

Grid Essentials

APEX 18.1 Interactive Grids



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TH TECHNOLOGY

About Me ...

- TH Technology – Oracle Consulting Services, APEX Focus
- Mechanical/SW Engineer - Analyzed, designed, developed, converted, upgraded, enhanced legacy & database applications for 30+ years
- Building Web/APEX applications for government, medical, engineering industries since HTMLDB beginnings
- Leveraging Oracle 10g, 11g, 12c, 18 suite of tools
- Editor Emeritus, ODTUG Technical Journal
- Oracle Ace ♠
- APress Author
- ODTUG Director



About You ...

- Oracle Technology ?
- Years w APEX ?
- APEX Versions ?
- Interactive Reports and Tabular Forms ?
- Customizations ?

Biggest Gripes?



Agenda

- Evolution
- Essentials
 - Build/Upgrade ~ Features ~ Oddities
- Extras (Advanced)
 - JavaScript Customizations
- Wrapup
 - Pros/Cons ~ Questions









Interactive Grid: Evolution

<div> <input type="text" value="Search: All Text Columns"/> <input type="button" value="Go"/> <input type="button" value="Actions"/> <input type="button" value="Edit"/> <input type="button" value="Save"/> <input type="button" value="Add Row"/> </div>								
	ID		Name	Job	Manager	Hire D...	Salary	Comm...
	7934		MILLER	Clerk	CLARK	23-JA...	1300	-
	7900		JAMES	Clerk	BLAKE	03-DE...	950	-
	7876		ADAMS	Clerk	7788	12-JA...	1100	-
	7844		TURNER	Sales...	BLAKE	08-SE...	1500	0
	7654		MARTIN	Sales...	BLAKE	28-SE...	1250	1400
	7521		WARD	Sales...	BLAKE	22-FE...	1250	500
	7499		ALLEN	Sales...	BLAKE	20-FE...	1600	300
	7369		SMITH	Clerk	7902	17-DE...	800	-
	7902		FORD	Analyst	JONES	03-DE...	3000	-
	7788		SCOTT	Analyst	JONES	09-DE...	3000	-
	7566		JONES	Manager	KING	02-AP...	2975	-
	7782		CLARK	Manager	KING	09-JU...	2450	-
	7698		BLAKE	Manager	KING	01-MA...	2850	-
	7839		KING	Presid...		17-NO...	5000	-

rows selected

Evolution: Tabular Forms

- APEX 3 – Bare Bones
- APEX 4.0
 - RadioGroup, PopUp LOV, Simple CB
 - Declarative Validations
- APEX 4.1
 - :COLUMN References
 - Improved Error Handling
- APEX 4.2, 5.0
 - No Major TF enhancements
 - Major IR Rewrite
- APEX 5.1
 - Editable Interactive Grid (a Plugin)

← **Beginning of Shift**

← **All Widgets**



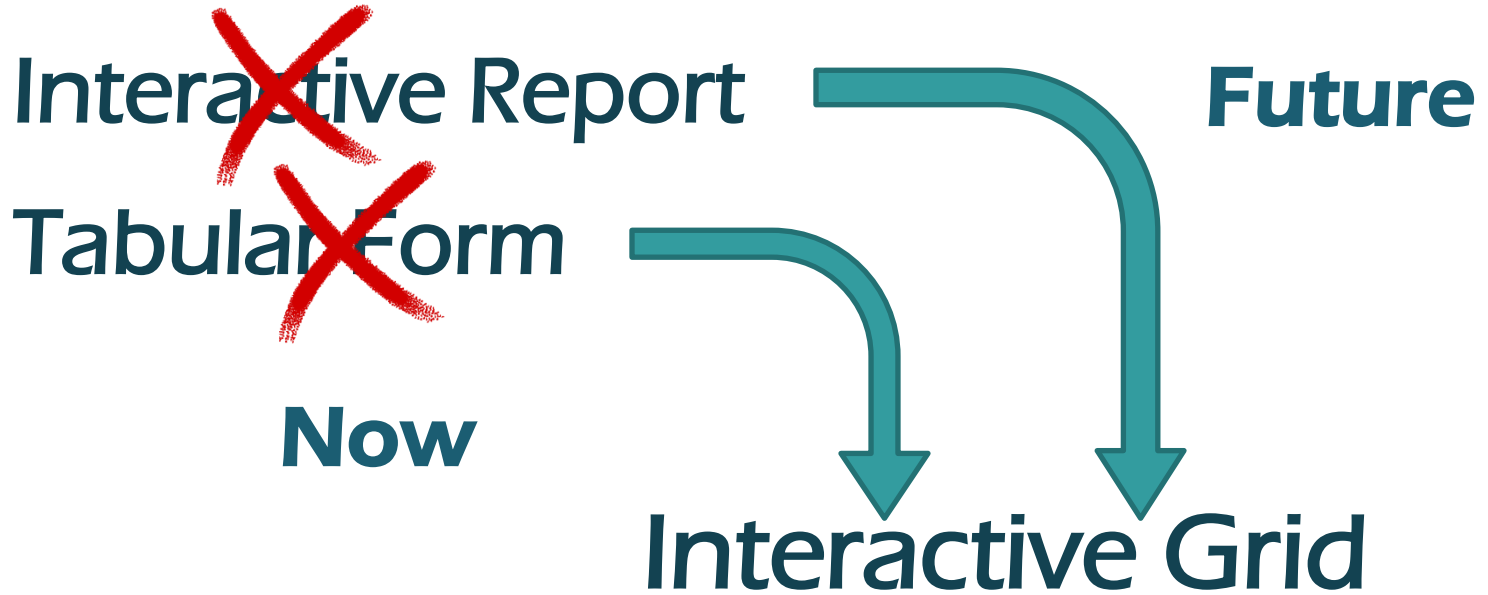
Interactive Grid

(Interactive Report or Tabular Form)

+ <All the Features You Ever Wanted>
(Thank You APEX Team!)

Interactive Grid

Direction



Interactive Report

- **Generates HTML on Server, part of Page**
- **Data Returned w UI Markup**
- **One Big JS Module**

Interactive Grid

- **HTML Renders on Client**
- **Data/Edits from Server via JSON**
- **Collection of Widgets**



Interactive Report

- **Collections
(pre 5.0)**
- **Browser Decides
Column Width**

`table-layout: auto;`

Interactive Grid

- **Model**
- **Each Column is an
"Item"**
- **Fixed Table
Layout**



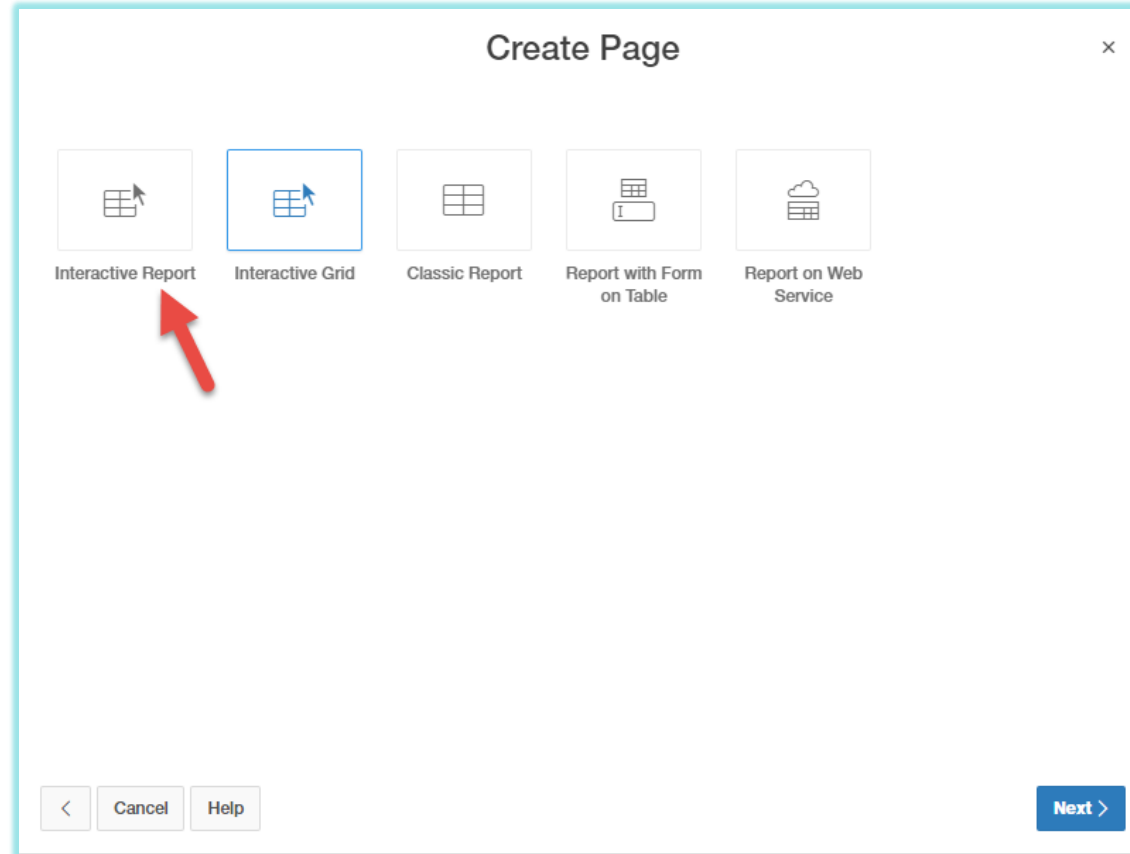
Interactive Grid: Essentials

Build/Upgrade Features Oddities

<div> <div>Search: All Text Columns</div> <div>Go</div> <div>Actions</div> <div>Edit</div> <div>Save</div> <div>Add Row</div> </div>								
	ID		Name	Job	Manager	Hire D...	Salary	Comm...
	7934		MILLER	Clerk	CLARK	23-JA...	1300	-
	7900		JAMES	Clerk	BLAKE	03-DE...	950	-
	7876		ADAMS	Clerk	7788	12-JA...	1100	-
	7844		TURNER	Sales...	BLAKE	08-SE...	1500	0
	7654		MARTIN	Sales...	BLAKE	28-SE...	1250	1400
	7521		WARD	Sales...	BLAKE	22-FE...	1250	500
	7499		ALLEN	Sales...	BLAKE	20-FE...	1600	300
	7369		SMITH	Clerk	7902	17-DE...	800	-
	7902		FORD	Analyst	JONES	03-DE...	3000	-
	7788		SCOTT	Analyst	JONES	09-DE...	3000	-
	7566		JONES	Manager	KING	02-AP...	2975	-
	7782		CLARK	Manager	KING	09-JU...	2450	-
	7698		BLAKE	Manager	KING	01-MA...	2850	-
	7839		KING	Presid...		17-NO...	5000	-

