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Reinventing Upgrades, Platform Changes, RAC and More with Database Replay

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Outline


- Database Replay – Motivation
- Database Replay – How it works?
- Usage scenarios and recommended testing methodology
 - 10.2 → 11g Database upgrade
 - RAC related testing
 - Platform migration
- Enterprise Manager Grid Control 10.2.0.5 support for above usage scenarios
- Conclusion

Please visit us at the OOW Demogrounds
Moscone West W-061/62



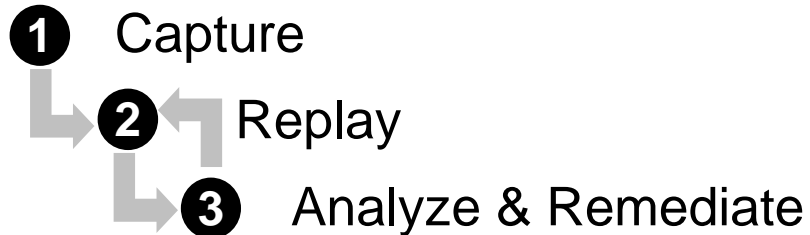
Database Replay - Motivation

- Businesses need to adapt to changes to stay competitive, compliant and evolve
 - DB upgrades, RAC, HW/OS/storage, config changes, etc.
 - Current testing often still results in missed SLAs, instabilities
- Current testing landscape and limitations
 - Artificial workload – Non-production, synthetic
 - Partial workflow coverage – Typically <5%
 - Time consuming – Months required & human capital intensive
 - No end-to-end solution – How to build test system, fix regressions, tune
 - High risk => Businesses are change averse!

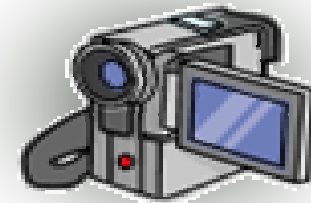


Database Replay provides real-workload testing solution that is comprehensive & easy-to-use for system change assessment

Database Replay

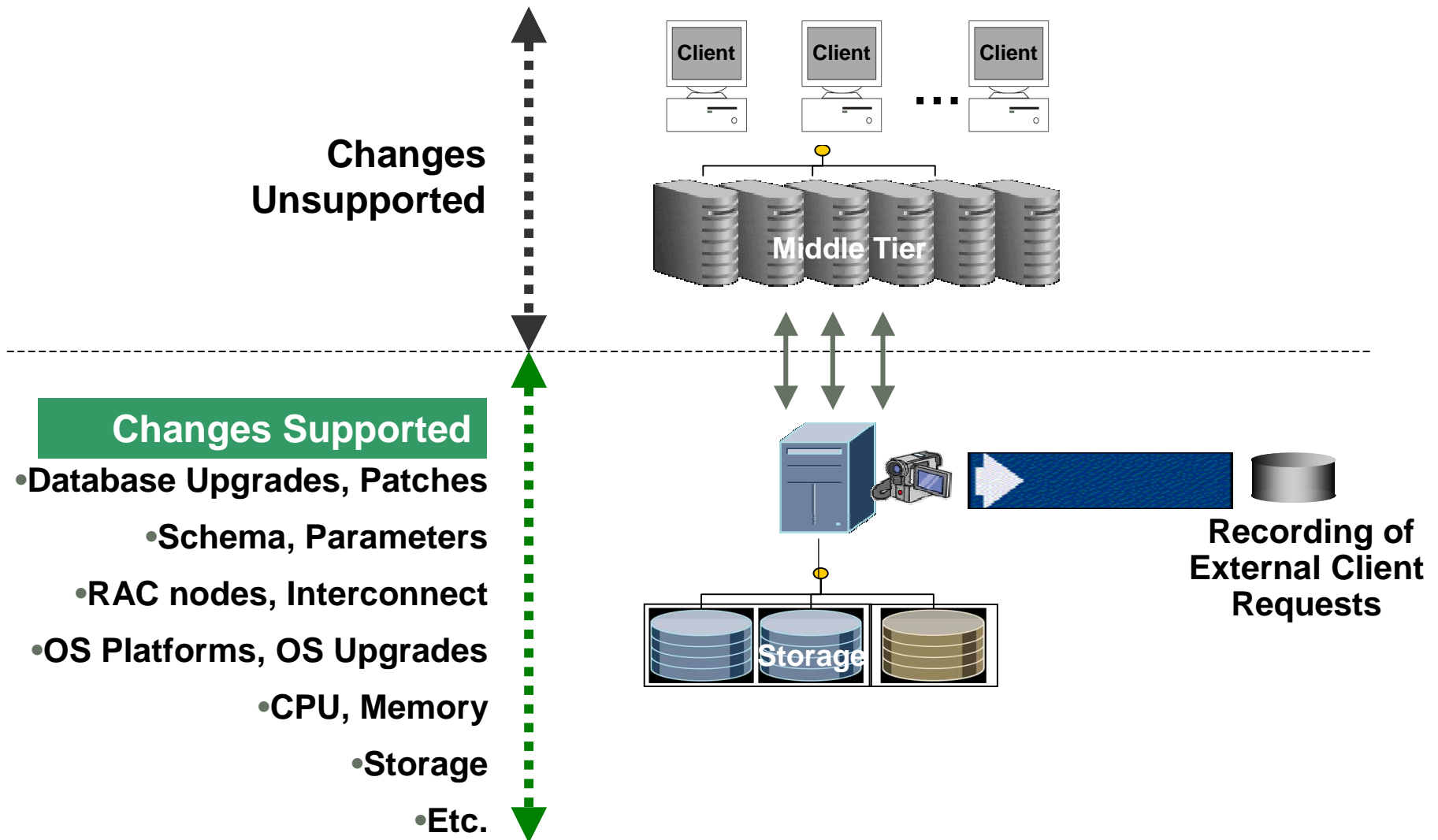


- **Capture Workload in Production**
 - Capture full production workload with real load, timing & concurrency characteristics
 - Move the captured workload to test system
- **Replay Workload in Test**
 - Make the desired changes in test system
 - Replay workload with full production characteristics
- **Analyze & Report**
 - Capture and Replay Reports
 - AWR, ASH, Replay Compare Period Reports



