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## **Application-Aware Virtualization**

Shail Goel, Principal Product Manager, Oracle Virtual Assembly Builder  
Anand Rudrabhatla, Senior Principal Product Manager, Oracle WebLogic Server  
Carlos Garcia Fernandez, CERN openlab

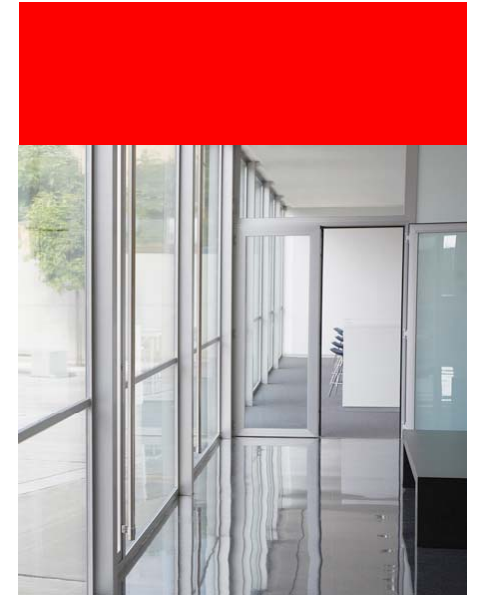


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## Agenda

- Oracle Virtual Assembly Builder Overview
  - Shail Goel
- Oracle WebLogic Server with JRockit Virtual Edition Overview
  - Anand Rudrabhatla
- Oracle WebLogic Server with JRockit Virtual Edition Performance Tests at CERN openlab
  - Carlos Fernandez



# Customer Requirements



## Operational Efficiency

- Simplified Self-Service Access
- Programmatic Configuration



## Deployment Efficiency

- Standardized Building Blocks
- Automated Provisioning



## Runtime Efficiency

- Improved Performance
- Lower Cost



# Oracle Virtual Assembly Builder

SOFTWARE.  
HARDWARE.  
COMPLETE.

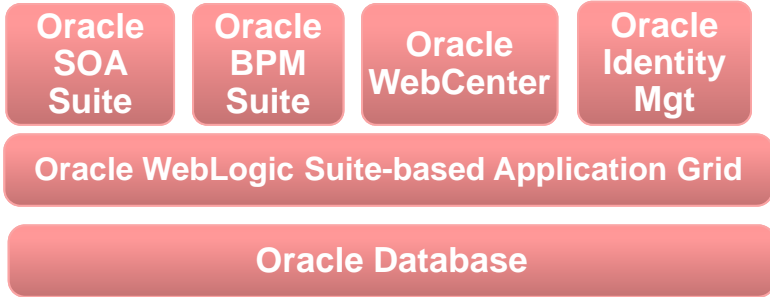
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## Oracle Virtual Assembly Builder Enables

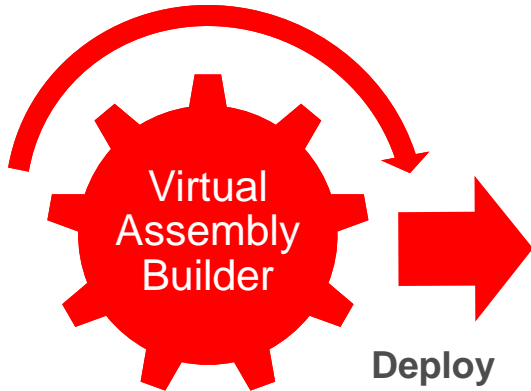
- Automated packaging and deployment of complex topologies
- Composition of a N-tier assembly from a collection of self-contained software appliances
- Deployment onto a pool of virtualized hardware resources with minimal user input
- Dynamic configuration of assembly upon deployment



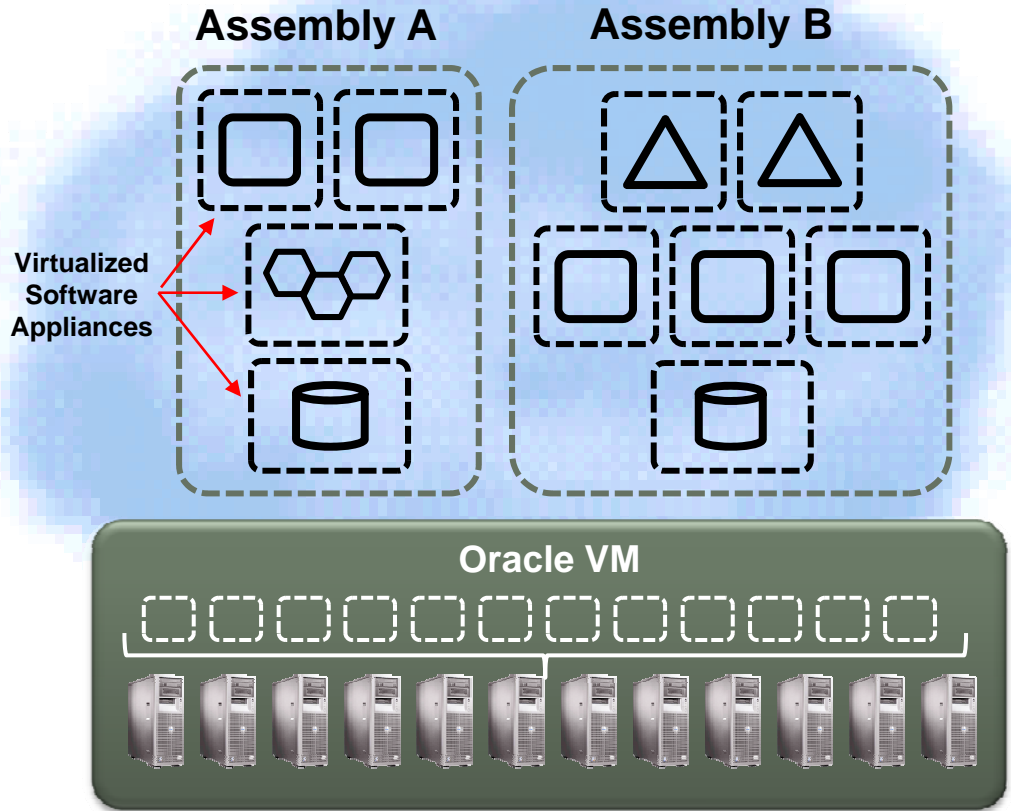
# Full N-Tier Deployment and Management of Complex Applications Onto Virtual Infrastructure



