Performance Readiness Oracle Life Sciences Suite

October 13th, 2010

Ralph May– Head Prime-Time Program

"Performance Testing" delivers *analysis;* Prime-Time delivers *performance readiness.*

ADD DBMS AND ORACLE LOGOS, STANDARD SESSION NOTICE REQUIRED FOR OHSUG

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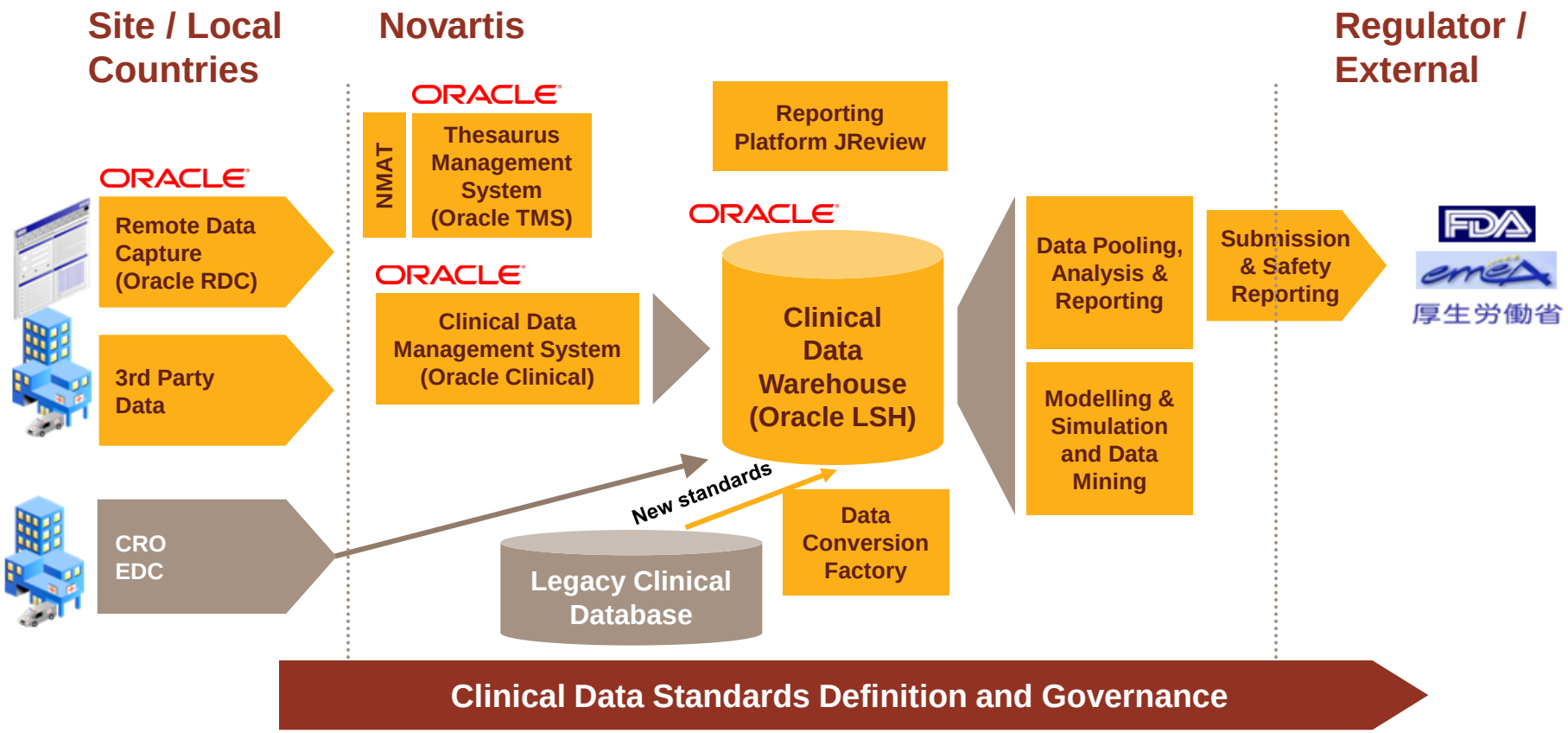
Disclaimers

- Oracle Disclaimer
- Novartis Disclaimer
- Fix Footer to be the same as on this slide
  - Separate Slides with different logos for each company's representative slides

ADVANCE – The three year landscape

Providing an integrated solution for clinical data from collection through submission



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The Context of Prime-Time

Is a cross-organizational partnership between Novartis, DBMS Consulting and our strategic partner Oracle with the mission of ensuring performance readiness of OC/RDC prior to First Patient First Visit (first use).

