

有效屏蔽底层故障 AC让您的应用更稳当

--- 实战演练工作坊系列（3）

公益讲座11：00准时开始，请大家先浏览云技术微信公众号技术文章。资料会在各群同步发布，已入群客户请勿重复入群！



20-19

数据库和云讲座群



甲骨文云技术公众号

有效屏蔽底层故障，AC让您的应用更稳当

实战演练工作坊系列(三)

张 灿

Nov 2022

Oracle SE Hub Database Management

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1. Application Continuity 简介
2. 应用场景：计划内维护
3. 如何部署您的应用程序
4. 演示

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- ➡ **1. Application Continuity 简介**
- 2. 应用场景：计划内维护
- 3. 如何部署您的应用程序
- 4. 演示

Application continuity

- 着重于用户体验。
- 发生错误时数据库可重放正在进行中事务，应用不会收到错误。
- 屏蔽硬件，软件，网络，存储，等错误。

6. ▼ Estimated Trip Cost

Flight Total:	1,536.69 AUD
San Francisco, CA - Hotel Total:	1,800.00 USD ±
	1,950.65 AUD

Trip Total: 3,487.35 AUD ±
3,218.00 USD

± Please note that this total is based on available information. The estimated cost may not include taxes and fees.

- Remember to obtain an original invoice for all your expenses where required under the Global Travel Policy. The invoice should always include the name and address of your Oracle company. Failure to obtain a proper invoice may increase Oracle's costs by up to 25%.

Your order number is 175634. You are protected by Application Continuity

[Purchase Trip](#) [Start Over](#)

Application continuity

故障转移解决方案

	TAC	AC	TAF	Draining
<i>I don't know how the application is implemented</i>	Yes	No	No	Yes
<i>My application does transactions</i>	Yes	Yes	No for unplanned Transactional disconnect only	Yes
<i>My application uses Oracle state (temp lobs, PL/SQL, temp tables.)</i>	Yes	Yes No for static mode	No	Yes
<i>My application does not use connection pools</i>	Yes	No	Yes	Yes
<i>My application has side effects (such as file transfers)</i>	Yes Side effects are not replayed	Customizable	No	Yes
<i>My app needs Initial State Restored</i>	Yes and custom	Yes and custom	Yes and custom	Yes
<i>Future proofed for application changes</i>	Yes	No	No	Yes

会话故障转移的
标准解决方案是

如果您使用的是
Application
Database
Continuity

如果使用的是
(TAF) 或者
New

在事务的使昇
且提供良好支持

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1. Application Continuity 简介

