_NAME | VARCHAR(128) | client program used for session |
| CLIENT_USERNAME | VARCHAR(128) | client operating system user name for the session |
| CLIENT_PROCESS | NUMBER | client process identifier for the session |
| CLIENT_HOST | VARCHAR(128) | client host ip address for the session |
| CLIENT_PORT | NUMBER | client port number for the session |
| CLIENT_TERMINAL | VARCHAR(128) | client terminal name for the session |
| TRANSACTION_ID | NUMBER | transaction identifier |

| | | |
|-----------------|--------------------------------------|---|
| SCN | VARCHAR(128) | system change number (SCN) string of the query at the time of the event |
| GCN | NUMBER | global change number (GCN) of the query at the time of the event |
| DCN | NUMBER | domain change number (DCN) of the query at the time of the event |
| LCN | NUMBER | local change number (LCN) of the query at the time of the event |
| STMT_NO | NUMBER | numeric number for each statement run in a session |
| SQL_TEXT | LONG VARCHAR | SQL associated with the event |
| SQL_BINDS | LONG VARCHAR | list of bind variables, if any, associated with SQL_TEXT |
| RETURN_CODE | NUMBER | error code generated by the action, zero if the action succeeded |
| ERROR_MESSAGE | VARCHAR(1024) | error message generated by the action, null if the action succeeded |
| ENTRY_ID | NUMBER | audit trail entry identifier in the session |
| EVENT_TIMESTAMP | TIMESTAMP(6) WITHOUT TIME ZONE | timestamp of the creation of the audit trail entry in local time zone |

| | | |
|----------------|--------------|--|
| POLICY_NAME | VARCHAR(128) | audit policy name that caused the current audit record |
| PRIVILEGE_USED | VARCHAR(32) | database privilege used to execute the action |
| ACTION_NAME | VARCHAR(32) | action name executed by the user |
| OBJECT_TYPE | VARCHAR(32) | object type of object affected by the action |
| OBJECT_SCHEMA | VARCHAR(128) | schema name of object affected by the action |
| OBJECT_NAME | VARCHAR(128) | object name of object affected by the action |

Table 5-158 列信息

DATABASE_PROPERTIES

DATABASE_PROPERTIES列出永久数据库属性

| 列名称 | 数据类型 | 说明 |
|----------------|---------------|----------------------|
| PROPERTY_NAME | VARCHAR(128) | Property name |
| PROPERTY_VALUE | VARCHAR(4000) | Property value |
| DESCRIPTION | VARCHAR(4000) | Property description |

Table 5-159 列信息

DBC_TABLE_TYPE_INFO

DBC_TABLE_TYPE_INFO识别此数据库中可用的ODBC/JDBC表类型

| 列名称 | 数据类型 | 说明 |
|-------------------|---------------|--|
| DBC_TABLE_TYPE_ID | NUMBER | number identifier of the table type in ODBC/JDBC |
| DBC_TABLE_TYPE | VARCHAR(128) | name of the table type in ODBC/JDBC |
| IS_SUPPORTED | BOOLEAN | is supported feature |
| COMMENTS | VARCHAR(1024) | comments of the table type |

Table 5-160 列信息

DICTIONARY

DICTIONARY包含数据字典表和视图的描述

| 列名称 | 数据类型 | 说明 |
|--------------|---------------|----------------------------|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| COMMENTS | VARCHAR(1024) | Text comment on the object |

Table 5-161 列信息

DICT_COLUMNS

DICT_COLUMNS包含数据字典表和视图中列的描述

| 列名称 | 数据类型 | 说明 |
|--------------|---------------|---|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object that contains the column |
| TABLE_NAME | VARCHAR(128) | Name of the object that contains the column |
| COLUMN_NAME | VARCHAR(128) | Name of the column |
| COMMENTS | VARCHAR(1024) | Text comment on the column |

Table 5-162 列信息

IMPLEMENTATION_INFO

IMPLEMENTATION_INFO包含有待实现定义的各个方面的信息

| 列名称 | 数据类型 | 说明 |
|--------------------------|---------------|---|
| IMPLEMENTATION_INFO_ID | NUMBER | identifier of the implementation item |
| IMPLEMENTATION_INFO_NAME | VARCHAR(1024) | descriptive name of the implementation item |
| INTEGER_VALUE | NUMBER | Value of the implementation item, or null if the value is contained in the column CHARACTER_VALUE |
| CHARACTER_VALUE | VARCHAR(1024) | Value of the implementation item, or null if the value is contained in the column INTEGER_VALUE |
| COMMENTS | VARCHAR(1024) | possibly a comment pertaining to the implementation item |

Table 5-163 列信息

IMPLEMENTATION_INFO_BASE

IMPLEMENTATION_INFO_BASE表对每个实现信息项都有一行

| 列名称 | 数据类型 | 说明 |
|-----------------|---------------|---|
| ID | VARCHAR(32) | identifier string of the implementation item |
| SUB_ID | VARCHAR(32) | identifier string of the implementation item |
| NAME | VARCHAR(1024) | descriptive name of the implementation item |
| SUB_NAME | VARCHAR(1024) | descriptive name of the implementation item |
| IS_SUPPORTED | BOOLEAN | TRUE if the implementation item is supported, FALSE if not |
| INTEGER_VALUE | NUMBER | Value of the implementation item, or null if the value is contained in the column CHARACTER_VALUE |
| CHARACTER_VALUE | VARCHAR(1024) | Value of the implementation item, or null if the value is contained in the column INTEGER_VALUE |
| COMMENTS | VARCHAR(1024) | possibly a comment pertaining to the implementation item |

Table 5-164 列信息

JDBC_CLIENT_PROPS

JDBC_CLIENT_PROPS是一组jdbc客户端参数

| 列名称 | 数据类型 | 说明 |
|---------------|----------------|------------------------------|
| NAME | VARCHAR(128) | property name |
| MAX_LEN | NATIVE_INTEGER | max length of a value |
| DEFAULT_VALUE | VARCHAR(128) | default value |
| DESCRIPTION | VARCHAR(256) | description on that property |

Table 5-165 列信息

PRODUCT

PRODUCT是关于产品名称ODBC版本JDBC接口的

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|----------------------------------|
| NAME | VARCHAR(32) | the product name |
| VERSION | VARCHAR(128) | product full version information |
| PRODUCT_VERSION | NUMBER | product version |
| MAJOR_VERSION | NUMBER | major version |
| MINOR_VERSION | NUMBER | minor version |
| PATCH_VERSION | NUMBER | patch version |

Table 5-166 列信息

SESSION_PRIVS

SESSION_PRIVS描述当前对用户可用的权限

| 列名称 | 数据类型 | 说明 |
|-----------|--------------|-----------------------|
| PRIVILEGE | VARCHAR(256) | Name of the privilege |

Table 5-167 列信息

SUPPLEMENTAL_LOG_TABLE_INFO

SUPPLEMENTAL_LOG_TABLE_INFO描述表级别的补充日志记录状态

| 列名称 | 数据类型 | 说明 |
|--------------------------|--------------|---|
| TABLE_SCHEMA | VARCHAR(128) | Schema of the object |
| TABLE_NAME | VARCHAR(128) | Name of the object |
| SUPPLEMENTAL_LOG_DATA_PK | VARCHAR(32) | Status of table-level PRIMARY KEY COLUMNS supplemental logging: IMPLICIT, EXPLICIT, NO |
| DROPPED | VARCHAR(3) | Indicates whether the global secondary index has been dropped and is in the recycle bin (YES) or not (NO) |

Table 5-168 列信息

Aliased Synonym

指DICTIONARY_SCHEMA中的视图或表等的公共同义词

COLS

COLS是USER_TAB_COLUMNS的公共同义词

DICT

DICT是DICTIONARY的公共同义词

IND

IND是USER_INDEXES的公共同义词

OBJ

OBJ是USER_OBJECTS的公共同义词

SEQ

SEQ是USER_SEQUENCES的公共同义词

TABS

TABS是USER_TABLES的公共同义词

RECYCLEBIN

RECYCLEBIN is a public synonym for USER_RECYCLEBIN.

CSII

5.2 INFORMATION_SCHEMA

INFORMATION_SCHEMA模式的视图与标准SQL中定义的INFORMATION_SCHEMA模式的视图提供相同的信息

为了使用该视图需要如下执行InformationSchema.sql

- Standalone的情况

```
% gsql sys gliese --as sysdba --import  
$SUNDB_HOME/admin/standalone/InformationSchema.sql
```

- 集群的情况

```
% gsql sys gliese --as sysdba --import  
$SUNDB_HOME/admin/cluster/InformationSchema.sql
```

Note:

- * OPEN阶段开始可查询INFORMATION_SCHEMA的视图和表
- * 保管在回收站的对象无法在INFORMATION_SCHEMA的视图中查询

COLUMNS

标识此目录中定义的可供给定用户或角色访问的表的列

| 列名称 | 数据类型 | 说明 |
|--------------------------|--------------|---|
| TABLE_CATALOG | VARCHAR(128) | catalog name of the column |
| TABLE_OWNER | VARCHAR(128) | owner name of the column |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the column |
| TABLE_NAME | VARCHAR(128) | table name of the column |
| COLUMN_NAME | VARCHAR(128) | column name |
| ORDINAL_POSITION | NUMBER | the ordinal position (> 0) of the column in the table |
| COLUMN_DEFAULT | LONG VARCHAR | the default for the column |
| IS_NULLABLE | BOOLEAN | is nullable of the column |
| DATA_TYPE | VARCHAR(128) | the standard name of the data type |
| CHARACTER_MAXIMUM_LENGTH | NUMBER | the maximum length in characters |
| CHARACTER_OCTET_LENGTH | NUMBER | the maximum length in octets |

| 列名称 | 数据类型 | 说明 |
|-------------------------|-------------|---|
| NUMERIC_PRECISION | NUMBER | the numeric precision of the numerical Data type |
| NUMERIC_PRECISION_RADIX | NUMBER | the radix (2 or 10) of the precision of the numerical data type |
| NUMERIC_SCALE | NUMBER | the numeric scale of the exact numerical data type |
| DATETIME_PRECISION | NUMBER | for a datetime or interval type, the value is the fractional seconds precision |
| INTERVAL_TYPE | VARCHAR(32) | for a interval type, the value is in (YEAR, MONTH, DAY, HOUR, MINUTE, SECOND, YEAR TO MONTH, DAY TO HOUR, DAY TO MINUTE, DAY TO SECOND, HOUR TO MINUTE, HOUR TO SECOND, MINUTE TO SECOND) |
| INTERVAL_PRECISION | NUMBER | for a interval type, the value is the leading precision |

| 列名称 | 数据类型 | 说明 |
|-----------------------|--------------|---|
| CHARACTER_SET_CATALOG | VARCHAR(128) | catalog name of the character set if it is a character string type |
| CHARACTER_SET_SCHEMA | VARCHAR(128) | schema name of the character set if it is a character string type |
| CHARACTER_SET_NAME | VARCHAR(128) | character set name of the character set if it is a character string type |
| COLLATION_CATALOG | VARCHAR(128) | catalog name of the applicable collation if it is a character string type |
| COLLATION_SCHEMA | VARCHAR(128) | schema name of the applicable collation if it is a character string type |
| COLLATION_NAME | VARCHAR(128) | collation name of the applicable collation if it is a character string type |
| DOMAIN_CATALOG | VARCHAR(128) | catalog name of the domain used by the column being described |

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|--|
| DOMAIN_SCHEMA | VARCHAR(128) | schema name of the domain used by the column being described |
| DOMAIN_NAME | VARCHAR(128) | domain name of the domain used by the column being described |
| UDT_CATALOG | VARCHAR(128) | catalog name of the user-defined type of the data type being described |
| UDT_SCHEMA | VARCHAR(128) | schema name of the user-defined type of the data type being described |
| UDT_NAME | VARCHAR(128) | user-defined type name of the user-defined type of the data type being described |
| SCOPE_CATALOG | VARCHAR(128) | catalog name of the referenceable table if DATA_TYPE is REF |
| SCOPE_SCHEMA | VARCHAR(128) | schema name of the referenceable table if DATA_TYPE is REF |

| 列名称 | 数据类型 | 说明 |
|---------------------|--------------|--|
| SCOPE_NAME | VARCHAR(128) | scope name of the referenceable table if DATA_TYPE is REF |
| MAXIMUM_CARDINALITY | NUMBER | maximum cardinality if DATA_TYPE is ARRAY |
| DTD_IDENTIFIER | NUMBER | data type descriptor identifier |
| IS_SELF_REFERENCING | BOOLEAN | is a self-referencing column |
| IS_IDENTITY | BOOLEAN | is an identity column |
| IDENTITY_GENERATION | VARCHAR(32) | for an identity column, the value is in (ALWAYS, BY DEFAULT) |
| IDENTITY_START | NUMBER | for an identity column, the start value of the identity column |
| IDENTITY_INCREMENT | NUMBER | for an identity column, the increment of the identity column |
| IDENTITY_MAXIMUM | NUMBER | for an identity column, the maximum value of the identity column |

| 列名称 | 数据类型 | 说明 |
|-------------------------------------|--------------|--|
| IDENTITY_MINIMUM | NUMBER | for an identity column, the minimum value of the identity column |
| IDENTITY_CYCLE | BOOLEAN | for an identity column, the cycle option |
| IS_GENERATED | BOOLEAN | is a generated column |
| GENERATION_EXPRESSION | VARCHAR(128) | for a generated column, the text of the generation expression |
| IS_SYSTEM_VERSION_START | BOOLEAN | is a system-version start column |
| IS_SYSTEM_VERSION_END | BOOLEAN | is a system-version end column |
| SYSTEM_VERSION_TIMESTAMP_GENERATION | VARCHAR(32) | for a system-version column, the value is ALWAYS |
| IS_UPDATABLE | BOOLEAN | is an updatable column |
| DECLARED_DATA_TYPE | VARCHAR(128) | the data type name that a user declared |
| DECLARED_NUMERIC_PRECISION | NUMBER | the precision value that a user declared |

| 列名称 | 数据类型 | 说明 |
|------------------------|---------------|--------------------------------------|
| DECLARED_NUMERIC_SCALE | NUMBER | the scale value that a user declared |
| COMMENTS | VARCHAR(1024) | comments of the column |

Table 5-169 列信息

COLUMN_PRIVILEGES

标识此目录中定义的表的列的权限这些表可由给定用户或角色使用或授权

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| GRANTOR | VARCHAR(128) | authorization name of the user who granted column privileges |
| GRANTEE | VARCHAR(128) | authorization name of some user or role, or PUBLIC to indicate all users, to whom the column privilege being described is granted |
| TABLE_CATALOG | VARCHAR(128) | catalog name of the column on which the privilege being described was granted |
| TABLE_OWNER | VARCHAR(128) | table owner name of the column on which the privilege being described was granted |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the column on which the privilege being described was granted |
| TABLE_NAME | VARCHAR(128) | table name of the column on which the privilege being described was granted |
| COLUMN_NAME | VARCHAR(128) | column name of the column on which the privilege being described was granted |
| PRIVILEGE_TYPE | VARCHAR(32) | the value is in (SELECT, INSERT, UPDATE, REFERENCES) |

| | | |
|--------------|---------|--------------|
| IS_GRANTABLE | BOOLEAN | is grantable |
|--------------|---------|--------------|

Table 5-170 列信息

CSII

CONSTRAINT_COLUMN_USAGE

标识由引用约束唯一约束检查约束和本目录中定义并由给定用户或角色拥有的断言所使用的列

| 列名称 | 数据类型 | 说明 |
|--------------------|--------------|--|
| TABLE_CATALOG | VARCHAR(128) | catalog name of the column that participates in the constraint being described |
| TABLE_OWNER | VARCHAR(128) | owner name of the column that participates in the constraint being described |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the column that participates in the constraint being described |
| TABLE_NAME | VARCHAR(128) | table name of the column that participates in the constraint being described |
| COLUMN_NAME | VARCHAR(128) | column name that participates in the constraint being described |
| CONSTRAINT_CATALOG | VARCHAR(128) | catalog name of the constraint |
| CONSTRAINT_OWNER | VARCHAR(128) | owner name of the constraint |
| CONSTRAINT_SCHEMA | VARCHAR(128) | schema name of the constraint |
| CONSTRAINT_NAME | VARCHAR(128) | constraint name |

