WebSphere Workshop für ISV's
- Neue Geschäftschancen mit Java auf dem Mainframe

Überblick zu Java und WebSphere Optionen auf System z
Which is the best platform for Java workload?

... you can deploy them virtually anywhere ...

... but which option will best suit your needs??

During development, J2EE components are not optimized to any deployment platform. The server, operating system and WAS determine how well those components meet business objectives in production.
Agenda

1. Java Optionen auf z/OS
2. Plattform-Differenzierung oder “Warum WebSphere auf z/OS”
3. Batch Modernisierung mit Java
4. Die IBM WebSphere Plattform in breiterem Kontext
5. Zusammenfassung
Java Deployment-Optionen on z/OS

Java SE

JavaTM Platform, Standard Edition 6

Java SE Runtime Environment (JRE)
Java SE Development Kit (JDK)

Java EE
Java™ Standard Edition Products on z/OS

IBM 31-bit SDK for z/OS, Java Technology Edition, V6
Build Level: August 18, 2008 (PTF UK39509/APAR PK65877/SDK6 SR2)

IBM 64-bit SDK for z/OS, Java Technology Edition, V6
Build Level: August 18, 2008 (PTF UK39510/APAR PK65878/SDK6 SR2)

IBM 31-bit SDK for z/OS, Java 2 Technology Edition, V5
Build Level: August 11, 2008 (PTF UK39047/APAR PK70615/SDK5 SR8a)

IBM 64-bit SDK for z/OS, Java 2 Technology Edition, V5
Build Level: August 11, 2008 (PTF UK39054/APAR PK70616/SDK5 SR8a)

IBM SDK for z/OS, Java 2 Technology Edition, V1.4
Build Level: September 23, 2008 (PTF UK40510/APAR PK66829/SDK1.4.2 SR12)

IBM 64-bit SDK for z/OS, Java 2 Technology Edition, V1.4
Build Level: May 17, 2008 (PTF UK36704/APAR PK60864/SDK1.4.2 SR11)
Note: This product is now out of service, as of September 30, 2008

Further information on the Java on z/OS web site:
http://www-03.ibm.com/servers/eserver/zseries/software/java/
Java Framework on z/OS: JZOS

- Full integration of Java into JES
- Easy to integrate new program logic written in Java into classic job nets (e.g. eMail or PDF generation)
- Easy to port Java applications from distributed to z/OS
- Allows to run Java based servers as started task
- IDE integration
- zAAP eligible

Special z/OS Java APIs for batch processing

- MVS dataset access (stream mode/record mode)
  - DD statements possible
  - APIs: ZFile/JRIO
- Condition code passing
- Console integration:
  - Integration of handler for the MVS statements Start, Stop and Modify
  - Communication with the MVS system console
- Control of output encoding (EBCDIC/ASCII)
- SAF classes
- Job management
- DFSORT
- z/OS Logstreams
- SMF
WebSphere for z/OS: A product evolution

Customers needs drive product innovation

- Application Server on the mainframe
- Java support
- Product consistency across platforms
- Lower costs
- Repeatable, successful process

WAS for z/OS adds J2EE platform enablement and brand platform commonality

WAS for z/OS CORBA support

WAS for z/OS adds Web Services support & WAS common interfaces across platforms

WebSphere Business Integration Server Foundation for z/OS & introduction of the zAAP processor

On demand operating environment, industry solutions, open services infrastructure with SOA

2004-2009

Version 7

Version 6.1

Version 6

Version 5.1

Version 5

Version 4

Version 3

Pre - Version 3

1999

2000

2001

2002

2003
WebSphere Application Server - The long way to common code

Continue to evolve into a single standards-based framework supporting common runtime and tooling

- Common code base between z/OS and MPs as of version V6.0.1
  - Using common terminology, topology, programming and system management model
- J2EE Application platform programming model
- Platform Messaging
- Service Oriented Architecture (SOA)
- System Management
- J2EE programming extensions
- WebSphere Rapid Deployment
WebSphere Application Server for z/OS: Unique Elements

**Integration with z/OS that maintains application transparency**

- **Server Architecture**
  - Control/Servant Region Split
- **Workload Management**
  - Leverages Workload Manager
- **Security**
  - Use of the Security Authorization Facility
- **Transaction Management**
  - Leverages Resource Recovery Services
- **Connectors**
  - Leverages available local (Type 2) connectors
- **Thread Management**
  - OS level threads for monitoring and control
- **Scalability**
  - Multiple Servant Region
- **Communications layer**
  - True Asynch I/O model
- **Recovery**
  - Leverages Automatic Restart Manager
- **Reporting**
  - System Management Facility
Reminder: Common at Spec Level API and Above

