

EPSILON<sup>®</sup>

Real World Experience

Improving Application Continuity at Epsilon

**Gairik Chakraborty**

## Agenda

- Snapshot of Epsilon
- Production Implementation

EPSILON

# Snapshot of Epsilon

# Epsilon at a Glance

- Epsilon is all-encompassing global marketing company, we are global leader in turning data-driven marketing into lasting relationships.
- More than 7000 associates and 70 offices worldwide
- Largest permission-based e-mailer in the world, delivering over 47 billion emails annually
- World’s leading source of data with information covering over 250 million consumers and 273M devices
- More than 2,000 global clients, including 26 of the Fortune 100
  - ▶ 9 out of 10 Top Banks
  - ▶ 8 out of 10 Top Retailers
  - ▶ The Top 10 Pharmaceutical Companies
  - ▶ The Top 10 Automotive Companies




---

<b>Leader</b>	<b>Leader</b>	<b>Leader</b>
Email marketing vendor	Database marketing service provider	Loyalty program service provider

# Epsilon at a Glance

## Marketing Data

Helps Brand to understand customers and connect with them

## Insights and Strategy

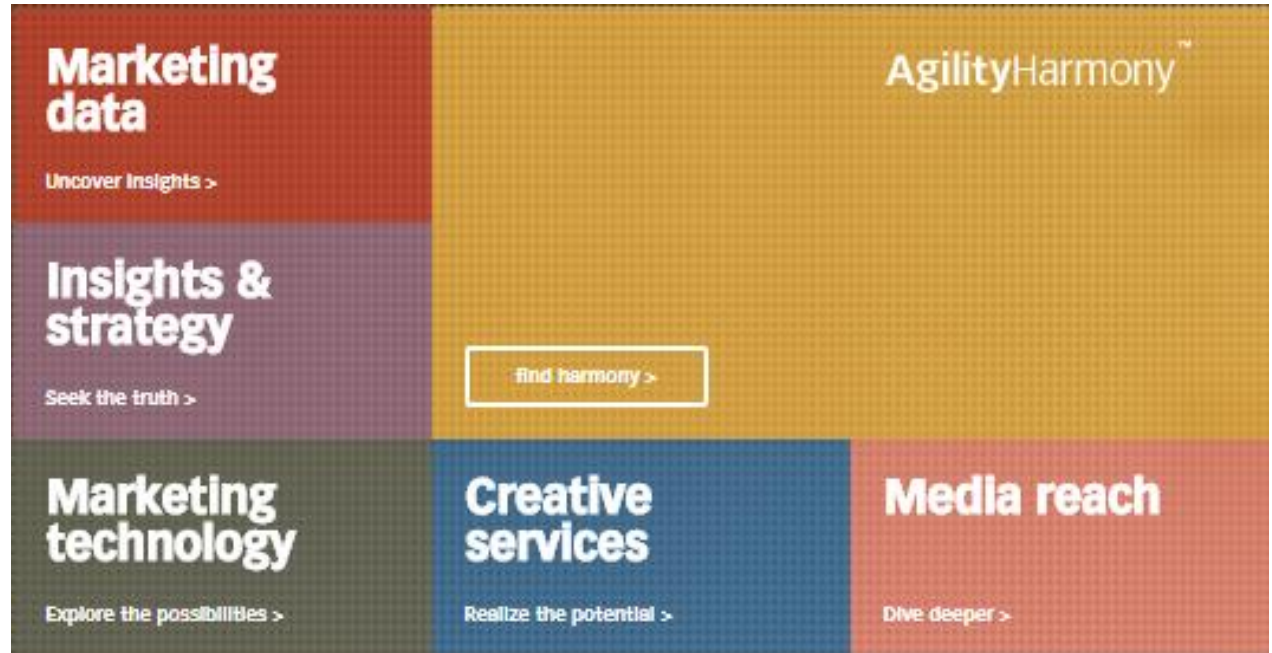
Understand what customers and prospects are doing and thinking. How and when they engage with brands

