The IBM WebSphere world: from Cloud to legacy environments
Agenda

- Cloud Computing
  - Introduction and models
- How to build private Cloud with WebSphere
  - Pattern-based approach
  - Workload-based approach
- WebSphere Application Server v8: technical overview
- IBM WebSphere eXtended Transaction Runtime
  - Modernize, extend and reuse COBOL business assets with WXTR
Agenda

- Cloud Computing
  - Introduction and models
- How to build private Cloud with WebSphere
  - Pattern-based approach
  - Workload-based approach
- WebSphere Application Server v8: technical overview
- IBM WebSphere eXtended Transaction Runtime
  - Modernize, extend and reuse COBOL business assets with WXTR
Pressures like workforce mobility and increasing productivity are placing greater demands on IT systems.

**Increased expectations**
- **52%** CAGR growth in self-service channels

**Increased demands**
- **10x** growth in digital data from 2007 to 2011.

**Increased competition**
- **2/10** of the world’s largest companies in 2000 remain on that list today.

54% of surveyed enterprise IT budgets in 2010 were spent on ongoing operations and maintenance costs.*

As a result, cloud is an increasingly attractive means of creating and delivering IT services.

<table>
<thead>
<tr>
<th>Value delivered</th>
<th>From traditional</th>
<th>To cloud</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change management</td>
<td>Months</td>
<td>Days or hours</td>
</tr>
<tr>
<td>Test provisioning</td>
<td>Weeks</td>
<td>20 minutes</td>
</tr>
<tr>
<td>Install database</td>
<td>1 day</td>
<td>12 minutes</td>
</tr>
<tr>
<td>Install of operating system</td>
<td>1 day</td>
<td>30–60 minutes</td>
</tr>
<tr>
<td>Provisioning environment</td>
<td></td>
<td>51% cost savings</td>
</tr>
<tr>
<td>Design and deploy business applications</td>
<td>Months</td>
<td>Days/Weeks</td>
</tr>
</tbody>
</table>
Cloud helps business and IT create and deliver value in fundamentally new ways

**Deliver IT without boundaries**
Enable new IT and business processes that break down traditional silos and simplify access to information in order to deliver better business outcomes.

**Improve speed and dexterity**
Speed the delivery of new offerings and services by creating new models of self-service and deployment.

**Create new business value**
Empower internal and external communities to define and create new offerings and services.
Businesses are choosing a variety of cloud models to meet their unique needs and priorities.

- **Private cloud**: On or off premises cloud infrastructure operated solely for an organization and managed by the organization or a third party.

- **Public cloud**: Available to the general public or a large industry group and owned by an organization selling cloud services.

- **Hybrid IT**: Traditional IT and clouds (public and/or private) that remain separate but are bound together by technology that enables data and application portability.

- **Traditional IT**: Appliances, pre-integrated systems and standard hardware, software and networking.
Adoption patterns are emerging for successfully beginning and progressing cloud initiatives

**IaaS**: Cut IT expense and complexity through a cloud enabled data center

**PaaS**: Accelerate time to market with cloud platform services

**BPaaS**: Innovate business models by becoming a cloud service provider

**SaaS**: Gain immediate access to business solutions on cloud

---

*Design*  |  *Deploy*  |  *Consume*
Easily build and rapidly scale private cloud environments with unparalleled time-to-market, integration and management.
Agenda

- Cloud Computing
  - Introduction and models
- How to build private Cloud with WebSphere
  - Pattern-based approach
  - Workload-based approach
- WebSphere Application Server v8: technical overview
- IBM WebSphere eXtended Transaction Runtime
  - Modernize, extend and reuse COBOL business assets with WXTR
What is IBM Workload Deployer?

- An hardware appliance that helps reducing risk / errors by codifying infrastructure and taking a declarative approach to your application environments
- It offers choices for delivering services in your private cloud
  - Existing middleware, virtual systems, virtual applications
- Reduces time and effort in installation, configuration, and integration of application environments
- Simplifies monitoring and management for your application environments
IBM Workload Deployer: deployment models

- VMware
- PowerVM
- z/VM
IBM Workload Deployer: deployment models

Existing Middleware
- Standard software installation and configuration on OS
- Images created through extend / capture
- Traditional administration and management model

Virtual System Patterns
- Packaged for virtual environments
- Automated deployment of middleware topologies
- Traditional administration and management model

Virtualized Middleware Services

Virtualized Infrastructure Services

Virtual Application Patterns
- Built for the cloud environment
- Highly automated, policy-based deployment
- Leverages elastic workload management services

Standard TCO existing applications

Improved TCO virtualized applications

Best TCO cloud applications

VMware, PowerVM, z/VM
Why leveraging a pattern-based approach

- Creation of middleware infrastructure takes too long

- Manual or semi-automated efforts are error-prone

- Poor resource utilization results in increased cost of labor and hardware

- Avg. lead time to get new application up – **4 to 6 months**
  - Delay caused by approvals, procurement, shipment, hardware installation, license procurement, OS installation, application installation, configuration

