

Oracle Application Express—What's it All About?

—Peter Lorenzen
WM-data, Denmark



Editor's Note: If you're not familiar with APEX, Peter's article will point you in the right direction. If you already use APEX, you might want to give it a quick read to see if you agree with what he says.

Introduction

Oracle Application Express (APEX) applications are popping up all over the place. The product is free and has a lot of things going for it. My associates and I have successfully used APEX for a number of smaller development projects. One project was for RTX Telecom that uses APEX to control over one million DECT telephones in Romania. In this article I will try to explain what APEX is and what it can be used for, based on our experiences.

APEX?

APEX is a browser-based Web development environment that enables you to quickly develop database-centric Web applications. APEX was launched as an MS Access/Excel killer. The focus has been on consolidating fragmented information into the database in a user-friendly manner. APEX does this well, but it also makes sense to use it in a range of other situations. Oracle developed APEX from scratch and it is not based directly on any other product. So it's not a new release of Oracle WebDB! APEX debuted in 2004 when version 1.5 was released with Oracle Database 10gR1. It was first named HTML DB, but later renamed. At the time of writing the current version of APEX is 2.2.1.

APEX demands at least a version 9.2.0.3 database. APEX is built on the Apache HTTP Server and the mod_plsql Apache module. This is a proven architecture that has been around for a long time. Mod_plsql makes it possible to generate Web pages directly from PL/SQL. If you have used the PL/SQL Web toolkit or generated WSG modules with Oracle Designer, you have used mod_plsql. This architecture makes APEX perform well and scale with the database. It is possible to use the Apache HTTP Server from an Oracle Application Server (OAS). You don't need an OAS unless you have a very high load and need the better integration to performance tools that OAS offers.

The free Oracle Database10g Express Edition (XE) has a default APEX installed. What a cool package; a trimmed down 10.2 database and APEX included absolutely free! The APEX is a special release 2.1 that does not use the Apache HTTP Server and the mod_plsql module. Instead it uses the embedded Apache HTTP Server and the PL/SQL gateway, which were introduced with Oracle XML DB in release 9.2 of the database. TIP: If you are using a 10g database, the

Apache HTTP Server is no longer installed by default. You have to install it from the companion CD. It is not possible to install the normal APEX version on Oracle Database XE in a supported fashion. To see how APEX in XE differs from the standard APEX, check <http://tinyurl.com/uu6pl>.

The Guided Tour

All development in APEX takes place in a workspace. Workspaces can be created and maintained in the Administration Services application by an administrator. When a developer logs into a workspace, the Workspace home page appears. Here the three main parts of a workspace are presented: Application Builder, SQL Workshop, and Utilities.

Application Builder is where most of the application development takes place. SQL Workshop consists of tools that will help you view and manage database objects. It's the stuff you would otherwise use Oracle SQL Developer or Toad for. You can upload your script collection, run scripts, or use the visual query builder. All in all, it is a nice set of tools. Most developers probably would not use the tools, but for casual users they are fine. APEX Utilities lets you import/export data from the database, generate DLL, view object reports, and restore dropped database objects.

On the right side of the Workspace home page are some administration links that let you maintain users, user groups, and miscellaneous workspace stuff (see Figure 1).



Figure 1. Workspace Components

Application Development

In the Application Builder you can develop applications as you do in Oracle Designer. When you change a property, metadata is saved to the database. Creation of objects is mostly wizard-based, but when you need to change something later you need to know which property to change. Designing a page is not WYSIWYG, but you can see the order of items, buttons, and so on. APEX has a string of built-in page types such as Forms, Reports, and Charts.

FORMS

Forms can be built with a wizard or manually. They can be based on a table, view, procedure, SQL query, or Web

Continued

Oracle Application Express—What's it All About? (Continued)

service. Forms items are HTML form elements; some are enriched with extra features, for example, the date fields, which can have an associated pop-up calendar. Aside from normal Forms, it is also possible to create master detail Forms, tabular Forms, and others.

REPORTS

You can create HTML reports based on SQL. Currently HTML is your only option for report output. I think this is disappointing, but PDF reports are on the horizon for release 3.0. At the moment we use Apache FOP for our PDF reports. FOP is fine and free, but complicated to use. I have heard good things about PL/PDF, but it's not free. There is, of course, always the option of using Reports or XML Publisher if you already have the skills and licenses.

CHARTS

It's possible to create HTML and SVG charts. You can create charts where you drill down from one chart to another. Charts can also be refreshed using Partial Page Rendering (PPR), avoiding the need to refresh an entire page.

MS EXCEL INTEGRATION

One of the strong features of APEX is the close MS Excel integration. Via a wizard, you can upload a spreadsheet to a table. You can use an existing table or generate a new one in the process. It is also possible to base an entire application on a spreadsheet (see Figure 2). The wizard guides you through the upload and the application generation. The uploaded data can be maintained in the new application. A simple SVG chart is also generated by default. In minutes you go from Excel to an APEX application. This cool feature can be used for prototyping, or to get a quick start.



