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**So Much More Than Open Source:
Save Costs & Efforts with WebSphere
Application Server**

Open Source Application Server landscape



- Full Java EE 5 application server
- Under Red Hat, no longer supports OSS directly. Instead they provide support for their commercial distribution called JBoss Enterprise Application Platform (EAP).
- Open Source JBoss Community - self maintained and supported
- Driven by developer loyalty, but 95% of R&D is funded by Red Hat.



Apache Tomcat

- Servlet container only - Java EE 6 Web Profile. Free OSS with Apache license
- Developers like small memory and disk footprint, lightweight – fast restart
- Tomcat is typically supported internally, but 3rd party support is available



GlassFish

- Formerly Sun's Java EE app server.
- it is lightweight, has quick startup time and at the leading edge of the Java EE specs
- No longer strategic for Oracle as it was for Sun

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IBM contributions to Open Source go back 15+ years



1999 - 2001

- IBM forms Linux Technology Center
- Leads Apache projects Xerces (XML4J), Xalan, SOAP
- Creates OSI-approved IBM Public License
- Strategic participation in Mozilla
- IBM becomes founding member of OSDL
- Founder of Eclipse.org and Eclipse Consortium
- Creates internal bazaar using OSS methodology

2002 - 2003

- Linux contributions to scalability (8-way+), reliability (stress testing, defect mgmt, doc)
- Leads Apache projects: Web Services (WSIF and WSIL), Pluto (Portlet API) and WSRP4J (Remote Portal)
- Leads Eclipse projects GEF (editing), EMF (modeling), XSD (XML Schema), Hyades (testing), Visual Editor, AspectJ, Equinox rich client
- Globus Toolkit contributions for OGSA, OGSF

2004 - 2006

- IBM and Novell/SUSE achieve security milestone (EAL4+ and COE compliance)
- Eclipse Foundation, Inc. becomes independent - IBM contributes UML2, Voice Tools, Aperi, COSMOS, Ajax Toolkit Framework
- Globus Toolkit 4 is WS-I compliant
- Pledged 500 patents to open source
- Partner with Zend PHP
- IBM enhances Apache partnership
 - Contributes Derby database
 - Contributes voice recognition
 - Supports Geronimo J2EE project
 - Acquires Gluecode for skills
- IBM contributes accessibility code to Firefox

2007 - today

- IBM leads Open AJAX initiative and announces partnership with the Dojo Foundation
- Leads Apache Tuscany project
- Contributes code for security management to Eclipse Higgins
- IBM contributes to Apache Lucene project and announces OmniFind Yahoo! Edition
- IBM joins OpenOffice.org
- IBM joins Open Health Tools, moving code for medical record management from Eclipse OHF
- Contributes Open Services for ALM – Jazz REST Services samples
- IBM creates ODF Toolkit Union
- Contributes Lotus Notes/Domino app templates to OpenNTF.org
- Incubates Apache Wink (JAX-RS)

More than 1000 IBM developers involved in OSS projects

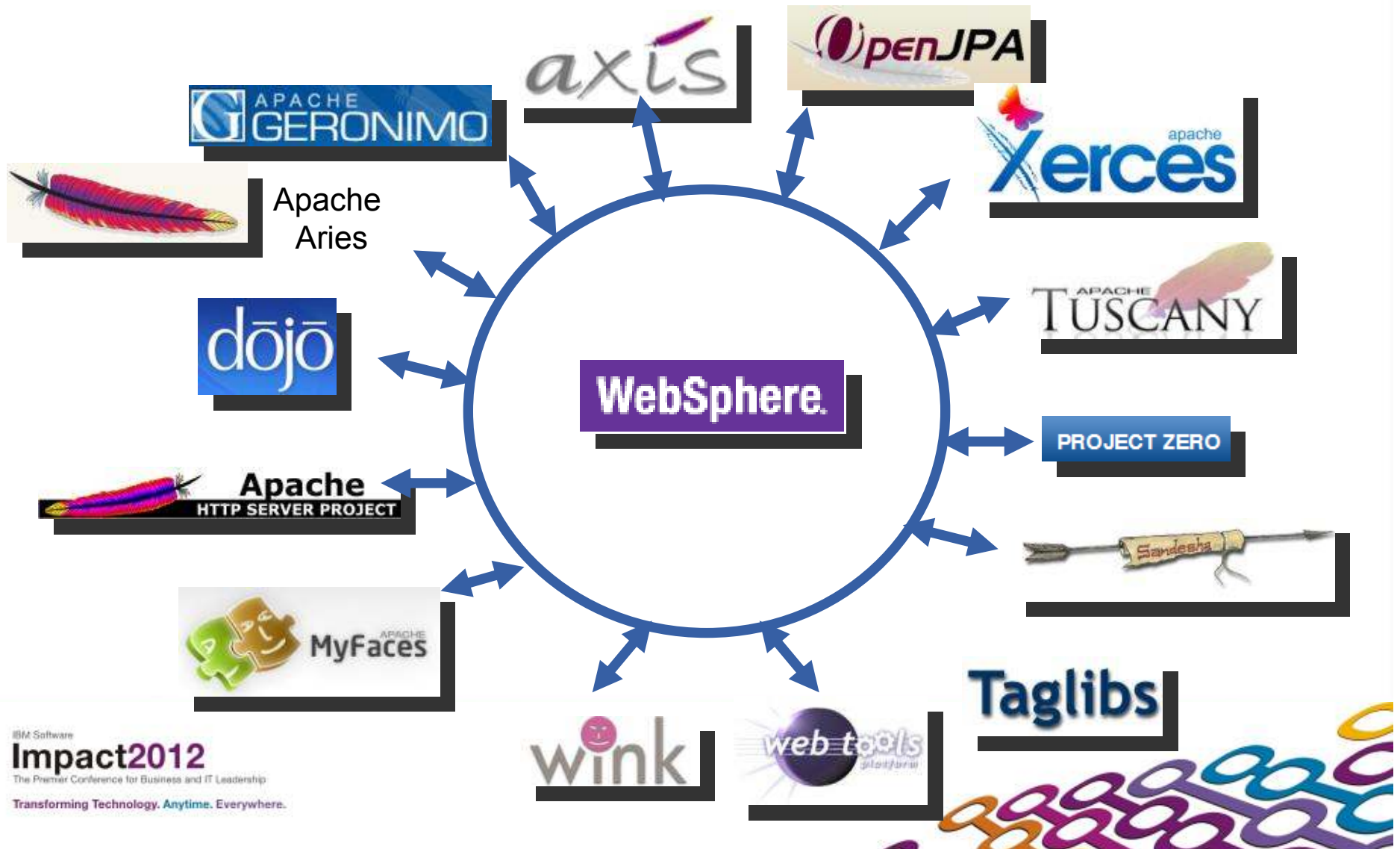
IBM leads 80+ OSS projects

IBM contributes to 150+ OSS projects



WebSphere takes advantage of the Open Source

WebSphere Application Server 8.5 includes all or parts of over 70 Open Source projects



WebSphere Application Infrastructure



Public cloud
enablement

**WebSphere Application
Accelerator for Hybrid Networks**

**WebSphere Application
Accelerator for Public Networks**

Private cloud
enablement

IBM Workload Deployer v3 (Images, Topologies, Patterns)

Mobile

IBM Worklight server (Mobile device support: Apple, Android, etc.)

