

# Why WebSphere Application Server on System z

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**The Future Runs on System z**



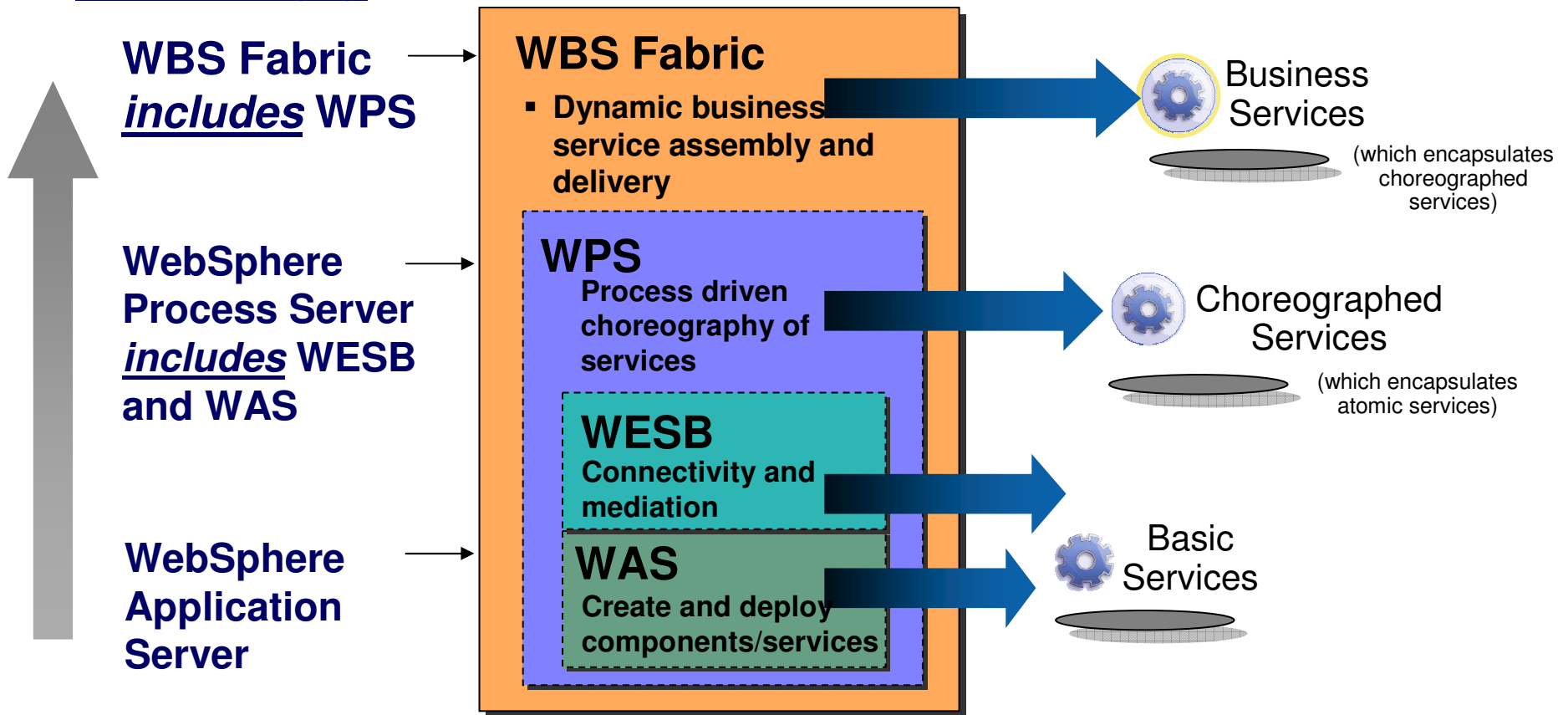
# Topics for today's discussion

- **The WebSphere Application Server**
- **Why WAS on z/OS**
- **WAS on Linux for System z**
- **WebSphere Extended Deployment Overview**



# A Complete WebSphere Business Services Solution Stack with a cumulative product packaging approach

**Product Packaging:**



# SOA requires a robust, secure deployment environment



## **IBM WebSphere Application Server V6**

*The Industry's leading application server for building, running & managing business-critical application services*

- 1 **Build** and **deploy** J2EE applications quickly and with ease, focusing on business logic while shielding applications from platform specifics
- 2 **Run** services in the most secure, scalable, highly available environment
- 3 **Reuse & create** Java assets and extend their reach to existing applications and data
- 4 **Manage** applications effortlessly
- 5 **Grow** as needs evolve, leveraging core skills and assets

**System z is the fastest growing WebSphere platform for 2005**



# WebSphere Application Server v6.1

*Powering your SOA for the Ultimate in Business Flexibility*



## Standards Based and Open

- J2SE 5.0
- JDK 5.0
- Web services standards
  - WS-Interop Basic Security
  - WS-Notification
  - WS-Business Activity
  - WS-Resource Framework
- JSR168 Portlets
- JSR116 Session Initiation Protocol (SIP) Servlets

## Consumability

- Application Server Toolkit, including automation tools and Command Assistance
- z Profile Management Tool
- Simplified Administration
- Simplified SSL Key/Certificate Management
- Security enhancements
- Virtual Member Manager
- IHS administration enhancements
- Integrated Support Assistant
- Platform Messaging Enhancements

## Platform Capability

- Performance Enhancements
- Proxy Server Enhancements
- Integrated User Registry
- Government Standards



### WebSphere Application Server V6.1

**Concurrent delivery on zOS and Distributed**

# WAS v6.1 Feature Packs

*Bringing State-of-the-Art Technology To Market Quickly!*



## Web Services

- 2Q07 GA, all platforms
- Delivery of Reliable Asynchronous Messaging Profile as optional component for WAS 6.1
- Provides secure, reliable business process integration with those of customers and suppliers allowing interactions to span long durations
- Java and SCA programming models
- Community Centric Profiles delivered in WAS 7.0

## EJB 3.0

- 4Q07 GA, all platforms
- Provides support for EJB 3.0 and Java Persistence API (JPA) on WebSphere Application Server 6.1
- Aimed at simplifying EJB development
  - Annotations provide component metadata in code
  - No need to create XML EJB deployment descriptors
- JPA is a simple and powerful persistence framework
  - Relational databases represented using “plain old Java objects” (POJOs)
- EJB 3.0 provides a standards based POJO alternative to frameworks

# Future WAS Feature Packs

*Bringing State-of-the-Art Technology To Market Quickly!*



## Web 2.0

- 4Q07
- Web 2.0 to SOA Connectivity – For enabling connectivity from Ajax (Asynchronous JavaScript and XML) clients and mash-ups to external web services, internal SOA services, and JEE assets. Extends enterprise data to customers and partners through web feeds.
- Ajax Messaging – For connecting Ajax clients to real-time updated data like stock quotes or instant messaging.
- Ajax Development Toolkit – Best-in-class Ajax development toolkit for WebSphere Application Server based on Dojo ([dojotoolkit.org](http://dojotoolkit.org)) with IBM extensions.

## SOA

- 2H08 GA, all platforms
- Apache Tuscany code base on WAS release after 6.1
- SCA
  - POJO (Java Object) service component implementations including support for annotations
  - Intra and Inter-composite asynchronous capability
  - Recursive composition model support
  - SCA bindings include the Web Services binding, SCA default binding, JMS Binding, and EJB binding
  - HTTPSession Scoped components
  - Sample applications
  - Exploitation of Web Services feature pack functionality
- SDO
  - Dynamic data API support
  - Static data API support, including code generation capabilities
  - Some Helper classes implemented (XMLHelper, XSDHelper, DataFactory, CopyHelper, EqualityHelper, DataHelper, TypeHelper)
  - Partial ChangeSummary support
  - Java serialization of DataObject
  - SDO metadata configuration support
- SCA and SDO samples
- Whitepapers, BLOGs – to detail IBM's plans for SCA and SDO within an SOA environment
- Includes SOA Core from WPS 6.0 (for interoperability)