Table 5-171 列信息

CONSTRAINT_TABLE_USAGE

标识由引用约束唯一约束检查约束和本目录中定义并由给定用户或角色拥有的断言所使用的表

| 列名称 | 数据类型 | 说明 |
|--------------------|--------------|---|
| TABLE_CATALOG | VARCHAR(128) | catalog name of the table that participates in the constraint being described |
| TABLE_OWNER | VARCHAR(128) | owner name of the table that participates in the constraint being described |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the table that participates in the constraint being described |
| TABLE_NAME | VARCHAR(128) | table name that participates in the constraint being described |
| CONSTRAINT_CATALOG | VARCHAR(128) | catalog name of the constraint |
| CONSTRAINT_OWNER | VARCHAR(128) | owner name of the constraint |
| CONSTRAINT_SCHEMA | VARCHAR(128) | schema name of the constraint |
| CONSTRAINT_NAME | VARCHAR(128) | constraint name |

Table 5-172 列信息

INFORMATION_SCHEMA_CATALOG_NAME

标识包含信息架构（Information Schema）的目录

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|--|
| CATALOG_NAME | VARCHAR(128) | the name of catalog in which this Information Schema resides |

Table 5-173 列信息

KEY_COLUMN_USAGE

标识本目录中定义的列这些列被约束为键并且可以由给定用户或角色访问

| 列名称 | 数据类型 | 说明 |
|--------------------|--------------|--|
| CONSTRAINT_CATALOG | VARCHAR(128) | catalog name of the constraint |
| CONSTRAINT_OWNER | VARCHAR(128) | owner name of the constraint |
| CONSTRAINT_SCHEMA | VARCHAR(128) | schema name of the constraint |
| CONSTRAINT_NAME | VARCHAR(128) | constraint name |
| TABLE_CATALOG | VARCHAR(128) | catalog name of the column that participates in the constraint being described |
| TABLE_OWNER | VARCHAR(128) | owner name of the column that participates in the constraint being described |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the column that participates in the constraint being described |
| TABLE_NAME | VARCHAR(128) | table name of the column that participates in the constraint being described |

| | | |
|-------------------------------|--------------|--|
| COLUMN_NAME | VARCHAR(128) | column name that participates in the constraint being described |
| ORDINAL_POSITION | NUMBER | the ordinal position of the specific column in the constraint being described. If the constraint described is a key of cardinality 1 (one), then the value of ORDINAL_POSITION is always 1 (one). |
| POSITION_IN_UNIQUE_CONSTRAINT | NUMBER | If the constraint being described is a foreign key constraint, then the value of POSITION_IN_UNIQUE_CONSTRAINT is the ordinal position of the referenced column corresponding to the referencing column being described, in the corresponding unique key constraint. |

Table 5-174 列信息

MODULES

标识目录中给定用户或角色可以访问的sql服务器模块

| 列名称 | 数据类型 | 说明 |
|-------------------------------|--------------|---|
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module |
| MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module |
| MODULE_NAME | VARCHAR(128) | name of the SQL-server module |
| DEFAULT_CHARACTER_SET_CATALOG | VARCHAR(128) | default character set catalog name of the SQL-server module |
| DEFAULT_CHARACTER_SET_SCHEMA | VARCHAR(128) | default character set schema name of the SQL-server module |
| DEFAULT_CHARACTER_SET | VARCHAR(128) | default character set name of the SQL-server module |
| DEFAULT_SCHEMA_CATALOG | VARCHAR(128) | catalog name of default schema of SQL-server module |
| DEFAULT_SCHEMA_NAME | VARCHAR(128) | default scheam name of the SQL-server module |
| MODULE_DEFINITION | LONG VARCHAR | definition of the SQL-server module |

| | | |
|----------------------|--------------------------------------|--|
| MODULE_AUTHORIZATION | VARCHAR(32) | authorization of the SQL-server module(DEFINER/INVOKER) |
| SQL_PATH | VARCHAR(1024) | described SQL PATH when the SQL-server module is defined |
| CREATED | TIMESTAMP(6) WITHOUT TIME ZONE | creation time of the SQL-server module |
| LAST_ALTERED | TIMESTAMP(6) WITHOUT TIME ZONE | most lately altered time of the SQL-server module |

Table 5-175 列信息

MODULE_BODY

标识该目录中可被给定用户或角色访问的sql服务器模块主体

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------------------------------|--|
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module |
| MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module |
| MODULE_NAME | VARCHAR(128) | name of the SQL-server module |
| MODULE_DEFINITION | LONG VARCHAR | definition of the SQL-server module |
| CREATED | TIMESTAMP(6) WITHOUT TIME ZONE | creation time of the SQL-server module |
| LAST_ALTERED | TIMESTAMP(6) WITHOUT TIME ZONE | most lately altered time of the SQL-server module |

Table 5-176 列信息

MODULE_BODY_MODULE_USAGE

标识给定用户或角色拥有的 SQL 服务器模块该目录中定义的 SQL 服务器模块主体依赖于这些模块

| 列名称 | 数据类型 | 说明 |
|--------------------|--------------|---|
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module |
| MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module |
| MODULE_NAME | VARCHAR(128) | name of the SQL-server module |
| REF_MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module of contained in definition text of the SQL-server module body |
| REF_MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module of contained in definition text of the SQL-server module body |
| REF_MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module of contained in definition text of the SQL-server module body |
| REF_MODULE_NAME | VARCHAR(128) | SQL-server module name of contained in definition text of the SQL-server module body |

Table 5-177 列信息

MODULE_BODY_ROUTINE_USAGE

标识由给定用户或角色拥有的 SQL 调用例程在该目录中定义的SQL服务器模块主体依赖于这些例程

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module |
| MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module |
| MODULE_NAME | VARCHAR(128) | name of the SQL-server module |
| ROUTINE_CATALOG | VARCHAR(128) | catalog name of the SQL-invoked routine of contained in definition text of the SQL-server module body |
| ROUTINE_OWNER | VARCHAR(128) | owner name of the SQL-invoked routine of contained in definition text of the SQL-server module body |
| ROUTINE_SCHEMA | VARCHAR(128) | schema name of the SQL-invoked routine of contained in definition text of the SQL-server module body |
| ROUTINE_NAME | VARCHAR(128) | SQL-invoked routine name of contained in definition text of the SQL-server module body |

Table 5-178 列信息

MODULE_BODY_SEQUENCE_USAGE

标识给定用户或角色所拥有的序列此目录中定义的sql服务器模块主体依赖于这些序列

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|--|
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module |
| MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module |
| MODULE_NAME | VARCHAR(128) | name of the SQL-server module |
| SEQUENCE_CATALOG | VARCHAR(128) | catalog name of the sequence of contained in definition text of the SQL-server module body |
| SEQUENCE_OWNER | VARCHAR(128) | owner name of the sequence of contained in definition text of the SQL-server module body |
| SEQUENCE_SCHEMA | VARCHAR(128) | schema name of the sequence of contained in definition text of the SQL-server module body |
| SEQUENCE_NAME | VARCHAR(128) | sequence name of contained in definition text of the SQL-server module body |

Table 5-179 列信息

MODULE_BODY_TABLE_USAGE

标识由给定用户或角色拥有的表此目录中定义的sql服务器模块主体依赖于这些表

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module |
| MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module |
| MODULE_NAME | VARCHAR(128) | name of the SQL-server module |
| TABLE_CATALOG | VARCHAR(128) | catalog name of the table of contained in definition text of the SQL-server module body |
| TABLE_OWNER | VARCHAR(128) | owner name of the table of contained in definition text of the SQL-server module body |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the table of contained in definition text of the SQL-server module body |
| TABLE_NAME | VARCHAR(128) | table name of contained in definition text of the SQL-server module body |

Table 5-180 列信息

MODULE_MODULE_USAGE

标识由给定用户或角色拥有的sql服务器模块此目录中定义的sql服务器模块依赖于这些模块

| 列名称 | 数据类型 | 说明 |
|--------------------|--------------|--|
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module |
| MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module |
| MODULE_NAME | VARCHAR(128) | name of the SQL-server module |
| REF_MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module of contained in definition text of the SQL-server module |
| REF_MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module of contained in definition text of the SQL-server module |
| REF_MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module of contained in definition text of the SQL-server module |
| REF_MODULE_NAME | VARCHAR(128) | SQL-server module name of contained in definition text of the SQL-server module |

Table 5-181 列信息

MODULE_PRIVILEGES

标识此目录中定义的sql服务器模块上的特权这些特权可用于或由给定用户或角色授予

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|--|
| GRANTOR | VARCHAR(128) | authorization name of the user who granted SQL-server module privileges |
| GRANTEE | VARCHAR(128) | authorization name of some user or role, or PUBLIC to indicate all users, to whom the SQL-server module privilege being described is granted |
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module on which the privilege being described was granted |
| MODULE_OWNER | VARCHAR(128) | owner name of the the SQL-server module on which the privilege being described was granted |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the the SQL-server module on which the privilege being described was granted |
| MODULE_NAME | VARCHAR(128) | name of the the SQL-server module on which the privilege being described was granted |

| | | |
|----------------|-------------|-----------------------------|
| PRIVILEGE_TYPE | VARCHAR(32) | the value is in (EXECUTE) |
| IS_GRANTABLE | BOOLEAN | is grantable |

Table 5-182 列信息

CSII

MODULE_ROUTINE_USAGE

标识由给定用户或角色拥有的sql调用例程此目录中定义的sql服务器模块依赖于这些例程

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|--|
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module |
| MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module |
| MODULE_NAME | VARCHAR(128) | name of the SQL-server module |
| ROUTINE_CATALOG | VARCHAR(128) | catalog name of the SQL-invoked routine of contained in definition text of the SQL-server module |
| ROUTINE_OWNER | VARCHAR(128) | owner name of the SQL-invoked routine of contained in definition text of the SQL-server module |
| ROUTINE_SCHEMA | VARCHAR(128) | schema name of the SQL-invoked routine of contained in definition text of the SQL-server module |
| ROUTINE_NAME | VARCHAR(128) | SQL-invoked routine name of contained in definition text of the SQL-server module |

Table 5-183 列信息

MODULE_SEQUENCE_USAGE

标识给定用户或角色所拥有的序列此目录中定义的sql服务器模块依赖于这些序列

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module |
| MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module |
| MODULE_NAME | VARCHAR(128) | name of the SQL-server module |
| SEQUENCE_CATALOG | VARCHAR(128) | catalog name of the sequence of contained in definition text of the SQL-server module |
| SEQUENCE_OWNER | VARCHAR(128) | owner name of the sequence of contained in definition text of the SQL-server module |
| SEQUENCE_SCHEMA | VARCHAR(128) | schema name of the sequence of contained in definition text of the SQL-server module |
| SEQUENCE_NAME | VARCHAR(128) | sequence name of contained in definition text of the SQL-server module |

Table 5-184 列信息

MODULE_TABLE_USAGE

标识由给定用户或角色拥有的表此目录中定义的sql服务器模块依赖于这些表

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|--|
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module |
| MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module |
| MODULE_NAME | VARCHAR(128) | name of the SQL-server module |
| TABLE_CATALOG | VARCHAR(128) | catalog name of the table of contained in definition text of the SQL-server module |
| TABLE_OWNER | VARCHAR(128) | owner name of the table of contained in definition text of the SQL-server module |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the table of contained in definition text of the SQL-server module |
| TABLE_NAME | VARCHAR(128) | table name of contained in definition text of the SQL-server module |

Table 5-185 列信息

PARAMETERS

标识此目录中定义的SQL调用例程的SQL参数这些例程的参数可供给定用户或角色访问

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| SPECIFIC_CATALOG | VARCHAR(128) | catalog name of the specific name of the SQL- invoked routine that contains the SQL parameter being described |
| SPECIFIC_OWNER | VARCHAR(128) | owner name of the specific name of the SQL- invoked routine that contains the SQL parameter being described |
| SPECIFIC_SCHEMA | VARCHAR(128) | schema name of the specific name of the SQL- invoked routine that contains the SQL parameter being described |
| SPECIFIC_NAME | VARCHAR(128) | specific name of the SQL- invoked routine that contains the SQL parameter being described |
| ORDINAL_POSITION | NUMBER | ordinal position of the SQL- invoked routine that contains the SQL parameter being described |
| PARAMETER_MODE | VARCHAR(32) | parameter mode of the SQL parameter being described |

| 列名称 | 数据类型 | 说明 |
|---------------------------|--------------|---|
| IS_RESULT | BOOLEAN | the parameter is RESULT parameter of type-preserving function |
| AS_LOCATOR | BOOLEAN | the parameter is passed as locator |
| PARAMETER_NAME | VARCHAR(128) | name of the SQL parameter being described |
| FROM_SQL_SPECIFIC_CATALOG | VARCHAR(128) | specific catalog name of the from-sql routine for the input parameter being described |
| FROM_SQL_SPECIFIC_SCHEMA | VARCHAR(128) | specific schema name of the from-sql routine for the input parameter being described |
| FROM_SQL_SPECIFIC_NAME | VARCHAR(128) | specific name of the from-sql routine for the input parameter being described |
| TO_SQL_SPECIFIC_CATALOG | VARCHAR(128) | specific catalog name of the to-sql routine for the input parameter being described |
| TO_SQL_SPECIFIC_SCHEMA | VARCHAR(128) | specific schema name of the to-sql routine for the input parameter being described |
| TO_SQL_SPECIFIC_NAME | VARCHAR(128) | specific name of the to-sql routine for the input parameter being described |

| 列名称 | 数据类型 | 说明 |
|--------------------------|--------------|--|
| DATA_TYPE | VARCHAR(128) | data type of the SQL parameter being described |
| CHARACTER_MAXIMUM_LENGTH | NUMBER | maximum length of the SQL parameter being described |
| CHARACTER_OCTET_LENGTH | NUMBER | maximum length in octets of the SQL parameter being described |
| CHARACTER_SET_CATALOG | VARCHAR(128) | character set catalog name of the data type of the SQL parameter being described |
| CHARACTER_SET_SCHEMA | VARCHAR(128) | character set schema name of the data type of the SQL parameter being described |
| CHARACTER_SET_NAME | VARCHAR(128) | character set name of the data type of the SQL parameter being described |
| COLLATION_CATALOG | VARCHAR(128) | collation catalog name of the data type of the SQL parameter being described |
| COLLATION_SCHEMA | VARCHAR(128) | collation schema name of the data type of the SQL parameter being described |

| 列名称 | 数据类型 | 说明 |
|-------------------------|--------------|--|
| COLLATION_NAME | VARCHAR(128) | collation name of the data type of the SQL parameter being described |
| NUMERIC_PRECISION | NUMBER | precision of the data type of the SQL parameter being described |
| NUMERIC_PRECISION_RADIX | NUMBER | precision radix of the data type of the SQL parameter being described |
| NUMERIC_SCALE | NUMBER | scale of the data type of the SQL parameter being described |
| DATETIME_PRECISION | NUMBER | fractional second precisions of the data type of the SQL parameter being described |
| INTERVAL_TYPE | VARCHAR(32) | interval qualifier of the data type of the SQL parameter being described |
| INTERVAL_PRECISION | NUMBER | interval precision of the data type of the SQL parameter being described |
| UDT_CATALOG | VARCHAR(128) | catalog name of UDT of the data type of the SQL parameter being described |
| UDT_SCHEMA | VARCHAR(128) | schema name of UDT of the data type of the SQL parameter being described |
| UDT_NAME | VARCHAR(128) | name of UDT of the data type of the SQL parameter being described |

| 列名称 | 数据类型 | 说明 |
|----------------------------|-----------------|--|
| SCOPE_CATALOG | VARCHAR(128) | catalog name of referenceable tables of the data type of the SQL parameter being described |
| SCOPE_SCHEMA | VARCHAR(128) | schema name of referenceable tables of the data type of the SQL parameter being described |
| SCOPE_NAME | VARCHAR(128) | name of referenceable tables of the data type of the SQL parameter being described |
| MAXIMUM_CARDINALITY | NUMBER | maximum cardinality of the data type of the SQL parameter being described |
| DTD_IDENTIFIER | NUMBER | dtd identifier of the data type of the SQL parameter being described |
| DECLARED_DATA_TYPE | VARCHAR(128) | declared data type of the SQL parameter being described |
| DECLARED_NUMERIC_PRECISION | NUMBER | precision of declared data type of the SQL parameter being described |
| DECLARED_NUMERIC_SCALE | NUMBER | scale of declared data type of the SQL parameter being described |
| PARAMETER_DEFAULT | LONG VARCHAR | default value of the SQL parameter being described |