Extreme
transactions

WAS v8.5 batch support

**WebSphere eXtreme Scale v7.1
DataPower XC10**

Autonomics
and elasticity

WebSphere Virtual Enterprise v7 (now part of WAS ND v8.5)

Foundation

Feature Packs



WebSphere Application Server v8.5 (Express, Base, ND, HV)

JVM

IBM JVM v1.6 or v1.7



Red Hat Application Infrastructure: lacks vision & reach




 No Application Acceleration for Hybrid Networks  No Application Acceleration for Public Networks

 No Edge Appliance








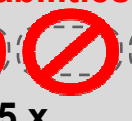


 Alpha version of OpenShift


 No intelligent management capability

 No batch support

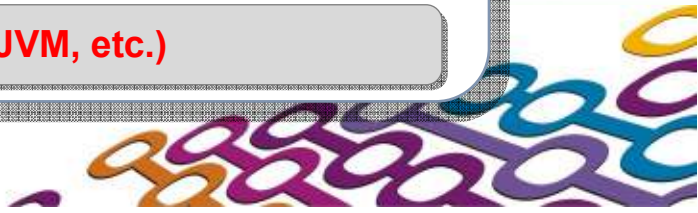
 JBoss Infinispan (beta)
No cache appliance

Missing some of the Feature Pack capabilities

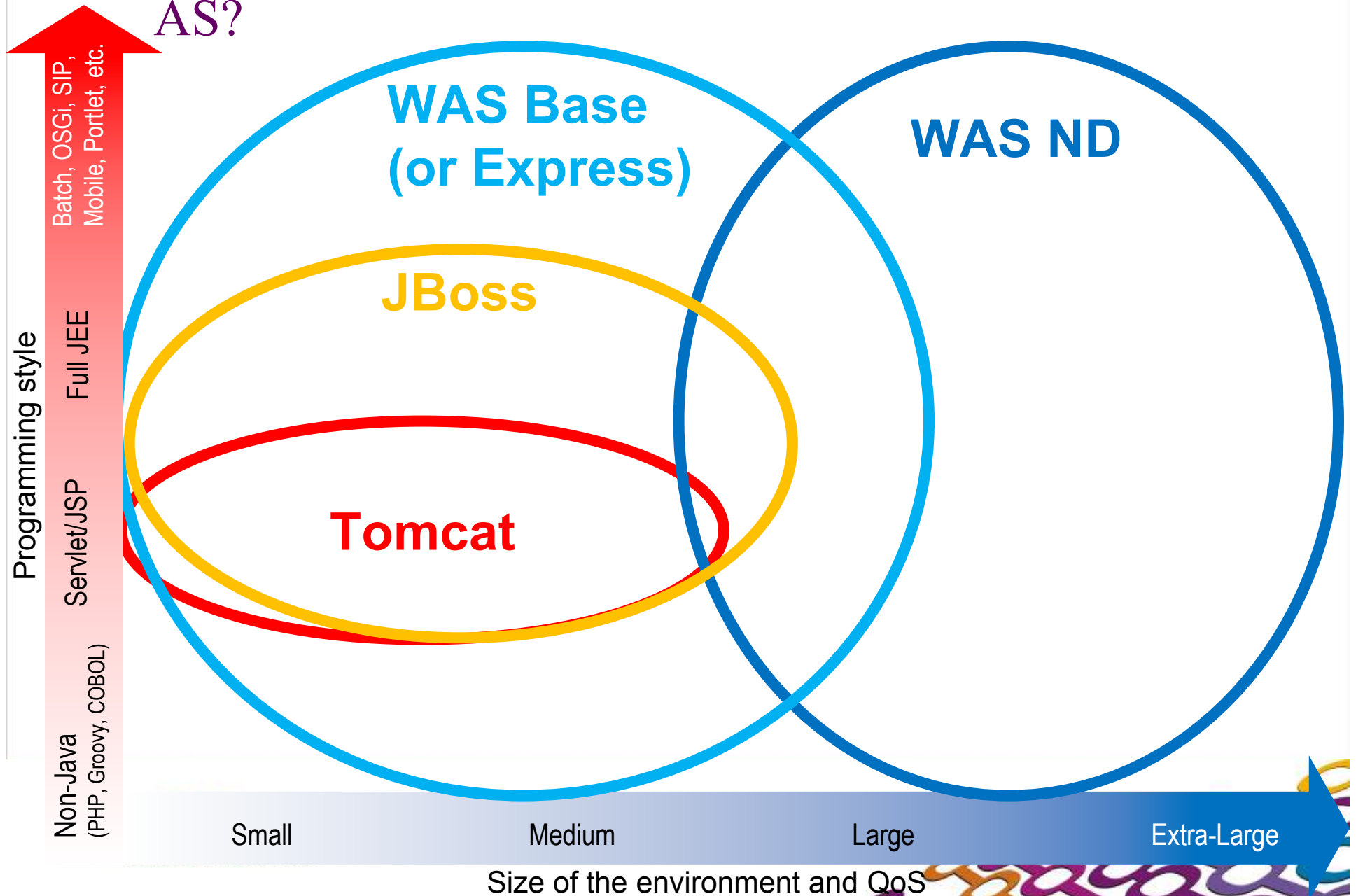
         

 JBoss Application Server (EAP) 5.x

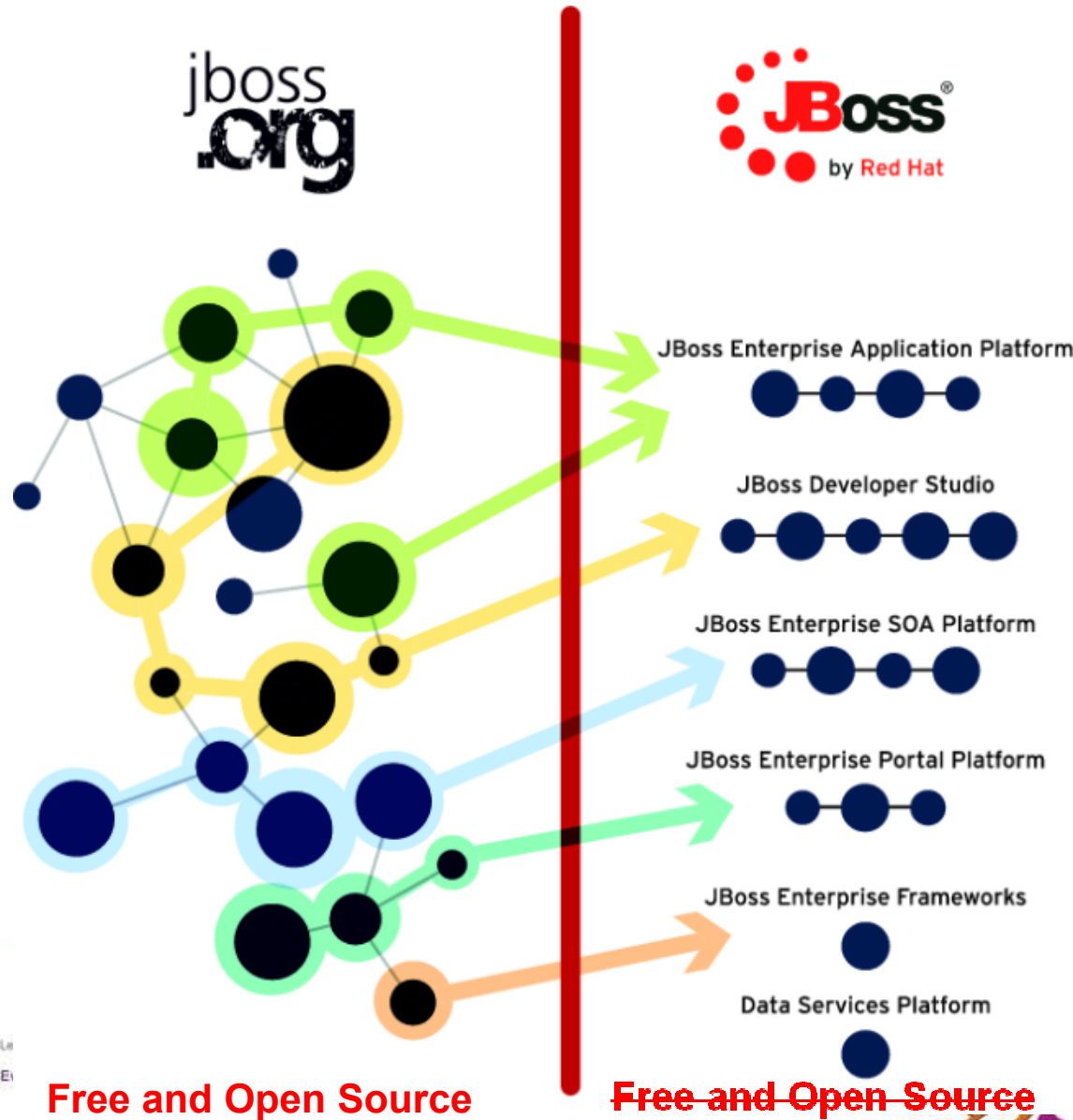
 3rd party JVM (OpenJDK, Oracle JVM, etc.)



