DT281

Build and extend Apps with the
ABAP RESTful Application Programming Model

Public

THE BEST RUN **SAP**

Agenda

Public

TODAY'S SCENARIO – **OVERVIEW**

Build a transactional SAP Fiori app with RAP
with search, filter, and draft capabilities

Filters

LIST REPORT PAGE

Freestyle search

Actions

Create and Delete operations

Draft

Navigation to details object page

Standard

	Travel ID	Agency ID	Customer ID	Starting Date	Overall Status	
	1	Maxitrip (70041)	Ryan (594)	Dec 4, 2021	Open	>
	2 Draft	Hot Socks Travel (70007)	Prinz (608)	Dec 4, 2021	Open	>
	3 Draft	Hendrik's (70046)	Detemple (93)	Dec 4, 2021	Open	>
✓	4	The Ultimate Answer (70042)	Madeira (665)	Dec 4, 2021	Accepted	>
	5	Hot Socks Travel (70007)	Mechler (225)	Dec 4, 2021	Open	>
	6 Draft	Miles and More (70049)	Neubasler (72)	Dec 4, 2021	Open	>
	7	Hendrik's (70046)	Wohl (138)	Dec 4, 2021	Open	>
	8	Ben McCloskey Ltd. (70012)	Müller (705)	Dec 4, 2021	Open	>
	9	Sunny, Sunny, Sunny (70032)	Benz (115)	Dec 4, 2021	Accepted	>
	10	Ali's Bazar (70016)	Leisert (697)	Dec 4, 2021	Open	>

Travels (10)   Copy Travel   Reject Travel   Accept Travel   Create   Delete   Show Details

Editing Status: All   Travel ID: Agency ID: Customer ID: Go   Adapt Filters (1)

Search

Build a transactional SAP Fiori app with RAP
Travel list report app → Object page

Edit,
Delete,
Actions

Travel

Travel ID:
4

End Date:
Dec 11, 2022

Agency ID:
The Ultimate Answer (70042)

Booking Fee:
40.00 USD

Customer ID:
Madeira (665)

Total Price:
1,871.00 USD

Starting Date:
Feb 12, 2022

Description:
Vacation to Berlin

Edit | Delete | Deduct Discount | Accept Travel | Reject Travel

Draft ∨

4

Header | Travel

Travel

Deduct Discount | Accept Travel | Reject Travel

Travel ID:
4

End Date: *
Dec 11, 2022

Overall Status:
Open

Agency ID:
The Ultimate Answer (70042)

Booking Fee:
40.00 | USD

Attachment:
281457_Collaborate4_R_blue.png

Customer ID: *
Madeira (665)