- Bugs are introduced by inconsistent configurations – **30%**
  - Often most difficult variety of bugs detected during the move from development to QA or production

- Setting up an environment is expensive, so there is an incentive to hold onto it “just in case” – even when no longer needed
  - Slow down in technology adoption
  - Future environments require new hardware, instead of recycling returned hardware; cycle repeats
Virtual systems at a glance

Hypervisor Edition (from IBM)
Custom built (ICON)

- Multi-server environment deployed as an atomic unit
- Individual components connected to one another
- Ready-to-use environment

Script Packages

- WebSphere Application Server
- Operating System

Description of Middleware Topology

2 x WebSphere Message Broker, 3 x WebSphere Application Server (cluster)

Virtual Systems in IBM Workload Deployer
Building a virtual system pattern

- Virtual system patterns are built by combining **parts** from Hypervisor Edition images
  - Parts correspond to middleware components that you use to define your topology
  - Combine parts from multiple images in a single pattern
- Example: Parts available in a WebSphere Application Server image

<table>
<thead>
<tr>
<th>WebSphere Application Server 7.0.0.17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative agents</td>
</tr>
<tr>
<td>Custom nodes</td>
</tr>
<tr>
<td>Deployment manager</td>
</tr>
<tr>
<td>IBM HTTP servers</td>
</tr>
<tr>
<td>[show less]</td>
</tr>
<tr>
<td>Job manager</td>
</tr>
<tr>
<td>Standalone server</td>
</tr>
<tr>
<td>On demand routers</td>
</tr>
</tbody>
</table>

Contains parts:

- [part product IDs...]
- [part product IDs...]
- [part product IDs...]
- [part product IDs...]
- [part product IDs...]
- [part product IDs...]
CREATE: “My Sample Pattern”
Move the system on a different HW platform

Web Server

Cluster

Custom Node

Sample Application

Resource Definitions

Web Server

Cluster

Custom Node

Sample Application

Resource Definitions

Web Server

Cluster

Custom Node

Sample Application

Resource Definitions

Web Server

Cluster

Custom Node

Sample Application

Resource Definitions

HW platform to HW platform

Version to Version

© 2012 IBM Corporation
By leveraging a pattern-based approach you can:

- Build a new system in minutes

- Fully automate the deployment process
  - Remove inconsistency between deployment
  - Build and create the SAME system as many time as you want in a consistent way!

- Better utilize the systems’ resources:
  - Better usage of HW resources
  - Better usage of licenses!

- Easily move from an HW platform to another
  - Just choose another deployment platform and create the SAME system there
Why leveraging a workload-based approach

- Delivered as full solutions, tailored for a use case:
  - Web application
  - Database
  - Batch
  - Analytics

- Optimized-for-purpose results in limited ability to customize
  - Database-as-a-Service
Virtual applications at a glance

**EAR file**

**DDL file**

**Policies**
- Scaling policy (clustering, caching)
- Routing policy
- JVM policy
- Logging policy

Virtual Applications in IBM Workload Deployer

- Full life cycle management
- Multi-server environment deployed as an atomic unit
- Individual components wired to one another
- Ready-to-use environment
Virtual Application Builder

Drag assets onto the canvas to define application and related resources.

Define cross-component links and add policies; respond to warning messages to build well-formed applications.

Specify configuration details for components, policies, and links.
Sample virtual application – pattern to instance

Virtual Application Pattern

Scaling Policy
Routing Policy
Existing user registry
Application
Existing Database

Application deployer

Application
Functional requirements
Non-functional requirements

Proxy Service
Proxy Service
Proxy Service
WebSphere Application Server
WebSphere Application Server
WebSphere Application Server

Monitoring, Life cycle management

Existing DB2
Existing LDAP

Caching Service
Caching Service
Agenda

- Cloud Computing
  - Introduction and models
- How to build private Cloud with WebSphere
  - Pattern-based approach
  - Workload-based approach
- WebSphere Application Server v8: technical overview
- IBM WebSphere eXtended Transaction Runtime
  - Modernize, extend and reuse COBOL business assets with WXTR
WebSphere Application Infrastructure: The Big Picture

Vertically Integrated & Horizontally Fit for Purpose

- Operational Management & Efficiency
  - IBM Workload Deployer (Images, Topologies, Patterns)

- Batch Processing & Distributed Caching
  - WebSphere Virtual Enterprise (Intelligent Mgmt Pack)
  - WebSphere Compute Grid
  - WebSphere eXtreme Scale
  - DataPower XC10

- Fit for Purpose
  - Feature Packs
  - WebSphere Application Server Foundation

- Programming Models
  - IBM JVM
WebSphere Application Server: Over a Decade of Leadership & Trusted Delivery

