

Agenda Key: 41LA
Session Number: 403627

Lab: IBM Toolbox for Java™

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Java related sessions



Basic Java

Mon 9:30 - 22MD A Java Introduction to Object-Oriented Programming (OOP)

Mon 3:30 - 26MJ Debugging the New Java ***New Session***

Tues 8:00 - 31CD Java 101: Basic Syntax and Structure

Tues 11:00 - 33LA LAB: Introduction to Java ***LAB***

Web 9:30 - 42CD The Future of Java on IBM i

Java Toolbox

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Advanced Java related topics

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Lab: IBM Toolbox for Java™

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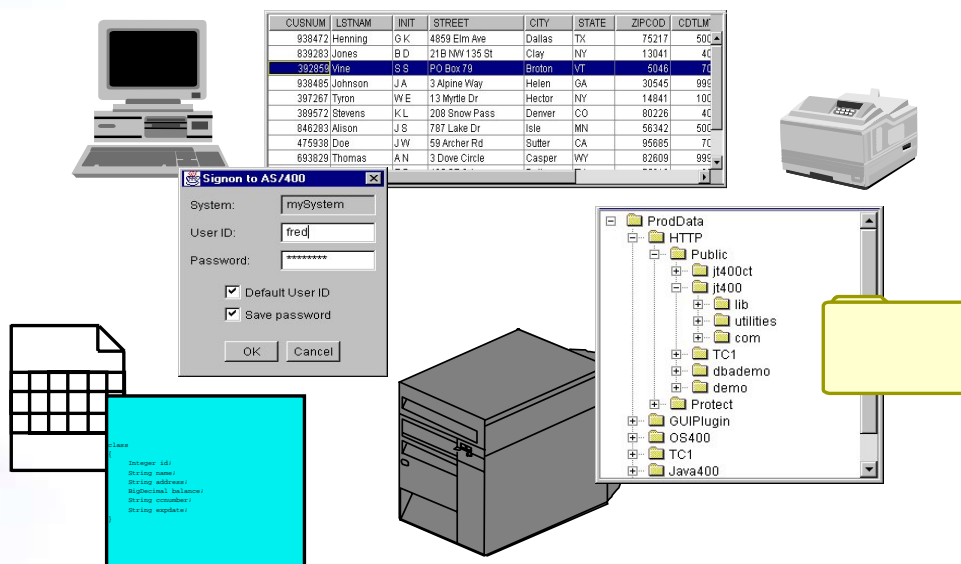
- Introduction
- Infrastructure
- CommandCall
- SQLResultSetTablePane
- GUIBuilder
- HTML and Servlet Classes
- ToolboxME
- System Debugger and Debug Manager
- JTOpen
- References
- Lab Instructions

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IBM Toolbox for Java

What is the Toolbox/JTOpen?

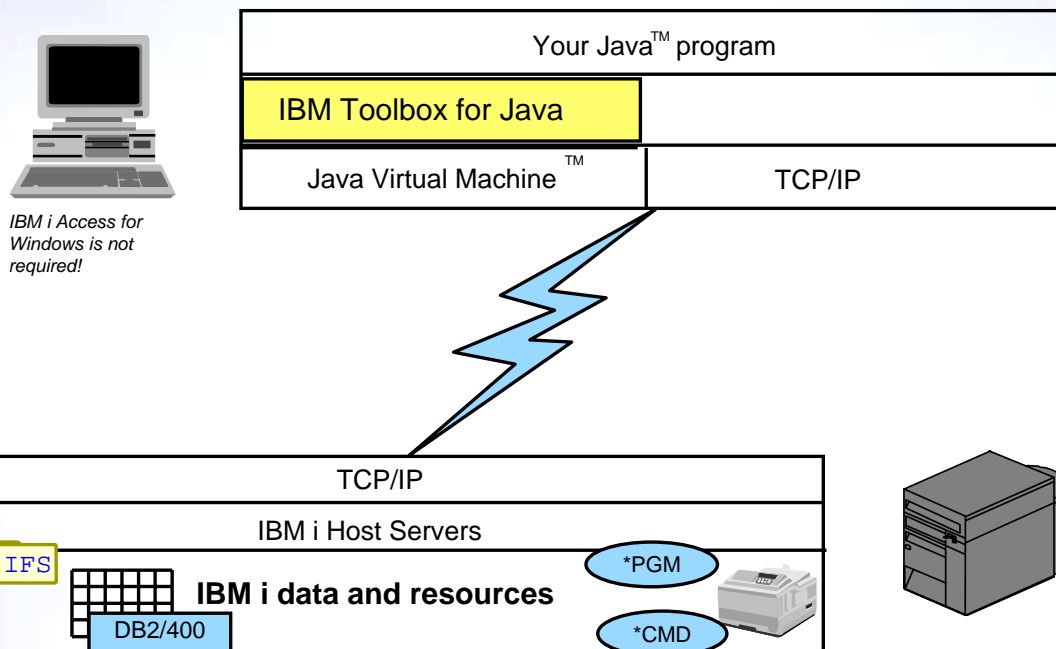
A set of Java classes and utilities which provide access to IBM i data and resources