Analysis & Reporting

Supported Changes

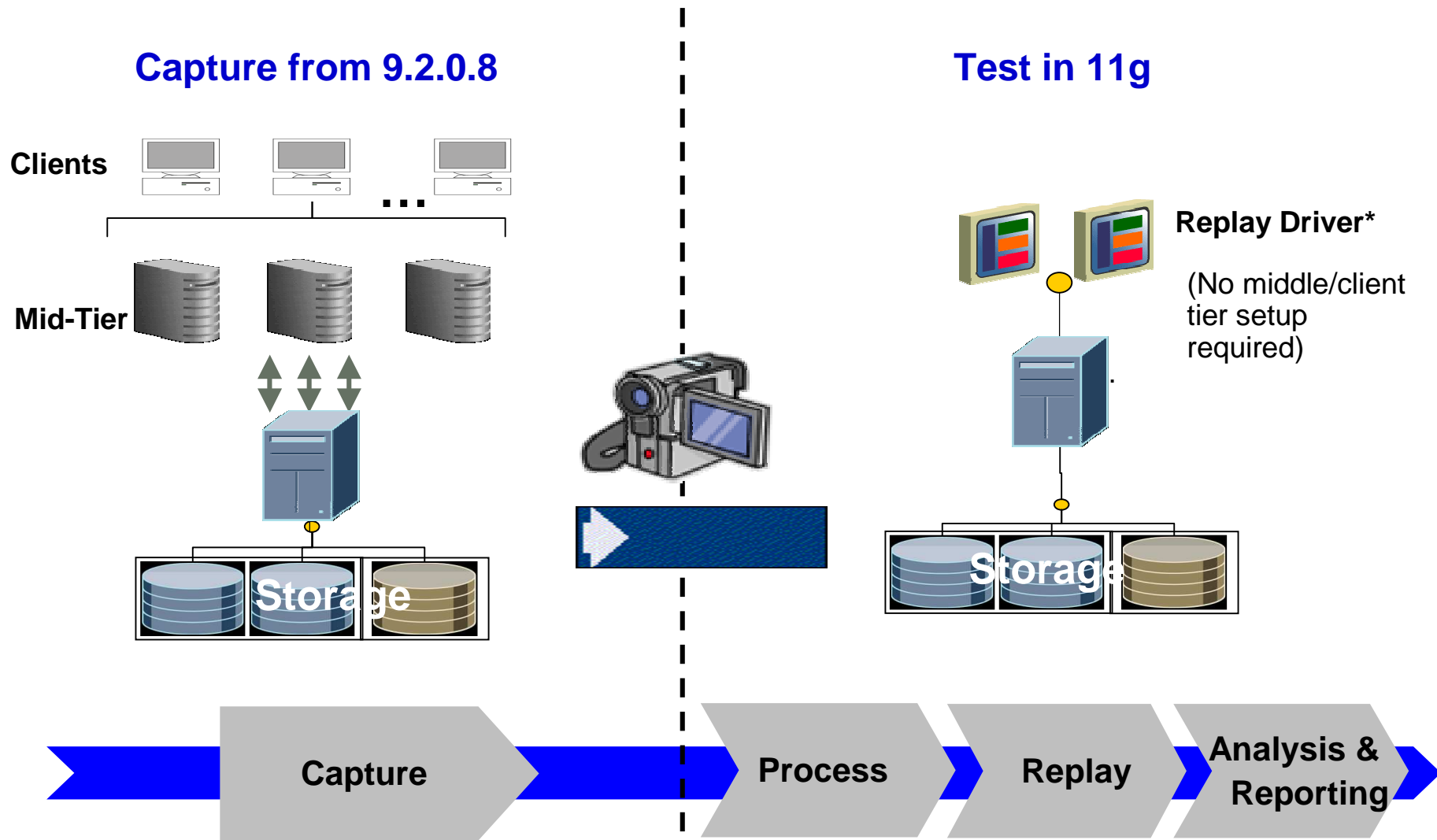


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†Shared Server support from Oracle Database Release 11.2

Database Replay Workflow

Example: Upgrading from Oracle Database 9.2.0.8 to 11g



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† ML 560977.1: Real Application Testing for Earlier Releases



Using Database Replay for Upgrade Testing



10.2 → 11g Database Upgrade

Scenario:

How can I use Database Replay to check if my peak workload will perform as expected after upgrade from 10.2 to 11g?

Goal:

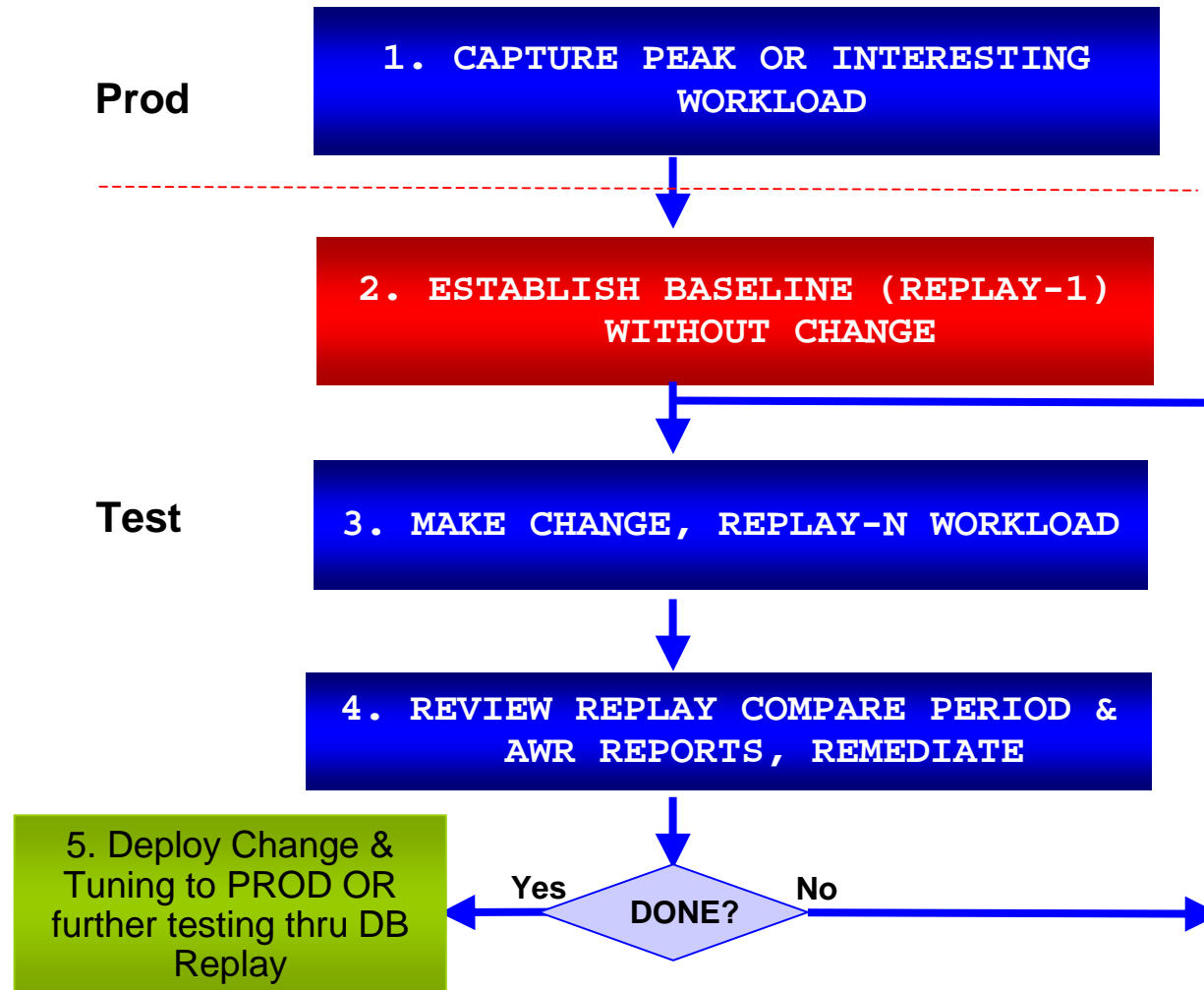
Test the impact of Oracle Database 11g upgrade on the peak workload captured on production system & make sure are no negative effects of the change



Siebel Workload Description

- Siebel PSPP workload used for testing DB upgrade scenario
 - Used internally for upgrade certification and new feature uptake
- Siebel 8.0, 1300 users: 700 financial call center, 600 financial partner manager
- Financial call center scenario:
 - Creates new contact
 - Creates new opty for the contact
 - Add products to the opty
 - Creates quotes
 - Converts quotes to order
- Financial partner manager scenario
 - Creates a new service request
 - Assigns the service request

Recommended Testing Methodology with Database Replay





Recommended Testing Methodology with Database Replay

- Use identical Test system if possible
- Test one change at a time to understand causality
- Use **Replay Compare Period Report** to understand Baseline (Replay 1) deviations to production capture
- Compare two replays in the same environment
 - Baseline to Replay N
 - Replay N-1 to Replay N for incremental changes and tuning
- Validate replay using application metrics (e.g., order entered/sec)

Replay Summary

Database Instance: [siamst](#) > [Database Replay](#) > [Replay Workload](#) > Logged in As SYSTEM

View Workload Replay: [wrr-20090903-122103](#) OK

Summary

Replay Name	wrr-20090903-122103	Capture Name	capture
Status	Completed	Duration (hh:mm:ss)	09:15:09
Directory Object	siebel ⓘ	Prepare Time	Sep 3, 2009 12:21:04 PM PDT
Database Name	SIAMST	Start Time	Sep 3, 2009 12:34:28 PM PDT
DBID	2968440095	End Time	Sep 3, 2009 9:49:37 PM PDT
Replay Error Code	n/a		
Replay Error Message	None		

Workload Profile | [Connection Mappings](#) | [Replay Parameters](#) | [Report](#)

Chart Type: [Elapsed Time Comparison](#)

Network Time (hh:mm:ss)	1806:31:40	Clients	4
Think Time (hh:mm:ss)	17:43:41	Clients Finished	4

Assessing the Replay

The Elapsed Time Comparison chart shows how much time the replayed workload has taken to accomplish the same amount of work as captured.

