

# SAP NetWeaver AS for ABAP<sup>®</sup> 7.52

## Overview and Product Highlights

Technology Core Platform Product Management, SAP SE  
October 2017

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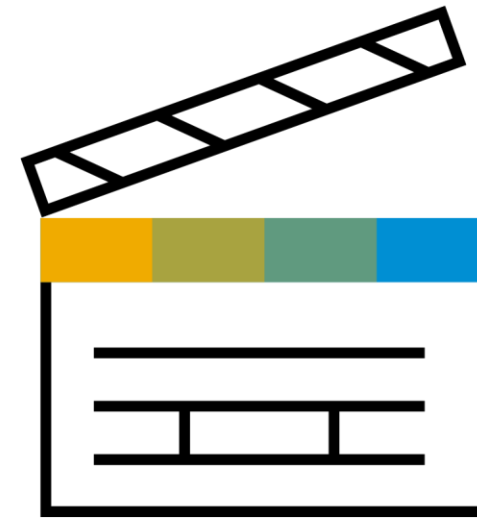
# Agenda

## ABAP Platform overview

### ABAP 7.52 Product highlights

- ▶ ABAP development tools
- ▶ ABAP language today
- ▶ SAP HANA-centric optimizations
- ▶ ABAP Programming Model for SAP S/4HANA
- ▶ ABAP code analysis tools
- ▶ Custom code adaptation for SAP S/4HANA
- ▶ Real-time events and Industrial IoT
- ▶ SAP S/4HANA extensibility

## Summary



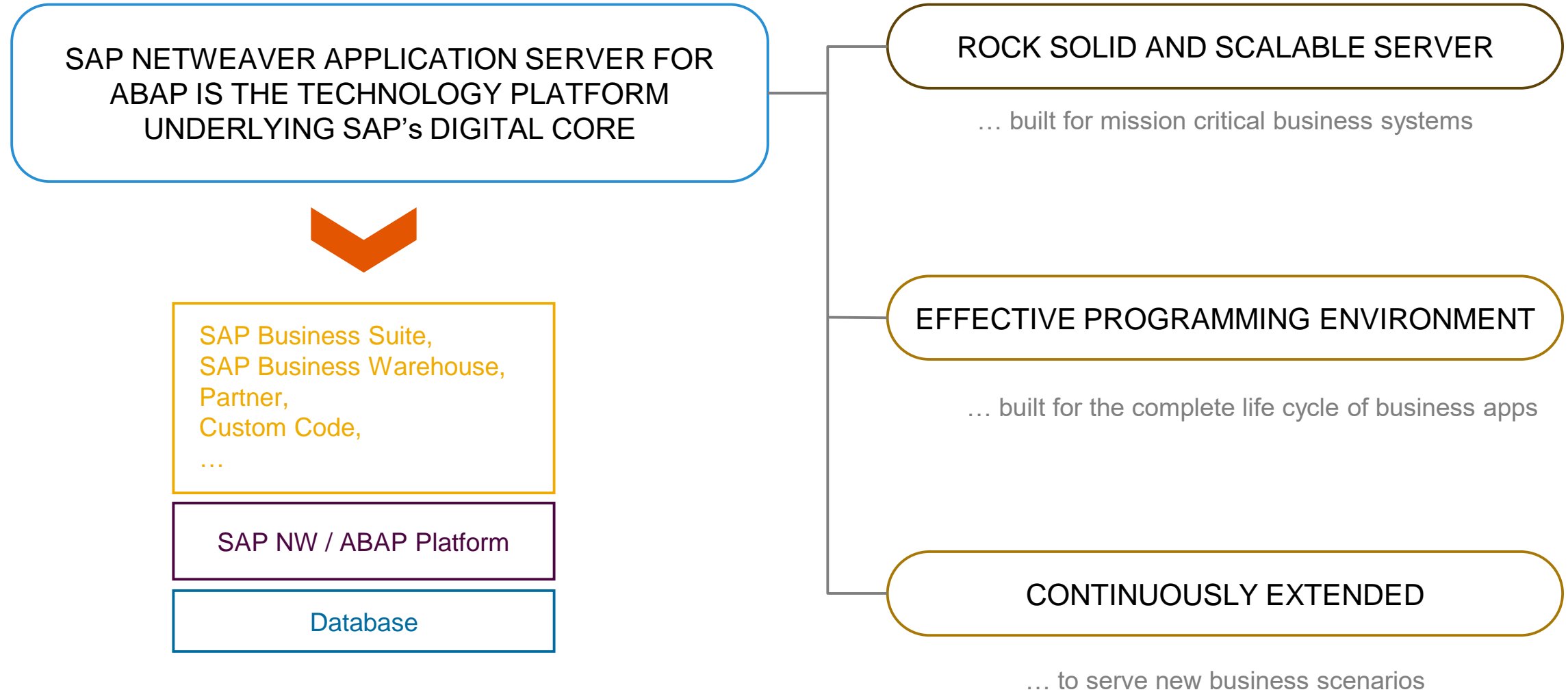


# ABAP Platform Overview



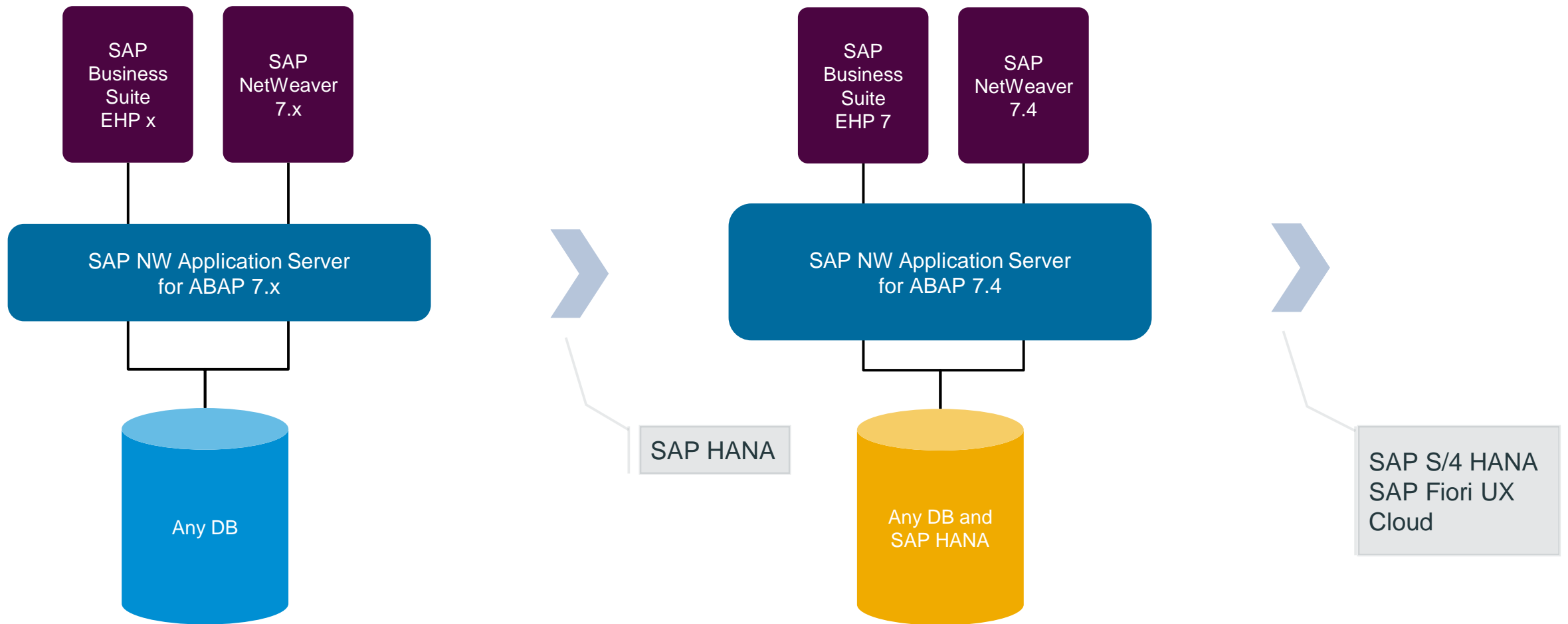
# ABAP Platform

## Product description



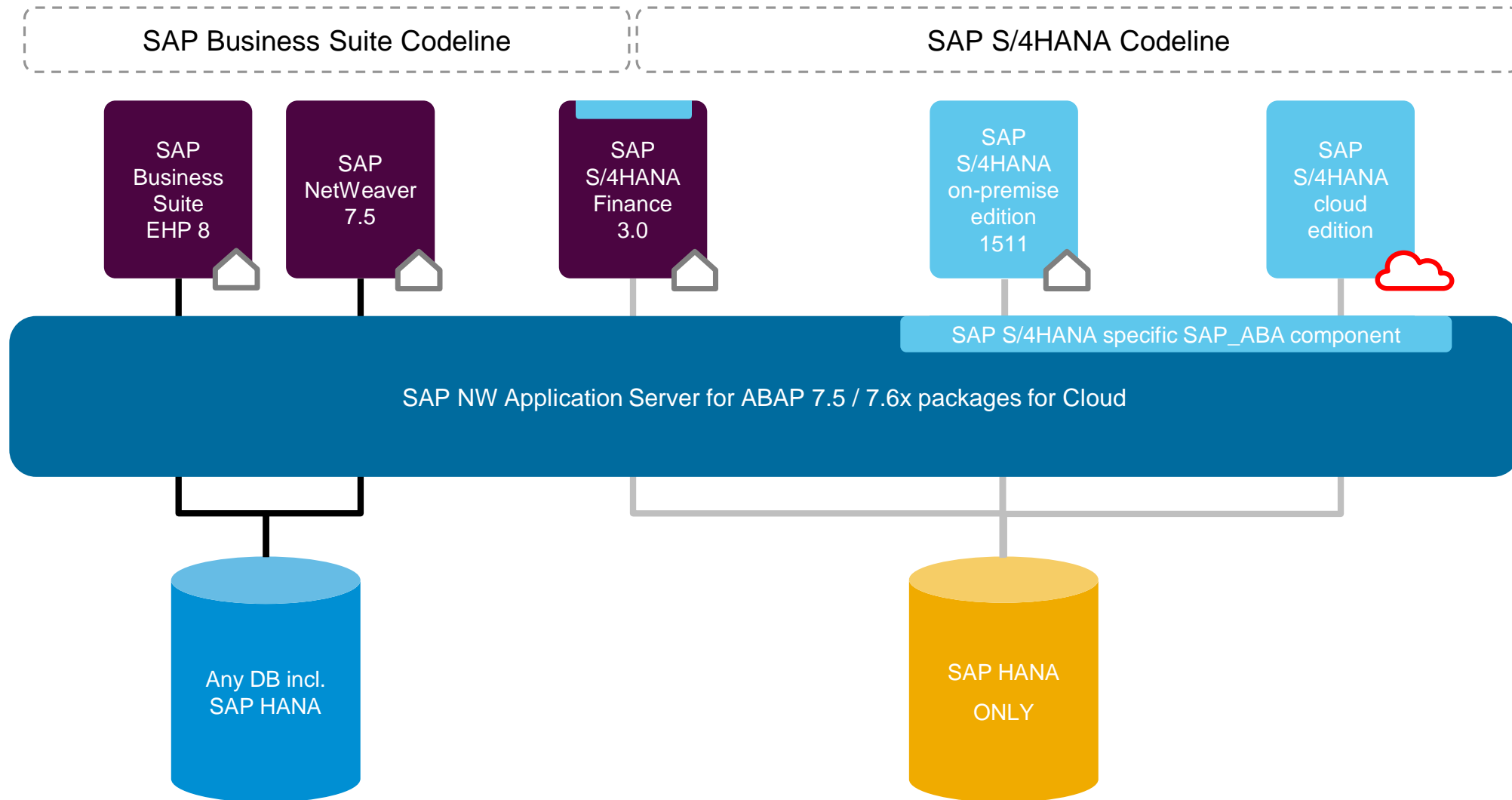
# ABAP Platform

## Major innovations through SAP HANA



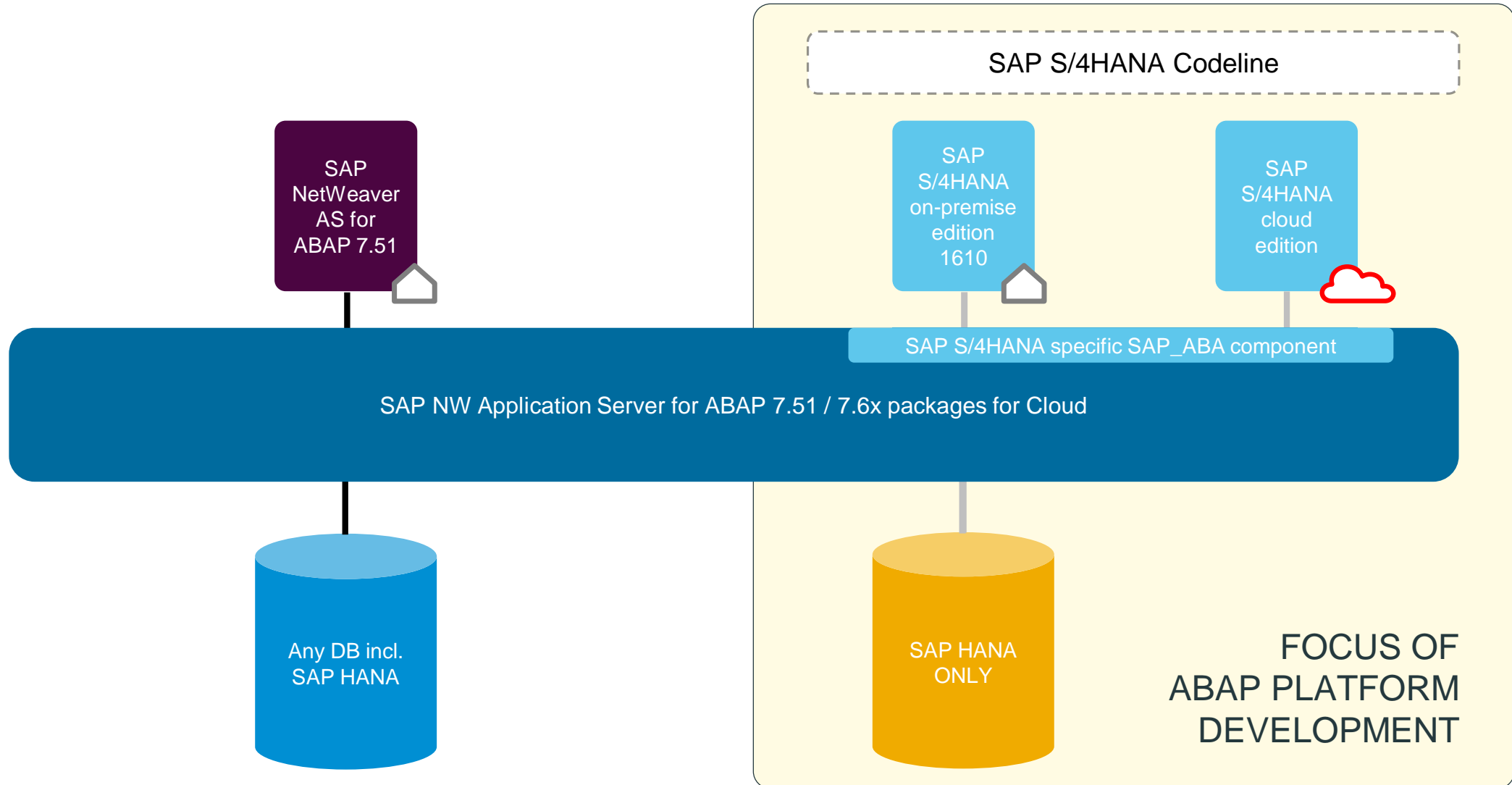
# ABAP Platform: Foundation for SAP S/4HANA