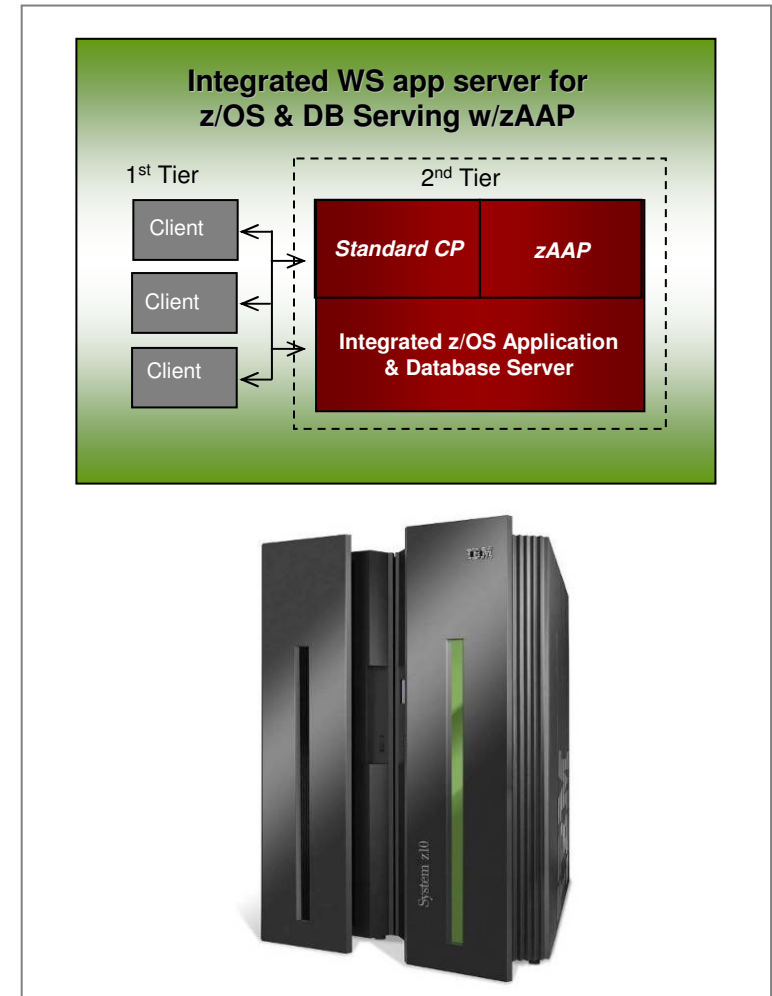
# What's New for WebSphere Application Server for z/OS

## ■ Reduced cost of ownership

- Architected on SOA infrastructure & principles
  - Fully J2EE 1.4 platform certified
  - Leading Web Services support
  - WebSphere Rapid Development & Deployment
- zAAP enabled (System z9, z990, z890)
  - Run Java applications next to mission critical data
  - Lower the cost of computing for WebSphere Application Server (and all z/OS based Java applications)

## ■ Platform optimization / brand dedication

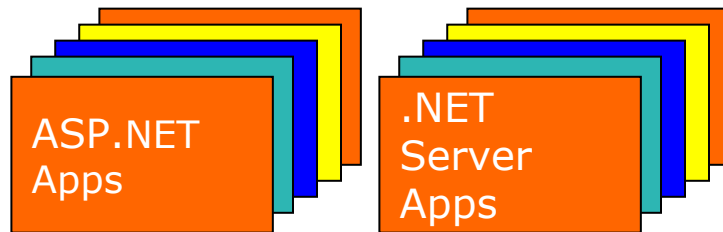
- Common code infrastructure
  - Administration skills shared between platforms
  - Develop anywhere, run on WebSphere Application Server for z/OS
  - Feature Packs for functional enhancements
    - Web Services, EJB 3.0, Web 2.0, SOA
- Native OS support; RRS, RACF, zWLM, Parallel Sysplex
- Optimization features designed to provide security and data interaction, including support for the traditional mainframe SW – CICS, IMS, DB2
- Enhanced QoS within the product, complementary to QoS of the platform
  - High availability manager – ARM
- Other “Hidden Gems” documented in White Paper (WP101138) on Techdocs at [www.ibm.com/support/techdocs](http://www.ibm.com/support/techdocs)





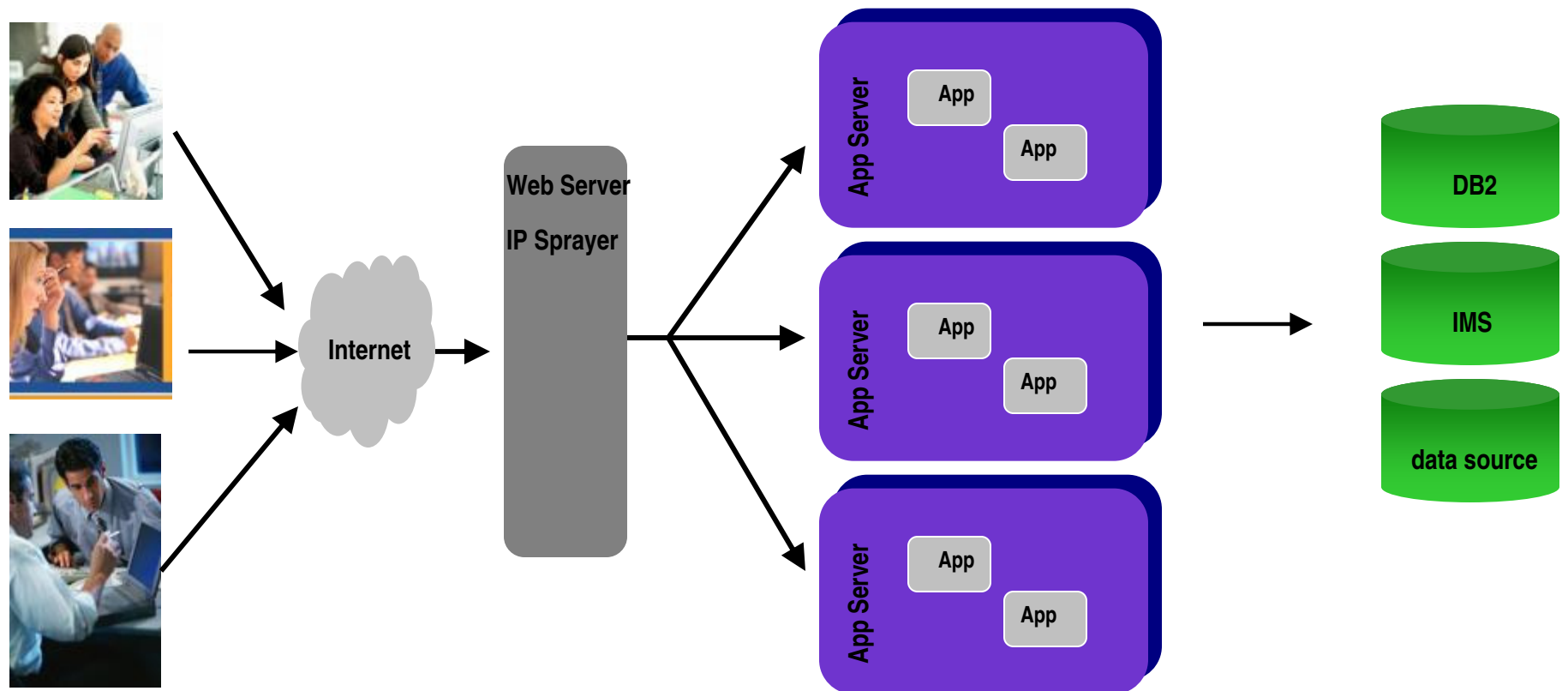


## Consolidating ASP.NET applications on WebSphere and WebSphere Portal



- ✓ C# and Visual Basic developers use Mainsoft's Visual Studio-based SDK to create and port .NET applications into WebSphere
- ✓ Extend System z security, reliability, scalability & performance to .NET applications.
- ✓ Simplify IT infrastructure with a single security model, disaster recovery plan and point of management.
- ✓ Lower TCO by removing Windows servers.

