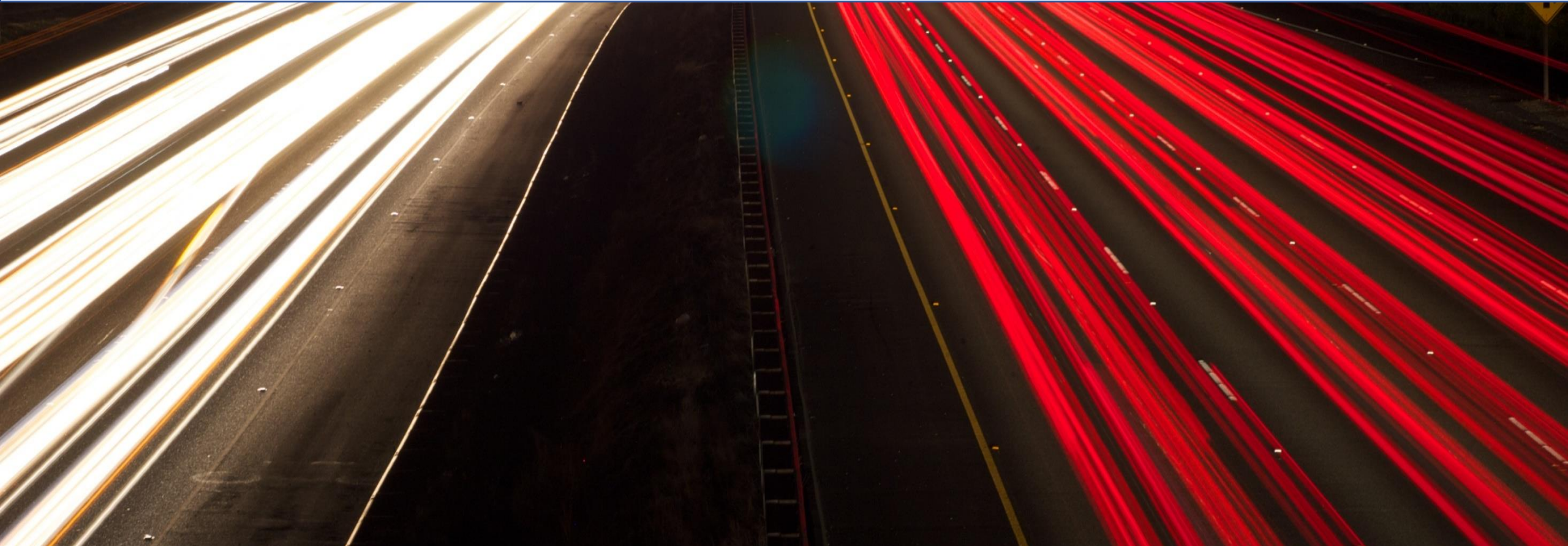# SAP UI5 and Fiori Training with OData Services
on
SAP Web IDE

HTML5, CSS, Java Script, J Query, Complementary OOPS ABAP, Component JS, Routing, Manifest, Custom Controls
Latest topics covered without copy paste of code.
http://www.onlinefioritrainings.com

Basic Foundation for UI5

HTML5   CSS

JavaScript   JQuery

SAP UI5 Framework and Controls

- UI5 Architecture
- UI5 Application Development

FIORI Introduction and App Development

- FIORI Libraries
- Types of Apps

ODATA Service Development

- Net weaver Gateway System
- ODATA CURD Operations

Start Date: 16th Apr2018
Expected End Date: 25th June 2018
Weekdays 7-8 AM India time
Duration : 40+ Hours + Complementary OOPS ABAP

Flow of program:

Initialization – variable declaration, values, dependencies
Place your UI element – Screen element – what user see.
Processing logic – handle validations, read inputs, manipulate data, access db, navigation
Output – Display results

In SAP UI5:
SAP UI5 framework: A framework is a collection of libraries, each of these libraries includes classes, each of these class includes methods to full fill certain task.
SAP UI5 is a framework which is based on open Standards like HTML5, CSS, JS, JQ to be able to build responsive web applications.
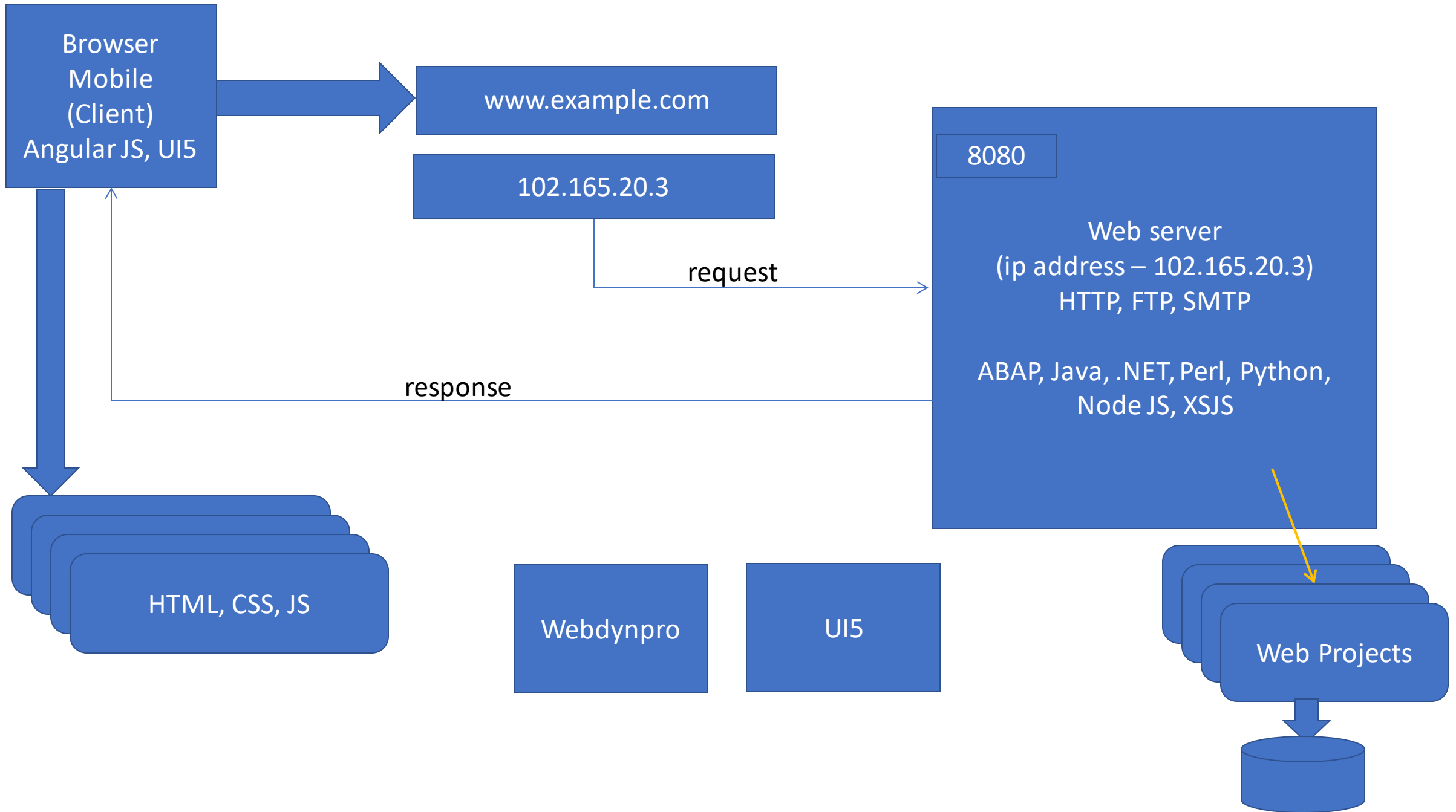
| SAP GUI | → | WD | BSP | → | SAP UI5 |

Index.html

<head>
initialization
</head>

<body>
</body>
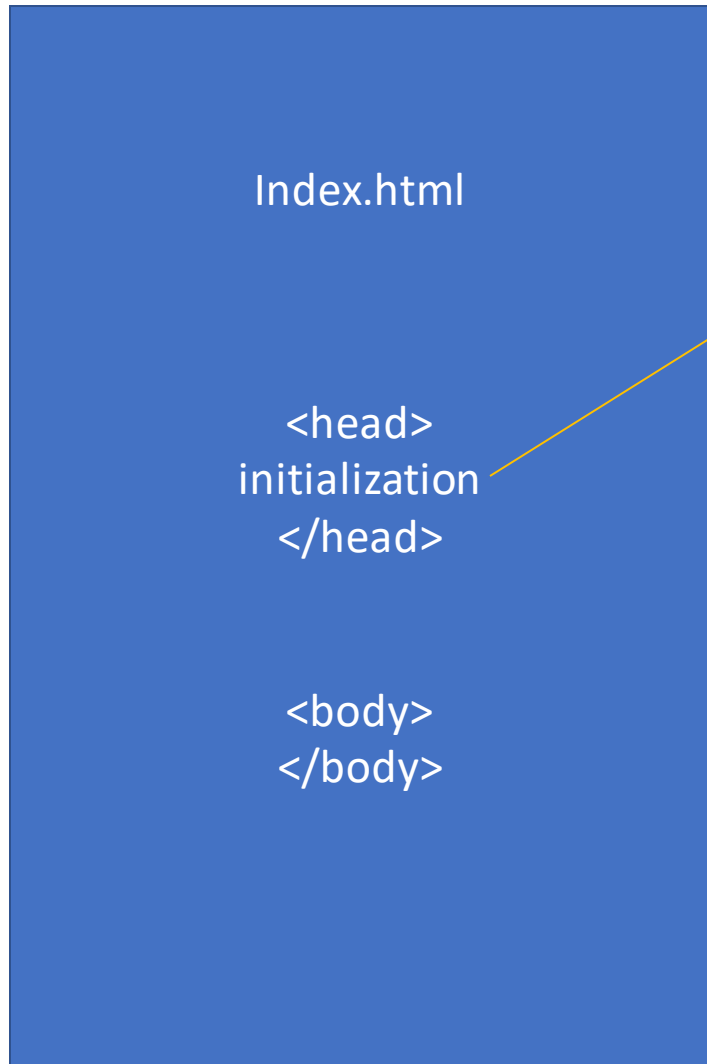
CDN

bootstrap

Data: lv_matnr type matnr.

var variableName = **new** libraryName.ClassName(sId, SProp);

sId – unique id of your UI Control
sProp = properties of a UI control e.g. label, value, text, width, height, enable, visible etc.
Event name and action handler.

HTML – stands for *Hyper Text Mark up Language* , It is not a programming language, HTML is used for creating static web Content. The content is created by using HTML tags. E.g. Input, div, img, button etc.

CSS – Stands for *Cascading Style Sheet,* it is used to beautify the HTML content e.g. Formatting, text colouring, boarder, width etc.

JS – Stands for *Java Script,* this is the programming language of browser. It is no where related to Java programming language.

Funda Fox:

➢ Browser only understand HTML, CSS and Java script directly.

Eclipse (Open Source IDE)

SAP WebIDE

Benefits of WebIDE
1. It runs on browser, hence you can access from anywhere, any device, any time
2. It built for UI5 development
   1. Connectivity to SAP server
    2. SAP Extensibility Pane

Trial Edition (single developer)

Productive version (SCP)

1. Setup java runtime environment (JRE) to work with these tools. ➔ JDK (1.8)

http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html

2. How to setup WebIDE (http://tools.hana.ondemand.com/)
3. Download WebIDE personal Edition (correct bit size)
4. DO NOT EXTRACT FROM DOWNLOADS FOLDER DIRECTLY,
5. Copy the downloaded file to your computer folder (D:\MyWebIDE)
6. Extract here option (Winrar software from internet)
         Eclipse folder will be generated in the main folder
7. Go to eclipse folder, Run orion.exe (do not close orion window)
8. Open (chrome) browser, type url
    localhost:8080/webide/index.html

Eclipse/WebIDE

compiled

JRE

Command line

KERNEL (OS)

Assem
MOV A,B
01010101

CPU
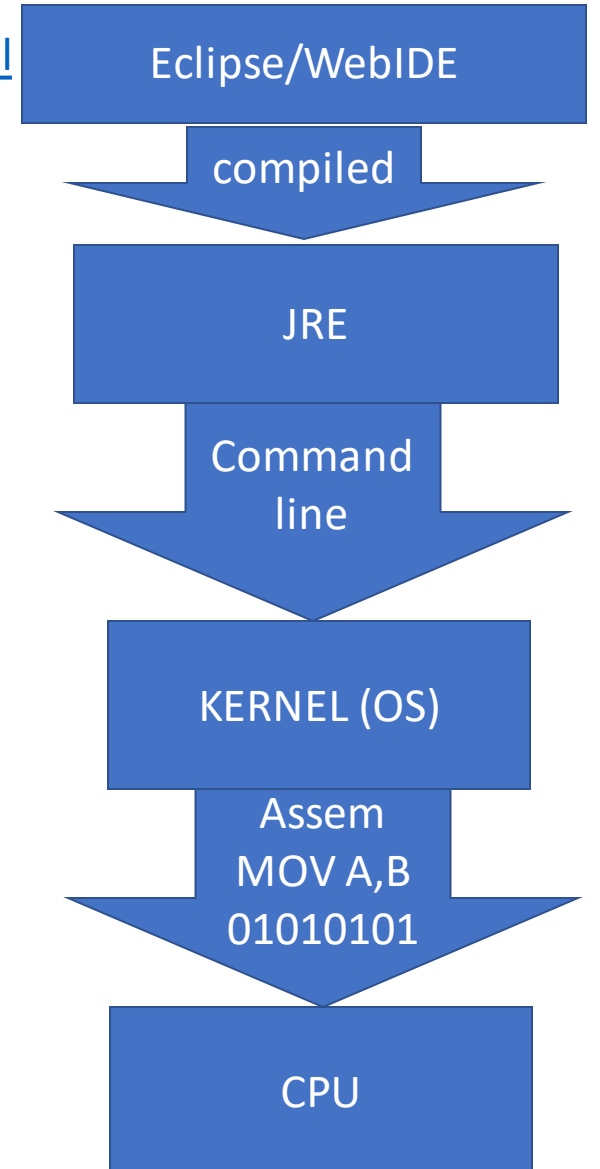
HTML – HTML stands for *Hyper Text Markup Language* It is used to create static web pages.

