Oracle Forms & a Service Oriented Architecture (SOA).

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Oracle Forms and a Service Oriented Architecture

OVERVIEW

More and more businesses are looking to the principles of Service Oriented Architecture (SOA) to align their business and I.T. needs. The ability to build services modeled on business functions, reuse and orchestration of common, loosely coupled services and the agility associated with working with modular services, built on recognized standards, are attractive options.

Oracle Forms has been very successful in the market place but has traditionally been a monolithic tool. You either used Forms (and Reports and possibly Graphics) and only Forms or you didn't use it. In the new world of disparate and distributed services making up much of new development Forms has been changed from being monolithic to being part of a Service Oriented Architecture.

How can Forms be part of a Service Oriented Architecture?

Recent versions of Oracle Forms has gained functionality that makes it possible to integrate existing (or new) Forms applications with new or existing development utilizing the Service Oriented Architecture concepts.

Oracle remains fully committed to the development of Oracle Forms. See the Statement of direction at http://otn.oracle.com/products/forms

With its support for Java and its integration into SOA, Forms provides an incremental approach for developers who need to extend their business platform to JEE. This allows Oracle Forms customers to retain their investment in Oracle Forms while leveraging the opportunities offered by complementing technologies.

But how do you actually integrate Forms with a Service Oriented Architecture. How can Forms be a part of SOA? This whitepaper is meant to shed some light on this topic.

THE THREE AREAS

There are three areas where Oracle Forms can be integrated with a Service Oriented Architecture:

- **Use of external service**
  With functionality recently added to Forms it is now possible to call from Forms to Java making it feasible to use Web services and BPEL processes.

- **Exposure of Oracle Forms business logic to the outside world**
  In a world of distributed applications, Forms code might need to be moved out of Forms and into a place where it can be used by other applications. This section covers how to achieve that.
- **Using the Application Server's infrastructure.**
  Oracle Forms coexists and integrates with Oracle's Applications Server's infrastructure functionality. Forms' integration with Oracle Single Sign-on and Enterprise Manager is covered in this section.

CALLING OUT FROM ORACLE FORMS

Use of external services

Oracle Forms use of external services hinges on recent functionality regarding Java integration. Oracle Forms can call out to Java on the file system. It can make use of Java beans and its native screen widgets can be customized with custom Java code (the Pluggable Java Component architecture). In this section we are going to touch on the functionality of calling out to Java code residing on the file system.

Once that functionality was put in place Oracle Forms was able to call all kinds of external services such as Web services and be part of a BPEL process flow. But let's start at the beginning.

Calling Java

The functionality that makes it possible to call out to Java on the file system is called the Java Importer. It is incorporated into the Forms Builder and takes a class as an input and creates a PL/SQL package that acts as a wrapper around the Java class making it possible to call Java code from a PL/SQL trigger or function/procedure.

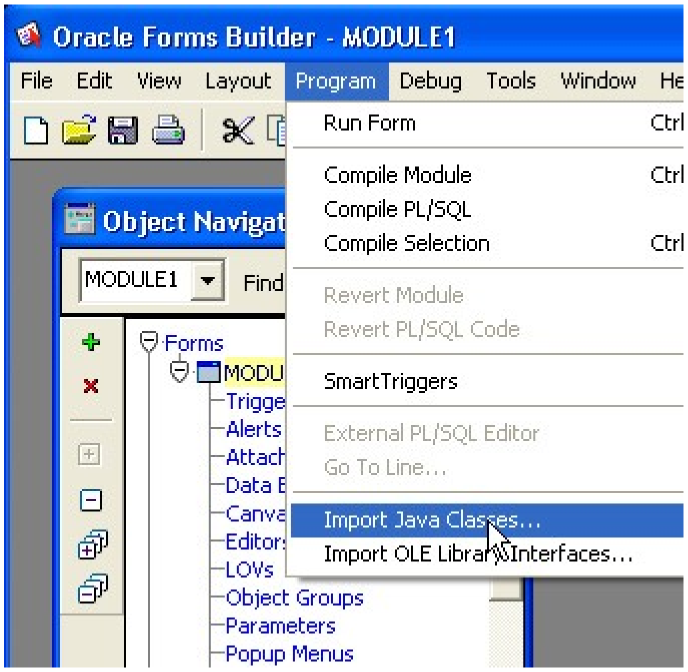
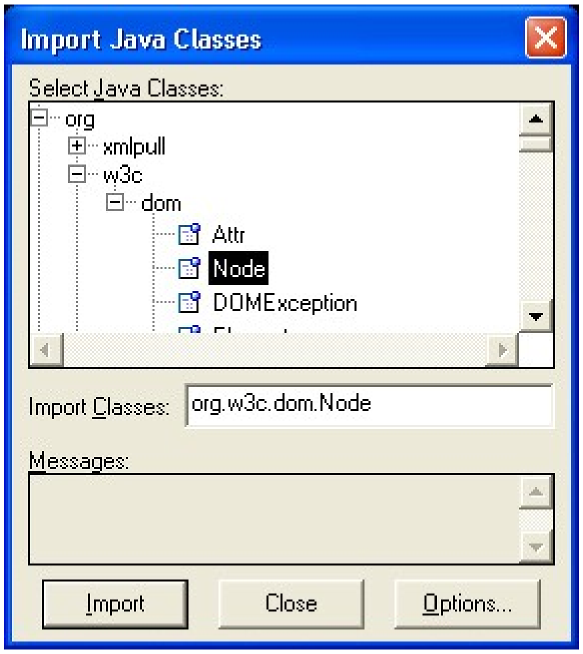


Figure 1: The Java Importer menu item

The Importer can scan JAR files only one level deep. It cannot find class files in JAR files that are in turn in a JAR file.

The Java Importer scans the local machine in the directories specified in the Registry variable FORMS_BUILDER_CLASSPATH and finds all Java class files.



Import Classes: org.w3c.dom.Node

Figure 2: Java Importer dialog

Using the new built-in packages `ora_java` and `jni`, the Importer will take a class definition like the following one and make a PL/SQL wrapper package.

```
public class Dates {
    public static void main(String[] args) {
        System.out.println(theDate());
    }
    public static final String theDate() {
      return new Date().toString();
    }
}
```

The package will be created with the name of the class. Each public Java function will have a corresponding PL/SQL function and each Java function returning void will result in a corresponding PL/SQL procedure:

```
PACKAGE BODY dates IS
  args   JNI.ARGLIST;
  -- Constructor for signature ()V
  FUNCTION new RETURN ORA_JAVA.JOBJECT IS
  BEGIN
    args := NULL;
    RETURN (JNI.NEW_OBJECT('formstest/dates',
        '()V', args));
  END;
  -- Method: main ([Ljava/lang/String;)V
  PROCEDURE main(
    a0     ORA_JAVA.JARRAY) IS
  BEGIN
    args := JNI.CREATE_ARG_LIST(1);
    JNI.ADD_OBJECT_ARG(args, a0,
'[Ljava/lang/String;');
    JNI.CALL_VOID_METHOD(TRUE, NULL,
    'formstest/dates', 'main',
    '([Ljava/lang/String;)V', args);
  END;

  -- Method: theDate ()Ljava/lang/String;
  FUNCTION theDate RETURN VARCHAR2 IS
  BEGIN
    args := NULL;
    RETURN JNI.CALL_STRING_METHOD(TRUE, NULL,
     'formstest/dates', 'theDate',
     '()Ljava/lang/String;', args);
  END;

BEGIN
  NULL;
END;
```

Java classes declared static, classes that are always instantiated with one and only instance in a Java application, will have no `new` functions generated.

The package code can subsequently be used to, at runtime, call out to the Java code and return not just scalar values as in this example but complex data structures like arrays and Java objects. There are functions in the `ora_java` built-in PL/SQL package to manipulate arrays and complex data types.

C:\applications\exampleApp\classes\ or

C:\applications\exampleApp\jars\exmpl.jar

At runtime the class files needs to be accessible to the Forms runtime. To do that you add either the full path to the directory the class file is in or add the full path to the JAR file to the CLASSPATH environment variable in the default.env file (see the EM section below for more information).

It is also possible to import system classes and thus manipulate Java data types and extract data that can be used in PL/SQL.

One such example is the `java.lang.Exception` class. The following is a partial representation of the PL/SQL package code that is the result of importing the `Exception` class.

```
PACKAGE BODY Exception_ IS
  args   JNI.ARGLIST;
  -- Constructor for signature
  -- (Ljava/lang/Throwable;)V
  FUNCTION new(
    a0   ORA_JAVA.JOBJECT) RETURN ORA_JAVA.JOBJECT IS
  BEGIN
    args := JNI.CREATE_ARG_LIST(1);
    JNI.ADD_OBJECT_ARG(args, a0,
      'java/lang/Throwable');
    RETURN (JNI.NEW_OBJECT('java/lang/Exception',
        '(Ljava/lang/Throwable;)V', args));
  END;
  -- Method: toString ()Ljava/lang/String;
  FUNCTION toString(
    obj   ORA_JAVA.JOBJECT) RETURN VARCHAR2 IS
  BEGIN
    args := NULL;
    RETURN JNI.CALL_STRING_METHOD(FALSE, obj,
        'java/lang/Exception', 'toString',
        '()Ljava/lang/String;', args);
  END;
BEGIN
  NULL;
END;
```

'Exception' is a reserved word in PLSQL so the importer resolves a potential naming conflict by adding an underscore.