# A Typical Distributed Application Server Architecture



# Typical Application Servers

- **How do you scale the Application?**
  - Add more boxes
- **How do you scale the Database?**
  - Add more boxes and replicate
- **How do you handle failover?**
  - Add more boxes
- **How is an application highly available?**
  - Install the application on many boxes
- **How are requests prioritized?**
  - Add more boxes to handle Gold Customers
- **How do I handle peak loads?**
  - Keep enough boxes available to handle the max possible load
- **What about when I don't have peak loads?**
  - The Servers will be underutilized
- **How do you route work evenly to multiple boxes?**
  - Round-robin inbound work
- **How do you ensure that your servers are evenly utilized?**
  - Best guess based on Application Knowledge

**“Add More Boxes”**

# WebSphere Application Server for z/OS

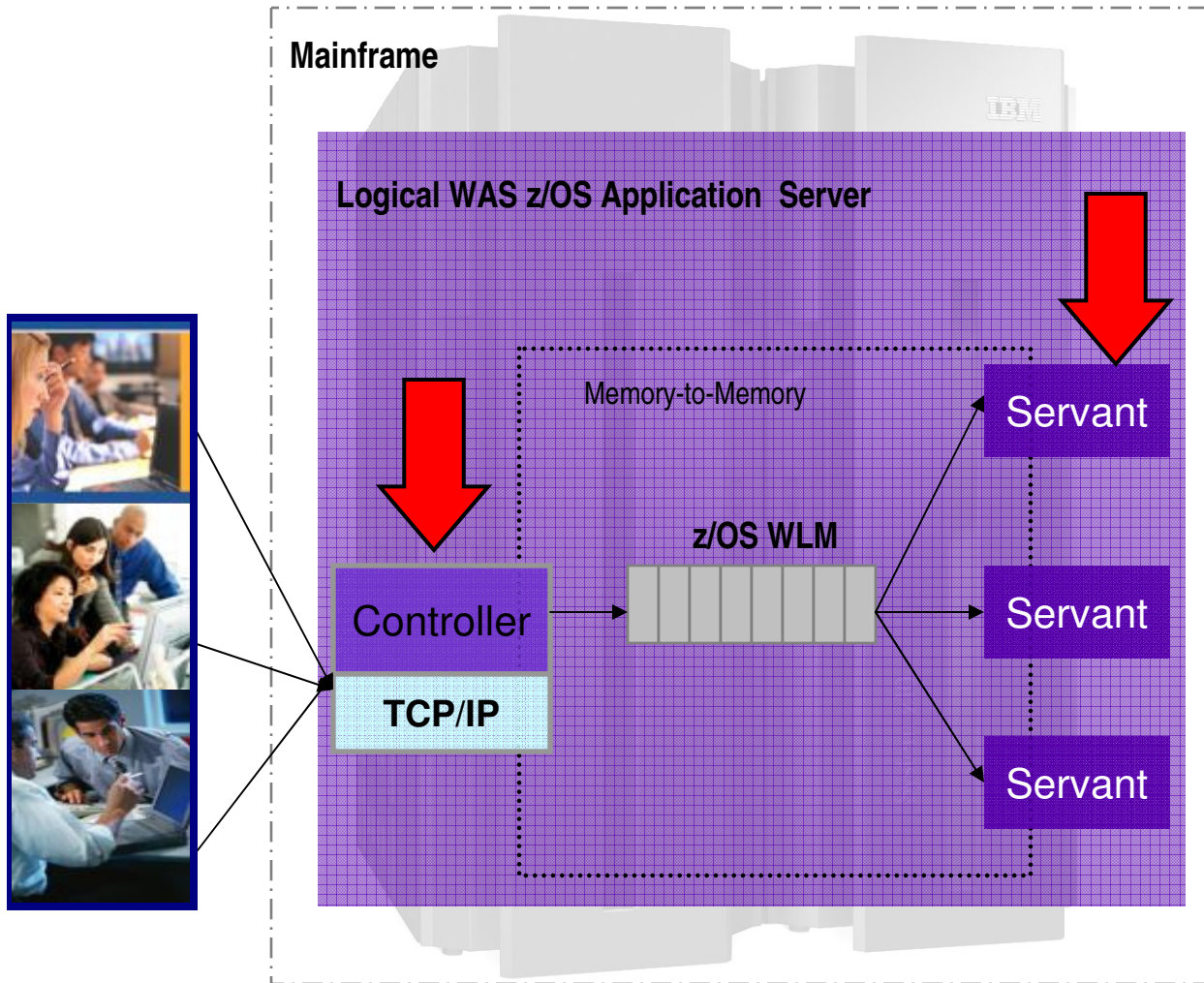
## Server Architecture

**A WAS z/OS application server is comprised of multiple processes.**

**The Controller executes authorized, robust system code and acts as a control center for WAS**

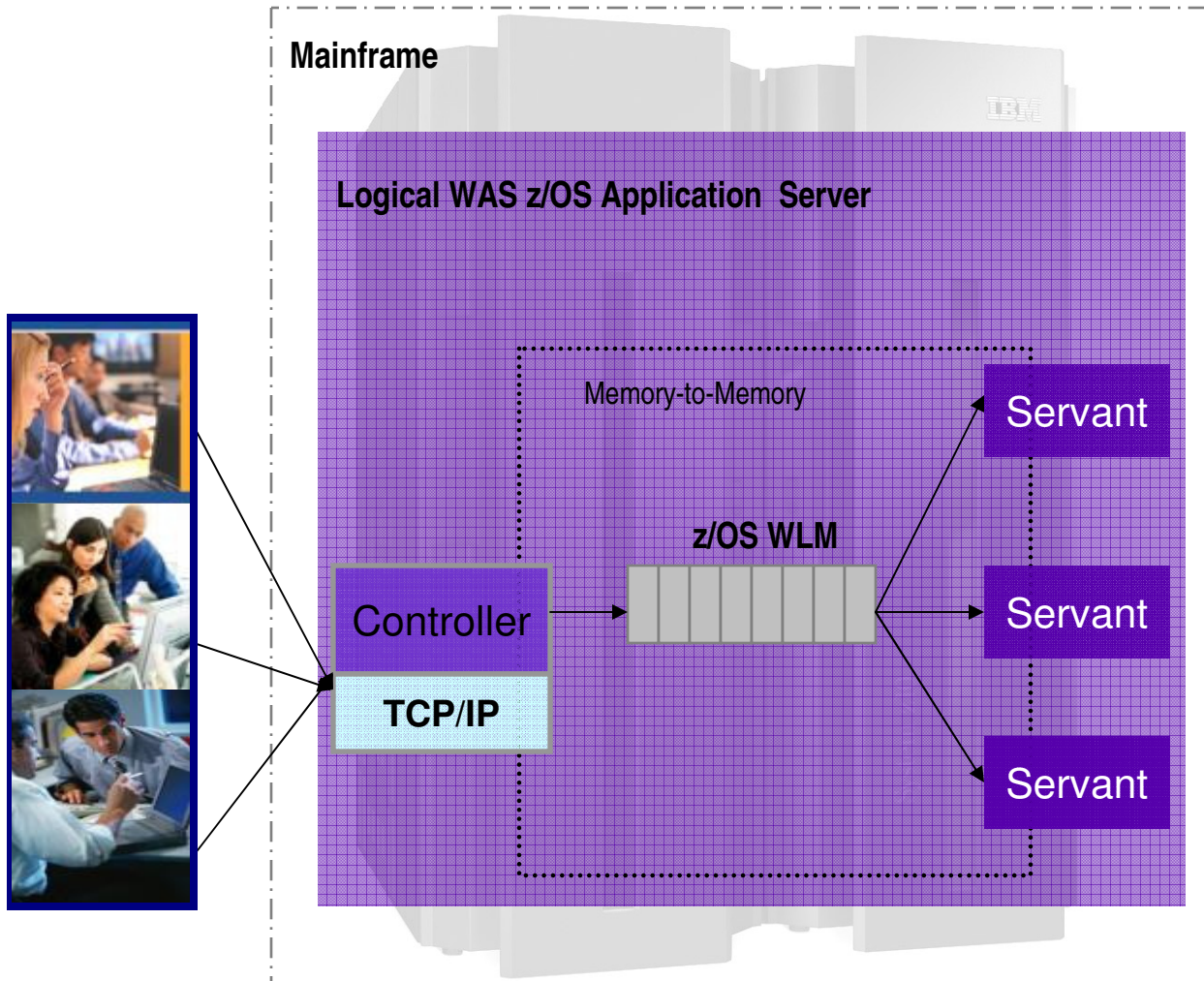
**Application code is executed within the Servant Process.**

- ✓ Theoretically, Servant processes are clones of each other.
- ✓ They can be terminated or created without interrupting the overall end-user experience
- ✓ Servant processes can be dynamically created or terminated by z/OS WLM (Workload Manager). The decisions can be based on user-defined service policies.