rows selected

Interactive Report – Still There



Interactive Grid

Demo Interactive Grid

Q

▼

Search: All Text Columns

Go

Actions

▼

Reset

Empno	Ename	Job	Mgr	Hiredate	Sal	Comm	Deptno	Comm Elig	Raise Elig	Riff Elig
7839	ALLEN	SALESMAN	BLAKE	17-NOV-81	4000	-	30	Y	Y	N
7698	BLAKE	MANAGER	KING	01-MAY-81	2850	-	30	N	Y	N
7782	CLARK-SMIT	MANAGER	KING	09-JUN-81	2450	-	10	N	Y	N
7566	JONES	MANAGER	KING	02-APR-81	2975	-	20	N	Y	N
7788	SCOTT	ANALYST	JONES	09-DEC-82	3000	-	20	Y	Y	N
7902	TURNER	SALESMAN	JONES	03-DEC-81	3000	-	30	N	Y	N
7369	SMITH	CLERK	FORD	17-DEC-80	800	-	40	N	Y	N
7499	SMITH-CLARK	CLERK	BLAKE	20-FEB-81	1600	300	30	Y	Y	-
7521	WARD	SALESMAN	BLAKE	22-FEB-81	1250	500	30	Y	Y	-
7654	KING	PRESIDENT		28-SEP-81	1250	1400	40	Y	N	N
7844	TURNER	SALESMAN	BLAKE	08-SEP-81	1500	0	30	Y	Y	-
7876	ADAMS	CLERK	SCOTT	12-JAN-83	1100	-	20	N	Y	N
7900	JAMESON	SALESMAN	BLAKE	03-DEC-81	950	-	30	Y	Y	N

Column Widths

- Appearance → “Width” Property Does Not Set Column Width
- Drag and Drop then Report → Save
- Columns
 - Resize
 - Reorder
 - Minimum Width
- Min Width vs Current Width



Actions ▾

Columns



Displayed

Column



Row Actions



Ename



Job



Manager



Hiredate



Sal



Comm



Column

Row Actions

Minimum Column Width (Pixel)

30

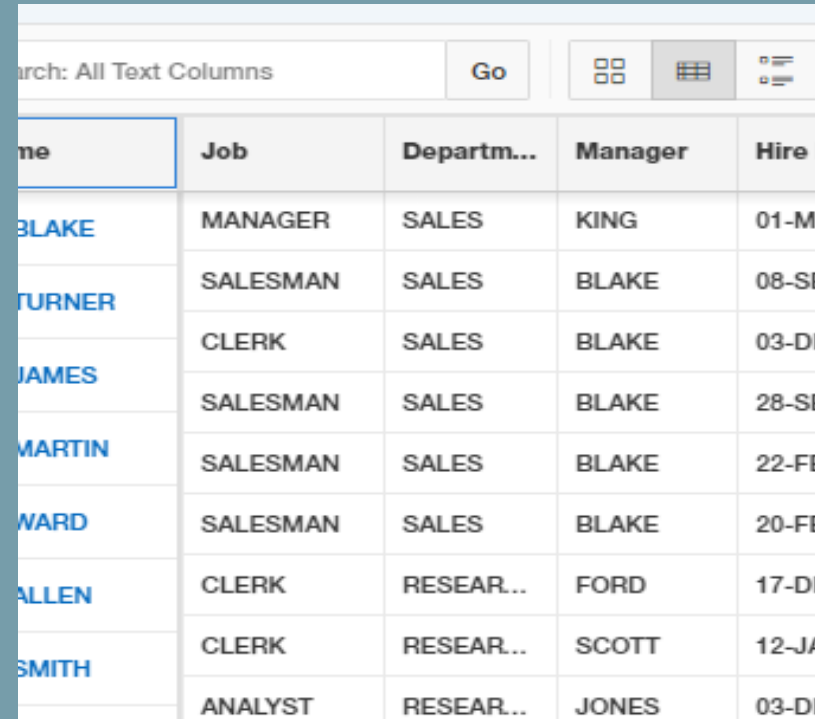
Help

Cancel

Save



Editable Grid:

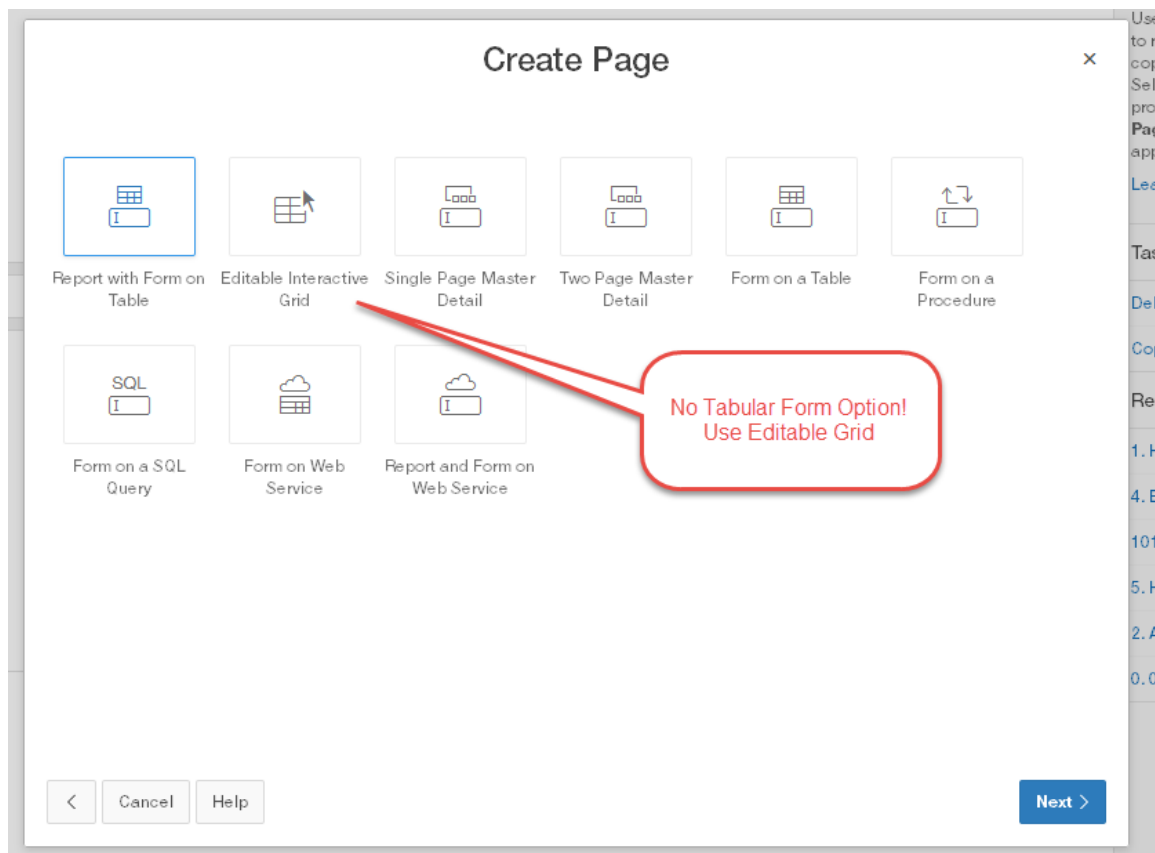


The screenshot displays an Oracle APEX Editable Grid. At the top, there is a search bar with the text "Search: All Text Columns" and a "Go" button. To the right of the search bar are three icons: a grid icon (selected), a list icon, and a print icon. Below the search bar is a table with the following columns: "Name", "Job", "Department", "Manager", and "Hire Date". The table contains data for several employees, including Blake, Turner, James, Martin, Ward, Allen, and Smith. The "Name" column is highlighted with a blue border, indicating it is the active cell for editing.