Capture, Assemble  
&  
Package



Enterprise Manager  
Grid Control  
Oracle VM  
Manager



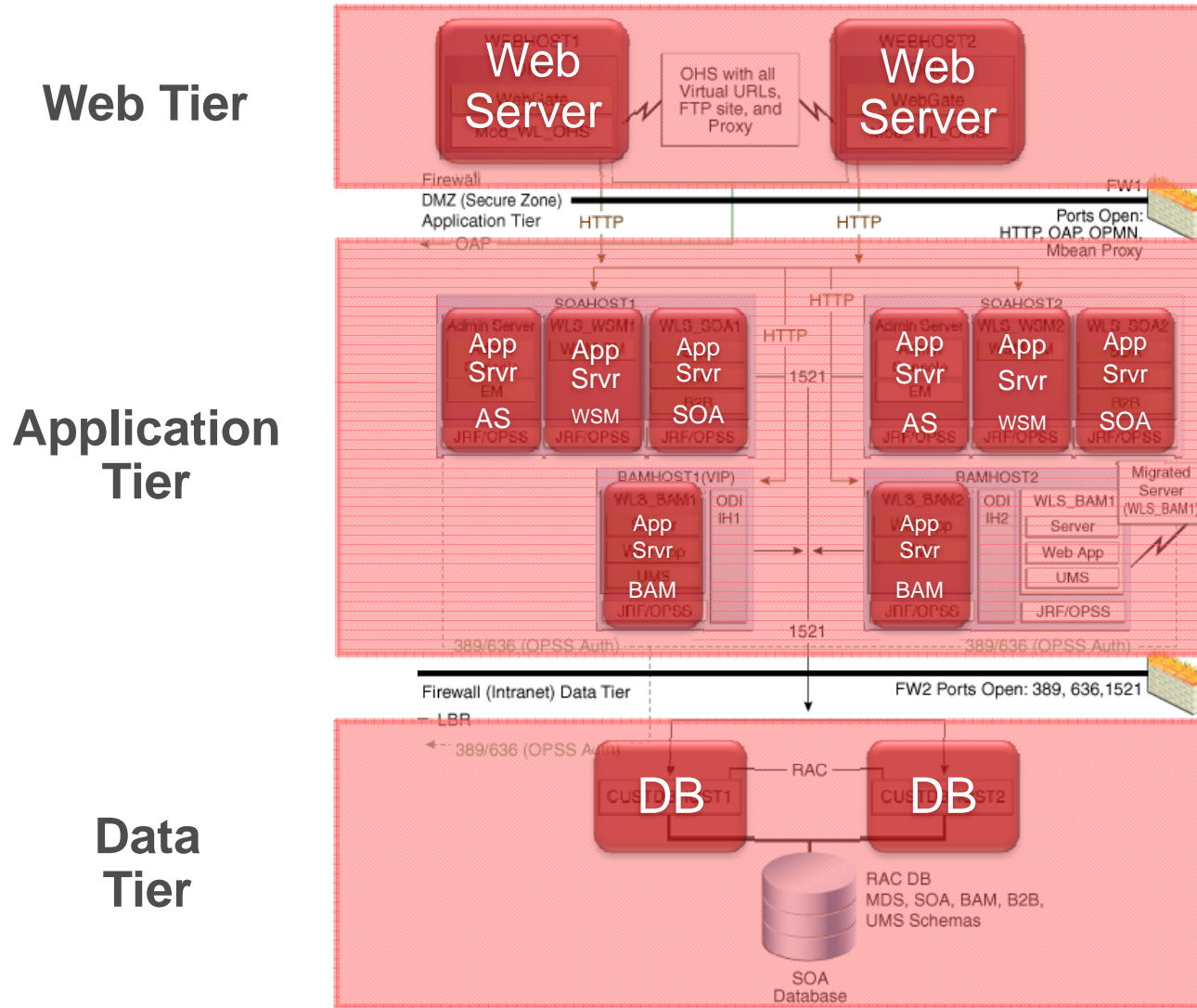




## Some Target Use Cases for Virtualized Deployment

- **Development Farm**
  - Developers require access to their own environment
    - E.g. SOA Suite, Service Bus, DB
  - Setup requires corporate standard configuration
  - Repeatedly configure dozens such environments into VMs
- **Shared Services Environment**
  - Application teams require custom platform environments
    - WebLogic Server, BPM, SOA Suite, etc.
  - IT prescribes corporate std. components and configurations
  - Deployment topology scaled to different sizes (S – M – L) as collection of VMs

# Typical Deployment Topology for Oracle SOA Suite



Web Tier

2 nodes

+

Application Tier

8 nodes

+

Data Tier

2 nodes

---

12 nodes

# Challenges in Configuring and Deploying New Application into Virtualized Environment

1 to 3 weeks



Provision virtualized resources

Install & configure OS and all platform software

Create / customize scripts to "automate" process

Use scripts or manually configure all software components to create platform environment

Integrate and test complete end-to-end platform environment

Deploy application

1-5 days

1-2 days

1-5 days

.5 day

1-2 days

.5 day

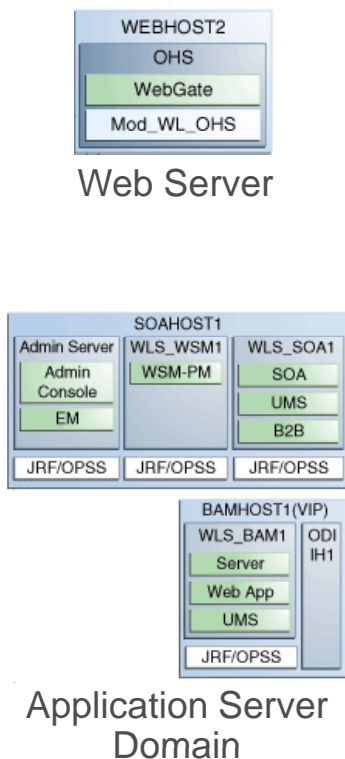


## Slash Total Configuration and Deployment Time for Multi-Tier Application Topology from Days to Hours

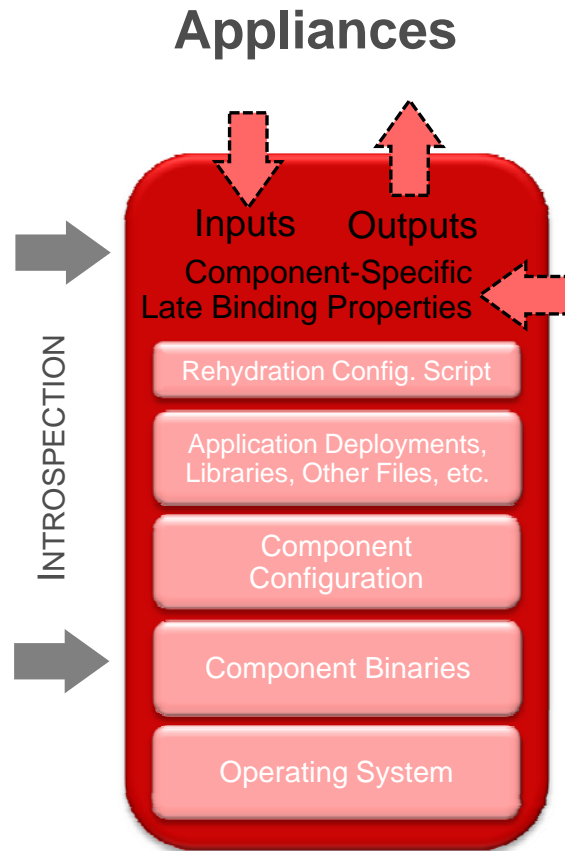
- Standardize
  - Create self-contained software appliances
  - Eliminate customized one-offs and configuration errors
- Templatize
  - Create configurable blueprints for entire application topology
  - Simplify repeatable process for predictable outcomes
- Automate
  - Orchestrate deployment and configuration of all components
  - Reduce manual oversight and expert administration

