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embracing change, unlocking the future

Everything you always wanted to know about OpenEdge/Java integration but were afraid to ask

Frank Hilhorst
President Progressive Consulting Inc.

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What is my goal today?

- Have you walk out of here with new ideas about what you can do with a business application
- Show you how you can implement these ideas
- Give you a set of examples and tools

How am I going to go about achieving this goal

- Making the case
  - Why should you care
- Current state of integration OERA/JAVA
- Walk through sample OpenClient project
  - Showing some strategies for OpenEdge/ JAVA integration
- Go over the tools and sample implementations in the toolkit

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Making the case why you should care

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A look at our solar system in the software universe

Planet Microsoft

Planet JAVA

Planet OpenEdge

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I have a dream ...

that one day the OpenEdge business application will sit together with the JAVA applications at the table of Open Source brotherhood and the JAVA applications will endow them with all kinds of cool features

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Demo

- OpenEdge Call Center application
  - Integrates with Google Voice through a JAVA Servlet
    - Google Voice calls the cutomer from the Agent's phone
      - Agent screen is automatically populated with customer data

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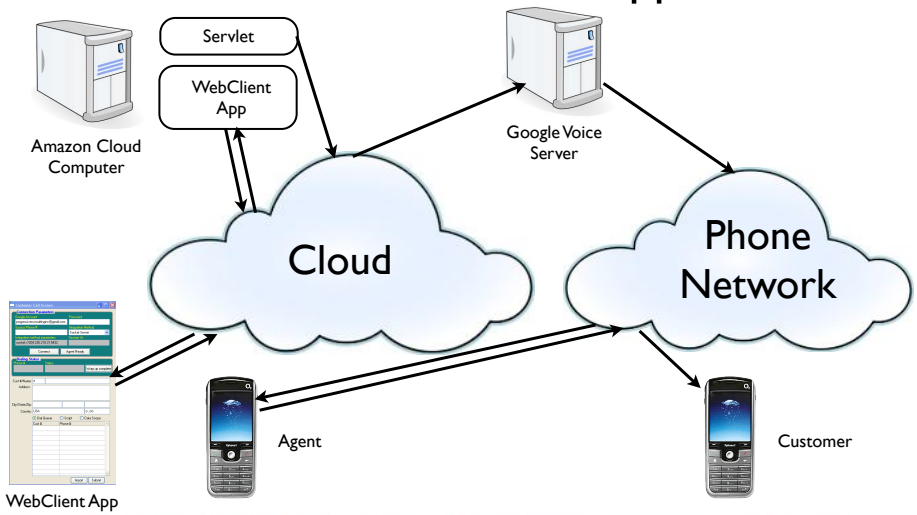
Architecture of Call Center Application



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The cost of the Call Center application

Component	Cost
Jetty servlet engine	Free
ActiveMQ JMS server	Free
OpenEdge Call Center app	Free
4GL STOMP Adapter	Free

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What is in the Toolkit

- Jetty Servlet engine
- ActiveMQ JMS Server
- Servlet with Google Voice API
- 4GL Agent Screen based upon the Sports database
- 4GL STOMP JMS Adapter

Current state of integration OERA/JAVA

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Current implementations of JAVA in the OERA

- Web Services Adapter (Wsa Servlet)
- Internet Adapter (Aia servlet)
- SonicMq JMS server
  - Sonic 4GL Adapter
- Savvion
- OpenEdge architect (Eclipse)

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Reasons why Planet OpenEdge and Planet Java are converging

- ABL OO
- Eclipse (OpenEdge architect)
- Mobile applications

Java terminologies and their Progress equivalents

Java Terminology	Progress Equivalent
J2EE (Java 2 Enterprise Edition)	OERA (OpenEdge Reference Architecture)
Servlet Engine (Tomcat)	WebSpeed
Servlet ● web.xml	Cgi Wrapper ● progress.ini
JSP (Java Server Page)	Speedscript
Java Bean	Appserver procedure
Jar library	Shared procedure library

