Java EE App Servers Multitenant or Containerized? Both!

CON7506

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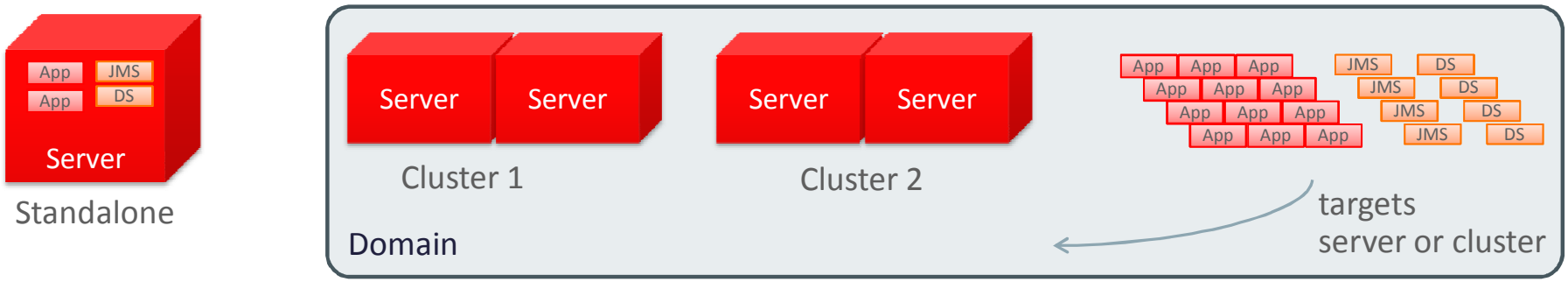
Traditional Java EE App Server Environment

Traditional Java EE App Server Execution

- Standalone or Domain
- JNDI Resources on server scope or application scope
  - Data Sources, JMS, Security Realm, JNDI Entries, Libraries



Java EE App Server on Docker

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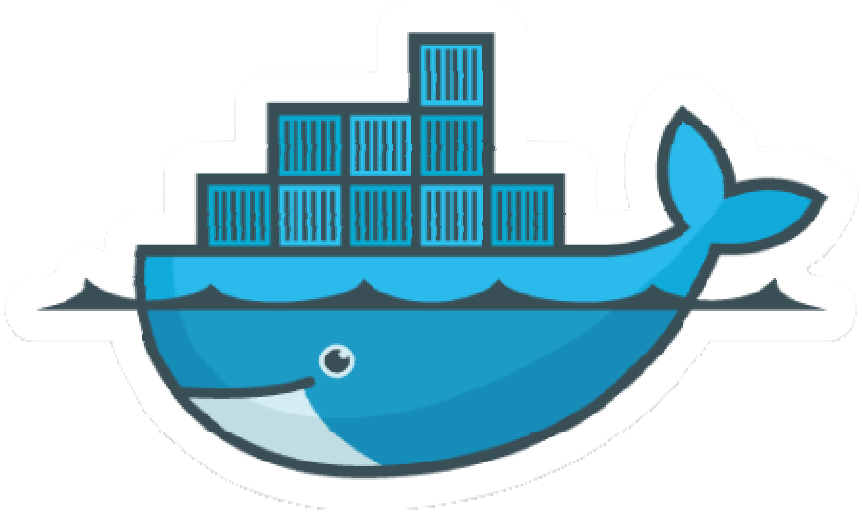
WebLogic Server on Docker

