WebSphere for Dummies …

AI Grega
IBM Software Offerings Manager for System i
algrega@us.ibm.com

Agenda

- The First Application Server
- What is WebSphere?
- The WebSphere Product Family on System i5
- Q & A
AS/400… The First Application Server …

• Younger than PC technology and able to run multiple workloads on a single Server
• Serving thousands of Users on a Single Machine
• Ran 2000+ RPG and COBOL Applications the first Day!

The AS stood for Application System

Later the next Decade (mid-late 90’s) …

• Sun Microsystems create Java and developers begin to write Applets
• The Web Application Server is created and Servlets did the heavy lifting
• PC Clients could now be thin

What could be missing…

View

Controller

Model

PC Client

JSP’s

WebSphere

Software

Servlets

Database

Legacy & ERP

JDBC
What is WebSphere?

In the Beginning
Point Products
Base Application Server

WebSphere Application Server
Application Server
Java Servlet Engine
HTTP Server
Database Connector
Load Balancing
Performance Pack
Caching
File Replication
Application Services

WebSphere software

Then came
Extend, Integrate and Optimize your Business

Extend your reach
Integrate your people, processes and information
Optimize your application infrastructure

WebSphere software
What is WebSphere?

- WebSphere Started as a Web Application Server in 1998
- In 2000 IBM Launched “It’s a Different Kind of World, You need a Different Kind of Software” and the WebSphere Brand was created
- In 2002 WebSphere Application Server surpassed BEA with the highest “Market Share” for Web Application Servers

Like any new building project you start with the Foundation…

**WebSphere Application Server**

*is the Foundation for running Java Applications*
Why use a WebSphere Application Server?

- **Needs?**
  - You have Java Stuff to Run
  - You want to keep your Options Open
  - You want the option for High Availability

- **WebSphere Products?**
  - WebSphere Application Server Express (WAS)
  - WebSphere Application Server Network Deployment (WAS ND)

- **Why System i5?**
  - Because it’s In there!
  - You can try it out right away with useful applications

### WebSphere Application Server Express

- Included with i5/OS
- It’s designed to Install in minutes on i5/OS
- It supports the latest J2EE Framework for developing new Applications
- It’s a place to run your Java Stuff
- It’s services that provide access to your Data (JDBC)
- It’s Administration to Manage your Applications
- It’s a foundation for other WebSphere Products
Web Performance Monitor for i5/OS

Available with V5R4 and latest HTTP Server PTF’s

Monitor response time and resource usage

What’s new in Web Administration for i5/OS – Web Performance Advisor

i5/OS Exclusive
WebSphere Application Server Network Deployment

Provides HA for Java Apps!
Cloning! Fail Over! Clustering!

WebSphere Application Server Express
http://www.ibm.com/software/webservers/appserv/express/

- WebSphere Application Server – Express v6 now available with every i5 and upgrade to i5/OS V5R3
  - Maintenance now part of Software Subscription
- IBM Business Solutions
  - Tightly integrated with i5/OS since V5R3
  - Delivered as a no charge LPP: 5722-BZ1
  - Includes:
    1. New IBM Welcome Page
    2. Survey Creator application,
    3. The IBM Telephone Directory
Do you Buy or Do You Build?

**WebSphere Development Studio Client**
*If you have a compiler you already have this*

Or

*Are entitled to it!*

Buy [ ] OR [ ] Build

---

Why use WebSphere Development Studio Client?

- **Needs?**
  - You want one tool to edit everything
  - You want to make the old stuff look new
  - You need to keep up with the new stuff coming

- **WebSphere Products?**
  - WebSphere Development Studio Client, WebSphere Development Studio Client Advanced Edition

- **Why System i5?**
  - You most likely have it already!
### WebSphere Development Studio Client V7.0

Bundled with WebSphere Development Studio for iSeries (5722-WDS)

#### Host compilers
- C/C++
- COBOL
- RPG
- ADTS

<table>
<thead>
<tr>
<th>Functionality</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WebSphere Development Studio Client v7.0</td>
<td>Remote System Explorer, iSeries Projects</td>
</tr>
<tr>
<td>Web Tools for iSeries</td>
<td>Java Tools for iSeries</td>
</tr>
<tr>
<td>IBM WebFacing Tool</td>
<td>HATS Toolkit</td>
</tr>
<tr>
<td>Rational Application Developer (Subset)</td>
<td></td>
</tr>
</tbody>
</table>