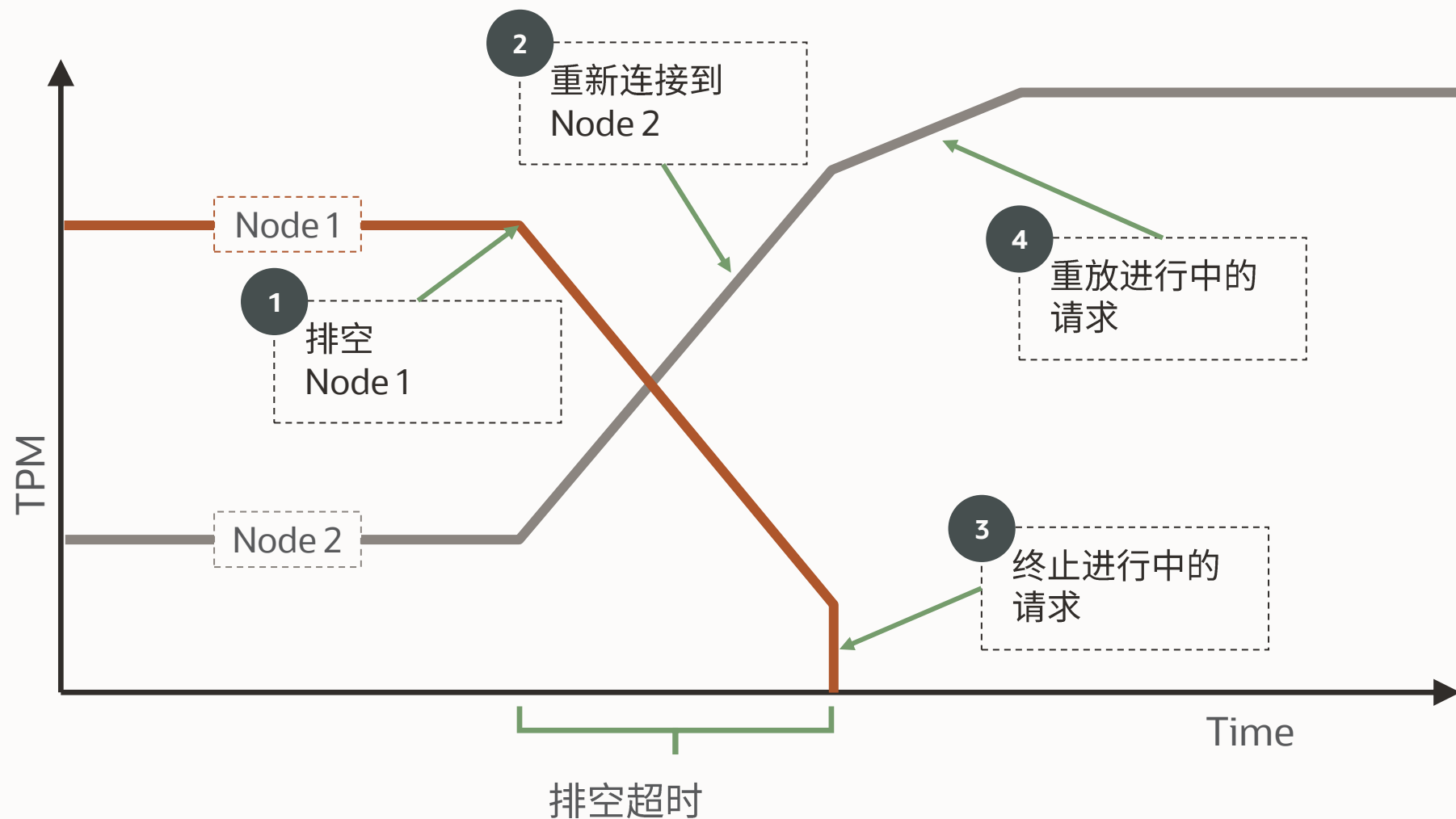
➔ **2. 应用场景：计划内维护**

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计划内维护

排空... 重新连接... 故障转移



- 数据库服务重定位 (relocate)
- 自动的, 用户的工作排空
- 很多阶段可以排空:
 - ✓ 归还连接给连接池
 - ✓ 连接测试
 - ✓ 注销
- 计划的故障转移

计划内维护

DBA commands: Group commands (12.2 and later)

指定数据库/节点/PDB，迁移所有服务

- **srvctl relocate service -database -instance** -drain_timeout.. -stopoption [immediate|transactional]
- **srvctl relocate service -node .** -drain_timeout.. -stopoption
srvctl stop service -pdb . -drain_timeout.. -stopoption

停止单个节点的服务或数据库实例

- **srvctl stop service -node <node_name>** -drain_timeout.. -stopoption
srvctl stop database -node <node_name> -drain_timeout.. -stopoption

Data Guard 切换

- **Switchover** to <db_resource_name> **[wait [xx]]**;

如何实现排空/重新连接/故障转移？

先决条件

- ✓ 实现的基础：正确配置的数据库和集群架构
- ✓ 快速感知数据库相关事件：Fast Application Notification(FAN)
- ✓ 设计良好的应用程序：请求界限（Request Boundaries）
- ✓ 客户端堆栈(driver, pool, or app server)