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IBM Toolbox for Java

The big picture - Client/Server



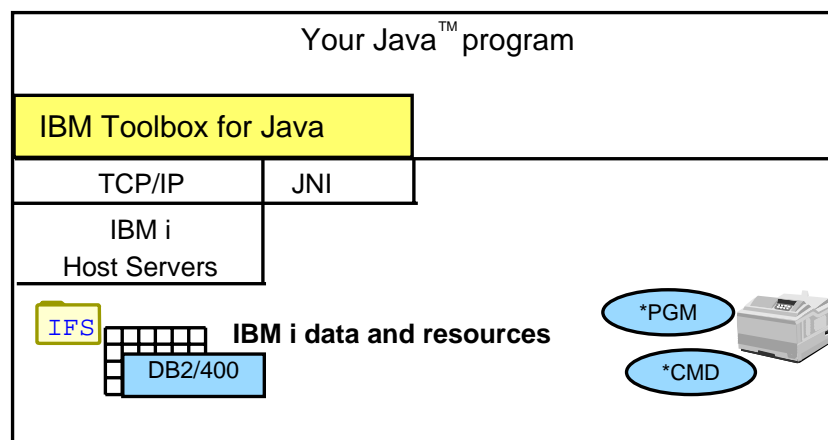
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IBM Toolbox for Java

The big picture - Toolbox and data on the same IBM i



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IBM Toolbox for Java

Supported platforms:

- IBM i, Linux®, Windows®, AIX®, Solaris, FireFox, Microsoft Internet Explorer

Requires Java 1.1.8 or greater, and supports Java 2

Divided into packages:

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

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IBM Toolbox for Java

Access Classes: Low-level Java APIs to Access Data

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

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IBM Toolbox for Java

"The AS400 object"

Represents a connection to the IBM i

Provides a sign-on GUI

- Password caching available
- Change password GUI when appropriate

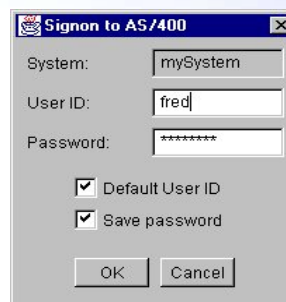
Controls conversations with server jobs

- 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);
```

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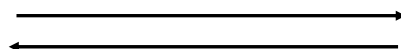
Command call and program call

Make use of legacy code and system APIs

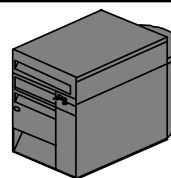
Java program



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();
```