#### New! Selective Installation Features for Flexibility

You can now easily transition SEU users to Remote System Explorer

- Edit your ILE Programs
- New! Selective Installation Features for Flexibility
- PC based Debugging Environment
- This is Eclipse IDE to support RSE and other plug-ins

**Features:**
- Selective Install allows you to load the plug-ins you’ll use
- Much lighter-weight Integrated Development Environment
- Minimum of 256MB of RAM Required
WebSphere Development Studio Client Advanced Edition

http://www.ibm.com/software/awdtools/wdt400/about/wdscAE.html/

**WDScAE has all the features for WDSc plus…**

- New Application Design Component (Visualize Applications)
- Single Sign-on with EIM
- Deploy Cascading Style sheets, Portlets, and Handle System Screens

**WebSphere Development Studio Client AE v7.0**

- Remote System Explorer
- iSeries Projects
- Web Tools for iSeries
- Portal Toolkit
- IBM WebFacing Tool
- HATS Toolkit
- Rational Application Developer (Full Function RAD)

- Easier Integration with Rational Clear Case (IBM Change Mgmt Solution)
- Design Portlets from WebFaced Apps or HATS
- Deploy Portlets
- Enterprise Java Bean Development
- i5 joblog support in RAD Log and Trace Analyzer

**WDScAE is sold per developer via Passport advantage**

---

**Application Modernization**

**5250 Refacing**

*Turning Green to GUI… or a portlet or a web service*

- Improved user interface and workflow
- Integration with WebSphere Portal
Why Modernize Applications?

- **Needs?**
  - Executives don’t like Green Screens
  - i5 newbies like to point and click
  - You want to use those cheaper Standard Edition boxes

- **WebSphere Products?**
  - IBM WebFacing Tool or HATS Toolkit for developing the modernized screens
  - IBM WebFacing Deployment Tool with HATS Technology (WDHT)

- **Why System i5?**
  - You already have the tools
  - Now you have better pricing and deployment options

---

What Can Be Re-Faced?

- **The IBM WebFacing Tool**

- **HATS Toolkit**

- **Requires RPG/COBOL Screen Data Definitions (DDS)**
- **Can Render any RPG/COBOL Screen**
Screen Transformation

The IBM WebFacing Tool
http://www.ibm.com/software/awdtools/wdf400/about/web-facing.html

HATS Toolkit

One to One

One to One or Many to One

Screen Deployment Options

The IBM WebFacing Tool
http://www.ibm.com/software/awdtools/wdf400/about/web-facing.html

HATS Toolkit

GUI

Portal

Rich Client

Requires WDScAE

Requires WDScAE

Web Service

Requires WDScAE

Requires WDScAE
Multiple System Support

The IBM WebFacing Tool  HATS Toolkit

One System to One Set of Refaced Screens

Multiple Systems Supported

The 5250 Refacing Bottom Line

The IBM WebFacing Tool  HATS Toolkit

- Both tools can web enable existing ILE Programs
- Development Tools for both tools are shipped with the IBM WebSphere Development Studio CD bundle
- Both tools will need the IBM WebFacing Deployment Tool with HATS Technology (WDHT) take full advantage of their capabilities and to deploy the screens when completed
WebFacing Deployment Tool with HATS Technology (WDHT) V7.0

- Announcement Letter: 207-034
- Used to deploy both IBM Webfacing and HATS modernized applications
- Replaces HATS for iSeries offering
  - New tier based pricing model
- Eliminates OLTP charge for HATS users
  - Removes significant cost barrier for HATS sales in iSeries accounts
- Automatic transfer to new product for HATS customers at renewal
- Allows WebFaced applications to handle system or unexpected screens
- Can deploy both HATS and WebFaced Apps as a Single EAR file

People Integration

*Portal Servers Provide*

*A flexible Framework for building exactly what your end users need*
Why use a Portal Server?