The Scope: “Performance Readiness”

- ✓ Performance & Response Time Measurement
- ✓ Performance & Capacity Projections
- ✓Coordinated Remediation to Solve identified Performance Issues
- ✓Recommendations for Long-term monitoring

Prime-Time is founded on the NO-FAULT principle. We are collectively working to deploy a industrial strength solution.

The Partnership

1. Partnership with Oracle

- Investing in our success; committing senior resources from their performance team.
- Fast Tracking of our issues, providing a direct escalation path to the relevant development team and working collaboratively to analyze and resolve issues as they were identified. – this resulted directly in the release of OC 4.5.0.11, and changes to out server configuration and RAID design.
- Jump Starting test execution by sending two of their performance experts for a two week period to work on-site and side by side with our performance team.

2. Partnership with DBMS Consulting

- Sunil G. Singh has brought his considerable real-world expertise to the design, execution and analysis of the performance effort. This resulted in improvements to the test design and changes to the overall application architecture

Key Performance Areas to Focus (Oracle to input)

1. ADD/CHANGE

Latency

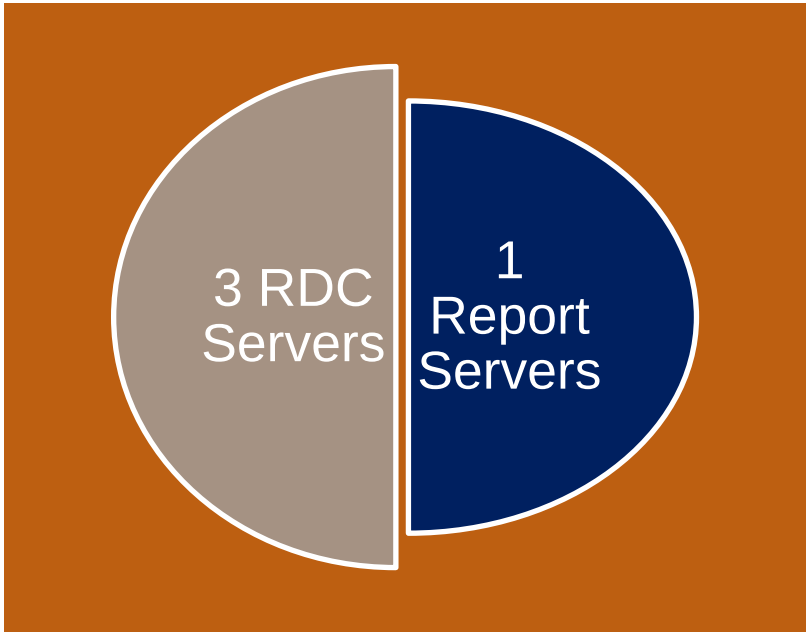
1. RAID

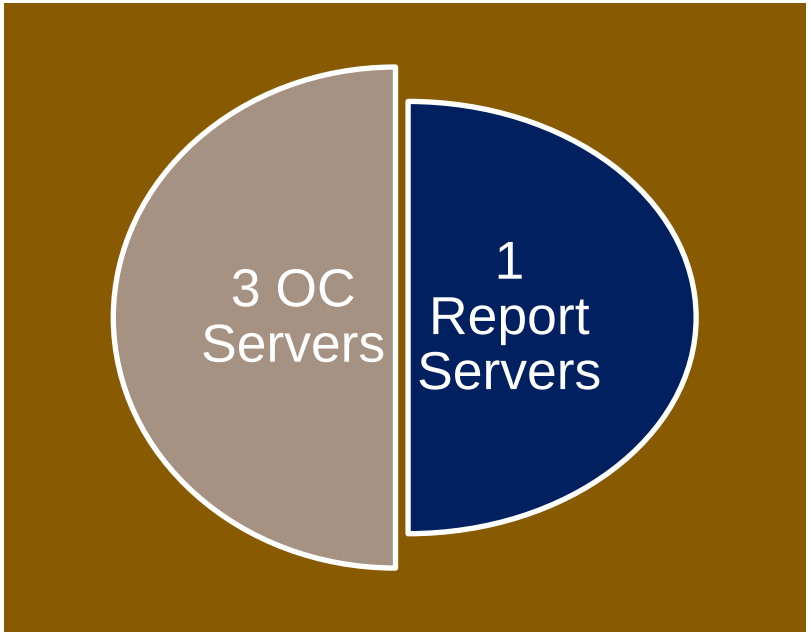
2. Server Architecture

3. Data Base

4. Load Balancing

SUMMARY OF Performance Configuration





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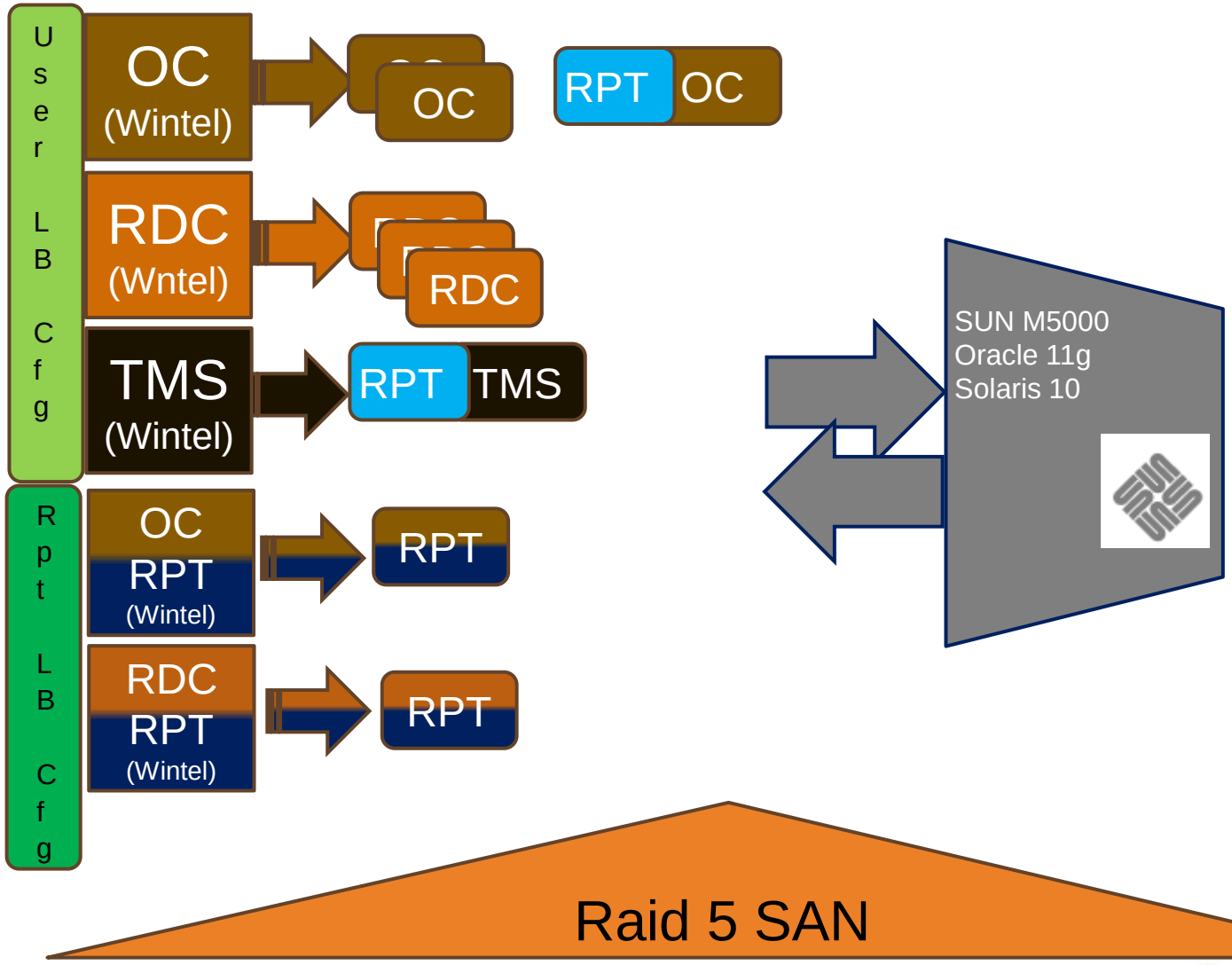
Detailed Performance Configuration