Which IBM product competes with JBoss AS?



Red Hat JBoss Community vs. Enterprise



JBoss Enterprise products are for Enterprise Developers who are building production applications and need:

- Enterprise quality support from Red Hat during development and/or production with guaranteed SLAs
- Pre-integrated and tested software that's certified multiple JVMs and Operating Systems
- Continuous updates and patches to resolve security, performance, and stability issues
- Notifications about security issues and advice on how to resolve them
- Training and consulting services



An iceberg floating in a dark blue ocean under a cloudy sky. The tip of the iceberg is above the water, while the vast majority of the iceberg is submerged. The text '10%' is placed on the visible tip, and '90%' is placed on the submerged part. Below the '90%' is the text 'the hidden cost of software'.

10%

90%

the hidden cost of software



Software license & subscription costs

- Cost of selection of the vendor software
- Requirements analysis and capture cost
- Developer, admin and end-user training cost
- Application design and development costs
- Cost of integration with other systems
- Quality, user acceptance and other testing costs
- Deployment cost
- Operational support cost
- Application enhancements and bug fixes cost
- Runtime price/performance analysis cost
- Hardware and networking costs
- Product upgrades cost
- SLA penalties
- Downtime costs (planned and unplanned)
- Removal and disposal costs
- Self-support costs
- Cost of risks

Gartner research note G00165072, March 2009:

“Products available for free (such as open source), or those that are a “same cost” swap out, can cost more during three- to five-year period than a first-time commercial purchase costing thousands of dollars. To understand operation life cycle costs, a number of key inputs are necessary to provide a more realistic assessment of the total costs of management products.”



License cost comparison of additional components for App Server



- Management and monitoring
 - JON configuration DBMS
- Hardware for the JON database
 - Load Balancer
- Dynamic content caching proxy
- Page fragment & POJO caching
- HTTPSession persistence DBMS
 - LDAP
 - JDK
- XA integration with WSMQ
- HTTP Server

App Server Hardware

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License + support cost over 5 years



Servers	Sockets per server	Cores per socket	Processor type	IBM PVU metric	WAS Express (PVU)	WAS Base min(PVU or socket)	JBoss EAP
4	2	10	Nehalem EX (2 socket)	70	na	\$180,000	\$243,438
4	2	8	Nehalem EX (2 socket)	70	na	\$180,000	\$190,000
4	2	6	Nehalem EX (2 socket)	70	na	\$180,000	\$160,315
4	4	10	Nehalem EX (4 socket)	100	na	\$360,000	\$486,877
4	4	8	Nehalem EX (4 socket)	100	na	\$360,000	\$380,000
4	4	6	Nehalem EX (4 socket)	100	na	\$360,000	\$296,877
4	2	6	Nehalem EP	70	na	\$180,000	\$160,315
4	1	2	Intel Pre-Nehalem	50	\$17,604	\$35,460	\$53,438
4	1	2	HP Itanium	100	\$35,208	\$70,920	\$53,438
4	2	16	Sparc T3	70	na	\$180,000	\$380,000
4	2	8	Power 7 (710, 740, etc)	70	na	\$180,000	\$190,000
4	4	8	Power 7 (750, 755)	100	na	\$360,000	\$380,000
4	2	2	Power 6 (520, JS12, etc.)	80	\$56,333	\$113,472	\$53,438
4	2	2	Power 6 (550 and up)	120	\$84,499	\$170,208	\$53,438
4	8	8	Power 7 (770, 780)	120	na	\$2,723,328	\$760,000
4	1	1	Systemz10	120	\$21,125	\$42,552	\$53,438
4	1	1	Single core (all)	100	\$17,604	\$35,460	\$53,438



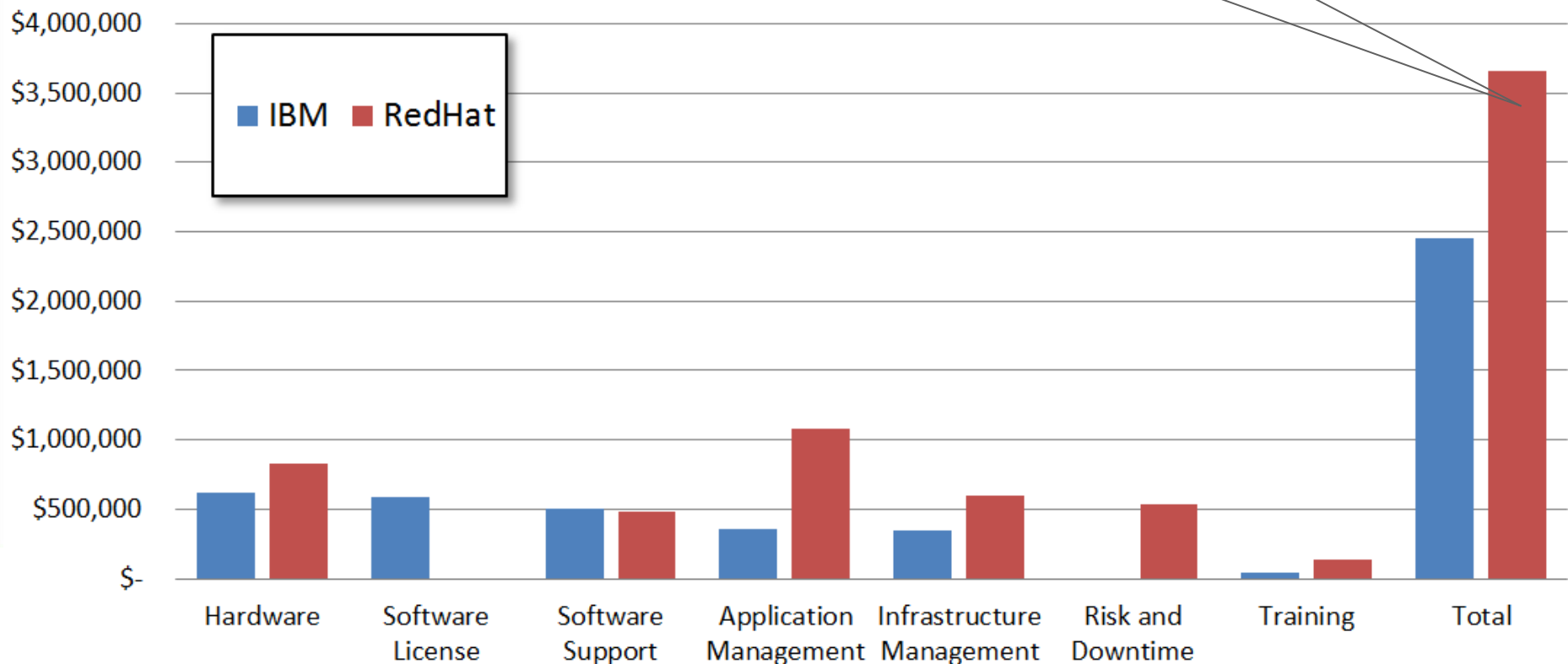
In most cases WAS Express or Base license + support cost over 5 years is lower than that of JBoss.





