



Pete Helgren

# Open Source Tools and Applications for i

**Value Added Software, Inc**  
801.581.1154

18027 Cougar Bluff  
San Antonio, TX 78258



## --Security Top Reason for Using Open Source Software

(September 28, 2007)

According to a survey of companies in India, Australia, China and Korea, security is the number one reason for using open source software. Budget concerns and availability of management tools and utilities rank second and third, respectively. More small and medium sized businesses than large businesses are using open source software; companies in China and India are more likely to use open source software than are companies in Australia and Korea. The results of the study also indicate that companies use open source software because it can "fulfill their requirements for specific functionalities."

<http://www.zdnetasia.com/news/software/printfriendly.htm?AT=62032771-39000001c>

[Editor's Note (Boeckman): A report was released by MITRE back in 2003 on the use of Free and Open Source Software within the DoD and security was also cited as one of the reasons it is being adopted.]

# Did you know....?

- ...you can write web applications in RPG  
(CGIDEV2 and Renaissance are free tools for this, plus there's a plethora of commercial ones.)
- ...you can use stored procedures to call RPG routines via SQL, making them accessible to any programming language  
(PHP, Java, .NET, VB, even Microsoft Office and Open Office)  
...the stored procedure interface even lets you call them from different computers over the network...

# Did you know....?

- ...that you can also use a User Defined Table Function to do the same thing as a stored procedure, which makes it possible to call from embedded SQL in ILE languages  
(where stored procedure result sets don't work)
- ...that an RPG program can use Windows Networking to open and read/write files over a network directly.  
(without any need to transfer the file first.)

# Did you know....?

- ...that RPG (via it's ability to call Java methods) can access any sort of database... Oracle, SQL Server, MySQL, Access, some folks are even doing things like Sybase, Foxpro and dBase. (JDBC4)

# Did you know....?

- ...that RPG can be a player in web services. (Scott's HTTPAPI is one way, Thomas Raddatz's WSDL2RPG is a new [and very cool] way to do it in pure RPG -- plus WDSC wizards can generate Java wrappers to make it work via WebSphere)

# Did you know....?

- ...instead of writing reports the old fashioned way as O-specs designed for a line printer, you can now do things like: Externally defined print files with fonts, barcodes, etc. Or even take that further and deliver reports as HTML, PDF or as an Excel spreadsheet.

# Did you know....?

- ...you can run programs written for AIX without even having to recompile them.
- ...thanks to the Linux and BSD communities, there are lots and lots of open source tools that run on Unix systems, including AIX -- and the system's support for AIX lets you run many of them on i.

# Did you know....?

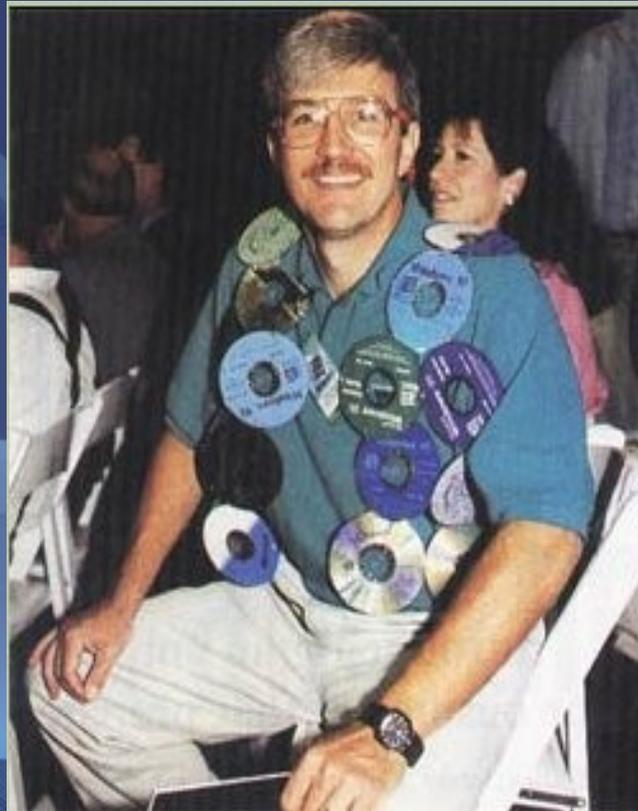
- ...that with the help of QShell, you can even pipe the output from many of these Unix tools so that it'll become input to an RPG (or other ILE language, or Java, or PHP, etc) program -- and the system handles the ASCII/EBCDIC translation for you.
- ...that QShell's "find" utility lets you search sections of your IFS for files that match a particular criteria, and that it can write the results to a file, or even call a program (including RPG, CL, etc programs) for each file that matches the criteria?



# Agenda / Table of Contents

- The case for the Open Source model.
- Requirements
- License Types
- Languages and platforms
- Open Source Resources
  - Review of Applications by Functional Areas
  - RPG Open Source sites
  - Other useful open source sites
- My “Top 10” Open Source Tools and Applications List
- Installation “How to's” and examples.

# Pete - BEFORE being introduced to Open Source



# The case for Open Source

- Advantages
  - Ownership
  - Cost
  - Quality
- Business Incentives
  - TCO lower (hotly debated)
- Community Aspect
  - Good for System i (I think)

# Advantages of the Open Source Model

- You “own” the source – modify it as you want. Never obsolete.
- Cost is usually – free!
- Quality is higher
  - [http://www.dwheeler.com/oss\\_fs\\_why.html](http://www.dwheeler.com/oss_fs_why.html)
  - *Other Advocacy Links:*
  - <http://eu.conecta.it/paper/Contents.html>
  - <http://www.opensource.org/advocacy/jobs.php>

## Business “case” for Open Source model

- Almost every major business has an “open source” project or initiative
  - Even Microsoft has “Shared Source” initiative.
- TCO open to debate
- Quality open to debate
- Bottom Line – Companies DO make money doing this, including ours.
- Venture capitalists have invested in Open Source (\$400 million in 2004/2005)

## Community Aspect of Open Source Software

- Plenty of online resources
- Plenty of folks willing to help
- Endless projects in various states of completion (or abandonment)
- A place to “shine” if your Open Source project takes off (ego – which, fortunately, few programmers have.....)

# Other considerations:

- Positive economic impact
  - [ec.europa.eu/enterprise/ict/policy/doc/2006-11-20-flossimpact.pdf](http://ec.europa.eu/enterprise/ict/policy/doc/2006-11-20-flossimpact.pdf)
  - <http://perens.com/Articles/Economic.html>
- Plenty of resource available
  - Proprietary packaged software firms account for well below 10% of employment of software developers in the U.S., and “IT user” firms account for over 70% of software developers employed with a similar salary (and thus skill) level.
- Top Ten Legal issues facing FOSS
  - <http://lawandlifesiliconvalley.blogspot.com/2007/12/2007-top-ten-free-and-open-source-legal.html>

# Requirements

- i
- PASE LICPGM 5722SS1 option 33  
OS/400 - Portable App Solutions  
Environment
- Java 5 (for those who want to use Java)
- Latest “everything”: CUMe's, Groups, PTF's
- Fearless, adventuresome spirit. Willingness to learn.
- Time (basically, no life outside of technology....)

# Most Popular License Types

- *GPL (GNU General Public License v2 and v3)*
  - *License that restrict how source and derivative works can be distributed*
  - *Example – Linux*
- *BSD (Berkeley Software Distribution)*
  - *License that doesn't restrict how source and derivative works can be distributed*
  - *Example - Mac OS X*

# License Type Summary

License Type	Protected by Copyright ?	Can be resold commercially?	Can be used in closed source project	Modifications must be released?	Explicit patent license provided?
Public Domain	No	Yes	Yes	No	No
BSD/MIT	Yes	Yes	Yes	No	No
ASL v2	Yes	Yes	Yes	No	Yes
GPL v2	Yes	No	No	Yes	No
LGPL	Yes	Yes	Yes	Yes	No
MPL/CDDL	Yes	Yes	Yes	Yes	Yes
CPL/EDL	Yes	Yes	Yes	Yes	Yes

Public Domain – Not a license. More of a declaration of no rights.

BSD/MIT – Basically no restrictions on how the SW is used

ASL v2 – Like BSD with some additional patent and termination clauses

GPL v2 – No charge but bound to license terms for derivative works

LGPL- Can charge and use commercially

MPL/CDDL – Mozilla, Firefox and others use it. Patent clauses.