Version	Year
HTML	1991
HTML 2.0	1995
HTML 3.2	1997
HTML 4	1999
XHTML	2000
HTML 5	2014

W3C – World Wide Web Consortium – responsible for versions of HTML. All the browsers IE, Firefox, chrome, safari etc. Has to comply to the guidelines provided by W3C. Because browser only understand HTML directly.
HTML page is also known as HTML document. To indicate that its a HTML document, we start our page using special tag called doctype.
<!DOCTYPE html>

1. Difference between HTML and HTML5?
   - HTML 5 is just the latest version of HTML
   - With HTML 5 the doc type declaration was simplified, in older version it was something like below
     <!DOCTYPE SCHEMA="HTML_NDN" version="XHTML.0">
   - HTML5 is more liberal in nature, we don't need to put an end tag for many of tags now e.g. Meta, input, img etc.
   - New type of input types were introduced like number, date, color, email, contact etc.
   - Automatic validation has been introduced before submit.
   - New structural tags were introduced.
   - Direct support of audio and video tab.
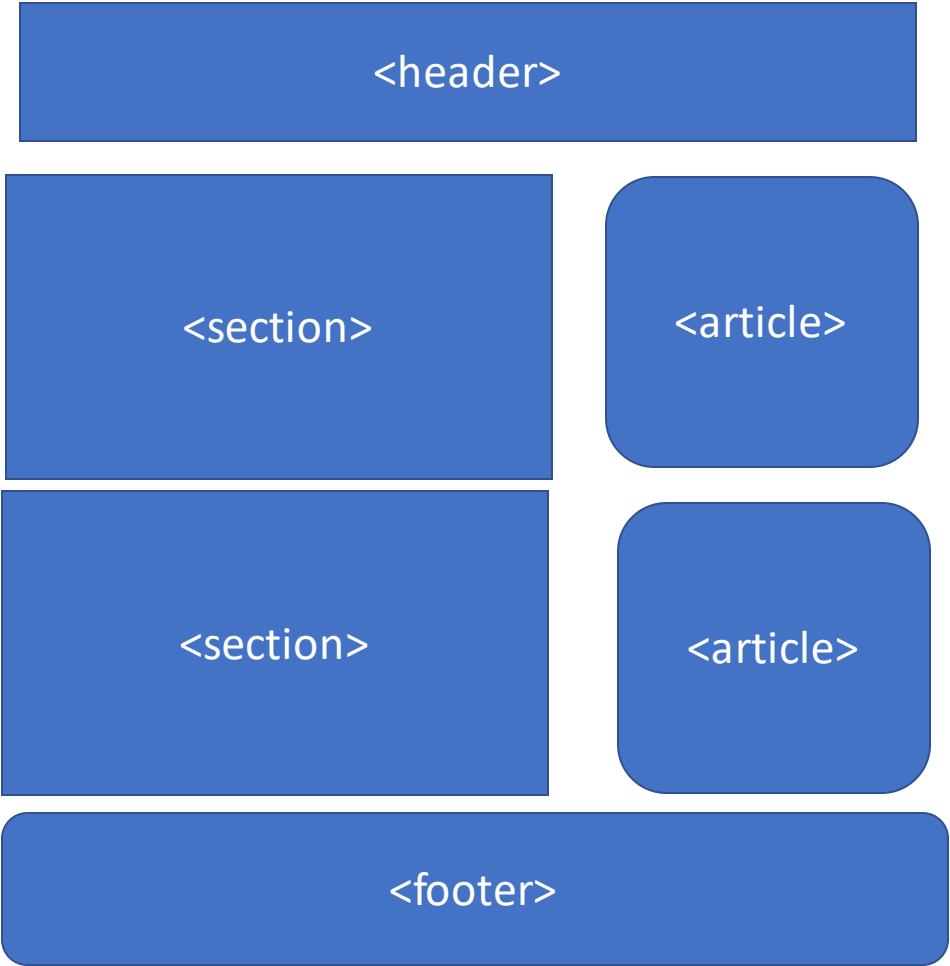
2. Difference between UI5 and HTML5?

   - HTML 5 is a mark up but UI5 is a framework.
   - HTML versions are released by W3C, UI5 versions are released by SAP.

Basics of HTML file:

➢ Every document has a head and body tag
➢ Every tag will follow below syntax

        <tagName>content</tagName>

➢ HTML is a TREE data structure

<!DOCTYPE html>

<head>

<body>
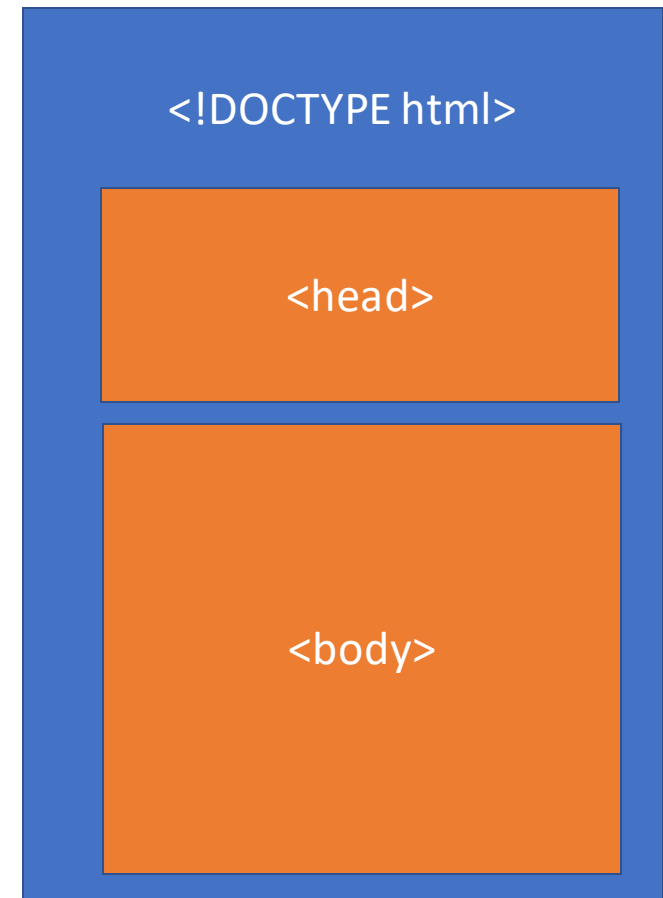
New structural elements were introduced in HTML5

<header>

<section>

<article>

<section>

<article>

<footer>

Exercise: in ordered list and un ordered list tags which Anubhav created, go ahead and add video URL of each topic from www.onlinefioritrainings.com

th	th
Td	Td
Td	Td
Td	Td
Td	Td

table

thead

tbody

Iframe control: control which is used to embed another html document inside your html document.

Web developer tools for browser : open by using F12 key on any browser.

The HTML tree structure which is displayed inside the browser is known as DOM (Document Object Model)

Block levels in HTML – they don't have their own footprint on UI. The purpose is to give structure to HTML content.

1. div – division tag – used to include elements inside a block which always starts from a new line.
2. Span - used to group elements but doesn't start with a new line.

Typically, every HTML element can have a property called id, id has to be unique on page for an element.
You also provide a classification of element which belongs to similar group. class="address"

CSS stands for Cascading Style Sheet, it is used to style HTML content.

Why ?

<p>He was able to <b>achieve<b> all his <color value="red">goals<goal> by end to last year. The new year looks promising for him.</p>

HIGH MAINTENANCE. CSS3

How to apply CSS on HTML Content?

1. Inline CSS – inline CSS is used apply style at a particular HTML element level. In precedence level this takes highest precedence.
   <tagName **style**="prop: value; prop2:value; prop3:value…">Content</*tagName*>
   Disadvantage: you need to provide style at each element level which is again lead to high maintenance in future.

2. Internal CSS – Internal style is applied at the page level using style tag. This simplifies targeting multiple elements using same style code.
   <style>
   　　selector {
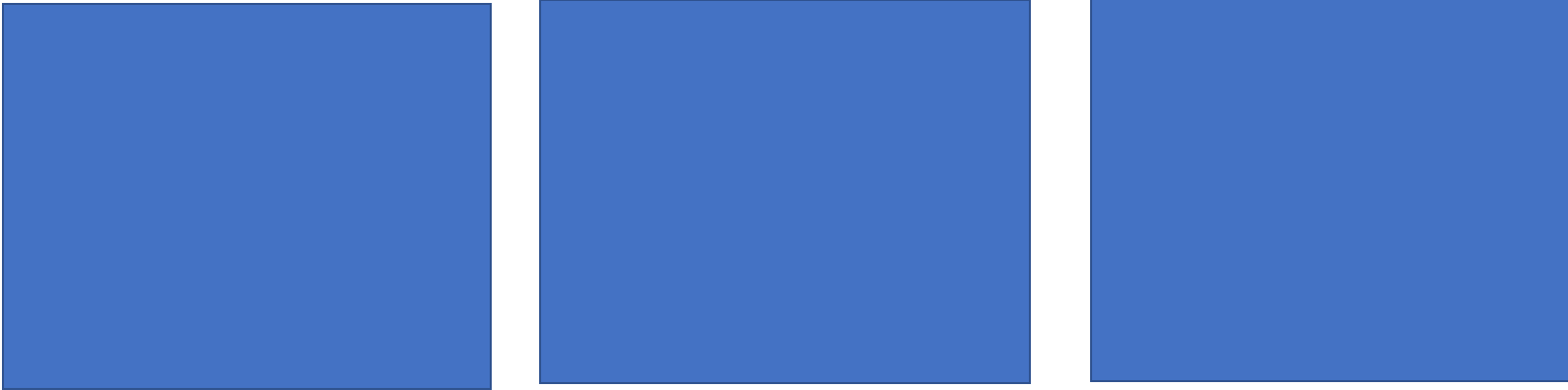   　　　prop: value;
   　　　prop: value;
   　　}
   </style>
   Selector is the targeted element(s) on which this style will be applied.
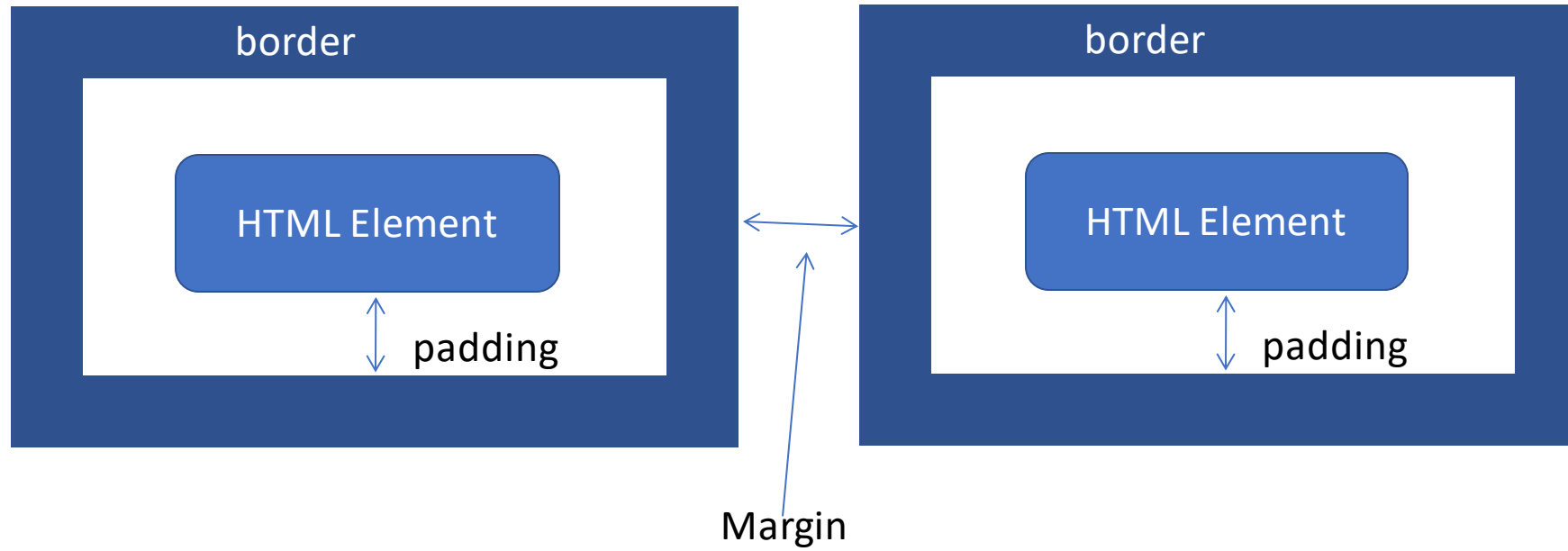   tagName, .className , #id

Responsive Web Design: An web Application which adapts itself according to the device automatically.

