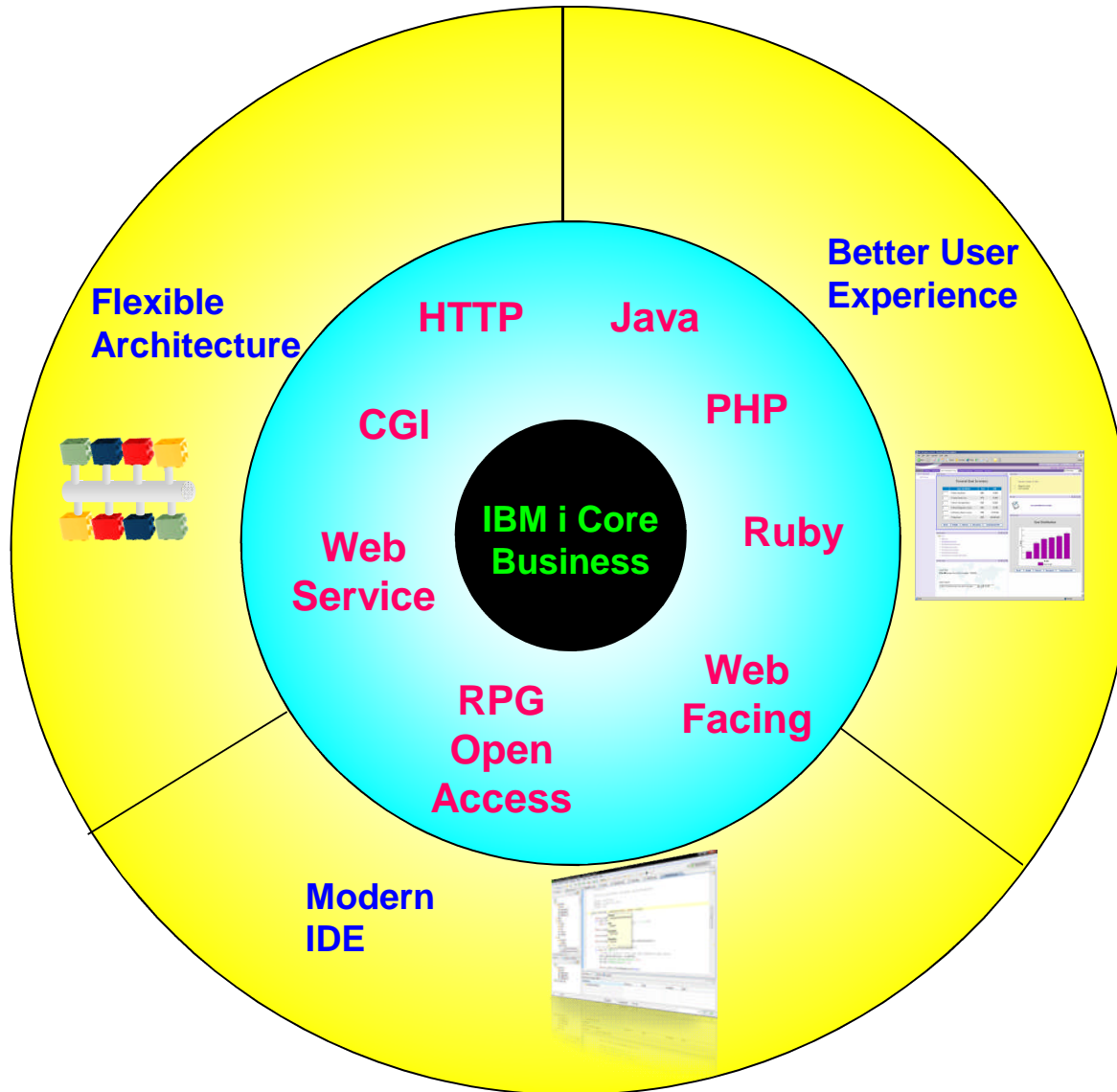


Understanding Your Web Serving Options on IBM i

Tim Rowe
timmr@us.ibm.com



Modernize Your IBM i Business with Web Technology





Ruby on Rails



Apache
HTTP Server & CGI



PHP on IBM i

WAS



(WebSphere Application Server)

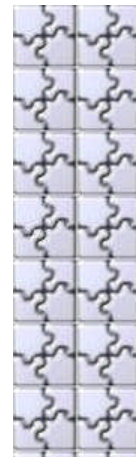


Tomcat



WebSphere Liberty Profile

Integrated Web Application Server
Based on Liberty



IBM i Web Technologies Revolution Overview



V5R1:

- JDK(classic) 1.1.8, 1.2, 1.3, 1.4
- WebSphere Application Server V3.5, V4.0, V5.0, V5.1
- WebSphere Commerce Suite V4.1, V5.1
- WebSphere Commerce V5.4
- HTTP Server (original)
- HTTP Server (powered by Apache) 2.0.18
- Tomcat 3.2.4
- Net.data

V5R3:

- JDK(classic) 1.3, 1.4, 5.0
- WebSphere Application Server V4.0, V5.1, V6.0, V6.1
- WebSphere Portal Server V5.0, V5.1, V6.0
- WebSphere Commerce V5.6
- WebSphere MQ V6.0, V7.0
- Workplace Collaboration Services V2.5, V2.6
- WebSphere MQ V6.0, V7.0
- Zend Core (PHP)
- HTTP Server (powered by Apache) 2.0.58
- Tomcat 3.2.4
- Net.data

V6R1:

- JDK(classic) 1.4, 5.0, 6.0
- JDK(IT4J) 1.4 64bit, 5.0 32bit, 64bit, 6.0 32 bit, 64 bit
- WebSphere Application Server V6.0, V6.1, V7.0, V8.0
- WebSphere Portal V6.0, V6.1 V7.0
- WebSphere Commerce V6.0, V7.0
- WebSphere MQ V6.0, V7.0
- WebSphere MQ FTE V7.0.2, V7.0.3, V7.0.4
- Zend Server (PHP)
- HTTP Server (Apache) 2.2.11
- Integrated Web Services
- WSDL2RPG
- Integrated Web App Server V7 V8
- Net.data

AS/400

Web Technologies

IBM i

V5R2:

- JDK(classic) 1.1.8, 1.2, 1.3, 1.4
- WebSphere Application Server V4.0, V5.0, V5.1, V6.0
- WebSphere Portal Server V5.0.2
- HTTP Server (original)
- Workplace Collaboration Services V2.5, V2.6
- WebSphere Commerce V5.4, V5.6
- WebSphere MQ V6.0
- HTTP Server (powered by Apache) 2.0.39
- Tomcat 3.2.4
- Net.data

V5R4:

- JDK(classic) 1.3, 1.4, 5.0, 6.0
- JDK(IT4J) 5.0 32bit, 6.0 32bit
- WebSphere Application Server V5.1, V6.0, V6.1, V7.0
- WebSphere Portal Server V5.1, V6.0, V6.1, V7.0
- WebSphere Commerce V5.6, V6.0
- WebSphere MQ V6.0, V7.0
- WebSphere MQ FTE V7.0.2, V7.0.3,
- Zend Server (PHP)
- HTTP Server (Apache) 2.0.63
- Integrated Web Services Server
- WSDL2RPG
- Integrated Web App Server V7.0
- Net.data

V7R1:

- JDK(IT4J) 1.4 64bit, 5.0 32 & 64bit, JDK 6.0 32 & 64bit, 7.0 32bit, 64bit
- WebSphere Application Server V6.1, V7.0, V8.0
- WebSphere Portal V6.1, V7.0
- WebSphere Commerce V7.0
- WebSphere MQ V7, V7.1
- WebSphere MQ FTE V7.0.3, V7.0.4
- Zend Server (PHP)
- HTTP Server (Apache) 2.2.11
- Integrated Web Services
- WSDL2RPG
- Integrated Web App Server V7.0, V8.1
- Net.data

V7R2:

- JDK 6.0 32 & 64bit, 7.0 32bit, 64bit
- WebSphere Application Server V8.0 & 8.5
- WebSphere Portal V8.0
- WebSphere Commerce V7.0
- WebSphere MQ V7.1
- WebSphere MQ FTE V7.0.4
- Zend Server (PHP)
- HTTP Server (Apache) 2.4
- Integrated Web Services - JAX-WS
- WSDL2RPG
- Integrated Web App Server- Liberty
- PowerRuby

Java vs CGI vs PHP

	Java	CGI	PHP
Language complexity	Complex. Need learning cost	Can be implemented by many native languages on IBM i, like C/C++/RPG. No need additional learning cost	Scripting language, easy to learn
Popularity	Popular	Long history. Lots of users on IBM i	Popular
Development period	Normal	Normal	Quick
Generating web page	Easy. Have lots of web related technology, like Servlet, JSP, etc. Lots of technology helping to create fancy web page	Not easy. All HTML codes need to be coded in native language	Easy. PHP script and HTML can code together
Maintainability	Easy. Pure object-oriented language. HTML and business codes can be divided clearly	Hard. Business codes and HTML codes are mixed	Easy - Medium
Open source	Lots of open source projects about Java. Can get all kinds of supports from internet easily	Few open source. Few support from Internet	Support from Zend and open source community
Runtime	Need run on Java virtual machine and application server	Native program support. Just need HTTP Server	Zend Server PHP engine
Debugging	Easy	Normal	Easy
Performance	Good. Need run on JVM	Best. Implemented by native languages. And CGI is optimized on IBM i	Normal. Scripting language, need to interpret one by one when running it

Java vs CGI vs PHP

	Java	CGI	PHP
Security	Several security standard and framework	Need to maintain by program	Some security standard. Also need to maintain by program
Database access	Has standard database access interface. Less change when switch to another database,	Normal. But the performance is the best.	Easy with XML Service
IDE	Eclipse, Rational Developer, etc, plugs lots of easy-to-use plugins from internet	Rational Developer for i, 5250 terminal.	Zend studio
Scalability	Extreme Scalability with WAS ND	High Scalability	High Scalability
IBM i access	Normal. Need IBM Java Toolbox support or JNI	Easy. Can call native API directly	Normal. XML Service based

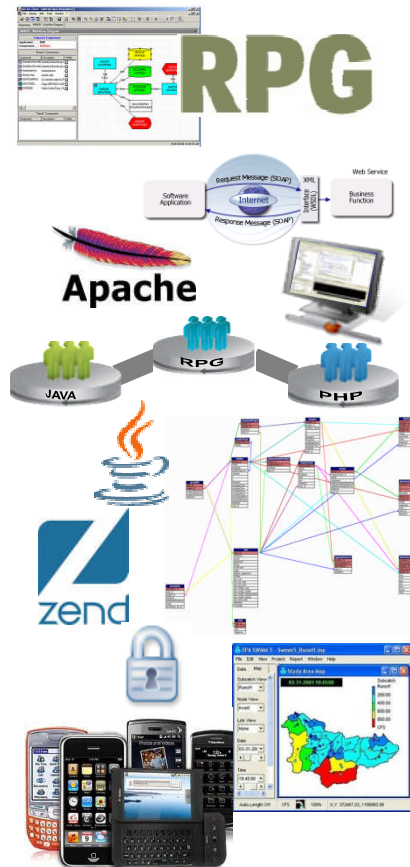
The Application Modernization **Redbook**

An innovative approach, combining general best practices of modernization along with the solutions, tools, and ISVs that can help make it happen

Redbook Residency

Write detailed chapters describing best practices for all aspects of Application Modernization

- Database
- Modern RPG
- Web Services
- Communication between applications
- Graphical User Interfaces
- Development tools
- Development best practices
- Flexible applications
- Languages Mobile
- Many other possible topics



Solution Guides

ISV, Partners, and Solution providers write a technical solution guide describing how they can help accomplish application modernization

Available

How to Enable on IBM i – Software Requirement

- IBM i 7.1
 - 5770-SS1 Option 30 QSH
 - 5770-DG1 *BASE IBM HTTP Server for i
 - 5761-JV1 *BASE IBM Developer Kit for Java
 - 5761-JV1 Option 11 Java SE 6 32 bit
 - Latest DG1 Group PTF, SF99368 level 26
 - Latest Java Group PTF, SF99572 level 16
- IBM i 6.1
 - 5761-SS1 Option 30 QSH
 - 5761-DG1 *BASE IBM HTTP Server for i
 - 5761-JV1 *BASE IBM Developer Kit for Java
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 - Latest DG1 Group PTF, SF99115 level 37
 - Latest Java Group PTF, SF99562 level 27



Application Serving on IBM i



Ruby on Rails



Apache

HTTP Server & CGI



PHP on IBM i

WAS



(WebSphere Application Server)

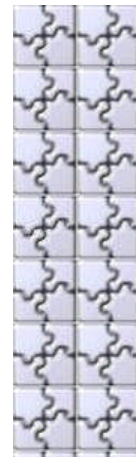


Tomcat



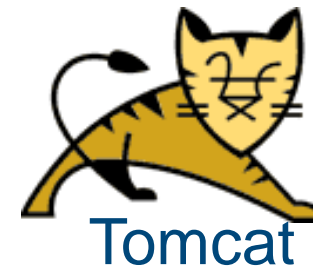
WebSphere Liberty Profile

Integrated Web Application Server
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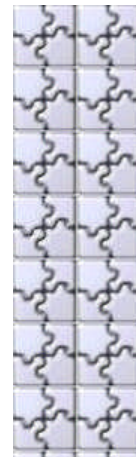
Application Serving on IBM : Java-based

WAS 
(WebSphere Application Server)



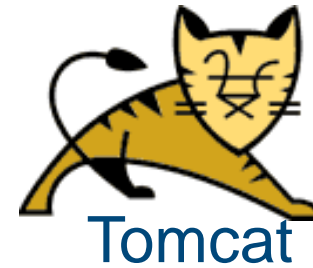
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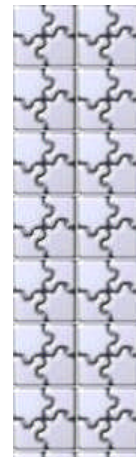
Application Serving on IBM : Java-based

WAS 
(WebSphere Application Server)



WebSphere Liberty Profile

Integrated Web Application Server
Based on Liberty



The Lightweight WAS Liberty Profile

First delivered in WebSphere Application Server v8.5, the Liberty Profile is a highly composable, dynamic Server runtime. Enhanced feature coverage and management in v8.5.5.

Dynamic Server Profile

Not static like Web Profile – configured by app at a fine-grained level

Developer First Focus

Simplified, shareable server config (like a dev. artifact). One XML file or several to simplify sharing & reuse of config. Adds MAC OS for development

Start fast, run efficiently

Starts in <3s
Memory footprint: <50MB
(TradeLite benchmark)

Small Download:

50MB for Web Profile features



WAS v8.5 Liberty Profile & WebSphere Developer Tools for Eclipse (WDT)

Integrated Tooling

Powerful tools in WDT Eclipse feature. Maven plugin goals for build, test and deploy

Enhanced!

Dynamically Extensible

Install new features from a repository (local or remote) without server restart

Enhanced!

Unzip Install & Deploy

IM or unzip to install. Option to deploy “server package” of app + config + required subset of server runtime for highest density deployment.

Enhanced!

New features

CDI, JMS, JAX-WS, local EJB, OAuth, federated user repository, MongoDB, clustering, WebCache

New!

