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Oracle WebLogic Server 12.2.1 Multitenancy

Efficiency, Agility, and Lower Cost
CON8630

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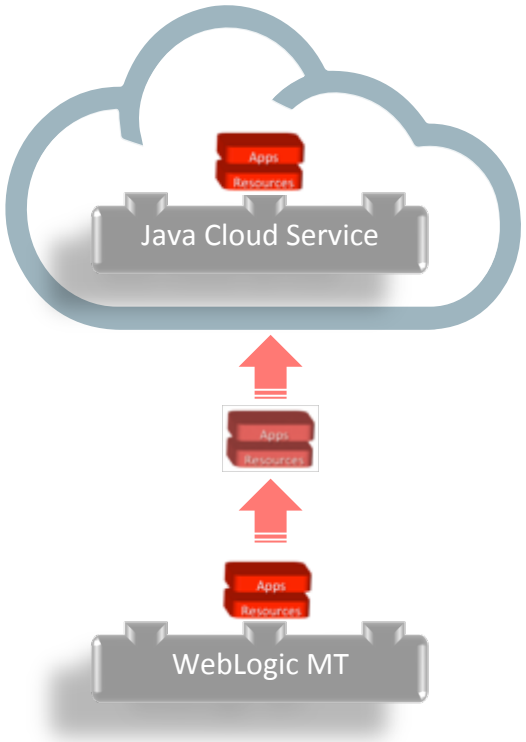
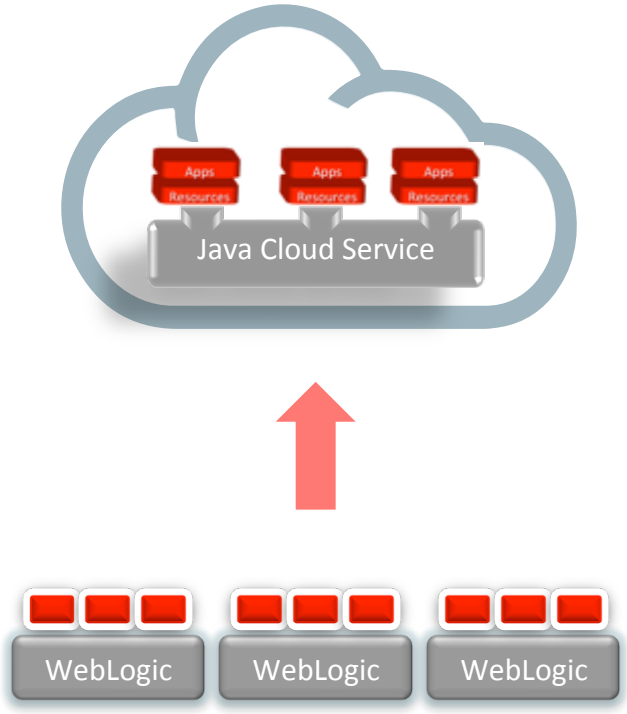
WebLogic Multitenant: Solving Critical Business Challenges