When the Replay bar is shorter than the Capture bar, the replay environment is processing the workload faster than the capture environment.

The divergence table gives information about both the data and error discrepancies between the replay and capture environments, which can be used as a measure of the replay quality.

Replay Summary (Contd.) : Errors and Data Divergence

Divergence			
	Number of Calls	Percentage of Total Calls	
Error Divergence:			
Session Failures Seen During Replay	0	0.00	
Errors No Longer Seen During Replay	24	0.00	
Errors Mutated During Replay	2489	0.02	
New Errors Seen During Replay	853	0.01	
Data Divergence:			
DMLs with Different Number of Rows Modified	200	0.00	
SELECTs with Different Number of Rows Fetched	425	0.00	
▼ Detailed Comparison			
	Capture	Replay	Percentage of Capture
Duration (hh:mm:ss)	03:33:47	09:15:09	259.68
Database Time (hh:mm:ss)	09:07:54	17:16:07	189.11
Average Active Sessions	2.56	1.87	72.82
User Calls	11,212,622	11,212,577	100.00

Replay Errors and Data Divergence Analysis

Database Instance: [siamst](#) > [Database Replay](#) > [Replay Workload](#) > [View Workload Replay: wrr-20090903-122103](#) > Logged in As SYSTEM

Diverged Calls During Replay: wrr-20090903-122103

View the most relevant set of replayed calls that have diverged from the capture by filtering out all but the ones of interest. A large number of calls may be relevant. If so, consider grouping them by an attribute value they have in common.

▼ Conditions for Displaying Diverged Calls

[Filter Conditions for Diverged Calls](#)

Only the calls that meet all the following filter conditions will be displayed among the results. Conditions with empty values will not contribute to filtering.

Type of Divergence: Observed:
Select the blank choice to prevent filtering by type. Enter an error number (ex.: 1401).

SQL ID:

Service:

Errors Mutated During Replay ▼

Session Failures Seen During Replay

Errors No Longer Seen During Replay

Errors Mutated During Replay

New Errors Seen During Replay

DMLs with Different Number of Rows Modified

SELECTs with Different Number of Rows Fetched

Fetch: k is disabled when the ll currently displayed. t 15 >

SQL ID	Timestamp ▲	Type of Divergence	Divergence Details	Rows Observed	Error Observed	Service	Module	Action	Session
	Sep 3, 2009 12:40:06 PM PDT	Error Mutated During Replay	Expected Error Number: 25228		15566	siamst	emagent_AQMetrics	DEQ	210:106
	Sep 3, 2009 12:40:06 PM PDT	Error Mutated During Replay	Expected Error Number: 25228		15566	siamst	emagent_AQMetrics	DEQ	210:106

Replay Errors and Data Divergence Grouping

Diverged Calls During Replay: wr-20090903-122103

View the most relevant set of replayed calls that have diverged from the capture by filtering out all but the ones of interest. A large number of calls may be relevant. If so, consider grouping them by an attribute value they have in common.

Conditions for Displaying Diverged Calls

Filter Conditions for Diverged Calls

Only the calls that meet all the following filter conditions will be displayed among the results. Conditions with empty values will not contribute to filtering.

Type of Divergence: Error Observed:

Select the blank choice to prevent filtering by type. Enter an error number (ex.: 1401).

SQL ID:

Session (ID:Serial#): :

Service:

Module:

Action:

Grouping of Filtered Calls

Summarize the diverged calls displayed by filter using one of the following attributes:

Grouping Attribute:

Grouping on filtered attributes will be ignored.

Diverged Calls

Below is the grouped table of diverged calls that matches the specified attribute. Expand the table row to see the individual calls in the group.

TIP The SQL ID link for individual calls allows you to drill down to the call details. This link is disabled when the call details have not yet been loaded into the server. Click the

Session

- None
- Error Observed
- SQL ID
- Session
- Service
- Module
- Action

Details	Session (ID:Serial#)	Completed Without Failure	Number	SQL ID	Timestamp	Type of Divergence	Divergence Details	Rows Observed	Error Observed	Service	Module	Action	Session
Show	210:106	✓			Sep 3, 2009 12:40:06 PM PDT	Error Mutated During Replay	Expected Error Number: 25228		15566	siamst	emagent_AQMetrics	DEQ	210:106
Show	12:380	✓			Sep 3, 2009 12:40:06 PM PDT	Error Mutated During Replay	Expected Error Number: 25228		15566	siamst	emagent_AQMetrics	DEQ	210:106
					Sep 3, 2009 12:40:06 PM PDT	Error Mutated During Replay	Expected Error Number: 25228		15566	siamst	emagent_AQMetrics	DEQ	210:106
					Sep 3, 2009 12:40:06 PM PDT	Error Mutated During Replay	Expected Error Number: 25228		15566	siamst	emagent_AQMetrics	DEQ	210:106

Replay Analysis: Reports

Database Instance: [siamst](#) > [Database Replay](#) > [Replay Workload](#) >
[View Workload Replay: wrr-20090909-165137](#)

[▶ Summary](#)

[Workload Profile](#) [Connection Mappings](#) [Replay Parameters](#) [Report](#)

Workload Replay Report

[Run Report](#)

Compare Period Report

First Workload Capture or Replay [mycapture \(Sep 16, 2009 10:20:52 AM\)](#)

Second Workload Capture or Replay [REPLAY-orclj.us.oracle.com-20090929142400 \(Sep 29, 2009 2:25:16 PM\)](#)

[Run Replay Compare Period Report](#) [Run AWR Compare Period Report](#)

AWR Report

Workload Capture or Replay [REPLAY-orclj.us.oracle.com-20090929142400 \(Sep 29, 2009 2:25:16 PM\)](#)

[Run Report](#)

ASH Report

Workload Capture or Replay [REPLAY-orclj.us.oracle.com-20090929142400 \(Sep 29, 2009 2:25:16 PM\)](#)

Start Date 
(example: Oct 9, 2009)

End Date 
(example: Oct 9, 2009)

Start Time AM PM

End Time AM PM

Filter [SID](#)

[Run Report](#)



