Migrating Critical Business Applications to APEX ... Successfully

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TH TECHNOLOGY
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About Me …

Karen Cannell ~ Consultant, TH TECHNOLOGY

- Mechanical/SW Engineer - Analyzed, designed, developed, converted, upgraded, enhanced legacy & database applications for 25+ years
- Building APEX applications for government, medical, engineering industries since HTMLDB
- Leveraging the Oracle 10g, 11g, 12c suite of tools
- Editor ODTUG Technical Journal

Send Me ODTUG Technical Journal Content!
Beginning Application Express
4.2, APress, 2013

Agile Oracle Application Express
APress, 2012
About You …

- New to APEX?
- MS Access Applications?
- Oracle Forms?
- APEX Experience?
- Migration Plans?
Agenda

- Planning
- Migration Process
- The APEX Migration Workshop
- Lessons Learned

Plan for your Migration Processes
We’ll Learn

- What to Expect When Undertaking a Migration Project
- Overview of SQL Developer Migration Workbench
- Overview of the APEX Migration Process
Why Migrate?
Why Migrate?

- Consolidate - Platform, Management, DB
- Reliability
- Scalability
- Performance
- Critical Business Function onto Enterprise DB
  - Support
  - Security
  - Accessibility

"Forms is Going Away"

The Decision Process - a Project in Itself
Migration != Conversion
Migration Is Not Easy
Migration === Change

User Interface Will Change
- Forms to Web
- Ms Access to Web
- User Experience Will Change

Form/Report Flow Will Change
- Web Pages are Different Than ....

Sound Database Design Essential
- APEX Will Magnify Poor Query Performance

Re-Engineer and Re-Design Will Be Needed
Essentials

- Experienced Resources – Both Sides
- Commitment
- Re-Evaluation, Re-Engineering
- Communication
- Manage Expectations
Migration

- One Way
- Forward
- Better
Successful Migration Project

- $\geq$ Functionality
- $\geq$ Value
- $\leq$ Cost to Operate
- 😊😊😊 End Users
Planning – Consider These … at least!

- Scope
- Business Process
- Database Design
- Form Design
- Input / Output
- Security
- User Interface

- Standards
- Overall Process
  - Framework?
  - Themes?
- Resources
- Documentation
- Training
Requirements

- Decision
- Commitment
- Business Experts
- Technical Experts
- APEX Experts

- Hardware, Software
- Database/Server Support
- User Support
- Acceptance Criteria
- Training

Communication
Decision

- Solid Management Decision
- Committed Funding
- All Stakeholders On Board
- For The Duration

Be Prepared to Play Cheerleader
Commitment

- Resources
- Bandwidth
- HW and SW
- Support
- Schedules
- Funding
Experts

- Business Expert
- Legacy App Technical Expert
- APEX Expert

All on Speaking Terms
Able to Share Knowledge
Hardware and Software

- Database and Application Server
- File Servers
- Disk Space
- Backup
- Bandwidth for Estimated Load
- Licenses
- Dev – Test – Production Environments
DB and System Support

- Dev – Test – QA – Production
- Downtime?
- Service Periods?
- Plan Ahead to Get Approvals, Resources
- Expectations
  - Response Time
Post-Implementation Support

- End User Help Desk
- Developers?
- End User Documentation
- Technical Documentation

- Who Writes it?
- Costs
- Timing – Ready for Test Phase?
Acceptance Criteria

- Have A Test Plan
  - Define Key Functionality
- Execute the Test Plan
  - Make Sure It's There

W/O a Test Plan, Can Never Succeed
Training

- End Users
- Developers
- Support Resources
  - Do Not Assume they Know APEX
Communication

- All Stakeholders
- Continual
- Honest

Manage Expectations

Play Cheerleader When You Have To
Migrate to APEX - Successfully

The APEX Migration Process
Overview - MS Access
Overview – Oracle Forms

TH Technology

Migrate Critical Apps to APEX ... Successfully
Overview – Other Platforms

- Upload/Build Objects
- Analyze
- Generate App
- Customization
Overview – Work Balance

