



IBM Power Systems™



Agenda Key: 403627 – 41LA
Session Number:

Lab: IBM Toolbox for Java™



Kim Button – button@us.ibm.com

John Eberhard – jeber@us.ibm.com

© Copyright IBM Corporation, 2008. All Rights Reserved.
This publication may refer to products that are not currently available in your country. IBM makes no commitment to make available any products referred to herein.

IBM Power Systems



Lab: IBM Toolbox for Java™

Table of contents

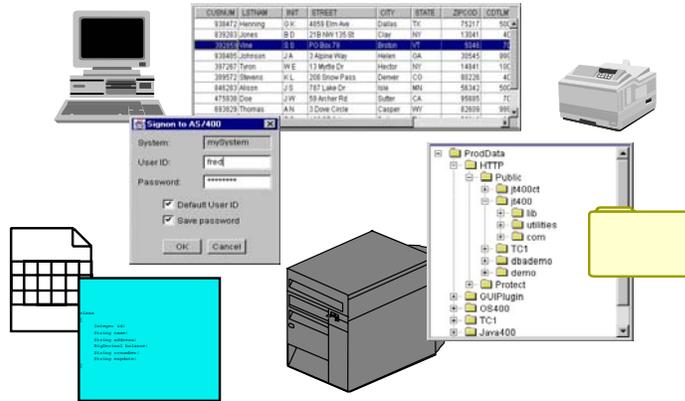
- Introduction
- Infrastructure
- CommandCall
- SQLResultSetTablePane
- GUIBuilder
- HTML and Servlet Classes
- ToolboxME
- System Debugger and Debug Manager
- JTOpen
- References
- Lab Instructions



IBM Toolbox for Java

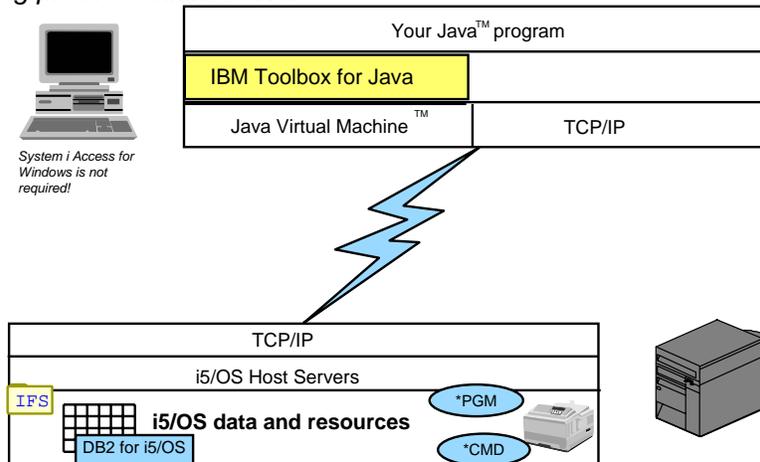
What is the Toolbox/JTOpen?

A set of Java classes and utilities which provide access to i5/OS® data and resources



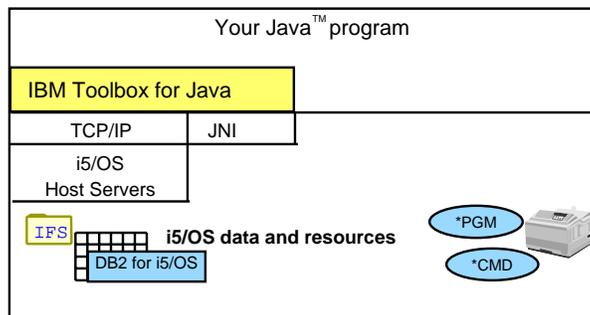
IBM Toolbox for Java

The big picture - Client/Server



IBM Toolbox for Java

The big picture - Toolbox and data on the same i5/OS



IBM Toolbox for Java

Supported platforms:

- i5/OS, Linux®, Windows®, AIX®, Solaris, Netscape Communicator, Microsoft Internet Explorer

Requires Java 1.1.8 or greater, and supports Java 2

Divided into packages:

- com.ibm.as400.access - APIs for accessing i5/OS data and resources
- com.ibm.as400.resource - Framework for accessing list-based data
- com.ibm.as400.vaccess - GUI components
- com.ibm.as400.data - Program call markup language
- com.ibm.as400.ui.* - Graphical Toolbox
- com.ibm.as400.util.* - HTML, XSL-FO (***NEW***) and Servlet components
- com.ibm.as400.micro.* - APIs for wireless devices
- utilities - utility classes such as JarMaker, JPing, RunJavaApplication, AboutToolbox