CPL/EDL – Derived from IBM Public License

# Open Source Resources

- sourceforge.net
  - Billions and billions of projects (well, 171,712 as of yesterday...)
- freshmeat.net
- IBM Developerworks
  - <http://www-130.ibm.com/developerworks/>
- IBM Alphaworks
  - <http://www.alphaworks.ibm.com/>
- Many, many others...[opensource4systemi.com](http://opensource4systemi.com)

# Open Source top ten supported OS types

(reviewing data from Sourceforge)

Windows95/98	7.13
WindowNT/2K/XP	6.74
All 32bit Windows	22.01
All BSD Platforms	3.49
All Posix (Linux/BSD/Unix-like	31.77
Classic 8-bit (Apple,Atari,Commodore)	0.01
OS independent (Written in Interpretive Language)	27.05
OS Portable (Source code to work with many OS Platforms)	1.61
Project IS and OS	0.07
Project IS and OS kernel	0.08
Project is OS Distribution Specific	0.04

## Open Source Top Six supported license types (reviewing data from Sourceforge)

GNU General Public License	74.61
GNU Library or Lesser General Public License (LGPL)	12.29
BSD License	7.84
Artistic License	2.04
Apache Software License	1.58
Apache License 2.0	0.79
Common Public License	0.84

# Open Source projects by language types

(reviewing data from Sourceforge)

Assembly	1.91
C	18.57
C#	3.19
C++	19.43
Delphi	2.25
Java	19.12
JavaScript	3.07
Perl	7.28
PHP	13.96
PL/SQL	1.35

# Useful Open Source Tools (Application Development)

- **IDE's**

- Eclipse (<http://www.eclipse.org/>)
- Netbeans (<http://www.netbeans.org/>)

- **DB Management**

- F.R.O.G for IBM i5 (Freeware - seems to be using iNav)
  - (<http://www.innovativesys.net/index.php?pagename=frog&content=frog>)
- SQuirreL for SQL
  - (<http://squirrel-sql.sourceforge.net/>)
- Quantum DB (Freeware Plugin for Eclipse)
  - (<http://quantum.sourceforge.net/>)

# Useful Open Source Tools (Application Development)

- Frameworks/languages
  - CGIDEV2 (AKA Easy400) [RPG]
    - (<http://www.easy400.net/easy400p/main.html>)
  - PHP
    - (<http://www.zend.com/en/partners/strategic/i5os>)
  - Java
    - JSP/JSF
      - (<http://java.sun.com/javaee/javaserverfaces/>)
      - (<http://java.sun.com/products/jsp/>)
    - Struts
      - (<http://struts.apache.org/>)

# Useful Open Source Tools (Application Development)

- Freemarker
  - (<http://www.freemarker.org/>)
- Ruby on Rails (new)
  - (<http://www.rubyoni.com>)

# Useful Open Source System Management Tools

- **Network** (great list here:  
<http://www.slac.stanford.edu/xorg/nmtf/nmtf-tools.html>)
  - Nagios
    - (<http://www.nagios.org/>)
  - Zenoss (Python, VMWare appliance)
    - (<http://www.zenoss.com/>)
- **Application**
  - Software Testing Automation Framework (STAF)
    - (<http://staf.sourceforge.net/index.php>)
  - jManage - Open Source Application Management Platform
    - (<http://www.jmanage.org/>)

# Useful Open Source Business Applications

- **Office Suites**
  - Open Office (<http://www.openoffice.org/>)
  - Libre Office (<https://www.libreoffice.org/>)
  - NeoOffice (<http://www.neooffice.org/neojava/en/index.php>)
- **Customer Relationship Management**
  - SugarCRM (LAMP/WAMP )
    - (<http://www.sugarcrm.com/crm/>)
  - vTiger CRM (LAMP/WAMP )
    - (<http://www.vtiger.com/>)
  - opencrx (Java/Web)
    - (<http://www.opencrx.org/>)

# Useful Open Source Business Applications

- **Enterprise Resource Management**
  - Compiere (Java/Oracle)
    - (<http://www.compiere.com/>)
  - OpenBravo (Java/XML)
    - (<http://www.openbravo.com>)



# RPG Open Source Resources

- ScottKlement.com (Scott Klement's web site)
  - <http://www.scottklement.com/oss.html>
- Aaron Bartell's [www.mowyourlawn.com](http://www.mowyourlawn.com)
  - RPG Wrapper for JavaMail API
  - XML Parser
- Booth Martin's web site  
[http://www.martinvt.com/Code\\_Samples/code\\_samples.html](http://www.martinvt.com/Code_Samples/code_samples.html)
  - Great Code samples and examples
- Netshare400.com (Code samples and programs)
- Open Source and code examples links
  - <http://www.think400.dk/downloads.htm/>
  - <http://www.freeas400software.com/> (not necessarily Open Source)

# RPG Open Source sites

- Geert Van Landeghem's tutorial on generating Excel files:
  - [www.jasservices.com/articles/as400/001\\_genexcel.htm](http://www.jasservices.com/articles/as400/001_genexcel.htm)
- Bob Cancilla's IGNITe/400 Article on Javamail from RPG  
[www.ignite400.org/news/news2002070401.htm](http://www.ignite400.org/news/news2002070401.htm)
- David Morris' – Sending E-Mail from RPG
  - [www.itjungle.com/fhg/fhg051204-story04.html](http://www.itjungle.com/fhg/fhg051204-story04.html)
  - [www.itjungle.com/fhg/fhg102704-story01.html](http://www.itjungle.com/fhg/fhg102704-story01.html)

# RPG Open Source Resources (Company Sponsored)

- IBM
  - <http://www-130.ibm.com/developerworks/opensource/>
- Bob Cozzi
  - [www.rpgiv.com](http://www.rpgiv.com) (Code examples)
- SoftLanding [www.softlanding.com/](http://www.softlanding.com/)
  - TurnOver / Subversion (Open source port)
- Easy400.net (CGI/Web Development)
- Iseries Toolkit
  - <http://iseries-toolkit.sourceforge.net/>
  - <http://www.iseries-toolkit.org/>
- Google, DogPile and other search engines are helpful.

## I want RPG!!!

- Develop skills in calling Java from RPG
- Other integration skills especially C calls.

## Pete's “Top 10” Open Source Tools and Applications

- Eclipse
- PHP – Web scripting and design tool.
- Ruby/Rails – Web framework
- Apache Web server
- Linux on Power
- tn5250j – 5250 emulation (java)
- Tomcat – Servlet container (web applications)

## Pete's "Top 10" Open Source Tools and Applications (cont.)

- Freemarker – Templating tool (java)
- Jasper Reports – Report engine
  - iReport Graphical report design tool for Jasper
- Java Toolbox for iSeries(JT400, JT/Open)
- EASY400 – Web CGI toolkit/API
- WRKODBCJOB – A single utility program for displaying info on ODBC/JDBC jobs in i5/OS

