# Enterprise Virtualization with Virtual Compute Appliance X4-2

BIAS

Business Intelligent Application Solutions

ORACLE Platinum Partner

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# Manifesto for Enterprise Virtualization



- Virtualization, deployment, and ongoing management of n-tier applications should be simplified.
- Data center consolidation should be modeled using tools that facilitate migration planning and automate discovery of existing assets.
- Virtualized applications should run on ‘wire-once’ engineered systems that come fully assembled and ready to handle production workloads of many types.
- Scalability should be predictable so that returns on new hardware investment match budgetary forecasts.
- Enterprise virtualization should empower cloud services.

# About BIAS Corporation

- Founded in 2000
- Distinguished Oracle Leader
  - Technology Momentum Award
  - Portal Blazer Award
  - 3 Time Titan Award
  - Excellence in Innovation Award
- Management Team is Ex-Oracle
- 250 employees with 10+ years of Oracle experience on average
- Inc.500|5000 Fastest Growing Private Company in the U.S. for the 5th Time
- 30 Oracle Specializations spanning the entire Oracle stack
- Locations:
  - Atlanta (Headquarters)
  - Washington D.C.
  - Offshore – Hyderabad, India
  - Offshore – Chennai, India

# About the Presenter



- Director of Infrastructure at BIAS Corporation
- An Oracle alumnus, Consulting and Product Development
- Java and System Administration since 1996
- Co-patented "Dynamic Auditing (Pat. #7814075)" feature of secure database appliances.
- Co-patented "Element Management System for Heterogeneous Telecommunications Network (Pat. #6260062)"

# Agenda

**Answering some of the what's, how's, and why's**

1. What are the business challenges?
2. What are the components of an OVCA?
3. How can the OVCA scale without downtime using automatic node discovery?
4. How does the OVCA simplify network provisioning using Software Defined Networks (SDN)?
5. How are some clients currently enabling Enterprise Virtualization?

# Agenda Continued

**Answering some of the what's, how's, and why's**

6. How does the OVCA enable Enterprise Virtualization?

7. How does the OVCA reduce the cost of software licenses?

8. How does the OVCA fit into Cloud control and management?

9. Why is an OVCA easy to maintain?

# What we encounter

Customers understand what data center consolidation is already.

For example, they already use blade infrastructure running OVM or VMware and now have a need to rapidly deploy IaaS and DBaaS services.

We have a retail customer who wants to know how to offer DBaaS via an existing HP c7000 Blade System. This system is already reused for virtual machines and runs converged FCoE networks via HP Virtual Connect FlexFabric.

The same customer asks the question: "Can I turn off some of the CPU sockets in BIOS to avoid Oracle license costs?"

The real answer is a higher level statement – help the customer scale so that consolidation ratios are increased without fear of unpredictable costs.

# Value Propositions

- OVCA is a general purpose solution that enables the very rapid deployment of converged infrastructure across a variety of operating systems.
- OVCA automates large scale deployments of Oracle VM infrastructure empowering easy adoption of private clouds and cloud services.
- OVCA is a data center consolidation offering for Enterprise Virtualization.

# Agenda Item



What are the components of an OVCA?

