

Ten tips from using the ABAP Programming Model for SAP Fiori on AnyDB

DX134

John Patterson | @jasper_07





Our Fiori adoption



Costing too much



Taking too long



Hard to find resources



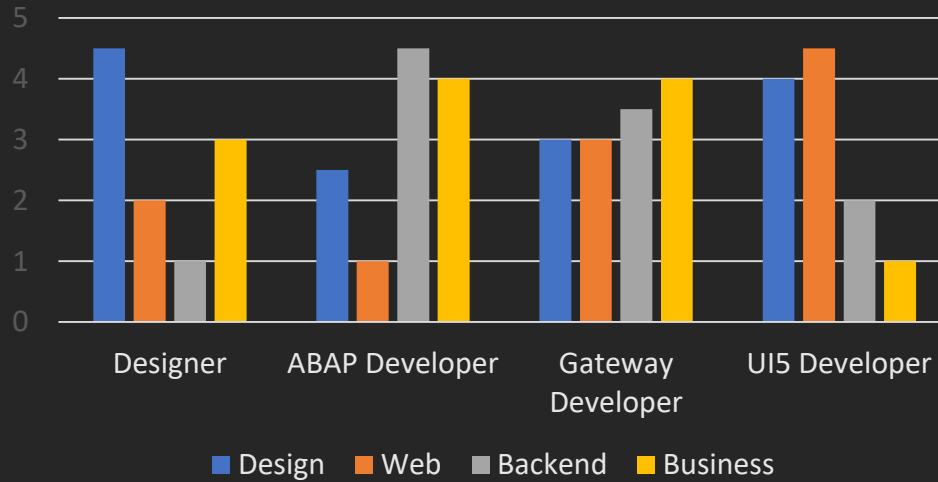
Can't keep up with demand



Need more developers to upskill

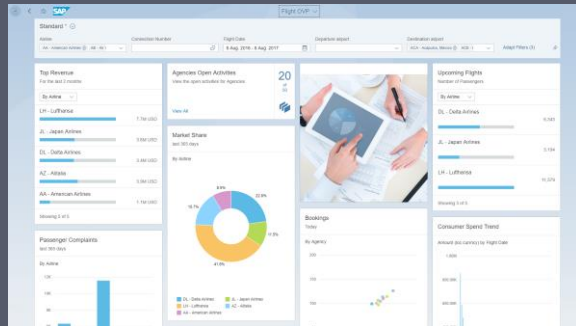
You go to war with the developers you have

My Team



Fiori Elements

Metadata-Driven Uis based on CDS Annotations



Overview Page

The List Report displays a table of flight data with columns for 'Flight Date', 'Origin', 'Destination', 'Carrier', and 'Status'. The table is filtered by 'Standard' and 'Flight Date'.

Flight Date	Origin	Destination	Carrier	Status
2019-08-01	NYC	LAX	AA	On Time
2019-08-01	NYC	LAX	DL	Delayed
2019-08-01	NYC	LAX	UA	On Time
2019-08-01	NYC	LAX	AA	On Time
2019-08-01	NYC	LAX	DL	Delayed
2019-08-01	NYC	LAX	UA	On Time
2019-08-01	NYC	LAX	AA	On Time
2019-08-01	NYC	LAX	DL	Delayed
2019-08-01	NYC	LAX	UA	On Time
2019-08-01	NYC	LAX	AA	On Time

