Fiori Conf 2024

FIORI APPLICATION WITH FLEXIBLE PROGRAMMING MODEL AND RESTFUL ABAP

EXTERNAL API DATA INTEGRATION AND AI IMAGE GENERATOR

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Luzern, 24.04.2024
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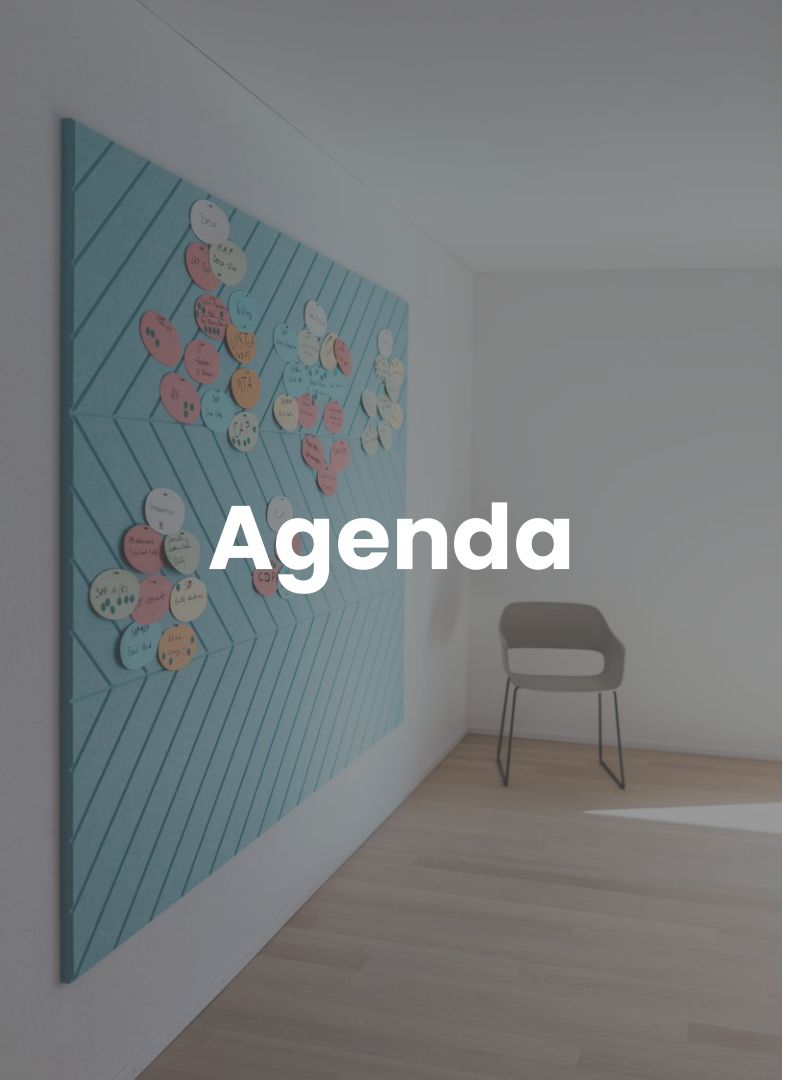
Phillip Dörrschuck



Agenda

01 Introduction

02 Application

03 Live Demo

SE **You**

Was macht die Pure Consulting eigentlich so?

ChatGPT

Pure Consulting, ein führendes Beratungsunternehmen aus Saudi-Arabien, spezialisiert sich auf die Entwicklung und Implementierung von Strategien für den öffentlichen und privaten Sektor. Sie bieten Dienstleistungen in den Bereichen Strategie, Marketing, Kommunikation, Organisationsentwicklung und Transformationsmanagement an. Ihr Ziel ist es, nachhaltigen Erfolg für ihre Kunden zu fördern, indem sie innovative und maßgeschneiderte Lösungen anbieten [,,].

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ChatGPT

Die Pure Consulting AG mit Sitz in Root, Schweiz, ist ein Beratungsunternehmen, das sich auf SAP-Lösungen spezialisiert hat. Sie bieten ein breites Spektrum an Dienstleistungen, einschließlich:

1. **SAP S/4HANA Transformationen**: Analyse, Konzeption und Umsetzung von Transformations-Roadmaps für SAP S/4HANA.
2. **Technology Consulting**: Beratung zu technischen Herausforderungen und Implementierung von Technologielösungen.
3. **Custom Development**: Entwicklung von kundenspezifischen Applikationen, Erweiterungen und Schnittstellen.
4. **Process Consulting**: Verbesserung von Geschäftsprozessen zur Steigerung der Effizienz.
5. **Analytics & Reporting**: Bereitstellung von Analysen und Berichten für fundiertere Entscheidungsprozesse.
6. **Maintenance & Support**: Maßgeschneidertes Application Management und Support für Systeme und Applikationen.

Zudem legt Pure Consulting AG Wert auf Innovation und Technologie, um nachhaltige und effiziente Lösungen für ihre Kunden zu schaffen. Sie betonen auch die Wichtigkeit von Mitarbeiterentwicklung und bieten verschiedene Schulungen über ihre Academy an [,,] [,,].

Speaker

Phillip Dörrschuck

- Position
  - SAP Senior Development Consultants
- Topic focus
  - S/4 Transformation Projects
  - Technology Consulting
  - Trainings @ ***Pure Academy***
    (We make your employees S/4 ready)

Julian Danho

Overview and objectives of the session

The Idea behind the app

RESEARCH

Use of the Cocktail API

API

Backend in SAP

RAP BACKEND

GenAI image generation

GenAI

Extension of the Frontend

FRONTEND

Research

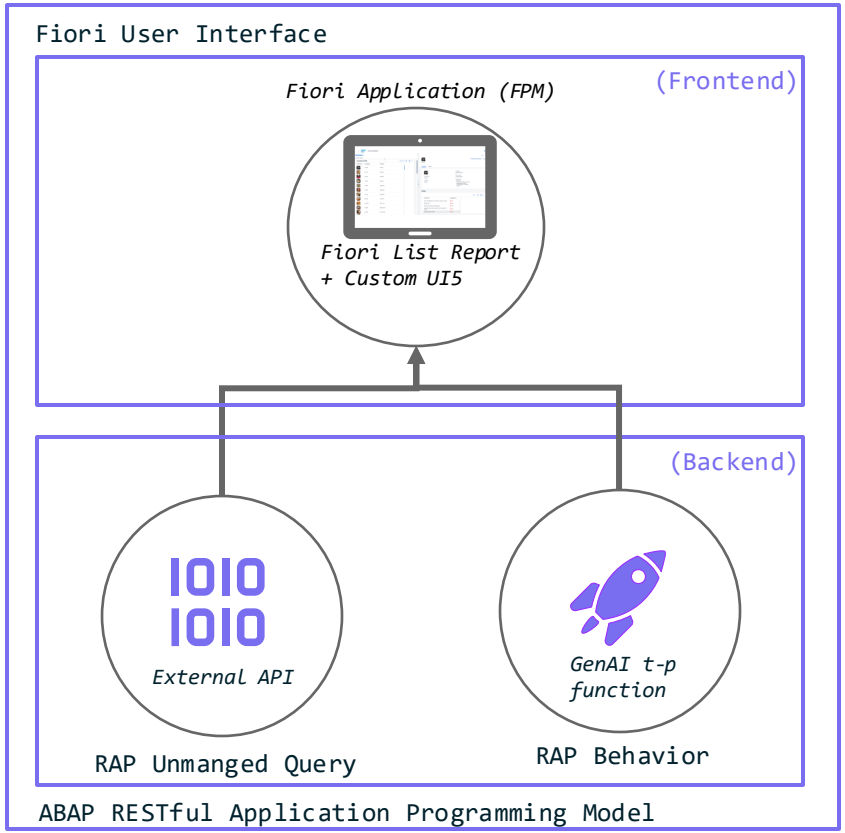
- **Context**
  - Typically, implementation revolves around SAP in-house capabilities — data and functions.
  - This project transcended the norm by integrating a Fiori application with external systems for a client.
  - For this session a Fiori application was developed to demonstrate an extended suite of capabilities