Name	Job	Department	Manager	Hire Date
BLAKE	MANAGER	SALES	KING	01-M
TURNER	SALESMAN	SALES	BLAKE	08-SE
JAMES	CLERK	SALES	BLAKE	03-DI
MARTIN	SALESMAN	SALES	BLAKE	28-SE
WARD	SALESMAN	SALES	BLAKE	22-FE
ALLEN	CLERK	RESEAR...	FORD	17-DI
SMITH	CLERK	RESEAR...	SCOTT	12-JA
	ANALYST	RESEAR...	JONES	03-DI



Tabular Forms == Legacy



Editable Interactive Grid

Search: All Text Columns

Go

Actions

Edit

Save

Add Employee

Reset

<input type="checkbox"/>	<div></div>	Empno	Ename	Job	Mgr	Hiredate	Sal	Comm	Dept	Comm elig	Raise elig
<input checked="" type="checkbox"/>	<div></div>	7782	CLARK-S...	MANAGER	ALLEN	09-JUN-81	2450	-	ACCOUNT...	No	Yes
<input type="checkbox"/>	<div></div>	7934	MILLER	CLERK	CLARK...	23-JAN-82	1300	100	ACCOUNT...	Yes	No
<input type="checkbox"/>	<div></div>	7654	KING	PRESIDENT		28-SEP-81	1250	1400	OPERATIO...	Yes	No
<input type="checkbox"/>	<div></div>	7788	SCOTTIE	ANALYST	JONES	09-DEC-82	3000	-	RESEARCH	Yes	Yes
<input checked="" type="checkbox"/>	<div></div>	7876	ADAMS	CLERK	SCOTTIE	12-JAN-83	1100	-	RESEARCH	No	Yes
<input type="checkbox"/>	<div></div>	7566	JONES	MANAGER	ALLEN	02-APR-81	2975	-	RESEARCH	No	Yes
<input type="checkbox"/>	<div></div>	7900	JAMESON	SALESMAN	BLAKE	03-DEC-81	950	-	SALES	Yes	Yes

Editable

4: Interactive Report

e-Rendering

Regions

Content Body

Interactive Grid

Columns

Attributes

Column Groups

Interactive Report - Legacy

Columns

Attributes

Interactive Report - Converted to I-C

Filter Properties

Edit

Enabled

Yes

No

Allowed
Operations

- ☒ Add Row
- ☒ Update Row
- ☒ Delete Row

Allowed Row
Operations
Column

- Select -



Lost Update Type

Row Values



Add Row If Empty

Yes

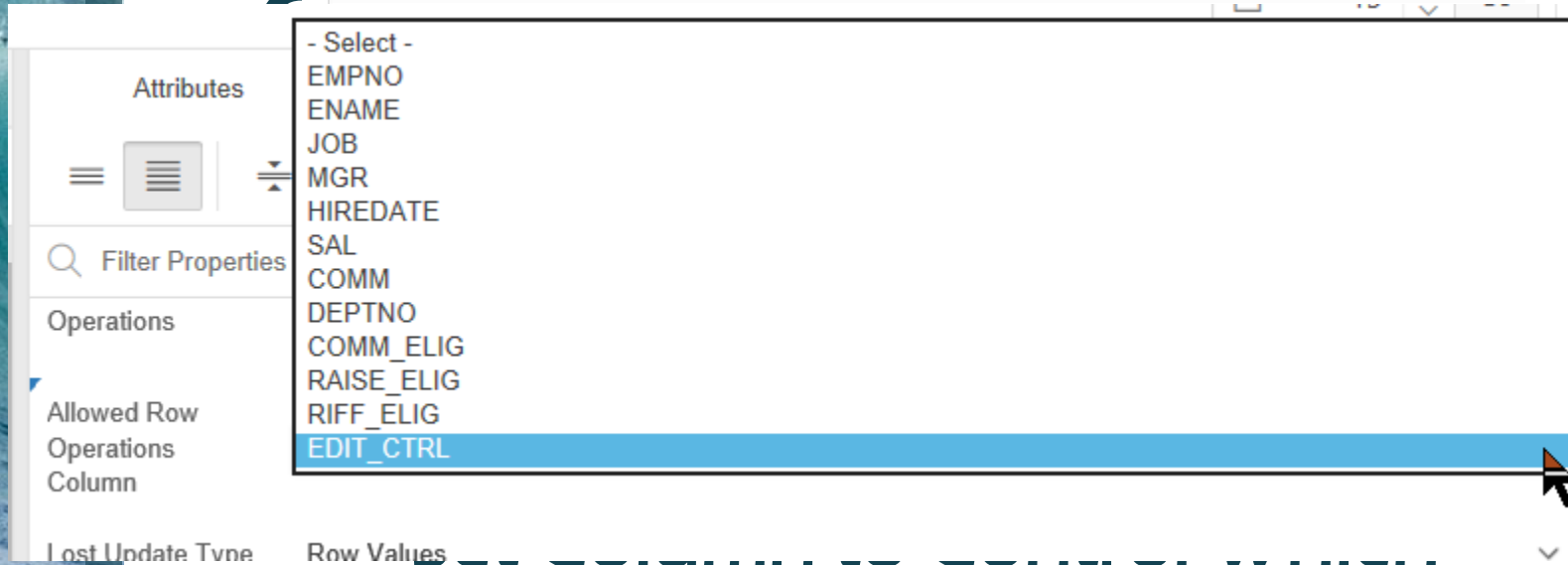
No

Edit Authorization



What Is Editable

SQL Query



The screenshot shows a database tool interface with a sidebar on the left and a main panel on the right. The sidebar has sections for 'Attributes', 'Filter Properties', 'Operations', 'Allowed Row Operations', and 'Column'. The main panel displays a list of attributes for an SQL query, including EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, COMM, DEPTNO, COMM_ELIG, RAISE_ELIG, RIFF_ELIG, and EDIT_CTRL. The 'EDIT_CTRL' attribute is highlighted in blue, indicating it is the selected or active attribute.

Attributes

Filter Properties

Operations

Allowed Row Operations

Column

SQL Query

- Select -
- EMPNO
- ENAME
- JOB
- MGR
- HIREDATE
- SAL
- COMM
- DEPTNO
- COMM_ELIG
- RAISE_ELIG
- RIFF_ELIG
- EDIT_CTRL

Rows Are Editable

Lost Update Type

- Row Values
 - Checksum of All Query-able Columns
- Column Value
 - ex: `DATE_UPDATED`



Lost Updates, Lock Row

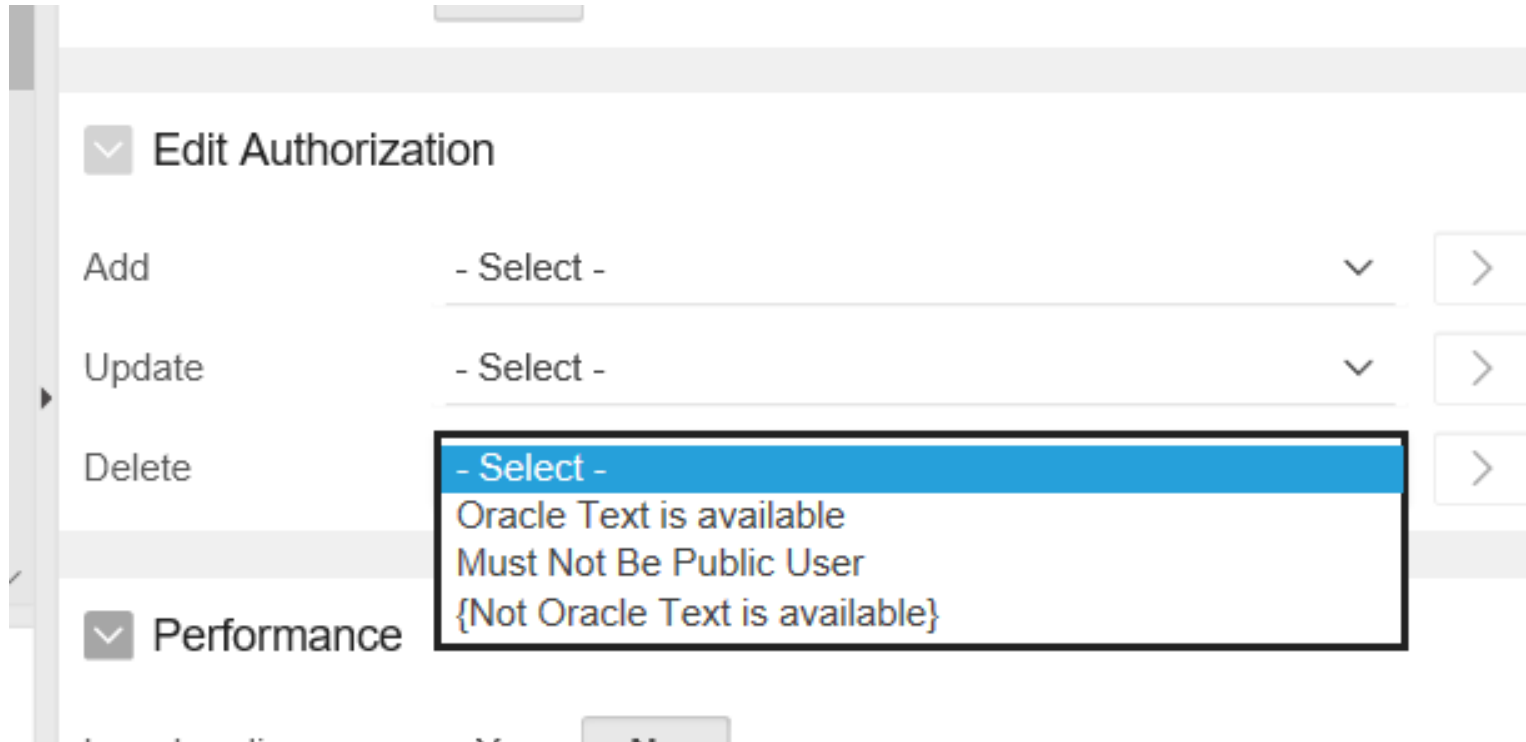
- Lock Row Adds
FOR UPDATE NOWAIT

See Reference ~ Matt Mulvaney

<http://www.explorer.uk.com/apex-interactive-grid-preventing-lost-updates-record-locking/>



Who Can Edit (Authorizations)



▼ Edit Authorization

Add - Select - ▼ >

Update - Select - ▼ >

Delete - Select - ▼ >

▼ Performance

- Select -
Oracle Text is available
Must Not Be Public User
{Not Oracle Text is available}

If Editable

- Set a PK
- Set Reload on Submit
 - Only On Success





Interactive Grid 'E-Grid Casc LOV' doesn't have a primary key column defined which is required for editing or in a master detail relationship.