Table 5-186 列信息

REFERENTIAL_CONSTRAINTS

标识在此目录中的表上定义的引用约束可由给定用户或角色访问

| 列名称 | 数据类型 | 说明 |
|------------------------|--------------|--|
| CONSTRAINT_CATALOG | VARCHAR(128) | catalog name of the referential constraint |
| CONSTRAINT_OWNER | VARCHAR(128) | owner name who owns the referential constraint |
| CONSTRAINT_SCHEMA | VARCHAR(128) | schema name of the referential constraint being described |
| CONSTRAINT_NAME | VARCHAR(128) | referential constraint name |
| CONSTRAINT_TABLE_NAME | VARCHAR(128) | name of the table to which the referential constraint being described applies |
| CONSTRAINT_COLUMN_NAME | VARCHAR(128) | column name of the table to which the referential constraint being described applies |
| ORDINAL_POSITION | NUMBER | the ordinal position of the specific column in the referential constraint being described. |

| | | |
|-------------------------------|--------------|---|
| UNIQUE_CONSTRAINT_CATALOG | VARCHAR(128) | catalog name of the unique or primary key constraint applied to the referenced column list being described |
| UNIQUE_CONSTRAINT_OWNER | VARCHAR(128) | owner name of the unique or primary key constraint applied to the referenced column list being described |
| UNIQUE_CONSTRAINT_SCHEMA | VARCHAR(128) | schema name of the unique or primary key constraint applied to the referenced column list being described |
| UNIQUE_CONSTRAINT_NAME | VARCHAR(128) | constraint name of the unique or primary key constraint applied to the referenced column list being described |
| UNIQUE_CONSTRAINT_TABLE_NAME | VARCHAR(128) | table name of the unique or primary key constraint applied to the referenced column list being described |
| UNIQUE_CONSTRAINT_COLUMN_NAME | VARCHAR(128) | column name of the unique or primary key constraint applied to the referenced column list being described |
| IS_PRIMARY_KEY | BOOLEAN | whether the constraint applied to the referenced column list being described, is primary key or not |

| | | |
|--------------------|-------------|--|
| MATCH_OPTION | VARCHAR(32) | the referential constraint that has a match option: the value in (SIMPLE, PARTIAL, FULL) |
| UPDATE_RULE | VARCHAR(32) | the referential constraint that has an update rule: the value in (NO ACTION, RESTRICT, CASCADE, SET NULL, SET DEFAULT) |
| DELETE_RULE | VARCHAR(32) | the referential constraint that has a delete rule: the value in (NO ACTION, RESTRICT, CASCADE, SET NULL, SET DEFAULT) |
| IS_DEFERRABLE | BOOLEAN | is a deferrable constraint |
| INITIALLY_DEFERRED | BOOLEAN | is an initially deferred constraint |

Table 5-187 列信息

ROUTINES

标识此目录中可由给定用户或角色访问的SQL-invoked例程

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| SPECIFIC_CATALOG | VARCHAR(128) | specific catalog name of the routine |
| SPECIFIC_OWNER | VARCHAR(128) | specific owner name of the routine |
| SPECIFIC_SCHEMA | VARCHAR(128) | specific schema name of the routine |
| SPECIFIC_NAME | VARCHAR(128) | specific name of the routine |
| ROUTINE_CATALOG | VARCHAR(128) | catalog name of the routine |
| ROUTINE_OWNER | VARCHAR(128) | owner name of the routine |
| ROUTINE_SCHEMA | VARCHAR(128) | schema name of the routine |
| ROUTINE_NAME | VARCHAR(128) | null |
| ROUTINE_TYPE | VARCHAR(128) | name of the routine |
| MODULE_CATALOG | VARCHAR(128) | module name of the routine |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the module in which the routine is defined |

| 列名称 | 数据类型 | 说明 |
|--------------------------|--------------|---|
| MODULE_NAME | VARCHAR(128) | name of the module in which the routine is defined |
| UDT_CATALOG | VARCHAR(128) | catalog name of the user-defined data type which defined the routine as a method function |
| UDT_SCHEMA | VARCHAR(128) | schema name of the user-defined data type which defined the routine as a method function |
| UDT_NAME | VARCHAR(128) | name of the user-defined data type which defined the routine as a method function |
| DATA_TYPE | VARCHAR(128) | data type the routine returns |
| CHARACTER_MAXIMUM_LENGTH | NUMBER | maximum character length of data type the routine returns |
| CHARACTER_OCTET_LENGTH | NUMBER | maximum character length in octets of data type the routine returns |

| 列名称 | 数据类型 | 说明 |
|-------------------------|--------------|---|
| CHARACTER_SET_CATALOG | VARCHAR(128) | character set catalog name of data type the routine returns |
| CHARACTER_SET_SCHEMA | VARCHAR(128) | character set schema name of data type the routine returns |
| CHARACTER_SET_NAME | VARCHAR(128) | character set name of data type the routine returns |
| COLLATION_CATALOG | VARCHAR(128) | collation catalog name of data type the routine returns |
| COLLATION_SCHEMA | VARCHAR(128) | collation schema name of data type the routine returns |
| COLLATION_NAME | VARCHAR(128) | collation name of data type the routine returns |
| NUMERIC_PRECISION | NUMBER | precision of data type the routine returns |
| NUMERIC_PRECISION_RADIX | NUMBER | precision radix of data type the routine returns |
| NUMERIC_SCALE | NUMBER | scale of data type the routine returns |

| 列名称 | 数据类型 | 说明 |
|--------------------|--------------|--|
| DATETIME_PRECISION | NUMBER | fractional seconds precision of data type the routine returns |
| INTERVAL_TYPE | VARCHAR(32) | interval qualifier for data type the routine returns |
| INTERVAL_PRECISION | NUMBER | interval leading field precision of data type the routine returns |
| TYPE_UDT_CATALOG | VARCHAR(128) | catalog name of the user-defined data type, which is the data type the routine returns |
| TYPE_UDT_SCHEMA | VARCHAR(128) | schema name of the user-defined data type, which is the data type the routine returns |
| TYPE_UDT_NAME | VARCHAR(128) | name of the user-defined data type, which is the data type the routine returns |
| SCOPE_CATALOG | VARCHAR(128) | catalog name of referenceable table |

| 列名称 | 数据类型 | 说明 |
|---------------------|--------------|--|
| SCOPE_SCHEMA | VARCHAR(128) | schema name of referenceable table |
| SCOPE_NAME | VARCHAR(128) | name of referenceable table |
| MAXIMUM_CARDINALITY | NUMBER | maximum cardinality of data type the routine returns |
| DTD_IDENTIFIER | NUMBER | dtd identifier of data type the routine returns |
| ROUTINE_BODY | VARCHAR(32) | type of the routine body |
| ROUTINE_DEFINITION | LONG VARCHAR | catalog name of the routine |
| EXTERNAL_NAME | VARCHAR(128) | external name of the external routine |
| EXTERNAL_LANGUAGE | VARCHAR(32) | language of the external routine |
| PARAMETER_STYLE | VARCHAR(32) | SQL parameter passing style of the external routine |
| IS_DETERMINISTIC | BOOLEAN | the routine is deterministic or not |
| SQL_DATA_ACCESS | VARCHAR(32) | routine possibly contains SQL or access data |

| 列名称 | 数据类型 | 说明 |
|-------------------------|---------------|--|
| IS_NULL_CALL | BOOLEAN | routine returns NULL if any of parameter values are NULL |
| SQL_PATH | VARCHAR(1024) | described SQL PATH when the routine is defined |
| SCHEMA_LEVEL_ROUTINE | BOOLEAN | the routine is schema-level routine |
| MAX_DYNAMIC_RESULT_SETS | NUMBER | max result set count of the routine |
| IS_USER_DEFINED_CAST | BOOLEAN | the routine is a function that is a user-defined cast function |
| IS_IMPLICITLY_INVOCABLE | BOOLEAN | the user-defined cast function is implicitly invocable |
| SECURITY_TYPE | VARCHAR(32) | security type of the routine(DEFINER/INVOKER) |
| TO_SQL_SPECIFIC_CATALOG | VARCHAR(128) | catalog name of the to-sql routine of the result type of routine |

| 列名称 | 数据类型 | 说明 |
|----------------------------|--------------------------------------|--|
| TO_SQL_SPECIFIC_SCHEMA | VARCHAR(128) | schema name of the to-sql routine of the result type of routine |
| TO_SQL_SPECIFIC_NAME | VARCHAR(128) | name of the to-sql routine of the result type of routine |
| AS_LOCATOR | BOOLEAN | return value of the routine is passed as locator |
| CREATED | TIMESTAMP(6) WITHOUT TIME ZONE | creation time of the routine |
| LAST_ALTERED | TIMESTAMP(6) WITHOUT TIME ZONE | most lately altered time of the routine |
| NEW_SAVEPOINT_LEVEL | BOOLEAN | specify new savepoint level or not |
| IS_UDT_DEPENDENT | BOOLEAN | routine is dependent |
| RESULT_CAST_FROM_DATA_TYPE | VARCHAR(128) | data type which is specified in result cast clause of the routine definition |

| 列名称 | 数据类型 | 说明 |
|-------------------------------|--------------|--|
| RESULT_CAST_AS_LOCATOR | BOOLEAN | locator indication which is specified in result cast clause of the routine definition |
| RESULT_CAST_CHAR_MAX_LENGTH | NUMBER | maximum character length of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_CHAR_OCTET_LENGTH | NUMBER | maximum character length in octets of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_CHAR_SET_CATALOG | VARCHAR(128) | character set catalog name of data type which is specified in result cast clause of the routine definition |

| 列名称 | 数据类型 | 说明 |
|--------------------------------|--------------|---|
| RESULT_CAST_CHAR_SET_SCHEMA | VARCHAR(128) | character set schema name of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_CHARACTER_SET_NAME | VARCHAR(128) | character set name of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_COLLATION_CATALOG | VARCHAR(128) | collation catalog name of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_COLLATION_SCHEMA | VARCHAR(128) | collation schema name of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_COLLATION_NAME | VARCHAR(128) | collation name of data type which is specified in result cast clause of the routine definition |

| 列名称 | 数据类型 | 说明 |
|--------------------------------|-------------|--|
| RESULT_CAST_NUMERIC_PRECISION | NUMBER | precision of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_NUMERIC_RADIX | NUMBER | precision radix of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_NUMERIC_SCALE | NUMBER | scale of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_DATETIME_PRECISION | NUMBER | fractional seconds precision of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_INTERVAL_TYPE | VARCHAR(32) | interval qualifier of data type which is specified in result cast clause of the routine definition |

| 列名称 | 数据类型 | 说明 |
|--------------------------------|--------------|--|
| RESULT_CAST_INTERVAL_PRECISION | NUMBER | interval precision of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_TYPE_UDT_CATALOG | VARCHAR(128) | UDT catalog name of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_TYPE_UDT_SCHEMA | VARCHAR(128) | UDT schema name of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_TYPE_UDT_NAME | VARCHAR(128) | UDT name of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_SCOPE_CATALOG | VARCHAR(128) | catalog name of referenceable table described in result cast clause of the routine definition |

| 列名称 | 数据类型 | 说明 |
|-----------------------------|--------------|--|
| RESULT_CAST_SCOPE_SCHEMA | VARCHAR(128) | schema name of referenceable table described in result cast clause of the routine definition |
| RESULT_CAST_SCOPE_NAME | VARCHAR(128) | name of referenceable table described in result cast clause of the routine definition |
| RESULT_CAST_MAX_CARDINALITY | NUMBER | maximum cardinality of data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_DTD_IDENTIFIER | NUMBER | dtd identifier of data type which is specified in result cast clause of the routine definition |
| DECLARED_DATA_TYPE | VARCHAR(128) | declared data type of the routine returns |
| DECLARED_NUMERIC_PRECISION | NUMBER | declared data type precision of the routine returns |

| 列名称 | 数据类型 | 说明 |
|--|--------------|---|
| DECLARED_NUMERIC_SCALE | NUMBER | declared data type scale of the routine returns |
| RESULT_CAST_FROM_DECLARED_DATA_TYPE | VARCHAR(128) | declared data type which is specified in result cast clause of the routine definition |
| RESULT_CAST_DECLARED_NUMERIC_PRECISION | NUMBER | declared data type precision which is specified in result cast clause of the routine definition |
| RESULT_CAST_DECLARED_NUMERIC_SCALE | NUMBER | declared data type scale which is specified in result cast clause of the routine definition |

Table 5-188 列信息

ROUTINE_MODULE_USAGE

标识由给定用户或角色拥有的SQL服务器模块此目录中定义的SQL例程依赖于这些模块

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| SPECIFIC_CATALOG | VARCHAR(128) | specific catalog name of the routine |
| SPECIFIC_OWNER | VARCHAR(128) | specific owner name of the routine |
| SPECIFIC_SCHEMA | VARCHAR(128) | specific schema name of the routine |
| SPECIFIC_NAME | VARCHAR(128) | specific name of the routine |
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module of contained in routine body of the SQL-invoked routine |
| MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module of contained in routine body of the SQL-invoked routine |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module of contained in routine body of the SQL-invoked routine |
| MODULE_NAME | VARCHAR(128) | SQL-server module name of contained in routine body of the SQL-invoked routine |

Table 5-189 列信息

ROUTINE_PRIVILEGES

标识此目录中定义的SQL调用例程的权限这些例程可由给定用户或角色访问或授权

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|--|
| GRANTOR | VARCHAR(128) | authorization name of the user who granted routine privileges |
| GRANTEE | VARCHAR(128) | authorization name of some user or role, or PUBLIC to indicate all users, to whom the routine privilege being described is granted |
| SPECIFIC_CATALOG | VARCHAR(128) | specific catalog name of the SQL-invoked routine on which the privilege being described was granted |
| SPECIFIC_OWNER | VARCHAR(128) | specific owner name of the the SQL-invoked routine on which the privilege being described was granted |
| SPECIFIC_SCHEMA | VARCHAR(128) | specific schema name of the the SQL-invoked routine on which the privilege being described was granted |
| SPECIFIC_NAME | VARCHAR(128) | specific name of the the SQL-invoked routine on which the privilege being described was granted |
| ROUTINE_CATALOG | VARCHAR(128) | routine catalog name of the SQL-invoked routine on which the privilege being described was granted |
| ROUTINE_OWNER | VARCHAR(128) | null |

| | | |
|----------------|--------------|---|
| ROUTINE_SCHEMA | VARCHAR(128) | routine schema name of the the SQL-invoked routine on which the privilege being described was granted |
| ROUTINE_NAME | VARCHAR(128) | routine name of the the SQL-invoked routine on which the privilege being described was granted |
| PRIVILEGE_TYPE | VARCHAR(32) | the value is in (EXECUTE) |
| IS_GRANTABLE | BOOLEAN | is grantable |

Table 5-190 列信息

ROUTINE_ROUTINE_USAGE

标识由此目录中定义的SQL例程所依赖的给定用户或角色所拥有的每个SQL调用例程

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|--|
| SPECIFIC_CATALOG | VARCHAR(128) | specific catalog name of the routine |
| SPECIFIC_OWNER | VARCHAR(128) | specific owner name of the routine |
| SPECIFIC_SCHEMA | VARCHAR(128) | specific schema name of the routine |
| SPECIFIC_NAME | VARCHAR(128) | specific name of the routine |
| ROUTINE_CATALOG | VARCHAR(128) | routine catalog name of a routine contained in routine body of the SQL-invoked routine |
| ROUTINE_OWNER | VARCHAR(128) | routine owner name of a routine contained in routine body of the SQL-invoked routine |
| ROUTINE_SCHEMA | VARCHAR(128) | routine schema name of a routine contained in routine body of the SQL-invoked routine |
| ROUTINE_NAME | VARCHAR(128) | routine name of a routine contained in routine body of the SQL-invoked routine |