2015



# ABAP Platform: Foundation for SAP S/4HANA

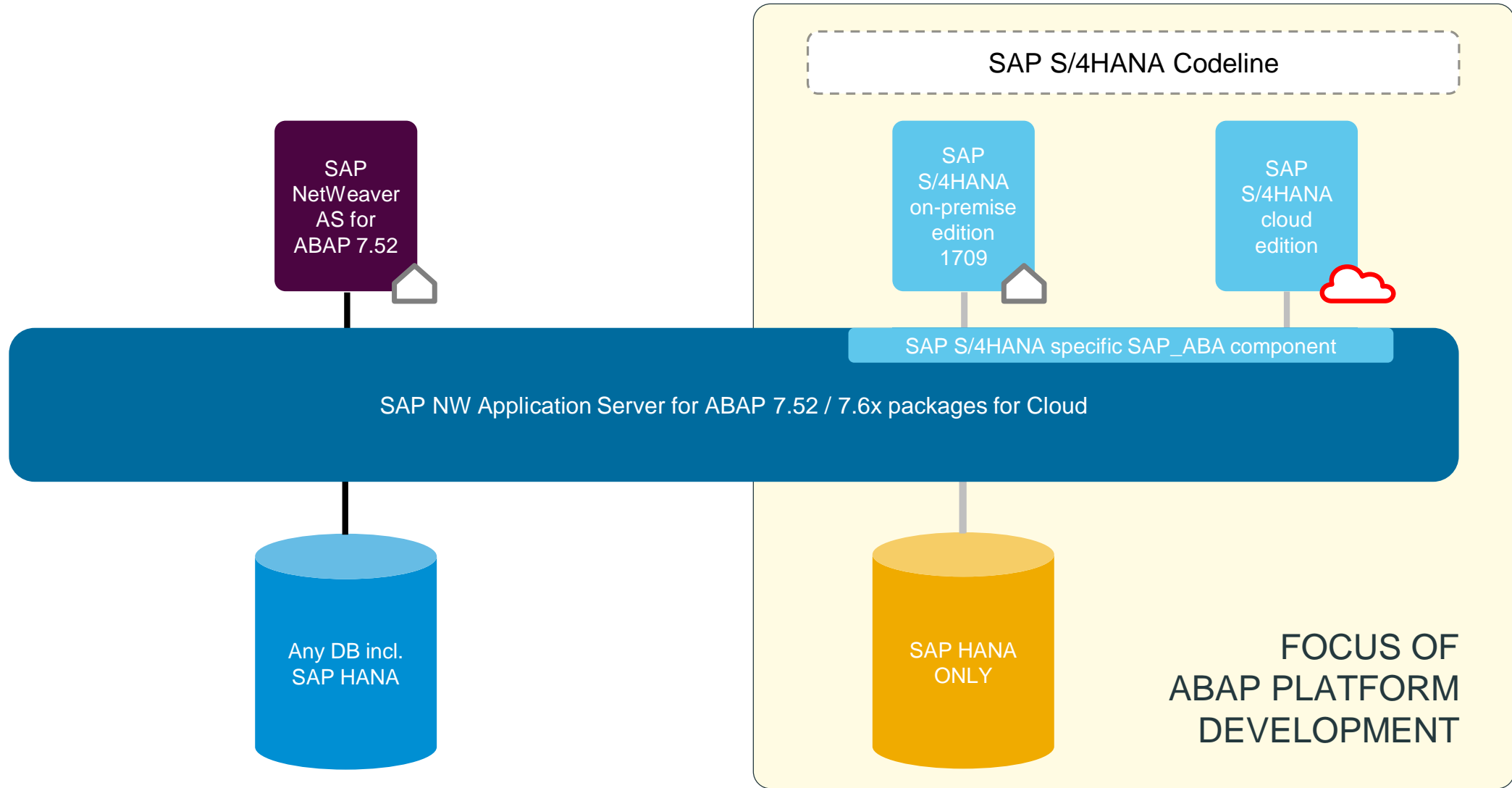
2016





# ABAP Platform 7.52: Foundation for SAP S/4HANA

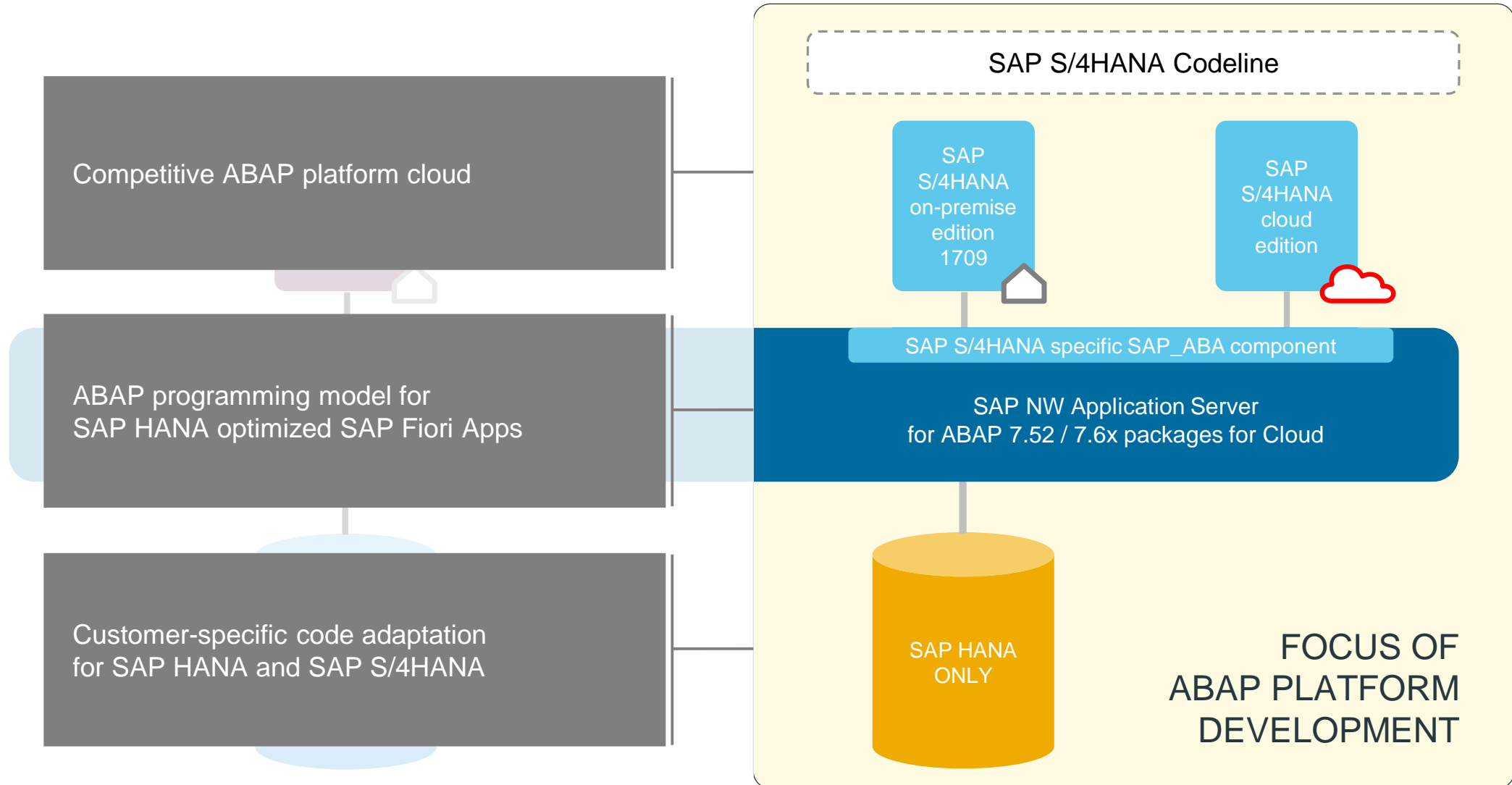
Current Innovation



# ABAP Platform 7.52: Foundation for SAP S/4HANA

Current Innovation

## Main investment topics



# ABAP Platform 7.52 at a glance



Further simplification and enrichment of the **ABAP language**

**ABAP** application development further optimized for **SAP HANA**

ABAP programming model for **SAP Fiori** apps in SAP S/4HANA

Increased developer efficiency in **Eclipse**®

Advanced quality assurance tools and custom code adaptation for **SAP S/4HANA**

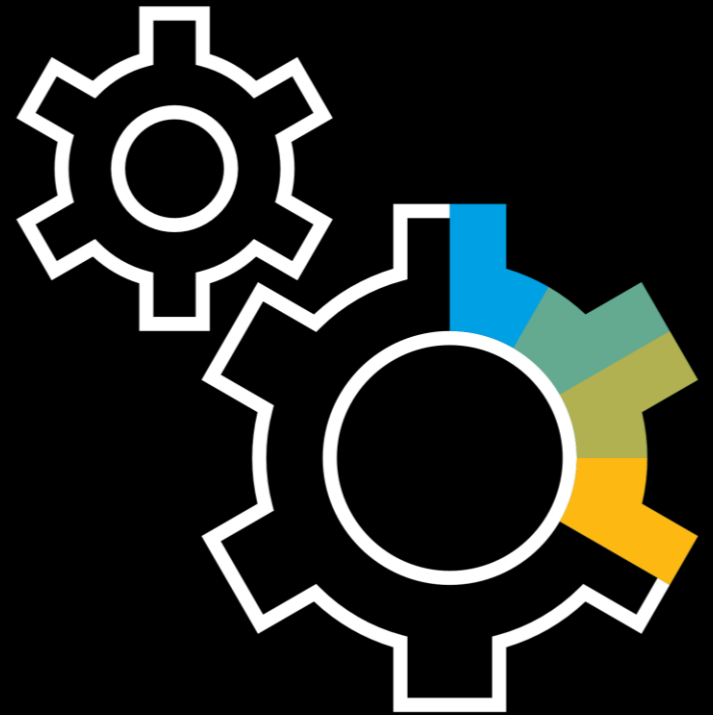
**SAP S/4HANA** extensibility

Real-time events and **Industrial IoT**

# ABAP 7.52 Product Highlights



# ABAP Development Tools in Eclipse



# ABAP development on the Eclipse platform



## Eclipse Tooling Platform

Increased developer productivity

Power of SAP HANA for ABAP developers

Easy integration of custom or 3<sup>rd</sup> party tools

## Powerful ABAP Development Tools

Advanced source code editing, search & navigation

Full ABAP for SAP HANA support

Tools for Floorplan Manager and Web Dynpro ABAP

Test, Quality Assurance, Troubleshooting

Toolset for Core Data Services development

## Various SAP development tools

SAPUI5

SAP Gateway

SAP Cloud Platform

SAP BW4/HANA and SAP BW

## Central Eclipse update site

Easy installation and upgrade

Selective usage

Available in SAP Development Tools site \*

\* <https://tools.hana.ondemand.com>



# ABAP Development Tools in Eclipse

## AS ABAP 7.52 features overview (1)

```
1 @EndUserText.label : 'Demo database table for employees'
2 @AbapCatalog.enhancementCategory : #NOT_EXTENSIBLE
3 @AbapCatalog.tableCategory : #TRANSPARENT
4 @AbapCatalog.deliveryClass : #A
5 @AbapCatalog.dataMaintenance : #LIMITED
6 define table employees_demo {
7   @EndUserText.label : 'Client'
8   key mandt : abap.clnt not null;
9   @EndUserText.label : 'User Name'
10  key userid : abap.char(12) not null;
11  @EndUserText.label : 'Last Name'
12  lastname : abap.char(20) not null;
13  @EndUserText.label : 'Surname'
14  firstname : abap.char(20) not null;
15  @EndUserText.label : 'Street'
16  street : abap.char(40) not null;
17  @EndUserText.label : 'ZIP Code'
18  zipcode : abap.char(5) not null;
19  @EndUserText.label : 'Residence'
20  city : abap.char(40) not null;
21  @EndUserText.label : 'Country'
22  country : tax0301_46c - structure
23  @EndUserText.label : 'Salary'
24  salary : abap0311_46c - structure
25
26 }
```

New source-based  
Database Table editor

Overview: S EPM BO SO

General Data	Package Properties
Application Component: BC-SRV-NWD	Superpackage: S_EPM_BO
Responsible: SAP	Package Type: Development
	<input type="checkbox"/> Adding further objects to package not possible
	<input type="checkbox"/> Encapsulated

Transport Properties
Transport Layer: SDWB
Software Component: SAP_BASIS
<input checked="" type="checkbox"/> Record Changes to all Objects of the Package in Transport Requests

New form-based  
ABAP package editor

```
1 REPORT HELLOWORLD.
2
3 DATA : lv_test type string value 'World'.
4
5
```

Coverage As

Run As	1 ABAP Application	F8
Debug As	2 ABAP Application (Console)	F9
Profile As	3 ABAP Test Cockpit	Ctrl+Shift+F2

Console

```
org.eclipse.ui.console.ConsoleView
01.08.2017 HELLO WORLDS
-----
Hello World
```

Run ABAP program on console

# ABAP Development Tools in Eclipse

## AS ABAP 7.52 features overview (2)

ADT on the Open Eclipse 4.7 (Oxygen) Platform

### CDS enhancements

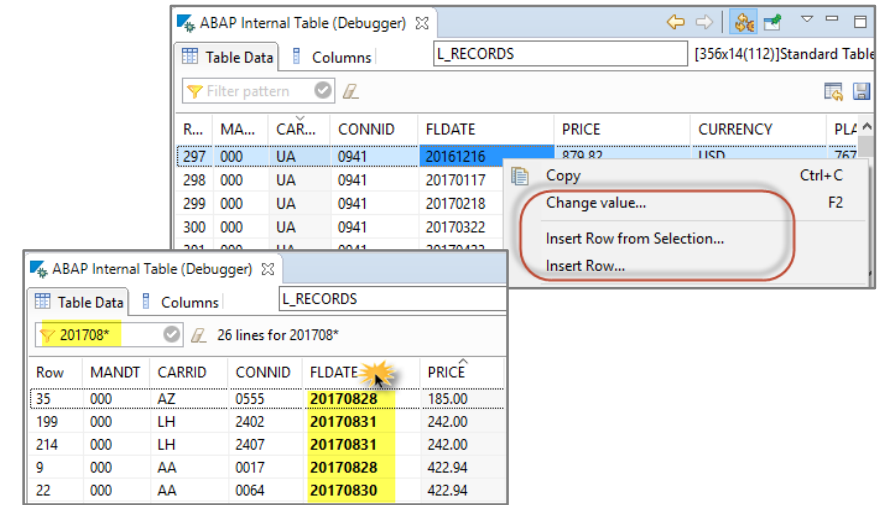
- Ensure quality of CDS code
  - Hierarchy tests using CDS Test Double Framework
  - Apply Quick Assist in ABAP Unit class editor
  - Make easier to write tests for CDS Views
- Integration with SAP Translation Hub for language-dependent CDS annotation values (SAP Note [2473699](#))

### Debugging enhancements

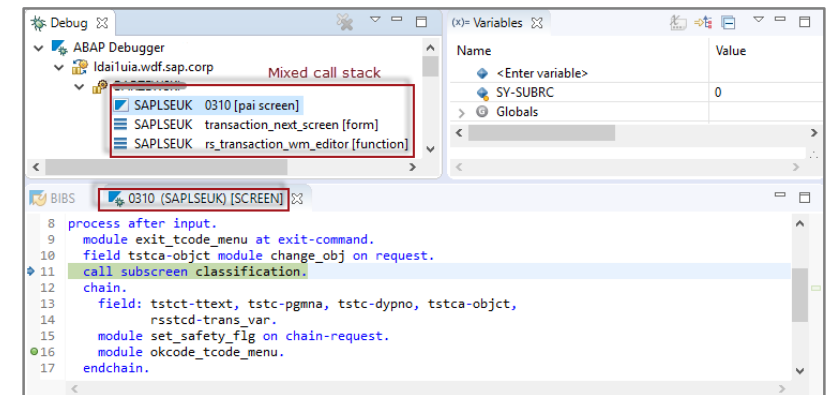
- Improved internal table analysis
- Debugging dynpro flow logic
- Debugging enhancement implementations

### Further developer productivity enhancements

### Internal Tables in Debugger: change, filter and sort



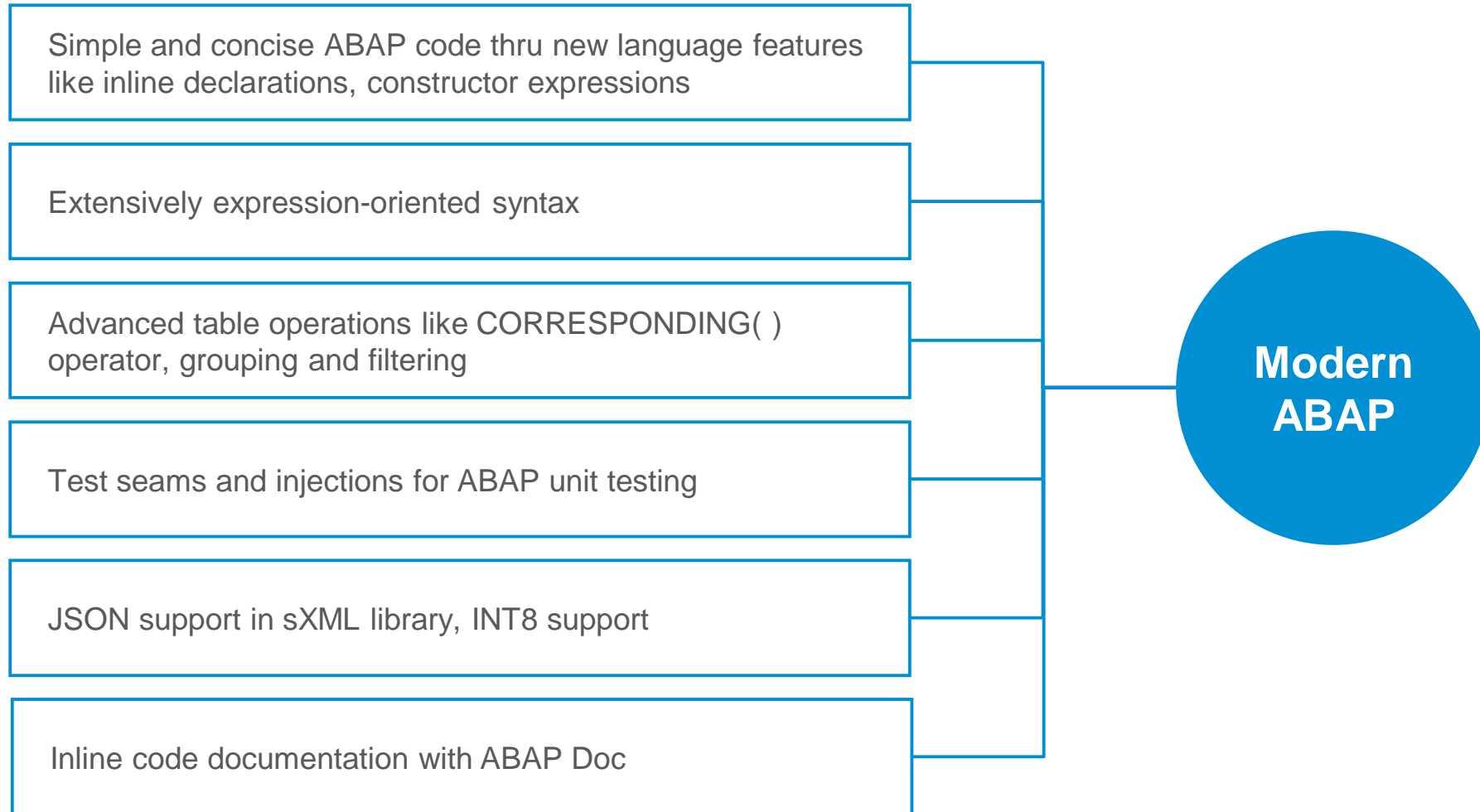
### Debugging Dynpro Flow Logic



# ABAP Language Today



# Declarative modernization of the ABAP language



# Support of enumerated types

## Simple

```
TYPES:
  BEGIN OF ENUM colors1,
    black,
    red,
    gold,
  END OF ENUM colors1.
...
DATA mycolor1 TYPE colors1.
mycolor1 = black.
```

## Handy

```
TYPES:
  BEGIN OF ENUM colors2 STRUCTURE colors2_values,
    red,
    white,
    blue,
  END OF ENUM colors2 STRUCTURE colors2_values.
...
DATA mycolor2 TYPE colors2.
mycolor2 = colors2_values-red.
```

## Full support

```
TYPES:
  BEGIN OF ENUM colors3 STRUCTURE colors3_values BASE TYPE int1,
    red  VALUE IS INITIAL,
    green VALUE 42,
    blue VALUE 255,
  END OF ENUM colors3 STRUCTURE colors3_values.
...
DATA mycolor3 TYPE colors3.
mycolor3 = colors3_values-green.
```

