



IBM Power Systems™



Agenda Key: 403627 – 41LA  
Session Number:

## Lab: IBM Toolbox for Java™



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IBM Power Systems



## Lab: IBM Toolbox for Java™

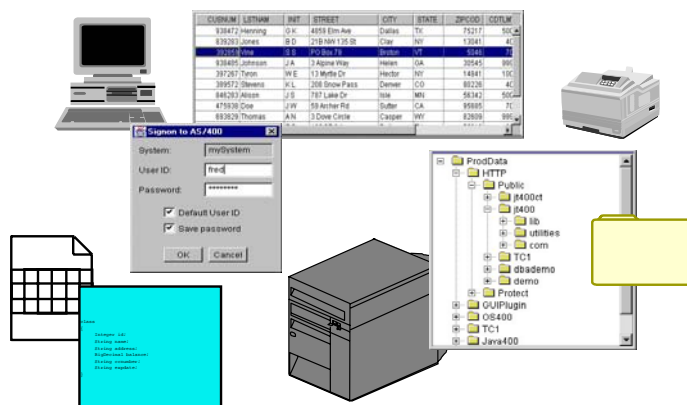
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## IBM Toolbox for Java

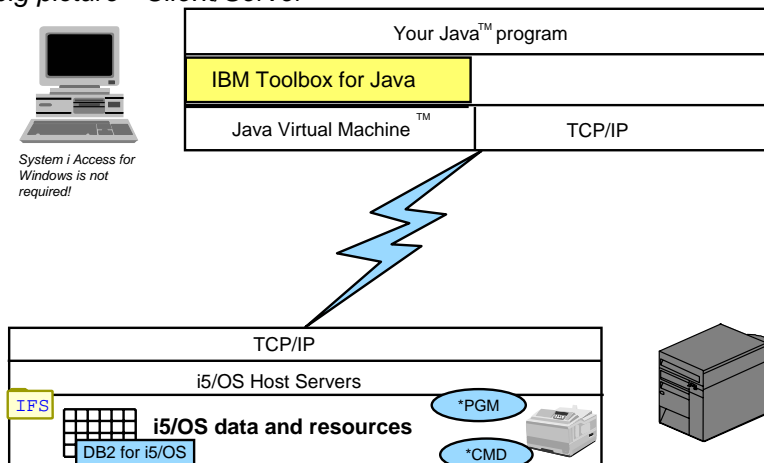
*What is the Toolbox/JTOpen?*

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



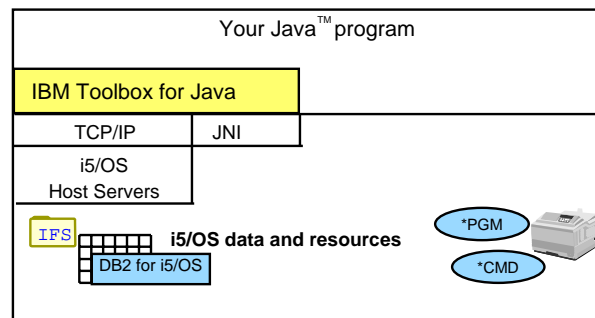
## IBM Toolbox for Java

*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

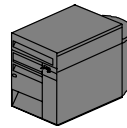
Make use of legacy code and system APIs

Java program



Input parameters

Output parameters  
and messages



```
AS400 system = new AS400();
CommandCall cc = new CommandCall(system);
cc.run("CRTLIB NEWLIB");
```

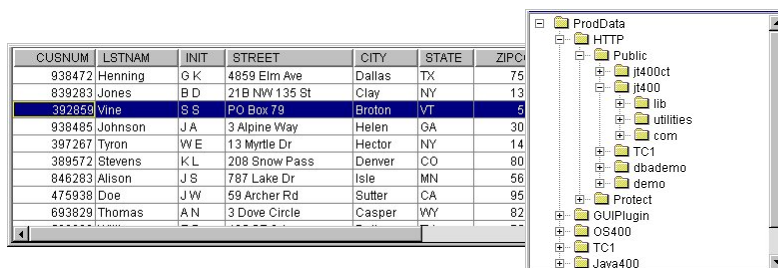
```
AS400 system = new AS400();
ProgramParameter[] parmList = new ProgramParameter[n];
parmList[0] = new ProgramParameter(data);
...
ProgramCall pc = new ProgramCall(system,
    "/QSYS.LIB/MYLIB.LIB/MYPGM.PGM", parmList);
pc.run();
```

## 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

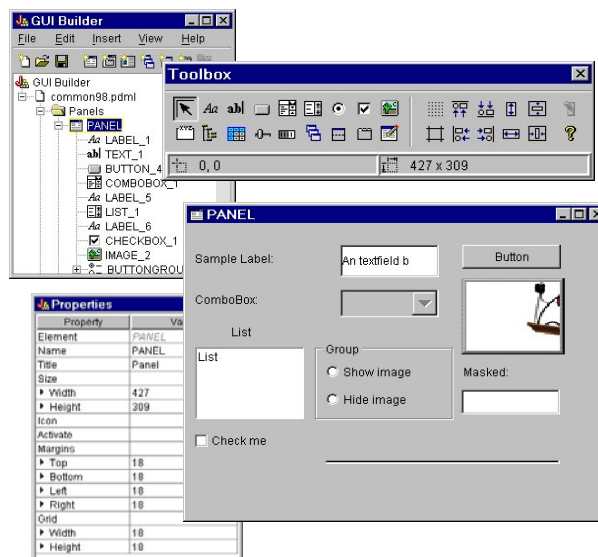
**SQLResultSetTablePane**

CUSNUM	LSTNAM	INIT	STREET	CITY	STATE	ZIPCOD	CDTLM
938472	Henning	G K	4859 Elm Ave	Dallas	TX	75217	50C
839283	Jones	B D	218 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	99S
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	99S