Table 5-191 列信息

ROUTINE_SEQUENCE_USAGE

标识由此目录中定义的某些SQL例程所依赖的给定用户或角色所拥有的每个外部序列生成器

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| SPECIFIC_CATALOG | VARCHAR(128) | specific catalog name of the routine |
| SPECIFIC_OWNER | VARCHAR(128) | specific owner name of the routine |
| SPECIFIC_SCHEMA | VARCHAR(128) | specific schema name of the routine |
| SPECIFIC_NAME | VARCHAR(128) | specific name of the routine |
| SEQUENCE_CATALOG | VARCHAR(128) | catalog name of the sequence of contained in routine body of the SQL-invoked routine |
| SEQUENCE_OWNER | VARCHAR(128) | owner name of the sequence of contained in routine body of the SQL-invoked routine |
| SEQUENCE_SCHEMA | VARCHAR(128) | schema name of the sequence of contained in routine body of the SQL-invoked routine |
| SEQUENCE_NAME | VARCHAR(128) | sequence name of contained in routine body of the SQL-invoked routine |

Table 5-192 列信息

ROUTINE_TABLE_USAGE

标识由此目录中定义的SQL例程所依赖的给定用户或角色所拥有的表

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|---|
| SPECIFIC_CATALOG | VARCHAR(128) | specific catalog name of the routine |
| SPECIFIC_OWNER | VARCHAR(128) | specific owner name of the routine |
| SPECIFIC_SCHEMA | VARCHAR(128) | specific schema name of the routine |
| SPECIFIC_NAME | VARCHAR(128) | specific name of the routine |
| TABLE_CATALOG | VARCHAR(128) | catalog name of the table of contained in routine body of the SQL-invoked routine |
| TABLE_OWNER | VARCHAR(128) | owner name of the table of contained in routine body of the SQL-invoked routine |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the table of contained in routine body of the SQL-invoked routine |
| TABLE_NAME | VARCHAR(128) | table name of contained in routine body of the SQL-invoked routine |

Table 5-193 列信息

SCHEMATA

标识目录中属于给定用户或者给定用户或角色可访问的模式

| 列名称 | 数据类型 | 说明 |
|-------------------------------|---------------|---|
| CATALOG_NAME | VARCHAR(128) | catalog name of the schema |
| SCHEMA_NAME | VARCHAR(128) | schema name |
| SCHEMA_OWNER | VARCHAR(128) | authorization name who owns the schema |
| DEFAULT_CHARACTER_SET_CATALOG | VARCHAR(128) | catalog name of the default character set for columns and domains in the schemata |
| DEFAULT_CHARACTER_SET_SCHEMA | VARCHAR(128) | schema name of the default character set for columns and domains in the schemata |
| DEFAULT_CHARACTER_SET_NAME | VARCHAR(128) | character set name of the default character set for columns and domains in the schemata |
| SQL_PATH | VARCHAR(1024) | character representation of schema path specification |

| | | |
|---------------|--------------------------------------|----------------------------------|
| CREATED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | created time of the schema |
| MODIFIED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | last modified time of the schema |
| COMMENTS | VARCHAR(1024) | comments of the schema |

Table 5-194 列信息

SEQUENCES

识别本目录中定义的给定用户或角色可访问的外部序列生成器

| 列名称 | 数据类型 | 说明 |
|-------------------------|--------------|---|
| SEQUENCE_CATALOG | VARCHAR(128) | catalog name of the sequence |
| SEQUENCE_OWNER | VARCHAR(128) | owner name of the sequence |
| SEQUENCE_SCHEMA | VARCHAR(128) | schema name of the sequence |
| SEQUENCE_NAME | VARCHAR(128) | sequence name |
| DATA_TYPE | VARCHAR(128) | the standard name of the data type |
| NUMERIC_PRECISION | NUMBER | the numeric precision of the numerical data type |
| NUMERIC_PRECISION_RADIX | NUMBER | the radix (2 or 10) of the precision of the numerical data type |
| NUMERIC_SCALE | NUMBER | the numeric scale of the exact numerical data type |
| START_VALUE | NUMBER | the start value of the sequence generator |
| MINIMUM_VALUE | NUMBER | the minimum value of the sequence generator |

| | | |
|----------------------------|--------------------------------------|--|
| MAXIMUM_VALUE | NUMBER | the maximum value of the sequence generator |
| INCREMENT | NUMBER | the increment of the sequence generator |
| CYCLE_OPTION | BOOLEAN | cycle option |
| CACHE_SIZE | NATIVE_INTEGER | number of sequence numbers to cache |
| DECLARED_DATA_TYPE | VARCHAR(128) | the data type name that a user declared |
| DECLARED_NUMERIC_PRECISION | NUMBER | the precision value that a user declared |
| DECLARED_NUMERIC_SCALE | NUMBER | the scale value that a user declared |
| CREATED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | created time of the sequence generator |
| MODIFIED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | last modified time of the sequence generator |
| COMMENTS | VARCHAR(1024) | comments of the sequence generator |

Table 5-195 列信息

SQL_FEATURES

列出此 ISO/IEC 9075 标准的特性和子特性并指出 SQL 实现支持哪些特性

| 列名称 | 数据类型 | 说明 |
|------------------|---------------|---|
| FEATURE_ID | VARCHAR(32) | identifier string of the conformance element |
| FEATURE_NAME | VARCHAR(1024) | descriptive name of the conformance element |
| SUB_FEATURE_ID | VARCHAR(32) | identifier string of the subfeature, or a single space if not a subfeature |
| SUB_FEATURE_NAME | VARCHAR(1024) | descriptive name of the subfeature, or a single space if not a subfeature |
| IS_SUPPORTED | BOOLEAN | TRUE if an SQL-implementation fully supports that conformance element described when SQL-data in the identified catalog is accessed through that implementation, FALSE if not |
| IS_VERIFIED_BY | VARCHAR(1024) | If full support for the conformance element described has been verified by testing, then the IS_VERIFIED_BY column shall contain information identifying the conformance test used to verify the conformance claim; otherwise, IS_VERIFIED_BY shall be the null value |

| | | |
|----------|---------------|--|
| COMMENTS | VARCHAR(1024) | possibly a comment pertaining to the conformance element |
|----------|---------------|--|

Table 5-196 列信息

CSII

SQL_IMPLEMENTATION_INFO

列出此ISO / IEC 9075标准中定义的SQL实现信息项并为每个标准指示SQL实现支持的值

| 列名称 | 数据类型 | 说明 |
|--------------------------|----------------|---|
| IMPLEMENTATION_INFO_ID | VARCHAR(32) | identifier string of the implementation information item |
| IMPLEMENTATION_INFO_NAME | VARCHAR(1024) | descriptive name of the implementation information item |
| INTEGER_VALUE | NATIVE_INTEGER | value of the implementation information item, or null if the value is contained in the column CHARACTER_VALUE |
| CHARACTER_VALUE | VARCHAR(32) | value of the implementation information item, or null if the value is contained in the column INTEGER_VALUE |
| COMMENTS | VARCHAR(1024) | possibly a comment pertaining to the implementation information item |

Table 5-197 列信息

SQL_PACKAGES

列出此 ISO/IEC 9075 标准的包并指出 SQL--implementation 支持哪些包

| 列名称 | 数据类型 | 说明 |
|----------------|---------------|---|
| ID | VARCHAR(32) | identifier string of the conformance element |
| NAME | VARCHAR(1024) | descriptive name of the conformance element |
| IS_SUPPORTED | BOOLEAN | TRUE if an SQL-implementation fully supports that conformance element described when SQL-data in the identified catalog is accessed through that implementation, FALSE if not |
| IS_VERIFIED_BY | VARCHAR(1024) | If full support for the conformance element described has been verified by testing, then the IS_VERIFIED_BY column shall contain information identifying the conformance test used to verify the conformance claim; otherwise, IS_VERIFIED_BY shall be the null value |
| COMMENTS | VARCHAR(1024) | possibly a comment pertaining to the conformance element |

Table 5-198 列信息

SQL_PARTS

列出 ISO/IEC 9075 标准的部分并指出 SQL 实现支持哪些部分

| 列名称 | 数据类型 | 说明 |
|----------------|---------------|---|
| ID | VARCHAR(32) | identifier string of the conformance element |
| NAME | VARCHAR(1024) | descriptive name of the conformance element |
| IS_SUPPORTED | BOOLEAN | TRUE if an SQL-implementation fully supports that conformance element described when SQL-data in the identified catalog is accessed through that implementation, FALSE if not |
| IS_VERIFIED_BY | VARCHAR(1024) | If full support for the conformance element described has been verified by testing, then the IS_VERIFIED_BY column shall contain information identifying the conformance test used to verify the conformance claim; otherwise, IS_VERIFIED_BY shall be the null value |
| COMMENTS | VARCHAR(1024) | possibly a comment pertaining to the conformance element |

Table 5-199 列信息

SQL_SIZING

列出此ISO / IEC 9075标准的大小调整项针对每个标准指示SQL实现支持的大小

| 列名称 | 数据类型 | 说明 |
|-----------------|----------------|--|
| SIZING_ID | NATIVE_INTEGER | identifier of the sizing item |
| SIZING_NAME | VARCHAR(1024) | descriptive name of the sizing item |
| SUPPORTED_VALUE | NATIVE_INTEGER | value of the sizing item, or 0 if the size is unlimited or cannot be determined, or null if the features for which the sizing item is applicable are not supported |
| COMMENTS | VARCHAR(1024) | possibly a comment pertaining to the sizing item |

Table 5-200 列信息

STATISTICS

提供有关单个表的统计信息列表以及与该表相关联的索引这些索引可供给定用户或角色访问

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|--|
| TABLE_CATALOG | VARCHAR(128) | catalog name of the table |
| TABLE_OWNER | VARCHAR(128) | owner name of the table |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the table |
| TABLE_NAME | VARCHAR(128) | table name of the table |
| STAT_TYPE | VARCHAR(32) | statistics type: the value in (TABLE STAT, INDEX CLUSTERED, INDEX HASHED, INDEX OTHER) |
| NON_UNIQUE | BOOLEAN | indicates whether the index does not allow duplicate values |
| INDEX_CATALOG | VARCHAR(128) | catalog name of the index |
| INDEX_OWNER | VARCHAR(128) | owner name of the index |
| INDEX_SCHEMA | VARCHAR(128) | schema name of the index |
| INDEX_NAME | VARCHAR(128) | name of the index |
| COLUMN_NAME | VARCHAR(128) | column name that participates in the index |
| ORDINAL_POSITION | NUMBER | ordinal position of the specific column in the index described |

| | | |
|--------------------|---------------|---|
| IS_ASCENDING_ORDER | BOOLEAN | index key column being described is sorted in ASCENDING(TRUE) or DESCENDING(FALSE) order |
| IS_NULLS_FIRST | BOOLEAN | the null values of the key column are sorted before(TRUE) or after(FALSE) non-null values |
| CARDINALITY | NUMBER | if STAT_TYPE is (TABLE TYPE), then this is the number of rows in the table; otherwise, it is the number of unique values in the index |
| PAGES | NUMBER | if STAT_TYPE is (TABLE TYPE), then this is the number of pages used for the table; otherwise, it is the number of pages used for the current index. |
| FILTER_CONDITION | VARCHAR(1024) | filter condition, if any. |
| COMMENTS | VARCHAR(1024) | if STAT_TYPE is (TABLE TYPE), then this is the table comments; otherwise, it is the index comments. |

Table 5-201 列信息

TABLES

标识此目录中定义的给定用户或角色可访问的表

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------|---|
| TABLE_CATALOG | VARCHAR(128) | catalog name of the table |
| TABLE_OWNER | VARCHAR(128) | owner name of the table |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the table |
| TABLE_NAME | VARCHAR(128) | table name of the table |
| TABLE_TYPE | VARCHAR(32) | the value is in (BASE TABLE, VIEW, GLOBAL TEMPORARY, LOCAL TEMPORARY, SYSTEM VERSIONED, FIXED TABLE, DUMP TABLE) |
| DBC_TABLE_TYPE | VARCHAR(32) | ODBC/JDBC table type: the value is in (TABLE, VIEW, GLOBAL TEMPORARY, LOCAL TEMPORARY, IMMUTABLE TABLE, SYSTEM TABLE, ALIAS, SYNONYM) |
| TABLESPACE_NAME | VARCHAR(128) | tablespace name of the table, NULL if view |

| 列名称 | 数据类型 | 说明 |
|----------------------------------|--------------|---|
| SYSTEM_VERSION_START_COLUMN_NAME | VARCHAR(128) | if the table is a system-versioned table, then the name of the system-version start column of the table |
| SYSTEM_VERSION_END_COLUMN_NAME | VARCHAR(128) | if the table is a system-versioned table, then the name of the system-version end column of the table |
| SYSTEM_VERSION_RETENTION_PERIOD | VARCHAR(32) | if the table is a system-versioned table, then the character representation of the value of the retention period of the table |
| SELF_REFERENCING_COLUMN_NAME | VARCHAR(128) | if the table is a typed table, then the name of the self-referencing column of the table |
| REFERENCE_GENERATION | VARCHAR(32) | if the table has a self-referencing column, the value is in (SYSTEM GENERATED, USER GENERATED, DERIVED) |
| USER_DEFINED_TYPE_CATALOG | VARCHAR(128) | if the table being described is a table of a structured type, the catalog name of the structured type |

| 列名称 | 数据类型 | 说明 |
|--------------------------|--------------------------------------|--|
| USER_DEFINED_TYPE_SCHEMA | VARCHAR(128) | if the table being described is a table of a structured type, the schema name of the structured type |
| USER_DEFINED_TYPE_NAME | VARCHAR(128) | if the table being described is a table of a structured type, the name of the structured type |
| IS_INSERTABLE_INTO | BOOLEAN | is an insertable-into table |
| IS_TYPED | BOOLEAN | is a typed table |
| COMMIT_ACTION | VARCHAR(32) | if the table is a temporary table, the value is in (DELETE, PRESERVE) |
| CREATED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | created time of the table |
| MODIFIED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | last modified time of the table |
| COMMENTS | VARCHAR(1024) | comments of the table |

Table 5-202 列信息

TABLE_CONSTRAINTS

标识此目录中定义在表上的给定用户或角色可访问的表约束

| 列名称 | 数据类型 | 说明 |
|--------------------|--------------|---|
| CONSTRAINT_CATALOG | VARCHAR(128) | catalog name of the constraint |
| CONSTRAINT_OWNER | VARCHAR(128) | authorization name who owns the constraint |
| CONSTRAINT_SCHEMA | VARCHAR(128) | schema name of the constraint being described |
| CONSTRAINT_NAME | VARCHAR(128) | constraint name |
| TABLE_CATALOG | VARCHAR(128) | catalog name of the table to which the table constraint being described applies |
| TABLE_OWNER | VARCHAR(128) | authorization name who owns the table to which the table constraint being described applies |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the table to which the table constraint being described applies |
| TABLE_NAME | VARCHAR(128) | table name of the table to which the table constraint being described applies |
| CONSTRAINT_TYPE | VARCHAR(32) | the value is in (PRIMARY KEY, UNIQUE, FOREIGN KEY, NOT NULL, CHECK) |
| IS_DEFERRABLE | BOOLEAN | is a deferrable constraint |
| INITIALLY_DEFERRED | BOOLEAN | is an initially deferred constraint |

| | | |
|---------------|--------------------------------------|--------------------------------------|
| ENFORCED | BOOLEAN | is an enforced constraint |
| CREATED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | created time of the constraint |
| MODIFIED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | last modified time of the constraint |
| COMMENTS | VARCHAR(1024) | comments of the constraint |

Table 5-203 列信息

TABLE_PRIVILEGES

标识本目录中定义的表的表上的特权这些表可由给定用户或角色访问或授权

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|--|
| GRANTOR | VARCHAR(128) | authorization name of the user who granted table privileges |
| GRANTEE | VARCHAR(128) | authorization name of some user or role, or PUBLIC to indicate all users, to whom the table privilege being described is granted |
| TABLE_CATALOG | VARCHAR(128) | catalog name of the table on which the privilege being described was granted |
| TABLE_OWNER | VARCHAR(128) | table owner name of the table on which the privilege being described was granted |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the table on which the privilege being described was granted |
| TABLE_NAME | VARCHAR(128) | table name on which the privilege being described was granted |
| PRIVILEGE_TYPE | VARCHAR(32) | the value is in (CONTROL, SELECT, INSERT, UPDATE, DELETE, REFERENCES, LOCK, INDEX, ALTER) |
| IS_GRANTABLE | BOOLEAN | is grantable |

| | | |
|----------------|---------|---|
| WITH_HIERARCHY | BOOLEAN | whether the privilege was granted WITH HIERARCHY OPTION or not |
|----------------|---------|---|