- **Technical Breakthrough**
  - Data integration: Connection of non-SAP data sources
  - Functionality expansion: External third-party functions for enhanced app capabilities
  - UI enrichment: Crafting hybrid Fiori apps, merging Elements and SAPUI5 freestyle

Research

- **Core features of the application**
  - FPM for UI enhancement and optimization
  - Unmanged query for external data
  - RAP Behavior for including third-party GenAI image generation

- **Achievement**
  - From foundational RAP and Fiori Elements to an AI-enhanced and external integrated hybrid Fiori application



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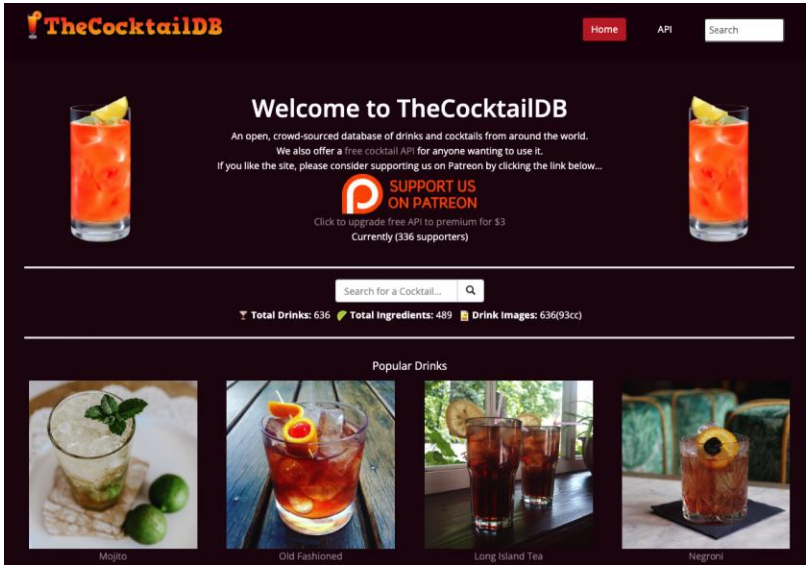
Cocktail API

- **TheCocktailDB API**
  - Access to a comprehensive database of cocktails and mixed drinks.
  - Free API with extensive cocktail data.
  - Ability to search for cocktails by name or ID.
- **API Access**
  - Simple integration via REST
  - Returns data in JSON format for ease of use.
  - Free to use API
- **SAP Integration**
  - HTTP GET via ABAP *CL_WEB_HTTP_CLIENT_MANAGER* (A4C)
  - Map JSON to ABAP element

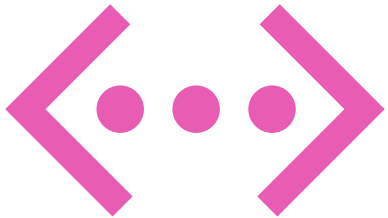


Cocktail API

- **Example query**
  - **Retrieve Margarita:** www.thecocktaildb.com/api/json/v1/1/search.php?s=margarita

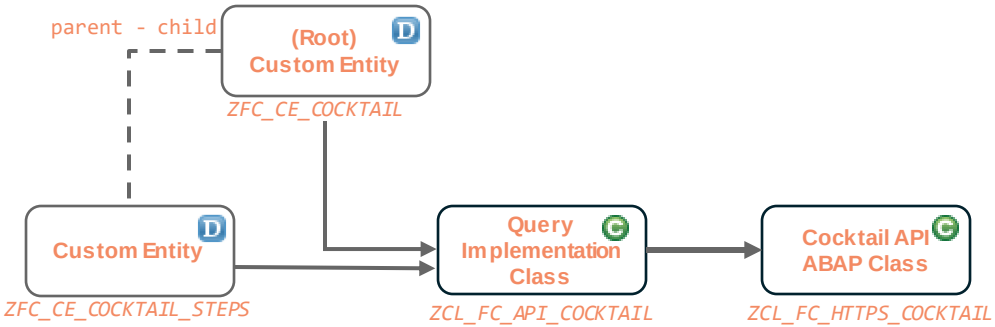
- **Example of provided JSON**

```
{
   "drinks": [
      "idDrink": "11007",
      "strDrink": "Margarita",
      "strCategory": "Ordinary Drink",
      "strGlass": "Cocktail glass“,
      "strInstructions": "Rub the rim[…]“,
      "strDrinkThumb“: „$thumb",
      "strIngredient1“: "Tequila",
      …
      "strIngredient15“: " Triple sec",
   ]
}
```



Restful ABAP

- Read of external API Data
  - Need custom entity
  - Define custom structure without need of DDIC table
- Hierarchical CDS Structure (Cocktails and Steps)
  - Unmanaged Query with ABAP class
  - One Class for both
  - Call Cocktail API class in Unmanaged Query
- CDS UI Annotations
  - Various annotations for the UI (LineItem, Identification, Facets, …)