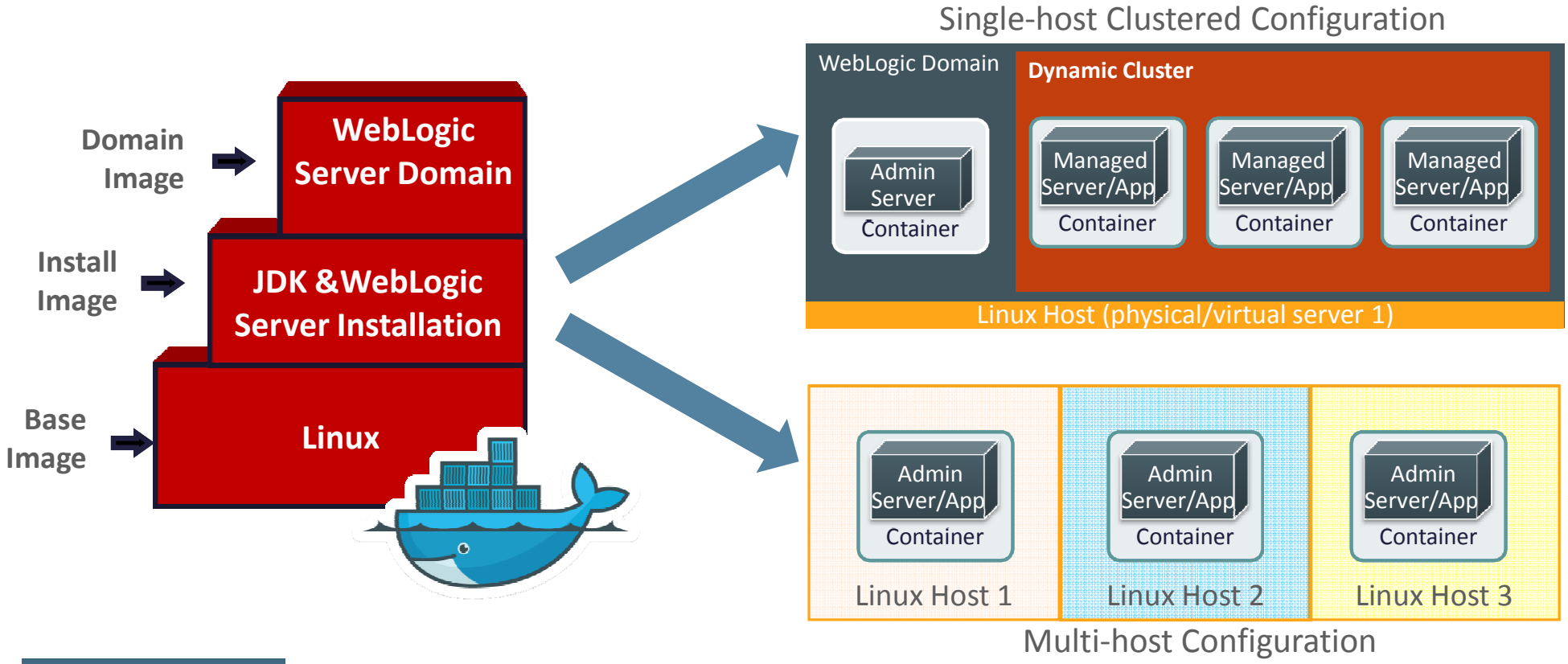


Certification of WebLogic running on Docker

WLS Version	JDK Version	HOST OS	Kernel	Docker Version
12.2.1 (EE 7)	8	Oracle Linux 6 UL 6	Unbreakable Enterprise Kernel Release 3 (3.8.13)	1.7+
12.2.1 (EE 7)	8	Oracle Linux 7	Unbreakable Enterprise Kernel Release 3 (3.8.13) or Red Hat Compatible Kernel (3.10)	1.7+
12.2.1 (EE 7)	8	Red Hat EL 7	Red Hat Compatible Kernel (3.10)	1.7+
12.1.3 (EE 6)	7/8	Oracle Linux 6 UL 5	Unbreakable Enterprise Kernel Release 3 (3.8.13)	1.3.3+
12.1.3 (EE 6)	7/8	Oracle Linux 7	Unbreakable Enterprise Kernel Release 3 (3.8.13) or Red Hat Compatible Kernel (3.10)	1.3.3+
12.1.3 (EE 6)	7/8	Red Hat EL 7	Red Hat Enterprise Linux Kernel (3.10)	1.3.3+