Table 5-204 列信息

CSII

USAGE_PRIVILEGES

标识本目录中定义的对象的使用权限这些对象可由给定用户或角色访问或授权

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|--|
| GRANTOR | VARCHAR(128) | authorization name of the user who granted usage privileges, on the object of the type identified by OBJECT_TYPE |
| GRANTEE | VARCHAR(128) | authorization identifier of some user or role, or PUBLIC to indicate all users, to whom the usage privilege being described is granted |
| OBJECT_CATALOG | VARCHAR(128) | catalog name of the object of the type identified by OBJECT_TYPE on which the privilege being described was granted |
| OBJECT_OWNER | VARCHAR(128) | owner name of the object of the type identified by OBJECT_TYPE on which the privilege being described was granted |
| OBJECT_SCHEMA | VARCHAR(128) | schema name of the object of the type identified by OBJECT_TYPE on which the privilege being described was granted |
| OBJECT_NAME | VARCHAR(128) | object name of the type identified by OBJECT_TYPE on which the privilege being described was granted |

| | | |
|----------------|-------------|---|
| OBJECT_TYPE | VARCHAR(32) | the value is in (DOMAIN, CHARACTER SET, COLLATION, TRANSLATION, SEQUENCE) |
| PRIVILEGE_TYPE | VARCHAR(32) | the value is in (USAGE) |
| IS_GRANTABLE | BOOLEAN | is grantable |

Table 5-205 列信息

VIEWS

标识此目录中定义的可被给定用户或角色访问的已查看表

| 列名称 | 数据类型 | 说明 |
|----------------------------|--------------|--|
| TABLE_CATALOG | VARCHAR(128) | catalog name of the viewed table |
| TABLE_OWNER | VARCHAR(128) | owner name of the viewed table |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the viewed table |
| TABLE_NAME | VARCHAR(128) | view name of the viewed table |
| VIEW_DEFINITION | LONG VARCHAR | the character representation of the user-specified query expression contained in the corresponding view descriptor |
| CHECK_OPTION | VARCHAR(32) | the value is in (CASCADED, LOCAL, NONE) |
| IS_UPDATABLE | BOOLEAN | is an updatable view |
| INSERTABLE_INTO | BOOLEAN | is an insertable view |
| IS_TRIGGER_UPDATABLE | BOOLEAN | whether an update INSTEAD OF trigger is defined on the view or not |
| IS_TRIGGER_DELETABLE | BOOLEAN | whether a delete INSTEAD OF trigger is defined on the view or not |
| IS_TRIGGER_INSERTABLE_INTO | BOOLEAN | whether an insert INSTEAD OF trigger is defined on the view or not |

| | | |
|-------------|---------------|--|
| IS_COMPILED | BOOLEAN | whether the view is compiled or not |
| IS_AFFECTED | BOOLEAN | whether the view is affected by modification of underlying object or not |
| COMMENTS | VARCHAR(1024) | comments of the view |

Table 5-206 列信息

VIEW_MODULE_USAGE

标识由给定用户或角色拥有的sql服务器模块此目录中定义的视图依赖于这些模块

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| TABLE_CATALOG | VARCHAR(128) | catalog name of the viewed table |
| TABLE_OWNER | VARCHAR(128) | owner name of the viewed table |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the viewed table |
| TABLE_NAME | VARCHAR(128) | view name of the viewed table |
| MODULE_CATALOG | VARCHAR(128) | catalog name of the SQL-server module of contained in definition text of the view |
| MODULE_OWNER | VARCHAR(128) | owner name of the SQL-server module of contained in definition text of the view |
| MODULE_SCHEMA | VARCHAR(128) | schema name of the SQL-server module of contained in definition text of the view' |
| MODULE_NAME | VARCHAR(128) | SQL-server module name of contained in definition text of the view |

Table 5-207 列信息

VIEW_ROUTINE_USAGE

标识由此目录中定义的视图所依赖的给定用户或角色所拥有的每个例程

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|--|
| TABLE_CATALOG | VARCHAR(128) | catalog name of the viewed table |
| TABLE_OWNER | VARCHAR(128) | owner name of the viewed table |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the viewed table |
| TABLE_NAME | VARCHAR(128) | view name of the viewed table |
| SPECIFIC_CATALOG | VARCHAR(128) | specific catalog name of a routine contained in the query expression of the view being described |
| SPECIFIC_OWNER | VARCHAR(128) | specific owner name of a routine contained in the query expression of the view being described |
| SPECIFIC_SCHEMA | VARCHAR(128) | specific schema name of a routine contained in the query expression of the view being described |
| SPECIFIC_NAME | VARCHAR(128) | specific name of a routine contained in the query expression of the view being described |

Table 5-208 列信息

VIEW_TABLE_USAGE

标识在目录中定义并由给定用户或角色拥有的已查看表所依赖的表

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| VIEW_CATALOG | VARCHAR(128) | catalog name of the viewed table |
| VIEW_OWNER | VARCHAR(128) | owner name of the viewed table |
| VIEW_SCHEMA | VARCHAR(128) | schema name of the viewed table |
| VIEW_NAME | VARCHAR(128) | view name of the viewed table |
| TABLE_CATALOG | VARCHAR(128) | catalog name of a table that is explicitly or implicitly referenced in the original query expression of the compiled view being described |
| TABLE_OWNER | VARCHAR(128) | owner name of a table that is explicitly or implicitly referenced in the original query expression of the compiled view being described |
| TABLE_SCHEMA | VARCHAR(128) | schema name of a table that is explicitly or implicitly referenced in the original query expression of the compiled view being described |
| TABLE_NAME | VARCHAR(128) | table name of a table that is explicitly or implicitly referenced in the original query expression of the compiled view being described |

Table 5-209 列信息

5.3 PERFORMANCE_VIEW_SCHEMA

PERFORMANCE_VIEW_SCHEMA由可以查询系统当前状态信息的视图组成

使用该视图需如下执行PerformanceViewSchema.sql

- Standalone的情况

```
% gsql sys gliese --as sysdba --import  
$SUNDB_HOME/admin/standalone/PerformanceViewSchema.sql
```

- Cluster的情况

```
% gsql sys gliese --as sysdba --import  
$SUNDB_HOME/admin/cluster/PerformanceViewSchema.sql
```

根据启动阶段（NOMOUNTMOUNTOPEN）PERFORMANCE_VIEW_SCHEMA视图可查询的信息有所不同

可通过如下操作可查看各个视图可查询的启动阶段

```
gSQL> select table_name, startup_phase from v$tables order by 1;
```

| TABLE_NAME | STARTUP_PHASE |
|----------------|---------------|
| ----- | ----- |
| V\$AGABLE_INFO | OPEN |
| V\$ARCHIVELOG | MOUNT |

| | |
|-----------------------------|---------------|
| V\$AUDITABLE_DB_PRIVILEGES | NO_MOUNT |
| V\$AUDITABLE_SYSTEM_ACTIONS | NO_MOUNT |
| V\$BACKUP | MOUNT |
| V\$BALANCER | OPEN |
| V\$BCH | MOUNT |
| V\$BUFFER_STAT | MOUNT |
| V\$COLUMNS | OPEN |
| V\$CONTROLFILE | MOUNT |
| V\$DATAFILE | MOUNT |
| V\$DB_CHANGE_TRACKING | MOUNT |
| V\$DB_FILE | MOUNT |
| V\$DB_PROPERTY | OPEN |
| V\$DISPATCHER | OPEN |
| V\$ERROR_CODE | NO_MOUNT |
| V\$INCREMENTAL_BACKUP | MOUNT |
| V\$INSTANCE | NO_MOUNT |
| V\$KEYWORDS | NO_MOUNT |
| V\$LATCH | NO_MOUNT |
| V\$LOCK_WAIT | OPEN |
| TABLE_NAME | STARTUP_PHASE |
| ----- | ----- |
| V\$LOGFILE | MOUNT |
| V\$OPEN_CURSOR | NO_MOUNT |
| V\$PLAN_HISTORY | OPEN |

| | |
|-------------------------|---------------|
| V\$PLAN_HISTORY_LATEST | OPEN |
| V\$PROCESS_MEM_STAT | NO_MOUNT |
| V\$PROCESS_SQL_STAT | NO_MOUNT |
| V\$PROCESS_STAT | NO_MOUNT |
| V\$PROPERTY | NO_MOUNT |
| V\$PROPERTY_ALIAS | NO_MOUNT |
| V\$PSM_RESERVED_WORDS | NO_MOUNT |
| V\$QUEUE | OPEN |
| V\$RESERVED_WORDS | NO_MOUNT |
| V\$SEQUENCE | OPEN |
| V\$SESSION | NO_MOUNT |
| V\$SESSION_AUDIT | OPEN |
| V\$SESSION_CONNECT_INFO | NO_MOUNT |
| V\$SESSION_EVENT | OPEN |
| V\$SESSION_MEM_STAT | NO_MOUNT |
| V\$SESSION_SQL_STAT | NO_MOUNT |
| V\$SESSION_STAT | NO_MOUNT |
| V\$SESSION_WAIT | OPEN |
| TABLE_NAME | STARTUP_PHASE |
| ----- | ----- |
| V\$SHARED_MODE | OPEN |
| V\$SHARED_SERVER | OPEN |
| V\$SHM_SEGMENT | NO_MOUNT |
| V\$SPROPERTY | NO_MOUNT |

| | |
|--------------------------|----------|
| V\$SQLFN_METADATA | NO_MOUNT |
| V\$SQL_CACHE | NO_MOUNT |
| V\$SQL_COMMAND | NO_MOUNT |
| V\$SQL_HISTORY | NO_MOUNT |
| V\$STATEMENT | NO_MOUNT |
| V\$SYSTEM_EVENT | OPEN |
| V\$SYSTEM_MEM_STAT | NO_MOUNT |
| V\$SYSTEM_SQL_STAT | NO_MOUNT |
| V\$SYSTEM_STAT | NO_MOUNT |
| V\$TABLES | NO_MOUNT |
| V\$TABLESPACE | MOUNT |
| V\$TABLESPACE_STAT | OPEN |
| V\$TRANSACTION | OPEN |
| V\$WAIT_EVENT_CLASS_NAME | OPEN |
| V\$WAIT_EVENT_NAME | OPEN |
| V\$XA_TRANSACTION | OPEN |

62 rows selected.

GV\$ Global View

集群提供与几乎所有V\$ view相对应的GV\$ view

V\$ 视图查询当前连接的服务器的信息而GV \$视图查询所有服务器的信息

GV\$视图包含V\$视图的所有列信息另外还包含已获取数据的服务器

(clustermember)ORIGIN_MEMBER_NAME列

Note:

仅限在集群上使用

例如V \$ TRANSACTION信息如下显示当前连接的服务器的事务信息

```
gSQL> SELECT TRANS_ID, SESSION_ID, TRANS_VIEW_SCN, START_TIME FROM
V$TRANSACTION;
```

```
TRANS_ID SESSION_ID TRANS_VIEW_SCN START_TIME
```

```
-----
40501296          48 1098.1.26      2017-04-07 17:14:01.912637
```

相反GV \$ TRANSACTION信息如下显示所有服务器的事务信息

```
gSQL> SELECT ORIGIN_MEMBER_NAME, TRANS_ID, SESSION_ID, TRANS_VIEW_SCN,
START_TIME FROM GV$TRANSACTION;
```

```
ORIGIN_MEMBER_NAME TRANS_ID SESSION_ID TRANS_VIEW_SCN START_TIME
```

```

-----
-----
G1N1          40501296          48 1098.1.26          2017-04-07
17:14:01.912637
G2N2          40304688          48 1098.0.888          2017-04-07
17:14:55.134015
G2N1          42205232          48 1098.0.888          2017-04-07
17:14:55.135996
G1N2          40435760          48 1098.1.889          2017-04-07
17:14:01.910138

```

如上所述ORIGIN_MEMBER_NAME信息从每个对应于G1N1G2N1G1N2G2N2的集群成员中获取了各事务信息

查询特定远程服务器的信息时可如下使用ORIGIN_MEMBER_NAME列的条件进行查询

```

gSQL>
SELECT ORIGIN_MEMBER_NAME, TRANS_ID, SESSION_ID, TRANS_VIEW_SCN,
START_TIME
FROM GV$TRANSACTION
WHERE ORIGIN_MEMBER_NAME IN ( 'G2N1', 'G3N2' );

ORIGIN_MEMBER_NAME TRANS_ID SESSION_ID TRANS_VIEW_SCN START_TIME
-----
-----
G3N2          32178224          48 1099.0.888          2017-04-07

```


17:33:10.934752

G2N1

42270768

48 1099.0.888

2017-04-07

17:31:14.726007

2 rows selected.



V\$AGABLE_INFO

V\$AGABLE_INFO显示系统可编辑信息

| 列名称 | 数据类型 | 说明 |
|-------------------|-------------|---------------------------------------|
| SCN | VARCHAR(32) | system scn |
| AGABLE_SCN | VARCHAR(32) | system agable scn |
| AGABLE_SCN_GAP | VARCHAR(32) | gap between system scn and agable scn |
| OLDEST_SESSION_ID | NUMBER | identifier of session blocking aging |

Table 5-210 列信息

V\$ARCHIVELOG

V\$ARCHIVELOG显示日志归档的信息

| 列名称 | 数据类型 | 说明 |
|------------------------|---------------|---|
| ARCHIVELOG_MODE | VARCHAR(32) | database log mode: the value in (NOARCHIVELOG, ARCHIVELOG) |
| LAST_ARCHIVED_LOG | NUMBER | sequence number of last archived log file |
| ARCHIVELOG_DIR | VARCHAR(1024) | archive destination path |
| ARCHIVELOG_FILE_PREFIX | VARCHAR(128) | file prefix name of the archived log |

Table 5-211 列信息

V\$AUDITABLE_DB_PRIVILEGES

V\$AUDITABLE_DB_PRIVILEGES 显示可审计的数据库权限

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|-------------------------------|
| PRIVILEGE_ID | NUMBER | database privilege identifier |
| PRIVILEGE_NAME | VARCHAR(128) | database privilege name |

Table 5-212 列信息

V\$AUDITABLE_SYSTEM_ACTIONS

The V\$AUDITABLE_SYSTEM_ACTIONS 显示可审计的系统操作（ system actions）

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|------------------------------------|
| ACTION_ID | NUMBER | auditable system action identifier |
| ACTION_NAME | VARCHAR(128) | auditable system action name |

Table 5-213 列信息

V\$BACKUP

V\$BACKUP显示备份信息

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| TBS_NAME | VARCHAR(128) | tablespace name |
| BACKUP_STATUS | VARCHAR(16) | indicates whether the tablespace begin backup (ACTIVE) or not (INACTIVE) |
| BACKUP_LSN | NUMBER | the last checkpoint lsn of tablespace when backup started |

Table 5-214 列信息

V\$BALANCER

V\$BALANCER显示BALANCER信息

| 列名称 | 数据类型 | 说明 |
|-----------------------|-------------|-------------------------------|
| PROCESS_ID | NUMBER | balancer process identifier |
| CUR_CONNECTIONS | NUMBER | current number of connections |
| CONNECTIONS | NUMBER | total number of connections |
| CONNECTIONS_HIGHWATER | NUMBER | highest number of connections |
| MAX_CONNECTIONS | NUMBER | maximum connections |
| STATUS | VARCHAR(16) | status |