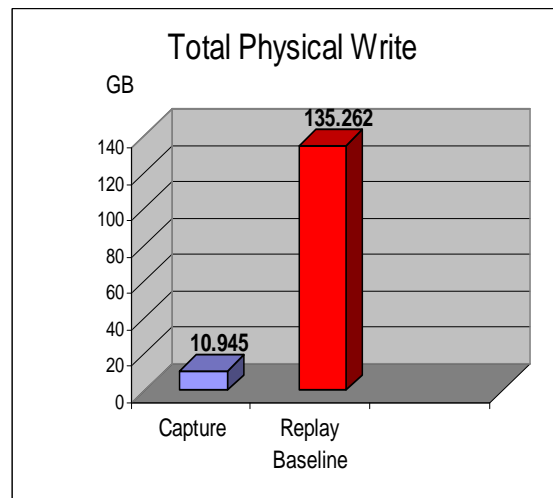
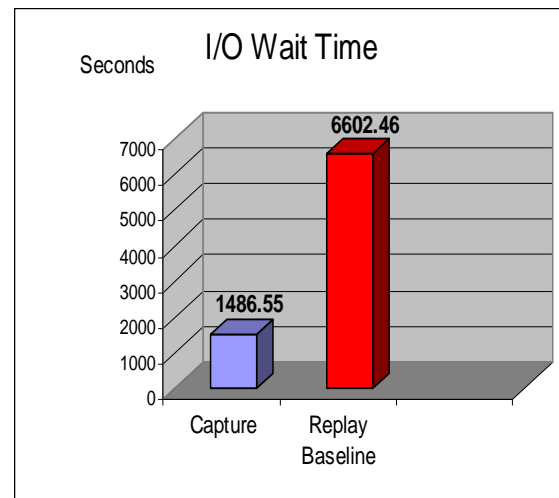
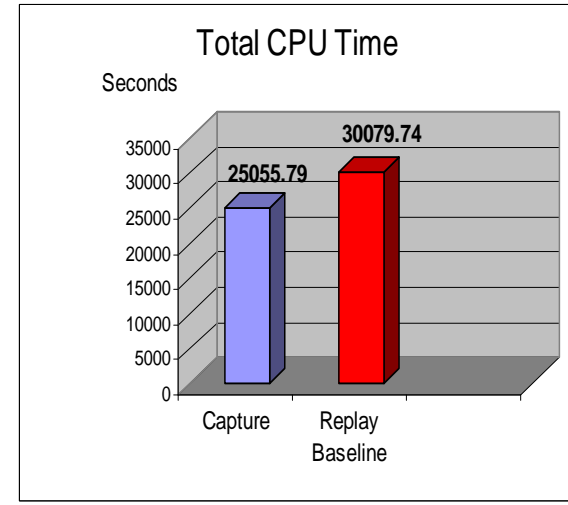
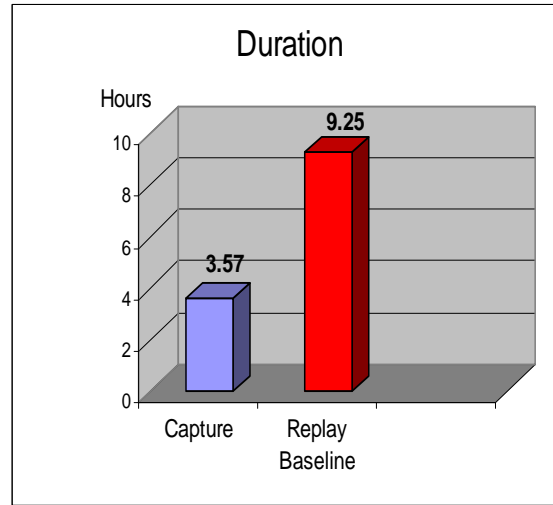
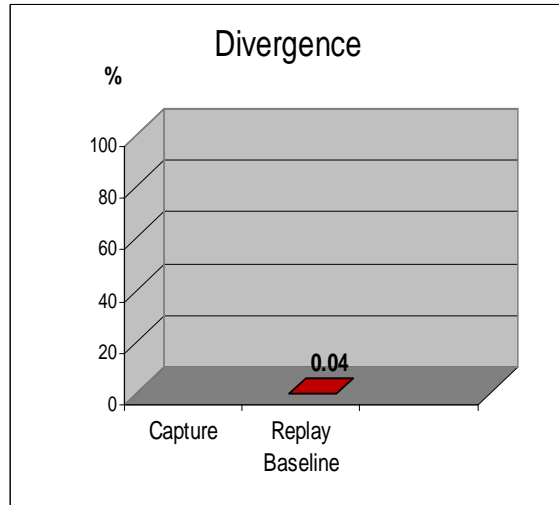
Replay Compare Period Report



Enhanced
in 11.2 !

- Your new **best friend** in analyzing replay information!!
 - Provides holistic view of the experiment – covers functional and performance aspects of testing
 - “Replay Divergence Summary” categorization indicates if further analysis is necessary: LOW/MED/HIGH
- Two reports are available
 - Capture Vs Replay, Replay Vs Replay
- Identifies interference from other workloads, e.g., maintenance windows or other non-replayed workload
- Automatically runs ADDM
- Reports provide more accurate performance analysis
 - Uses enhanced ASH infrastructure for capture/replay sessions

Replay Compare Period: 10.2.0.4 Capture Vs 11.2.0.1 Replay Baseline



[Compare Period Report Link](#)

Important Changes between Capture and Replay Baseline

(-) Changes to Important Parameters

	Capture	Replay
sessions	566	792
compatible	10.2.0.4	11.2.0

(-) Changes to Optimizer-Relevant Parameters

	Capture	Replay
optimizer_capture_sql_plan_baselines	NULL	FALSE
optimizer_use_invisible_indexes	NULL	FALSE
optimizer_use_pending_statistics	NULL	FALSE
optimizer_use_sql_plan_baselines	NULL	TRUE
optimizer_features_enable	10.2.0.4	11.2.0.1
result_cache_mode	NULL	MANUAL

No Changes to Memory Configuration Parameters

(-) Instances of the Capture Database

instance number	instance name	host name	number of CPU cores	number of CPU sockets	physical memory	instance type
1	siamst	stase07	8	8	31.73 G	RDBMS

(-) Instances of the Replay Database

instance number	instance name	host name	number of CPU cores	number of CPU sockets	physical memory	instance type
1	siamst	stase07	4	4	31.73 G	RDBMS

Replay Period Report: Top SQL Changes

	Force Matching Signature	example SQL_ID	Change in DB Time	Change in Average Response Time	Capture DB time	Replay DB time	example sql text
5.9 hr	9011963922445766669	44u0kwtwmd7h5	21209.57 seconds	7175.79%	295.57 seconds	21505.14 seconds	(+) SELECT T9.CONFLICT_ID, T9.LAST_UPD, T9.CRE [...]
	8567836812353523192	628g90748qrd5	-5947.74 seconds	-99.3%	5989.66 seconds	41.92 seconds	(+) SELECT T34.CONFLICT_ID, T34.LAST_UPD, T34. [...]
	9389583114292788166	dry9f79q87ngv	-3150.3 seconds	-99.01%	3181.74 seconds	31.44 seconds	(+) SELECT T34.CONFLICT_ID, T34.LAST_UPD, T34. [...]
	1542715800513830963	6fb88urfgysja	-2790.54 seconds	-100%	2790.54 seconds	0 seconds	(+) SELECT T34.CONFLICT_ID, T34.LAST_UPD, T34. [...]
	11530247703233490999	8q1jjwp4u7pn6	-2547.13 seconds	-100%	2547.13 seconds	0 seconds	(+) SELECT /*+ BEGIN_OUTLINE_DATA IGNORE_OPTIM_EMBED [...]
0.6 hr	17598323506657830469	5kcd99qf8y6yh	2386.13 seconds	6861.99%	34.77 seconds	2420.9 seconds	(+) SELECT T9.CONFLICT_ID, T9.LAST_UPD, T9.CRE [...]

Next Step: Tune Regressed SQL Statements using SQL Plan Baselines & Replay workload