Exercise: there 3 images inside the project Anubhav has put, Place all 3 images in a single line with square box (200px w and h).

3. External CSS

CSS Box Model

border

HTML Element

padding

Margin

border

HTML Element

padding

What is the actual size of HTML element it takes on screen – HTML Element Width + Padding + Border + Margin

Pesudo classes in CSS:
It is an event which gets applied when we do an activity on UI element. Example HOVER.

Selector: Psedo-class{

     --style code
}

What is JS?

JS stands for Java Script, it is the only programming language browser has.

What is JS is used for?

➢ Writing the manipulation and imperative logic (arithmetic, string, date and time etc.)
➢ Can be used to manipulate the DOM
➢ Used to check user input
➢ Able to create dynamic UI element on UI.
➢ Change CSS @ runtime

2 types of Java Script:
➢ **Client Side JS** – The complete code runs on client side (Browser – the gets downloaded to browser and user can see that in Resources tab, same can be debugged also in browser). The power of Morden browser makes it possible to run code in client side. The main advantage is to avoid unnecessary load on server, send a call to server when is absolutely needed for example saving data into db. It is used to develop the UI applications.
➢ Server Side JS – The code gets executed in server, The server provides runtime support for server side JS. Purpose is to provide functionality like DB lookup, Send email, Store Passwords, Manipulation, Control Flow, Server side validations etc. Examples are Node js, XSJS (used inside HANA).

You can apply the JS using one of three ways:

1. **Inline JS**: At the tag level. There is no reuse.
2. **Internal JS**
   It is applied at page level by writing reusable functions. We use a special tag in head of page as <script></script>.
3. **External JS**
   It kept in a separate file and file is reference using below syntax
   <script src="path of the file"></script>

Event: When user perform an action on UI, it triggers an event. For example, when you click on a button **onclick** event will be called. We have events for every thing e.g. Ondblclick, onmouseover, onkeypress, onkeydown, onload.

In ABAP what to use to get current date?
sy-datum.
Similarly every language has reusable objects which are globally available. In java script also we have 2 such objects:

1. **document** – the object your HTML DOM. Using this we can read HTML elements as an object in our code.
2. **window** – the object which holds the object of browser window.

How to get object(s) of HTML element
document.getElementsByClassName("")
document.getElementsByTagName("")
document.getElementById("")

Window also has methods:
window.alert("text") – popup on screen

FUNDA FOXes:
➤ JS is case-sensitive
➤ JS follows below nami-convention = when we write combination of words, the first letter of first word is small and next consecutive word's first letter is capital.(camel case).
    example: iloveindia – iLoveIndia
        ilikelearning – iLikeLearning
➤ Every statement in JS ends with semi-colon (;)
➤ methods are also known as Functions / behaviours / APIs. (B*API*)
➤ Whenever something doesn't work, press F12 immediately. Console is your best friend.
➤ We dont need to tell the type of variable in JS, it decides automatically based on value assigned.

Ways to create Functions is JS?

Anonymous function (function without any name)

```
function(param1,param2,...){
        -- code...
}
```

Named function (here we create a foo function)

```
function foo(param1,param2,...){
        -- code...
}

var foo = function(){
        --code
}
```

When we want to refer function, we use functionName().

In ABAP how you create a variable:
Data: lv_matnr type MATNR.
Multiple fields
Data: wa type mara.
Wa-MATNR, wa-MAKTL - write: wa.
Multiple records in ABAP prog – internal table
Data : itab type table of MARA.

Simple Variable

var variableName = *value*;

Structure (object variable)

var variableName = { fieldname: value, fieldName2: value, fieldName3: value };
variableName.fieldName
variableName.fieldName2

Table (Array – starts with index 0)

var tableName = [item0, item1, item2, item3];

Exercise: Design an array which store information of multiple employees.

Java Script Object Notation – JSON

4 output functions in JS

1. Window.alert('popup to user');
2. Document.write('content') – this becomes the final DOM, it replaces current DOM of your app
3. HTMLElement.innerText
4. Console.log('content') – to print something in console (developers)

Use case: check if the user name and password are Anubhav and Anubhav123, if yes, replace whole DOM with login success!

Funda fox:
> In JS = is the assignment operator and === is the comparison operator.

User case: Provide an input field, where user enter their favourite team name and click on button. That team should be added on UI.
Dynamic UI element on screen.

Exercise: Design a table on UI (empty one), put 2 input fields on top of table.
1. Team Name
2. Captain First Name
3. Captain Last Name

Let user enter value in input field and click on add button, A row should be added to your table.
There are 2 columns in table, team name, captain name.
Join the first and last name of captain to place inside.

12 Hours.

jQuery: jQuery is a java script library. This library is open source library, and it used by most of the companies like google, microsoft, netflix, yahoo, SAP.

Purpose: *write less and do more*

Change CSS of my box title.
--got elements in array getElementsByClassName
--Loop

   each element we change CSS
--endLoop

Magic stick – jQuery – 1 line

How to start using it – Reference
1. Download and reference locally
2. Direct reference from CDN (Content Delivery Network)

Many of the companies has their own CDS, does it mean that if i refer google CDN and write a code, tomorrow i switch to microsoft CDN i realize the reuse method is not available.

jQuery.com

Google

NetFlix

SAP UI5
jQuery.sap

MicroSoft
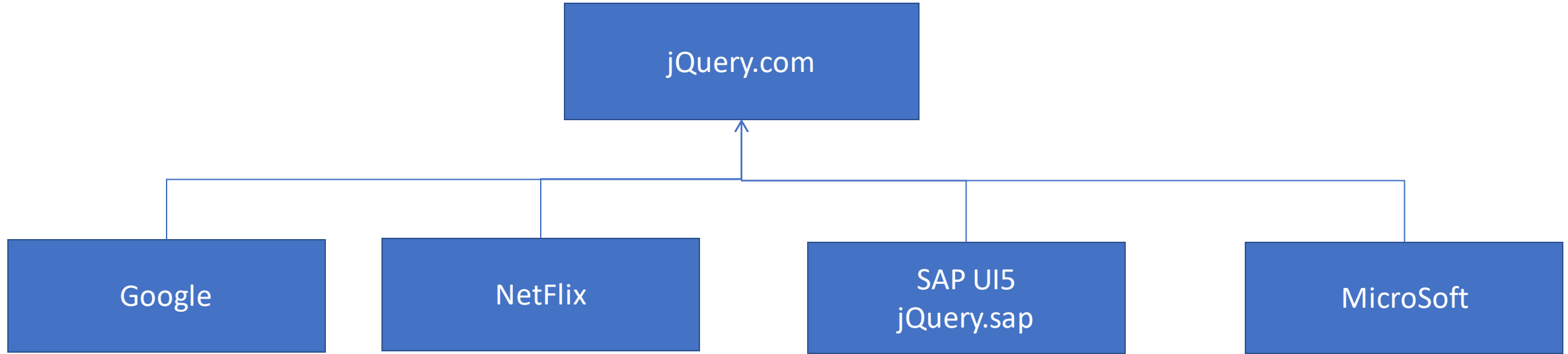
The symbol which is used to tell the browser that we want to use jQuery is $.

Syntax:
$(**selector**).action();

selector: tagName, #id, .className

Action: function/event

Functions:
.hide(), .show(), .fadeOut(), .fadeIn(), .animate(), .css()

Event:
click, load

Changing CSS @ runtime:
$(".box-title").css("background","blue").css("color","black");
$(".box").hide();
$(".box").show();
$(".box").fadeOut(5000);
$(".box").fadeIn(5000);

Exercise: You need to put a button on UI, when you click on that button, all your input fields should start dancing.
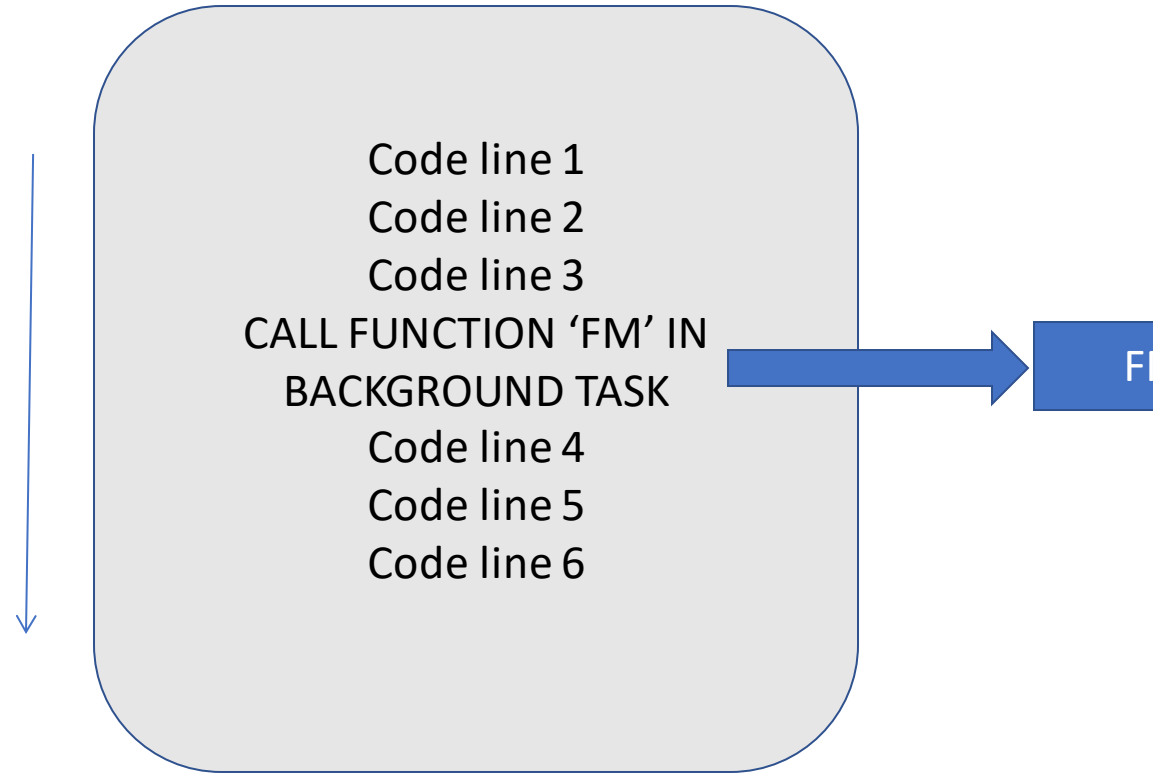Hint: Function recursion.

