



APEX 5 IR Guts & Performance

Karen Cannell **TH TECHNOLOGY**
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The background of the image is a nighttime photograph of the Chicago skyline, featuring illuminated skyscrapers and a large Ferris wheel in the foreground. Overlaid on the right side of the skyline is a colorful, multi-faceted sunburst logo with rays emanating from a central white point. The text is centered over the image.

ODTUG
Kscope16
CHICAGO, ILLINOIS · JUNE 26-30

PLEASE FILL OUT YOUR EVALUATIONS

Join Your Community!

Tonight from 8:00 – 10:00 in Sheraton III



APEX Open Mic Night

Often described as “APEX meets improv,” the APEX Open Mic Night combines the elements of your favorite bar and comedy club with a Kscope flair, all while you spend time with your favorite colleagues from the APEX Community. The event gives participants 15 minutes each to present ideas and discoveries that can make life easier for others.

About Me ...

Karen Cannell ~ TH TECHNOLOGY

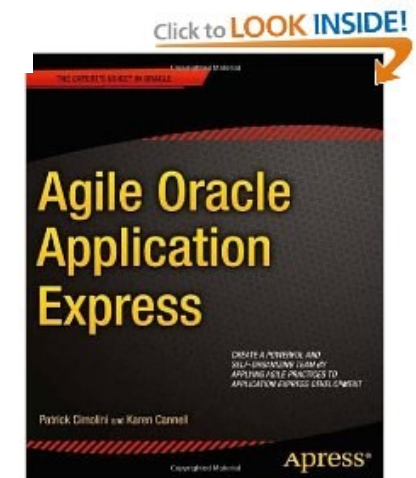
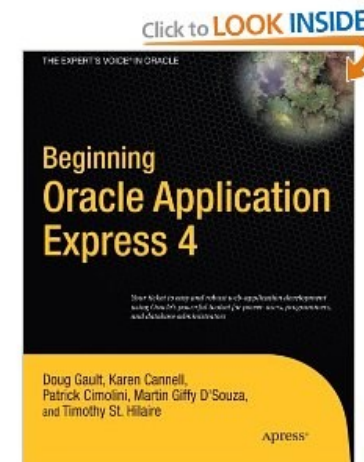
- Mechanical/SW Engineer - Analyzed, designed, developed, converted, upgraded, enhanced legacy & database applications for 25+ years
- Building Oracle –based Web solutions for government, medical, engineering industries, APEX since HTMLDB
- Leveraging the Oracle 10g, 11g, 12c suite of tools
- Oracle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

We Have Books ...

🌐 Expert Oracle Application Express, APress 2015
Report Printing

🌐 Beginning Application Express
4.2, APress, 2013

🌐 Agile Oracle Application Express
APress, 2012



About You ...

- 🌐 New to APEX?
- 🌐 APEX Experience?
- 🌐 APEX Versions?
- 🌐 IR Habits?
- 🌐 IR Customizations?

New Stuff or Old?

APEX5 Ready?

NOTE TO EARLY SLIDE DOWNLOADERS

- Many of these slides **HAVE CHANGED** as I find more neat stuff to add for you every day.
- Please download the updated slides from the Kscope16 site or www.thtechnology.com or email kcannell@thtechnology.com

Agenda ~ Guts and Performance

- Guts ~ Inside and Outside
 - CSS
 - JS
- Performance
 - The Real Query(ies)
 - Declarative Settings
 - Drills & Parameters
 - Extra Boost
- Questions

Developer & User Team

“APEX IR give the end user great power to format and arrange reports to their needs, the **developer** needs to be aware of the end user needs to prepare and deliver the appropriate IR query to support them.”