# Converged Infrastructure



**Computing + Storage + Networking**

**Oracle Engineered System**


**Rapid Deployment**

**Ease of Provisioning**

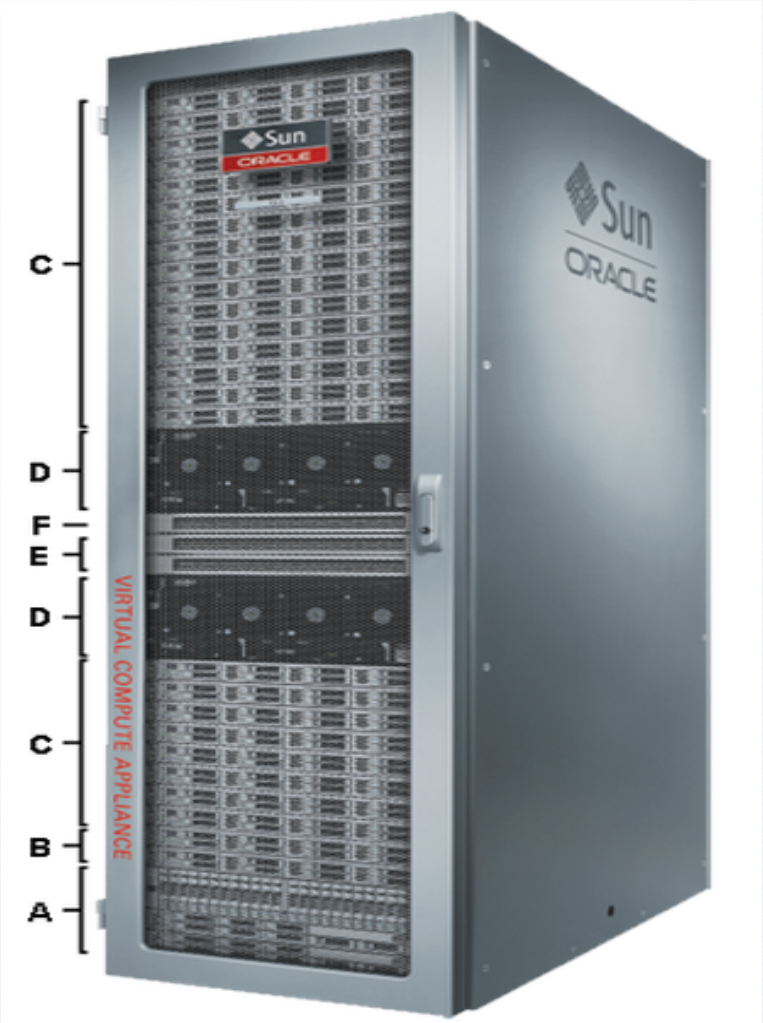
**Workload optimizations**

**Enhanced monitoring**

**High speed connectivity**

**Horizontal & Vertical Scalability**

# Components of an OVCA




| | |
|---|---|
| A : | 1 x Oracle ZFS Storage Appliance ZS3-ES |
| B : | 2 x Sun Server X4-2 as Mgmt Nodes |
| C: | 2-25 x Sun Server X4-2 as Compute Nodes |
| D: | 2 x Oracle Fabric Interconnect F1-F15 Director Switch |
| E: | 2 x NM2-36P Sun Datacenter InfiniBand Expansion Switch |
| F: | 2 x Oracle Switch ES1-24 |

# OVCA Node Specifications



- Each Sun Server X4-2 Compute and Management Node has:
  - (2) Intel 2.6 GHz Xeon (8 core) processors
  - 256 GB 1600 MHz RAM
  - (2) 1.2 TB HDD (RAID1)
  - 1 Dualport QDR Infiniband HCA (PCIe)
  - 1 GigE Management Port (BASET)

- Base rack has 2 Management Nodes and 2 Compute Nodes.

- Compute Nodes can be added for scalability up to 25 total.

- The discovery process of new nodes is automatic and requires no outage to add.

# OVCA ZS3-ES Storage Specifications



- Two clustered controllers with two 1.6 TB SSDs each
- A single disk chassis containing twenty 900 GB SATA drives
- RAID-Z2 configuration leading to 11.3 TB of usable space
- External Ethernet-based (e.g. NFS and iSCSI) storage connectivity is recommended

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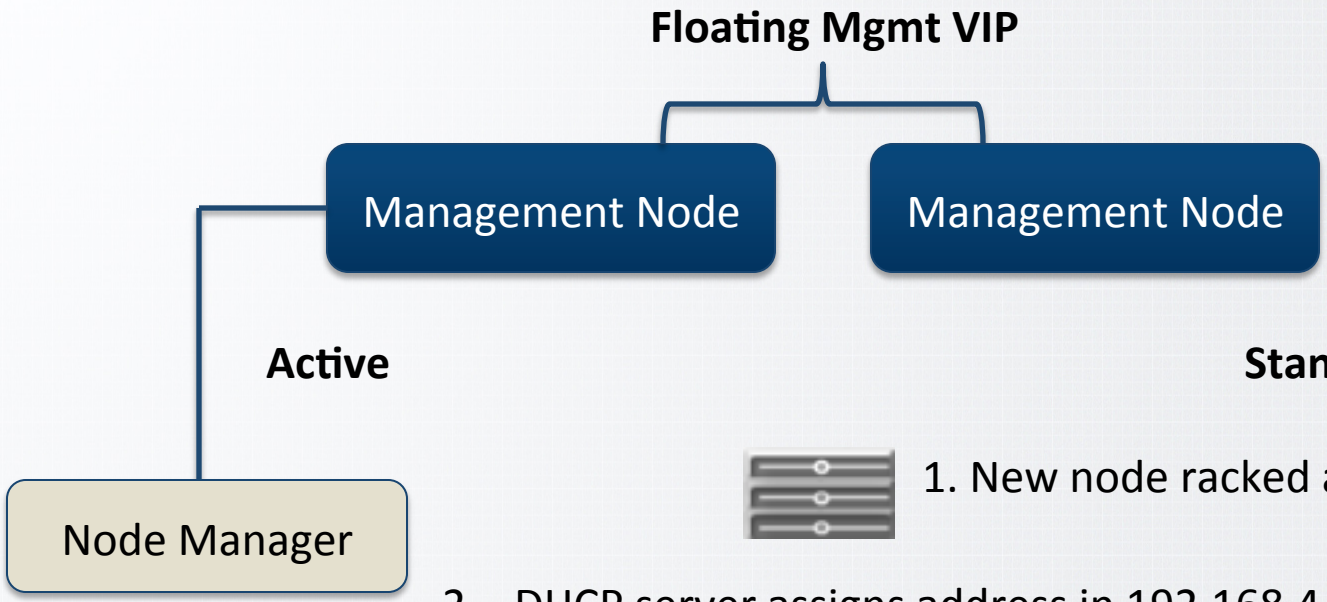
How can the OVCA scale without downtime using automatic node discovery?