Contact your application administrator.

Technical Info (only visible for developers)

1. `is_internal_error`: true
2. `apex_error_code`: APEXDEV.IG.NO_PK
3. `component.type`:
APEX_APPLICATION_PAGE_REGIONS
4. `component.id`: 17111353091365601
5. `component.name`: E-Grid Casc LOV
6. `error_backtrace`:



Edit: Set One Column as a Primary Key

Source

Type Database Column

Database Column EMPNO

Data Type NUMBER

Query Only Yes No

Primary Key Yes No

Master Detail



For an Editable Interactive Grid, the Page attribute 'Reload on Submit' must be set to 'Only for Success'.

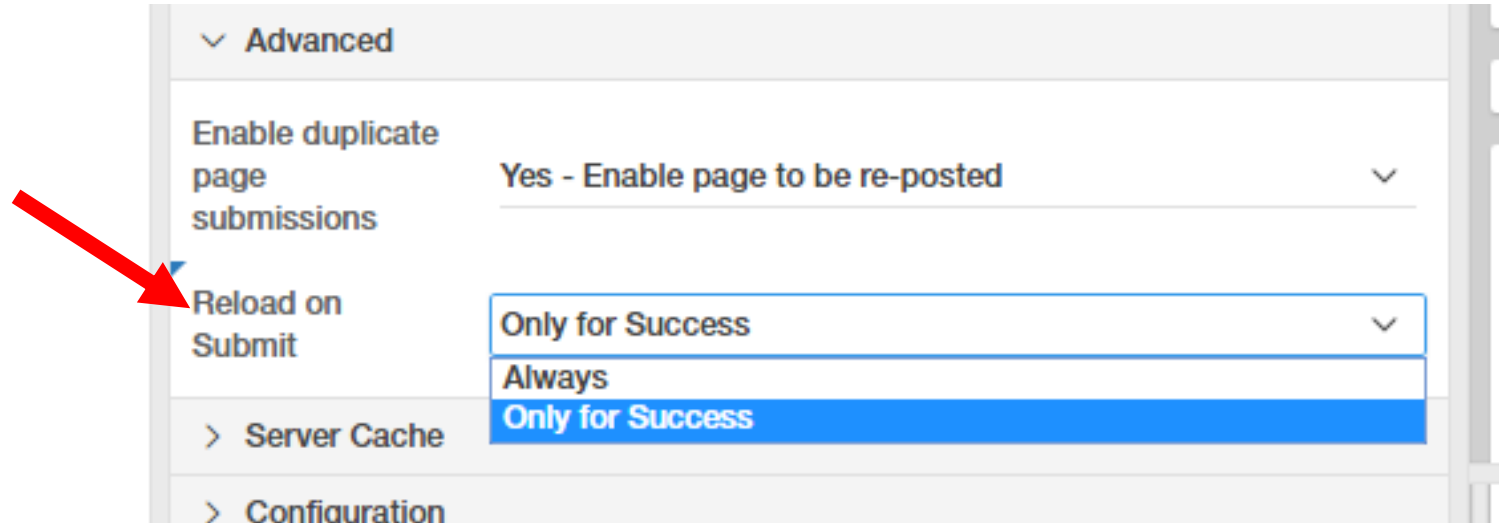
Contact your application administrator.

Technical Info (only visible for developers)

1. is_internal_error: true
2. apex_error_code:
APEXDEV.IG.RELOAD_ON_SUBMIT_EDITABLE
3. component.type:
APEX_APPLICATION_PAGE_REGIONS
4. component.id: 17111353091365601
5. component.name: E-Grid Casc LOV
6. error_backtrace:

```
----- PL/SQL Call Stack -----
   object      line   object
   handle      number  name
000007FFC480F540      935  package body APEX_050100.WWV_FLOW_ERROR
000007FFC480F540     1003  package body APEX_050100.WWV_FLOW_ERROR
000007FFC480F540     1395  package body APEX_050100.WWV_FLOW_ERROR
```

Edit: Page Reload on Submit



Advanced

Enable duplicate page submissions Yes - Enable page to be re-posted

Reload on Submit

- Only for Success
- Always
- Only for Success

> Server Cache

> Configuration

Row Selector

- ☐ COMM_ELIG
- ☐ RAISE_ELIG
- ☐ RIFF_ELIG
- Attributes
- New Interactive Grid - Editable
- ▼ Columns
 - ☒ APEX\$ROW_SELECTOR
 - ☐ APEX\$ROW_ACTION
 - ☐ ROWID
 - ☐ EMPNO
 - ☐ ENAME
 - ☐ JOB

▼ Identification

Column Name

APEX\$ROW_SELECTOR

Type

Row Selector

▼ Settings

Enable Multi Select

Yes

No

Show Select All

Yes

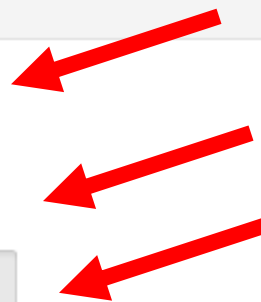
No

Hide Control

Yes

No

▼ Layout



Working w the Row Selector

- JavaScript

```
menu$.menu("option").items.push({  
  type:"action",  
  label:"Total Salary",  
  action: function(menu, element) {  
    var i, records = view.getSelectedRecords(),  
        total = 0;  
    for ( i = 0; i < records.length; i++) {  
      total += parseInt(view.model.getValue(records[i], "SAL"), 10);  
    }  
    alert("Total Salary for selected employees is " + total);  
  }  
});
```

APEX\$ROW_SELECTOR – PL/SQL

- Same as Tab Form:

```
BEGIN
```

```
IF :APEX$ROW_SELECTOR = 'X' THEN
```

```
-- your processing goes here
```

```
    DELETE FROM EMP WHERE EMPNO = :ID;
```

```
END IF;
```

```
END;
```


Row Action Menu


▼  New Interactive Grid - Editable


▼  Columns

☒ APEX\$ROW_SELECTOR

 APEX\$ROW_ACTION


 ROWID


 EMPNO


 ENAME

 JOB

 MGR

 HIREDATE

 SAL

 COMM

 DEPTNO

Add Row

▼ Layout

Sequence 20

▼ Advanced

Static ID

JavaScript Code

▼ Server-side Condition

Type - Select -



Save Interactive Grid Data

Type Interactive Grid - Automatic Row Processing (DML) ⌵ ☰

⌵ Settings

Target Type Region Source
Table / View
PL/SQL Code

Prevent Lost Updates Yes No

Lock Row Yes ⌵

Return Primary Key(s) after Insert Yes No

Target Type

Select which row processing technique is performed to save data changes made to the Interactive Grid.

Available options include:

Region Source

Inserts, updates, and deletes utilize the region source SQL Query .

Note - Ensure columns that are not insertable or updatable have **Query Only** set to Yes, to exclude them from processing.

Table / View

Inserts, updates, and deletes utilize a different table or view to the one defined in the region source SQL Query. For example, the SQL Query retrieves data from a table-join or non-updatable view and the DML processing needs to be performed against a single base table or updatable view.

Note - Ensure columns that are not insertable or updatable have **Query Only** set to Yes, to exclude them from processing.

PL/SQL Code

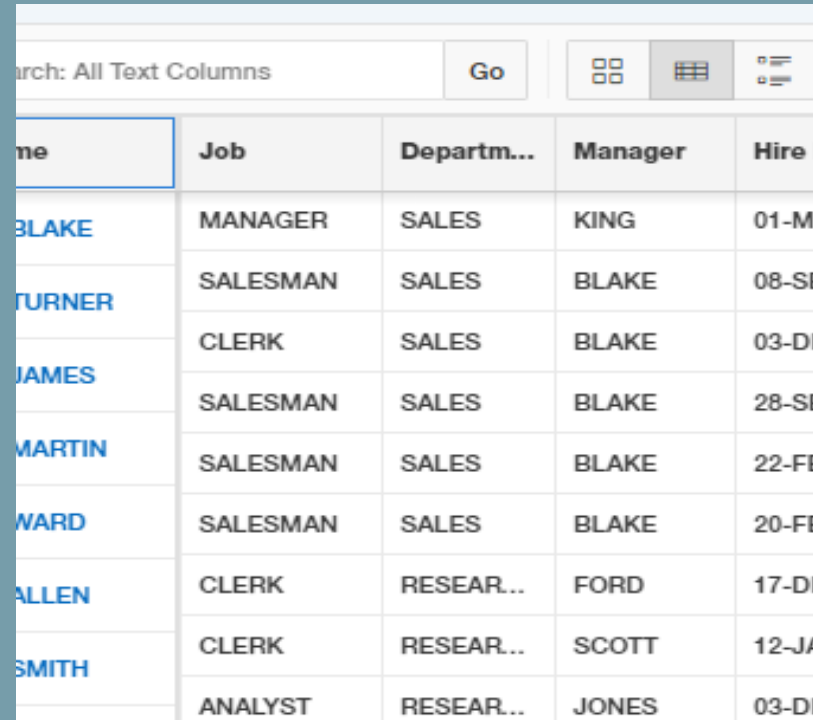
Processing is based on custom PL/SQL code. This option allows you to execute any PL/SQL code to implement any data manipulation in the underlying database.