Know Your Users

Know What Your Users Do

Train Your Users to Maximize IR Use



APEX 5 Interactive Reports:

Guts

CSS and JavaScript

Guts ~ CSS

- APEX 5 - All New CSS

`apexir_<element>` ids

are replaced by

`a-IRR-<component>` classes and

`<Static Id>_...` id names


```
<div class="col col-12">
  <div id="DEMO_IR" class="t-IRR-region" role="group" aria-labelledby="DEMO_IR_heading">
    <h2 class="u-VisuallyHidden" id="DEMO_IR_heading">Straight Table Query ~180,000 Rows</h2>
    <div id="DEMO_IR_ir" class="a-IRR-container">
      <div id="DEMO_IR_worksheet_region" aria-live="polite" class="a-IRR">
        <div id="DEMO_IR_single_row_view" class="a-IRR-singleRowView"></div>
        <div id="DEMO_IR_full_view" class="a-IRR-fullView">
          <div id="DEMO_IR_toolbar" class="a-IRR-toolbar">...</div>
          <div id="DEMO_IR_content" class="a-IRR-content">
            <div id="DEMO_IR_dialog_js" class="a-IRR-dialogBody" style="display:none"></div>
            <style id="DEMO_IR_worksheet_css" type="text/css">
            </style>
            <input type="hidden" id="DEMO_IR_worksheet_id" value="2355217996949548">
            <input type="hidden" id="DEMO_IR_app_user" value=" " >
            <input type="hidden" id="DEMO_IR_report_id" value="2367548967959237">
            <input type="hidden" id="DEMO_IR_view_mode" value="REPORT">
            <div id="DEMO_IR_chart" class="a-IRR-chartView"></div>
            <div id="DEMO_IR_group_by" class="a-IRR-groupByView"></div>
            <div id="DEMO_IR_pivot" class="a-IRR-pivotView"></div>
          <div id="DEMO_IR_data_panel" class="a-IRR-reportView">
            <div class="a-IRR-paginationWrap a-IRR-paginationWrap--top">...</div>
            <div class="a-IRR-tableContainer">
              <div class="t-fht-wrapper">
                <div class="t-fht-thead js-stickyTableHeader js-stickyWidget-toggle" id="stickyTableHeader_2"
                  style="z-index: 308; width: 1126px; position: absolute; top: auto;">...</div>
                <div style="width: 1126px; height: 39px;"></div>
                <div class="t-fht-tbody">
                  <table summary class="a-IRR-table" id="2355217996949548" style="margin-top: -39px;">
                    <tbody>
                      <tr>
                        <th class="a-IRR-header" style="visibility: hidden;">...</th>
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                        <th class="a-IRR-header" style="visibility: hidden;">...</th>
                      </tr>
                    </tbody>
                  </table>
                </div>
              </div>
            </div>
          </div>
        </div>
      </div>
    </div>
  </div>
```

Why Do We Care About the CSS?

- Customizations
- Color
- Style
- Use in ThemeRoller Custom CSS
- Use in Custom Dyn Actions

Custom CSS

```
212 .a-TreeView ul {
213     background-color: #3f6379;
214 }
215
216 .a-IRR-header {
217     background-color:#D5EBF6;
218     color:#41647a;
219 }
220 .a-IRR-header a {
221     background-color:#D5EBF6;
222     color:#41647a;
223 }
224 .a-IRR-toolbar, .a-IRR-selectList, .a-IRR-search-field{
225     border-radius: 4px;
226 }
227
228 .t-Tab-pill {
229     background: linear-gradient(#548797, #f4f4f4);
230     border-radius: 4px;
231 }
232
233 #pick_species_search_field, #remove_species_search_field,#pick_gears_search_field,
#remove_gears_search_field
234     width:120px;
235 }
```

011

2011

04

01

MA

Northeast

North
Atlantic

BRISTOL

New
BedfordLOBSTER,
AMERICANHoman
americ

Guts ~ JavaScript

- All Changed
- Locked Down (relatively)
- No gReport
- No API in Sight

- Lots of Refactoring for Customizations ...

IF You Need To Customize / Refactor

- See jQuery Widgets

```
<base_dir>/i/libraries/apex/minified  
/widget.interactiveReport.js
```

```
/widget.menu.js
```

- Read

<http://hardlikesoftware.com/weblog/2015/05/12/apex-5-0-interactive-report-customization/>

Widgets 101

- `$(selector).widgetName("method");`

- Ex:

```
$("#DEMO_IR_ir").interactiveReport("option");
```

```
$("#DEMO_IR_actions_menu").menu("option");
```

```
$("#DEMO_IR_actions_menu").menu("find",  
"irDownload").action();
```

```
$("#DEMO_IR_actions_menu").menu("find",  
"irReset").action();
```