- Upload/Build Objects
- Analyze
- Generate App

Customization
APEX Migration Process

- Export Legacy DB Objects
  - Tables, Views, Triggers, Data
- Migrate DB Objects to Oracle
  - Relational DB Design
- Migrate Application Components
  - Code Modules, Forms, Reports
- Organize into APEX Application
  - Web Pages
  - Web Application
- Customize / FIX IT
Tools to Help

- Oracle Exporter – MS Access
- Forms2XML – Forms/Reports File Convertors
- SQL Developer Migration Workbench
- APEX Migration Workshop
Oracle Exporter

- MS Access Only
- No Plans for 2010

- Download from APEX Migration Workshop
- SQL Developer 3.2 – Integrated
- SQL Developer 4.0 ? Not Integrated

- 32bit MS Access …
MS Access 32bit vs 64bit

- Beware 32bit vs 64bit
- Cannot Mix MS Access 32bit vs 64bit

- Oracle Exporter == 32bit
  - Does Not Run in 64bit MS Access

- SQL Developer
  - 32bit SQL Dev Cannot Connect to 64bit MS Access
  - 64bit SQL Dev Cannot Connect to 32bit MS Access
Exporter Supported Versions

- 2010 NOT Supported

Options:
- Save As Earlier Version
- Export Objects as XML (one at a time)
- Use Ms Access Export to ODBC Database Option (External Data → Export → More → ODBC Database)
  - Table at a time
  - Make sure 32bit MS Access gets 32bit ODBC driver, 64bit Access get 64bit ODBC driver
Exporter - Demo

.. Cannot demo …

I have 64bit MS Access now!
Start Oracle Exporter (32bit .mde!)
Select MS Access .mdb file
Full Schema and Table Data Export Completed...
Output Files

- Northwind_Migrate
  - Northwind.sql
  - Northwind.xml

- Northwind_Migrate_Access2003
  - Categories.dat
  - Customers.dat
  - Employees.dat
  - Order Details.dat
  - Orders.dat
  - Products.dat
  - Shippers.dat
  - Suppliers.dat
Exporter - Results

- .SQL – Migration Repository file for APEX
- .XML – SQL Developer file
In General, These Steps:

- Oracle Exporter
- Review Output Files
- Import Files into SQL Dev Migration Repos
- Generate Output … schema.sql
- View Resulting schema.sql … Run?
- Use Scratch Editor .. Fix Invalids
- Eventually → Good New Schema
Data Migration

- Schema First, Then Data
- Export/Import
- SQL Loader
- SQL Dev Migration
- “Copy to Oracle”
  - My Best Bet on 64b MS Access
  - Tedious for Many Tables
- Load then ETL to Final Structures
Exporter/ DB Migration Results

Tables → Tables
Queries → Views
Program Units → Empty Modules
Must Manually Rewrite

Check These Things:
- FK Constraints
- Triggers
- The Script Itself

OK for a Few Modules, BIG WORK for Complex Apps
SQL Developer Migration

Oracle SQL Developer
Release 4.0 is here

Develop

Administer

Model

Migrate

Migrate Critical Apps to APEX ... Successfully
SQL Dev Migration Workbench

- Database to Oracle

- Earlier Version – More MS Access
- Later Version – More Major DB
Migration Wizard

Migration Wizard - Step 1 of 9

Introduction

This wizard enables the migration of third party database on to Oracle. Database migration can be carried out either in an Online or Offline mode. You need a live connection to third party database to do an Online Migration.

Migration involves the following steps:

1. Priming an Oracle connection with the Migration Repository.
2. Creating a Migration Project that serves as a container for the migration entities.
3. Capturing the source database meta information into the Migration Repository.
4. Converting the captured meta information to Oracle specific meta information.
5. Generating Oracle Database creation script from the converted meta information.
7. Move the Data from the Source Database to the newly created Oracle Database.

Following connection privilege prerequisites.