List Report

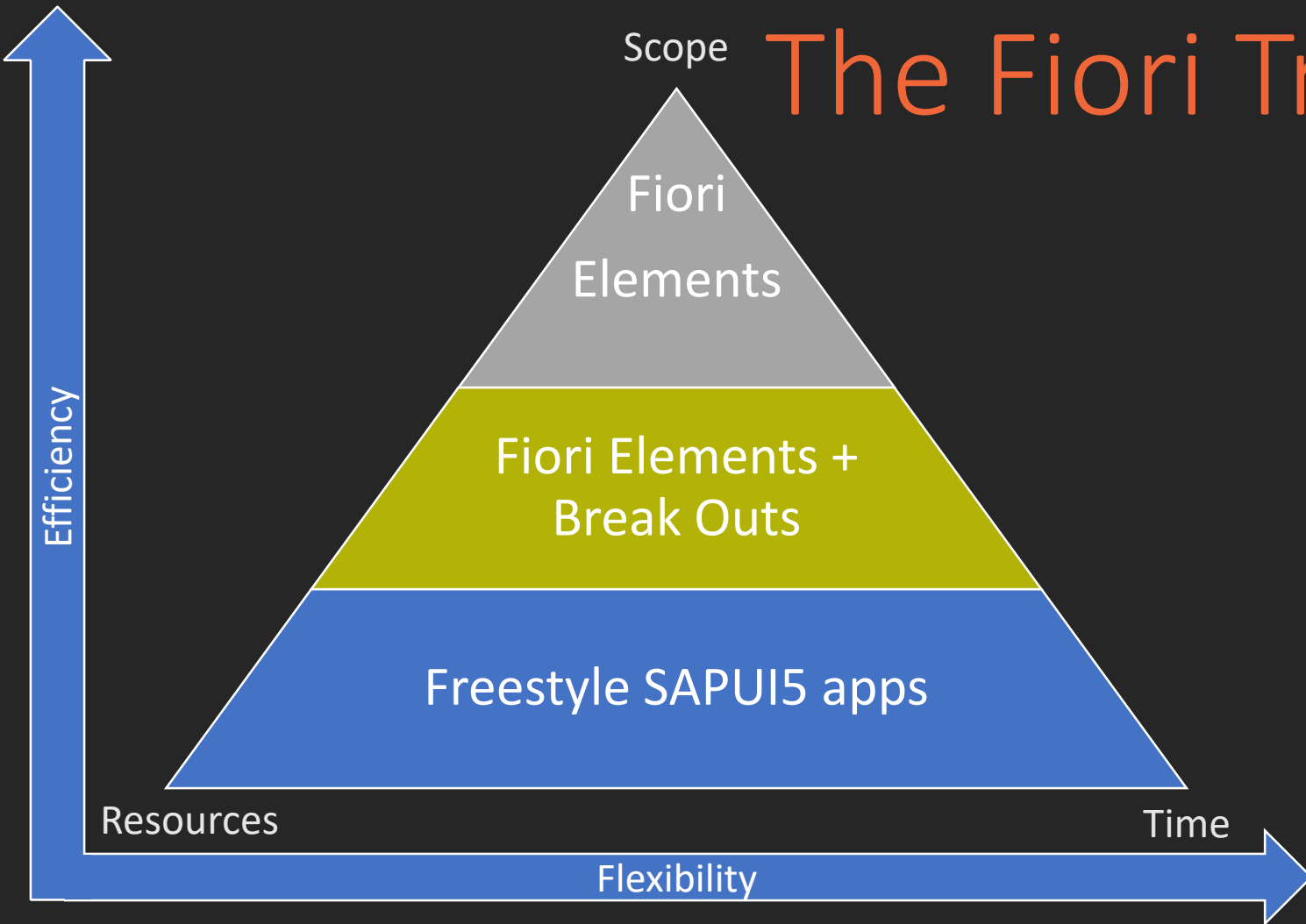
The Object Page displays detailed information for a specific flight. The top navigation bar includes filters for 'Standard', 'Flight Date', 'Origin', 'Destination', and 'Carrier'. The main content area is divided into several sections:

- General Information:** A section containing basic flight details like flight number, date, and status.
- Bookings:** A table of bookings for the flight, with columns for 'Booking ID', 'Passenger Name', 'Class of Service', 'Fare Basis', and 'Status'.

Booking ID	Passenger Name	Class of Service	Fare Basis	Status
00000001	John Doe	Y	Y	On Time
00000002	Jane Doe	Y	Y	On Time
00000003	John Doe	Y	Y	On Time
00000004	Jane Doe	Y	Y	On Time
00000005	John Doe	Y	Y	On Time
00000006	Jane Doe	Y	Y	On Time
00000007	John Doe	Y	Y	On Time
00000008	Jane Doe	Y	Y	On Time
00000009	John Doe	Y	Y	On Time
00000010	Jane Doe	Y	Y	On Time

Object Page

The Fiori Triangle





Limitations

CDS on AnyDB

- Performance issues
- No Fuzzy search
- Work arounds

Fiori Elements

- Steeper than expected learning curve
- WebIDE wizard missing key features
- Breakouts very restricted Extension API

Get access to a system with examples

1

Working examples really reduce the
learning curve

Solutions

Solutions : Filtered (12 of 75)

View: All Solutions

S/4HANA

Name	Available In	Status	Operations
SAP S/4HANA, on-premise edition 1610 FPS01 TRIAL SAP SE Jun 14, 2017	Amazon Web Services, Microsoft Azure, Microsoft Azure (Classic)	Available	Create Instance
SAP S/4HANA Chemicals trial with industry best practices 1610 TRIAL SAP SE May 25, 2017	Amazon Web Services, Microsoft Azure, Microsoft Azure (Classic)	Available	Create Instance
SAP S/4HANA 1610 FPS01, Fully-Activated Appliance TRIAL SAP SE May 22, 2017	Amazon Web Services, Microsoft Azure, Microsoft Azure (Classic)	Available	Create Instance
SAP Model Company for Subscription Billing MC SAP SE May 19, 2017	Amazon Web Services, Microsoft Azure (Classic), Microsoft Azure	Available	Create Instance
SAP Solution Manager 7.2 & Focused Solutions Demo System with SAP S/4HANA TRIAL SAP SE Mar 31, 2017	Amazon Web Services	Available	Create Instance
SAP Model Company for Connected Manufacturing MC SAP SE Mar 6, 2017	Amazon Web Services, Microsoft Azure, Microsoft Azure (Classic)	Available	Create Instance
SAP Solution Manager 7.2 SPS03 for the Design and Build in Your S/4HANA Planning Phase TRIAL SAP SE Jan 9, 2017	Amazon Web Services, Microsoft Azure, Microsoft Azure (Classic)	Available	Create Instance
SAP S/4HANA 1610, Fully-Activated Appliance TRIAL SAP SE Dec 22, 2016	Amazon Web Services, Microsoft Azure (Classic), Microsoft Azure	Available	Create Instance
SAP S/4HANA 1610 TRIAL SAP SE Nov 1, 2016	Amazon Web Services, Microsoft Azure, Microsoft Azure (Classic)	Available	Create Instance
SAP S/4HANA, on premise edition 1511 FPS01 Fully-Activated TRIAL SAP SE Apr 1, 2016	Amazon Web Services, Microsoft Azure, Microsoft Azure (Classic)	Available	Create Instance
SAP NetWeaver AS Java 7.5 on SAP ASE 16.0 TRIAL	Amazon Web Services, Microsoft Azure (Classic), Microsoft Azure	Available	Create Instance