IBM Toolbox for Java

Access Classes: Low-level Java APIs to Access Data

- User Authentication and Identification
- Command Call
- Connection Pools
- Clustered Hashtables
- Data Area
- Data Description
- Data Conversion
- Data Queues
- Environment Variables
- FTP
- IFS
- JDBC
- Jobs
- Messages
- NetServer
- Print
- Permissions
- Program Call
- Record-level Database Access
- Save File
- System Status
- System Values
- Users and Groups
- User Space

IBM Toolbox for Java

"The AS400 object"

Represents a connection to the i5/OS

Provides a sign-on GUI

- Password caching available
- Change password GUI when appropriate

Controls conversations with server jobs

- Multiple users and multiple conversations
- Implicit and explicit connections

Provides Secure Sockets Layer (SSL) communication

- Encryption and server authentication

Most Toolbox classes use the AS400 object

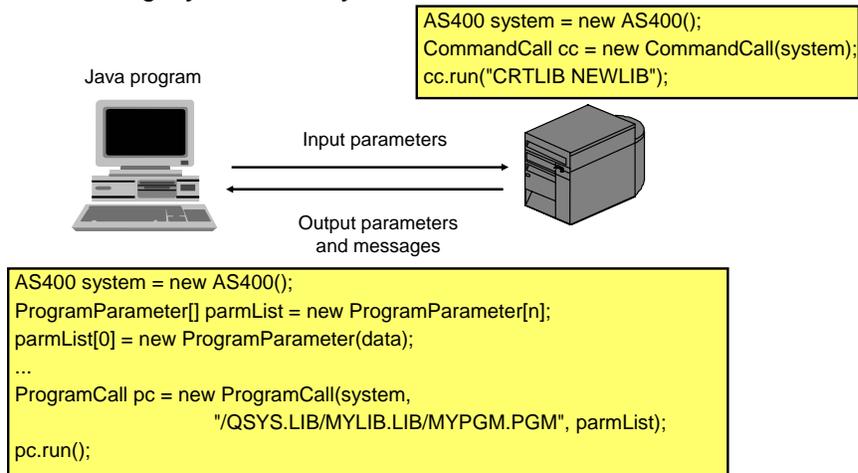


```
AS400 sys = new AS400();
AS400 sys2 = new AS400("mySystem");
AS400 sys3 = new AS400("mySystem",
                        "myUID",
                        "myPWD");

CommandCall cc = new CommandCall(sys);
```

Command call and program call

Make use of legacy code and system APIs



IBM Toolbox for Java

Graphical user interface components

A set of Java Swing (GUI) components which present i5/OS data and resources

- Components reside in package `com.ibm.as400.vaccess`



IBM Toolbox for Java

Use JDBC to present query results

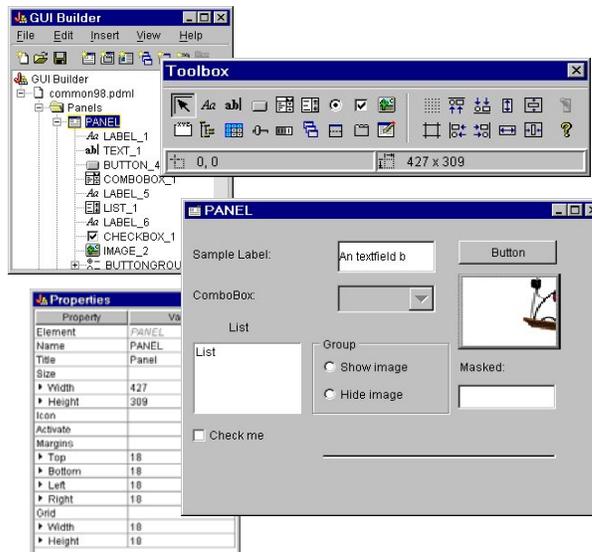
SQLResultSetTablePane

CUSNUM	LSTNAM	INIT	STREET	CITY	STATE	ZIPCOD	CDTLM
938472	Henning	G K	4859 Elm Ave	Dallas	TX	75217	50C
839283	Jones	B D	21B NW 135 St	Clay	NY	13041	4C
392859	Vine	S S	PO Box 79	Broton	VT	5046	7C
938485	Johnson	J A	3 Alpine Way	Helen	GA	30545	99C
397267	Tyron	W E	13 Myrtle Dr	Hector	NY	14841	10C
389572	Stevens	K L	208 Snow Pass	Denver	CO	80226	4C
846283	Alison	J S	787 Lake Dr	Isle	MN	56342	50C
475938	Doe	J W	59 Archer Rd	Sutter	CA	95685	7C
693829	Thomas	A N	3 Dove Circle	Casper	WY	82609	99C