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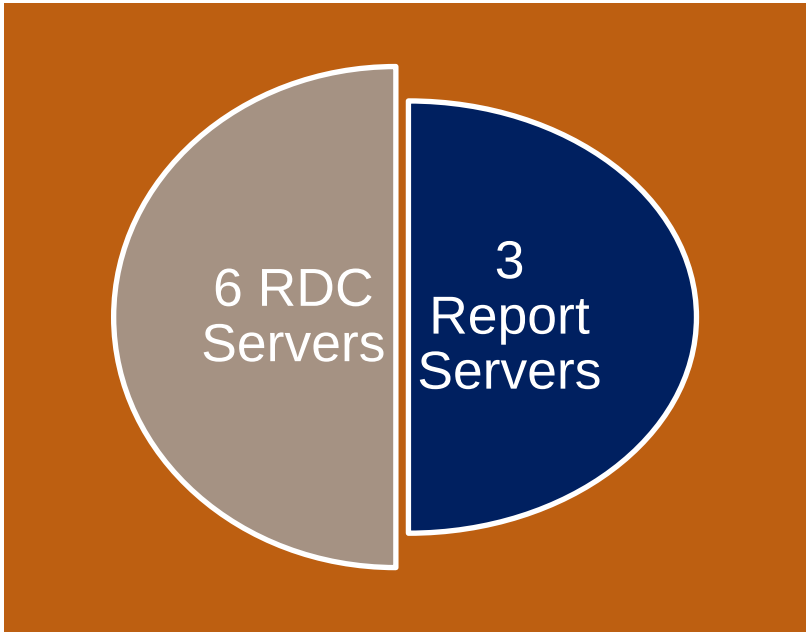
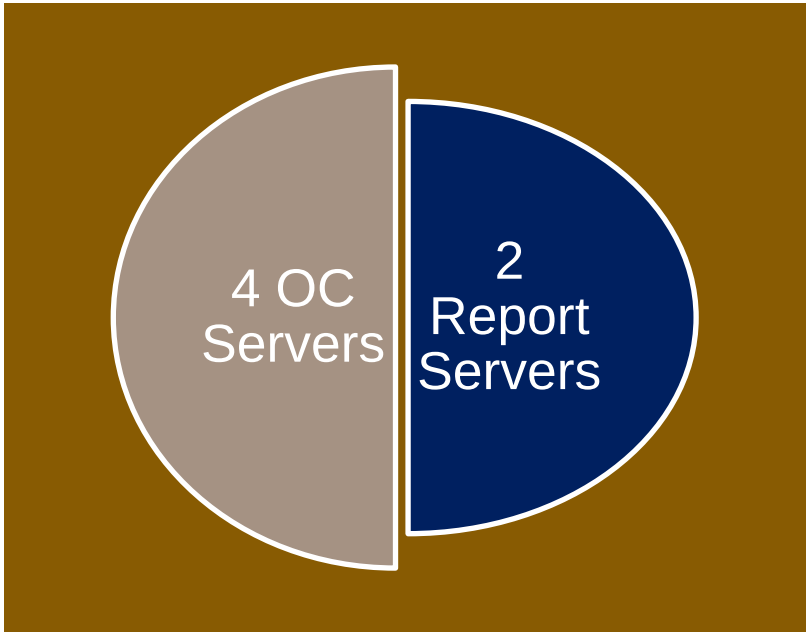
SUMMARY OF Target Production Configuration