Total Price:
1,871.00 | USD

Starting Date: *
Feb 12, 2022

Description:
Vacation to Berlin

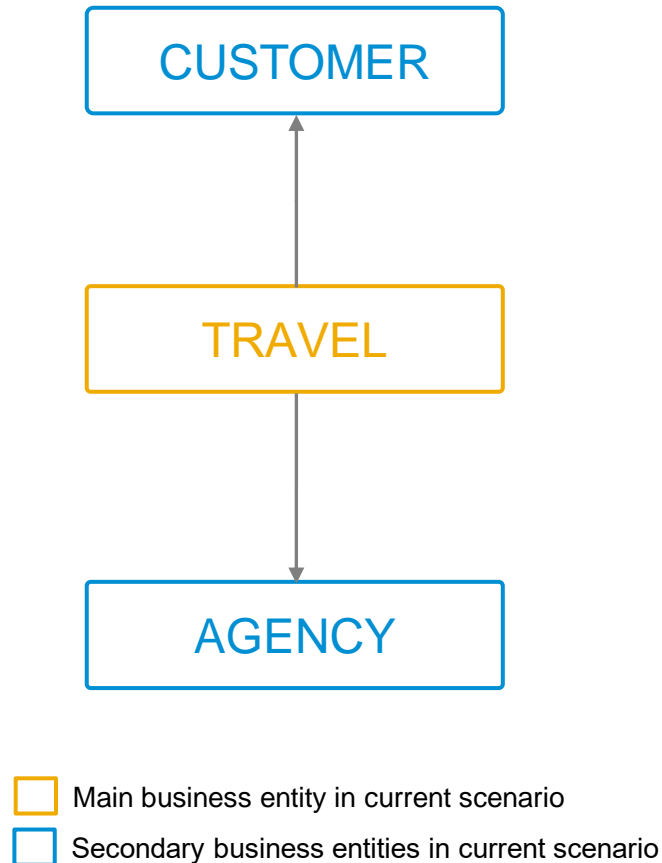Updating draft... | Save | Discard Draft

Upload,
Delete

Draft

Optional: Write an ABAP unit test for a RAP business object
Unit test runs
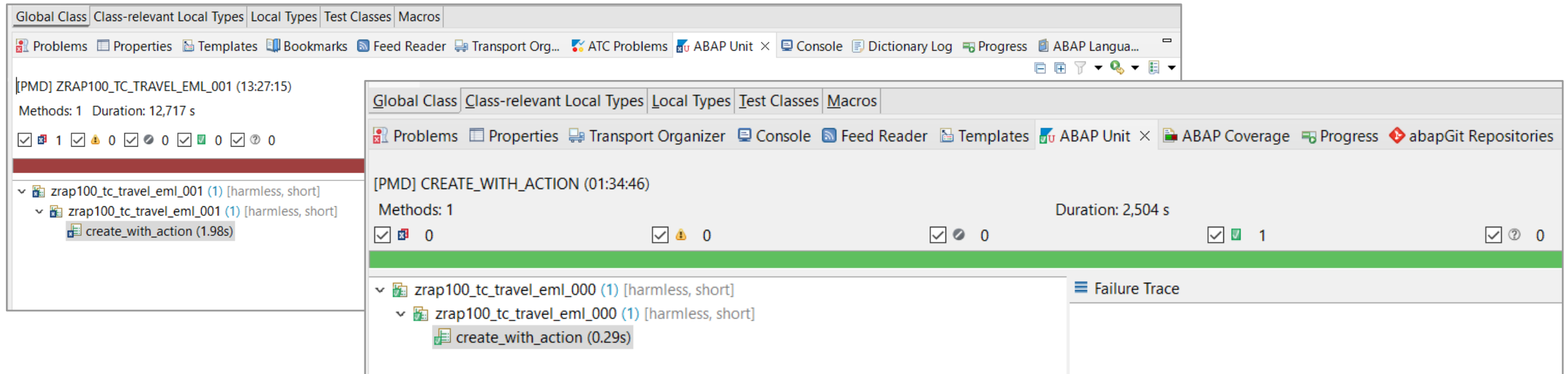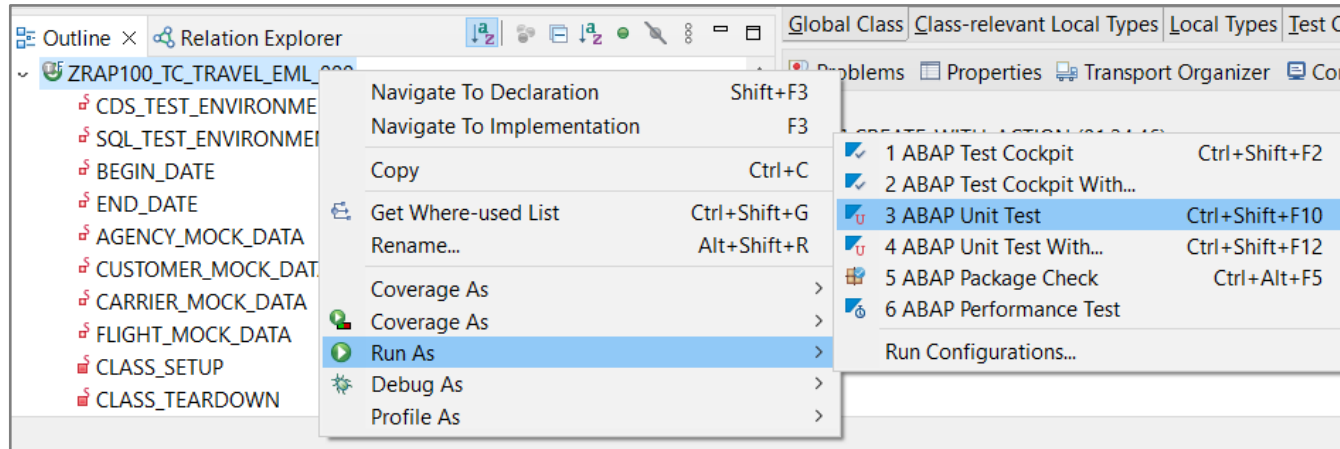
Build and test a transactional SAP Fiori app with RAP
Underlying simplified Flight data model