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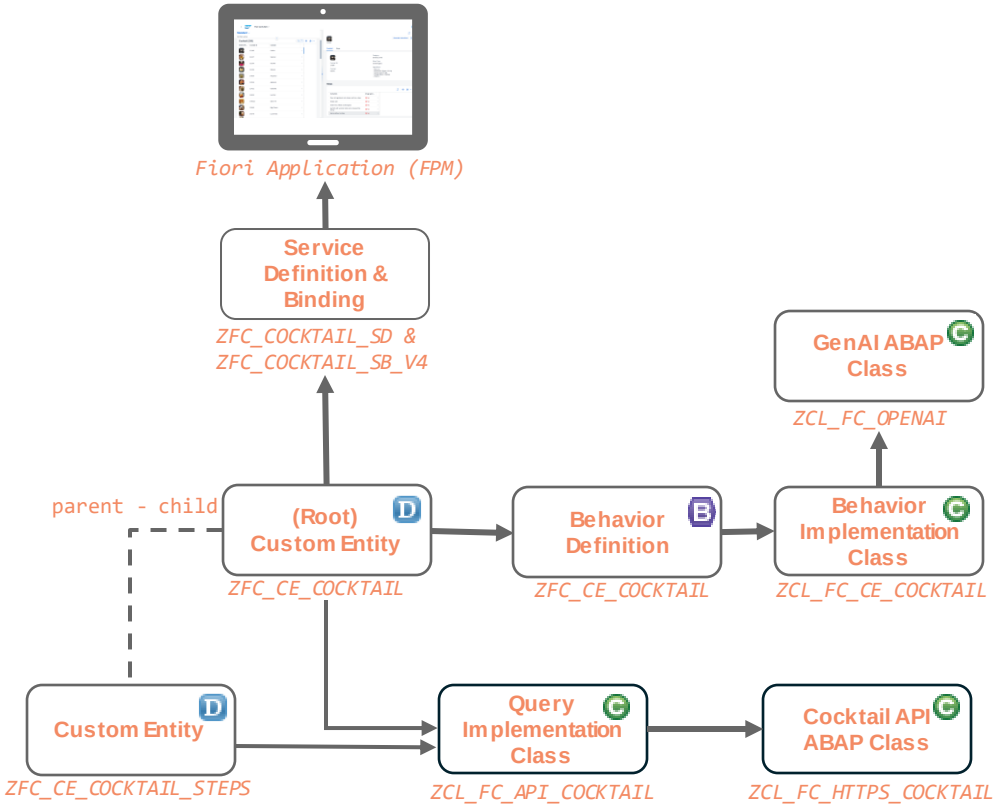
Restful ABAP

- Behavior Definition & Implementation for root entity
  - RAP Action to include third-party GenAI image generation
  - Action implementation in Behavior Implementation Class
  - Call GenAI ABAP class which includes AI image generation
- Service Definition & Binding to use in the UI
  - OData V4



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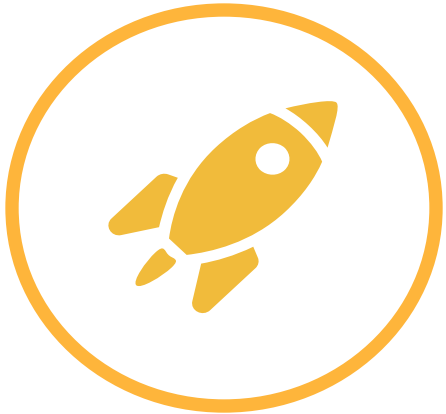
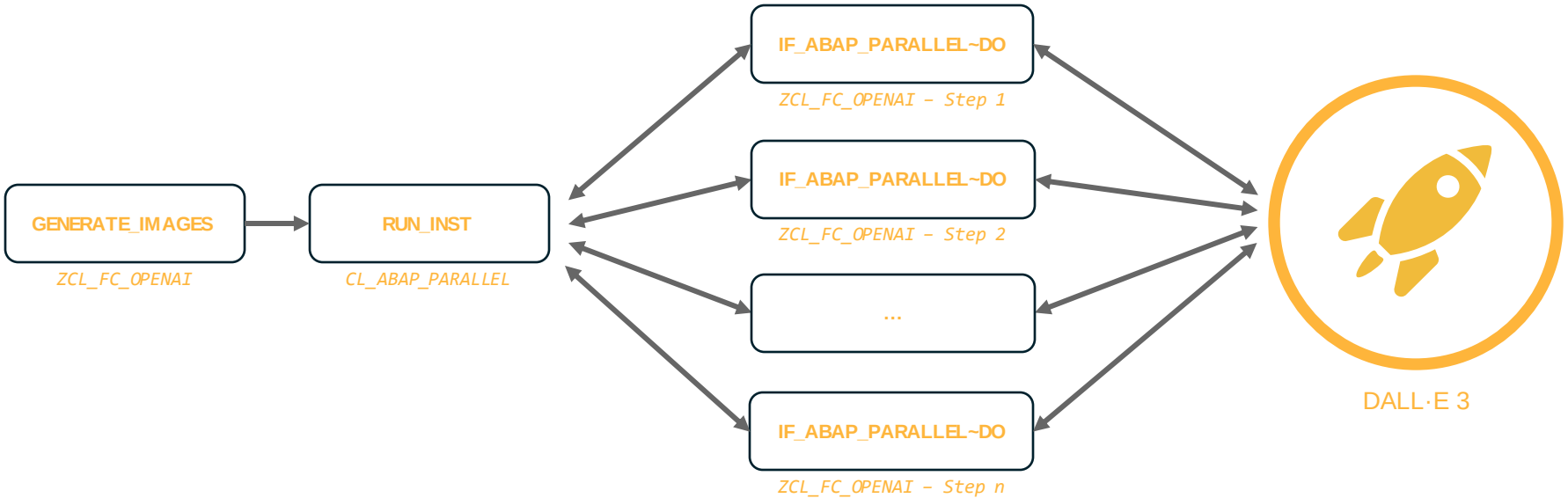
GenAI Image Generation

- Overview
  - Leveraging advanced AI algorithms for image synthesis and creativity
  - cutting-edge AI to produce custom visuals and illustrations
- Performance and Efficiency
  - Semi-rapid generation approx. 20-30 seconds per image
  - Ensures timely delivery of high volumes of images
- Parallel image generation needed
  - Parellisation using *CL_ABAP_PARALLEL*
  - Downport for ABAP 7.50 - Note 2791374
- Cost Efficiency
  - $0.04 per image - 25 images at $1.



GenAI Image Generation

- OpenAI Endpoint for image generation
  - Included in ABAP class



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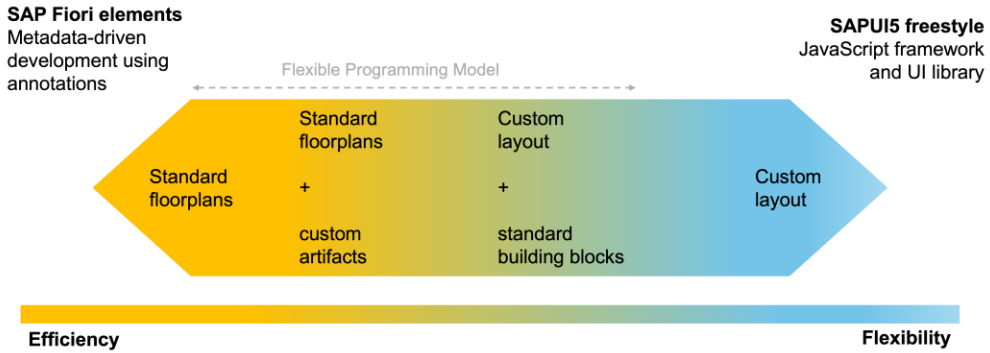
Frontend