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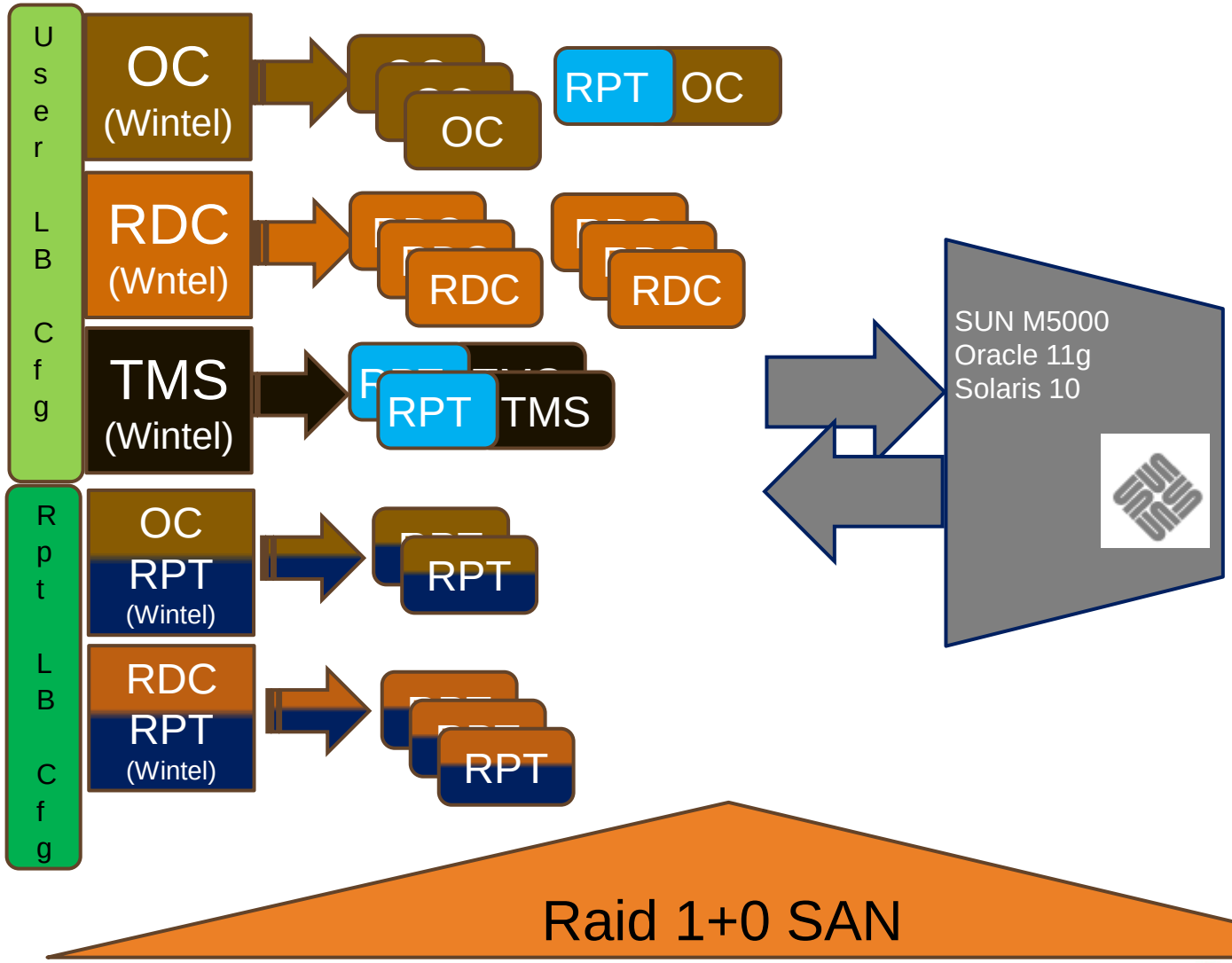
Detailed Production Configuration



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Technical Specifications OC/RDC

Tier	Specifications
RDC	**Intel dedicated** HW Specifications Includes: 2 x Xeon Quad-Core E5440 80 W 2.83 GHz Processor (8 Core) 96 GB Memory server memory 2 x 73GB 10K 3.5-inch Hot-Swap SAS HDD 3 x 146GB 10K 2.5-inch Hot-Swap SAS HDD (App & Data) 2 x Intel Prot/1000 PT Dual Port server adapter ServeRAID-8k Adapter SW Specifications includes: Oracle AS10g R2 (10.1.23) ActivePerl 5.6.1 Windows 2003 Enterprise Edition

Tier	Specifications
OC	**Intel dedicated** HW Specifications Includes: 2 x Xeon Quad-Core E5440 80 W 2.83 GHz Processor (8 Core) 16 GB Memory server memory 2 x 73GB 10K 3.5-inch Hot-Swap SAS HDD 3 x 146GB 10K 2.5-inch Hot-Swap SAS HDD (App & Data) 2 x Intel Prot/1000 PT Dual Port server adapter ServeRAID-8k Adapter SW Specifications includes: Oracle AS10g R2 (10.1.23) ActivePerl 5.6.1 Windows 2003 Enterprise Edition