# Further language enhancements in ABAP 7.52

## Implicit message specification in RAISE EXCEPTION MESSAGE

```
MESSAGE ID 'SABAPDEMOS' TYPE 'S'
  NUMBER '888'
  WITH 'Message'.
TRY.
  RAISE EXCEPTION TYPE cx_demo_dyn_t100 USING MESSAGE.
CATCH cx_demo_dyn_t100 INTO DATA(oref).
  cl_demo_output=>display( oref->get_text( ) && ` , ` && oref->msgty).
ENDTRY.
```

## Assignment of values

```
DATA(mapper) =
  cl_abap_corresponding=>create_with_value
  (
    source           = struct/itab
    destination      = struct/itab
    mapping           = mapping_tab
    discarding_duplicates = flag
  ).
```

## Virtual sorting of internal tables

```
cl_abap_itab_utilities=>virtual_sort(im_virtual_source = VALUE #(
  ( source = REF #( from_city_tab ) components = VALUE #( ( name = 'latitude' )( name = 'longitude' ) ) )
  ( source = REF #( to_city_tab )   components = VALUE #( ( name = 'latitude' )( name = 'longitude' ) ) )
  ( source = REF #( flight_tab )    components = VALUE #( ( name = 'carrid' ) ( name = 'connid' ) ) )
) )
```

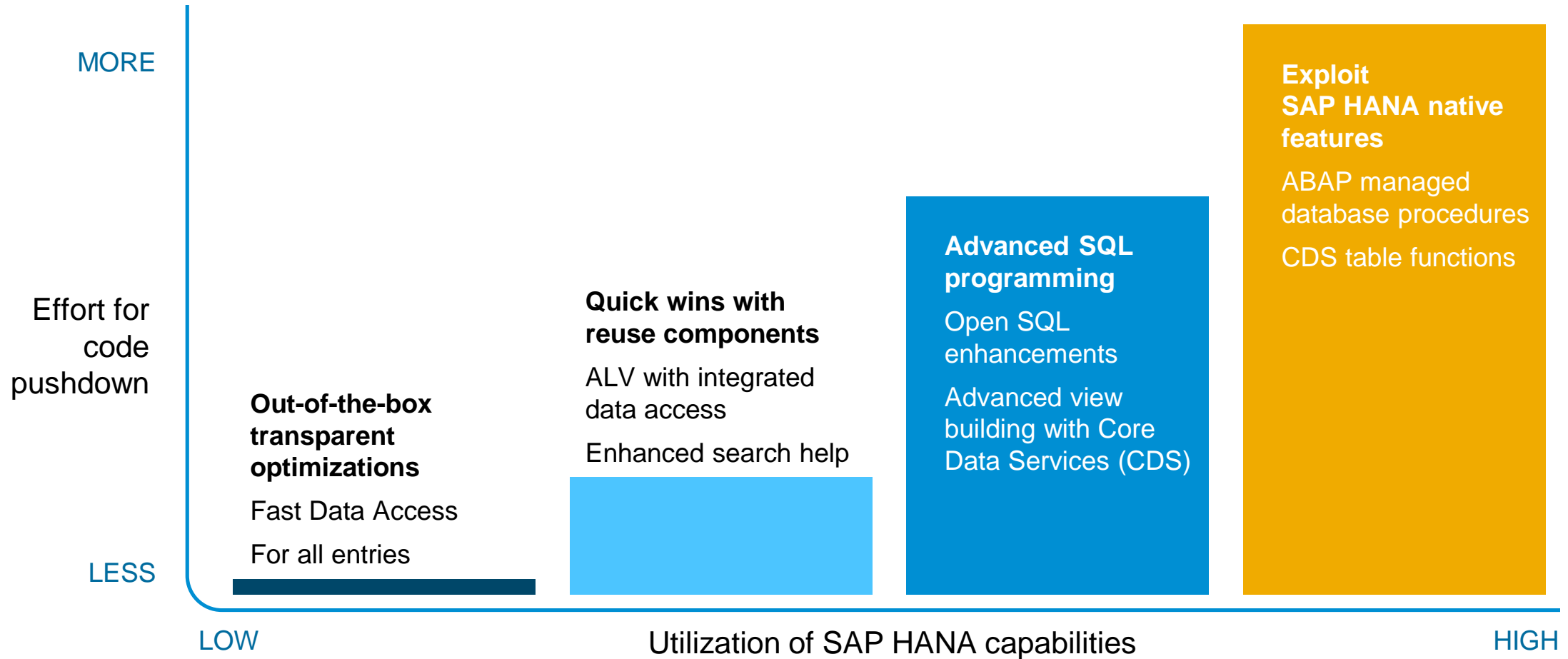


# SAP HANA-centric Optimizations



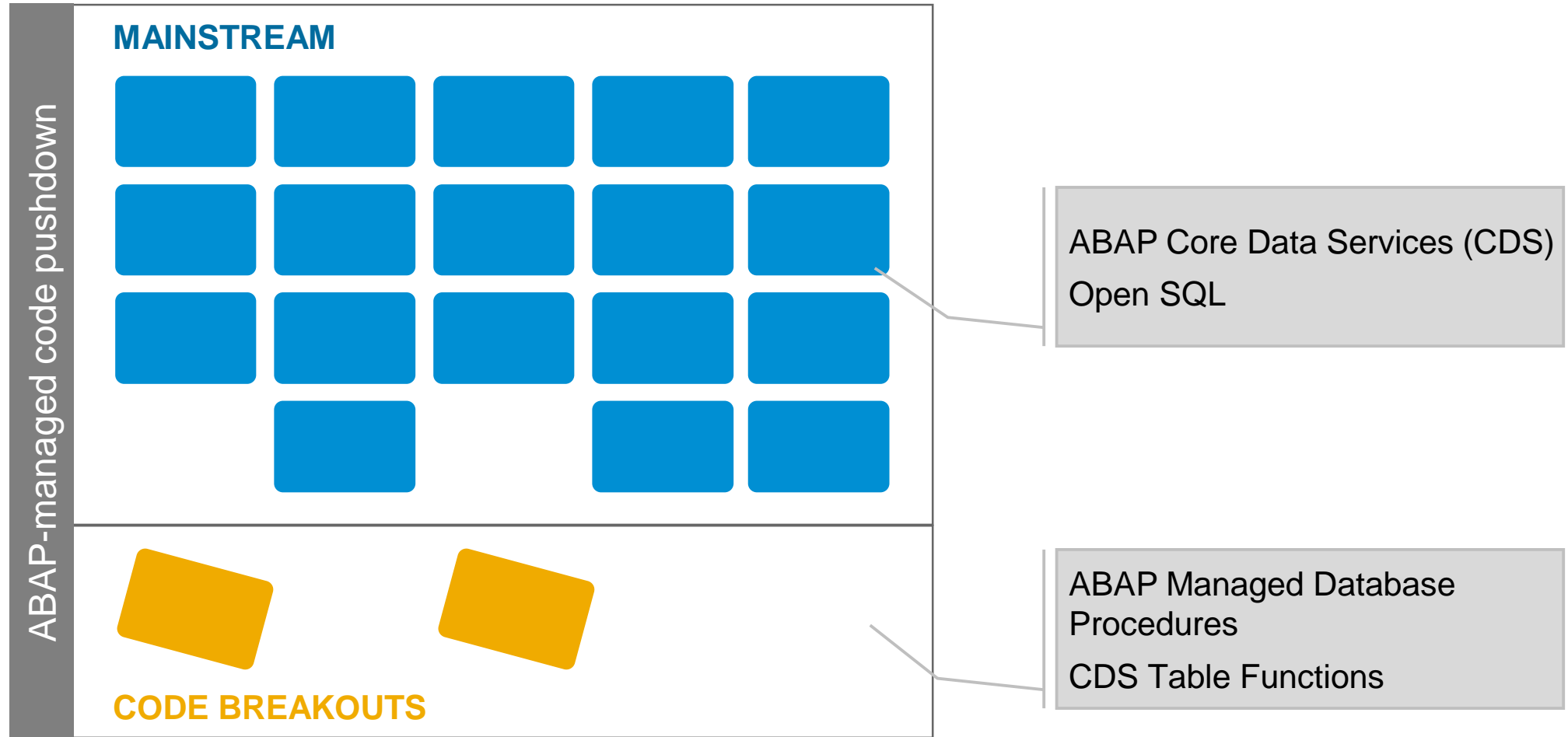
# ABAP optimizations for SAP HANA

## Overview

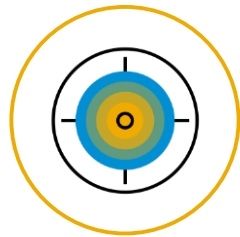


# ABAP optimizations for SAP HANA

## Mainstream and code breakouts

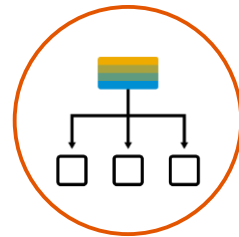


# Next generation data modelling and access with CDS



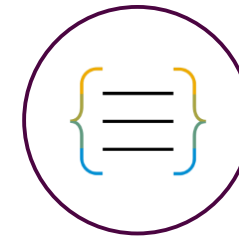
Capture  
business  
intent

Reduced complexity  
Extending SQL



Common  
data  
model

Semantically rich  
Declarative  
Close to conceptual  
thinking

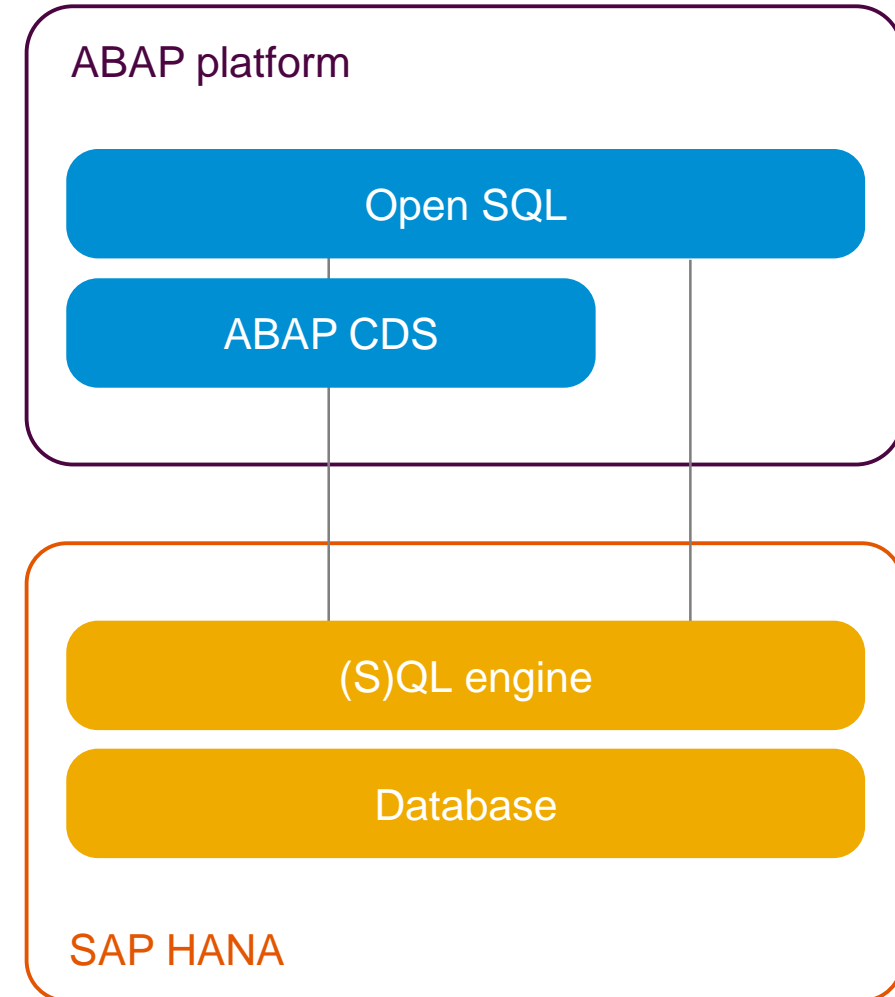


Improved  
programming  
model

For all application domains  
Rich set of build-in functions  
Code pushdown capabilities

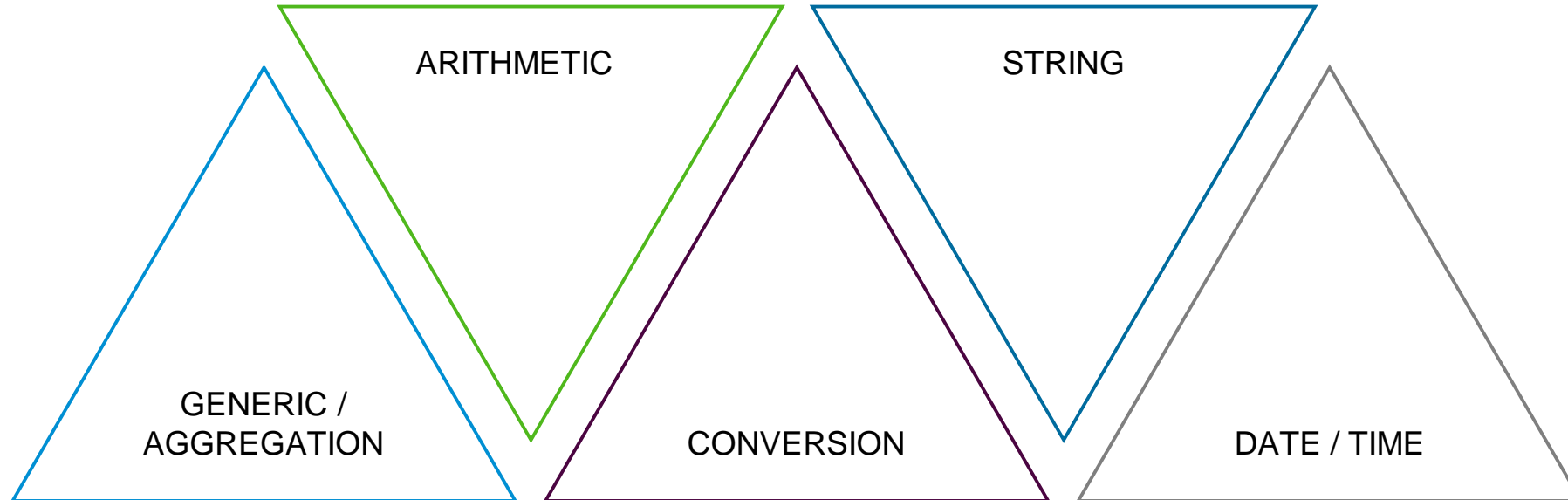
# CDS integration into the ABAP platform

- 01 Leverage DDIC semantics
- 02 Highly reusable and extensible CDS artefacts
- 03 Fully integrated into the ABAP infrastructure
- 04 Proven and consistent ABAP lifecycle management
- 05 Consumption in Open SQL and Gateway/SADL



Lifecycle management

# Built-in SQL functions and expressions in ABAP CDS





# CDS associations

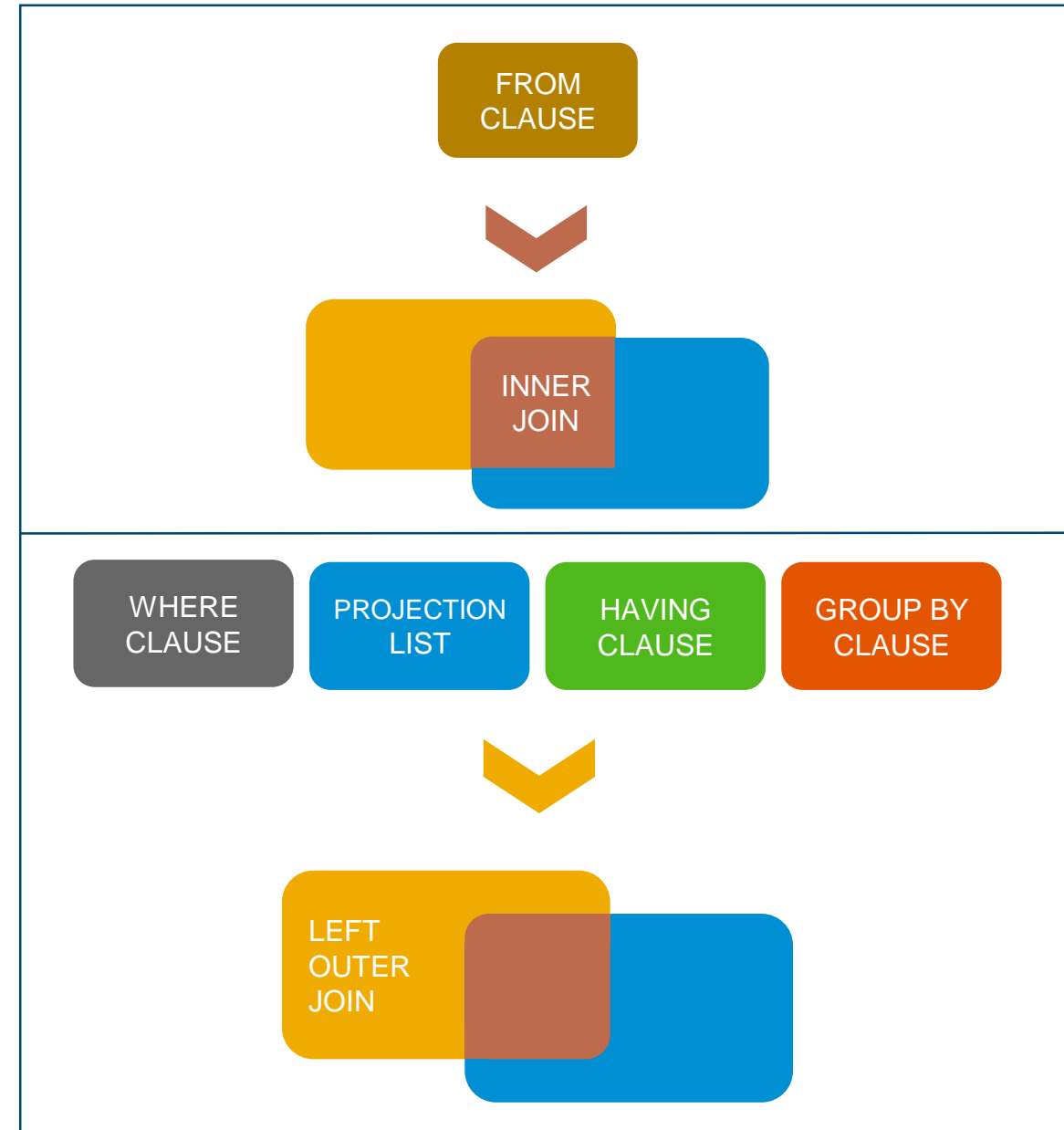
Capturing the relationships between entities in the data model