## Marketing Technology

Technology platforms enables connection between customer and Brands

## Creative Services

Connects customer to brands at emotional level through strategic thinking , creative digital design , art direction



## Agility Harmony

Next generation digital messaging platform developed by marketers for effective multichannel campaigns including e-mail, mobile and social media

## Media reach

Always have right digital or offline presence to deliver targeted messages to potential customers

## About Me

- Senior Director, Database Technology team
- High availability and Engineered Systems implementation for multiple large fortune 100 clients
- Working on Big Data and Cloud deployments for Marketing technology platforms
- Over 15 years of experience working on Oracle technology platform
- OCP and OCE ( DB 12c, RAC and Exadata )

# Improving Application Continuity at Epsilon

# High Level Business Requirements

- Global customer with extreme performance and availability requirements
- Zero downtime requirement for entire application stack
- System needs to be fault tolerant including entire site failure
- Maintenance needs to be performed while system is online
- Real-time monitoring and reporting of system performance and health



# Previous State and Challenges

## Previous State

- Database version 11gR2 RAC 11.2.0.4
- Application was using WLS 12.1.3
- Active Data Guard with reporting workload running from DR site
- Application servers sitting idle on DR site

## Challenges

- Network maintenance in a data center requires application downtime
- Significant investment for DR site, most of the resources stays idle
- No protection for unplanned outages including node failures
- Many manual steps required to switch over application to DR site and process involves downtime
- Customer wanted zero downtime solution

# Current State and Resolutions

## Actions

- Database upgraded to 12c – 12.1.0.2
- Application is now using WLS 12.2.1
- Database hardware platform using Exadata X5-2
- Active / Active Replication between the sites using GoldenGate – version 12.2

