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Insights on Using SAP HANA Platform, SAPUI5 and XS OData Services to build Analytical Applications

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- SAP HANA® - Robust Application Development Platform
- Native SAP HANA Development
- XS OData REST based Services
- SAPUI5 Overview
- Example Custom Application Business Scenario
- Best Practices in Building XS OData based Application



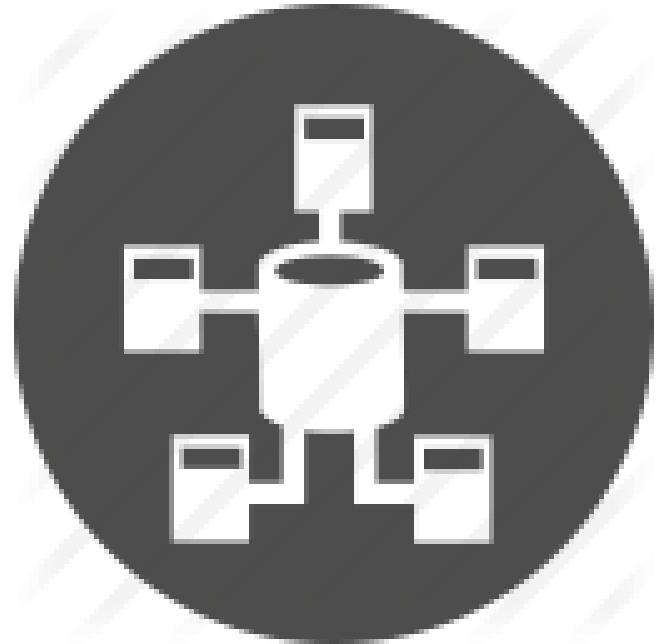
SAP HANA - Robust Application Development Platform

SAP HANA is a platform (not just DB)

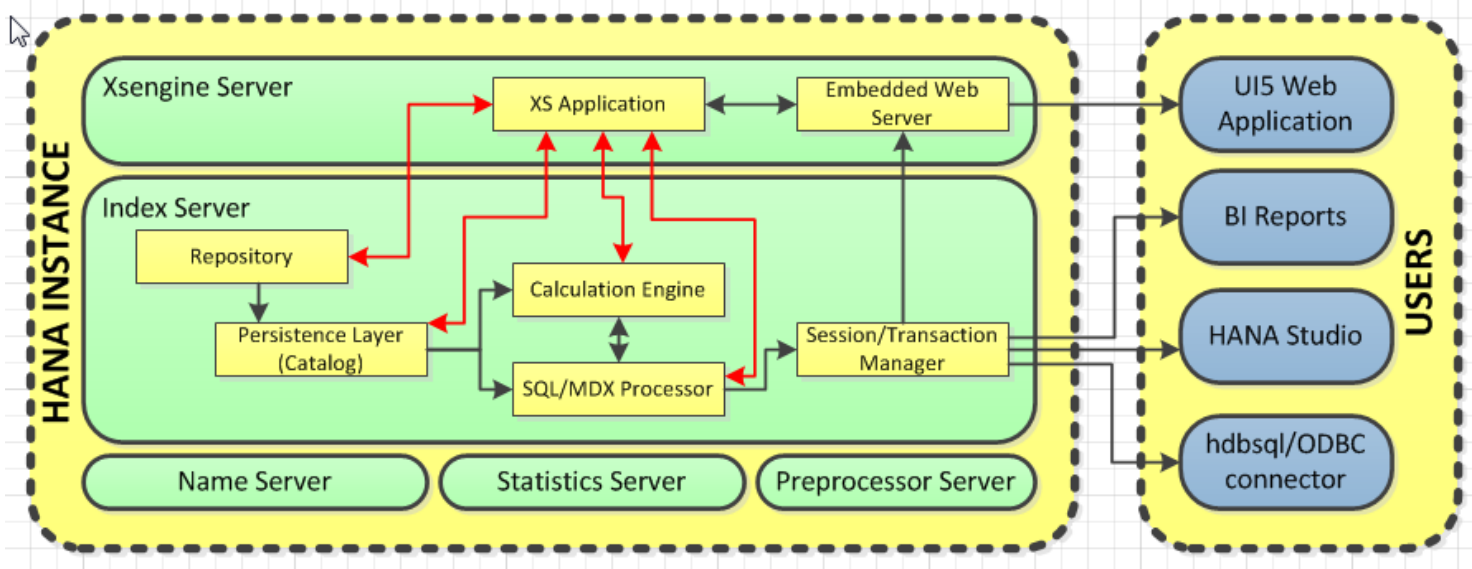
- OTLP + OLAP
- Embedded business logic
- Embedded Web/App Server