Support

Links

Start building up your own library of examples

2



Generating OData Services

1

Via CDS
Annotation
@OData.publish

EXPOSE

2

Via SEGW using
CDS Referenced
Data Source

ENRICH

3

Via SEGW using
Mapped Data
Source

ENHANCE

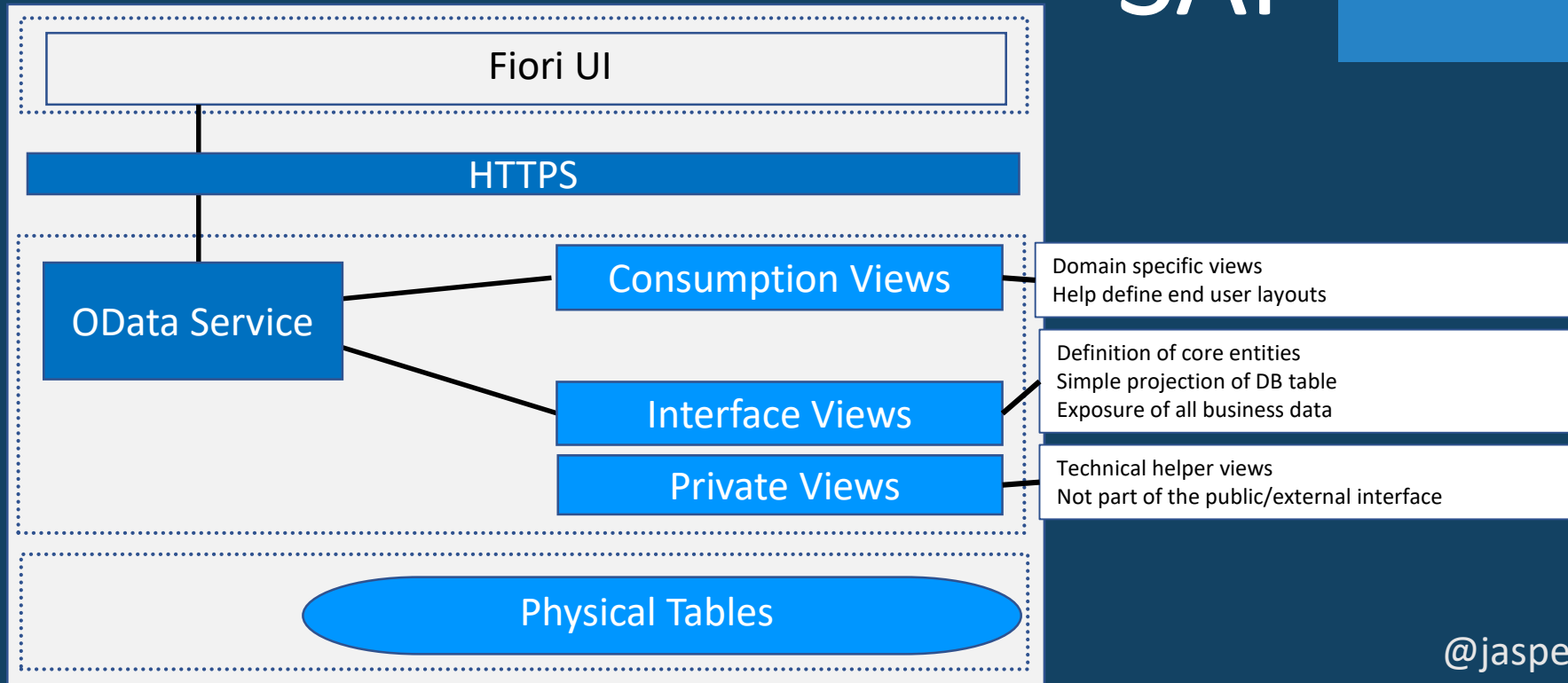
When to use `@odata.publish?`

3

Generates a single root entity with associations. Ideal for List Report and Object Page

Structure CDS views like SAP

4



Views on Views

Consumption View “C”

Private View “P”

Interface View “I”

Database table

SQL Dependency Tree

SQL Name	Relation	Type	Entity Name
CMMPURGRPANA		CDS View	C_PurchasingGroupAnalysis
PMPURGRPAN3	from	CDS View	P_PurchasingGroupAnalysis3
PMPURGRPAN1	from	CDS View	P_PurchasingGroupAnalysis1
IMMPURDOCITEM	from	CDS View	I_PurchasingDocumentItem
EKPO	from	Table	
IMMPURCHASINGDOC	left outer join	CDS View	I_PurchasingDocument
EKKO	from	Table	
IMMPURCHASINGDOC	inner join	CDS View	I_PurchasingDocument
EKKO	from	Table	
PMMRELDATES	inner join	CDS View	P_RelevantDates
PMMCALENDARDATE	from	CDS View	P_CalendarDate
ICALENDARDATE	from	CDS View	I_CalendarDate
SCAL TT DATE	from	Table	
PPURORDHISDETAIL	left outer join	CDS View	P_PurchaseOrderHistoryDetail
PMPURIRGRPANI?	from	CDS View	P_PurchasingGroupAnalysis?