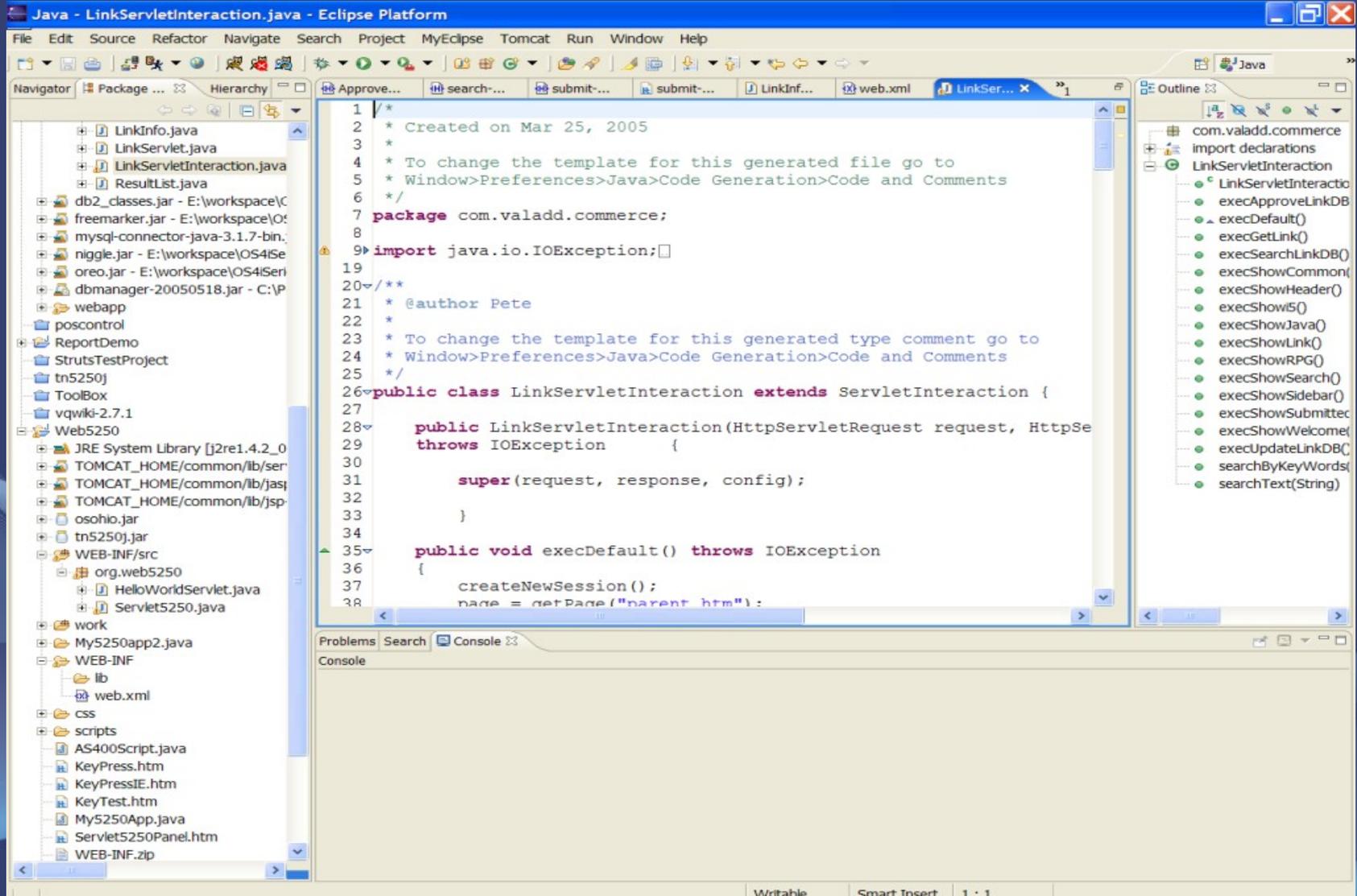
# Honorable Mentions

- PASE programs like VNC.
  - If it is written for AIX and is open source you can probably get it running on the i in PASE
- **mySQL** – Open Source database (now with db/2 for i storage engine!)
- **WASCE** – Websphere Application Server – Community Edition (J2EE container and much more)
- **Squirrel** – SQL Editing tool
- **PowerRuby** (includes Node.js !!!)
- **Ruby on Rails** – Simple web framework

# Eclipse

- IDE for ALL developers
  - Relatively easy to use (Eclipse-Step by Step by Joe Pluta is a good reference)
  - Pretty big footprint
  - Uses a “pluggable” architecture.
- Rational Developer for i (RDi,RDP, RDG, whatever....)
  - Nice RPG/IBM i extensions
  - If you have a development tools license, you probably have RDi.

# Eclipse



Java - LinkServletInteraction.java - Eclipse Platform

File Edit Source Refactor Navigate Search Project MyEclipse Tomcat Run Window Help

Navigator Package ... Hierarchy

```
1 | /*
2 | * Created on Mar 25, 2005
3 | *
4 | * To change the template for this generated file go to
5 | * Window>Preferences>Java>Code Generation>Code and Comments
6 | */
7 | package com.valadd.commerce;
8 |
9 | import java.io.IOException;
10 |
11 | /**
12 | * @author Pete
13 | *
14 | * To change the template for this generated type comment go to
15 | * Window>Preferences>Java>Code Generation>Code and Comments
16 | */
17 | public class LinkServletInteraction extends ServletInteraction {
18 |
19 |     public LinkServletInteraction(HttpServletRequest request, HttpSe
20 |     throws IOException {
21 |
22 |         super(request, response, config);
23 |
24 |     }
25 |
26 |     public void execDefault() throws IOException
27 |     {
28 |         createNewSession();
29 |         page = getPage("parent.htm");
30 |     }
31 | }
```

Outline

- com.valadd.commerce
- import declarations
- LinkServletInteraction
  - execApproveLinkDB
  - execDefault()
  - execGetLink()
  - execSearchLinkDB()
  - execShowCommon()
  - execShowHeader()
  - execShowI5()
  - execShowJava()
  - execShowLink()
  - execShowRPG()
  - execShowSearch()
  - execShowSidebar()
  - execShowSubmittec
  - execShowWelcome()
  - execUpdateLinkDB()
  - searchByKeyWords()
  - searchText(String)

Problems Search Console

Console

Writable Smart Insert 1 : 1



# RD*i*

(based on Eclipse)

The screenshot displays the RD*i* IDE interface. The top window is titled "iSeries Projects - FT5501.SQLRPGLE - IBM Rational Software Development Platform". The main editor shows the source code for FT5501.SQLRPGLE, which includes a header section with product information and a data section with copybook references.

```
Line 20      Column 31      Replace
.....1.....+.....2.....+.....3.....+.....4.....+.....5.....+.....6.....+
000002      H DFACTGRP(*NO) ACTGRP(*NEW) BNDDIR('QC2LE') BNDDIR('IFSTE
000003      H*****
000004      H/TITLE Create Output File from Submitted Paramters
000005      H*****
000006      H*
000007      H* Product of - Value Added Software, Inc
000008      H*           1511 East Harvard Ave
000009      H*           Salt Lake City, UT 84105
000010      H*           (801) 581-1154
000011      H*
000012      H* Copyright and Trade Secret Notice
000013      H*
000014      H* Trade Secret Property of Value Added Software, Inc
000015      H* All rights, including copyrights reserved.
000016      H* Created: 2003
000017      H*
000018      H*****
000019      H* Original version written: 01/05/05 By: P. Helgren
000020      H* Modifications:
000022      H*
000023      H*****
000103      D/copy IFSEBOOK/QRPGLESRC,IFSIO_H
000104      D/copy IFSEBOOK/QRPGLESRC,ERRNO_H
```

The bottom window shows the "iSeries Commands Log" and "iSeries Job Status" tabs. The "iSeries Job Status" tab contains a table with the following columns: Description, Resource, In Folder, and Location. The table is currently empty.

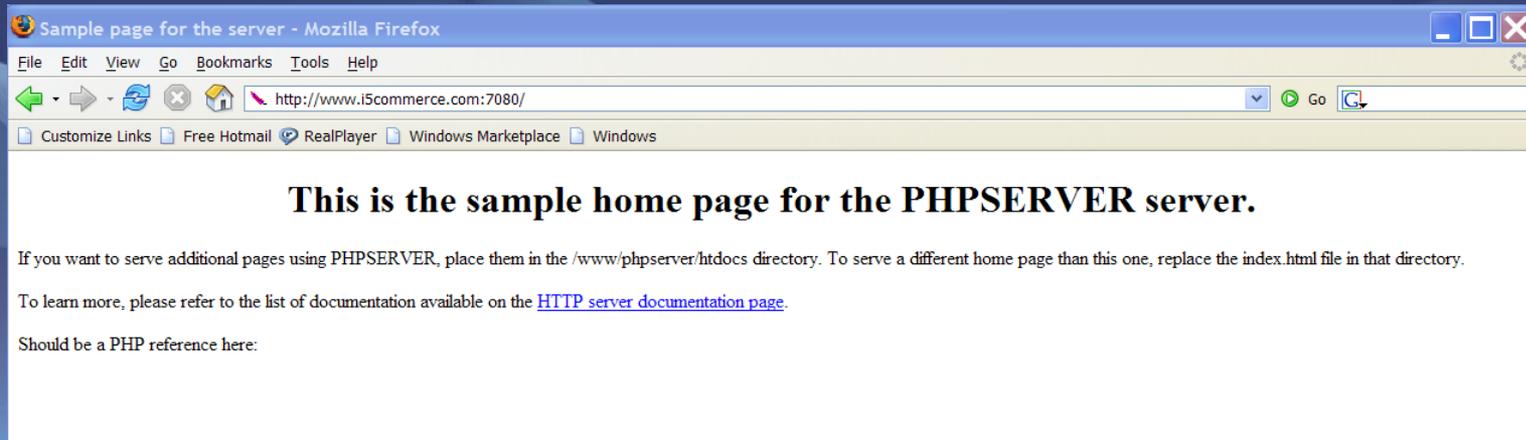
Description	Resource	In Folder	Location
0 Items			

# Apache on i

- Easy to install – It's already there! (or should be: go licpgm check for 5722DG1 - IBM HTTP Server
- On V5R3M0 (who is still running that?) and above it is the **ONLY** HTTP server installed.
- On V5R2M0 you could have both the Original Server **AND** Apache