Reset IR – Dynamic Actions

- PL/SQL call to APEX_IR.RESET

```
1 DECLARE
2     l_region_id apex_application_page_regions.region_id%type;
3 BEGIN
4     SELECT region_id
5     INTO l_region_id
6     FROM apex_application_page_regions
7     WHERE application_id = :APP_ID
8           AND page_id = :APP_PAGE_ID
9           AND static_id = 'DEMO_IR';
10
11     APEX_IR.RESET_REPORT(
12         p_page_id => :APP_PAGE_ID,
13         p_region_id => l_region_id,
14         p_report_id => NULL
15     );
16
17 END;
```

```
$("#DEMO_IR_actions_menu").menu("find",
"irReset").action();
```

Same Result as the other, but
this approach is Unsupported

More UnSupported Customizations

- Download an IR:

```
$("#DEMO_IR_actions_menu").menu("find","irDownload").action();
```

- Get the Current Rows Per Page:

```
$("#DEMO_IR_ir").interactiveReport("option","currentRowsPerPage");
```

- Set the Current Rows Per Page:

```
$("#DEMO_IR_ir").interactiveReport("option","currentRowsPerPage", 50);
```

This approach is UnSupported and Subject to Change

Caveats

We **Can** Extend Things, But Before I/We/You Do

- **Caveat 1 – Things May Change**
- **Caveat 2 – APEX 5.1 Multi Edit Grid**
 - **WILL** Supercede IRs
 - **May** (will probably) Have an API



APEX 5 Interactive Reports:

Performance

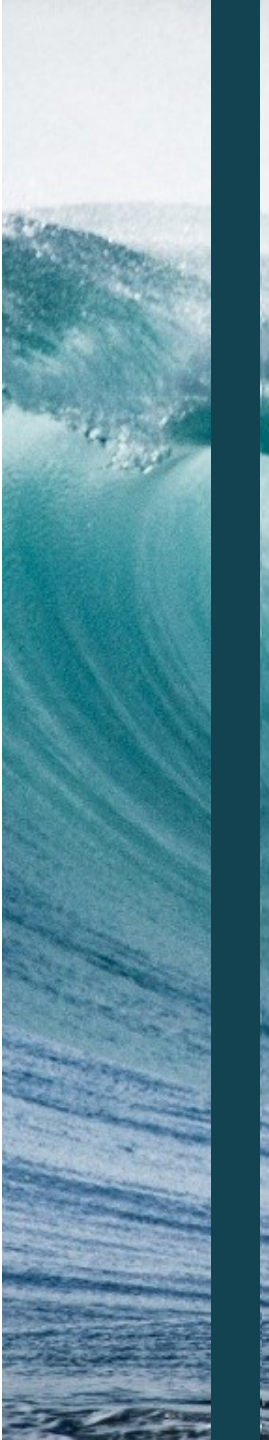
**The Real Query, Declarative Settings, Drills &
Parameters, Extras**

The Basic Interactive Report

- Few(er) Rows < 1000000
 - Good Performance
 - Defaults Are Fine
- Larger, More Complex
 - Know Your Options
 - Use Them!

The Pitifully Slow IR

- Slow IR performance Magnifies ...
- Wait for First Display ...
- Wait for Col Heading Filters ...
- Wait for Pivot ...
- Wait for Chart ...



IR Performance 1-2-3

- Tune the Real SQL Query
- Optimize IR Settings
- Train Users in IR Behavior

The SQL Query

- Tune The Real Query.
 - Slow Performance **Magnifies**
- Tune the Query for How Users Retrieve Data
- Debug to Find The Real Query
- Tune Outside of APEX
 - Explain Plan
 - Indexes

The Real Query

- Changes w Filters
 - Search Filter
 - Col Heading Filter
- Changes w Views
 - Table
 - Group By
 - Chart
 - Pivot