- WebSphere Application Server V6.0.2
- WebSphere Application Server V6
- WebSphere Application Server V6.1
- WebSphere Application Server V7
- WAS V7 Feature Packs (XML, CEA, SCA)
- SAML & WOLA
- WAS HV
- WAS EC2 AMI
- WAS V8
- Web 2.0 & Mobile FEP
- WAS HV Refresh
- Migration Toolkit Refresh
- WAS V8 Alpha, Beta & Beta Refresh
- WAS V7 Feature Packs
  - OSGi Apps & JPA 2.0
  - Modern Batch
  - CEA Mobile Widgets
  - Dynamic Scripting
- WAS HV Refresh
- Migration Toolkit Refresh
### WebSphere Application Server Family

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WebSphere Application Server for Developers</strong></td>
<td>Enables efficient development of innovative applications that will eventually run on WAS in production. Also available as a no-charge edition for the developer desktop.</td>
</tr>
<tr>
<td><strong>WebSphere Application Server Hypervisor Edition</strong></td>
<td>Optimized to instantly run in VMware and other server virtualization environments.</td>
</tr>
<tr>
<td><strong>WebSphere Application Server Network Deployment</strong></td>
<td>Delivers near-continuous availability, with advanced performance and management capabilities, for mission-critical applications.</td>
</tr>
<tr>
<td><strong>WebSphere Application Server for z/OS</strong></td>
<td>Takes full advantage of the z/OS Sysplex to deliver a highly secure, reliable, and resource efficient server experience.</td>
</tr>
<tr>
<td><strong>WebSphere Application Server</strong></td>
<td>Provides secure, high performance transaction engine for moderately sized configurations with web tier clustering and failover across up to five application server profiles.</td>
</tr>
<tr>
<td><strong>WebSphere Application Server - Express</strong></td>
<td>A lower-cost, ready-to-go solution to build dynamic Web sites and applications.</td>
</tr>
<tr>
<td><strong>WebSphere Application Server Community Edition</strong></td>
<td>An open source-based, small footprint foundation with no up-front acquisition costs.</td>
</tr>
</tbody>
</table>

*Built on a common code base*
Speed the Development & Test Lifecycle Through Self Service Access to Repeatable Environments

1. Self service request

2. Rapidly access consistent & repeatable provisioned development & test environment

IBM Workload Deployer & WAS Hypervisor Edition
WAS Hypervisor Edition (WAS HV)

- WAS shipped ready to run on a hypervisor based on OVF standard
- No installation required (just run and choose a profile)
- Single virtual image capable of supporting single servers or clusters
- WAS v6.1 and v7 available with full support for FEPs
- New images released on quarterly update intervals
- Maintenance, support, and fixes through IBM for both WAS and Operating System
- Self optimizing & autonomic clouds via newly announced Intelligent Management Pack, an optional add-on to WAS HV & that IBM Workload Deployer can leverage
Intelligently Manage Application Environments & Deliver Rich User Experiences Faster

**Speed Delivery of Applications & Services**
- Open Source to Enterprise
- Free WAS for Developers
- Self Service Development Environments
- Faster Edit-Compile-Debug
- Programming Models
  - Java EE 6
  - Web 2.0 & Mobile
  - OSGi Applications
  - SCA
  - Java Batch
  - XML
  - SIP & CEA
  - Dynamic Scripting
- Integrated Tooling
- Application Adapters

**Operational Efficiency & Reliability**
- High Performance
- Transactional Strength
- Scalability & HA
- Install & Maintenance
- Problem Determination
- Platform & Environment Flexibility
- Flexible Pricing Models
- Feature Packs

**Security & Control**
- Administrative Productivity
- OSGi Application Agility
- Security
- Migration
Intelligently Manage Application Environments & Deliver Rich User Experiences Faster

**Speed Delivery of Applications & Services**
- Open Source to Enterprise
- Free WAS for Developers
- Self Service Development Environments
- Faster Edit-Compile-Debug
- Programming Models
  - Java EE 6
  - Web 2.0 & Mobile
  - OSGi Applications
  - SCA
  - Java Batch
  - XML
  - SIP & CEA
  - Dynamic Scripting
- Integrated Tooling
- Application Adapters

**Operational Efficiency & Reliability**
- High Performance
- Transactional Strength
- Scalability & HA
- Install & Maintenance
- Problem Determination
- Platform & Environment Flexibility
- Flexible Pricing Models
- Feature Packs

**Security & Control**
- Administrative Productivity
- OSGi Application Agility
- Security
- Migration
Monitored Directory Support

Accelerate edit-compile-debug tasks during the development lifecycle

- Enhanced **developer** productivity through new monitored directory-based application install, update and uninstall of Java EE applications

- Drag & drop and command line support

- Supported with WAS Express, Base, ND & z/OS

- Supported file types:
  - EAR (Enterprise Archive)
  - WAR (Web Application Archive)
  - JAR (Java Archive)
  - SAR (SIP Application Resource)
WebSphere Application Server Feature Packs