Lightweight cluster management

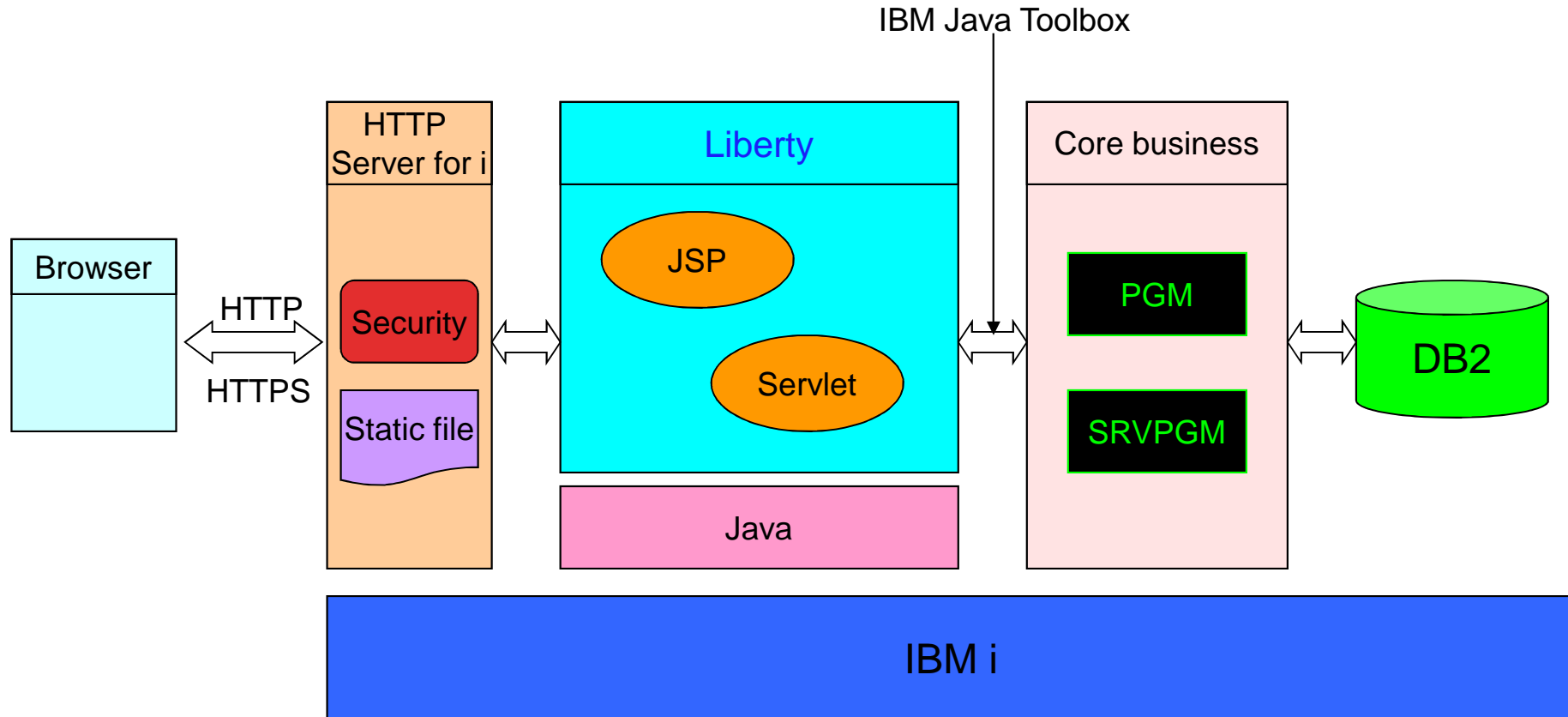
Liberty servers can join a lightweight cluster for workload balancing and high availability

New!

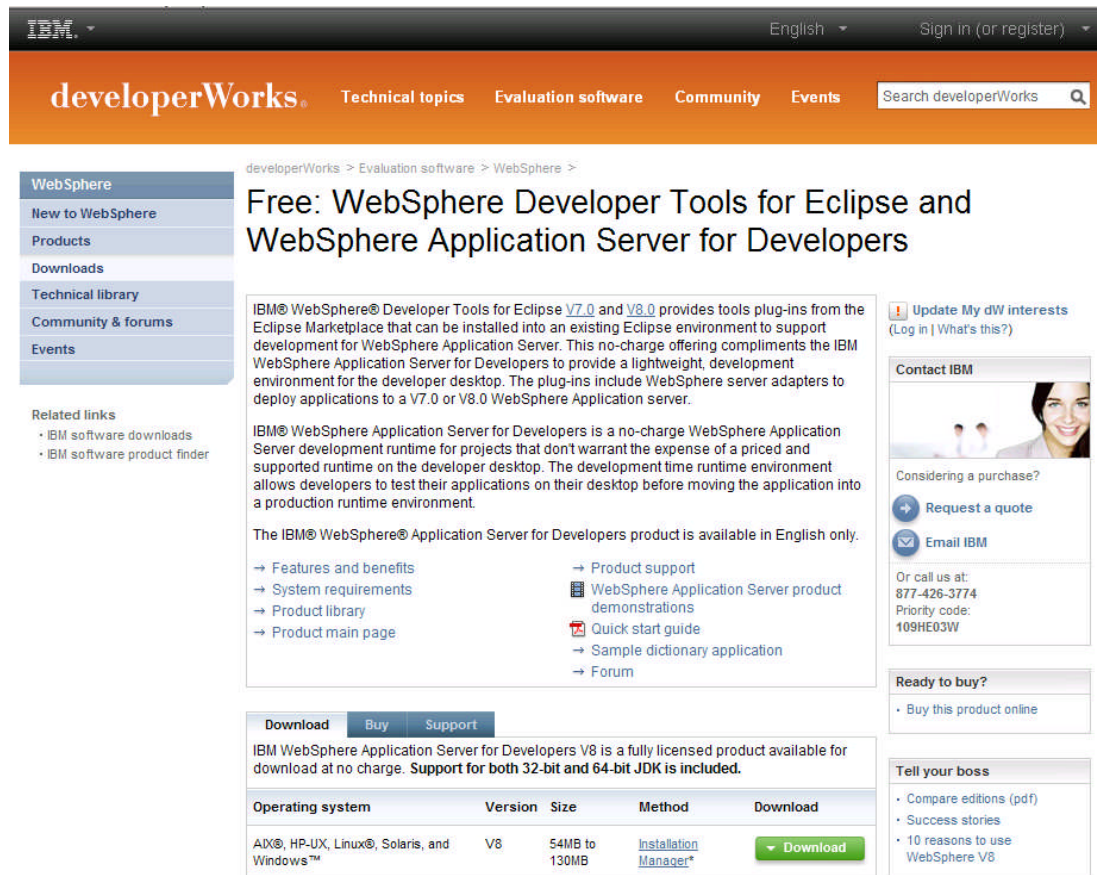
Fidelity to full profile WAS

Same reliable containers & QOS. Develop on Liberty profile and deploy to Liberty or full-profile WAS

Integrate IBM i business with Liberty



- No charge WebSphere Application Server for Developers
 - For use on developer desktop at no charge
 - Download at:
<http://www.ibm.com/developerworks/downloads/ws/wasdevelopers/index.html>



The screenshot shows the IBM developerWorks website. The main heading is "Free: WebSphere Developer Tools for Eclipse and WebSphere Application Server for Developers". The page includes a navigation menu on the left with options like "WebSphere", "New to WebSphere", "Products", "Downloads", "Technical library", "Community & forums", and "Events". Below the heading, there is a brief description of the tools and a list of related links such as "Features and benefits", "System requirements", "Product library", "Product main page", "Product support", "WebSphere Application Server product demonstrations", "Quick start guide", "Sample dictionary application", and "Forum". At the bottom, there is a "Download" section with a table of download options.

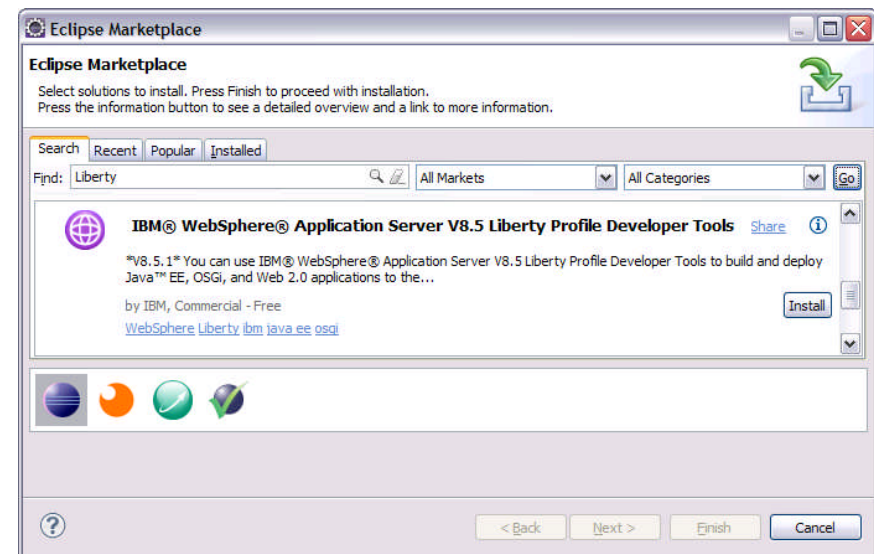
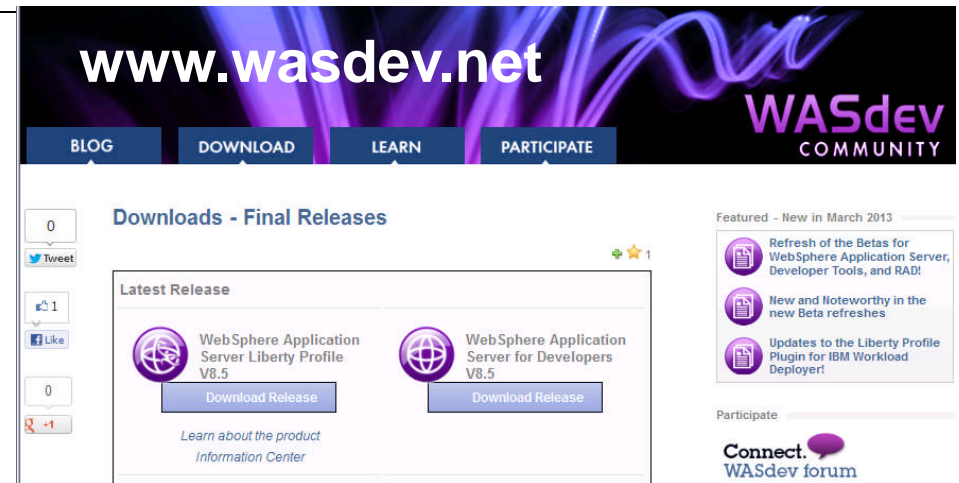
Operating system	Version	Size	Method	Download
AIX®, HP-UX, Linux®, Solaris, and Windows™	V8	54MB to 130MB	Installation Manager*	Download

No Hurdles to Install

- Tools and runtime are **no-charge** for development. No time limit
- Eclipse feature install for tools
- 50MB zip download for server profile.
 - Installation Manager also supported
→ same installed result.

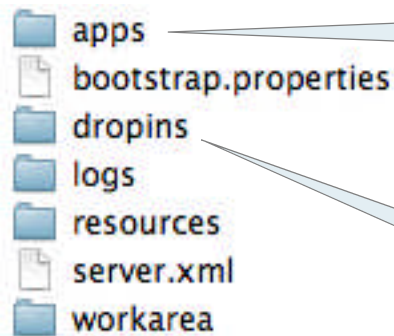
2 minutes from “Nothing” to “Done”:

1. Install WAS Developer Tools for Eclipse Feature
2. Use the Tools to download the WAS Liberty Profile or download from WASdev.net



Application Deploy

- Applications can be deployed via:
 - Monitored directory
 - Configuration
- Run apps from the file system, or a URL
- Can search server specific apps or shared apps directories

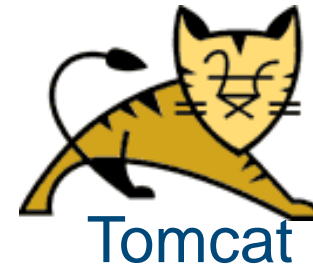


Configured application go here by default, but can be anywhere

Monitored directory for applications

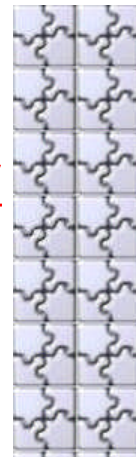
Application Serving on IBM : Java-based

WAS 
(WebSphere Application Server)



WebSphere Liberty Profile

Integrated Web Application Server
Based on Liberty



Introduction – IBM Integrated Web Application Server for i

■ IBM integrated Web application server for i

– Goals

IBM i functional enhancement

The Web container is integrated into IBM i OS

Easy to use

Simplified access, deployment and management

Small, Less resources

Positioned as ‘on-ramp’ to the Web

Replacement for AFS Tomcat



Introduction – IBM Integrated Web Application Server for i

- Integrated Web application server
 - What is it?
 - Web container
 - Based on the OSGI framework
 - Supports application packaged in a WAR
 - Runs IBM Technology for Java (32 –bit)
 - Supports Java Toolbox and Native DB drivers
 - Web container for ‘simple’ applications



Why is this important to the IBM i?

- It runs on our smallest boxes
- Simple to use
- Easy to install – part of the operating system (already included!)
- Easy to maintain - PTFs
- Starts very quickly (seconds)
- IBM admin interfaces have a place run
 - No Tomcat
 - No WAS system instance
- Replacement for Tomcat
- Allow us to do things like
 - Web Services Server
 - Web Query
 - IBM Navigator for i
 - Application Runtime Expert for i
 - Generates new excitement for IBM i



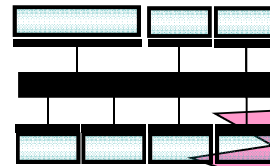
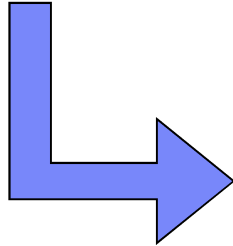
New stuff – Integrated Web Services Server

```

FTestFile UF A E      Disk
D ErrMsg01 S          20  Inz('End of file reached')
D ErrMsg02 S          22  Inz('Error! File closed')
D ErrMsg03 S          26  Inz('Unexpected error')
D Status03          SS 0
:
* Read file and check for status codes
C                               Read(E)  TestFile
C                               Select
C                               When      %Error
C                               If        %Status(TestFile) = 01211
C                               ErrMsg02  Dpily
C                               Else
C                               ErrMsg03  Dpily
C                               Endif
* Test for the end of file
C                               When      %EOP(TestFile)
C                               ErrMsg01  Dpily
C                               Endsl
    
```

RPG

COBOL



Web Service Consumer

Manage Deployed Services	
Server: "WSERVICE2"	
	ConvertTemp
	STOCKQ

Web Services Server

New Stuff – IBM Navigator for i

- New Web Console for the IBM i
- Available in IBM 6.1 on every system
- Over 300 i tasks have been enabled for the Web
- New function only available in Web console
 - BRMS
 - HA
 - Performance
 - Job Watcher
 - Disk Watcher

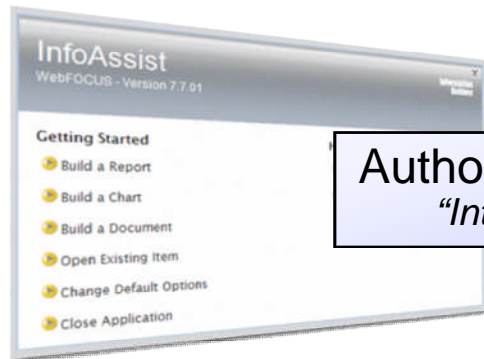
Reenergized

The screenshot displays the IBM Navigator for i web console interface. On the left is a navigation tree with categories like 'IBM i Management', 'Work Management', and 'Active Subsystems'. The main content area shows the 'Active Jobs' page for 'Lp13ut9'. It includes a table of active jobs with columns for Job Name, Detailed Status, and Current User. The table lists various system jobs such as Qbatch, Qcmn, Qcstot, Qlzperv, Qnmapingd, Qnmarexecd, Qnpservr, Qzrcsrvr, Qzscsrvr, Qcti, Qsysccd, Qhttpsvr, Admin, and Admin1. The status for most jobs is 'Waiting for request' or 'Waiting for dequeue'. The page also shows a filter input, a table with 166 items, and a pagination control at the bottom.