Table 5-215 列信息

V\$BCH

V\$BCH显示数据库缓冲区控制header array的信息

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|---|
| BCH_SEQ | NUMBER | bch sequence |
| TABLESPACE_ID | NUMBER | tablespace identifier of the page cached in the frame of bch |
| PAGE_ID | NUMBER | page identifier of the page cached in the frame of bch |
| LOGICAL_ADDRESS | VARCHAR(18) | logical address of the frame of bch |
| DIRTY | BOOLEAN | dirty state of the page cached in the frame of bch |
| PGAE_TYPE | VARCHAR(20) | page type of the page cached in the frame of bch |
| FIRST_DIRTY_LSN | NUMBER | first dirty lsn of the page cached in the frame of bch |
| RECOVERY_LSN | NUMBER | recovery lsn of the page cached in the frame of bch |

| | | |
|-----------------------------------|--------------------------------------|---|
| LAST_FLUSHED_LSN | NUMBER | last flushed lsn of the page cached in the frame of bch |
| FIXED_COUNT | NUMBER | fixed count of the page cached in the frame of bch |
| TOUCHED_COUNT | NUMBER | touched count of the page cached in the frame of bch |
| RECENT_TOUCH_COUNT_INCREASED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | timestamp that touch count of the page cached in the frame of bch increased most recently |
| BCH_LIST_TYPE | VARCHAR(16) | list type to which the bch belongs |
| BCH_STATE | VARCHAR(16) | bch state |

Table 5-216 列信息

V\$BUFFER_STAT

V\$BUFFER_STAT显示数据库的buffer statistics.

| 列名称 | 数据类型 | 说明 |
|-----------------------|--------|---|
| BUFFER_POOL_SIZE | NUMBER | total buffer frame size (page count) |
| HASH_BUCKET_COUNT | NUMBER | buffer hash bucket count |
| LRU_LIST_COUNT | NUMBER | buffer lru list count |
| HOT_REGION_PERCENTAGE | NUMBER | percentage of lru hot region |
| HOT_REGION_CRITERIA | NUMBER | touch count criteria of lru hot region |
| CHECKPOINT_LIST_COUNT | NUMBER | buffer checkpoint list count |
| FLUSH_LIST_COUNT | NUMBER | buffer flush list count |
| FREE_LIST_COUNT | NUMBER | buffer free list count |
| FREE_BUFFER_WAIT | NUMBER | total number of waiting for free list |
| READ_COMPLETE_WAIT | NUMBER | total number of waiting for read page complete |
| BUFFER_LOOKUPS | NUMBER | total number of lookups in the buffer for requested pages |
| BUFFER_HIT | NUMBER | total number of hits in the buffer for requested pages |
| BUFFER_MISS | NUMBER | total number of misses in the buffer for requested pages |

| | | |
|-----------------------|--------|--|
| TOTAL_WRITES | NUMBER | total number of physical writes |
| TOTAL_READS | NUMBER | total number of physical reads |
| FLUSH_PER_SECOND | NUMBER | total number of disk writes per one second |
| READ_PER_SECOND | NUMBER | total number of disk reads per one second |
| AVERAGE_WRITE_LATENCY | NUMBER | average latency of disk writes |
| AVERAGE_READ_LATENCY | NUMBER | average latency of disk reads |

Table 5-217 列信息

V\$CLUSTER_DISPATCHER

V\$CLUSTER_DISPATCHER显示集群调度程序信息

Note:

仅限在集群上使用

| 列名称 | 数据类型 | 说明 |
|---------------|---------|--|
| DISPATCHER_ID | NUMBER | dispatcher identifier |
| IS_SYNC | BOOLEAN | whether the dispatcher is sync or not |
| RX_BYTES | NUMBER | total amount of data that has received through the dispatcher |
| TX_BYTES | NUMBER | total amount of data that has transmitted through the dispatcher |
| RX_JOBS | NUMBER | the total number of jobs received |
| TX_JOBS | NUMBER | the total number of jobs transmitted |

Table 5-218 列信息

V\$CLUSTER_LOCATION

V\$CLUSTER_LOCATION显示集群位置信息

Note:

仅限在集群上使用

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|-------------------------------------|
| MEMBER_NAME | VARCHAR(128) | member name |
| HOST | VARCHAR(128) | host name or IP address of a member |
| PORT | NUMBER | host port of a member |

Table 5-219 列信息

V\$CLUSTER_MEMBER

V\$CLUSTER_MEMBER显示集群成员信息

Note:

仅限在集群上使用

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|---|
| MEMBER_ID | NUMBER | member identifier |
| MEMBER_POSITION | NUMBER | member position |
| STATUS | VARCHAR(64) | status of the member: the value in (ACTIVE, INACTIVE) |
| IS_GLOBAL_COORD | BOOLEAN | indicates whether a member is global coordnator (TRUE) or not (FALSE) |
| IS_GROUP_COORD | BOOLEAN | indicates whether a member is group coordnator (TRUE) or not (FALSE) |

Table 5-220 列信息

V\$COLUMNS

V\$COLUMNS对于所有性能视图的每列都有一行（以V\$开头的视图）

在NO_MOUNTMOUNT阶段如下使用gsql命令查询performance view的列信息

```
gSQL> \desc V$INSTANCE

COLUMN_NAME      TYPE                IS_NULLABLE
-----
RELEASE_VERSION  VARCHAR(64)         FALSE
STARTUP_TIME     TIMESTAMP(6) WITHOUT TIME ZONE FALSE
INSTANCE_STATUS  VARCHAR(16)         FALSE
```

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|--|
| TABLE_OWNER | VARCHAR(128) | owner name who owns the performance view |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the performance view |
| TABLE_NAME | VARCHAR(128) | name of the performance view |
| COLUMN_NAME | VARCHAR(128) | column name |
| ORDINAL_POSITION | NUMBER | the ordinal position (> 0) of the column in the performance view |
| DATA_TYPE | VARCHAR(128) | the data type name that a user declared |

| | | |
|----------------|---------------|--|
| DATA_PRECISION | NUMBER | the precision value that a user declared |
| DATA_SCALE | NUMBER | the scale value that a user declared |
| COMMENTS | VARCHAR(1024) | comments of the column |

Table 5-221 列信息

V\$CONTROLFILE

V\$CONTROLFILE显示有关SUNDB控制文件的信息

| 列名称 | 数据类型 | 说明 |
|---------------------|---------------|---|
| STATUS | VARCHAR(16) | control file status (VALID, CORRUPTED) |
| CONTROLFILE_NAME | VARCHAR(1152) | control file name (absolute path) |
| LAST_CHECKPOINT_LSN | NATIVE_BIGINT | the last checkpoint lsn |
| IS_PRIMARY | BOLLEAN | indicates whether the control file is primary |

Table 5-222 列信息

V\$DATAFILE

V\$DATAFILE显示所有数据文件的信息

| 列名称 | 数据类型 | 说明 |
|-----------------------|--------------------------------------|---|
| TBS_NAME | VARCHAR(128) | tablespace name |
| DATAFILE_NAME | VARCHAR(128) | datafile name (absolute path) |
| CHECKPOINT_LSN | NUMBER | LSN at last checkpoint (null if temporary tablespace) |
| CREATION_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | timestamp of the datafile creation |
| FILE_SIZE | NUMBER | datafile size (in bytes) |
| LOADED_CHECKPOINT_LSN | NUMBER | checkpoint LSN of the datafile loaded in memory |
| CORRUPT_PAGE_COUNT | NUMBER | number of corrupt pages in the datafile |

Table 5-223 列信息

V\$DB_CHANGE_TRACKING

V\$DB_CHANGE_TRACKING显示数据库变更跟踪信息

| 列名称 | 数据类型 | 说明 |
|---------------------------|-------------|--|
| TABLESPACE_ID | NUMBER | tablespace identifier |
| DATAFILE_ID | NUMBER | datafile identifier |
| CHANGE_TRACKING_STATE | VARCHAR(32) | state of datafile change tracking |
| CHANGE_TRACKING_CHUNK_SEQ | NUMBER | datafile identifier |
| MAX_SIZE | NUMBER | datafile identifier |
| BITMAP_BLOCK_COUNT | NUMBER | bitmap block count of change tracking chunk |
| LAST_PAGE_SEQ | NUMBER | the last page sequence of change tracking chunk |

Table 5-224 列信息

V\$DB_FILE

V\$DB_FILE显示数据库中使用的所有文件的列表

| 列名称 | 数据类型 | 说明 |
|-----------|---------------|-----------|
| FILE_NAME | VARCHAR(1024) | file name |
| FILE_TYPE | VARCHAR(16) | file type |

Table 5-225 列信息

V\$DB_PROPERTY

V\$DB_PROPERTY显示永久属性列表

| 列名称 | 数据类型 | 说明 |
|----------------|---------------|---|
| PROPERTY_NAME | VARCHAR(128) | name of the property |
| DESCRIPTION | VARCHAR(2048) | description of the property |
| DATA_TYPE | VARCHAR(32) | data type of the property |
| VALUE_UNIT | VARCHAR(32) | unit of the property value: the value in (NONE, BYTE, MS(milisc)) |
| PROPERTY_VALUE | VARCHAR(2048) | property value for the session. otherwise, the instance-wide value |
| MIN_VALUE | NUMBER | minimum value for property. null if type is varchar |
| MAX_VALUE | NUMBER | maximum value for property. null if type is varchar |
| SES_MODIFIABLE | VARCHAR(32) | property can be changed with ALTER SESSION or not: the value in (TRUE, FALSE) |
| SYS_MODIFIABLE | VARCHAR(32) | property can be changed with ALTER SYSTEM and when the change takes effect: the value in (NONE, FALSE, IMMEDIATE, DEFERRED) |
| IS_MODIFIABLE | VARCHAR(32) | property can be changed or not: the value in (TRUE, FALSE) |

| 列名称 | 数据类型 | 说明 |
|---------------|-------------|---|
| IS_DEPRECATED | VARCHAR(32) | whether a property is deprecated or not: the value in (TRUE, FALSE) |
| IS_GLOBAL | VARCHAR(32) | whether a property scope is global or not: the value in (TRUE, FALSE) |

Table 5-226 列信息

V\$DISPATCHER

V\$DISPATCHER显示dispatchers的信息

| 列名称 | 数据类型 | 说明 |
|-----------------------|-------------|--|
| PROCESS_ID | NUMBER | dispatcher process identifier |
| RESPONSE_JOB_COUNT | NUMBER | response job count |
| ACCEPT | NUMBER | indicates whether this dispatcher is accepting new connections |
| START_TIME | NUMBER | process start time |
| CUR_CONNECTIONS | NUMBER | current number of connections |
| CONNECTIONS | NUMBER | total number of connections |
| CONNECTIONS_HIGHWATER | NUMBER | highest number of connections |
| MAX_CONNECTIONS | NUMBER | maximum connections |
| RECV_STATUS | VARCHAR(16) | receive status |
| RECV_BYTES | NUMBER | total bytes of received |
| RECV_UNITS | NUMBER | total units of received |
| RECV_IDLE | NUMBER | total idle time of receive (1/100 second) |
| RECV_BUSY | NUMBER | total busy time of receive (1/100 second) |
| SEND_STATUS | VARCHAR(16) | send status |

| | | |
|------------|--------|--|
| SEND_BYTES | NUMBER | total bytes of sent |
| SEND_UNITS | NUMBER | total units of sent |
| SEND_IDLE | NUMBER | total idle time of send (1/100 second) |
| SEND_BUSY | NUMBER | total busy time of send (1/100 second) |

Table 5-227 列信息

V\$ERROR_CODE

V\$ERROR_CODE显示所有SUNDB错误代码的列表

| 列名称 | 数据类型 | 说明 |
|---------------|---------------|------------------------|
| ERROR_CODE | NUMBER | SUNDB error code |
| SQL_STATE | VARCHAR(32) | standard SQLSTATE code |
| ERROR_MESSAGE | VARCHAR(1024) | error message |

Table 5-228 列信息

V\$GLOBAL_TRANSACTION

V\$GLOBAL_TRANSACTION显示当前活动的全局事务的信息

| 列名称 | 数据类型 | 说明 |
|--------------------|--------------------------------------|--|
| GLOBAL_TRANS_ID | VARCHAR(1024) | global transaction identifier |
| LOCAL_TRANS_ID | NUMBER | local transaction identifier |
| GLOBAL_TRANS_STATE | VARCHAR(32) | state of the global transaction: the value in (NOTR, ACTIVE, IDLE, PREPARED, ROLLBACK_ONLY, HEURISTIC_COMPLETED) |
| ASSO_STATE | VARCHAR(32) | associate state of the global transaction: the value in (NOT_ASSOCIATED, ASSOCIATED, ASSOCIATION_SUSPENDED) |
| START_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | global transaction start time |
| IS_REPREPARABLE | BOOLEAN | indicates whether the global transaction is reparable |

Table 5-229 列信息

V\$INCREMENTAL_BACKUP

V\$INCREMENTAL_BACKUP显示控件文件备份集中的控制文件和数据文件的信息

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------------------------------|--|
| BACKUP_NAME | VARCHAR(1024) | backup file name (absolute path) |
| BACKUP_SCOPE | VARCHAR(128) | incremental backup scope: the value in (database, tablespace, control) |
| INCREMENTAL_LEVEL | NUMBER | incremental backup level: the value in (0, 1, 2, 3, 4) |
| INCREMENTAL_TYPE | VARCHAR(32) | incremental backup type: the value in (DIFFERENTIAL, CUMULATIVE) |
| LSN | NUMBER | all changes up to checkpoint LSN are included in this backup |
| BEGIN_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | incremental backup beginning time |
| COMPLETION_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | incremental backup completion time |

Table 5-230 列信息

V\$INSTANCE

V\$INSTANCE显示当前实例的状态

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------------------------------|--|
| RELEASE_VERSION | VARCHAR(64) | release version |
| STARTUP_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | time when the instance was started |
| INSTANCE_STATUS | VARCHAR(16) | status of the instance: the value in (STARTED, MOUNTED, OPEN) |

Table 5-231 列信息

V\$JOURNALING

V\$JOURNALING 显示日记信息（journaling information）

Note:

仅限在集群上使用

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| TABLE_NAME | VARCHAR(128) | table name |
| SHARD_ID | NUMBER | shard identifier |
| RECORD_COUNT | NUMBER | journalled record count |
| TOTAL_SIZE | NUMBER | total size of journalled records (byte) |

Table 5-232 列信息

V\$KEYWORDS

V\$KEYWORDS显示所有SQL关键字的列表

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| KEYWORD_NAME | VARCHAR(128) | name of keyword |
| KEYWORD_LENGTH | NUMBER | length of the keyword |
| IS_RESERVED | BOOLEAN | indicates whether the keyword cannot be used as an identifier (TRUE) or whether the keyword is not reserved (FALSE) |

Table 5-233 列信息

V\$LATCH

V\$LATCH显示锁信息

| 列名称 | 数据类型 | 说明 |
|-------------------|-------------|---|
| LATCH_DESCRIPTION | VARCHAR(64) | latch description |
| REF_COUNT | NUMBER | reference count |
| SPIN_LOCK | VARCHAR(3) | indicates whether the spin lock is locked (YES) or not (NO) |
| WAIT_COUNT | NUMBER | wait count |
| CURRENT_MODE | VARCHAR(32) | current latch mode: the value in (INITIAL, SHARED, EXCLUSIVE) |

Table 5-234 列信息

V\$LOGFILE

V\$LOGFILE显示所有重做日志成员的信息

| 列名称 | 数据类型 | 说明 |
|-------------|---------------|--|
| GROUP_ID | NUMBER | redo log group identifier |
| FILE_NAME | VARCHAR(1024) | name of the log member |
| GROUP_STATE | VARCHAR(32) | state of the log group: the value in (UNUSED, ACTIVE, CURRENT, INACTIVE) |
| FILE_SEQ | NUMBER | file sequence number of the log member |
| FILE_SIZE | NUMBER | file size of the log member (in bytes) |

Table 5-235 列信息

V\$LOCK_WAIT

V\$LOCK_WAIT列出当前持有的锁和未完成的锁请求

| 列名称 | 数据类型 | 说明 |
|------------------|--------|---|
| GRANT_TRANS_ID | NUMBER | transaction identifier that holds the lock |
| REQUEST_TRANS_ID | NUMBER | transaction identifier that requests the lock |

Table 5-236 列信息

V\$LOCKED_OBJECT

V\$LOCKED_OBJECT显示锁定对象信息

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---------------------------------------|
| LOCK_SLOT_ID | NUMBER | lock slot identifier |
| TABLE_OWNER | VARCHAR(128) | owner name who owns the locked table |
| TABLE_SCHEMA | VARCHAR(128) | schema of the locked table |
| TABLE_NAME | VARCHAR(128) | locked table name |
| LOCK_MODE | VARCHAR(8) | granted lock mode (IS, IX, S, X, SIX) |