CUSTOMER

TRAVEL

AGENCY

A **Travel entity** defines general travel data, such as the agency ID or customer ID, the overall status of the travel booking.
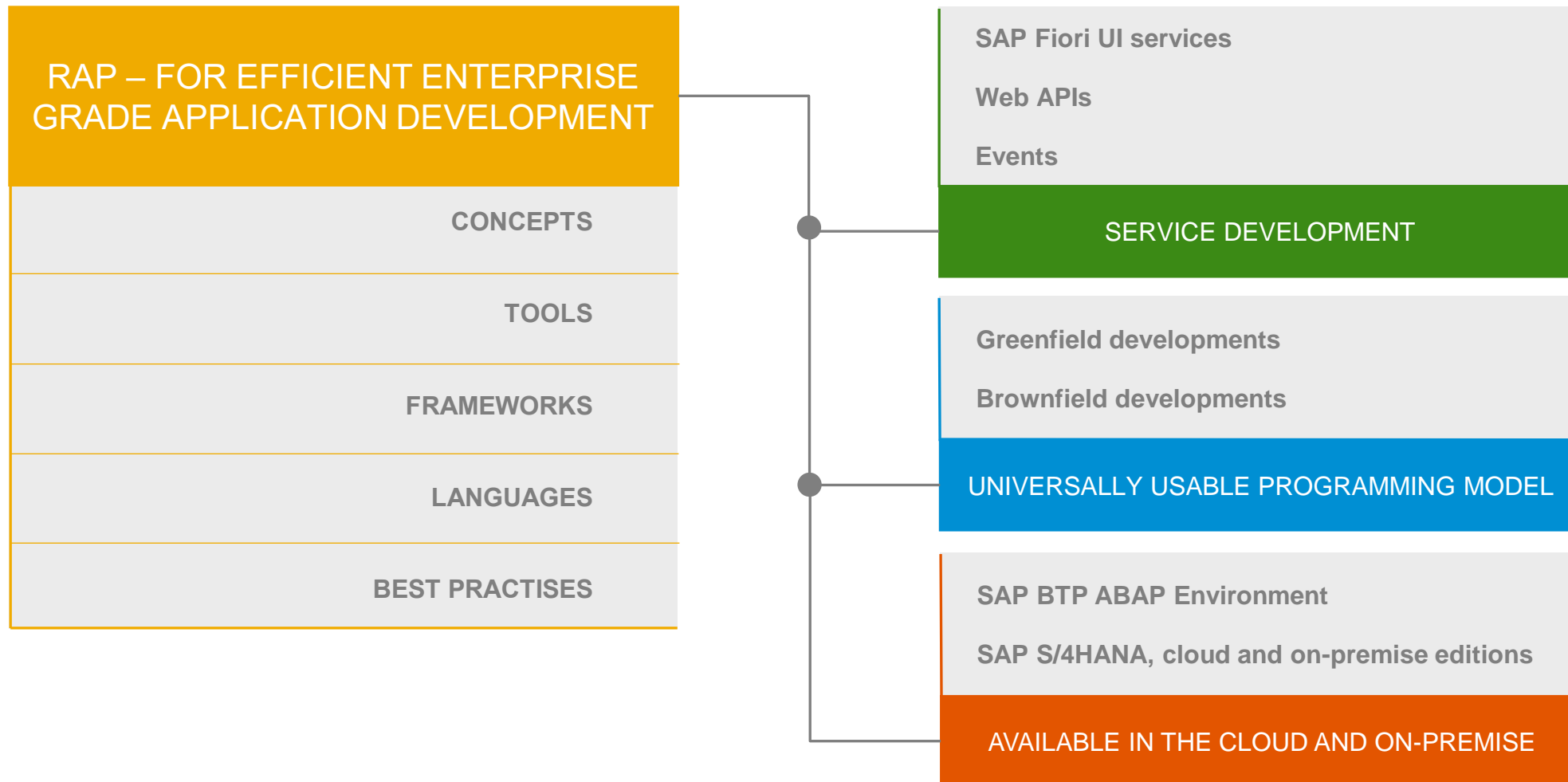
A **Customer entity** provides a detailed description of a flight customer, or passenger, such as the name, the address, and contact data.

An **Agency entity** defines travel agency data, such as the address and contact data.