# STANDARDIZE: Appliances

## Reference Installation

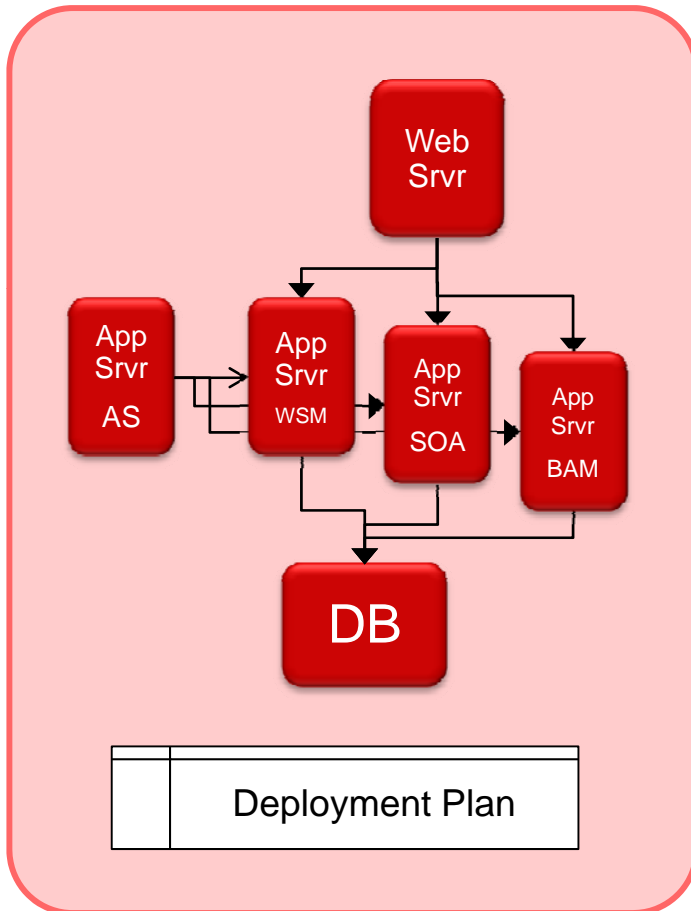


## Appliances



- Application-aware P2V
- Self-contained virtual disk images with all s/w to run single instance of a single component
- Customize base OS distrib.
- Component configuration and libraries from reference system captured during introspection
- Configurable properties set at deployment time
- Automatically packaged for target virtual platform

## TEMPLATIZE: Assemblies



- Blueprint describing complete multi-tier application topology
- Collection of all interrelated appliances
- Start-order dependencies
- Allow connection to external resources from appliances (e.g. DB, LDAP server, mail server, web services endpoints, etc.)
- Customize deployment properties for all appliances using Deployment Plan
- Treated as a single deployment unit

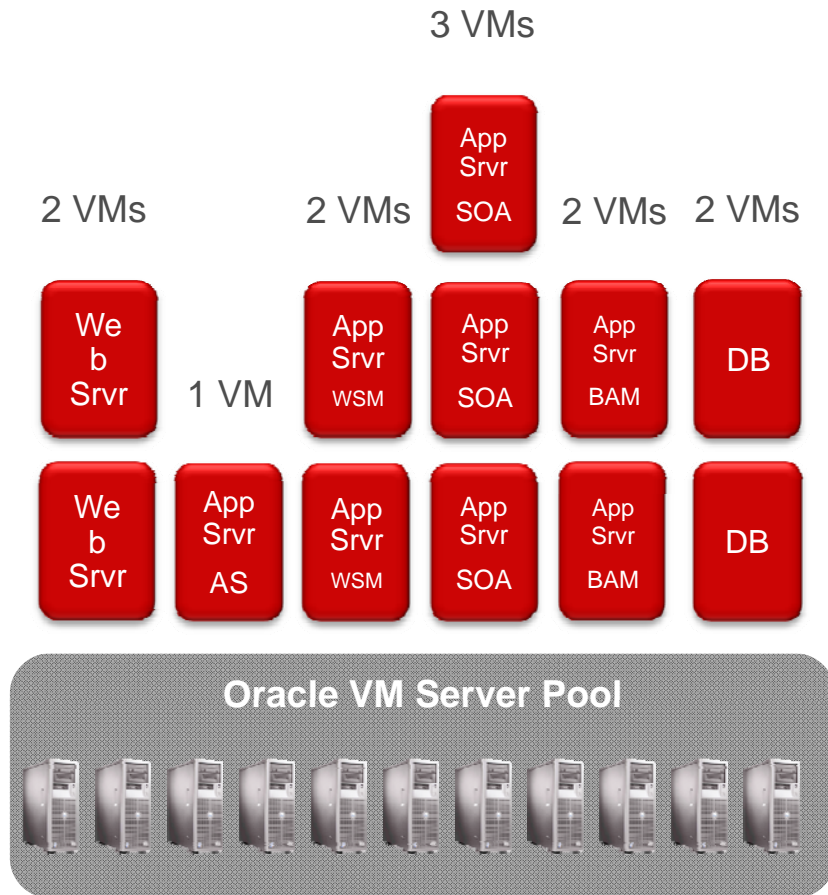


## TEMPLATIZE: Deployment Plans

	<p>Appliances</p> <ul style="list-style-type: none"><li>• Scaling<ul style="list-style-type: none"><li>• Min, Max, Initial</li></ul></li><li>• VM Properties<ul style="list-style-type: none"><li>• CPU, Memory</li></ul></li><li>• Component Properties<ul style="list-style-type: none"><li>• JDBC, etc.</li></ul></li><li>• Networking Properties<ul style="list-style-type: none"><li>• IP address</li></ul></li><li>• User Properties<ul style="list-style-type: none"><li>• Login, Passwords</li></ul></li></ul>

- Overrides for configurable properties for all appliances
- Multiple deployment plans for same assembly
- Use CLI commands to script assembly deployment with different deployment plans

# AUTOMATE: Orchestrated Deployment



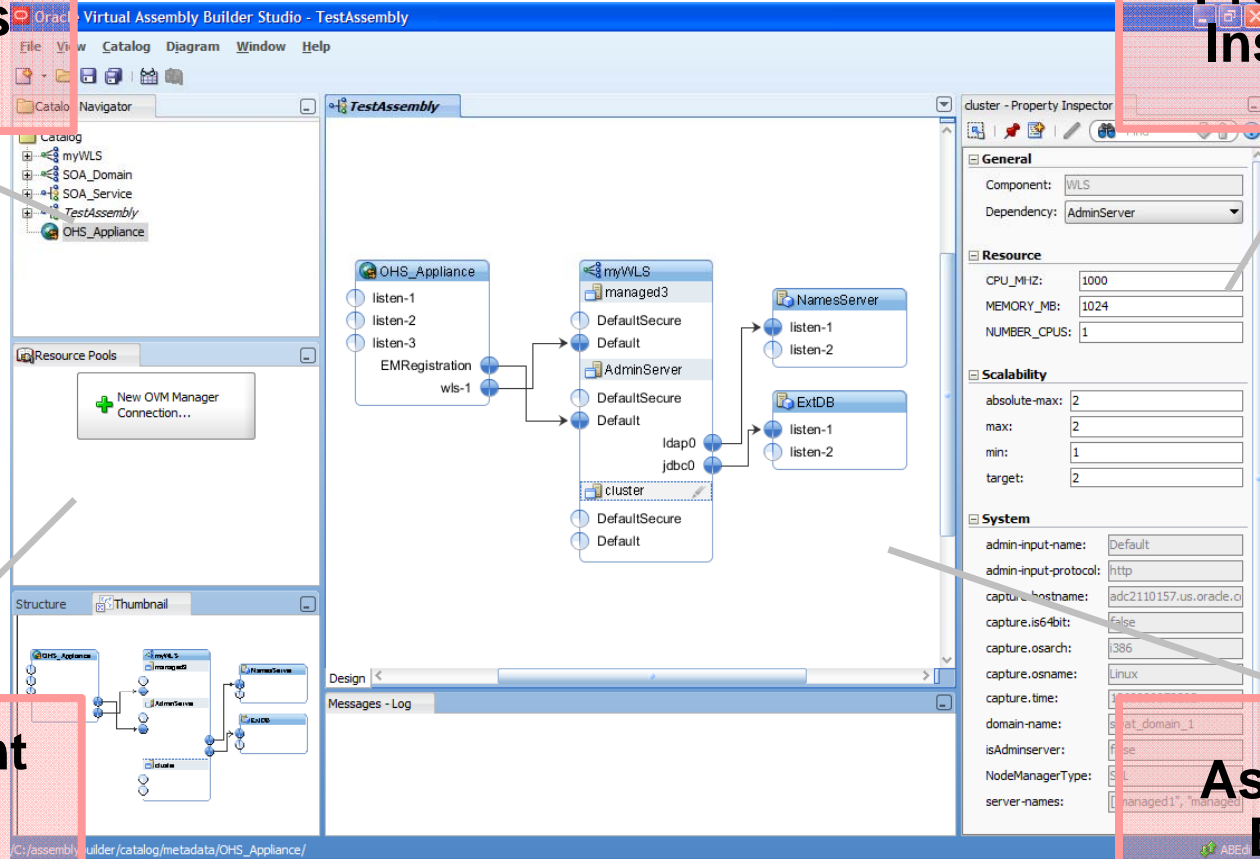
- Deploy and configure collection all VM instances within assembly with single command
  - Start specified number of instances for all appliances
  - Establish defined relationships between appliances
- VM lifecycle
  - Stage → Prepare → Start
- Software lifecycle within each VM
  - Use properties from Deployment Plan
  - Start OS → Configure OS → Configure networking
  - Start component → Configure component
  - Apply properties picked up from other appliances
  - Listen for component-specific “ready metric”