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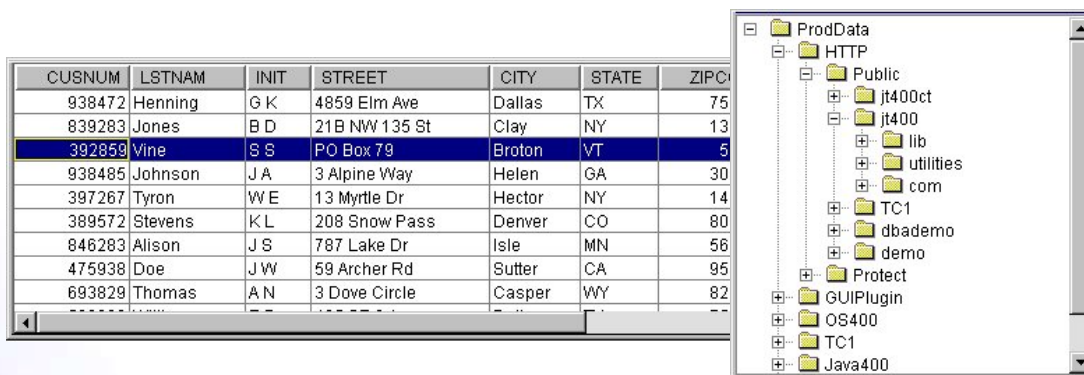
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IBM Toolbox for Java

Graphical user interface components

A set of Java Swing (GUI) components which present IBM i data and resources

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



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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	500
839283	Jones	B D	21B NW 135 St	Clay	NY	13041	40
392859	Vine	S S	PO Box 79	Broton	VT	5046	70
938485	Johnson	J A	3 Alpine Way	Helen	GA	30545	999
397267	Tyron	W E	13 Myrtle Dr	Hector	NY	14841	100
389572	Stevens	K L	208 Snow Pass	Denver	CO	80226	40
846283	Alison	J S	787 Lake Dr	Isle	MN	56342	500
475938	Doe	J W	59 Archer Rd	Sutter	CA	95685	70
693829	Thomas	A N	3 Dove Circle	Casper	WY	82609	999

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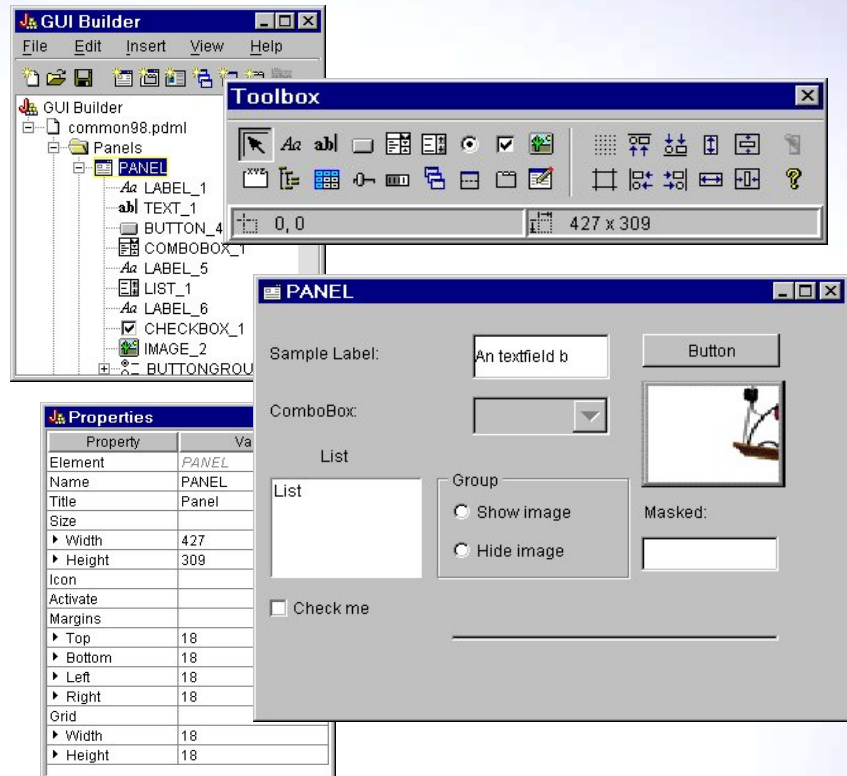
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Graphical Toolbox

GUI Builder

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



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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

The screenshot shows a Netscape browser window displaying a table with four columns: ID, Last Name, Initial, and Address. The table contains three rows of data.