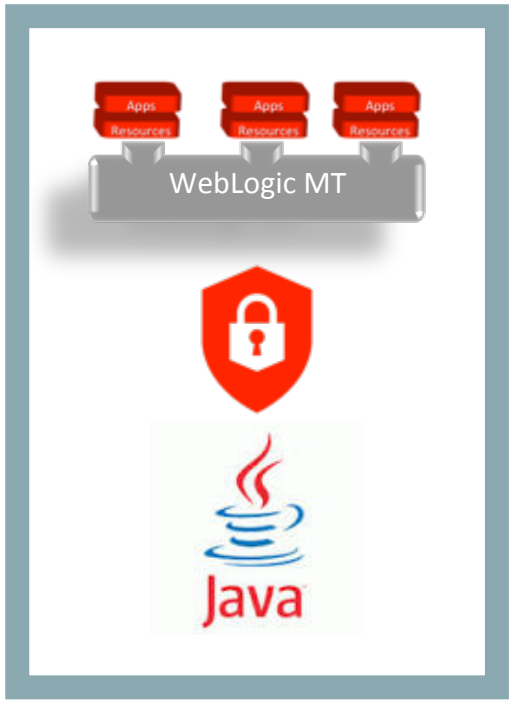
Microcontainer
Portability for Devops



3X Consolidation Ratio

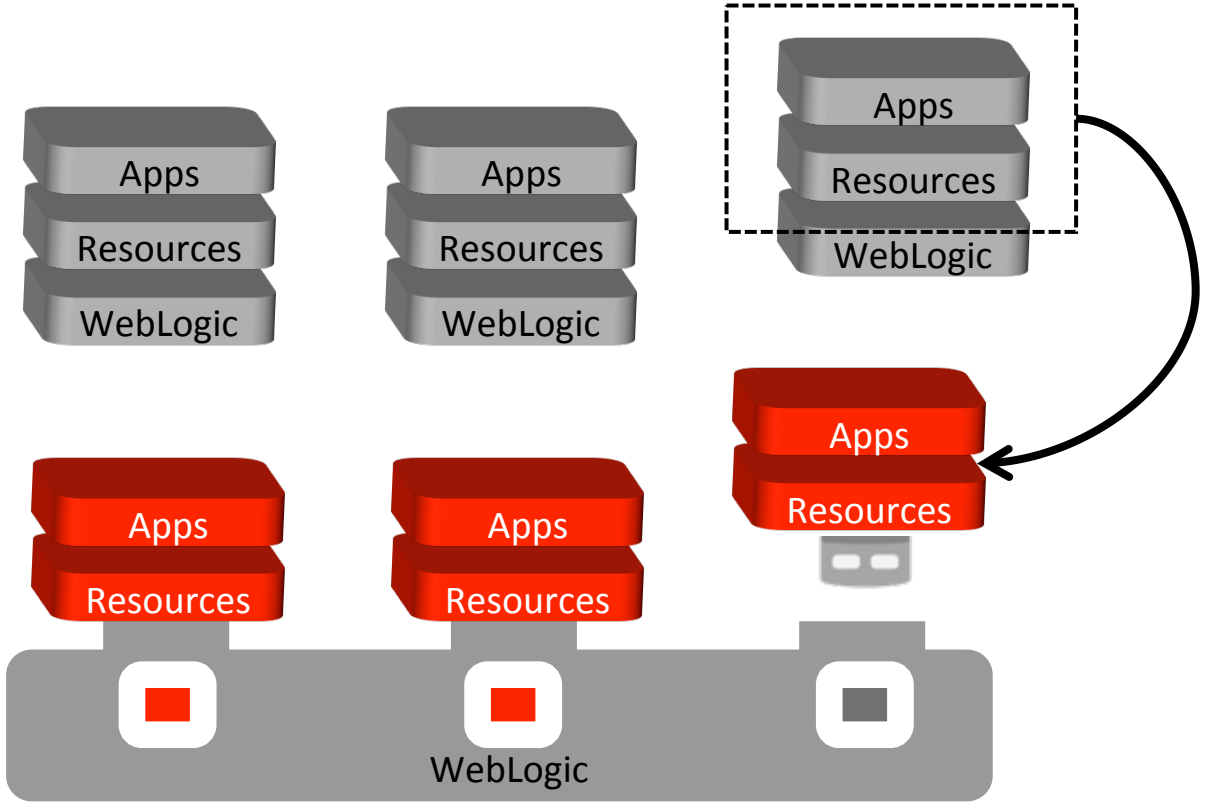


Secure/Isolated
Multitenant Java



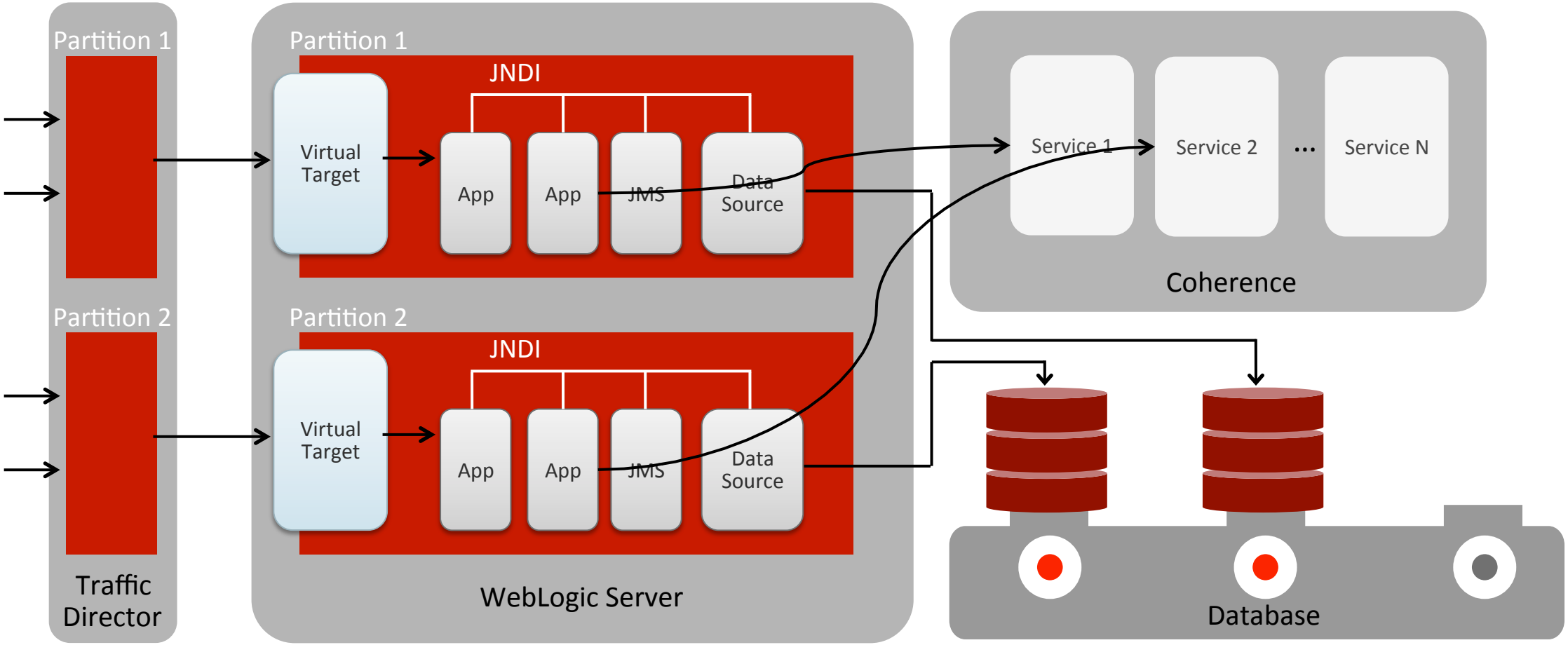
WebLogic Multitenant

Microcontainers and a Shared Platform



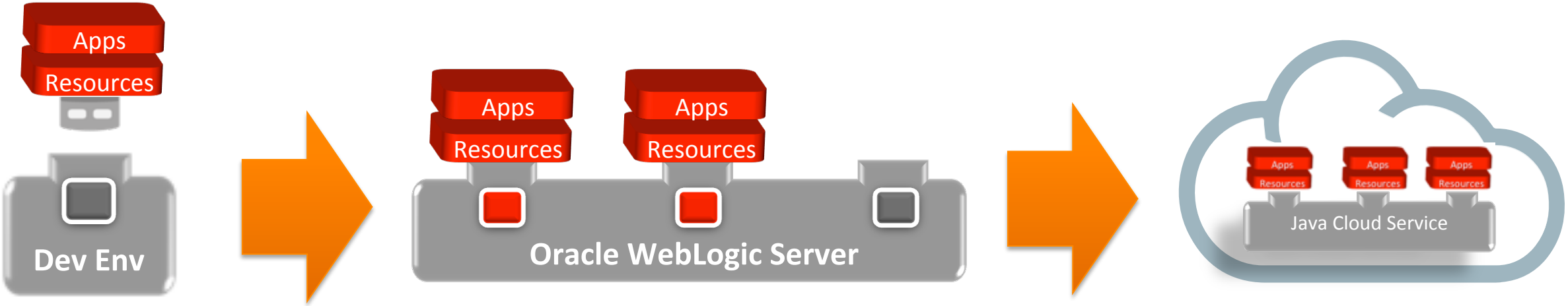
- Encapsulate applications into pluggable partitions
- Run them on shared platforms

