

A line of red combine harvesters is shown working in a golden field, moving from the foreground towards the background. The sky is blue with some light clouds. The overall scene is a typical agricultural landscape during harvest time.

Road to Application Continuity

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Agenda

- Who we are
- Business objectives
- Implementation steps
- Application Continuity at Work
- Tips and Tricks – Not to Miss
- Conclusion



**Service and
Technology**
that **Serve
You**

Who we are



**Service and
Technology**
that **Serve
You**

- Subsidiary of Chubb and support the agribusiness line of business
- Chubb is the world's largest publicly traded P&C insurance company and the largest commercial insurer in the U.S.
- We provide commercial and personal property and casualty insurance, personal accident and supplemental health insurance, reinsurance and life insurance to a diverse group of clients.
- operations in 54 countries and territories

Our Oracle Journey

- Oracle Customer for more than 20 years
- Started with Oracle OPS on OpenVMS - 1995
- Migration to 9i RAC with Veritas-Cluster on Solaris - 2008
 - Introduction of select failover with JDBC OCI and TAF, for unplanned outages
- Migration to 11g RAC on OEL UEK Intel - 2013
 - Introduced OID for TNS lookup
- Database Upgrade to 12.1 - 2017
- Java is our main development language for Oracle since 1999

Business objectives

- Upgrade the clients to avoid extended license fees
- Increase return on investment for software license – App Continuity is incl. with RAC
- Support data types that our Applications need
- Recover transactions, which are our business

Client Decision Matrix

Client/ HA Features	JDBC OCI 12.1		JDBC THIN 12.1	
	UCP	3 rd party pool	UCP	3 rd party pool
Pool	UCP	3 rd party pool	UCP	3 rd party pool
TAF	No LOB Types	No LOB Types	x	x
FCF/FAN	No FCF	No FCF	✓	No FCF
Transaction Idempotence	x	x	✓	*
Application Continuity	x	x	✓	*

> **JDBC-THIN with UCP and AC gives best return on investment**

Easy Implementation Steps for Application Continuity - Application

1. Use Oracle Pool
2. Basic principle must apply
 - When a request is completed, return the connection
3. Check and remove deprecated JAVA classes (prior 18c)
 - deprecated oracle.sql concrete classes like BLOB, CLOB, BFILE, OPAQUE, ARRAY, STRUCT or ORADATA (we only had a couple)

Easy Implementation Steps for Application Continuity - Application Server

- Configure FAN and FCF with ONS
 - Starting from UCP 12.2 enabled by default
- depending on your Application needs, set autoCommit to false through connection properties
 - `connectionProperties=" autoCommit=false "`
- Use Recommended TNS Format for High Availability to Autoconfigure FAN
 - `(CONNECT_TIMEOUT=120) (RETRY_COUNT=20) (RETRY_DELAY=3) (TRANSPORT_CONNECT_TIMEOUT=3)`
 - When Data Guard in use, add `address_list` for Data Guard
 - `tnsnames.ora` with JDBC-Thin, use `oracle.net.tns_admin`
- Pool timeout settings
 - `connectionWaitTimeout` needs to be higher than `Connect_Timeout` !

Easy Implementation Steps for Application Continuity - RAC-Database

- Fast Application Notification
 - Out of the box configured starting from Version 12.1, when using recommended TNS
- SCAN-Listener
 - Needed on RAC for providing continuous Connectivity
- Standardize on database services that support Application Continuity
- Set FAST_START_MTTR_TARGET to meet Recovery Time Objective
- Grants for mutable objects
 - Sysguid, Systimestamp/Sysdate, Sequences