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Options for integrating JAVA functionality into an OpenEdge application

- Servlet
  - With OpenClient connection to Progress
- Sockets
- JMS (Soniq, ActiveMq)
- JNI
  - Wrap JVM in a .dll or ActiveX control

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Approaching JAVA from a PROGRESS perspective

- What you will look for ....
  - The temp-table
- What you will find .....
  - Hash tables, vectors, arrays, collections etc.
- What you will be unfamiliar with ....
  - multithreading

Walk through sample Project

Servlet with JAVA OpenClient integration

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What you need to know about Servlets

- Development starts with an object that extends the httpServlet class
- End product of a JAVA servlet project is a .war file
  - .war file gets deployed in the webapps directory of the servlet engine
- Each servlet comes with a web.xml configuration file
  - Acts like the progress.ini for that servlet

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Steps involved in a JAVA OpenClient project

- Create Appserver procedure you want to call from JAVA
- Create a Java Proxy for the appserver procedure with ProxyGen
- Create .jar file for JAVA classes
- Create JAVA project
- Import proxy and OpenClient .jars
- Code JAVA Project

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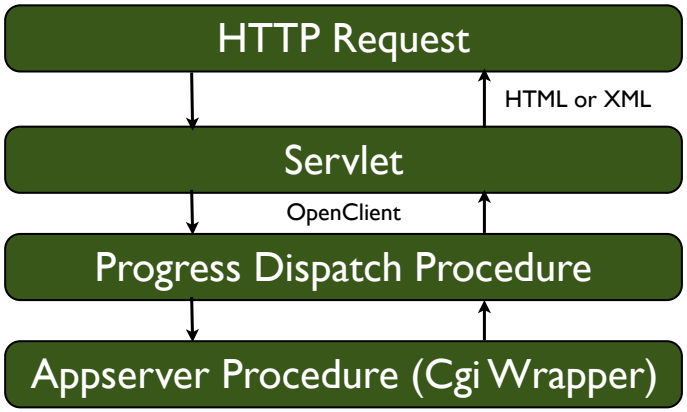
Diagram of sample project



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What the dispatch procedure looks like

Procedure Editor - Untitled:1

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```
DEFINE INPUT PARAMETER icOperation AS CHARACTER   NO-UNDO.
DEFINE INPUT PARAMETER ilcInputParameters AS LONGCHAR NO-UNDO.
DEFINE OUTPUT PARAMETER ocContentType AS CHARACTER   NO-UNDO.
DEFINE OUTPUT PARAMETER olcOutput AS LONGCHAR NO-UNDO.

RUN VALUE(icOperation) (
   INPUT ilcInputParameters,
   OUTPUT ocContentType,
   OUTPUT olcOutput) NO-ERROR.

IF  ERROR-STATUS:ERROR THEN
DO:
   ASSIGN ocContentType = "text/html"
         olcOutput =
          "<html><head>" +
          "<title>ProCgi Dispatch Error</title>" +
          "</head><body>" +
          SUBST("<h1>&1 - &2</h1>",
              ERROR-STATUS:GET-NUMBER(1),
              ERROR-STATUS:GET-MESSAGE(1)) +
          "</body></html>".
END.
```

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What the Cgi Wrapper include file looks like

```
DEFINE INPUT PARAMETER ilcInputParameters AS LONGCHAR NO-UNDO.
DEFINE INPUT PARAMETER ilcFileUpload AS LONGCHAR NO-UNDO.
DEFINE OUTPUT PARAMETER ocContentType AS CHARACTER   NO-UNDO.
DEFINE OUTPUT PARAMETER olcOutput AS LONGCHAR NO-UNDO.

&GLOBAL-DEFINE OUT  olcOutput =  olcOutput +
&GLOBAL-DEFINE OUT-LONG  olcOutput =  olcOutput +

FUNCTION get-value RETURNS CHARACTER
 ( /* parameter-definitions */
    icParName AS CHARACTER )  FORWARD.

