

APEX Connect 2024, 23rd of April 2024

Key points about APEX Migrations

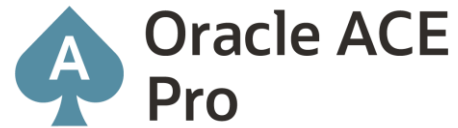
Oliver Lemm

code of change

 **Hyand** by
GOD | MT

about me

Deputy Head of Business Unit Low Code architect, project manager and developer



GOD III

Two become Hyand Ranked among the top 15 IT service providers in Germany

Kaunas ■ Vilnius

Hamburg ■

Wolfsburg ■
Braunschweig ■

Berlin ■

Dortmund ■
Ratingen ■

Wroclaw ■

Cologne ■

Frankfurt ■

Ingolstadt ■

Munich ■

Pune ■

> 900

Employees
(of which 160 in
shoring locations)

> 150

Clients

> 10

Industries

16

Locations

1. Universal Theme & Compatibility Mode
2. JavaScript
3. Upgrade Application / Advisor
4. Deprecated & Desupported
5. Complexity of your App
6. Types of Migration
7. Effort Calculation

Compatibility Mode

Compatibility Mode

- controls internal functionality in APEX
- major changes since APEX 5
 - APEX 5 – Login, Session Timeout, Session State
 - APEX 5.1 – Client-Side Validations, DA „Wait for Result“ Synchronous -> Asynchronous AJAX (DA)
 - APEX 19.1 – Rich text Editor max length
 - APEX 19.2 – Classic Report empty columns
 - APEX 21.2 – APEX_ERROR.ADD_ERROR change
- More details can be found inside the Release Notes [APEX 23.2 - 3.Changed Behavior - 3.6 Compatibility Mode](#)

The screenshot shows the Oracle APEX App Builder interface for 'Application 102'. The 'Definition' tab is active, and the 'Properties' section is expanded. The 'Compatibility Mode' dropdown menu is open, showing a list of version options: 19.2 / 20.1 / 20.2 / 21.1 (selected), 21.2 / 22.1 / 22.2 / 23.1 / 23.2, 19.2 / 20.1 / 20.2 / 21.1, 19.1, 5.1 / 18.1 / 18.2, 5.0, 4.2, 4.1, and Pre 4.1. Other properties like 'Friendly URLs', 'Allow Feedback', 'Logging', 'Debugging', 'Application Email From Address', 'Proxy Server', 'Oracle Text Function', 'Tokenize Row Search', and 'Maximum Background Page Process Jobs' are also visible.

Universal Theme

Universal Theme

- Introduced with APEX 5.0
- getting updates every APEX Release
- since APEX 21.2 Compatibility Mode dependency
- since APEX 23.2 „information banner“

Verify Theme Subscription

1 error has occurred



- Application "Sample Reporting" compatibility mode must be at least 21.2 / 22.1 / 22.2 / 23.1 / 23.2 for a theme refresh. Compatibility mode can be changed from the Application Definition, under Properties.



Subscription Status

Current theme does not match master theme

Template Type	Template Name	Status
Theme Style	My Theme Style	Not subscribed
	Redwood Light	Out of Sync
	Vita	Out of Sync
	Vita - Dark	Out of Sync

APEX App Builder ▾ SQL Workshop ▾ Team Development ▾ Gallery

SR Application 102 \ Shared Components

There is a new version of Universal Theme available! You can refresh your theme to take advantage of new features, enhancements, and bug fixes. [Refresh Theme](#)

Text	Match
Text with Icon	Out of Sync

Universal Theme

- Theme Style resets
- „set Theme Style“ since APEX 23+ gone
- Theme Style saved with CSS Variables

APEX App Builder SQL Workshop Team Development Gallery Search

SR Application 102 Shared Components Themes Universal Theme - 42 Edit File

14818575600485021.css

Cancel Delete Save Changes

File saved and minified

```
1 :root {
2   --a-base-font-weight-semibold: 600;
3   --a-icon-size: 1rem;
4   --a-button-border-radius: 0.125rem;
5   --a-button-padding-y: 0.5rem;
6   --a-button-padding-x: 0.75rem;
7   --a-button-font-size: 0.75rem;
8   --a-button-line-height: 1rem;
9   --a-button-gap-x: 0.3rem;
10  --a-button-icon-spacing: 0.375rem;
11  --a-button-icon-size: 1em;
```

Theme Roller

Filter

Theme

Select Theme Vita (Current)

Global Colors

Containers

Navigation

Regions

States

Save Save As

Theme Roller

Theme style updated successfully!