Used (!) associations are implicitly translated into SQL joins

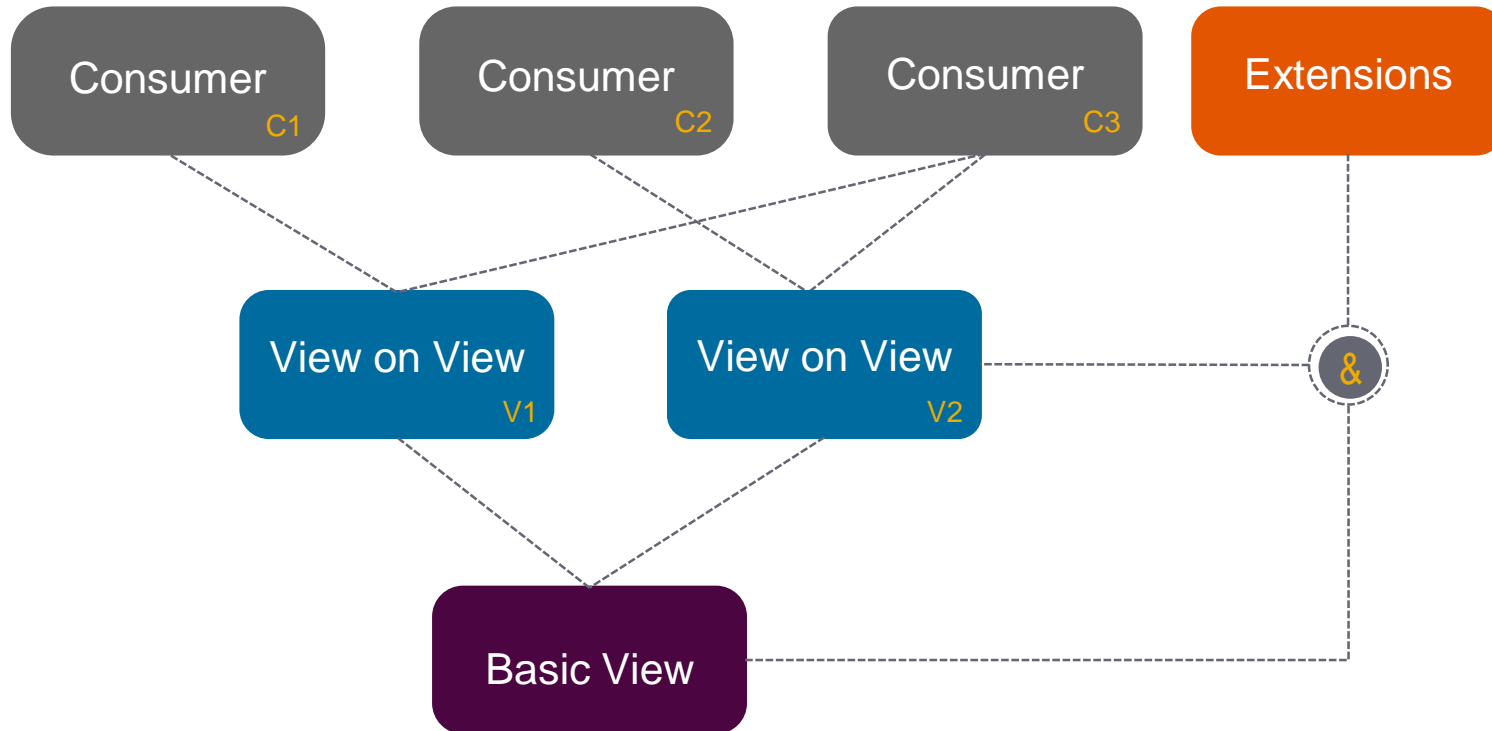
Reuse of generated joins when semantically identical

Can be queried in CDS views and Open SQL

▶ Navigate thru entity using path expressions



# Hierarchy of views and extensibility

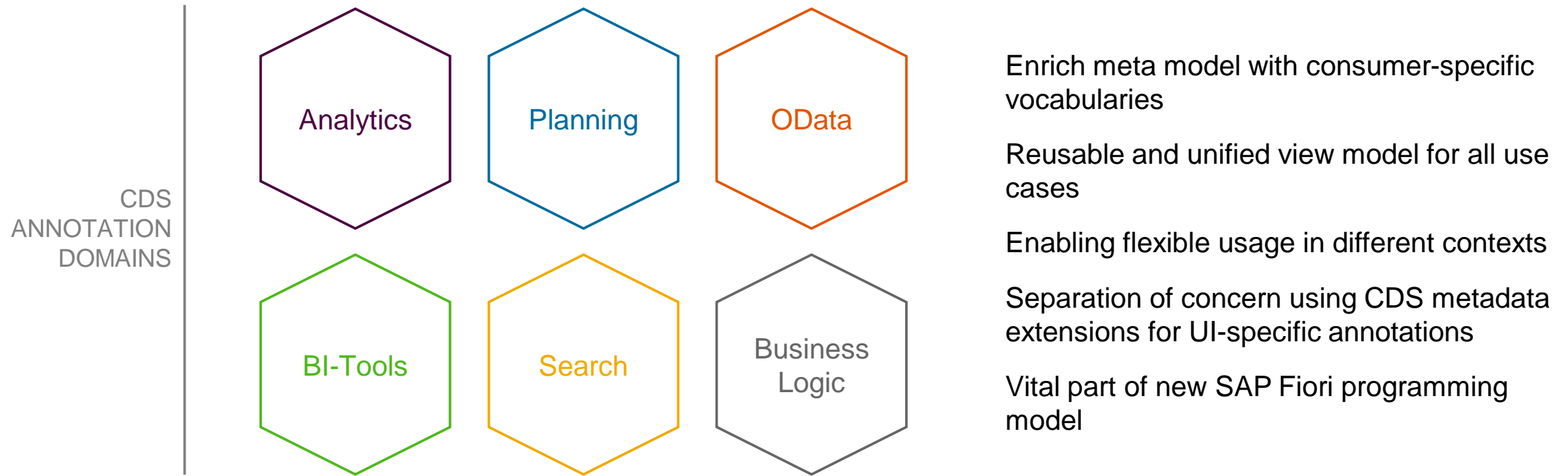


Hierarchical view-on-view concept

Optimized result sets with minimum data transfer

Append additional columns, arithmetic expressions or literals to result set

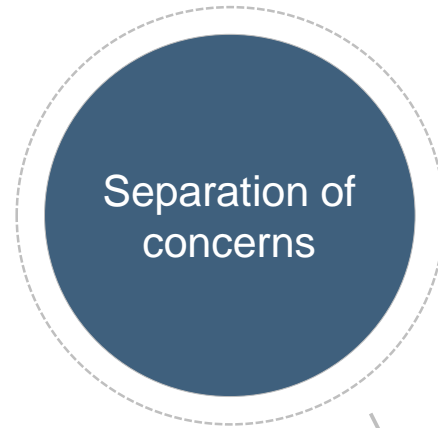
# CDS annotations for domain-specific frameworks



# CDS metadata extensions (MDE)

Keep view definition distinct from UI-specific annotations

Use one view definition with various layers of metadata (e.g. SAP, partner, customer or industry specific)



Separation of concerns



Simplified change management

Change UI-specific annotations without modifying underlying CDS view

No need to change original (SAP) views when metadata changes

Simplified mass activation / activation chain



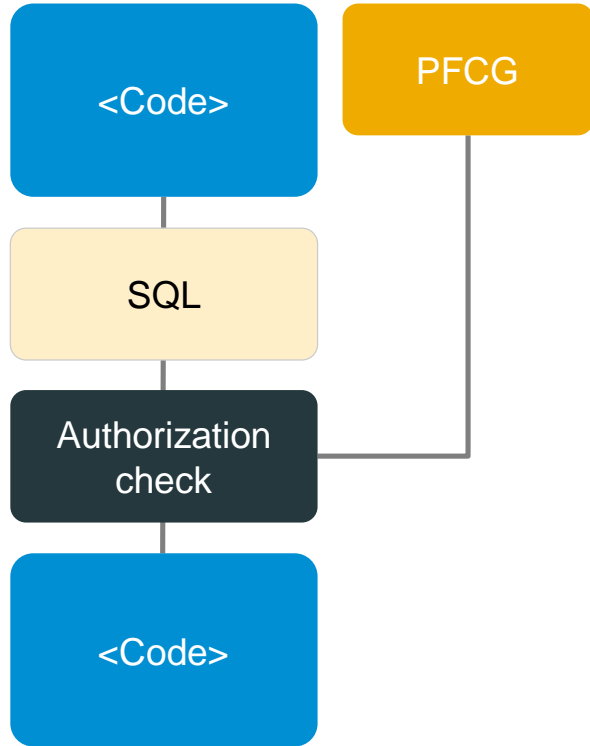
CDS METADATA EXTENSIONS



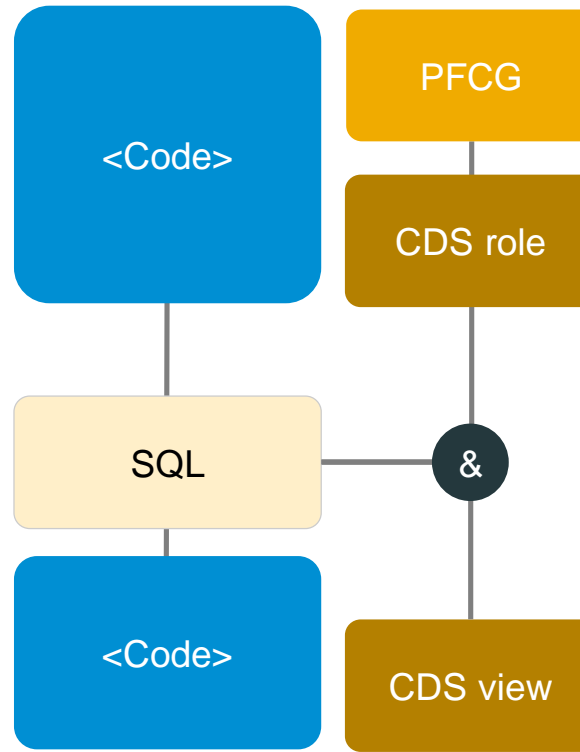
Tool support

Wizard for extracting existing metadata from CDS view to CDS MDE

# Declarative access control with CDS roles



Classical approach



Declarative approach

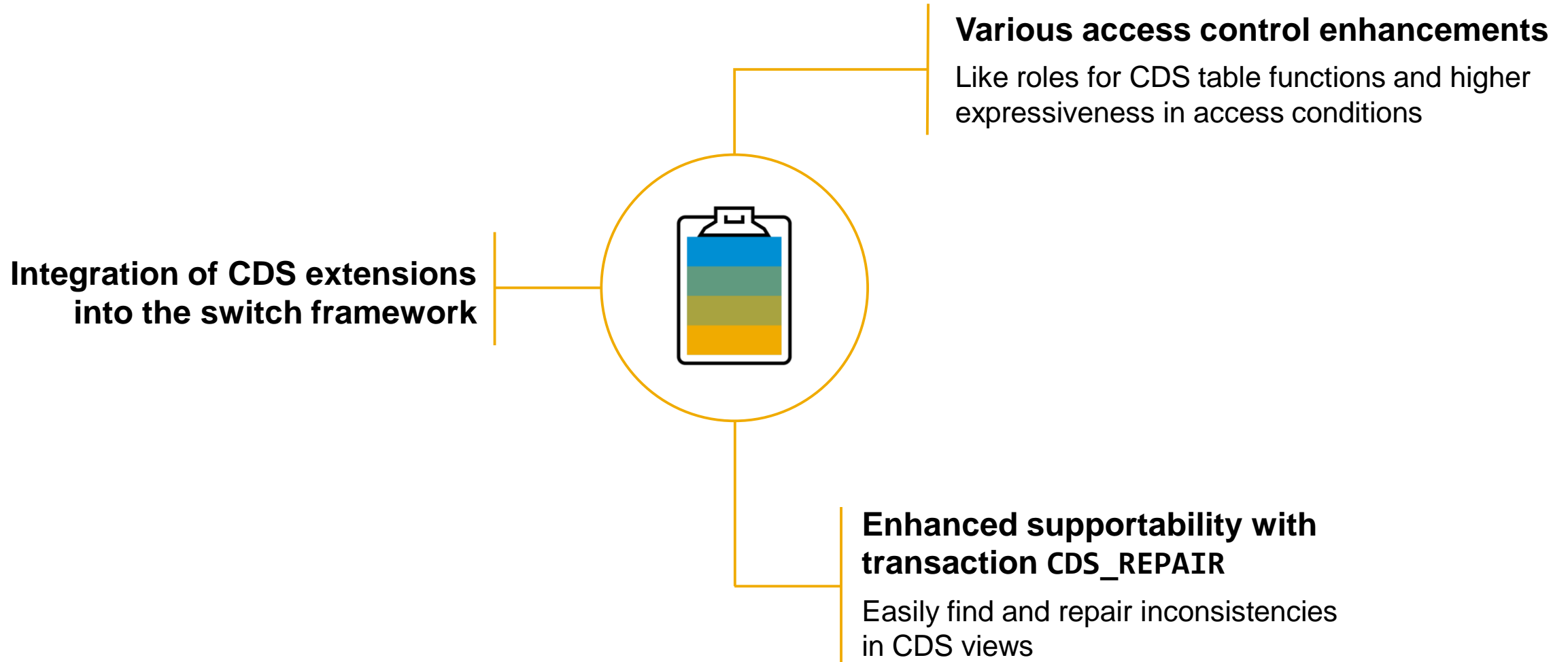
Declarative approach instead of coded approach

- ▶ Thru CDS Data Control Language
- ▶ Based on CDS entities and PFCG data
- ▶ Full access rules and roles inheritance supported

Authorizations pushed down to the database

Defined once and automatically used everywhere

# CDS feature overview in AS ABAP 7.52





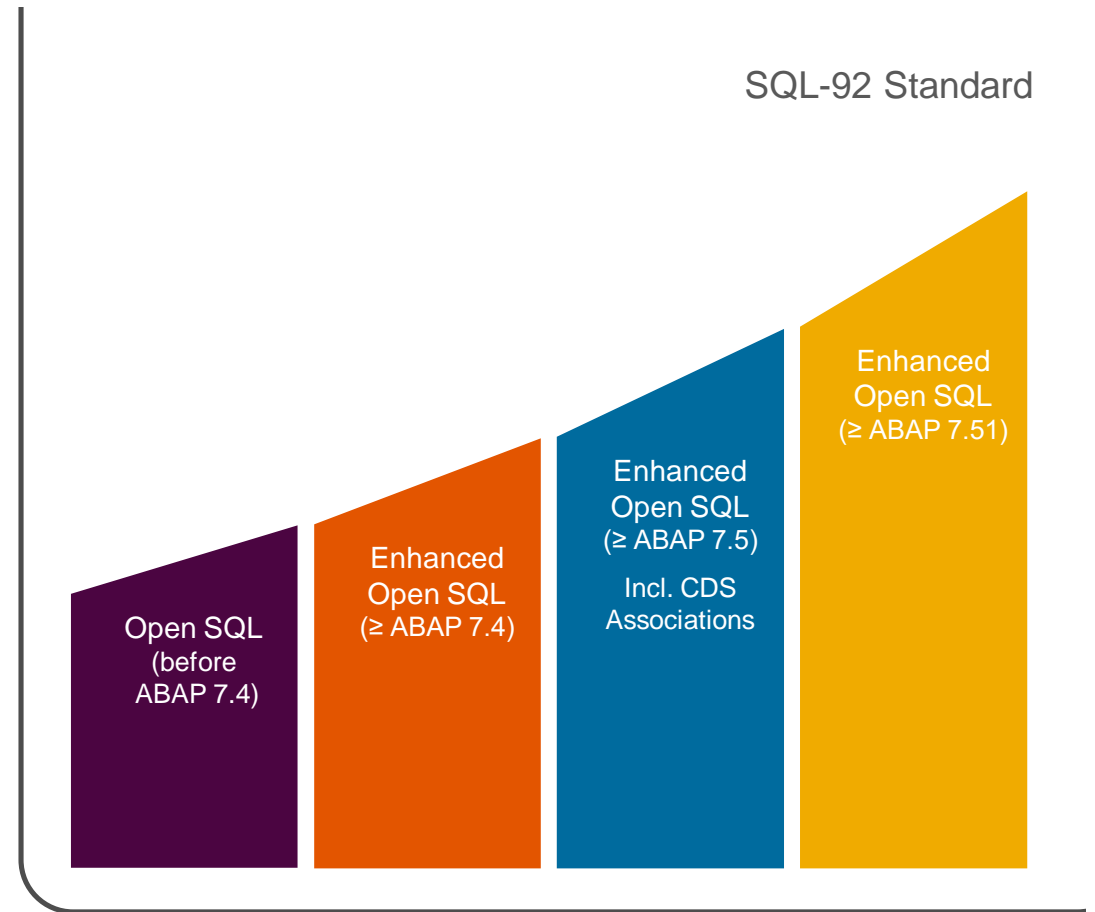
# Broad SQL standard coverage

Higher expressiveness in Open SQL statements

Code pushdown support thru new language features

Reduction of existing limitations

Flexible consumption of CDS modelling entities and roles



# Advanced Open SQL capabilities

Extended  
JOIN  
support

Various SQL  
functions &  
expressions

UNION  
(ALL)