# Oracle Virtual Assembly Builder Studio

Assemblies,  
Appliances  
Catalog

Properties  
Inspector



Deployment  
Resource  
Pools

Assembly  
Editor



## Current Capabilities of Oracle Virtual Assembly Builder 11gR1

- Studio application with CLI for scripted actions
- Appliance creation for multiple components
  - Oracle WebLogic Server, Oracle HTTP Server, Oracle Web Cache, Oracle Database (single instance)
- Deployment onto Oracle VM 2.2
- Remote introspection from Linux environment
- Packaging appliances with Oracle Enterprise Linux
  - WebLogic Server appliances can also be packaged using Oracle JRockit Virtual Edition



## Roadmap

- Deploy OVF compliant appliances onto OVM 3.0
- Integration with EM Grid Control
  - Monitoring, deployment, lifecycle management
- Introspection for additional components
  - RAC database, Coherence, SOA, External Appliances
- Support for PaaS and Cloud deployment patterns
  - Concurrency, separable catalog, VLAN & Volume config.
- Additional virtualized deployment platforms
  - Solaris Containers
- Customized introspection and appliance creation
  - SDK for plugin development

A man in a dark suit, light blue shirt, and striped tie is sitting in a chair, gesturing with his right hand. He is positioned in front of a row of server racks. The server racks have perforated metal doors. The background is a blurred office setting with large windows.

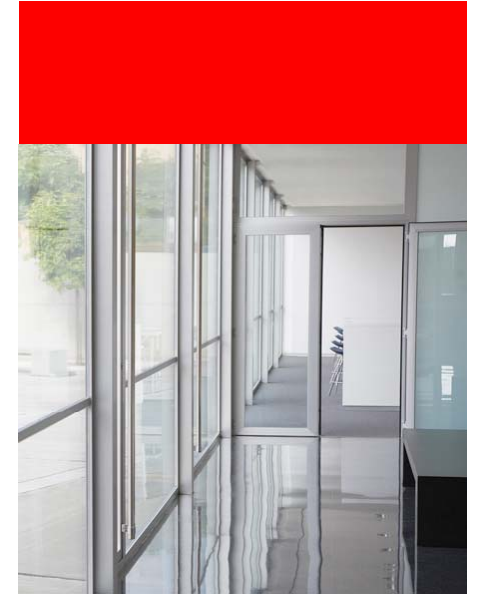
**Oracle WebLogic Server  
with  
JRocket Virtual Edition**

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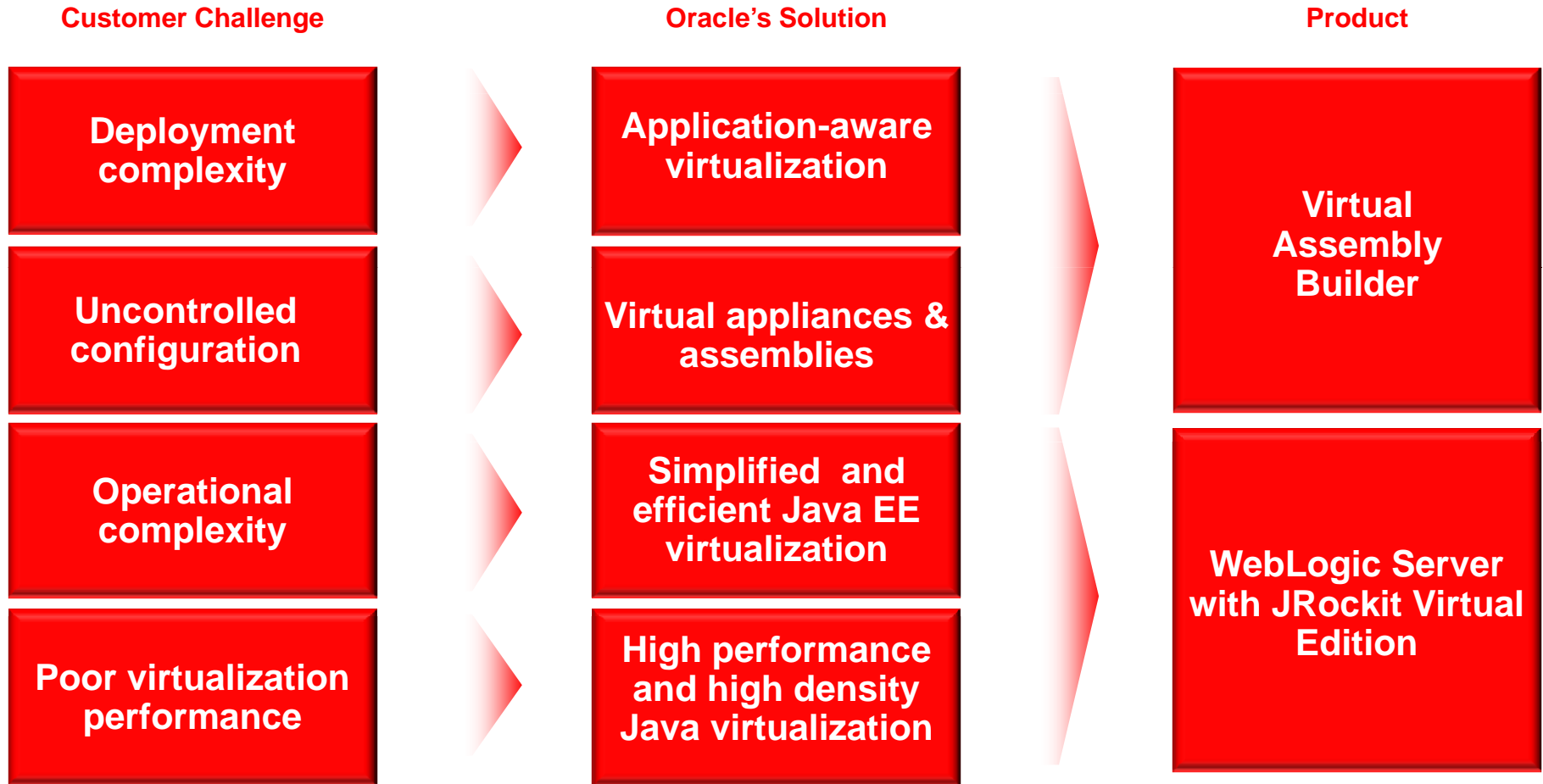
## Agenda

- Oracle WebLogic Server with Oracle JRockit Virtual Edition Overview
- CERN Preliminary Test Results
- Roadmap