Easy Implementation Steps for Application Continuity - Configuration

Initial Configuration

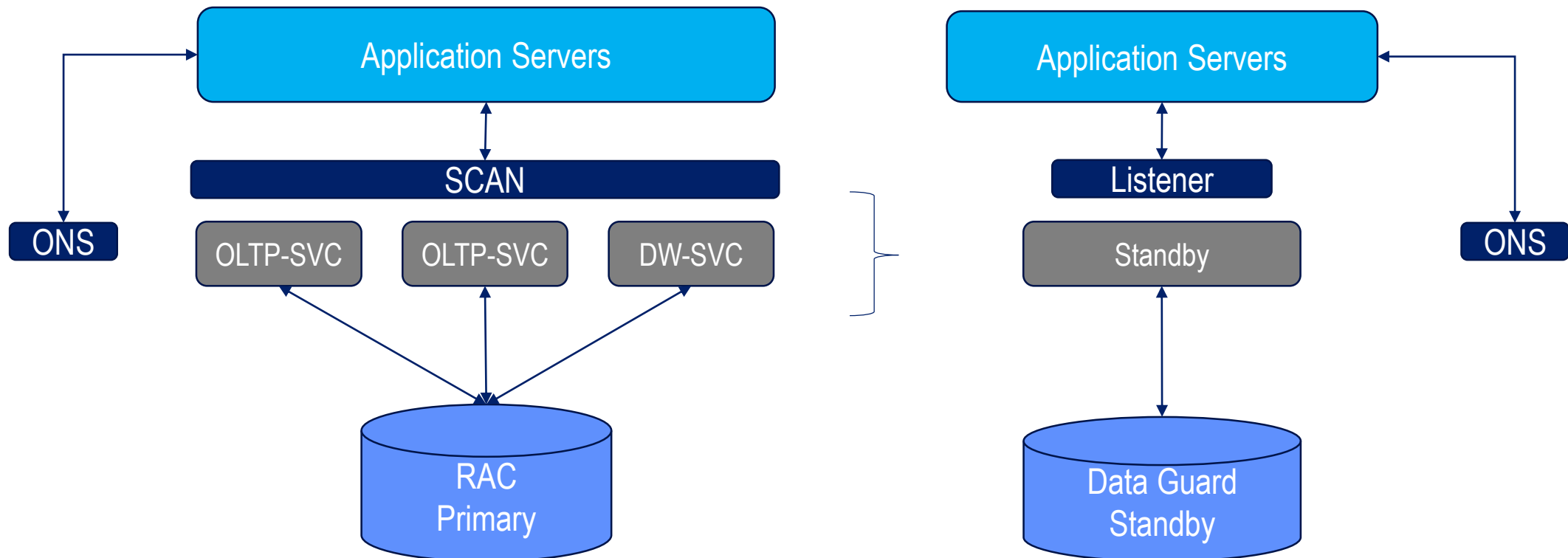
- Database 12c Version 12.1.0.2
- Client 11g Version 11.2.0.4
 - Instant Client JDBC OCI
- Tomcat
 - dbcp Pool
 - Default autocommit true
- JAVA 1.8.0 102

Final Configuration

- Database 12c Version 12.1.0.2
- Client 12c Version 12.2.0.1
 - JDBC THIN
- Tomcat
 - UCP Pool (FAN,FCF)
 - Autocommit false
- JAVA 1.8.0 102

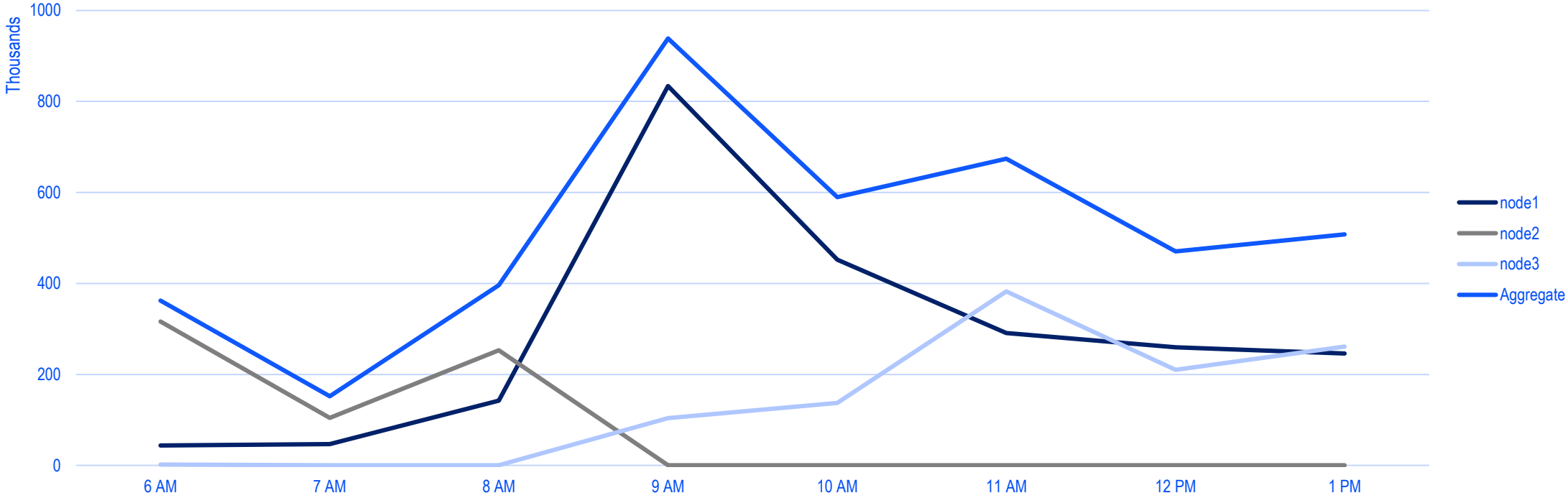
Easy Implementation Steps for Application Continuity - Architecture