Key Technical Concepts



Microcontainers in WebLogic Server 12.2.1

- Maximum **portability** between environments
- **Parity** between dev and production
- **Fast** startup/shutdown – disposability
- Easy **scale up**
- Enable migration to the **cloud**



Isolation for Pluggable Partitions

Independence and Autonomy for Microcontainers

Runtime Isolation

- JDK and WebLogic partnership
- Heap, CPU, threads, requests…

Administrative Isolation

- Admin roles, lifecycle, troubleshooting

Security/Identity Isolation

- Realm, users per partition

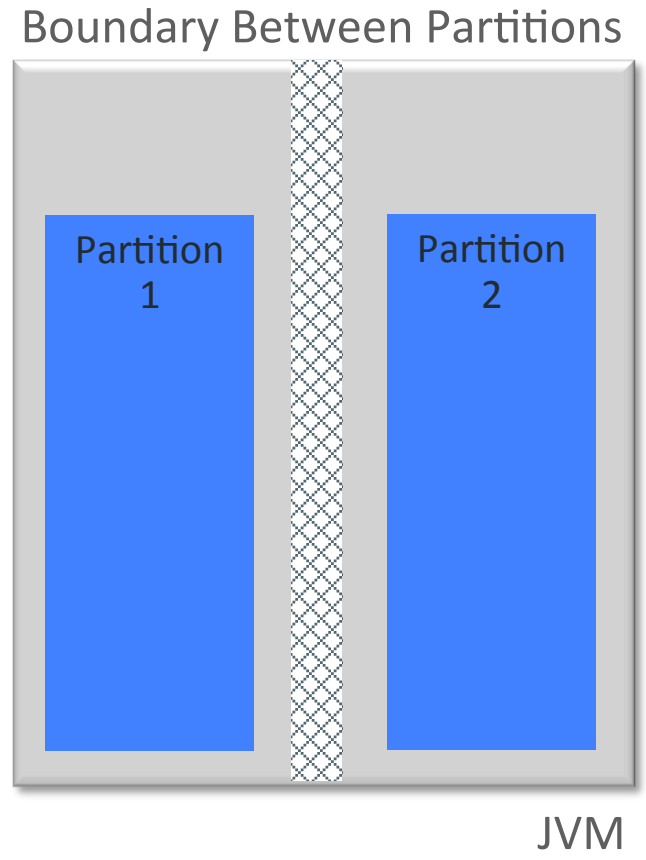
Traffic/Data Isolation

- Dedicated JNDI, segregated data
- Dedicated and shared Coherence caches

Resource Consumption Managers

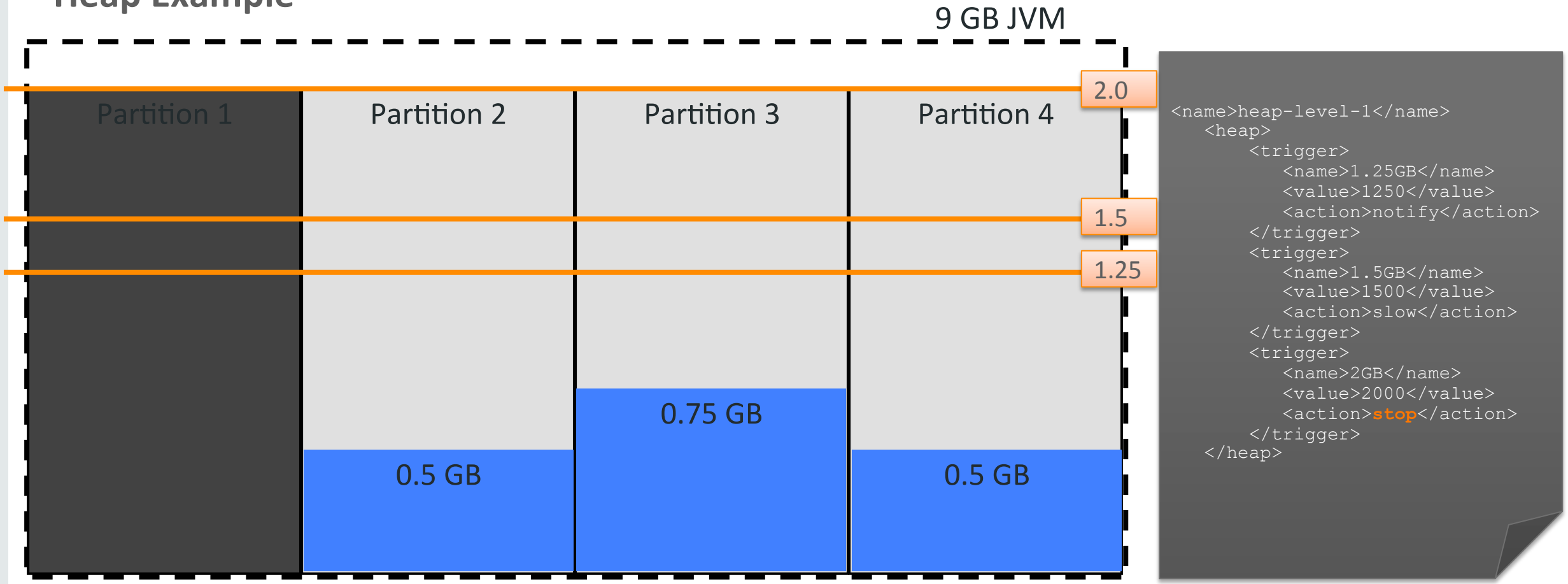
Runtime Isolation Within a JVM

- Deep integration between WebLogic Server and the Oracle JDK
- Prevents resource hogging, protects applications in a shared JVM
- Managed resources
  - **Retained heap, CPU time, open file descriptors**
- Triggerable actions
  - **Notify** – inform administrator that a threshold has been crossed
  - **Slow** – reduce partition's ability to consume resources
  - **Fail** – reject requests for the resource (file descriptors only)
  - **Stop** – initiate the shut down sequence for the offending partition
- "Boundaries" and Fair Share usage patterns