☐ Main business entity in current scenario

☐ Secondary business entities in current scenario

INTRODUCTION TO RAP

ABAP RESTful Application Programming Model (RAP) – At a glance

RAP – FOR EFFICIENT ENTERPRISE GRADE APPLICATION DEVELOPMENT

- CONCEPTS
- TOOLS
- FRAMEWORKS
- LANGUAGES
- BEST PRACTISES

SAP Fiori UI services

Web APIs

Events

SERVICE DEVELOPMENT

Greenfield developments

Brownfield developments

UNIVERSALLY USABLE PROGRAMMING MODEL

SAP BTP ABAP Environment

SAP S/4HANA, cloud and on-premise editions

AVAILABLE IN THE CLOUD AND ON-PREMISE

The key players

ABAP Development Tools in Eclipse for all development tasks

Easy developer onboarding
End-to-end development flow

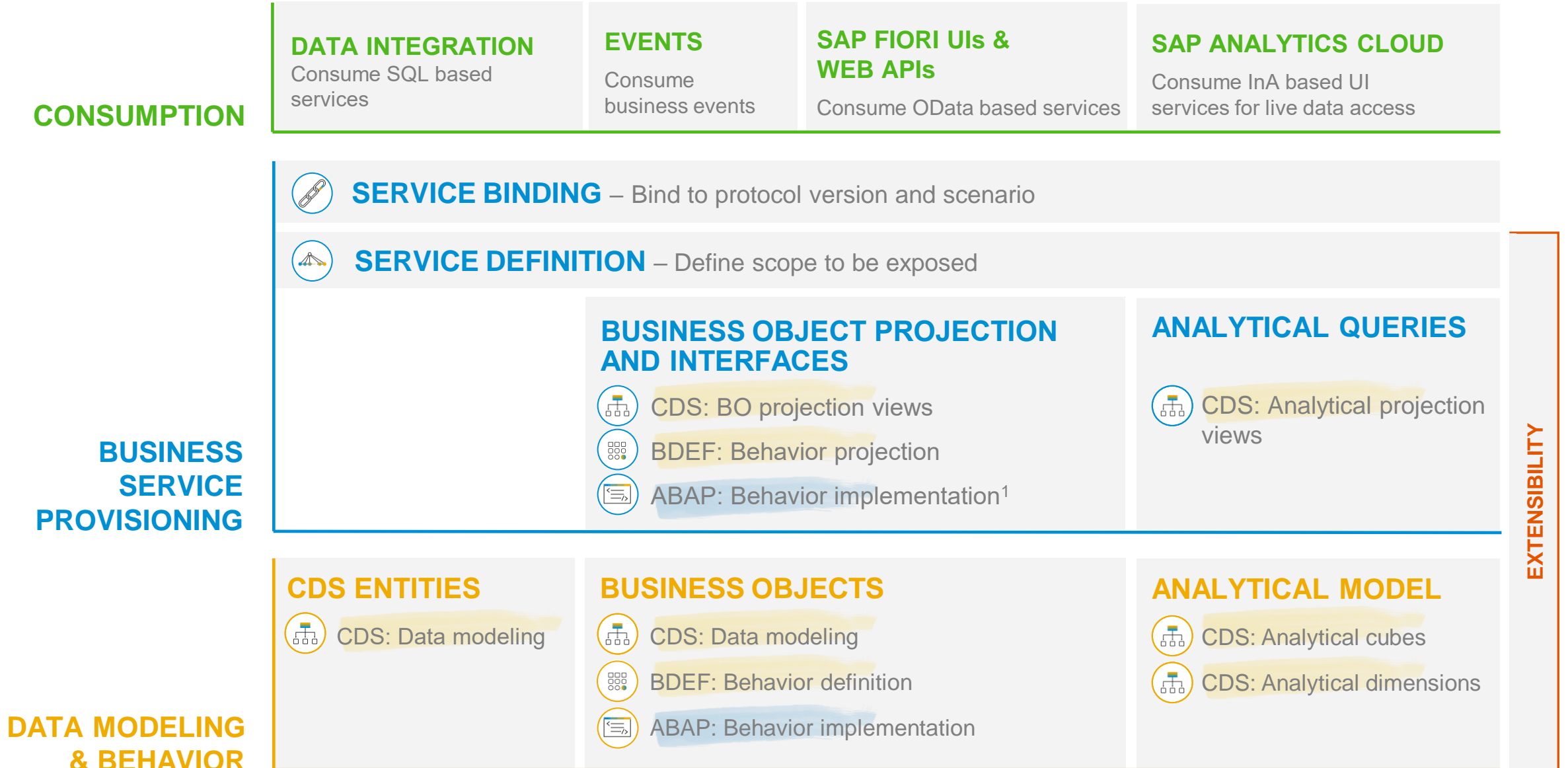Languages: ABAP and Core Data Services (CDS)