Find

Open SQL vs Native SQL

5

Analyze how CDS on HANA works to
bridge the gaps in AnyDB


Aggregate Example

Open SQL will want to 'group by' all non-aggregate fields = SELECT fields + the KEY fields

That doesn't work!! KEY is unique

Trick don't use KEY fields, let CDS populate a locally generated KEY

Learnt from observing HANA XS and Analytical views



```
define view Zc_Te_Abooking as select from Zi_Te_Bookings as book
association [1] to Zc_Te_Agency as _Agency on $projection.AgencyNumber = _Agency.AgencyNumber
association [1] to Zi_Te_Carrier as _Carrier on $projection.CarrierId = _Carrier.CarrierId
association [1] to Zi_Te_Connection as _Connection on $projection.CarrierId = _Connection.CarrierId
and $projection.ConnectionId = _Connection.ConnectionId

{
  @Search.defaultSearchElement: true
  book.CarrierId,
  book.ConnectionId,
  @UI.lineItem: [{position:10,qualifier:'Carrier', importance:#HIGH}]
  _Carrier.Name as CarrierName,

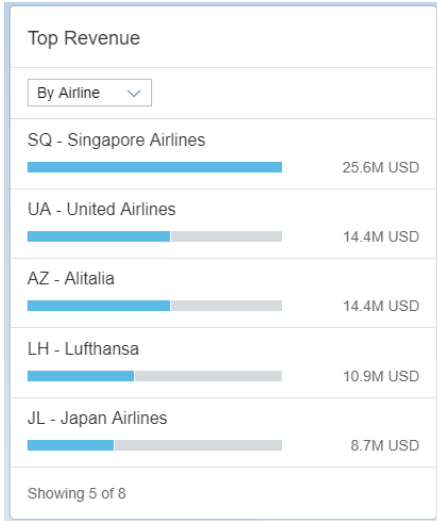
  book.FlightDate,
  book.BookId,
  @Semantics.currencyCode: true
  cast( 'USD' as abap.cuky ) as Currency,
  @UI.lineItem: [{position:20,qualifier:'Carrier', importance:#HIGH, type: #AS_DATAPOINT },
  @DefaultAggregation: #SUM
  book.LocalCurrencyAmount as Amount,
  book.AgencyNumber,
  @UI.lineItem: [{position:10,qualifier:'Agency', importance:#HIGH}]
  coalesce( _Agency.AgencyName, 'Internet Booking' ) as AgencyName,
  @DefaultAggregation: #COUNT
  cast(0 as abap.int4) as NumberOfItems,
  _Connection.AirportFrom,
  _Connection.AirportTo,
  _Connection,
  _Agency
}
```


Automagic KEY

```
▼<EntityType Name="Zc_Te_AbookingType" sap:label="Analytics on Booking" sap:semantics="aggregate" sap:content-version="1">
  ▼<Key>
    <PropertyRef Name="ID"/>
  </Key>
  <Property Name="ID" Type="Edm.String" Nullable="false" sap:creatable="false" sap:updatable="false" sap:sortable="false" sap:filterable="false"/>
  <Property Name="CarrierId" Type="Edm.String" MaxLength="3" sap:aggregation-role="dimension" sap:display-format="UpperCase" sap:label="Airline"/>
  <Property Name="NumberOfItems" Type="Edm.Int32" sap:aggregation-role="measure"/>
  <Property Name="AirportFrom" Type="Edm.String" MaxLength="3" sap:aggregation-role="dimension" sap:display-format="UpperCase" sap:label="Departure">
```

Zc_Te_Abooking?\$top=5&\$orderby=Amount desc&\$select=CarrierName,Amount,Currency

```
{
  - d: {
    __count: "8",
    - results: [
      - {
        - __metadata: {
          id: http://vhcalnplci.dummy.nodomain:8000/sap/opu/odata/sap/ZTE_FLIGHT_OVP_SRV/Zc_Te_Abooking('---.---.23.-.3.-.SQ%20-%20Singapore%20AirlinesUSD'),
          uri: http://vhcalnplci.dummy.nodomain:8000/sap/opu/odata/sap/ZTE_FLIGHT_OVP_SRV/Zc_Te_Abooking('---.---.23.-.3.-.SQ%20-%20Singapore%20AirlinesUSD'),
          type: "ZTE_FLIGHT_OVP_SRV.Zc_Te_AbookingType"
        },
        CarrierName: "SQ - Singapore Airlines",
        Currency: "USD",
        Amount: "25604007.50"
      },
    ],
  },
}
```