- **Needs?**
  - Every one wants to see their own stuff
  - Stop the surfing between applications
  - One sign-on for everything

- **IBM Products?**
  - WebSphere Portal Express, WebSphere Portal Enable
  - Workplace Services Express, Workplace Collaboration Services

- **Why System i5?**
  - You may be entitled to this already
  - You have the tools to make this useful

---

Portal Servers Deliver the Content your Users Need

- **Portlets**
  - Small Applications
  - Most Portal Servers ship basic Portlets: News, Weather, Stocks
  - Portlets can easily be generated from HATS and the IBM Webfacing Tool (in WebSphere Development Studio Client for iSeries Advanced Edition)

- Many iSeries Enterprise Edition Customers are entitled to Workplace Services Express
Portals allow you to customize the Users Environment
Executives are looking for a view of the company and Industry

An Executive View

Lines of Business need a different approach
Customer Service Reps want a single interface to see everything

Customer Service View

This Portlet triggers these Portlets
Customers are looking for Self-Service
Customers would rather visit a web site that call a 1-800 Number

A Customer View

<table>
<thead>
<tr>
<th>Mega Communications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Services</td>
</tr>
<tr>
<td>Service</td>
</tr>
<tr>
<td>Broadband</td>
</tr>
<tr>
<td>Base TV</td>
</tr>
<tr>
<td>HBO</td>
</tr>
<tr>
<td>GND</td>
</tr>
</tbody>
</table>

New Service from Mega Communications!
Add IP Phone for Just $14.95 a month!

On Pay Preview this Month
- The Departed (R) $1.99
- Borat (R) $1.99
- Flicka (PG) Special $1.99

IBM WebSphere Portal Express Version 6.0 – Simplifying our portfolio

- IBM WebSphere Portal Express 5.0.2.3
- IBM Workplace Services Express 2.6
- IBM WebSphere Portal Express Plus 5.0.2.3

IBM WebSphere Portal Express 6.0
- Next release of Portal Express, and Portal Express Plus
- Based on WebSphere Portal 6.0
- Improved development platform
- Includes core capabilities for document management and web content management
- Out of the box capabilities
- Includes Lotus Component Designer

IBM WebSphere Portal Express Next
- Follow on release of WebSphere Portal Express and next release of Workplace Services Express
- Additional capabilities planned in document management and team collaboration
- Migration for WSE 2.6 Teamspace
Provide Better Customer Service

**Electronic Commerce**

*Extends your business to the Web*

*Or*

*Provides a platform for Business to Business*

---

Why Electronic Commerce?

- **Needs?**
  - You want your site to look like the big guys!
  - You want better customer self service
  - You don’t have a rocket scientists to run it

- **WebSphere Products?**

- **Why System i5?**
  - Can scale as big as you can grow
  - Doesn’t break easily and doesn’t take an Army to run
IBM Commerce Options

Enterprise
Optimize both direct and indirect channels by capturing and deploying best practices across the extended demand chain.

- Channel Management
- Contract and Policy Management
- Advanced Roles and Relationships
- Collaborative Workspaces
- Reseller Hosting
- Supplier Enablement
- Buy-Side Support
- Multi-round RFQ

Professional
Deliver a consistent, personalized user experience across multiple channels to maximize customer loyalty and walletshare.

- Advanced Analytics, Data Mining
- Live Help Collaboration
- Collaborative Filtering
- Advanced Product Search Aids
- Improved Scalability
- Clustering Support

Commerce-Express
An easily installed, affordable, yet complete solution enabling growing mid-market companies to do business on the Web.

- Targeted Marketing

Application, Partner and Process Integration

Business Integration

It’s about keeping up with change!
Without throwing away what you have
Why Integrate Applications?

- **Needs?**
  - You can’t afford to hire new people
  - You need reliable data movement

- **WebSphere Products?**
  - WebSphere MQ, WebSphere ESB, Datapower, WebSphere Message Broker

- **Why System i5?**
  - MQ API’s are easily coded by RPG/COBOL folks
  - i5 is already highly available, this is icing

Before…

**How much does it cost you to constantly adapt applications so they can talk to each other, or integrate?**

- Shipping
  - Speak NY
- Finance
  - Speak French
After... with IBM WebSphere MQ

Guaranteed Message Delivery
Full Message Auditing and Security
Support for over 80 Platform Configurations