Standard implementation tasks via typed APIs supporting
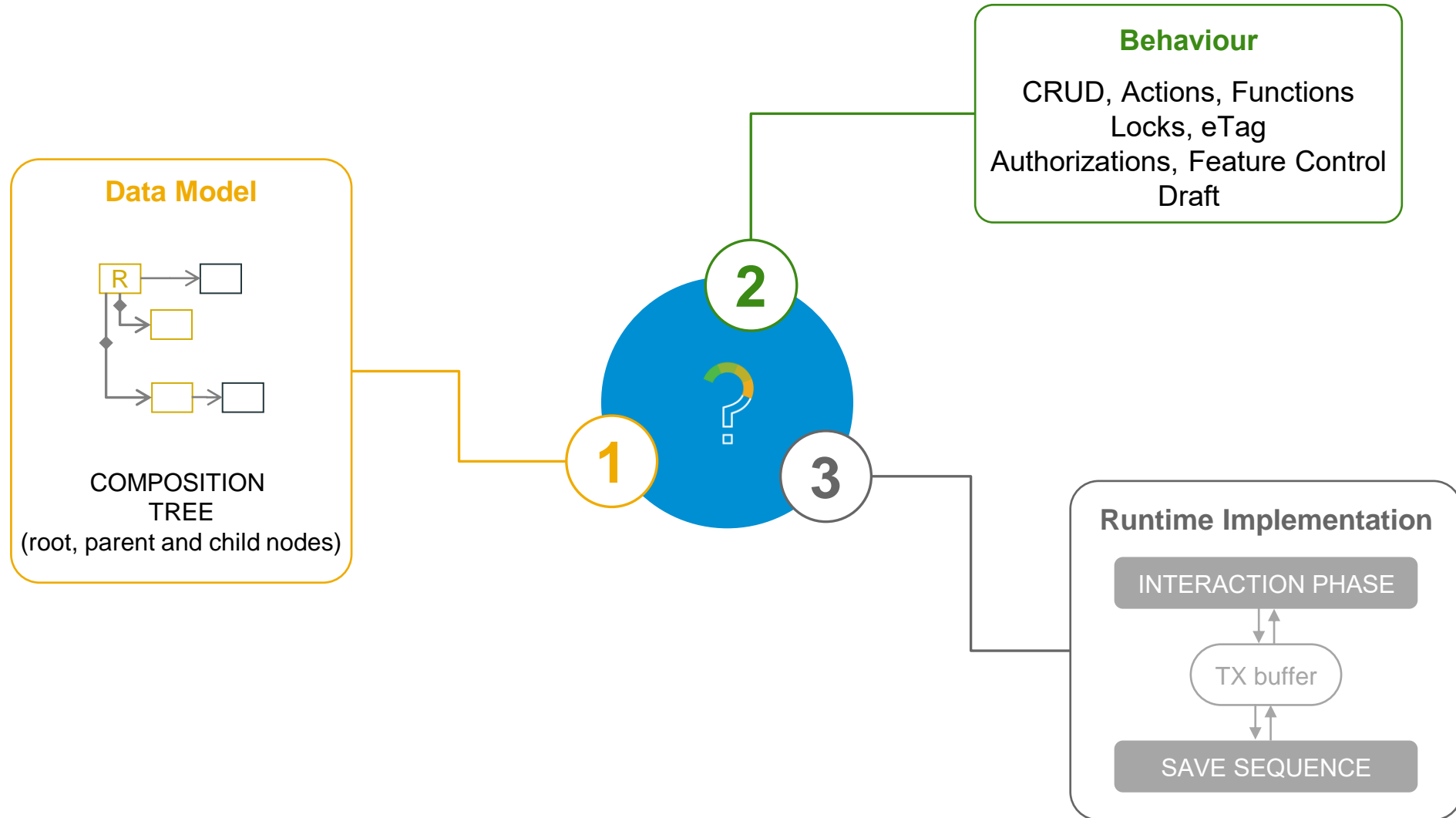static code checks, auto-completion, element info

Powerful frameworks

Take over technical implementation tasks
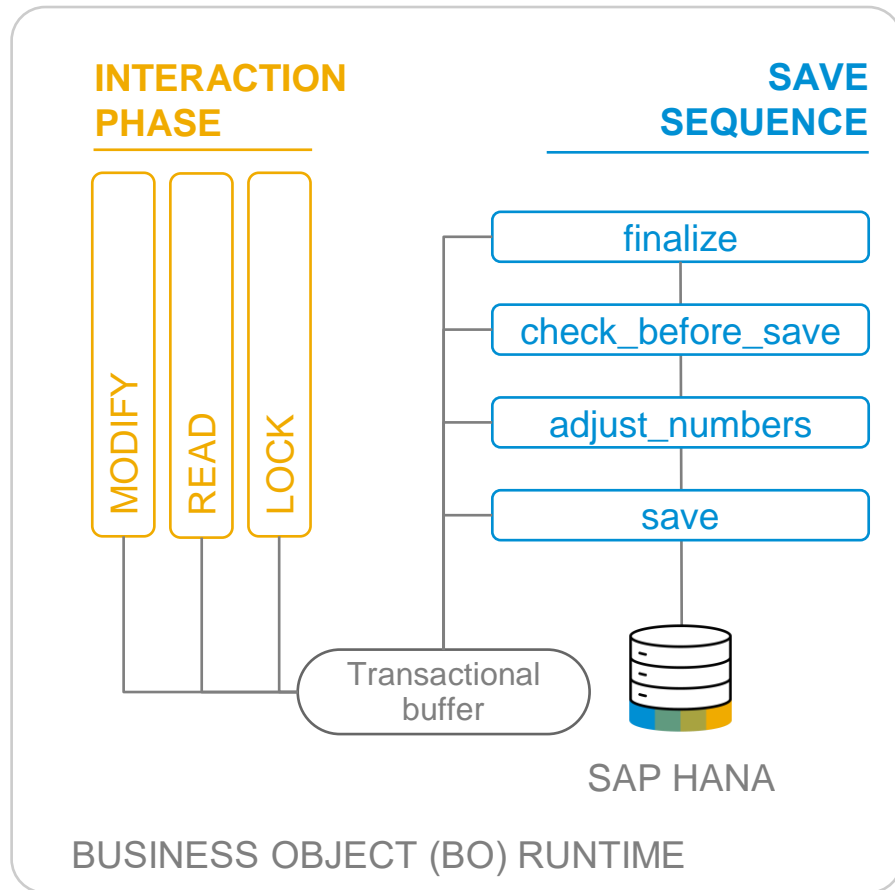Business logic added in code exits on protocol-agnostic layers