The resulting Exception_ class is used in this PL/SQL function shown in more depth later in this white paper when obtaining a currency conversion rate from a Web service.

The `Exception_.toString` call is used to get a character representation of an exception obtained from Java that is of a type PL/SQL cannot understand but Java can.

```
function get_conversion_rate(currency_code varchar2)
      return number IS
    conv ora_java.jobject;
    rate ora_java.jobject;
    excep ora_java.jobject;
begin
  conv:=currencyConverter.new;
  rate:=currencyConverter.getrate(conv,
    'USD',
    currency_code);
  return float_.floatvalue(rate);
exception
    when ora_java.java_error then
        message('Error: '||ora_java.last_error);
        return 0;
    when ora_java.exception_thrown then
        excep:=ora_java.last_exception;
        message('Exception:
            '||Exception_.toString(excep));
        return 0;
end;
```

Web Services

A Web service is a piece of code that can accept remote procedure calls using the HTTP protocol and an XML based data format called SOAP and return data in the form of XML to the originator. Web services are a major part of any Service Oriented Architecture and makes it possible to distribute business logic exposed as a service onto servers on the local network or even the Internet.

Forms cannot make use of a Web service directly but now that we know how to call out to Java we can make it happen. With a proxy made in Oracle's JDeveloper we can call any Web Service from Forms.

Basic flow

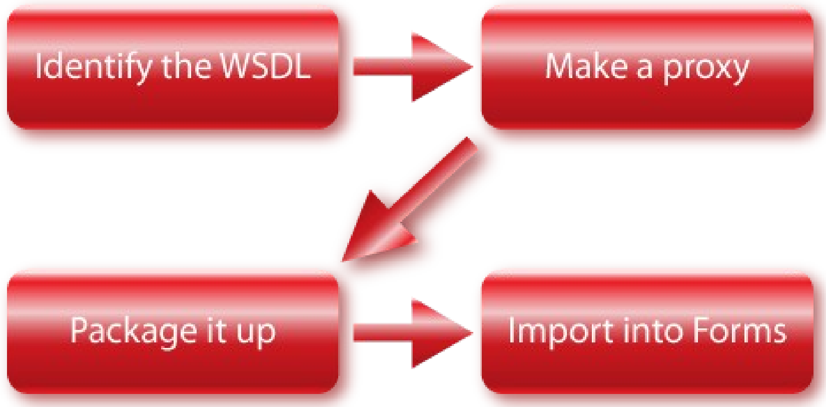


Figure 3: Basic Flow

Identifying the WSDL file

See this link to learn more about the WSDL file standard.

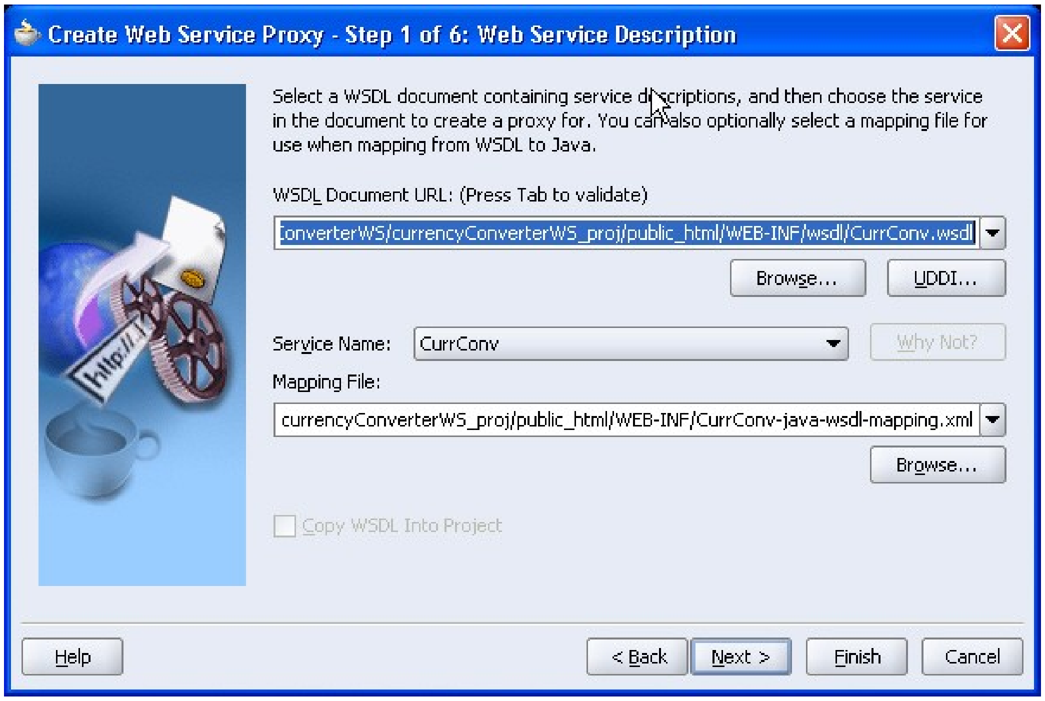
A Web service is defined by a WSDL (Web Service Description Language) file. It has definitions on how to call the service and what you can expect as return data. Since a Web service is a network service, its definition is also a network resource. The administrator of the Web service you are interested in, should be able to tell you how to get the WSDL file URL. Web services may be published in Universal Description Discovery Integration (UDDI) registry which acts like a telephone directory of Web services.

Making the proxy

A proxy, in this context means a Java class that has been instrumented to know how to call a specific Web service. Oracle's JDeveloper can help us to make the proxy.

JDeveloper has a wizard that takes a WSDL file as input and creates a Java package that we can subsequently import into Forms, making it possible for our Forms application to call the Web service.

Once you have the WSDL file URL you can plug it in to the JDeveloper Web Service Proxy Wizard. The screen shot below has a WSDL file already plugged in.


Create Web Service Proxy - Step 1 of 6: Web Service Description
Browse...
UDDI...
Why Not?
Browse...
Help
< Back
Next >
Finish
Cancel

Select a WSDL document containing service descriptions, and then choose the service in the document to create a proxy for. You can also optionally select a mapping file for use when mapping from WSDL to Java.

WSDL Document URL: (Press Tab to validate)
converterWS/currencyConverterWS_proj/public_html/WEB-INF/wsdl/CurrConv.wsdl

Service Name: CurrConv

Mapping File:
currencyConverterWS_proj/public_html/WEB-INF/CurrConv-java-wsdl-mapping.xml

Copy WSDL Into Project

Figure 4: Web service Proxy Wizard

The name of the service defined in this WSDL file is CurrConv and the wizard has picked that up. See this link for exact instructions on how to make a Web service proxy.

Package it all up

See this link to learn how to package the Web service proxy that you have created up so that you can import it into Forms.

Import into Forms

Once you have the proxy class you can import it into Forms and call its functions from PL/SQL code. The operative functions imported from the proxy are listed below:

```
package CurrencyConverter
    /* currconv3.mypackage.CurrConv3Stub */ IS
  function new return ora_java.jobject;
  function getrate(
    obj   ora_java.jobject,
    a0    varchar2,
    a1    varchar2) return ora_java.jobject;
end;
```

The getRate function is the function that we are after. It takes two currency symbols and returns a Java object that we know is a number of type float (the first argument is the class instance and will be described later).

The WHEN-BUTTON-PRESSED trigger code is listed below:

```
function get_conversion_rate(currency_code varchar2)
return number IS
    conv ora_java.jobject;
    rate ora_java.jobject;
    excep ora_java.jobject;
begin
  conv:=currencyConverter.new;
  rate:=currencyConverter.getrate(conv,
    'USD', currency_code);
  return float_.floatvalue(rate);
exception
    when ora_java.java_error then
        message('Error: '||ora_java.last_error);
        return 0;
    when ora_java.exception_thrown then
        excep:=ora_java.last_exception;
        message('Exception:
            '||Exception_.toString(excep));
        return 0;
end;
```

This code delivers the rate used in the application. It takes a currency symbol (in this example we only convert from US dollars) as an argument and returns a PL/SQL number which holds the rate.

You might be curious about why the instance is passed in rather than operated on directly and the reason is that PLSQL is not object oriented enough to perform that trick.

We first declare three local variables of type JOBJECT (JOBJECT is a type defined in the ora_java package representing a Java object of any kind). The first line after begin fetches a reference to an instance of the proxy and stores it in the variable `conv`. The second line gets the rate from that instance. The return clause makes a number from the resulting rate Java object with the help of an imported Java system class, `java.lang.Float`. It has a call, `floatValue`, which converts a float to a number, which is what we need here (Forms cannot handle a Java float directly but it can handle a number).

The exception handler is reached if any of the calls out to Java causes (throws is the term used in Java) an exception or an error. In case of an exception we get the exception with the help of the `ora_java` package call `last_exception`. To actually see it, we call an imported Exception_ package routine called `toString`.

What if the Web service is secured with a password?

This page has a good tutorial on how to change a Web service proxy to use authentication.