1. Repository Connection - Connect, Resource and Create View
2. Target Connection for DB Creation -

Help

< Back Next > Finish Cancel

Skip this page on next launch.
SQL Developer Tasks

- Relational Tables
- PKs, FKs, Constraints
- Triggers, Sequences
- Views
- Adjustments to Your Schema
- Data Migration

Time Spent Here Is Worth It!
APEX Performance

Poor Performance is MAGNIFIED in APEX

Fix SQL Performance Issues Early
Fix SQL Performance Issues Outside of APEX

Good Relational Design Pays Off
Don’t Skimp Here!

Good Relational Design Is Important
If Migrating Oracle Forms...
Oracle Forms Conversion
Convert Parts to XML

- **Forms2XML for Forms, Menus, Libraries**
  - Forms (.FMB), Menus (.mmb), Object libraries (.OLB)
  - Utility or Command Line

- **Forms Builder File Conversion Utility**
  - PL/SQL Library (.PLL)

- **Report Builder File Conversion Utility**
  - Binary (.RDF), ASCII (.REX), JSP (.JSP)
Forms Conversion, cont’d

- Create APEX Workspaces and Users
  - APEX Administrator

- Upload Database Objects into Workspace Schema
  - SQL Scripts
  - SQL Developer (or your favorite SQL-PL/SQL IDE)

  Sample Files:
  - forms_conversion_ddl.sql
  - forms_conversion_data_insert.sql
SQL Developer – Execute DDL script(s)
Create Conversion Project

- Application Builder → Migrations
  - Lower right on the page

- Create Project
  - Load Forms Module XML File First (myForm_fmb.xml)
  - Load Additional XML Files
    - Reports, Menus, OLBS, PLLs
Enter Project Details

Project Name: 1nd Sample Forms Conversion Demo
Type: Forms
Description: Southwind Sample Forms Conversion Demo
Schema: SOUTH-WIND

Locate the Forms Module XML file generated by the Forms2XML conversion tool. Click here for information on how to generate a Forms Module XML file.

Forms Module XML File: customers_fmb.xml

Tasks:
- Download Exporter for Microsoft Access
- How to Migrate Microsoft Access Applications
- How to Convert Oracle Forms Applications
- Sample Files

Migrate Critical Apps to APEX ... Successfully
Upload Main Form First
Upload Other Forms, Reports, Menus, OLBs, PLLs
<table>
<thead>
<tr>
<th>Edit</th>
<th>Type</th>
<th>File Name</th>
<th>Blocks</th>
<th>DB Blocks</th>
<th>Items</th>
<th>Triggers</th>
<th>Record Groups</th>
<th>Lists of Values</th>
<th>Alerts</th>
<th>Program Units</th>
<th>Component Count</th>
<th>Percent Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>FMB</td>
<td></td>
<td>customers_fmb.xml</td>
<td>4</td>
<td>3</td>
<td>25</td>
<td>20</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>75</td>
<td>77.33</td>
</tr>
<tr>
<td>FMD</td>
<td></td>
<td>orders_fmb.xml</td>
<td>4</td>
<td>3</td>
<td>24</td>
<td>45</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>106</td>
<td>63.96</td>
</tr>
</tbody>
</table>

**Forms Conversion**

- **Project Created.**

- **Task:** Migrate Critical Apps to APEX ... Successfully
## Migration Project Page

<table>
<thead>
<tr>
<th>Edit</th>
<th>Type</th>
<th>File Name</th>
<th>Blocks</th>
<th>DB Blocks</th>
<th>Items</th>
<th>Triggers</th>
<th>Record Groups</th>
<th>Lists of Values</th>
<th>Alerts</th>
<th>Program Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RPT</td>
<td>Employees.xml</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FMB</td>
<td>customers_fmb.xml</td>
<td>5</td>
<td>4</td>
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<td>23</td>
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<td>1</td>
<td>2</td>
<td>7</td>
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<tr>
<td></td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>FMB</td>
<td>orders_fmb.xml</td>
<td>4</td>
<td>3</td>
<td>34</td>
<td>45</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>OLB</td>
<td>stndrd20_obl.xml</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>PLL</td>
<td>wizard.pld</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Example with Forms, Reports, Menus, OLBs, PLLs

Migrate Critical Apps to APEX ... Successfully
Now What?