Filter

Theme

Select Theme My Theme Style

Global Colors

Containers

Navigation

Regions

States

Palette

Buttons

Forms

Interactive Reports

Layout

Custom CSS

Save Save As

JavaScript

JavaScript changes

- Releasenotes – New Features – 2.28 JavaScript API Updates
- <https://docs.oracle.com/en/database/oracle/apex/23.2/htmnrn/new-features.html#GUID-5E4F1950-DACE-4D55-9505-C4570FC30C38>

2.28 JavaScript API Updates

New and Changed APIs

This release contains new options, parameters, and functionality:

- `apex.util.escapeHTML`: when `pValue` is NULL, an empty string is returned.
- Removed option `lowValuesOptimization` from `facetsRegion` `listControl` and `selectListControl` types because it was not useful and is no longer used.
- `mapRegion` option `tileLayer` has a number of new properties.
- `model.allowDelete` has a change in behavior for tree shape models: all the child nodes must also allow delete.
- `model.walkTree` `pVisitor` parameter `postNode` callback allows for post-order traversal.
- `facetsRegion` interface describes Flexible Operators for facet type Input Field.

Fixed or Improved Examples

The Index Introduction text is improved.

This release includes fixed or improved examples:

- `apex.pwa.getPushSubscription`
- `model.child`
- `model.childCount`
- `model.clearChanges`
- `model.fetchAll`
- `model.setValue`

Improved API Descriptions

This release includes improved API descriptions:

- `grid` and `tableModelView` widget option `hideSinglePage`
- `interactiveGrid` widget type definition `toolbarData` properties
- `model.clearChanges`
- `model.getRecord`
- `model.getTotalRecords`
- `model.setData`
- `model.setValue` `pValue` parameter
- `model.walkTree`

JavaScript Library Upgrades

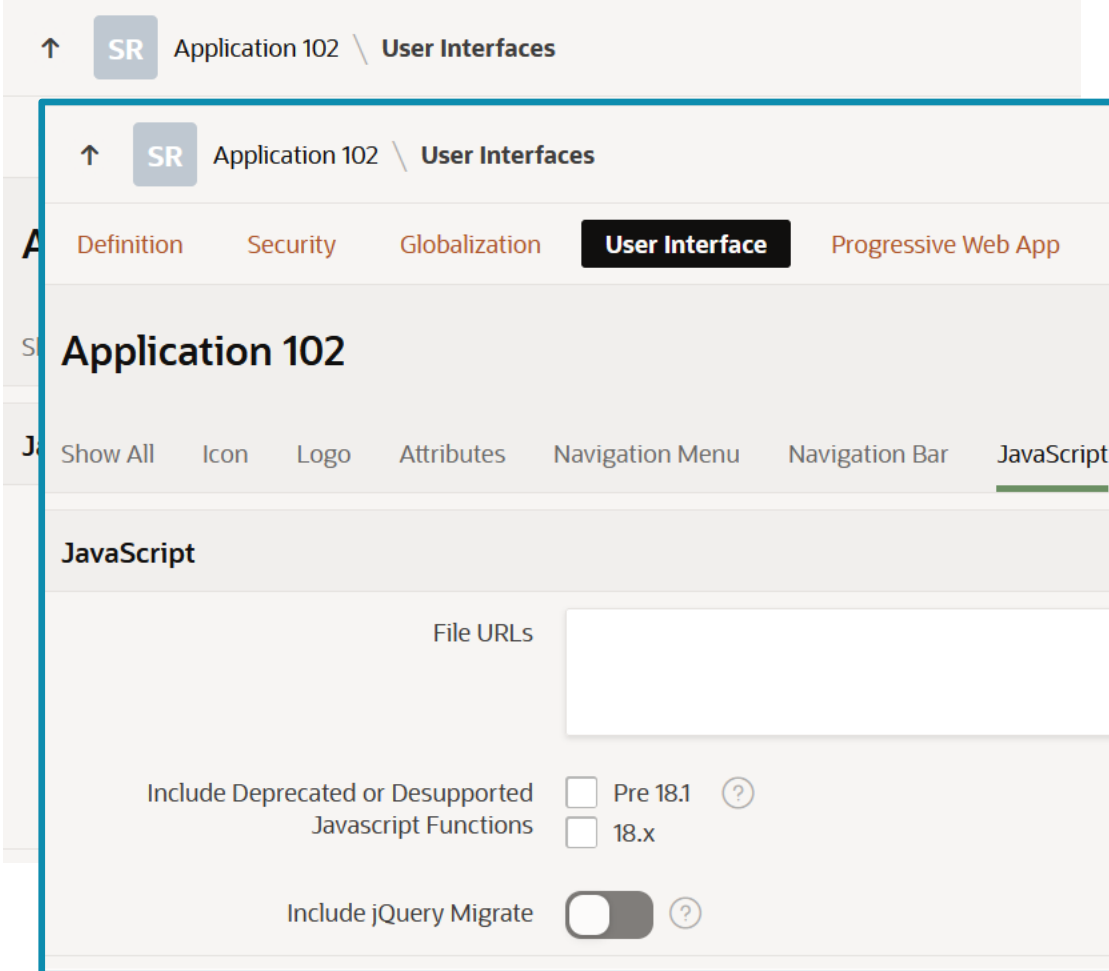
- Releasenotes – New Features – 2.29 JavaScript Library Updates
- <https://docs.oracle.com/en/database/oracle/apex/23.2/htmnrn/new-features.html#GUID-175489FB-CC24-40F6-89EF-A4A7AAFD7770>