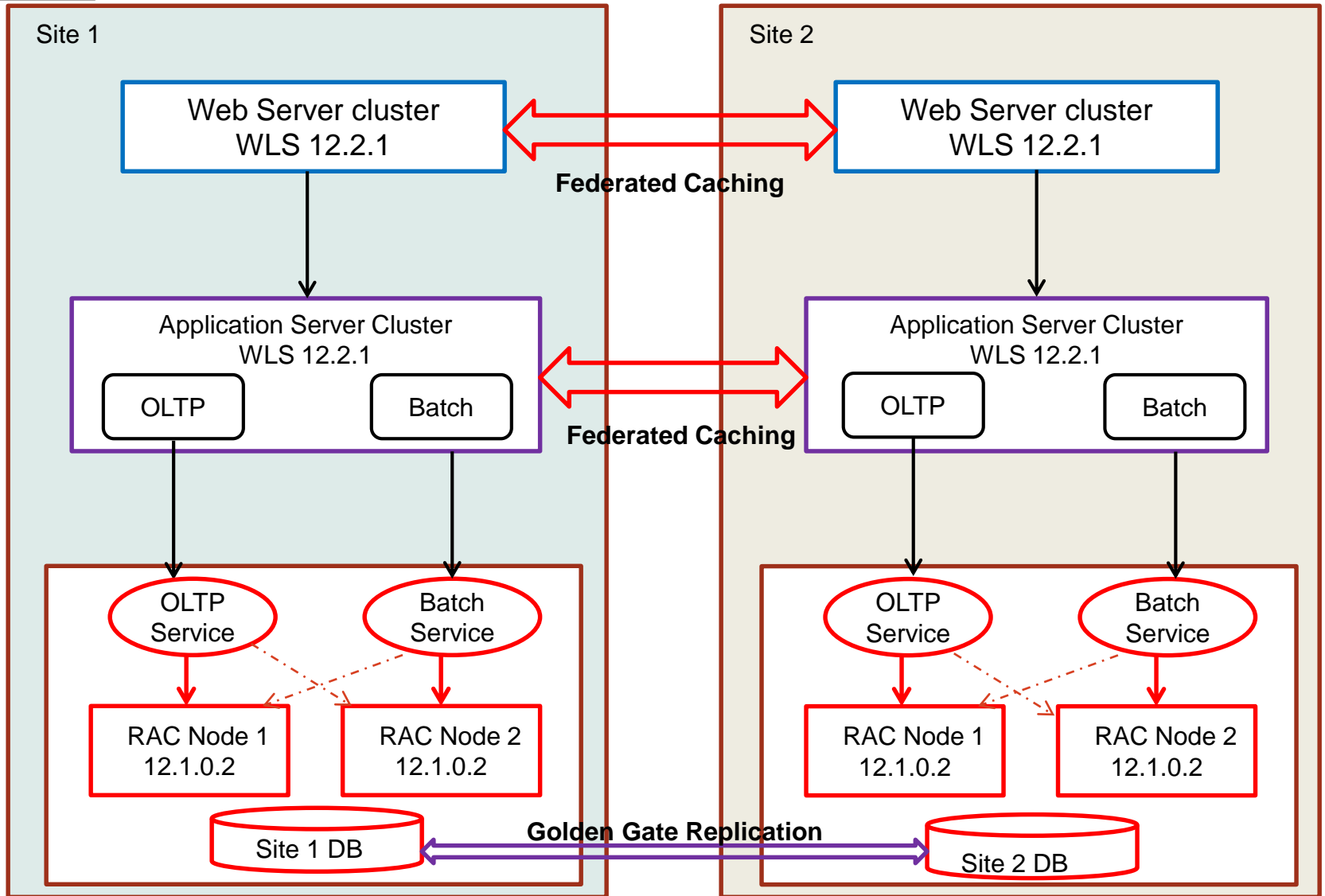
## Outcome

- Connection pool drains quickly after receiving FAN events
- **No longer application server restart** required for planned maintenance or unplanned outage of Oracle stack
- **Application Continuity replays** transactions during unplanned outage – which would have failed otherwise .  
**No impact to user experience**
- WLS coherence federated caching feature helps to replicate cached data across multiple data center and keeps application server in sync
- GoldenGate replication keeps databases in sync at both data centers
- Moved to a supported release good till 2018