The Culprit!!

```
SELECT T9.CONFLICT_ID, T9.LAST_UPD, T9.CREATED, T9.LAST_UPD_BY, T9.CREATED_BY, T9.MODIFICATION_NUM,
T9.ROW_ID, T4.KEY_VALUE, T25.PR_DEPT_OU_ID, T1.INTEGRATION_ID, T1.PRTNR_FLG, T25.PR_REGION_ID,
T25.CITIZENSHIP_CD, T6.ATTRIB_07, T25.EMAIL_ADDR, T25.EMP_FLG, T25.FAX_PH_NUM, T25.FST_NAME,
T25.CITIZENSHIP_CD, T25.HOME_PH_NUM, T25.AGENT_FLG, T25.JOB_TITLE, T25.LAST_NAME, T25.SEX_MF,
T25.MEMBER_FLG, T25.MID_NAME, T25.OWNER_PER_ID, T9.NAME, T25.PERSON_UID, T25.PRIV_FLG, T20.STATUS,
T8.PR_EMP_ID, T3.NAME, T25.CURR_PRI_LST_ID, T25.PR_OU_ADDR_ID, T1.NAME, T20.PR_ADDR_ID,
T25.PR_EMAIL_ADDR_ID, T25.PR_ALT_PH_NUM_ID, T25.PR_REP_DNRM_FLG, T25.PR_REP_MANL_FLG,
T25.PR_REP_SYS_FLG, T25.PR_MKT_SEG_ID, T22.PR_EMP_ID, T8.PR_EMP_ID, T13.LOGIN, T18.LOGIN, T17.PR_FAX_NUM_ID,
T25.PR_GRP_OU_ID, T25.PR_INDUST_ID, T25.PR_NOTE_ID, T25.PR_OPTY_ID, T25.BU_ID, T25.PR_SYNC_USER_ID,
T25.PR_PER_ADDR_ID, T25.PR_PER_PAY_PRFL_ID, T25.PR_POSTN_ID, T25.PR_PROD_LN_ID, T25.PR_RESP_ID,
T17.PR_SMS_NUM_ID, T25.PR_SECURITY_ID, T5.NAME, T25.MED_SPEC_ID, T25.PR_STATE_LIC_ID, T25.PR_TERR_ID,
T25.PROVIDER_FLG, T12.OWN_INST_ID, T12.INTEGRATION_ID, T11.SHARE_HOME_PH_FLG, T25.CUST_SINCE_DT,
```

Next Steps:

- Tune Regressed SQL Statements using SQL Plan Baselines
- Replay workload

```
ORAPERF.S_ADDR_PER T23, ORAPERF.S_ORG_EXT_FNX T24, ORAPERF.S_CONTACT T25 WHERE T25.PR_DEPT_OU_ID =
T1.PAR_ROW_ID (+) AND T1.PR_POSTN_ID = T22.PAR_ROW_ID (+) AND T25.CURR_PRI_LST_ID = T3.ROW_ID (+) AND
T25.PR_POSTN_ID = T8.PAR_ROW_ID (+) AND T9.ROW_ID = T20.CON_ID (+) AND T20.POSTN_ID (+) = :1 AND T22.PR_EMP_ID
= T13.PAR_ROW_ID (+) AND T8.PR_EMP_ID = T18.PAR_ROW_ID (+) AND T25.PR_PER_ADDR_ID = T23.ROW_ID (+) AND
T25.MED_SPEC_ID = T5.ROW_ID (+) AND T9.ROW_ID = T4.CONTACT_ID (+) AND T9.ROW_ID = T25.PAR_ROW_ID AND
T9.ROW_ID = T17.PAR_ROW_ID (+) AND T9.ROW_ID = T11.PAR_ROW_ID (+) AND T9.ROW_ID = T6.PAR_ROW_ID (+) AND
T9.ROW_ID = T12.PAR_ROW_ID (+) AND T19.POSTN_ID = :2 AND T25.ROW_ID = T19.CON_ID AND T16.ROW_ID =
T19.POSTN_ID AND T19.POSTN_ID = T7.PAR_ROW_ID (+) AND T7.PR_EMP_ID = T15.PAR_ROW_ID (+) AND
T25.PR_DEPT_OU_ID = T2.ROW_ID (+) AND T25.PR_DEPT_OU_ID = T21.PAR_ROW_ID (+) AND T25.PR_DEPT_OU_ID =
T24.PAR_ROW_ID (+) AND T25.PR_SYNC_USER_ID = T10.ROW_ID (+) AND T25.PR_SYNC_USER_ID = T14.PAR_ROW_ID (+)
AND ((T25.PRIV_FLG = 'N') AND (T19.CON_LAST_NAME >= :3)) AND (T9.ROW_ID IN ( SELECT SQ1_T1.PERSON_ID FROM
ORAPERF.S_PARTY_PER SQ1_T1, ORAPERF.S_PARTY SQ1_T2, ORAPERF.S_ORG_EXT SQ1_T3 WHERE ( SQ1_T2.ROW_ID =
SQ1_T3.PAR_ROW_ID AND SQ1_T1.PARTY_ID = SQ1_T2.ROW_ID) AND ((SQ1_T3.INT_ORG_FLG != 'Y' OR SQ1_T3.PRTNR_FLG
!= 'N') AND SQ1_T3.ACCNT_FLG != 'N') AND (SQ1_T3.NAME LIKE :4))) ORDER BY T19.POSTN_ID, T19.CON_LAST_NAME,
T19.CON_FST_NAME
```

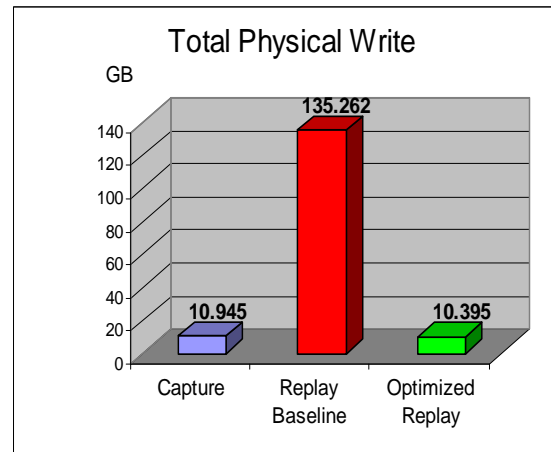
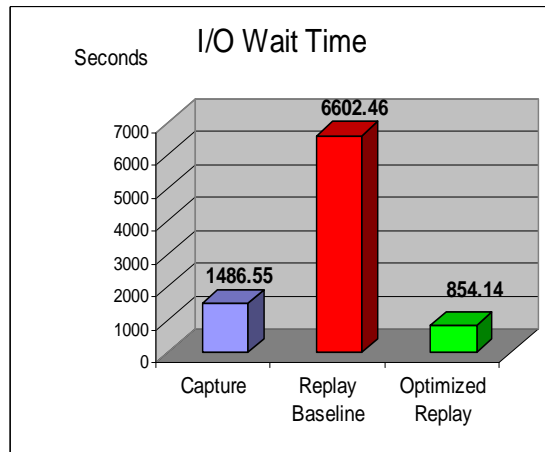
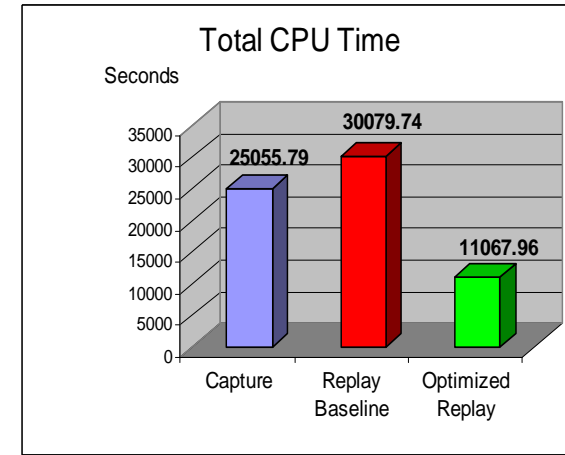
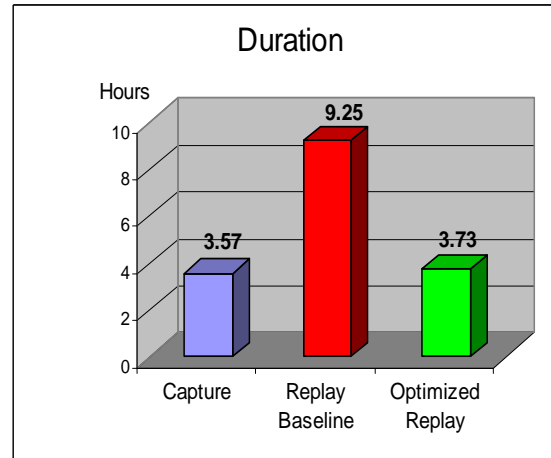
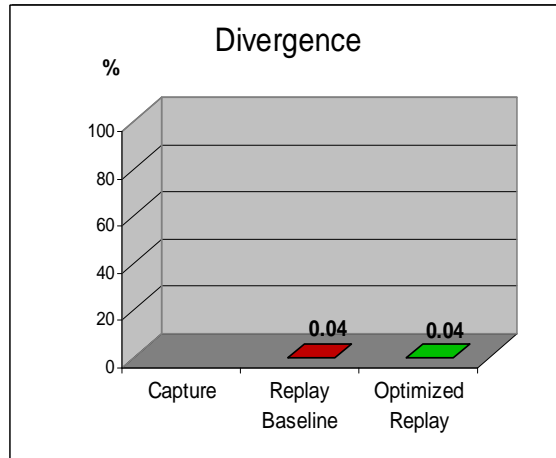
Replay Period Report: Validate Tuning