ABAP RESTful Application Programming Model (RAP) – The big picture

CONSUMPTION

DATA INTEGRATION	EVENTS	SAP FIORI UIs & WEB APIs	SAP ANALYTICS CLOUD
Consume SQL based services	Consume business events	Consume OData based services	Consume InA based UI services for live data access

BUSINESS SERVICE PROVISIONING

🔗 **SERVICE BINDING** – Bind to protocol version and scenario

⏶ **SERVICE DEFINITION** – Define scope to be exposed

BUSINESS OBJECT PROJECTION AND INTERFACES
- CDS: BO projection views
- BDEF: Behavior projection
- ABAP: Behavior implementation[1]

ANALYTICAL QUERIES
- CDS: Analytical projection views

DATA MODELING & BEHAVIOR

CDS ENTITIES
- CDS: Data modeling

BUSINESS OBJECTS
- CDS: Data modeling
- BDEF: Behavior definition
- ABAP: Behavior implementation

ANALYTICAL MODEL
- CDS: Analytical cubes
- CDS: Analytical dimensions

EXTENSIBILITY

CDS   ABAP/EML   [1] Not applicable for RAP BO interfaces

Business object

Data Model

COMPOSITION
TREE
(root, parent and child nodes)

Behaviour

CRUD, Actions, Functions
Locks, eTag
Authorizations, Feature Control
Draft

Runtime Implementation

INTERACTION PHASE

TX buffer

SAVE SEQUENCE

Business object runtime implementation types

INTERACTION PHASE

MODIFY READ LOCK

SAVE SEQUENCE

finalize

check_before_save

adjust_numbers

save

Transactional buffer

SAP HANA

BUSINESS OBJECT (BO) RUNTIME

UNMANAGED

For brownfield developments with available application code for interaction phase, transactional buffer, and save sequence

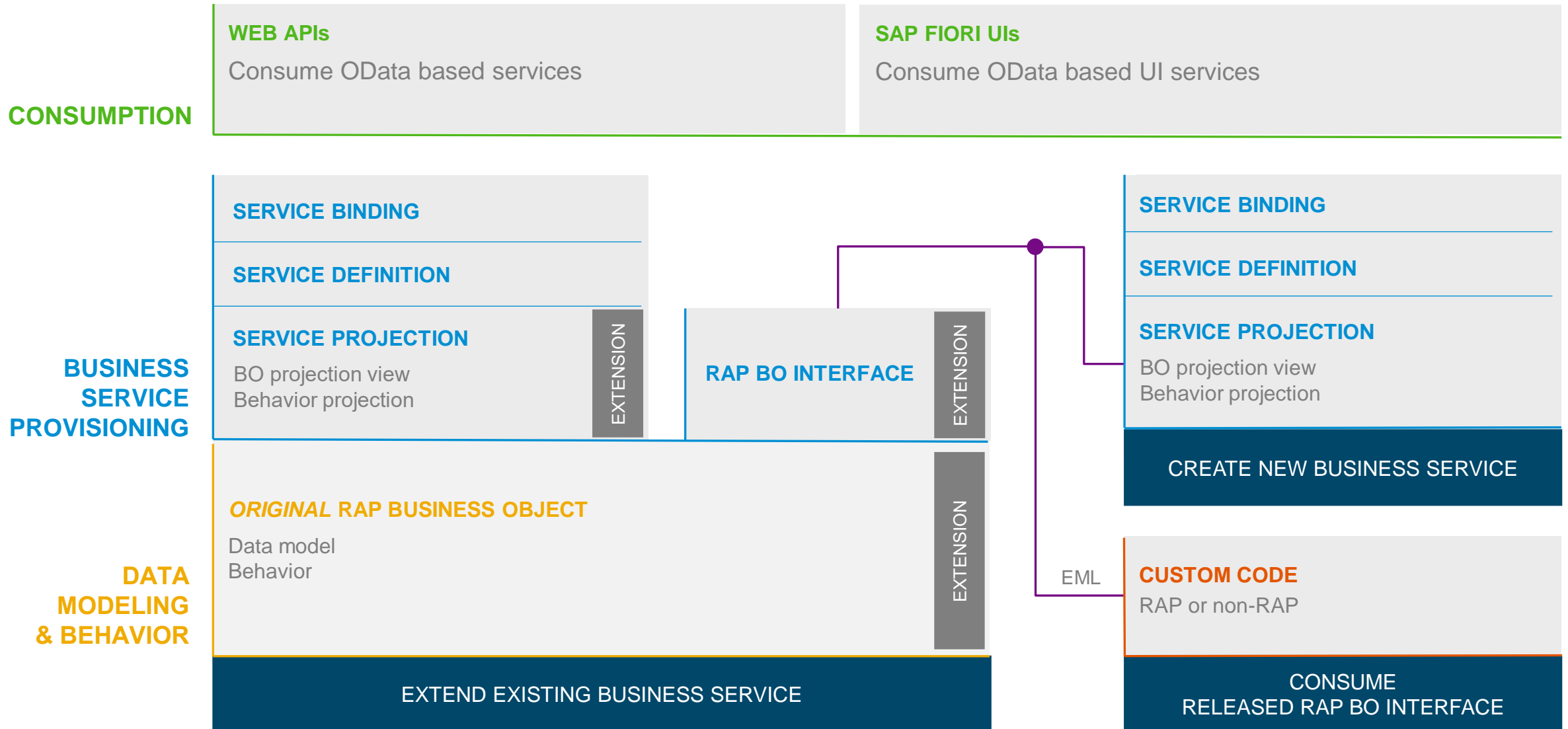➔ Developers in charge of BO runtime: CRUD operations