FUNCTION output-content-type RETURNS LOGICAL
 ( /* parameter-definitions */
  icContentType AS CHAR )  FORWARD.
```

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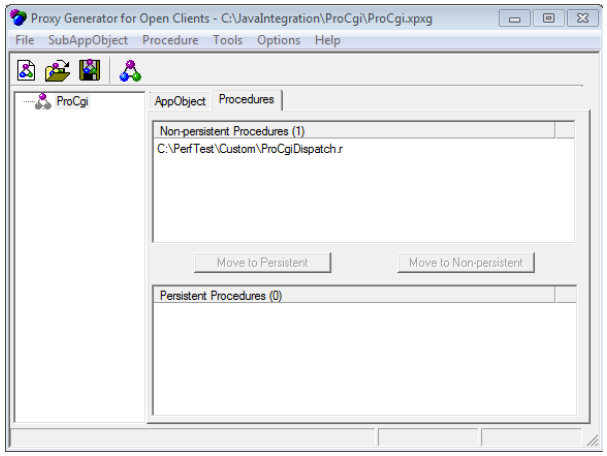
Creating a JAVA Proxy for the dispatch procedure



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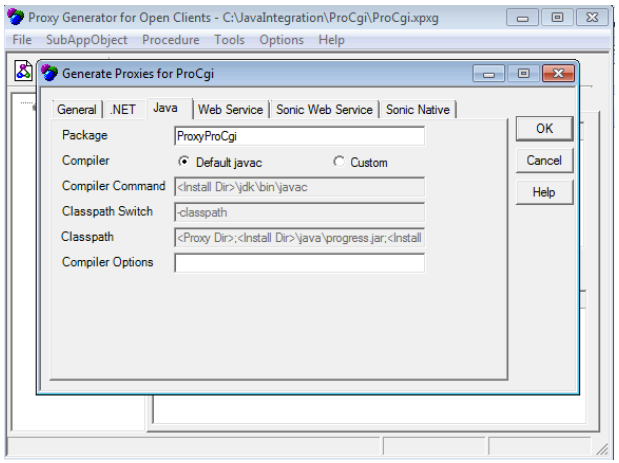
Creating a JAVA Proxy for the dispatch procedure (continued)



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The JAVA files created by ProxyGen

C:\Windows\system32\cmd.exe

```
C:\JavaIntegration\ProCgi>dir .\ProxyProCgi\*.*
 Volume in drive C has no label.
 Volume Serial Number is 28BC-2DBA

 Directory of C:\JavaIntegration\ProCgi\ProxyProCgi

04/07/2012  03:32 PM    <DIR>          .
04/07/2012  03:32 PM    <DIR>          ..
04/07/2012  03:32 PM             3,462 ProCgi.class
04/07/2012  03:32 PM             7,406 ProCgi.java
04/07/2012  03:32 PM             1,971 ProCgiImpl.class
               3 File(s)        12,839 bytes
               2 Dir(s)  36,490,874,880 bytes free

C:\JavaIntegration\ProCgi>
```

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Create a .jar library for the JAVA proxy classes

- jar cvf ProxyProCgi.jar ./ProxyProCgi/*.class