This option should be utilized when using database packages, such as table APIs or calls to RESTful Web Services, to implement business logic.

Note - The PL/SQL code will be called for each row that has been inserted, updated or deleted.

More Editable Grid Details:

Master-Detail,
Cascading LOV,
Dyn Actions,
32K Limit



The screenshot displays an Oracle APEX application interface. At the top, there is a search bar labeled "Search: All Text Columns" with a "Go" button. To the right of the search bar are three icons: a grid icon, a table icon (which is selected), and a list icon. Below these elements is a table with the following columns: "Name", "Job", "Departm...", "Manager", and "Hire". The table contains data for several employees, including BLAKE, TURNER, JAMES, MARTIN, WARD, ALLEN, and SMITH. The table is presented in a master-detail format, with the "Name" column highlighted in blue. The "Hire" column shows dates in MM-DD format.

Name	Job	Departm...	Manager	Hire
BLAKE	MANAGER	SALES	KING	01-M
TURNER	SALESMAN	SALES	BLAKE	08-SE
JAMES	CLERK	SALES	BLAKE	03-DI
MARTIN	SALESMAN	SALES	BLAKE	28-SE
WARD	SALESMAN	SALES	BLAKE	22-FE
ALLEN	CLERK	RESEAR...	FORD	17-DI
SMITH	CLERK	RESEAR...	SCOTT	12-JA
	ANALYST	RESEAR...	JONES	03-DI

Master Detail

▼ Overview: Master Detail

There are wizards to help create master detail Interactive Grids but it is easy enough to set up manually was done for this example.

- Add the master Interactive Grid and the detail Interactive Grid.
- Configure the columns and set the primary key(s) for each and in the case of this example enable
- Then on region attributes for the detail grid set the Master Detail: Master Region attribute to the m to the master table so set the Master Detail: Master Column to DEPTNO (the primary key of the m
- Make sure the detail grid toolbar save button is disabled.

- **Disable Detail Grid Save Button**

Cascading LOV

- Just Like Page Item to Page Item

The screenshot shows the APEX configuration interface for a Cascading List of Values (LOV). The main dialog, titled "Pick Cascading LOV Parent Column(s)", contains a search bar and a table of available columns. The table lists columns with their names and labels, such as EMPNO, ENAME, JOB, MGR, HIREDATE, SAL, COMM, DEPTNO, and COMM_ELIG. To the right, the configuration for the "MANAGER_NAMES" LOV is displayed. It includes settings for "Display Extra Values", "Display Null Value", "Null Display Value", and "Null Return Value", each with "Yes" and "No" radio buttons. The "Link" section is expanded, showing the "Target" and "Source" sections. The "Source" section is further expanded, showing the "Database Column" set to "MGR" and the "Data Type" set to "NUMBER".

Name	Label
APEX\$ROW_SELECTOR	
APEX\$ROW_ACTION	
EMPNO	
ENAME	Ename
JOB	Job
MGR	Manager
HIREDATE	Hiredate
SAL	Sal
COMM	Comm
DEPTNO	Dept
COMM_ELIG	Comm?

MANAGER_NAMES

Type: List of Values

Display Extra Values: Yes No

Display Null Value: Yes No

Null Display Value:

Null Return Value:

Cascading LOV Parent Column(s):

Link

Target:

Source

Type: Database Column

Database Column: MGR

Data Type: NUMBER

```

SELECT
  apex_item.checkbox (30,
    seq_id,
    'onclick="highlight_row(this, ' || seq_id || ')"',
    NULL,
    ':',
    'f30_' || LPAD (seq_id, 4, '0') ) delete_checkbox,
  apex_item.hidden (31, seq_id)
  || apex_item.select_list_from_query
    (32,
      c001,
      'SELECT dname d, ' || 'deptno r FROM
eba_demo_tf_dept',
      'style="width:220px" '
      || 'onchange="f_set_casc_sel_list_item(this, '
      || 'f33_'
      || LPAD (seq_id, 4, '0')
      || ')"',
      'YES',
      '0',
      '- Select Department -',
      'f32_' || LPAD (seq_id, 4, '0'),
      NULL,
      'NO' ) deptno,
  apex_item.select_list_from_query (33,
    c002,
    'SELECT ename d, '
    || 'empno r FROM eba_demo_tf_emp '
    || 'WHERE deptno = '
    || c001,
    'style="width:220px"',
    'YES',
    '0',
    '- Select Employee ('
    || (SELECT COUNT (*)
      FROM eba_demo_tf_emp
      WHERE deptno = c001)
    || ' ) -',
    'f33_' || LPAD (seq_id, 4, '0'),
    NULL,
    'NO' ) employee
  FROM apex_collections
  WHERE collection_name = 'DEPT_EMP'
  UNION ALL

```

```

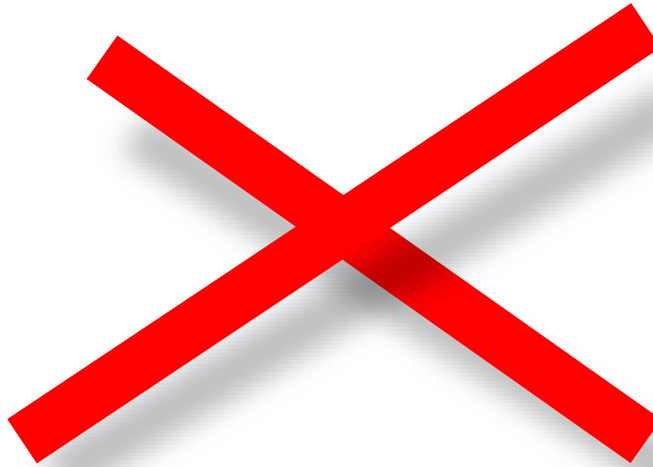
SELECT  apex_item.checkbox
        (30,
        NULL,
        'onclick="highlight_row(this, '
        || TO_NUMBER (9900 + LEVEL)
        || ')"',
        NULL,
        ':',
        'f30_' || LPAD (9900 + LEVEL, 4, '0') ) delete_checkbox,
        apex_item.hidden (31, NULL)
        || apex_item.select_list_from_query
          (32,
            0,
            'SELECT dname d, ' || 'deptno r FROM eba_demo_tf_dept',
            'style="width:220px" '
            || 'onchange="f_set_casc_sel_list_item(this, '
            || 'f33_'
            || LPAD (9900 + LEVEL, 4, '0')
            || ')"',
            'YES',
            '0',
            '- Select Department -',
            'f32_' || LPAD (9900 + LEVEL, 4, '0'),
            NULL,
            'NO' ) deptno,
        apex_item.select_list_from_query
          (33,
            NULL,
            'SELECT ename d, '
            || 'empno r FROM eba_demo_tf_emp '
            || 'WHERE deptno = '
            || 0,
            'style="width:220px"',
            'YES',
            '0',
            '- Select Employee (0) -',
            'f33_'
            || LPAD (9900 + LEVEL, 4, '0'),
            NULL,
            'NO'
          ) employee
        FROM DUAL
        WHERE :request = 'ADD_ROWS'
        CONNECT BY LEVEL = 2

```

Before (APEX 4.2)

After (APEX 5.1+)

32K Row Limit



Dynamic Action

- Just Like On a Page Item
- Conditions/Action Reference
Any Column In Row
- Cannot Reference Element in
Other Rows



Validations (Overview!)

- `:COLUMN_NAME` References
 - Similar to 4.2 Tab Form
 - On Submit
- Dynamic Actions
 - Column Option
- HTML5 Form Validation
 - Required
 - Pattern – Min, Max (Numbers)
 - In Custom Attributes



- Validating
 - Validations
 - ☒ No Special Char in EName
 - ☒ **Validate Salary**
 - ☒ Validate Commission
 - Processing
 - Processes
 - Save Interactive Grid Data
 - After Processing
 - Ajax Callback

Name Validate Salary

Execution Options

Sequence 20

Validation

Editable Region Validations

Type PL/SQL Expression

PL/SQL Expression

:SAL BETWEEN 100 AND 2000

Always Execute ☒ Yes ☐ No

Error

Error Message

#COLUMN_HEADER# must be between 100 and 2000.