➔ Adapters needed to integrate the existing code

MANAGED

For greenfield developments with standard implementation
(opt. unmanaged appl. components: DB tables, lock/PFCG object, update task FM)

➔ Standard CRUD operations work out of the box

➔ Developers add BO specific business logic

Developer extensibility with RAP

CONSUMPTION

WEB APIs	SAP FIORI UIs
Consume OData based services	Consume OData based UI services

BUSINESS SERVICE PROVISIONING

SERVICE BINDING

SERVICE DEFINITION

SERVICE PROJECTION
BO projection view
Behavior projection

EXTENSION

RAP BO INTERFACE

EXTENSION

SERVICE BINDING

SERVICE DEFINITION

SERVICE PROJECTION
BO projection view
Behavior projection

CREATE NEW BUSINESS SERVICE

DATA MODELING & BEHAVIOR

***ORIGINAL* RAP BUSINESS OBJECT**
Data model
Behavior

EXTENSION

EML

CUSTOM CODE
RAP or non-RAP

EXTEND EXISTING BUSINESS SERVICE

CONSUME
RELEASED RAP BO INTERFACE

TODAY'S SCENARIO – **EXERCISES**

The DT281 hands-on exercises

✓ **PRE-REQUISITES**

▶ Set up and connect your ABAP Development Tools for Eclipse to the ABAP environment

Create the Database Table and Generate the UI Service

Enhance the BO Data Model & Enable OData Streams

Enhance the BO Behavior – Early Numbering

Enhance the BO Behavior – Determinations

Enhance the BO Behavior – Validations

Enhance the BO Behavior – Actions

Enhance the BO Behavior – Dynamic Feature Control *(optional)*

Write an ABAP Unit Test for the RAP BO *(optional)*

External API-based Access to the RAP BO with EML *(explore)*

DEMO

SUMMARY

Wrap up – Key takeaways

The **ABAP RESTful Application Programming Model (RAP)** helps to efficiently and rapidly build enterprise-grade services with intrinsic built-in cloud qualities

RAP best support **SAP HANA** and **SAP Fiori elements**

RAP is **available** on **SAP BTP ABAP Environment**,
SAP S/4HANA Cloud, and **SAP S/4HANA** starting with edition 1909

The RAP **feature scope** is enhanced
quarterly on SAP BTP ABAP Environment,
bi-yearly on SAP S/4HANA Cloud, public edition, and
yearly on SAP S/4HANA and SAP S/4HANA Cloud, private edition.

☞ What's New in RAP: SAP BTP | SAP S/4HANA | SAP S/4HANA Cloud

☞ Take a look at the interactive SAP Road Map Explorer for updates.

Major RAP enhancements[1] in 2022

ENHANCED BASE BUSINESS OBJECT LAYER

- ❖ Unmanaged internal early numbering for managed and unmanaged BOs
- ❖ Late numbering now also supported for managed BOs
- ❖ Instance factory actions for managed BOs to model actions that create new instances based on an input instance
- ❖ Use of client-independent tables as data sources for managed BOs with draft capabilities

WORKING WITH LARGE OBJECTS

- ❖ OData-based services built with RAP now support streams
- ❖ Option to incorporate external binary files or text files can be offered to end users in Fiori elements based apps

STABLE CONSUMPTION LAYER VIA BO INTERFACES (link)

- ❖ A BO Interface offers an additional abstraction layer on top of a base RAP BO
- ❖ Can be defined using the BO view provider contract `transactional_interface` and the behavior implementation type `interface`
- ❖ Can be consumed via EML or via business services

Major RAP enhancements[1] in 2022 (2)

DEVELOPER EXTENSIBILITY FOR RAP BUSINESS OBJECTS (link)

❖ Enable the extensibility of your RAP BO with fine-granular control over the extension points

❖ Build upgrade-safe and lifecycle-stable extensions using well-defined extension anchors of the original RAP BO

INTEGRATION OF BUSINESS EVENTS (link)