# New Node Discovery Process




1. New node racked and powered on
2. DHCP server assigns address in 192.168.4.0/24
3. PXE server delivers software to new node
4. New node is rebooted after firmware imaging
5. Upon restart, Linux Kickstart process is run
6. Kernel modules and drivers for Oracle SDN installed
7. Node rebooted one last time to start Oracle VM Agent

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How does the OVCA simplify network provisioning using Software Defined Networks (SDN)?

# OVCA uses SDN to ease network integration

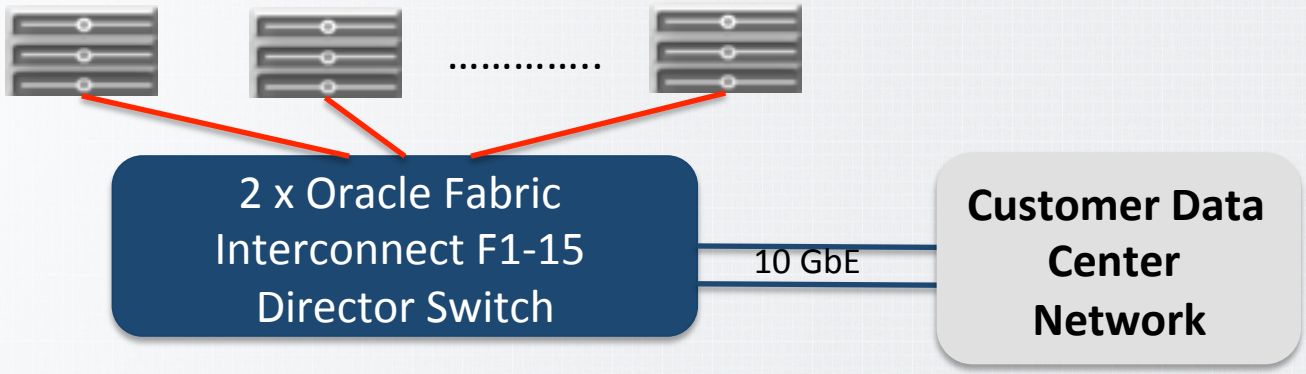


**Software Defined Networking (SDN)** offers the ability to programmatically control networks while avoiding the details of forwarding functions. Virtual networks can be built rapidly on top of pre-existing physical network infrastruture.

SDN solves common data center challenges:

- As the number of virtual machines increases, the amount of East-West network traffic increases.
- Different storage protocols require different network cards, optics, and cabling approaches.
- VLANs and VLAN trunking are cumbersome to configure, scale, and maintain; and, they can't always solve the isolation needs demanded by secure multi-tenancy.
- QoS should be easier to enforce.