Graphical Toolbox

GUI Builder

- WYSIWYG panel definition
- Generates Panel Definition Markup Language (PDML) code
- Supports JavaHelp™



HTML and Servlet classes

Web components create tables and forms

- com.ibm.as400.util.html package
- com.ibm.as400.util.servlet package
- Use servlet classes to get data, then display it in an HTML form or table
- List, details, explorer and tree views
- Implementations for Record Level Access and SQL via JDBC, along with HTMLTableConverters, HTMLFormConverters, and more

```

HTMLTableConverter converter = new HTMLTableConverter();
HTMLTable table = new HTMLTable();
table.setHeaderInUse(false);
table.setBorderWidth(8);
converter.setTable(table);

ResultSet resultSet = statement.getResultSet();
SQLResultSetRowData rowdata = new SQLResultSetRowData(resultSet);

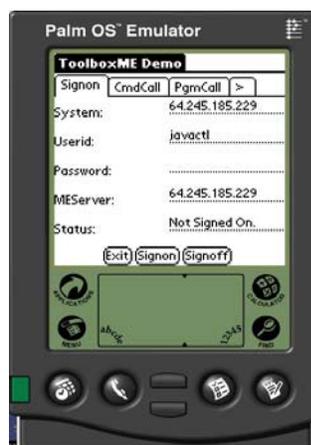
String[] html = converter.convert(rowdata);
out.println(html[0]);

```

Toolbox Micro Edition

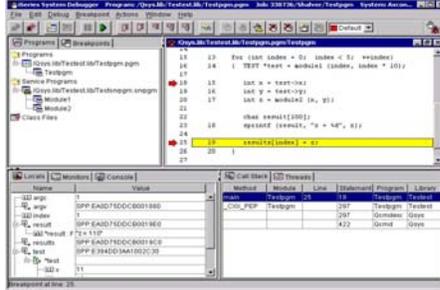
Supported Components

- AS400
- Command Call
- Program Call via PCML
- Data Queues
- JdbcMe





System Debugger and Debug Manager



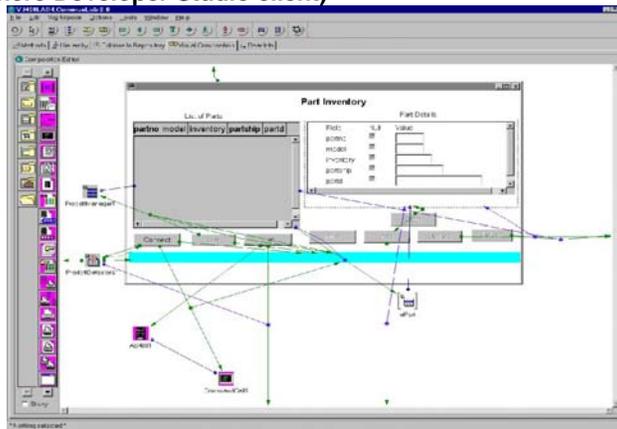
- Supports all ILE languages: C, C++, RPG, Java, Cobol, CL
 - Point and click breakpoint manipulation in source code
 - Automatic variable evaluation with mouse and local variable display
 - Program call stack and thread display
- Requires JDK1.3 and tes.jar, jt400.jar, and jhall.jar
- Invoke with the following: `java utilities.DebugMgr` *OR* `java utilities.Debug -s system -u user`



Visual Development Environments

No coding necessary!

Toolbox beans work with many visual development environments like WDSC (WebSphere Developer Studio client)



JTOpen (Open Source)

All of the primary Toolbox packages are open source!
<http://jt400.sourceforge.net/>

- Part of IBM's open source development community
- Use source as a debug tool
- Submit new function under the IBM Public License (IPL)
- Modify source for your use
- Submit problem reports and bug fixes

Two versions of the Toolbox:

- Licensed program
 - Supported by IBM
 - Fixes delivered via PTFs
- Open source version
 - Supported by open source community
 - Now also officially supported by IBM Service!
 - Includes source from non-IBM contributors
 - New functions and fixes available here first!



References

Where can I get more information?