Access innovative standards and programming models faster on a stable foundation

With WAS V6.1 & 7.0

- EJB 3.0
- Web 2.0
- Web Services

WAS V6.1

- Web 2.0
- CEA
- XML
- SCA
- OSGi Apps & JPA 2.0
- Java Batch

Java EE 5

With WAS V8

- Web 2.0 & Mobile
- Dynamic Scripting

WAS V8

- CEA
- XML
- SCA
- OSGi Apps & JPA 2.0
- Java Batch

Java EE 6
Java EE 6

Simplify standards-based enterprise Java development for dept. to core business apps

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
Web 2.0 & Mobile

Extend the reach of enterprise web applications across devices to deliver high quality user experiences

Enabling Mobile UI's:
- Dojo Core & Widget Infrastructure
- Dojo Visualization
- New Mobile Widget Library
- Dojo Web Builder (Build optimization service)
- Desktop & Mobile Demo Showcase

Accelerating Rich Internet Applications:
- Touch-enabled desktop widgets
- Maps components (tiled and vectors)
- New Visualization widgets
- Component updates: Dojo 1.6++, JAX-RS, etc

Common Mobile & RIA Building Blocks:
- Directory Listing Service
- File Upload Service (multipart)
- Graphics Conversion Service (SVG/PNG/JPG/PDF)
- Logging/Debug/Analytics Capture Service

Available as a Feature Pack supporting WAS v8, v7 & v6.1
OSGi Applications

Key Features:

- **Modular deployment and management:** Separate common libraries from application archives; manage them centrally and across many versions, concurrently.

- **Standards Based DI Framework:** POJO development model, with a container that manages injection of configuration, and controls activation & deactivation, integrated with the server.

- **In-place update:** Update applications modules without restarting the application.

- **Java Standards Layering:** Java standards such as transaction, security, & persistence can be mixed into the componentized apps as services.

- **SCA Integration:** Components can be decorated as SCA components to provide coarse grain SOA services.

Speed development, increase ease of use and reuse through the modularity, dynamism, and versioning capabilities of OSGi applied to web & enterprise applications.
OSGi and SCA: the assembly food chain

**SCA Composite** assembled from heterogeneous components including an **OSGi Application** component, and integrated through SCA services with configurable bindings (JMS, web services…).

**OSGi Bundles** assembled in an **OSGi Application** and integrated through services in the OSGi service registry.

**POJOs** assembled using a Blueprint context and scoped by an **OSGi Bundle**.
Java Batch

Quickly develop and deploy batch applications and dramatically reduce infrastructure and operational costs

Key Features:

- **Lower TCO:** Concurrent execution of batch & online transaction processing (OLTP) workloads using shared business logic on a shared infrastructure; Higher throughput and lower resource consumption on z/OS when collocated with data subsystems

- **Enhanced Developer Productivity:** Pre-integrated application framework, Java batch programming model and tools to manage batch life cycle

- **Automation & Admin:** Container managed services for checkpoint and restart capabilities in addition to reliable, highly available, secure and scalable infrastructure. Integrated administration of OLTP applications and batch jobs

- **Packaging utility:** Utility to package batch application that can be deployed using JEE runtime

- **Ease of Access & Use:** Integrated with WAS V8
XML

Key Features:

- **Speed & Simplicity**: Work with structured data using high performance tools optimized for XML data processing and querying
- **Standards Based**: Support for the XPath 2.0, XSLT 2.0, and XQuery 1.0 W3C standards
- **Consistency**: XML runtime API that offers consistent execution and data navigation API while allowing access to existing Java logic
- **Enterprise grade**: Enterprise class multi-threaded scalability & serviceability with IBM support
- **Samples**: 40+ samples including 4 end to end scenarios
- **Ease of Access & Use**: Integrated with WAS V8

Reuse Java skills & improve ease of use while developing applications to process structured data.
Dynamic Scripting

Leverage existing platform investment to rapidly address situational application requirements using PHP or Groovy

Key Features:

- **Time to Value**: Rapid development with PHP, Groovy, and a Web 2.0 oriented programming model based on WebSphere sMash

- **Reuse**: Develop and deploy application components supporting the iWidget specification that can be incorporated into WebSphere Portal and IBM Mashup Center-based applications

Available as a Feature Pack supporting WAS v8, v7 & v6.1

http://www.projectzero.org/

Web 2.0 & Mobile
Extend SOA and Java EE assets to the glass & mobile devices via dynamic, rich JSF, DOJO & mobile web applications

SOA
Assemble Web services and SCA components into heterogeneous business applications

OSGi
Build dynamic, modular, and easily manageable applications

Java EE 6
Develop and test Java EE 6 applications with annotation based programming

WAS Integration
Hot deploy incremental changes to WAS

Modern Batch
Integrated programming model support for batch applications

Refactor
Code
Deploy
Test
Debug
Refine
RAD / RAD SE
WAS
IBM Assembly and Deploy Tools for WebSphere Administration (IADT)

Rapidly assemble & deploy applications to WebSphere Application Server environments

Key Capabilities:

- Import and validate applications
- Edit deployment descriptors and binding files
- Edit EAR-level configuration (Enhanced EAR)
- Create and debug Jython and wsadmin scripts
- Deploy EJB and web services
- Deploy applications to local or remote WAS v8 servers
- Debug applications on WAS v8