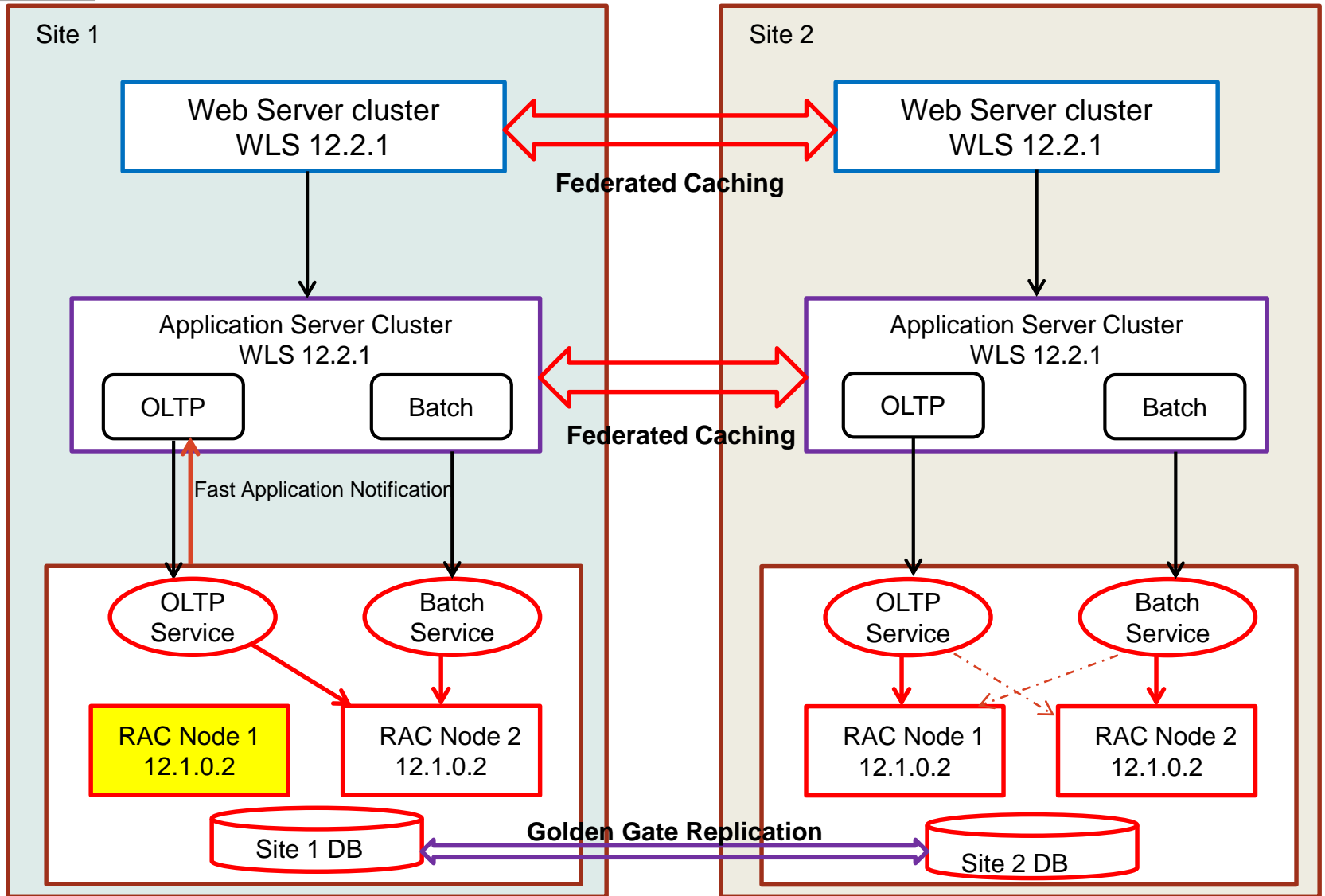
# Technology Stack

- Exadata X5-2 Primary and DR site
- Application servers use :
  - WebLogic Server 12.2.1 with Active Gridlink
  - Federated Coherence caching
- Oracle Database 12c (12.1.0.2)
  - Real Application Clusters (RAC)
  - Active Data Guard
  - Fast Application Notification (FAN)
  - Application Continuity (AC)
  - Transaction Guard (TG)
- Oracle GoldenGate ( 12.2 ) for active - active replication