Platform Features

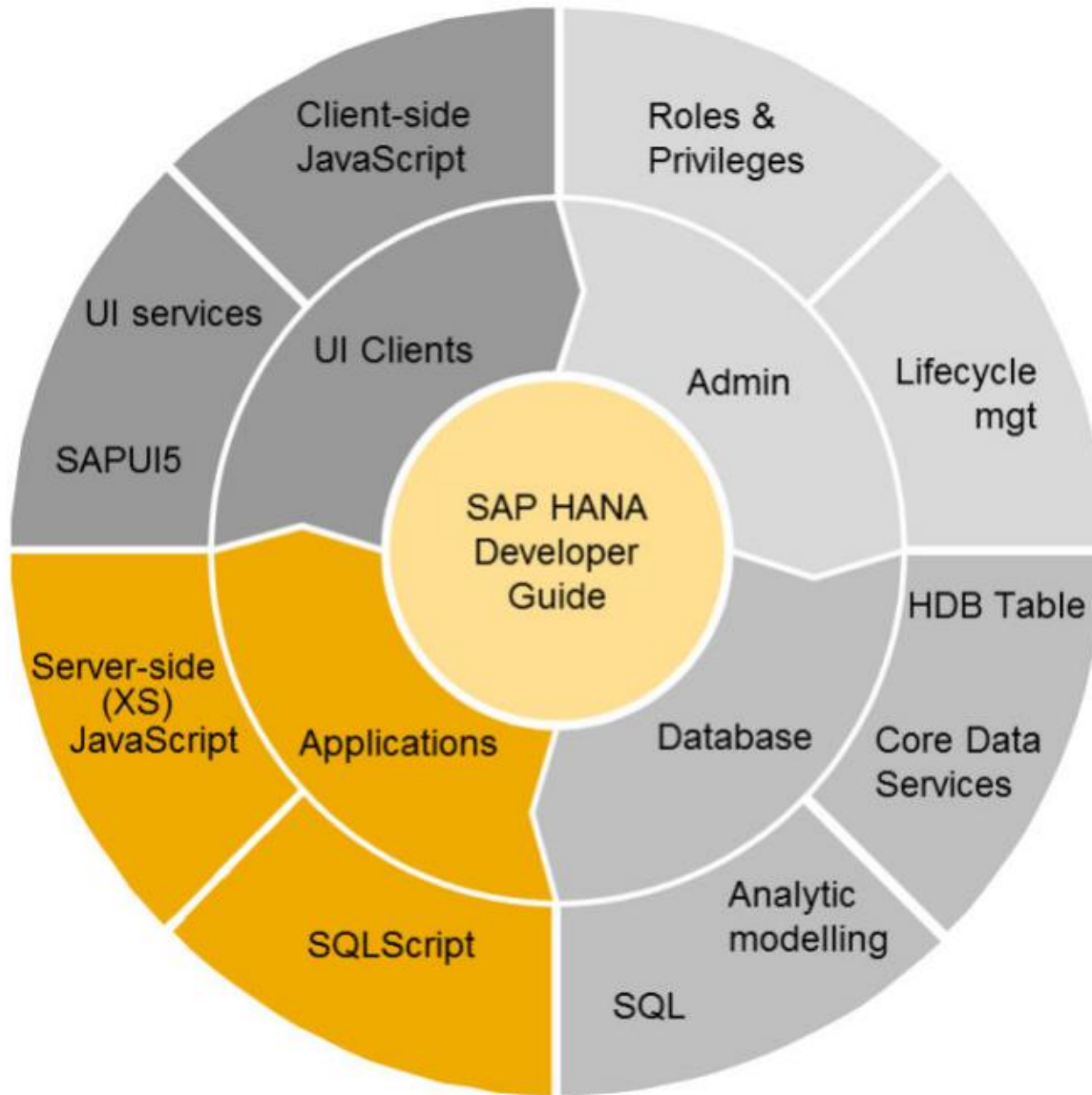
- DB for Transactions, analytics,
- Predictive, sentiment, and spatial
- Integration with Big Data (Hadoop), IOT, Streaming, HANA Vora
- Real-time business operations, Native Web/Mobile App development
- Supports any application
 - 60% of SAP HANA use cases are outside the SAP landscape
 - Hundreds of startups are developing on SAP HANA



- **SAP HANA Extended Application Services (just XS for short) is a key aspect of SAP HANA as a platform**
 - Design-time Repository client provides central object management
 - Run-time server-side application processing (SQL, SQLScript, JavaScript, R, OData)
 - Run-time client-side application presentation (html, JavaScript, SAP UI5)
- **XS is a small-footprint application server, web server, and basis for an application development platform**
- **XS is actually an extension of, and tightly integrated into, the SAP HANA Database**



SAP HANA Application Development Platform





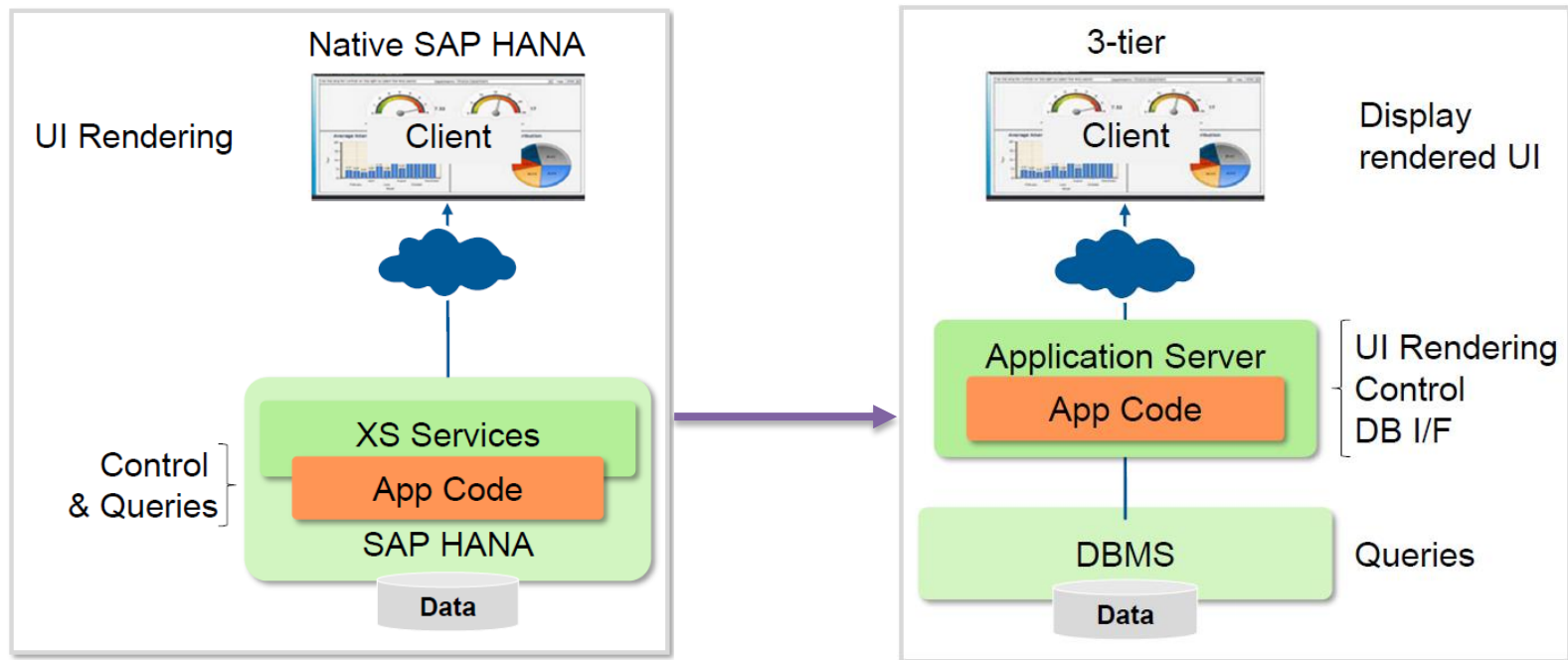
SAP HANA Native Application Development

Native SAP HANA Applications:

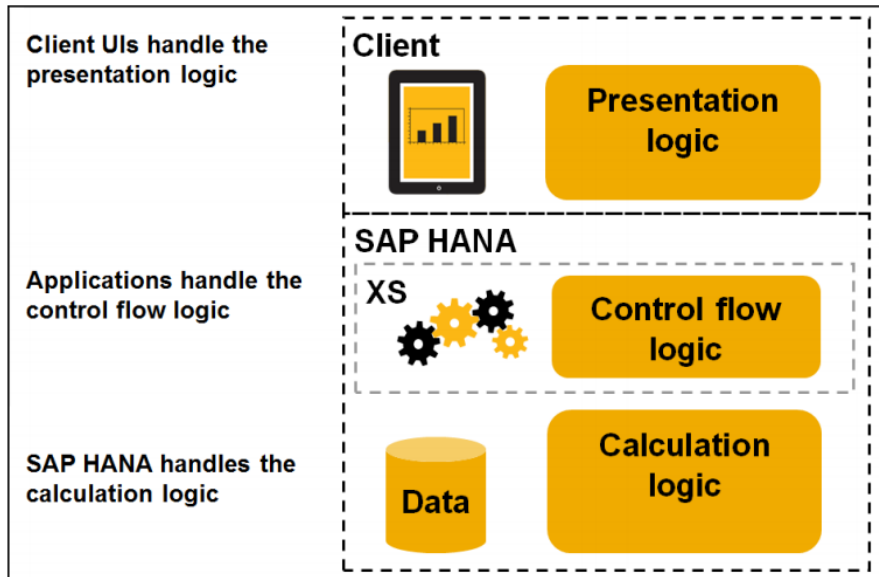
- Applications written for SAP HANA XS, for example, in: server-side JavaScript, ODATA, XMLA/MDX

Non-Native SAP HANA Applications:

- Applications developed externally, for example, in: ABAP, JAVA, .Net ...



SAP HANA Native Applications - Summary



Calculation Logic

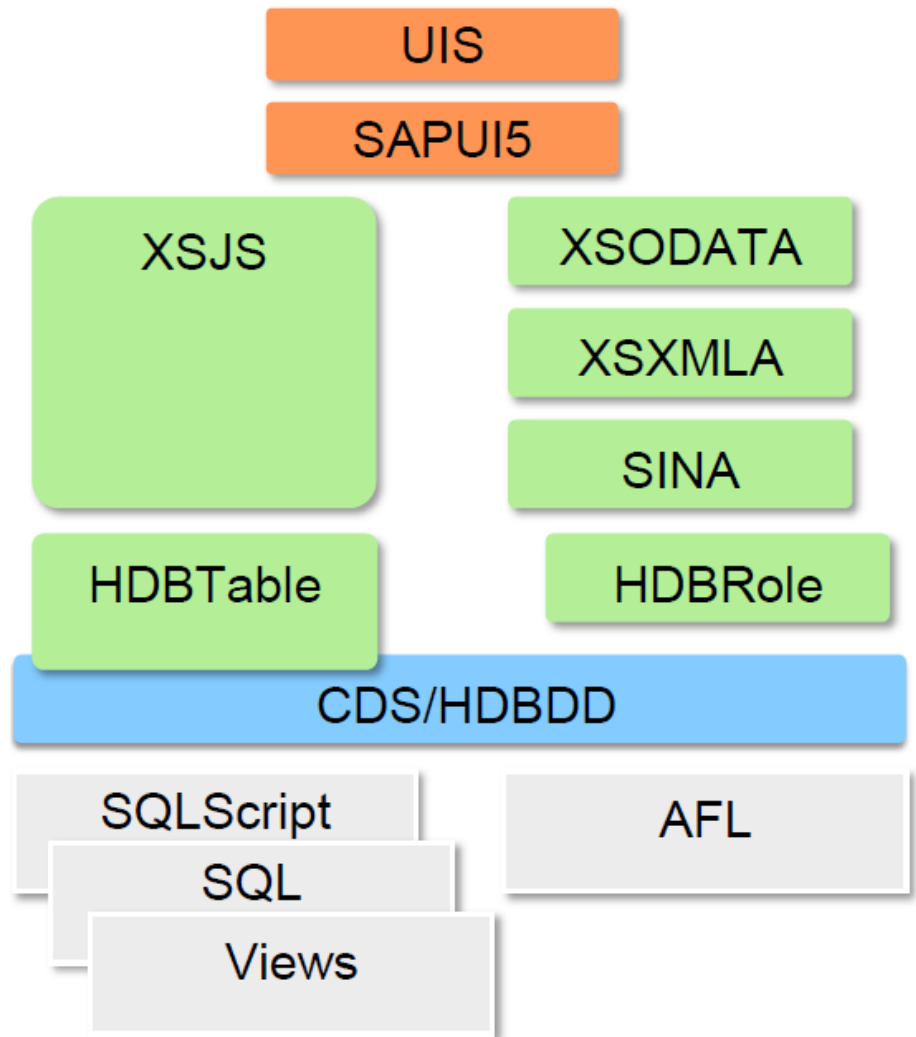
- Data: SQL/SQLScript, CDS/HDBDD, HDBTable.
- SQLScript, SQL, Views
- Calculation Engine Functions
- Application Function Library (AFL)

Control Flow logic

- XSJS, XSOData, XSXMLA
- HDBRole

Client UI/front-end technology

- HTML5/SAPUI5
- Client-side JavaScript



Implementation Stack

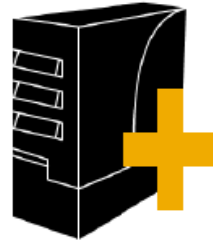
- Simplified Stack
 - No separate App/Web Server (so no connectivity issues / network roundtrips)
 - Deep Integration between XS App and SAP HANA DB
 - Communication using Native Data Types
 - XS Engine is a process within SAP HANA Server (Inter-process communication)

Unified development Tools

- SAP HANA Studio – Integrated IDE
 - SQL Scripts, Application Logic, Rich UI Development (HTML5)
 - Unified Lifecycle Management
 - Single Version Control System
- Iterative Development and testing
 - Test / Debug without Deploying
- ✓ **Can build simple analytical application as well as Complex, high-speed business apps in robust environment**