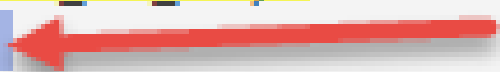
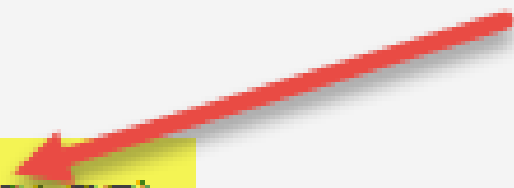
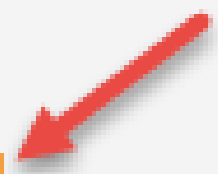
Let's See The Real Query

- Table View
 - Max Row Count
 - Pagination "of Z "
- Tabular w Filters
- Group By
- Chart
- Pivot

0.05700

0.00500

```
...Execute Statement: select
  apxws_row_pk,
  "SPECIES_ITIS",
  "COMMON_NAME",
  "SCIENTIFIC_NAME",
  "SPECIES_NAME",
  "GENUS_NAME",
  "FAMILY_NAME",
  "ORDER_NAME",
  count(*) over () as apxws_row_cnt
from (
select * from (select b.ROWID apxws_row_pk, b.* from (select * from (
select
  "SPECIES_ITIS",
  "COMMON_NAME",
  "SCIENTIFIC_NAME",
  "SPECIES_NAME",
  "GENUS_NAME",
  "FAMILY_NAME",
  "ORDER_NAME"
  from "SPECIES"
) ) b) r
) r where rownum <= to_number(:APXWS_MAX_ROW_CNT)
order by "COMMON_NAME",apxws_row_pk
```



Declarative Settings

- Lots of IR Settings
- Developer Controls These
(That's You!)

Defaults Aren't The Best For Every IR

MaxRowCount

- Small as Practical
- What Is Practical?
- 1000000 default
- Depends on Your Data
- Test ~ Timing ~ Debug

- For “Download It All” Users
 - Offer a Separate Download Page
 - **Avoid High Max Row Count for All Users**

Impact of Max Row Count

Demo

- Default Max Row Count
- High Max Row Count
- Low Max Row Count
- NULL Max Row Count

Your Mileage Will Vary

Know Your Data ~ Know Your Users

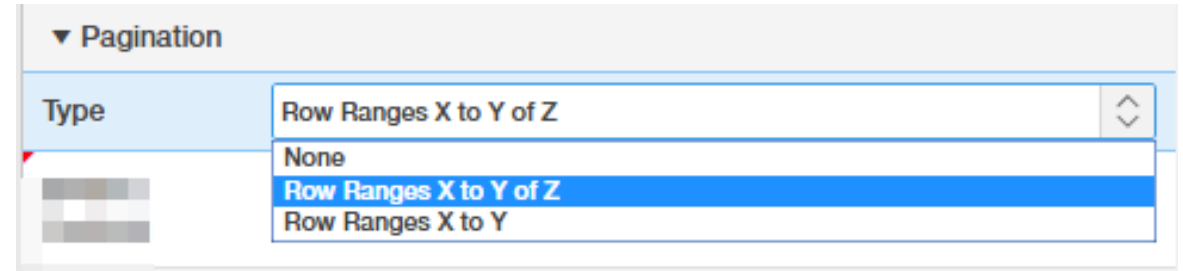
Max Rows Per Page

- Be Practical
- Higher → Longer Page Load
- 5000?
- Always Set **Max Rows Per Page**
- Use Header Float Settings
 - None
 - Page
 - Region
- Inform Users of Tradeoffs

Train Your Users to Maximize IR Use

Pagination

- **Avoid X to Y of Z**
 - Z Gets Determined Every Time
 - “of Z” is Expensive!
 - Alternative for “of Z” – Set Count
 - Lose Count w Filters
- **Pagination Plugins**
- **Show Pagination Query, Timing, Impact**



Column Heading Menus

- **Column Filter ~ Based on Subset, Not All Rows!!**
 - “My Data is Not There!”
- **Contents based on 1st 1000 Rows**
- **Search Fields Work on the Full Result Set**