# WebSphere Application Server for z/OS

## Reliability

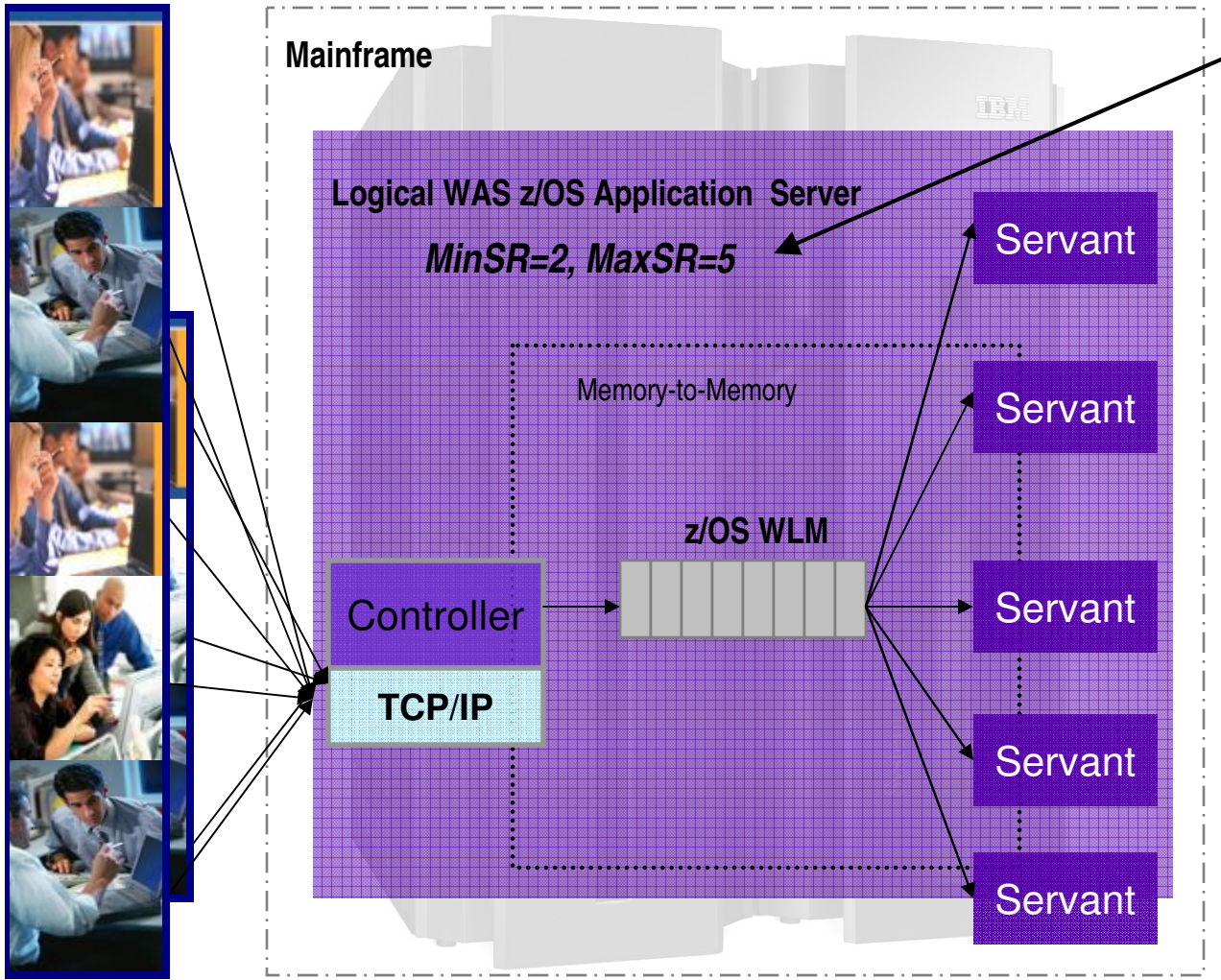


**If a servant process executing application code is terminated, the application can still be served by any of the other servants within WAS**

z/OS WLM detects the terminated servant and dynamically restarts it

# WebSphere Application Server for z/OS

## Scalability



**WAS z/OS allows you to define a minimum and maximum number of servant processes**

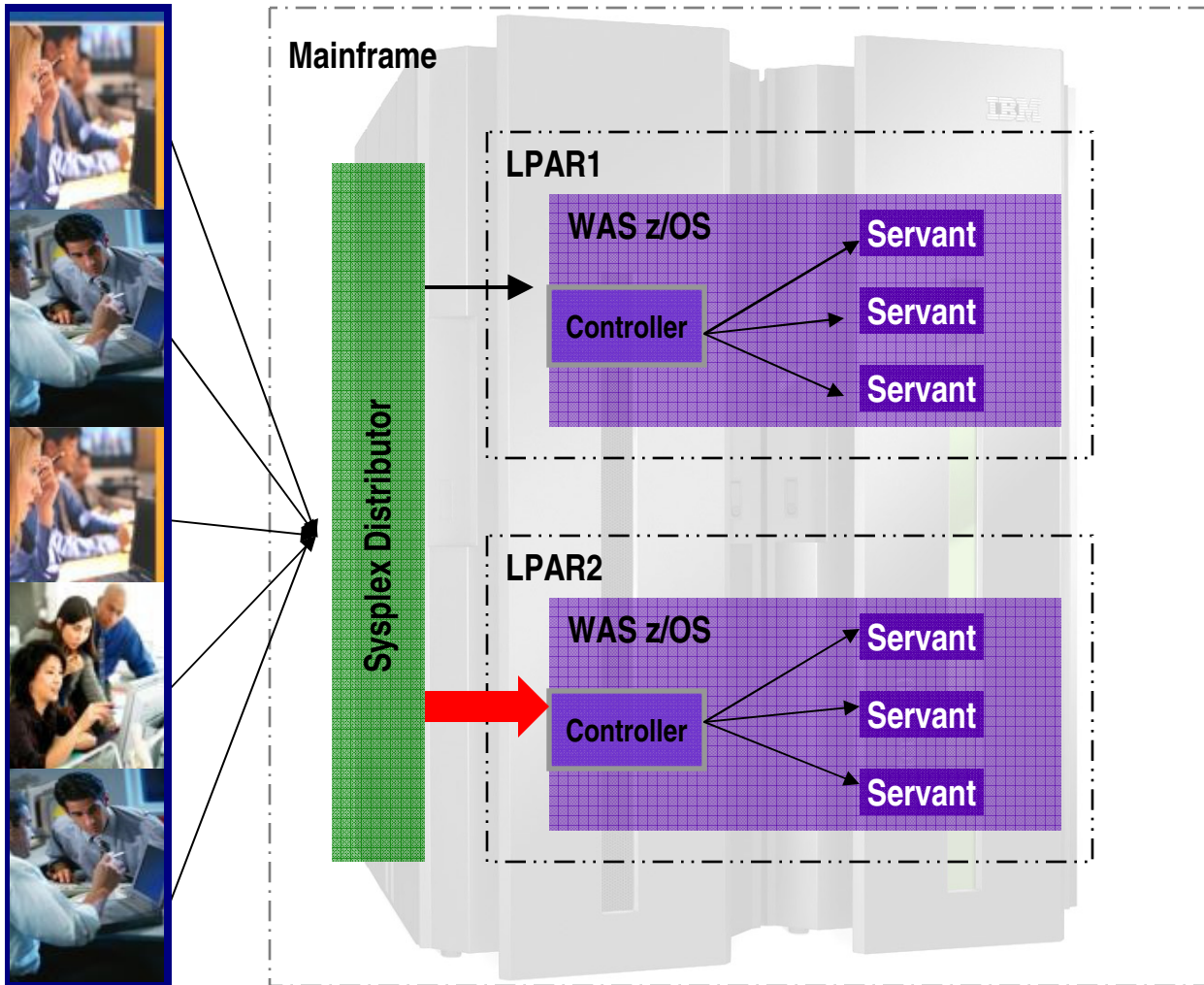
Workload can be unpredictable, and spikes in demand can demand application resources

When work begins to queue up waiting for application server resources, z/OS WLM takes notice and acts

Once the peak has subsided, z/OS WLM balances resources, so that it only maintains the servants needed to handle the incoming demand

# WebSphere Application Server for z/OS

## Availability



For true high availability, the Controllers need to be clustered

If a controller fails, the servants continue to process their in-flight work, but are not able to take additional work

The Sysplex Distributor reroutes work while **ARM** (Automatic Restart Manager) restarts the controller