**SAP HANA
Development
System**



**SAP HANA
QA/Test
System**



**SAP HANA
Productive
System**



Connect SAP HANA studio to the SAP HANA system

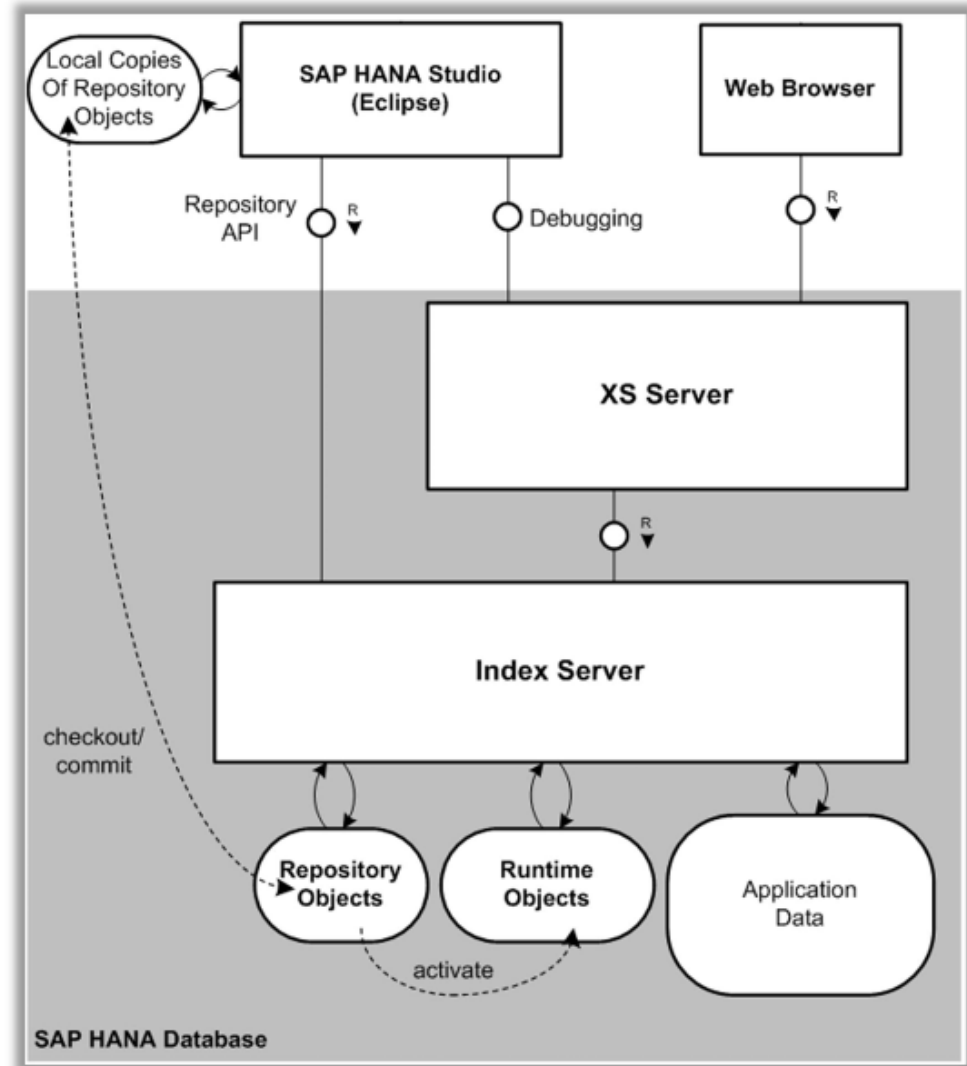
Repository integration

Design-time objects

Repository: transportable

Runtime objects

Catalog: activated



- **XS OData Services**
 - Embedded in XS Engine
 - Easily expose tables, views and procedures to Front-end
 - Supports Read-only and Create/Update/Delete

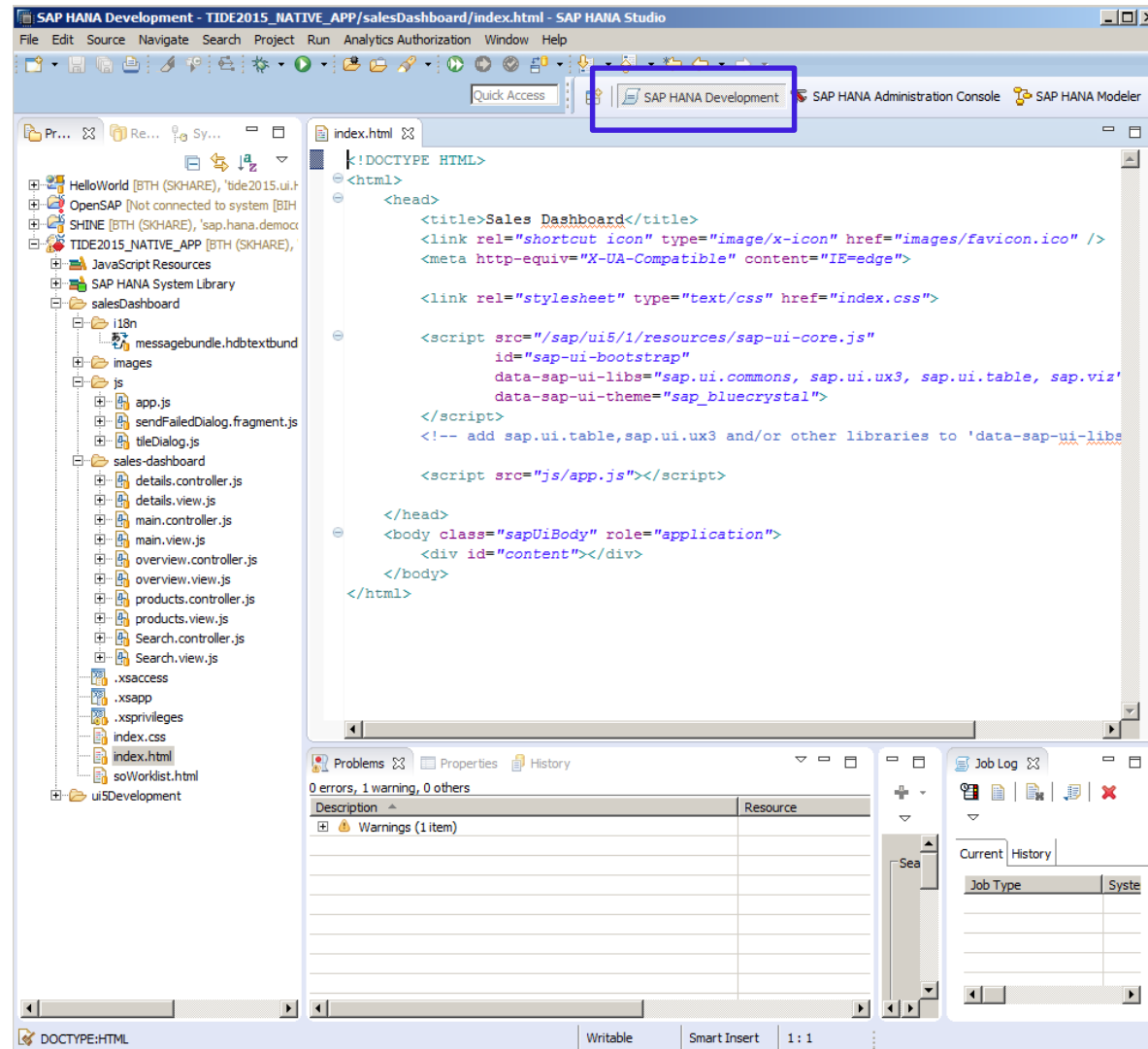
- **Server-side Logic in JavaScript**
 - Complex processing logic, use the power of SAP HANA
 - Common Language for Front-end & Back-end
 - Not the easiest to Debug
 - Invoke SQL Procedures