<http://ibm.com/systems/i/software/toolbox>

- News, downloads, FAQs, service packs, articles, COMMON labs

<http://jt400.sourceforge.net/>

- JTOpen - open source, bug reporting, feature requests

<http://www-03.ibm.com/servers/eserver/support/series/forums/index.html>

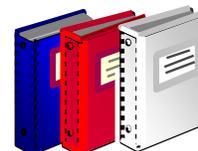
- System i Technical Forums - including IBM Toolbox for Java/JTOpen Forum

IBM Toolbox for Java Programmers Guide

- Shipped with the IBM Toolbox for Java
- Contains overview, full API documentation (javadoc), and code examples
- Available in the i5/OS Information Center
 – <http://publib.boulder.ibm.com/infocenter/systems/scope/i5os/topic/rzahh/page1.htm>

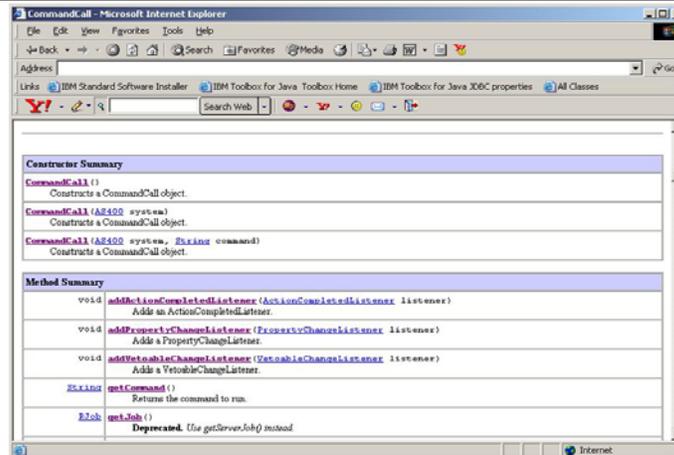
Building AS/400 Client/Server Applications with Java

- Redbook SG24-2152-02



IBM Toolbox for Java Javadoc

- API Documentation in HTML format generated from comments in source code
- <http://publib.boulder.ibm.com/infocenter/systems/scope/i5os/topic/rzahh/javadoc/overview-summary.html>



Prototypes

- Based on the Javadoc API documentation
- Contain
 - Class name (type of object)
 - Constructors (how to create the object)
 - Method declarations (actions on the object)
- Example: Create an AS400 object named *system* and specify the name of the server running i5/OS you want to connect to.

Prototypes

class AS400

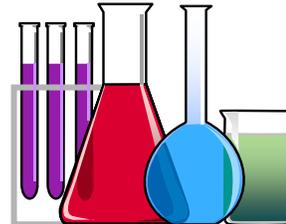
- public AS400()
- public AS400(String systemName)
- public void setSystemName(String systemName)

Code

```
AS400 system = new AS400("mySystem");
or
AS400 system = new AS400();
system.setSystemName("mySystem");
```

Lab Exercises

- Call an i5/OS command from a Java application
- Use JDBC to query a database on the server
- Use a GUI to present the results of a JDBC query
- Call an i5/OS API
- Bonus: Call an i5/OS API using PCML
- Bonus: Use GuiBuilder to build a simple GUI



Please ask questions!

IBM Certification Testing – Here at COMMON!!

- Where and When ?
 - Delta Island F
 - 8:30 – 5:00 Tuesday and Wednesday
 - 8:30 – 12:00 Thursday
- What's in it for me ?
 - Portable credential
 - Proof that you can "Walk the Talk"
 - Peer and Employer recognition
 - Industry recognition
- How much does it cost ?
 - **NOT** \$190 that you pay at Prometric testing centers
 - **Special Discounted price of \$95 !!**
- What tests are available?
 - System i (of course)
 - All "other" System Group platform tests (System p, x, z, and Storage)
 - All Software Group tests

Just arrived at **COMMON**

UPDATED

**System Operator
System Administrator
ILE RPG Programmer
certification tests**



See Laura Calley in the
Certification Lab



Trademarks and Disclaimers

© IBM Corporation 1994-2007. 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.

Trademarks of International Business Machines Corporation in the United States, other countries, or both can be found on the World Wide Web at <http://www.ibm.com/legal/copytrade.shtml>.

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 registered 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.

IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency which is now part of the Office of Government Commerce.

ITIL is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office.

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.

The 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.

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.

Prices are suggested U.S. list prices and are subject to change without notice. Starting price may not include a hard drive, operating system or other features. Contact your IBM representative or Business Partner for the most current pricing in your geography.

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