The Java and Java EE specification allow for vendors to offer differentiator code provided the agreed-to API specifications are met:

- Applications
- Java and Java EE specification APIs
- Implementation of specifications
- Platform-specific Exploitation
- Operating System and Hardware

- Adherance to open standards … across IBM platforms, across vendors
- Largely common across platform instances of WebSphere Application Server
- The closer to the operating system, the more unique the code gets

“zDiff” functionality found down here
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The selection of the right application server platform for your business critical applications

*WebSphere Application Server runs on most important platforms*

<table>
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<tr>
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<td>Other</td>
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Important are comparisons to functional and non-functional requirements

- High Availability
- Performance
- Security
- Transactionality
- Tooling
- Scalability
- Administration
- Roadmap
- Support and Migration

*Which Application Server on which platform corresponds to the business critical requirements with which Quality-of-Services?*
The business impact of workload criticality

When shared services become critical business resources, and the potential cost of a failure increases ...

it makes business sense to deploy them to System z ...

- Efficiency: Control processes where they run
- Integration: Improve the flow of processes
- Automation: Remove the human enter keys
- Reliability: Guaranteed connections deliver automated processes
- Workload Management: Integration with workload manager / intelligence resource director
- Security: built into all system layers
- Availability: z(ero downtime)/OS brand promise
- Performance: Full utilization of system capacity with same class of service
Deciding where to deploy applications

The first step in deciding where to run your applications is evaluating your platform options based on the needs of your application.

- Little OS function
- Simple Workload management
- Availability
- Some virtualization of resources
- Resource provisioning on demand
- Zero downtime
- Prioritization of diverse workloads
- Support for complex transactions
- Stalwart security model

Watch terminology - Not equivalent across platforms
Deciding where to deploy applications

Factoring in the value of the application server

The second step in deciding where to run your applications is evaluating your application server options.

Windows

- WAS delivers:
  - High availability
  - Clustering
  - J2EE 1.4
  - Web Services
  - Security
  - Messaging

AIX/UNIX/Linux

- WAS delivers:
  - High availability
  - Clustering
  - J2EE 1.4
  - Web Services
  - Security
  - Messaging

z/OS

- WAS delivers:
  - High availability
  - Clustering
  - J2EE 1.4
  - Web Services
  - Security
  - Messaging
  - Platform optimization
    - Mainframe security
    - Sysplex support
    - z/OS WLM architected inside
    - Tight integration with DB2, CICS
    - Complex transaction support

WebSphere Application Server offers common schedules and a programming model across the releases.
Moving from multiple physical tiers to a single tier provides many benefits, including tighter security, enhanced management, reduced costs, and performance gains.
Collocation with Data Subsystems

Collocated Deployment

- High throughput, reduced overall CPU utilization due to cross-memory data transfer, reduced latency
  - Operation benefits include identity assertion, high availability, fail over, Workload management….
- Lower TCO for Enterprise deployments due to reduced complexity of managing overall Enterprise architecture

Non-collocated Deployment

- Network latency adversely impacts performance
- Operational overheads further erode performance due to
  - Serialization of objects, Query parameters
  - Threads Switching
  - Multiple points of failure and controls
  - XA less efficient than RRS
- Higher TCO due to higher operational cost
On-line Banking Benchmark Demonstrates Performance Advantages of Collocation with Data Subsystems

1. Separate Machines
   - 4 CPUs (32% busy)
     - WAS 6.1
     - DB2 8.1
     - Linux
     - z/OS
     - Power System
     - Type 4
   - 4 CPUs (98%)

2. Separate LPARs
   - 8 CPUs in shared pool (91%)
     - WAS 6.1
     - DB2 8.1
     - z/OS
     - System z
     - Type 4

3. Same LPAR
   - 8 CPUs (91%)
     - WAS 6.1
     - DB2 8.1
     - z/OS
     - System z
     - Type 2

- 150 tps
- 160 tps
- 243 tps

52% more throughput with collocated workload

Effect of refactoring business logic to be co-resident with z/OS data:
- Average CPU time per EJB transaction was reduced by over 77%
- Number of bytes of data transferred per EJB transaction was reduced by 99%

http://www.ibm.com/support/techdocs, Optimizing WebSphere Performance on DB2, WP100558
zAAP Innovation: A Simplified Example…

Consider a WebSphere Application that is transactional in nature and requires 1000 MIPS today on zSeries.