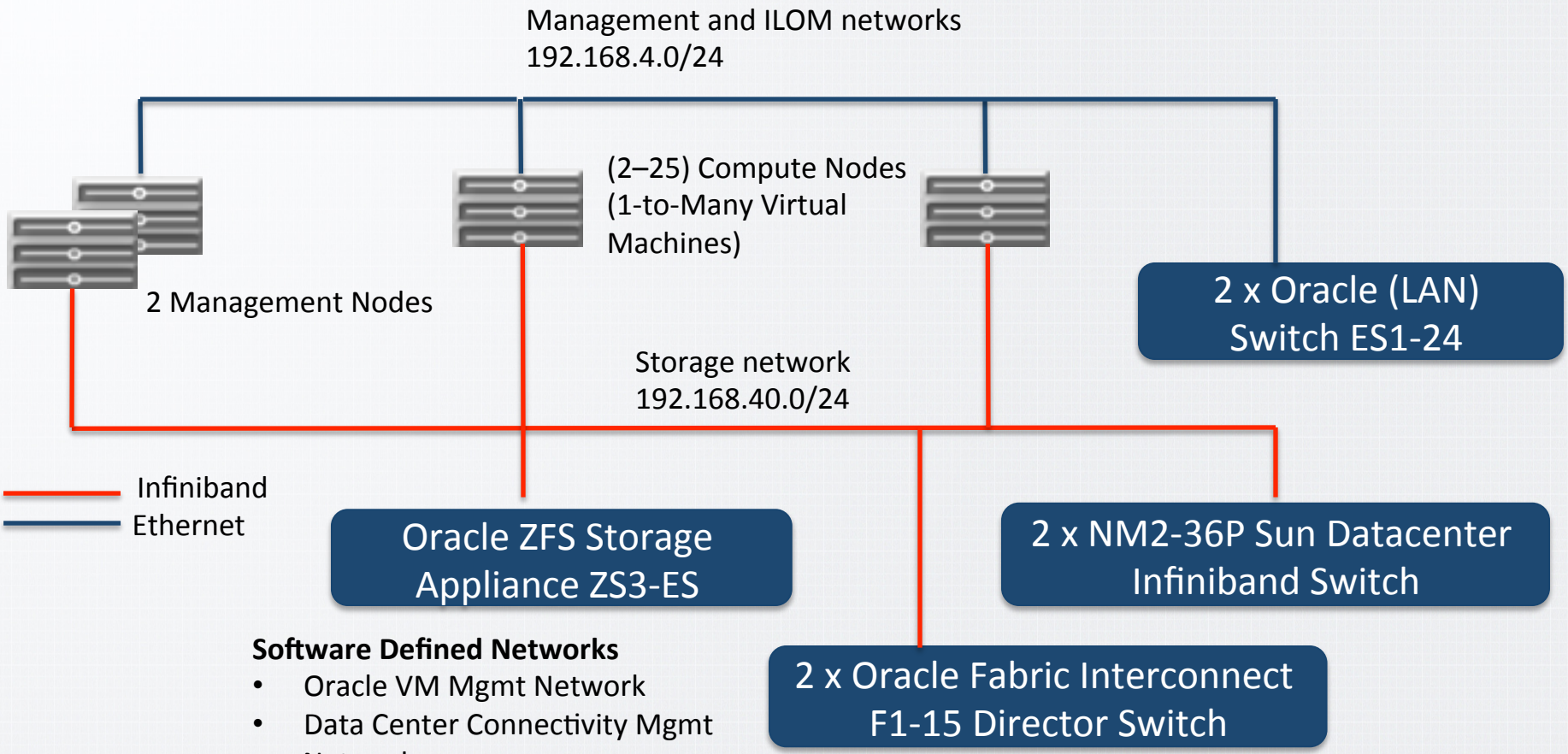
# Rapid Network Provisioning in OVCA




- SDN possible by enabling you to create multiple Layer 2 Private Virtual Interconnects (PVI) by carving out the physical Infiniband bandwidth
- Connections to other Ethernet-based storage (NAS, iSCSI) possible
- Each IB link is 40Gbps (bonded links aggregate to 80Gbps)
- Secure multi-tenancy w/o the use of VLANs (restriction of 4095 VLANs not relevant)
- 16,000 possible L2 Domains
- QoS for SLA management via Oracle Fabric Manager UI

# Oracle Virtual Networking inside of OVCA






**Software Defined Networks**

- Oracle VM Mgmt Network
- Data Center Connectivity Mgmt Network
- Public VM Network
- Private VM Network

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How are some clients currently enabling Enterprise Virtualization?

# Legacy Approach to Templatize Databases



1. **VMware has a script to automate associating a local RHEL ISO to a Kickstart file.**

- The script is located in a downloadable Data-Director-Initialize-Base-DBVM-<build#>.iso
  Download the iso and use an available Linux environment to run:
  mount –o loop /mnt/Data-Director-Initialize-Base-DBVM-<build#>.iso /tmp/mnt

- Customize the disk partition layout, packages, users, grous, network settings, etc. in a Kickstart file and save it in /tmp/mnt

- Download the desired RHEL iso image of choice and place it in a local or accessible network path (e.g. as an NFS mount)

- Run the VMware script to repackage the RHEL iso image with references to the Kickstart configuration file:
  /tmp/mnt/make_installer_iso.sh [REDHAT_ISO_PATH] [REDHAT_VERSION] [Output_folder]

- Place the repackaged RHEL iso image somewhere accessible in the vCenter Data Store

# Legacy Approach Continued



**2. Import the base database template *.ova file from VMware**

- Log in to the vSphere client and connect to vCenter
- Download and deploy VMware-Data-Director-Blank-Base-DBVM-<build#>.ova into the system resource pool
- Inside of the vSphere client, edit the Hardware Settings for the *.ova image and mount the repackaged RHEL iso created in Step #1 on boot
- Power on the VM
- RHEL Linux will be automatically installed based upon Kickstart parameters

# Legacy Approach Continued



**3. After OS installation, ensure that the template is vFabric Data Director compliant**

- Point the CDROM to the Data-Director-Initialize-Base-DBVM-<build#>.iso again
- From the mounted CDROM folder, run *./install.sh –i* to install scripts used to configure Oracle, VMware tools, and a Python runtime.
- Finally, run:
  */opt/aurora/installation/install.sh [NFS path for Oracle binaries] [Oracle_version]*
- Oracle Database is now installed on the VM.
- Convert the VM to a Template.

# Another Approach Outside of Oracle

HP Database and Middleware Automation (DMA) offers standardized Oracle Grid Deployments via Workflows.

The Workflows enable customization and deployment of servers into Smart Groups.

DMA is usually used as a Plugin within the VMware environment.

VMware vCloud Automation Center (vCAC)
—> Catalog —> Service —> DBaaS —> DMA Workflow

vCenter Orchestrator will enable the viewing of the DMA job as a Library Item.