如何实现排空/重新连接/故障转移？

先决条件

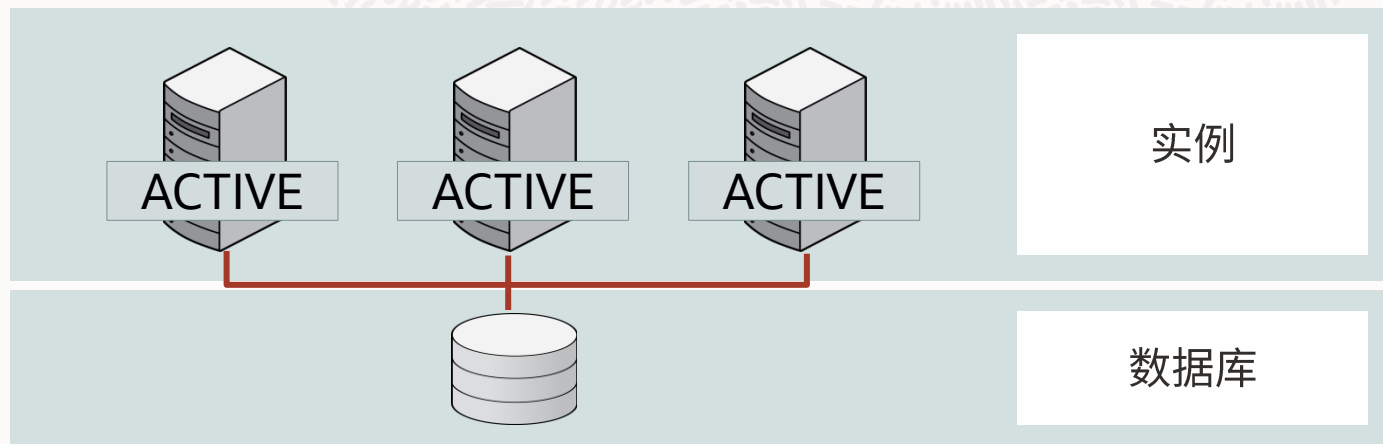
- ➡ ✓ 实现的基础：正确配置的数据库和集群架构
 - ✓ 快速感知数据库相关事件：Fast Application Notification(FAN)
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根据Oracle MAA最佳实践进行配置

数据库层高可用方案

Real Application Cluster (RAC)

- 使用多个实例操作一个数据库的功能
- 所有节点都处于活动状态的共享磁盘类型的群集数据库



Data Guard

- 将主数据库重做日志（Redo）传输到容灾端的备用数据库，然后在备用数据库中应用重做日志以保持数据和主数据库同步。
- 可以切换到备库。

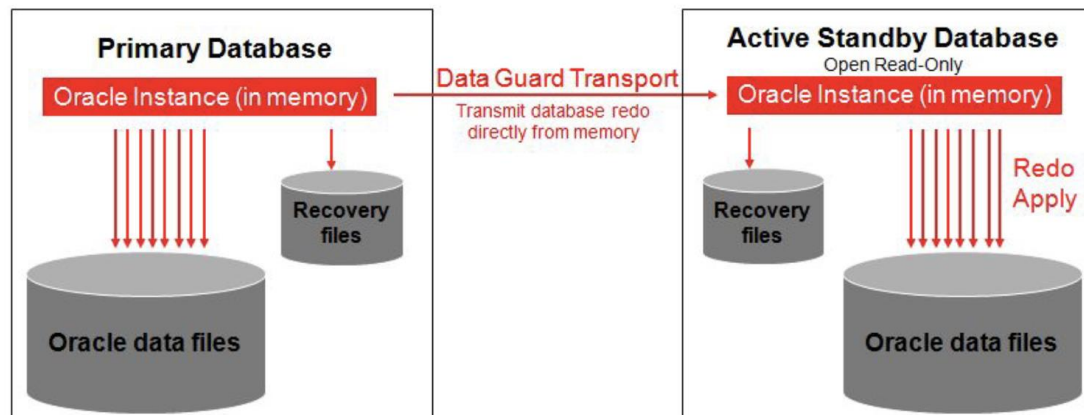


Figure 2: Data Guard/Active Data Guard Architecture



如何实现排空/重新连接/故障转移？

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Fast Application Notification (FAN)