SQL Trace Record

Details for Selected SQL Trace Record

```
SELECT
  TOP 5 SUM( "AMOUNT" ) "AMOUNT" ,"CARRIERNAME" "CARRIERNAME" ,
  "CURRENCY" "CURRENCY"
FROM
  "ZVC_TE_ABOOKINGS" "ZC_TE_ABOOKING"
WHERE
  "MANDT" = ?
GROUP BY
  "CARRIERNAME" ,"CURRENCY"
ORDER BY
  "AMOUNT" DESC /* R3:CL_SADL_SQL_STATEMENT=====CP:2877 T:ZVC_TE_ABOOKINGS M
:001 */ /*unc. rd.*/
```

Variables

A0 (CH,3)	= '001'
-----------	---------

Simple Effective and Reusable

When to use SEGW & CDS Reference?

6

Need multiple root entities, like an OVP
or need to add additional metadata,
enrich query results or mix CDS with
classic Gateway


Enrich returned values


CL_EPM_REF_APPS_SHOP_DPC_EXT

```
256 METHOD images_get_entity.  
257     super->images_get_entity(  
258         EXPORTING  
259             iv_entity_name           = iv_entity_name  
260             iv_entity_set_name       = iv_entity_set_name  
261             iv_source_name           = iv_source_name  
262             it_key_tab                = it_key_tab  
263             io_request_object         = io_request_object  
264             io_tech_request_context   = io_tech_request_context  
265             it_navigation_path        = it_navigation_path  
266         IMPORTING  
267             er_entity                = er_entity  
268             es_response_context       = es_response_context  
269     ).  
270  
271     DATA(lt_entityset) = VALUE cl_sepmra_shop=>tt_productimage( ( CORRESPONDING #( er_entity ) ) ).  
272  
273     _shop_facade->image_enrich_transient_values( CHANGING ct_image = lt_entityset ).  
274  
275     er_entity = lt_entityset[ 1 ].  
276 ENDMETHOD.  
277
```

Know your Smart Controls

7

 Fiori Design Guidelines

Search 

UI Elements > Filter > Filter Bar / Smart Filter Bar > Smart Filter Bar Annotations


Updated: November 11, 2016

Smart Filter Bar Annotations

Latest SAPUI5 Version 1.46 

[Intro](#) [Usage](#) [Components](#) [Data Types](#) [Properties](#) [Resources](#)

Intro

 Information This article is intended as an aid to designers and developers who want to explore the detail configuration options available for the [smart filter bar](#).

The [smart filter bar](#) is a wrapper that analyzes a given OData service and renders a filter bar based on the content defined by the service. For example, the OData service determines whether a field is visible on the filter bar, and whether it supports type-ahead and [value help](#). To configure more settings or overwrite the settings from the OData service, **the developer can set additional annotations in an external document (metadata.xml).**

Smart Control Example

The screenshot shows a SAP Flight OVP interface. The top navigation bar includes the SAP logo and a 'Flight OVP' dropdown. Below this, a filter bar contains several input fields: 'Airline', 'Connection Number', 'Flight Date', 'Departure airport', and 'Destination airport'. A 'Standard *' button is on the left, and an 'Adapt Filters (2)' button is on the right. The 'Airline' field is highlighted with a blue box and labeled '1'. A dropdown menu is open for 'Airline', showing a list of airlines with checkboxes. The 'Flight Date' field is highlighted with a blue box and labeled '3'. The main content area is divided into three sections: 'Agencies Open Activities' (with a 'View All' link), 'OVP Image' (showing a person using a tablet), and 'Upcoming Flights' (with a 'By Airline' dropdown and a list of flights including 'SQ - Singapore Airlines' with 13,404 passengers). The 'Upcoming Flights' section also shows 'Number of Passengers' and a '4.4M USD' value.

1. Standard * ☺

3

Flight OVP

Airline

Connection Number

Flight Date

Departure airport

Destination airport

Adapt Filters (2)

AA - American Airlines

AB - Air Berlin

AC - Air Canada

AF - Air France

AZ - Alitalia

BA - British Airways

CO - Continental Airline

4.4M USD

Agencies Open Activities

View the open activities for Agencies

20 of 50

OVP Image

Upcoming Flights

Number of Passengers

By Airline

SQ - Singapore Airlines

13,404

1. Smart Filter Bar
2. Multi Select Fixed Value
3. Interval value

Smart Control Example

```
</entitytype>
<EntityType Name="Zc_Te_Flight_FilterType" sap:label="Filter for OVP" sap:content-version="1">
  <Key>
    <PropertyRef Name="CarrierId"/>
    <PropertyRef Name="ConnectionId"/>
    <PropertyRef Name="FlightDate"/>
  </Key>
  <Property Name="CarrierId" Type="Edm.String" Nullable="false" MaxLength="3" sap:display-format="UpperCase" sap:filter-restriction="multi-value" sap:label="Airline" sap:value-list="fixed-values"/>
  <Property Name="ConnectionId" Type="Edm.String" Nullable="false" MaxLength="4" sap:display-format="NonNegative" sap:label="Connection Number"/>
  <Property Name="FlightDate" Type="Edm.DateTime" Nullable="false" Precision="0" sap:display-format="Date" sap:filter-restriction="interval" sap:label="Flight Date"/>