CDS  
consumption

Increased  
number of  
allowed sub-  
queries

Common  
Table  
Expressions

Access to  
Global  
Temporary  
Tables

Access to  
cached  
views in  
SAP HANA

# Common Table Expression (CTE) in Open SQL

```
6 REPORT zr_open_sql_features.
7
8 DATA from_id TYPE spfli-carrid VALUE 'AF'.
9 DATA to_id   TYPE spfli-carrid VALUE 'LH'.
10
11 * Common Table Expression (CTE)
12 WITH
13 +connections AS (
14   SELECT spfli~carrid, carrname, connid, cityfrom, cityto
15         FROM spfli
16         INNER JOIN scarr
17         ON scarr~carrid = spfli~carrid
18         WHERE spfli~carrid BETWEEN @from_id AND @to_id ),
19
20 +sum_seats AS (
21   SELECT carrid, connid, SUM( seatsocc ) AS sum_seats
22         FROM sflight
23         WHERE carrid BETWEEN @from_id AND @to_id
24         GROUP BY carrid, connid ),
25
26 +result( name, connection, departure, arrival, occupied, dummy ) AS (
27   SELECT carrname, c~connid, cityfrom, cityto, sum_seats, concat_with_space( 'Hello', 'world!', 1 )
28         FROM +connections AS c
29         LEFT OUTER JOIN +sum_seats AS s
30         ON c~carrid = s~carrid AND
31            c~connid = s~connid )
32 SELECT *
33       FROM +result
34       ORDER BY name, connection
35       INTO TABLE @DATA(lt_data)
36       UP TO 6 ROWS.
37
38 cl_demo_output=>display( lt_data ).
39
```

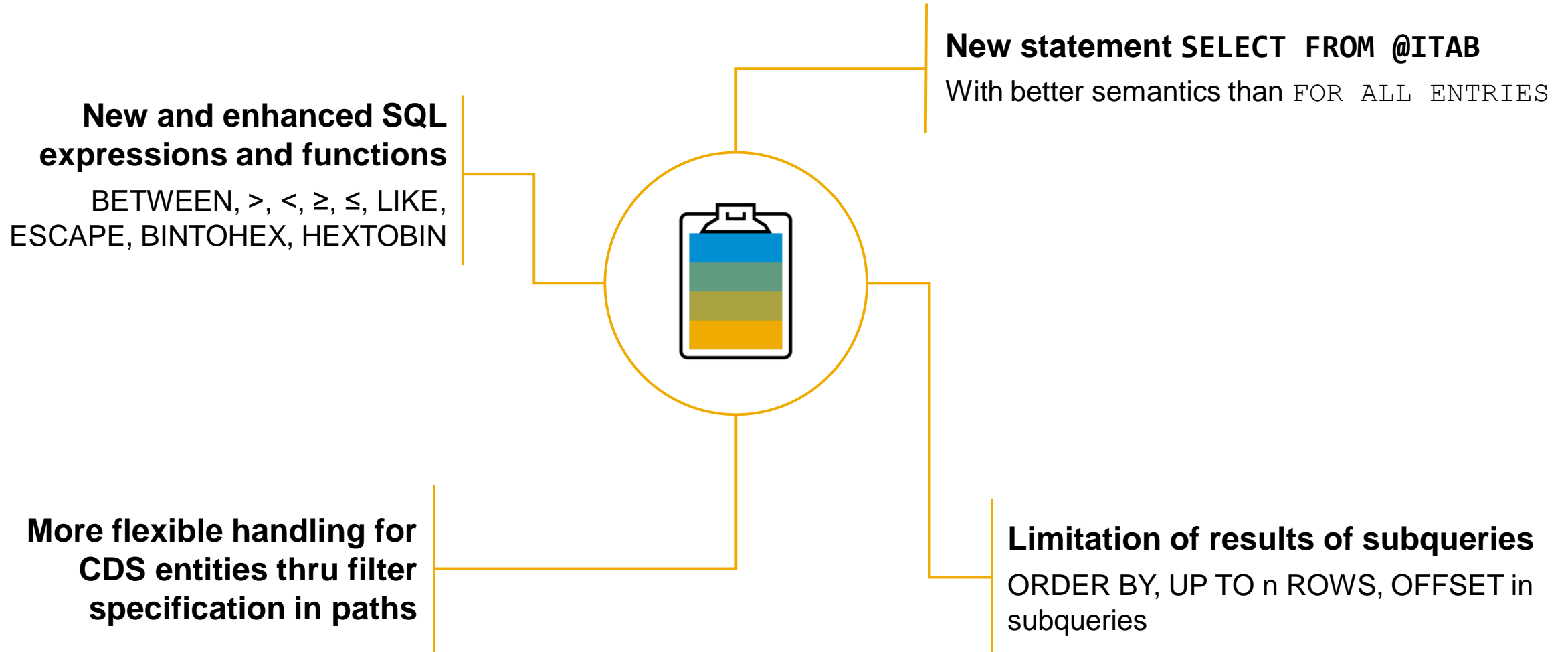
New WITH statement for defining one or more common table expressions

Name of CTE begins with +  
Comma-separated list  
UNION supported

Each CTE is a kind of subquery producing a tabular result

Can be used as a data source in the same WITH statement in all subsequent queries in the main query

# Open SQL feature overview in AS ABAP 7.52



# Why code breakouts make sense ...



## Unleash the full potential of your SAP HANA database

Some scenarios require selective measure

Highest performance requirements e.g. with complex calculations

Use of database / analytical engine specific functions required

Open SQL and CDS views are not sufficient to solve problem efficiently



## Restrictions

Database specific

SAP HANA only

No automatic fallback for any-db

# ABAP managed database procedures (AMDP)



Utilize native SAP HANA entities

Stored procedures and database functions supported

Complex logic with if / else...

Parameterized requests and multiple result sets

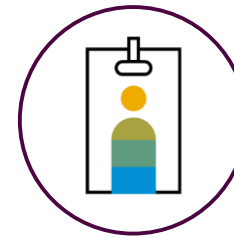


Integrated in ABAP infrastructure

Development, runtime error analysis, enhancement, transport

SQLScript coding embedded in ABAP classes

Seamless integration with CDS



Easy access to SAP HANA advanced engines / libraries

Like predictive analysis, financials, text mining, calculation engine

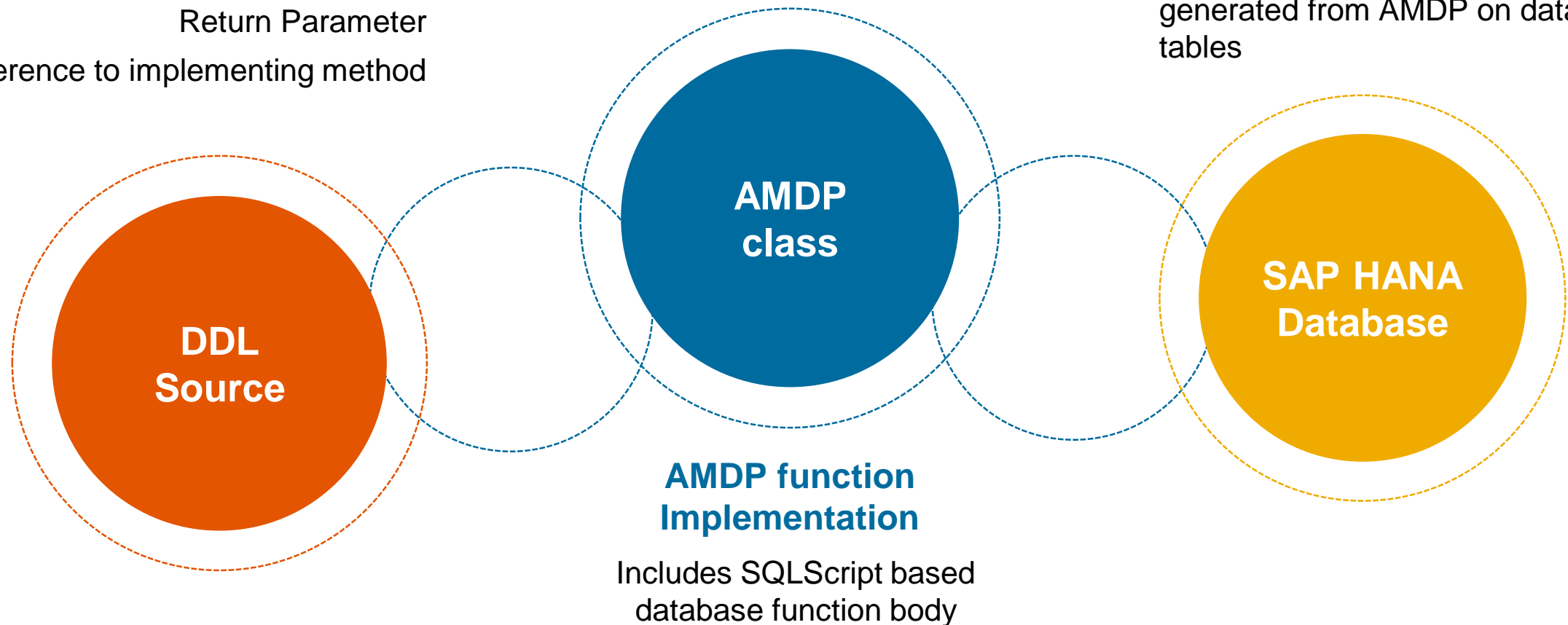
# Seamless AMDP integration into CDS

## CDS Table function definition

Parameter list  
Return Parameter  
Reference to implementing method

## Runtime for table function

Runs stored SQLScript procedure generated from AMDP on database tables



# AMDP feature overview in AS ABAP 7.52

**More flexibility in leveraging SAP HANA-specific features within CDS data models**

Arbitrary nesting of CDS views and CDS table functions allowed



**Improved interoperability between CDS and AMDP**

AMDP support for CDS views using client handling algorithm

`#SESSION_VARIABLE`



# Programming Model for SAP S/4HANA

01011  
11010  
10   
01101

# New types of apps intrinsically optimized for SAP HANA

Sales Order ID	Customer	Overall Status
500001060 Locked by A4H-112		
500001074		
500001021 Unsaved Changes by A4H-112	DelBont Industries (100000002)	Delivered (D)
500000025	Talpa (100000003)	Delivered (D)
500001073	TECUM (100000005)	
500000539	Asia High tech (100000006)	Delivered (D)
500000601 Draft	Alpine Systems (100000011)	Delivered (D)
500000888 Locked by A4H-112	HEPA Tec (100000013)	Delivered (D)
500000143	Robert Brown Entertainment (100000015)	Delivered (D)

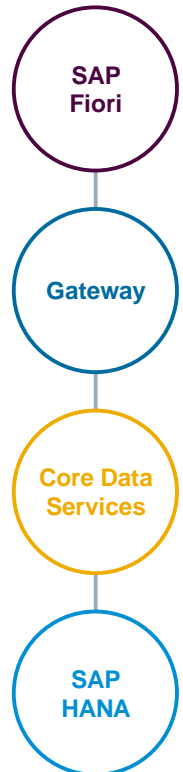
**Development of state-of-the-art web based apps**

SAP Fiori user experience on all devices drives the model

Combining transactions, search and analytics

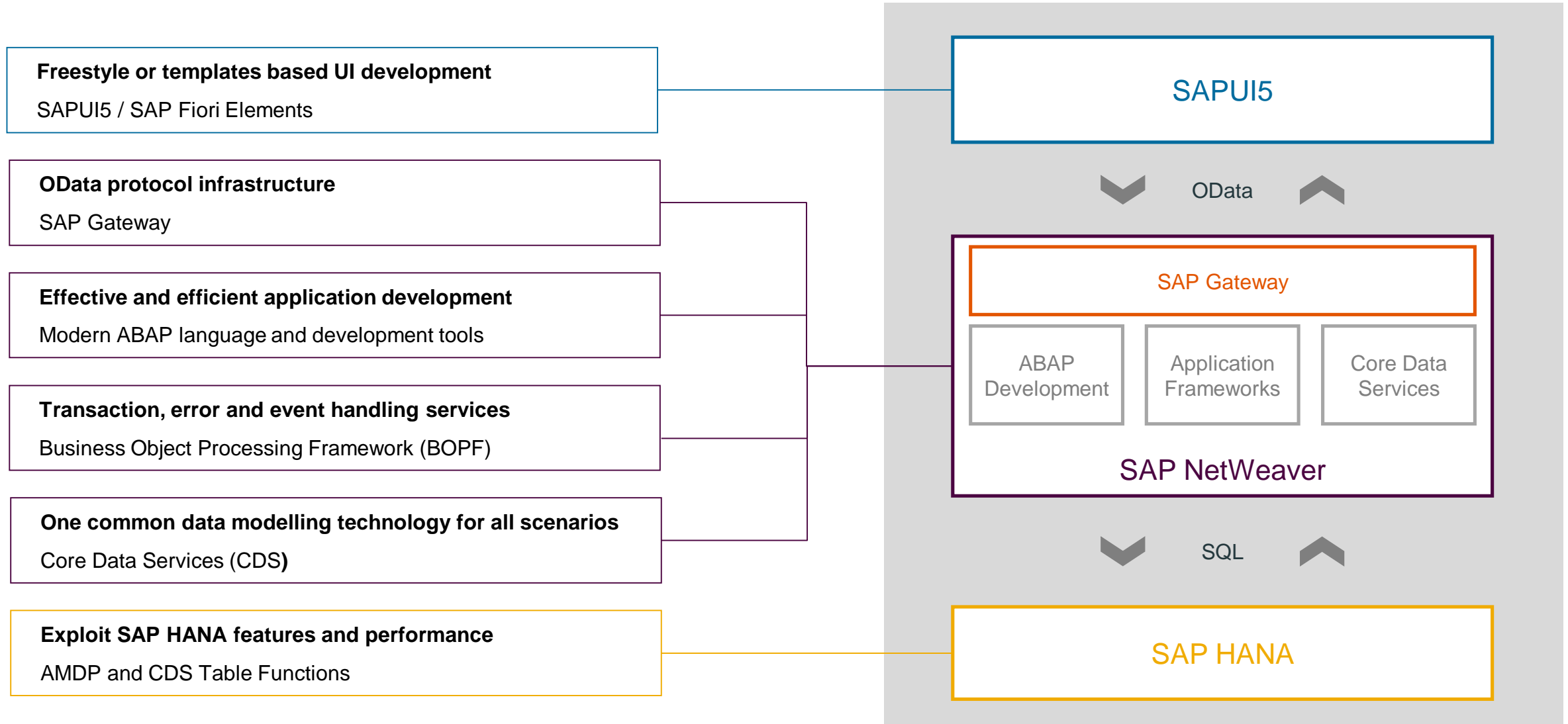
Optimized for SAP HANA

Common cloud qualities (e.g. extensibility)



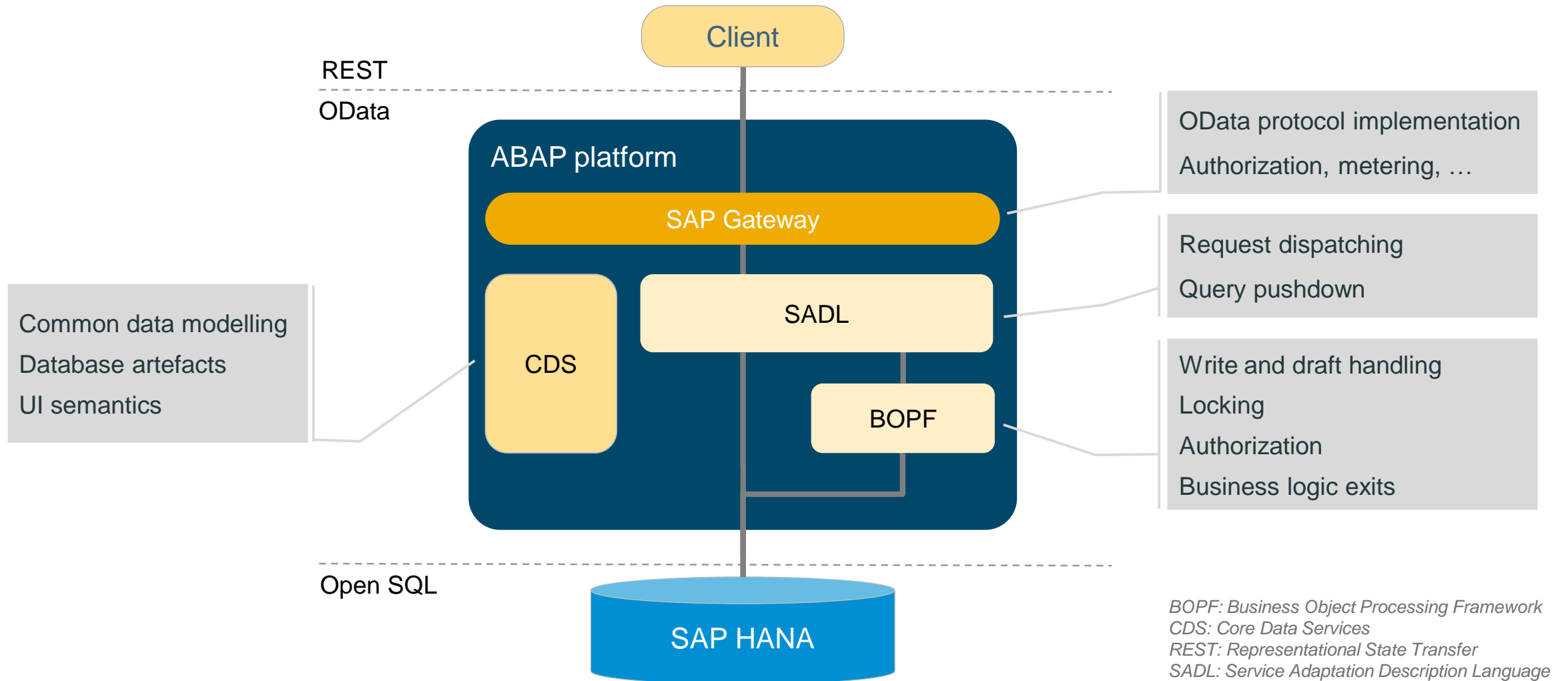
# Develop SAP HANA optimized SAP Fiori apps

## The new ABAP programming model



# ABAP programming model for SAP S/4HANA apps

## Major components and responsibilities



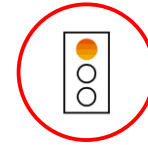
# Where to invest now to be prepared for the SAP S/4HANA programming model?



## YOU SHOULD

Follow the programming model and [best practices](#) and use...