The dead thing cannot tell you it is dead

- ✓ 当数据库、节点和网络发生停机的时候，FAN提供对客户端的立即通知响应。
- ✓ FAN对在故障时解决客户端TCP/IP超时问题至关重要。
- ✓ FAN启动数据库会话的排空，因此客户端在计划维护期间不会出现中断。当资源再次可用时，FAN会立即通知客户端。

All Oracle uses ONS 6200端口

JDBC Universal Connection Pool

OCI/OCCL driver

ODP.NET Unmanaged Provider (OCI)

ODP.NET Managed Provider (C#)

OCI Session Pool

WebLogic Active GridLink

Tuxedo

JDBC Thin Driver **(new 12.2)**

CMAN in Traffic Manager mode (new 18c)

Auto-Configured

```
DESCRIPTION =  
  (CONNECT_TIMEOUT=90)  
    (RETRY_COUNT=20)(RETRY_DELAY=3)  
    (TRANSPORT_CONNECT_TIMEOUT=3)  
  
  (ADDRESS_LIST =  
    (LOAD_BALANCE=on)  
    ( ADDRESS = (PROTOCOL = TCP)  
      (HOST=primary-scan) (PORT=1521)))  
  
  (ADDRESS_LIST =  
    (LOAD_BALANCE=on)  
    ( ADDRESS = (PROTOCOL = TCP) (HOST=scan)(PORT=1521)))  
  
(CONNECT_DATA=(SERVICE_NAME=gold)))
```

ONS Node Set 1

ONS Node Set 2



如何实现排空/重新连接/故障转移？

先决条件

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- ✓ 快速感知数据库相关事件：Fast Application Notification(FAN)
- ➡ ✓ 设计良好的应用程序：请求界限 (**Request Boundaries**)
- ✓ 客户端堆栈(driver, pool, or app server)



新概念: 请求界限 (Request Boundaries)

描绘工作单位

Oracle Pools 12c+, Java Standard (JDK9+), Transparent Application Continuity (TAC)

```
PoolDataSource pds = GetPoolDataSource();
```

```
Connection conn = pds.getConnection();
```

```
PreparedStatement pstmt = ...
```

```
...
```

```
SQL, PL/SQL, local calls,
```

```
...
```

```
conn.commit();
```

```
conn.close();
```

我们如何使用请求?

- 排空 (Draining)
- 负载均衡 (Load Balancing)
- 恢复进行时工作
- 计划的故障转移
- 重置会话状态
- 性能指标
- 防护等级

开始请求

请求正文通常以
COMMIT结尾

结束请求

如何实现排空/重新连接/故障转移？

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- ✓ 设计良好的应用程序：请求界限（Request Boundaries）

➡ ✓ 客户端堆栈(driver, pool, or app server)



Use Oracle Pools with FAN

Full Lifecycle - Drain and Rebalance

应用程序使用...

Oracle – WebLogic Active GridLink, UCP,
ODP.NET managed and unmanaged, OCI
Session Pool, Tuxedo

使用UCP的第三方App Server: IBM WebSphere
and Liberty, Apache Tomcat, NEC WebOTX, Red
Hat WildFly (JBoss), Spring

FPP or srvctl ...

**srvctl [relocate|stop] service -
drain_timeout**

排空会话

Immediately new work is redirected

Gradually idle are drained

**Active sessions are released when
returned to pools**

FAN Planned

**Drain &
rebalance**



UCP与其他基于Java的应用程序服务器

A simple data source replacement

General Properties

✦ Scope
cells:expe-was:nodes:ee001a:servers:ST6AppServerEE001A

✦ Name
Oracle JDBC Driver UCP ST6_QC02P01

Description

Oracle JDBC Driver UCP ST6_QC02P01

Class path

`${WAS_INSTALL_ROOT}/jdbc/ojdbc7.jar`
`${WAS_INSTALL_ROOT}/jdbc/ucp.jar`
`${WAS_INSTALL_ROOT}/jdbc/ons.jar`

Native library path

☐ Isolate this resource provider

✦ Implementation class name

oracle.ucp.jdbc.PoolDataSourceImpl

Apply OK Reset Cancel

Additional Properties

■ [Data sources](#)