Declared Boundaries

Heap Example

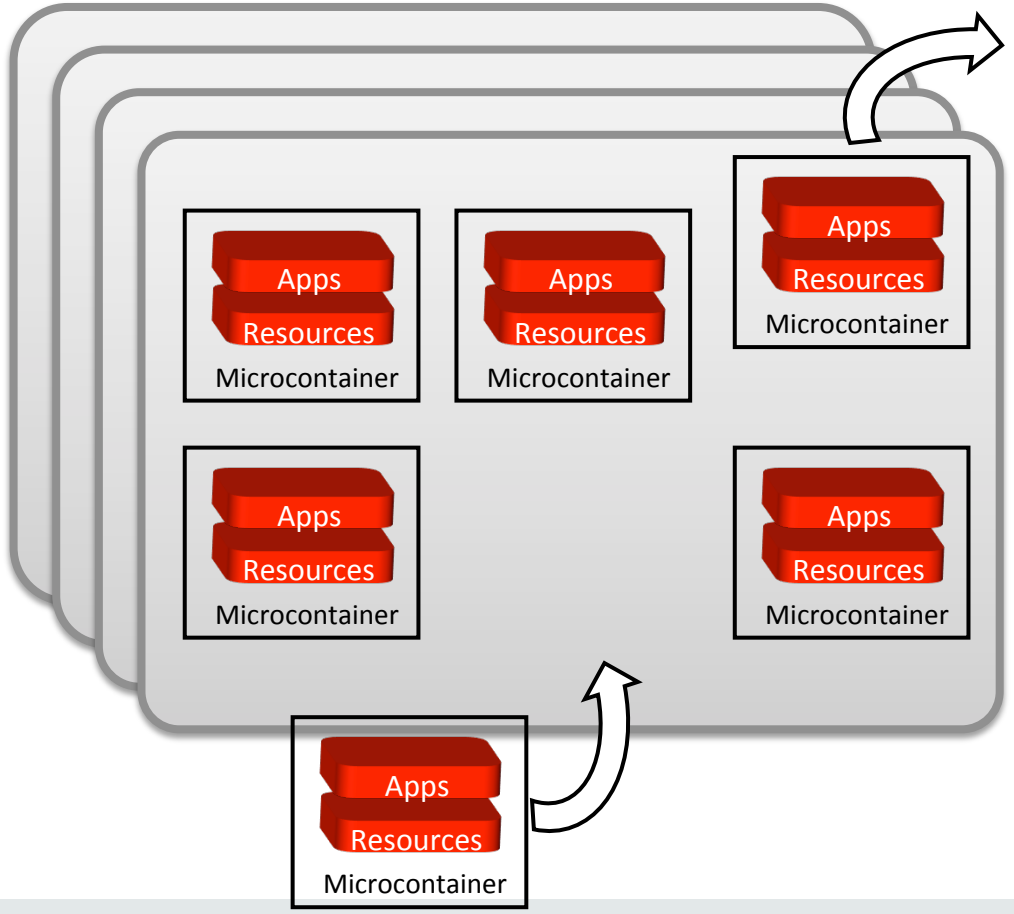



```
<name>heap-level-1</name>
   <heap>
      <trigger>
         <name>1.25GB</name>
         <value>1250</value>
         <action>notify</action>
      </trigger>
      <trigger>
         <name>1.5GB</name>
         <value>1500</value>
         <action>slow</action>
      </trigger>
      <trigger>
         <name>2GB</name>
         <value>2000</value>
         <action>stop</action>
      </trigger>
   </heap>
```