**All this is done without manual intervention**

# WebSphere z/OS Application Server

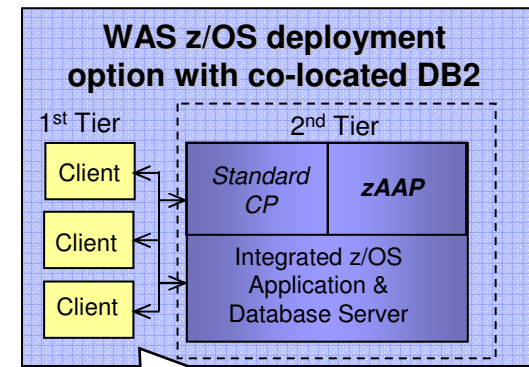
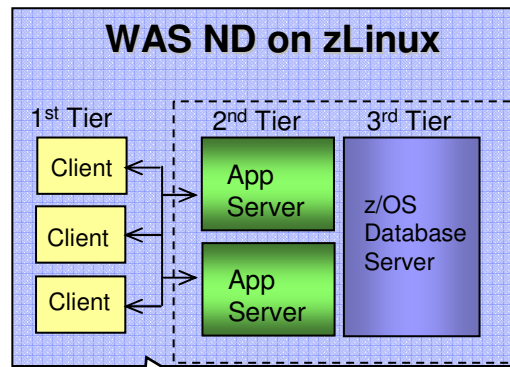
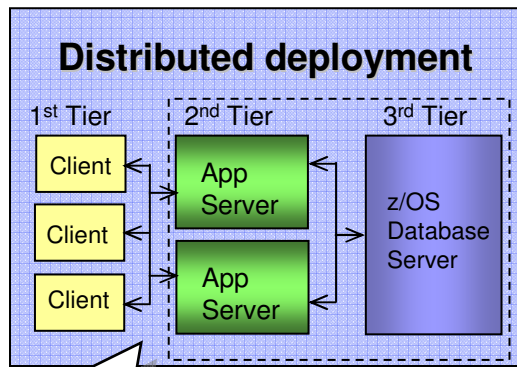
- **How do you scale the Application?**
  - Increase the Max Servants per Server
- **How do you scale the Database?**
  - Use a Shared DB2 Database
- **How do you handle failover?**
  - Use ARM for Controllers. Servants are handled via WLM
- **How is an application highly available?**
  - Servants are restartable via WLM. Controllers are recoverable via ARM
- **How are requests prioritized?**
  - WLM
- **How do I handle peak loads?**
  - WLM spawns servants
- **What about when I don't have peak loads?**
  - WLM eliminates excess Servants, freeing up system resources for other work
- **How do you route work evenly to multiple Servers?**
  - Sysplex Distributor routes work to specific LPAR's based on WLM metrics for resource utilization
- **How do you ensure that your servers are evenly utilized?**
  - WLM Metrics are used to decide where to route work to

**WAS integration with z/OS System Facilities provides a more robust, efficient, scalable environment**



# Platform Matters

## WebSphere Deployment options



Typical distributed deployment with:

- Network layer between each tier
- Normal access to z/OS DB limited by the network overhead and processor speed

Typical distributed deployment on the mainframe with:

- Ability to use hipersockets for faster DB transactions
- Normal DB access

Unique configuration only for WAS z/OS with:

- Memory to memory transfer rates with DB (Type 2 connections) for high volume transfer rates
- Remove network layer and overhead

# Application Characteristics for Platform Deployments: System p and System z

Compute Intensive

Small working set

Raw throughput

Predictable

Homogenous

Simple transactions

Heavy I/O – mixed workload

Large working set

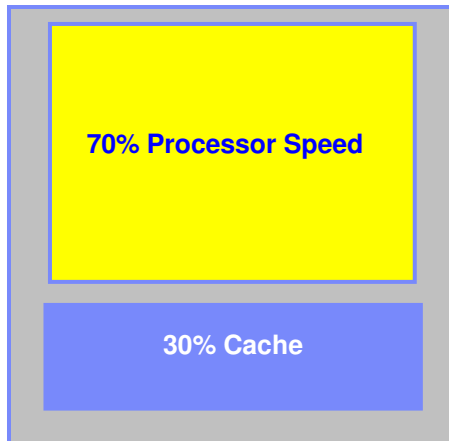
High ROI

Unpredictable volumes

Access to core mainframe assets

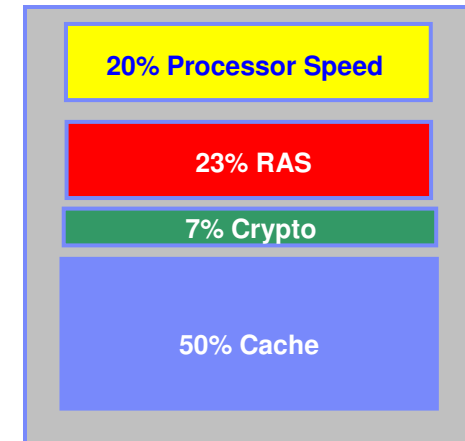
Complex transactions

Business critical



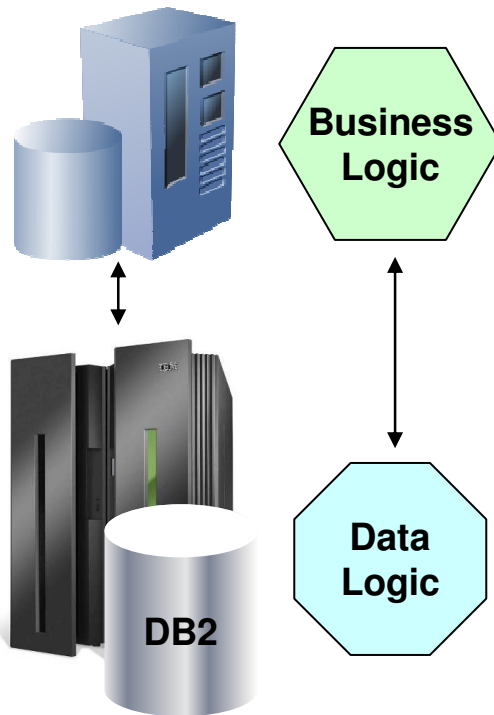
*pSeries/System p*

**Considering application characteristics is only one factor when deciding where to run your business applications, but knowing what your platform does best is *critical***