# The Best Approach: Reuse OVM Templates



- Log in to the Active Management Node on the OVCA.
- After adding the desired parameters, simply execute:

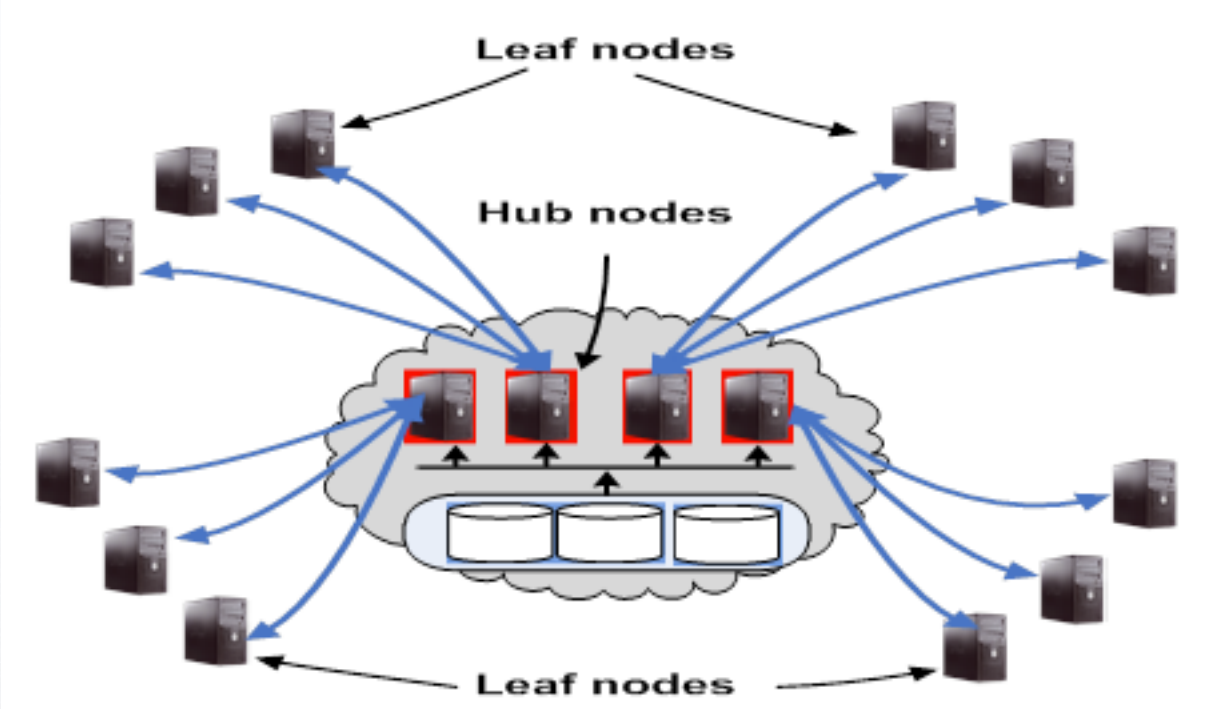
***deploycluster.py <Oracle VM Manager login> <DB/RAC OVM Templates Options>***

- History of Database Templates:

***2010 – Initial release only with Oracle VM 2 deployment style options***
***2012 – deploycluster tool released with Oracle VM 3***
***2013 – Support for Single Instance, Oracle Restart, and Oracle 12c (Flex Cluster, Flex ASM, Container/Pluggable Database)***

# Large Scale Deployment on OVCA






100 node clusters are easy to achieve via the database tempaltes

# Agenda Item



What does OVCA offer and enable to improve Enterprise Virtualization?

# Easing the conversion from physical to virtual



- Build and ready the Cloud Infrastructure environment (i.e. OVCA is pre-built, just power on)
- Create virtual assemblies using Oracle Virtual Assembly Builder (OVAB)
- *In the future*, connect OVCA to OEM Cloud Control 12c to upload the virtual assemblies into the software library; or, for now, manually import into the OVM Manager repository
- If using OEM Cloud Control 12c, deploy the virtual assemblies through the Self Service Portal. Or, simply execute clone operations manually from within OVM Manager

# Introspection of existing systems

- You can directly start from pre-built assemblies downloaded from Oracle; or, you can configure reference systems and perform introspection.

- Introspection captures the state of existing physical or virtual systems and creates metadata to describe the current software configuration for reuse in the virtual assembly.