```

1 2 3

► ZCL_ZTE_FLIGHT_MPC_EXT ►

```
66 METHOD add_interval_filter.
67   create_annotation( iv_entity_type = iv_entity_type iv_property = iv_property )->add( iv_key    = /iwbp/if_ana_odata_types=>gcs_ana_odata_annotation_key-filter_restriction
68   iv_value    = /iwbp/if_ana_odata_types=>gcs_ana_odata_annotation_value-filter-interval ).
69 ENDMETHOD.
70
71 METHOD create_annotation.
72   ro_annotation = model->get_entity_type( |{ iv_entity_type }| )->get_property( |{ iv_property }| )->/iwbp/if_mgw_odata_annotatable~create_annotation(
73   iv_annotation_namespace = /iwbp/if_mgw_med_odata_types=>gc_sap_namespace ).
74 ENDMETHOD.
75
76 METHOD define.
77   super->define( ).
78
79   "set flight date as an interval
80   add_interval_filter( EXPORTING iv_entity_type = gc_zc_te_flighttype iv_property = 'FlightDate' ).
81
82   "set carrier as a multi select static value list
83   add_multi_value_filter( EXPORTING iv_entity_type = gc_zc_te_flighttype iv_property = 'CarrierId' ).
84   model->get_entity_type( gc_zc_te_flighttype )->get_property( 'CarrierId' )->set_value_list( /iwbp/if_mgw_odata_property=>gcs_value_list_type_property-fixed_values ).
85   add_text_property( EXPORTING iv_entity_type = gc_zc_te_flighttype iv_property = 'CarrierId' iv_text_property = 'to_Carrier/Name' ).
86
87
```

2 3 1 2

When to use SEGW & Mapped data source?

8

More complex scenarios, you want to dynamically change the behavior or inject additional logic into a query