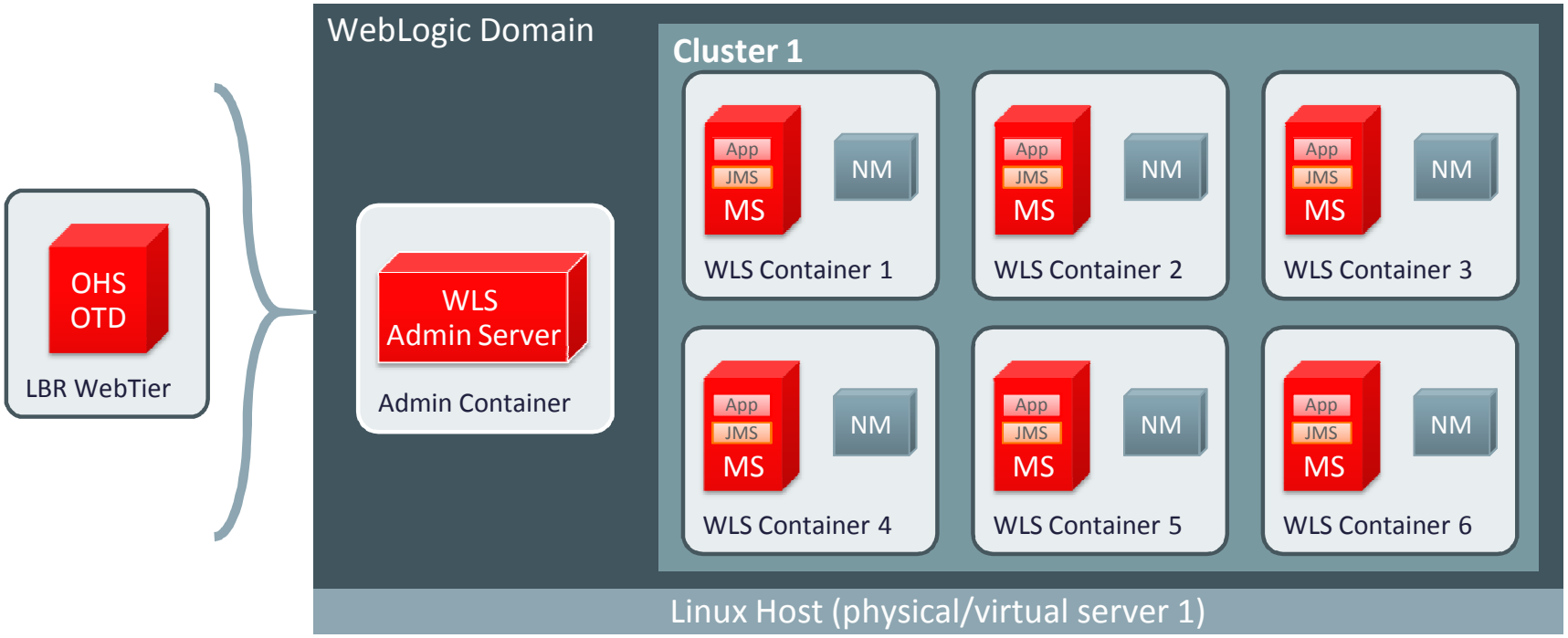
WebLogic Docker Support

Create/Extend Docker Images, Multiple Configurations Supported



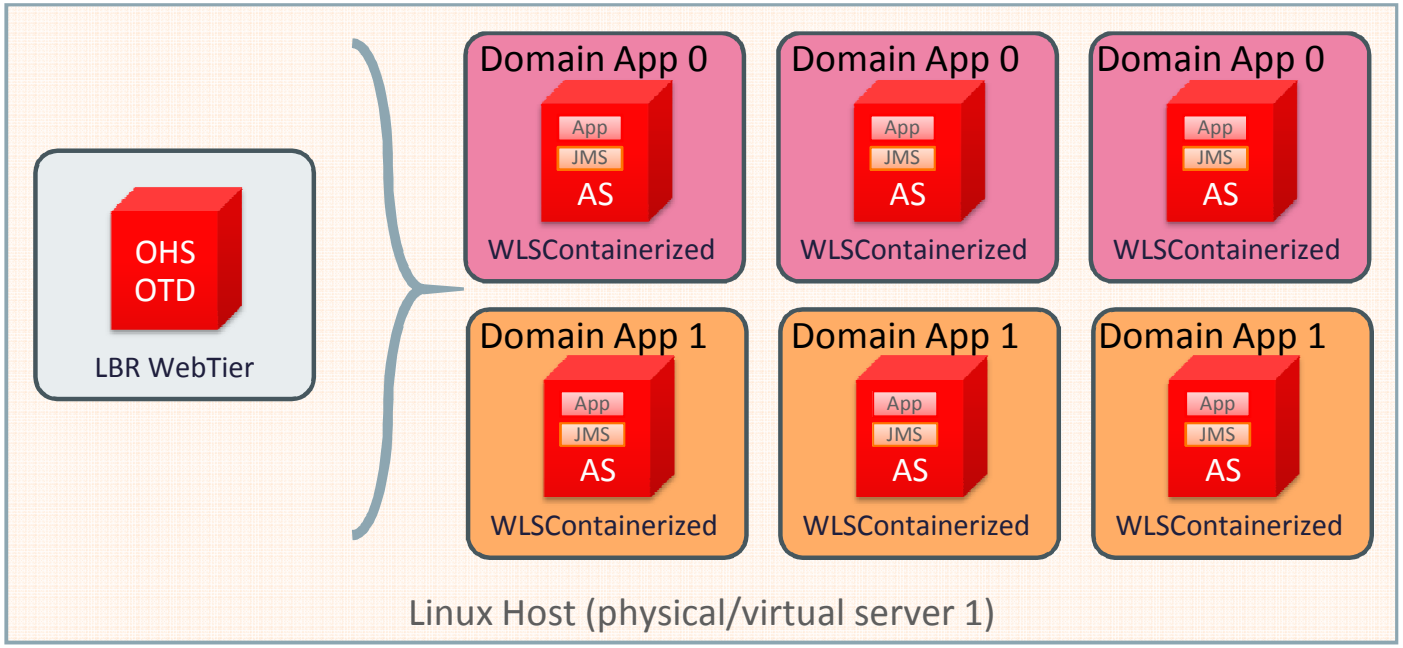
Certified Topology: Domain on Containers in Single Host

Expand a Dynamic Cluster by Adding "Machines" Into Domain




```
# docker run –-name wlsadmin –d mywlsimage startWebLogic.sh
# docker run –-link wlsadmin:wlsadmin –d mywlsimage createServer.sh
# docker run –-link wlsadmin:wlsadmin –d mywlsimage createServer.sh
```

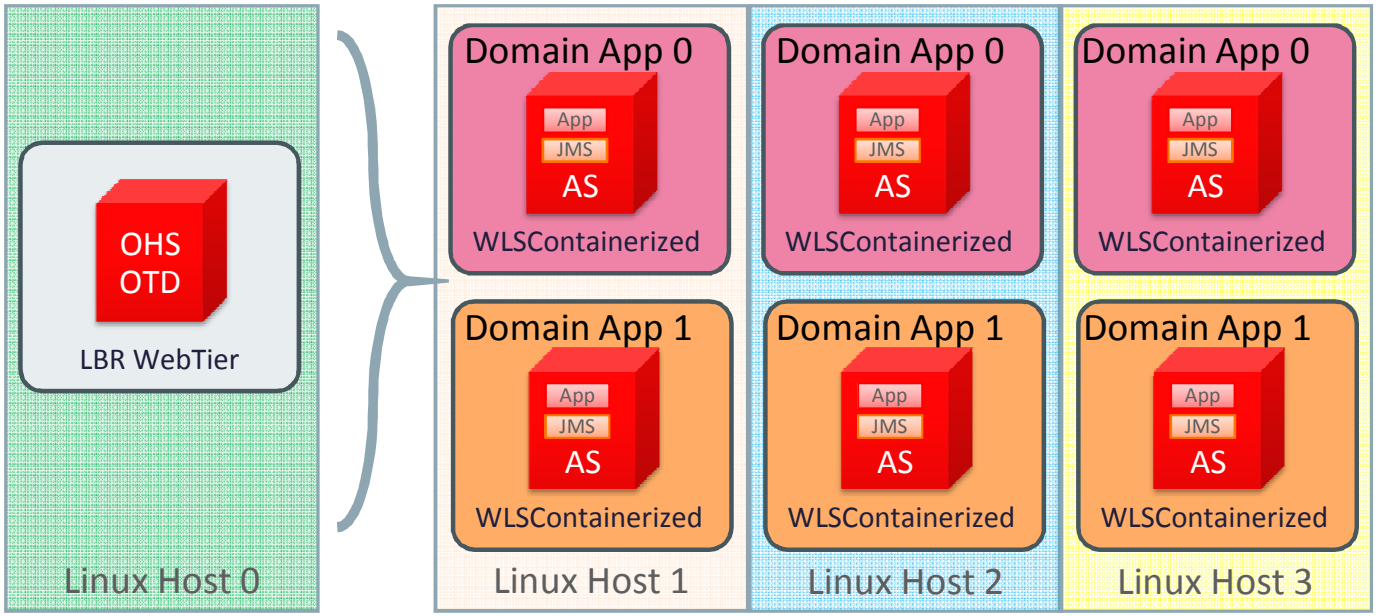
Certified Topology: Containerized Apps in Single Host




```
root@host_1 # docker run -d mywlsapp1 startWebLogic.sh
root@host_1 # docker run -d mywlsapp1 startWebLogic.sh
root@host_1 # docker run -d mywlsapp1 startWebLogic.sh
```