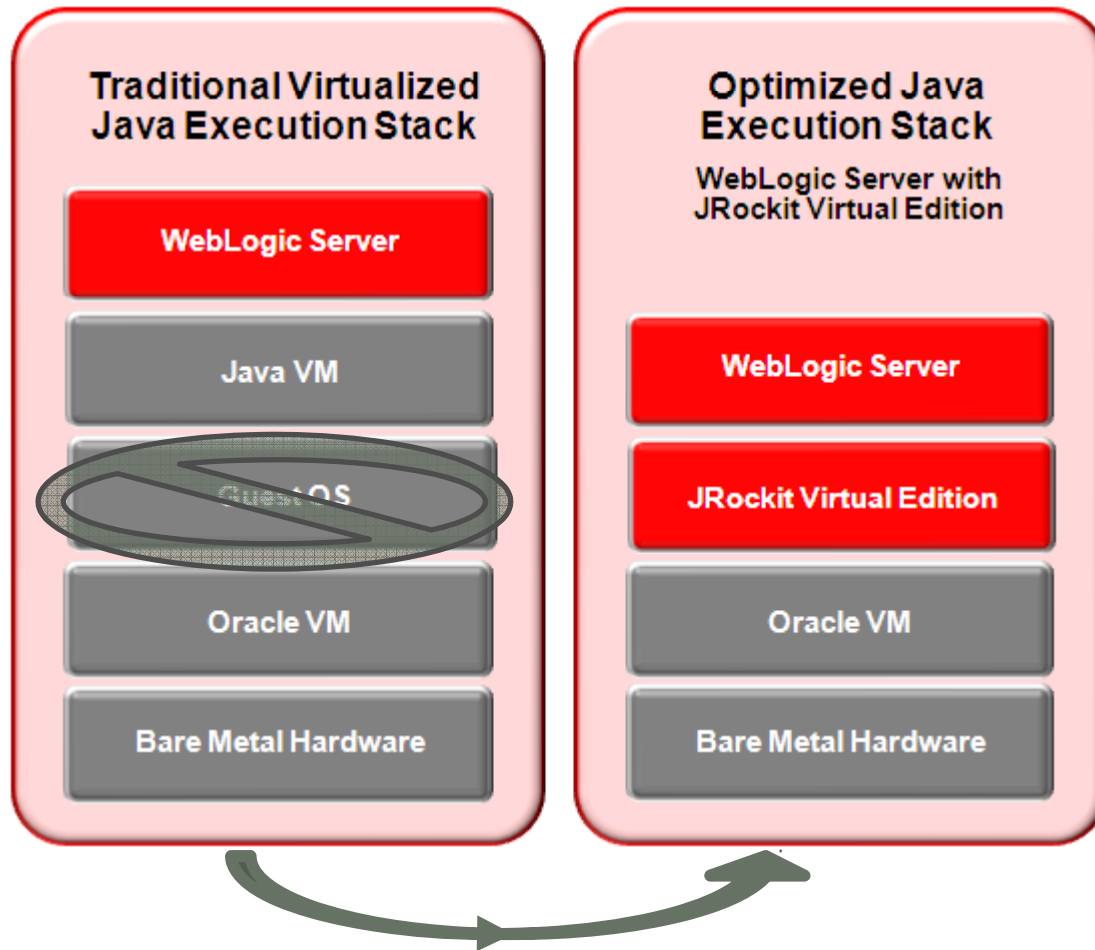


# Product Motivation

## High Performance, More Dense and Efficient Virtualized Java



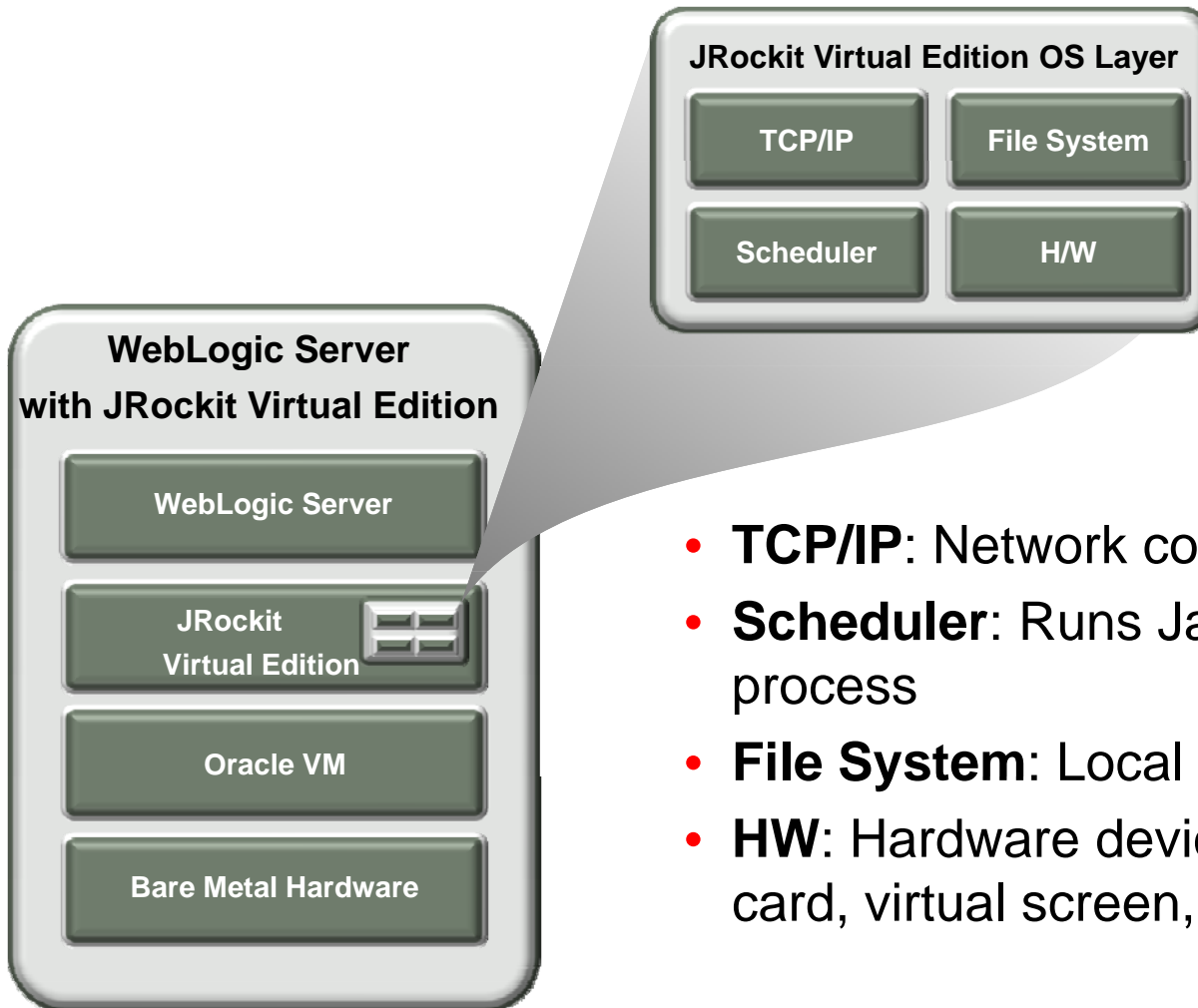
# WebLogic with Oracle JRockit Virtual Edition



- **Runs natively on hypervisor**
  - Higher density
  - Better performance
- **Reduced operational cost**
  - Simpler patching
  - Improved security
- **Same administrative infrastructure**
  - WebLogic console + scripting
  - Enterprise Manager JRockit Mission Control
- **Custom Java appliances**
  - Building blocks for larger assemblies
  - Simple deployment

# JRokit Virtual Edition

How does it work?