2.29 JavaScript Library Upgrades

- Backbone.js 1.4.1
- DOMPurify 3.0.5
- FullCalendar 6.1.8
- jQuery Migrate 3.4.1
- lodash 4.17.21
- Marked.js 5.1.2
- Oracle JET 15.0.7
- Terser 5.19.2
- TinyMCE 6.7.1

JavaScript Settings

- AppBuilder – App – Shared Components – User Interface
- deactivate
 - Include Deprecated or Desupported Pre 18.1
 - Javascript Functions 18.x
 - Include jQuery Migrate



The screenshot shows the APEX configuration interface for 'Application 102' under the 'User Interfaces' section. The 'User Interface' tab is selected, and the 'JavaScript' sub-tab is active. The 'JavaScript' settings section includes a 'File URLs' text area, a checkbox for 'Include Deprecated or Desupported Javascript Functions' with options for 'Pre 18.1' and '18.x', and a toggle switch for 'Include jQuery Migrate'.

„legacy“ JavaScript

- `apex.confirm(...)` / `htmldb_delete_message="DELETE_CONFIRM_MSG"`
 - ⇒ declarative Message
 - ⇒ `apex.message.confirm`
- `$v(,P42_ASSIGNED_TO)` / `$s(...)`
 - ⇒ `apex.items.P42_ASSIGNED_TO.value`
- use `apex.env.APP_ID` / `APP_PAGE_ID` / `APP_SESSION`
- remove custom `[data-action]` attribute

Behavior

Action: Redirect to URL

Target: javascript:apex.confirm(htmldb_delete_message,'DELETE');

Execute Validations:

Warn on Unsaved Changes: Do Not Check

Database Action: SQL DELETE action

Behavior

Action: Submit Page

Execute Validations:

Warn on Unsaved Changes: Do Not Check

Database Action: SQL DELETE action

Requires Confirmation:

Confirmation

Message: &APP_TEXT\$DELETE_MSG!RAW.