High Density/Virtualization

3X Density Improvement

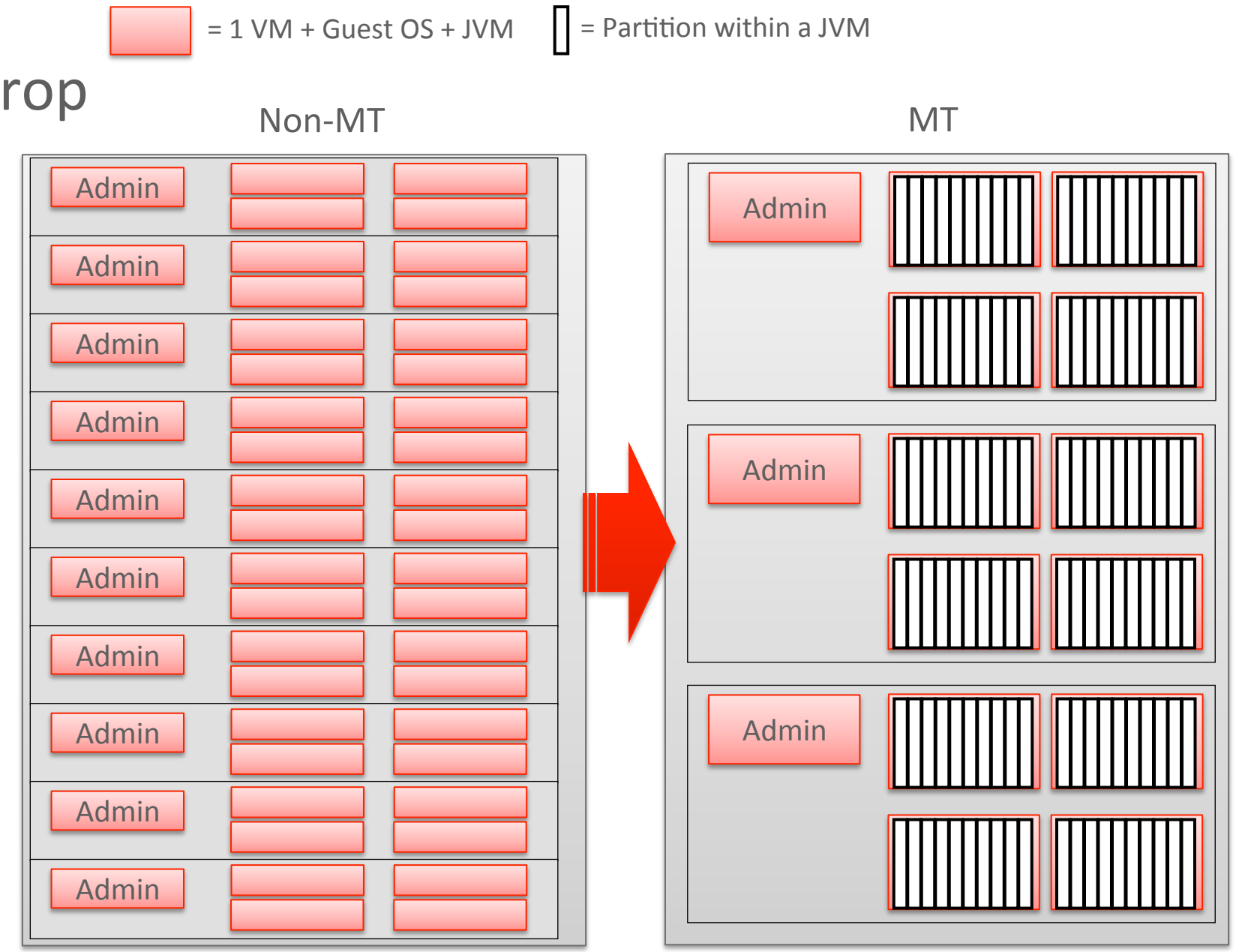
- **Lower Total Cost of Ownership of server-side Java Infrastructure**
  - Reduce hardware footprint/CAPEX by 66%
  - Reduce OPEX costs by 25%
  - Consolidate domains by 10X
- **Simplify with Java Cloud Infrastructure**
  - Easy to adopt
  - Elasticity on demand
  - Promotes consistency, quality, and standardization



WebLogic MT Value Prop

Density

- Benchmark Data shows significant consolidation opportunities
- Running 10 partitions in shared JVMs shows no increase in response times, minimal increase in memory footprint
- CPU load per app is reduced