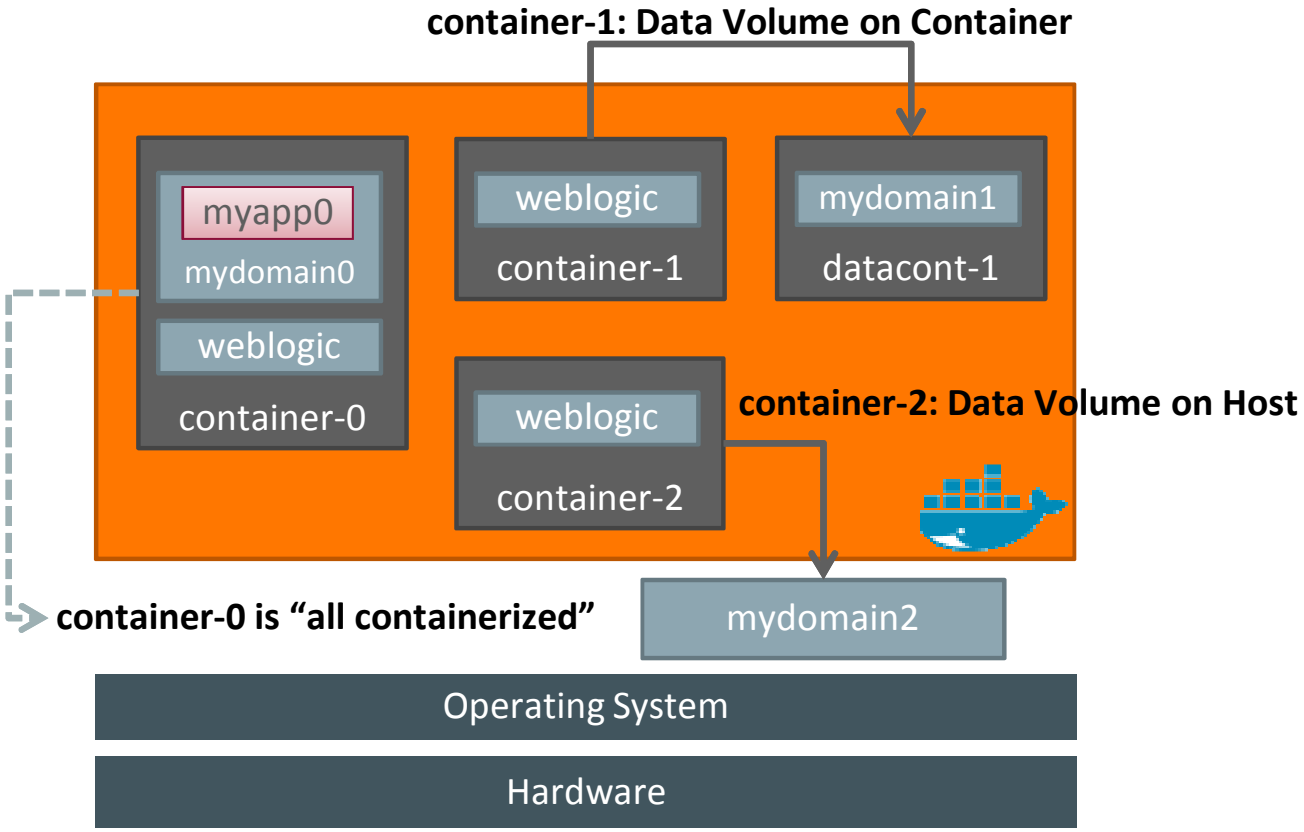
Certified Topology: Containerized Apps on Multiple Hosts

Load Balancing only. No real clustering between Servers




```
root@host_1 # docker run -d mywlsapp0 startWebLogic.sh
root@host_2 # docker run -d mywlsapp0 startWebLogic.sh
root@host_3 # docker run -d mywlsapp0 startWebLogic.sh
```

WebLogic on Docker – Domain Location Examples



- Keep the file system on a separate container.
  - Easy to move containers
- Keep the file system on the host.
  - Better I/O performance
- Containers with containerized applications have no negative side effects of loosing their file system.