TCO study: WAS vs. JBoss EAP v5 over five years

Hands-on analysis of capabilities revealed that JBoss is 49% more expensive than WebSphere



Source: Based on the study by Summa Technologies, December 2010



WAS development environment choices



FREE WebSphere Developer Tools for Eclipse

FREE WebSphere Application Server for Developers

Available at no charge for the developer desktop/laptop (optional support is \$949* per year)

FREE WAS (and other IBM software) on IBM SmartCloud or Amazon EC2

ISVs and SIs can use IBM software for development, test, POC and demos. Software is free, only pay for machine time per hour (starting from 20 cents per hour)

FREE WAS with Rational Application Developer

Includes WAS and Portal test servers at no additional cost. RAD Standard costs \$2,060* per developer, full RAD costs \$4,860* per developer with first year of support included. Floating user license is also available (i.e. concurrent user license)

FREE RAD with WebSphere Application Server Tools Editions

Additional 3% on the cost of WAS or WAS ND provide unlimited licenses of RAD and WAS Developer Tools for Eclipse, which can be used only in support of the purchased production servers



WAS v8 is **JEE6** certified since June 2011



Enhanced developer productivity, user experiences, performance & integration:

- **Enterprise JavaBeans (EJB) 3.1:**
Enhanced developer productivity through simplification including testing outside of the application server, new timer support & async enhancements
- **Contexts and Dependency Injection for Java (CDI) 1.0:** Faster time to value through tighter and simpler integration between Web & business logic tiers
- **Java Persistence API (JPA) 2.0:**
Enhanced developer ease of use & app performance through improved locking, mapping support & dynamic query construction
- **Java Servlet 3.0:** Enhanced time to value through annotations and ease of integrating third party presentation frameworks
- **Java API for RESTful Web Services (JAX-RS) 1.1:** Deliver better user experiences faster through integrated Web 2.0 prog model support
- **JavaServer Faces (JSF) 2.0:** Enhanced developer productivity & end user experience through annotations & Facelets support
- **Bean Validation 1.0:** Improved developer productivity through declarative means for describing validation constraints for data
- **Java Architecture for XML Binding (JAXB) 2.2:** Improved performance via new default marshalling optimizations
- **Enterprise Web Services 1.3:** Improved integration and reuse support
- **Java API for XML-Based Web Services (JAX-WS) 2.2:** Developer productivity and security enhancements



IBM WebSphere 11 years of performance leadership

IBM WAS track record

- Held the **most** records in ECPeef
- **FIRST** to publish SPECj2001
- **FIRST** to publish SPECj2002
- **FIRST** and **ONLY** company to publish SPECj2002 Distributed
- **FIRST** to publish SPECj2004
 - Was the only vendor to publish for over 13 months
 - Held #1 spot for most of the time
- **FIRST** to publish SPECjEnterprise2010
- **LOWEST** cost per transaction
- **BEST** performance per core

SPECjEnterprise2010

IBM: 524

Oracle: 452

JBoss: 0 (never published)

EjOPS per second per processor core

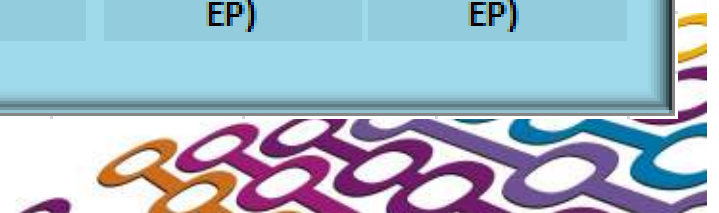
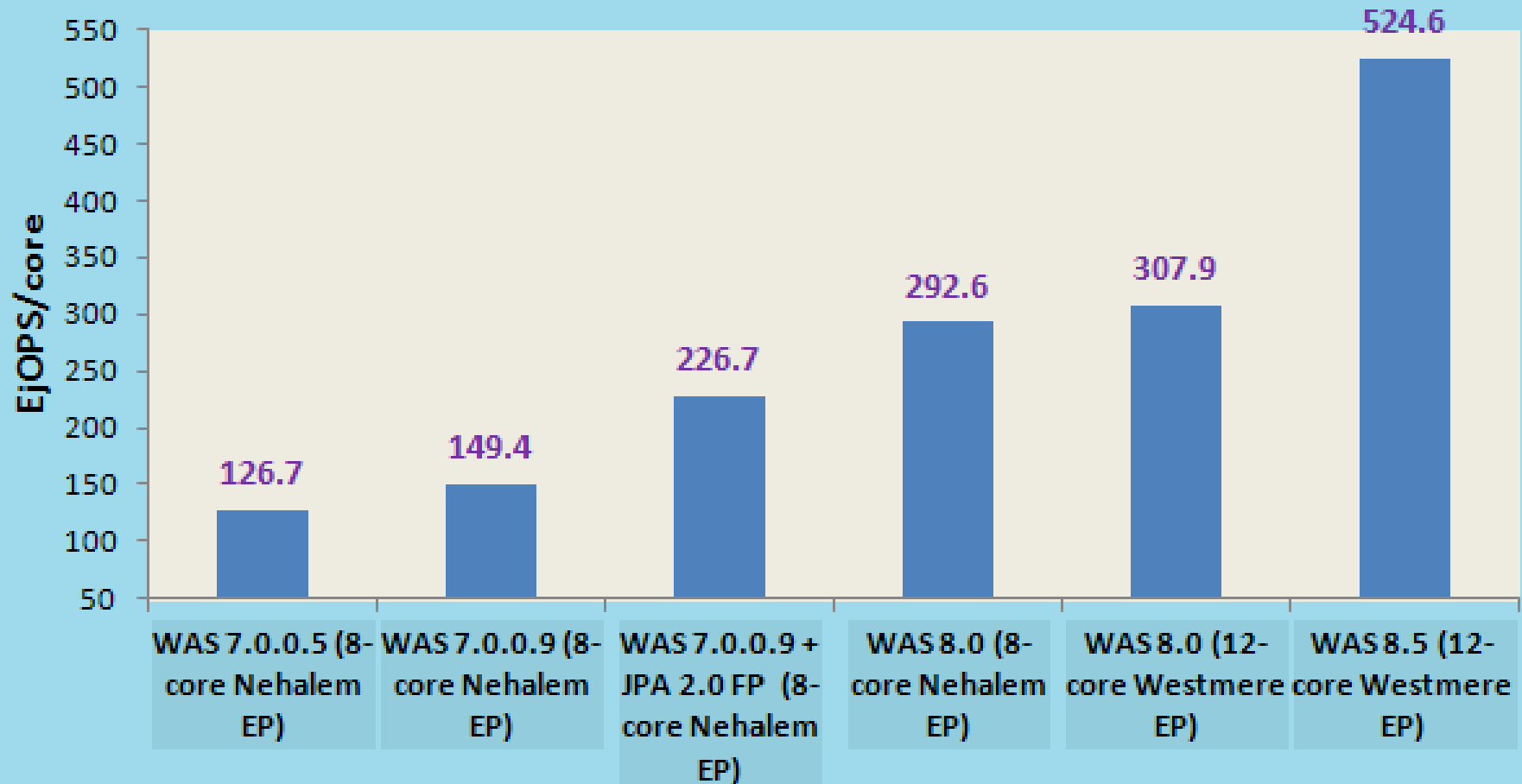
1. WAS V8.5 on Westmere-EP
2. WLS 10.3.5 on Westmere-EP