Job Name	Detailed Status	Current User
Qbatch	Waiting for dequeue	Qsys
Qcmn	Waiting for dequeue	Qsys
Qcstot	Waiting for request	Quser
Qlzperv	Waiting for request	Quser
Qnmapingd	Waiting for request	Quser
Qnmarexecd	Waiting for request	Quser
Qnpservr	Waiting for request	Quser
Qzrcsrvr	Waiting for request	Quser
Qzscsrvr	Waiting for request	Quser
Qcti	Waiting for dequeue	Qsys
Qsysccd	Waiting for event	Qpgmr
Qhttpsvr	Waiting for dequeue	Qsys
Admin	Waiting for signal	Qtmhhttp
Admin	Waiting for signal	Qtmhhttp
Admin	Waiting for signal	Qtmhhttp
Admin1	Waiting for thread	Qlwisvr

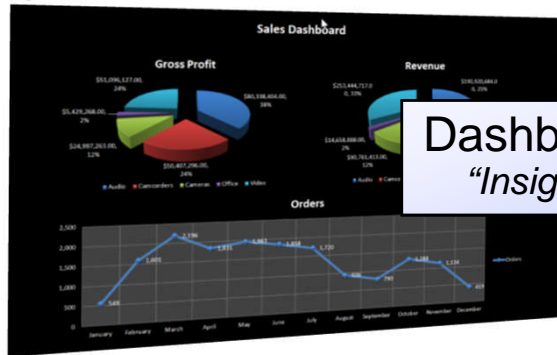
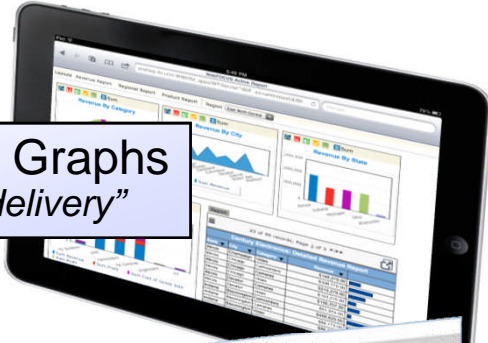
DB2 Web Query for i – Intuitive, Insightful, Extensible

Fast, easy access to business information assets for query, reporting and analysis



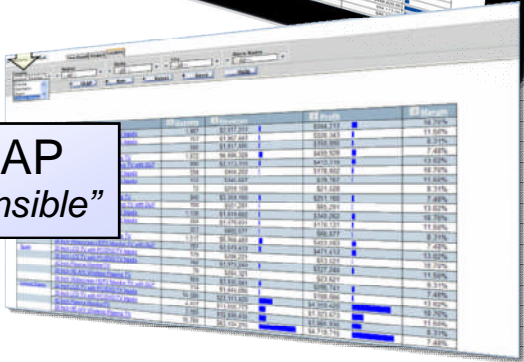
Authoring Tool
"Intuitive"

Reports & Graphs
"Flexible delivery"



Dashboards
"Insightful"

OLAP
"Extensible"



- Providing Analytics and Query/400 Modernization for the IBM i Client
- Low Cost Solution Offering Value Upgrade from Query/400
- Leveraging Best Practice Meta Data Layer Approach
- Leveraging DB2 for i Advanced Query Optimization Technology
- Leveraging features that allow a single report to replace many Query/400 reports

Application Runtime Expert for i

- Automate verification of runtime & environment attributes

- Performs health check
- Identifies differences
- Automatically fix many differences

- Application Runtime Attributes

- File/Directory Authorities and Attributes
- Compare native IBM i object attributes
- User profiles
- PTFs & Installed Products
- System Values
- TCP/IP Network verification and configuration
- Ports in use
- Run & verify SQL statements
- Run & verify results of CL commands

- Problem diagnostic, the first stop

Automate the verification of your systems and the applications running on them!

The screenshot displays the IBM Application Runtime Expert for i web interface in a Mozilla Firefox browser. The top window shows the 'Plugin Selection and Customization' page, where users can select and customize plugins for a template named 'MyTemplate5'. The 'Files and Directories' section includes options for 'File and Directory Attributes', 'File and Directory Authorities', and 'Configuration Files'. The 'Software Requirements' section is also visible.

The bottom window shows the 'System verification status' page, which displays a table of verification results for various server addresses. The status is '21/28 complete'. The table lists server addresses, their status, and the result of the verification.

Server address	Status	Result
NLS01P01	Complete	✓ No problem found.
NLS01P02	Complete	✓ No problem found.
NLS01P03	Complete	✓ No problem found.
NLS01P04	Complete	✓ No problem found.
NLS01P05	Complete	✓ No problem found.
NLS02P01	Complete	✓ No problem found.
NLS02P02	Complete	✓ No problem found.
NLS02P03	Complete	✓ No problem found.
NLS02P06	Complete	✓ No problem found.
NLS03P01	Processing	
NLS03P02	Processing	
NLS03P03	Complete	⚠ 1 errors, 0 warnings.
NLS03P04	Complete	⚠ 1 errors, 0 warnings.
NLS03P05	Complete	✓ No problem found.
NLS03P06	Complete	✓ No problem found.
NLS04P01	Processing	

IBM i Integrated Web Application Server (IAS)

- Time to move on.....

- Options

- Tomcat

- Not a great choice for all existing IBM apps
 - Not controlled by IBM (good & bad here)

- Liberty



- New portable Web Container part of the WebSphere Family
 - Targeted as the new IBM i integrated server
 - Will be transitioning over the course of the next year
 - IBM Applications Already running on this new server

Benefits of Moving IAS to Liberty

- Fully supported, maintained, and enhanced Web Container
- Ensure PCI Compliance
 - Security Vulnerabilities corrected and patched
- Server will be easier for compliance
 - It is recognized, It's a standard WAS server
- Opens up new technologies we can leverage
 - Web Services runtime engine for example
 - Move to new JVM levels (improved performance)
- Full Development tools support for user applications

Roll out

- We have converted the internal or IBM owned servers now
 - Web Admin GUI, ARE, DB2 Web Query

- 7.2 both servers are shipped
 - Existing LWI based serves will continue to run
 - No NEW LWI based servers can be created
 - New servers are all Liberty based
 - Migration tool to move customer applications from LWI to Liberty

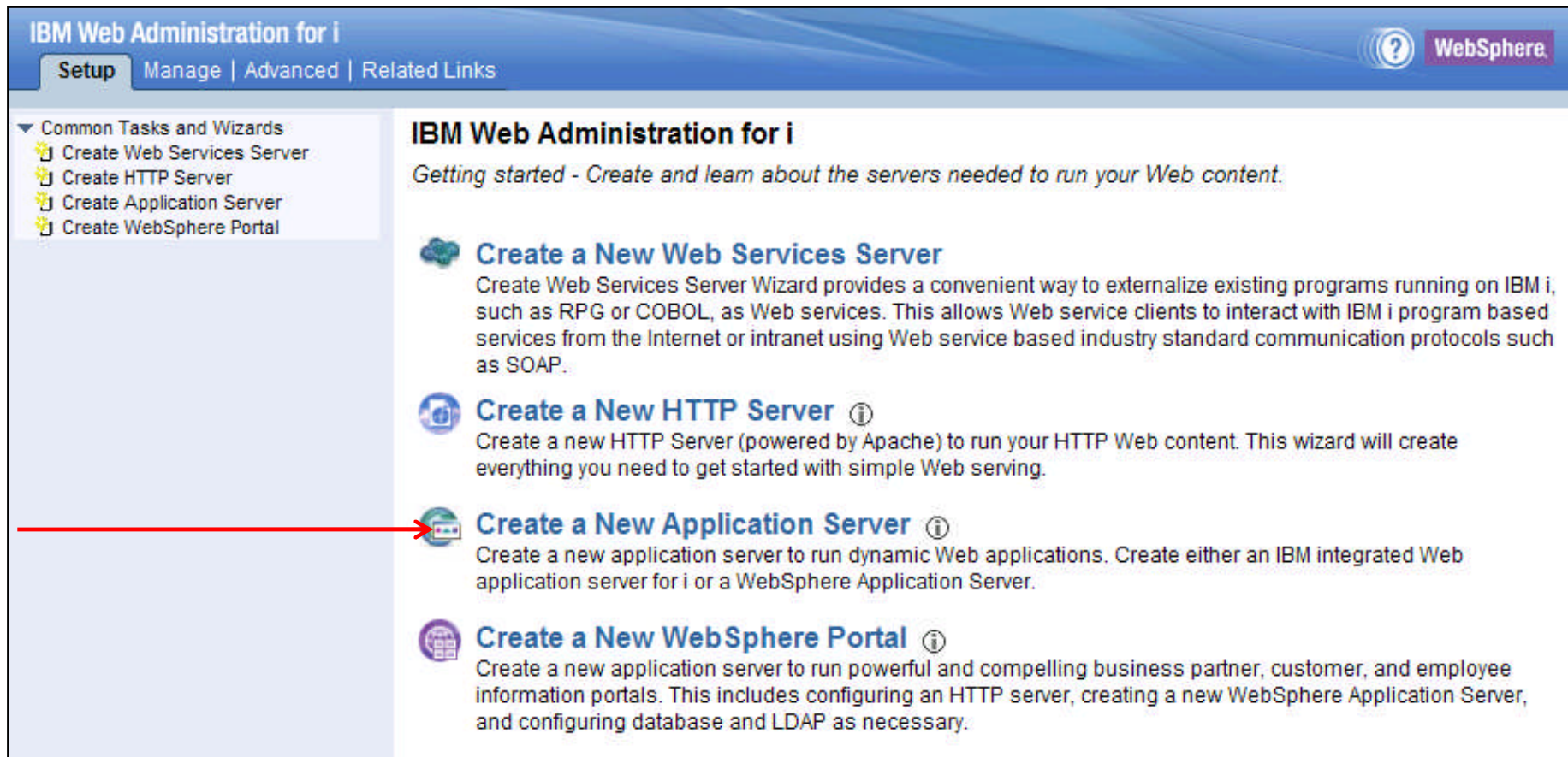
- Will you notice or care ?
 - Internal servers – No, Server runtime will switch during PTF apply
 - New servers – Minimal if any at all
 - More applications will work in the expected manner

IAS (Liberty) vs WAS

	Integrated Web Application Server	WebSphere Application Server Express	WebSphere Application Server Network Deployment
Cost	Integrated	Entitled	Fee
Packaging	Integrated with IBM i 5.4 & Newer	Ships with Web Enablement for IBM i	Separate product
Fixes	IBM i PTFs	WebSphere iFix	WebSphere iFix
Access to DB2 for IBM i	Yes	Yes	Yes
Supports JSF, JSP, & servlets	Yes	Yes	Yes
Multiple Instances	Yes	Yes	Yes
Full J2EE Support	No	Yes	Yes
Java Based Messaging Engine	Yes	Yes	Yes
Cross Platform	Yes	Yes	Yes
Advanced performance, management & high-availability	No	No	Yes
Rational Application Developer	Yes	Yes	Yes
J2EE application packaging	Yes	Full (WAR and EAR files)	Full (WAR and EAR files)

How do I get to it

Port 2001 interface – <http://hostname:2001/HTTPAdmin>



The screenshot shows the IBM Web Administration for i interface. The top navigation bar includes 'Setup', 'Manage', 'Advanced', and 'Related Links'. A 'WebSphere' logo is visible in the top right. The left sidebar lists 'Common Tasks and Wizards' with options: 'Create Web Services Server', 'Create HTTP Server', 'Create Application Server', and 'Create WebSphere Portal'. The main content area is titled 'IBM Web Administration for i' and contains a sub-header 'Getting started - Create and learn about the servers needed to run your Web content.' Below this are four wizard links, each with an icon and an information icon:

- Create a New Web Services Server**: Create Web Services Server Wizard provides a convenient way to externalize existing programs running on IBM i, such as RPG or COBOL, as Web services. This allows Web service clients to interact with IBM i program based services from the Internet or intranet using Web service based industry standard communication protocols such as SOAP.
- Create a New HTTP Server**: Create a new HTTP Server (powered by Apache) to run your HTTP Web content. This wizard will create everything you need to get started with simple Web serving.
- Create a New Application Server**: Create a new application server to run dynamic Web applications. Create either an IBM integrated Web application server for i or a WebSphere Application Server. *(A red arrow points to this link from the left sidebar.)*
- Create a New WebSphere Portal**: Create a new application server to run powerful and compelling business partner, customer, and employee information portals. This includes configuring an HTTP server, creating a new WebSphere Application Server, and configuring database and LDAP as necessary.

Create Application Server

Select Application Server Version and Type

This system has more than one version and type of application server installed.

Choose the type of application server to create

IBM integrated Web app

V8.1

V7.1

WebSphere Application

V7.0 ND

V6.1

V6.1 Base

V6.1 Express

V6.1 ND

V6.0

V6.0 ND

Create Integrated Web Application Server, V7.1

Specify Application Server Name - Step 1 of 6

Specify a unique name for the application server.

Create Integrated Web Application Server, V7.1

Specify Internal Ports Used by the Application Server - Step 2 of 6

The application server uses several internal services such as internal HTTP transport service to perform its processing. In order for these services to function, you must assign the ports that are currently not in use. For each service, you assign the ports that are used by the application server. For each port in the range, then provide the following information:

First port in range:

Create Integrated Web Application Server, V7.1

Create a new HTTP server (powered by Apache) - Step 3 of 6

A new HTTP server (powered by Apache) will be created for you.

HTTP server name:

HTTP server description:

Your HTTP server may listen for requests on the following IP address and TCP port:

IP address: Port:

Note: Most browsers may not be able to access the sample applications.

Create Integrated Web Application Server, V7.1

Summary - Step 6 of 6

When you click Finish, this IBM integrated Web application server for i is created.

Application Server **HTTP Server**

Application server version: 7.1

Application server name: INTAPPSVR2

Server description: IBM integrated Web application server for i created by the Create Application Server wizard.

Internal port range: 10171 - 10180

Instance root: /www/intappsvr2

Application server home directory: /www/intappsvr2/lwi

External HTTP server association: INTAPPSVR2

Server URL: http://LP03UT18:10181

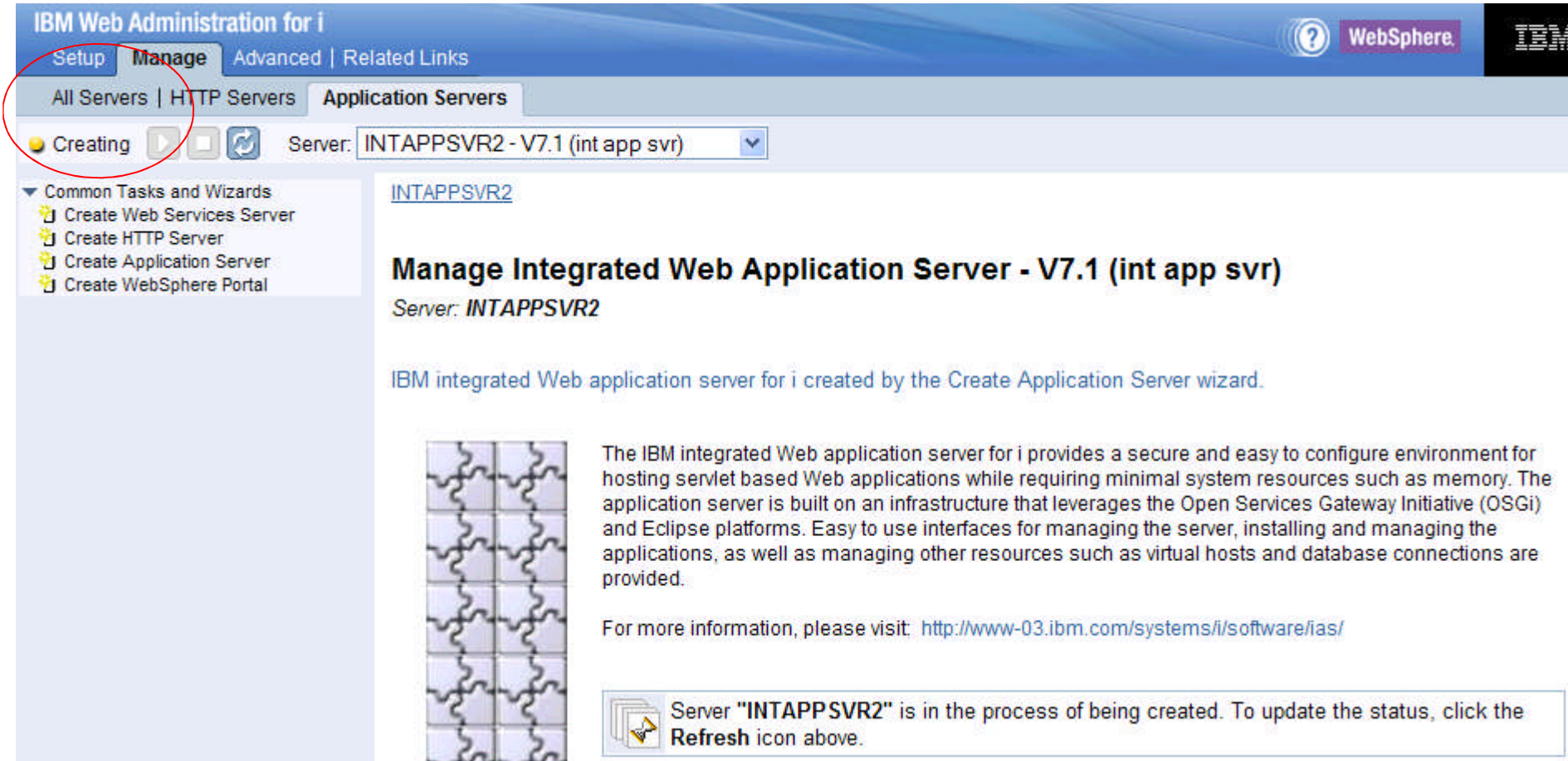
Sample applications:	Application name	URL to test the server
Eclipse Help		http://LP03UT18:10181/help

Note: To access the sample applications, ensure both the application server and HTTP server are started, then enter a URL from the table above.