Business Process Execution Language (BPEL)

Now that we have established that Forms can call out to Java and use Web services, we can start looking at BPEL or Business Process Execution Language. BPEL is an emerging standard for orchestrating disparate and heterogenous business services into a process flow. Oracle offers a comprehensive BPEL solution and Forms can take part in a BPEL process flow as a manual process step or as an initiating step or both.

An example

In the following example Forms is going to act both as an initiator and as a manual process step. The process is that of a consumer loan. The business flow diagram below outlines what the process looks like.

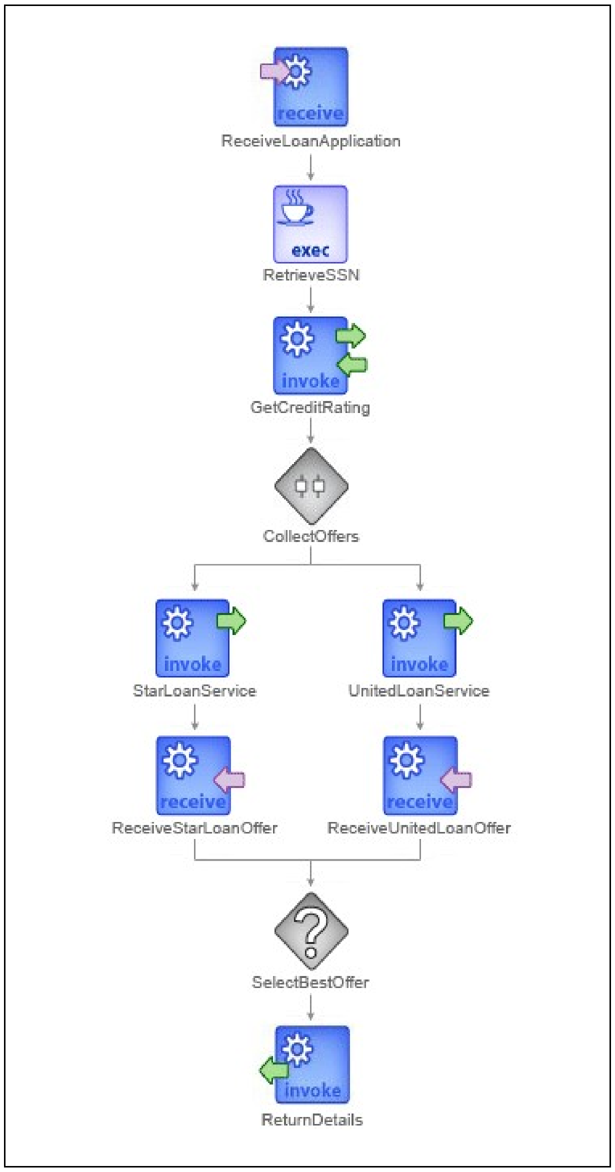
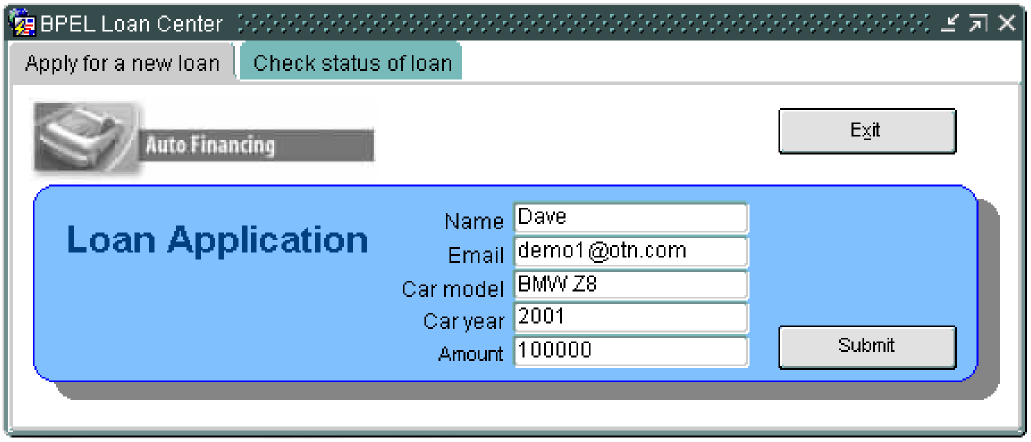


Figure 5: BPEL Process Flow

The process first receives an application for a consumer loan. This step is performed in a Forms application that communicates with the BPEL server through either a Web service exposed by the BPEL server or by way of a Java interface supplied by Oracle as a part of the BPEL server.

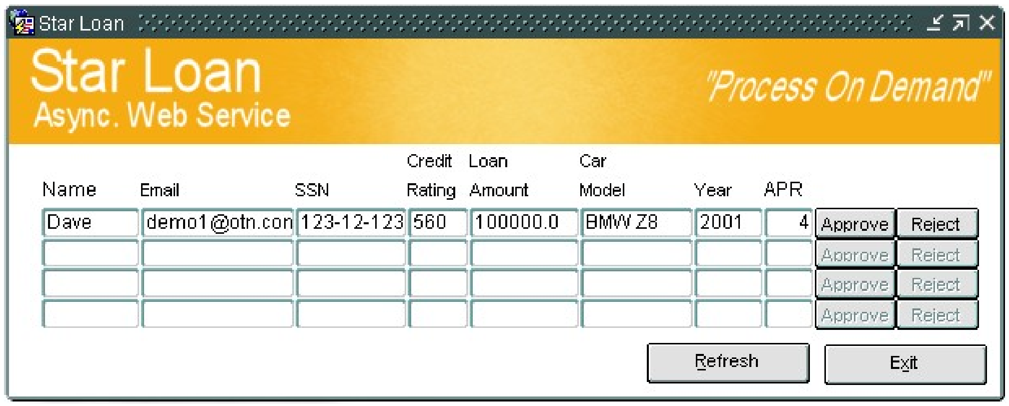


Name	Dave
Email	demo1@otn.com
Car model	BMW Z8
Car year	2001
Amount	100000

Figure 6: Applying for a Loan

The screenshot above shows the application that the fictitious user Dave uses to send in his application for a car loan. When the user clicks the Submit button the Forms application sets in motion the BPEL process flow described earlier. The process fetches Dave's Social Security Number and then gets his credit rating. As the developer of the application that Dave uses we don't have to know how this is achieved. That is up to the developer of the BPEL process. We just need to know how to kick off the process.

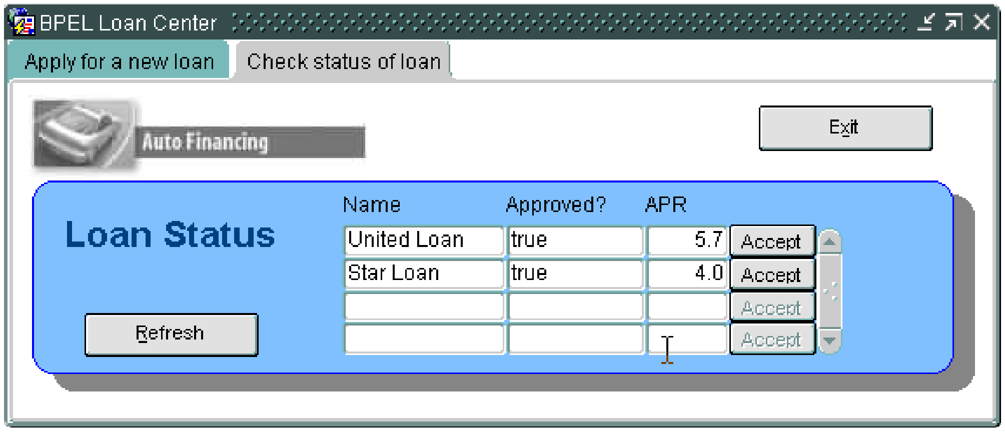
After having fetched Dave's credit rating the BPEL process collects two offers from two different loan vendors, Star Loans and United Loans. United Loans uses an automated process that we, in this example, are not interested in. Star Loan on the other hand uses a manual process that is implemented in a Forms application.



Name	Email	SSN	Credit Rating	Loan Amount	Car Model	Year	APR		
Dave	demo1@otn.con	123-12-123	560	100000.0	BMW Z8	2001	4	Approve	Reject
								Approve	Reject
								Approve	Reject
								Approve	Reject

Figure 7: Approving the Loan

The loan officer at Star Loan queries the BPEL process and sees that an application has arrived from Dave. He/she determines the appropriate interest rate and clicks the Approve button. This will kick off the next step of the process where Dave has the opportunity to select the best offer. He does that in the same Forms application he used earlier:



Name	Approved?	APR
United Loan	true	5.7
Star Loan	true	4.0

Figure 8: Choosing the Best Offer

Dave sees the two loan offers in his application and can select the best offer by clicking the Accept button. This will again cause Forms to communicate with the BPEL server and causes the process to conclude.

Note the Refresh button. Forms could potentially poll the BPEL server with the help of a Forms timer. This application does not do that. Instead Dave has to manually query the BPEL process. Forms cannot yet (as of version 10.1.2) easily register an interest in a BPEL event and automatically be notified if input is needed from it. In version 11 of Forms we intend to have functionality in place that will make this much easier.

Although Forms cannot receive incoming events out-of-the-box in 10.1.2, there is a way to do it. See this link for more information.