Known Issues with Docker (latest versions)

- IP addresses change after a container restart
  - Container restart will leave servers not being able to communicate to each other
  - DNS server configured in the container
  - Rebuild configuration
- No multicast support
  - Unicast clustering is recommended if on Single Host

Docker 1.8+ three important enhancements

- **Multi Host support (experimental)**- SDN functionality through its recent SocketPlane acquisition together with 2 important features:
  - DNS Server, apps resilient to change in ip-address
  - VXLAN (virtual extensible LAN), allows application's microservices to reside on any member of a Swarm, a native Docker cluster.
- **Data Volumes (experimental)**- Docker Plugin Architecture**,** third-party container data management solutions to provide data volumes for containers.
  - Available plugins for container data volume management Flocker
- **Security –** Docker Image Signing and Verification using The Update Framework (TUF)

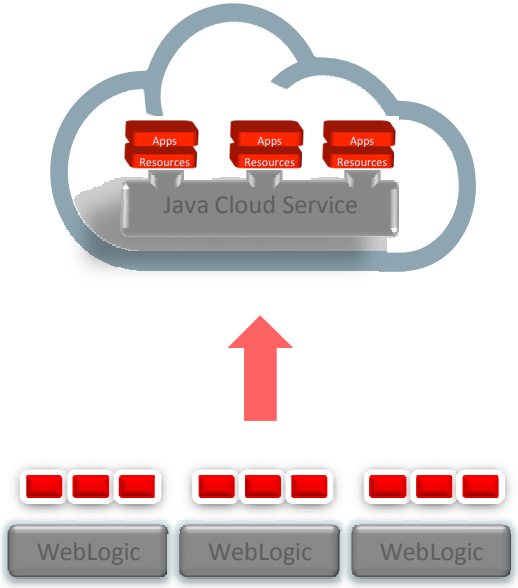
Docker Future for Oracle WebLogic and Beyond

- Integration with other DevOps technologies (e.g. Maven)
- Publish WLS Docker images on a Docker Hub repository
- Optimizing Docker Image size to make easy to move across the network
  - Optimize size of each layer that makes the image
- Broader product line adoption, with recommended and certified topologies
  - SOA, Enterprise Manager, OHS/OTD, Database, etc.