- **Eclipse-based SAP HANA Studio and Web IDE for Development**
 - XS OData, Core Data Services - CDS, Server-side JavaScript
 - SAP UI5 Front-end Code
 - Lifecycle Management
 - Add-on Tools and Templates

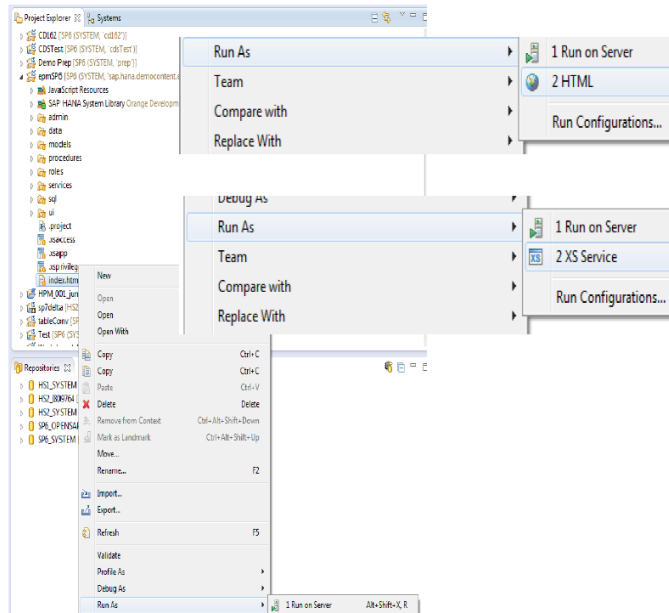
SAP HANA Studio (Development Perspective)

- Eclipse Bases Extensible Development Environment for Building SAP HANA Native Apps
 - Project Explorer
 - Repositories
 - Systems
 - Workspaces
 - Shared Projects (XS, SAP UI5 etc.)
 - Wizard for different types of files
 - Code Templates (e.g. XSJS)
 - Syntax Checking

- Development, Testing, Debugging, Lifecycle Management

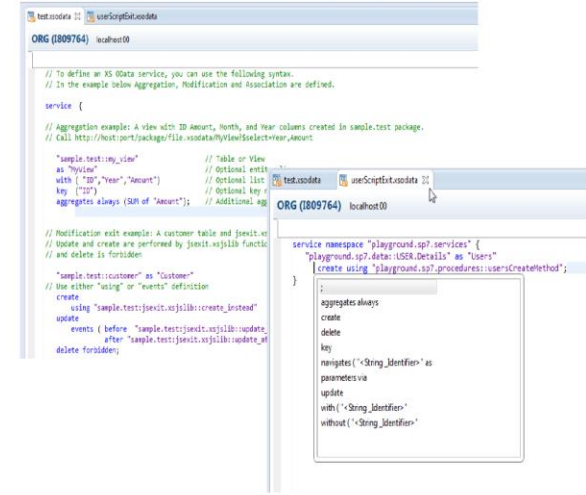
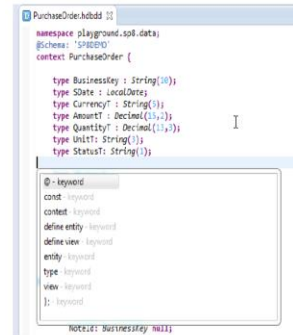


SAP HANA Studio Advanced Features (Run As, Mass Activation, Versions History etc.)

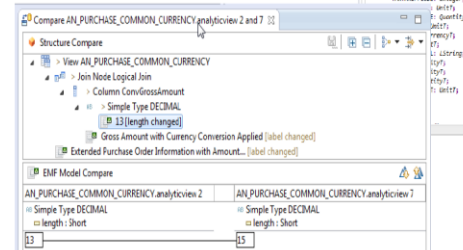
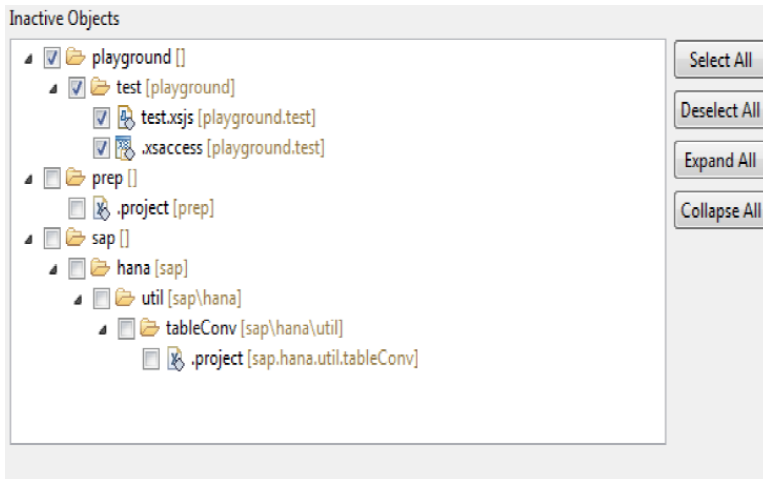
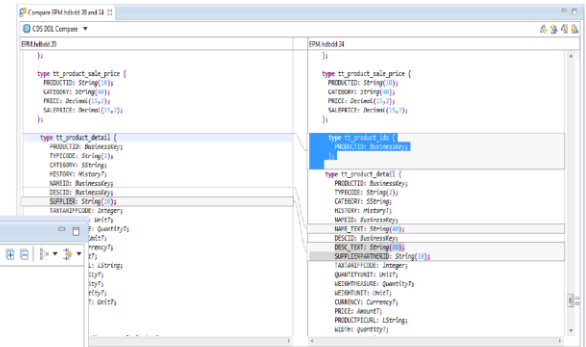


