Oracle RAC Scalability with Cisco UCS

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# Oracle RAC Database Deployment – Key drivers

## Performance

Meet ever-increasing performance needs of IT at a lower total cost of ownership

- Migrate from proprietary architecture to open standard x86 servers

- Demonstrate leading performance for OLTP and DSS use cases

## Scalability

Use clustering to spread workload across multiple instances

- Provides ability to scale out system resources easily

- Enable larger clusters with low latency 10GE network as foundation

- Policy based HW provisioning via service profiles

## Consolidation

Look to re-host a number of smaller Oracle Databases on to a single Server

- Increase server resource utilization

- Balanced configuration meets sustained resource demands over period of time

- Improved availability

## High Availability

Provide database node availability via clustering

- Provides Database availability in case of node failures

- Business continues to process data and service its customers

- Unique failover capabilities guards against common hardware failures
OLTP Workload Performance and Scalability

Workload
- SwingBench Order Entry workload
- 4 TB Database
- 60/40 Read/Write Ratio

Hardware
- Cisco UCS B200 M2 Servers
- 96 GB RAM
- M81KR Converged Network Adapter
- EMC VNX storage
  - 15 SSD Drives
  - 120 FC Drives
Data Warehouse Scalability on UCS with Oracle RAC

Scaling from 1 Node → 2 Nodes → 4 Nodes

Baseline – One node

- Establish Baseline
- Power Run time with single stream (full query set)
- Concurrency with multiple streams while staying within response time threshold

One node to two node

- Near instant server provisioning via UCS service profiles
- Wire once architecture
- Use Oracle ASM to rebalance data

Two nodes to four nodes

- Seamless expansion with UCS Service profiles
- Data spreads across 240 spindles (2 storage systems)
- Queries may request data that resides on single storage.
Data Warehousing Scalability on UCS with Oracle RAC

Performance analysis

Details of Performance results:
- Demonstrates near linear scaling going from one to four nodes
- Low latency 10gE allows excellent Oracle RAC scaling

Sustained CPU utilization ~67% during run.

Each Server has 4 vHBAs provided from single Cisco CNA. Approximately 1400 MB/Sec IO for each server.
Consolidation and Sustained performance – 24 hour run

- 24 hour stress run
  - 90% or higher CPU Utilization
  - Full memory consumption (occasional swapping)
  - High Network utilization
  - Significant IO demands

- Workloads:
  
  **OLTP Workload**
  Many users, small and random transactions

  **DSS Workload**
  Few users performing heavy queries

  **CPU Workload**
  Users performing CPU sensitive queries

  **Interconnect Workload**
  Custom in memory database exercising Cache Fusion
Improved Availability
## Oracle RAC on Cisco UCS – Improved Availability

<table>
<thead>
<tr>
<th>Failure</th>
<th>Description</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 or 3</td>
<td>Single Link Failure (Public Interface)</td>
<td>Represents Port Failure—nodes Should Continue to Work</td>
</tr>
<tr>
<td>1 and 2 or 3 and 4</td>
<td>All Links Failure (Public Interface)</td>
<td>Nodes Should Continue to Work Via Failover</td>
</tr>
<tr>
<td>5 or 7</td>
<td>Single Link (Private Interconnect)</td>
<td>Represents Port Failure — Nodes Should Continue to Work</td>
</tr>
<tr>
<td>6 or 8</td>
<td>All Links (Private Interconnect)</td>
<td>Nodes Should Continue to Work Via Failover</td>
</tr>
<tr>
<td>9</td>
<td>Storage Path Failure</td>
<td>1 IO Path Lost—No Effect, All IO Paths—Nodes Should Reboot</td>
</tr>
</tbody>
</table>
Reference Designs and Proven Benefits
Oracle RAC on UCS – Cisco Validated Design Guides

- 8 node Oracle RAC cluster
- 2 chassis, 4 Blades each
- 2 vNICs and 2 HBAs per Blade
- All links 10Gbps
- 40 Gbps total per chassis
Cisco UCS Traffic Flow for Oracle RAC

- LAN Cloud
- SAN Cloud
- Public Network Traffic
- Fibre Channel Traffic
- Private Traffic

FCoE Traffic

Fibre Channel over Ethernet (FCoE)

Ethernet

FC Traffic
Oracle and UCS - Benefits

Performance
- Improved interconnect and Cache Fusion performance
- Fast CPUs and unique extended memory capability
- Fast, low latency and lossless 10 gigabit Ethernet enables large clusters

Availability
- UCS Failover capabilities protect against common hardware failures

Scalability / Flexibility
- Capacity on demand and dynamic resource allocation
- RAC node additions are simpler and faster
  - Near instantaneous provisioning
  - Stateless blades
  - Wire Once - No additional cables

Manageability
- Single management interface for up to 320 blades
UCS Momentum and World Records
Cisco UCS Momentum

- UCS orders exceeded an annualized run rate of $1.1 billion in FQ4-2011, which represents 129% year over year growth
- 7,400 unique UCS Customers; 2,620 repeat customers with average 3.4 repeat buys
- 350 ATP Channel Partners for UCS B-Series; All for UCS C-Series; Active Distis with Configuration to Order Capability
- Ten of Thousands of supported applications
- 49 World Record Performance Benchmarks to date
- 44+ ISVs writing to UCS API
  - UCS Emulator Guide downloaded over 15,960 times
  - XML model information Guide downloaded over 7,467 times
Cisco Keynote: Empowering Customers Through Market Transformations.

John Chambers
Chairman and CEO, Cisco

Wednesday, October 5, 8 – 8:45 a.m.

Moscone North Hall D
Thank you.