- IADT tools replace the previously available IBM Rational Application Developer Assembly and Deploy function
- Restricted to assembly and deployment usage only
IBM WebSphere Adapters 7.5 includes enhanced adapters for:
- SAP Software
- Siebel Business Applications
- Oracle E-Business Suite
- JD Edwards EnterpriseOne
- PeopleSoft Enterprise

- Supported for development & test with WebSphere Application Server as part of WAS V8 license

- Production usage requires separate WebSphere Adapters license
Intelligently Manage Application Environments & Deliver Rich User Experiences Faster

### Speed Delivery of Applications & Services
- Open Source to Enterprise
- Free WAS for Developers
- Self Service Development Environments
- Faster Edit-Compile-Debug
- Programming Models
  - Java EE 6
  - Web 2.0 & Mobile
  - OSGi Applications
  - SCA
  - Java Batch
  - XML
  - SIP & CEA
  - Dynamic Scripting
- Integrated Tooling
- Application Adapters

### Operational Efficiency & Reliability
- High Performance
- Transactional Strength
- Scalability & HA
- Install & Maintenance
- Problem Determination
- Platform & Environment Flexibility
- Flexible Pricing Models
- Feature Packs

### Security & Control
- Administrative Productivity
- OSGi Application Agility
- Security
- Migration
High Performance

Reduce TCO through higher performance application foundations

- **Java 6**
  - JVM runtime enhancements
  - JIT optimizations

- **Application Performance Improvements vs. WAS v7**
  - DayTrader: Up to 20%
  - OSGi Applications: Up to 26%

- **End-to-end performance improvements vs. WAS v7 including**
  - Up to 15% faster product installations
  - Up to 20% faster server startup time for developers
  - Up to 69% faster application server creation in a large topology
  - Up to 31% faster application server cluster creation in a large topology
  - Up to 22% faster application deployments in a large topology
  - Up to 11% better vertical scaling on larger multi-core systems
  - JPA 2.0 optimizations with DynaCache and JPA Level 2 cache

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.
Transactional Integrity

No transaction is ever lost or violated with WebSphere application infrastructure’s built-in transaction integrity

- WebSphere Platform designed as a transactional server from Day One.
  - For all transaction protocols (XA, OTS, WS-AT)
  - On all platforms
- WebSphere transaction costs are “pay-as-you-go”
  - WebSphere fully optimized for 1PC and dynamically engages 2PC only after a 2\textsuperscript{nd} resource is used
  - Distributed transaction contexts created dynamically only during the first remote request in a transaction
  - No change to application configuration as it engages 2PC or distributed transactions \rightarrow the “simplest” configuration always works.
- Flexible configuration
  - e.g. Per-application resource commit-ordering for DB/JMS scenarios

IBM has been doing this right for 40+ years
WebSphere Application Server: HA Architecture – A Brief Review

High Availability Architecture provides:

- Peer Recovery Model with Active Hot Standbys for persistent services
  - Transactions
  - Messaging
- If a JVM fails then any Singletons running in that JVM are restarted on a Peer once the Failure is detected
- Starting on an already running Peer eliminates the start up time of a new process which could take minutes
- Planned failover takes a few seconds
- This low failover time means WAS can tolerate many failures without exceeding the 5.5 minute yearly maximum outage dictated by 99.999%

Failure Scenario:
- Client calls EJB which updates database using 2PC transactions
  - Failure during in-process transaction (after the prepare statement)
  - Database record is locked until transaction is recovered (committed or rolled back)

WAS-ND HA
- HA Manager detects the failure
  - Failover to a peer server which recovers the transaction log (shared on a NAS) from the failed server
  - Recovery in a few seconds
High Availability Improvements

- **Improved HA support for messaging applications**
  - Reconnect to a standby gateway queue manager when an active queue manager fails or becomes available

- **Resource failover and retry logic for relational datasources and JCA connection factories**
  - Simplifies application development
    - Minimizes the application code required to handle failure of connections to relational databases and other JCA resources
    - Provides a common mechanism for applications to uniformly respond to planned or unplanned outages
  - Administrator can tailor datasources and connection factory configuration based on application needs:
    - number of connection retries
    - alternate/failover resource
    - pre-population of alternate/failover resource connection pool
    - auto failback
  - Full control of functionality available to scripts and programs via management MBean

- **Improved reliability & performance with DB2**
  - Support for client affinity & client reroute for apps that use IBM DB2
  - New location transparency for EJBs using DB2 connections

- **Improved transactional integrity**
  - Support for shared DB locks between transaction branches and integration of new programming models with WAS proven transaction engine
IBM Installation Manager

Faster time to value & lower operational costs through new install & maintenance tech.