Am I Really 81.22% Done?

<table>
<thead>
<tr>
<th>Triggers</th>
<th>Record Groups</th>
<th>Lists of Values</th>
<th>Alerts</th>
<th>Program Units</th>
<th>Component Count</th>
<th>Percent Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>75</td>
<td>77.33</td>
</tr>
<tr>
<td>45</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>106</td>
<td>83.96</td>
</tr>
</tbody>
</table>

Recent
- orders_fmb.xml
- customers_fmb.xml

Completion Status
- Components: 181
- Completed: 147
- Percent Complete: 81.22
Review and Edit Modules

- Project Details
- Forms
- Reports
- Menus
- Object Libraries
- PL/SQL Libraries

Use Annotations to Track Progress
### Project Details - Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alerts</td>
<td>Yes</td>
</tr>
<tr>
<td>Attached Library</td>
<td>No</td>
</tr>
<tr>
<td>Blocks</td>
<td>Yes</td>
</tr>
<tr>
<td>Block-Level Triggers</td>
<td>Yes</td>
</tr>
<tr>
<td>Canvas</td>
<td>No</td>
</tr>
<tr>
<td>Coordinates</td>
<td>No</td>
</tr>
<tr>
<td>Editor</td>
<td>Yes</td>
</tr>
<tr>
<td>Form-Level Triggers</td>
<td>Yes</td>
</tr>
<tr>
<td>Item-Level Triggers</td>
<td>Yes</td>
</tr>
<tr>
<td>Lists of Values</td>
<td>Yes</td>
</tr>
<tr>
<td>Menu</td>
<td>No</td>
</tr>
<tr>
<td>Module Parameter</td>
<td>No</td>
</tr>
<tr>
<td>Object Group</td>
<td>No</td>
</tr>
<tr>
<td>Program Units</td>
<td>Yes</td>
</tr>
<tr>
<td>Property Class</td>
<td>No</td>
</tr>
<tr>
<td>Record Groups</td>
<td>Yes</td>
</tr>
<tr>
<td>Report</td>
<td>No</td>
</tr>
<tr>
<td>Visual Attributes</td>
<td>No</td>
</tr>
<tr>
<td>Windows</td>
<td>No</td>
</tr>
</tbody>
</table>

Changing the applicability will update all components within your project to the new value, irrespective of their current setting.
## Trigger Applicability

Changing the applicability will update all components within your project to the new value, irrespective of their current setting.

<table>
<thead>
<tr>
<th>Trigger Name</th>
<th>Form Level</th>
<th>Block Level</th>
<th>Item Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEY-CLRBLK</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-CLFRRM</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-CLRREC</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>KEY-COMMIT</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-CQUERY</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-CRREC</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-DOWN</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>KEY-DUP-ITEM</td>
<td>No</td>
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<td>No</td>
</tr>
<tr>
<td>KEY-DUPREC</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>KEY-EDIT</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>KEY-ENTER</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>KEY-ENTRY</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<td>KEY-EXECQRY</td>
<td>Yes</td>
<td>No</td>
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<td>KEY-EXIT</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>KEY-HELP</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>KEY-LSTVAL</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>KEY-MENU</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-NEXT-ITEM</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>KEY-NEXTSET</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-NXtblk</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>KEY-NXKEY</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-NXTREC</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-OTHERS</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-PREV-ITEM</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>KEY-PRINT</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-PRV/BLK</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-PRV/REC</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>KEY-REOP</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**Project Details – Forms Triggers**
# Review Form Components

- Alerts
- Blocks
- List of Values
- Program Units
- Record Groups
- Triggers

- Canvas
- Coordinates
- Editor
- Property Class
- Visual Attributes
- Windows
Component Mapping – Generally…

- Alerts → Messages
- Blocks → Regions
- List of Values → LOV
- Program Units ❌
  Manually Rewrite
- Record Groups → Named LOV
- Triggers ❌
  Rewrite many of these as Computation, Validation or Process

- Canvas → Template
- Coordinates ❌
- Editor → HTML Editor
- Property Class ❌
- Visual Attributes ❌
- Window → Page