Table 5-237 列信息

V\$OPEN_CURSOR

V\$OPEN_CURSOR显示当前每个会话的cursor状态

| 列名称 | 数据类型 | 说明 |
|----------------|-----------------------------------|-------------------------|
| SESSION_ID | NUMBER | ID of the session |
| USER_NAME | VARCHAR(128) | NAME of the user |
| CURSOR_NAME | VARCHAR(128) | NAME of the cursor |
| PSM_CURSOR_ID | NUMBER | ID of the PSM cursor |
| SQL_TEXT | LONG VARCHAR | SQL text for the cursor |
| IS_PSM_CURSOR | BOOLEAN | is PSM cursor |
| IS_OPEN | BOOLEAN | is open |
| OPEN_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | cursor open time |
| LAST_EXEC_TIME | NATIVE_BIGINT | last execution time(us) |
| IS_SENSITIVE | BOOLEAN | is sensitive |
| IS_SCROLLABLE | BOOLEAN | is scrollable |
| IS_HOLDABLE | BOOLEAN | is holdable |
| IS_UPDATABLE | BOOLEAN | is updatable |

Table 5-238 列信息

V\$PLAN_HISTORY

V\$PLAN_HISTORY显示SQL计划的信息

| 列名称 | 数据类型 | 说明 |
|-------------------|-----------------------------------|--|
| DRIVER_MEMBER_POS | NUMBER | driver member position |
| DRIVER_SESSION_ID | NUMBER | driver session identifier |
| SESSION_ID | NUMBER | session identifier |
| STMT_ID | NUMBER | statement identifier in a session |
| CL_STMT_ID | NUMBER | cluster statement identifier in a session |
| DRIVER_CL_STMT_ID | NUMBER | driver cluster statement identifier in a session |
| PLAN_HISTORY_POS | NUMBER | plan history position |
| PLAN_HISTORY_ID | NUMBER | plan history identifier |
| SQL_TEXT | LONG VARCHAR | SQL text for the statement |
| PLAN_TEXT | LONG VARCHAR | plan text for the statement |
| LAST_EXEC_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | statement last execution time |

Table 5-239 列信息

V\$PLAN_HISTORY_LATEST

V\$PLAN_HISTORY_LATEST显示最新的SQL计划的信息

| 列名称 | 数据类型 | 说明 |
|-------------------|-----------------------------------|--|
| DRIVER_MEMBER_POS | NUMBER | driver member position |
| DRIVER_SESSION_ID | NUMBER | driver session identifier |
| SESSION_ID | NUMBER | session identifier |
| STMT_ID | NUMBER | statement identifier in a session |
| CL_STMT_ID | NUMBER | cluster statement identifier in a session |
| DRIVER_CL_STMT_ID | NUMBER | driver cluster statement identifier in a session |
| PLAN_HISTORY_POS | NUMBER | plan history position |
| PLAN_HISTORY_ID | NUMBER | plan history identifier |
| SQL_TEXT | LONG VARCHAR | SQL text for the statement |
| PLAN_TEXT | LONG VARCHAR | plan text for the statement |
| LAST_EXEC_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | statement last execution time |

Table 5-240 列信息

V\$PROCESS_STAT

V\$PROCESS_STAT显示sundb进程统计信息

| 列名称 | 数据类型 | 说明 |
|------------|--------------|--------------------------|
| STAT_NAME | VARCHAR(128) | statistic name |
| PROC_ID | NUMBER | sundb process identifier |
| STAT_VALUE | NUMBER | statistic value |

Table 5-241 列信息

V\$PROCESS_MEM_STAT

V\$PROCESS_MEM_STAT显示sundb进程内存统计信息

| 列名称 | 数据类型 | 说明 |
|------------|--------------|--------------------------|
| STAT_NAME | VARCHAR(128) | statistic name |
| PROC_ID | NUMBER | sundb process identifier |
| STAT_VALUE | NUMBER | statistic value |

Table 5-242 列信息

V\$PROCESS_SQL_STAT

V\$PROCESS_SQL_STAT显示sundb进程SQL统计信息

| 列名称 | 数据类型 | 说明 |
|------------|--------------|--------------------------|
| STAT_NAME | VARCHAR(128) | statistic name |
| PROC_ID | NUMBER | sundb process identifier |
| STAT_VALUE | NUMBER | statistic value |

Table 5-243 列信息

V\$PROPERTY

V\$PROPERTY显示当前会话中所有属性的列表 否则实例范围值

| 列名称 | 数据类型 | 说明 |
|-----------------|---------------|---|
| PROPERTY_NAME | VARCHAR(128) | name of the property |
| DESCRIPTION | VARCHAR(2048) | description of the property |
| DATA_TYPE | VARCHAR(32) | data type of the property |
| STARTUP_PHASE | VARCHAR(32) | modifiable startup-phase: the value IN (NO MOUNT / MOUNT / OPEN & [BELOW ABOVE]) |
| VALUE_UNIT | VARCHAR(32) | unit of the property value: the value in (NONE, BYTE, MS(milisc)) |
| PROPERTY_VALUE | VARCHAR(2048) | property value for the session. otherwise, the instance-wide value |
| PROPERTY_SOURCE | VARCHAR(32) | source of the current property value: the value IN (USER, DEFAULT, ENV_VAR, BINARY_FILE, FILE, SYSTEM) |
| INIT_VALUE | VARCHAR(2048) | property init value for the session |
| INIT_SOURCE | VARCHAR(32) | source of the current property INIT_VALUE: the value IN (USER, DEFAULT, ENV_VAR, BINARY_FILE, FILE, SYSTEM) |

| | | |
|----------------|-------------|---|
| MIN_VALUE | NUMBER | minimum value for property. null if type is varchar |
| MAX_VALUE | NUMBER | maximum value for property. null if type is varchar |
| SES_MODIFIABLE | VARCHAR(32) | property can be changed with ALTER SESSION or not: the value in (TRUE, FALSE) |
| SYS_MODIFIABLE | VARCHAR(32) | property can be changed with ALTER SYSTEM and when the change takes effect: the value in (NONE, FALSE, IMMEDIATE, DEFERRED) |
| IS_MODIFIABLE | VARCHAR(32) | property can be changed or not: the value in (TRUE, FALSE) |
| IS_DEPRECATED | VARCHAR(32) | whether a property is deprecated or not: the value in (TRUEFALSE) |
| IS_GLOBAL | VARCHAR(32) | whether a property is global or not: the value in(TRUR, FALSE) |

Table 5-244 列信息

V\$PROPERTY_ALIAS

V\$PROPERTY_ALIAS显示所有属性别名的列表

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|----------------------------|
| PROPERTY_NAME | VARCHAR(128) | name of the property |
| PROPERTY_ALIAS | VARCHAR(128) | alias name of the property |

Table 5-245 列信息

V\$PSM_RESERVED_WORDS

V\$PSM_RESERVED_WORDS显示所有PSM保留关键字的列表 保留字不能用于变量名或过程名

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|-----------------------|
| KEYWORD_NAME | VARCHAR(128) | name of keyword |
| KEYWORD_LENGTH | NUMBER | length of the keyword |

Table 5-246 列信息

V\$QUEUE

V\$QUEUE显示队列信息

| 列名称 | 数据类型 | 说明 |
|--------|--------------|--|
| TYPE | NUMBER | queue type (COMMON or DISPATCHER) |
| INDEX | NUMBER | index |
| QUEUED | NUMBER | number of items in the queue |
| WAIT | NUMBER | total time that all items in this queue have waited (1/100 second) |
| TOTALQ | VARCHAR(128) | total number of items that have ever been in the queue |

Table 5-247 列信息

V\$RESERVED_WORDS

V\$RESERVED_WORDS显示所有SQL保留关键字的列表保留字不能用于表名或列名

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|-----------------------|
| KEYWORD_NAME | VARCHAR(128) | name of keyword |
| KEYWORD_LENGTH | NUMBER | length of the keyword |

Table 5-248 列信息

V\$SEQUENCE

V\$SEQUENCE显示序列信息

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------|-------------------------------------|
| SEQUENCE_NAME | VARCHAR(128) | sequence name |
| PHYSICAL_ID | NUMBER | sequence physical identifier |
| START_WITH | NUMBER | start with value |
| INCREMENT_BY | NUMBER | increment value |
| MAXVALUE | NUMBER | maximum value |
| MINVALUE | NUMBER | minimum value |
| CACHE_SIZE | NUMBER | cache size |
| LOCAL_NEXT_VALUE | NUMBER | local next value |
| LOCAL_CURR_VALUE | NUMBER | local current value |
| RESTART_VALUE | NUMBER | restart value |
| CYCLE | BOOLEAN | allow cycle |
| USE_LAST_VALUE | BOOLEAN | use last value cache count |
| LOCAL_CACHE_COUNT | NUMBER | current local cache count |
| GLOBAL_NEXT_VALUE | NUMBER | global next cache chunk start value |

| | | |
|-----------------------------|--------------------------------------|--|
| SYNC_COMPARE_SN | NUMBER | serial number for global sequence synchronization |
| GLOBAL_LATCH_SESSION_ID | NUMBER | identifier of the session acquiring the global latch(-1 if the latch is not acquired) |
| GLOBAL_LATCH_SESSION_SERIAL | NUMBER | serial number of the session acquiring the global latch(-1 if the latch is not acquired) |
| DDL_LATCH_SESSION_ID | NUMBER | identifier of the session acquiring the ddl latch(-1 if the latch is not acquired) |
| DDL_LATCH_SESSION_SERIAL | NUMBER | serial number of the session acquiring the ddl latch(-1 if the latch is not acquired) |
| LOCAL_LATCH_SESSION_ID | NUMBER | identifier of the session acquiring the local latch(-1 if the latch is not acquired) |
| LOCAL_LATCH_SESSION_SERIAL | NUMBER | serial number of the session acquiring the local latch(-1 if the latch is not acquired) |
| IS_ONLINE | BOOLEAN | is onlie |
| LAST_SYNC_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | last time the sequence was synchronized |

Table 5-249 列信息

V\$SESSION

V\$SESSION显示每个当前会话的会话信息

| 列名称 | 数据类型 | 说明 |
|-----------------|--------------------------------------|---|
| SESSION_ID | NUMBER | session identifier |
| SERIAL_NO | NUMBER | session serial number |
| TRANS_ID | NUMBER | transaction identifier (-1 if inactive transaction) |
| CONNECTION_TYPE | VARCHAR(32) | connection type: the value in (DA, TCP) |
| USER_NAME | VARCHAR(128) | user name |
| SESSION_STATUS | VARCHAR(32) | status of the session: the value in (CONNECTED, SIGNALED, SNIPED, DEAD) |
| SERVER_TYPE | VARCHAR(32) | server type: the value in (DEDICATED, SHARED) |
| PROCESS_ID | NUMBER | client process identifier |
| LOGON_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | logon time |
| PROGRAM_NAME | VARCHAR(128) | program name |
| CLIENT_ADDRESS | VARCHAR(1024) | client address (null if DA) |
| CLIENT_PORT | NUMBER | client port (0 if DA) |

| 列名称 | 数据类型 | 说明 |
|---------------|-------------|--|
| FAILOVER_TYPE | VARCHAR(13) | indicates whether and to what extent transparent application failover (TAF) is enabled for the session (NONE, SESSION) |
| FAILED_OVER | VARCHAR(3) | indicates whether the session is running in failover mode and failover has occurred (YES) or not (NO) |
| IS_AUDITED | VARCHAR(3) | indicates whether the session is audited (YES) or not (NO) |

Table 5-250 列信息

V\$SESSION_AUDIT

V\$SESSION_AUDIT显示已审计的会话信息

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|--|
| SESSION_ID | NUMBER | session identifier |
| SERIAL_NO | NUMBER | session serial number |
| POLICY_NAME | VARCHAR(128) | active audit policy name |
| WHEN_SUCCESS | VARCHAR(3) | indicates whether the audit policy is enable for auditing successful events or not |
| WHEN_FAILURE | VARCHAR(3) | indicates whether the audit policy is enable for auditing unsuccessful events or not |

Table 5-251 列信息

V\$SESSION_CONNECT_INFO

V\$SESSION_CONNECT_INFO显示当前会话的网络连接信息

| 列名称 | 数据类型 | 说明 |
|----------------|-------------|-----------------------|
| SESSION_ID | NUMBER | session identifier |
| SERIAL_NO | NUMBER | session serial number |
| CLIENT_CHARSET | VARCHAR(40) | client character set |

Table 5-252 列信息

V\$SESSION_EVENT

V\$SESSION_EVENT显示有关会话等待事件的信息

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|--|
| SESSION_ID | NUMBER | ID of the session |
| WAIT_EVENT_ID | NUMBER | Identifier of the wait event |
| WAIT_EVENT_NAME | VARCHAR(64) | Name of the wait event |
| TOTAL_WAITS | NUMBER | Total number of waits for the event |
| TOTAL_TIMEOUTS | NUMBER | Total number of timeouts for the event |
| TIME_WAITED | NUMBER | Total amount of time waited for the event (microsecond) |
| AVERAGE_WAIT | NUMBER | Average amount of time waited for the event (microsecond) |
| MAX_WAIT | NUMBER | Maximum time waited for the event by the session(microsecond) |
| CLASS_NAME | VARCHAR(64) | Name of the class of the wait event |

Table 5-253 列信息

V\$SESSION_STAT

V\$SESSION_STAT显示会话统计信息

| 列名称 | 数据类型 | 说明 |
|------------|--------------|--------------------|
| STAT_NAME | VARCHAR(128) | statistic name |
| SESS_ID | NUMBER | session identifier |
| STAT_VALUE | NUMBER | statistic value |

Table 5-254 列信息

V\$SESSION_MEM_STAT

V\$SESSION_MEM_STAT显示会话内存统计信息

| 列名称 | 数据类型 | 说明 |
|------------|--------------|--------------------|
| STAT_NAME | VARCHAR(128) | statistic name |
| SESS_ID | NUMBER | session identifier |
| STAT_VALUE | NUMBER | statistic value |

Table 5-255 列信息

V\$SESSION_MEM_USAGE

V\$SESSION_MEM_USAGE显示每个会话的会话内存使用率

| 列名称 | 数据类型 | 说明 |
|-----------------|------------|--|
| SESSION_ID | NUMBER | session identifier |
| ALLOCATOER_ID | NUMBER | memory allocator identifier |
| ALLOCATOER_TYPE | VARCHAR(7) | memory allocator type (REGION or DYNAMIC) |
| MEMORY_TYPE | VARCHAR(4) | memory type (HEAP, SHM) |
| TOTAL_SIZE | NUMBER | total memory size |

Table 5-256 列信息

V\$SESSION_SQL_STAT

V\$SESSION_SQL_STAT显示会话SQL统计信息

| 列名称 | 数据类型 | 说明 |
|------------|--------------|--------------------|
| STAT_NAME | VARCHAR(128) | statistic name |
| SESS_ID | NUMBER | session identifier |
| STAT_VALUE | NUMBER | statistic value |

Table 5-257 列信息

V\$SESSION_WAIT

V\$SESSION_WAIT显示每个会话的当前或最后等待时间

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|---|
| SESSION_ID | NUMBER | ID of the session |
| SEQ_NO | NUMBER | Identifier of the wait event |
| WAIT_EVENT_ID | NUMBER | Name of the wait event |
| WAIT_EVENT_NAME | VARCHAR(64) | A number that uniquely identifies the current or last wait (incremented for each wait) |
| P1TEXT | VARCHAR(64) | Description of the first parameter for the wait event |
| P1 | NUMBER | First wait event parameter (in decimal) |
| P1HEX | VARCHAR(32) | First wait event parameter (in hex) |
| P2TEXT | VARCHAR(64) | Description of the second parameter for the wait event |
| P2 | NUMBER | Second wait event parameter (in decimal) |
| P2HEX | VARCHAR(32) | Second wait event parameter (in hex) |
| P3TEXT | VARCHAR(64) | Description of the third parameter for the wait event |

| | | |
|----------------------|-------------|---|
| P3 | NUMBER | Third wait event parameter (in decimal) |
| P3HEX | VARCHAR(32) | Third wait event parameter (in hex) |
| STATE | VARCHAR(64) | Wait state |
| WAIT_TIME | NUMBER | If the session is currently waiting, then the value is time waited for the current wait. If the session is not in a wait, then the value is the duration of the last wait (in microseconds) |
| TIME_SINCE_LAST_WAIT | NUMBER | Time elapsed since the end of the last wait (in microseconds). If the session is currently in a wait, then the value is 0. |
| CLASS_NAME | VARCHAR(64) | Name of the class of the wait event |