- Full local & centralized product lifecycle management:
  - Install/Uninstall
  - Update/Rollback (Fixpacks and iFixes)
  - Modify (Add/Remove features)

- Installs exactly the desired level of service in one pass
  - No need to install GA product first and then apply a fixpack and/or ifixes as a separate step

- Lays down binaries relevant to user selections and system environment

- GUI & response file modes of operation
  - GUI to perform individual operations
  - Response files can be recorded from the GUI or created by specifying the appropriate xml
  - Silent mode support for invoking multiple operations

- Single user experience across WAS, WAS components & various IBM products
  - A single instance of IIM can manage the product lifecycle for any IM based products, from WebSphere, Rational, etc.
  - Support for WAS, IHS, WCT, etc.
Centralized Installation Manager (CIM)

- CIM V8 is available from Job Manager & DManager
  - Job Manager based solution spans the boundaries of the cell
  - Install targets are specified in agentless fashion
  - Install and config job scheduling is supported
- CIM V8 is able to remotely install WebSphere Application Server, IBM HTTP Server, Application Clients, DMZ Security Proxy Server, and Web Server Plug-ins
- Better scalability due to more distributed architecture
- Distributed & z/OS scenarios supported
- “CIM V7” function is still available with Deployment Manager along with new “CIM V8” function
Platform & Environment Flexibility

Lower TCO through aligning business needs with platform/environment capabilities

Platform Specific Exploitation

IBM System z
- z/OS
- Linux for System z

IBM System p, i
- AIX, i5/OS

IBM System x
- Linux
- Windows

Match deployments to preferred hardware:
Platform specific exploitation on IBM systems along with broad hardware & OS support including HP Itanium, Oracle SPARC, AIX, IBM i, z/OS, Linux, Windows, HP-UX & Oracle Solaris

Common Management of Heterogeneous Systems

IBM zEnterprise System
- z/OS
- Linux on System z
- AIX
- IBM i
- Linux
- Windows

Match deployments to preferred OS on a unified zEnterprise System: Take advantage of zManager to manage multiple platforms under a logical management infrastructure
Intelligently Manage Application Environments & Deliver Rich User Experiences Faster

Speed Delivery of Applications & Services
- Open Source to Enterprise
- Free WAS for Developers
- Self Service Development Environments
- Faster Edit-Compile-Debug
- Programming Models
  - Java EE 6
  - Web 2.0 & Mobile
  - OSGi Applications
  - SCA
  - Java Batch
  - XML
  - SIP & CEA
  - Dynamic Scripting
- Integrated Tooling
- Application Adapters

Operational Efficiency & Reliability
- High Performance
- Transactional Strength
- Scalability & HA
- Install & Maintenance
- Problem Determination
- Platform & Environment Flexibility
- Flexible Pricing Models
- Feature Packs

Security & Control
- Administrative Productivity
- OSGi Application Agility
- Security
- Migration
Move Nodes to New Environments with Ease

- Automate the movement of existing deployments to new machines and operating systems

![Diagram showing the movement of nodes from one machine to another](image)

**Original Machine: host1**

```
dmgr
/dmgrNode
/node1
```

**Node agent**

```
server1
/node1
```

**addNode -asExistingNode**

```
/node1
```

**New Machine: host2**

```
Node agent
/node1
```

```
server1
```

Improve administrator productivity and minimize downtime
Rapidly Recover a Damaged Node

- Automate the recovery of damaged nodes along with prior configuration information

Improve administrator productivity and minimize down time
Create Cells from a Template

Improve administrator productivity and repeatability and minimize errors

- Automate and improve repeatability of deploying consistent WebSphere Application Server environments
Additional Administrator Productivity Enhancements

- Job Manager enhancements to simplify the creation, augmenting and deletion of profiles on remote nodes
- Enhanced portability of Properties File Based Configuration to speed and standardize customizations across different cells
- Enhanced Properties File Based Configuration format for easier editing of application deployment options
- Administrative option for all platforms to list all SDKs in use and select SDK to use amongst supported Java SDKs
Flexible Management

Utilize a flexible, scalable and asynchronous administrative topology for highly productive global administration and management

Admin Agent
- Centralized Node Administration

Job Manager
- Asynchronous Remote Management
- Multiple Admin Agents and/or Deployment Mgrs
- Loosely Coupled: one-to-many and many-to-one
- Highly Scalable

Admin Agent
- WAS Servers
- WAS Express Server

Deployment Manager
- WAS Network Deployment Cell
- WAS Network Deployment Cell

Admin Agent
- Admin Agent

Admin Agent
- Admin Agent

Job Manager
Continued Mixed Version Cell Support

Support for existing infrastructure in new V8 deployments to save time, money and reduce risk

WAS Network Deployment V8 Cell

V8 Cell can contain 6.1, 7.0 & 8.0 nodes

ND V6.1 Nodes

ND V7.0 Nodes

ND V8.0 Nodes
Continued Support for Existing Applications

Support for existing Java EE applications in new V8 deployments to continue achieving value from existing investments

WAS Network Deployment V8 Cell

V8 Cell can contain 6.1, 7.0 & 8.0 nodes
IBM Tivoli Composite Application Manager (ITCAM)

- Data Collector available in WebSphere Application Server v8.0 as an extension offering (optional install)
- ITCAM for WebSphere Application Server provides additional request-based response time and CPU metrics
- Customer application code is not instrumented in any way
- Simple upgrade from ITCAM for WebSphere Application Server to ITCAM for Application Diagnostics – no rip and replace
- After upgrade ITCAM data still visible in Tivoli Performance Viewer as well
Rapidly extend applications to meet new business requirements with reduced downtime.