In this example, with zAAP, we can reduce the standard CP capacity requirement for the Application to 500 MIPS or a 50% reduction. * For illustrative purposes only
Advantages by colocation of application and data – simplifies TCO

Before
Networked Web Serving

1st Tier
Client
Client
Client

2nd Tier
App Server
App Server

3rd Tier
z/OS Database Server

Multiple Data Copies

After
Integrated z/OS Application & Database Servicing

1st Tier
Client

2nd Tier
Integrated Application & Database Server

zAAP
IFL

2nd Tier

WAS
IMS
CICS
DB2

Integrated Application & Database Servicing

Linux

z/OS

Standard CP

With IFL
With zAAP

Potential advantages of consolidating application and data serving

- Security
- Resilience
- Performance
- Operations
- Environmental
- Utilization
- Scalability
- Auditability
- Simplification
- Transaction Integrity

Fewer points of intrusion
Fewer Points of Failure
Avoid Network Latency
Fewer parts to manage
Less Hardware
Efficient use of resources
Batch and Transaction Processing
Consistent identity
Problem Determination/diagnosis
Automatic recovery/rollback w. RRS
WebSphere differentiation is defined by the platform

- The System z and z/OS platform has inherent strengths
- Two ways to take advantage:
  - "Just showing up" -- get benefits simply by running there
  - Intentional exploitation -- coding reaches out and exploits strengths
- WebSphere z/OS benefits from both
- zDiff items represent further direct exploitation
- But ... "WebSphere is WebSphere" above the specification line

Having z/OS as the platform does make a difference
# Agenda

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Let’s look at the trend…

Emergence of (business and IT) **Optimization** as an Industry Driver recognizing the significance of bulk workload processing.

**Early Computing**

- Traditional Batch workloads enabling enterprise computing

**On-Line Transaction Processing**

- Primary focus on online Transaction Processing and real-time access to goods and information

**Optimized and Balanced Efficiency**

- Evolving focus on optimization to enable globally-integrated business transformation & cost/complexity containment through a balanced blend of bulk (batch) and on-line processing

**Growing significance of Bulk Processing efficiency in Enterprise Computing**

- Loss of skills in and a decline in innovative approaches to Bulk Processing
Batch and SOA

“… business function used in online transactions may be the same business function used in batch processes, so organizations should think about their IT modernization strategy and consider SOA as a standardized application integration mechanism” - Gartner Research

- Reusing business services is a fundamental principle of SOA
- Batch workloads are an integral part of any IT infrastructure
- How do you integrate your batch & OLTP environments with a common services infrastructure?
Continuous Batch Processing

Current Batch Processing Technique

Going forward, Batch Processing Techniques
**Container-managed Check-point processing**

**Traditional Batch Program Design**
- Designed with an outer and inner loop
- Outer loop iterates across input stream
- Inner loop checkpoints every 1,000 or 10,000 records – hard-coded by programmer

**Container-managed Checkpointing**
- Check-point is managed by container
- Varied by the container based on competing work-load demands
- Check-point interval decreased to reduce contention when OLTP workloads increase
- Decreased the check-point interval when competing OLTP workload decreases to increase efficiency of batch processing
Sharing Services Across Batch and OLTP - The role of Containers

- Execution Containers (EJB Container, Batch Container) are responsible for managing transactions, security, etc.
WebSphere XD Compute Grid

- Compute Grid supports Java EE based Batch Applications.

- These applications allow for batch access to enterprise applications hosted in WebSphere. They have available to them WebSphere resources:
  - Transactions
  - Security
  - high availability
  - Leverages the inherent WAS z/OS QoS
  - Thread Pooling & Connection Pooling

- Compute Grid provides services such as
  - Check Pointing / Restart - the ability to resume batch work at some selected interval
  - Result Processing - the ability to intercept step and job return codes and subsequently process them using any J2EE facility (Web Service, JMS message, and so on)
  - Batch Data Stream Management - the ability to handle reading, positioning, and repositioning data streams to files, relational databases, native z/OS datasets, and many other input and output sources.
  - Parallel Job Execution & Operational Control
  - External Scheduler Integration & SMF Records for Batch
Unified Development, Testing, Deployment Infrastructure

- Customer develops business service POJO's
- Applications are assembled via Spring
- XD BDS Framework acts as bridge between SwissRe business logic and XD Compute Grid programming model
- XD Batch Simulator for development
- XD Batch Unit test environment for unit testing
- XD batch packager for .ear creation

![Diagram showing the flow of development, testing, and deployment infrastructure with nodes for Business IDE, Business Services Testing Infrastructure, XD Compute Grid Pojo-based App, XD BDS Framework, Eclipse-based XD Batch Simulator, RAD-Based XD Batch Unit Test Environment, XD Batch Packager, RAD-Based Unit-testing for OLTP, Common Deployment Process, and WebSphere XD Infrastructure.](image-url)
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The WebSphere product organization...