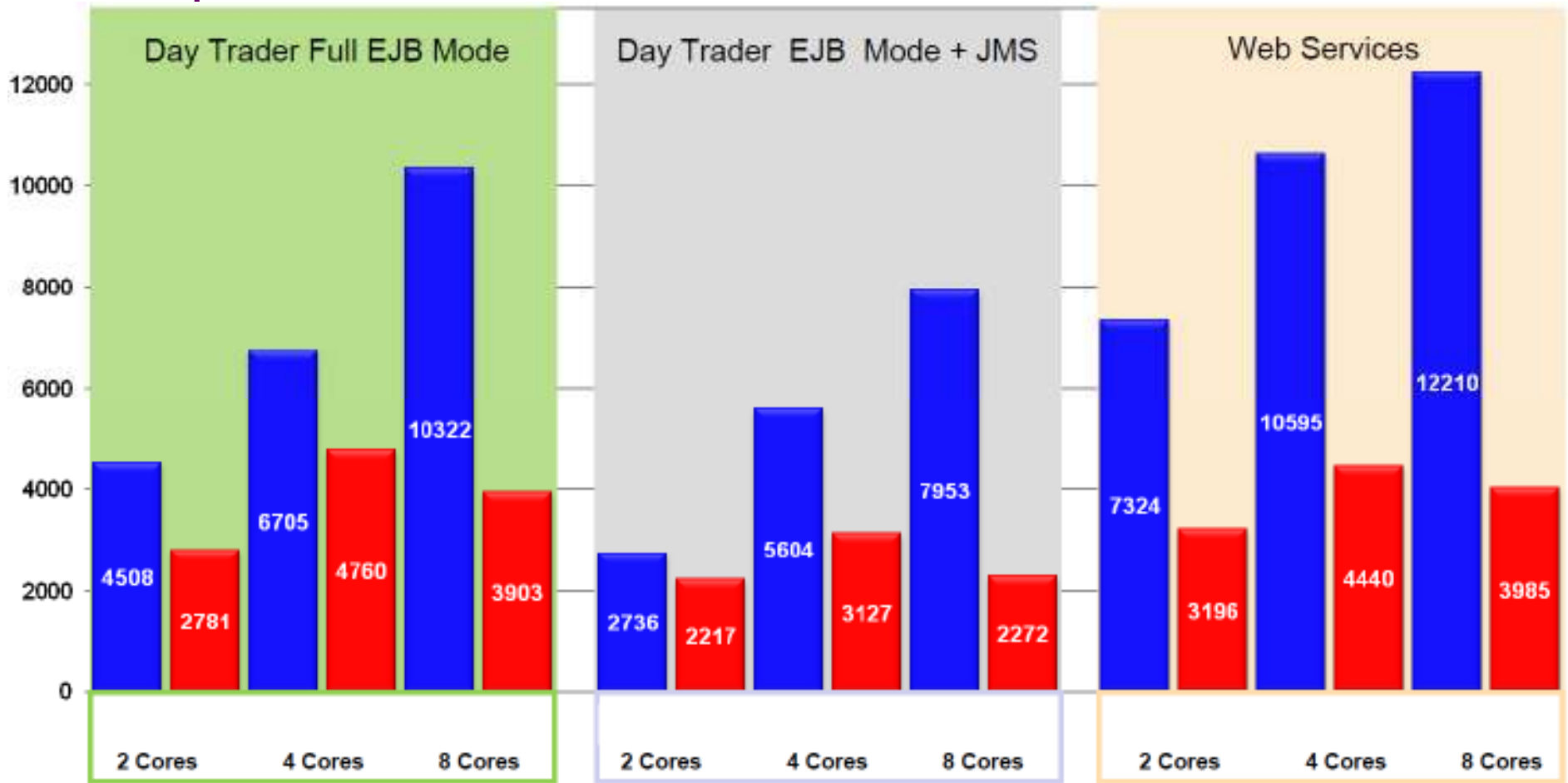
WebSphere release-to-release performance



SPECjEnterprise 2010 (Release-to-Release Performance)



WebSphere has superior vertical scaling when compared to JBoss



Application Server:

- IBM x3550 M2, Intel Xeon X5570 @ 2.93 GHz, 2x4 cores x 2 threads, 114 GB RAM, RHEL 5.5 (64 bit)
- IBM WebSphere 7 (64 bit) / JBoss EAP 5.0.1+Sun JDK 1.6.0.21 (64 bit)
- Apache Day Trader

Database Server:

- IBM x3755 MC1, AMD Opteron 8360SE @ 2.0 GHz, 4x4 cores, 15 GB RAM, RHEL 5.5 (64 bit)
- IBM DB2 9.7

Application Server	1 st Instance
IBM WebSphere	
Red Hat JBoss	

Source: IBM SWG CPO, December 2010

IBM J9 JVM competitive advantages



	IBM J9	Hot Spot, OpenJDK
Fast garbage collection for large heap sizes (>4GB) - -Xgcpolicy:balanced	Yes	No
System class data sharing for reduced memory footprint and faster startup	Yes	Client only
Application class data sharing for smaller memory footprint and faster startup	Yes	No
Avoid JVM restarts due to the PermGen filling up	Yes	No
Compressed 64-bit references (for faster runtime and smaller memory)	Yes	Recent
Troubleshooting tools for JVM (heap dump, garbage analyzer, etc.)	Yes	No
Faster performance per core	Yes	No*

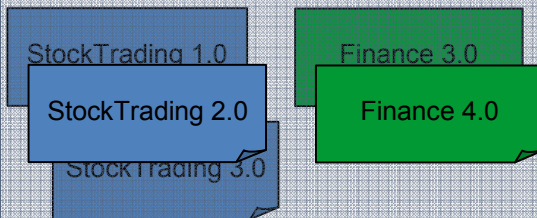


Intelligent Management

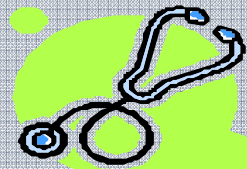


Extending QoS through autonomic computing

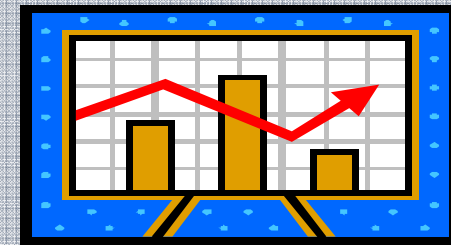
Application Edition Management Self-Managing



Health Management Self-Protecting Self-Healing



Dynamic Clustering Self-Optimizing



Intelligent Routing



Intelligent routing - new ODR capability from WVE (now WASND)



	WASND	F5 + JBoss
SLA enforcement. Prioritizes requests based on service policies and current capacity and conditions	Yes	No
Enables dynamic clusters of application servers to scale load when needed based on service policies	Yes	No
Application edition-aware routing. Continuous availability during updates	Yes	No
CPU and heap overload protection	Yes	No
Dynamically recognizes when routing information changes (e.g. app/ server/node add/remove/change)	Yes	No
Dynamically adjusts server weights based upon server's current resources and response times	Yes	No
Performs HTTP session re-balancing	Yes	No
Reacts to server starts and stops without retries	Yes	No
Load balances or fails over between clusters in the same or different cells	Yes	Yes
Supports content-based routing rules	Yes	Yes
Static file serving and in-memory and disk page caching	Yes*	No

* - WASND ships with (1) Proxy Server and (2) DMZ Secure Proxy and (3) IBM HTTP Server