Migrate Critical Apps to APEX ... Successfully
### Component Details

<table>
<thead>
<tr>
<th>Component</th>
<th>Count</th>
<th>Equivalent Component</th>
<th>Implementation Details</th>
<th>Included</th>
<th>File Name</th>
<th>Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alerts</td>
<td>2</td>
<td>-</td>
<td>An alert message can be stored as a Text Message in the Shared Components of an Oracle Application Express application. Text Messages can be used to build translatable text strings with substitution variables that can be called from PL/SQL packages, procedures, and functions.</td>
<td>-</td>
<td>customers_fmb.xml</td>
<td>Yes</td>
</tr>
<tr>
<td>Blocks</td>
<td>4</td>
<td>Regions</td>
<td>A single block can be mapped to a region in Oracle Application Express. Based upon the block type and data source type (table/view) identified in the Forms XML file, some default mappings are defined. For example, a report block which is based upon an Oracle view, will be mapped to an Interactive report in Oracle Application Express. A form block based upon a table, will be mapped to an Interactive report and form in Oracle Application Express.</td>
<td>0</td>
<td>customers_fmb.xml</td>
<td>Yes</td>
</tr>
<tr>
<td>Canvas</td>
<td>5</td>
<td>-</td>
<td>In Oracle Forms, the canvas is the object on which the GUI is drawn, the “background” of the form. In Oracle Application Express, the engine constructs the appearance of each page in a application using Templates. Templates define how pages, page controls, and page components display. Depending on the Coordinate System used in the Oracle Forms application, coordinates can be expressed in real units such as inches, centimeters, and pixels. One unit in an Oracle Application Express item position might not be equal to one physical pixel in an Oracle Forms application. Therefore the coordinate values cannot be automatically applied to the generated application.</td>
<td>-</td>
<td>customers_fmb.xml</td>
<td>No</td>
</tr>
<tr>
<td>Coordinates</td>
<td>1</td>
<td>-</td>
<td>In Oracle Forms, Editors provide standard editing features, including search/replace and cut, copy, and paste, for text items. For a selected text item, an Editor can be mapped to a HTML Editor in Oracle Application Express.</td>
<td>-</td>
<td>customers_fmb.xml</td>
<td>Yes</td>
</tr>
<tr>
<td>Editor</td>
<td>1</td>
<td>-</td>
<td>In Oracle Forms, Editors provide standard editing features, including search/replace and cut, copy, and paste, for text items. For a selected text item, an Editor can be mapped to a HTML Editor in Oracle Application Express.</td>
<td>-</td>
<td>customers_fmb.xml</td>
<td>Yes</td>
</tr>
<tr>
<td>Lists of Values</td>
<td>1</td>
<td>Lists of Values</td>
<td>A List of Values can be mapped to an equivalent List of Values in Oracle Application Express. When LOVs are selected for inclusion in the migration to Oracle Application Express their associated record group will also be included in the migration.</td>
<td>1</td>
<td>customers_fmb.xml</td>
<td>Yes</td>
</tr>
<tr>
<td>Program Units</td>
<td>7</td>
<td>-</td>
<td>In the post-generation phase of a Forms Conversion, Program Units can be incorporated into your Oracle Application Express application as a PL/SQL package, page process, computation or validation.</td>
<td>-</td>
<td>customers_fmb.xml</td>
<td>Yes</td>
</tr>
<tr>
<td>Property Class</td>
<td>1</td>
<td>-</td>
<td>In Oracle Forms, Property Class is a named object that contains a list of properties and their settings. An object based on a property class can inherit the settings of any property in that class that make sense for the object. Similarly, in Oracle Application Express, a Theme is a named collection of templates used to define the user interface of an application. Oracle Application Express has a repository of 20 themes, and you can also create your own custom themes.</td>
<td>-</td>
<td>customers_fmb.xml</td>
<td>No</td>
</tr>
<tr>
<td>Record Groups</td>
<td>1</td>
<td>-</td>
<td>In Oracle Forms, LOV values are derived from a record group. When an LOV is defined, it is associated with a named record group. When an LOV is included in the migration, its associated Record Group will also be included in the migration to Oracle Application Express.</td>
<td>-</td>
<td>customers_fmb.xml</td>
<td>Yes</td>
</tr>
<tr>
<td>Triggers</td>
<td>20</td>
<td>-</td>
<td>An Oracle Forms trigger is an event handler written in PL/SQL to augment the default processing behavior. The trigger logic can be incorporated into an Oracle Application Express application as a computation, validation or PL/SQL process at post-generation phase. For example, POST_QUERY block trigger logic can be automatically incorporated into an application, as part of the Editor process.</td>
<td>-</td>
<td>customers_fmb.xml</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Lots to Do Here!
Lots of Manual Work To Do