```
Franciscus-Hilhorsts-MacBook-Pro:ProxyProCgi frankhil1567$ jar cvf ProxyProCgi.jar ./ProxyProCgi/*.class
added manifest
adding: ProxyProCgi/ProCgi.class(in = 3462) (out= 1363)(deflated 60%)
adding: ProxyProCgi/ProCgiImpl.class(in = 1971) (out= 907)(deflated 53%)
Franciscus-Hilhorsts-MacBook-Pro:ProxyProCgi frankhil1567$
```

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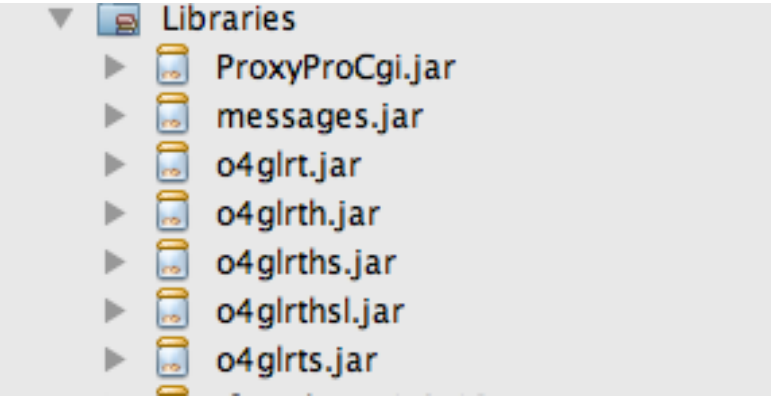
Import the Proxy jar and the JAVA OpenClient jar's into JAVA project



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3 Step process of Executing a Proxy method

- Create Appserver Connection object
- Instantiate proxy object passing connection object as input parameter
- Execute method in proxy object

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JAVA code for Executing a Proxy method

```
public String ProCgiDispath(HttpServlet servlet,
                            String cOperation,
                            String cQueryParameters,
                            StringHolder ocContentType,
                            StringHolder ocOutput)
    throws Open4GLException IOException{
  String cAppserverUrl = servlet.getInitParameter("AppserverUrl");
  // Step 1 create Appserver Connection OBJECT
  Connection appServerConnection = new Connection(cAppserverUrl, "", "");
  // Step 2 Instantiate proxy object passing connection object as INPUT
  ProCgi ghAppserver = new ProCgi(appServerConnection);
  // Step 3 Execute method in proxy object
  ghAppserver.ProCgiDispatch(cOperation,
                             cQueryParameters,
                             ocContentType,
                             ocOutput);
}
```

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The next Strategy for Integration

- Object to Object mapping
  - Create 4GI objects with same attributes and methods as Java objects
    - Serialize 4GL objects to XML
      - Serialize XML back to Java Objects

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So what if we could create Graphs directly from a CGI wrapper?

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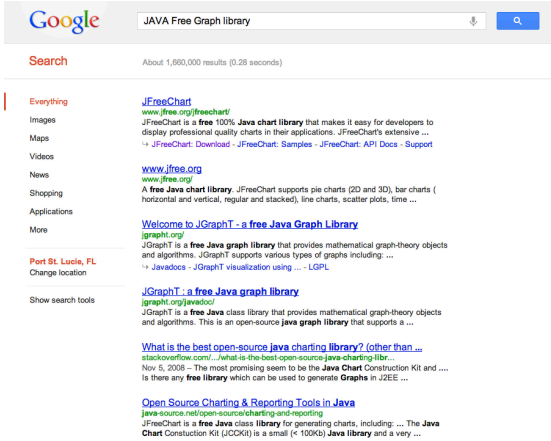
So let's stick our hand in the cooky jar



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Basic steps for creating a Graph with JFreeChart

- Create dataset object
- Populate dataset object with graph data
- Create Graph object passing dataset as input parameter
- Stream Graph as .png file to the browser

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What the Java Code looks like