Enterprise Service Bus capabilities

Flexible connectivity infrastructure for integrating applications, data, and services to power your SOA
ESB Capabilities: Routing

Shipping System

→ ROUTES messages between services

ESB Capabilities: Transformation

Shipping System

→ TRANSFORMS message formats between requestor and service

Shipping Master
- Lname (Char 15)
- Fname (Char 15)
- Zipcode (Char 5)
- Addr1 (Char 30)
- City (Char 20)
- State (Char 2)
- etc

Customer Master
- Lname (Char 20)
- Fname (Char 20)
- Address1 (Char 25)
- City (Char 20)
- State (Char 20)
- Zipcode (char 5)
- etc
ESB Capabilities: Conversion

CONVERTS transport protocols between requestor and service

ESB Capabilities: Publication/Subscription

HANDLES business events between disparate sources
What are the IBM ESB offerings

A Basic ESB:
WebSphere ESB V6, a new product delivering an Enterprise Service Bus, built on top of and leveraging WebSphere Application Server. Facilitates SOA for Web services. Uniquely able to connect to WebSphere MQ networks.

A Network Appliance ESB:
The Datapower XA35 is a hardware implementation of an Enterprise Service Bus. It accelerates infrastructure implementation, offloading XML traffic to speed up processing with minimum network disruption.

An Advanced ESB:
WebSphere Message Broker V6, a new version of our proven product, built on top of and leveraging WebSphere MQ. Delivers an advanced Enterprise Service Bus facilitating SOA for existing (non-Web Services) applications.

Why Integrating with Partners?

- Needs?
  - You need to do EDI with Partners
  - You can’t afford a Value Added Network
- WebSphere Products?
  - WebSphere Partner Gateway Express
- Why System i5?
  - Don’t throw away what you have
  - Leverages existing EDI Translators
Provides AS2 Support for EDI over the Internet

**AS2 Provides:**
- Secure and Reliable Delivery
- Non-Repudiation

**Why Business Process Management? SOA?**

- **Needs?**
  - Your getting killed keeping up with changes
  - You need something that will be around awhile (standards)

- **WebSphere Products?**
  - WebSphere Business Server Express Plus, HATS Studio with WDHT
  - The IBM SOA Foundation: WebSphere Business Modeler, WebSphere Integration Developer, WebSphere ESB and WebSphere Process Server, WebSphere Business Monitor

- **Why System i5?**
  - You have to tools to get started today
  - … and the foundation to deploy them
What are the barriers to business flexibility?

- Infrastructure built over time, no roadmap
- Point application buys
- No standards on business process – need best practices
- The inability to reuse

Don’t throw away what you have… Re-Use it!
Reuse: Using tools you may be entitled to
Modernize RPG and COBOL Batch Applications

WDSc: Web Services Wizard

Web Service

RPG Application

Historically RPG is columnar in nature, though free-formatting is allowed under particular circumstances. The purpose of various lines code are determined by a letter code in column 6. An asterisk (*) in column 7 denotes a comment line.

- "F" (file) specs define files and other i/o devices
  FARMstF1   UF   E       K     Disk    Rename(ARMST:RARMST)
- "D" specs are used to define variables
  D pCusNo S              6p 0
  D pName S             30a
  D pAddr1          S             30a
  D pAddr2          S             30a
  D pCity S             25a
  D pState S              2a
  D pZip S             10a

i5/OS (aka OS/400)

5250 Applications Deployed as a Web Service
…Created with the HATS Toolkit and Deployed with WDHT

Uses the HATS Toolkit in WDSc V7.0

Web Service

- Zero footprint
- View through your favorite browser

5250 Data stream
What if you already have MQ?

Web Services Appliance

WebSphere Datapower XI50

- WebSphere Datapower is a SOA Hardware Appliance designed to provide high speed web services routing, web services security and legacy application modernization
- It acts like an WebSphere MQ Client
- It can deploy RPG and COBOL applications as web services using WebSphere MQ to communicate with backend applications

Building SOA-based Solutions for IBM System i5 Platform

- SG24-7284
- This book provides the detailed information about multiple ways for building SOA-based solutions around System i platform. The discussion in the book covers the server and client side implementations that include:
  - ProgramCall in IBM Toolbox for Java
  - HATS
  - DB2 Web services
  - PHP
  - Web services client for ILE (RPG, C, C++, COBOL)
  - Java-Server Faces (JSF)

WebSphere Business Modeler

WebSphere Process Server

One Place to access All your Services

Then you design your Plan of attack!