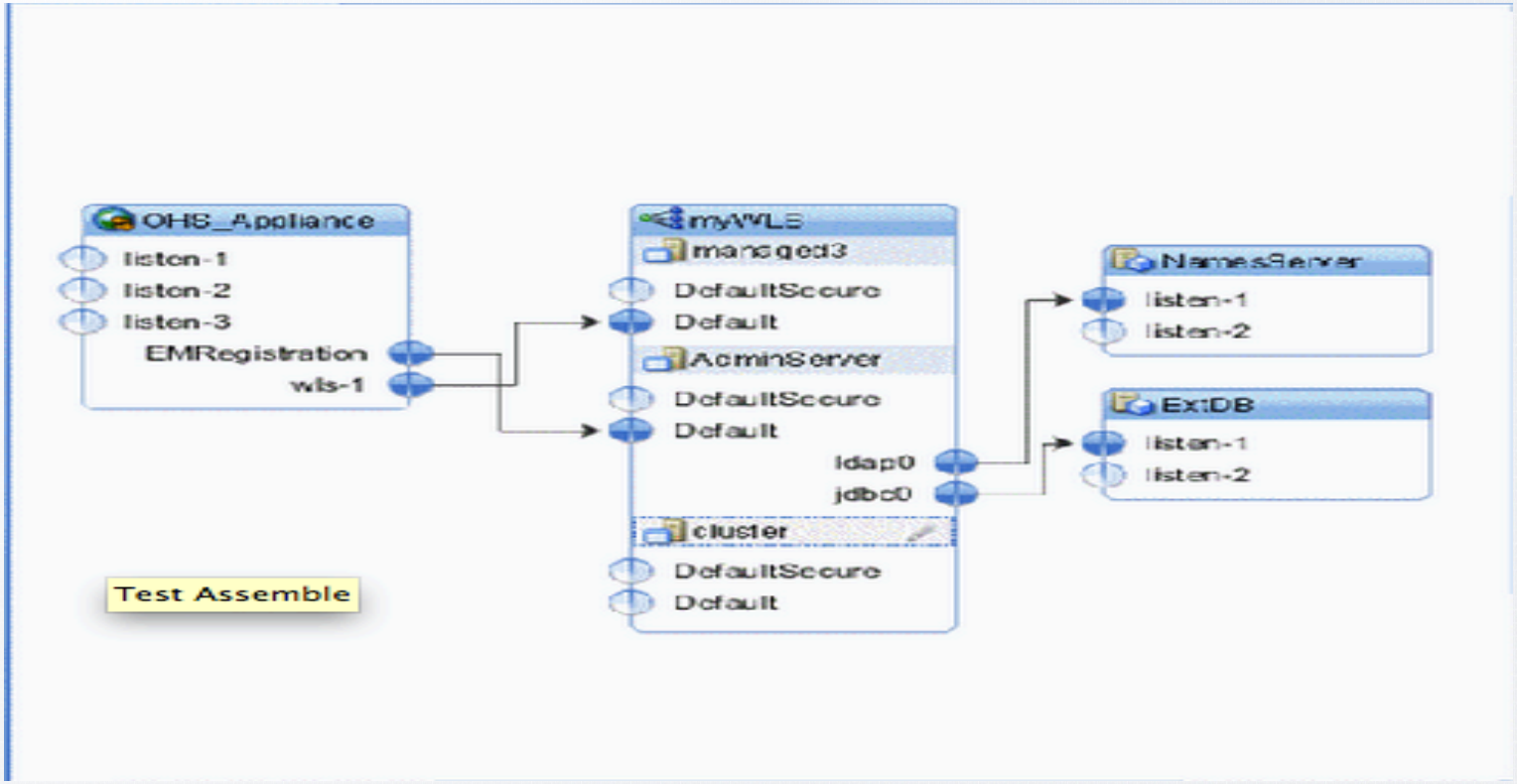
- Currently, introspection of only Oracle WLS, OHS, Coherence, Web Cache, and RDBMS is supported; but, custom scripts can be placed on the reference systems for initial, pre-, and post- during the appliance build.

**./abctl introspectOHS –name *mainWebServer***
**-remoteHost *webServerHost* –remoteUser *admin***
**-oracleInstance */path/to/ohs* –componentName *ohs1***

**Output to *$catalog/bundles/$cid* for importing as package later in OVAB**

# Creating an Enterprise topology with OVAB

Command-line invocation: $AB_INSTANCE/bin/abctl
GUI: $ORACLE_HOME/bin/abstudio.sh




*Per Oracle Documentation*

# Import assemblies into OVCA via OVM Manager



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How does an OVCA reduce the cost of software licenses?

# Oracle VM and VMware tidbits



- vSphere 5.5. Configuration Maximum of 64 vCPUs per Virtual Machine
  ***Oracle VM supports up to 128 vCPUs per Virtual Machine***

- CPU affinity and pinning in VMware does not enable licensing a subset of the ESXi host capacity
  ***Oracle offers subsystem pricing in OVM via hard partitioning***

- Due to license concerns, customers tend to restrict VMware vMotion using DRS host affinity
  ***Hard partitioning in Oracle VM enables more consolidation by limiting the license impact of Live Migration***

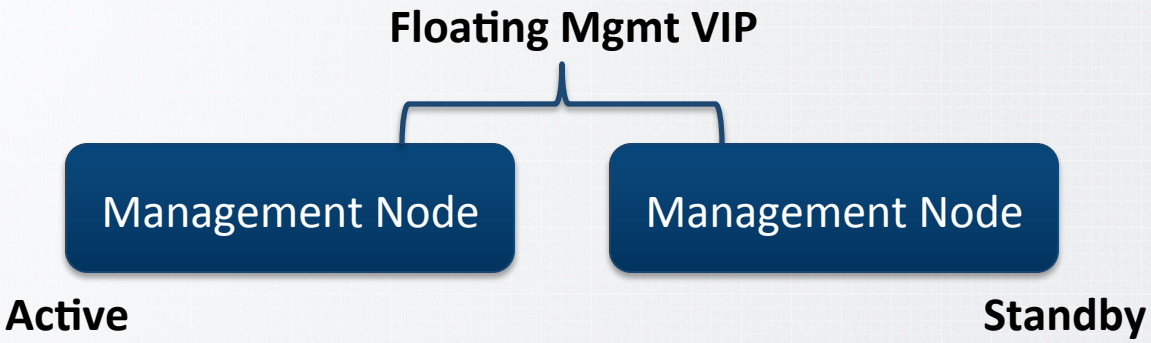
# Agenda Item



How does OVCA fit into Cloud control and management?