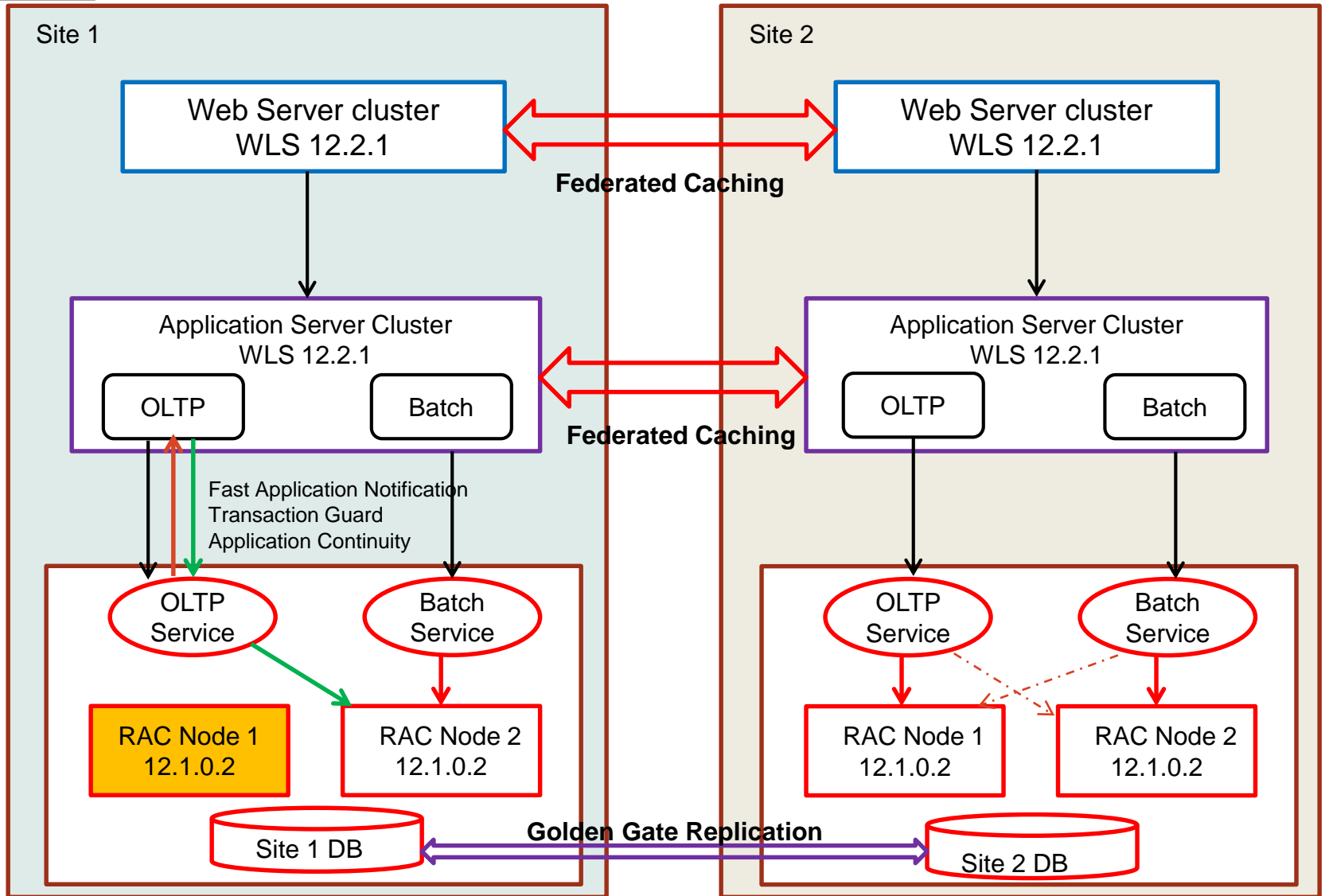
# Normal Operation : Application Service Placement



# Scheduled Maintenance: Application Service Placement



# Unplanned Outage: Application Service Placement



# Application Continuity Assessment

## 1. Clean up Concrete Classes

### Oracle Application Continuity Assessment Report

System Health Score is 99 out of 100 [\(detail\)](#)

#### Summary

OS/Kernel Version	LINUX X86-64 OELRHEL 6 2.6.32-504.23.4.el6.x86_64
Number of nodes	1
Hostnames	1
orachk Version	12.1.0.2.6_20160207
Collection	orachk_dc1uc...web01_032316_122036.zip
Duration	17 seconds
Executed by	appweb
Arguments	-asmhome ../asm/asm-5.1/lib/all/asm-all-5.1.jar -javahome /app01/java/jdk1.8.0_72 -appjar /app01/.../weblogic_domains/gr_web_domain/servers/web01/tmp/_WL_user/p10-.../gr-web-devenv-ant-3-16
Collection Date	23-Mar-2016 12:20:42