Display Location Inline with Field and in Notification

Associated Column SAL

HIREDATE

SAL

Validations

Validate Salary

Dynamic Actions

Client - Dynamic - Validate Salary

True

Execute JavaScript Code

False

COMM

Validations

Validate Commission

Dynamic Actions

Client - Dynamic - validate Comm

Identification

Action

Execute JavaScript Code

Settings

Code

```
var sal = apex.item("Sal"),
    num = sal.getValue();
if ( num !== "" && (parseFloat(num) != num || num < 100 || num > 2000)) {
    // this message only shown if there is no data-valid-message attribute
    // on the column item
    sal.node.setCustomValidity("invalid number");
} else {
    sal.node.setCustomValidity(""); // clear the error
}
```

Affected Elements

Selection Type

Column(s)

Column(s)

COMM,SAL

Execution Options

Sequence

10

Event

Client - Dynamic - Validate Salary

Fire When Event
Result Is

True

Fire on
Initialization

Yes

No

Code Editor - Code



id

```
1 var sal = apex.item('salary'),
2   num = sal.getValue();
3 if ( num !== "" && (parseFloat(num) !== num || num < 100 || num > 2000)) {
4   // this msg only used if there is no data-valid-message attribute on the column
5   sal.node.setCustomValidity("Salary must be between 100 and 2000");
6 } else {
7   sal.node.setCustomValidity(""); // clear the error
8 }
```

I

validity
attribute

Code Editor - Code



ids

```
1 var comm = apex.item("commission"),
2   sal = apex.item("salary"),
3   numComm = comm.getValue(),
4   numSal = sal.getValue();
5 if ( numComm !== "" && (parseFloat(numComm) != numComm ||
6   numComm < (0.1*numSal) ||
7   numComm > numSal)) {
8   // this message only shown if there is no data-valid-msg
9   comm.node.setCustomValidity("Commission must be at least 10% of salary, and not > salary");
10 } else {
11   comm.node.setCustomValidity(""); // clear the error
12 }
```

validity
attribute

▼ Advanced

Static ID

CSS Classes

Custom Attributes

pattern="^[A-Z a-z]*\$" data-valid-message="Name is required and must not contain special characters or numbers"

Use As Row
Header

Yes

No

JavaScript Code



JS: Access Grid, Model, Record...

```
1
//--Get the link element that was clicked
var $te = $(this.triggeringElement);

//--Get the ID of the row
var rowId = $te.closest('tr').data('id');

//--Identify the particular interactive grid
var ig$ = apex.region("emp_igrid").widget();

//--Fetch the model for the interactive grid
var model = ig$.interactiveGrid("getViews","grid").model;

//--Fetch the record for the particular rowId
var record = model.getRecord(rowId);

//-- access the cell values via the column name static id NAME
var comm = model.getValue(record,"COMM");

IF comm < 100 {
    //--Set the values for the RIFF cell
    model.setValue(record,"RIFF","Y");
}
```


Ugly Error Messages

1 error has occurred

- Ajax call returned server error ORA-20987: APEX - ORA-01438: value larger than specified precision allowed for this column - Contact your application administrator. Details about this incident are available via debug id "75205". for .

view can integrate with jquery ui tooltips. See the Advanced JavaScript Code attribute for details on how UI tooltip options object is passed to the grid view in defaultGridViewOptions.tooltip. The items option is set automatically. The content callback option receives extra arguments to make it easy to access its model. Tooltips are also used to show errors and warnings at the row and cell level so the content there is an error message to display.

a tip on the row header that tells you if the row has been added, changed, or deleted. On data cells the tip is been changed. On the Name cells the hire date is shown. On the Notes column the full text of the note is

columns


Go

Actions ▾

Edit

Save

Add Row

 Reset

	Job	Manager	Salary	Commission	On Leave	Notes
	Salesman	SCOTT	1100	-	Yes	Medical LeaveXXXXX
	Salesman	BLAKE	160000	300	Yes	-

Upgrading to Grid:

IR to Grid,
Tabular Form
to Grid

Utilities



Application Dashboard

Review a summary of this application.



Upgrade Application

After upgrading to a new release, review component features.



Attribute Dictionary

Manage item / column user interface defaults for a



Database Object Dependencies

Review the database objects referenced by this ap

Upgrade Interactive Reports?

HOW

- Change Region Type

WHEN

- Standard, No Frills Users → YES
- Considerations
 - Pivot
 - Computed
 - Customized Logic
 - Drills To IRs



Upgrade Tabular Forms?

HOW

- **Upgrade Utility**
 - May Need Rework

WHEN

- **Standard → YES**
- **Non-Standard**
 - Maintain vs Rebuild
 - **Rebuild is Relatively Quick**
 - **Rebuild is Cleaner**

What Will Upgrade?

- Keys Off ApplyMRU, ApplyMRD
- Tries!
- Custom Embedded Javascript
- Custom Processes



Manual Upgrade Steps

- Backup
- Change Region Type to I-Grid
- Delete Old Buttons (you will Replace Them)
- Set the Page Attribute Advanced > Reload on Submit = "Only for Success"
- Set Region Attribute → Edit Enabled to "Yes"
- Check for ROWID – I-Grid uses its own – Remove Yours
- Check Lost Updates
- Check Validations
- Check Processes Save Interactive Grid Data" Process
- Rebuild Buttons
- TEST TEST TEST








- **CREATE A BACKUP !**
- **TEST AN UPGRADE FIRST**
- **REBUILDING IS OFTEN FASTER**



Interactive Grid: Extras

Advanced:
JS Customizations
for Menus,
Toolbars and More

<div><input type="text" value="Search: All Text Columns"/> <input type="button" value="Go"/></div>				
<div><input type="button" value="Add Row"/></div>				
<input type="checkbox"/>		Name	Job	Manager
<input checked="" type="checkbox"/>		JAMES	Clerk	BLAKE
<input type="checkbox"/>		SMITH	Clerk	FORD
<input type="checkbox"/>		MILLER	Clerk	FORD
<input type="checkbox"/>		BLAKE	Salesman	KING
<input type="checkbox"/>		ALLEN	Salesman	BLAKE

Customization Options

- Same For Editable/Non-Editable
 - Toolbar
 - Action Menu
 - Column Heading Menu
 - Row Actions Menu



Customizations

- **Advanced → JavaScript Code**
 - Grid → Grid Menus
 - Column → Column Menu
(Most of the Time...)
- Read Widget JS Files to Learn What is Possible
- Read Hardlikesoftware.com

**No Longer PL/SQL Collections ~
Now JavaScript**

Grid Plugins

- Extend IG Toolbar

<https://apex.oracle.com/pls/apex/f?p=apexbyg:extendigtoolbar>



Region Buttons

- PREV
- Next

Content Body

- Overview: Add Toolbar Button
 - Attributes
- hidden
 - Attributes
- Region Buttons
 - dummy1
- Add Toolbar Button
 - Columns
 - Attributes**
 - Column Groups
 - Printing

Post-Rendering

Detail View

Show Yes No

Advanced

Oracle Text Index Column - Select -

Email From Address

JavaScript Code

```
function(config) {  
    var $ = apex.jquery,  
        toolbarData = $.apex.interactiveGrid.copyDefaultToolbar(),  
        lastToolbarGroup = toolbarData[toolbarData.length - 1],  
        createButton = {  
            type: "BUTTON",  
            hot: true,  
            action: "create-employee"  
        };  
    lastToolbarGroup.controls.push( createButton );  
    config.toolbarData = toolbarData;  
}
```

Help

So What (Else) Can I Do ?

From the JavaScript console type:

```
apex.region("igrid_id").widget().interactiveGrid("option","config")
```

Window > Object

+	ajaxColumns	"tF00s9LlY0i7d8yNoC1_RcHz...IQXu-wAEBW0WghffLWThCss"
	ajaxIdentifier	"Rjxh0ZBLS_nEXOKNtpzdgNhNhFbiLys_fRPXWCZegB4"
+	appearance	Object { showNullValue="-", useFixedRowHeight=true }
	columnGroups	[]
-	columns	[Object { id="63921276245062101", name="APEX\$ROW_ACTION", staticId="C63921276245062101", more... }, Object { id="64112665497602308", staticId="C64112665497602308", more... }, Object { id="64113193931602312", name="EMPNO", staticId="C64113193931602312", more... }]
+	0	Object { id="63921276245062101", name="APEX\$ROW_ACTION", staticId="C63921276245062101", more... }
-	1	Object { id="64112665497602308", name="ROWID", staticId="C64112665497602308", more... }
+	accessibility	Object { usedAsRowHeader=false }
+	appearance	Object { columnCssClasses="", formatExample="" }
	data Type	"ROWID"
+	default	Object { duplicate=true, value="" }
	escape	true
-	features	Object { canHide=true, highlight=true, compute=true, more... }
	aggregate	true
	canHide	true
	compute	true
	controlBreak	true
	groupBy	true
	highlight	true
	sort	true
+	filter	Object { operators=[2], dateRanges="all", isRequired=false, more... }
+	heading	Object { alignment="center", heading="", label="" }
	helpid	" "

Customization Examples

- Change Toolbar
- Change Column Heading Menu
- Change RowAction Menu
- Change Toolbar Actions Menu
- “Global” Settings



Change Toolbar

Custom Toolbar - Added Filter, Help Buttons

Search: All Text Columns

Go

Actions

Filter

Edit

Save

Add Row

Great Lakes Oracle 2018 Help

<div><div></div><div>...</div><div></div></div>	<div><div></div><div>...</div><div></div></div>	Empno	Ename	Job	Mgr	Hiredate	Sal	Comm	Dept	Comm...	Raise E
<div><div></div><div>...</div><div></div></div>	<div><div></div><div>...</div><div></div></div>	7788	SCOTTIE	ANALYST	JONES	09-DEC-82	3000	-	RESEARCH	Yes	Y
<div><div></div><div>...</div><div></div></div>	<div><div></div><div>...</div><div></div></div>	7499	SMITH-CLARK	CLERK	BLAKE	20-FEB-81	1600	300	SALES	Yes	Y
<div><div></div><div>...</div><div></div></div>	<div><div></div><div>...</div><div></div></div>	7876	ADAMS	CLERK	SCOTTIE	12-JAN-83	1100	-	RESEARCH	No	Y
<div><div></div><div>...</div><div></div></div>	<div><div></div><div>...</div><div></div></div>	7369	SMITH	CLERK	TURNER	17-DEC-80	800	5	OPERATIONS	No	Y
<div><div></div><div>...</div><div></div></div>	<div><div></div><div>...</div><div></div></div>	7934	MILLER	CLERK	CLARK-SMIT	23-JAN-82	1300	100	ACCOUNTING	No	Y
<div><div></div><div>...</div><div></div></div>	<div><div></div><div>...</div><div></div></div>	7698	BLAKE	MANAGER	ALLEN	01-MAY-81	2850	-	SALES	No	Y
<div><div></div><div>...</div><div></div></div>	<div><div></div><div>...</div><div></div></div>										