Upgrade Application / Advisor

Upgrade Application

- App Builder – App – Utilities
- easy and fast migration
- mostly seamless
- node your changes

↑ SR Application 102 \ Utilities \ Upgrade Application \ Upgrade

Upgrade Type Upgrade jQuery Date Picker to new Date Picker

Q Go Actions

<input type="checkbox"/>	Page ↑	Page Name	Region	Object Name
<input type="checkbox"/>	2	Maintain Project	Maintain Project	P2_END_DATE
<input type="checkbox"/>	2	Maintain Project	Maintain Project	P2_START_DATE
<input type="checkbox"/>	17	Interactive Grid	Projects	END_DATE
<input type="checkbox"/>	17	Interactive Grid	Projects	START_DATE
<input type="checkbox"/>	37	Linking to Interactive Grids	Interactive Grid	END_DATE
<input type="checkbox"/>	37	Linking to Interactive Grids	Interactive Grid	START_DATE
<input type="checkbox"/>	40	Drill Down IG	Projects	FIRST_START_DATE
<input type="checkbox"/>	40	Drill Down IG	Projects	LAST_END_DATE

Upgrade Number Fields to use a decimal virtual keyboard 17

Update all end-aligned Number Fields to start-aligned 16

Advisor

- App Builder – App – Utilities – Advisor

Select your checks

- Result

Check your output

false positiv

Checks to Perform

Select All Deselect All

Errors: ? Performance: ?

- Error (1113)**
 - References with Substitution Syntax (1)
 - References with Column Syntax (1)
 - References with Bind Variable Syntax (2)
 - Declarative References of Application Items, Page Items, Columns or Interactive Report Filters (20)
 - Is Valid SQL or PL/SQL Code (1081)
 - Fetch, DML, MR* Processes are Valid (8)
- Security (136)**
 - Inappropriate use of Substitution Syntax (17)
 - Application attributes that can be locked down (1)
 - Authorization (63)
 - Session State Protection (1)
 - Browser Security Settings (54)
- Warning (4)**
 - References of Page Item in a String (2)
 - Length of Item or Tabular Form Column Name (1)
 - Inconsistent references between Dynamic Actions and Buttons (1)
- Performance (2)**
 - User Interface includes compatibility JavaScript (2)
- Quality Assurance (550)**
 - Report has Default Order (44)
 - Deprecated attribute values (506)
- Accessibility (270)**
 - Region has Row Header (67)
 - Page item has label (198)
 - Page item does not cause an unexpected context change (4)
 - Display Image item has image ALT text defined (1)
- Length of Item or Tabular Form Column Name**
- Inconsistent references between Dynamic Actions and Buttons**
- Protected items in Ajax calls**
- Legacy Orphan Components**

Deprecated & Desupported

Deprecated & Desupported

- Release Notes
 - 3. Changed Behavior
 - => take a look
 - 5. Deprecated Features
 - => should be changed
 - 7. Desupported Features
 - => "must" be changed

5 Deprecated Features

Deprecated features are features which Oracle plans to desupport or remove in a future release of Oracle APEX. If a feature is related to application metadata or an API, existing applications can still use the feature, but Oracle strongly recommends that developers start to modify their applications as described in this section. Use APEX Advisor to scan existing applications for deprecated attributes.

- [Quick SQL Deprecated Functionality](#)
- [JSON Application Export Deprecated](#)

5.1 Quick SQL Deprecated Functionality

Deprecated Settings

The following Quick SQL settings are deprecated:

- `Data Language (#language: "DE")`: No longer generates sample data into different languages (German, Korean, Japanese, Spanish).
- `Tags Framework (#tags: true)`: No longer generates tag framework objects (table, trigger, sync procedure).
- `On Delete (#ondelete: "cascade")`: No longer supports system-wide `ondelete` settings. Handle these settings through the new `/cascade` column directive.
- `Longer Varchar2 (#longVC: true)`: No longer supports artificially shortening or increasing `VARCHAR2` size.
- `Tenant ID (#tenantID: true)`: No longer supported.

Deprecated Directives

The following Quick SQL directives are deprecated:

- `/select`: No longer generates a SQL `SELECT` statement after generating data for each table.

Parent topic: [Deprecated Features](#)

5.2 JSON Application Export Deprecated

The JSON application export option is deprecated, and will be removed in the next release.

Parent topic: [Deprecated Features](#)

Complexity of your App

Complexity of your App

no of components

- app level
 - Pages
- page level
 - Components (regions, items, da, processes, ...)
- component level
 - settings
 - columns

lines/char of code

- PL/SQL
- JavaScript
- CSS



Embedded Code

- App Builder – App – Utilities – Embedded Code
- Overview of your Inline Code

↑ SR Application 102 \ Utilities \ Embedded Code

Search

Total Row Count 80

Search...