Technical Specifications TMS/Data Base Server

Tier	Specifications
TMS	**Intel dedicated** HW Specifications Includes: 2 x Xeon Quad-Core E5440 80 W 2.83 GHz Processor (4 Core) 4 GB Memory server memory 3 x 73GB 10K 3.5-inch Hot-Swap SAS HDD HDD (App & Data) ServeRAID-8k Adapter SW Specifications includes: TMS 4.6.1 Oracle AS10g R2 (10.1.23) ActivePerl 5.6.1 Windows 2003 Enterprise Edition

Tier	Specifications
DB	**SUN M5000 dedicated** HW Specifications Includes: Sun M5000 32 cores 192 GB Memory 146 GB x 2 HDD RAID 1 PT Dual Port server adapter ServeRAID-8k Adapter SW Specifications includes: Solaris 10 Veritas Clustering (active/passive configuration) Oracle 11.1.0.7 Oracle Database Services OC / RDC 4.6 TMS 4.6.1

ORACLE ADD SLIDES HERE (Oracle Logo/Format for these slides)

Suggestion: Oracle add description of the Metalink White Papers on Performance for OC/RDC 4.6

Suggestion: Oracle add slides for internal Performance Testing for RDC, RDC Testing Center

Suggestion: Oracle add specific suggestions given to Novartis

- TCP Port Time Wait
- Patch 4.6.0.11
- SGA_TARGET
- Use of ASMM vs. AMM
- Configuration of multiple JVMs, processes per desktop

Results – 1 PASSED

Test Configuration:

- 300 Concurrent users on RDC application using LB
- 180Users – Insert
- 60Users – Update
- 60Users – Browse
- Ramp-up time 1 user in 1 second
- Think time – 10 seconds
- Executed from Bayer load generator machines with <1 ms network latency

Application Servers

CPU Utilization: Approx 20%
Memory Utilization: Approx 20%

Response times:
All the average response times were within SLA limits
There are some spikes in the response times for the CRFs with discrepancies highlighted.

Database
CPU Utilization: 10 to 15% (on average)

We need to think about how to present results

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Results – 2 PASSED

Test Configuration:

- 500 Concurrent users on RDC application using LB
- 300 Users – Insert
- 100 Users – Update
- 100 Users – Browse
- Ramp-up time 1 user in 1 second
- Think time – 10 seconds
- Executed from Bayesian generator machines with <1 ms network latency

Application Servers

CPU Utilization: Approx 25%
Memory Utilization: Approx 25%

Response times:
All the average response times are within the SLA limit
There are some spikes in the response times for the CRFs with discrepancies highlighted.

Database
CPU Utilization: 15% to 20% (on average)

We need to think about how to present results

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Results – 3 PASSED

Test Configuration:

- 800 Concurrent users on RDC application using LB
- 480 Users – Insert
- 160 Users – Update
- 160 Users – Browse
- Ramp-up time 1 user in 2 second
- Think time – 10 seconds
- Executed from Bayer load generator machines with <1 ms network latency

Application Servers

CPU Utilization: Approx 30%
Memory Utilization: Approx 30%

Response times:
All the average response times were within SLA limits
There are some spikes in the response times for the CRFs with discrepancies highlighted.

Database
CPU Utilization: 20% to 25% (on average)

We need to think about how to present results

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Results – 4

Test Configuration:

- 1200 Concurrent users on RDC application using LB
- 720 Users – Insert
- 240 Users – Update
- 240 Users – Browse
- Ramp-up time 1 user in 2 second
- Think time – 10 seconds
- Executed from Ba[illegible] generator machines with <1 ms network latenc[illegible]
- Data Used :Cycle 1[illegible]

Application Servers

CPU Utilization: 40-50%
Memory Utilization: 56%

Response times:
at1200 concurrent users test on RDC application after all the users are ramped up and ex[illegible]ted fo[illegible] 5 mi[illegible]utes , most of the users experienced time-out [illegible]rro[illegible] mes[illegible]ages, the DB server reached 100% CPU utilization.

We suspect but cannot yet confirm that the underlying cause was the initiation of the [illegible]cheduled nightly backup of the data base.