Change Toolbar

Goes in Grid
Advanced →
JavaScript

```
// toolbarFind is a new API as of 5.1.1
function(config) {
    var $ = apex.jquery,
        toolbarData = $.apex.interactiveGrid.copyDefaultToolbar(),
        // this is the toolbar group w the Actions menu
        toolbarGroup = toolbarData.toolbarFind("actions1");

    // add a filter button after the actions menu
    toolbarGroup.controls.push( {
        type: "BUTTON",
        action: "show-filter-dialog",
        iconBeforeLabel: true
    });
    config.toolbarData = toolbarData;
    return config;
}
```

// Note toolbarFind - will use that a lot

```
function(config) {
    var $ = apex.jQuery,
        toolbarData = $.apex.interactiveGrid.copyDefaultToolbar(),
        toolbarGroup = toolbarData.toolbarFind("actions1"); // this is the group with the actions menu

    // add a filter button after the actions menu
    toolbarGroup.controls.push( {
        type: "BUTTON",
        action: "show-filter-dialog",
        iconBeforeLabel: true
    });

    toolbarGroup2 = toolbarData[toolbarData.length - 1]; // this is the last group with reset bt
    // add our own button
    toolbarGroup2.controls.push( {
        type: "BUTTON",
        action: "eco-action"
    });

    config.toolbarData = toolbarData;

    config.initActions = function( actions ) {
        // can modify state of existing actions or add your own
        // can also pass in an array of actions to add
        // this adds our own Help button, but could be anything
        actions.add( {
            name: "eco-action",
            label: "Great Lakes Oracle 2018 Help",
            action: function(event, focusElement) {
                alert("Hello GLOC 2018 Attendees! You could add any existing or custom Action here.");
            }
        } );
    }
    return config;
}
```

Change Column Heading Menu

Custom Column Actions - EName No Sort, No Aggregate

<div><div>Q</div><div>Go</div></div>		<div>Actions</div>		<div>Edit</div>	<div>S</div>	
<div><input type="checkbox"/></div>	<div>≡</div>	Empno	Ename	Job	Mgr	Hiredate
<div><input checked="" type="checkbox"/></div>	<div>≡</div>	7788	SCOTT	ANALYST	JONES	09-DEC-82
<div><input type="checkbox"/></div>	<div>≡</div>	7934	MILLER	CLERK	CLARK	23-JAN-82
<div><input type="checkbox"/></div>	<div>≡</div>	7369	SMITH	CLERK	FORD	17-DEC-80
<div><input type="checkbox"/></div>	<div>≡</div>	7076	ADAMS	CLERK	SMITH	17-JAN-83

Change Column Heading Menu

**Goes in Column
Advanced →
JavaScript**

```
function(config) {  
    config.features.sort = false;  
    config.features.aggregate = false;  
    config.features.controlBreak = false;  
    config.features.canHide = false;  
    config.features.groupBy = false;  
    // config.filter.isRequired=true;  
    return config;  
}
```

Change Column Heading Menu

Custom Column Actions - EName No Sort, No Aggregate

<div><div>Q</div><div>Go</div></div>		<div>Actions</div>		<div>Edit</div>		<div></div>	
<div><input type="checkbox"/></div>	<div>≡</div>	Empno	Ename	Job	Mgr	Hiredate	
<div><input checked="" type="checkbox"/></div>	<div>≡</div>	7788	SCOTT	ANALYST	JONES	09-DEC-82	
<div><input type="checkbox"/></div>	<div>≡</div>	7934	MILLER	CLERK	CLARK	23-JAN-82	
<div><input type="checkbox"/></div>	<div>≡</div>	7369	SMITH	CLERK	FORD	17-DEC-80	
<div><input type="checkbox"/></div>	<div>≡</div>	7076	ADAMS	CLERK	SMITH	17 JAN 82	

Change RowAction Menu

<input type="checkbox"/>	☰	Empno	Ename	Job	
<input checked="" type="checkbox"/>	☰	7788	SCOTTIE	ANALYST	
<input checked="" type="checkbox"/>	☰	7499	SMITH-CLARK	CLERK	
<input type="checkbox"/>	☰	7369	SMITH	CLERK	
<input type="checkbox"/>	☰	7934	MILLER	CLERK	CLAI
<input type="checkbox"/>	☰	7698	BLAKE	MANAGER	
<input type="checkbox"/>	☰	7566	JONES	MANAGER	
<input type="checkbox"/>	☰	7782	CLARK-SMITH	MANAGER	
<input type="checkbox"/>	☰	7834	KING	PRESIDENT	
<input type="checkbox"/>	☰	7900	JAMESON	SALESMAN	
<input type="checkbox"/>	☰	7914	TURNER	SALESMAN	

↩ Single Row View

+ Add Row

📄 Duplicate Row

🗑 Delete Row

🔄 Refresh Row

↶ Revert Changes

Hi

Total Salary



```

// This executes after page load,
// before the IGrid is initialized
// to catch the initial events
$(function() {
  // listen for grid views (not chart or groupby views)
  $("#emp_igrid").on("interactivegridviewchange", function(event, data) {
    if ( data.view === "grid" && data.created ) {
      var view = apex.region("emp_igrid").widget().interactiveGrid("getViews", "grid"),
          menu$ = view.rowActionMenu$;

      menu$.menu("option").items.push({
        type:"action",
        label:"Hello",
        action: function(menu, element) {
          var record = view.getContextRecord( element )[0];
          alert("Welcome to GLOC 2018, " + view.model.getValue(record, "ENAME") );
        }
      });

      menu$.menu("option").items.push({
        type:"action",
        label:"Total Salary",
        action: function(menu, element) {
          var i, records = view.getSelectedRecords(),
              total = 0;
          for ( i = 0; i < records.length; i++) {
            total += parseInt(view.model.getValue(records[i], "SAL"), 10);
          }
          alert("Total Salary for selected employees is " + total);
        }
      });
    }
  });
});

```

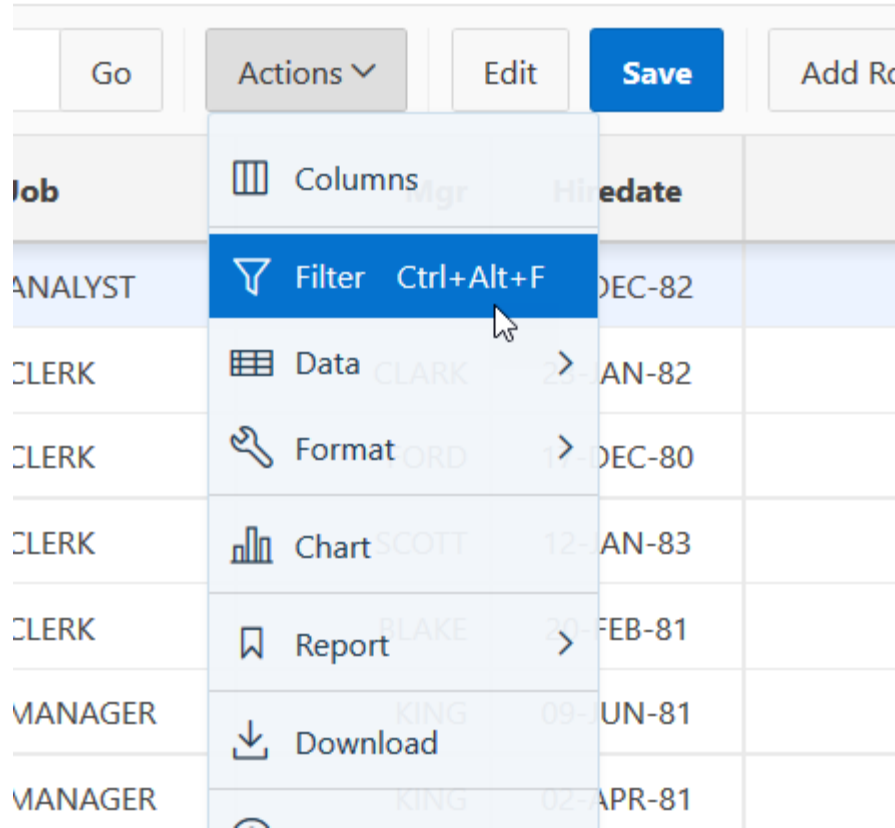
Goes in Page JavaScript

Access the Model ...

```
menu$.menu("option").items.push({  
  type:"action",  
  label:"Total Salary",  
  action: function(menu, element) {  
    var i, records = view.getSelectedRecords(),  
        total = 0;  
    for ( i = 0; i < records.length; i++) {  
      total += parseInt(view.model.getValue(records[i], "SAL"), 10);  
    }  
    alert("Total Salary for selected employees is " + total);  
  }  
});
```