Table 5-258 列信息

V\$SHARED_MODE

V\$SHARED_MODE显示共享模式的信息

| 列名称 | 数据类型 | 说明 |
|-------|--------------|-------|
| NAME | VARCHAR(128) | name |
| VALUE | VARCHAR(128) | value |

Table 5-259 列信息

V\$SHARED_SERVER

V\$SHARED_SERVER显示共享服务器的信息

| 列名称 | 数据类型 | 说明 |
|---------------------|--------------|----------------------------------|
| PROCESS_ID | NUMBER | shared server process identifier |
| PROCESSED_JOB_COUNT | NUMBER | processed job count |
| STATUS | VARCHAR(128) | status |
| IDLE | NUMBER | total idle time (1/100 second) |
| BUSY | NUMBER | total busy time (1/100 second) |

Table 5-260 列信息

V\$SHM_SEGMENT

V\$SHM_SEGMENT显示了所有共享内存段的列表

| 列名称 | 数据类型 | 说明 |
|-------------|-------------|---|
| SHM_NAME | VARCHAR(32) | shared memory segment name |
| SHM_ID | NUMBER | shared memory segment identifier |
| SHM_SIZE | NUMBER | shared memory segment size (in bytes) |
| SHM_KEY | NUMBER | shared memory segment key |
| SHM_SEQ | NUMBER | shared memory segment sequence |
| SHM_ADDR | VARCHAR(32) | start address of the shared memory segment |
| LARGE_PAGES | BOOLEAN | indicates whether the shared memory segment use large pages |

Table 5-261 列信息

V\$SPROPERTY

V\$SPROPERTY显示属性列表这是存储一个二进制属性文件

| 列名称 | 数据类型 | 说明 |
|-----------------|---------------|---|
| PROPERTY_NAME | VARCHAR(128) | name of the property |
| DESCRIPTION | VARCHAR(2048) | description of the property |
| DATA_TYPE | VARCHAR(32) | data type of the property |
| STARTUP_PHASE | VARCHAR(32) | modifiable startup-phase: the value IN (NO MOUNT / MOUNT / OPEN & [BELOW ABOVE]) |
| VALUE_UNIT | VARCHAR(32) | unit of the property value: the value in (NONE, BYTE, MS(milisecc)) |
| PROPERTY_VALUE | VARCHAR(2048) | property value stored in the binary property file |
| PROPERTY_SOURCE | VARCHAR(32) | source of the current property value: the value is BINARY_FILE |
| INIT_VALUE | VARCHAR(2048) | property init value for the system |
| INIT_SOURCE | VARCHAR(32) | source of the current property INIT_VALUE: the value IN (USER, DEFAULT, ENV_VAR, BINARY_FILE, FILE, SYSTEM) |
| MIN_VALUE | NUMBER | minimum value for property. null if type is varchar |
| MAX_VALUE | NUMBER | maximum value for property. null if type is varchar |

| | | |
|----------------|-------------|---|
| SES_MODIFIABLE | VARCHAR(32) | property can be changed with ALTER SESSION or not: the value in (TRUE, FALSE) |
| SYS_MODIFIABLE | VARCHAR(32) | property can be changed with ALTER SYSTEM and when the change takes effect: the value in (NONE, FALSE, IMMEDIATE, DEFERRED) |
| IS_MODIFIABLE | VARCHAR(32) | property can be changed or not: the value in (TRUE, FALSE) |

Table 5-262 列信息

V\$SQLFN_METADATA

V\$SQLFN_METADATA包含关于操作符和内置函数的元数据

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| FUNC_NAME | VARCHAR(128) | name of the built-in function |
| MINARGS | NUMBER | minimum number of arguments for the function |
| MAXARGS | NUMBER | maximum number of arguments for the function |
| IS_AGGREGATE | BOOLEAN | indicates whether the function is an aggregate function (TRUE) or not (FALSE) |

Table 5-263 列信息

V\$SQL_CACHE

V\$SQL_CACHE列出共享SQL计划的统计信息

| 列名称 | 数据类型 | 说明 |
|------------------|--------------|--|
| SQL_HANDLE | NUMBER | SQL handle |
| HASH_VALUE | NUMBER | hash value of the SQL statement |
| REF_COUNT | NUMBER | count of prepared statements referencing the statement |
| PLAN_SIZE | NUMBER | the total plan size of the SQL statement (in bytes) |
| CLOCK_ID | NUMBER | clock identifier |
| PLAN_AGE | NUMBER | plan age |
| USER_NAME | VARCHAR(128) | user name |
| BIND_PARAM_COUNT | NUMBER | count of bind parameters |
| SQL_TEXT | LONG VARCHAR | SQL full text |
| PLAN_COUNT | NUMBER | physical plan count of the SQL statement |
| PLAN_ID | NUMBER | plan identifier |

| 列名称 | 数据类型 | 说明 |
|----------------|--------------|---|
| PLAN_SIZE | NUMBER | the total plan size of the SQL statement (in bytes) |
| PLAN_IS_ATOMIC | BOOLEAN | plan is atomic array insert or not |
| PLAN_TEXT | LONG VARCHAR | plan text for SQL statement |

Table 5-264 列信息

V\$SQL_COMMAND

V\$SQL_COMMAND列出每个SQL命令的属性信息

| 列名称 | 数据类型 | 说明 |
|--------------|--------------|---|
| COMMAND | VARCHAR(128) | SQL command |
| FROM_PHASE | VARCHAR(32) | executable from start-up phase |
| UNTIL_PHASE | VARCHAR(32) | executable until start-up phase |
| ACCESS_MODE | VARCHAR(32) | database access mode: values in (NONE, READ & WRITE, READ, READ & LOCK) |
| NEED_FETCH | VARCHAR(32) | the command is a query which has result set and need fetch |
| IS_DDL | VARCHAR(3) | the command is a DDL(Data Defintion Language) or not |
| AUTO_COMMIT | VARCHAR(3) | the command is auto-commit or not |
| IS_CACHEABLE | VARCHAR(3) | the command is plan-cacheable or not |
| AUDIT_ACTION | VARCHAR(128) | auditable action name for the SQL command |

Table 5-265 列信息

V\$SQL_HISTORY

V\$SQL_HISTORY显示SQL的信息

| 列名称 | 数据类型 | 说明 |
|-------------------|-----------------------------------|--|
| DRIVER_MEMBER_POS | NUMBER | driver member position |
| SESSION_ID | NUMBER | session identifier |
| START_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | statement start time |
| EXEC_TIME | NUMBER | execution time(us) |
| PREPARED | BOOLEAN | indicates whether the statement is prepared (YES) or not (NO) |
| SUCCESS | BOOLEAN | indicates whether the statement is success (YES) or not (NO) |
| STATUS | CHARACTER VARYING(16) | status of the statement: the value in (RUNNING, DONE) |
| SQL_TEXT | CHARACTER VARYING(1024) | first 1024 bytes of the SQL text for the statement |

Table 5-266 列信息

V\$STATEMENT

V\$STATEMENT列出所有语句

| 列名称 | 数据类型 | 说明 |
|-----------------|-----------------------------------|--|
| SESSION_ID | NUMBER | session identifier |
| STMT_ID | NUMBER | statement identifier in a session |
| STMT_VIEW_SCN | NUMBER | statement view scn |
| SQL_TEXT | VARCHAR(1024) | first 1024 bytes of the SQL text for the statement |
| START_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | statement start time |
| TOTAL_EXEC_TIME | NATIVE_BIGINT | total execution time(us) |
| LAST_EXEC_TIME | NATIVE_BIGINT | last execution time(us) |
| EXECUTIONS | NATIVE_BIGINT | number of executions |

Table 5-267 列信息

V\$SYSTEM_EVENT

V\$SYSTEM_EVENT显示有关事件总等待的信息

| 列名称 | 数据类型 | 说明 |
|-----------------|-------------|--|
| WAIT_EVENT_ID | NUMBER | Identifier of the wait event |
| WAIT_EVENT_NAME | VARCHAR(64) | Name of the wait event |
| TOTAL_WAITS | NUMBER | Total number of waits for the event |
| TOTAL_TIMEOUTS | NUMBER | Total number of timeouts for the event |
| TIME_WAITED | NUMBER | Total amount of time waited for the event (microsecond) |
| AVERAGE_WAIT | NUMBER | Average amount of time waited for the event (microsecond) |
| CLASS_NAME | VARCHAR(64) | Name of the class of the wait event |

Table 5-268 列信息

V\$SYSTEM_STAT

V\$SYSTEM_STAT 显示系统统计信息

| 列名称 | 数据类型 | 说明 |
|------------|---------------|-----------------|
| STAT_NAME | VARCHAR(128) | statistic name |
| STAT_VALUE | NUMBER | statistic value |
| COMMENTS | VARCHAR(1024) | comments |

Table 5-269 列信息

V\$SYSTEM_MEM_STAT

V\$SYSTEM_MEM_STAT显示系统内存统计信息

| 列名称 | 数据类型 | 说明 |
|------------|---------------|-----------------|
| STAT_NAME | VARCHAR(128) | statistic name |
| STAT_VALUE | NUMBER | statistic value |
| COMMENTS | VARCHAR(1024) | comments |

Table 5-270 列信息

V\$SYSTEM_SQL_STAT

V\$SYSTEM_SQL_STAT显示系统SQL统计信息

| 列名称 | 数据类型 | 说明 |
|------------|---------------|-----------------|
| STAT_NAME | VARCHAR(128) | statistic name |
| STAT_VALUE | NUMBER | statistic value |
| COMMENTS | VARCHAR(1024) | comments |

Table 5-271 列信息

V\$TABLES

V\$TABLES包含所有性能视图的定义（以V\$开头的视图）

| 列名称 | 数据类型 | 说明 |
|---------------|-----------------------------------|---|
| TABLE_OWNER | VARCHAR(128) | owner name who owns the performance view |
| TABLE_SCHEMA | VARCHAR(128) | schema name of the performance view |
| TABLE_NAME | VARCHAR(128) | name of the performance view |
| STARTUP_PHASE | VARCHAR(32) | visible startup phase of the performance view |
| CREATED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | created time of the performance view <ul style="list-style-type: none"> available only in OPEN phase |
| MODIFIED_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | modified time of the performance view <ul style="list-style-type: none"> available only in OPEN phase |
| COMMENTS | VARCHAR(1024) | comments of the performance view <ul style="list-style-type: none"> available only in OPEN phase |

Table 5-272 列信息

V\$TABLESPACE

V\$TABLESPACE显示表空间信息

| 列名称 | 数据类型 | 说明 |
|---------------|--------------|---|
| TBS_NAME | VARCHAR(128) | tablespace name |
| TBS_ID | NUMBER | tablespace identifier |
| TBS_ATTR | VARCHAR(128) | tablespace attribute: the value in (device attribute (MEMORY) temporary attribute (TEMPORARY, PERSISTENT) usage attribute(DICT, UNDO, DATA, TEMPORARY)) |
| IS_LOGGING | BOOLEAN | indicates whether the tablespace is a logging tablespace (YES) or not (NO) |
| IS_ONLINE | BOOLEAN | indicates whether the tablespace is ONLINE (YES) or OFFLINE (NO) |
| OFFLINE_STATE | VARCHAR(32) | indicates whether the tablespace can be taken online normally (CONSISTENT) or not (INCONSISTENT). null if the tablespace is ONLINE |
| EXTENT_SIZE | NUMBER | extent size of the tablespace (in bytes) |
| PAGE_SIZE | NUMBER | page size of the tablespace (in bytes) |

Table 5-273 列信息

V\$TABLESPACE_STAT

V\$TABLESPACE_STAT显示表空间统计信息

| 列名称 | 数据类型 | 说明 |
|---------------------|--------------|--|
| TBS_NAME | VARCHAR(128) | tablespace name |
| TBS_ID | NUMBER | tablespace identifier |
| TOTAL_EXT_COUNT | NUMBER | total extent count of the tablespace |
| USED_META_EXT_COUNT | NUMBER | meta extent count currently used on the tablespace |
| USED_DATA_EXT_COUNT | NUMBER | data extent count currently used on the tablespace |
| FREE_EXT_COUNT | NUMBER | free extent count of the tablespace |
| EXTENT_SIZE | NUMBER | extent size of the tablespace (in bytes) |

Table 5-274 列信息

V\$TRANSACTION

V\$TRANSACTION列出系统中的活动事务

| 列名称 | 数据类型 | 说明 |
|-------------------|-------------|---|
| TRANS_ID | NUMBER | transaction identifier |
| SESSION_ID | NUMBER | session identifier (null if the global transaction is unassociated |
| TRANS_SLOT_ID | NUMBER | transaction slot identifier |
| PHYSICAL_TRANS_ID | NUMBER | physical transaction identifier |
| TRANS_STATE | VARCHAR(32) | transaction state: the value in (ACTIVE, BLOCK, PREPARE, COMMIT, ROLLBACK, IDLE, PRECOMMIT) |
| IS_GLOBAL | BOOLEAN | indicates whether the transaction is global or not |
| TRANS_ATTRIBUTE | VARCHAR(32) | transaction attribute: the value in (READ_ONLY, UPDATABLE, LOCKABLE, UPDATABLE LOCKABLE) |
| ISOLATION_LEVEL | VARCHAR(32) | transaction isolation level: the value in (READ COMMITTED, SERIALIZABLE) |
| TRANS_VIEW_SCN | NUMBER | transaction view scn |
| TCN | NUMBER | transaction change number |
| TRANS_SEQ | NUMBER | transaction sequence number |

| | | |
|-----------------|--------------------------------------|-------------------------|
| START_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | transaction start time |
| UNDO_SEGMENT_ID | NUMBER | undo segment identifier |

Table 5-275 列信息

V\$WAIT_EVENT_CLASS_NAME

V\$WAIT_EVENT_CLASS_NAME显示有关等待事件类的信息

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|--|
| CLASS_ID | NUMBER | Identifier of the class of the wait event |
| NAME | VARCHAR(64) | Name of the class of the wait event |
| DESCRIPTION | VARCHAR(128) | Description of the class of the wait event |

Table 5-276 列信息

V\$WAIT_EVENT_NAME

V\$WAIT_EVENT_NAME显示有关等待事件的信息

| 列名称 | 数据类型 | 说明 |
|-------------|--------------|--|
| CLASS_ID | NUMBER | Identifier of the wait event |
| NAME | VARCHAR(64) | Name of the wait event |
| DESCRIPTION | VARCHAR(128) | Description of the wait event |
| PARAMETER1 | NUMBER | Description of the first parameter for the wait event |
| PARAMETER1 | NUMBER | Description of the second parameter for the wait event |
| PARAMETER1 | NUMBER | Description of the third parameter for the wait event |
| CLASS_ID | NUMBER | Identifier of the class of the wait event |
| CLASS_NAME | VARCHAR(64) | Name of the class of the wait event |

Table 5-277 列信息

V\$XA_TRANSACTION

V\$XA_TRANSACTION显示有关当前活动的XA事务的信息

| 列名称 | 数据类型 | 说明 |
|-------------------|--------------------------------------|--|
| XA_TRANS_ID | VARCHAR(1024) | XA transaction identifier |
| LOCAL_TRANS_ID | NUMBER | local transaction identifier |
| DRIVER_TRANS_ID | NUMBER | driver transaction identifier |
| DRIVER_MEMBER_POS | NUMBER | driver member position |
| XA_TRANS_STATE | VARCHAR(32) | state of the XA transaction: the value in (NOTR, ACTIVE, IDLE, PREPARED, ROLLBACK_ONLY, HEURISTIC_COMPLETED) |
| ASSO_STATE | VARCHAR(32) | associate state of the XA transaction: the value in (NOT_ASSOCIATED, ASSOCIATED, ASSOCIATION_SUSPENDED) |
| START_TIME | TIMESTAMP(6) WITHOUT TIME ZONE | XA transaction start time |
| IS_REPREPARABLE | BOOLEAN | indicates whether the XA transaction is reparable |

Table 5-278 列信息