ID	Last Name	Initial	Address
938472	Henning	G K	4859 Ave
839283	Jones	B D	21B 135 S
392859	Vine	S S	PO B

```
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]);
```

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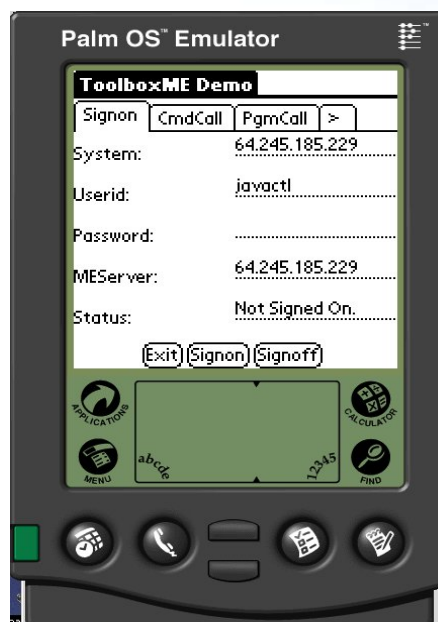
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Toolbox Micro Edition

Supported Components

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

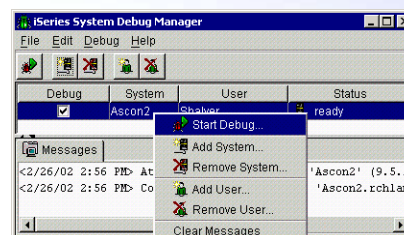
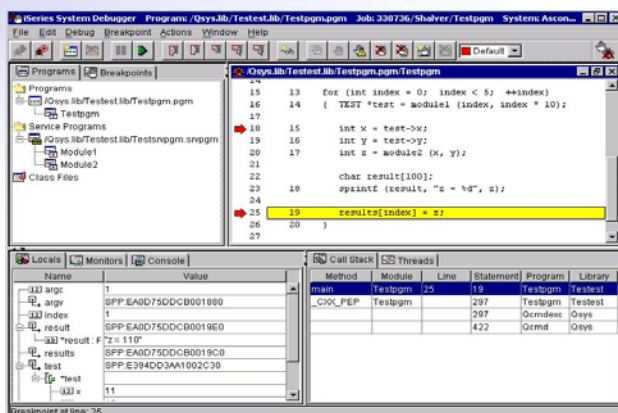


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System Debugger and Debug Manager



- 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`

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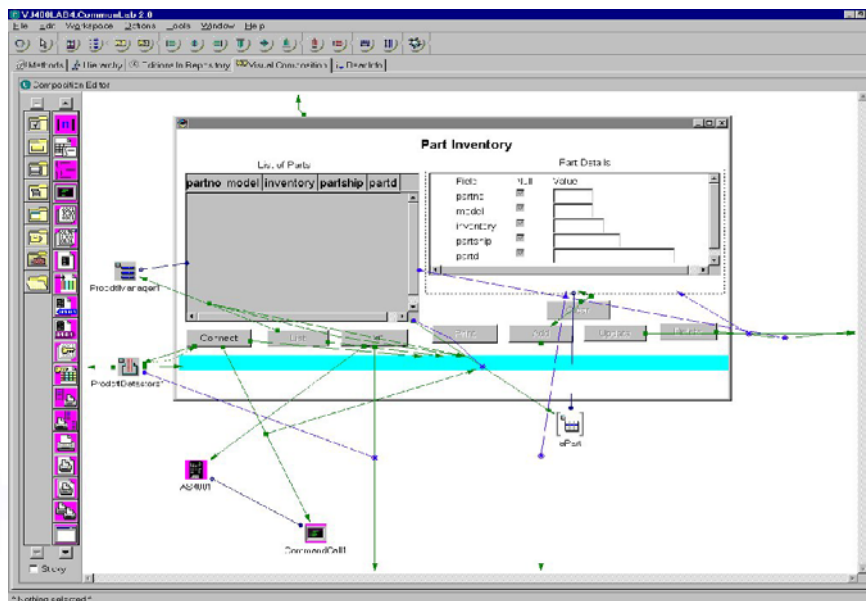
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Visual Development Environments

No coding necessary!