Application Edition Management



Applications can be upgraded without incurring outages

- Upgrade Applications without interruption to end users
- Concurrently run multiple editions of an applications
 - Automatically route users to a specific application
- Multiple editions can be activated for extended periods of time
- Rollout policies to switch from one edition to another without service loss
- Easily update OS or WebSphere without incurring down time
- Easy-to-use edition control center in admin console, plus full scripting support

**Validation
Mode**



**Rollout
Policies**



**Concurrent
Activation**



Dynamic Clustering



Proactively provision and start or stop application servers based on workload demands to meet Service Level Agreements

- Associate service policies with your applications
 - Let WebSphere manage to the service goals
- Programmatically respond to spikes in demand
 - Add or reduce application server instances as appropriate
- Automatically recover from infrastructure problems
- Includes automatic start and stop of cluster members based on load for MQ-driven applications
- Decrease administrative overhead required to monitor and diagnose performance issues



Lazy Application Start



- Dynamic Clusters support a min and max number of running cluster members
- If the “stop all instances” option is enabled, the min is 0, which means:
 - ✓ The application may not be running in the pool anywhere
 - ✓ When a request is received, a cluster member is started
 - ✓ When the application goes idle all clusters members are stopped
 - ✓ This allows low volume applications to be available without consuming resources.
 - ✓ A customizable On Demand Router error page with meta-refresh provides a user-friendly customer experience

Minimum number of cluster instances

Stop all instances started during periods of inactivity

Time to wait before stopping instances:
60 minutes

Keep one instance started at all times

Keep multiple instances started at all times

Number of instances:
2

Maximum number of cluster instances

Limit the number of instances that can be started

Number of instances:
2

Do not limit the number of instances that can be started

Vertical stacking of instances on a node

If the nodes in the dynamic cluster have excess processing capacity, vertical stacking will allow an application to make more effective use of the capacity by starting multiple instances on the same node. [i](#)

Allow more than one instance to be started on the same node

Number of instances:
2



Overload Protection



Maximum heap utilization protects against OutOfMemory exceptions

* Memory overload protection: Maximum percentage of the WebSphere Application Server maximum heap size to use:

100 %

Maximum CPU utilization protects against various failures which occur when CPU is consumed

CPU overload protection

Nodes are protected from CPU overload by queuing and routing messages. When the specified maximum CPU usage is exceeded, the CPU is considered to be overloaded.

* Maximum CPU usage:

90 %

A rejection policy prevents a CPU from being overloaded by rejecting incoming HTTP or SIP messages that are not part of pre-existing dialogs or sessions for HTTP or SIP traffic.

Rejection policy:

- Reject no incoming messages, allow all messages into the queue regardless of their potential to time out or breach the response time threshold of their service policy goal.
- Reject incoming messages that are not part of a pre-existing dialog or session if the predicted response time of the message exceeds the response time threshold of its service policy goal.
- Reject incoming messages that are not part of a pre-existing dialog or session if the predicted response time of the message exceeds the response time threshold of its service policy goal by more than the following percentage:

Rejection threshold:

-1 %

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Memory leak detection Protection in WAS



Reduce possibilities of memory leak in your applications

Get enough info. if leak is detected to help fix my app

List stopped apps that have memory leaks

WebSphere Application Server V8.5:

- Ability to mitigate memory leak when stopping apps
- Ability to prevent leaks, receive leak warnings and get heap/system dumps
- MBean to list stopped apps that have memory leaks

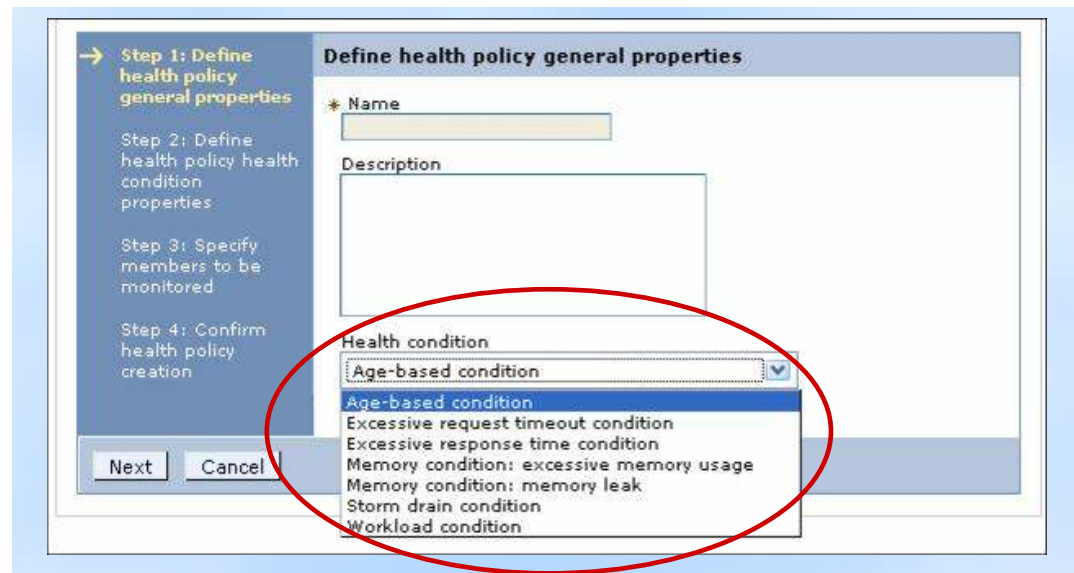


Health Management – Health Policies



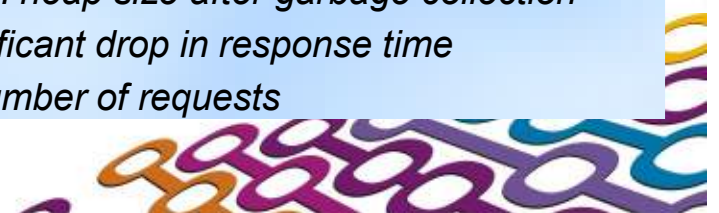
Helps mitigate common health problems before outages occur

- Health policies can be defined for common server health conditions
- When a health policy's condition is true, corrective action execute automatically or require approval
 - Notify administrator (send email or SNMP trap)
 - Capture diagnostics (generate heap dump, java core)
 - Restart server
- Excessive response time means you are monitoring what matters most: your customer's experience!
- Application server restarts are done in a way that prevent outages and service policy violations
- Each health policy can be in supervise or automatic mode. Supervise mode is like training wheels to allow you to verify that a health policy does what you want before making it automatic.