Column Filter

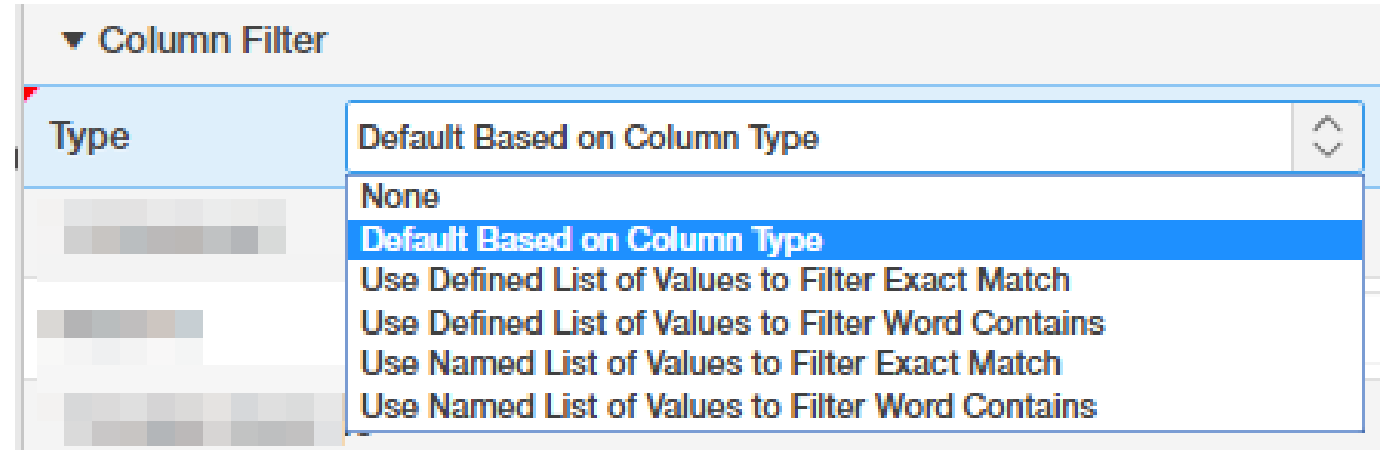
- 'A'O, 'Ahinahina through ... Zygodon
- By Default, LOV Contents based on 1st 1000 Rows



Column Filter Options

- IF you Set LOV

Choose LOV
Carefully



- Goal is to Display All ... Faster
- Exact Match vs Contains ... controls filters relative to Result Set
- Search Still Works on the Full Result Set

Drills, Passing Parameters

- 1 IR ~ Same Syntax for Passing Parameters

```
IREQ_<column_name>
```

- Multi IRs on Same Page

```
IREQ[IR Static Id]_<column_name>
```

- IR w Multiple Saved Reports

```
IREQ[IR Static Id] _<Saved Report Id>_<column_name>
```

- ``|| column_name ||`` if values contain `,::%`

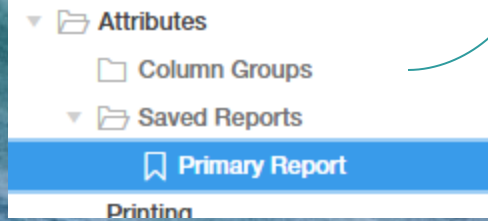
Referencing IR Columns & Filter Values

- IREQ[Static Id]_<column_alias> Equals
- IR [Static Id]_< <column_alias> Equals
- IRLT[Static Id]_< <column_alias> <
- IRLTE[Static Id]_< <column_alias> <=
- IRGT[Static Id]_< <column_alias> >
- IRGTE[Static Id]_< <column_alias> >=
- IRLIKE[Static Id]_< <column_alias> SQL LIKE
- IRN[Static Id]_< <column_alias> NULL
- IRNN[Static Id]_< <column_alias> NOT NULL
- IRC[Static Id]_< <column_alias> Contains
- IRNC[Static Id]_< <column_alias> Not Contains

No BETWEEN, IN, NOT IN

Syntax for IR Links / Drills

- Look at Saved Report attributes
 - Gives you the exact syntax to reference each saved report



A screenshot of a 'Saved Report' configuration page. The page title is 'Saved Report'. Below the title are four icons: a hamburger menu, a list icon, a refresh icon, and a settings icon. The page is divided into sections:

- Identification**
 - Visibility: Primary Default
 - Name: Primary Report
 - Alias: 101177
- Link**
 - Link Example: `f?p=&APP_ID.:610:&APP_SESSION.:IR[MV_LANDINGS]_101177`

A red arrow points to the highlighted portion of the link example: `IR[MV_LANDINGS]_101177`.