For more information on how to achieve BPEL integration and a working example, see this link.

EXPOSING FORMS BUSINESS LOGIC TO THE OUTSIDE WORLD

Overview

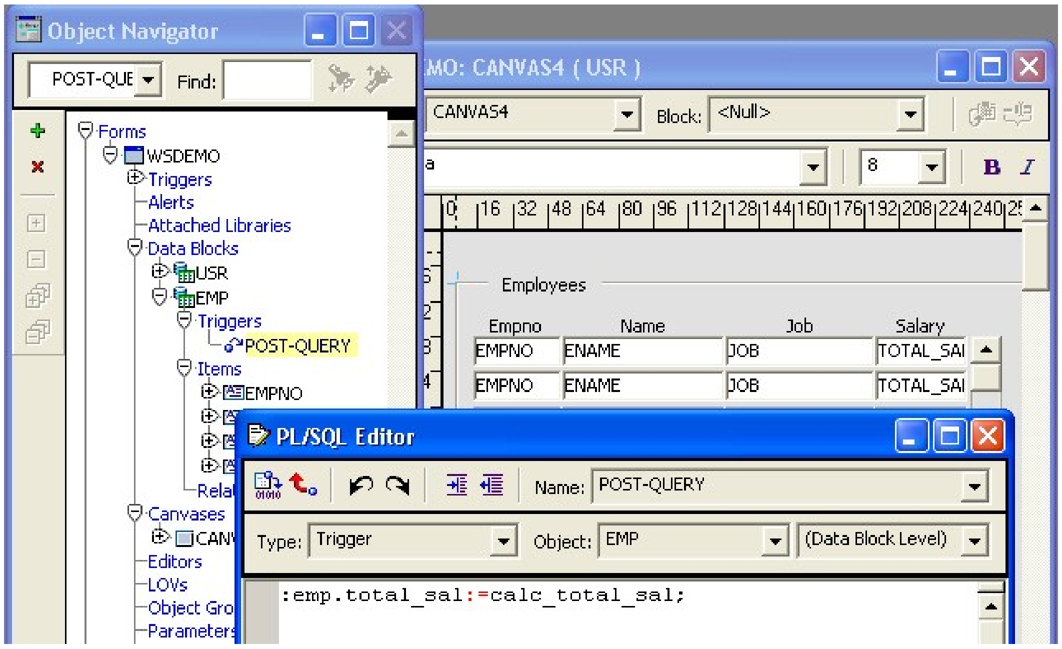
So far we have covered how Forms can call out to the outside world. What about the opposite? Can the outside world use existing Forms business logic? Perhaps as exposed as a Web service? Or could Forms business logic (which is written in PL/SQL) be called directly?

The answer is a qualified Yes. As a development tool, the fact that the user interface and the business logic are so closely integrated, makes the development of Forms very simple and intuitive. However, this tight integration of UI code and business logic makes the exposure of the pure business services to outside consumers, much more challenging.

It is however possible to move Forms PL/SQL code from Forms to the database and from there expose it to the outside world, either as a database procedure/-function or as a PL/SQL Web service.

A simple example

In this simple example we have a block in Forms with a column labeled Salary that shows the total salary for the employees in the Emp table. The sum is calculated with a POST-QUERY trigger.



```
:emp.total_sal:=calc_total_sal;
```

Figure 9: Example form

The trigger calls a local (it is executed by Forms rather than the database) PL/SQL function thus:

```
function calc_total_sal return number is
  total number;
  l_mgr number;
  l_mgr_name varchar2(30);
  usr varchar2(200):=
    get_application_property(username);
begin
  select mgr into l_mgr
    from emp
    where empno=:emp.empno;
  select ename into l_mgr_name
    from emp
    where mgr is null;
  if (l_mgr is not null) then
    select sal+nvl(comm,0) into total
      from emp
      where empno=:emp.empno;
  elsif (usr<>l_mgr_name) then
    total:=-1;
  elsif (usr=l_mgr_name) then
    select sal+nvl(comm,0) into total
      from emp
      where empno=:emp.empno;
  end if;
  return total;
end;
```

The business logic implemented in the function is this: If the employee whose salary is being calculated is not the President, calculate his total salary by adding columns sal and comm together, taking into account that the comm column can potentially be null. If the employee row is the President's and the current user is not the President return -1 otherwise return the total salary for the President (nobody but the President can see the salary of the President of the company).

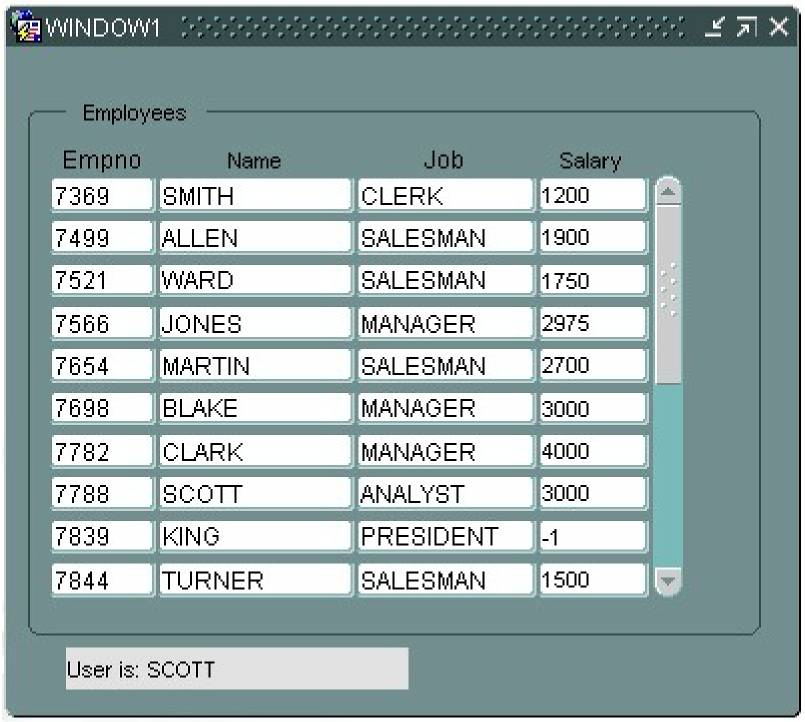
To use this code from the database we need to refactor it. The database does not understand references to any Forms objects nor does it understand any of the Forms specific PL/SQL built-ins. In this case we have a call to a Forms built-in, namely `get_application_property`. We also have a reference to the empno field. If we take them out and pass them in as parameters the function now looks like this:

```
function calc_total_sal(l_empno number, usr varchar2)
    return number is
  total number;
  l_mgr number;
  l_mgr_name varchar2(30);
begin
  select mgr into l_mgr
    from emp
    where empno=l_empno;
  Select ename into l_mgr_name
    from emp
    where mgr is null;
  if (l_mgr is not null) then
    select sal+nvl(comm,0) into total
      from emp
      where empno=l_empno;
  elsif (usr<>l_mgr_name) then
    total:=-1;
  elsif (usr=l_mgr_name) then
    select sal+nvl(comm,0) into total
      from emp
      where empno=l_empno;
  end if;
  return total;
end;
```

Note that the variables usr and l_empno are now external and have to be passed in. The POST-QUERY trigger has to change accordingly, to say;

```
:emp.total_sal:=calc_total_sal(:emp.empno,
    get_application_property(username);
```

but after that it will continue to function as before.



Empno	Name	Job	Salary
7369	SMITH	CLERK	1200
7499	ALLEN	SALESMAN	1900
7521	WARD	SALESMAN	1750
7566	JONES	MANAGER	2975
7654	MARTIN	SALESMAN	2700
7698	BLAKE	MANAGER	3000
7782	CLARK	MANAGER	4000
7788	SCOTT	ANALYST	3000
7839	KING	PRESIDENT	-1
7844	TURNER	SALESMAN	1500

User is: SCOTT

Figure 10: Scott is logged on and he is not the President so he cannot see KING's salary

Moving a PL/SQL procedure from a form definition file to the database can be achieved in the Forms Builder by dragging and dropping the PL/SQL unit between a form module and a database node in the Forms navigator.

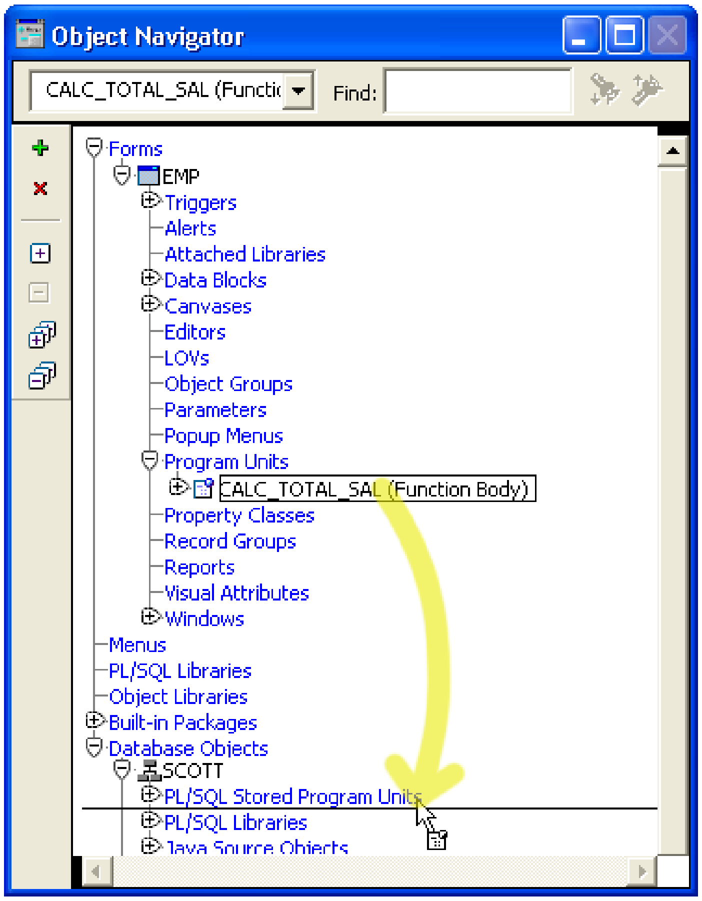


Figure 11: Copying a Function to the Database

Now that we have the Forms PL/SQL code in the database, we can leverage its business logic in any application that can call a database function.