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



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JTOpen (Open Source)

All of the primary Toolbox packages are open source!

sourceforge.net/projects/jt400

- 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!



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Top 5 Good Things About the Toolbox

1. It's free, no strings attached.
2. Fully supported by IBM Service.
 - User forum on Web is monitored daily by IBM developers.
3. Lets any Java app, anywhere on your LAN,
 - Access and exploit your IBM i resources.
4. Thoroughly documented on the Web.
5. In use by IBM and customers since V4R2 (1998).
 - Used under-the-covers in many other IBM products.

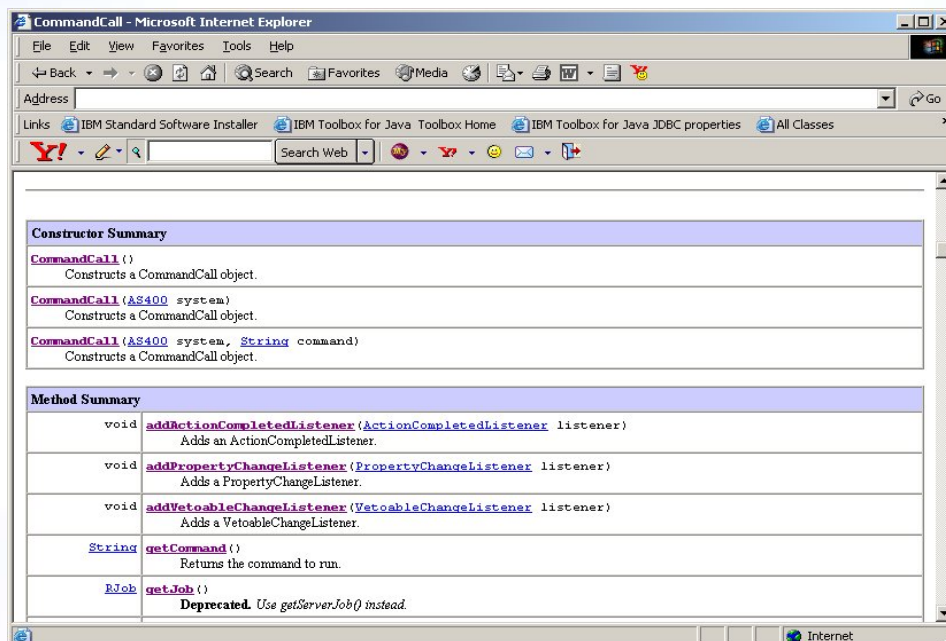
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IBM Toolbox for Java Javadoc

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



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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 `mySystem` and specify the name of the server running IBM i 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");
```

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Lab Exercises

- Call an IBM i 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 IBM i API
- Bonus: Call an IBM i API using PCML
- Bonus: Use GuiBuilder to build a simple GUI

Please ask questions!



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Questions

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References

Where can I get more information?

www.ibm.com/systems/i/software/toolbox

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

sourceforge.net/projects/jt400

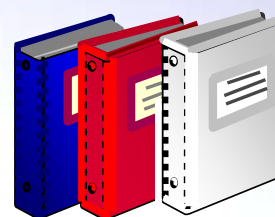
- JTOpen - open source, bug reporting, feature requests

www.ibm.com/systems/support/i/forums

- IBM 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 IBM i Information Center
 - publib.boulder.ibm.com/infocenter/systems/scope/i5os/topic/rzahh/page1.htm



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