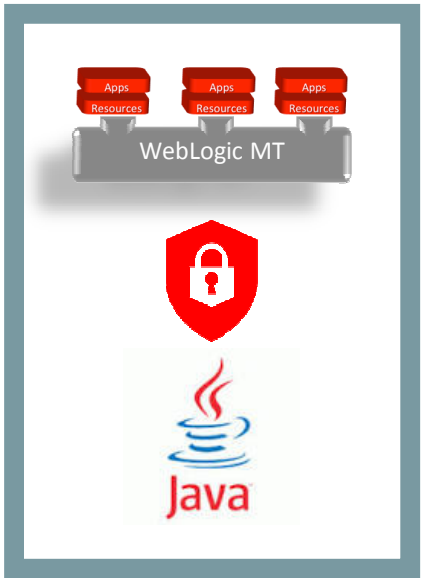
Multitenant Java EE App Server

WebLogic Multitenant: Consolidate Securely to the Cloud

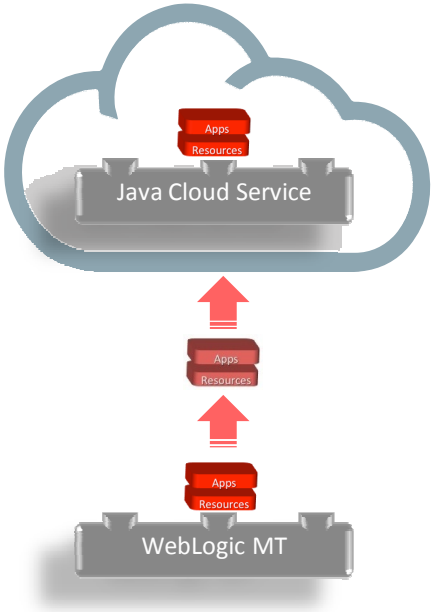
3-10X Consolidation Ratio



Secure Isolated Multitenant Java

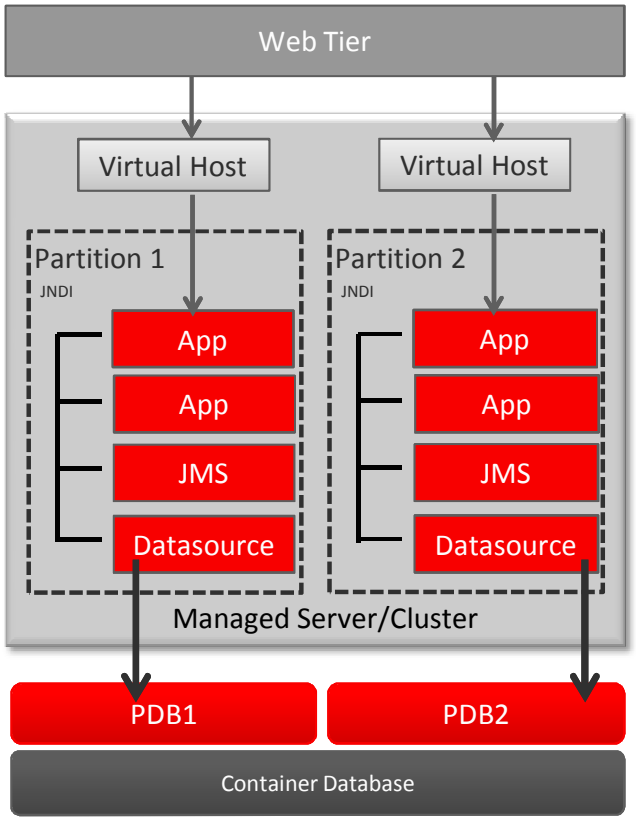


Microcontainer Portability for DevOps



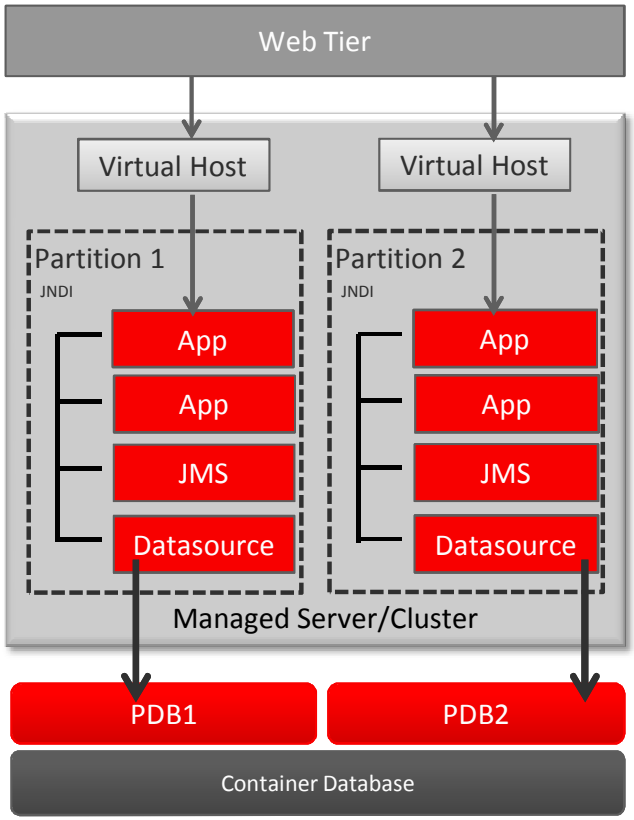
Oracle WebLogic Server 12.2.1
Multitenancy Concepts

- Key new concept is the domain partition
- Apps and resources deployed for each partition
  - No application changes required
- Partitions are isolated
- WebLogic infrastructure shared among partitions
- Partitions can span clusters
- Partitions can be started/stopped independently
- Partitions can be “exported” and “imported”
- Partitions support live migration