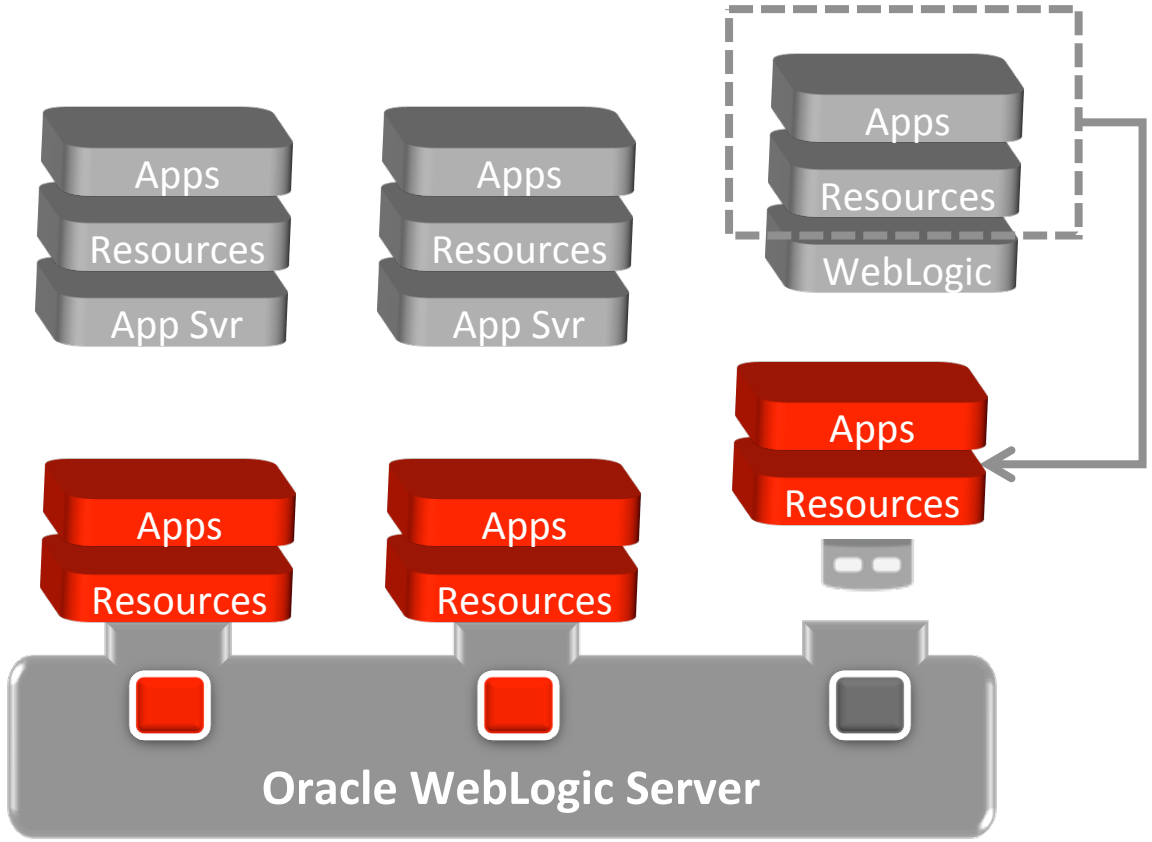
MT Benchmark Data

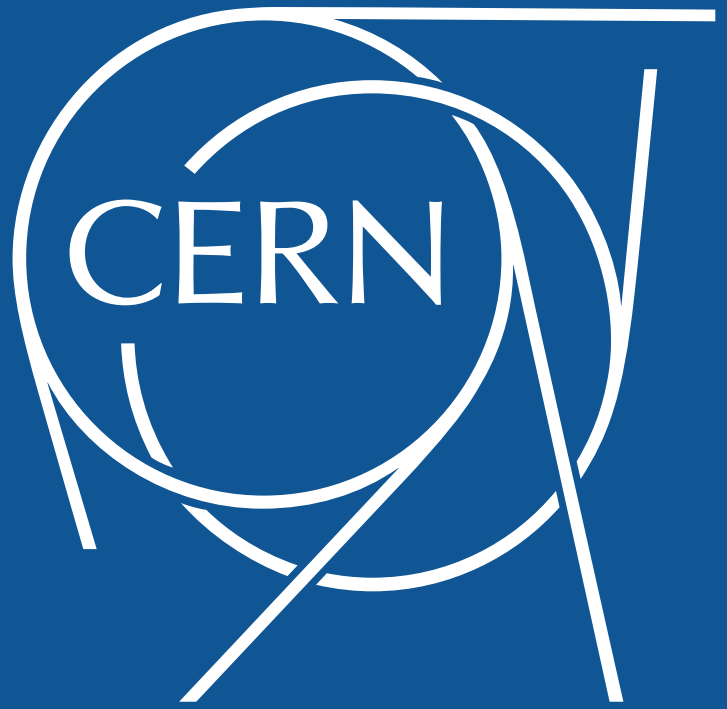
MedRec		Non-MT: 1 domain Admin + 4 node cluster 1 app/domain	Non-MT: Extrapolated for 10 domains	WLS-MT: 1 domain Admin + 4-node cluster 10 partitions/domain 1 app/partition	Savings
JVM Heap Setting		-Xms:512m –Xmx 2g	-Xms:512m –Xmx 2g	-Xms:512m –Xmx 2g	
Concurrent users		400	4000	4000	
TPS	Transaction/Sec	2.37	23.7	23.45	
Response Time (Sec)	90% RT	0.47	0.239	0.057	
	Average RT	0.17	0.107	0.052	
CPU Usage	%CPU (per VM)	2% each on 4 CPUs 0.5% of total server CPU capacity	5% each on 16 CPUs 5% of total server CPU capacity	8% of 4 CPUs 2% of total server CPU capacity	**60%/2.5X less CPU usage**
Process OS Memory Footprint (GB)	Average	3.88 (0.97 each on 4 VMs)	38.8 (0.97 each on 40 VMs)	11.2 (2.8 each on 4 VMs)	**71%/3.5X less memory usage**

Multitenancy in WebLogic 12.2.1

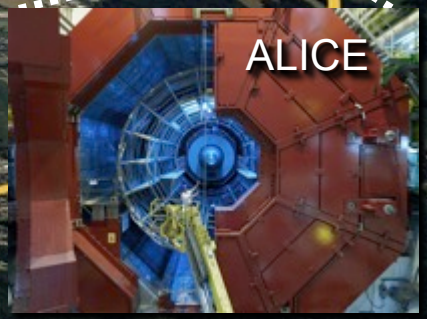
Summary

- Agility/devops with lightweight **pluggable partitions**
  - Ultra-light container-like service packaging
  - Portability across environments
- **High density** with domain and JVM sharing
  - Consolidate/virtualize within domains and JVMs
- **Isolation** between microcontainers
  - Runtime, administration, security, data