- Administratively preview new bundles before making updates.
- In-place bundle update enables application to remain continuously available throughout the update process.
Dynamic Application Extension of OSGi Apps

- Administratively add new functionality to deployed applications
- Well-designed extensions result in zero application down-time as extensions are added and removed

Rapidly extend applications to meet new business requirements with reduced down time
Multiple Security Domains

Separate applications, users and infrastructure to increase flexibility and control

Applications can have their own application security domain. Own user population

Deployment Manager, Node Agent, and the Admin Subsystem common administrative security domain.

- Multiple security domains provide flexible security configuration under centralized management
- Option to separate User security domain from administrative security domain

Applications in a cluster share a common application security domain.
Federated Repository (VMM) now Supports Multiple Security Domains

- Support multiple VMMs Configuration per cell or JVM instance using WebSphere Security Domains
- Ability to have unique VMM Security configuration per Security Domain
- Ability to have a one global VMM configuration for the entire cell.
Fine-grained Administrative Security

Isolate administrators from each other and according to access levels to improve security and governance

Key Features:

- Users can be defined with administrative roles on specific resources:
  - Cells, node groups, nodes, clusters, servers, and applications

- Administrative Console will be filtered by user’s administrative role

- User cannot access any other resources outside assigned resources
Application Migration Tooling

- Migrate applications from older releases to WAS V8 or V7
- Migrate from Oracle or JBoss faster and easier to WAS V8 or V7
  - Migrate applications up to 2x as fast
  - Migrate web services up to 3x as fast
- Application Migration Tool
  - Analyzes source code to find potential migration problems:
    - Removed features
    - Deprecated features
    - Behavior changes
    - JRE 5 & JRE 6 differences
    - Java EE specification changes or enforcements
  - Capable of making some application changes
  - Provides guidance on how to make required changes
  - Works with Eclipse or Rational Application Developer (RAD)

Get the Tool at No Charge: http://ibm.co/hqfkdj
Configuration Migration Tooling

Migrate WebSphere environments faster with minimized risk

Assists administrators in moving their configuration when migrating

- Merges old configuration with new configuration
- Provides deep functionality, e.g. “Lights-on” WAS migration
- Especially useful for customers that have large topologies
  - Large telecom customer recently used the tool when migrating a 500+ JVM environment

Provides a framework for Stack product migration

- Already in use by Commerce, Portal, WPS and Virtual Enterprise

- Diagram showing the process:
  - v6.x, v7.0 Profile → WASPreUpgrade → Backup Files → Server Configuration Applications Resources → WASPostUpgrade → Migrated V8.0 Profile → Create V8.0 Profile → V8.0 Profile
Agenda

- Cloud Computing
  - Introduction and models
- How to build private Cloud with WebSphere
  - Pattern-based approach
  - Workload-based approach
- WebSphere Application Server v8: technical overview
- IBM WebSphere eXtended Transaction Runtime
  - Modernize, extend and reuse COBOL business assets with WXTR
WXTR extends IBM Transaction Processing on System p

- Modern COBOL application deployments today are in conjunction with WebSphere Application Server
  - Often traditional distributed applications are integrated with WAS presentation and business logic
- WXTR delivers increased deployment choices for distributed customers
  - Strengthens WAS position on supporting a range of programming choices
  - TXSeries still an option for loose coupling or stand-alone legacy applications
- Allows competitive positioning against other distributed TPM solutions, such as MicroFocus Server and Clerity Unikix, to provide a modernization path for COBOL customers on distributed platforms
  - Can also provide a new option for existing IBM TXSeries customers

- **Oracle Tuxedo migration support coming soon…**
Functional Highlights

*WebSphere eXtended Transaction Runtime provides:*

- Tightly integrated managed environment
- Unified System Administration
- Integrated Application development and debugging
WXTR in WAS Deployment Topology

Stand-alone

Stand-alone application server environment
WXTR Installation Overview

- **IBM Installation Manager**
  - Focused on end user role
  - Install / Update / Modify / Rollback / License Management Technology
  - Released December 2006

- **Key Features:**
  - Granular Install
  - Extend existing Eclipse
  - Using ZIP file as a repository
  - No need to extract ZIPs before install
  - Reliability
  - Resume on download error or cancel
  - Silent and Console install
  - Multiple product install in one operation
WXTR – API Services