- ▶ \*Core Data Services (CDS) for database artefacts (≥ 7.40, [Documentation](#))
- ▶ \*CDS Metadata Extensions for UI Annotations (≥ 7.51 SP2, [Documentation](#))
- ▶ \*DCL for read/query instance-based authority checks (≥ 7.50, [Documentation](#))
- ▶ BOPF stand-alone (≥ 7.40, [Documentation](#), newer releases: CDS/BOPF integration)
- ▶ \*BOPF and CDS integration including draft (≥ 7.51 SP2, [Documentation](#))
- ▶ Gateway integration of CDS or BOPF (= 7.40, [Documentation](#), newer releases: OData Exposure)
- ▶ \*OData Exposure of CDS / BOPF for SAP Fiori and future development (≥ 7.50 SP5, [Documentation](#))
- ▶ Floorplan-Manager integration of CDS and BOPF (≥ 7.40, [Documentation](#))



## DO NOT

Implement things that are already solved

- ▶ Manual implementation of **read-only calls** to DB
- ▶ Business logic mixed with **technical aspects** (e.g. locks, authority-check, LUW handling, persistency)
- ▶ Business logic mixed with **protocol specific APIs** (e.g. PBO/PAI, Gateway classes: DPC\_EXT)



## BENEFITS

Reuse / prepare your skillset and coding for the future

- ▶ Reuse CDS and DCL in SAP S/4HANA
- ▶ Lower TCD for the future: Minimal investment on technical protocol level

# ABAP Code Analysis Tools



# ABAP Code Analysis Tools

## Advanced quality assurance



**ABAP Test Cockpit** for static quality checks and unit tests on ABAP objects

**SQL Monitor** for runtime SQL performance analysis in productive ABAP-based systems

Classic performance monitoring and trace tools (SQL Trace, ABAP runtime analysis/Profiler...)

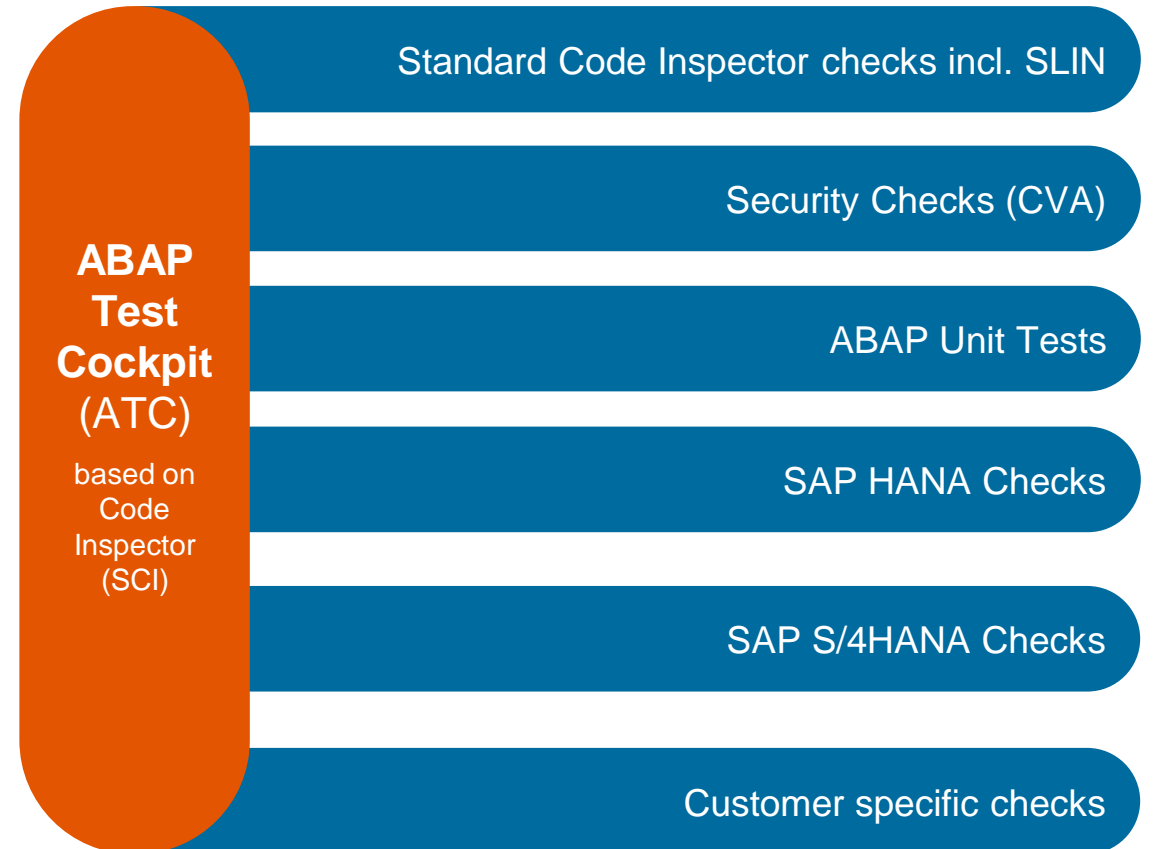
# ABAP Code Analysis Tools

## ABAP Test Cockpit - One tool for all quality aspects

- Central infrastructure for functional, performance and security code checks
- Extensible infrastructure for customer specific checks
- Uniform quality criteria for your whole system landscape
- New quality assurance processes minimize errors in productive systems
- Smooth migration of ABAP code to SAP HANA and SAP S/4HANA



More about: [ATC Introduction](#)





# ABAP Code Analysis Tools

## Remote code analysis with ATC

One **central ATC system** (SAP\_BASIS  $\geq 7.51$ ) for all static checks in your system landscape

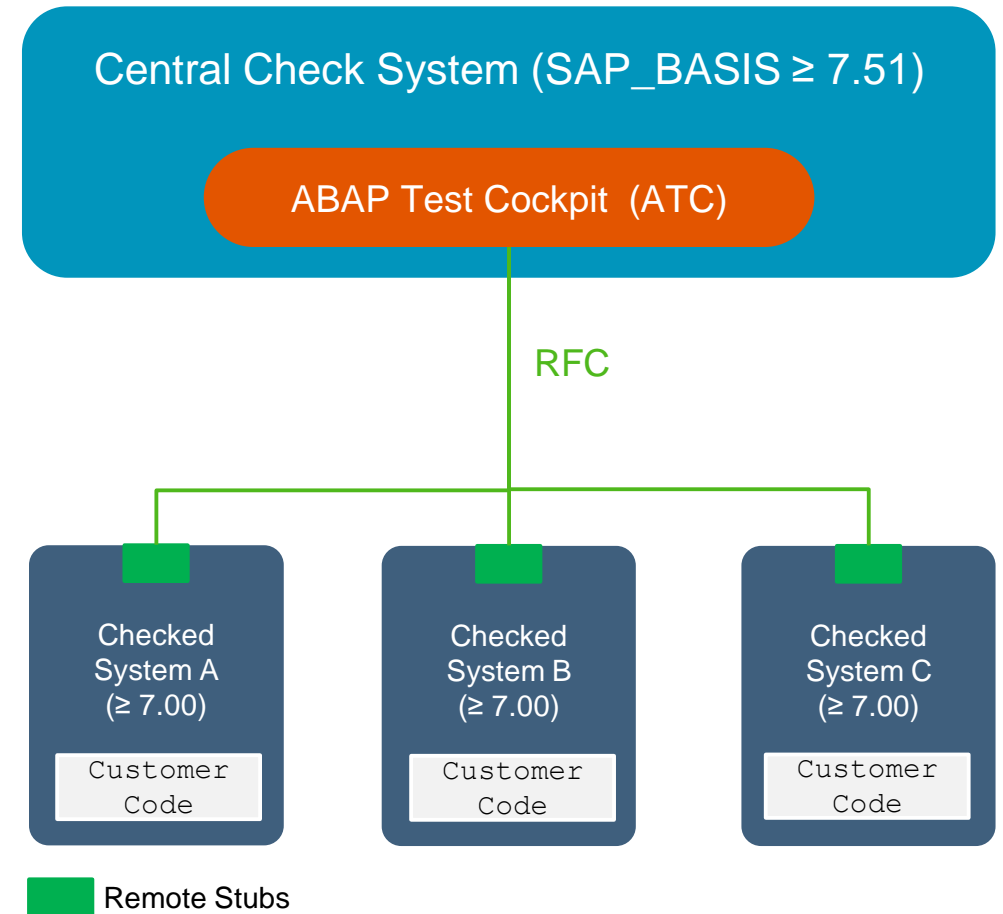
- **Remote stubs** return a model from custom code
- **Check logic** is executed on central system
- **Check variant** is maintained in central system
- **New checks** are installed on central system
- **Exemptions** are stored on central system
- **Integrated** in the development system

Minimized administration efforts

One quality standard for your whole system landscape



More about [Remote Code Analysis in ATC](#)



# ABAP Code Analysis Tools

## Baseline in ATC – Focus on findings in new or recently changed code

### Baseline concept

- Take over individual ATC results into the baseline
- Options
  - suppress all findings from the baseline (exclude from the ATC result list)
  - indicate the findings from the baseline as exempted
  - assign the low priority to the findings from baseline
- The baseline is effective as long as the related code sections remain unchanged

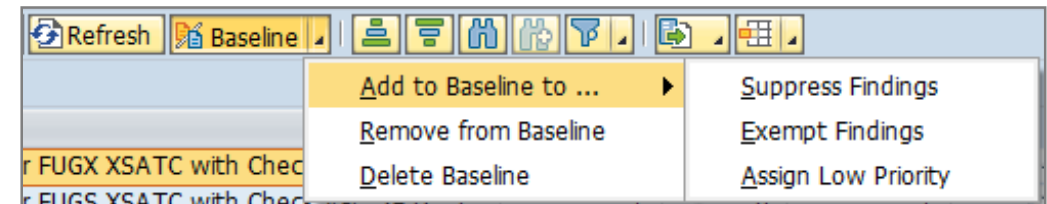
### Baseline activities

- Adding/Removing individual check results
- Deleting baseline (reset the test system to original state)



More about [Working with Baseline in ATC](#)

### Baseline management



**ABAP Test Cockpit: Manage Results**

Display Delete Copy Replicate Activate Refresh Baseline

ABAP Results

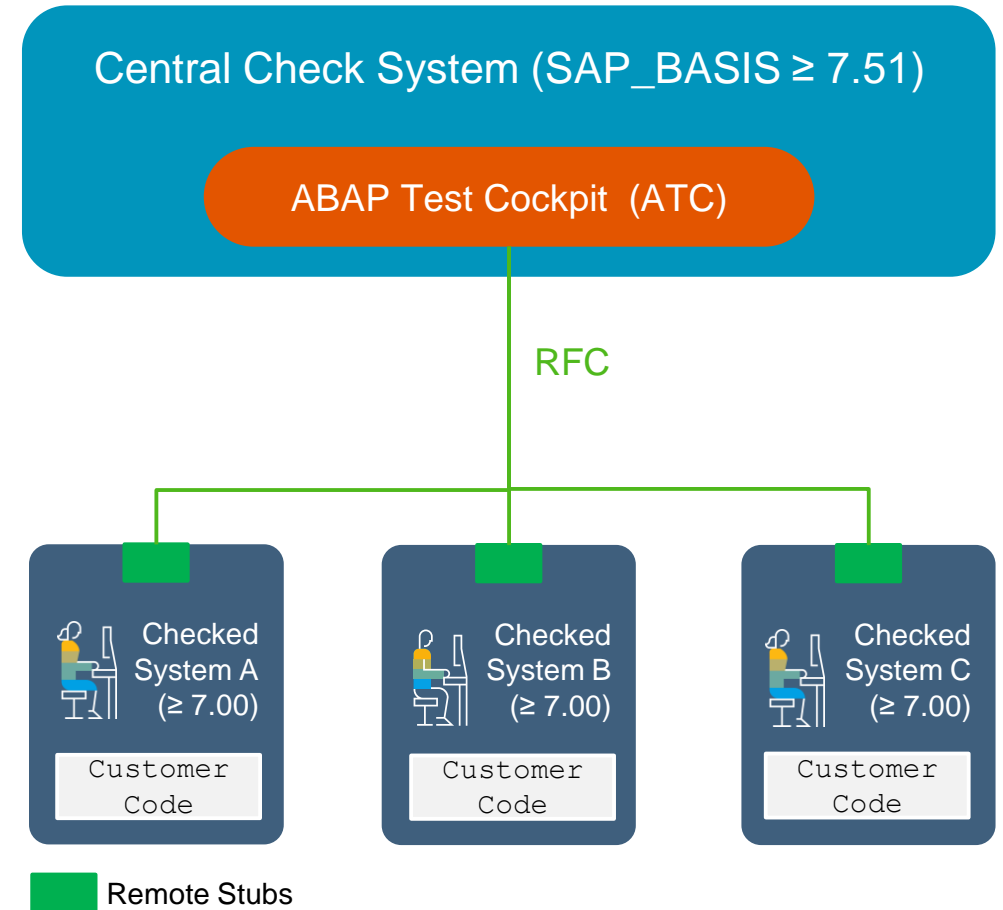
	Active	Cen...	Is in Baseline	Run...	Check Run Title
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		Created by Batman on 20160622
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		ATC CI Check for FUGX XSATC with Check
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		ATC CI Check for FUGS XSATC with Check
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		ATC CI Check for PROG SATC_TEST_PROG
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		ATC CI Check for ENHO SATC_ABAP_CHEC
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		CI SATC_API_FACTORY_REMOTE====CE

# ABAP Code Analysis Tools

## Local developer scenario for remote code analysis with ATC

All Remote Code Analysis activities during development occur in the local development system

- ▶ Execute ATC checks
- ▶ View ATC checks results
- ▶ Check transports before release
- ▶ Correct findings
- ▶ Request exemptions



More about [Remote Code Analysis in ATC for Developers](#)

# ABAP Code Analysis Tools

## Performance tuning using SQL Monitor

SQL Monitor allows to get performance data for all SQLs executed in your productive system

- ▶ What are the most expensive and most frequently executed SQLs?
- ▶ Which SQL reads/writes millions of records?
- ▶ What is the SQL profile of my transaction VA01?

SQL Monitor allows to link the monitored SQL to the driving business process

Available for SAP NetWeaver ≥ 7.00

SQL Monitor does not harm your business processes (performance overhead < 3%)



More about [SQL Monitor Guide and Best Practices](#)

**SQL Monitor**

Application Help | Log | Data | Job Overview

**State**

- Number of Records: 665.006
- Record Limit: 2.000.000
- Last State Change: 19.08.2014 / 11:46:58 (CET) by user Batman
- Last Data Action: 01.07.2014 / 09:57:04 (CET) by user Batman (refresh data)
- Scheduled Data Refresh Job: Scheduled for Job Event SAP\_RTM\_COLLECT\_ALL\_FINISHED by User
- Scheduled Deactivation: 26.08.2014 / 11:46:56 (CET) by user Batman
- Time Series: Active / Period: 1 Hours
- Activation State:  Globally Active (8 servers available)

Server Name	Expected State	Actual State	Local ...
dummy01	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> SQL Monitor is active	
dummy02	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> SQL Monitor is active	

**Activation / Deactivation**

All Servers | Deactivate

Select Servers

**Data Management**

Display Data | Delete Data

Export Data

**SQL Monitor: Top 200 records, not aggregated**

Application Help | Display Time Series | Activate/Deactivate SQL Trace | Display SQL Trace Activations | Display SQL Trace

DB Exctns	Total DB Time	Total Records	DB Mn T	Mean ...	Time/Rec	Table Names	SQL Operation	Obj. ...	Object Name	Incl.
3.313	3.107,570	0	0,938	0,000	0,000	CROSS	SELECT (Open S...	CLAS	CL_SLIN_VIRTUAL...	CL_S
1.942	2.100,806	212	1,082	0,109	9,909	SLINAUTH_CACH...	SELECT (Open S...	CLAS	CL_SLIN_AUTH_CAC...	CL_S
1.730	2.783,618	1.730	1,609	1,000	1,609	SLINAUTH_CACH...	MODIFY (Open S...	CLAS	CL_SLIN_AUTH_CAC...	CL_S
862	63.681,713	1.026.184	73,877	1.190...	0,062	AGR_HIERT	Other (ABAP SQL)	FUGR	SDBL_DYNSQL	LSDF
836	596,711	0	0,714	0,000	0,000	TADIR	SELECT (Open S...	CLAS	CL_SPAK_OBJECT_E...	CL_S
749	1.321,531	0	1,764	0,000	0,000	<NO_TABLE>	Commit	FUGR	THFB	LTHF
749	8.193,385	383.488	10,939	512,0...	0,021	AGR_HIERT	Other (ABAP SQL)	FUGR	SDBL_DYNSQL	LSDF
661	952,737	2.598	1,441	3,930	0,367	DD01L	SELECT, FOR ALL...	PROG	RADBTDFF	RADI
654	781,104	145	1,194	0,222	5,387	DD09L	SELECT (Open S...	CLAS	CL_ABAP_COMPILER...	CL_A
654	1.456,300	653	2,227	0,998	2,230	DD02L	SELECT (Open S...	CLAS	CL_ABAP_COMPILER...	CL_A
635	794,959	137	1,252	0,216	5,803	DD12L	SELECT (Open S...	CLAS	CL_ABAP_COMPILER...	CL_A
625	994,397	323	1,591	0,517	3,079	DD17S,DD03L	SELECT (Open S...	CLAS	CL_ABAP_COMPILER...	CL_A
625	1.007,215	137	1,612	0,219	7,352	DD12L	SELECT (Open S...	CLAS	CL_ABAP_COMPILER...	CL_A
620	982,767	5.163	1,585	8,327	0,190	DD04L	SELECT, FOR ALL...	PROG	RADBTDFF	RADI
558	675,007	56	1,210	0,100	12,054	DD02L	Other (ABAP SQL)	CLAS	CL_DDL_PARSER	CL_D
545	895,458	857	1,643	1,572	1,045	DD02B,DD02BND	Other (ABAP SQL)	CLAS	CL_DDL_PARSER	CL_D
545	816,005	6.269	1,497	11,503	0,130	DD03ND	Other (ABAP SQL)	CLAS	CL_DDL_PARSER	CL_D

# ABAP Code Analysis Tools

## AS ABAP 7.52 features overview

### ABAP Test Cockpit

- Improve coverage of checked source code
  - Scan all custom code in enhancements, modifications, customer EXITs, Smart Form
  - Ignore findings in SAP Includes, generated code
- Additional information in ATC result list with filtering and sorting capabilities
  - Display of simplification item information in ATC result list, e.g. OSS note