# Concrete class check - results

## Application Continuity Summary

Outage Type	Status	Message
Concrete class checks		Total : 28092 Passed : 28089 Warning : 0 Failed : 3 (Failed check count is one per file)
	FAILED	[com/epsilon/ci/cr/dao/model/MegaMenuContentHtmlData][[Field] name=htmlClob, desc=Loracle/sql/CLOB;, lineno=unknown]
	FAILED	[com/epsilon/ci/cr/dao/model/MegaMenuContentHtmlData][[Method] name=getHtmlClob, desc=()Loracle/sql/CLOB;, lineno=73]
	FAILED	[com/epsilon/ci/cr/dao/model/MegaMenuContentHtmlData][[Method] name=setHtmlClob, desc=(Loracle/sql/CLOB;)V, lineno=78]
	FAILED	[com/epsilon/ci/cr/dao/model/MegaMenuContentHtmlData][[Field] name=htmlClob, desc=Loracle/sql/CLOB;, lineno=unknown]
	FAILED	[com/epsilon/ci/cr/dao/model/MegaMenuContentHtmlData][[Method] name=getHtmlClob, desc=()Loracle/sql/CLOB;, lineno=73]
	FAILED	[com/epsilon/ci/cr/dao/model/MegaMenuContentHtmlData][[Method] name=setHtmlClob, desc=(Loracle/sql/CLOB;)V, lineno=78]
	FAILED	[com/epsilon/ci/cr/dao/model/MegaMenuContentData][[Field] name=megamenuHtmlTemplate, desc=Loracle/sql/CLOB;, lineno=unknown]
	FAILED	[com/epsilon/ci/cr/dao/model/MegaMenuContentData][[Method] name=getMegamenuHtmlTemplate, desc=()Loracle/sql/CLOB;, lineno=23]
	FAILED	[com/epsilon/ci/cr/dao/model/MegaMenuContentData][[Method] name=setMegamenuHtmlTemplate, desc=(Loracle/sql/CLOB;)V, lineno=26]



## Action Item

- Oracle recommends to replace concrete classes with new interfaces

Old types	New interfaces
oracle.sql.ARRAY	oracle.jdbc.OracleArray
oracle.sql.STRUCT	oracle.jdbc.OracleStruct
oracle.sql.CLOB	oracle.jdbc.OracleClob
oracle.sql.BLOB	oracle.jdbc.OracleBlob
oracle.sql.REF	oracle.jdbc.OracleRef
oracle.sql.OPAQUE	oracle.jdbc.OracleOpaque
oracle.sql.Nclob	java.sql.NClob
oracle.sql.BFILE	oracle.jdbc.OracleBfile

- Refer My Oracle support note 1364193.1 for more details

# Application Continuity Assessment

## 2. Coverage Analysis - results

### Application Continuity Summary

...

Outage Type	Status	Message
Coverage checks		TotalRequest = 398 PASS = 389 WARNING = 0 FAIL = 9
	FAIL	[FAIL] Trace file name = Q01 SP1_ora_33017.trc Row number = 4006 SERVICE NAME = (Q01 SP_WEB_SSL_SERVICE. !US.QA) MODULE NAME = (JDBC Thin Client) ACTION NAME = null CLIENT ID = null Coverage(%) = 20 ProtectedCalls = 1 UnProtectedCalls = 4
	FAIL	[FAIL] Trace file name = Q01 SP1_ora_83837.trc Row number = 32339 SERVICE NAME = (Q01 SP_WEB_SSL_SERVICE. !US.QA) MODULE NAME = (JDBC Thin Client) ACTION NAME = null CLIENT ID = null Coverage(%) = 20 ProtectedCalls = 1 UnProtectedCalls = 4

## Database side configuration

```
D1[REDACTED]RUS1 > srvctl config service -d d01[REDACTED]sp -s d01[REDACTED]sp_web_ssl_service.[REDACTED]rus.qa
Service name: D01[REDACTED]SP_WEB_SSL_SERVICE.[REDACTED]RUS.QA
Server pool:
Cardinality: 2
Disconnect: false
Service role: PRIMARY
Management policy: AUTOMATIC
DTP transaction: false
AQ HA notifications: true
Global: false
Commit Outcome: true
Failover type: TRANSACTION
Failover method: BASIC
TAF failover retries: 10
TAF failover delay: 3
Connection Load Balancing Goal: LONG
Runtime Load Balancing Goal: SERVICE_TIME
TAF policy specification: BASIC
Edition:
Pluggable database name:
Maximum lag time: ANY
SQL Translation Profile:
Retention: 86400 seconds
Replay Initiation Time: 300 seconds
Session State Consistency: DYNAMIC
GSM Flags: 0
Service is enabled
Preferred instances: D01[REDACTED]SP1,D01[REDACTED]SP2
Available instances:
```