With the help of JDeveloper we can now also make a Webservice out of the code, making it possible for environments that cannot directly call into the database but which can call a Web service, to leverage legacy Forms code.

See this web page for more information on how to use JDeveloper to make a Web service from database PL/SQL code.

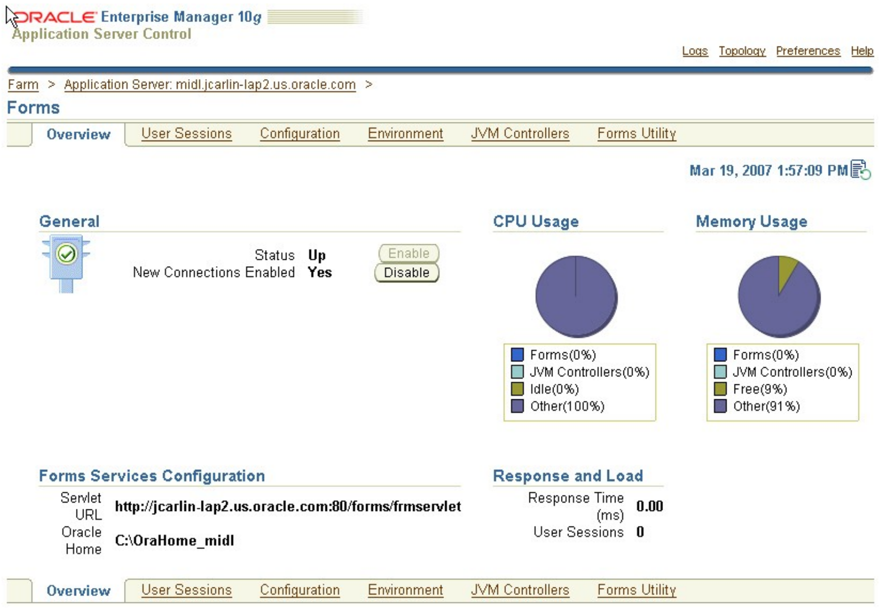
USING THE APPLICATION SERVER'S INFRASTRUCTURE

When Forms becomes a part of a larger setting it needs to be able to participate in application server wide functions such as maintenance and management and user authentication. It doesn't make much sense to have one application use its own authentication scheme and all the others use another scheme. In versions 9 and 10 Forms is a full member of the Application Server infrastructure and is automatically configured to be able to use both the Single Sign-on server (Oracle OID and SSO) and to be managed thru Oracle Enterprise Manager.

Enterprise Manager

As part of the Oracle Application Server platform, Oracle Forms applications can now be managed remotely through Oracle Enterprise Manager's Application Server Control running in a browser.

This is the screen that meets the administrator when he logs onto the Application Server Control console:



Status **Up**
New Connections Enabled **Yes**

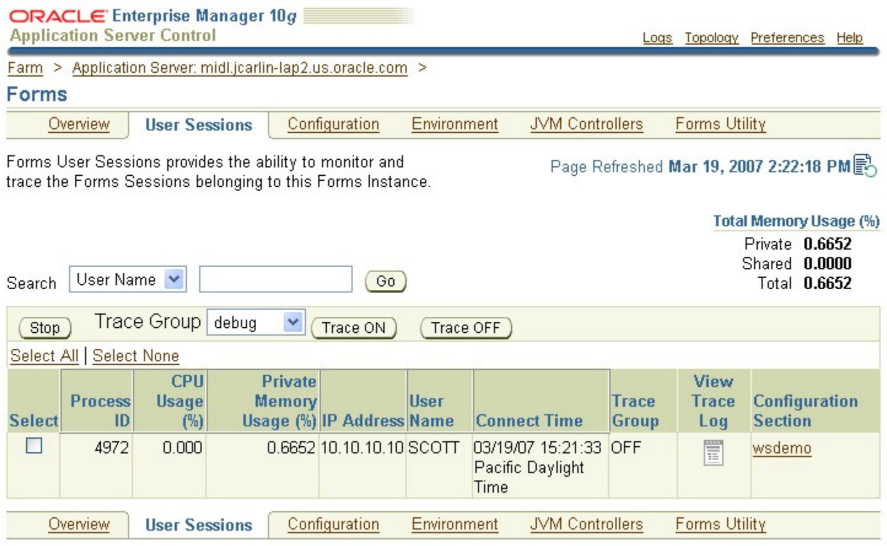
CPU Usage	Memory Usage
Forms(0%)	Forms(0%)
JVM Controllers(0%)	JVM Controllers(0%)
Idle(0%)	Free(9%)
Other(100%)	Other(91%)

Servlet URL **http://jcarlin-lap2.us.oracle.com:80/forms/frmservlet**
Oracle Home **C:\OraHome_midl**

Response Time (ms) **0.00**
User Sessions **0**

Figure 12: Forms EM Home page

In this overview screen the administrator can monitor the over-all status of the system and critical metrics such as CPU and memory usage for Forms and its main components.


ORACLE Enterprise Manager 10g Application Server Control

Logs Topology Preferences Help

Farm > Application Server: midl.jcarlin-lap2.us.oracle.com >

Forms

Overview | User Sessions | Configuration | Environment | JVM Controllers | Forms Utility

Forms User Sessions provides the ability to monitor and trace the Forms Sessions belonging to this Forms Instance.

Page Refreshed Mar 19, 2007 2:22:18 PM

Total Memory Usage (%)	
Private	0.6652
Shared	0.0000
Total	0.6652

Search: User Name | Go

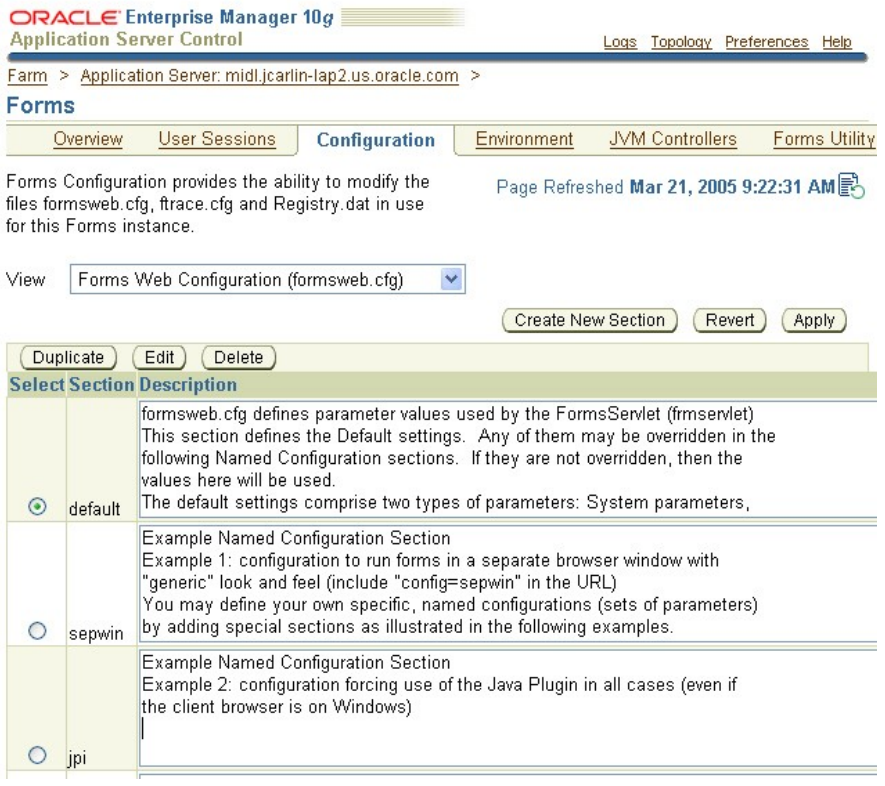
Stop | Trace Group: debug | Trace ON | Trace OFF

Select All | Select None

Select	Process ID	CPU Usage (%)	Private Memory Usage (%)	IP Address	User Name	Connect Time	Trace Group	View Trace Log	Configuration Section
☐	4972	0.000	0.6652	10.10.10.10	SCOTT	03/19/07 15:21:33 Pacific Daylight Time	OFF		wsdemo

Figure 13: EM User Sessions page

In this next screen, called User Sessions, each user's session is listed with crucial metrics such as its CPU and memory usage, IP address and username and trace settings. The configuration section used when starting the application is also shown. If tracing is turned on from here the trace log can be viewed from this console. Individual user sessions can be terminated from here.