# Apache on i - Example

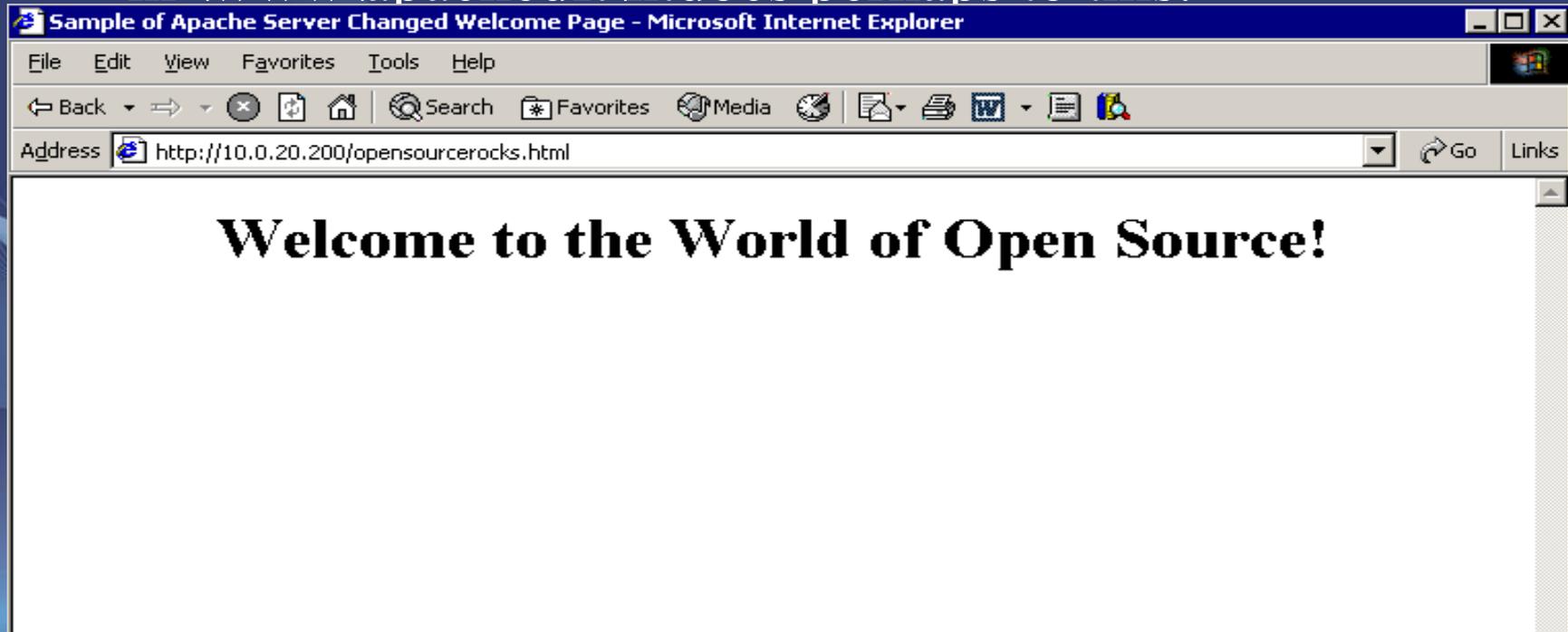
- Not running?:
  - STRTCPSVR SERVER(\*HTTP) HTTPSVR(\*ADMIN)
  - STRTCPSVR SERVER(\*HTTP) HTTPSVR(APACHEDFT)
- Welcome page should look like this:



# Apache on i – Example

(cont)

- You can modify the welcome page (index.html) found in `\www\apachedft\htdocs` perhaps to this:

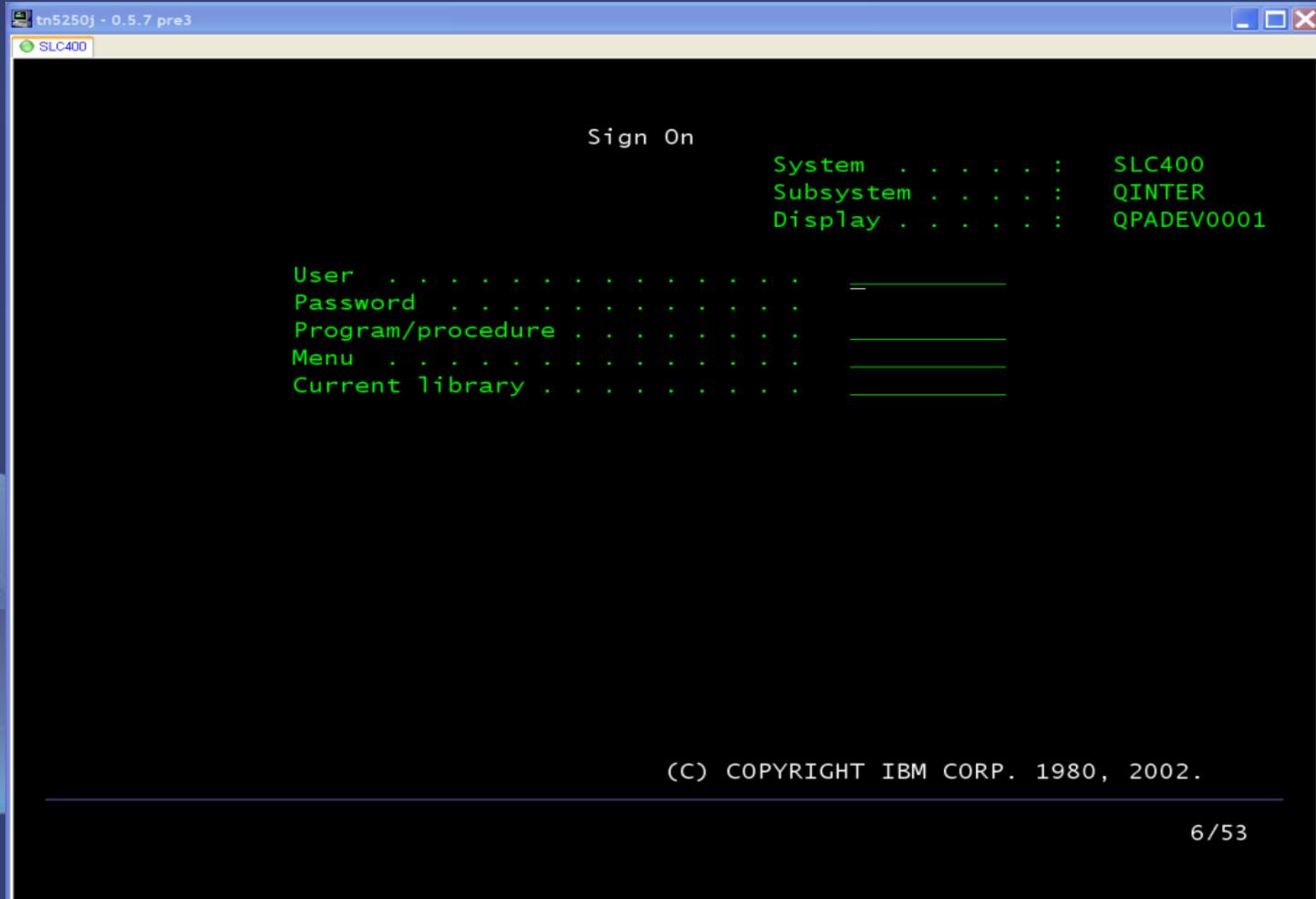


# tn5250j

- Java 5250 emulation
  - Cross platform (Mac/Linux/Windows)
- File transfer
- Spoolfile transfer and conversion
- Open Source (free!)
- <http://tn5250j.sourceforge.net/index.html>

# tn5250j - Example

- What can I say? It's 5250 at it's best!



```
tn5250j - 0.5.7 pre3
SLC400

Sign On

System . . . . . : SLC400
Subsystem . . . . . : QINTER
Display . . . . . : QPADEV0001

User . . . . . : _____
Password . . . . . : _____
Program/procedure . . . . . : _____
Menu . . . . . : _____
Current library . . . . . : _____
```

(C) COPYRIGHT IBM CORP. 1980, 2002.