Back
Finish
Cancel
Printable Summary

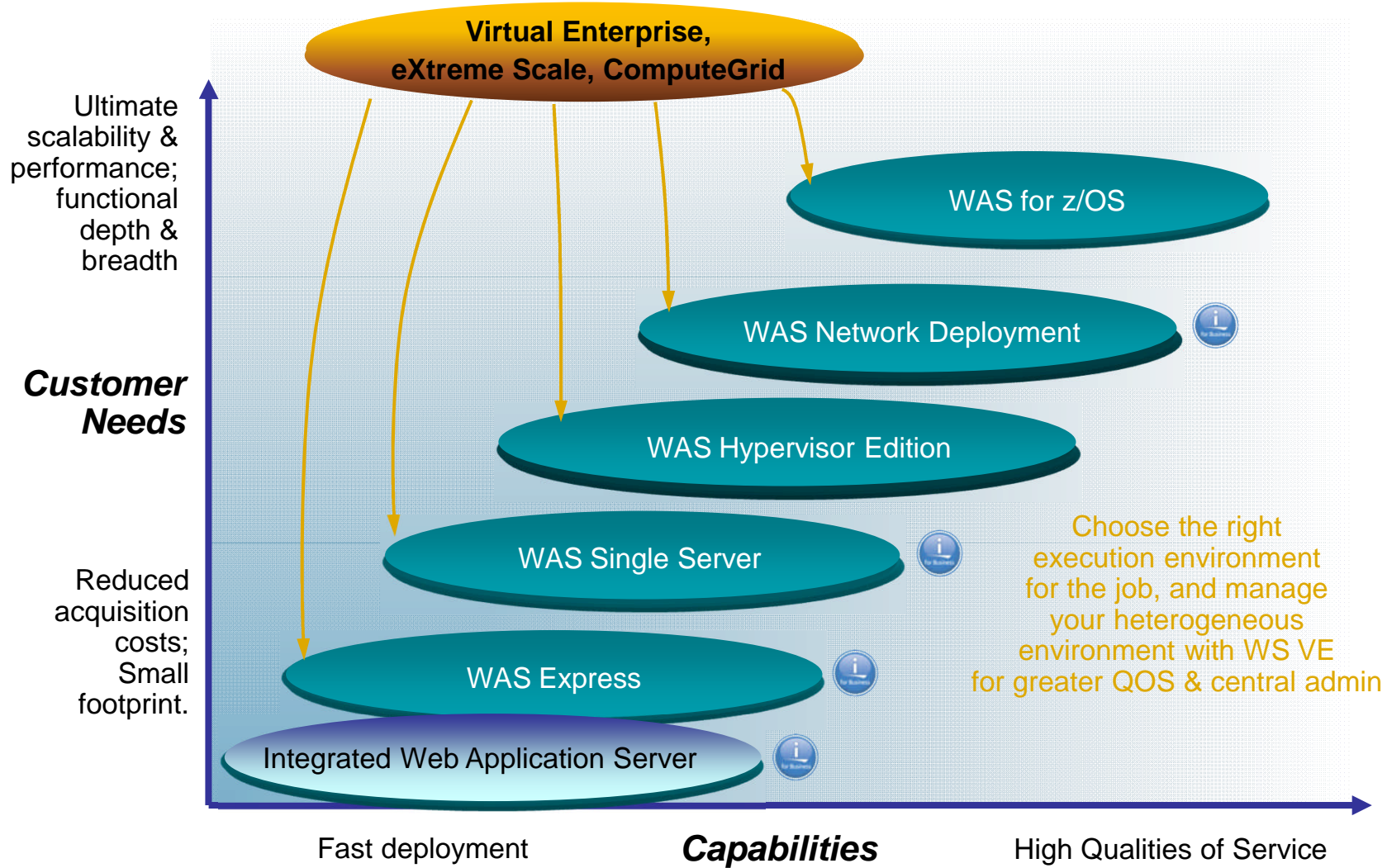
Create Application Server

- Server creating



The screenshot shows the IBM Web Administration for i interface. The top navigation bar includes 'Setup', 'Manage', 'Advanced', and 'Related Links'. Below this, there are tabs for 'All Servers', 'HTTP Servers', and 'Application Servers'. A red circle highlights the 'Creating' status icon and the 'Server: INTAPPSVR2 - V7.1 (int app svr)' dropdown menu. The left sidebar lists 'Common Tasks and Wizards' with options like 'Create Web Services Server', 'Create HTTP Server', 'Create Application Server', and 'Create WebSphere Portal'. The main content area displays the title 'Manage Integrated Web Application Server - V7.1 (int app svr)' and the server name 'Server: INTAPPSVR2'. A paragraph describes the server's capabilities, and a link provides more information. A bottom box contains a message: 'Server "INTAPPSVR2" is in the process of being created. To update the status, click the Refresh icon above.'

WebSphere Application Server Portfolio



IAS (Liberty) vs WAS

	Integrated Web Application Server	WebSphere Application Server Express	WebSphere Application Server Network Deployment
Cost	Integrated	Entitled	Fee
Packaging	Integrated with IBM i 5.4 & Newer	Ships with Web Enablement for IBM i	Separate product
Fixes	IBM i PTFs	WebSphere iFix	WebSphere iFix
Access to DB2 for IBM i	Yes	Yes	Yes
Supports JSF, JSP, & servlets	Yes	Yes	Yes
Multiple Instances	Yes	Yes	Yes
Full J2EE Support	No	Yes	Yes
Java Based Messaging Engine	Yes	Yes	Yes
Cross Platform	Yes	Yes	Yes
Advanced performance, management & high-availability	No	No	Yes
Rational Application Developer	Yes	Yes	Yes
J2EE application packaging	Yes	Full (WAR and EAR files)	Full (WAR and EAR files)

Application Serving on IBM : Java-based

WAS

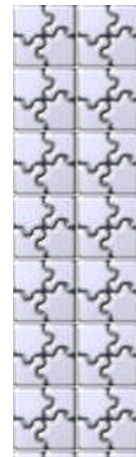


(WebSphere Application Server)



WebSphere Liberty Profile

Integrated Web Application Server
Based on Liberty

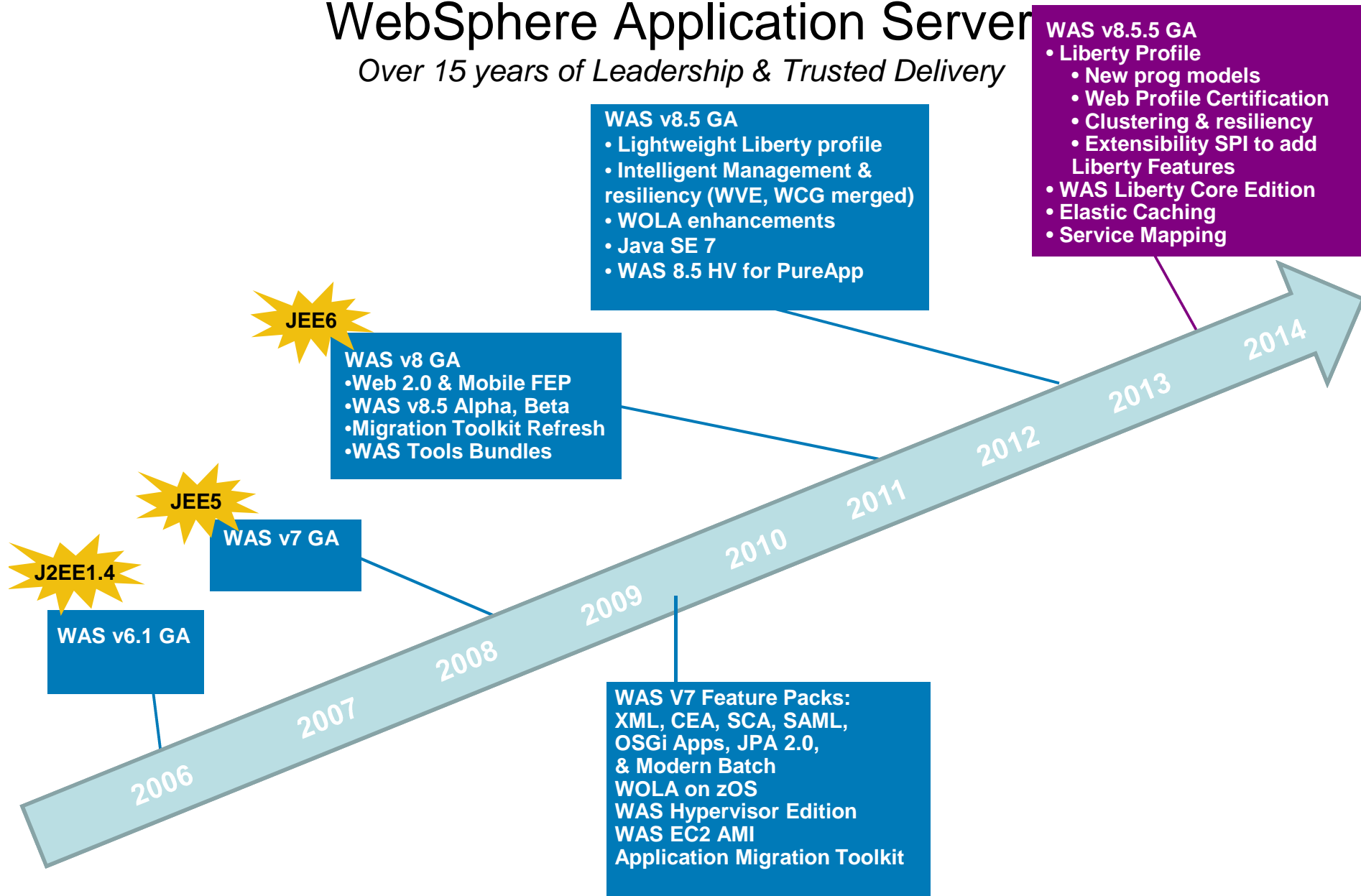


What is WebSphere Application Server?

- **WebSphere Application Server:**
 - Allows you to implement and manage server-side Java components
 - Enterprise JavaBeans, JavaServer Pages, Servlets
 - Is fully Java™ Enterprise Edition (Java EE) compliant
 - Works in conjunction with an HTTP server to provide dynamic web content
 - Express edition is available at **no additional cost** for IBM i customers

WebSphere Application Server

Over 15 years of Leadership & Trusted Delivery



<h3>WAS for Developers</h3>  <p>Tools Edition Liberty and full Profiles +WXS</p> <p>Enables efficient development of innovative apps that will run on WAS in production</p> <p>Available as a no-charge edition for the developer desktop and includes Eclipse adapters</p> <p>Provide WAS and WDT editions as freely available for dev desktops and supported under production runtime licenses</p>	<h3>WAS Hypervisor Edition</h3> <p>Liberty and full Profiles Intelligent Mgmt</p> <p>Optimized to instantly run in VMware, PowerVM, zVM and other server virtualization environments.</p>	<h3>WAS ND</h3>  <p>Tools Edition Liberty and full Profiles Intelligent Mgmt +WXS</p> <p>Delivers near-continuous availability, with advanced performance and intelligent management capabilities, for mission-critical apps. Full entitlement to eXtreme Scale.</p>	<h3>WAS for z/OS</h3> <p>Liberty and full Profiles Intelligent Mgmt +WXS Client</p> <p>Takes full advantage of the z/OS Sysplex to deliver a highly secure, reliable, and resource efficient server experience. Entitlement to eXtreme Scale z/OS client.</p>
<h3>WAS</h3>  <p>Tools Edition Liberty and full Profiles +WXS</p> <p>Provides secure, high performance transaction engine for moderately sized configurations with web tier clustering and failover across up to five application server profiles. Includes entitlement to eXtreme Scale for session caching and DynaCache.</p>			
<h3>WAS Liberty Core</h3>   <p>Liberty Profile Only (Web Profile)</p> <p>A lightweight and low-cost Liberty profile based offering (not full-profile WAS), providing the capabilities to rapidly build and deliver web apps that do not require the full Java EE stack.</p>		<h3>WAS Express</h3>  <p>Liberty and full Profiles</p> <p>A low-cost, ready-to-go solution to build dynamic Web sites & apps, including both Liberty and full-profile WAS.</p>	<h3>WAS CE</h3> <p>An open source-based, small footprint foundation with no up-front acquisition costs.</p>

- ✓ **New WebSphere Application Server Liberty Core edition**
- ✓ **Developer desktop install / support for WAS & WDT with active WAS S&S**

Unmatched combination of Application Server runtime and development experience, from the highly resilient to the lightweight and nimble

Developer Experience	Fit for Purpose App Servers	Operational Excellence
<p>Fast, flexible, and simplified application development</p> <ul style="list-style-type: none"> ▪ Liberty Profile <ul style="list-style-type: none"> ▪ Java EE 6 Web Profile ▪ Web Services ▪ JMS, MDB ▪ EJB Lite, CDI, Managed Beans ▪ NoSQL DB (MongoDB Client) ▪ Support for WebSphere Web Cache (DynaCache) ▪ Asynchronous work management ▪ Pluggable JDK7 Support ▪ Migration Toolkit ▪ Enhanced developer tools ▪ Supported WAS and WDT on developer desktops ▪ OSGi, SCA, SIP, Batch applications 	<p>Choice of server runtimes from highly robust and resilient to lightweight and flexible</p> <ul style="list-style-type: none"> ▪ Application Edition Management ▪ Application Server Health Management ▪ Dynamic Clustering ▪ Intelligent Routing capabilities ▪ System Programming Interface to add custom and third party Liberty features ▪ Liberty profile packaging and install enhancements ▪ New lightweight WebSphere Application Server Liberty Core edition 	<p>Improved Operations, Security, Control & Integration</p> <ul style="list-style-type: none"> ▪ Liberty profile <ul style="list-style-type: none"> ▪ Collective administration ▪ Security enhancements ▪ Performance, problem determination and monitoring ▪ Service Mapping ▪ SIP improvements ▪ Improved Load Balancer for IPV4 and IPV6 ▪ Intelligent management in WebSphere web server ▪ WebSphere Extreme Scale integration

WAS and IBM i support matrix

	V5.1	V6.0	V6.1	V7.0	V8.0	V8.5
IBM i 5.3 Out of service	X	X	X	X		
IBM i 5.4 Out of service	X	X	X	X		
IBM i 6.1		X	X	X	X	X
IBM i 7.1			X	X	X	X
IBM i 7.2					X	X

WebSphere Application Server Liberty Core

Version 8.5.5 introduces WebSphere Application Server Liberty Core, a new lightweight Liberty only WAS edition, enabling Web Profile based applications