❖ Define and raise business events in RAP BOs and RAP BO behavior extension; Exposure fully integrated in RAP

❖ Events from SAP Event Mesh on SAP BTP are consumed in RAP BOs using the Event Consumption Model

ADT WIZARD FOR END-2-END GENERATION OF SERVICES

❖ Generation of all required artifacts: Data model, basic BO behavior, and business service

❖ Generation of OData V4 based UI services and Web APIs currently supported

INTEGRATION OF READ ACCESS LOGGING (RAL)

❖ To monitor and log all database read accesses performed within your RAP services

[1] Also available on-premise starting with ABAP Platform for SAP S/4HANA 2022

Guidance for RAP usage in SAP S/4HANA

SAP S/4HANA 1909

FIRST RAP DELIVERY WITH LIMITED FEATURE SET
Managed scenario for greenfield development not supported
No draft support for SAP Fiori development

GUIDANCE
Delivery with SAP S/4HANA 1909   ☞   Use the *ABAP Programming Model for SAP Fiori*

SAP S/4HANA 2020

BASIC RAP DELIVERY
Incl. **managed** scenario (*with major limitations regarding key layout and numbering*)
Draft support for managed or unmanaged BOs to build transactional SAP Fiori apps
OData V4 support for Web APIs and SAP Fiori UIs with FPS01

GUIDANCE
If limitations are crucial   ☞   Use the *ABAP Programming Model for SAP Fiori*
If limitations are not critical   ☞   Use RAP

SAP S/4HANA ≥ 2021

MASS ADOPTION READY RAP DELIVERY
Managed scenario now supports various key layouts
Late numbering for a managed BO (with or without draft)
Enhanced testability, documentability and supportability support
Extensibility options, easy **business events** exposure, and other enhancements delivered with edition 2022

GUIDANCE
☞   Exclusively use RAP

Sample implementations with the ABAP Flight Reference Scenario

Demonstrate how to use different RAP capabilities concretely

Based on a simple to use and understand data model: SFLIGHT reloaded

Feature scope regularly enhanced

Downloadable from GitHub

Read more in the RAP documentation: Cloud | SAP S/4HANA

FREE openSAP COURSE

Building Apps with the ABAP RESTful Application Programming Model (RAP)

Self-paced mode

Week 1: Introduction
Week 2: Developing a Read-Only List Report App
Week 3: Enabling the Transactional Behavior of an App
Week 4: Dealing with Existing Code
Week 5: Service Consumption and Web APIs
Week 6: Final Exam

ENROLL NOW!
https://open.sap.com/courses/cp13

More information

Further information

ABAP sessions at SAP TechEd in 2022

Modernization with the ABAP RESTful Application Programming Model (RAP)

Getting started with RAP

Building Apps with RAP (*openSAP course*)

Get Started with ABAP Programming on SAP BTP (SAP Learning Journey, also valid for SAP S/4HANA)

RAP – What's New: SAP BTP ABAP Environment | SAP S/4HANA | SAP S/4HANA Cloud

SAP BTP ABAP Environment on the interactive SAP Road Map Explorer

Public SAP Web sites

ABAP Development Community: www.sap.com/community/topic/abap.html

SAP BTP ABAP Environment Community: https://community.sap.com/topics/btp-abap-environment

SAP S/4HANA Cloud ABAP Environment Community: https://community.sap.com/topics/s4hana-cloud-abap-environment

ABAP Testing and Analysis Community: https://community.sap.com/topics/abap-testing-analysis

SAP products: www.sap.com/products

SAP training and certification opportunities

www.sap.com/education – e.g. trainings S4D437, S4D430, HA400, and S4D400

Open new career opportunities
Join the community of people with skills for the future

Check learning.sap.com/teched
to benefit like other certified experts:

61%
Get promotions[1]

91% Increase
confidence in abilities[1]

>71% Increase
problem-solving skills[2]

**Become an SAP solution expert –
now as easy as 1,2,3 in one place:**

FREE

- Follow expert-led **learning journeys and live sessions** for various development roles to upskill and **prepare for certification**

SAP
TechEd
OFFER

- Benefit from the **event-exclusive certification offer**

**Expand your
conference experience:**

FREE

- Connect with experts, share your knowledge, expand your network, and collaborate with peers in **SAP Community**

FREE

- Network with other participants in the group for **SAP TechEd** and join the **SAP Learning Groups** to get your learning questions answered

1. Pearson VUE's Latest "Value of IT Certification" Study Highlights Benefits of IT Certification in Challenging Times," Pearson Education Inc., May 25, 2021.
2. Chuck Cooper, Why Get IT Certified? The Value of IT Certification: An IT Certification White Paper, IT Certification Council, March 2021.

Thank you.

Contact information:

Volker Drees
Volker.drees@sap.com

Carine Tchoutouo Djomo
carine.tchoutouo.djomo@sap.com

THE BEST RUN **SAP**