### SQL Monitor

- Support for CDS entities and AMDPs
- New default settings for Time Series

### ATC findings in Modifications

```
37 exceptions others = 1.
38 if sy-subrc <> 0.
39   message e003(oo) with cifkey.
40 endif.
41 *{ INSERT MO2K900699 1
42
43 DATA: wa_vseoclass TYPE vseoclass.
44
45 SELECT * FROM vseoclass INTO TABLE @DATA(it_vseoclass).
46
47 READ TABLE it_vseoclass INDEX 1 INTO wa_vseoclass.
48
49 IF wa_vseoclass-clsfinal = 'X'.
50   WRITE: 'Final Class exists'.
51 ENDIF.
52
53
54 *} INSERT
55
56 case cifref->clstype.
57   when seoc_clstype_class.
```

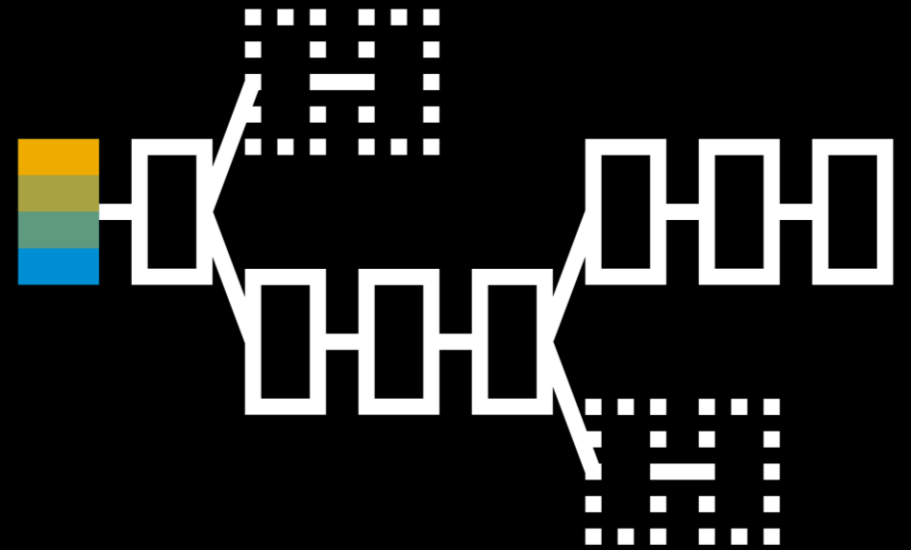
ATC Problems

DEV | S4HANA\_READINESS | Last Check Run

type filter text

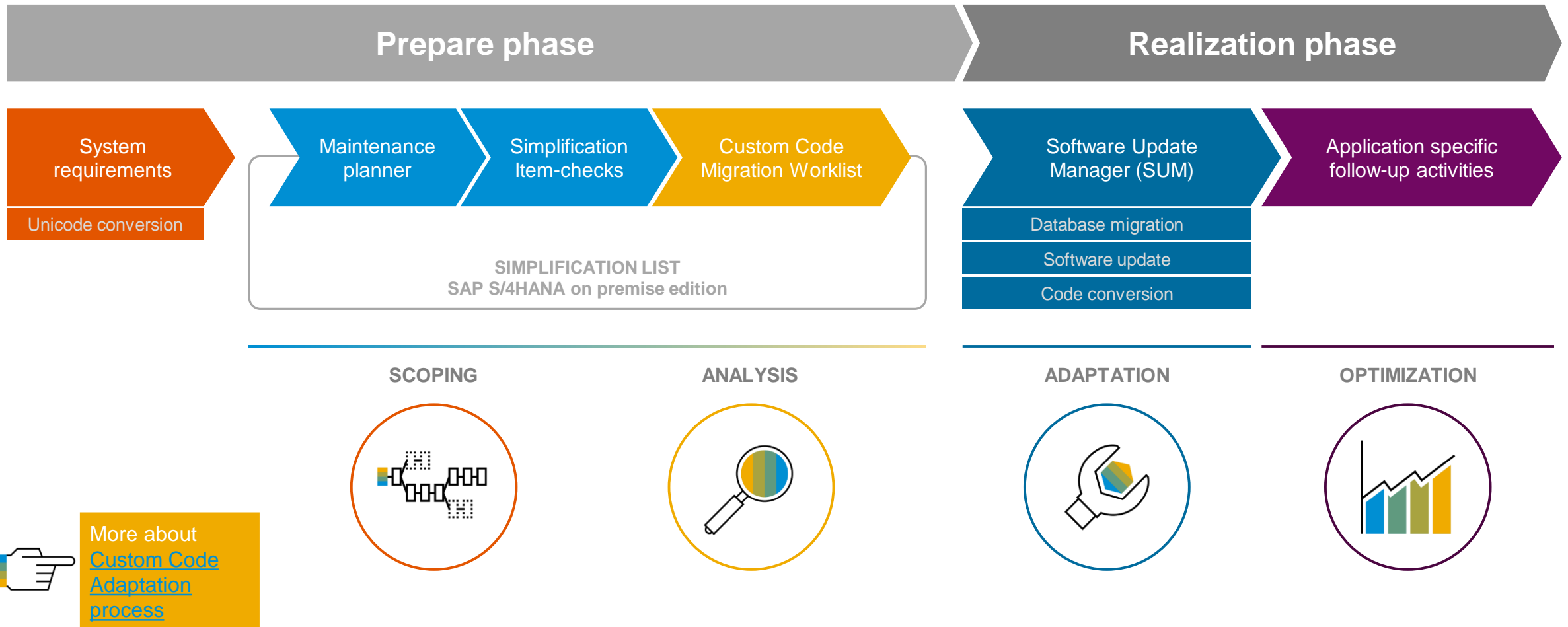
Description	Check
Worklist: 1 Infos	
Infos (1)	
READ TABLE ... INDEX 1 for result of statement at Include SEO_CLASS_OUTPUT line 45	Search problematic statements for result of SELECT/OPEN CURSOR without ORDER BY

# Custom code adaptation for SAP S/4HANA



# SAP S/4HANA system conversion

## Custom code related process

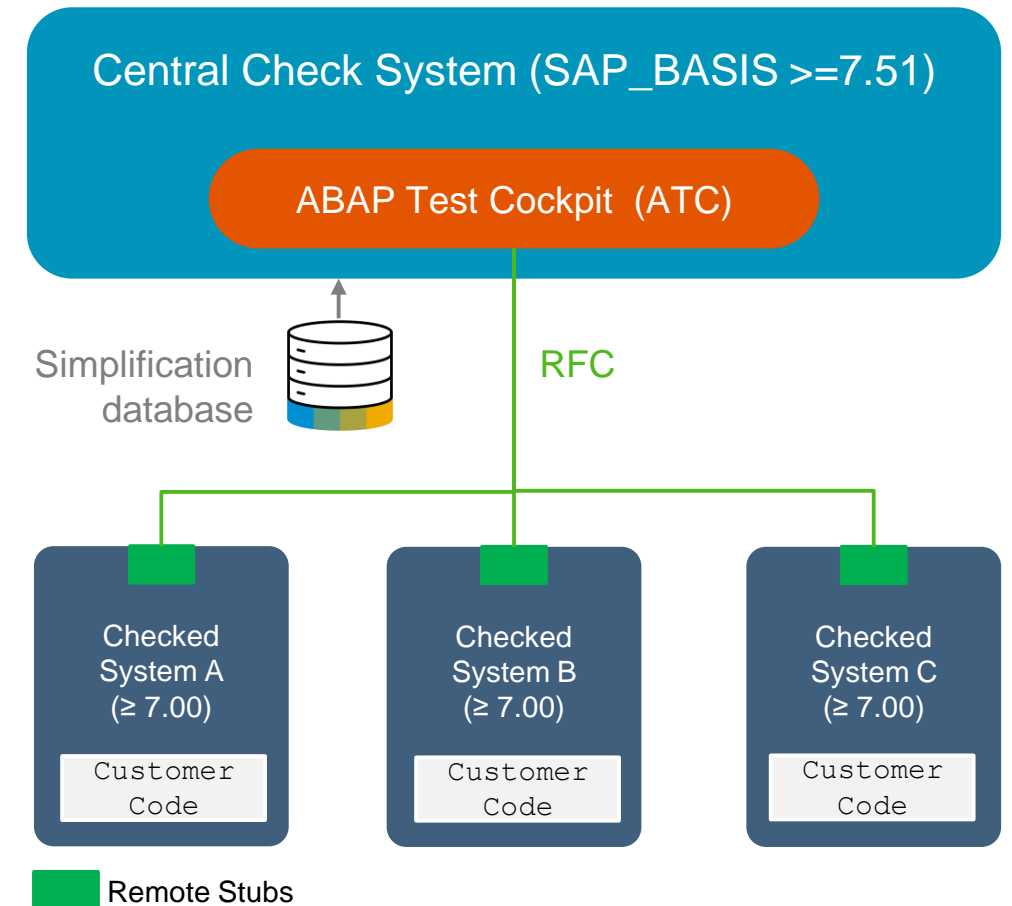




# Custom code adaptation for SAP S/4HANA

## Setup the remote ATC checks for SAP S/4HANA

- I. **Setup** remote ATC in central system and implement the SAP Note 2436688
- II. **Download** the newest version of the Simplification Database from SAP Service Marketplace (SAP Note 2241080)
- III. **Install** the Simplification Database on the central check system (transaction SYCM)
- IV. **Run** ATC with check variant S4HANA\_READINESS\_REMOTE
- V. **Analyze** the ATC result list



More about [Technical setup of remote ATC](#)



# Custom code adaptation for SAP S/4HANA

## SAP S/4HANA readiness checks in AS ABAP 7.51/7.52

### Simplification use cases

- ▶ Functionality not available anymore
- ▶ Data model changes
- ▶ Data type changes

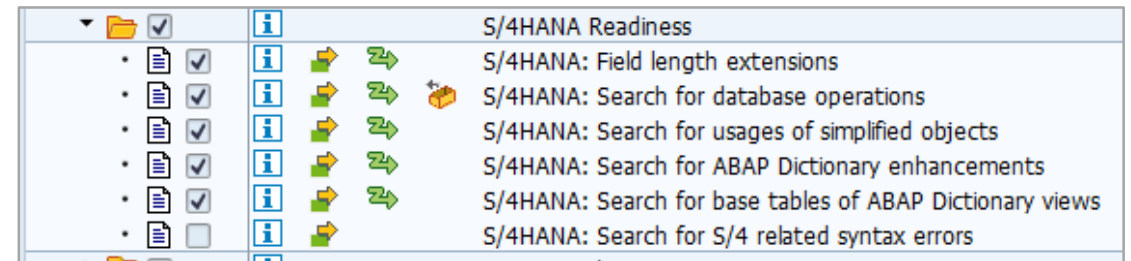
### SAP HANA use cases

- ▶ Usage of DB vendor specifics (native SQL)
- ▶ DB operations on pool / cluster tables
- ▶ SELECT / OPEN CURSOR statements without ORDER BY

### Use check variant

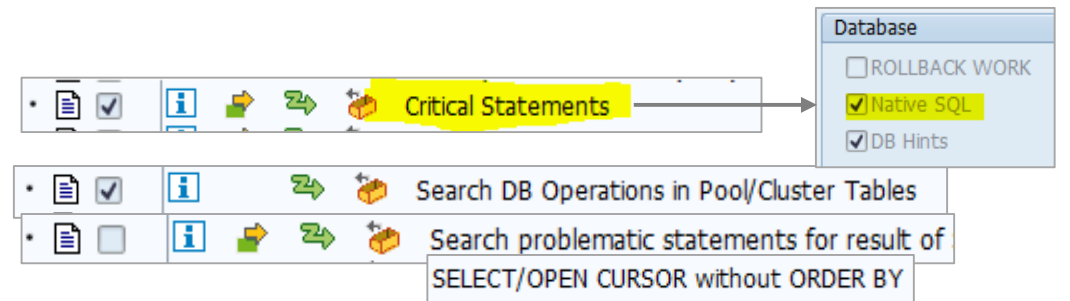
- ▶ **S4HANA\_READINESS\_REMOTE**

### SAP S/4HANA checks



S/4HANA Readiness	
<input checked="" type="checkbox"/>	S/4HANA: Field length extensions
<input checked="" type="checkbox"/>	S/4HANA: Search for database operations
<input checked="" type="checkbox"/>	S/4HANA: Search for usages of simplified objects
<input checked="" type="checkbox"/>	S/4HANA: Search for ABAP Dictionary enhancements
<input checked="" type="checkbox"/>	S/4HANA: Search for base tables of ABAP Dictionary views
<input type="checkbox"/>	S/4HANA: Search for S/4 related syntax errors

### SAP HANA checks



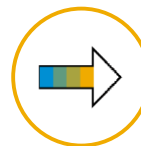
Database

- ROLLBACK WORK
- Native SQL
- DB Hints

Critical Statements

Search DB Operations in Pool/Cluster Tables

Search problematic statements for result of SELECT/OPEN CURSOR without ORDER BY



Check variant **S4HANA\_READINESS\_REMOTE** includes **SAP S/4HANA** and **SAP HANA** checks

# What you can do today in your SAP Business Suite landscape

## Get your custom code prepared for SAP S/4HANA



### YOU SHOULD



#### Collect productive usage and SQL execution data

Switch on [SCMON](#)

Switch on [SQL Monitor](#)



#### Create new code already SAP S/4HANA ready

[Setup remote ATC](#)

Use SAP S/4HANA ATC checks in your dev system



#### Educate your developers to be SAP S/4HANA ready

Gain practical skills in ADT in Eclipse

Get familiar with SAP S/4HANA must-have technologies  
(e.g. SQL, [CDS](#), [BOPF](#), OData)



### YOU COULD



#### Start to adapt your code in your dev system

Convert to Unicode

Fix SAP HANA ATC findings (e.g. NO ORDER)

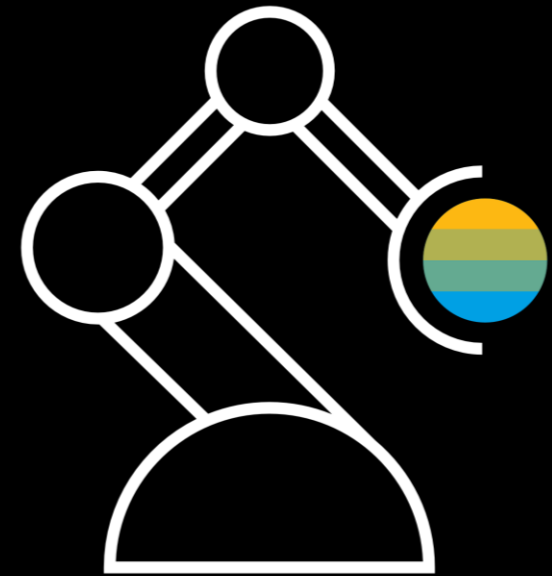
Optimize performance critical SQLs found in SQL Monitor



#### Estimate custom code adaptation efforts

Run SAP S/4HANA ATC checks for all custom code

# Real-time events and Industrial IoT



# Real-time events and Industrial IoT

## Real-time user experience

- ▶ Always up-to-date data on UI
- ▶ Immediate reaction to events

## ABAP Channels

- ▶ ABAP Push Channel (APC)
- ▶ ABAP Messaging Channel (AMC)
- ▶ Collaboration, Industrial IoT scenarios
- ▶ Recommended for productive use cases with SAP NetWeaver AS ABAP 7.4 SP08

## ABAP Daemons

- ▶ Always available ABAP sessions to handle events
- ▶ General availability: SAP NetWeaver AS ABAP 7.52



# ABAP Channels

No polling. Collaboration. Industrial IoT.