*zSeries/System z*

## What happens when logic and data are separated?

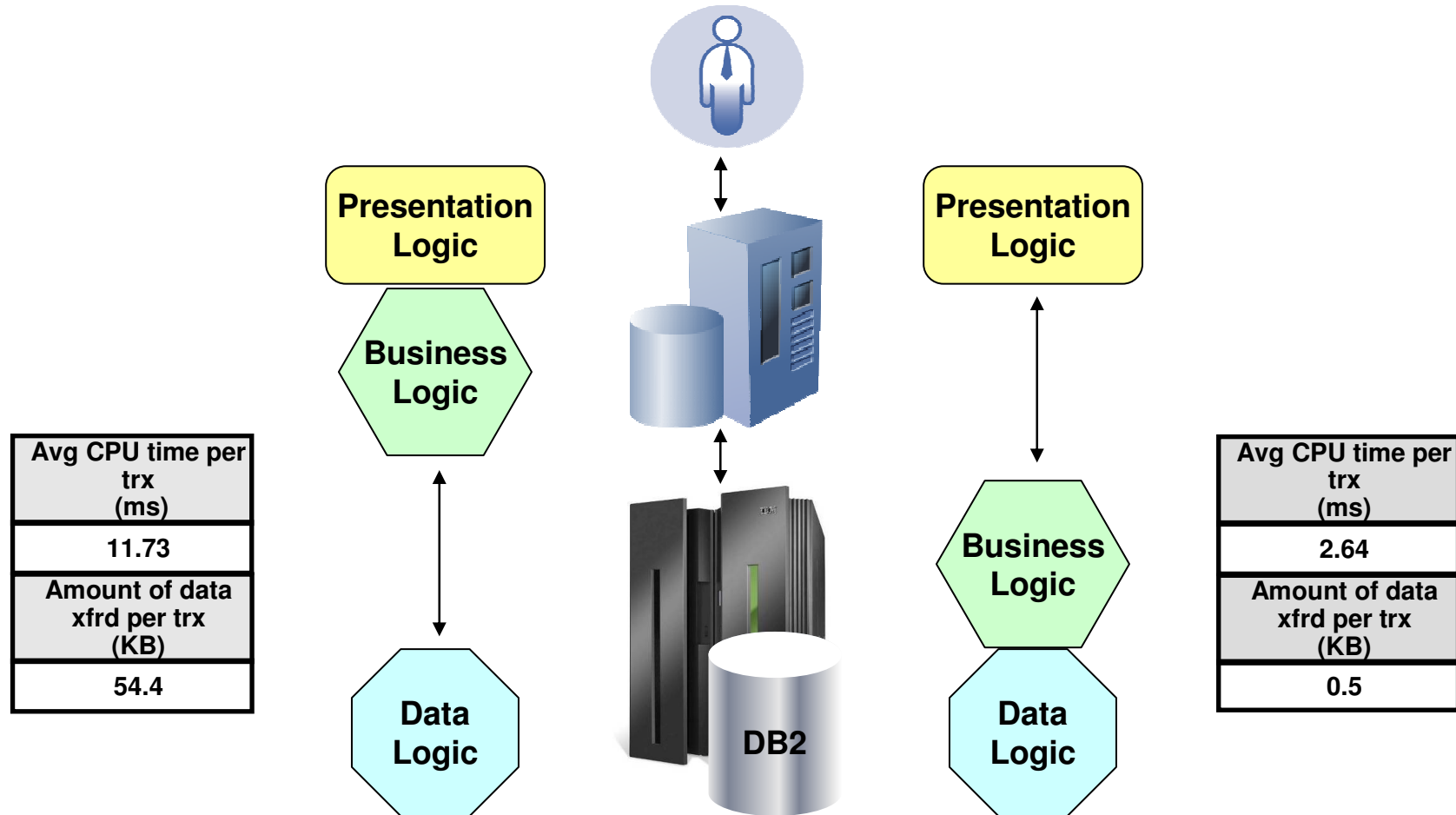


- Objects are converted into byte array at the requester (CPU, time)
- **Network latency is incurred (time)**
- More latency is incurred as service is dispatched (CPU, time)
- Objects are reconstructed at the server (CPU, time)
- Requested data is retrieved
- Objects are converted into byte array at the server (CPU, time)
- **Network latency is incurred (time)**
- Objects are reconstructed at the requester (CPU, time)

Some other considerations:

- Number of interactions between the tiers, volume of data passed
- No local optimizations of the access protocol
- Effect on server memory requirements due to locking

# The value of proximity: transportation industry POC



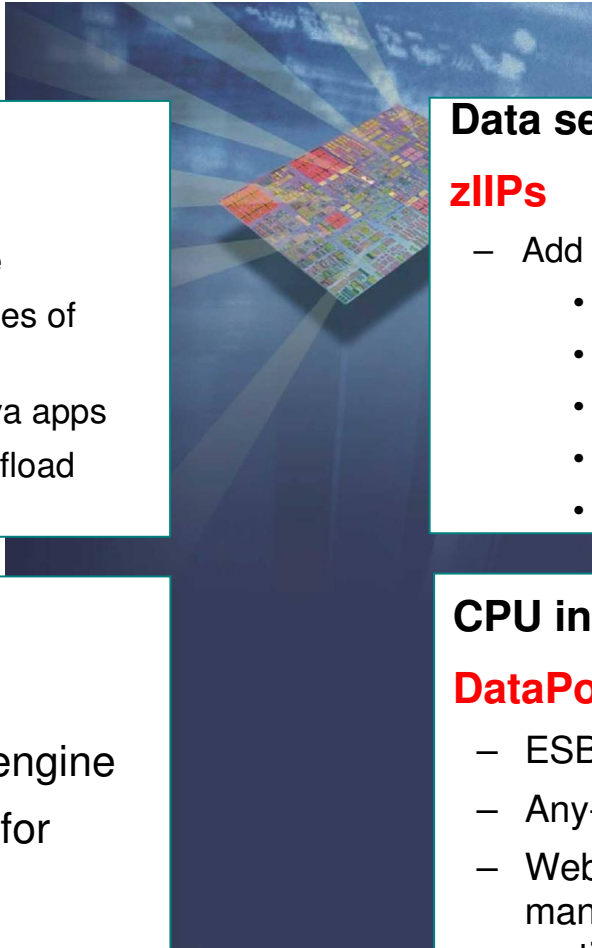
- **Effect of refactoring business logic to be co-resident with z/OS data:**

- 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*

# Specialized Hardware to Extend SOA Capabilities on System z

*Customize your mainframe for your specific workload needs*



## Java on the mainframe

### zAAPs

- Dedicated Java offload engine
- Average Java MIPs offload rates of 60%
- No development impact to Java apps
- z/OS XML System Services offload

## Data serving on the mainframe

### zIIPs

- Add value for DB2 workloads, including:
  - Enterprise applications
  - Data warehousing apps
  - DB2 z/OS V8 utilities
  - IPsec
  - z/OS XML System Services offload

## Linux on the mainframe

### IFLs

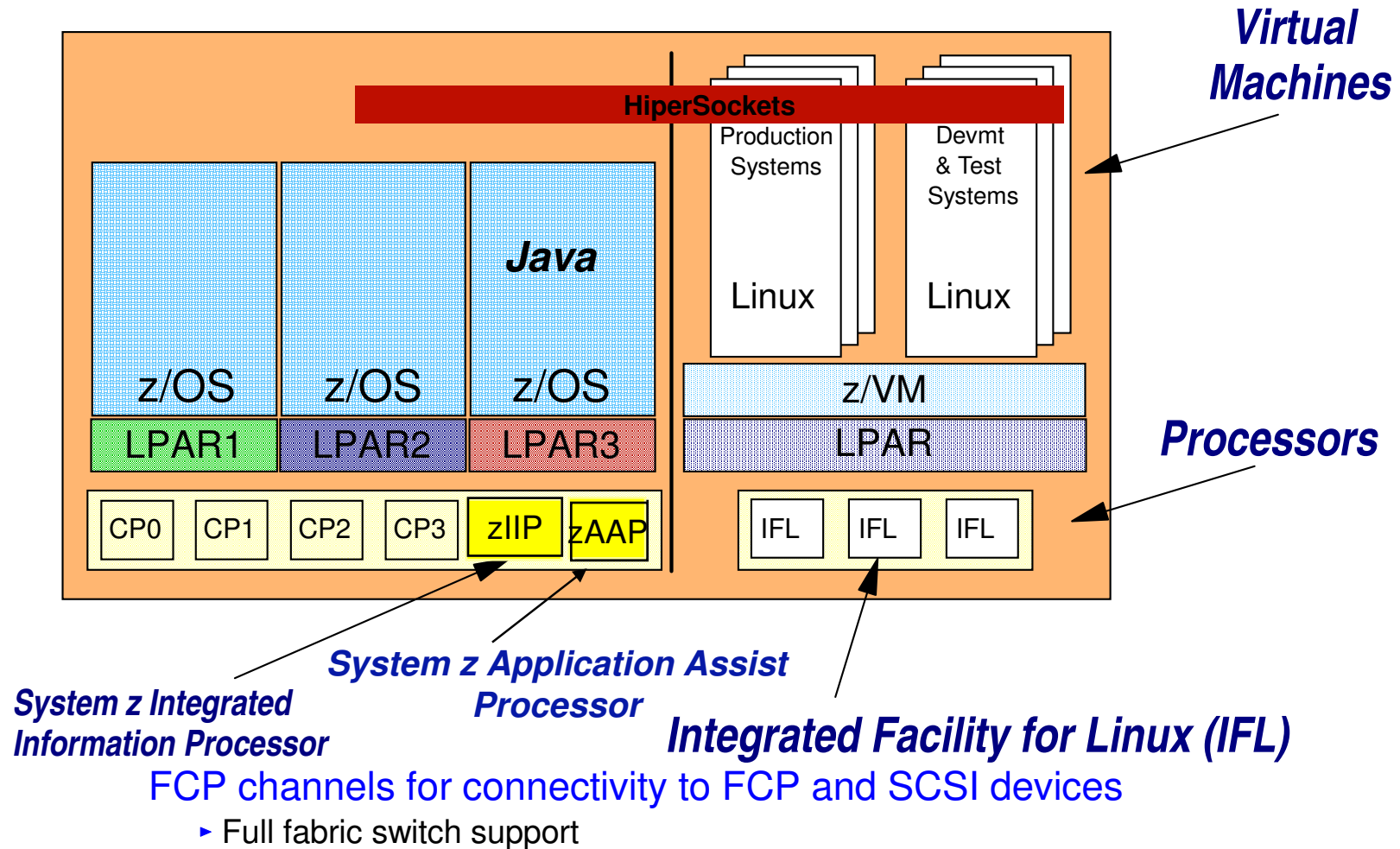
- Dedicated Linux offload engine
- Cost effective processor for Linux workloads
- LPAR mode specific

## CPU intensive XML offload

### DataPower

- ESB functionality in the hardware
- Any-to-any message transformation
- Web Service security and management, content-based routing, filtering

# Sample IBM System z™ Configuration



# WebSphere on System z Options

*A self managing server environment with the versatility and power to help integrate your business*