- Simple, lightweight and low cost WAS edition
- Liberty profile only (not full-profile WAS)
- Scoped to Web Profile capabilities (Servlet, JSP, JSF, etc)
- For Development and Production deployment
- Ideal for ISVs and enterprise customers wanting lightweight application servers
 - Easily embeddable (zip and go)
 - Extensible via Liberty Extensions SPI
- Applications written for Liberty Core will run on full profile WAS / Liberty
- Clear migration path up the stack to WAS base Liberty and ND Liberty (gaining programming models, management, resiliency, scalability)

WAS Install on IBM i

- WebSphere Application Server V8.0 and higher is installed and managed by IBM Installation Manager (IM) tool.
- There is no IM GUI interface on IBM i platform.
- WebSphere Application Server V8.0 and above can only be installed through command line.
- IBM Web Administration for i provides a GUI interface for WebSphere Application Server to:
 - Install product
 - Uninstall product
 - Update installation with interim fixes or fix pack
 - View interim fixes on the installation
 - Delete interim fixes

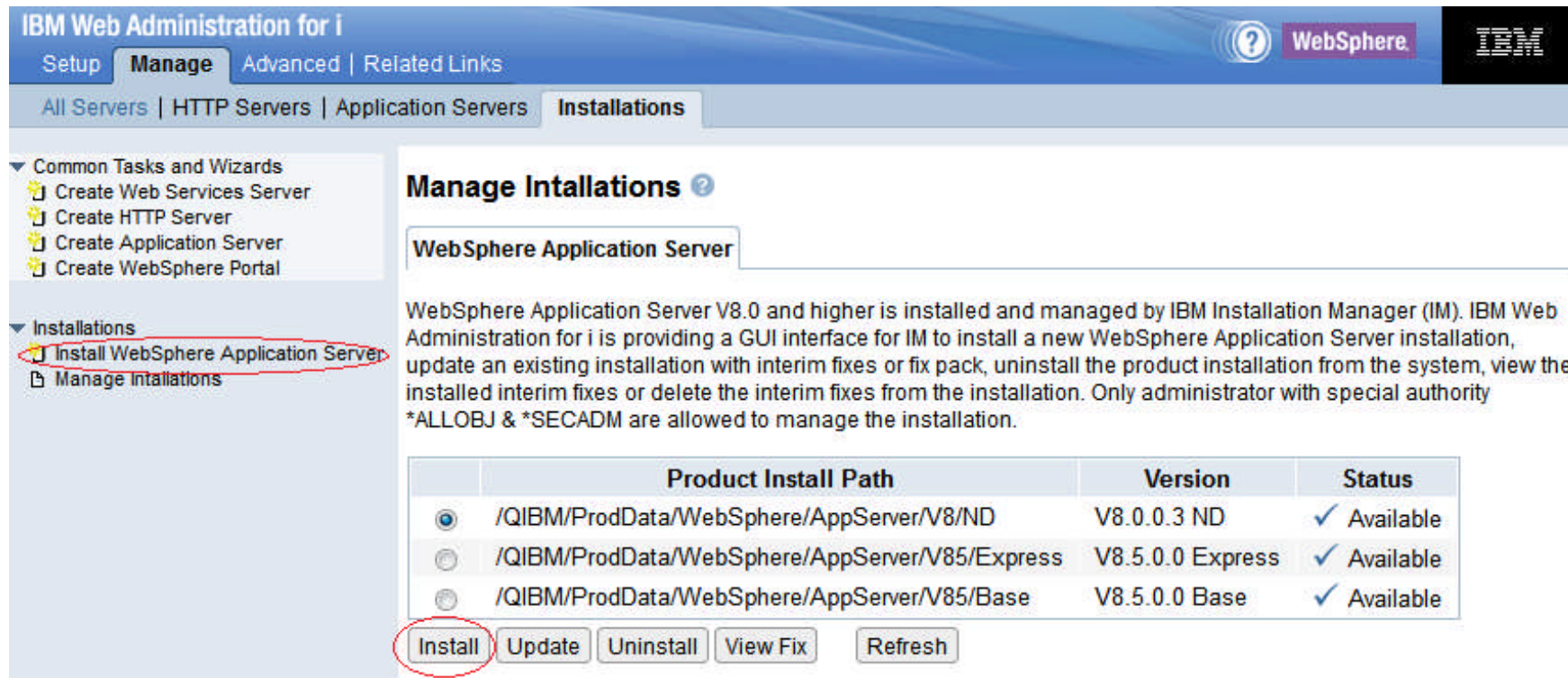


Install WebSphere Application Server

- Install the Installation Manager
 - Required for WebSphere install
 - Will update as required if already installed

<http://hostname:2001/HTTPAdmin>

- Install the WebSphere Application Server binaries

The screenshot shows the IBM Web Administration for i interface. The top navigation bar includes 'Setup', 'Manage', 'Advanced', and 'Related Links'. Below this, there are tabs for 'All Servers', 'HTTP Servers', 'Application Servers', and 'Installations'. The left sidebar contains a tree view with 'Common Tasks and Wizards' and 'Installations'. Under 'Installations', 'Install WebSphere Application Server' is highlighted with a red circle. The main content area is titled 'Manage Installations' and contains a sub-section for 'WebSphere Application Server'. Below this, there is a table listing installed products with columns for 'Product Install Path', 'Version', and 'Status'. The 'Install' button at the bottom of the table is also circled in red.

	Product Install Path	Version	Status
<input checked="" type="radio"/>	/QIBM/ProdData/WebSphere/AppServer/V8/ND	V8.0.0.3 ND	✓ Available
<input type="radio"/>	/QIBM/ProdData/WebSphere/AppServer/V85/Express	V8.5.0.0 Express	✓ Available
<input type="radio"/>	/QIBM/ProdData/WebSphere/AppServer/V85/Base	V8.5.0.0 Base	✓ Available

Install a new product – Install Installation Manager

Install WebSphere Application Server

Install IBM Installation Manager - Step 2 of 6

The wizard requires the IBM Installation Manager tool to complete WebSphere Application Server product installations on IBM i. Specify the installer package location on your local system. The wizard installs the IBM Installation Manager tool when you click next.

Installation Manager Packages

Location: e.g. /home/IIM/, /QOPT/Setup/IIM/OS400/

Click **Next** to install IBM Installation Manager on your system.

- Specify the IM install packages location
- Get the IM packages from physical media or download from IM website:
 - <http://www-01.ibm.com/support/docview.wss?uid=swg24032358>

JVM Improves Java Performance

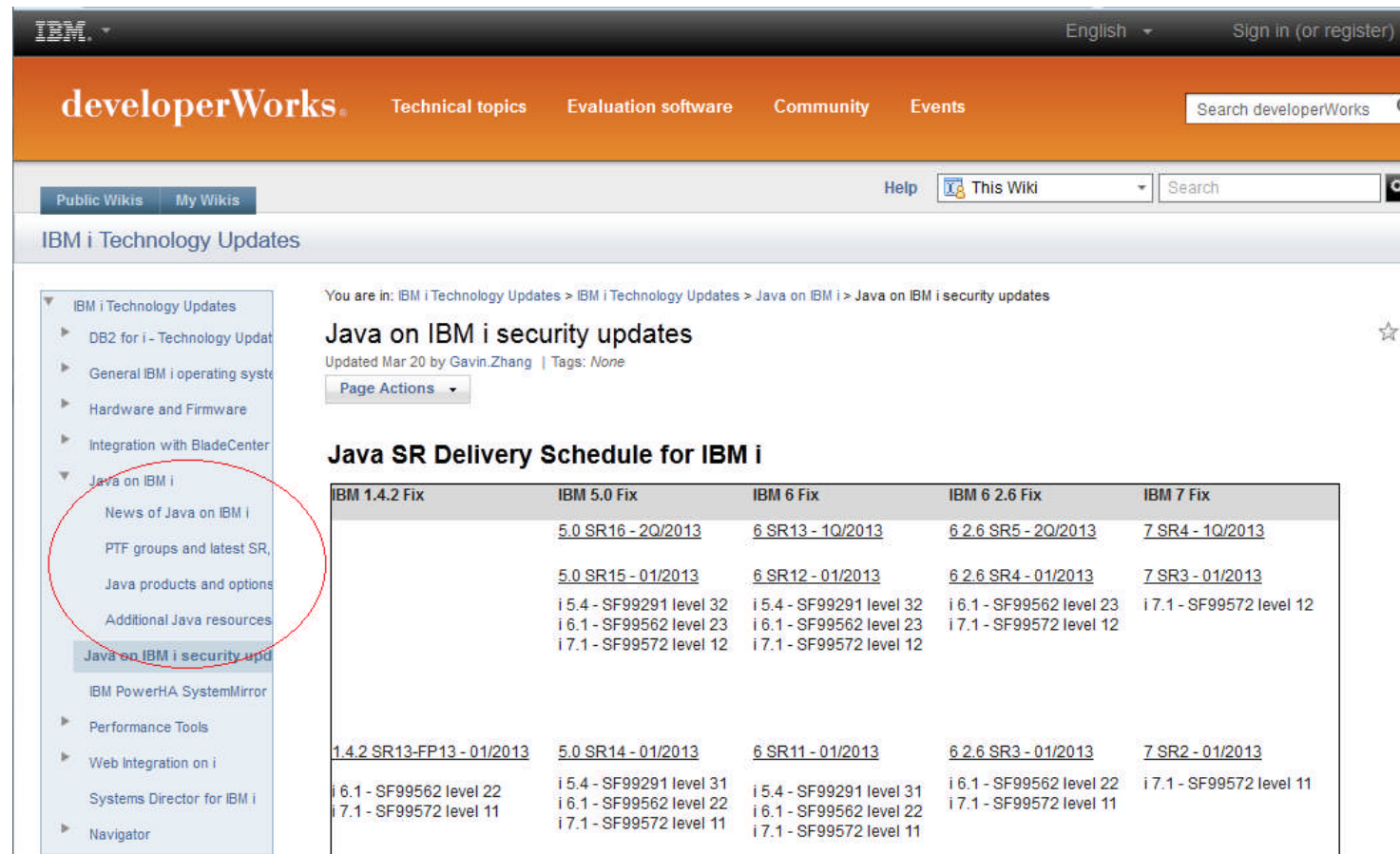
- IBM 32-bit & 64-bit Java™ Virtual Machine
 - Technology shared with AIX, IBM i and Linux
 - Improves performance & portability
- Exceptional Java environment and performance. Built by IBM for Power
 - Fully compatible with other industry standard Java applications
 - Can be called by APIs or directly from other languages
- IBM Java ToolBox for IBM i
 - Pre-coded Java classes to access native IBM i artifacts – files, data queues, etc



Java Security discussion

- Developer Works Java on IBM i
- Page to show delivery of Java SR & CVE solutions
 - What IBM i Java PTF Group

<https://www.ibm.com/developerworks/ibmi/techupdates/java>



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developerWorks Technical topics Evaluation software Community Events

Public Wikis My Wikis Help This Wiki

IBM i Technology Updates

You are in: IBM i Technology Updates > IBM i Technology Updates > Java on IBM i > Java on IBM i security updates



Java on IBM i security updates

Updated Mar 20 by Gavin.Zhang | Tags: None

Page Actions

Java SR Delivery Schedule for IBM i

IBM 1.4.2 Fix	IBM 5.0 Fix	IBM 6 Fix	IBM 6.2.6 Fix	IBM 7 Fix
	5.0 SR16 - 2Q/2013	6 SR13 - 1Q/2013	6.2.6 SR5 - 2Q/2013	7 SR4 - 1Q/2013
	5.0 SR15 - 01/2013	6 SR12 - 01/2013	6.2.6 SR4 - 01/2013	7 SR3 - 01/2013
	i 5.4 - SF99291 level 32 i 6.1 - SF99562 level 23 i 7.1 - SF99572 level 12	i 5.4 - SF99291 level 32 i 6.1 - SF99562 level 23 i 7.1 - SF99572 level 12	i 6.1 - SF99562 level 23 i 7.1 - SF99572 level 12	i 7.1 - SF99572 level 12
1.4.2 SR13-FP13 - 01/2013	5.0 SR14 - 01/2013	6 SR11 - 01/2013	6.2.6 SR3 - 01/2013	7 SR2 - 01/2013
i 6.1 - SF99562 level 22 i 7.1 - SF99572 level 11	i 5.4 - SF99291 level 31 i 6.1 - SF99562 level 22 i 7.1 - SF99572 level 11	i 5.4 - SF99291 level 31 i 6.1 - SF99562 level 22 i 7.1 - SF99572 level 11	i 6.1 - SF99562 level 22 i 7.1 - SF99572 level 11	i 7.1 - SF99572 level 11

JV1 opt	Name	JAVA_HOME	V5R4	i 6.1	i 7.1	i 7.2
6	Classic 1.4	/QIBM/ProdData/Java400/jdk14/	Y	Y	N	N
7	Classic 5.0	/QIBM/ProdData/Java400/jdk15/	Y	Y	N	N
8	IT4J 5.0 32bit	/QOpenSys/QIBM/ProdData/JavaVM/jdk50/32bit	Y	Y	Y	N
9	IT4J 5.0 64bit	/QOpenSys/QIBM/ProdData/JavaVM/jdk50/64bit	N	Y	Y	N
10	Classic 6.0	/QIBM/ProdData/Java400/jdk6	Y	Y	N	N
11	IT4J 6.0 32bit	/QOpenSys/QIBM/ProdData/JavaVM/jdk60/32bit /QOpenSys/QIBM/ProdData/JavaVM/jdk626/32bit	Y	Y	Y	Y
12	IT4J 6.0 64bit	/QOpenSys/QIBM/ProdData/JavaVM/jdk60/64bit /QOpenSys/QIBM/ProdData/JavaVM/jdk626/64bit	N	Y	Y	Y
13	IT4J 1.4 64bit	/QOpenSys/QIBM/ProdData/JavaVM/jdk14/64bit	N	Y	Y	N
14	IT4J 7.0 32bit 	/QOpenSys/QIBM/ProdData/JavaVM/jdk70/32bit /QOpenSys/QIBM/ProdData/JavaVM/jdk71/32bit	N	N	Y	Y
15	IT4J 7.0 64bit 	/QOpenSys/QIBM/ProdData/JavaVM/jdk70/64bit /QOpenSys/QIBM/ProdData/JavaVM/jdk71/64bit	N	N	Y	Y
16	IT4J 8.0 32bit	/QOpenSys/QIBM/ProdData/JavaVM/jdk80/32bit	N	N	Y	Y
17	IT4J 8.0 64bit	/QOpenSys/QIBM/ProdData/JavaVM/jdk80/64bit Not released yet	N	N	Y	Y

Note: Words in blue are still in plan and subject to change without notice.