ORACLE Enterprise Manager 10g Application Server Control

Logs Topology Preferences Help

Farm > Application Server: midl.jcarlin-lap2.us.oracle.com >

Forms

Overview | User Sessions | Configuration | Environment | JVM Controllers | Forms Utility

Forms Configuration provides the ability to modify the files formsweb.cfg, ftrace.cfg and Registry.dat in use for this Forms instance.

Page Refreshed Mar 21, 2005 9:22:31 AM

View: Forms Web Configuration (formsweb.cfg)

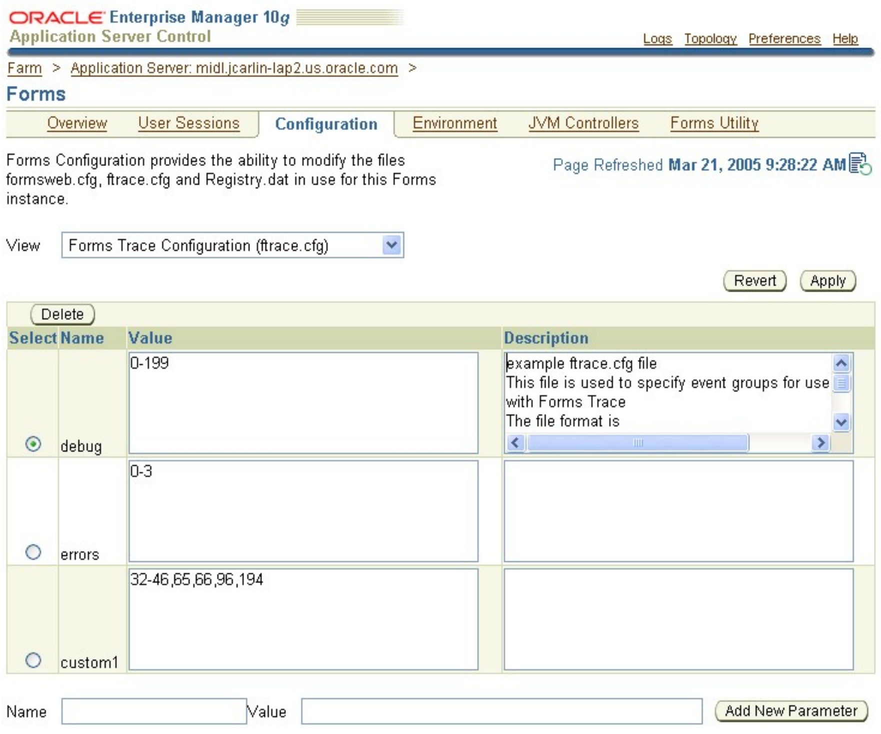
Create New Section | Revert | Apply

Duplicate | Edit | Delete

Select	Section	Description
●	default	formsweb.cfg defines parameter values used by the FormsServlet (frmservlet) This section defines the Default settings. Any of them may be overridden in the following Named Configuration sections. If they are not overridden, then the values here will be used. The default settings comprise two types of parameters: System parameters,
○	sepwin	Example Named Configuration Section Example 1: configuration to run forms in a separate browser window with "generic" look and feel (include "config=sepwin" in the URL) You may define your own specific, named configurations (sets of parameters) by adding special sections as illustrated in the following examples.
○	jpi	Example Named Configuration Section Example 2: configuration forcing use of the Java Plugin in all cases (even if the client browser is on Windows)

Figure 14: EM Configurations page

In this section you can create, edit and delete configuration settings in three different configuration files: the formsweb.cfg which is the main configuration file for a Forms installation, the ftrace.cfg which is the trace facility configuration file and the Registry.dat file which governs the font mapping. Here is a screenshot of the ftrace section:


ORACLE Enterprise Manager 10g
Application Server Control
Logs Topology Preferences Help
Farm > Application Server: midl.jcarlin-lap2.us.oracle.com >
Overview User Sessions Configuration Environment JVM Controllers Forms Utility
Revert Apply
Delete
Add New Parameter

Forms

Forms Configuration provides the ability to modify the files formsweb.cfg, ftrace.cfg and Registry.dat in use for this Forms instance.

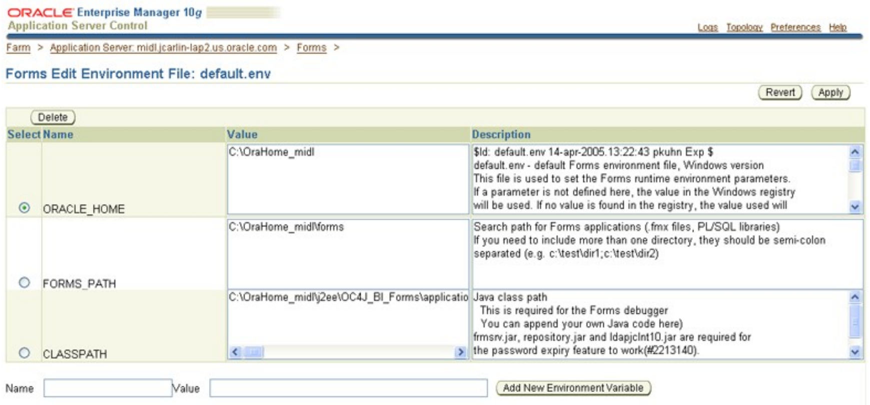
Page Refreshed Mar 21, 2005 9:28:22 AM

View: Forms Trace Configuration (ftrace.cfg)

Select	Name	Value	Description
●	debug	0-199	example ftrace.cfg file This file is used to specify event groups for use with Forms Trace The file format is
○	errors	0-3	
○	custom1	32-46,65,66,96,194	

Name: Value:

Figure 15: EM Trace Configurations page


ORACLE Enterprise Manager 10g
Application Server Control
Logs Topology Preferences Help
Farm > Application Server: midl.jcarlin-lap2.us.oracle.com > Forms >
Revert Apply
Delete
Add New Environment Variable

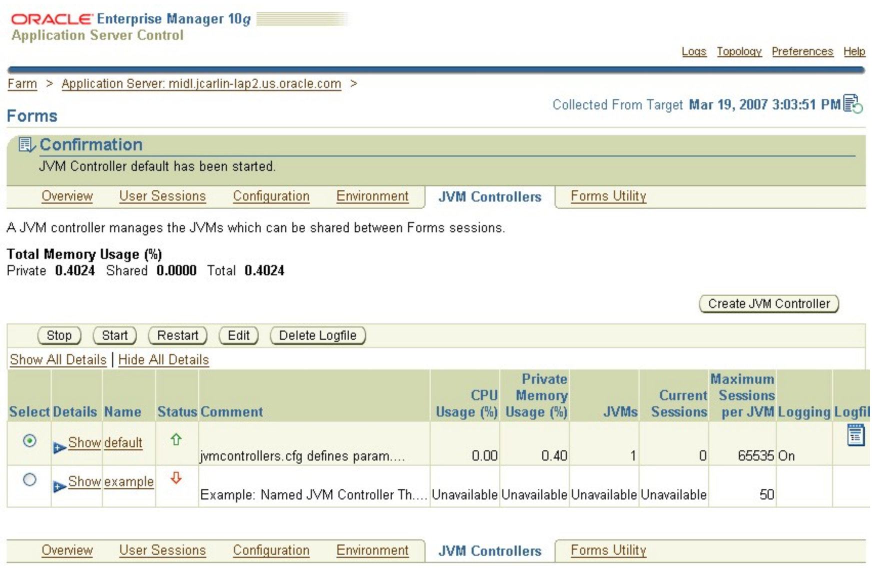
Forms Edit Environment File: default.env

Select	Name	Value	Description
●	ORACLE_HOME	C:\OraHome_midl	$Id: default.env 14-apr-2005.13:22:43 pkuhn Exp $ default.env - default Forms environment file, Windows version This file is used to set the Forms runtime environment parameters. If a parameter is not defined here, the value in the Windows registry will be used. If no value is found in the registry, the value used will
○	FORMS_PATH	C:\OraHome_midl\forms	Search path for Forms applications (.fmx files, PL/SQL libraries) If you need to include more than one directory, they should be semi-colon separated (e.g. c:\test\dir1;c:\test\dir2)
○	CLASSPATH	C:\OraHome_midl\j2ee\OC4J_BI_Forms\applicatio	Java class path This is required for the Forms debugger You can append your own Java code here) frmsrv.jar, repository.jar and ldapjclnt10.jar are required for the password expiry feature to work(#2213140).

Name: Value:

Figure 16: EM Environment page

In this Environment screen the administrator can manipulate environment settings stored in the default.env file that pertain to Forms:


ORACLE Enterprise Manager 10g
Application Server Control

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Collected From Target Mar 19, 2007 3:03:51 PM

Forms

Confirmation
JVM Controller default has been started.

Overview | User Sessions | Configuration | Environment | JVM Controllers | Forms Utility

A JVM controller manages the JVMs which can be shared between Forms sessions.