Callback function:
Is a function which triggers once the desired effect is over.
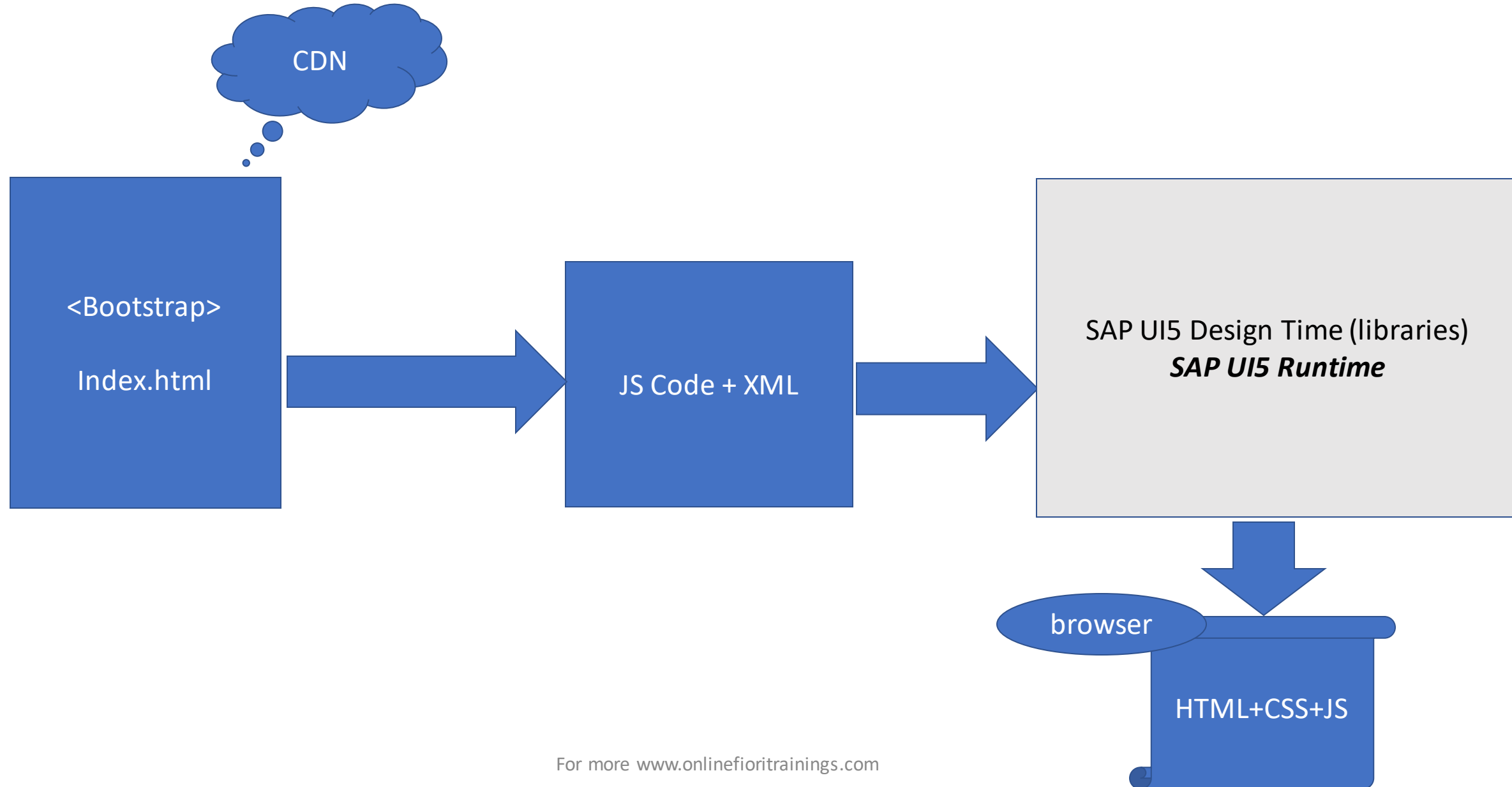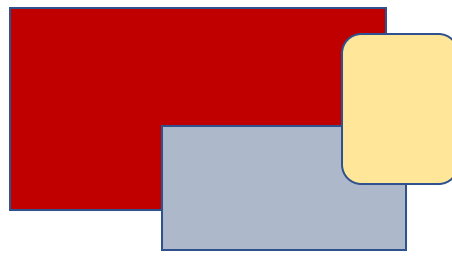$(selector).fadeOut(5000, *fnCallBack*);
Code...
The callBack function is called asynchronously.

$(".box").fadeOut(1000, function(){$(".box").fadeIn(1000);});

Code line 1
Code line 2
Code line 3
CALL FUNCTION 'FM' IN
BACKGROUND TASK
Code line 4
Code line 5
Code line 6

F

SAP UI5 Framework: Is a collection of reusable JS libraries, we can SAPUI5 to create responsive Web Applications.
This framework is based on open Standards like HTML5, CSS, JS, jQuery.

CDN

<Bootstrap>

Index.html

JS Code + XML

SAP UI5 Design Time (libraries)
SAP UI5 Runtime

browser

HTML+CSS+JS

sap-ui-core.js
sap-ui-libs=""
sap-ui-theme=""

CONTROL

sap.ui.commons

sap.ui.table

sap.suite.ui.common

sap.m

sap.ui.layout

sap.viz

SAP UI5 Runtime

Renderer

Server Side Support e.g. Proxy

CORE

sap.ui.core

sap.ui.mvc

Sap.ui.unified

sap.ui.view

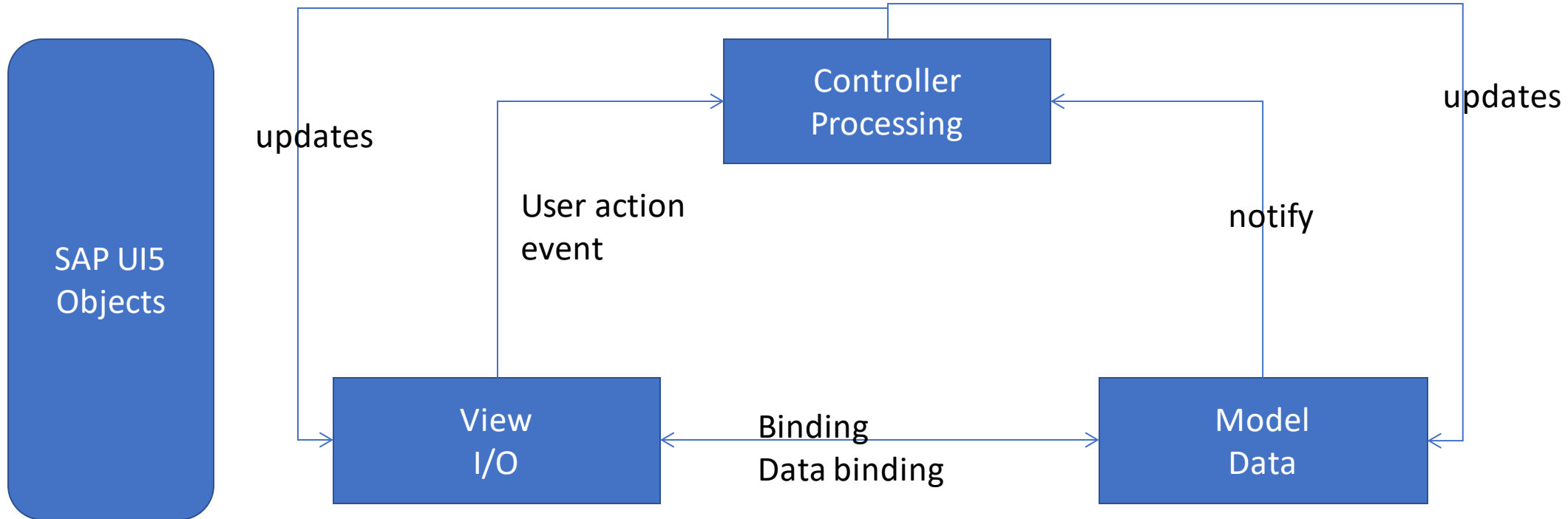HTML5, CSS, JS, JQ, LESS, DATAJS, D3JS,AJAX

Design Pattern: When OOPS programming started, everyone started developing application with their own understanding of OOPS. Design pattern are set of golden rules and solutions to common software problems.

Creational : creation of object e.g. Singleton, factory, abstract factory etc.
Behavioural : deals with communication between objects – decorator, adaptor, facade, Proxy.
Structure: relationship between object – template, Stratagy, MVC.

MVC Design pattern: is one the design pattern best suited for applications where we have UI. MVC stands for Model, View and Controller.

SAP UI5 Objects

updates

Controller Processing

updates

User action event

notify

View I/O

Binding Data binding
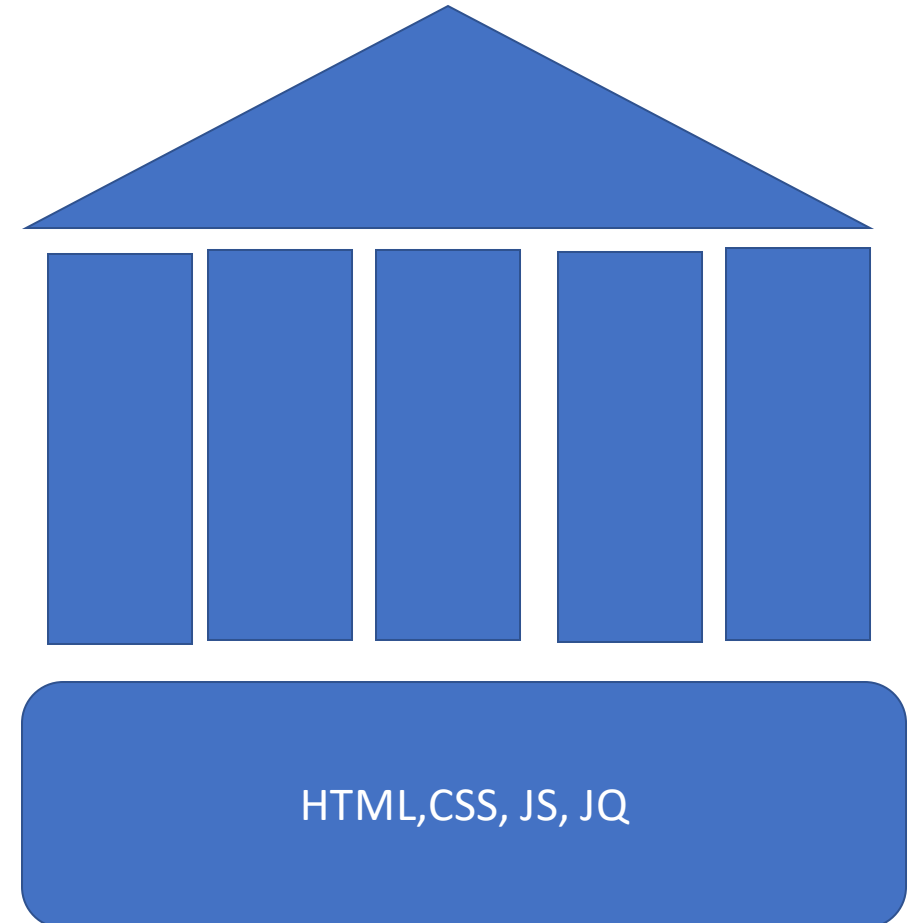
Model Data

Syntax to create a control in UI5?

var objectName = **new** libraryName.ControlName(sId, sProperties);

sId: unique id of your control.
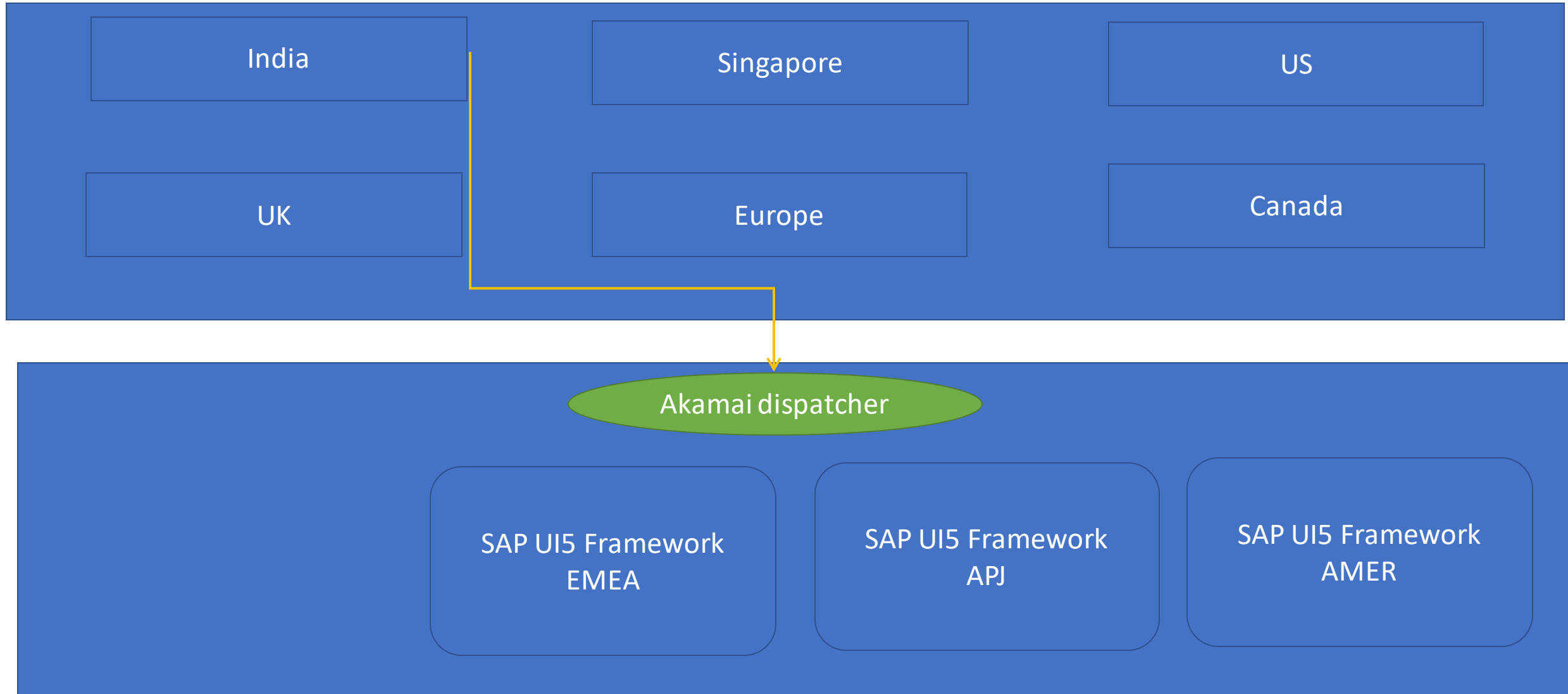sProperties: all the properties of your control e.g. Label, text, width, height, color, background.....
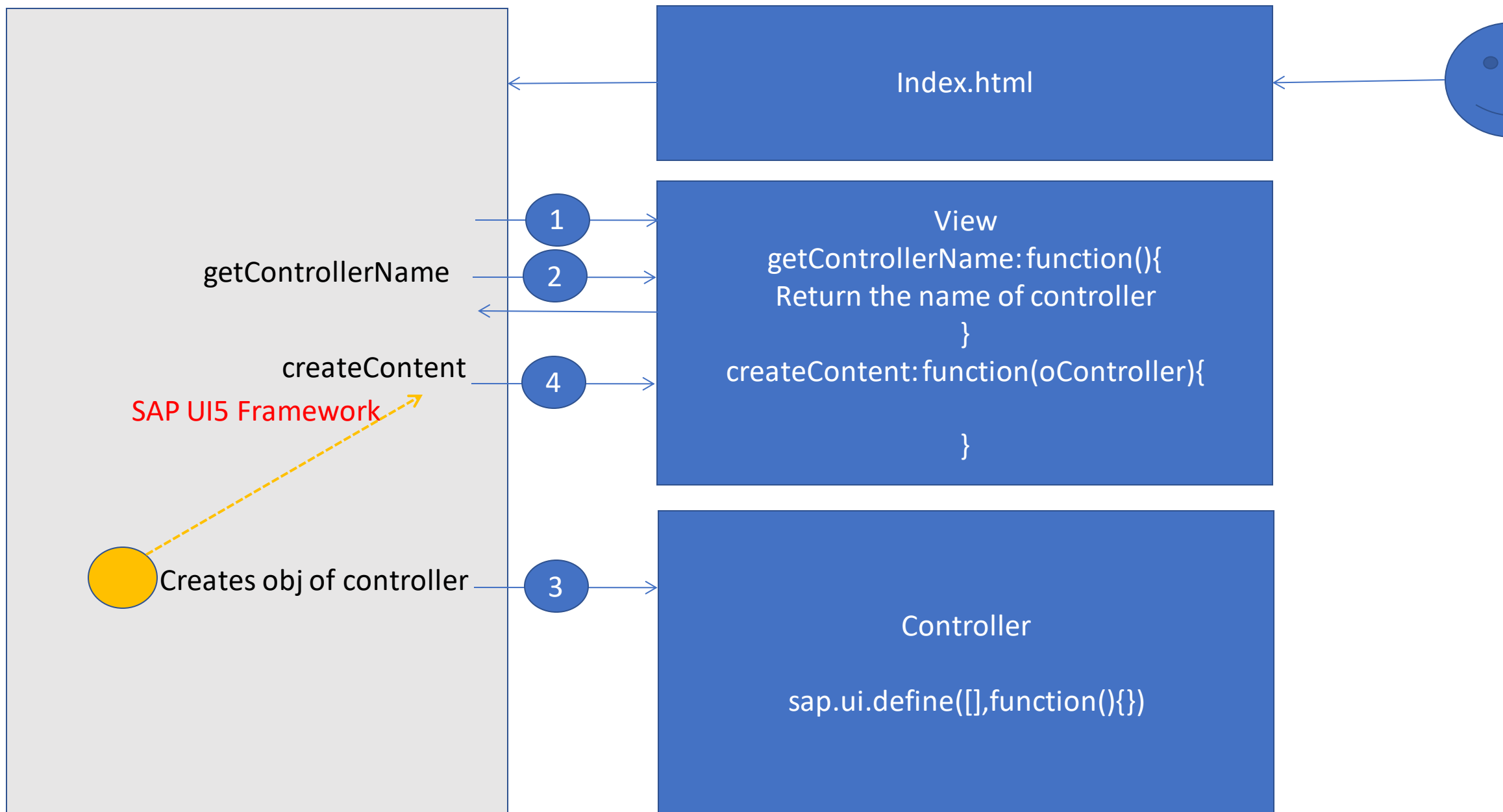Must be specified using below syntax
{