CERN

Accelerating Science and Innovation



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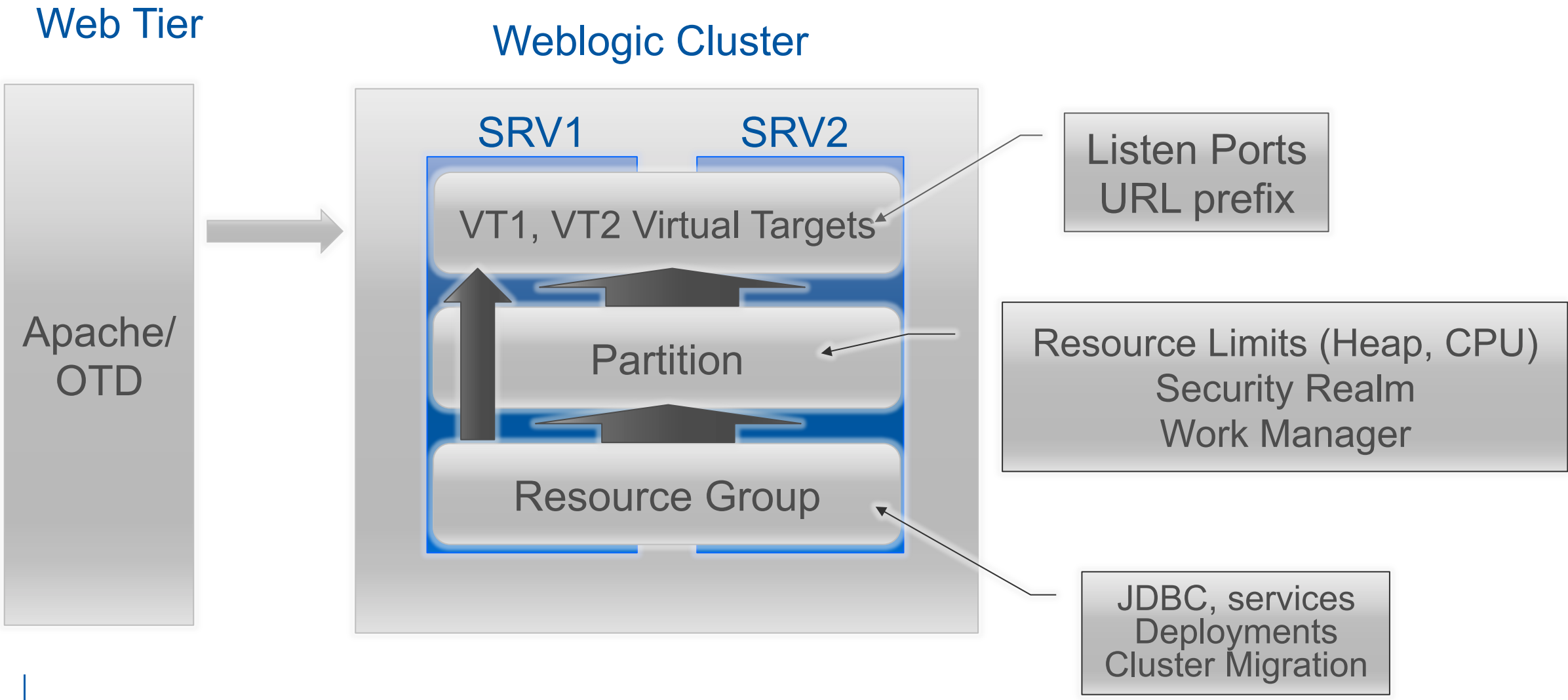
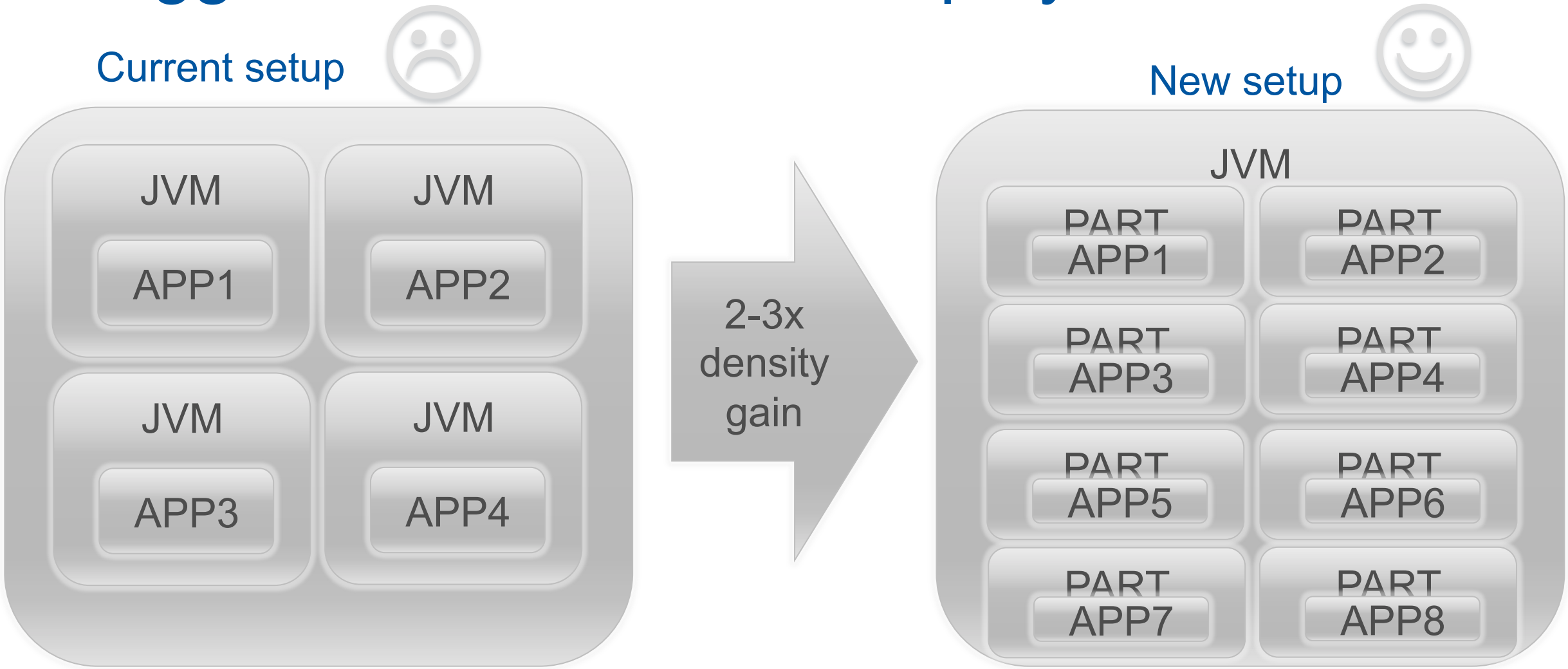
IT Challenges

- Improve operational efficiency
- Improve resource efficiency
- Enable cloud architectures
  - Gradual migration to cloud interfaces and workflows
- Improve responsiveness
  - Self-Service with coffee break response time