1. Enables Transaction Guard
2. Enables application Continuity

## Special Considerations

- Need to think about sequences , sysdate , systimestamp , SYS\_GUID usage in application.
- If original values are not preserved , replay will be rejected

```
GRANT [KEEP DATE TIME | KEEP SYSGUID].. [to USER]  
GRANT KEEP SEQUENCE.. [to USER] on [sequence object];  
ALTER SEQUENCE.. [sequence object] [KEEP|NOKEEP];
```

- Kill session while Application Continuity is enabled at service level should use noreplay clause:

```
alter system kill session 'sid, serial#, @inst' noreplay;  
alter system disconnect session 'sid, serial#, @inst' noreplay;
```

## Oracle JDBC replay Driver

- At WebLogic Server choose Application Continuity enabled JDBC data source

---

What database type would you like to select?

**Database Type:** Oracle

---

What database driver would you like to use to create database connections? Note: \* indicates that the driver is explicitly supported by Oracle WebLogic Server.

**Database Driver:** \*Oracle's Driver (Thin) for GridLink Application Continuity Connections; Versions:Any

# Application Continuity tracing

- **RDBMS**

```
alter system set event='10602 trace name context forever, level  
28:trace[progint_appcont_rdbms]:10702 trace name context forever, level  
16' scope = spfile ;
```

- **Web Logic Server**

```
-Dweblogic.debug.DebugJDBCReplay=true
```

- **JDBC driver**

```
-Djava.util.logging.config.file=configfile  
-Doracle.jdbc.Trace=true
```

Reference :

[https://docs.oracle.com/middleware/1221/wls/JDBCA/ds\\_oracledriver.htm#JDBCA787](https://docs.oracle.com/middleware/1221/wls/JDBCA/ds_oracledriver.htm#JDBCA787)

## Lessons learned

- Use JDBC statement cache instead of WebLogic statement cache
- Auto commit needs to be disabled in 12.1.0.2 RDBMS  
DefaultAutocommit=false in Gridlink properties (12.1 only)

[https://docs.oracle.com/middleware/1221/wls/JDBCA/ds\\_oracledriver.htm#JDBCA608](https://docs.oracle.com/middleware/1221/wls/JDBCA/ds_oracledriver.htm#JDBCA608)

- For Application Continuity assessments, refer following :  
[https://blogs.oracle.com/WebLogicServer/entry/using\\_orachk\\_to\\_clean\\_up](https://blogs.oracle.com/WebLogicServer/entry/using_orachk_to_clean_up)

[https://blogs.oracle.com/WebLogicServer/entry/using\\_orachk\\_for\\_coverage\\_analysis](https://blogs.oracle.com/WebLogicServer/entry/using_orachk_for_coverage_analysis)

## Business Benefits

- Scheduled maintenance ( Database and OS patching ) of Oracle technology stack can be done without disrupting business user experience. ( meet security compliance as well as uptime SLA )
- Application restart is no longer required after planned maintenance or unplanned outages.
- No application call failure even in case of unplanned outage improves user experience
- Using Oracle technologies - Real Application Clusters on Exadata -Fast Application Notification Transaction Guard , Application Continuity, Golden Gate and Web logic Server coherence caching, Epsilon is able to deploy zero downtime solution across multiple sites.



## Next Steps

- Use Application Continuity for ODP.NET to hide unplanned outages without any application code change
- Implementation of zero downtime solution for long running batch workload

EPSILON

# Q&A?