400 Application Servers per site
Database schema per crop year
18 Database services



AC at Work - Unplanned outage

AWR - User Commits per RAC-Node



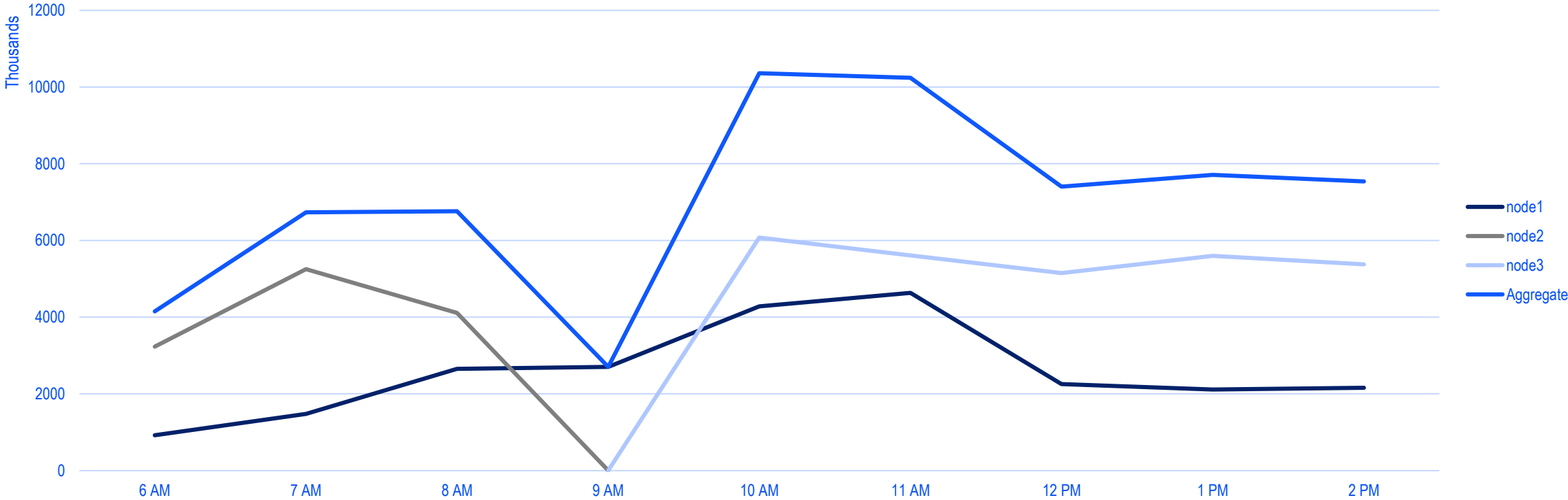
Unplanned outage of Node2.