**Integration and Messaging**
- Middleware infrastructure for integrating applications and services
- Messaging backbone for facilitating the transfer of messages from application to application

**Key Products:** WebSphere MQ, WS Enterprise Service Bus, WS Message Broker, WS Adapters, WS Service Registry & Repository, WebSphere Business Events, Datapower appliances

**Application Infrastructure**
- Runtime environment for deploying applications and services
- E-commerce solution for B2B and B2C transactions

**Key Products:** WS Application Server (WAS), WAS CE, WAS ND, WebSphere Compute Grid, WebSphere Extreme Scale, WebSphere Virtual Enterprise, WebSphere sMash, WebSphere Commerce

**Business Process Management**
- Middleware infrastructure for modeling, orchestrating, and monitoring business processes
- Business rules and decisions

**Key Products:** WS Process Server, WS Monitor, WS Modeler, WS Business Service Fabric, ILog Products

**Host Transaction Processing, OS and Utilities**
Application and transaction processing infrastructure and utilities for the mainframe platform

**Key Products:** CICS, IMS, TPF, Comm Server, CICS & PD Tools
WebSphere Productset Overview

major products only

- WebSphere Repository & Registry
- Business Rules Mgmt. System
- WebSphere DataPower
- WebSphere Message Broker
- MQSeries Family (FTE/Sec./LLM/everywhere)
- Adapter (SAP, Siebel, File, TCP/IP, ...)
- WebSphere Business Fabric
- WebSphere Process Server
- WebSphere ESB
- WebSphere Application Server
- WebSphere Virtual Enterprise
  - WebSphere XD Compute Grid
  - WebSphere eXtreme Scale
- WebSphere Business Modeler
- WebSphere Business Monitor
- WebSphere Business Events
- WebSphere Cloudburst

Application Infrastructure
Connectivity
Business Process Management
SOA Reference Architecture featuring System z WebSphere Software

- Business Innovation & Optimization Services
  - Facilitates better decision-making with real-time business information

- Interaction Services
  - Enables collaboration between people, processes & information

- Process Services
  - Orchestrate and automate business processes

- Information Services
  - Manages diverse data in a unified manner

- Partner Services
  - Connect with trading partners

- Business App Services
  - Build on a robust, scaleable, and secure services environment

- Access Services
  - Facilitates interactions with existing information and application assets

- Infrastructure Services
  - Optimizes throughput, availability and performance

- Model, Assemble
  - WebSphere MQ Series for z/OS V6
  - WebSphere MQ Message Broker for z/OS
  - WebSphere ESB for z/OS
  - WebSphere Transformation Extender

- Deploy
  - WebSphere Application Server for z/OS V6
  - WebSphere XD for z/OS V6

- Manage
  - WebSphere Classic Federation for z/OS
  - CICS Transaction Gateway for z/OS

- IT Service Management
  - Infrastructure Services
  - WebSphere Service Registry and Repository for z/OS / WebSphere Business Services Fabric for z/OS
  - WebSphere Portal Enable for z/OS V6
  - WebSphere Process Server z/OS V6
  - WebSphere Event Publisher for z/OS
  - WebSphere Replication Server for z/OS

 Integrated environment for design and creation of solution assets
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IBM System z - SOA for Today and Tomorrow

- **Leverage** zSeries infrastructure foundation platform for integration.
  - z/Architecture, Virtualization, Sysplex, z/OS V1.9 and V1.10, WLM/IRD, zAAP, zIIP, IFL, Linux

- **Model & discover** business functions and processes.
  - WS Business Modeler, Service Flow Model for WDz, WS Asset Analyzer, Rational Rose/XDE, CICS Interdependency Manager

- **Transform, modernize & extend** existing applications, processes and data.
  - WAS, SOA & Web Services and ESB, HATS, CICS TG, DB2 Connect, IMS Connect, WS MQ

- **Integrate** applications, processes and data; new and old.
  - z/OS, PR/SM, zAAP, IFL / Linux, zVM, Hipersockets
  - WS MQ Workflow, WS MQ Message Broker
  - WebSphere ESB, WebSphere Process Server

- **Manage** workload performance against business objectives.
  - WLM & IRD, EWLM, z/OS Security Server, IBM Director, Sysplex Distributor, VMRM
  - Tivoli OMEGAMON, IT Composite Application Monitoring, Rational Performance Tester
  - WebSphere Business Monitor

**IBM System z offers an advanced SOA integration platform for the on demand world!**
Thank You!

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