Language

- SQL (48)
- JavaScript (17)
- PL/SQL (15)

Scope

Filter Scope

- Shared Component (23)
- Page 1 - Interactive Report (1)
- Page 2 - Maintain Project (2)
- Page 3 - Classic Report (1)
- Page 4 - Manage Sample Data (1)
- Page 5 - Filtering (2)
- Page 6 - Drill Down IR (1)
- Page 7 - Highlighting (1)
- Page 8 - Format Masks (1)
- Page 11 - Interactive Report (4)

Show All

Component Type

- Region (42)
- Page Template (10)
- Process (6)
- List Template (5)
- Page Item (5)

Show All

Search Results

Theme: Universal Theme > Page Template: Right Side Column > JavaScript > Execute when P

```
apex.theme42.initializePage.rightSideCol();
```

Theme: Universal Theme > Page Template: Standard > JavaScript > Execute when Page Load

```
apex.theme42.initializePage.noSideCol();
```

Theme: Universal Theme > Page Template: Wizard Modal Dialog > JavaScript > Execute when

```
apex.theme42.initializePage.wizardModal();
```

Theme: Universal Theme > Page Template: Drawer > JavaScript > Execute when Page Loads

```
apex.theme42.initializePage.modalDialog();
```

Theme: Universal Theme > Page Template: Left Side Column > JavaScript > Execute when Pa

```
apex.theme42.initializePage.leftSideCol();
```

Theme: Universal Theme > Page Template: Left and Right Side Columns > JavaScript > Execu

```
apex.theme42.initializePage.bothSideCols();
```

Theme: Universal Theme > Page Template: Login > JavaScript > Execute when Page Loads

```
apex.theme42.initializePage.appLogin();
```

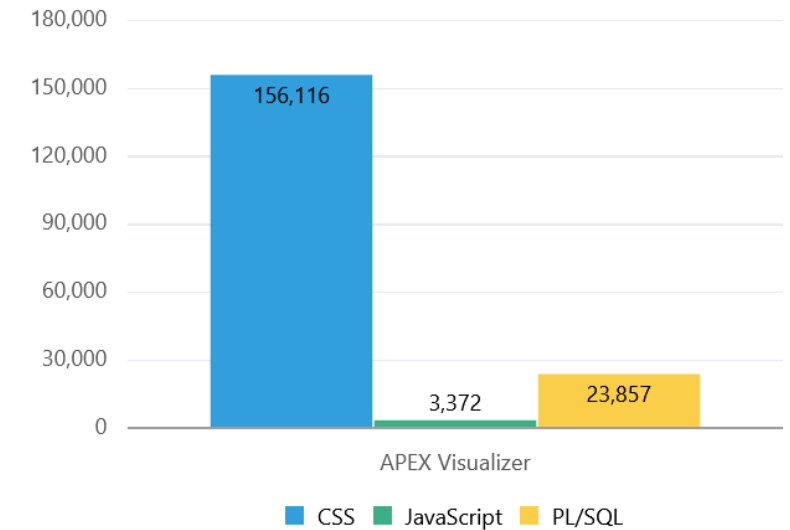
Theme: Universal Theme > Page Template: Marquee > JavaScript > Execute when Page Load

```
apex.theme42.initializePage.masterDetail();
```