Syntax highlighting for XSODATA

Keyword code completion for HDBDD and XSODATA



Source code and modeled object comparison tools



SAP HANA - Web Based Workbench

URL: <http://<Server>:<80nn>/sap/hana/ide/editor/>

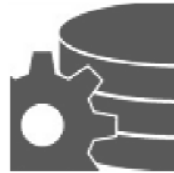
- Lightweight browser based IDE Project Explorer
 - Access to SAP HANA Repositories from Browser
 - Access SAP HANA catalog
 - Lifecycle management
 - Access user & roles
 - Create/Update/Delete files, Packages
 - Syntax Checking
 - No checkout needed
 - Access to server traces
 - Code Templates (e.g. XSJS)

- No Installation needed, Version same as SAP HANA Server, Development, Debugging



Editor

Create, edit, execute, debug and manage HANA XS artifacts



Catalog

Create, edit, execute and manage HANA DB SQL catalog artifacts



Security

Create users, create roles, assign objects and manage security



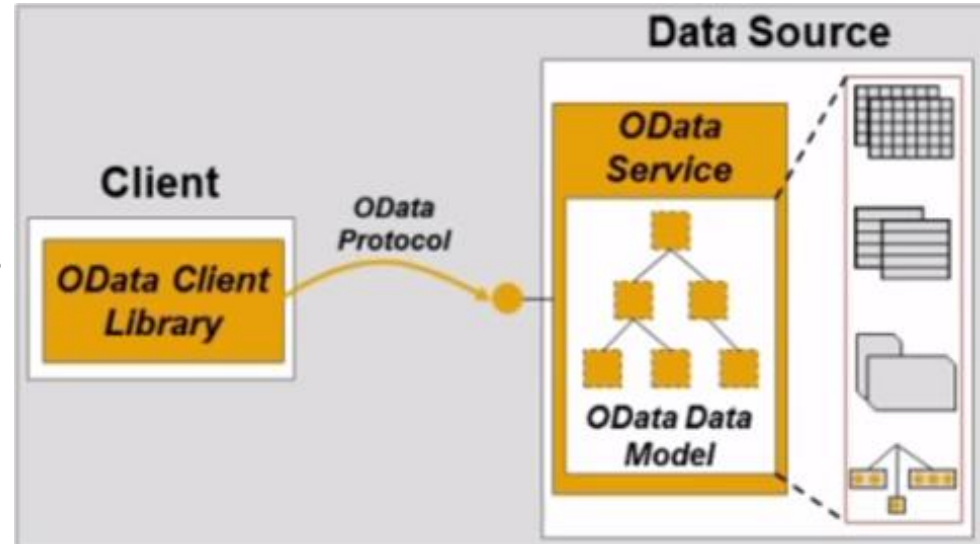
Traces

View, download traces for HANA XS applications, set trace levels

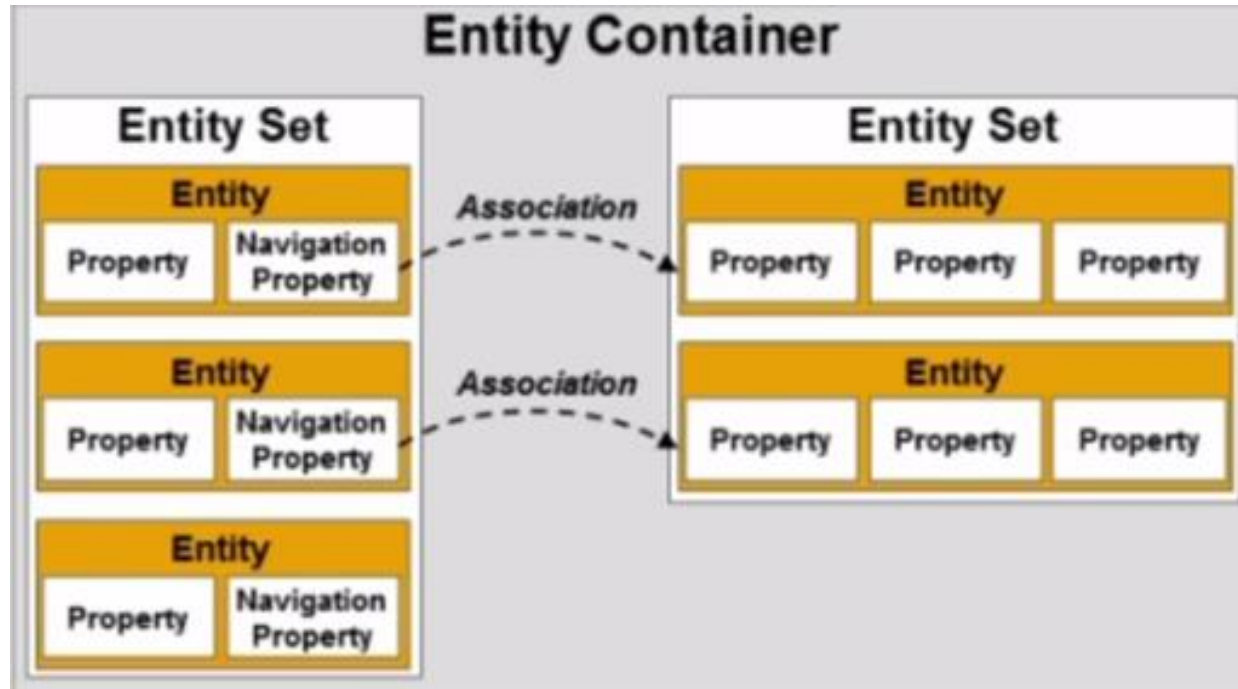


XS OData REST based Services

- **OData Data Model**
 - Organize/describe data with Entity Data Model.
- **OData Protocol**
 - REST-based create, read, update and delete + OData – defined query language.
- **Client Libraries**
 - Pre-built libraries to request OData and display results.
- **OData Services**
 - Exposes an end point that allows access to data in SAP HANA database.