Total Memory Usage (%)
Private **0.4024** Shared **0.0000** Total **0.4024**

Create JVM Controller

Stop | Start | Restart | Edit | Delete Logfile

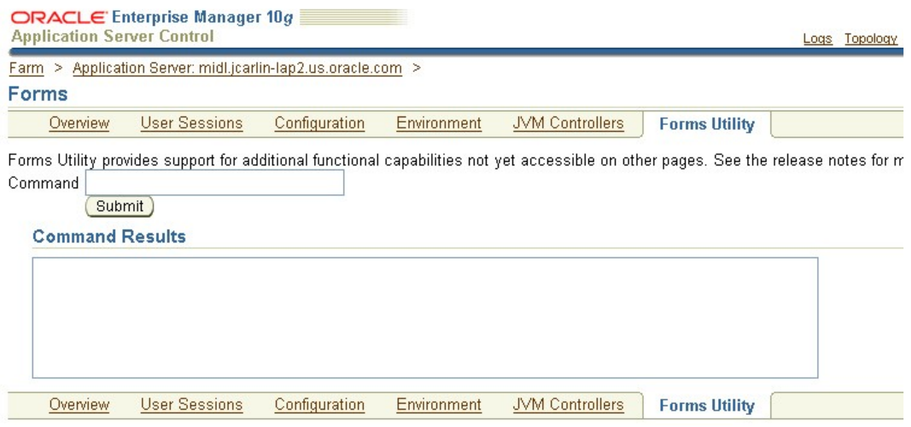
Show All Details | Hide All Details

Select	Details	Name	Status	Comment	CPU Usage (%)	Private Memory Usage (%)	JVMs	Current Sessions	Maximum Sessions per JVM	Logging	Logfil
◉	▶ Show	default	⇧	jvmcontrollers.cfg defines param....	0.00	0.40	1	0	65535	On	
○	▶ Show	example	⇩	Example: Named JVM Controller Th....	Unavailable	Unavailable	Unavailable	Unavailable	50		

Overview | User Sessions | Configuration | Environment | JVM Controllers | Forms Utility

Figure 17: EM JVM Controllers page

JVM Controllers are used to reduce memory requirements when calling Java from the file system and they are controlled from this screen.


ORACLE Enterprise Manager 10g
Application Server Control

Logs Topology

Farm > Application Server: midl.jcarlin-lap2.us.oracle.com >

Forms

Overview | User Sessions | Configuration | Environment | JVM Controllers | Forms Utility

Forms Utility provides support for additional functional capabilities not yet accessible on other pages. See the release notes for m

Command

Submit

Command Results

Overview | User Sessions | Configuration | Environment | JVM Controllers | Forms Utility

Figure 18: EM Utilities page

The last screen is used for additional functionality not yet accessible from other screens.

Single sign-on server

Changing Forms to use the Single Sign-on server rather than its own database based user authentication method is a matter of setting a flag in a configuration file.

Once Forms is set up to use SSO, Forms users who are logged on because they have done so in their Forms application need not reauthenticate themselves when they log in to a Portal or a Java application.

SSO-based authentication happens in 5 steps. In step 1 the user supplies his credentials (username and password). Instead of calling the database to authenticate the user, Forms calls the SSO server who in turn queries the OID/LDAP server to see if the user has enough privileges. If so, it returns the actual database username and password that will be used by Forms to log on. During the session Forms can access data about the logged in user from the OID repository thru a PL/SQL API.

The same single sign-on instance can of course be used by other applications served from the same application server so users need not be stored in multiple places and can be authenticated only once, namely the first time they log in to any of the applications making use of the same SSO Server.

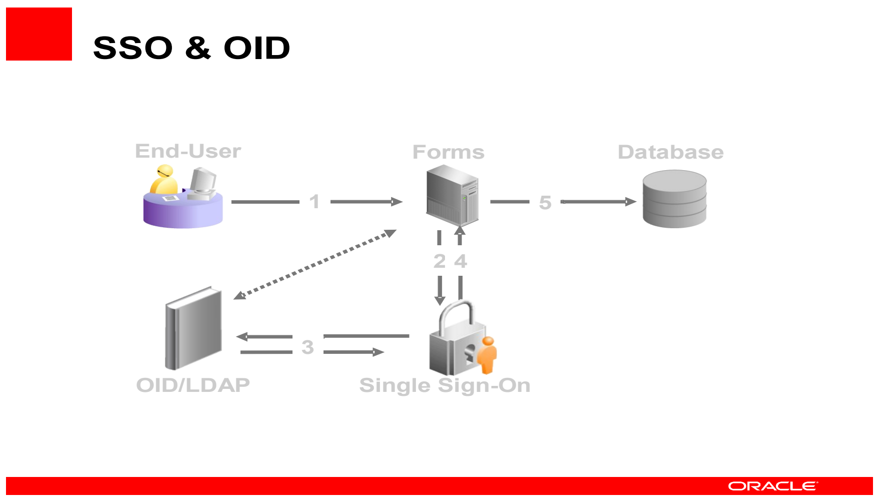

SSO & OID

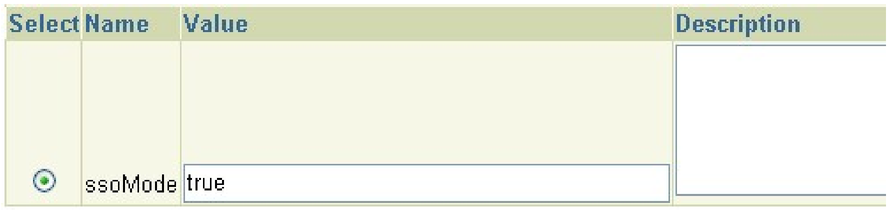
Figure 19: SSO flow

Enterprise User Security

The database can also use the Single Sign-on server as its authentification scheme with functionality called Enterprise User Security. This makes it possible to store authentication information in a single place, both for access to the database thru an application and thru direct means, such as SQL*Plus or the new SQL Developer.

Switching it on

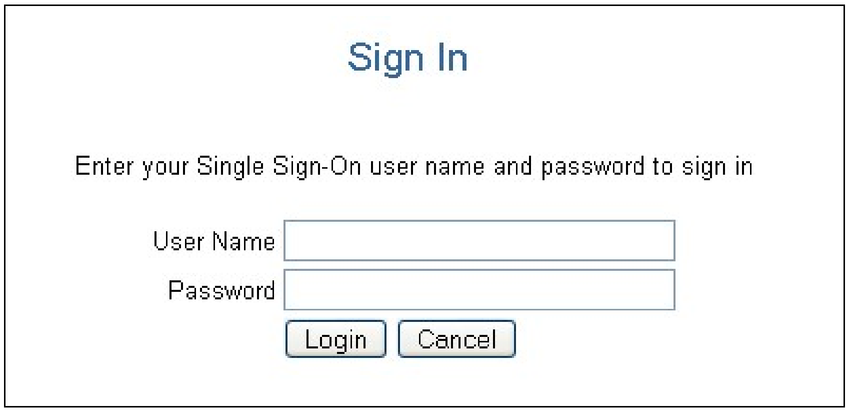
Making Forms use the Single Sign-on server is as easy as switching a switch in the formsweb.cfg file.



Select	Name	Value	Description
●	ssoMode	true	

Figure 20: Switching on SSO

Here we are setting the ssoMode switch in Enterprise Manager's Application Server Configuration section to true. This is all that is needed to enable SSO in a default Forms installation. When a user starts a Forms application he/she will be met by this SSO login screen instead of by the normal Forms login window:



Sign In

Enter your Single Sign-On user name and password to sign in

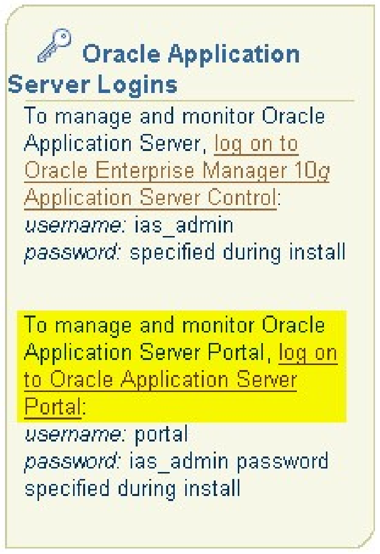
User Name

Password

Figure 21: Single Sign-on example

Defining users in OID

SSO users must be defined in OID. That can be done in Portal. Log in as orcladmin after clicking on the link in the Application Server welcome screen that is highlighted in the following screenshot:

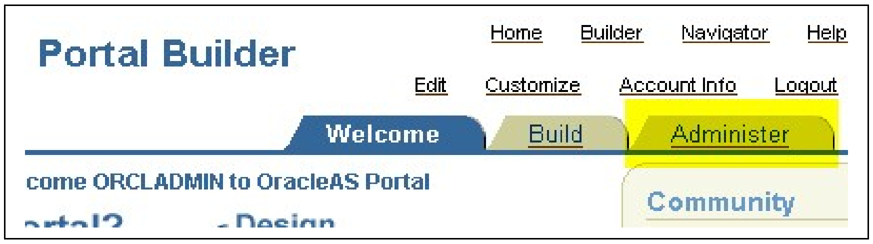

Oracle Application Server Logins

To manage and monitor Oracle Application Server, log on to Oracle Enterprise Manager 10*g* Application Server Control:
username: ias_admin
password: specified during install