## **Linux deployment: Distributed Consolidation**

- ✓ Applications from multiple under utilized distributed servers
- ✓ Higher utilization than distributed servers
- ✓ Implement multi-tier applications in a single System z for better data proximity exploiting hipersockets
- ✓ Lower TCO with IFLs
- ✓ Speedy deployment – cloning/server provisioning
- ✓ Higher QoS than distributed
- ✓ Less stringent requirements than z/OS deployment
- ✓ Alignment with distributed WebSphere family
- ✓ Unrivaled virtualization with centralized management
- ✓ No z/OS Skills
- ✓ Web Serving infrastructure consolidation
- ✓ Presentation Services
- ✓ Flexible, virtualized Test/Migration/Prototyping Platform
- ✓ J2EE/ISV products not available on z/OS

***Perfect for the System z customer requiring speedy deployment with less stringent QoS/integration requirements***

## **z/OS deployment: Integration Option**

- ✓ Highest QoS production environment
- ✓ Lower TCO with zAAPs
- ✓ Full exploitation of System z and z/OS
- ✓ Tight integration with DB2, CICS, IMS for chatty applications to eliminate network latency
- ✓ “Spikey”, unpredictable workloads
- ✓ Service level agreement management
- ✓ Dynamic load balancing, prioritization
- ✓ Strict security requirements
- ✓ Highest availability, reliability, scalability
- ✓ Disaster recovery and autonomic function
- ✓ Dynamic I/O configuration
- ✓ Storage management
- ✓ Capability/tools to modernize and integrate existing System z applications
- ✓ Migrate applications from another platform that require additional scalability and integration

***Perfect for the System z customer requiring high QoS and significant integration with CICS, IMS or DB2***

# Linux on System z: Linux is Linux... *but...*

- **Why do customers deploy to Linux on System z?**
  - Proximity to data
  - Operational simplification
  - Business resiliency
  - Security
- **What are they doing?**
  - **68%: Application Serving for z/OS (hosting multi-tier solutions on System z)**
    - z/OS as data serving back-end
    - Linux on System z hosts all other tiers (application servers, edge servers, etc.)
  - Other multi-tier solutions that benefit from System z QoS and/or virtualization
    - 10%: Data serving workloads not appropriate for DB2 on z/OS
    - 10%: Messaging, collaboration and groupware services
    - 10%: Consolidation of infrastructure and network edge services
    - 2%: Application development and deployment leveraging virtualization services
- **Utility Serving for z/OS**
  - Linux utility “appliance” hosting for z/OS, centrally provisioned and managed



# WebSphere Extended Deployment for z/OS

- ✓ *Software to virtualize, control, and turbo-charge your application infrastructure*
- ✓ *Available as a single integrated package or as 3 individual components*

WebSphere Virtual Enterprise (Operations Optimization)	WebSphere Extended Deployment Compute Grid	WebSphere eXtreme Scale (Data Grid)
<p><b>Resource Management and Optimization</b></p> <ul style="list-style-type: none"> <li>On Demand Router</li> <li>Dynamic Clusters</li> <li>Service Policy, Health Policy</li> <li>Application Placement, Flow Control</li> <li>Workload Management</li> <li>Application Edition Manager</li> <li>Visualization, Virtualization</li> </ul>	<p><b>Innovative Application Patterns:</b></p> <ul style="list-style-type: none"> <li>Transactional Batch</li> <li>Compute Intensive</li> <li>Job Scheduling</li> </ul>	<p><b>Data Fabrics &amp; Caching:</b></p> <ul style="list-style-type: none"> <li>Partitioning Facility</li> <li>ObjectGrid</li> </ul>

**Customer Scenarios:**

- Common code base for OLTP and Batch
- J2EE / WAS batch programming
- Integrated routing between z/OS and XD
- Application edition management for streamlined deployment and testing



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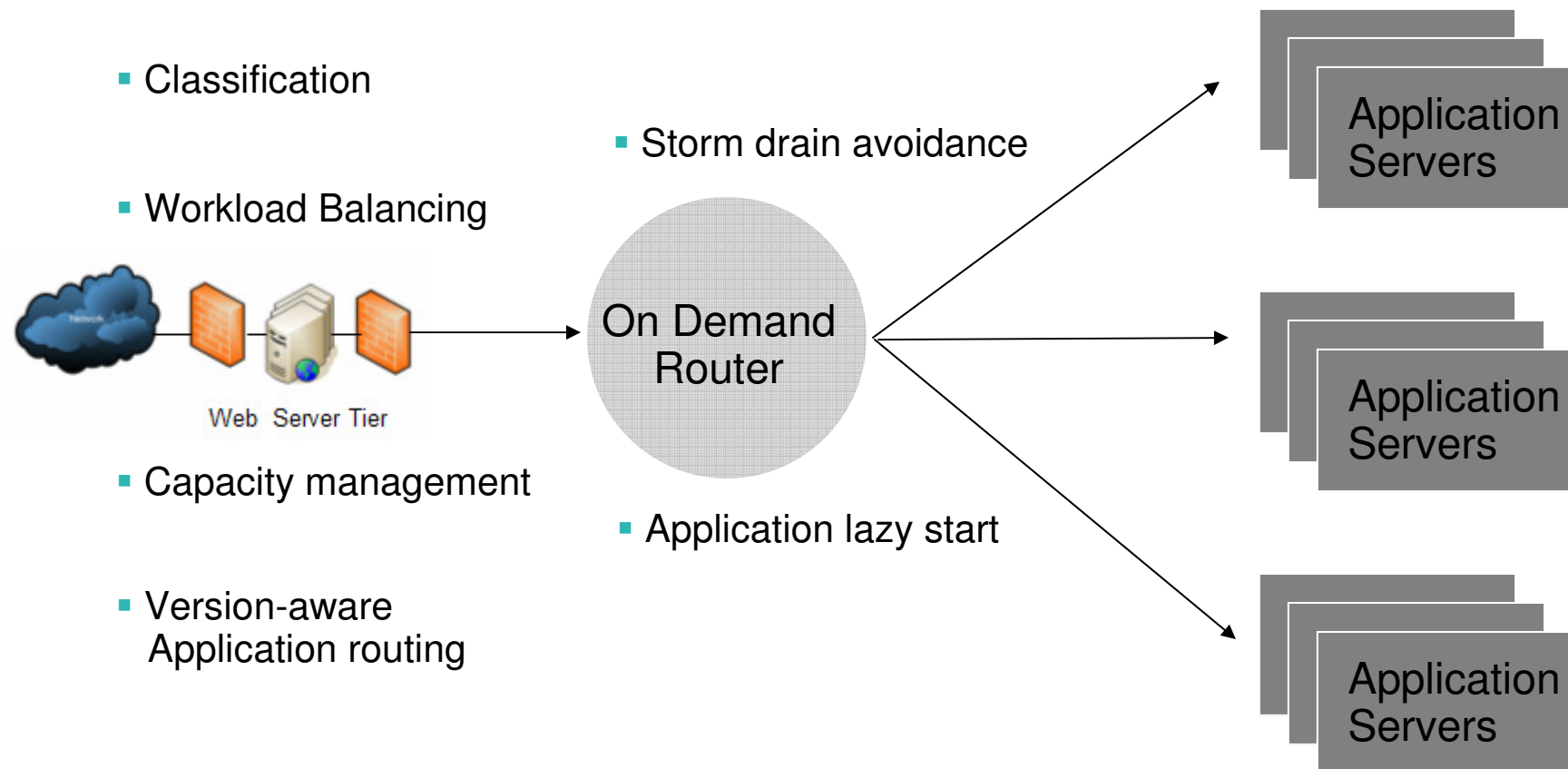
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# WebSphere Virtual Enterprise (formerly WebSphere Extended Deployment Operations Optimization)

## On Demand Router (ODR)

✓ Provides an intelligent proxy for workload routing within and across LPARs



# WebSphere Virtual Enterprise (formerly WebSphere XD Operations Optimization)

## Application Edition Manager

- ✓ Provides the facility for multiple versions of production applications, including operational support for piloting, staging, and rollback

## Visualization

- ✓ Customizable real-time charts display the success of your applications
- Runtime maps enable at-a-glance assessments of the components of your application server cells