**Savings:
5.9 hr**

**Savings:
0.6 hr**

Force Matching Signature	example SQL_ID	Change in DB Time	Change in Average Response Time	1st Replay DB time	2nd Replay DB time	example sql text
9011963922445766669	44u0kwtwmd7h5	-21318.98 seconds	-99.13%	21505.14 seconds	186.16 seconds	(+) SELECT T9.CONFLICT_ID, T9.LAST_UPD, T9.CRE [...]
17598323506657830469	5kcd99qf8y6yh	-2366.15 seconds	-97.74%	2420.9 seconds	54.75 seconds	(+) SELECT T9.CONFLICT_ID, T9.LAST_UPD, T9.CRE [...]

Replay Compare Period: Replay Baseline Vs Optimized Replay



[Compare Period Report Link](#)



10.2 → 11g Upgrade: Summary



- Very low divergence rate, limited to background monitoring activity (EM)
- After 10.2 → 11g DB Upgrade, performance was almost same as before!!
- Further tuning can be performed or other new features can be added one at a time....



Using Database Replay for RAC related Testing



Single Instance (SI) → RAC

Scenario:

Problem: The CPU utilization on the DB server is close to maximum limit, need to add instances (SI → 2-Node RAC) to handle increased month-end load. How do I test if my RAC configuration can handle the load?

Goal:

Assess impact the SI → RAC conversion for the peak workload & make sure are no negative effects due to the change



Using Database Replay for RAC Testing

- Database Replay handles all RAC related use cases without additional complexity
 - Simple case: Single Instance -> RAC
 - Advanced case: M-Instance RAC → N-Instance RAC
 - Interconnect changes (e.g., Infiniband)
- Database Replay + RAC considerations
 - Workload capture
 - Workload capture location
 - Connection mapping
 - Reporting and performance analysis

RAC Considerations: Workload Capture and Location

- **Workload capture**
 - For 10.2.0.4 and above DB releases: Automatic capture on all instances using MMON infrastructure
 - For 9.2.0.8, 10.2.0.2 and 10.2.0.3: Manually start capture on all instances
- **Workload capture directory location**
 - Both shared and local file system supported
 - Shared FS:
 - One directory across all instances captures entire workload
 - Recommended for ease of use
 - Local FS
 - Every node has separate capture directory
 - Directory name and path should be same
- **Workload replay directory location:**
 - All workload files must be consolidated into **single directory** when capture using shared/local FS





Workload Replay – Connection Remapping

- Database Replay allows connection remapping to test system using any of the following:
 - Explicit 1-1 connection remapping
 - Single connect descriptor
 - Single TNS net service name
- If already using Service Load Balancing (SLB), added node belongs to a service, connection mapping happens transparently
- If workload or application partitioning is used, explicit 1-1 mapping for every connection, e.g.,
 - Instance 1,2,3 :OLTP, Instance 4,5: DSS
- Make sure to remap every connection to test system setting
 - For API check using the following query:

```
SELECT replay_id ,conn_id ,capture_conn ,replay_conn FROM  
DBA_WORKLOAD_CONNECTION_MAP where replay_id = <value> order by 2
```

Workload Replay – Connection Remapping using EM interface

Replay Workload: Customize Options

Database: ORCL Cancel Back Step 2 of 5 Next

Capture Name: wrt-20091008-092801

Logged In As: SYSTEM

Connection Mappings Replay Parameters

Replay Clients must establish connections to the replay database. Specify connection details to the replay database using either a single connect descriptor or net service name. Optionally, you can map every captured connect descriptor to a separate connect descriptor or net service name for the replay database.

TIP Connections must point to the replay database for a successful replay.

1 Use a single connect descriptor for all client connections. Test Connection

```
(DESCRIPTION = (ADDRESS_LIST = (LOAD_BALANCE = ON)(ADDRESS = (PROTOCOL = TCP)(HOST = rac1-vip)(PORT = 1521))
(ADDRESS = (PROTOCOL = TCP)(HOST = rac2-vip)(PORT = 1521)))(CONNECT_DATA = (SERVICE_NAME = ORCL)))
```

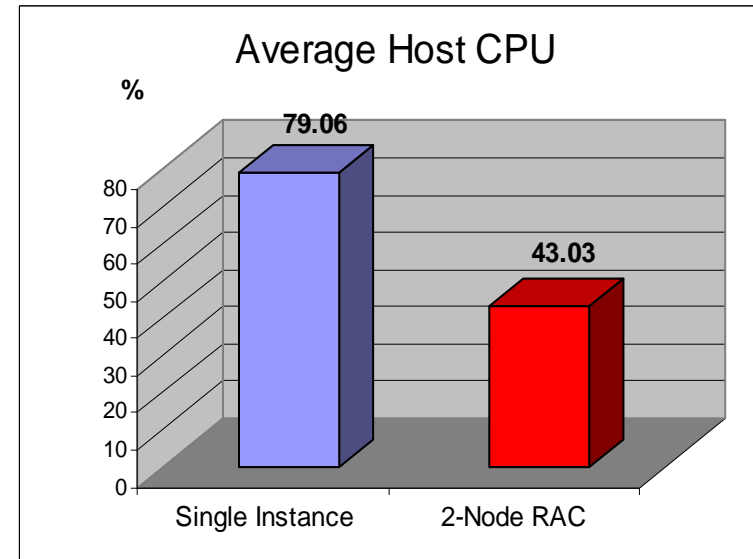
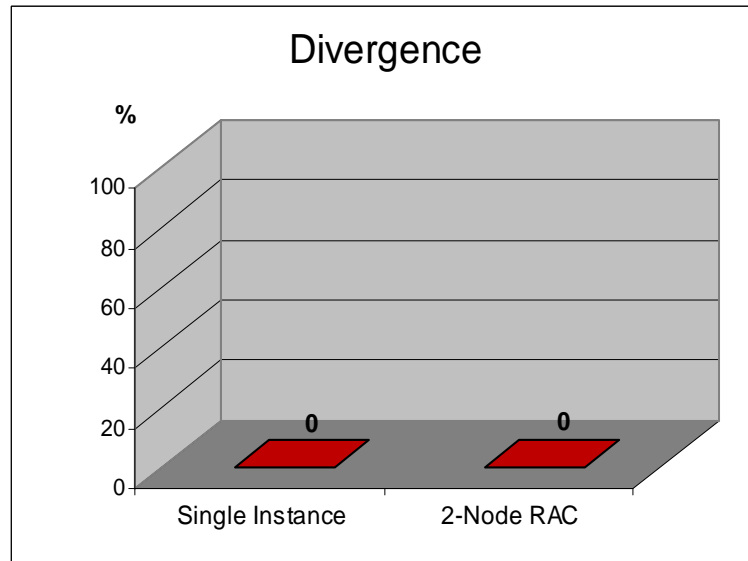
2 Use a single TNS net service name for all client connections.

TIP All Replay Clients must be able to resolve the net service name (for example through a local tnsnames.ora file).

3 Use a separate connect descriptor or net service name for each client connect descriptor captured in the workload.

Single Instance (SI) → 2-Node RAC

Replay Baseline on SI Vs Replay on 2-Node RAC



- Average CPU utilization per host is reduced, it is split equally on both nodes
- Compare Period Report



Change Accepted



Using Database Replay To Platform Migration Testing



Platform Migration

Scenario:

Problem: As part of our corporate standard push to Linux I want to migrate our 11.1.0.7 Oracle databases to Linux platform. How can I accomplish this?