Chart is based on hourly AWR Snapshot

AC at Work - Unplanned Outage

AWR - User Calls per node for one OLTP - Service



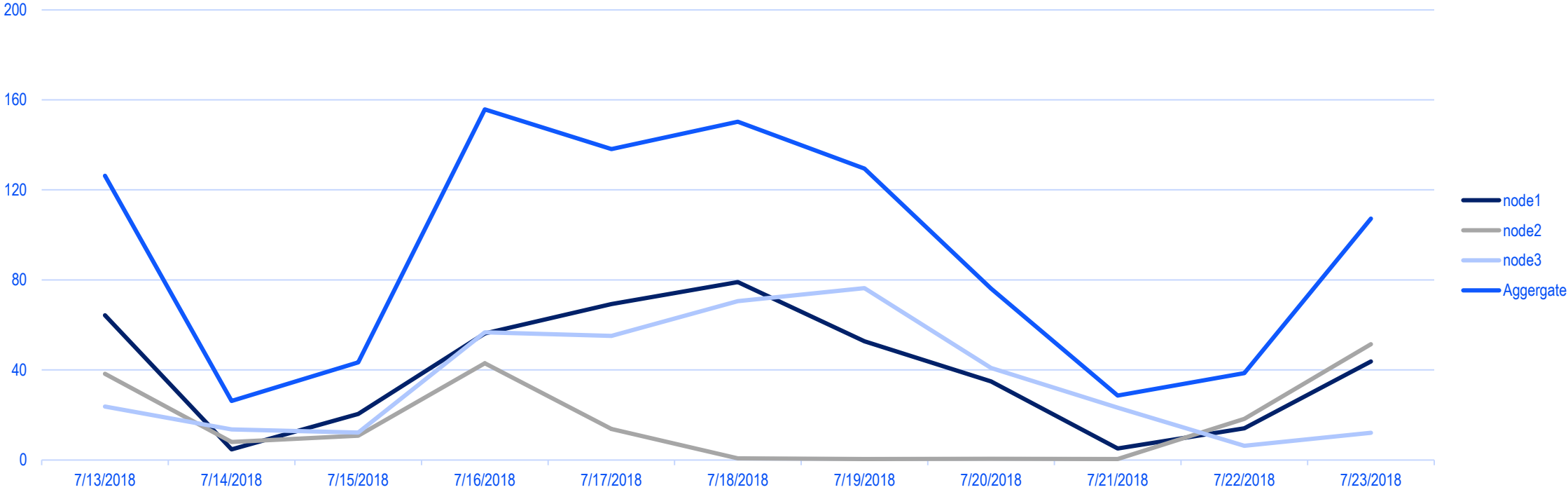
Unplanned outage of Node2

Chart is based on hourly AWR Snapshot

AC at Work - Planned maintenance

AWR - User Transactions per Sec across all DB Services

Chart is based on hourly AWR Snapshot



Tips and Tricks



- Configure timeouts correctly
- Recovery Point Objective of SLA
- Timeouts and settings that need to be verified
 - Cluster (CSS_MISSCOUNT = 30)
 - Database (FAST_START_MTTR_TARGET = 30)
 - TNS Connect Timeout = 120
 - UCP Connection Wait Timeout = 130
 - Service Replay Initiation Timeout = 300
- Fast Sync for Data Guard (MAA / 12c)
 - Add FAST_START_FAILOVER of Data Guard and configure Observer
- UCP Connection Wait Timeout for getting a connection needs to be higher as the TNS Connect_Timeout, otherwise the pool can cancel reconnect requests too early during reconnect



Tips and Tricks I



Application

UCP ConnectionWaitTimeout

TNS Connect Timeout

SCAN

FSFO

SCAN

DB-Service

DB-Service

DB-Service

Node1

Node2

Standby

CSS_Misscount

RAC Primary
FAST_START_MTTR_TARGET

Data Guard
FAST_START_MTTR_TARGET



Tips and Tricks II

- Set v\$session.Program through Pool Settings
 - This in turn, sets the v\$session.MODULE which provides granular information in ASH and other v\$ views
- Add own versioning file, that includes applied patches, into the jar
 - The versioning file helps to identify which version is in use
- Starting with 12c JDBC Thin, the date includes as well the time
 - oracle.jdbc.DateZeroTime=true to keep previous behavior
- Application Continuity Memory Management
 - Apply patch for Bug 28538380



Tips and Tricks II

- Batch Application
 - Apps that did 64k individual inserts as one transaction!
 - A maximum of Round trips between Client and Database per Request of 65536
 - Moved to addBatch JAVA function and it used just one round trip
- Multiple transactions in same request
 - 12.1 is for OLTP, replay is disabled after the 1st commit
 - Multiple commits supported with AC static mode in 12.2 or with TAC in 18c (preferred)
- Use 'order by' on queries (same as TAF) as a good practice
- AC checklist on oracle.com/goto/ac

Our Oracle Journey Continues

- Achievements
 - Client upgrade to 12.2
 - Introduction of Application Continuity for unplanned Outages
 - Ability to perform planned maintenance 24x7
 - Centralized tnsnames.ora
- What's Next
 - Implement Active Data Guard with FAST SYNC
 - Upgrade to 18c database

Conclusions

- Easy and straightforward Implementation
- Test often, test regularly, test thoroughly

“Being an Insurance Company, Application Continuity provides us the coverage that we need for our business.”