Figure 2. Data Load/Unload

USER INTERFACE

When an application is executing, the screens are rendered run-time from the metadata in the database. This is a little different from WebDB and Oracle Portal that generate PL/SQL packages for every module. APEX separates the presentation from the application logic. APEX operates with UI themes. There are 18 standard built-in themes to choose from. The themes can be customized as much as you want. You can create your own themes based on the built-in ones, build from scratch, or build from an export file. The standard themes are quite nice. We have had customers who were very focused on the layout, but ended up

being very pleased with a built-in theme. A theme consists of templates. Each template controls the layout of a specific component, for example, a button. Templates consist of HTML, CSS, and graphics. The theme concept is very flexible and makes it possible to get exactly the layout you want without changing your code.

SECURITY

With APEX it's possible to create public applications, or applications that require authentication. APEX contains a number of built-in authentication schemes. The standard scheme is called Application Express. The users are "thin" users, stored in a table. Groups of users can be created, but they only can be used with this authentication scheme. Other authentication schemes are based on database users, an external LDAP server, or an Oracle Single Sign-On (SSO) server. It is also possible to use custom authentication if you need something different. We have used the SSO integration and it works fine even though it is not so straightforward to set up.

Authorization schemes can be used to extend authentication schemes to allow a more granular access control. You can control access to an entire application, a page, or a component on a page. An authorization scheme is based on custom SQL or PL/SQL code.

APEX also has advanced built-in security functions that will help you with session state protection and cross-site scripting protection.

DEPLOYMENT

An application consists of the application itself and supporting objects such as images, CSS, JavaScript, and SQL scripts. You can deploy every type in its own file, or as a single SQL script file called a packaged application. You create an export file and import it on the other system. Brilliantly easy! It shows how well the metadata repository approach works.

SESSION STATE

As for most other HTML applications, APEX is stateless, meaning that the Web browser is only connected to the server while it requests or is downloading a page. One request is not related to the other, so if you put a value into a PL/SQL package variable on one page, it will not be there on the next page, because the next page is a different session. Normally in mod_plsql Web applications you can get around this via cookies or URL parameters. This is very cumbersome, though. Luckily, APEX has an elegant solution in the session state feature. APEX transparently manages session state in the database. All items on a page are automatically saved in the session state. You can get and set the session state as you want. This is a very strong feature.

AJAX

Everything has to be Ajax these days, and of course APEX supports Ajax. It is used for PPR of reports and charts, and you can use it in your own code. I don't believe you should use Ajax unless you really need it, because I find it a little difficult to maintain and debug. At the moment we only use it to create cascading related lists of values (LOVs). APEX simply can't handle this properly in a Form, but with Ajax it is fixed quickly.

WEB SERVICE

You can consume Web service in APEX but not publish it. The Web service has to use SOAP binding 1.1 and, according to Metalink, the only supported message format is RPC-Literal. I have only tested using the Google search API and it worked like a charm. I have also seen postings on the Oracle Technology Network (OTN) forums reporting that others have been successful using other message formats.

PRODUCTIVITY BOOSTERS

APEX contains a couple of things that will help you be more productive. UI Defaults let you create default UI properties for a table, view, or column. This saves a lot of time and will give you more consistency across pages. When you start a new project, one of the first things you should do is to go through all tables and views and create UI Defaults. UI Defaults will only help when you create new pages. When you change existing pages Application Reports come in handy. They not only show you information but also let you change it. Say, for instance, you want to change Family Name to Last Name throughout an application. You can use the Item Label report to show you all Item Labels and let you edit them in a grid.

Packaged Applications and Open Source

The number of off-the-shelf applications is probably going to be limited, since the source code for your application cannot be protected in any way. Fortunately, there are other initiatives at work. Oracle has created a number of standard APEX applications that solve common business problems, like a forum and an online store. Oracle calls them Packaged Applications because that's what they are. Currently there are eight Packaged Applications. They are free and can be downloaded from OTN. Packaged Applications are a powerful feature that can solve a specific problem or help you get started with APEX.

There is also a budding Open Source APEX community. Currently there are two projects; a general one driven by people from the APEX development team and ApexLib created by Patrick Wolf. ApexLib is focused on solving some of the shortcomings of APEX.

Here Today, Gone Tomorrow?

WebDB had a short life span. Will APEX also be a short-lived visitor? I don't think so. Oracle has demonstrated

its commitment to the product and Oracle themselves use APEX a lot. Metalink and Ask Tom are two examples, but there are hundreds of internal applications. Oracle has released a Statement of direction for APEX and from this you can see that Oracle is planning on releasing version 3.0 in the first half of 2007. This release will focus on four key areas: improved printing capabilities, improved Web Service support, Microsoft Access migration assistant, and Flash charts. There will be support for PDF and Word output via integration to XML Publisher. The big question is whether the product still will be free or if there will be an extra charge for the printing option. XML Publisher does not normally come cheap. Flash charts are good news since Adobe will end its support for SVG at the end of 2007.