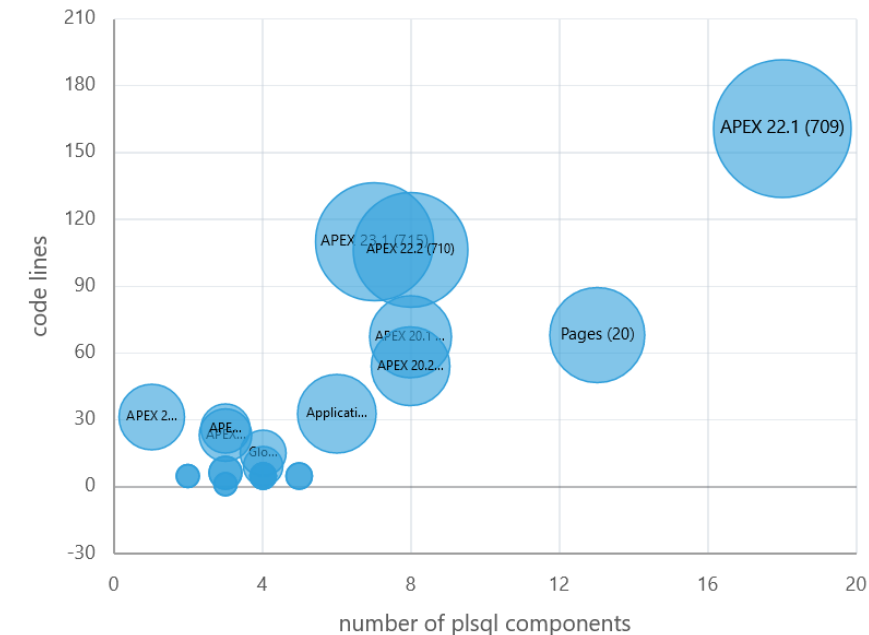
APEX Visualizer

- Open Source Tool
<https://github.com/OliverLemm/apex-visualizer>

Code Complexity (characters by app and type)



Characters of PLSQL Code per Page



▼ 6.1.4 Deprecated jQuery/JET Date Pickers

jQuery/JET Date Pickers are now deprecated and cannot be used for new pages or applications. The old jQuery Date Picker JavaScript APIs are not supported.

The JET Date Picker will be removed in a future release. Oracle recommends replacing all old Date Pickers with the new Date Picker.

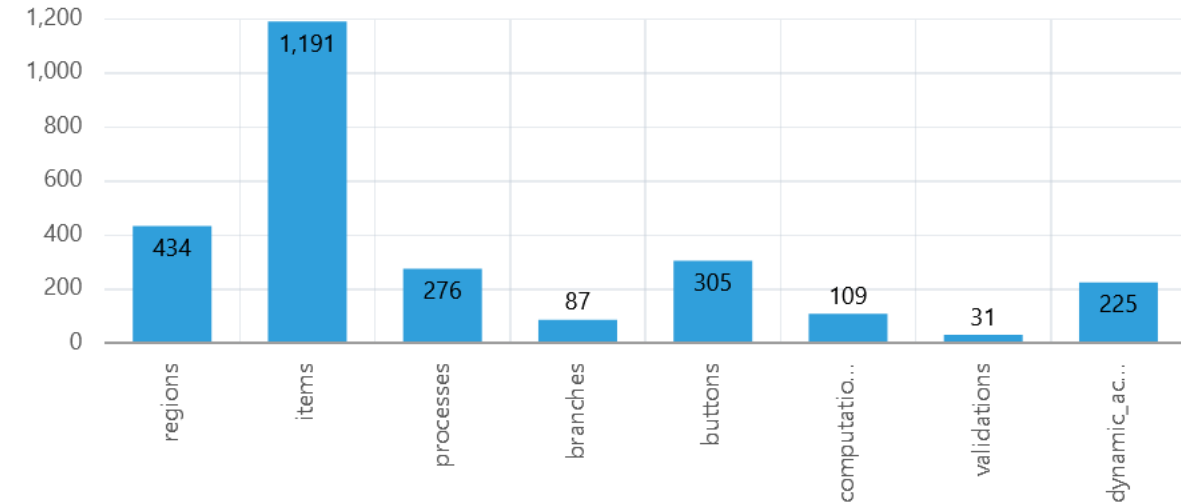
Page Id	Page Name	Region	Item Name	Label	Display As
2	Maintain Project	Maintain Project	P2_END_DATE	End Date	jQuery Datepicker
2	Maintain Project	Maintain Project	P2_START_DATE	Start Date	jQuery Datepicker