Health Conditions

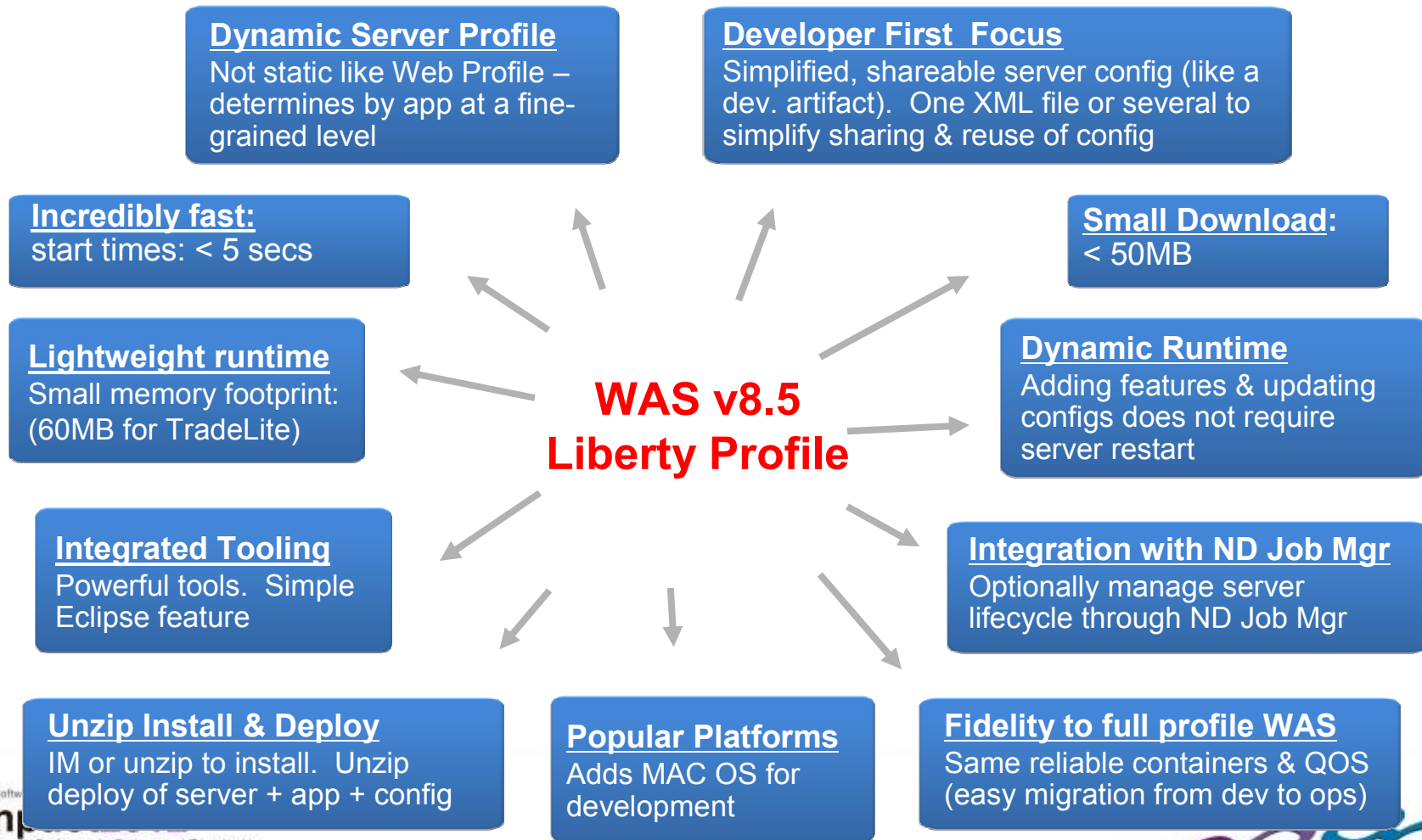
- Excessive request timeouts:** % of timed out requests
- Excessive response time:** average response time
- Excessive garbage collection:** % of time spent in GCs
- Excessive memory:** % of maximum JVM heap size
- Age-based:** amount of time server has been running
- Memory leak:** JVM heap size after garbage collection
- Storm drain:** significant drop in response time
- Workload:** total number of requests



WAS v8.5: Introduces the “Lightweight Liberty” Profile



A highly composable, dynamic Server profile



How do Red Hat customers really use JBoss AS in production?



- Less than 5% of JBoss customers use clustering
 - Must tolerate lower quality of services (\$\$\$)
 - Or use 3rd party tools to achieve high availability (\$\$\$)

and

- Most JBoss customers purchase 3rd party management tools, monitoring tools, configuration management tools, performance profilers, etc.
 - 3rd party tools require license and support payments (\$\$\$)
 - 3rd party tools are not always in synch with the desired version of JBoss (\$\$\$)
 - 3rd party vendor viability poses risks (\$\$\$)

and

- Most JBoss customers invest significant staff time to build home grown scripting frameworks for JBoss management (a combination of shell scripting and generation of JBoss XML files using XSLT, Java or other template mechanism)
 - Cost to develop, debug, maintain such scripts can be significant (\$\$\$)
 - New versions of JBoss (major or minor) are not 100% backwards compatible, causing significant rework of home grown scripts and tools (\$\$\$)

- **WAS ND provides all needed administrative tools out of the box at no extra cost**





Documentation – order of magnitude difference in quality



JBoss docs – limited and inconsistent, lags in time
JBoss wikis – lots of old confusing info
User forums – no longer monitored by developers



InfoCenter – world class, up to date

Redbooks – unique and comprehensive

developerWorks - implementation tips

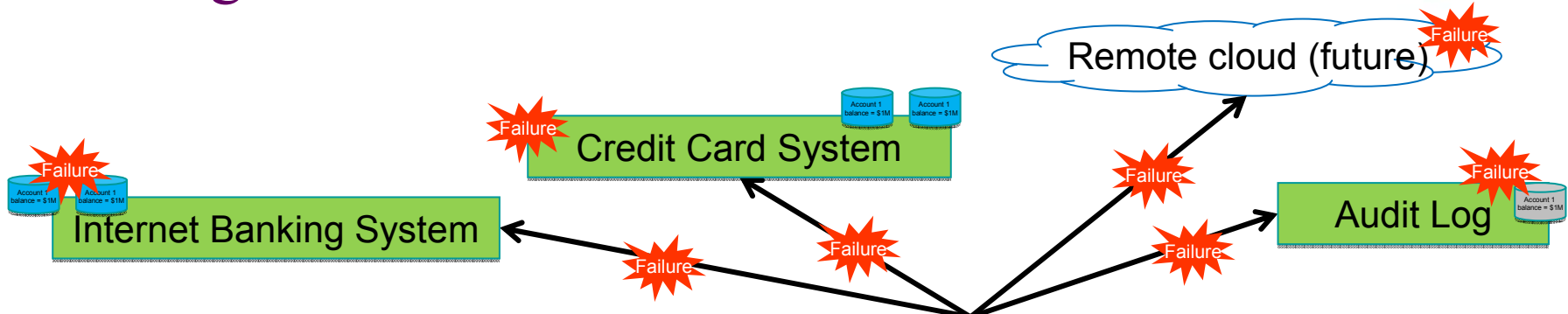
ISA – electronic support search tool

3rd party – sites, blogs, etc.