1

Change Toolbar Actions Menu



Change Toolbar Actions Menu

```
function(config) {  
  config.initActions = function( actions ) {  
    actions.hide("show-aggregate-dialog");  
    actions.lookup("show-filter-dialog").shortcut = "Ctrl+Alt+F";  
    actions.update("show-filter-dialog");  
    actions.lookup("save").shortcut = "Ctrl+Alt+S";  
    actions.update("save");  
  }  
  return config;  
}
```

**Goes in Grid
Advanced →
JavaScript**

I

“Global” Settings

- JS Function in JS File
- Include File
- Reference JS Function in Advanced → JavaScript Code
- Add Classes on Grids

```
((function($) {  
window.thtechIGridApp = {  
  commonIGConfig: function(config) {  
    config.defaultGridViewOptions = {  
      stickyFooter: false  
    };  
    if ($("#" + config.regionStaticId).hasClass("seqNbr")) {  
      config.defaultGridViewOptions.rowHeader = "sequence";  
    }  
    if ( config.pagination.type === "set" ) {  
      config.defaultGridViewOptions.pagination = {  
        firstAndLastButtons: false,  
        maxLinks: 12  
      };  
    }  
    if ( config.pagination.type === "scroll" ) {  
      config.defaultGridViewOptions.pagination = {  
        showtotalRowCount: false  
      };  
    }  
  }  
};
```



```
if ($("#" + config.regionStaticId ).hasClass("filterOnlyGrid")){
    config.toolbarData = [
        {
            groupTogether: true,
            controls: [
                {
                    type: "TEXT",
                    id: "search_field",
                    enterAction: "search"
                },
                {
                    type: "BUTTON",
                    action: "search"
                }
            ]
        },
        {
            controls: [
                {
                    type: "BUTTON",
                    action: "show-filter-dialog",
```

I

User Interface Details

Show All

Identification

Attributes

Navigation Menu

Navigation Bar

JavaScript

JavaScript

Content Delivery Network

None (use Web Server) ▼



File URLs

`/i/thtech/js/THTech_Common_IGConfig_wk2.js`

Include Legacy Javascript

Yes

No



Include jQuery Migrate

Yes

No



gReport.search Equivalent

```
// get the IGrid widget  
var ig$ = apex.region("emp_igrid").widget();  
  
// get the toolbar widget, the Search Field, pass a value  
ig$.interactiveGrid("getToolbar")  
    .toolbar("findElement", "search_field").val("BLAKE");  
  
// invoke a search with the value you just set  
ig$.interactiveGrid("getActions").invoke("search");
```

Custom: Edit via Dialog

- IG Cookbook Application
- Edits in Dialog
- Changed Row Actions
- Advanced, Possibilities!



► Notes

Edit in Dialog



Search: All Text Columns

	Actions	Name ↑≡	Job
<input type="radio"/>		ADAMS	Clerk
<input checked="" type="radio"/>		ALLEN	Sales
<input type="radio"/>		BLAKE	Manager
<input type="radio"/>		CLARK	Manager
<input type="radio"/>		FORD	Analyst
<input type="radio"/>		JAMES	Clerk
<input type="radio"/>		JONES	Manager
<input type="radio"/>		KING	President

Employee



Name

Job

Manager

Hire Date

Salary

Commission

On Leave ☐ Yes ☒ No

Rating ☐

Notes

Department

Save

s... O

- Y

300 N

- N

- N

- N

- N

- N

- N

Interactive Grid: Wrapup

Pros, Cons, Discussion

Departments				
Q	Search: All Text Columns	Go	Actions	Edit Add Row
		Deptno	Dname	
		10	ACCOUNTING	
		20	RESEARCH	
		30	SALES	
		40	OPERATIONS	
Rows selected				
Employees				
Q	Search: All Text Columns	Go	Actions	Edit Add Row
	Empno	Ename	Job	
	7839	KING	PRESIDENT	
	7782	CLARK	MANAGER	
	7934	MILLER	CLERK	

Upgrade or Not?

- Standard **UPGRADE**
- Customized
 - Little Use **Wait?**
 - High Volume
- Customized
 - Important **Rebuild!**

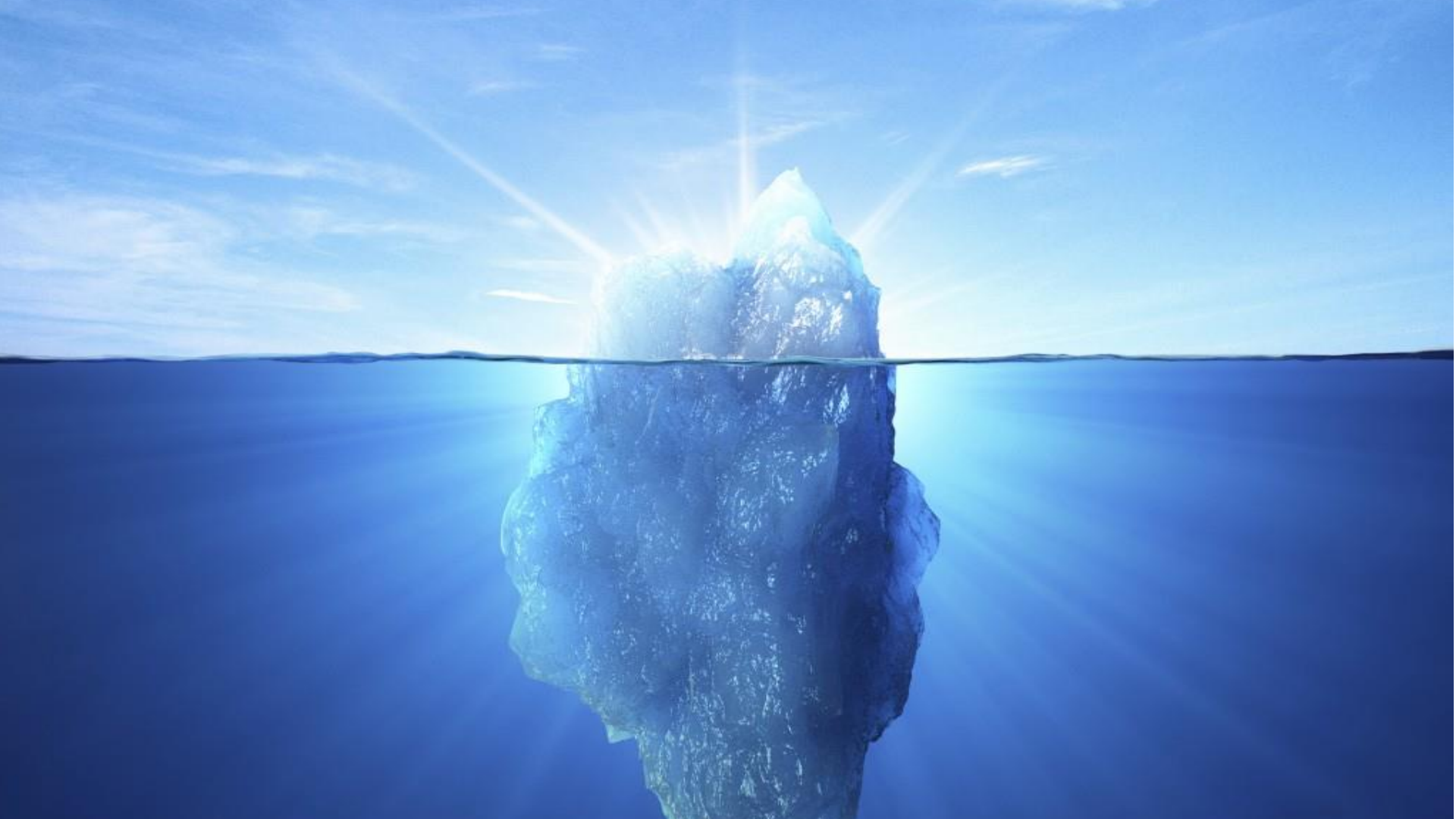


Best to Rebuild When ...

- **Low/Reasonable Volume of Tabular Forms to Upgrade**
- **All Features Have a Declarative Equivalent in Interactive Grid**

No Sense to Upgrade to Make Extensive Customizations





Challenge

- Sample Interactive Grid App
- IG Cookbook
<http://www.hardlikesoftware.com>
- Read the JS Widget Code
`<apex_install_dir>/images/libraries/apex`

PLAY



Comments? Questions? Thank You!



Karen Cannell
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@thtechnology

Resources

- **Sample Interactive Grids**
APEX 5.1 Sample Application, Editing section
- **Interactive Grids Under the Hood**
<http://hardlikesoftware.com/weblog/2016/06/08/interactive-grid-under-the-hood/>
- **Interactive Grid Column Widths**
<http://hardlikesoftware.com/weblog/2017/01/06/interactive-grid-column-widths/>
- **How to Hack Interactive Grids, Parts I thru IV**
<http://hardlikesoftware.com/weblog/2017/01/18/how-to-hack-apex-interactive-grid-part-1/>
- **APEX: Updating Interactive Grid Cells**
<https://ruepprich.wordpress.com/2017/03/09/apex-updating-interactive-grid-cells/>

Resources, cont'd

- **APEX Client-Side Validation**
<http://hardlikesoftware.com/weblog/2017/05/10/apex-client-side-validation/#more-615>
- **Interactive Grid Extend Toolbar Plugin**
<https://github.com/mgoricki/apex-plugin-extend-ig-toolbar>
- **APEX Grid Preventing Lost Updates**
<http://www.explorer.uk.com/apex-interactive-grid-preventing-lost-updates-record-locking/>
- **Editable Grid, PL/SQL Process**
<https://apex.oracle.com/pls/apex/germancommunities/apexcommunity/tipp/6361/index-en.html>
-