Syntax for IR Links / Drills

Group By State

Saved Reports

Group By State

Primary Report

nting

▼ Identification		
Visibility	Alternative Default	<input type="checkbox"/>
Name	Group By State	
Alias	GRP_BYSTATE	Can edit the alias
▼ Link		
Link Example		
f?p=&APP_ID.:3:&APP_SESSION.:IR[DEMO_IR]_GRP_BYSTATE		
▼ Audit Information		
Changed By		
Changed On	10 Jun 2016 14:14:17	

A large, powerful blue wave crashing, with the text "Still Slow?" overlaid in a dark teal font. The wave is on the left side of the image, and the text is centered over it. The background is a bright, white sky.

Still Slow?

Extra Power ~ Pipelined Table Functions

- Performance Boost
- More Work
- May Be Viable Option For
 - Complex Queries
 - High Volume Data
- Delivers Rows Faster? Let's see.

IR From Pipelined Table Function

- Create SQL Type (Row Type) for the Report Columns
 - CREATE TYPE
- Create Table Type of the Row Type
- Create Function PIPELINED
 - Dyn SQL
- Create IR Using
 - SELECT <col name list>
FROM TABLE(pipelined_function (<parameters>));

Code Examples for Pipelined Function Option

- CREATE FUNCTION inter_rpt_pipelined (...)

RETURN your_tbl_type PIPELINED

IS

TYPE rc IS REF_CURSOR;

l_rc rc;

v_your_type your_rec_type;

...

...

Query Example for Pipelined Function Option

- SQL that uses the function ...

```
SELECT harvest_id,  
       harvest_Date,  
       sector_id
```

```
...
```

```
FROM TABLE ( INTER_RPT_PIPELINED) ;
```


Pipelined Table Function in IR



SQL Query vs Pipelined Table Function

- SQL Query
 - Traditional IR
- Pipelined Table Function
 - Straight Table → Slower
 - Complex Query → Faster for first rows
- Cut is on Processing Time

SQL Query Not Enough?

- Query From a Collection
- Heading Names via Query
- Function to build SQL
- `APEX_COLLECTION.CREATE_COLLECTION_FROM_QUERY_B`

```
SELECT c001, c002, ...  
FROM apex_collections  
WHERE collection_name = 'YOUR_COLLECTION' ;
```



Recap

Guts

- New CSS
- New JavaScript
- Refactoring

Performance

- Tune The Real Query
- Settings
 - Max Row Count
 - Pagination
 - Rows Per Page
- Alternatives
 - Pipelined Table Function
 - Collection

The Future

Interactive Grid WILL Replace IR

- Upgrade Wizard
- Lazy Loading
- Endless Scroll - Buffers Next Fetch
- Require Filter
- Performance Options (Contains, Starts, REGEXP, CASE)
- JavaScript API (Maybe/Probably)

The Future

Interactive Grid WILL Replace IR

- Guts
 - Anticipate a JS API
 - JavaScript Code region for Customizing
- Performance
 - AJAX/JSON
 - Show Total Row Count
 - Fewer, Wiser Parameters
 - Better Performance, More Controls



APEX 5 IR Guts & Performance

Questions ?

Karen Cannell TH TECHNOLOGY
kcannell@thtechnology.com

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ODTUG

Kscope16



CHICAGO, ILLINOIS · JUNE 26-30

PLEASE FILL OUT YOUR EVALUATIONS

References

- **Jari Laine Pagination Option**

<http://jaris.blogspot.com/apex/f?p=BLOG:READ:0:::::ARTICLE:41900346848694>

- **JSnyder Blog Hard Like Software**

<http://hardlikesoftware.com/weblog/2015/05/12/apex-5-0-interactive-report-customization/>

- **Vishal Blog Post re Table Functions**

<http://obiee-oracledb.blogspot.com/2011/07/performance-enhancing-drug-called-table.html>

- **Sample App**

- apex.oracle.com THUNTER kscope16/demo

- **APEX 5.1 Early Adopter**

- **Sample Interactive Grid App**