Conclusion

Our experiences with APEX have generally been positive. I think that APEX is a good choice for smaller Web applications. It's very productive, and you can create simple applications quickly. APEX fills the gap where you don't want to use a full-blown enterprise solution like ADF. I don't think of APEX as an end-user tool. Casual users can use APEX, but as soon as you go beyond the wizards the learning curve is high. You really need to know SQL, PL/SQL, HTML, JavaScript, and CSS to get the most from APEX. If you don't have those skills you will soon be stuck. But if you do, you quickly can be productive. As with everything, APEX has its good and bad sides.

The Good

I love that APEX is so close to the database. I don't need help from Java heads or to fiddle around in a container on the Application server. I can stay in the comfort of the database where I feel at home. And since everything is in the database, it scales and performs with the base.

APEX is very flexible, so even where standard APEX sets some limits, you can usually code your way around the problems. This flexibility is one of the best features.

Another thing the product has going for it is the developer community. The APEX OTN forum is really, really good! I don't think APEX would have been such a success without it. The forum can be used as knowledge repository, since most questions have already been answered there, and as a place to post your own questions. People from the APEX development team answer questions daily, but there are also a growing number of non-Oracle developers that are very knowledgeable and helpful.

THE BAD

There is no version control in APEX. If you only use it for small projects this is not a big issue, but it sets an upper limit on the size APEX project you can do. When we had two developers working on a project we used to export the application to file and save it in CVS a couple of times a day.

Continued

Oracle Application Express—What’s it All About? (Continued)

This worked fine, but if you add more developers it starts to get complicated. It helps to use the Lock Page feature. This locks the page so only the person that has locked the page can change it.

There are standard texts in APEX that you can’t translate. APEX supports 10 languages, but if you need others you will see English texts that you cannot translate. You can code your way around this, but it takes time, costs money, and it is not always a reliable solution. Oracle is aware of the problems and has made it possible to translate the untranslatable messages associated with Reports. Look for “Translating Messages Used for Reports” in the User’s Guide. I hope Oracle will solve the problem completely with release 3.0.

I truly miss PL/SQL exception handling in APEX. If an unexpected error occurs, APEX navigates to an error page and shows the raw ORA error. This also happens if you have validations in database triggers that raise an error. It would be nice to have a way to catch exceptions, with an on-error PL/SQL block. You end up writing extra validation code in APEX for things like unique keys. This means extra roundtrips to the database that could have been avoided if validations were performed by the database, and the errors could be trapped in APEX.

LOVs or Select Lists as they are called in APEX, have some limitations in APEX and hopefully will be enhanced in the next version, maybe to work a bit more like they do in Forms.

There are no keyboard shortcuts in the Application Builder. This means that people with carpal tunnel syndrome should take care. It would be very nice with a few short cuts, for example, the Apply Changes button.

FINAL THOUGHTS

APEX is a great tool, which keeps getting better with each release. Use it for smaller Web projects and for more ad hoc tasks. If you want to take APEX for a spin, Oracle has a really cool service. They will host APEX workspaces online for free. You can request a workspace at apex.oracle.com. You are not allowed to use the service commercially, but otherwise it’s up to you. Everything works pretty much like a normal APEX. The only thing I have noticed is that the use of Web Service is disabled for security reasons. There are over 11,000 active workspaces.

Resources

OTN	http://tinyurl.com/pogay
APEX Wiki	http://tinyurl.com/kgdj3
APEX SIG	http://tinyurl.com/y247e8
Packaged Applications	http://tinyurl.com/zhqvr
APEX production sites	http://tinyurl.com/k79md
Sourceforge project	http://tinyurl.com/g72kq
ApexLib	http://tinyurl.com/2xafq3

Sr. Technical Editor’s Note: Also see the ODTUG APEX SIG at www.odtug.com.

About the Author

Peter Lorenzen is a technology manager at WM-data, Denmark. He works in the consulting division and specializes in Oracle development tools.



Peter Lorenzen

APEXposed!

June 18 and 19
Daytona Beach, Florida



Presented during the first two days of ODTUG Kaleidoscope, this training conference is the first of its kind. Two tracks, Novice and Experienced, will be offered. The Novice track participants will learn from a primarily hands-on environment, while the Experienced participants will tackle more complex issues in a lecture format followed by a hands-on session. Both groups will receive seriously practical tips, techniques, and solutions taught by the world’s leading APEXperts, including:

Mike Hichwa, Oracle Corporation

Scott Spendolini, Sumner Technologies, LLC

Josh Millinger, Sumner Technologies, LLC

Raj Mattamal, Sumner Technologies, LLC

Register now at www.odtugapextraining.com