- Aggregation
- Associations
- Key Specifications
- Property Projection
- Parameter Entity Sets



- **.xsOData file**

- The XS OData service definition**

```
service {  
  
    "tide2015.native_app_dev.TLITRG-00.tlitrg_ui5.WebContent::AN_SALESDOC_HDR" as "getSalesHeader"  
    keys generate local "SALES_ID";  
}
```

- **Namespace**

- **Location of XS OData service definition in the SAP HANA repository.**

- **Table Schema**

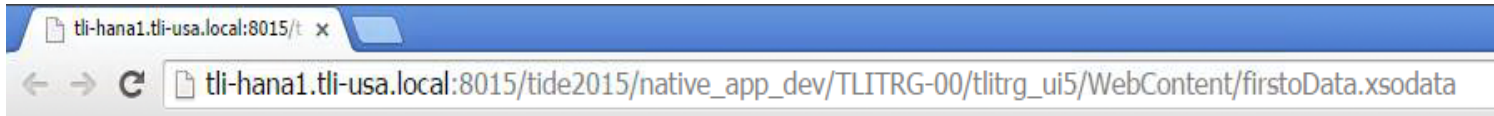
- **Schema containing the tables with the data to expose.**

- **Table Name**

- Name of the table containing data to expose with OData service.**

- **Activation**
 - Create catalog object to view.

- **Browser URIs**



This XML file does not appear to have any style information associated with it. The document tree is shown below.

```

▼ <service xmlns:atom="http://www.w3.org/2005/Atom" xmlns:app="http://www.w3.org/2007/app" xmlns="http://www.w3.org/2007/app"
  ▼ <workspace>
    <atom:title>Default</atom:title>
    ▼ <collection href="getSalesHeader">
      <atom:title>getSalesHeader</atom:title>
    </collection>
  </workspace>
</service>

```

- **Browser Tools**
 - JSONView/XML Tree/POSTMan
- **Basic options**
 - \$metadata, \$filter, \$orderby, \$select,\$top
- **Syntax**
 - Atom or JSON-compliant format.

Parameter	Description	Example
\$orderby	Orders entries by the entity supplied	/Products?\$orderby=Rating,desc
\$top	Selects only the first N items in a collection	/Products?\$top=5
\$skip	selects entries starting by N+1	/Products?\$skip=2
\$filter	filters entries based on the criteria	/Suppliers?\$filter=Address/City eq 'Redmond'
\$expand	expanded Entries are eagerly loaded and presented inline	/Categories?\$expand=Products
\$format	defines the format that the server must return	/Products?\$format=json
\$select	returns the subset of the specified properties	/Products?\$select=Price,Name

<http://192.168.16.175:8015/sap/hana/ide/editor/plugin/testtools/odataexplorer/index.html?appName=/tli/demo/services/salesByCountry.xsodata>

ID	COUNTRY	TOTAL_SALES	SALES	SHARE_SALES
12584611826727651	AR	188,053.4	188,053.4	1
12584611826727652	AT	63,138.8	63,138.8	1
12584611826727653	BR	285,208	285,208	1
12584611826727654	CA	262,952.4	262,952.4	1
12584611826727655	CH	63,138.8	63,138.8	1
12584611826727656	CN	91,485.4	91,485.4	1
12584611826727657	DE	1,826,052.6	1,826,052.6	1

[http://192.168.16.175:8015/tli/demo/services/salesByCountry.xsodata/\\$metadata](http://192.168.16.175:8015/tli/demo/services/salesByCountry.xsodata/$metadata)

```

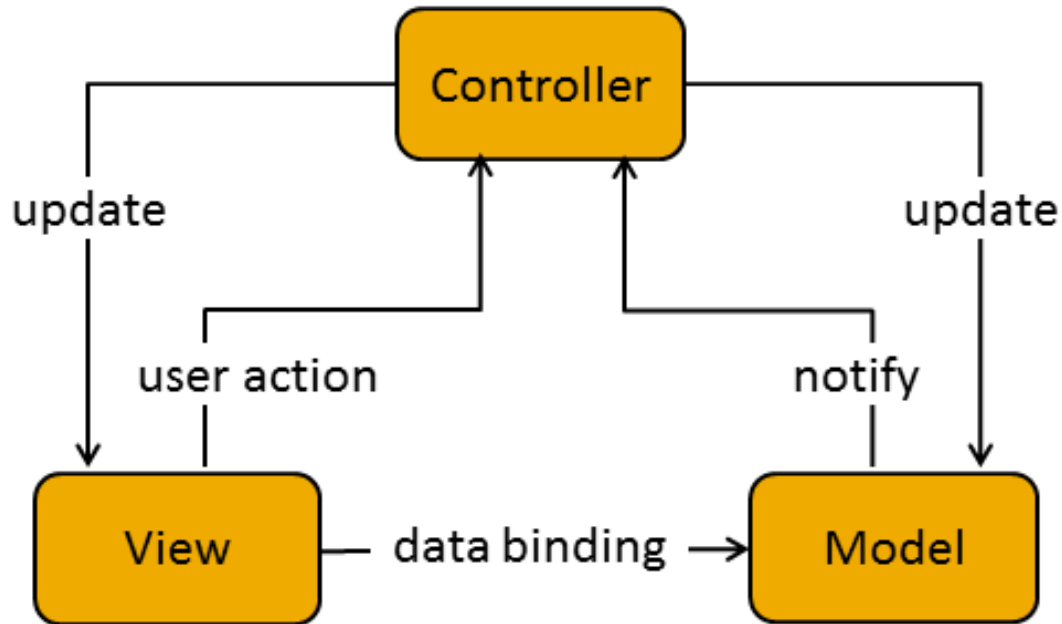
▼<edm:Edmx xmlns:edm="http://schemas.microsoft.com/ado/2007/06/edm" Version="1.0">
  ▼<edm:DataService xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices/meta"
    ▼<Schema xmlns:d="http://schemas.microsoft.com/ado/2007/08/dataservices" xmlns:m="htt
      ▼<EntityType Name="SalesByCountryType">
        ▼<Key>
          <PropertyRef Name="ID"/>
        </Key>
        <Property Name="ID" Type="Edm.String" Nullable="false" MaxLength="2147483647"/>
        <Property Name="COUNTRY" Type="Edm.String" MaxLength="3"/>
        <Property Name="TOTAL_SALES" Type="Edm.Decimal" Precision="15" Scale="2"/>
        <Property Name="SALES" Type="Edm.Decimal" Precision="15" Scale="2"/>
        <Property Name="SHARE_SALES" Type="Edm.Decimal" Precision="12" Scale="5"/>
      </EntityType>
      ▼<EntityContainer Name="salesByCountry" m:IsDefaultEntityContainer="true">
        <EntitySet Name="SalesByCountry" EntityType="tli.demo.SalesByCountryType"/>
      </EntityContainer>
    </Schema>
  </edm:DataService>
</edm:Edmx>

```



SAPUI5 Overview

- **Well-designed API, easy to consume and use.**
- **Extensible UI component model.**
- **Provides AJAX capabilities.**
- **Based on open standards like OpenAjax, JavaScript, CSS, HTML5 etc.**
- **Using and including the popular jQuery library.**
- **Complete adherence to MVC (Model View Controller) architecture.**
- **SAPUI5 plugin is available as open source and can be used on Eclipse for development.**
- **Allows application developers to create composite controls from UI5 controls.**
- **Include other JavaScript libraries where UI5 is lacking controls or features.**



Separates the information representation from user interaction.