Goal:

Assess the impact of platform migration from Windows to Linux using the peak workload captured on production system & make sure there are no negative effects due to the change



Platform Migration: Background

- What does “same platform” mean?
 - Software is installed from same Oracle CD/DVD
 - Same platform_id in v\$database
- Migration can be to same /different 32-64 bit, OS, endian
- Migration considerations
 - Uptime/SLAs
 - Datatype support
 - 32/64bit, OS, Little/Big-endian
 - #schema objects, user vs system schemas
 - Other: Expertise level, staging space, EBS, etc.
- Migration Options
 - Data Guard
 - Transportable Tablespace (TTS): 8i: same-endian format
 - Cross-Platform TTS –10gR1: cross-endian
 - Transportable DB (10gR2+): For same endian format
 - Other: Datapump, Golden Gate, etc.

Platform Migration: Determine Options To Use...

- For a given platform, supported method can be found using:
 - v\$database: platform_id, platform_name columns
 - v\$db_transportable_platform: Same-endian
 - v\$transportable_platform:Both endian
- See “Resources” slide at the end of the presentation
- Let’s assume that the migration strategy has been figured out, how do you test using real-workload?

For Microsoft Windows IA (32-bit),
output of
V\$db_transportable_platform

Platform Name	Platform Id
HP IA Open VMS	19
HP Open VMS	15
HP Tru64 UNIX	5
Linux IA (32-bit)	10
Linux IA (64-bit)	11
Linux x86 64-bit	13
Microsoft Windows IA (32-bit)	7
Microsoft Windows IA (64-bit)	8
Microsoft Windows x86 64-bit	12
Solaris Operating System (x86)	17
Solaris Operating System (x86-64)	20

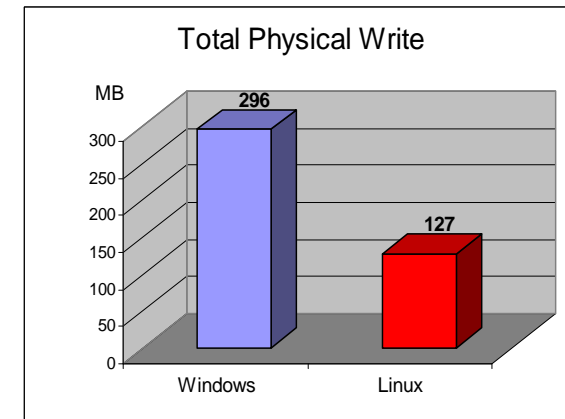
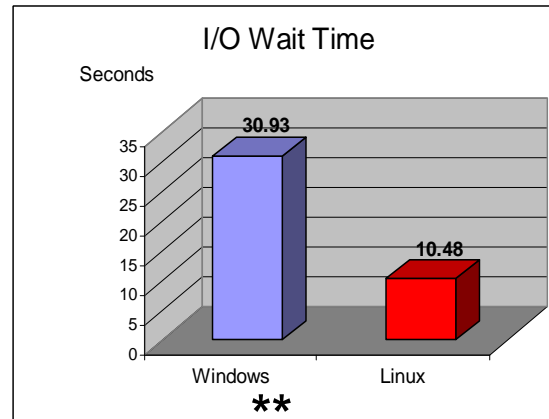
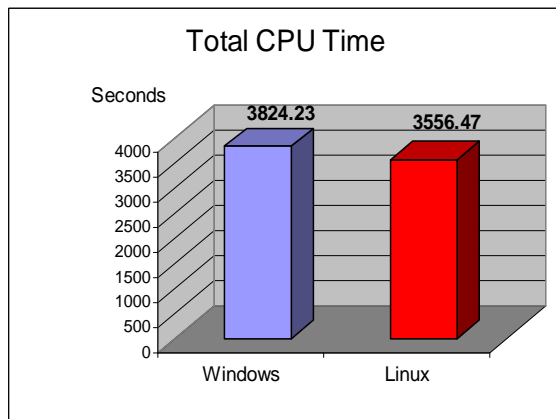
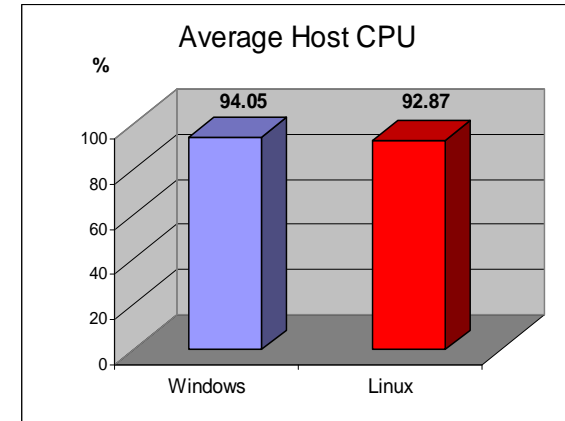
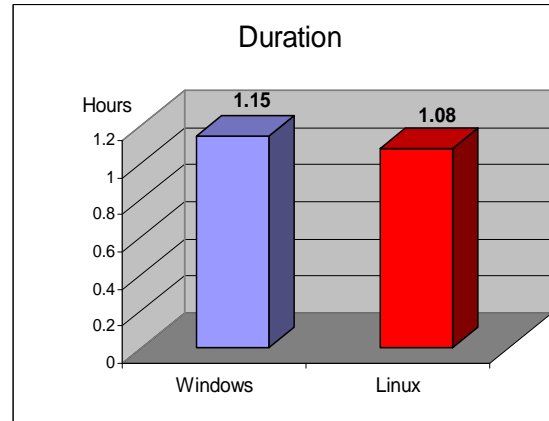
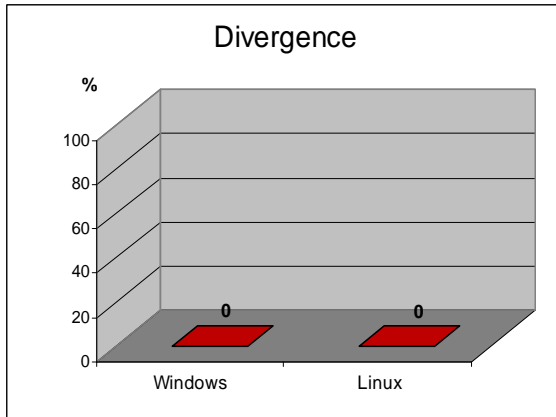


Platform Migration Testing With Database Replay

- Adhere to the “golden” rule of one change at a time
- Use SPA first for testing of SQL response time, followed by Database Replay for load testing
- Database Replay workload files are platform independent
- AWR data is platform-independent
 - Transported as before thru Datapump API
- Apply same performance tuning principles to platform migration testing
 - DB Time – Oracle’s single currency for measuring performance