       propname: value,

       propname: value,

       ....

}

HTML,CSS, JS, JQ

Akamai CDN is used to provide SAP UI5 Framework on internet

India	Singapore	US
UK	Europe	Canada

Akamai dispatcher

	SAP UI5 Framework EMEA	SAP UI5 Framework APJ	SAP UI5 Framework AMER

Index.html

View
getControllerName:function(){
Return the name of controller
}
createContent:function(oController){

}

1

getControllerName 2

createContent 4

SAP UI5 Framework

Creates obj of controller 3

Controller

sap.ui.define([],function(){})

For more www.onlinefioritrainings.com

Definition of a controller or ANY reusable JS file in UI5:-

C programming:
Loading Dependencies

    #include <studio.h>

    #include <conio.h>

Declare of variables
**Processing**
Return Output

Scaffolding Template: Is a way of defining any reusable JS resource of a UI5 project example Controller. In this we load all the dependencies first and using these dependencies, we will write our processing logic. And return the results and functions.

sap.ui.define(

       [*dep1, dep2, dep3...* **] ,**

       function(oDep1, oDep2, oDep3...) {

            return {};

      }

);

In java script, if we want to implement inheritance, we use **extend** keyword.
When we implement controller, we actually inherit from base class called ***sap.ui.core.mvc.Controller***
Function always have a return

Library(sap.ui.core)

Class (mvc)

Str (ViewType)

| JS | XML | JSON | HTML |
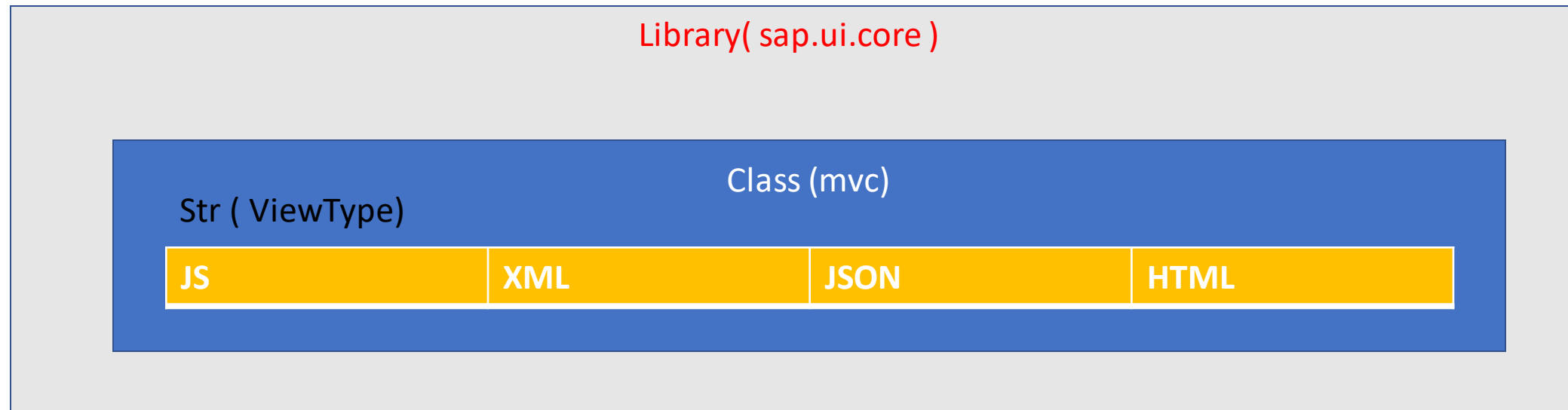
sap.ui.core.mvc.ViewType.JS

SAP UI5 SDK (Software Development Kit) – is the central place to find all the UP TO DATE documentation and required control definitions with sample code available. This helps developers to understand the UI5 framework.

Funda Fox:
➢ UI5 Control name doesnt follow camel case. It starts with upper case and every consecutive word also starts with uppercase.
➢ UI control is just like a class, a class includes properties, methods, events, exceptions, associations.
➢ Every UI5 control has property, For each property, you will have setter and getter methods.
      e.g. If we have a text property, we will have *setText* and *getText* method inside control.
➢ Every single event in UI5 has *fireEventName, attachEventName and detachEventName* methods.
➢ For aggregations also we have methods like *setAggregation, getAggregation* and *bindAggregation*
➢ When we want to work with SAP UI5 control properties and methods, we should never use HTML Object. HTML objects are obtained by document.getElement... API, they wont give access to SAP UI5 objects.
➢ How to obtain object of UI5 Control

sap.ui.getCore() – Gives you the runtime object of application.

➢Inside of this object, we have an API called **byId("id Control")** to obtain object of UI5 Control.
   sap.ui.getCore().byId("id")

Exercise in console:
document.getElementById("idTxt")
document.getElementById("idTxt").value
document.getElementById("idTxt").style.display = "none"
document.getElementById("idTxt").setEnabled(false);
sap.ui.getCore().byId("idTxt")
var x= sap.ui.getCore().byId("idTxt")
x.setValue("Wow")

Association of a class

Can you build whole software with one class?

Yes. It will not be extensible for future changes.
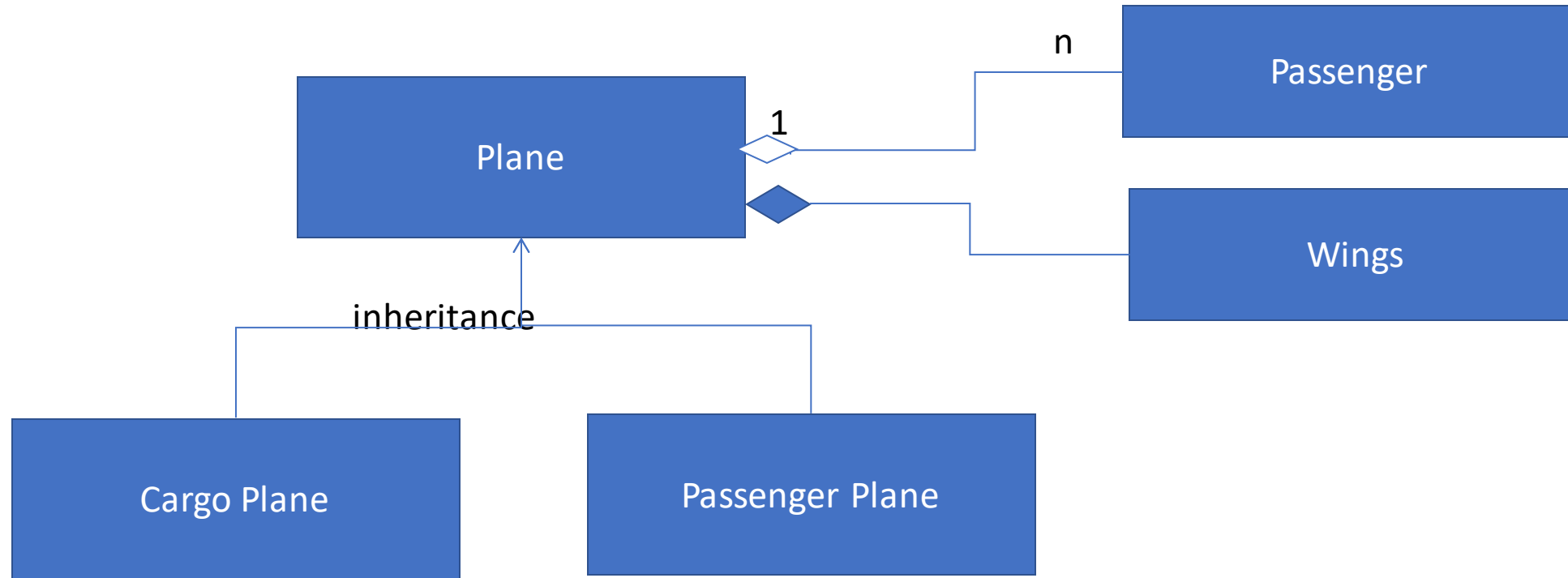
Association – Relationship between 2 classes.

Types of Association:

1. Aggregation – Should have relationship, both class objects co-exist separately. Lose coupling.
2. Composition – Must have relationship between classes. Both object cannot function independently.