```
protected void processRequest(HttpServletRequest request,
                              HttpServletResponse response){
  OutputStream out = response.getOutputStream();
  /*... Step 1 Create dataset OBJECT ..*/
  DefaultCategoryDataset dataset = new DefaultCategoryDataset();
  /*... Step 2 Populate dataset with data ..*/
  dataset.addValue(10.0, "S1", "C1");
  dataset.addValue(4.0, "S1", "C2");
  /*... Step 3 Create graph object with dataset as input ...*/
  JFreeChart chart = ChartFactory.createBarChart(
                     "Bar Chart",
                      "Category",
                     "Value",
                     dataset,
                     PlotOrientation.VERTICAL,
                     true, true, false);
  response.setContentType("image/png");
  /*.. Step 4 Stream Graph as a .png file to the browser ..*/
  ChartUtilities.writeChartAsPNG(out, chart, 400, 300);
}
```

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4GL Cgi Wrapper code for a simple Pie Chart

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```
output-content-type ("text/xml":U).
pieDataSet = NEW TurboGraph.DefaultPieDataset().
viCountryCnt = 0.
FOR EACH Customer BREAK BY Customer.Country:
    viCountryCnt = viCountryCnt + 1.
    IF LAST-OF(Customer.Country) THEN
    DO:
       pieDataSet:setValue(Customer.Country +
                                   SUBST(" (&1)",viCountryCnt), DEC(viCountryCnt)).
    END.
 END.
 pieChart = NEW TurboGraph.PieChart(pieDataSet).
 pieChart:setWidth(800).
 pieChart:setHeight(600).
 pieChart:setDisplayIn3D(FALSE).
 pieChart:setTitle("Customers by Country").
 lcSerializedXml = pieChart:Serialize().
 {&OUT} lcSerializedXml.
```

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What the serialized XML looks like


```xml
<?xml version="1.0"?>
- <Chart title="Sales by Country by Month" categoryAxisLabel="" valueAxisLabel="" display1n3D="true " height="600" width="800"
  type="BarChart">
  - <DataSet>
      <DatasetRow Value="19075.61" Key="Austria" Category="DEC 1997"/>
      <DatasetRow Value="4603.72" Key="Finland" Category="DEC 1997"/>
      <DatasetRow Value="8704.73" Key="France" Category="DEC 1997"/>
      <DatasetRow Value="40439.43" Key="Sverige" Category="DEC 1997"/>
      <DatasetRow Value="3621.32" Key="United Kingdom" Category="DEC 1997"/>
      <DatasetRow Value="687" Key="USA" Category="DEC 1997"/>
      <DatasetRow Value="18053" Key="Austria" Category="FEB 1998"/>
      <DatasetRow Value="1005" Key="Finland" Category="FEB 1998"/>
      <DatasetRow Value="1367.35" Key="France" Category="FEB 1998"/>
      <DatasetRow Value="10055.51" Key="Nederland" Category="FEB 1998"/>
      <DatasetRow Value="688.37" Key="United Kingdom" Category="FEB 1998"/>
      <DatasetRow Value="15126.78" Key="USA" Category="FEB 1998"/>
      <DatasetRow Value="6091.48" Key="Austria" Category="JAN 1998"/>
      <DatasetRow Value="5267.67" Key="Finland" Category="JAN 1998"/>
      <DatasetRow Value="4377.05" Key="France" Category="JAN 1998"/>
      <DatasetRow Value="4402.02" Key="Sverige" Category="JAN 1998"/>
      <DatasetRow Value="4807.68" Key="United Kingdom" Category="JAN 1998"/>
      <DatasetRow Value="3365.7" Key="USA" Category="JAN 1998"/>
      <DatasetRow Value="7166.87" Key="Finland" Category="MAR 1998"/>
      <DatasetRow Value="650.31" Key="France" Category="MAR 1998"/>
      <DatasetRow Value="3824.11" Key="United Kingdom" Category="MAR 1998"/>
      <DatasetRow Value="3678.77" Key="USA" Category="MAR 1998"/>
      <DatasetRow Value="472.45" Key="Austria" Category="NOV 1997"/>
      <DatasetRow Value="5200.38" Key="Finland" Category="NOV 1997"/>
      <DatasetRow Value="19108.2" Key="France" Category="NOV 1997"/>
      <DatasetRow Value="541.75" Key="United Kingdom" Category="NOV 1997"/>
      <DatasetRow Value="29762.58" Key="USA" Category="NOV 1997"/>
      <DatasetRow Value="1351.61" Key="Austria" Category="OCT 1997"/>
      <DatasetRow Value="5721.46" Key="Finland" Category="OCT 1997"/>
      <DatasetRow Value="292.95" Key="France" Category="OCT 1997"/>
      <DatasetRow Value="496.61" Key="Nederland" Category="OCT 1997"/>
      <DatasetRow Value="4586.99" Key="United Kingdom" Category="OCT 1997"/>
      <DatasetRow Value="4977.34" Key="USA" Category="OCT 1997"/>
      <DatasetRow Value="4104" Key="Finland" Category="SEP 1997"/>
      <DatasetRow Value="5638.75" Key="United Kingdom" Category="SEP 1997"/>
      <DatasetRow Value="4038.31" Key="USA" Category="SEP 1997"/>
    </DataSet>
```