NOTE: THIS POINT TO BE CLARIFIED BY NOVARTIS PRIOR TO 4-OCT-2010 SUBMISSION TO OHSUG

Database:
CPU Utilization: 100%

We need to think about how to present results

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Results – 5 PASSED
(800 RDC user + 200 OC user from multi locations)

Test Configuration:

- 800 Concurrent users on RDC and 200 concurrent users on OC applications using LB
- RDC
  - 480 Users – Insert
  - 160 Users – Update
  - 160 Users – Browse

Load generated from Basel

- OC
  - 200 Full scenario

- Ramp-up time 1 user in 2 second
- Think time – 10 seconds
- Data Used: Cycle 1
- Executed from Hyderabad, Tokyo, East Hanover

Application Servers

RDC

CPU Utilization: 20% to 25%
Memory Utilization: 30% to 35%

OC

CPU Utilization: 15% to 20%
Memory Utilization: 15% to 20%

Response times:

RDC:
All the average response times are within SLA limit

OC
Observed spikes while launching the login page and Applets

Hyderabad →
Tokyo →
East Hanover →

Database:
CPU Utilization: 20% to 25% (on average)
Observed spikes in DB reached 40% sometimes)

AWR report:

Lesson's Learned (Oracle+DBMS to input)

- A strong DBA / Unix specialist is an important asset
- Never underestimate how long it takes to create the needed testing infrastructure
- Planning the details is key – assumptions will kill you
- Expect the unexpected, this is after all performance testing

DBMS CONSULTING SLIDES ADDED HERE

- Theoretical maximum results for RDC concurrency for a single Win2003 server
- Theoretical maximum results for RDC concurrency for a single Win2008 server

Biographies

- James Rayner

Biographies (Oracle

- Chris Huang
- Murali Pawar

Biographies (SGS)

Sunil G. Singh, President & CEO, DBMS Consulting, Inc.

- Sunil is a Global Oracle Health Sciences deployment expert for DBMS Consulting. He has been an active member of the OHSUG community since 1996 and is extremely grateful for this opportunity to makes these presentations at OHSUG 2010.

Thank you

DRAFT material

Ralph May

"Performance Testing" delivers *analysis;* Prime-Time delivers *performance readiness.*

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How have we contributed to OC/RDC {So Far}

Strategic contribution

- We have enhanced the overall coordination of performance testing.
- Reduced the burden on existing project leadership.
  - Allowing the Project Leadership to Focus on “Project Closure”
  - Allowing the Support Leadership to Focus on “Support preparedness”
- Contributed to a deepening relations with the production support team.
- Set the stage with Oracle for a long-term commitment to Performance Readiness.

Tactical Contribution

- Leveraged the Partnership with Oracle to gain access to high valued resources at no {additional} cost to Novartis.
- We are closing the gap between expected performance and available performance

DRAFT Prime Time Objectives

- Broaden current Performance Testing Efforts
  - Beginning with Cycle 2 (including future Load Balance tests)
  - ADD LSH
  - Bring in External SME's as needed to confirm our recommendations
  - Baseline / establish change management / enhance configuration values
- Coordinate and Manage outcomes for all recommendations approved to prepare for Production
  - Server Provisioning
  - Riverbed Provisioning (OC and RDC internal improvement)
  - Akamai Implementation (RDC external improvement)
  - Application tuning
  - Overall Status and Communication
- Recommend / Implement Post Production Monitoring
  - Ensure that levels of performance achieved in TEST are maintained production

Test results draft slides to date

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Status of tests

- 300 User RDC test – **Passed**
- 500 User RDC test – **Passed**
- 800 User RDC test – **Passed**
- 1200 User RDC test – failed
- 800 RDC/200 OC user from multi locations - **Passed**

Techical architecture draft slides

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Table of Contents

RDC Specifications

- 6 application tier servers
- Expected to support 350 concurrent users

- **RDC App Servers – Intel dedicated computing power, standard catalog item**
- 8 Cores, 4 GB Memory Type: New dedicated Intel/IBM Medium Performance Includes:
  - 2 x Xeon Quad-Core E5440 80 W 2.83 GHz Processor
  - 4 GB Memory (server memory total of 32GB)
  - 2 x 73GB 10K 3.5-inch Hot-Swap SAS HDD
  - 3 x 146GB 10K 2.5-inch Hot-Swap SAS HDD (App & Data)
  - ServeRAID-8k Adapter
  - Remote Supervisior Adapter II Slimline
  - Console Switch Cable USB
- Additional Options: Offering #: 0102015
- Qty: 8 Item: 8 GB Memory Expansion Kit
- Qty: 2 Item: Intel PRO/1000 PT Dual Port Server Adapter