## Graphical Toolbox

### GUI Builder

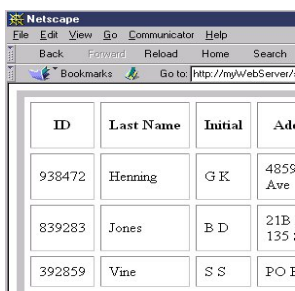
- WYSIWYG panel definition
- Generates Panel Definition Markup Language (PDML) code
- Supports JavaHelp™



## 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);

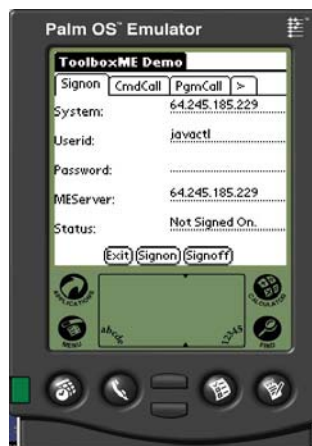
ResultSet resultSet = statement.getResultSet();
SQLResultSetRowData rowdata = new SQLResultSetRowData(resultSet);

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

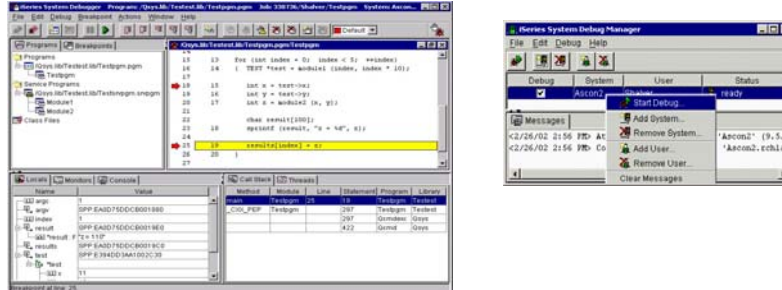
## Toolbox Micro Edition

*Supported Components*

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



## System Debugger and Debug Manager

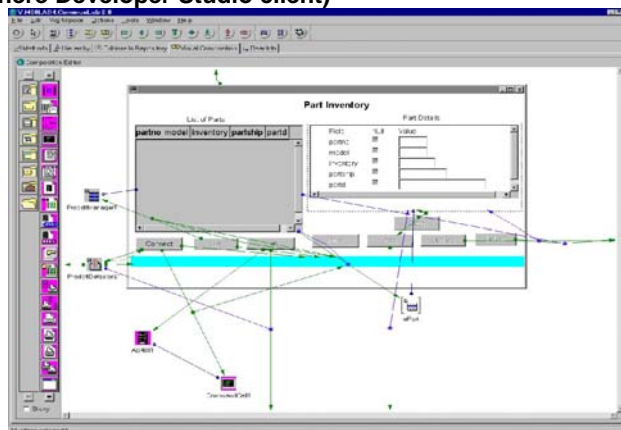


- Supports all ILE languages: C, C++, RPG, Java, Cobol, CL
- Point and click breakpoint manipulation in source code
- Automatic variable evaluation with mouse and local variable display
- Program call stack and thread display
- Requires JDK1.3 and tes.jar, jt400.jar, and jhall.jar
- Invoke with the following: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

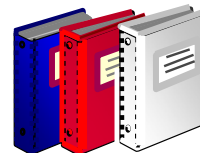
- System i Technical Forums - including IBM Toolbox for Java/JTOpen Forum

### **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>

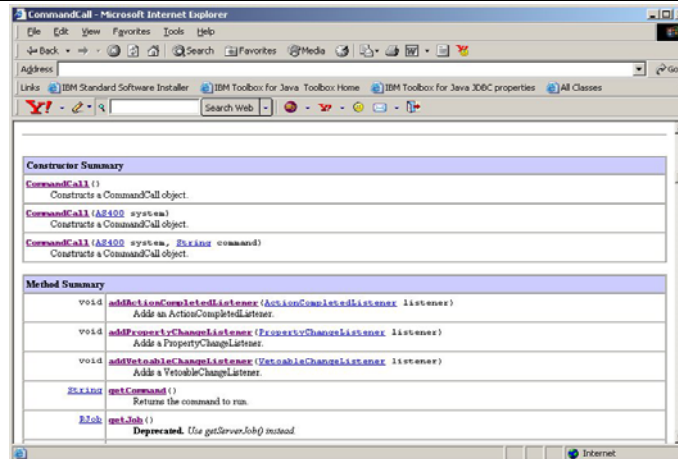
### **Building AS/400 Client/Server Applications with Java**

- 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

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