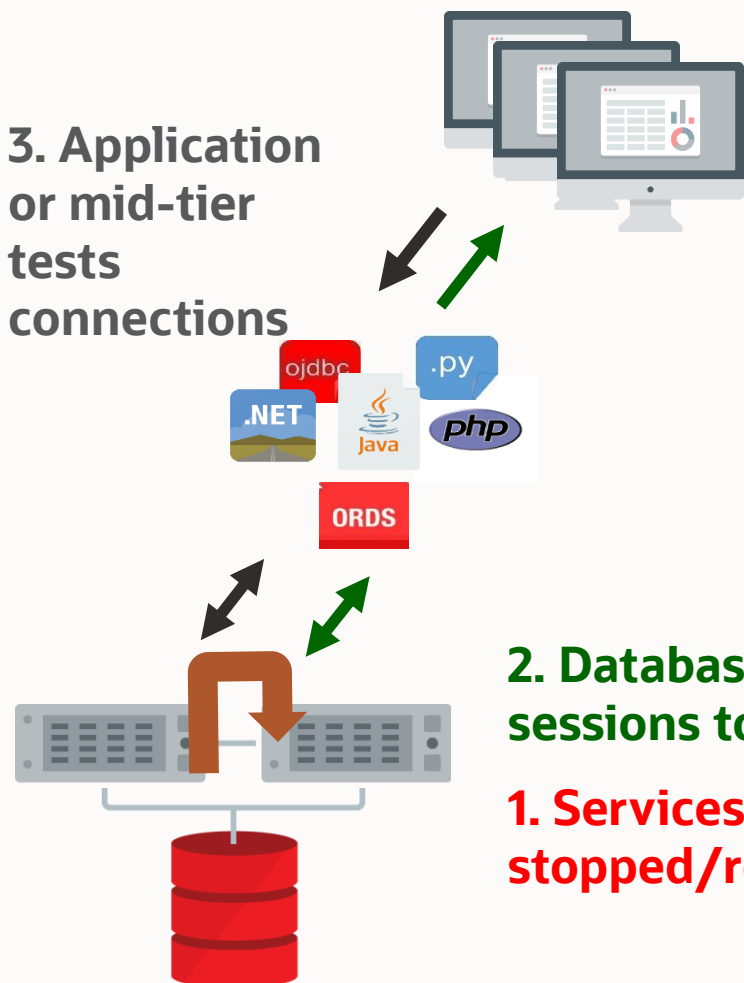
- IBM WebSphere
- IBM Liberty
- Apache Tomcat
- NEC WebOTX
- Red Hat WildFly (JBoss)
- Hibernate
- Spring
- Your own

Class path to be set for UCP JDBC Provider
`${WAS_INSTALL_ROOT}/jdbc/ojdbc7.jar`
`${WAS_INSTALL_ROOT}/jdbc/ucp.jar`
`${WAS_INSTALL_ROOT}/jdbc/ons.jar`

由Oracle Database 来排空

Connection Tests, All Drivers

3. Application or mid-tier tests connections



2. Database marks sessions to drain

1. Services or PDB are stopped/relocated

Plan B

- 应用程序“测试”连接
- 数据库响应连接错误
- 新的工作在另一个新连接上继续

Tip: enable more with
DBMS_APP_CONT_ADMIN
view in
DBA_CONNECTION_TESTS

DBA_CONNECTION_TESTS

Database Side ONLY. CDB, PDB, Service Levels



select connection_test_type, sql_connection_test, enabled from dba_connection_tests;

CONNECTION_TEST	SQL_CONNECTION_TEST	ENABLED	
-----		-----	
SQL_TEST	SELECT 1 FROM DUAL	Y	
SQL_TEST	SELECT COUNT(*) FROM DUAL	Y	
SQL_TEST	SELECT 1		Y
SQL_TEST	BEGIN NULL;END	Y	
PING_TEST	NA	N	
ENDREQUEST_TEST	NA	N	



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部署您的应用程序

1. 为您的工作负载配置数据库端服务(DBA)

- 为特定工作负载创建数据库服务
- 确保连接字符串使用此数据库服务

2. 配置应用程序 – (TAC 无代码更改)