- Use of Flexible Programming Model (FPM)
  - The FPM is designed to provide the development of hybrid application
  - Combination: standard floorplans with elements for tailored functionality
  - balance between efficiency and flexibility
  - Flexible Programming Model Explorer
- Use as the basis for a Fiori Elements List Report
  - UI annotations for the view in the application
- Custom Steps Object Page (3th page)
  - Own view and JS controller
  - Integration FPM Macro



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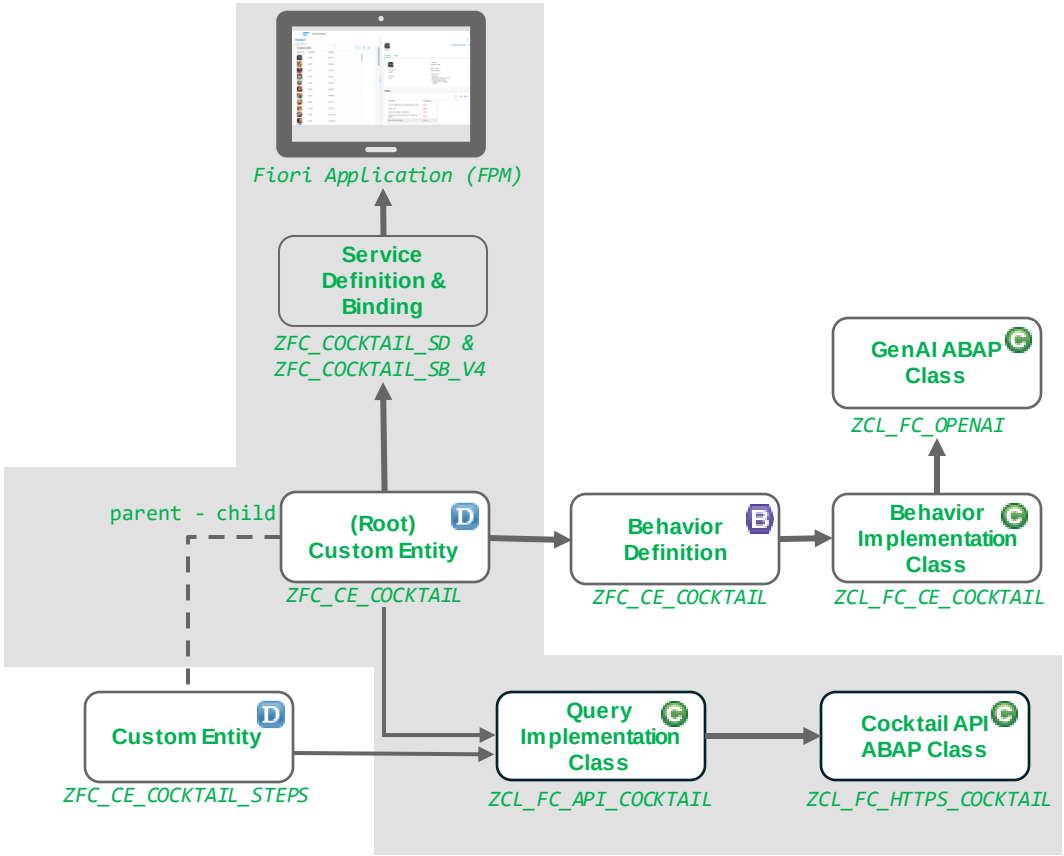
Live Demo

Live Demo Example (1)



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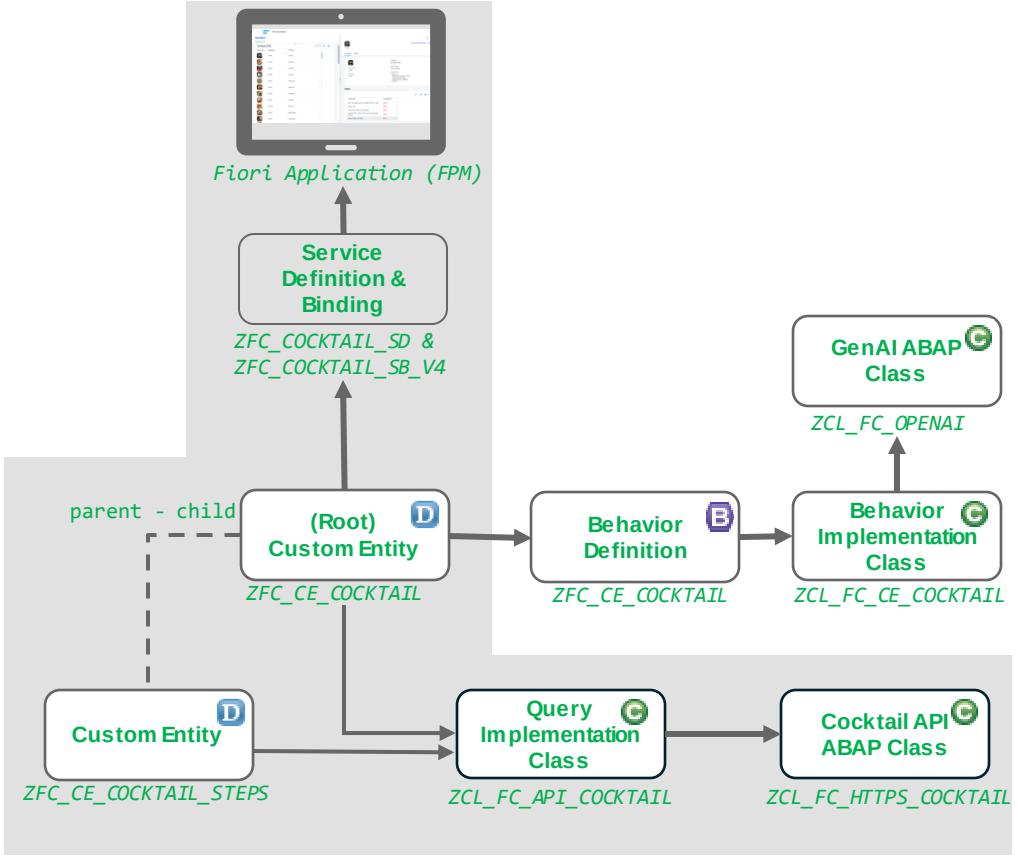
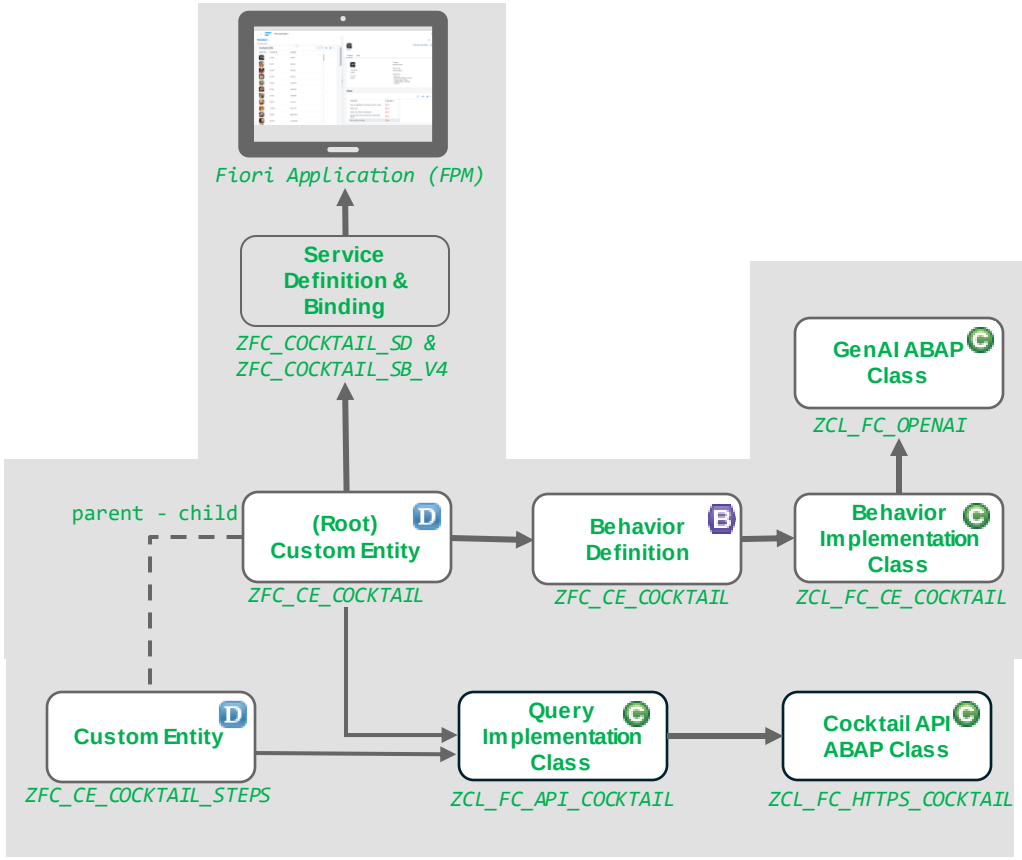
Live Demo Example (1)