Application Serving on IBM : Java-based

WAS 
(WebSphere Application Server)

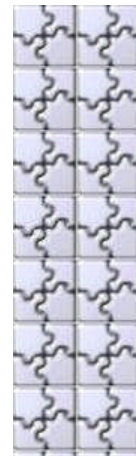


Tomcat



WebSphere Liberty Profile

Integrated Web Application Server
Based on Liberty

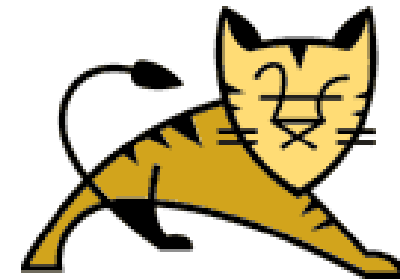


Liberty vs Tomcat

	Tomcat	Liberty
Size	<20M	<50M
Startup speed	1~3s	<5s
Java EE	JSP 2.2, Servlet 3.0, JSTL 1.2, need to add jar for other standard support	JSP 2.2, Servlet 3.0, JSF 2.0, JSTL 1.2, JPA 2.0, JDBC 4.0, JAX-RS 1.0, JNDI 1.0, Bean Validation 1.0, SSL 1.0, Security 1.0, Web Security 1.0, JMX 1.0 Can add or remove feature dynamically
OSGi support	No	Yes, support Blueprint 1.0, WAB 1.0
Dev tool	Eclipse	Eclipse, Rational Developer
Performance	Normal	Core is same to WebSphere Application Server, good performance
App hot deployment	Yes	Yes
Configuration	Multiple configuration files. Need to restart after configuration update	Single configuration. Configuration update is loaded immediately. No need restart
Migration	Can move to WebSphere Application Server by IBM Application Migration Toolkit	Programming model is same to WebSphere Application Server. Can run on WebSphere Application Server directly
Documentation	Less document from official web site but many documents from internet	http://wasdev.net , lots of documents, video, examples. Can communicate with developer directly

Introduction – Tomcat

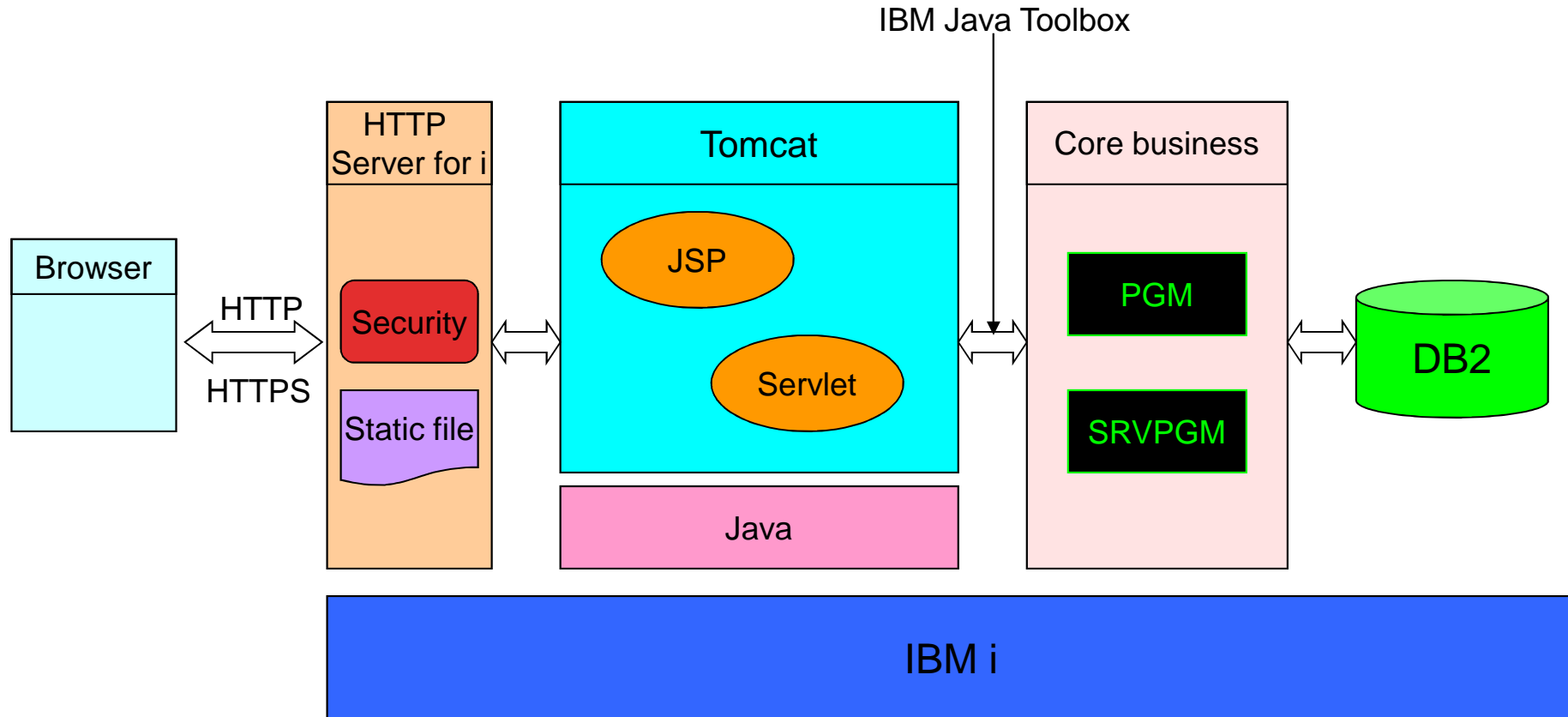
- An open source project by Apache.
- Open source implementation of Java Servlet (Version 3.0) and Java Server Page (Version 2.2)
- Widely used in Java EE world.
- Easy to deploy and use.
- IBM i does not provide native support now, not a license program on IBM i 6.1 and newer
- **Can be integrated into IBM i to power your business easily!!!**



<http://tomcat.apache.org/>



Integrate IBM i business with Tomcat



How to Enable on IBM i – Steps

- Step1: Download the latest Tomcat from Apache web site.
 - <http://tomcat.apache.org/download-70.cgi>
- Step2: Unzip Tomcat distribution file to your directory.
- Step3: Add JAVA_HOME environment variable export in Tomcat configuration file
<install dir>/bin/setclasspath.sh



```
# -----  
# Set JAVA_HOME or JRE_HOME if not already set, ensure any provided settings  
# are valid and consistent with the selected start-up options and set up the  
# endorsed directory.  
#  
# $Id: setclasspath.sh 1202062 2011-11-15 06:50:02Z mturk $  
# -----  
export -s JAVA_HOME=/QOpenSys/QIBM/ProdData/JavaVM/jdk60/32bit/  
# Make sure prerequisite environment variables are set  
if [ -z "$JAVA_HOME" -a -z "$JRE_HOME" ]; then  
# Bugzilla 37284 (reviewed).
```

How to Enable on IBM i – Steps

- Step4: Start Tomcat!!!
 - Run <Install dir>/bin/startup.sh

```
> cd /home/download/apache-tomcat-7.0.28/bin
$
> ./startup.sh
Using CATALINA_BASE:   /home/download/apache-tomcat-7.0.28
Using CATALINA_HOME:   /home/download/apache-tomcat-7.0.28
Using CATALINA_TMPDIR: /home/download/apache-tomcat-7.0.28/temp
Using JRE_HOME:        /QOpenSys/QIBM/ProdData/JavaVM/jdk60/32bit/
Using CLASSPATH:       /home/download/apache-tomcat-7.0.28/bin/bootstrap.jar:
/home/download/apache-tomcat-7.0.28/bin/tomcat-juli.jar
$
```

```


QINTER      QSYS      SPD      Q          DEQW
+QPADEV000B YANGCP      COMMAND      DSPW
QPADEV000C YANGCP      QSH           DEQW
+QPADEV0002 YANGCP      INT           DEQW
QPADEV0009 YANGCP      INT           CMD-WRKTACTJOB RUN
QPOZSPWT    YANGCP      BCI           2.2 JVM-org.apache TIMW
QZSHSH      YANGCP      BCI           .0 PGM-QZSHSH    TIMW
QZSHSH      YANGCP      BCI           .0 PGM-QZSHSH    TIMW

```

Tomcat Job!

- Step5: Access Tomcat sample web app
 - <http://your.server.name:8080/manager>



The Apache Software Foundation 

Tomcat Web Application Manager

Message: OK

Path	Version	Display Name	Running	Sessions	Commands
/	None specified	Welcome to Tomcat	true	0	Start Stop Reload Undeploy
HTTP_Tomcat_Business	None specified	T1	true	0	Start Stop Reload Undeploy
TomcatTestServlets	None specified	TomcatTestServlets	true	0	Start Stop Reload Undeploy
docs	None specified	Tomcat Documentation	true	0	Start Stop Reload Undeploy
examples	None specified	Servlet and JSP Examples	true	0	Start Stop Reload Undeploy
manager	None specified	Tomcat Host Manager Application	true	0	Start Stop Reload Undeploy
resources	None specified	Tomcat Resources	true	0	Start Stop Reload Undeploy



How to Enable on IBM i – More information

- Reference DW WW article “Running your IBM i Web Solution on ASF Tomcat” for more information about Tomcat enablement on IBM i
 - Create CL commands for start/stop Tomcat.
 - Run Tomcat in its subsystem.
 - More customization.

URL

<http://www.ibm.com/developerworks/ibmi/library/i-websolution-asf-tomcat/index.html>

Application Serving on IBM i



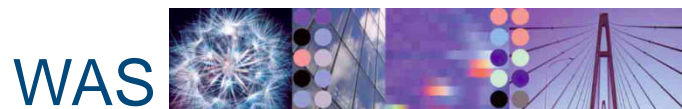
Ruby on Rails



Apache
HTTP Server & CGI



PHP on IBM i



(WebSphere Application Server)

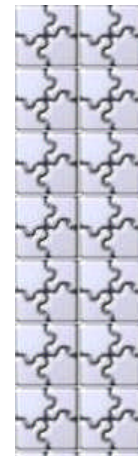


Tomcat



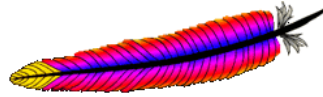
WebSphere Liberty Profile

Integrated Web Application Server
Based on Liberty



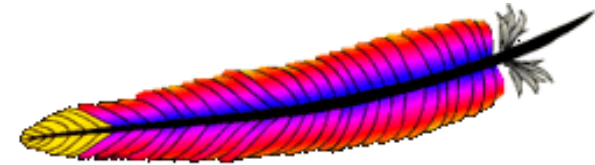
Introduction – IBM HTTP Server for i

- A secure, efficient, powerful, highly configurable, scalable and extensible server that provides HTTP services
- Powered by Apache HTTP Server
 - i 5.4: Powered by Apache 2.0.63
 - i 6.1 & i 7.1: Powered by Apache 2.2.11
 - i 7.2: Powered by Apache 2.4.4
- IBM HTTP Server for i is PCI Compliant Web server
 - Known Apache security vulnerabilities are patched via. PTF's on IBM i.
 - Web page: http://www-03.ibm.com/systems/i/software/http/product/pci_compliance.html



Why Apache HTTP server?

- Most popular Web server in the industry
 - 420 million Internet servers (as of April 2012) (Source, [Netcraft](#)).
- Secure transactions
- Easily maintainable
 - Many Apache skills available in the market
- Highly configurable
- Easy to use GUI to configure your servers
- Powerful - Runs the very simple site to the most complex site equally well
- Scalable - The Server handles the small usage site to the well traveled Web sites
- Payment Card Industry (PCI) Compliant



History of Apache on IBM i

- IBM i was the first IBM platform to deliver Apache 2.0 - over 13 years ago
- IBM i 6.1 & 7.1 based on Apache 2.2
 - Several mid release updates to new point releases within Apache 2.2
 - Continual update of ALL security related patches
- IBM i 7.2 based on Apache 2.4
 - Many changes and new ways of doing things
 - Requires a release boundary, otherwise existing application will fail!

What is PCI Compliance?

- Definition:
 - The Payment Card Industry Data Security Standard (PCI DSS) is a set of specific security standards designed to ensure that **ALL** companies that **process, store** or **transmit** credit card information maintain a secure environment during and after a financial transaction.
 - Adhering to the specific security standards documented in the PCI DSS make something PCI compliant.
 - <https://www.pcisecuritystandards.org/>
- The IBM HTTP Server for i is PCI Compliant Web server.
 - Known Apache security vulnerabilities are patched via. PTF's on IBM i.
 - Web page: http://www-03.ibm.com/systems/i/software/http/product/pci_compliance.html



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IBM Systems > Power Systems > Software > IBM i > HTTP Server >

HTTP Server for IBM i

PCI compliance

The Payment Card Industry Data Security Standard (PCI DSS) is a set of specific security standards designed to ensure that all companies that process, store or transmit credit card information maintain a secure environment during and after a financial transaction.

Adhering to the specific security standards documented in the PCI DSS make something PCI compliant.


The IBM HTTP Server for i is PCI Compliant Web server. Known Apache security vulnerabilities are patched via. PTFs on IBM i.

[↓ IBM i 7.1: Apache security vulnerabilities](#)
[↓ IBM i 6.1: Apache security vulnerabilities](#)
[↓ IBM i 5.4: Apache security vulnerabilities](#)

IBM i 7.1: Apache security vulnerabilities:

Common vulnerabilities and exposures	Description	Severity	Status on IBM i	PTF(s)
↔ CVE-2014-0098	mod_log_config crash	low	Fixed	SI52916
↔ CVE-2013-6438	mod_dav crash	moderate	Fixed	SI52602
↔ CVE-2013-1896	mod_dav crash	moderate	Fixed	SI50824
↔ CVE-2013-1862	mod_rewrite log escape filtering	low	Fixed	SI50403
↔ CVE-2012-4558	A XSS flaw affected the mod_proxy_balancer manager interface.	moderate	Fixed	SI49746
↔ CVE-2012-3499	Various XSS flaws due to unescaped hostnames and URIs HTML output	low	Fixed	SI49746
↔ CVE-2012-4557	mod_proxy_ajp remote DoS	low	Not Applicable	Not Applicable

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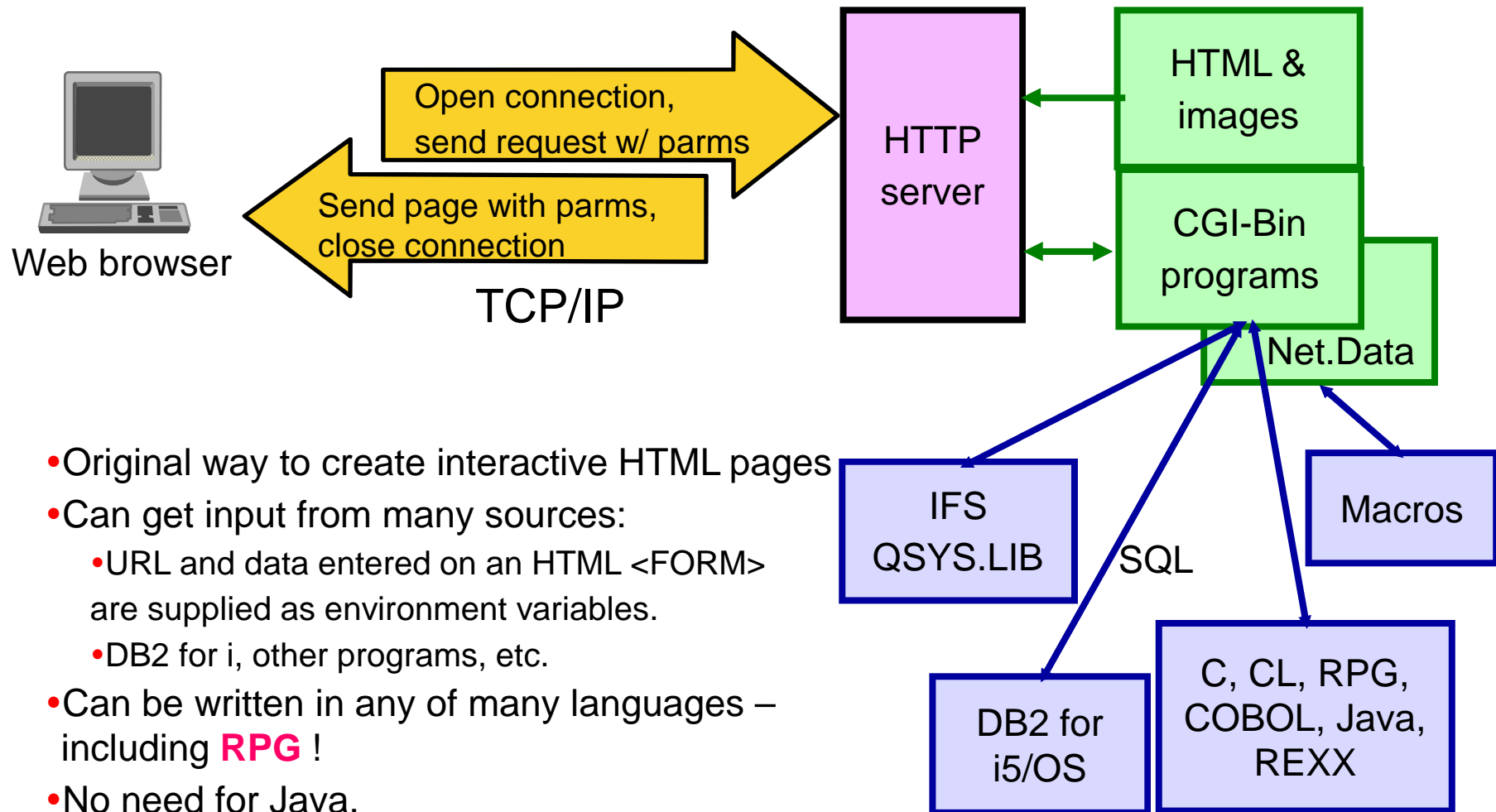
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- [→ Resources](#)
- [→ Frequently asked questions](#)