Platform Migration: Windows → Linux

Replay Baseline on Windows Vs Replay on Linux



ORACLE

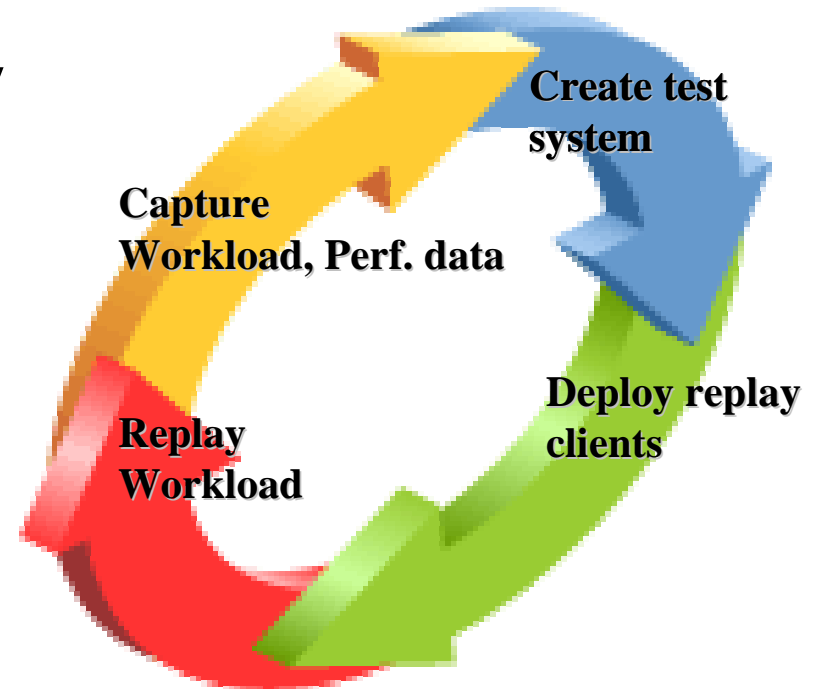
** Note: I/O Wait Time is insignificant (less than 1% of Total Elapsed Time)



Enterprise Manager Grid Control 10.2.0.5 Support for Usage Scenarios

End-to-end (E2E) Database Replay Automation Support

- Enterprise Manager Grid Control 10.2.0.5 supports E2E Database Replay Automation
 - Capture production workload & performance data
 - Copy workload & performance data to staging
 - Create test system: Provision, deploy software, clone database, RAC conversion
 - Deploy replay clients
 - Orchestrate replay through GC



E2E Database Replay Automation

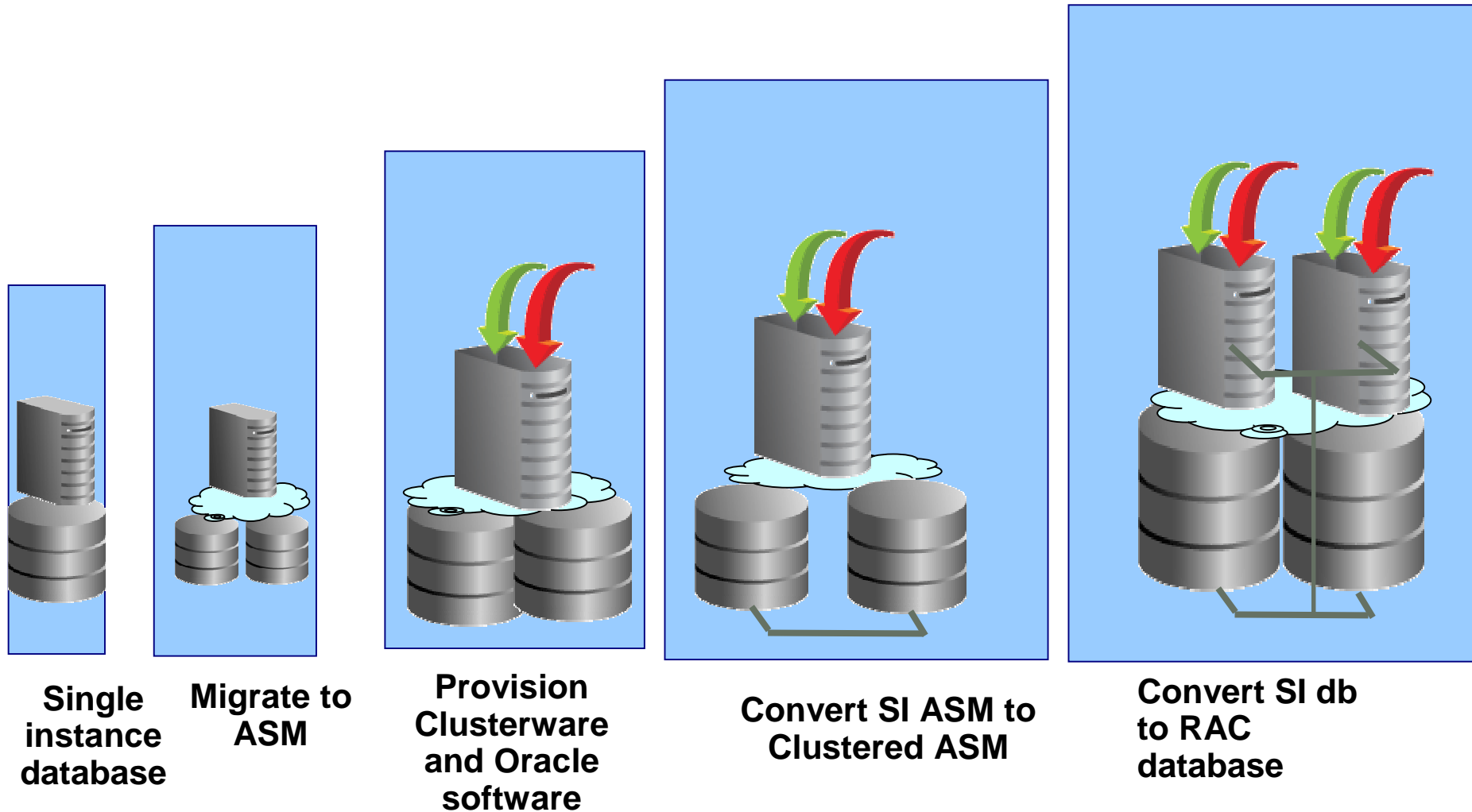
Task Name	Go to Task
▼ Capture Production Workload	
Capture Workload	
Export AWR Data	
Copy to Workload Staging Area	
▼ Prepare Test Database	
Set Up Test Database	
Isolate Test Database	
▼ Prepare for Replay	
Preprocess Workload	
Copy to Workload Staging Area	
Deploy Replay Clients	
Copy Workload to Replay Client Hosts	
▼ Replay Workload on Test Database	
Replay Workload	
Copy to Workload Staging Area	
Analyze Results	



Getting on to RAC – How can EM Grid Control help?

- Guided wizard for migration of SI to RAC DB & clustered ASM
 - Perform pre-req checks
 - Migrate SI to RAC as a single job
 - Migrate files and recovery area to shared storage (ASM or CFS) if needed
 - Configure listener, ASM, DB
 - Register listener, ASM, DB with clusterware

Getting on to RAC – How can EM Grid Control help?



EM Support for Transportable Tablespaces

ORACLE Enterprise Manager 11g Database Control Setup Preferences Help Logout

Cluster Database

Logged in As SYS

Cluster Database: orcl

Home Performance Availability Server Schema **Data Movement** Software and Support Topology

Move Row Data

- Export to Export Files
- Import from Export Files
- Import from Database
- Load Data from User Files
- Monitor Export and Import Jobs

Move Database Files

- Transport Tablespaces

Streams

- Setup
- Manage Replication
- Manage Advanced Queues

Advanced Replication

- Setup
- Manage

Instances

Name	Status	Host Name	Alerts	Policy Violations	Compliance Score (%)	ASM Instance	ADDM Findings
orcl_orcl_1	⊕	stnsp011.us.oracle.com	0 1	0 53 3	98	+ASM1_stnsp011.us.oracle.com ⊕ 0 0	0
orcl_orcl_2	⊕	stnsp012.us.oracle.com	1 4	1 25 1	98	+ASM2_stnsp012.us.oracle.com ⊗ 0 0	0

Related Links

Access	Add Exadata Cell Targets	Advisor Central
Alert History	All Metrics	Blackouts
Deployments	EM SQL History	Jobs
Metric and Policy Settings	Metric Collection Errors	Monitoring Configuration
Policy Groups	Scheduler Central	SQL Worksheet
Target Properties	User-Defined Metrics	



Conclusion

- Database Replay enables testing system changes using real-workloads
- Significantly reduces testing costs and production deployment risk
- Replay Compare Period Report helps analyze divergence and performance aspects
- Enterprise Manager Grid Control 10.2.0.5 supports common usage scenarios resulting in even more cost and time savings