## Health Policy

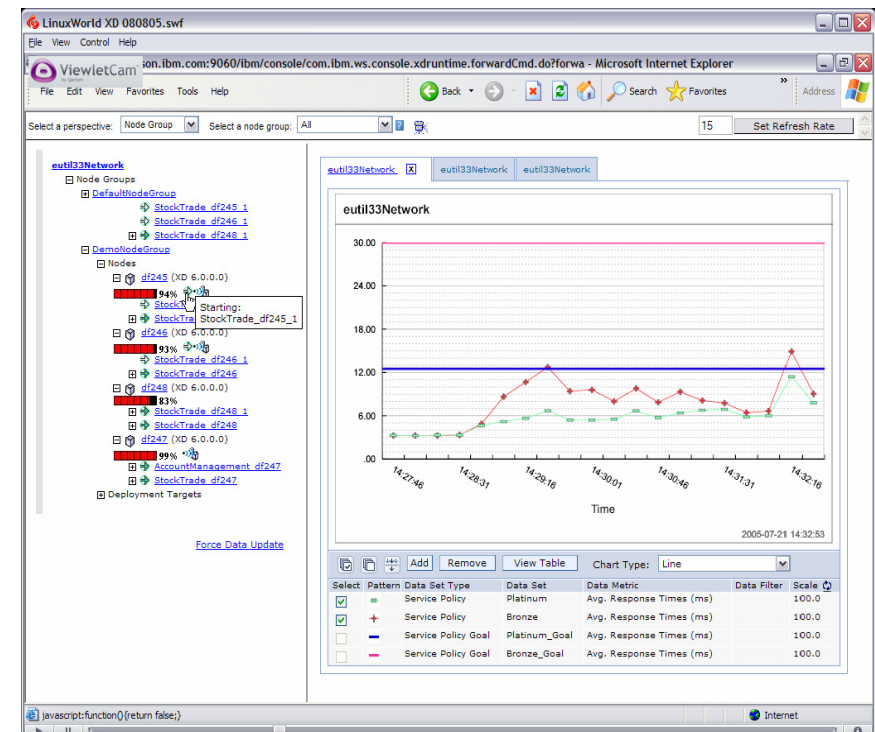
- ✓ Proactively seeks software maladies, such as hung servers, excessive memory consumption, storm drain situations, and addresses them

## Service Policies

- ✓ Enables granular classification of application workloads which is addressed within the ODR
- ✓ Value is compounded by z/OS WLM which manages XD application workloads, as well as all System z workloads

## Application Lazy Start

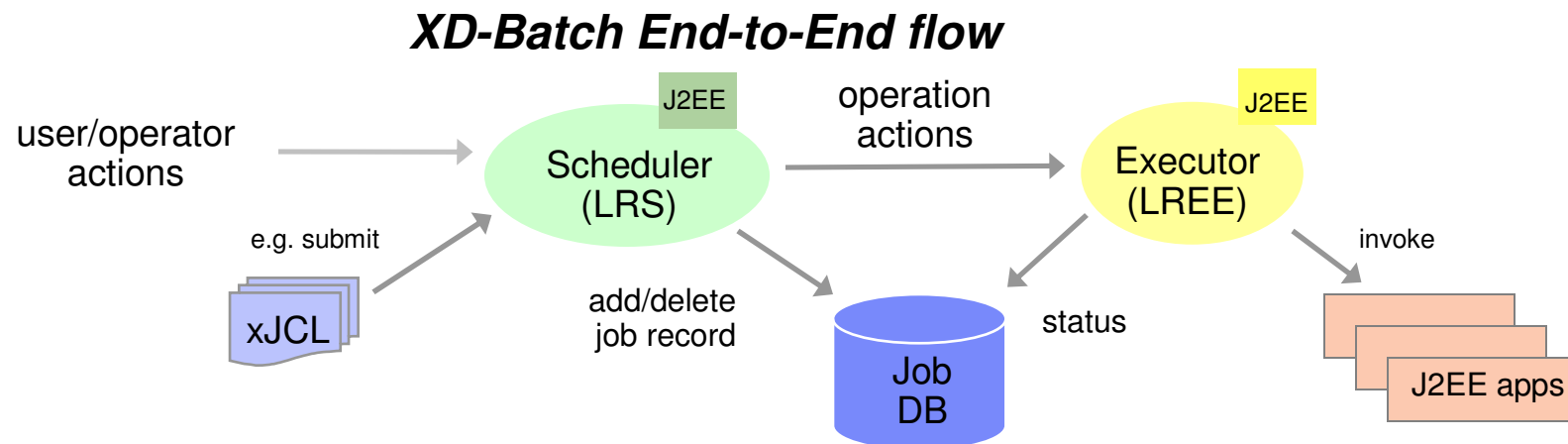
- ✓ Deactivated applications are lazily started when requests come in



## WebSphere XD Compute Grid

### WebSphere Batch environment

- ✓ Designed for structured J2EE batch workloads
- ✓ Scheduling agent to ensure batch workloads are disseminated to garner unused WebSphere resources
- ✓ Service policy support to differentiate workload importance



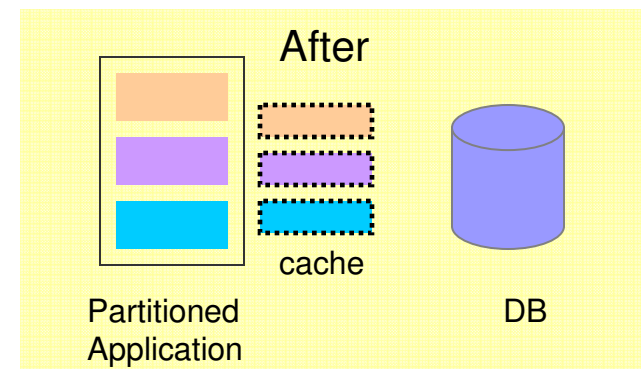
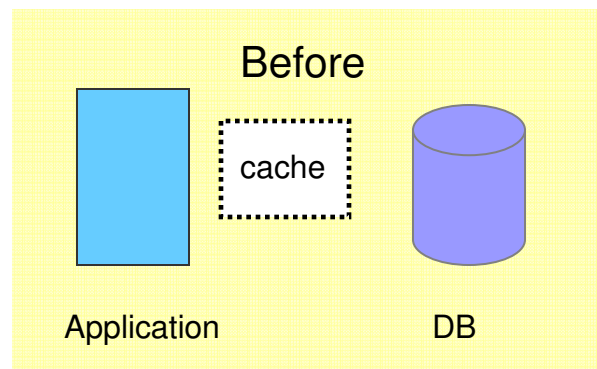
## WebSphere eXtreme Scale (formerly WebSphere XD Data Grid)

### Partitioning Facility

- ✓ Ability to break applications into partitions which enable smart, consistent caching at a partition level
- ✓ Highly available application partitions
- ✓ Provides reduced lock contention on shared DB2 resources

### ObjectGrid

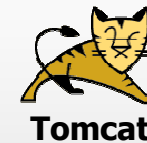
- ✓ Creates a caching fabric for shared object data which reduces unproductive backend datasource transactions



New and Enhanced!

## And it's Not Just for WebSphere Application Server...

WebSphere XD virtualizes, optimizes and manages the most application servers & environments in the industry



## WXD v6.1 Information Links:

- Announcement IBM WebSphere Extended Deployment V6.1
- IBM Offering Information (United States)
  - IBM WebSphere Extended Deployment V6.1 Software Announcement 207-088 PDF File
  - IBM WebSphere Extended Deployment for z/OS, V6.1 Software Announcement 207-087 PDF File
- IBM WebSphere Extended Deployment V6.1 Product Information
  - IBM WebSphere Extended Deployment Product Overview  
<http://www.ibm.com/software/webservers/appserv/extended/>
  - IBM WebSphere Extended Deployment Features and Benefits  
<http://www.ibm.com/software/webservers/appserv/extended/features/>
  - IBM WebSphere Extended Deployment Product Documentation  
<http://www.ibm.com/software/webservers/appserv/extended/library/>
- IBM WebSphere Extended Deployment InfoCenter  
<http://publib.boulder.ibm.com/infocenter/wxdinfo/v6r1/index.jsp>
- Redbook: Best Practices for Implementing WebSphere Extended Deployment, SG24-7343  
<http://www.redbooks.ibm.com/redbooks/pdfs/sg247343.pdf>
- developerWorks: Extended Deployment  
<http://www.ibm.com/developerworks/websphere/zones/xd/>
- IBM WebSphere Application Server Network Deployment Product Overview  
<http://www.ibm.com/software/webservers/appserv/was/network/>
- The IBM Solution Assurance Library (Search for Extended Deployment)  
<http://w3.ibm.com/support/assure/assur30i.nsf/Web/SA>



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DB2 Universal Database	HiperSockets	On demand business logo	SystemPac*
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## Notes:

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