Live Demo Example (1)



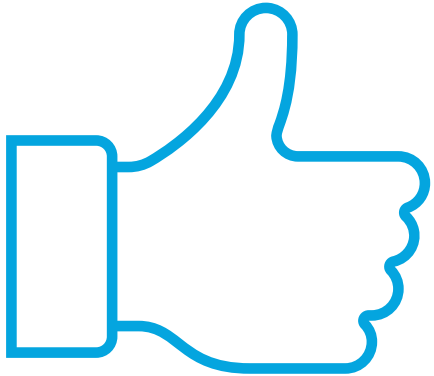
03 Conculusion

Lessons learned

- Common thinking:
  - SAP RAP in combination with Fiori Elements is bland
  - Only in-house capabilities

- RAP in combination with FPM is very powerful!
  - External Backend functions (data, functionalities, …)
  - FPM for UI enrichment and optimization
  - Hybrid applications (UI & Backend)

- The future of SAP development is well formed
  - Humans are creatures of habit
  - Get involved and marvel



Vielen Dank!

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Backend

[A4C] ZFC_CE_COCKTAIL

```
@EndUserText.label: 'Fiori Conf Cocktail Custom Entity'
@UI: {
  headerInfo: {
    typeName: 'Cocktail',
    typeNamePlural: 'Cocktail',
    imageUrl: 'StrDrinkThumb',  //case-sensitive

    description: { type: #STANDARD, value: 'Strdrink' } //case-sensitive
  }
}
@ObjectModel.query.implementedBy: 'ABAP:ZCL_FC_API_COCKTAIL'
@Search.searchable: true
define root custom entity ZFC_CE_COCKTAIL
{
      @UI.facet         : [
            {
              id        : 'idIdentification',
              type      : #IDENTIFICATION_REFERENCE,
              label     : 'Cocktail',
              position  : 10
            },
            {
            id          : 'idSteps',
            type        : #LINEITEM_REFERENCE,
            label       : 'Steps',
            position    : 30,
            targetElement: '_steps'
            }
          ]
      @EndUserText.label: 'Cocktail ID'

      @UI               : {
        lineItem        : [{ position: 10 }],
        identification  : [
          { position: 10 },
          { type: #FOR_ACTION, dataAction: 'generateImage', label: 'Generate Instructions' }
        ]
      }
  key IdDrink           : abap.char(20);
  @EndUserText.label: 'Cocktail'
      @UI               : {
            lineItem    : [{ position: 20 }],
      strMeasure15      : abap.char( 30 );
      _steps            : composition [0..*] of ZFC_CE_COCKTAIL_STEPS;
}
```

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Backend

[A4C] ZCL_FC_API_COCKTAIL

ZCL_FC_API_COCKTAIL

```
CLASS zcl_fc_api_cocktail DEFINITION
  PUBLIC
  FINAL
  CREATE PUBLIC .

  PUBLIC SECTION.

    INTERFACES if_rap_query_provider .
  PROTECTED SECTION.
  PRIVATE SECTION.

    METHODS _get_ingredients
      IMPORTING i_cocktail TYPE zfc_ce_cocktail
      RETURNING VALUE(r_ingredients) TYPE string.

ENDCLASS.



CLASS zcl_fc_api_cocktail IMPLEMENTATION.


  METHOD if_rap_query_provider~select.

    DATA(_paging) = io_request->get_paging( ).
    DATA(_search) = io_request->get_search_expression( ).
    DATA(_offset) = io_request->get_paging( )->get_offset( ).
    DATA(_filter_range) = io_request->get_filter( )->get_as_ranges( ).
    DATA(_page_size) = io_request->get_paging( )->get_page_size( ).
    DATA(_max_rows) = COND #(
      WHEN _page_size = if_rap_query_paging=>page_size_unlimited THEN 100
      ELSE _page_size
    ).

    CASE io_request->get_entity_id( ).
      WHEN 'ZFC_CE_COCKTAIL'.
        DATA _r_cocktails TYPE STANDARD TABLE OF zfc_ce_cocktail.

        zcl_fc_https_cocktail=>_get_cocktails(
          EXPORTING
            i_drink = VALUE #( _filter_range[ name = 'IDDRINK' ]-range[ 1 ]-low OPTIONAL )
            i_search = _search
          IMPORTING
```