1 - 2

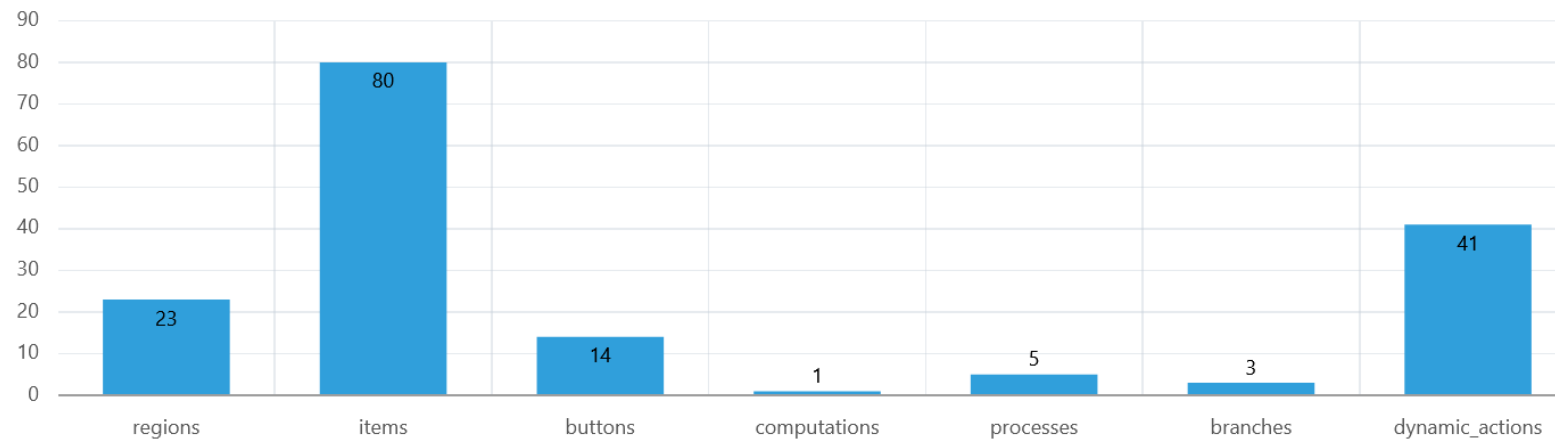
Complexity Categories

- simple Pages
 - < 10 Components
- normal page
 - < 50 Components
- complex page
 - < 100 Components
- very complex page
 - > 100 Components

Components Overall



Components per Page



Types of Migration

Types of Migration

no Universal Theme

- no Universal Theme
- Compatibility Mode
- JavaScript settings
- Deprecated/Desupported
- Tabular Forms
- no Icons
- Plugins

older than 1 year

- ! Universal Theme
- ! Compatibility Mode
- ! JavaScript settings
- ! Deprecated / Desupported

1 or 2 Releases old

- ! Universal Theme
- ✓ Compatibility Mode
- ✓ JavaScript settings
- ! only latest Releasenotes

Effort Calculation

all efforts in person days

1 day = 8 hours

for developers with 1-2 years experience in APEX

developers with 5 years need approx. half of the time

Calculation for no UT App

- no Universal Theme
 - all items have to be relocated
- 52 pages
 - login page is a normal page template change
- All Deprecated & Desupported removed
- Region / Page Positions Changes
- Legacy JavaScript
 - declarative functions / new API calls

1	App 123	No	effort	overall
2	simple page	32	0,125	4
3	normal page	12	0,250	3
4	complex page	6	1,000	6
5	very complex page	2	2,500	5
6	UT / comp mode / JS		1,000	1,000
7	Upgrade App	9	0,125	1,125
8	deprecated feat 1	3	0,063	0,188
9	deprecated feat 2	12	0,125	1,5
10	deprecated feat 3	6	0,031	0,188
11	desupported feat 1	9	0,250	2,25
12	desupported feat 2	2	0,125	0,25
13	legacy JS	6	0,031	0,188
14				
15	development effort			24,69
16				
17	QS		20%	4,938
18	PM		10%	2,469
19	Architect		10%	2,469
20	Migration analysis			0,5
21				
22	Overall in Days			35,06

Calculation for UT App

- Universal Theme “only refresh”
- 52 pages no effort per page
- All Deprecated & Desupported removed
- Legacy JavaScript
 - declarative functions
 - new API calls

1	App 456	No effort	overall
2	UT / comp mode / JS	0,250	0,250
3	Upgrade App	5 0,125	0,625
4	deprecated feat 1	3 0,063	0,1875
5	deprecated feat 2	12 0,125	1,5
6	deprecated feat 3	6 0,031	0,1875
7	desupported feat 1	9 0,250	2,25
8	desupported feat 2	2 0,125	0,25
9	legacy JS	6 0,031	0,1875
10			
11	development effort		5,4375
12			
13	QS	10%	0,54375
14	PM	10%	0,54375
15	Architect	10%	0,54375
16	Migration analysis		0,25
17			
18	Overall in Days		7,31875