Getting Haircut

Nails and Makeup

Enough Cash

No

Cash

Suit

Blouse

Handbag

Jewelry

High End Jewelry Shoppe

Main Street

Upscale Dept Store

Select

Handbag

Match

Blouse

Select

Suit

Get Shoes

Get Jewelry

Get Haircut

Nails and Makeup

Get Cash

Shoes

MALL

Haircut

Makeup

Nails

Cash

Select

Suit

Handbag

Jewelry

ATM

Select

Handbag

Match

Blouse

Select

Suit

Get Shoes

Get Jewelry

Shopping Center

Outlets

DMZ Server
**WebSphere Business Modeler**

*Business Level Modeling And Simulation*

- Designed for business users
- Import models directly from Visio
- Hundreds of process templates available
- Optimize all aspects of your business – set KPI’s and metrics
- Collaborate with subject matter experts through the Publishing Server

**Model, simulate, and analyze**
- Enhanced analysis and simulation capabilities. Fully understand impacts before deploying.

**Clean hand-off to I/T**
- Rapid and accurate deployment of your solutions
- Business modeling is the starting point for IT deployment (WID)

---

**Model and Simulate the Process**

- Run simulation to estimate savings and support the business case for the process change

**67% of processes fail** because their impact was not known prior to execution

*Omar Sawy, Redesigning Enterprise Processes for e-business*

<table>
<thead>
<tr>
<th>Current State - Times &amp; Costs</th>
<th>Future State - Times &amp; Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Analysis with Unlimited Resources</td>
<td>Case Analysis with Unlimited Resources</td>
</tr>
<tr>
<td><strong>Case</strong></td>
<td><strong>Case Description</strong></td>
</tr>
<tr>
<td>1</td>
<td>Direct mail, Complex</td>
</tr>
</tbody>
</table>
WebSphere Integration Developer

Accelerated Solution Assembly

- The complete toolbox for building composite applications
  - An Assembly Editor for wiring solutions together
  - All the tools you need for building solution components (Editors for BPEL, Business Rules, ...)
  - One, easy to learn interface based on Eclipse
- Architected for reuse and flexibility
  - Simplified component interfaces
  - Plug-and-play solution components

**One Tool, One set of skills, Many uses**

Integrating services across the enterprise: Processes, Mediations, Adapters, Components

Accelerated Solution Assembly
WebSphere Process Server*
*The Engine Room of Business Process Management*

- **Robust execution of business processes**
  - Reliable, scalable, secure, open standards
  - Single integrated runtime for all SOA based process automation

- **Supports all aspects of process integration**
  - Process flows
  - Business rules
  - Human steps
  - Services
  - State machines

- **Rapid process change ensuring business agility**
  - Reuse existing services that you already have and create new services for future use.
  - Build process flows without knowing where the information is coming from (late binding of services)
  - Business rules control the execution sequence of the process and can change dynamically

*SOD 2007

---

WebSphere Business Monitor
*Achieve Real-time Visibility into Processes*

- **Scorecards**
  - Key Performance Indicators for business units

- **Collaboration**
  - Work with teams to resolve situations

- **Business Alerts**
  - Notification of situations that require response

- **Reports & Analyses**
  - Understanding trends by combining real-time performance and historical information

- **External Information**
  - Information affecting performance
End-to-end process capabilities for your SOA

**IBM SOA Foundation:** [http://www.ibm.com/soa](http://www.ibm.com/soa)

WebSphere Integration Developer
Easy-to-use integration to simplify and speed the assembly of composite applications

WebSphere Business Modeler
Simple to use process modeling for the business analyst to help maximize process and business resource re-use

WebSphere Process Server*
Flexible deployment of business processes, making plug-and-play of components a reality

WebSphere ESB*
Connectivity infrastructure for integrating applications and services to power your SOA

WebSphere Business Monitor
Real-time visibility into process performance enabling process intervention and continuous improvement

*SOD on iSeries, GA 2007

The Entire WebSphere Portfolio CAN run on System i

- WAS Express & WAS ND
- WDSc and WDScAE
- IBM WebFacing, HATS Toolkit, WDHT
- WebSphere Portal Express, Express Plus & Enable
- WebSphere MQ
- WebSphere Partner Gateway Express
- WBI Server Express & Express Plus
- WESB & WebSphere Process Server (SOD 2007)
- WebSphere Commerce Express, Pro and Business Edition

Other WebSphere Products can still run here...

and here...

and here!