## ABAP Push Channel – No polling

- WebSockets in ABAP
- UI automatically updates when data changes

## ABAP Messaging Channel – Collaboration

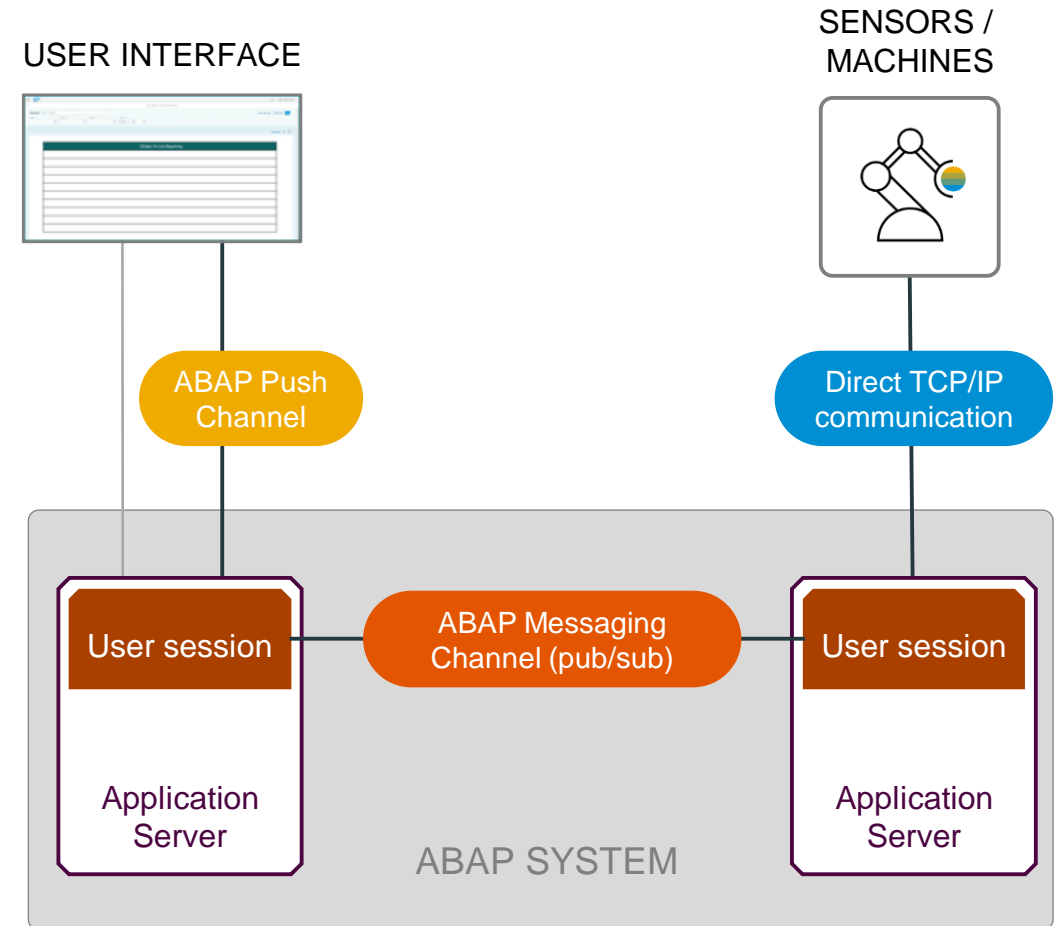
- Pub/sub infrastructure to exchange messages between sessions
- Data changes are published to subscribed clients immediately

## Industrial IoT

- Direct communication with sensors/machines
- Support native TCP/IP protocols



More about: [Introduction to ABAP Channels](#)



# ABAP Daemons in AS ABAP 7.52

Always available ABAP sessions to handle real-time events

## Features

- Similar to Windows Services or Linux cron jobs
- Long-lived: once started, there is no limit for the lifetime
- Robust against errors (E/A/X messages)
- Event-driven programming model, similar to ABAP Channels

## Supportability and Security

- Monitor ABAP Daemons (SMDAEMON), standard ABAP supportability tools for debugging, runtime analysis (SAT), kernel statistical records (STAD, STATS)
- Only client-specific and inside of an ABAP system, daemon user account must have S\_RFC authority rights



More about [ABAP Daemons](#)

## Implement a daemon application

The screenshot shows two overlapping SAP IDE windows. The top window displays the class hierarchy for CL\_AD\_EXT\_SIMPLE\_DAEMON, showing it inherits from CL\_ABAP\_DAEMON\_EXT\_BASE. The bottom window shows the method list for CL\_ABAP\_DAEMON\_EXT\_BASE, including methods like IF\_ABAP\_DAEMON\_EXTENSION-ON\_ACCEPT, IF\_ABAP\_DAEMON\_EXTENSION-ON\_START, IF\_ABAP\_DAEMON\_EXTENSION-ON\_MESSAGE, IF\_ABAP\_DAEMON\_EXTENSION-ON\_STOP, IF\_ABAP\_DAEMON\_EXTENSION-ON\_ERROR, IF\_ABAP\_DAEMON\_EXTENSION-ON\_RESTART, IF\_ABAP\_DAEMON\_EXTENSION-ON\_BEFORE\_RESTART\_BY\_SYSTEM, IF\_ABAP\_DAEMON\_EXTENSION-ON\_SERVER\_SHUTDOWN, and IF\_ABAP\_DAEMON\_EXTENSION-ON\_SYSTEM\_SHUTDOWN.

## Monitor active daemons with SMDAEMON

ABAP Daemons of AS Instance				
ABAP Daemon Application ID	ABAP Daemon Session	ABAP Daemon Name	ABAP Daemon State	Client Use
CL_AD_EXT_SIMPLE_DAEMON	T18*****	simple_daemon_*****	Processing	000
CL_AD_EXT_SIMPLE_DAEMON	T17*****	simple_daemon_*****	Idle	000

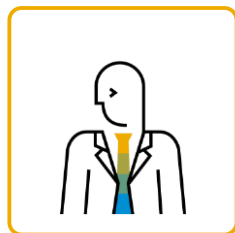
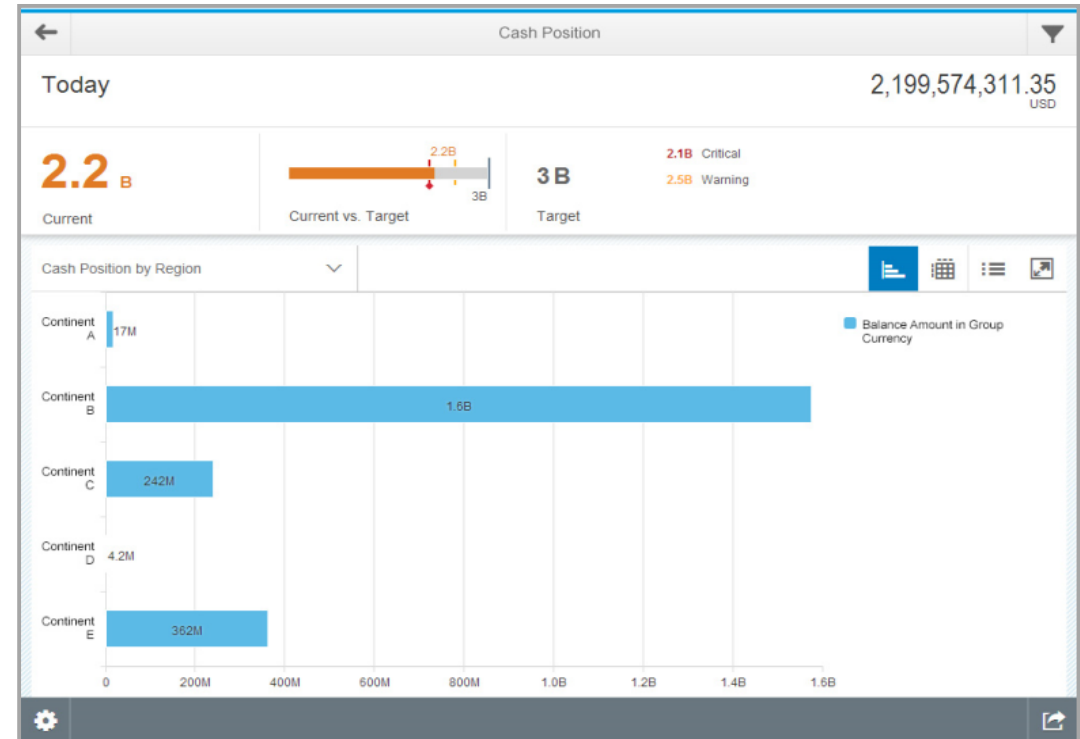
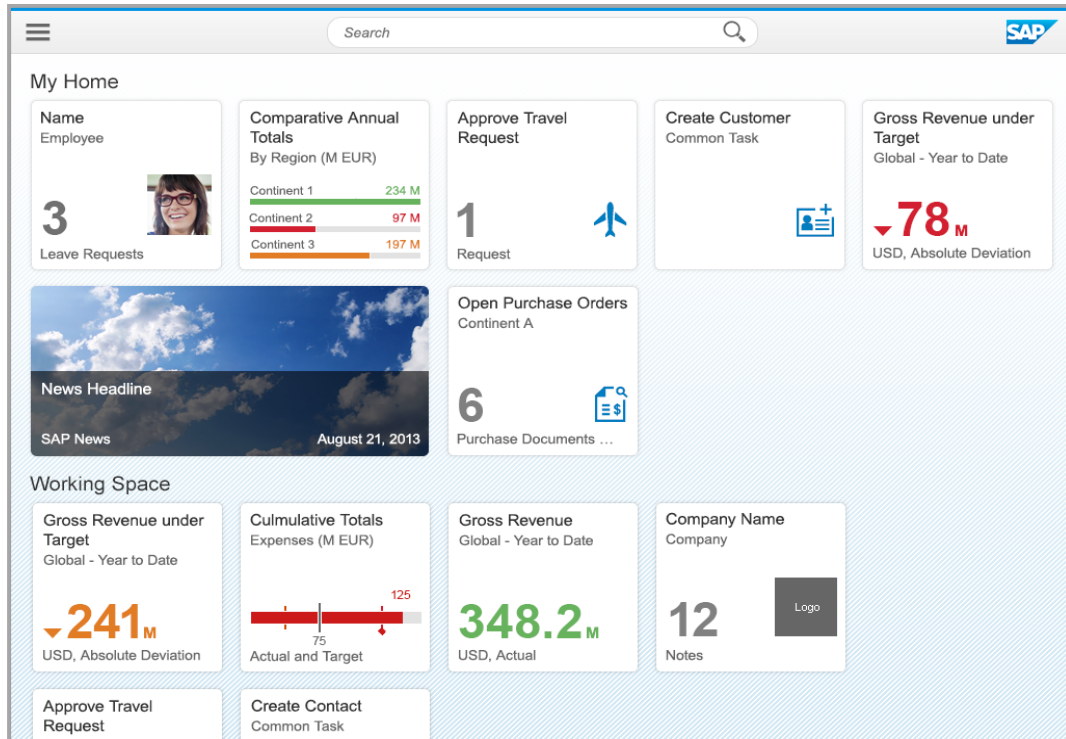
# **SAP S/4HANA Extensibility**



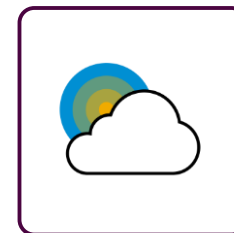


# SAP S/4HANA Extensibility

In-app extensibility and side by side extensibility



Key user can do **easy changes directly in the app**

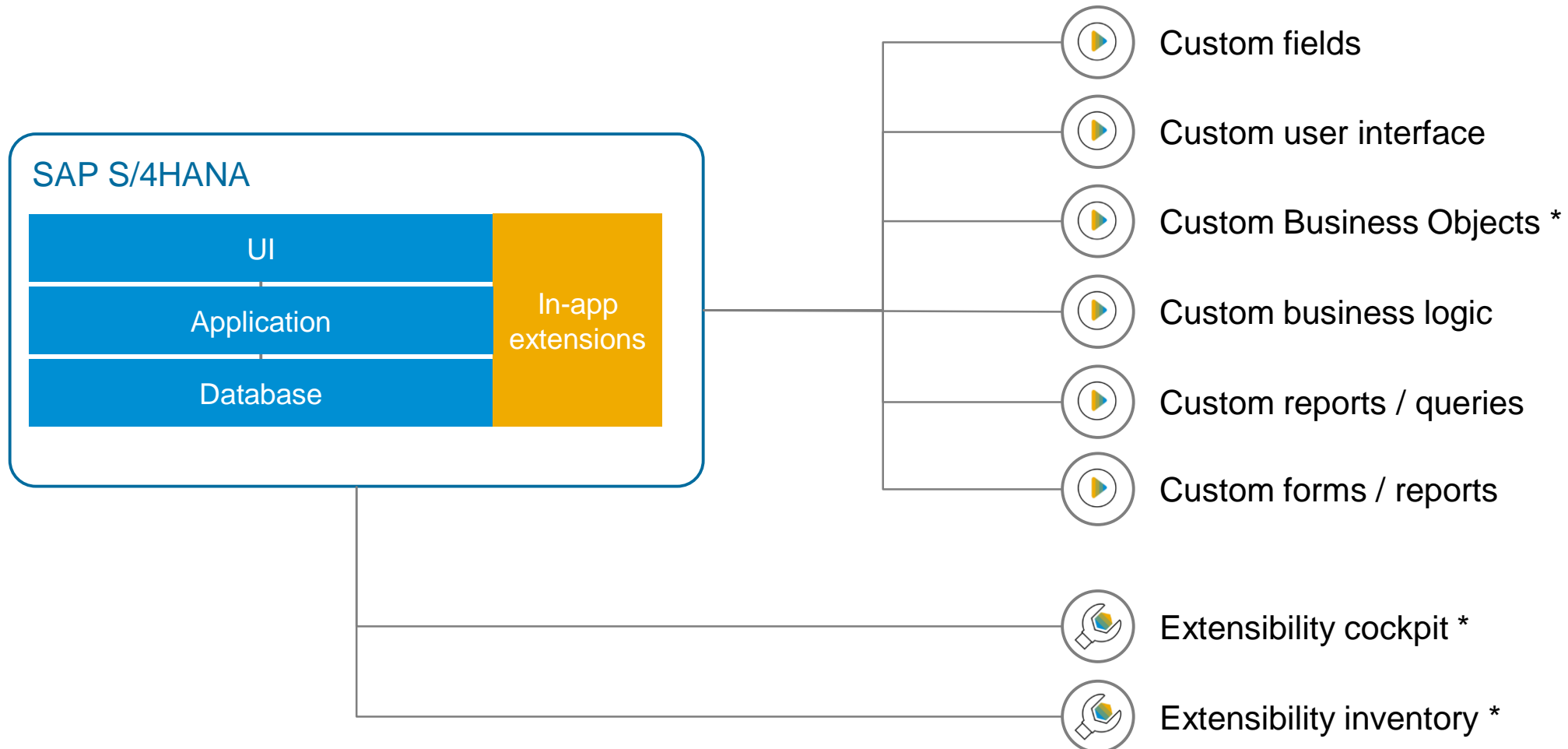


**SAP Cloud Platform** for side by side extensions and cloud integration



# SAP S/4HANA Extensibility

## In-app extensibility



# SAP S/4HANA Extensibility

## Side by side extensibility using SAP Cloud Platform

- **Building new applications**  
General IoT services and industry use-case support Partner services

### Extending SAP solutions

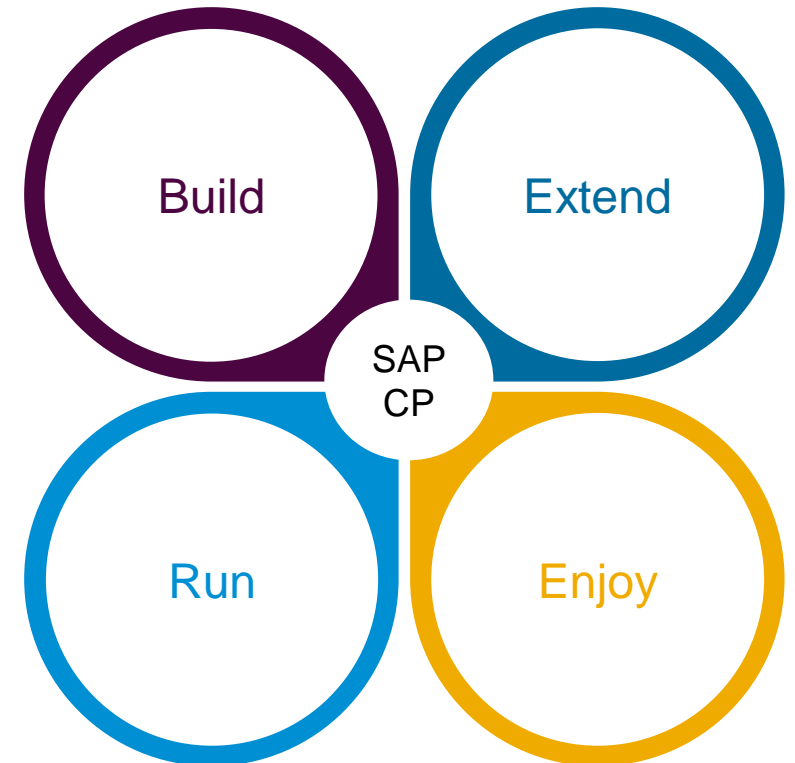
- Support additional SAP SuccessFactors modules, extensions for SAP Ariba  
Try, explore and run SAP Fiori applications in the cloud  
Extensions to SAP S/4HANA

### Running applications

- Enhanced monitoring  
Improvements for business continuity and scalability  
Platform APIs

### Developer experience

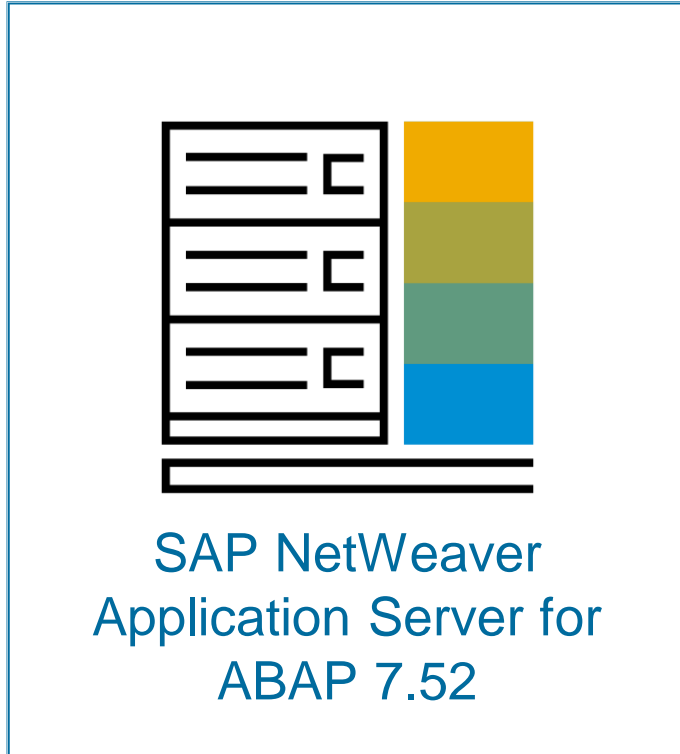
- Deepen commitment to open source communities  
Support additional runtimes and infrastructure services  
Developer Portal / API Marketplace



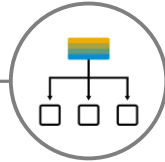
# Summary



# Key takeaways



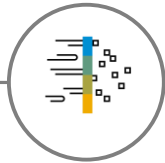
First class development experience in Eclipse using enriched ABAP language



Common data model with CDS and various SAP HANA optimizations



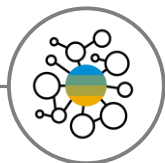
Efficient programming model for SAP Fiori applications



Best quality assurance with code analysis tools, efficient custom code adaptation for SAP S/4HANA



Extensible to the cloud with SAP Cloud Platform



Real-time events with ABAP Channels and ABAP Daemons, and Industrial IoT support

# Further Information

## SAP Community

- [Links collection about AS ABAP 7.52](#)
  - <https://go.sap.com/community/topic/abap.html>
  - <https://go.sap.com/community/topic/abap-connectivity.html>
  - <https://go.sap.com/community/topic/abap-extensibility.html>
  - <https://go.sap.com/community/topic/abap-testing-and-analysis.html>
- ABAP Development Community
  - ABAP Connectivity Community
  - ABAP Extensibility Community
  - ABAP Testing and Analysis Community

## Developer on sap.com

- <https://www.sap.com/developer/topics/abap-platform.html>

## SAP Help Portal

- [https://help.sap.com/viewer/p/SAP\\_NETWEAVER\\_AS\\_ABAP\\_752](https://help.sap.com/viewer/p/SAP_NETWEAVER_AS_ABAP_752)

# Thank you

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