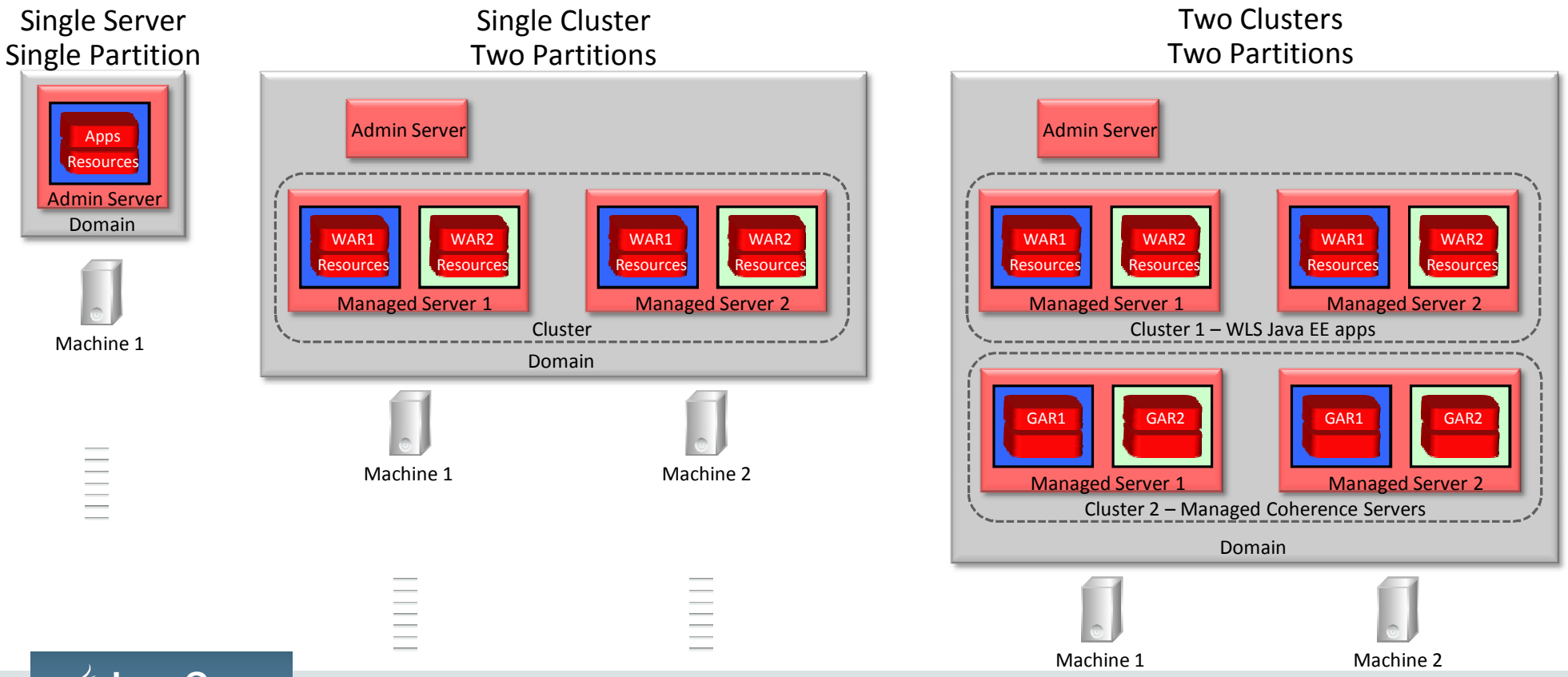


Oracle WebLogic Server 12.2.1
Multitenancy – Partition Isolation

- Memory and CPU isolation at the JVM level
  - Resource Consumption Management (RCM)
  - Oracle JDK 8u40
- Virtual Host per partition for application access
- Dedicated JNDI tree for resource isolation
- Work Manager per partition for thread management
- Security realm per partition
- Data can be segregated with PDBs
  - PDBs are not *required*
- Per-partition management

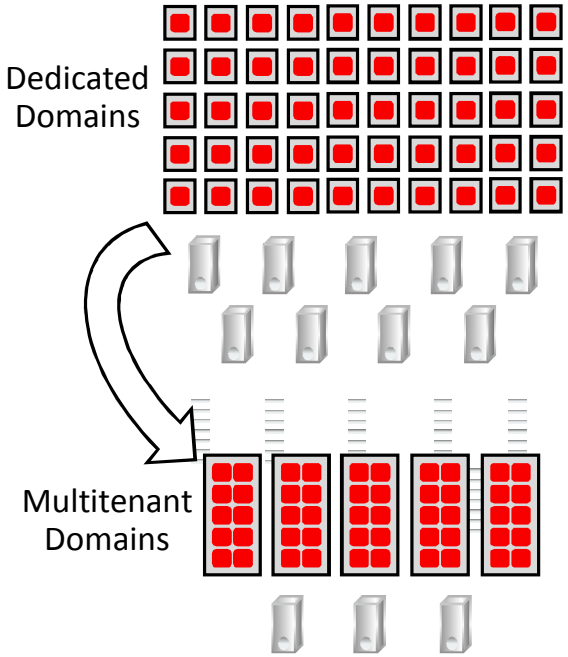


Oracle WebLogic Server 12.2.1
Example Multitenancy Configurations

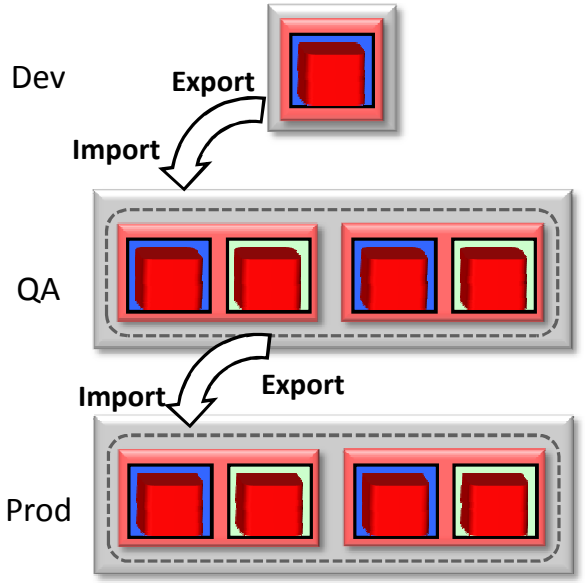


Multitenancy Benefits

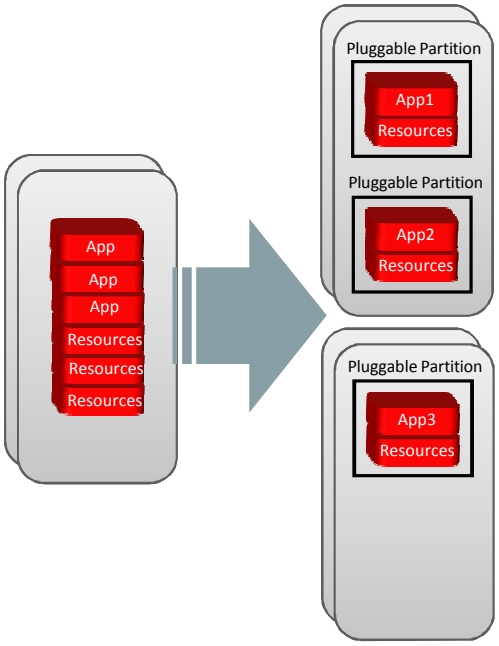
Consolidate: Increase Density, Maintain Isolation, Reduce TCO