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# Tomcat

- Tomcat is an Open Source “servlet container” (think of it as a server service that runs Java web applications )
- WebSphere application server is also a servlet container. It is an enhanced implementation with some IBM specific features.
- <http://jakarta.apache.org/tomcat/index.html>

# Tomcat - Installation

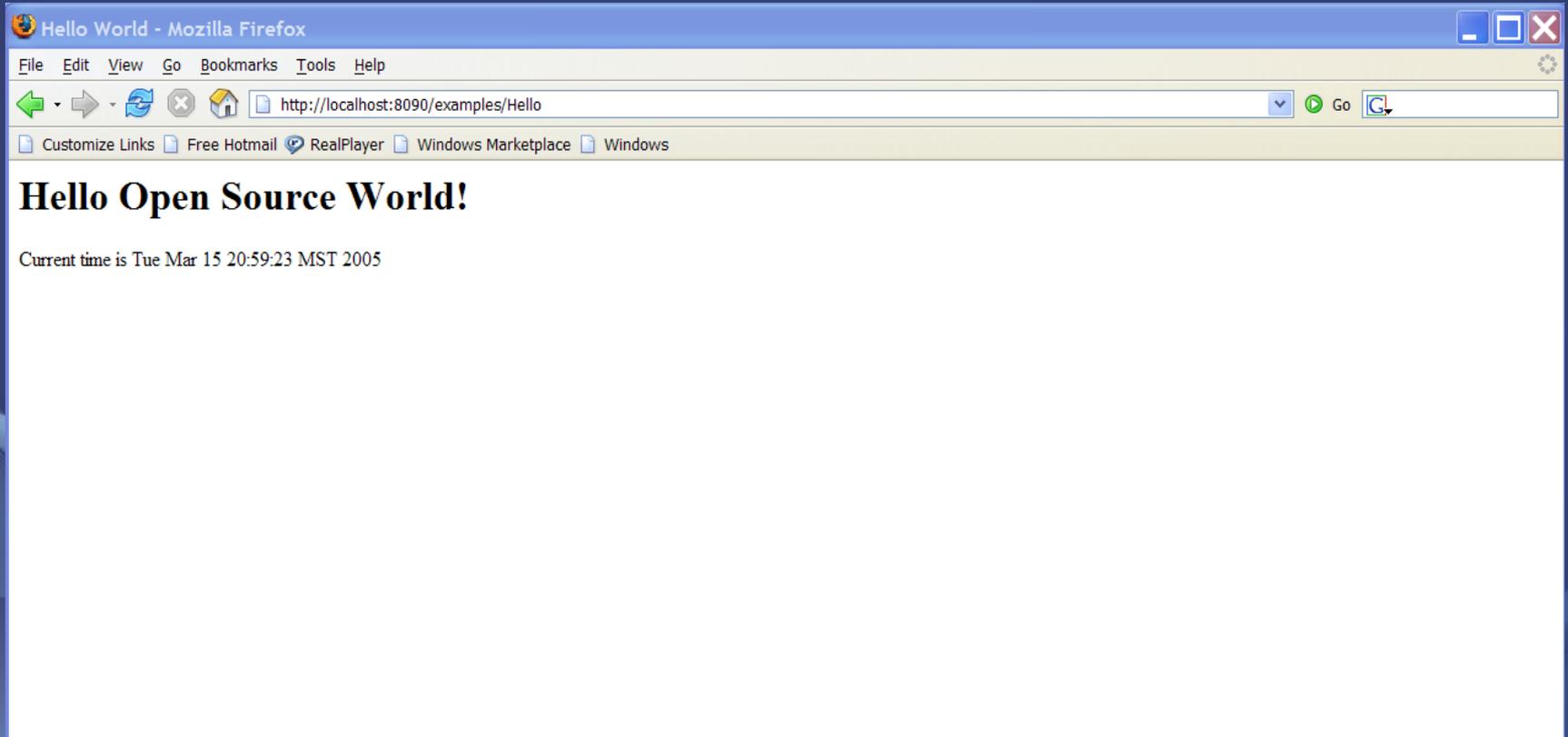
- Manual Installation Instructions:
    - Unzip it and set the port
  - Downloads
    - <http://tomcat.apache.org/download-70.cgi>
  - It is about as difficult as unzipping the Tomcat download
- If you can unzip a file you can install Tomcat

# Tomcat - Example

- Build a simple example servlet and run it

```
1 package com.valadd.examples;
2
3 import java.io.*;
4
5
6
7 // Step 1: Define a subclass of HttpServlet
8 public class HelloWorldServlet extends HttpServlet {
9
10     // Step 2: Override appropriate doXXX(...) method
11     public void doGet(HttpServletRequest request, HttpServletResponse response)
12         throws ServletException, IOException {
13
14         // Step 3. Set the MIME content of the response
15         response.setContentType("text/html");
16
17         // Step 4. Get a print writer to send information back to client
18         PrintWriter out = response.getWriter();
19
20         // Step 5. Now "print" the information back to the client
21         out.println("<html>");
22         out.println("<head><title>Hello World</title></head>");
23         out.println("<body>");
24         out.println("<h1>Hello Open Source World!</h1>");
25         out.println("Current time is " + new java.util.Date());
26         out.println("</body></html>");
27     }
28 }
29
```

# Tomcat Example (cont)



# Freemarker

- What is FreeMarker?
- FreeMarker is a "template engine"; a generic tool to generate text output (anything from HTML to autogenerated source code) based on templates. It's a Java package, a library for Java programmers. It's not an application for end-users in itself, but something that programmers can embed into their products.
- In some respects Freemarker is much like writing a simple 5250 app using SDA and RPG.

# Freemarker (cont)

- Read in the template
- Read in the data
- Write to the HTTP server

# Freemarker - Example

- Template looks like this:

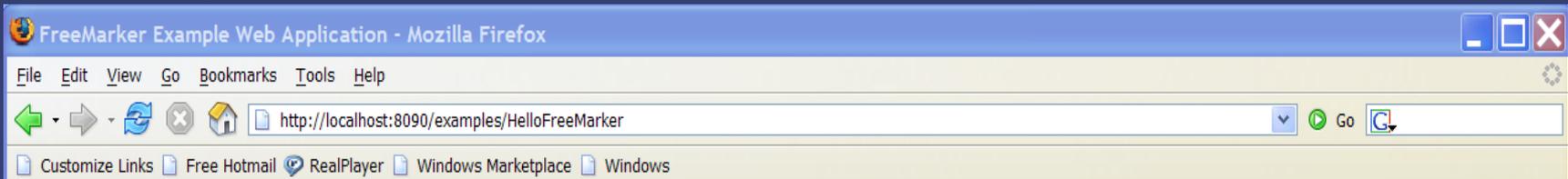
```
1<html>
2<head>
3  <title>FreeMarker Example Web Application</title>
4</head>
5<body>
6  <h1> ${message} </h1>
7</body>
8</html>
```

# Freemarker Example (cont)

- Java source looks like this

```
1 package com.valadd.examples;
2
3 import java.util.*;
4
5
6
7
8
9 public class HelloFreeMarkerServlet extends HttpServlet {
10     private Configuration cfg;
11
12     public void init() {
13         // Prepare the Freemarker configuration;
14         // - Load templates from the WEB-INF/templates directory of the Web app.
15         cfg = Configuration.getDefaultConfiguration();
16         cfg.setServletContextForTemplateLoading(
17             getServletContext(), "WEB-INF/templates");
18     }
19     protected void doGet(HttpServletRequest req, HttpServletResponse resp)
20         throws ServletException, IOException {
21
22         // Build the data-model
23         Map root = new HashMap();
24         root.put("message", "Hello FreeMarker & Open Source World!");
25
26         // Get the templat object
27         Template t = cfg.getTemplate("test.ftl");
28
29         // Prepare the HTTP response:
30         // - Use the charset of template for the output
31         // - Use text/html MIME-type
32         resp.setContentType("text/html; charset=" + t.getEncoding());
33         Writer out = resp.getWriter();
34
35         // Merge the data-model and the template
36         try {
37             t.process(root, out);
38         } catch (TemplateException e) {
39             throw new ServletException(
40                 "Error while processing Freemarker template", e);
41         }
42     }
43 }
```

# Freemarker Example - Result



**Hello FreeMarker & Open Source World!**

# Jasper Reports

- Jasper Reports is a powerful open source Java reporting tool that has the ability to deliver rich content onto the screen, to the printer or into PDF, HTML, XLS, CSV and XML files.
- iReport is an open source visual report builder/designer for Jasper Reports



# iReport Example

- A view of the completed design, just compile to create a .jasper file (compiled).