- API Services Supported

- API Services Not Supported

WXTR supports CICS programming paradigm
Integrated Managed Environment

- **An execution environment** to host Java EE and COBOL applications within WebSphere Application Server
  - JCA and SCA based standard interfaces
    - COBOL runtime errors are propagated to the Java EE environment as Java exceptions
    - Passing application data across mixed language applications
      - Application data exchanged through CICS COMMAREA format
      - Leverages CICS/IMS Binding feature provided by RAD
Data Management Services using DB2

- VSAM data store support using DB2
  - Supports sequential, indexed, and relative files.
  - Provides enhanced interoperation with COBOL business logic hosted in WXTR, enabling batch COBOL programs to access ESDS, KSDS, and RRDS files that are stored in DB2.
System Management – Concepts & Introduction
Unified System Administration

- **Integrated system administration experience**
  - Management of COBOL Container runtime using WebSphere administrative console
  - WebSphere administrative (wsadmin) scripting program support
  - Start-up and shutdown of the COBOL container runtime processes are coordinated with WebSphere Application start-up and shutdown actions

- No need to separately manage JEE container, Transaction Monitor and Connector
- Administer everything through WebSphere Admin console
- Better skills alignment in the organization through consistent administration
General Runtime Settings

WXTR Configuration Settings
WXTR administration architecture
Handling WXTR container lifecycle

```bash
# /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin/startServer.sh server1
ADMU0116I: Tool information is being logged in file
   /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server1/startServer.log
ADMU0128I: Starting tool with the AppSrv01 profile
ADMU3100I: Reading configuration for server: server1
ADMU3200I: Server launched. Waiting for initialization status.
ADMU3300I: Server server1 open for e-business; process id is 417972

# ps -eaf | grep -i cics
   cics 217122 307386 0 11:51:29 - 0:00 cicsas WXTR0001 30468709 102 a0000000 b0000000
   cics 229452 307386 0 11:51:30 - 0:00 cicsas WXTR0001 30468709 105 a0000000 b0000000
   cics 307386 577682 0 11:51:28 - 0:00 cicsam WXTR0001 30468709 5 a0000000 b0000000
   cics 331976 307386 0 11:51:30 - 0:00 cicsas WXTR0001 30468709 104 a0000000 b0000000
   cics 409756 307386 0 11:51:28 - 0:00 cicsas WXTR0001 30468709 101 a0000000 b0000000
   cics 503914 307386 0 11:51:29 - 0:00 cicsas WXTR0001 30468709 103 a0000000 b0000000
   cics 577682 172224 0 11:51:27 - 0:00 /opt/IBM/WebSphere/AppServer/WXTR/bin/cics -rWXTR0001 StartType=cold AllowDebugging=no
   cics 639034 307386 0 11:51:30 - 0:00 cicsas WXTR0001 30468709 106 a0000000 b0000000
```
Handling WXTR container lifecycle

- WAS is started through startServer.sh command.
  - This internally does various things including starting of various OSGI bundles

- An OSGI bundle has been added to WAS runtime by WXTR to synchronize WXTR container lifecycle activities like start, stop and recovery with WAS

- In WXTR OSGI bundle, we call the startCICSServices and stopCICSServices utilities (indicated by "WXTR admin utilities" in the below diagram) to handle start, stop and recovery.

- Thus when WAS is started WXTR also gets started and when WAS is stopped WXTR also gets stopped
Integrated Application development and deployment experience using IBM Rational tools:

- Build and Run applications on the fly
  - Automatic deployment of COBOL applications

- Mixed language debugging support across Java EE and COBOL applications
  - For example, Invoke COBOL program from Java EE, inspect the COBOL program and back to Java EE using the same IDE

Natural partner for Rational Developer for Power
✓ End-to-end debugging between COBOL & Java
Application Development – Makefile template feature

```
all: $(TARGET)
.cbl.o:
  $(COB) -c < -o $@ $(COB_OPTS) $(DB2_COMP_OPTS)
.cbl.ibmcob:
  @slibclean
  $(COB) $< -o $@ $(COB_OPTS) $(CICS_OPTS) $(LINK_OPTS) \ $(DB2_COMP_OPTS) $(DB2_LINK_OPTS)
  @ln -fs $(PWD)/$@ $(CCW_REGION_BINDIR)/$@
```
On the Fly CICS Syntax Checker feature
Application Development – Building while you save

After the application is build, deploy happens automatically when the application is run.
A Performance comparison with an alternate IBM solution – Throughput with COBOL and DB2 Load

Nature of the load
- COBOL program with CICS calls.
- SQL calls to DB2
- Distributed load in 70:30 ratio. 70% SELECT and 30% Updates
- Two Transactions, Single Database table
- Application tuning carried out for load distribution
- CTG in remote mode

Observations
- For the same TPS, WXTR takes lesser CPU resource compared to TXSeries
Big Picture

Develop

COBOL Source

- Business Logic
- Data Definitions (Copy books)

RAD-J2C tooling

Data Binding Beans

J2EE Application

- Servlets
- EJBs
- SCA / JCA

Rational Tooling

Deploy and Run

WXTR Runtime

- WXTR address space

Optimized local adapter

WAS

- JVM address space
Questions?