- **View – Define / Render the UI. (XML with HTML, JSON, declarative HTML)**
- **Model – Manages Application Data via Data Binding with views.**
- **Controller – View Events and User Interaction.**
- **Preferred way to access business data is using “OData Model”**

```
var oSalesRankModel = new sap.ui.model.odata.ODataModel("/TLITRG99/salesDashboard/WebContent/tide2015.xsodata/", true);
sort1 = new sap.ui.model.Sorter("SALES");
```

OData Service

```
var salesRankDataset = new sap.viz.ui5.data.FlattenedDataset({
  dimensions: [{
    axis: 1,
    name: sap.app.i18n.getText("PRODUCT_NAME"),
    value: "{PRODUCT_NAME}"
  }],
```

```
  measures: [{
    group: 1,
    name: sap.app.i18n.getText("TOTAL_SALES"),
    value: '{SALES}'
  }, {
    group: 2,
    name: sap.app.i18n.getText("SALES_RANK"),
    value: '{SALES_RANK}'
  }, {
    group: 3,
    name: sap.app.i18n.getText("NUMBER_OF_ORDERS"),
    value: '{ORDERS}'
  }
  ]
});
```

Define Measures

```
salesRankDataset.bindData("/getSalesRank", sort1);
view.oSalesRankBubble.setDataset(salesRankDataset);
view.oSalesRankBubble.setModel(oSalesRankModel);
```

Assign Data Model



Example Business Scenario for Custom Application

Application: Web Portal for Customers

- Allow Access to Accurate and timely Information
- Complete End-to-end Order Management Capabilities
 - Customer Product and Price
 - Quote, Order, Inventory
 - Shipment, Invoice, Financing
 - Internal and External reporting

Application Features

- Highly Integrated Solution with Standardized Processes
- Efficient and Effective (both for Internal users and Customers)
- Timely and Accurate Information from Heterogeneous systems
- Improved User Experience - Easy to use, reduce complexity

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Include title and description

Related Searches: dell poweredge, hp server, server, ibm server, dell poweredge server, dell server rack

Refine search

Categories

- Computers & Networking** (1,277)
 - Servers (799)
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		Price	Time Left
Featured Items			
	19" DELL PowerEdge 4210 Server Rack Cabinet~Side Panels Very Big Quantities in Stock, Over 50 Racks	<input type="button" value="Buy It Now or Best Offer"/> \$379.00	17 d 4h 18m
	DELL SERVER PowerEdge 3.6Ghz 1GB 2X 160GB SATA RAID !! VERY FAST 3.6GHZ CPU - 2X 160GB SATA + SATA RAID CARD	<input type="button" value="Buy It Now"/> 18 Bids \$255.00 Free shipping	22h 53m
	Dell PowerEdge 2950 2*X5470 32GB SQL Server x64 2005 Awesome Database Server w/6*450GB 15K, W2K3 R2 x64	<input type="button" value="Buy It Now"/> \$8,999.00	25d 15h 39m
	New ** Dell PE 1750 1650 Server Rail Kit ** Includes Cable Management Arm ** Free USA Shipping **	<input type="button" value="Buy It Now"/> \$79.99 Free shipping	11d 22h 1m
Optimize your selling success! Find out how to promote your items			
	Dell Poweredge 2650 DUAL XEON 2.2Ghz 2048Mb 2U Server DUAL XEON 2.2Ghz CPU! Fast Shipping! Warranty!	<input type="button" value="Buy It Now"/> 13 Bids \$46.00 Free shipping	3h 53m
	Dell PowerEdge 400SC P4 2.8 GHz Windows Server 2003	<input type="button" value="Buy It Now or Best Offer"/> \$185.00	6d 6h 37m



SAP HANA Modeling Approach

- Lead by TekLink Platinum Consultants
 - Defined technical Specification Templates and Standards for OData and SAP HANA Models
 - Security using dynamic Analytic Privilege (Stored Proc based)
 - Use of SAP HANA Core Data Services (CDS) for easier transports

- Reusable and Query/Reporting Views
 - Designed with Performance in Mind
 - Highly optimized by leveraging Parameters, Filter Expressions
 - Reduced dataset at lowest level
 - Mostly leverage Graphical Calculation Views
 - Advanced business logic using SQLScript based views
 - Business Logic in SAP HANA layer with just the presentation in UI and Reports

- Define Roles based on Business Functions and Data Visibility Requirements
- Only Allow Query and Reporting Views to be accessed by Client Systems
- Define security Context for Users based on their roles as User parameter
- Built the allowed list of values dynamically based on user context

```
CREATE PROCEDURE MYSCHEMA.PR_DYN_AP_1 (OUT CUST_LIST TT_LST)
    LANGUAGE SQLSCRIPT
    SQL SECURITY DEFINER
    READS SQL DATA AS

BEGIN
CUST_LIST =
    SELECT DISTINCT CUST_ID FROM MYSCHEMA.CUST_MAST A
    WHERE A.CUST_ID IN (
        SELECT VALUE FROM USER_PARAMETERS
        WHERE PARAMETER like 'AUTH_CUST'
        AND USER_NAME = SESSION_USER );

END;
```

- Design SAP HANA Models with Performance in Mind
 - Reduce size of data set passed between different steps
 - Try to identify filters that can be applied at lowest level of the model
 - Use Variables & Parameters
 - Design Models to achieve maximum parallel processing

- Keep the OData services light-weight
 - Do most processing in SAP HANA (like Joins, Aggregations etc.)
 - Use Filters, OrderBy, Select etc. at client layer
 - Use \$top and @skip for implementing pagination
 - Keep Data Security in mind while designing Models and Services

Insights on Using SAP HANA Platform, SAP UI5 and XS OData Services to build Analytical Applications

Please complete a session evaluation for this session!

Thank You !

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