The screenshot shows the iReport 0.4.0 application window. The title bar reads "iReport 0.4.0 [classic 595x842 E:\iReport-0.4.0\reports\employee\_Common.jrxml]". The menu bar includes File, Edit, View, Search, Project, Build, Format, Datasource, Tools, Plugins, Window, and Help. The toolbar contains various icons for report design, including a 100% zoom level. The font settings are set to Arial, size 14, with bold, italic, and underline options. The main workspace displays a report design for "Report Sample - Common". The report structure is as follows:

Report Sample - Common					
pageHeader					
Emp ID	Address	City	State	Zip	
\$(EMPID)	\$(EMPNAM)	\$(EMPADD)	\$(EMPCTY)	\$(EMPST)	\$(EMPZIP)
new Date()			pageFooter Page " + \$(PAGE_NUMBER) + " of " + \$(		

# Jasper Reports – Example (part 1)

## Sample Code to run Jasper Report (.jasper file)

```
41 public class ReportServletInteraction extends ServletInteraction {
42
43     private static String _appPath = null;
44     private static String _reportPath = null;
45
46     public ReportServletInteraction(HttpServletRequest request, HttpServletResponse response, NiggleConfig config)
47     throws IOException    {
48
49         super(request, response, config);
50         _appPath = config.getServletContext().getRealPath("");
51         _reportPath = _appPath + "/reports/";
52     }
53
54     public void execDefault() throws IOException
55     {
56         createNewSession();
57         page = getPage("selectreport.htm");
58     }
59
60     public void execPrintReport() throws IOException
61     {
62         JRAbstractExporter exporter = null;
63         Connection aConn = null;
64
65         //Need to modify this line so that it uses the URL string for your iSeries Connection
66         //String url = "jdbc:as400://10.0.20.200/commondb;user=xxxx;password=xxxx";
67         String url = "jdbc:mysql://10.0.20.200/oscDB?user=root&password=xxxxx";
68
69
70         String reportName = getParameter("reportName") + ".jasper";
71
72         String path = _reportPath + reportName; //"Report_List.JASPER";
73
74         String expType = getParameter("format");
75
76         //path = response.encodeRedirectURL(path);
77
78         ServletOutputStream out = response.getOutputStream();
79         Map imagesMap = new HashMap();
80         Map parmMap = new HashMap();
81
```

# Jasper Reports – Example (part 2)

- Sample Code to run Jasper Report (.jasper file)

```
82     try {
83         //Class.forName("sun.jdbc.odbc.JdbcOdbcDriver");
84         //Class.forName("com.ibm.as400.access.AS400JDBCdriver");
85         Class.forName("org.gjt.mm.mysql.Driver");
86         aConn = DriverManager.getConnection(url);
87         JasperReport aReport = JasperManager.loadReport(path);
88         //JasperReport aReport = (JasperReport)JRLoader.loadObject(path);
89         JasperPrint aPrint = JasperManager.fillReport(aReport,paramMap, aConn);
90         if(expType.equals("PDF")){
91             response.setContentType("application/pdf");
92             response.setHeader("Content-disposition","inline; filename=test.pdf");
93             byte[] pdfByteArray =JasperExportManager.exportReportToPdf(aPrint);
94             out.write(pdfByteArray, 0, pdfByteArray.length);
95             out.flush();
96             out.close();
97             return;
98         }else if(expType.equals("HTML")){
99             response.setContentType("text/html");
100            exporter = new JRHtmlExporter();
101        }else if(expType.equals("EXCEL")){
102            response.setContentType("application/vnd.ms-excel");
103            exporter = new JRXlsExporter();
104            exporter.setParameter(
105                JRXlsExporterParameter.IS_ONE_PAGE_PER_SHEET, Boolean.TRUE);
106        }
107        byte[] output = null;
108        output = exportReportToBytes(aPrint, exporter);
109
110        out.write(output, 0, output.length);
111        out.flush();
112        out.close();
113        return;
114    } catch (Exception e) {
115        System.out.println("Error :" + e);
116        e.printStackTrace();
117    } finally {
118        try {
119            if (aConn != null)
120                aConn.close();
121        } catch (Exception sqle) {
122            System.out.println("SQLException Error :" + sqle);
123        }
124    }
```

# Jasper Reports – Example (part 3)

- Sample Code to run Jasper Report (.jasper file)

```
126 private static byte[] exportReportToBytes(JasperPrint jasperPrint, JRExporter
127 exporter) throws JRException {
128     byte[] output;
129     ByteArrayOutputStream baos = new ByteArrayOutputStream();
130
131     exporter.setParameter(net.sf.jasperreports.engine.JRExporterParameter.JASPER_PRINT,
132 jasperPrint);
133     exporter.setParameter(JRExporterParameter.OUTPUT_STREAM, baos);
134
135     exporter.exportReport();
136
137     output = baos.toByteArray();
138
139     return output;
140 }
141 }
```

# Jasper Reports – Sample

- Prompt screen

Select Reports Demo - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://localhost:8090/examples/Report

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### Select Output Option for Demo Report

Excel

PDF

HTML

Report Name



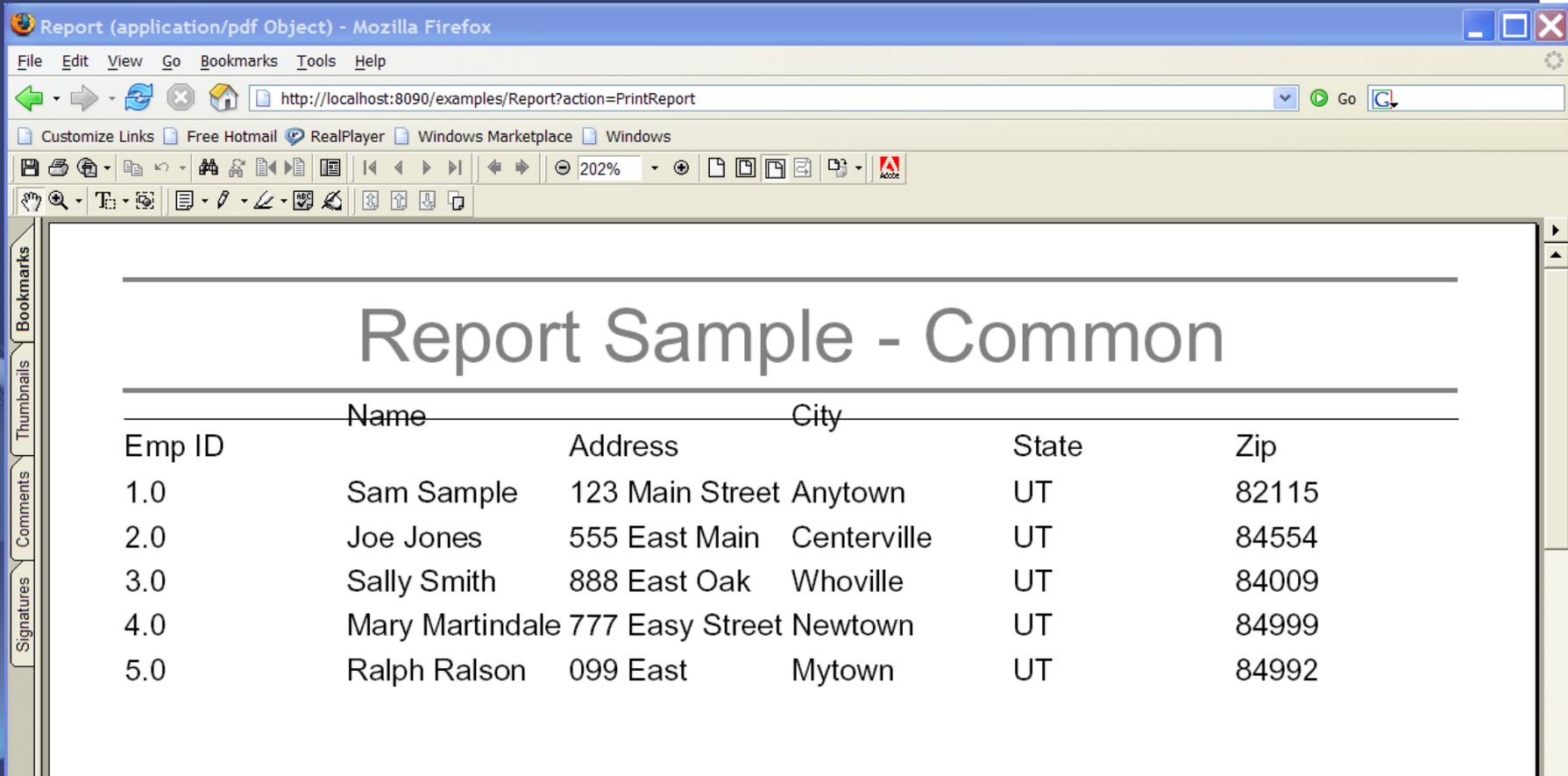
# Jasper Reports – Sample (cont)

- Report Output

Report Sample - Common

Emp ID	Name	Address	City	State	Zip
1.0	Sam Sample	123 Main Street	Anytown	UT	82115
2.0	Joe Jones	555 East Main	Centerville	UT	84554
3.0	Sally Smith	888 East Oak	Whoville	UT	84009
4.0	Mary Martindale	777 Easy Street	Newtown	UT	84999
5.0	Ralph Ralson	099 East	Mytown	UT	84992

# Jasper Reports – PDF Sample



Report (application/pdf Object) - Mozilla Firefox

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http://localhost:8090/examples/Report?action=PrintReport