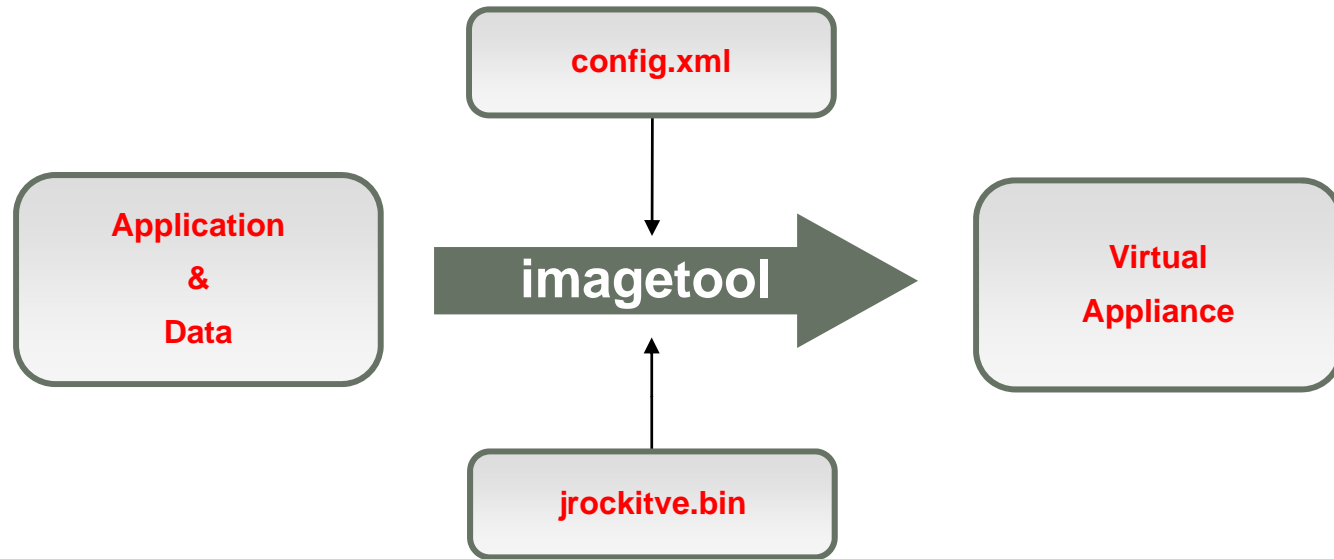


- **TCP/IP:** Network communication
- **Scheduler:** Runs Java threads. Single process
- **File System:** Local [virtual] disk
- **HW:** Hardware device interaction. Network card, virtual screen, etc.



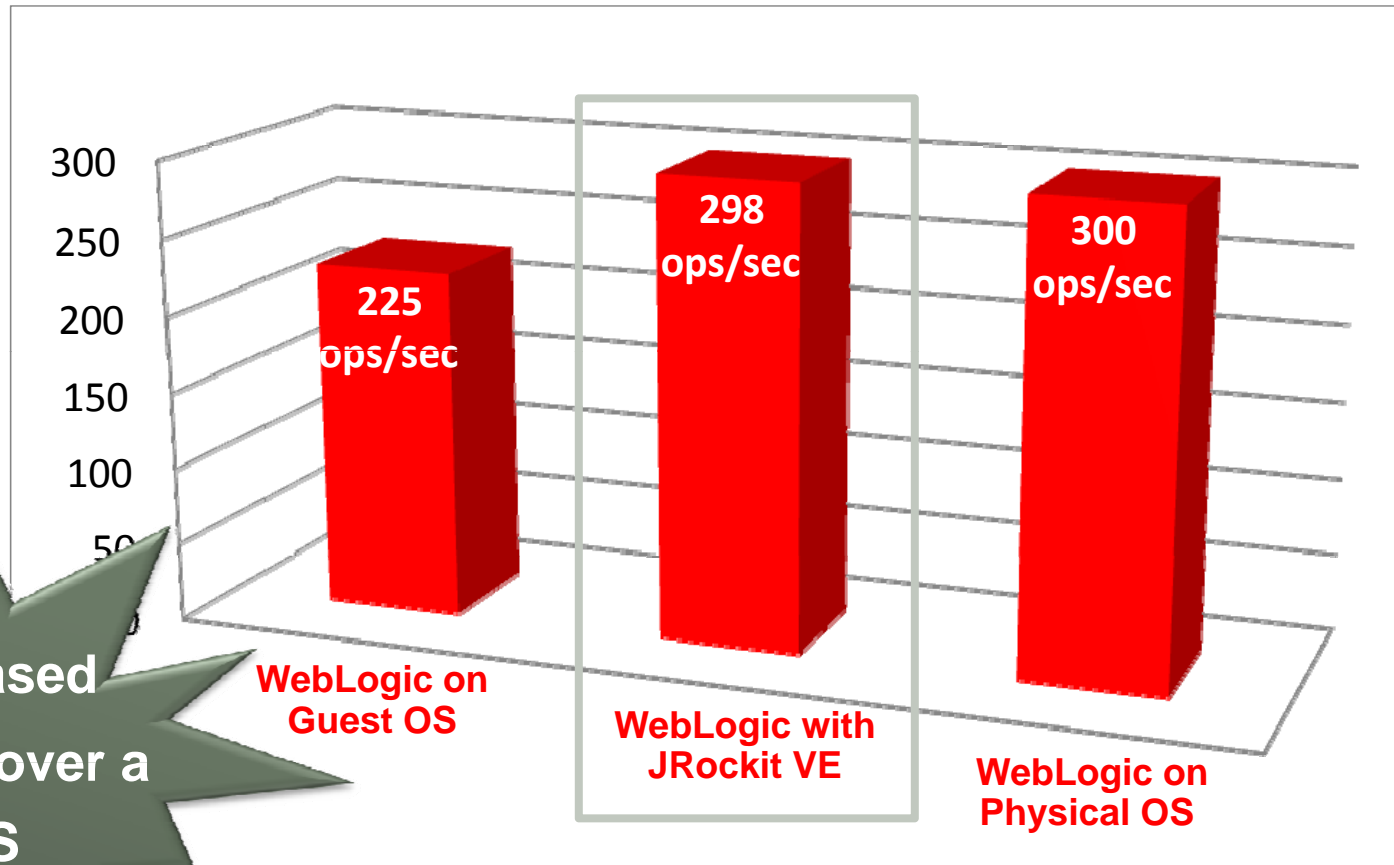


# Image Tool



- Enables appliance assembly and configuration
- Enables writing/injecting files to the virtual disk
- Supports reverse operations – disassemble to physical disk