Query Options

Set search fields

Add additional sort criteria

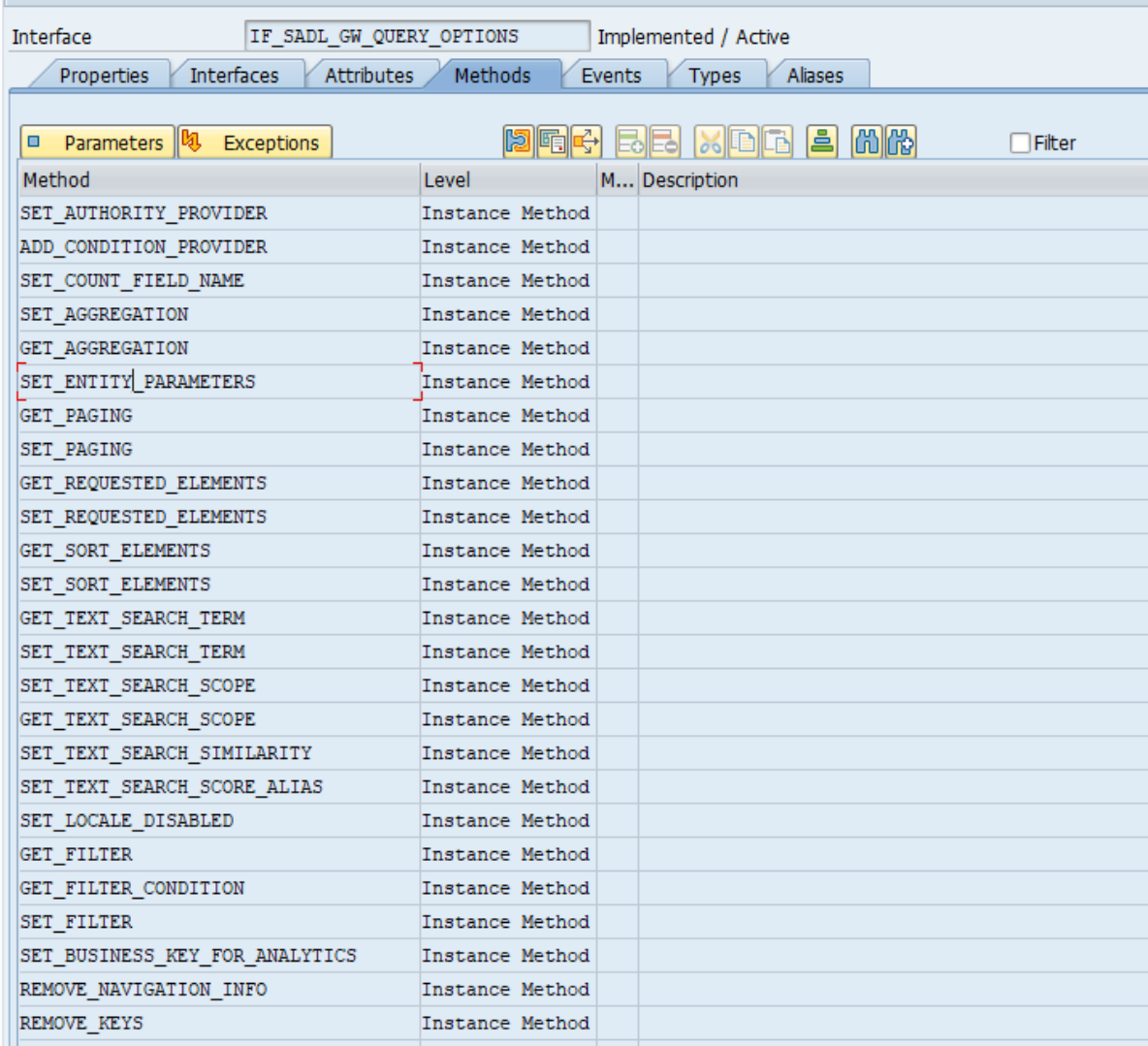
Define additional field selection

Add additional filter criteria

Define aggregates and groups

Set parameters

Change navigation behavior



Interface IF_SADL_GW_QUERY_OPTIONS Implemented / Active

Properties Interfaces Attributes Methods Events Types Aliases

Parameters Exceptions

Method	Level	M...	Description
SET_AUTHORITY_PROVIDER	Instance Method		
ADD_CONDITION_PROVIDER	Instance Method		
SET_COUNT_FIELD_NAME	Instance Method		
SET_AGGREGATION	Instance Method		
GET_AGGREGATION	Instance Method		
SET_ENTITY_PARAMETERS	Instance Method		
GET_PAGING	Instance Method		
SET_PAGING	Instance Method		
GET_REQUESTED_ELEMENTS	Instance Method		
SET_REQUESTED_ELEMENTS	Instance Method		
GET_SORT_ELEMENTS	Instance Method		
SET_SORT_ELEMENTS	Instance Method		
GET_TEXT_SEARCH_TERM	Instance Method		
SET_TEXT_SEARCH_TERM	Instance Method		
SET_TEXT_SEARCH_SCOPE	Instance Method		
GET_TEXT_SEARCH_SCOPE	Instance Method		
SET_TEXT_SEARCH_SIMILARITY	Instance Method		
SET_TEXT_SEARCH_SCORE_ALIAS	Instance Method		
SET_LOCALE_DISABLED	Instance Method		
GET_FILTER	Instance Method		
GET_FILTER_CONDITION	Instance Method		
SET_FILTER	Instance Method		
SET_BUSINESS_KEY_FOR_ANALYTICS	Instance Method		
REMOVE_NAVIGATION_INFO	Instance Method		
REMOVE_KEYS	Instance Method		

Query Options Example

```
18
19 CLASS ZCL_ZCDS_SADL_TEST2_DPC_EXT IMPLEMENTATION.
20
21
22 METHOD if_sadl_gw_query_control~set_query_options.
23
24     "add additional filter
25     io_query_options->get_filter_condition( IMPORTING et_filter_condition = DATA(lt_filter_condition) ).
26     APPEND VALUE #( element = 'PROCESSED' operator = 'EQ' low = abap_false ) TO lt_filter_condition.
27     IF lines( lt_filter_condition ) > 1.
28         APPEND VALUE #( operator = 'AND' ) TO lt_filter_condition.
29     ENDIF.
30     io_query_options->set_filter( it_filter_condition = lt_filter_condition ).
31
32     "add additional fields to be selected
33     io_query_options->get_requested_elements( IMPORTING et_elements = DATA(lt_requested_elements) ).
34     APPEND 'PRODUCT_ID' TO lt_requested_elements.
35     io_query_options->set_requested_elements( lt_requested_elements ).
36
37     "set STATUS and CURRECNY_CODE parameters
38     DATA(lt_parameters) = VALUE if_sadl_public_types=>tt_entity_parameters( (
39         entity_alias = 'SalesOrderHeaders'
40         parameters = VALUE #( ( name = 'CURRENCY_CODE' value = 'AUD' ) ( name = 'STATUS' value = 'APPROVED' ) )
41     ) ).
42     io_query_options->set_entity_parameters( lt_parameters ).
43
44     super->if_sadl_gw_query_control~set_query_options( iv_entity_set = iv_entity_set io_query_options = io_query_options ).
45
46 ENDMETHOD.
47
```


Good examples hidden in the SAPUI5 SDK, WebIDE wizard has limitations, know when to walk away

Breakout Example

The screenshot displays the SAP Manage Products (STTA) interface. The top navigation bar includes the SAP logo and a 'Home' dropdown. Below this, the 'My Home' tab is active, showing a grid of application tiles. The 'Manage Products (STTA)' tile is highlighted with a blue border and a blue arrow pointing to it. The main content area is titled 'Manage Products (Technical Application)' and features a search bar, a dropdown for 'Editing Status' (set to 'All'), and a 'Price' dropdown menu. The 'Price' dropdown is open, showing options: 'Price between 0-100', 'Price between 100-500', 'Price between 500-1000', and 'Price: Over 1000'. The main table displays product data with columns for 'Image', 'Product', 'Sub-Category', 'Supplier Name', 'Progress', 'Product Unit Price', 'Sales', and 'Revenue'. The first row shows a product in 'Draft' status, 'In Stock', with a price of '0.00 EUR' and a sales chart. The second row shows a product in 'Draft' status, 'In Stock', with a price of '0.00 EUR' and a sales chart. The interface includes various filters and actions, such as 'Adapt Filters (1)', 'Go', 'Change price', 'Copy with new Supplier', 'Activate', and 'Delete'. The bottom of the interface shows a 'Breakout Column: Additional content' section.