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## Report Sample - Common

Emp ID	Name	Address	City	State	Zip
1.0	Sam Sample	123 Main Street	Anytown	UT	82115
2.0	Joe Jones	555 East Main	Centerville	UT	84554
3.0	Sally Smith	888 East Oak	Whoville	UT	84009
4.0	Mary Martindale	777 Easy Street	Newtown	UT	84999
5.0	Ralph Ralson	099 East	Mytown	UT	84992

# Jasper Reports – Using RPG

- Use the RPG Report Generator I wrote found here:

<http://www.petesworkshop.com/downloads/rre.zip>

# PHP on the i

- PHP is a widely-used general-purpose scripting language that is especially suited for Web development and can be embedded into HTML.
- PHP runs in the PASE environment on the i.
- Runs with Apache
- Zend has teamed with IBM and released a more “native” version. Find it here:  
<http://www.zend.com/en/solutions/modernize-ibm-i/ibm-i-php-get-started>

# PHP on i - Example

- PHP source:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
"http://www.w3.org/TR/html4/loose.dtd">
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
<title>Untitled Document</title>
</head>

<body>
<h1> Hello PHP on iseries world - open source Rocks !! </h1><br>
Here is the info that proves it! <br>
<?phpinfo()?>
</body>
</html>
```

# PHP on i - Output

Untitled Document - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://www.i5commerce.com:7080/HelloPHPiSeries.php

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## Hello PHP on iSeries World - Open Source Rocks !!

Here is the info that proves it!

**PHP Version 4.3.5**

<b>System</b>	OS400 SLC400.SLCTimptech.com 2 5 0010000F388F
<b>Build Date</b>	Apr 2 2004 17:28:31
<b>Configure Command</b>	'./configure' '--with-config-file-path=/QOpenSys/php/etc' '--prefix=/QOpenSys/php/' '--enable-force-cgi-redirect' '--with-mysql' '--with-ibm-db2' '--with-pear' '--enable-magic-quotes' '--with-zlib' '--enable-inline-optimization' '--disable-debug' '--build=powerpc-ibm-aix4.3.3.0' '--host=powerpc-ibm-aix4.3.3.0'
<b>Server API</b>	CGI
<b>Virtual Directory Support</b>	disabled
<b>Configuration File (php.ini) Path</b>	/QOpenSys/php/etc/php.ini
<b>PHP API</b>	20020918
<b>PHP Extension</b>	20020429
<b>Zend Extension</b>	20021010
<b>Debug Build</b>	no
<b>Thread Safety</b>	disabled
<b>Registered PHP Streams</b>	php, http, ftp, compress.zlib

This program makes use of the Zend Scripting Language Engine:  
Zend Engine v1.3.0, Copyright (c) 1998-2004 Zend Technologies

# MySQL on i

- MySQL, like PHP, runs on the iSeries.
- Admin tools, like PHPMyAdmin can be used to administer mySQL on the iSeries

# MySQL on the i - installation

- Pre-V5R3M0 -Like PHP, not for the feint of heart
- Great instructions at [i5php.net](http://i5php.net)
- Binaries are already available at [i5php.net](http://i5php.net) or you can compile your own
- Zend installer now loads MySQL as well

# MySQL on i - Example

- Let's run the prior Jasper Reports servlet but connect to the mySQL instance on the iSeries
- The report will access the i5Commerce product catalog.

# MySQL on i - Output

Report (application/pdf Object) - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://localhost:8090/examples/Report?action=PrintReport

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## i5Commerce Products

Product ID	Product Name	Description	Product URL	products_vie
1	Matrox G200 MMS	Reinforcing its position as a	www.matrox.	1
2	Matrox G400 32MB	<b>Dramatically Different	www.matrox.	0
3	Microsoft IntelliMouse Pro	Every element of	www.microsoft.	3
4	The Replacement Killers	Regional Code: 2 (Japan,	www.replacement-killers.com	0
5	Blade Runner - Director's Cut	Regional Code: 2 (Japan,	www.bladerunner.com	0
6	The Matrix	Regional Code: 2 (Japan,	www.thematrix.com	0
7	You've Got Mail	Regional Code: 2 (Japan,	www.youvegotmail.com	0
8	A Bug's Life	Regional Code: 2 (Japan,	www.abugslife.com	0
9	Under Siege	Regional Code: 2 (Japan,		0
10	Under Siege 2 - Dark Territory	Regional Code: 2 (Japan,		0
11	Fire Down Below	Regional Code: 2 (Japan,		0
12	Die Hard With A Vengeance	Regional Code: 2 (Japan,		0
13	Lethal Weapon	Regional Code: 2 (Japan,		0
14	Red Corner	Regional Code: 2 (Japan,		0
15	Frantic	Regional Code: 2 (Japan,		0
16	Courage Under Fire	Regional Code: 2 (Japan,		0
17	Speed	Regional Code: 2 (Japan,		0
18	Speed 2: Cruise Control	Regional Code: 2 (Japan,		0
19	There's Something About Mary	Regional Code: 2 (Japan,		1
20	Beloved	Regional Code: 2 (Japan,		1
21	SWAT 3: Close Quarters Battle	<b>Windows	www.swat3.com	0
22	Unreal Tournament	From the creators of the	www.unrealtournament.net	0
23	The Wheel Of Time	The world in which The	www.wheeloftime.com	0
24	Disciples: Sacred Lands	A new age is dawning...		0

1 of 4 11.69 x 8.26 in

Done

# JT400

- Fairly comprehensive set of utilities for accessing i commands, api's and data
- **FREE!**

# JT400 Example

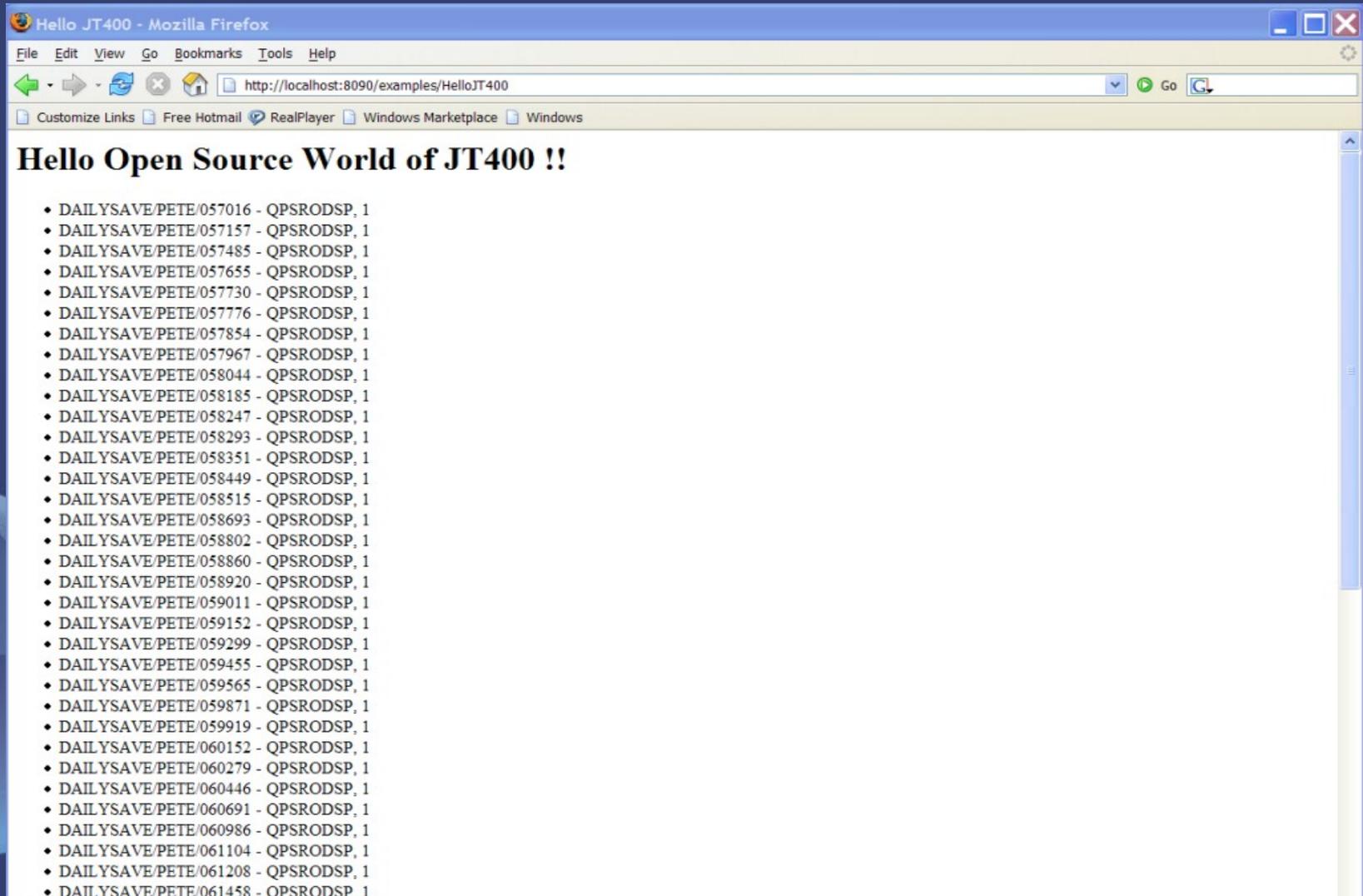
- Without the catch blocks