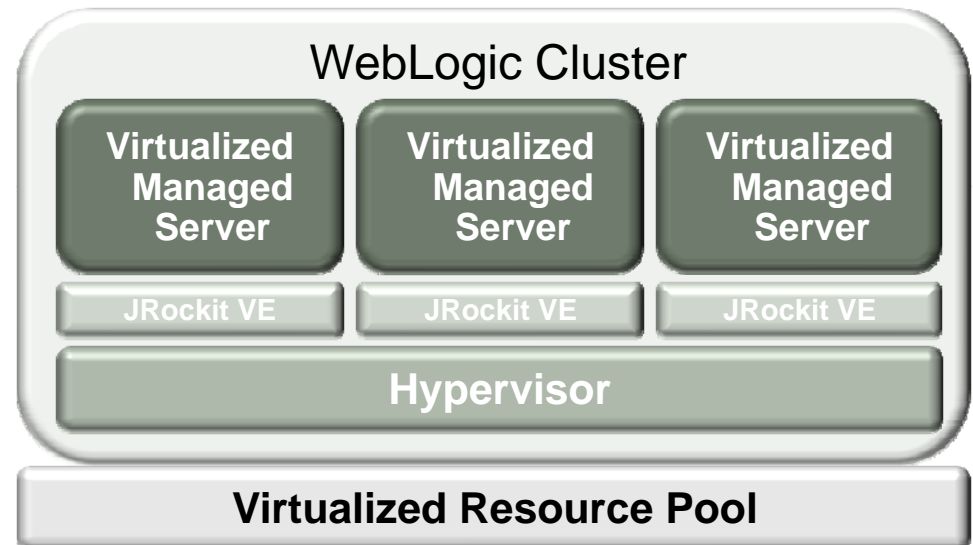
# Virtualized Performance: WebLogic Server with JRockit Virtual Edition



**32% increased performance over a guest OS**

# WebLogic Server with JRockit Virtual Edition

- **Standard WebLogic Server**
  - Running on JRockit Virtual Edition
- **Simplified and efficient virtualized Java EE**
  - Administration and management is virtualization aware
- **Increased performance and density**
  - Virtualized Java EE applications run faster and with more instances on the same hardware





## Introducing CERN

- Developed comprehensive performance benchmark for WebLogic Server with JRockit Virtual Edition
- Share preliminary results based on their testing of WebLogic Server with JRockit Virtual Edition



**Oracle WebLogic Server  
with JRockit Virtual  
Edition at CERN openlab**

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# **CERN**

**European Organization for Nuclear Research**  
**All CERN members: ~12000 users**

*15 PetaBytes of new data each year*

*40k cores*

**The world's largest particle physics laboratory**

**Located on Swiss/French border**

**Founded in 1954**

**Birth place of World Wide Web**



# CERN's use of WebLogic Server Overview

## Migration from iAS to WebLogic Server

- **CERN's figures:**
  - We are currently running 73 application servers in iAS.
  - We are preparing all the infrastructure to migrate to WebLogic Server
- **Virtualization:**
  - Growing number of application servers (and database servers) at CERN
  - Need to consolidate and make better use of resources
- **OVM:**
  - Big effort to integrate Oracle VM in CERN's complex infrastructure using Large Fabric Management Systems
  - The installation and fully configuration of a bare metal server with either Linux or Oracle VM takes 20 minutes without any human interaction
- **Why WebLogic Server with JRockit Virtual Edition:**
  - Simplifies the provisioning of application servers
  - Less complexity avoiding the installation and configuration of an OS in the servers
  - Higher Performance



# Tests run at CERN

## Description

- **Performance tests:**

- We chose an application with high load of CPU activity and memory but not I/O bound.
- This application is the APT (Activity Planning Tool). A very important application used to manage the resources, manage new staff contracts, replacements, as well as budgets and much more administrative operations.
- We run the same tests in WebLogic Server with JRockit Virtual Edition and WebLogic Server with RHES5 in a Physical machine.

- **Content:**

- Uploading and processing files with some complexity.

- **Machine configuration:**

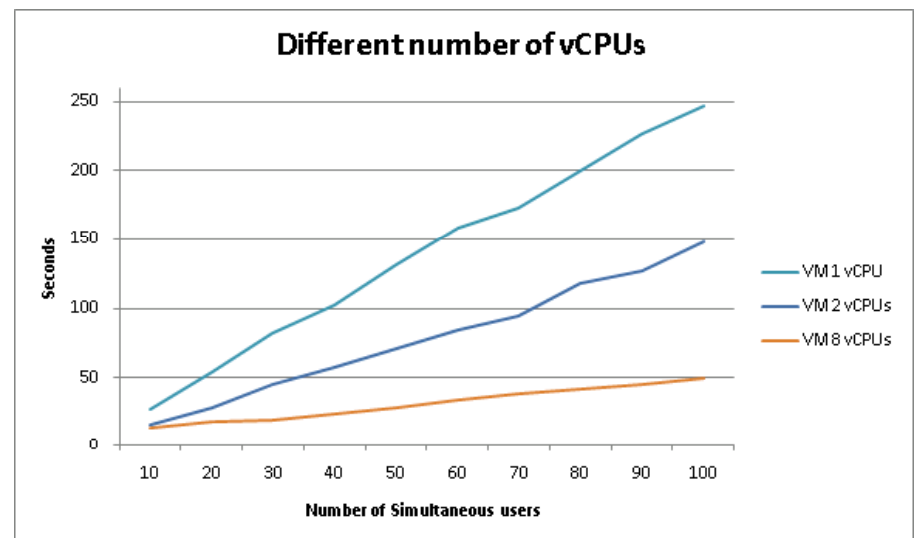
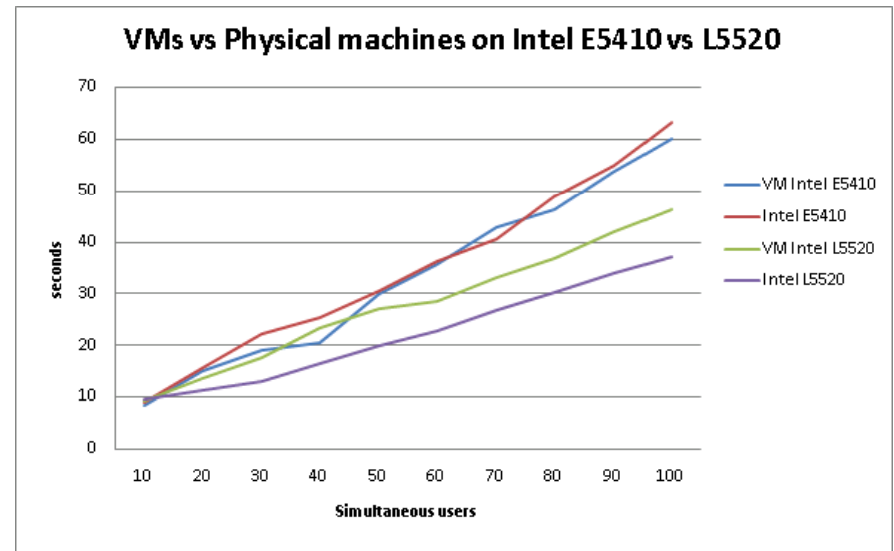
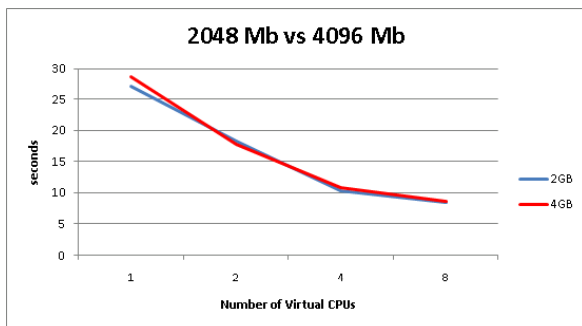
- 4 GB Memory
- 8 vCPUs



# Tests run at CERN

## Aspects comparison

- Influence of memory:
  - 2 GB vs 4 GB memory
- Influence of number of CPUs:
  - 1 vs 2 vs 8 CPUs and vCPUS
- Influence of Hardware:
  - Intel Xeon E5410
  - Intel Xeon L5520
- Influence of simultaneous users:
  - From 10 to 100 simultaneous