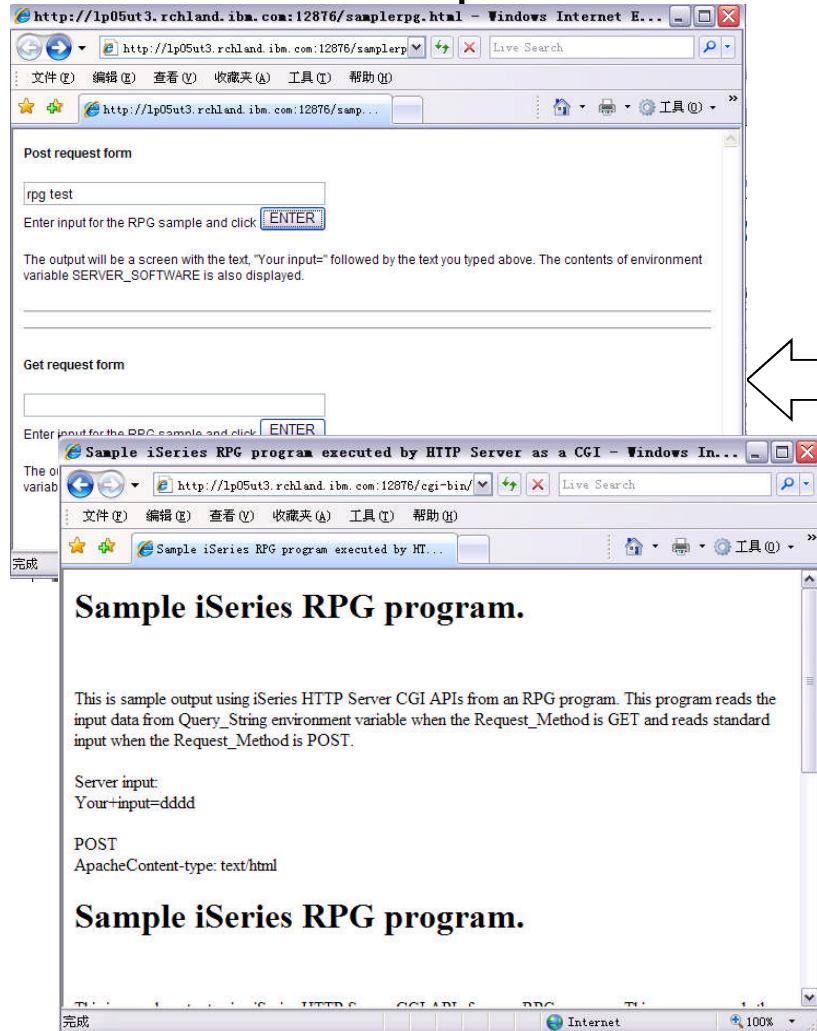
<http://www-03.ibm.com/systems/power/software/i/http/support/pci-compliance.html>

Running Your Business with CGI on HTTP Server



- Original way to create interactive HTML pages
- Can get input from many sources:
 - URL and data entered on an HTML <FORM> are supplied as environment variables.
 - DB2 for i, other programs, etc.
- Can be written in any of many languages – including **RPG** !
- No need for Java.
- More proprietary, not as scalable

RPG CGI Example



The screenshot shows a web browser window with a 'Post request form' containing the text 'rpg test'. Below it, a second browser window displays the output of the RPG program, titled 'Sample iSeries RPG program executed by HTTP Server as a CGI'. The output text is as follows:

```

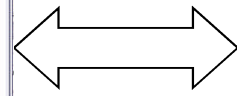
Sample iSeries RPG program.

This is sample output using iSeries HTTP Server CGI APIs from an RPG program. This program reads the
input data from Query_String environment variable when the Request_Method is GET and reads standard
input when the Request_Method is POST.

Server input:
Your+input=dddd

POST
ApacheContent-type: text/html

Sample iSeries RPG program.
    
```



```

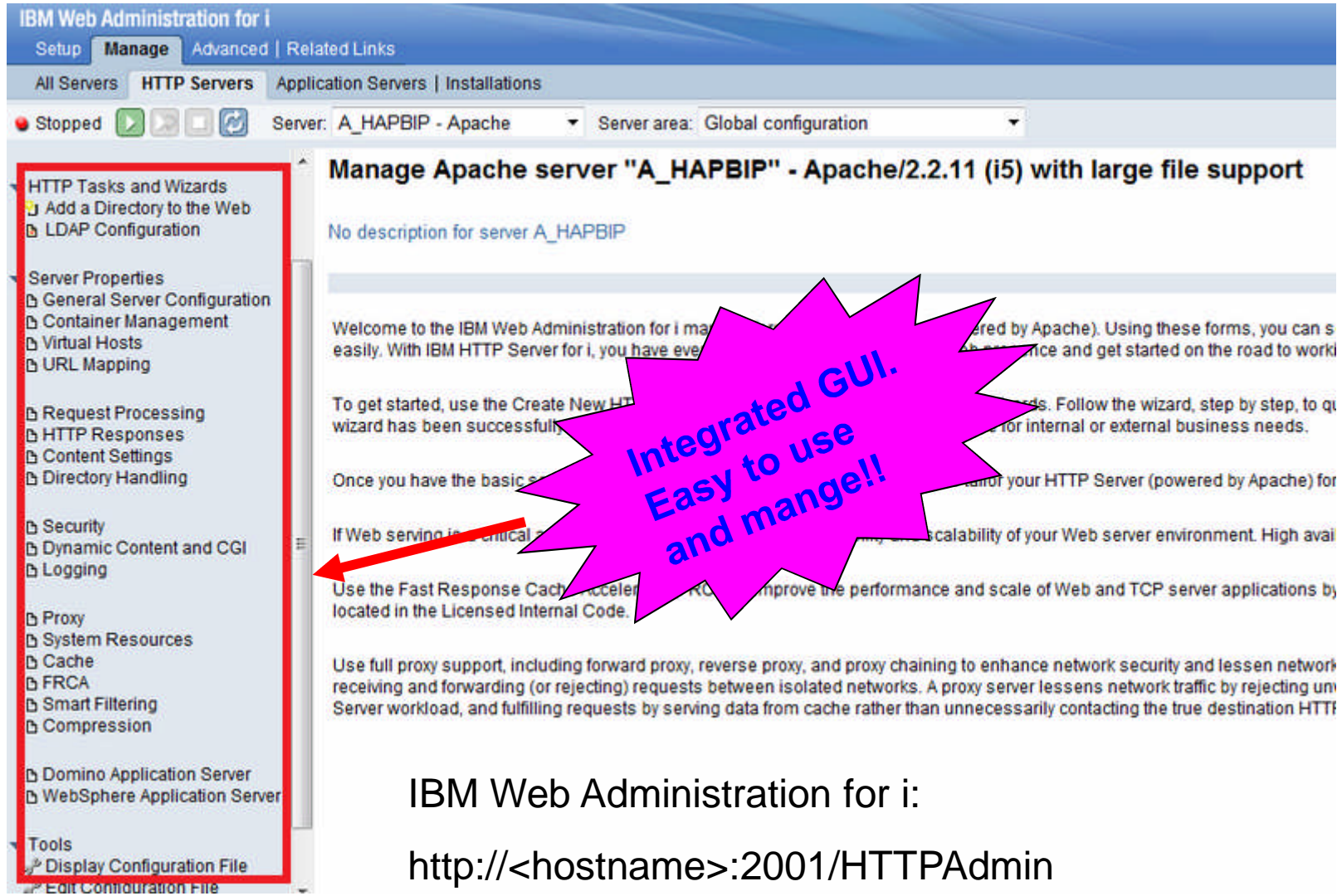
*****
* Initialize error code structure for error ids.
* This allows for 7 bytes in QUSEI for error message id.
C      Z-ADD      16      QUSEPRV
*****
**** Read the Environment variable, REQUEST_METHOD.
*****
C      MOVEVL      EnvMethod      EnvName
C      Z-ADD      14      EnvNameLen
C      callb      APIGetEnv
C      parm
C      parm      EnvRec
C      parm      EnvRecLen
C      parm      EnvLen
C      parm      EnvName
C      parm      EnvNameLen
C      parm      QUSEC
C      MOVEVL      EnvRec      EnvMResp
*****
**** Is the REQUEST_METHOD, POST?
C      4      subst      EnvRec:1      EResp
C      EResp      ifeq      'POST'
*****
* Get Environment Variable 'Content_Length' using
C      MOVEVL      EnvCL      EnvName
C      Z-ADD      14      EnvNameLen
C      CALLB      APIGetEnv
C      parm
C      parm      EnvRec
C      parm      EnvRecLen
C      parm      EnvLen
C      parm      EnvName
C      parm      EnvNameLen
C      parm      QUSEC
* Convert Content_Length to numeric.
C      eval      ContentLn=c2n(EnvRec : EnvLen)
* When the Content Length is greater than the buffer, Read maxdataLn.
C      ContentLn      ifgt      maxdataLn
C      Z-ADD      maxdataLn      ContentLn
C      endif
* Specify InDataLn to Content_Length value. Never should a CGI program
* ever attempt to read more than content length. Specification of more
* than content length in InDataLn is not defined.
C      Z-ADD      ContentLn      BufInLn
*****
* Read standard input
C      callb      APIStdIn
C      parm
C      parm      BufInLn
C      parm      StdInLn
C      parm      QUSEC
C      MOVEVL      StdInLn      Result
C      else
*****
**** Read the Environment variable, QUERY_STRING.
*****
C      MOVEVL      EnvQS      EnvName
C      Z-ADD      12      EnvNameLen
C      callb      APIGetEnv
C      parm
C      parm      EnvRec
C      parm      EnvRecLen
C      parm      EnvLen
C      parm      EnvName
C      parm      EnvNameLen
C      parm      QUSEC
    
```



More Information:

http://www-03.ibm.com/systems/i/software/http/examples/samplerpg/rpg_demo.html

GUI Management Tool



The screenshot displays the IBM Web Administration for i interface. The top navigation bar includes 'Setup', 'Manage', 'Advanced', and 'Related Links'. Below this, there are tabs for 'All Servers', 'HTTP Servers', 'Application Servers', and 'Installations'. The current server is identified as 'A_HAPBIP - Apache' with a 'Server area' of 'Global configuration'. The main content area is titled 'Manage Apache server "A_HAPBIP" - Apache/2.2.11 (i5) with large file support'. A left-hand sidebar contains a tree view of configuration options, including 'HTTP Tasks and Wizards', 'Server Properties', 'Security', 'Proxy', and 'Tools'. A prominent pink starburst graphic with the text 'Integrated GUI. Easy to use and manage!!' is overlaid on the main content area, with a red arrow pointing to the sidebar.

IBM Web Administration for i:
<http://<hostname>:2001/HTTPAdmin>

Application Serving on IBM i



Ruby on Rails



Apache

HTTP Server & CGI



PHP on IBM i

WAS



(WebSphere Application Server)

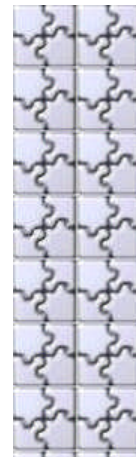


Tomcat

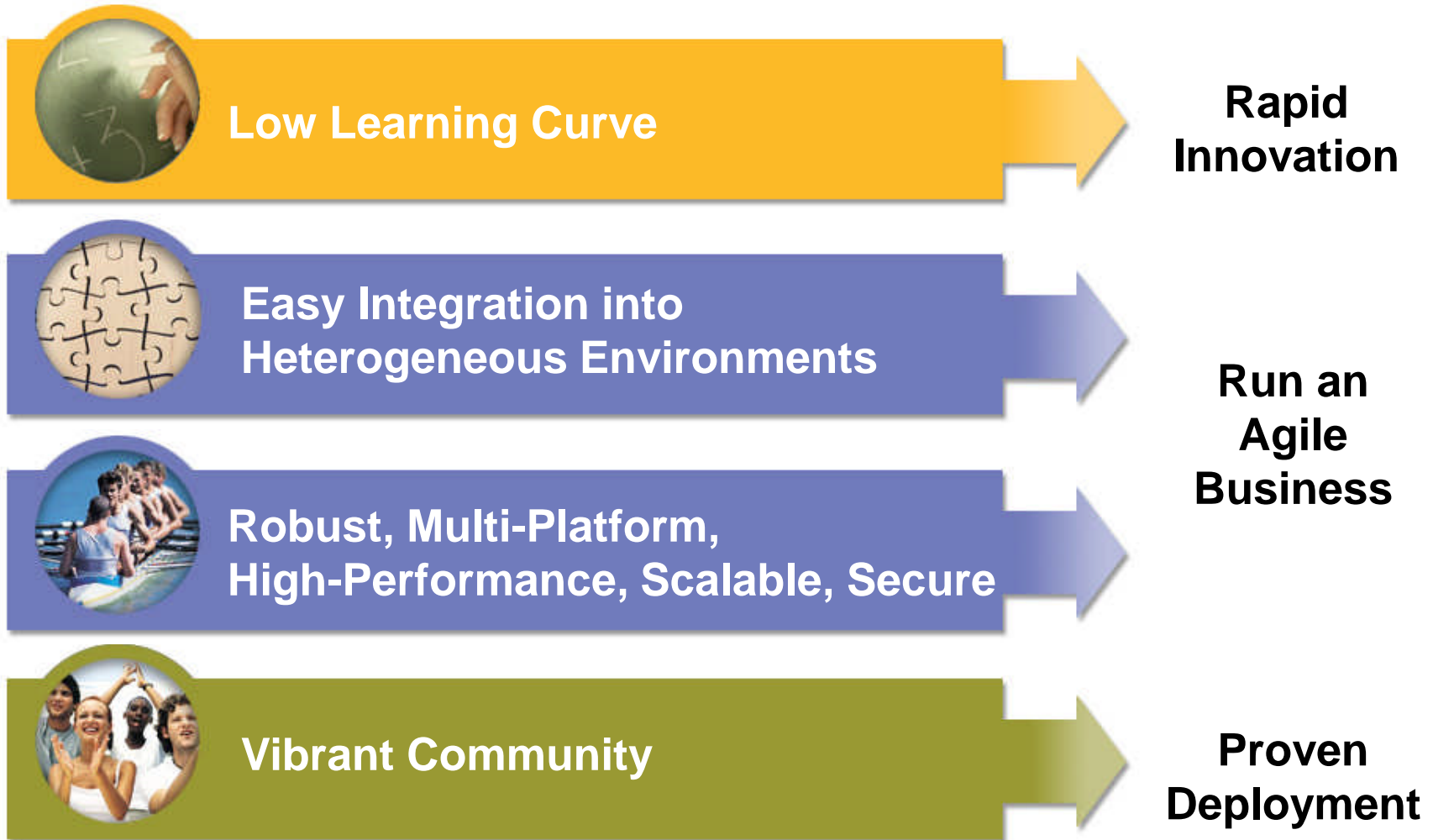


WebSphere Liberty Profile

Integrated Web Application Server
Based on Liberty



Why PHP?