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Backend

```
      zcl_fc_https_cocktail=>_get_cocktails(
        EXPORTING
          i_drink = VALUE #( _filter_range[ name = 'IDDRINK' ]-range[ 1 ]-low OPTIONAL )
          i_search = _search
        IMPORTING
          e_cocktails = DATA(_response) e_lines = DATA(_number_of_rec)
      ).

      _r_cocktails = VALUE #(
        FOR i = 1 WHILE i <= COND #( WHEN _max_rows <> 0 AND lines( _response-drinks ) > _max_rows THEN _max_rows ELSE _number_of_rec )
        ( VALUE #( BASE CORRESPONDING #( _response-drinks[ i ] )
          StrIngredients = me->_get_ingredients( i_cocktail = _response-drinks[ i ] )
         ) )
      ).

      io_response->set_data( _r_cocktails ).
      io_response->set_total_number_of_records( CONV #( _number_of_rec ) ).
    WHEN 'ZFC_CE_COCKTAIL_STEPS'.
      DATA(_id_drink) = _filter_range[ name = 'IDDRINK' ]-range[ 1 ]-low.
      DATA(_id_step) = VALUE #( _filter_range[ name = 'IDSTEP' ]-range[ 1 ]-low OPTIONAL ).
      DATA: _r_steps TYPE STANDARD TABLE OF zfc_ce_cocktail_steps.
      zcl_fc_https_cocktail=>_get_steps( EXPORTING i_drink = _id_drink IMPORTING e_lines = DATA(_number_of_steps) e_steps = DATA(_steps) ).
      IF _id_step IS INITIAL OR _id_step = 0.
        _r_steps = _steps-steps.
      ELSE.
        _r_steps = VALUE #( ( _steps-steps[ Idstep = _id_step ] ) ).
      ENDIF.

      io_response->set_data( _r_steps ).
      io_response->set_total_number_of_records( lines( _r_steps ) ).

  ENDCASE.

ENDMETHOD.
```

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Backend

```
CLASS zcl_fc_https_cocktail IMPLEMENTATION.
  METHOD _api_call.
    TRY.
        TRY.
            DATA(_client) = cl_web_http_client_manager=>create_by_http_destination( cl_http_destination_provider=>create_by_url( i_url )  ).
          CATCH cx_http_dest_provider_error.
            "handle exception
        ENDTRY.
        DATA(_response) = _client->execute( if_web_http_client=>get ).
        DATA(_status) = _response->get_status( ).
        IF _status-code = 200.
          r_response = _response->get_text( ).
        ELSE.
          RETURN.
        ENDIF.

        _client->close( ).

      CATCH cx_web_http_client_error INTO DATA(lx_http_error).
*       WRITE: / lx_http_error->get_text( ).
    ENDTRY.
  ENDMETHOD.
  METHOD _get_cocktails.
    DATA(_response_body) = zcl_fc_https_cocktail=>_api_call(
    i_url = COND #(
      WHEN i_drink IS NOT INITIAL THEN |https://www.thecocktaildb.com/api/json/v2/| && zcl_fc_cocktail_token=>ty_token-cocktail && |/lookup.php?i={ i_drink }|
      WHEN i_search IS NOT INITIAL THEN |https://www.thecocktaildb.com/api/json/v2/| && zcl_fc_cocktail_token=>ty_token-cocktail && |/search.php?s={ substring( val = i_search off = 1 len = strlen( i_search ) - 2 ) }|
      ELSE |https://www.thecocktaildb.com/api/json/v2/| && zcl_fc_cocktail_token=>ty_token-cocktail && |/search.php?s=c| )
    ).
    /ui2/cl_json=>deserialize(
          EXPORTING
            json        = _response_body
          CHANGING
            data        = e_cocktails
        ).
    e_lines = lines( e_cocktails-drinks ).
  ENDMETHOD.
```

Backend

```
@EndUserText.label: 'Fiori Conf Cocktail Steps Custom Entity'
@ObjectModel.query.implementedBy: 'ABAP:ZCL_FC_API_COCKTAIL'
define custom entity ZFC_CE_COCKTAIL_STEPS
{
   @UI.facet : [{
               id        : 'idIngredientsStep',
               type      : #IDENTIFICATION_REFERENCE,
               label     : 'Ingredients',
               position  : 20
             }]
  key IdDrink     : abap.char(20);
  key Idstep      : abap.int2;
      Strdrink    : abap.char(50);
      @UI         : {
            lineItem: [{ position: 10 }],
            identification: [{ position: 10 }]
      }
      @EndUserText.label: 'Instruction'
      Instruction : abap.char(100);

      Image_Url   : abap.string;
      @UI.lineItem: [{ position: 20, criticality: 'CriticalityImage', label: 'Image generated?' }]
      ImageGenerated: abap_boolean;
      CriticalityImage: abap.int1;
      _cocktail   : association to parent ZFC_CE_COCKTAIL on $projection.IdDrink = _cocktail.IdDrink;
}
```

Backend

```
1  unmanaged implementation in class zcl_fc_ce_cocktail unique;
2  strict ( 1 );
3
4  define behavior for ZFC_CE_COCKTAIL
5
6  lock master
7  authorization master ( instance )
8  {
9
10   association _steps;
11   action generateImage result [1..*] $self;
12   side effects { action generateImage affects entity _steps; }
13   field ( readonly ) Iddrink;
14 }
15
16 define behavior for ZFC_CE_COCKTAIL_STEPS
17 lock dependent by _cocktail
18 authorization dependent by _cocktail
19 {
20   field ( readonly ) IdDrink, Idstep;
21   association _cocktail;
22 }
```