http://204.236.218.31:8080/PieChartXml.xml#

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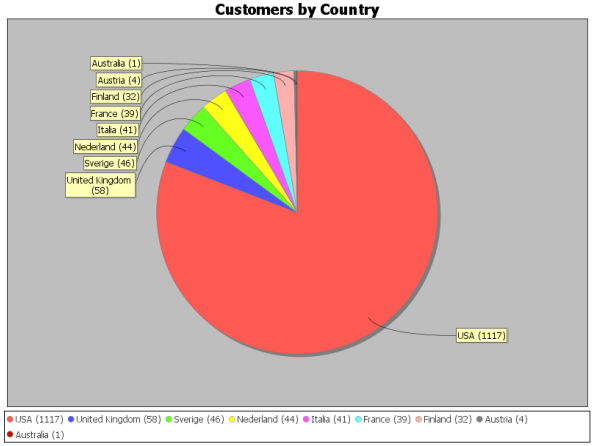
So let's Demo



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What is in the Toolkit

- Jetty Servlet engine deployed with
  - Call center servlet
  - ProCgi servlet
  - ProGraph servlet
- Sample CGI Wrappers
  - For Pie Chart and Bar Chart
- Call Center 4GL application

What is in the Toolkit (Continued)

- ActiveMQ JMS server
  - OpenSource JMS server
- 4GL Stomp adapter
  - Connects 4GL client with ActiveMq
- Eclipse for J2EE (Optional)
  - Comes ProCgi project configured and loaded
- 4GL JNI example

A look into the kitchen at Progressive Consulting

- Hot off the stove
  - TurboCgi
    - WebSpeed alternative
  - TurboComet
    - Comet Server with OpenClient integration

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A look into the kitchen at Progressive Consulting (continued)

- On the stove
  - TurboGraph
    - Allows you to create Graphs directly from a Cgi Wrapper
  - TurboVoice
    - Allows you to integrate VOIP into Progres application
  - TurboLocation
    - Building location aware business applications

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How to install the toolkit

- Unzip JavaIntegration.zip to C: drive
  - Should create directory structure C:\JavaIntegration
- You need to have JAVA installed
  - JAVA_HOME must be defined

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How to install the toolkit (continued)

- Define appserver
  - Connects to database
    - C:/JavaIntegration/Sports2000.db
  - Propath should include
    - C:\JavaIntegration\GoogleVoice
    - C:\JavaIntegration\ProCgi\CgiWrappers

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How to install the toolkit (continued)

- In C:\JavaIntegration\GoogleVoice\Ini \progress.ini
  - Point DLC variable to your Progress install directory
  - Point the following parameter to your appserver

```
[AspectSimulator]
PollingUrl=-DirectConnect -H 127.0.0.1 -S 3390
```

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How to install the toolkit (continued)

- In C:\JavaIntegration\Shortcuts start the following shortcuts in the following order
  - Start ActiveMQ
  - Start Jetty Servlet Engine
    - In the browser type the following url
      - http://localhost:8080/AspectSvr/Aspect
  - Google Voice Demo
  - Eclipse JAVA J2EE

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I would like to hear from you

- If you have a problem installing the toolkit
- If some toolkit component(s) do not work for you
- If you could use any of the tools but something is missing
- I you have ideas about features you want to add to your business application that may be available in JAVA
  - Let's make business applications exciting
    - *Drop me a line*

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Questions?

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