# Accessing the OVCA



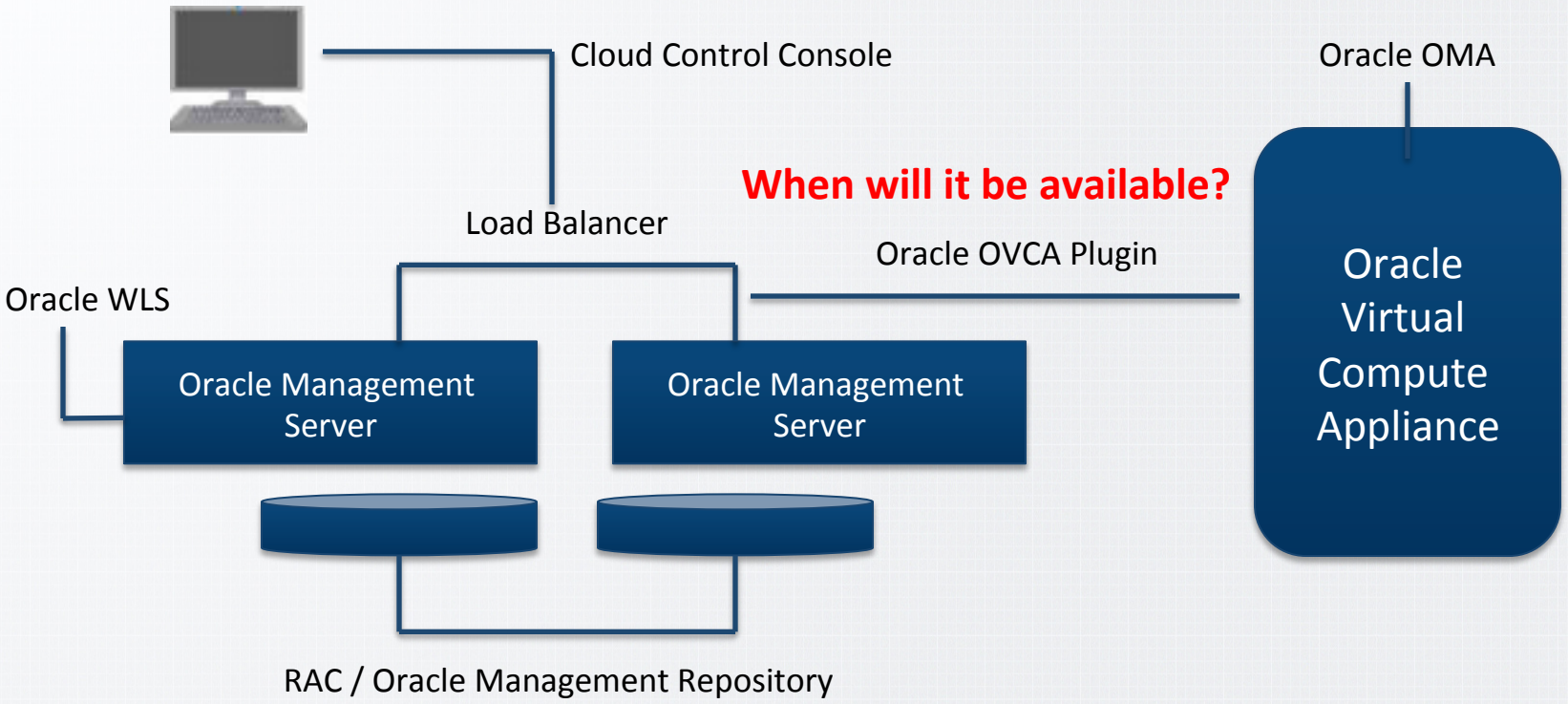



**OVCA Dashboard**
*https://mgmt-vip:7002/ovca*

**Oracle VM Manager**
*https://mgmt-vip:7002/ovm/console*

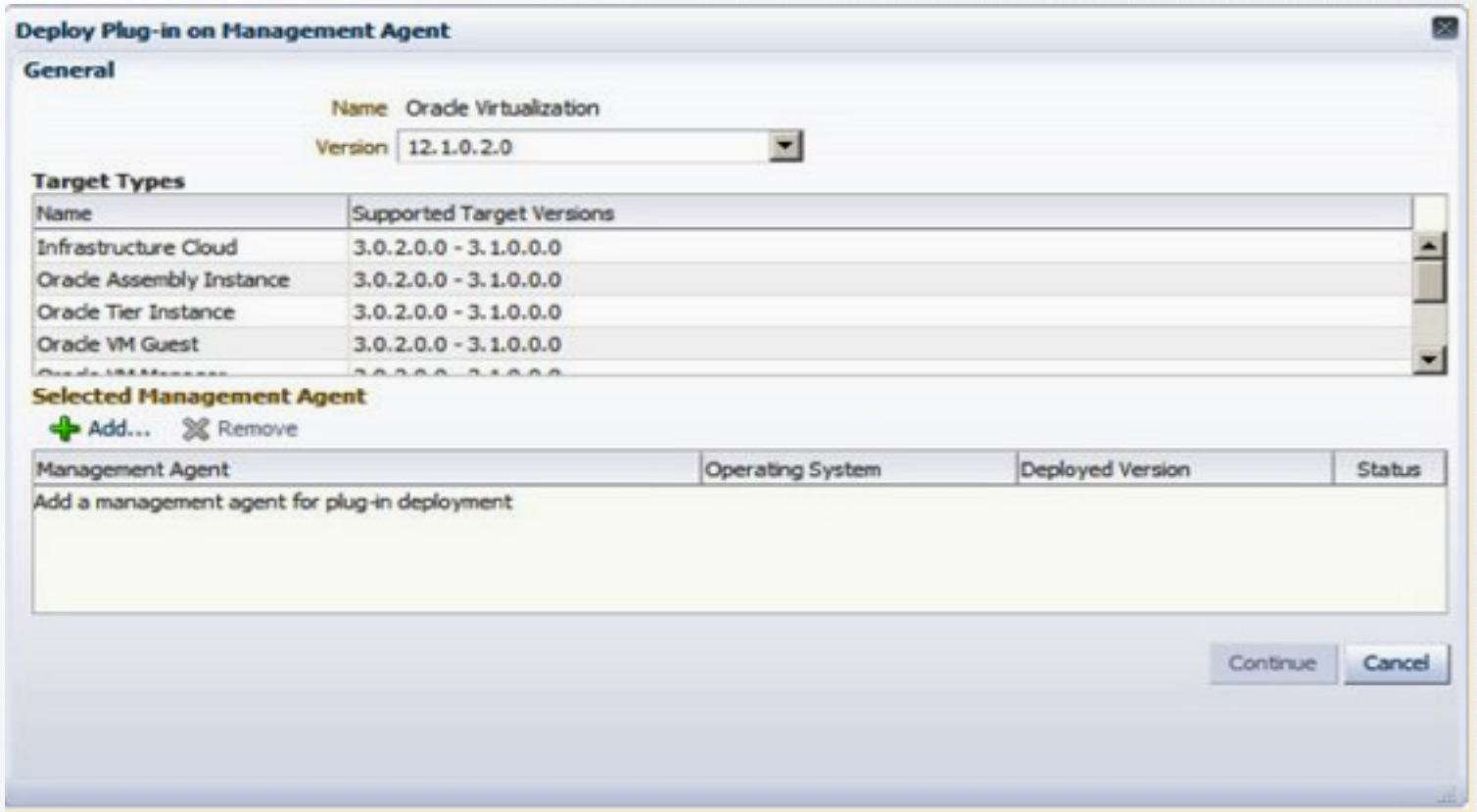
# Customer Wishlist – OEM Cloud Control 12c





# Use the Virtualization Plugin






Oracle VM Manager Core is *tcps://mgmt-vip:54322*

# Workarounds to using Virtualization Plugin

- A virtual server pool is a collection of one to many physical servers running the Oracle VM hypervisor.
- A zone is a collection of virtual server pools that share storage.
- An administrator can operator collectively on all of the virtual machines within a zone.
- *Many of the monitoring metrics in OEM with regards to VM peformance are exposed in the OVCA dashboard.*
- *As an alternative to OEM, use OVCA's OVM Manager to manage the VMs (e.g. DRS/DPM, Live Migration settings, cloning from templates, etc.)*
- *One key advantage to OEM Cloud Control 12c is the offering of iAAS, DBaaS, PaaS*

# Agenda Item



Why is an OVCA easy to maintain?

# Automated Backups of the OVCA

- A cron job runs twice daily from the Active Management node (by default, 0900 and 2100 hrs).
- The Backup files are stored as an NFS mount of the MGMT_ROOT filesystem on the ZFS storage appliance.
- The Backup files contain all of the switch and ZFS controller configuration data, including DHCP configuration for all of the nodes.
- In addition, backup files for the Oracle VM Manager database (MySQL) on the management nodes are saved on ZFS.
- Storage is exposed to the compute nodes via a shared OCFS2 filesystem for reuse by the VMs. Internally, ZFS carves this storage using RAID-Z2.
- *There is no standardized approach for Disaster Recovery.*

# Patching the OVCA



Management Node

- Download patch bundles (between 4-5GB) using any proxies in /etc/ovca.conf and a command line invocation.
- Store the patch on a shared ZFS NFS export
- Start the Activation Process on Master node
  - Reboots the Standby node
  - Updates the Standby node with new patch
  - Master node then reboots itself
  - Standby node is promoted to Master and then conducts the Activation Process on other node

# Manifesto Revisted



- Virtualization, deployment, and ongoing management of n-tier applications should be simplified.
- Data center consolidation should be modeled using tools that facilitate migration planning and automate discovery of existing assets.
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# Contact Us



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