Calculation for one Release

- Universal Theme “only refresh”
- 52 pages no effort per page
- All Deprecated & Desupported removed

1	App 789	No	effort	overall
2	UT / comp mode / JS		0,125	0,125
3	Upgrade App	2	0,125	0,25
4	deprecated feat 1	3	0,063	0,1875
5	desupported feat 1	4	0,125	0,5
6				
7	development effort			1,063
8				
9	QS		10%	0,10625
10	PM		10%	0,10625
11	Architect		10%	0,10625
12	Migration analysis			0,125
13				
14	Overall in Days			1,50625

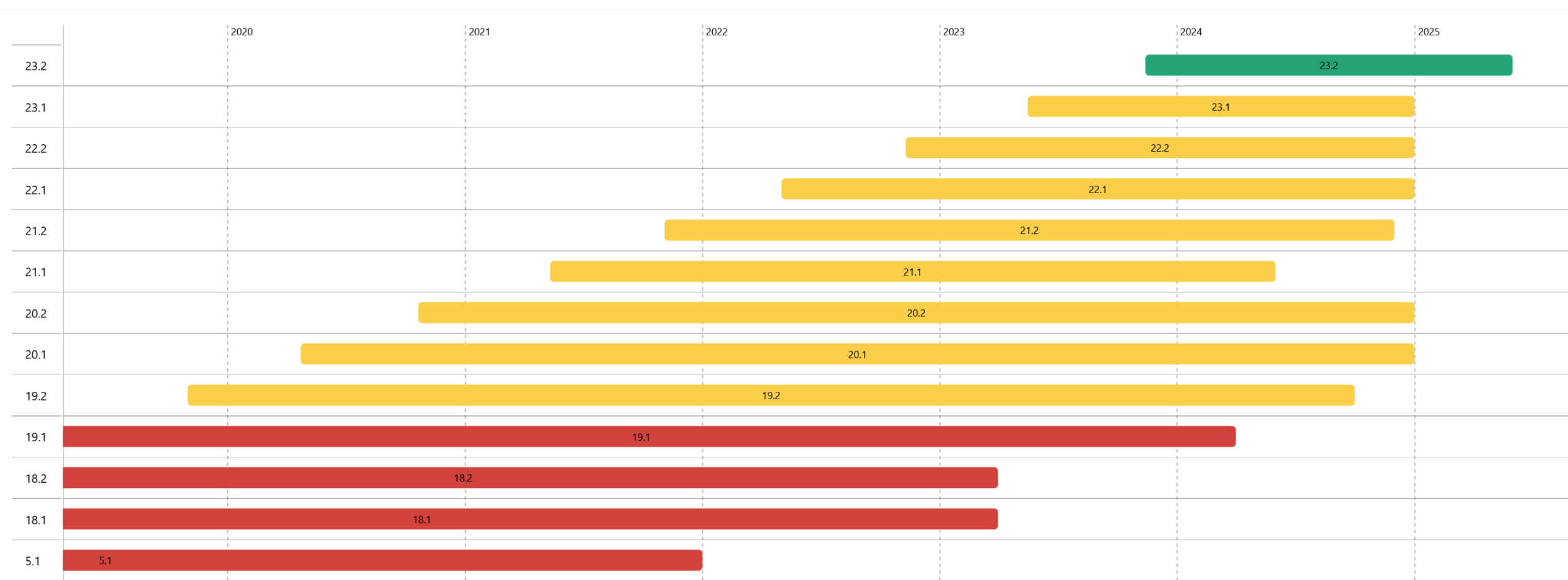
Conclusion

1. Migration Analysis
2. Universal Theme & Compatibility Mode
3. Upgrade Application & Advisor
4. JavaScript
5. Plugins
6. APEX Visualizer
7. QS, PM & Architect

Try to migrate every
2nd APEX Release

APEX Support Timelines - <https://apex.mt-itsolutions.com/supporttimelines>

APEX Support Timelines



Say Hy_

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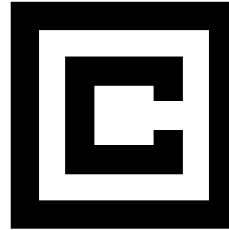
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