Backend

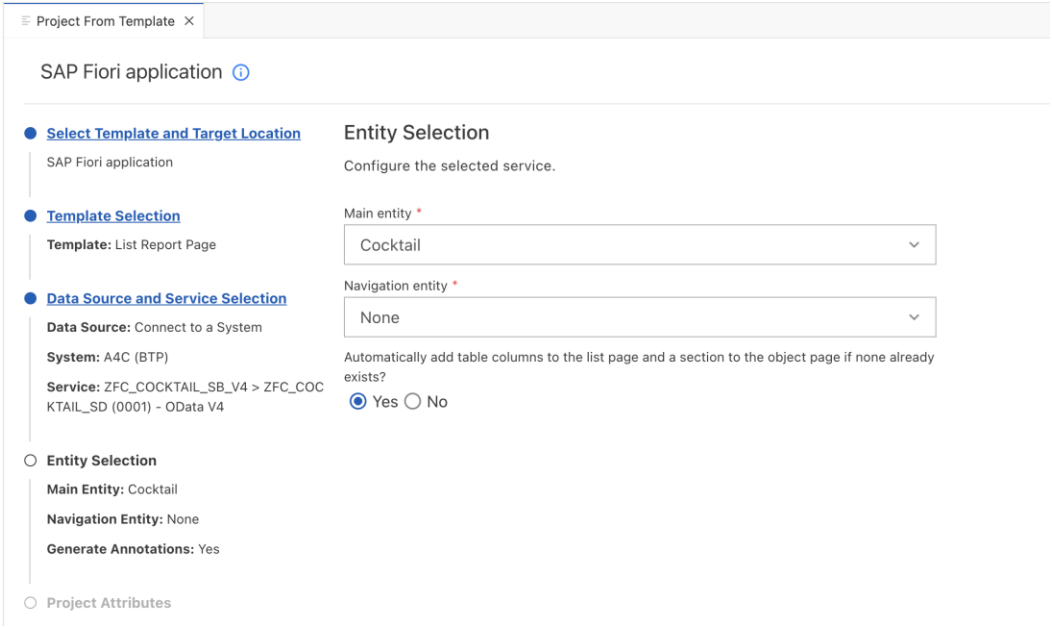
```
METHOD generateImage.
  DATA: _t_insert TYPE TABLE OF zfc_cocktail_st.

  LOOP AT keys ASSIGNING FIELD-SYMBOL(<_key>).
    zcl_fc_https_cocktail=>_get_cocktails( EXPORTING i_drink = CONV #( <_key>-IdDrink ) IMPORTING e_cocktails = DATA(_cocktails) ).
    zcl_fc_https_cocktail=>_get_steps( EXPORTING i_drink = CONV #( <_key>-IdDrink ) IMPORTING e_steps = DATA(_steps) ).
    zcl_fc_openai=>generate_images( EXPORTING i_cocktail = _cocktails-drinks[ 1 ] IMPORTING e_errortext = DATA(_error) CHANGING c_steps = _steps-steps ).

    IF _error IS INITIAL.
      _t_insert = VALUE #( FOR _step IN _steps-steps ( CORRESPONDING #( _step ) ) ).
      MODIFY zfc_cocktail_st FROM TABLE @_t_insert.
      APPEND VALUE #( BASE CORRESPONDING #( <_key> ) %param = CORRESPONDING #( <_key> ) ) TO result ASSIGNING FIELD-SYMBOL(<ls_result>).
    ELSE.
      failed-zfc_ce_cocktail = VALUE #( ( CORRESPONDING #( <_key> ) ) ).
      reported-zfc_ce_cocktail = VALUE #( (
        VALUE #( BASE CORRESPONDING #( <_key> )
          %msg = new_message_with_text( text = _error )
        )
      ) ).
    ENDIF.
  ENDLOOP.
ENDMETHOD.
```

Backend

```
METHOD generate_images.

  DATA(_t_gen) = VALUE cl_abap_parallel=>t_in_inst_tab( FOR _step IN c_steps (
    NEW zcl_fc_openai(
      i_prompt = |We are preparing the cocktail { i_cocktail-Strdrink }, consider the following information while generating:
                 | { _step-Instruction } please generate a realistic image as reference bar Sazerac-Bar, New Orleans|
        i_step = _step
    )
  ) ).

  NEW cl_abap_parallel( )->run_inst( EXPORTING p_in_tab = _t_gen IMPORTING p_out_tab = DATA(_t_out) ).

  LOOP AT _t_out ASSIGNING FIELD-SYMBOL(<_out>).
    DATA(_obj) = CAST zcl_fc_openai( <_out>-inst ).
    c_steps[ Idstep = _obj->m_step-Idstep ]-Image_Url = _obj->m_image.
    e_errortext = _obj->m_errortext.
  ENDLOOP.

ENDMETHOD.
```

Frontend (Custom Page)

- List Report Page Template



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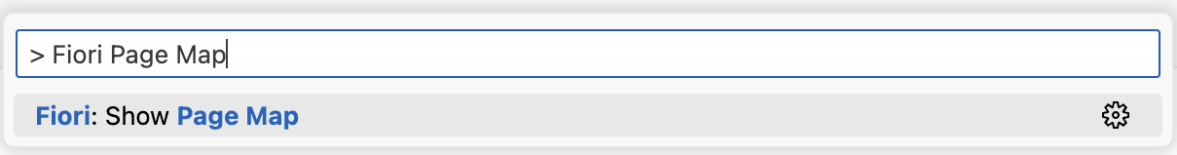
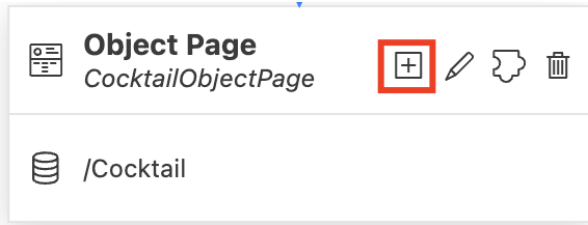
Frontend (Custom Page)

- Command Console: „Fiori: Show Page Map“

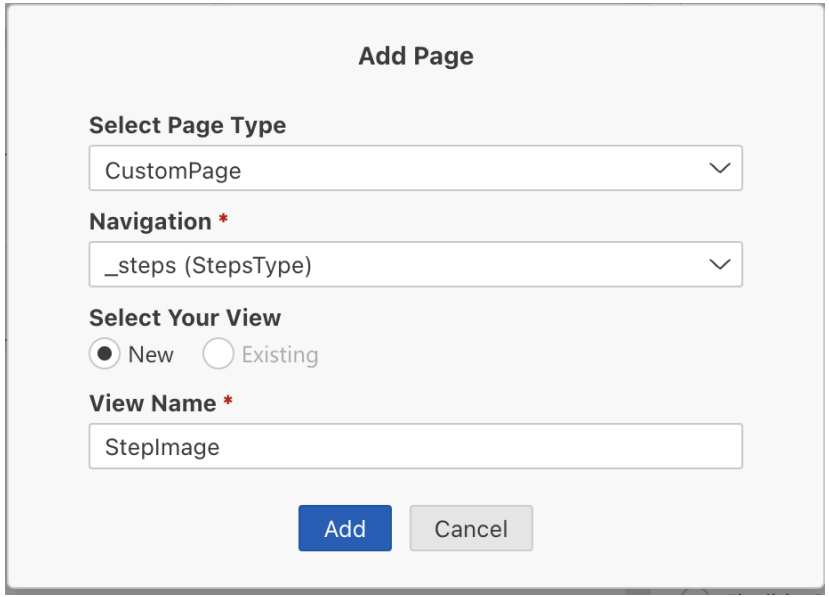


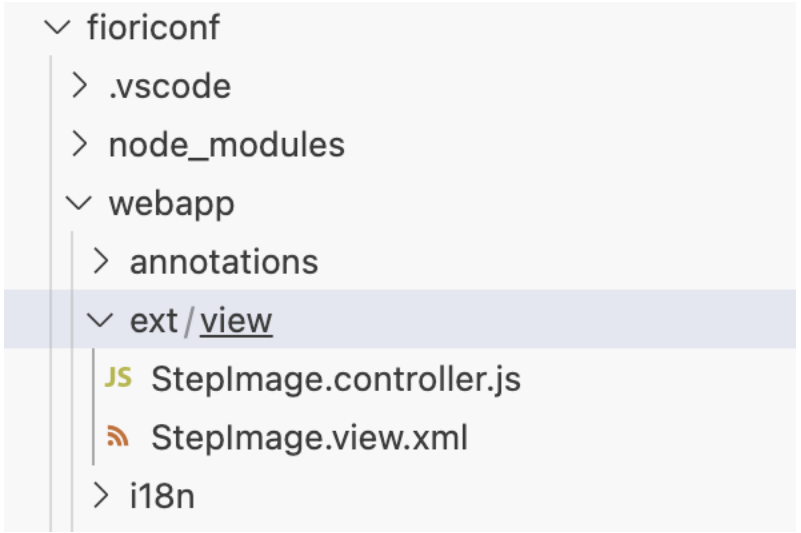
- Add New Page after the Object Page



Frontend (Custom Page)