Open Source Solutions for i

- **Zend Server Community Edition for i**
 - Preloaded with IBM i 7.1, 6.1, 5.4
- **Zend Server for i**
 - Provides advanced functions
 - Available from IBM with advanced support offerings
- **Zend Studio for i**
 - Eclipse-based development environment
 - Available with one year of Silver support from Zend for no additional charge
- **Zend DBi**
 - MySQL implementation for IBM i
 - DB2 Storage Engine



Zend DBi - Available for i 5.4 and newer

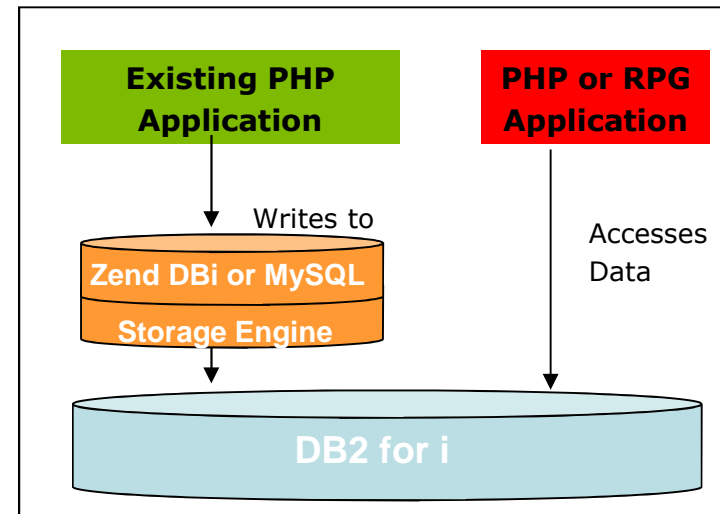
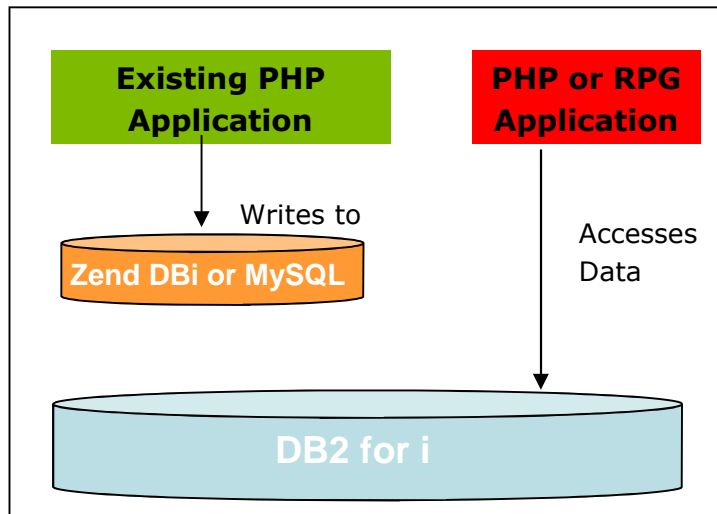


MySQL

- Based on MySQL source code
- Provides support for Open Source based applications

DB2 Storage Engine for PHP

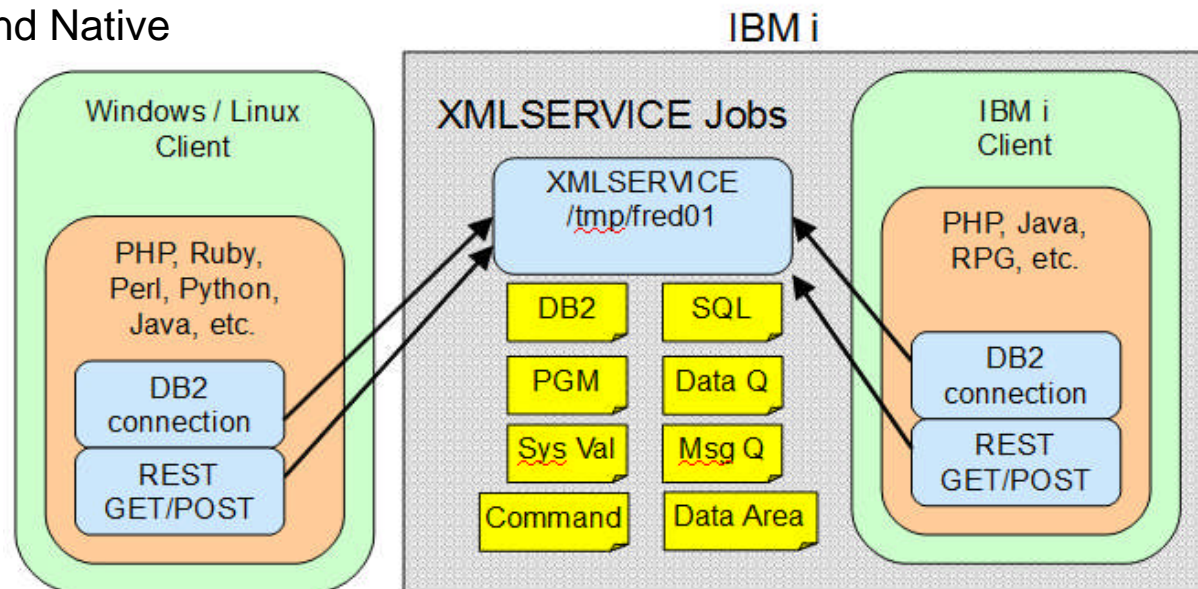
- Supporting open source applications while simplifying data management
Application uses MySQL data commands against Zend DBi or MySQL database;
storage engine translates the commands and passes to DB2 for i



PHP Integration with i – XML Service

Easy access to IBM i data and resources from PHP
(similar to IBM ToolBox for Java)

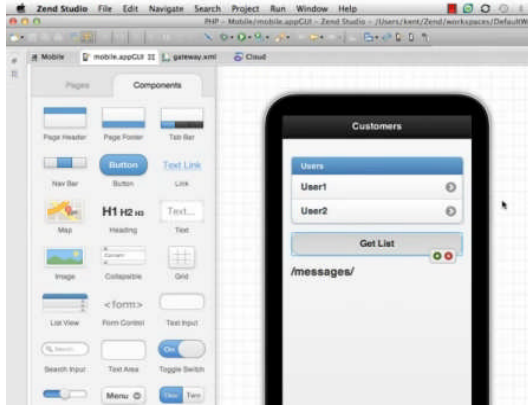
- DB2 for i – SQL and Native
- Program call
- Procedure call
- Data Area
- Data Queue
- Message Queue
- Commands
- System values
- Spool files



- Local or Remote access

Quickly & Easily Create Mobile Solutions for IBM i Applications

Zend Studio



- Drag & Drop interface to create mobile applications
- Tie mobile apps directly to your native IBM i objects (RPG programs, DB2, etc)
- Single development location
 - Creating mobile app
 - Create integrating restful web service
 - Tie to IBM i native toolkit
 - PHP application to drive the interactions

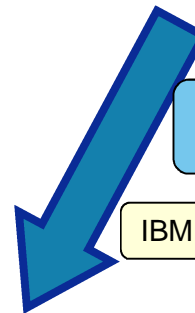


Create mobile apps ready to deploy to app market places!

Mobile App Marketplace



iOS, Android, Windows Phone, & more



Zend Server 6
PHP Rest Web Services

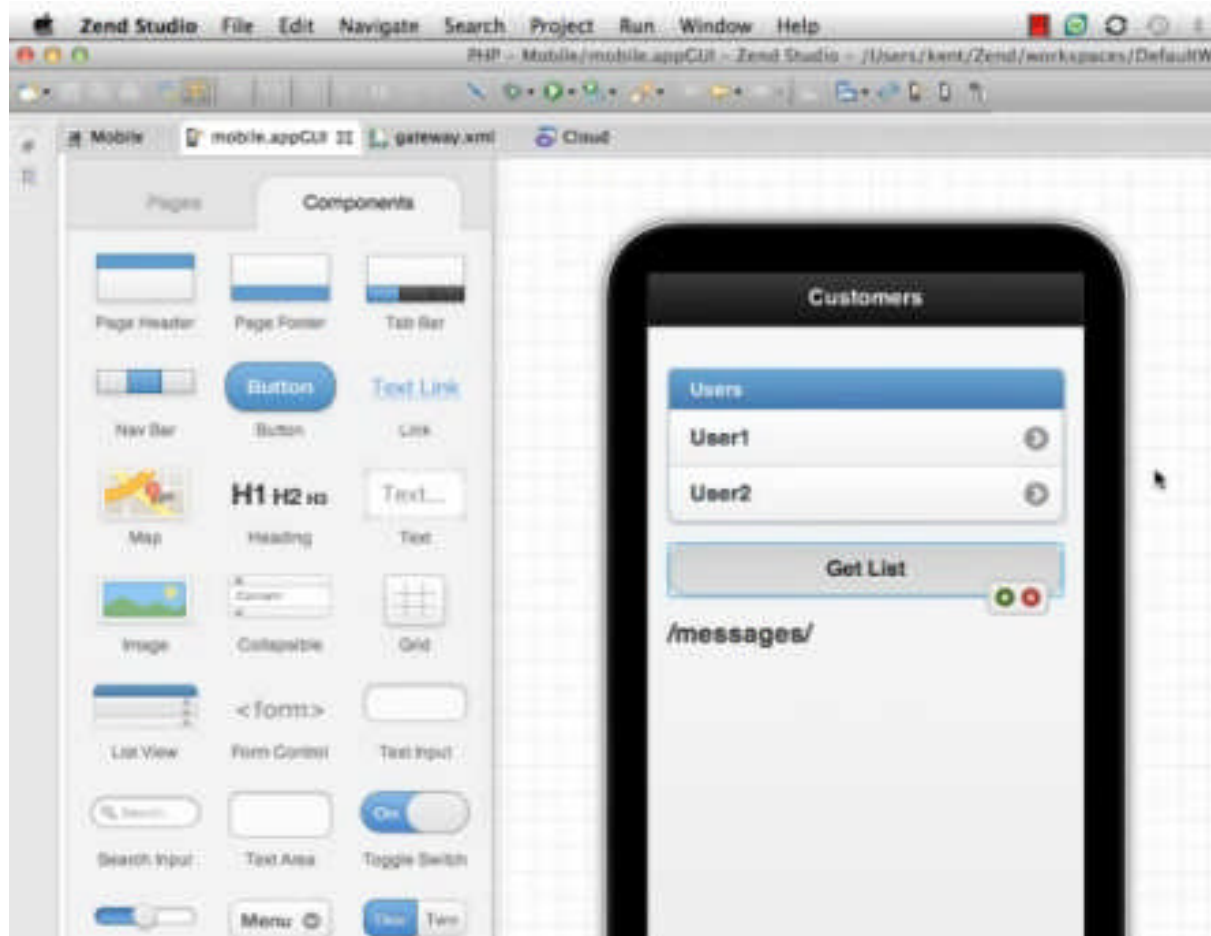
IBM i XML Service



- Mobilize your RPG & COBOL applications
- XML Service ties your Mobile application to your IBM i native objects
- Mobile solutions for the IBM i shop!

Zend Server 6

<http://www.youtube.com/watch?v=t4nmRO9-gN4&feature=plcp>



Application Serving on IBM i



Ruby on Rails



Apache

HTTP Server & CGI



PHP on IBM i

WAS



(WebSphere Application Server)

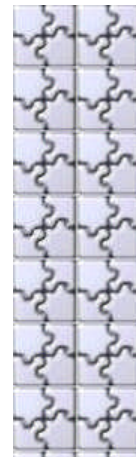


Tomcat



WebSphere Liberty Profile

Integrated Web Application Server
Based on Liberty





- What is PowerRuby?
 - Freely available and commercially supported port of the Ruby language
 - Includes supporting infrastructure (i.e. Rails) for running Ruby web applications on IBM i
 - Available for download from PowerRuby.com
 - Includes native DB2 database driver – MySQL not necessary
 - Integrates with XMLSERVICE for access to IBM i programs and objects
- Components
 - Ruby 2.0.0 and 1.9.3 (MRI implementation, a.k.a CRuby)
 - `ibm_db` (IBM supported - <http://rubyforge.org/projects/rubyibm/>)
 - Apache + Thin ← the web server stack (more Ruby app servers options coming)
 - Rails 3.2.x and 4.0.0 (CoffeeScript support in the works)
- Learn more
 - PowerRuby.com for updates and news
 - twitter.com/rubyonpower

Who uses Ruby On Rails?*



**builtwith.com and rubyonrails.org used for references

What is Ruby?

... a dynamic, open source programming language with a focus on simplicity and productivity. It has an elegant syntax that is natural to read and easy to write.



quick and easy:

- variable declarations are unnecessary
- variables are not statically typed
- syntax is simple and consistent
- memory management is automatic
- Est 1995
- Mass acceptance 2006
- Very active and well organized community

object oriented programming:

- everything is an object
- classes, methods, inheritance, etc.
- singleton methods
- iterators and closures

ruby-lang.org – Home website

ruby-doc.org/docs/ProgrammingRuby - Traditional learning

codecademy.com - Learn Ruby in the browser for free



What is Rails?

... an open-source web framework written in the Ruby language that's optimized for programmer happiness and sustainable productivity. It lets you write beautiful code by favoring **convention over configuration**.

Provides mechanisms for simplifying many common tasks of web development including

- DB access
- Routing requests
- Separation of concern (MVC, "helpers", mailers, presenters)
- Unit testing
- Really, too many benefits to list.



RubyOnRails.org – Framework home

EdgeGuides.RubyOnRails.org/getting_started.html – Quick learning from the creators

RailsCasts.com - Excellent video resource

TeamTreehouse.com - Comprehensive Ruby/Rails/HTML/CSS/Javascript training

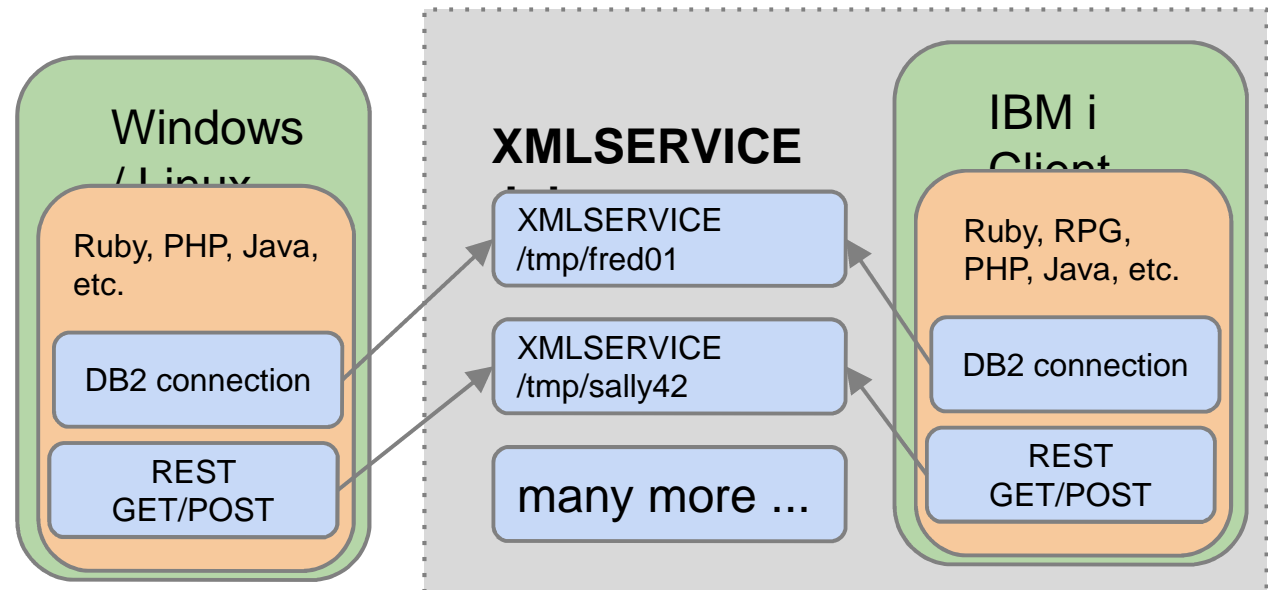


"Rails", "Ruby on Rails", and the Rails logo are registered trademarks of David Heinemeier Hansson. All rights reserved.

Ruby Integration with i - XML Service (similar to IBM ToolBox for Java)

IBM i 7.1: TR5

- DB2 for i – SQL and Native
- Program call
- Procedure call
- Data Area
- Data Queue
- Message Queue
- Commands
- System values
- Spool files



YoungiProfessionals.com/wiki/XMLSERVICE (a.k.a. YiPs)

Application Serving on IBM i



Ruby on Rails



Apache

HTTP Server & CGI



PHP on IBM i

WAS



(WebSphere Application Server)

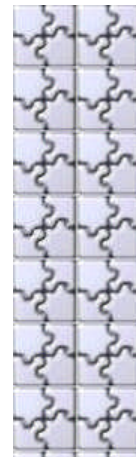


Tomcat



WebSphere Liberty Profile

Integrated Web Application Server
Based on Liberty



Questions?

Thank
YOU

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