- 使用推荐的连接串
- 使用最新的客户端版本



应用程序开发人员和所有者，以及DBA。

应用程序部署说明

使用服务

使用非默认数据库服务（默认服务与数据库或PDB具有相同的名称）。您创建的服务提供了位置透明性和HA功能。

For example:

Transparent Application Continuity

```
$ srvctl add service -db mydb -service GOLD -preferred inst1,inst2 - failover_restore AUTO -failoverretry 1 -failoverdelay 3 -  
commit_outcome TRUE -failovertype AUTO -replay_init_time 600 -retention 86400 -notification TRUE -drain_timeout 300 -  
stopoption IMMEDIATE
```

Application Continuity

```
$ srvctl add service -db mydb -service SILVER -preferred inst1 -available inst2 -failover_restore LEVEL1 -failoverretry 1 -failoverdelay 3  
- commit_outcome TRUE -failovertype TRANSACTION -replay_init_time 1800 - retention 86400 -notification TRUE -drain_timeout  
300 -stopoption IMMEDIATE
```

Transparent Application Failover

```
$ srvctl add service -db mydb -service BRONZE -preferred inst1 -available inst2 -failover_restore LEVEL1 -failoverretry 1 -failoverdelay  
3 - commit_outcome TRUE -failovertype SELECT -retention 86400 -notification TRUE -drain_timeout 300 -stopoption IMMEDIATE
```

To add with the Data Guard role, here is the TAC example:

```
$ srvctl add service -db mydb -service GOLD -preferred inst1 -available inst2 -failover_restore AUTO -failoverretry 1 -failoverdelay 3 -  
commit_outcome TRUE -failovertype AUTO -replay_init_time 600 -retention 86400 -notification TRUE -drain_timeout 300 -  
stopoption IMMEDIATE
```

应用程序部署说明

使用推荐的连接串

将推荐的连接串与内置的超时，重试和延迟一起使用，以便传入的连接在中断期间不会看到错误。

Use this Connection String for ALL Oracle driver version 12.2 or higher:

Alias (or URL) =

(DESCRIPTION =

(CONNECT_TIMEOUT= 90)(RETRY_COUNT=50)(RETRY_DELAY=3)(TRANSPORT_CONNECT_TIMEOUT=3)

(ADDRESS_LIST =

(LOAD_BALANCE=on)

(ADDRESS = (PROTOCOL = TCP)(HOST=primary-scan)(PORT=1521)))

(ADDRESS_LIST =

(LOAD_BALANCE=on)

(ADDRESS = (PROTOCOL = TCP)(HOST=standby-scan)(PORT=1521)))

(CONNECT_DATA=(SERVICE_NAME = YOUR SERVICE)))

应用程序部署说明

服务例子

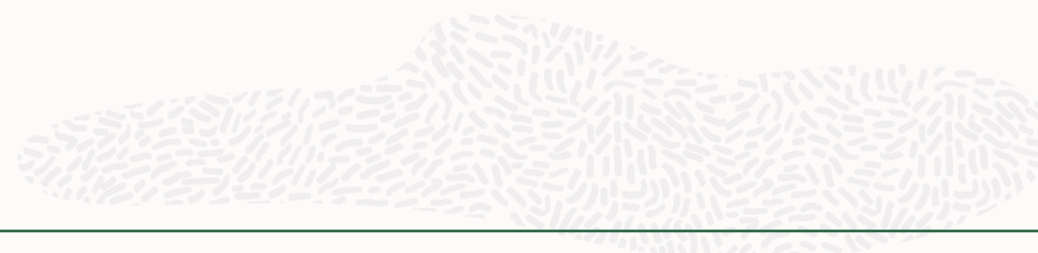


Service Name	Description	Draining	FAN	TAC
TPURGENT	OLTP Highest Priority	Yes	Yes	Yes
TP	OLTP General Priority Recommended to be used as main service	Yes	Yes	Yes
HIGH	Reporting or Batch Highest Priority	Yes	Yes	
MEDIUM	Reporting or Batch	Yes	Yes	