- Just Keep Pluggin’ …
- Component by Component
- Use Annotations to Assign Components to Developers
- Track Overall Progress on Project Details Page
Annotations

- Use to Assign Developers
- Notes
- Tags
- Most Every Component

Change when done
Annotations

- Migration Utility Will Decide Some For You
- Notes
- Tags

Note as to why not included by Migration Utility

The Datasource associated with the block is not a table or view in the schema associated with your Conversion project.
# Program Units

<table>
<thead>
<tr>
<th>Name</th>
<th>Program Unit Type</th>
<th>Assignee</th>
<th>Tags</th>
<th>Applicable</th>
<th>Complete</th>
<th>Notes Snippet</th>
<th>File Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHECK_PACKAGE_FAILURE</td>
<td>Procedure</td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
<td>orders_fmb.xml</td>
</tr>
<tr>
<td>QUERY_MASTER_DETAILS</td>
<td>Procedure</td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
<td>orders_fmb.xml</td>
</tr>
<tr>
<td>CLEAR_ALL_MASTER_DETAILS</td>
<td>Procedure</td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
<td>orders_fmb.xml</td>
</tr>
<tr>
<td>CHECK_WINDOW_SIZE</td>
<td>Procedure</td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
<td>orders_fmb.xml</td>
</tr>
<tr>
<td>DATE_CHOSEN</td>
<td>Procedure</td>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
<td>orders_fmb.xml</td>
</tr>
</tbody>
</table>
Code That Does Not Translate

- IF NOT ( Form_Success) ...
- Get_Relation_Property()
- QUERY_MASTERDETAILS
- Go_Block
- Check_Package_Failure
- Set_Block_Property
- Etc., Etc., Etc. …
Set Application Defaults

- Tabs
- Authentication
- Application Theme
- Globalization
### TH Technology

**Migrate Critical Apps to APEX Successfully**

<table>
<thead>
<tr>
<th>Page</th>
<th>Page Name</th>
<th>Page Type</th>
<th>Page Source</th>
<th>Source</th>
<th>Delete Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Home</td>
<td>Blank</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2 Customers</td>
<td>Tabular Form</td>
<td>Table</td>
<td>S_CUSTOMER</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3 Orders</td>
<td>Report</td>
<td>Table</td>
<td>S_ORD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>4 Orders</td>
<td>Master Detail</td>
<td>Table</td>
<td>S_ITEM</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5 Items</td>
<td>Report</td>
<td>SQL Query</td>
<td>select &quot;S_ITEM&quot;.&quot;ORD</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6 Items</td>
<td>Form</td>
<td>Table</td>
<td>S_ITEM</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>7 Inventory</td>
<td>Tabular Form</td>
<td>Table</td>
<td>S_INVENTORY</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

#### Add Page

Select Page Type:

- **Blank**
- **Report**
- **Form**
- **Tabular Form**
- **Master Detail**
- **Report and Form**

**Action:** Add blank page to application

**Subordinate to Page:** Top Level Page

**Page Name:** Page 8
Lets One Override The Default Settings

Migrate Critical Apps to APEX ... Successfully
Done! ... well, ... sort of.
Check it out at  http://localhost:7777/apex42/f?p=114
Things Not Generated

- Forms Based on Views
- Non-Database Blocks
- PL/SQL Libraries
- Menus
- Object Libraries
- Alerts
- Property Classes, Visual Styles and Formats