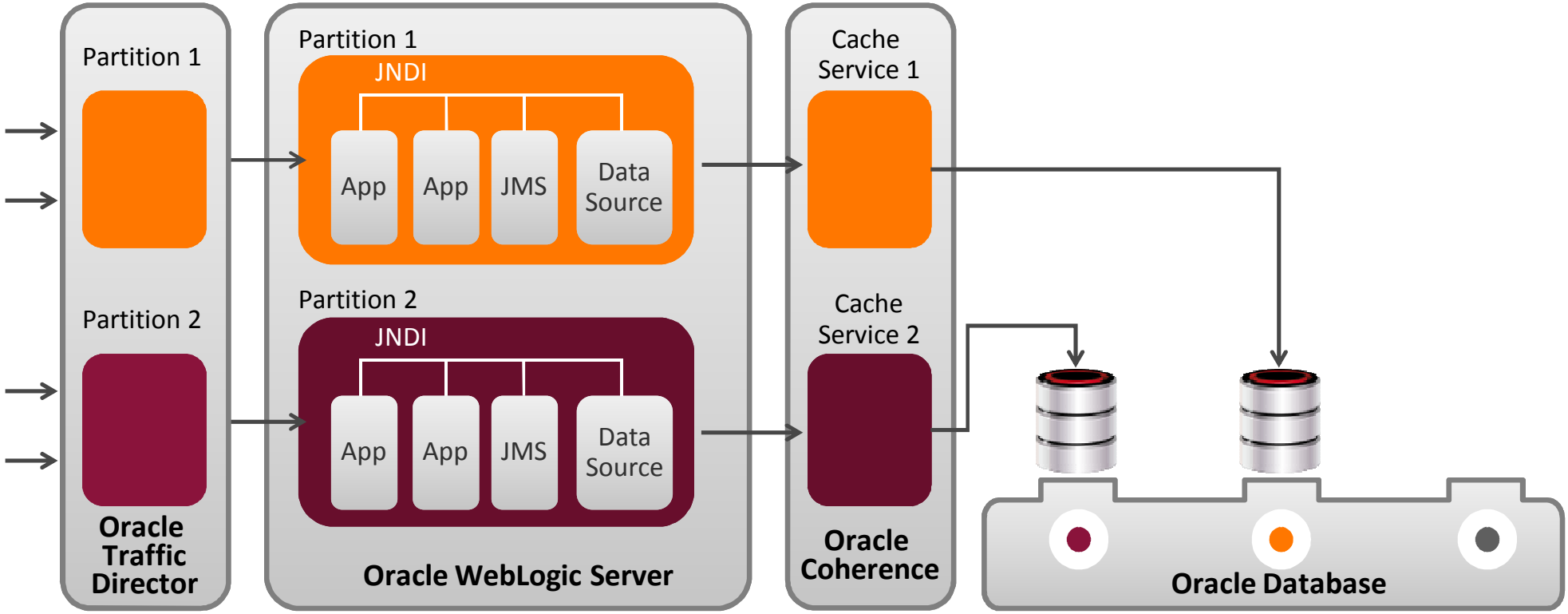
Use Pluggable Partitions for DevOps: Increase Agility



Adopt Service-Based Architectures: Increase Agility

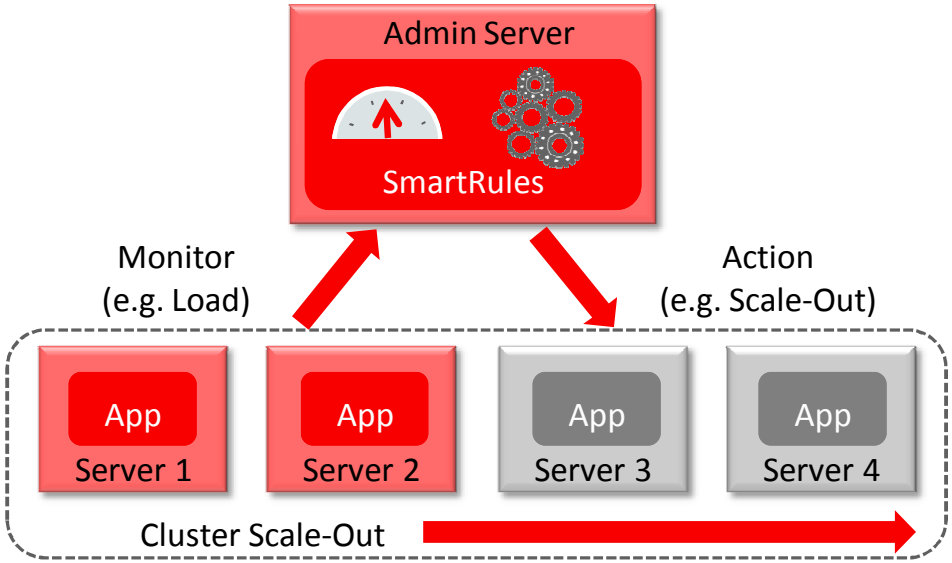


End-to-End Integration



Automated Elasticity for Dynamic Clusters

- Administration APIs for Dynamic Clusters
  - Start/stop a specified number of servers
  - Expand/shrink the size of the cluster
  - Manage server lifecycle, quiescence
- Simple/automated scale up/down or tune
- Rules-based decisions based on capacity, demand or schedule
- Watches, Notifications become Policies, Actions
  - Policies: SmartRules, Calendar-based policies
  - Actions: scaleUp, scaleDown, REST, script
- Peak Loads, Geographic Patterns, Adding Partitions, Batch Processing, Rebalancing



Why Multitenant App Server Makes Sense Too

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Standalone, Domain, Docker, or Multitenant?

- Each deployment model has its pros and cons
- It depends!
- On Docker, app server is fully isolated at all levels, but not heavy as VM
  - But loses integration with IDEs; unpractical for changes on the fly
- Multitenant model isolates CPU, Memory, and logical resources
  - Also provides evolutionary approach though still allowing same tooling (REST, IDEs integration
- Choose what works best for your case, and environment (ex: Docker for Dev, Multitenant for Prod)

Blogs and Articles

- Oracle Linux
  - Oracle Linux Containers and Docker
- Oracle WebLogic
  - Docker, Java EE 7, and Maven with WebLogic 12.1.3
  - WebLogic with Docker in the Cloud
- Oracle Docker on GitHub
  - github.com/oracle/docker

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