Killing Sessions

Extended



DBA Command	Replays
srvctl stop service -db orcl -instance orcl2 -force	YES
srvctl stop service -db orcl -node rws3 -force	YES
srvctl stop service -db orcl -instance orcl2 -noreplay -force	
srvctl stop service -db orcl -node rws3 -noreplay -force	
alter system kill session ... immediate	YES
alter system kill session ... noreplay	
dbms_service.disconnect_session([service], dbms_service. noreplay)	



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更多资源

Oracle官方AC产品页面 -> <https://www.oracle.com/goto/ac>

进入上面的网页，拉到最下面。

Downloads & Demos & Videos

[Application Continuity Standalone Demo](#)

[Application Continuity with WebLogic Server Integration Demo](#)

[Transaction Guard Feature Video](#)

[Application Continuity Video from Koenig Solutions](#)

[Transaction Guard Video from Koenig Solutions](#)

[Oracle Database Downloads](#)

[Application Continuity Video from Valentin Tabacaru](#)

Technical Articles - Older Releases

[Zero Downtime: Hiding Planned Maintenance and Unplanned Outages from Applications \(PDF\)](#)

[Transparent Application Continuity, New in Oracle Database 18c \(NCOUG Presentation\) \(PDF\)](#)

[Continuous Availability for Oracle Database 12c White Paper \(PDF\)](#)

[Maximum Application Availability with Oracle Database 12c Presentation \(PDF\)](#)

[Maximize Availability with Oracle Database 12c Release 2 White Paper \(PDF\)](#)

[Application Continuity Preparation Checklist for 12c \(PDF\)](#)

[Pythian: Succeeding at Failure - Ensuring 24x7 Availability with Application Continuity](#)

Technical Articles - Current Releases

[Continuous Availability for Applications on ADB Dedicated Technical Brief \(PDF\)](#)

[Continuous Availability for Applications on ADB Shared Technical Brief \(PDF\)](#)

[Transaction Guard with the Oracle Database Technical Brief \(PDF\)](#)

[Transparent High Availability for Your Applications 19c \(PDF\)](#)

[Application Continuity - Application Deployment Guidelines \(PDF\)](#)

[Client Pre-Deployment Questionnaire \(xlsx\)](#)

[Developer Runbook for Application Continuity \(PDF\)](#)

[Fast Application Notification \(FAN\)—Includes fanWatcher: A Utility to Subscribe to ONS and View FAN Events White Paper \(PDF\)](#)

[WebLogic Active GridLink: Intelligent Integration between WebLogic Server and Oracle Database Real Application Clusters White Paper \(PDF\)](#)

Oracle Open World Presentations

[OpenWorld 2018—No Outages! Transparent Application Continuity, with Rain & Hail Crop Insurance \(PDF\)](#)

[OpenWorld 2018—No Outages! Planned Maintenance Without Impact \(PDF\)](#)

[OpenWorld 2017—Hiding Scheduled Maintenance at Epsilon \(PDF\)](#)

[OpenWorld 2017—Improving Application Continuity, with Epsilon \(PDF\)](#)

[OpenWorld 2016—NEC - Hiding Database Maintenance & Outages from Applications \(PDF\)](#)

[OpenWorld 2017—CME - Providing Continuous Application Availability using Oracle Application Continuity \(PDF\)](#)

[OpenWorld 2017 - Latest Innovations and Customer Deployments for Online Planned Maintenance \(PDF\)](#)



ORACLE
甲骨文

Oracle分析平台 新特性及案例分享

数据库与云系列公益讲座

孙宇峰

- 资深解决方案工程师
- 20年+数仓/分析架构规划、设计、咨询、开发经验
- 5年机器学习经验



内容简介

- Oracle Analytics Cloud (OAC) 新特性介绍
- Oracle Analytics Server (OAS) 新特性介绍
- Oracle Analytics机器学习案例分享



直播时间：12月9日 11:00 - 12:00

扫描二维码注册并安装手机Zoom进入直播

Zoom ID: 976 6962 5763 密码: 98039717



数据库和云讲座群

20-19



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技术专家1V1深入交流