User forums – self help



The saga of a one million dollars

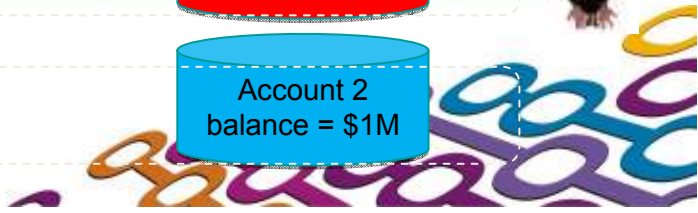
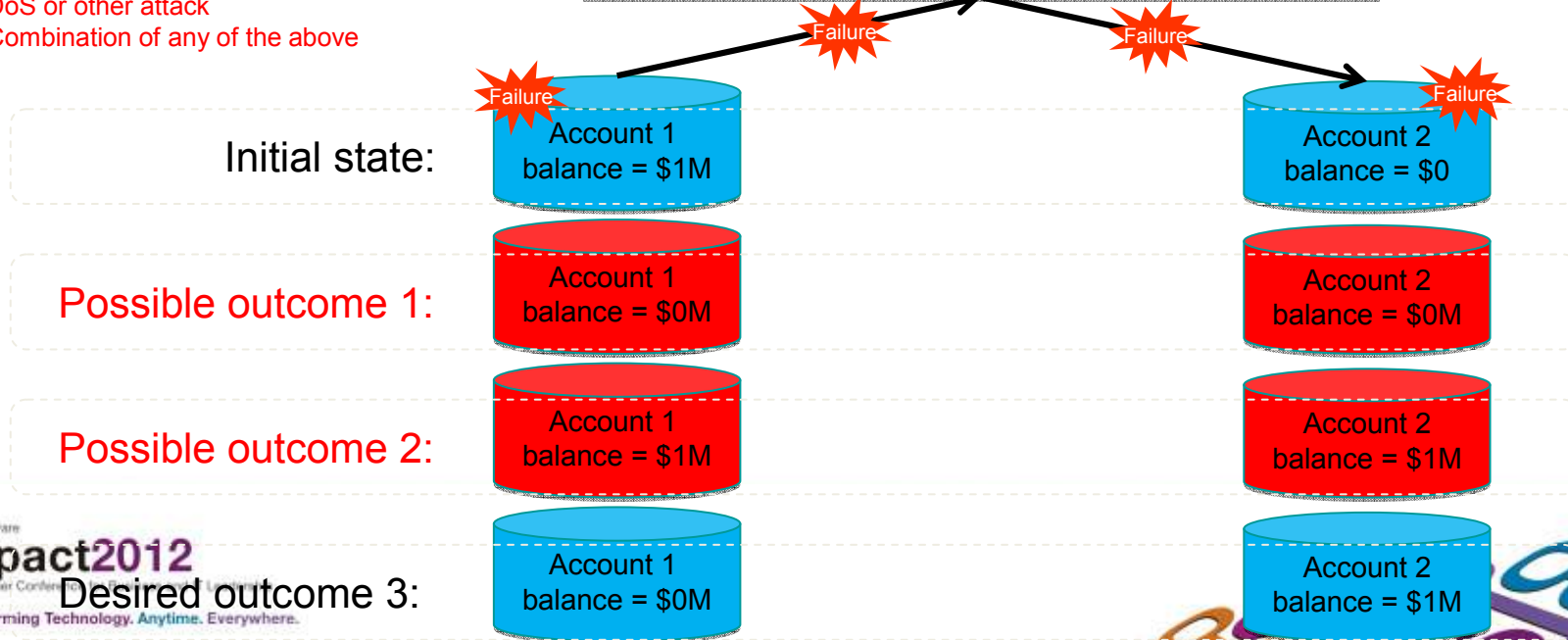


Types of failures:

1. Power outage
2. Network error or outage
3. Software failure (OS, DBMS, etc.)
4. Hardware failure
5. Human error
6. Application error
7. DoS or other attack
8. Combination of any of the above

Transaction: Transfer \$1M

1. Check funds availability in Account1
2. Withdraw funds from the Account1
3. Debit funds to the Account2
4. Update related systems with the right information
5. Write into the audit log for security and compliance reasons



Highly available transaction log



- Provides Failover of In-flight 2 PC transactions
- WAS-ND Can Be Configured to Store Transaction Logs For Each Server on a NAS (Network Attached Storage) or Shared File System
 - Allows All Peers to See All Transaction Logs
 - Automatic HAManager Recovery requires that the distributed file in use provide the necessary file locking semantics
- When a WAS-ND cluster Member Fails, a Peer is Elected to Recover the Transaction Log From the Failed Server
 - In Doubt Transactions From a Failed Server Are Recovered Very Quickly
 - Significantly Faster Than Hardware Clustering
 - Recovery Can Take Minutes
 - Requires OS Clustering & Shared Disk
 - Recovery in a few seconds
 - Design Criteria < 1 sec.
- Not Enabled By Default For a Cluster
 - Enable failover of transaction log recovery



• **JBoss does not provide transaction log failover**



Security issues with JBoss



- No role-based administrative security (“Who can do what?”)
- No resource scope separation for admin users (“Who can manage what?”)
- Clustered configuration is insecure
 - Can lead to ad hoc clusters and unexpected downtime, unauthorized instances can join the cluster and hijack workload
 - Must have file system level access to all servers, which is often not an option in secure environments

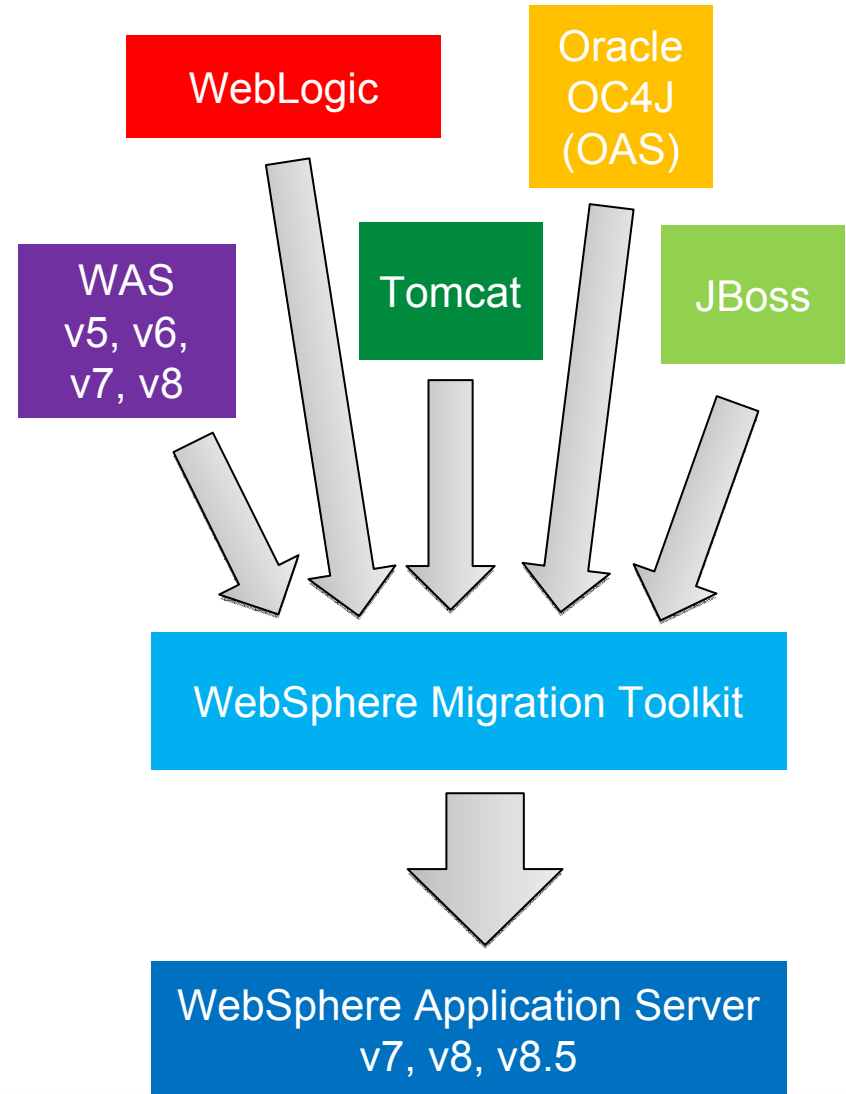
These issues result in increased administration costs when using JBoss because of lost productivity. These issues increase risks to the organization due to loss/theft of data or loss of business due to unplanned downtime.



FREE WebSphere Migration Toolkit (Eclipse plugin)



- Migrate WebSphere applications from older releases to WAS v7.0, v8.0 or v8.5
 - Migrate applications from v5.1, v6.0, v6.1, v7.0 and v8.0
- Migrate From Oracle (WebLogic & OracleAS), JBoss or Tomcat to WebSphere Faster/Easier
 - Migrate applications 2x as fast
 - Migrate web services 3x as fast
- The tool programmatically scans customer applications and identifies the changes required
 - In many cases the tool is capable of making the application change itself, in other cases it provides guidance on how to make the required change
 - Generate reports to assess the migration task
- Ease the migration process and speed time to value with this Free toolkit





Thank You