To manage and monitor Oracle Application Server Portal, log on to Oracle Application Server Portal:
username: portal
password: ias_admin password specified during install

Figure 22: Loggin on to Portal

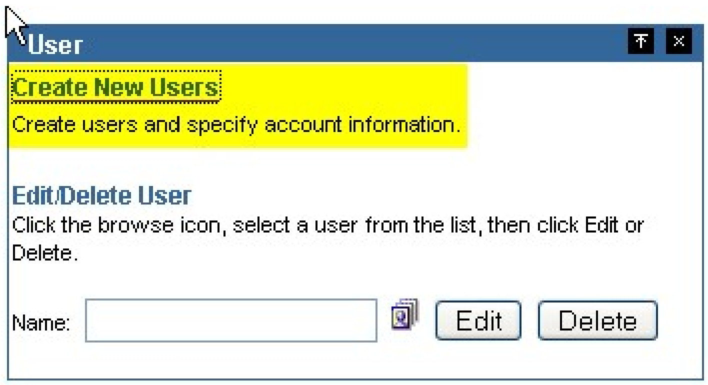
Click the Administer tab when you arrive at this screen:



come ORCLADMIN to OracleAS Portal

Figure 23: Administer page

This will take you to a part of the Portal builder that has a user interface for OID management. To create a new user, click the link in the User portal in the top right hand corner that is highlighted in the following screenshot:


User

Create New Users

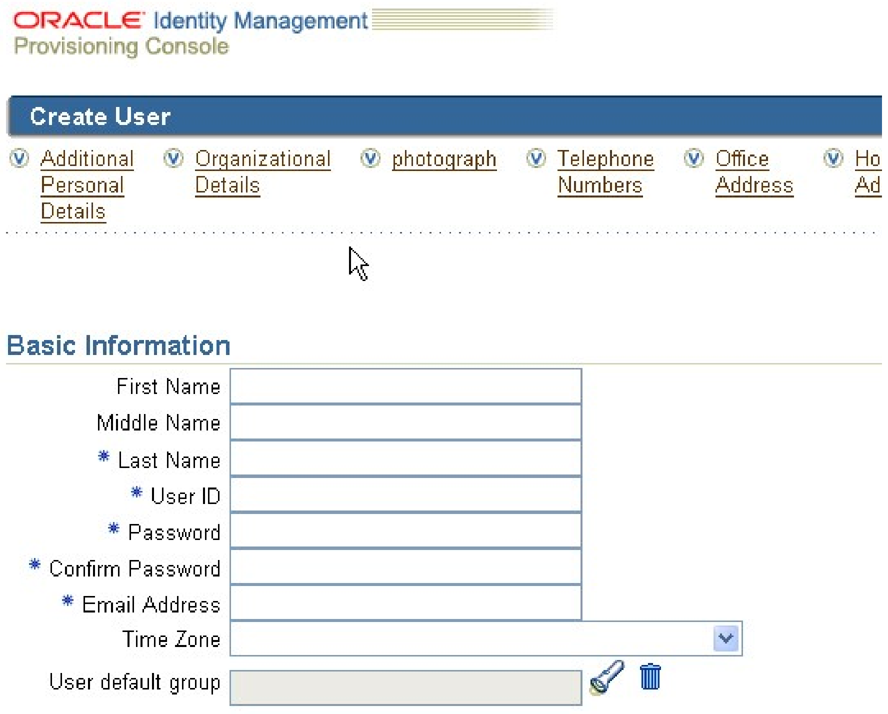
Create users and specify account information.

Edit/Delete User

Click the browse icon, select a user from the list, then click Edit or Delete.

Figure 24: Create new user

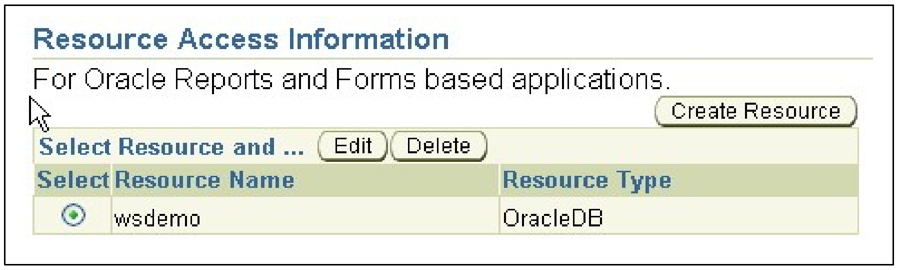
Doing that will open up this screen where you can specify all the data you will need about the user, such as First and Last name, username, e-mail, permissions and roles.



First Name	
Middle Name	
* Last Name	
* User ID	
* Password	
* Confirm Password	
* Email Address	
Time Zone	
User default group	

Figure 25: New User page

A mandatory part (for Forms users) that is not entirely obvious is the Resource Access Information part:


Resource Access Information

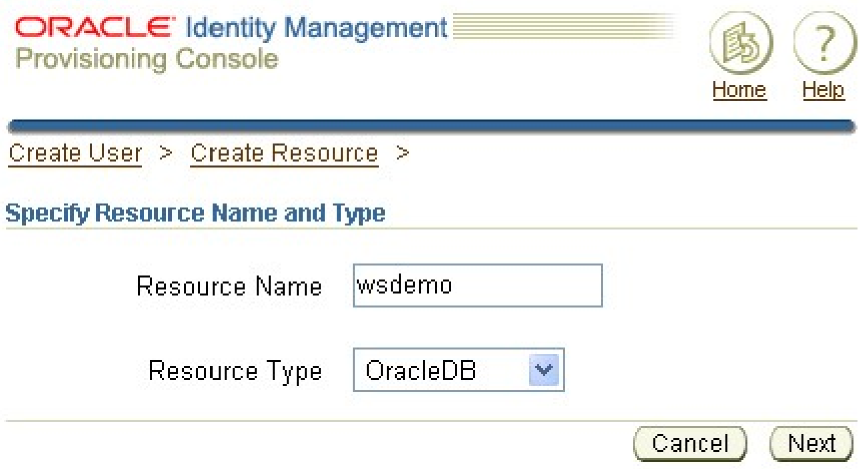
For Oracle Reports and Forms based applications.

Select	Resource Name	Resource Type
●	wsdemo	OracleDB

Figure 26: Resource Access Descriptor

This information will be used by Forms (and Reports incidentally) when logging on to the database. The user will be authenticated by the information specified in this big screen but the actual log-in will be done with the account specified in this section.

To create a new resource click the Create Resource button and fill in the name of the resource in this screen:



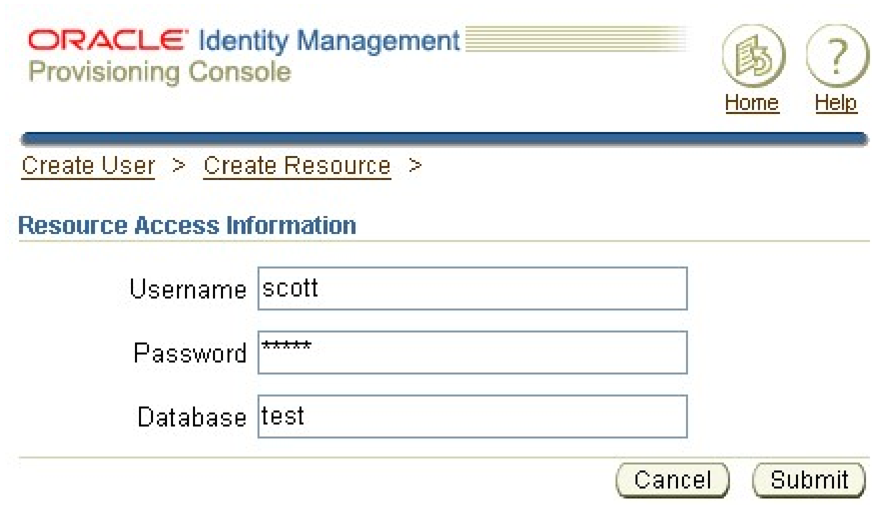
Specify Resource Name and Type

Resource Name: wsdemo

Resource Type: OracleDB

Figure 27: Name the RAD

The resource type should be OracleDB. Click the Next button to get to this screen:



Resource Access Information

Username	scott
Password	*****
Database	test

See this link for more detailed information on how to manipulate RADs at runtime and other useful information concerning Forms use of OID. The link is about Forms version 9 but is still relevant for version 10.1.2.

Figure 28: RAD login information

This is where you specify the database account name, password and the TNS name used by Forms to log in. After you click the Submit button the Resource Access Descriptor or RAD, is created for this one user. This has to be done for all users.

CONCLUSION

This whitepaper has covered the topic of integrating Oracle Forms with a Service Oriented Architecture. We had a look at how Forms can call out to Java, thus making it possible to make us of Web services and process flows orchestrated by BPEL. We touched on the process of exposing existing Forms code to SOA processes by refactoring the code and moving it to the Oracle Database. Finally we explored how Forms can take advantage of the remote management capabilities or Oracle Enterprise Management (EM) and of centralized user authentication by way of Oracle Identity Management (SSO and OID).

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March - June 2007
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