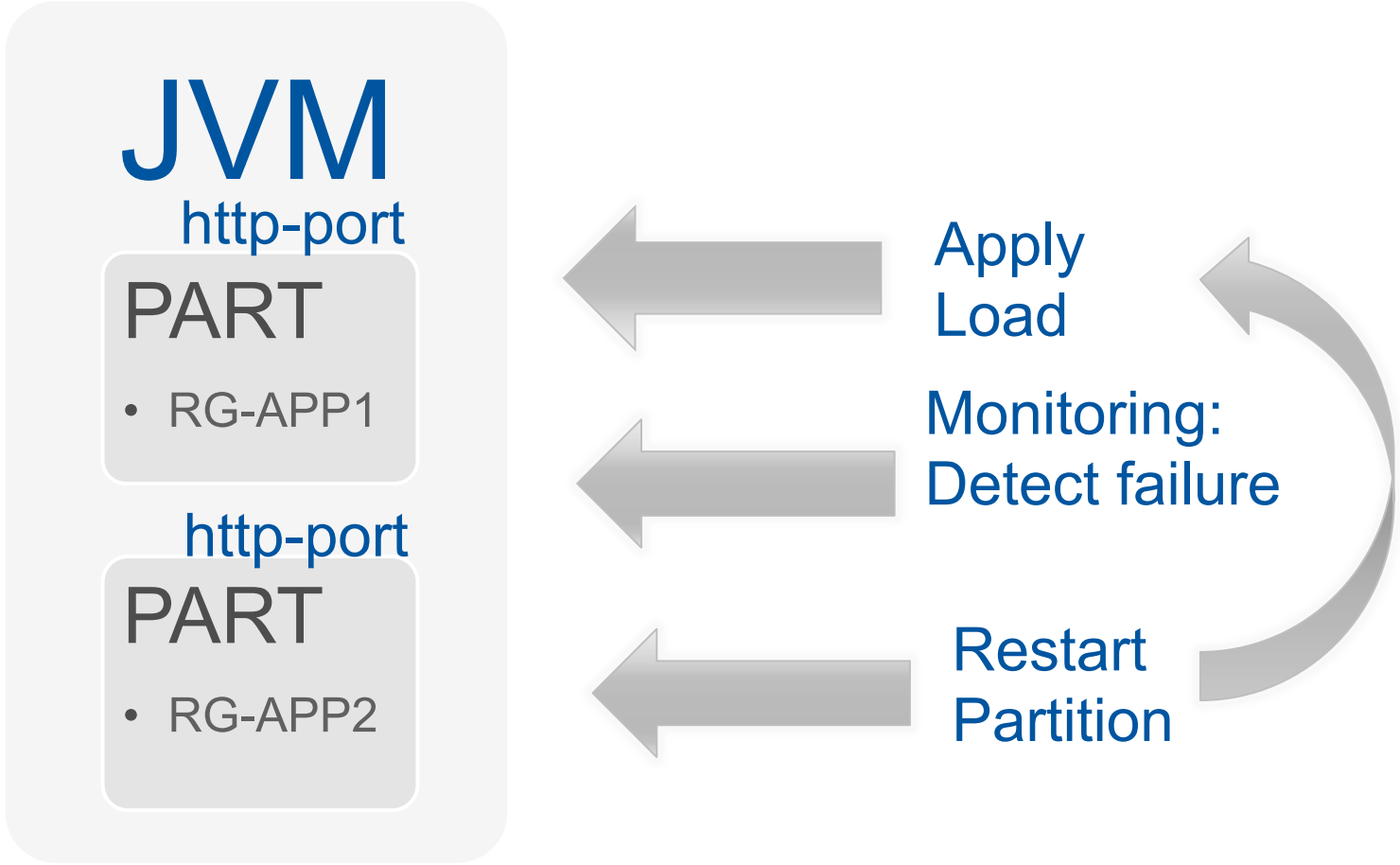
Pluggable Partition as a Deployment Unit



Pluggable Partition as a Deployment Unit



Isolation/Safety between PluggablePartitions



- Partitions limit heap size
- Fast startup
- JVM runs stable even under heavy memory stress
- It works
- https://github.com/lurodrig/performance-issues-demos

CERN

Automation with Pluggable Partitions

- RESTful API
  - Allows all languages
  - opens integration (Puppet)
  - Proof of concept CLI https://github.com/cerndb/wls-cli
- Application isolation
  - Resource group/Virtual target
- Docs/examples

WLST

```
connect('weblogic',‘XXXX','t3://localhost:
7001')
edit()
startEdit()
cd('/')
cmo.createVirtualTarget('VT-app1')
cd('/VirtualTargets/VT-app1')
set('HostNames',jarray.array([String('app1'),
String(‘host-app')], String))
set('Targets',jarray.array([ObjectName('com.bea
:Name=cluster-1,Type=Cluster')], ObjectName))
cmo.setUriPrefix('/app1')
cmo.setPortOffset(10)
activate()
```

REST

```
curl -v \
--user weblogic:XXXX \
-H X-Requested-By:MyClient \
-H Accept:application/json \
-H Content-Type:application/json \
-d "{
  name:       'VT-app1',
  hostNames: [ 'app1', ‘host-app' ],
  uriPrefix: '/app1',
  targets:    [ { identity: [ 'clusters',
'cluster-1' ] } ],
  portOffset: 10
}" \
-X POST \
http://localhost:7001/management/weblogic/
latest/edit/virtualTargets
```

WLS 12.2.1 vs IT Challenges

- ✓ Improve operational efficiency
  - ✓ Yes – Resource group cluster migration
- ✓ Improve resource efficiency
  - ✓ Yes – Partitions. Resource limitations
- ✓ Enable cloud architectures
  - ✓ Yes – RESTful management APIs
- ✓ Improve responsiveness
  - ✓ Yes – Fast provisioning/Better fault detection

Oracle Consulting Service Offerings

Oracle Weblogic Server Multitenant Services

Oracle Consulting will introduce Oracle WebLogic Multitenant architecture, design an implementation strategy, install/configure Oracle Weblogic Server Multitenant, and consolidate and migrate domains. Learn more: *data sheet*

Rapid Start Service

- Jumpstart implementation
- Hands-on guidance
- 2 domains with up to 10 managed servers
- Non-production
- 2 week service

Consolidation Service

- Enterprise scale implementation
- Lead and executed by Oracle Consulting Experts
- Number of servers to be migrated and complexity of conversion depends on customer requirements

Confidently implement with Oracle's extensive experience, leading practices and proven delivery approach

More Information? Contact OD_Consulting_Sales_US_Grp@oracle.com

Some Recommended Sessions

- HOL10439 – **Hands on lab** – High Density Deployments in Oracle WebLogic Server 12cR2 with Domain Partitions
  - Tues 10/27 4:00 – 5:00 PM Hotel Nikko—Nikko Ballroom II (3rd Floor)
- CON8634 – Oracle WebLogic Server: Automated and Simplified Management in a World of Clouds
  - Tues 10/27 11:00 – 11:45 AM Moscone South—304
- THIS SESSION: CON8630 – with **Artur Wiecek**: Oracle WebLogic Server 12.2.1 Multitenancy: Efficiency, Agility, and Lower Cost
  - Tues 10/27 4:00 – 4:45 PM Moscone South—302
- MTE10083 – with **Frank Munz**: Twelve Things You Should Know About Oracle WebLogic Server 12c
  - Tues 10/27 6:15 PM – 7:00 PM Moscone South—301 ⬅ Frank's dream: fill the room!
- CON8633 – with **Larry Feigen**: Multitenancy in Java: Innovation in the JDK and Oracle WebLogic Server 12.2.1
  - Wed 10/28 1:45 – 2:30 PM Moscone South—302

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Applications & Platform Services


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