- Create a New CustomPage called „StepImage“





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Frontend (Custom Page)

- Insert Building Blocks for the Facet and an Image

StepImage.view.xml

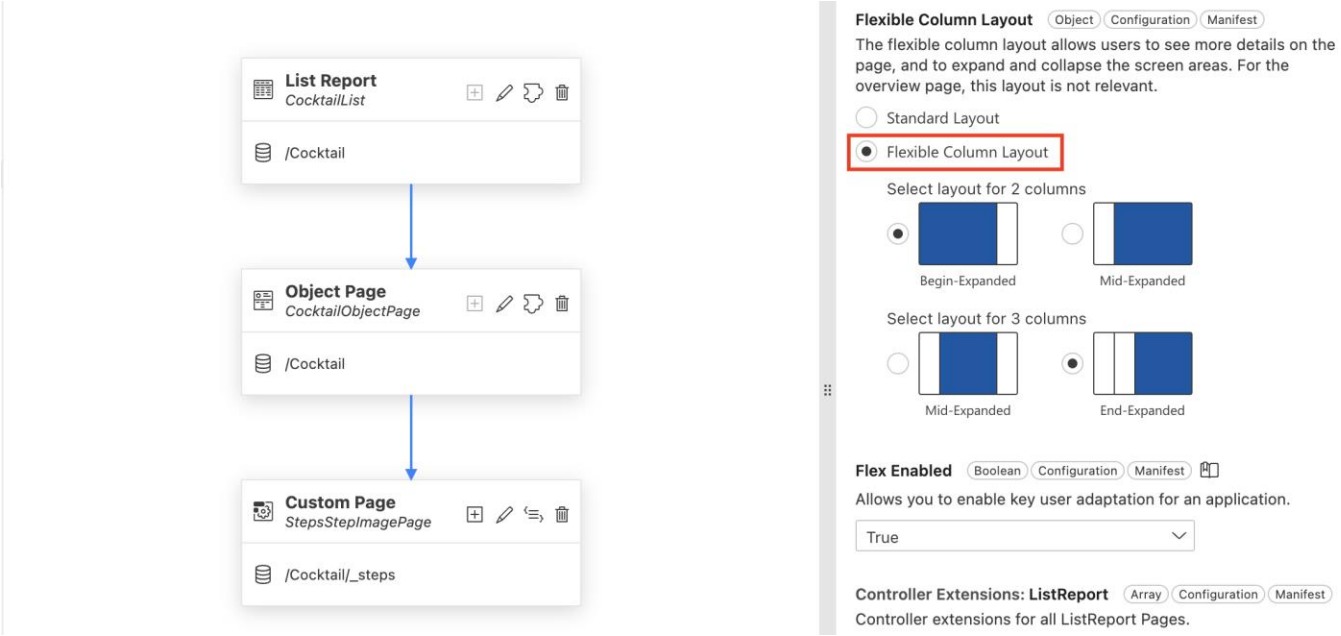
webapp > ext > view > StepImage.view.xml

You, 4 days ago | 1 author (You)

```
1  <mvc:View xmlns:core="sap.ui.core" xmlns:mvc="sap.ui.core.mvc" xmlns="sap.m" xmlns:macros="sap.fe.macros"
2      xmlns:html="http://www.w3.org/1999/xhtml" controllerName="fioriconf.ext.view.StepImage">
3      <Page id="StepImage" title="{i18n>StepImageTitle}">
4          <content>
5              <macros:Form metaPath="@com.sap.vocabularies.UI.v1.Facets/0" id="myForm" title="Step Number {Idstep}">
6              </macros:Form>
7              <Image src="{Image_Url}" width="100%" />
8          </content>
9      </Page>
10 </mvc:View>
```

Frontend (Flexible Column Layout)

- Activate the Flexible Column Layout in Fiori Page Map



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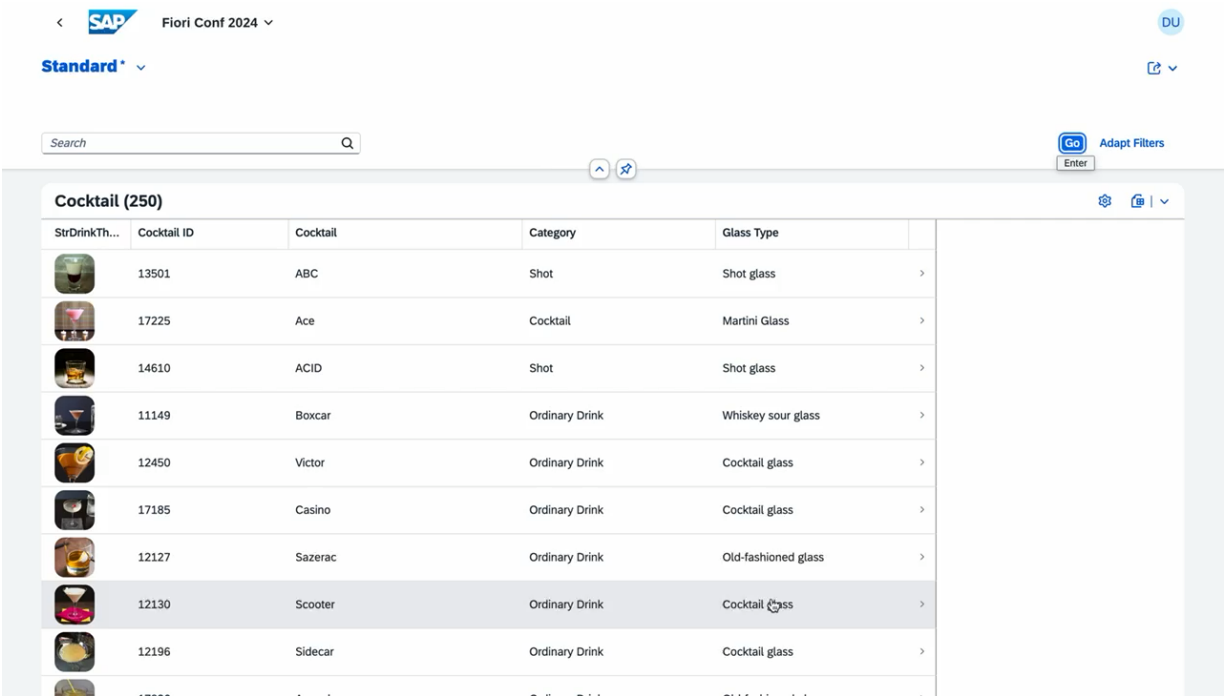
Frontend (Demo)



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