You Need to Figure Out IF and Where These Go
Things Generated

- **Forms**
  - Block $\rightarrow$ Region, one per Page
  - Master-Detail Block $\rightarrow$ Master Detail Page
  - Tabular Form $\rightarrow$ Tabular Form
  - Need PK, INSERT or UPDATE
  - LOV, RG, CB Date Pickers, Editors When Possible
  - POST-QUERY Triggers* (when moved into Enhanced Query)

- **Reports**

- **Program Units** IFF PL/SQL
Migration Advice

- Move Business Logic Into Packages
- Use/Develop Standard Theme
  - CSS
  - Templates
  - Navigation
    - Menus vs Tab, Button Placement, Page Hierarchy
  - Page Flow
- Communicate

IT WILL LOOK and PERFORM DIFFERENT than Users Are Used To
The APEX Migration Workshop
Oracle 12c Migration Enhancements

- Enhanced SQL Developer
- Enhanced SQL Developer Migration Workbench
- IDENTITY Columns – defined in the table, no need for sequence and trigger
- Implicit Result Sets
- 32K VARCHARs - up from 4000, MAX_SQL_STRING_SIZE DB parameter
- FETCH FIRST ROWS - SELECT * FROM T1 FETCH FIRST 10 PERCENT ROWS ONLY
- SQL Translation Framework
SQL Translation Framework

- Does Not Convert to SQL or PL/SQL
- For Apps with ODBC, JDBC, OLE DB or .NET
- Enables Client-Side Code to Run Unchanged
- Neat Stuff But Not Usually a Help for APEX Migrations
“..that’s an awful lot of work …”

Build From Scratch is Always an Option …
Get Help – Experience Counts

- Consultants
- Frameworks
- Consult / Training
- Co-Developing
Lessons Learned
What Works

- Re-Evaluate, Re-Engineer
  - for Oracle DB
  - for Web Pages
  - for Web Flow / Interface

- Good Relational DB Design

- Have Standards – Apply Standards

- Communicate
  - Evaluate – Reassess – Repeat
What Does Not Work

- Straight Conversion
- Migrating as Isolated Project
- Migration as APEX Training
- Skimp on DB Design
- No or Skimpy Training
- No or Poor Communication
- “Aw, This is Easy…”
Lessons Learned

- Plan
- Know Your Team
- Re-Think, Re-Engineer the Business Process
- Take Time for Good DB Design
- Migration Utilities May Help
- Maintain Communications
- Keep Showing, Validating Progress
Honesty
Summary

- Migration is a Process
- Re-Evaluate – Re-Engineer
- These HELP
  - SQL Developer Migration Workbench
  - APEX Migration Workshop
- Lots of Manual Work to Do
- Communication - Expectations
TH Technology

Migrate Critical Apps to APEX Successfully
Questions?

Please fill out the evaluations

Migrating Critical Apps to APEX … Successfully

kcannell@thtechnology.com

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ODTUG Technical Journal
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kcannell@odtug.com

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Thank You

Please fill out the evaluations

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References/Recommended Reading

**APPLICATION EXPRESS MIGRATION WORKSHOP**

**ORACLE APPLICATION EXPRESS 4.2 APPLICATION MIGRATION GUIDE**
http://docs.oracle.com/cd/E37097_01/doc/doc.42/e35126/appmgr_start.htm

**MIGRATING APPLICATIONS AND DATABASES WITH ORACLE DATABASE 12c**

**SQL DEVELOPER SUPPLEMENTARY INFORMATION FOR MS ACCESS MIGRATIONS**
http://docs.oracle.com/cd/E39885_01/doc.40/e18459/toc.htm

**APEX ACCESS MIGRATION TUTORIAL**

**ORACLE DATABASE AND APPLICATIONS MIGRATIONS FORUM**
For help, there is a separate Oracle forum for Application Migrations, including MS Access:
References/Recommended Reading

1. **SQL Developer Migration Workbench**

2. **Migrating Applications and Databases with Oracle Database 12c**

3. **Using SQL Translation Framework in Oracle Database 12c Tutorial (FYI)**