1 Breakout Column: Additional content

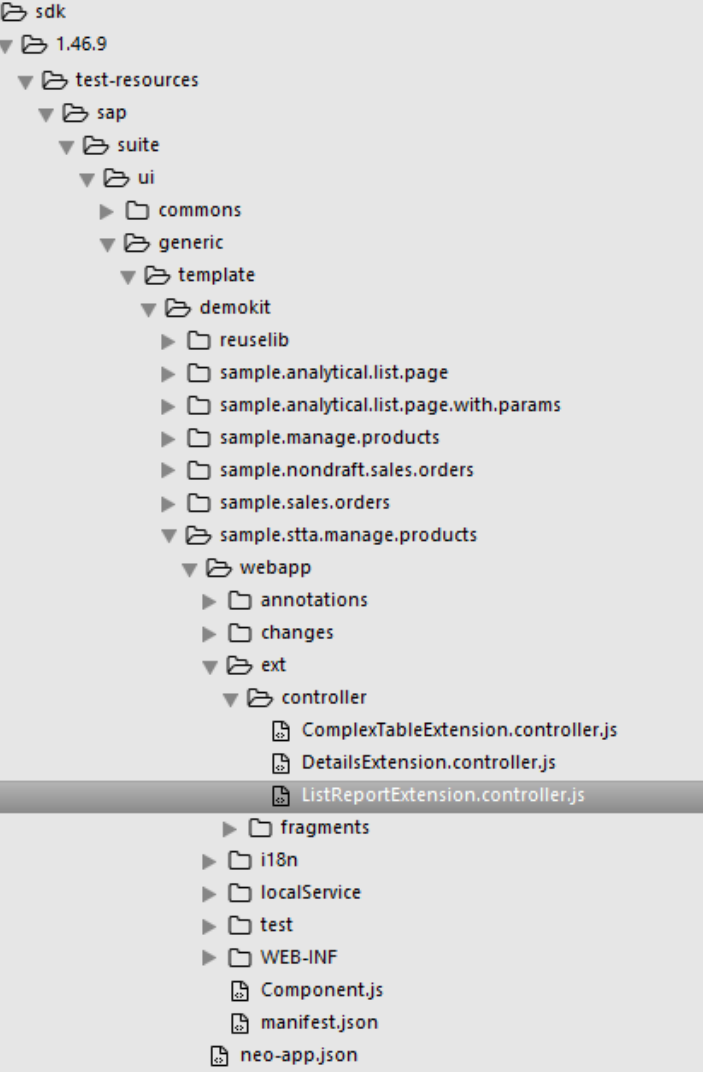
2

3

4

5

6



```
sap.ui.controller("STTA_MP.ext.controller.ListReportExtension", {

    onInitSmartFilterBarExtension: function() {
        // the custom field in the filter bar might have to be
        // bound to a custom data model
        // if a value change in the field shall trigger a follow
        // up action, this method is the place to define and
        // bind an event handler to the field
    },

    onListNavigationExtension: function(oEvent) {
        var oNavigationController = this.extensionAPI.getNavigationController();
        var oBindingContext = oEvent.getSource().getBindingContext();
        var oObject = oBindingContext.getObject();

        // for laser printers we trigger external navigation for all others w
        if (oObject.ProductCategory == "Laser Printers") {
            oNavigationController.navigateExternal("EPMPProductManageSt");
        } else {
            // return false to trigger the default internal navigation
            return false;
        }
        // return true is necessary to prevent further default navigation
        return true;
    },

    onBeforeRebindTableExtension: function(oEvent) {
        // usually the value of the custom field should have an
        // effect on the selected data in the table. So this is
        // the place to add a binding parameter depending on the
        // value in the custom field.
        var oBindingParams = oEvent.getParameter("bindingParams");
        oBindingParams.parameters = oBindingParams.parameters || {};
    }
});
```

Fiori Elements and Build.me

10

Great for rapid prototyping Fiori Elements, but don't assume the generated code is reusable

Takeaways

1

One size doesn't fit all

2

Fiori Elements can be used to help solve scaling problems

3

Need to find examples and create own examples

Give something back to
the community



FEEDBACK

Please complete a session evaluation for this session!

DX134

John Patterson | @jasper_07



[Code from talk - github.com/jasper07/Teched17](https://github.com/jasper07/Teched17)

[SAPUI5 SDK - Fiori Elements Reference Apps](#)

[Fiori Design Guidelines - Smart Table](#)

[Generating an OData Service Based on a CDS View](#)

[Fine-Tuning the Execution of SADL-Based Gateway Services](#)

[The Semantically Rich Data Model – An ABAP based CDS Views example](#)

[My CDS view self study tutorial](#)