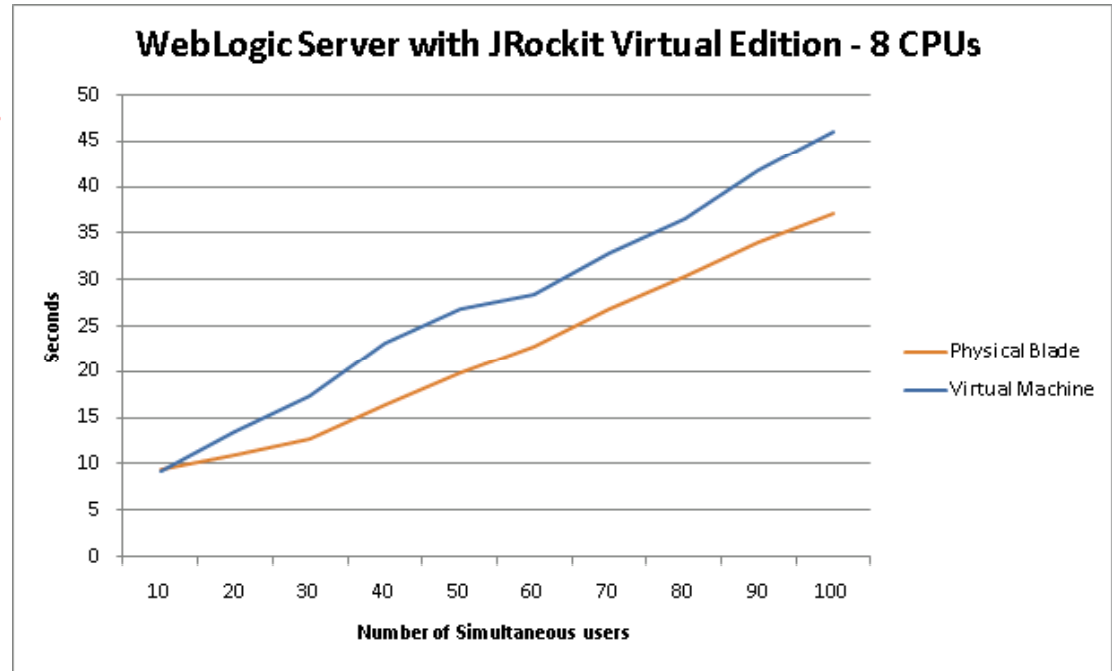
LEGEND (Graphs)

VM = WebLogic Server with JRockit Virtual Edition

# Tests run at CERN

## Results of the tests

- **Physical Machine:**
  - 48 GB memory
  - 8 CPUs
  - Intel Xeon L5520
- **Virtual Machine:**
  - 4 GB memory
  - 8 vCPUs
- **Users:**
  - From 10 to 100 simultaneous users



### LEGEND (Graph and Table)

Virtual Machine = WebLogic Server with JRockit Virtual Edition

Users	Physical Machine	Virtual Machine
10	9.44	9.21
20	11.05	13.39
30	12.77	17.39
40	16.44	23.15
50	19.89	26.89
60	22.76	28.36
70	26.76	32.87
80	30.29	36.61
90	34.08	41.82
100	37.11	46.1



## Conclusions

### A very good solution

#### WebLogic Server with JRockit Virtual Edition offers

- **Great solution for scalability:**
  - Easy to configure
  - Easy to add or reduce number of WebLogic Server instances
- **Consolidation:**
  - Our production servers are split across the application configuration boundaries so they are underutilized in terms of CPU
  - This new servers have 48 GB of memory, enough to run about 10 WebLogic Server instances
- **Future work:**
  - Need to work in the integration in our Large Scale Environment
  - Consistent way of managing the virtual images
  - Facilitate the deployment options to our developers



**Oracle WebLogic Server  
with JRockit Virtual  
Edition - Roadmap**

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# WebLogic Server Suite Virtualization Roadmap

<b>CY2010</b> (Complete)	<b>2010-2011</b>	<b>2011</b>
<p><b>Integration</b></p> <ul style="list-style-type: none"><li>• Based on WebLogic Server 10.3.2</li><li>• Deployable as OVM template on OVM 2.2</li><li>• Certified with Assembly Builder 11.1.1.2.0</li></ul> <p><b>Enhanced Features</b></p> <ul style="list-style-type: none"><li>• Limited NFS support</li></ul> <p><b>Tooling</b></p> <ul style="list-style-type: none"><li>• WLSVE Image Tool allows users to create, edit and configure the WLS-VE OVM templates</li><li>• Supports offline patching with Smart Update Tool</li></ul> <p><b>Standards and Technologies</b></p> <ul style="list-style-type: none"><li>• Java EE 5</li></ul>	<p><b>Integration</b></p> <ul style="list-style-type: none"><li>• Based on WebLogic Server 10.3.4</li><li>• Deployable as OVM template on OVM 2.2.1</li><li>• Certified with Assembly Builder 11.1.1.2.x</li><li>• Integration with Enterprise Manager for Monitoring</li></ul> <p><b>Enhanced Features</b></p> <ul style="list-style-type: none"><li>• Integrated with OVM HA for fail-over</li></ul>	<p><b>Integration</b></p> <ul style="list-style-type: none"><li>• Based on next major release of WebLogic Server</li><li>• Next release of Exalogic Elastic Cloud</li><li>• Coherence Integration</li><li>• Certified with OVM 3.0 and Assembly Builder 11.1.1.3.0</li></ul> <p><b>Enhanced Features</b></p> <ul style="list-style-type: none"><li>• Support large pages</li><li>• Support for 64-bit JVM</li><li>• Performance Improvements (Net I/O and SMP)</li><li>• Improved diagnostics</li><li>• Full NFS client support</li><li>• VirtualBox support</li><li>• Multiple NICs</li></ul> <p><b>Tooling</b></p> <ul style="list-style-type: none"><li>• WLST offline for configuration management</li></ul> <p><b>Standards and Technologies</b></p> <ul style="list-style-type: none"><li>• Java EE 6</li></ul>



## Key Takeaway Messages

- Application aware virtualization
- Virtual appliances & assemblies
- Virtualized deployment of entire multi-tier application infrastructure
- Simplified and operationally efficient Java EE virtualization
- Higher performance, higher density for Java virtualization



## For More Information

- Sessions
  - Enterprise IT and Cloud Computing – Richard Sarwal General Session (with Citrix)
    - Monday, September 20 | 3:30 p.m. - 4:30 p.m. | Moscone South, Room 102
  - Making Virtualized Enterprise Java Practical (S317477) – Ruma Sanyal (with Choice Hotels)
    - Monday, September 20, 11:30AM | Hotel Nikko, Nikko Ballroom II
  - Platform as a Service (PaaS) Is the Sweet Spot for Private Clouds (S317479) – Mohamad Afshar (with Savvis, Deutsche Bank, Deloitte)
    - Tuesday, September 21, 5:00PM | Moscone West L3, Rm 3022
  - Virtualizing the Application Grid (S317457) – Arvind Jain (with National Australia Bank)
    - Wednesday, 10 am, Marriott Marquis (Salon 9)
- Partners / Customers
  - The Siemens-Oracle Test and Development Cloud (S315224) - Siemens
    - Monday, September 20, 11:30AM | Scene and Be Heard Theater, Moscone West, Booth 3401
  - Cloud Just Got Clearer: Deploy a Secure, Virtual Environment on Oracle Platform (S319442) – CSC
    - Monday, September 20, 11:00AM | CSC Booth
    - Wednesday, September 22, 10:00AM | Moscone West L2, Rm 2010
- Hands On Lab
  - Virtualize Enterprise Java Deployments with Oracle Virtual Assembly Builder (S318581)
    - Wednesday, September 22, 1:00PM | Hilton San Francisco, Imperial Ballroom B
- Demo Booth
  - Moscone West (W-205) – Monday, Tuesday and Wednesday

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