Exercise:

Design a JS view with 2 input fields, These input fields only should accept numbers.
And a button called calculate.
When we click on calculate button, add these 2 numbers and display result in popup.
Considerations: Has to be with MVC. Must use Ui5 Control object.
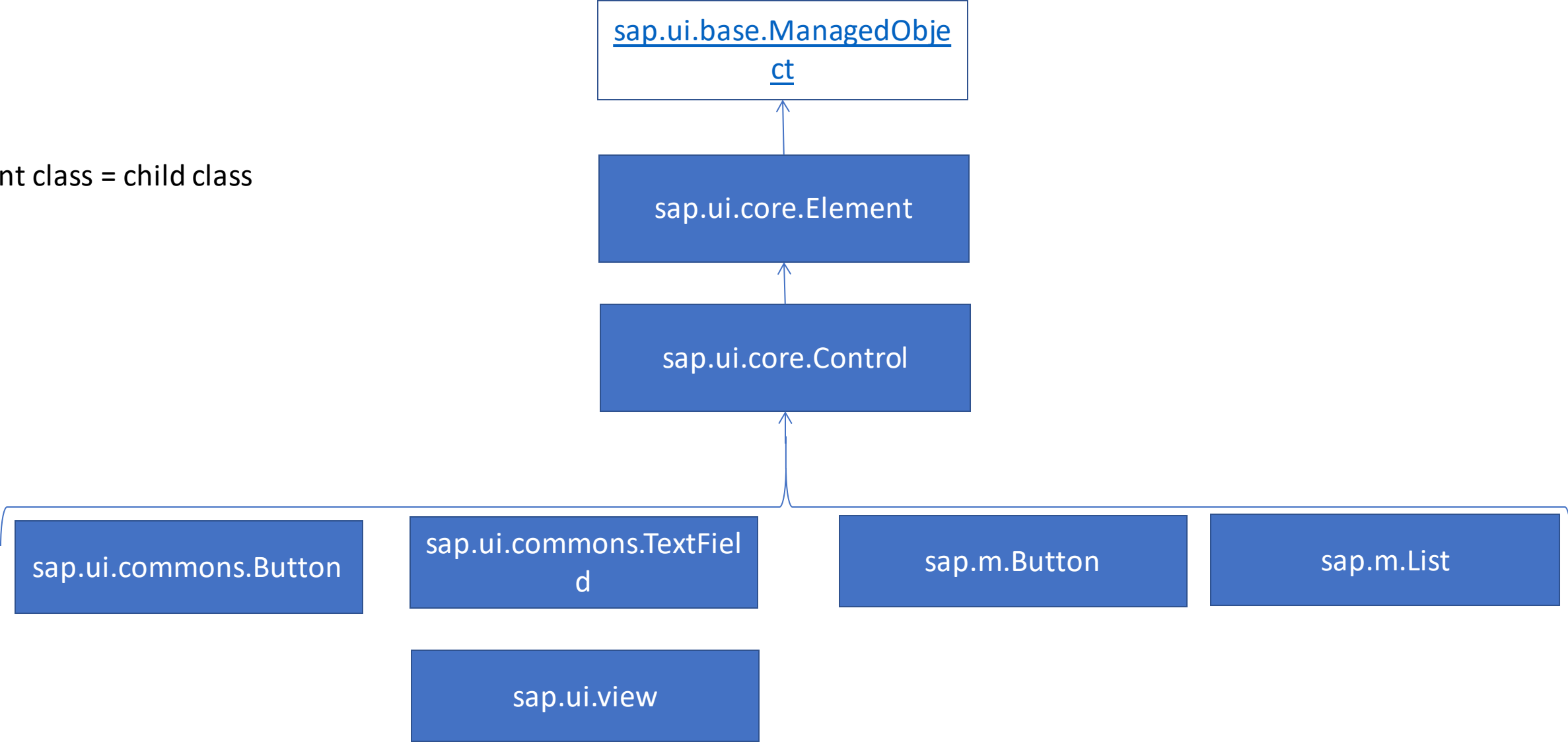
Personal Address

Save

Office Address

Save

Control Hierarchy:

Parent class = child class

```
                    sap.ui.base.ManagedObject
                              ↑
                       sap.ui.core.Element
                              ↑
                       sap.ui.core.Control
                              ↑
```

sap.ui.commons.Button   sap.ui.commons.TextField   sap.m.Button   sap.m.List

sap.ui.view

Funda Fox:

➢ If you are unable to find property, method or aggregation inside of a control, you must check that in its parent control.

View Types in SAP UI5?

4 types of views in SAP UI5

1. JS View - < 20%
2. **XML View - > 80%**
3. JSON View – 0 %
4. HTML View – 0%

Why we use XML views rather JS view ?
1. XML views are industry standard, all the other MVC paradigm technologies like Android, Angular JS, Bootstrap framework, usage XML as standard view.
2. JS is a programming language, if a developer usage JS as view, then it is possible that a developer may end up coding processing logic inside of a view. ***That's a violation of MVC principle.***
3. Parsing of XML view is faster as compared to JS view in mobile devices.

how to debug XML views?
How can you debug something which is not at all a programming language.

You have been given an ABAP report task, You have written ABAP report in SE38. You colleague has been given same taks, Will the code change if he/she writes in SE80?
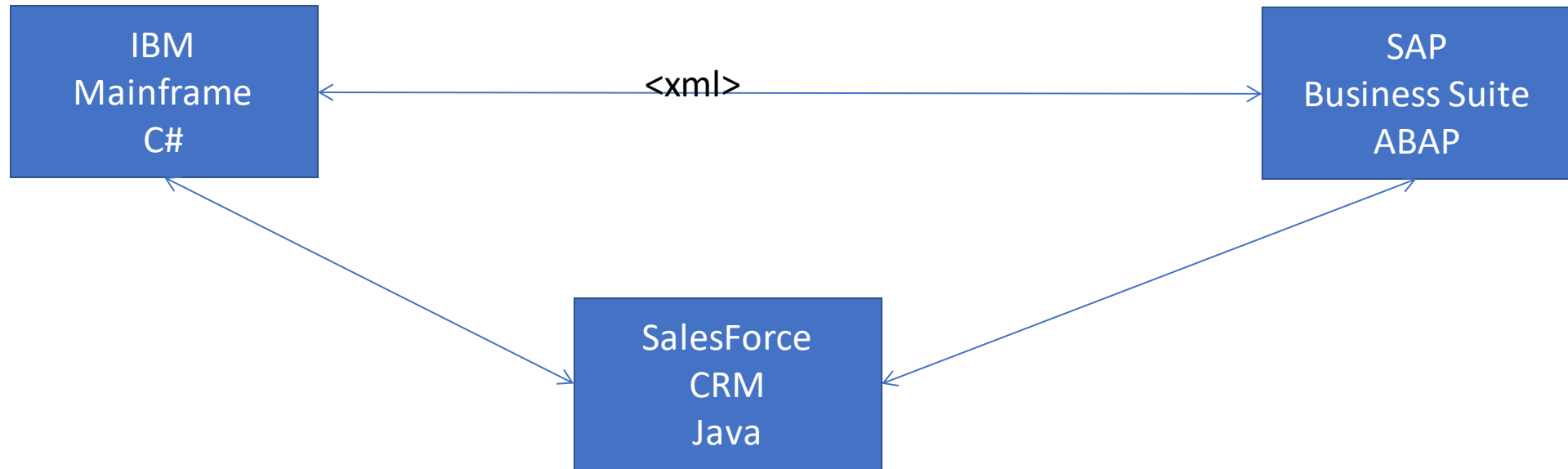NO.

Can multiple views use same controller and is vice-versa possible?
Yes but vice-versa not possible.

What is XML?
XML stands for eXtensible Markup Language. The purpose of xml was to establish a common language to transfer data between heterogeneous technologies.

```
┌──────────────┐                              ┌──────────────┐
│     IBM      │          <xml>               │     SAP      │
│  Mainframe   │ <─────────────────────────>  │Business Suite│
│     C#       │                              │    ABAP      │
└──────────────┘                              └──────────────┘
        ↖                                            ↗
          ↘          ┌──────────────┐          ↙
            ↘        │  SalesForce  │        ↙
              ↘      │     CRM      │      ↙
                ─>   │     Java     │   <─
                     └──────────────┘
```

Every programming language must have to have methods, interfaces, APIs, classes to process XML.
Creates an XML from Itab = Rendering (Data type → XML)
Converts XML to Collections in Java = Rendering (XML → Data Type)
PI, XI – if_ixml_document, if_ixml

**Exercise**: if the total value is more than 100, make the switch on else switch off.

```
<core:View xmlns:core="sap.ui.core" xmlns="sap.m" xmlns:form="sap.ui.layout.form">
        <Button id="anubhav" text="click me" />
        <form:SimpleForm></form:SimpleForm>
</core:View>
```

myView

Funda Fox:

➢ When the DOM is created for an XML view, the UI control(s) will have an id created as

   viewid-controlId → myView—anubhav

   Sap.ui.getCore().byId("anubhav"); -- **code will not work**

   sap.ui.getCore().byId("myview—anubhav") = **this will work**

➢ How to obtain object of the view inside of the controller

   this.getView() = obtain the object of the view inside of controller

   this.getView().byId("anubhav") – will work beautifully

View 2
Button1
Button2

view0

view1

View

Button(anubhav)
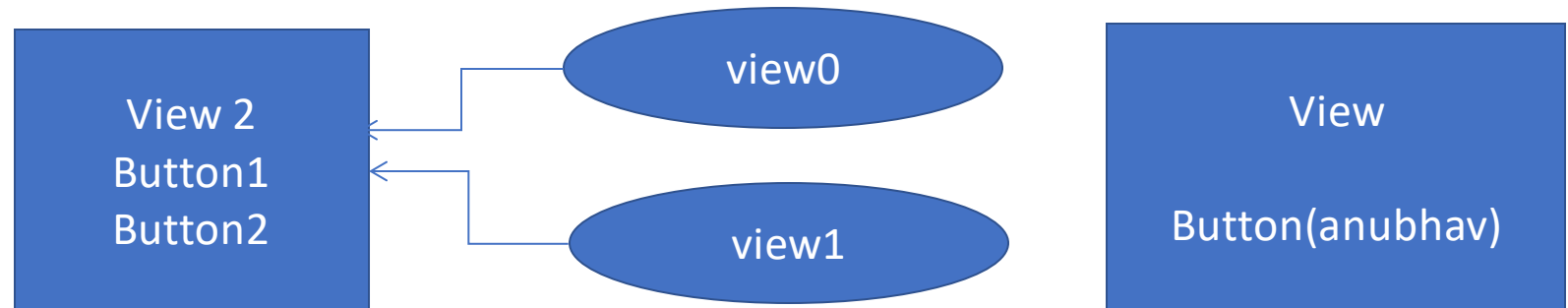
Funda fox
➢ We should have one controller per view.

If you try to be the best, You will be number 1,
If you try to be unique, you will be only one.

Exercise: Design a screen for user to enter personal address. When user click on Punch button. Display the address below the input fields in text control.


Input Fields

Punch

Display Address
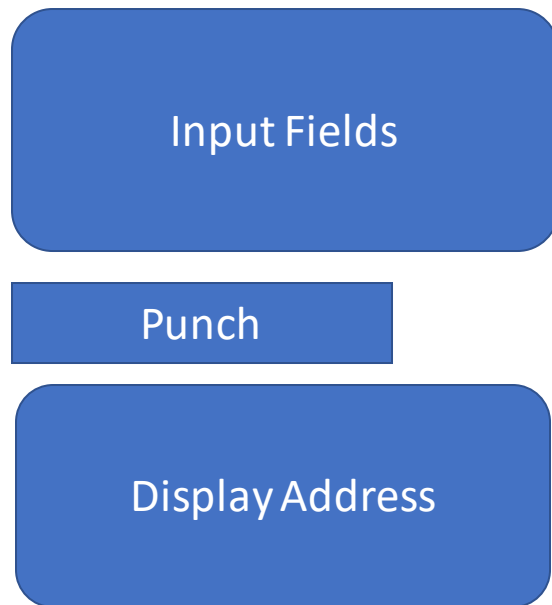
Which is the runtime engine of JS?

- Mozilla Firefox – Mozilla Spider monkey
- Google and other – Google V8

1. Once you talked about Open UI5, can you explain the difference between open UI5 and SAP UI5.
2. I wish to use global variable in controller. This variable should be accessible by all my methods. Like in ABAP we can define class level variables and use them using me-> keyword in all methods. All the methods share that instance/static variable. Sharing data between methods within the controller.

Open UI5 v/s SAP UI5?

Open UI5 is *subset* of SAP UI5 which is free for use, it comes under open source Apache license. Anyone can use, adapt and change the UI5 framework. However SAP UI5 is a licensed product which comes with SAP NW.
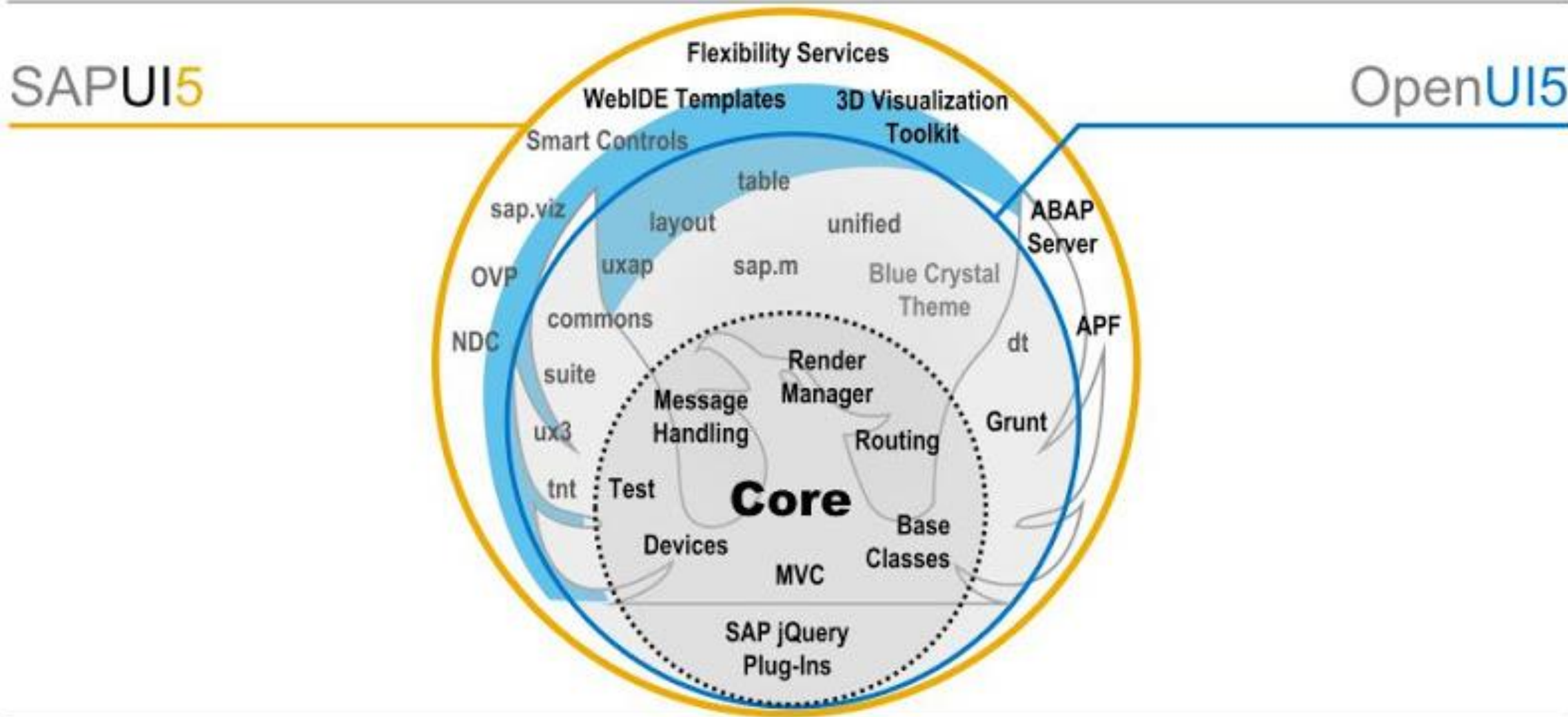
Funda Fox:

➢ "*this*" is the object of controller (with in the controller, object of controller)

Technique to define global variables
1. variablename: value,
2. Inside of onInit method, write ***this.variableName = value;***
3. Using scaffolding template

When it comes to js view, ***this*** pointer will only and only work ***as a controller*** object provided the object of controller is passed explicitly.