You get the Picture

IBM Virtualization Engine allows you to manage all these environments!
Your KEY WebSphere on System i Resources!

To Better Understand the WebSphere Software Platform on System i!

WebSphere and other SWG System i References
- ibm.com/systems/i/success/
- iSociety
  - ibm.com/systems/isociety/

To Build WebSphere Software Platform Skills and Solutions!

- System i Developers Road Atlas
- IBM Redbooks – System i Domain
- IBM IT Education Services – System i Training
  - ibm.com/services/learning/us/catalog/series/
- IBM Web Lecture Services - System i College
- IBM developerWorks
  - ibm.com/developerworks/
- IBM Global Services – System i Practice
  - ibm.com/servers/eserver/iseries/service/isgs/
- IBM Custom Technology Center
  - ibm.com/eserver/services/
- iSeries Benchmark Centers
  - ibm.com/servers/eserver/iseries/benchmark/cbc/
- Business Partners in WebSphere Portal Catalog
  - ibm.com/software/info1/websphere/index.jsp?tab=Ian
  - dings/portalbuzz

To Leverage WebSphere Partner Programs!

- IBM PartnerWorld
  - ibm.com/partnerworld
- IBM Global Services – System i Practice
  - ibm.com/servers/eserver/iseries/service/isgs/
- IBM Custom Technology Center
  - ibm.com/eserver/services/
- iSeries Benchmark Centers
  - ibm.com/servers/eserver/iseries/benchmark/cbc/
- Business Partners in WebSphere Portal Catalog
  - ibm.com/software/info1/websphere/index.jsp?tab=Ian
  - dings/portalbuzz

To Leverage WebSphere Partner Programs!

- IBM PartnerWorld
  - ibm.com/partnerworld
- IBM Global Services – System i Practice
  - ibm.com/servers/eserver/iseries/service/isgs/
- IBM Custom Technology Center
  - ibm.com/eserver/services/
- iSeries Benchmark Centers
  - ibm.com/servers/eserver/iseries/benchmark/cbc/
- Business Partners in WebSphere Portal Catalog
  - ibm.com/software/info1/websphere/index.jsp?tab=Ian
  - dings/portalbuzz

Virtual Innovation Center Online
  - /portal_login.jsp
Trademarks and Disclaimers

© IBM Corporation 1994-2006. All rights reserved.

References in this document to IBM products or services do not imply that IBM intends to make them available in every country.

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both:

IBM, IBM Logo, IBM eServer, IBM iSeries, IBM System i, IBM i5/OS, e-business on demand, IBM (logo), System i

Rational is a trademark of International Business Machines Corporation and Rational Software Corporation in the United States, other countries, or both.

Intel, Intel Logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Linux is a trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Other company, product or service names may be trademarks or service marks of others.

Information is provided "AS IS" without warranty of any kind.

All customer examples described are presented as illustrations of how those customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics may vary by customer.

Information concerning non-IBM products was obtained from a supplier of these products, published announcement material, or other publicly available sources and does not constitute an endorsement of such products by IBM. Sources for non-IBM list prices and performance numbers are taken from publicly available information, including vendor announcements and vendor worldwide homepages. IBM has not tested these products and cannot confirm the accuracy of performance, capability, or any other claims related to non-IBM products. Questions on the capability of non-IBM products should be addressed to the supplier of those products.

All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only. Contact your local IBM office or IBM authorized reseller for the full text of the specific Statement of Direction.

Some information addresses anticipated future capabilities. Such information is not intended as a definitive statement of a commitment to specific levels of performance, function or delivery schedules with respect to any future products. Such commitments are only made in IBM product announcements. The information is presented here to communicate IBM's current investment and development activities as a good faith effort to help with our customers' future planning.

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

Photographs shown are of engineering prototypes. Changes may be incorporated in production models.