```
1 package com.valadd.examples;
2
3 import java.io.*;
4
15 // Step 1: Define a subclass of HttpServlet
16 public class HelloJT400Servlet extends HttpServlet {
17
18     // Step 2: Override appropriate doXXX(...) method
19     public void doGet(HttpServletRequest request, HttpServletResponse response)
20         throws ServletException, IOException {
21
22         // Step 3. Set the MIME content of the response
23         response.setContentType("text/html");
24
25         // Step 4. Get a print writer to send information back to client
26         PrintWriter out = response.getWriter();
27
28         // Step 5. Now "print" the information back to the client
29         out.println("<html>");
30         out.println("<head><title>Hello JT400</title></head>");
31         out.println("<body>");
32         out.println("<h1>Hello Open Source World of JT400 !!</h1>");
33         AS400 system = new AS400("10.0.20.200", "██████", "██████");
34         SpooledFileOpenList list = new SpooledFileOpenList(system);
35         list.setFilterUsers(new String[] { "*CURRENT" }); // Get all of myUserID's
36         list.addSortField(SpooledFileOpenList.JOB_NUMBER, true); // Sort the list b
37         try {
38             list.open();
```

# JT400 Example (cont.)

```
61     Enumeration enum;
62     out.println("<UL>");
63     try {
64         enum = list.getItems();
65         while (enum.hasMoreElements())
66             {
67                 SpooledFileListItem item = (SpooledFileListItem)enum.nextElement();
68
69                 out.println("<LI>"+item.getJobName()+"/"+item.getJobUser()+"/"+item.getJobNumber()+
70                             "+ " - "+item.getName()+", "+item.getNumber());
71             }
72     out.println("</UL>");
73     list.close();
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97     out.println("</body></html>");
98 }
99 }
```

# JT400 Output



Hello JT400 - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://localhost:8090/examples/HelloJT400

Customize Links Free Hotmail RealPlayer Windows Marketplace Windows

## Hello Open Source World of JT400 !!

- DAILYSAVE/PETE/057016 - QPSRODSP, 1
- DAILYSAVE/PETE/057157 - QPSRODSP, 1
- DAILYSAVE/PETE/057485 - QPSRODSP, 1
- DAILYSAVE/PETE/057655 - QPSRODSP, 1
- DAILYSAVE/PETE/057730 - QPSRODSP, 1
- DAILYSAVE/PETE/057776 - QPSRODSP, 1
- DAILYSAVE/PETE/057854 - QPSRODSP, 1
- DAILYSAVE/PETE/057967 - QPSRODSP, 1
- DAILYSAVE/PETE/058044 - QPSRODSP, 1
- DAILYSAVE/PETE/058185 - QPSRODSP, 1
- DAILYSAVE/PETE/058247 - QPSRODSP, 1
- DAILYSAVE/PETE/058293 - QPSRODSP, 1
- DAILYSAVE/PETE/058351 - QPSRODSP, 1
- DAILYSAVE/PETE/058449 - QPSRODSP, 1
- DAILYSAVE/PETE/058515 - QPSRODSP, 1
- DAILYSAVE/PETE/058693 - QPSRODSP, 1
- DAILYSAVE/PETE/058802 - QPSRODSP, 1
- DAILYSAVE/PETE/058860 - QPSRODSP, 1
- DAILYSAVE/PETE/058920 - QPSRODSP, 1
- DAILYSAVE/PETE/059011 - QPSRODSP, 1
- DAILYSAVE/PETE/059152 - QPSRODSP, 1
- DAILYSAVE/PETE/059299 - QPSRODSP, 1
- DAILYSAVE/PETE/059455 - QPSRODSP, 1
- DAILYSAVE/PETE/059565 - QPSRODSP, 1
- DAILYSAVE/PETE/059871 - QPSRODSP, 1
- DAILYSAVE/PETE/059919 - QPSRODSP, 1
- DAILYSAVE/PETE/060152 - QPSRODSP, 1
- DAILYSAVE/PETE/060279 - QPSRODSP, 1
- DAILYSAVE/PETE/060446 - QPSRODSP, 1
- DAILYSAVE/PETE/060691 - QPSRODSP, 1
- DAILYSAVE/PETE/060986 - QPSRODSP, 1
- DAILYSAVE/PETE/061104 - QPSRODSP, 1
- DAILYSAVE/PETE/061208 - QPSRODSP, 1
- DAILYSAVE/PETE/061458 - QPSRODSP, 1

# EASY400

- “One stop shopping” for all things CGI on the i.
- Open Source RPG CGI programs for the Web.
- “EASY” to develop HTML based applications using RPG.
- There are other RPG CGI tools available.

# EASY400 - Example

- EASY to install and then:



## Welcome to Easy400 powered by Apache

Last update: 12/30/2001 16:17:17

Our Easy400 downloadable applications have all been successfully tested under V4R5 and V5R1 HTTP server powered by Apache.  
No changes to our applications were necessary to have them working under Apache.  
The whole thing was just done by

- Defining to the HTTP a new server (powered by Apache)
- Defining the Apache directives for such a server.

If you want, you may read what was [my experience](#) in "*migrating*" my traditional HTTP directives to Apache. There you will also find:

- some tips about implementing page protection
- some interim conclusions about migrating / creating a new HTTP server (powered by Apache)
- my Apache configuration, to be used as an example.

If you care, you may also [download and install](#) our library EASY400&PC. It will allow you to run all of our deliverables under an HTTP server instance (powered by Apache).

---

Please find hereafter some useful documentation on this subject and the list of the Easy400 applications which I have already successfully run under Apache.

### 1. Apache documentation

- **IBM** HTTP Server (powered by Apache)
- **IBM** IBM HTTP Server for iSeries Documentation Center
- **Easy400** Collection of articles on iSeries 400 HTTP and Apache
- **apache.org** Apache HTTP Server Project
- **apache.org** Apache directives

### 2. Easy400 applications configured for running under an HTTP server powered by Apache

- **CGIDEV2** ILE-RPG CGI development toolset, comprehensive of tutorial, examples and demos
- **CENTAUR2** An attractive e-commerce ILE-RPG CGI demo
- **CGI400C2** Our HTML and CGI self-learning class
- **JS2** Our JavaScript tutorial

# EASY400 - Summary

- Easy to install
- Use of RPG and HTML helps you to transition to more web based development.
- Lots of installations of EASY400.



# WRKODBCJOB

- It simply works. Great for diagnosing ODBC/JDBC connection issues.

```
Work ODBC Jobs                                SLC400
                                           3/15/05  22:00:28

Type options, press Enter.
  1=Job Status   2=Job Definition   3=Run Attributes   4=Spool Files
 10=Job Log      11=Call Stack      12=Locks           13=Library List
 14=Open Files   15=Overrides       16=Commitment Status  99=Kill Job

Job      Job      Serving
Opt  Subsystem  Job Name  User Name  Number  User Name  IP Address
 1_  QUSRWRK    QZDASOINIT  QUSER    065954  DEMO      216.250.76.221
  __  QUSRWRK    QZDASOINIT  QUSER    067041  DEMO      216.250.76.221
  __  QUSRWRK    QZDASOINIT  QUSER    087999  ASAAP     10.0.20.134
  __  QUSRWRK    QZDASOINIT  QUSER    153925  DEMO      216.250.76.221
  __  QUSRWRK    QZDASOINIT  QUSER    154015  DEMO      216.250.76.221
  __  QUSRWRK    QZDASOINIT  QUSER    154021  DEMO      216.250.76.221
  __  QUSRWRK    QZDASOINIT  QUSER    154106  DEMO      216.250.76.221
  __  QUSRWRK    QZDASOINIT  QUSER    154154  DEMO      216.250.76.221
  __  QUSRWRK    QZDASOINIT  QUSER    154178  DEMO      216.250.76.221
  __  QUSRWRK    QZDASOINIT  QUSER    154408  DEMO      127.0.0.1

More...
```

F3=Exit    F5=Refresh    F12=Cancel

# Thank you!

- Happy programming in the Open Source world!