Model: in MVC architecture the model is represented by Data. This data can come from an SAP server or hard coded inside project files. Depending on the source and format of data we have verity of models to choose from.

We have four types of models in SAP UI5

JSON Model
XML Model
Resource Model

OData Model

Client Side Model: A client side model is used to keep all the data in client (downloaded in browser @ one shot), There no communication to server. The usage of client side model is, cases when we want data to be exchanged between view. We can use them in cases where the volume of data is small. It is like Internal table and Work area in ABAP.

Server Side Model: A server side model is used when there is a communication required to SAP server, The communication happens through request and response (via HTTP). Most suitable for creating real-time business applications on top of ERP.

Steps to work with a Model:

1. *Create the model object*

   var oModel = new sap.ui.model.modeltype.ModelObj();

   var oModel = new sap.ui.model.json.JSONModel(); -- Create a json model

   var oModel = new sap.ui.model.xml.XMLModel(); --create an XML model

   var oModel = new sap.ui.model.resource.ResourceModel();

   var oModel = new sap.ui.model.odata.v2.ODataModel(); -- V4 is the latest Odata model object

2. *Set the data or Load the data to model object*

   oModel.setData(data in required format);

   oModel.loadData("path of file");

3. *Make the model aware to your UI or Application or UI Control. We must set the model at App level OR View Level OR Control level.*

   sap.ui.getCore().setModel(oModel);   --application level

   this.getView().setModel(oModel);   --View Level inside controller write the code

   this.getView().byId("control id").setModel()   --Model object @ control level

Whenever we want the data to be loaded in UI, The UI Control (text field, label, table) has to bind the address (path) of the model data.

Funda Fox:

1. It doesn't matter which type of view you use, You can choose any model of your choice.
2. If your data is in JSON format, use JSON model.

Sample JSON to build path:

Every curly braces is represented by **/**

Every [] is represented by **/index**

```
{
        "empTab": [
                {
                        "empNo": 100,
                        "empName": "Anubhav",
                        "salary": 800,
                        "currency": "EUR",
                        "skills": ["ABAP", "Webdynpro", "UI5"]
                },
                {
                        "empNo": 200,
                        "empName": "Archana",
                        "salary": 900,
                        "currency": "USD",
                        "skills": ["OOPSABAP", "AoH", "S/4"]
                }              ],
        "empStr": {
                "empNo": 999,
                "empName": "Roger",
                "salary": 999,
                "currency": "INR"
        }
}
```

/empStr/empName→Roger
/empTab/1/empNo→200
/empTab/1/skills/0→OOPSABAP
/empTab/0/skills/1→Webdynpro

What is a model?
Model is an object and if want to manipulate data inside model we can use the methods of this object.

Change the data of model
oModel.setProperty("path","value");
oModel.getProperty("path");

Property Binding: When you bind UI control's property to Model path, it is property binding.

Exercise: Every time i click on button, it should toggle field read only to enabled and vice-versa.

Model (Object)	View
/empStr/empNo	UI Field 1
/empStr/empName	UI Field 2

json
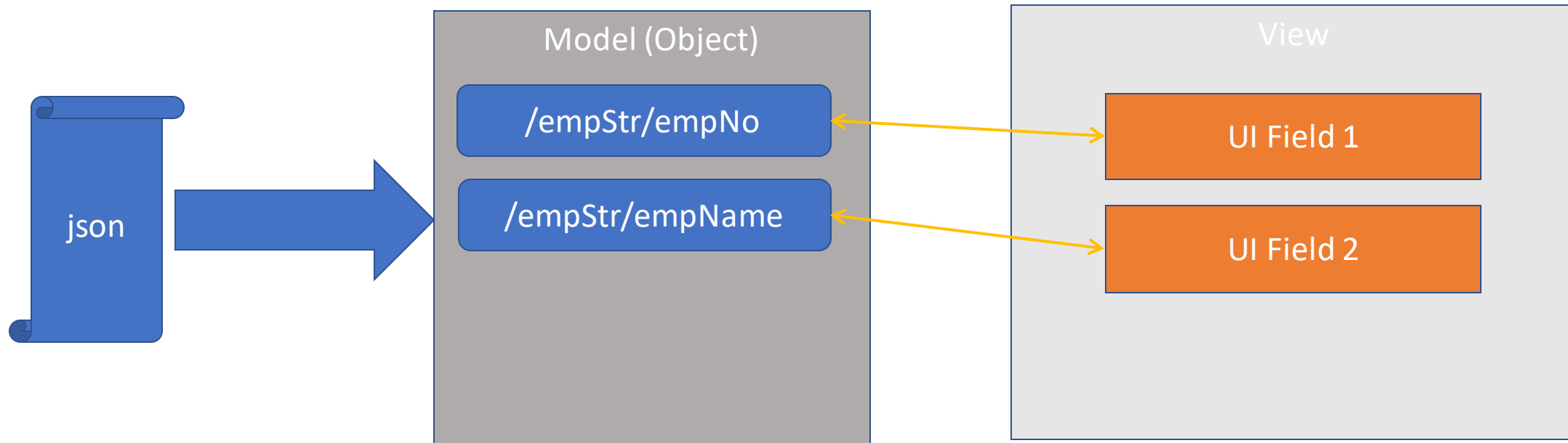
One Way : Data from the model will reflect in the view but vice-versa not possible.

Two Way : Data from model will reflect in view and vice-versa will happen.

One time: is like one way binding but only works when view loads at first time. After that there is no connection between view and model.

What is the default binding mode for JSON also XML model?

Two Way

Can we change binding modes for model?

Yes.

Can we use multiple models in an Application?

Yes, When we work with multiple models, the application should be able to differentiate between these models.

Use Named model control to set multiple models @ app level.

Two twin brothers joins a company and both have same name.

Employee ID

How to bind with named model?

When you have name of a model, you can use ***modelName>*** in binding.

Exercise:

On click of print button, flip the model objects, as a result we should see the data in fields will change.

Syntax to be used in binding:
 option 1: use of curly braces with path
{json path}
Option 2: path as a prefix.
{ path : 'json path' }

Funda fox:

Whenever we use the binding syntax as option 2, we must use a setting in bootstrap to tell SAP UI5 that the binding type is of complex binding.
data-sap-ui-xx-**bindingSyntax**="**complex**"

Columns

Rows

Input Field	CheckBox		

label: decide the title of the column
template: it receives a UI control
object and this will decide what type
of cell will be created.

Funda Fox: When we put columns inside table, it is important to assign the template property along with label to display
the desired columns and cells.

Absolute path and relative path: An absolute path is the path with which the parent control is connected, usually it is root child of dataset. The relative path is the path with which the child elements of a control connects. System will treat relative path as a subset of absolute path. These paths are used in cases of Aggregation binding where parent control (table) binds to Absolute path and childrens (columns) binds to relative path.

Exercise: Make the Employee name editable. Remove multi select for table, it should only allow single selection. Marital status should be a dropdown (combobox), with 2 values (Married and Single).

Pass by value – The value of a variable passed to the function.
Pass by reference – The pointer to the memory is passed to the function.

Funda Fox:
Every event handler method in SAP UI5 will received an event object, which carries the information about the action taken by user on UI and also the information about the UI Control on which action was taken. Example when we select a table record, an event object will tell me which row of the table (index) was selected by user.

This event object has some methods like
oEvent.getParameter("pname");
oEvent.getSource() – object of source control, so we don't need to do this.getView().byId();
oEvent.getParameters();

Element – memory allocated for each record

Model Data /empTab

Table

Row 1
Row 2
Row 3

/emptab/0 → 100 Anubhav 99 EUR

/emptab/1 → 200 Archana 900 USD

/emptab/2 → 300 Sonali

bindElement(path)

Simple Form

Input Fields

empStr

999 Roger 950 EUR
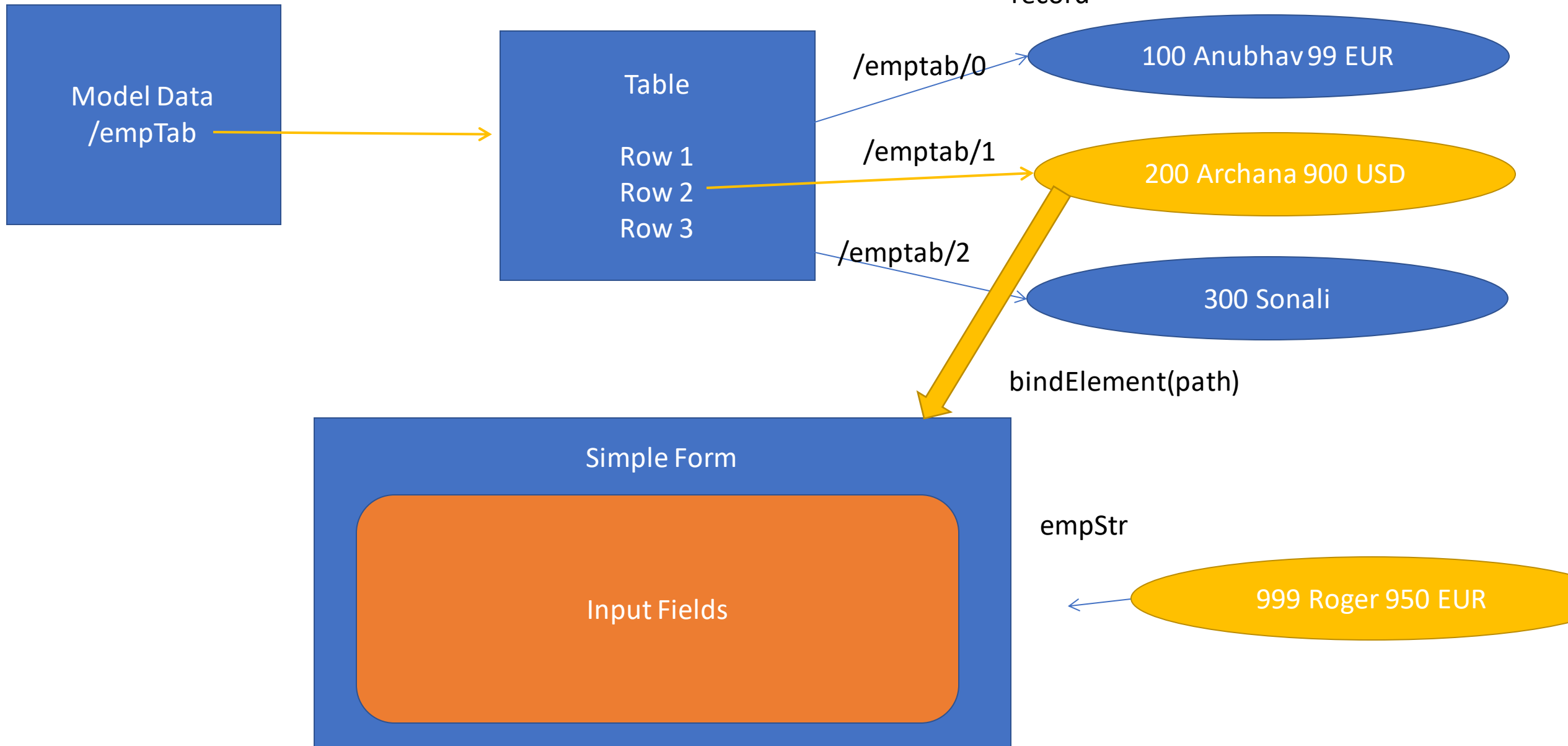
Property binding always use relative path. Aggregation and Element binding is used to set absolute path.
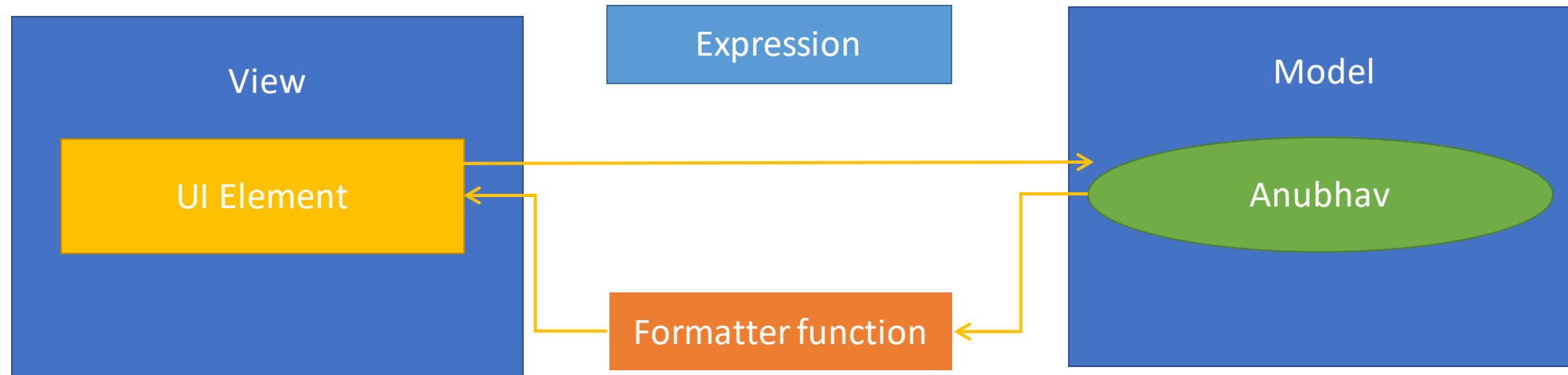
CONVERSION_ALPHA_INPUT
CONVERSION_ALPHA_OUTPUT

When we apply formatter, that particular filed becomes one way binding.

Syntax for expression binding:
{= condition ? True(what todo) : Else(what to do)}
Within the expression binding you can use binding element properties also like ${path}

Xml Model makes use of XML data.
OTR – Online Text Repository ?
Translation.

Internationalization : standard which tells that software should support multiple languages. This purpose SAP UI5 provides me a technique called Resource Model.
All the texts relevant for UI element Labels and translation are kept in a separate file, later these texts are translated to different languages.
+

Developer

KM Developer
(Doc. & translation)

As a developer your job is to make sure that labels are used only and only from the internalization file (i18n.properties).
Create resource model and bind the labels from the UI texts.
Once the deadline for development close is done, UI is frozen. The KM developer starts translation of UI labels, He/she creates a copy of i18n file and creates language specific files with lang. Codes. Example, if i need software to run in hindi language, the language code is hi.

How do business users launch fiori apps:
Fiori apps are accessed by a single starting point for app applications called SAP Fiori launchpad.

?sap-ui-language=<lang code>
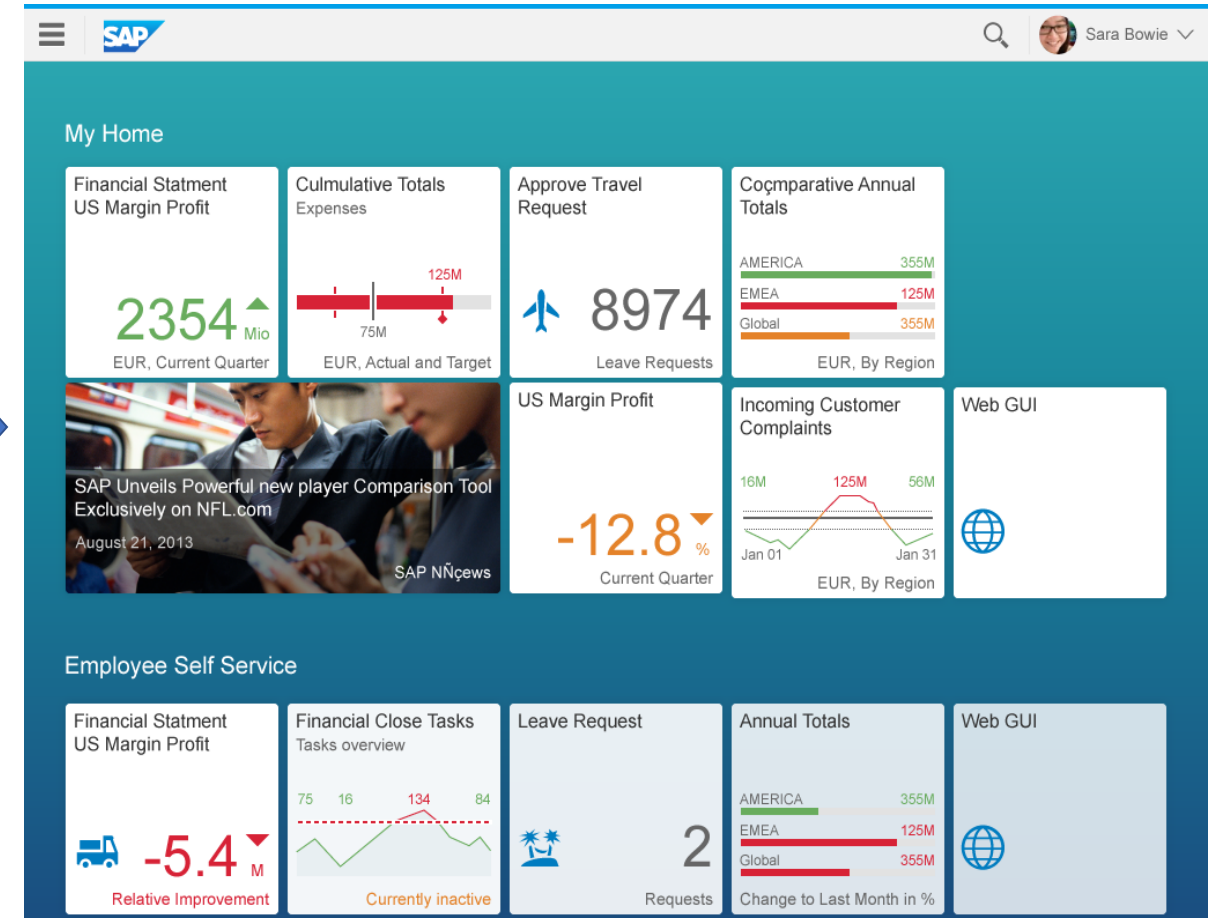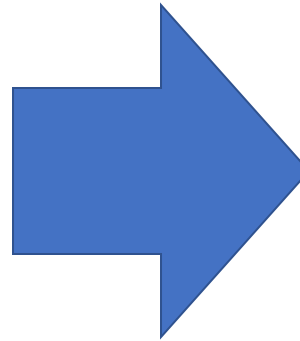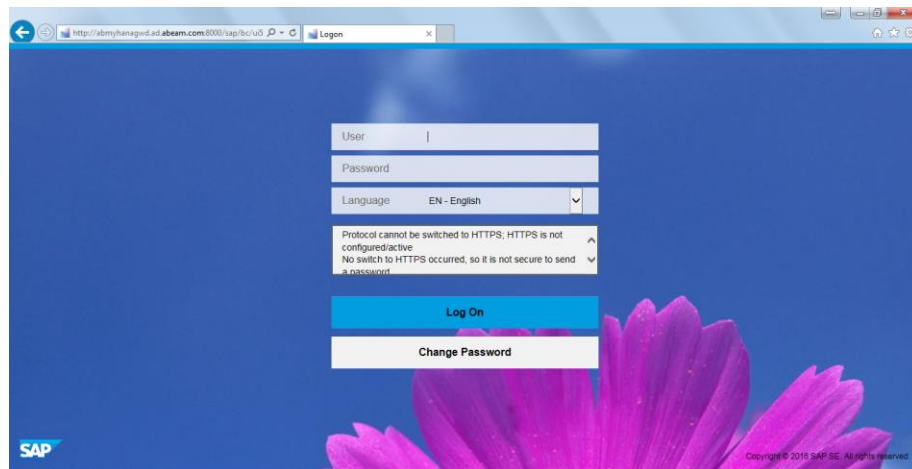
By far we saw how to create user interface using SAP UI5. But we have a concept called UX (User eXperience).
What is difference between UI and UX.
UI is the technical user interface however UX is how user is used to using apps. You can change UI but cannot change UX.
You must try to make your UI as close to UX as possible.

Fiori is all about UX. There are UX guidelines provided by SAP to make sure that if you create your application using these guidelines, you will be able to achieve a great user experience.
http://design.sap.com/fiori-ux.html
https://experience.sap.com/fiori-design/
http://sapfioritrial.com

Fiori apps created by using SAP UI5 framework.

Fiori UX application:

Index.html

Object of view

View.xml

Return oControl;
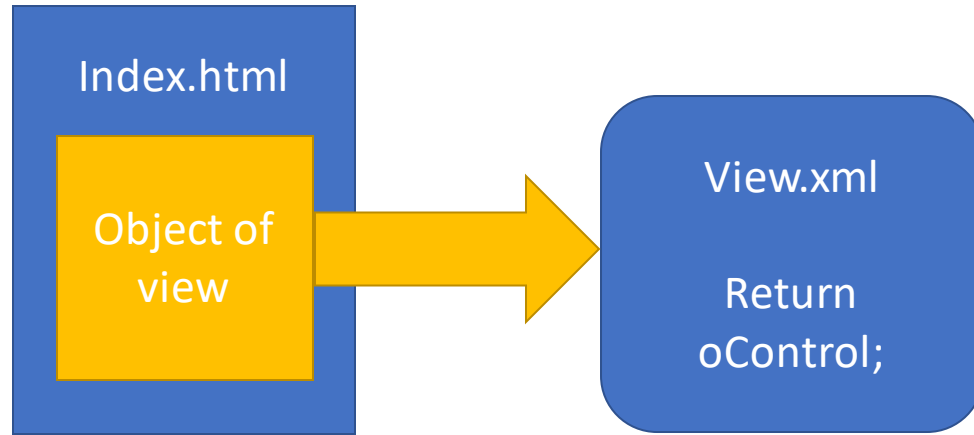
Fiori Application always has a container control (usually sap.m.App) which encapsulates all the views.

Index.html

sap.m.App

Main.view.xml

Second.view.xml

parents

Brother 1

Brother 2
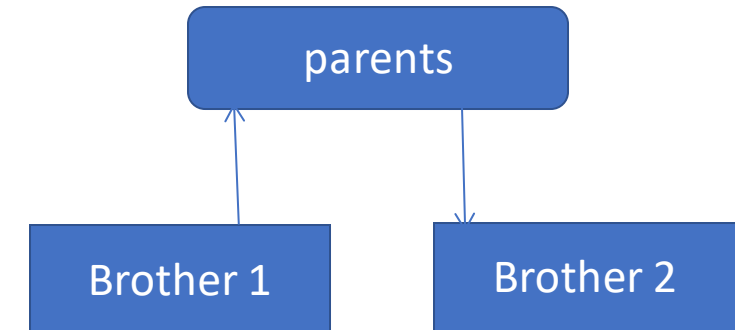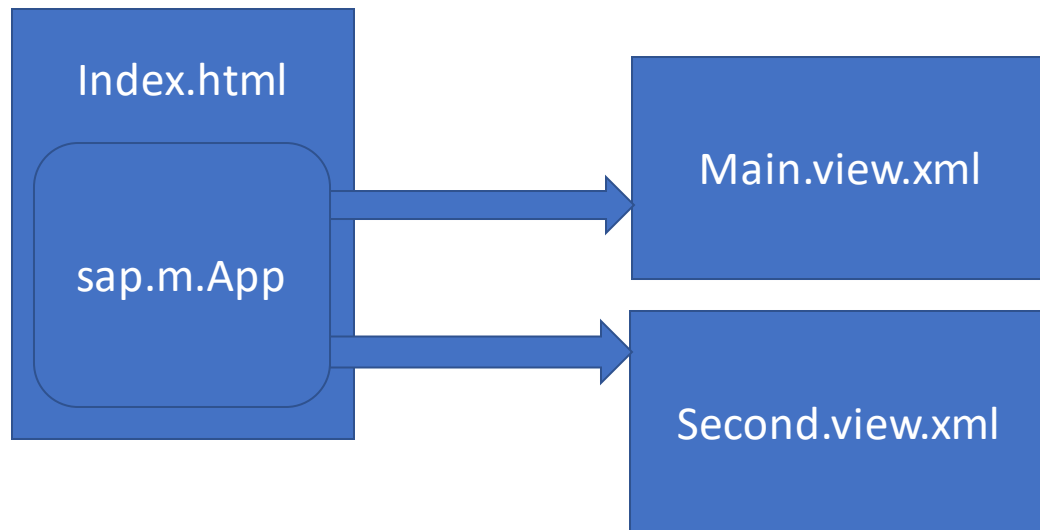
List Control: Is a single column table, used to display multiple items.

List

header

Item 1

Item 2

Item 3

...

...
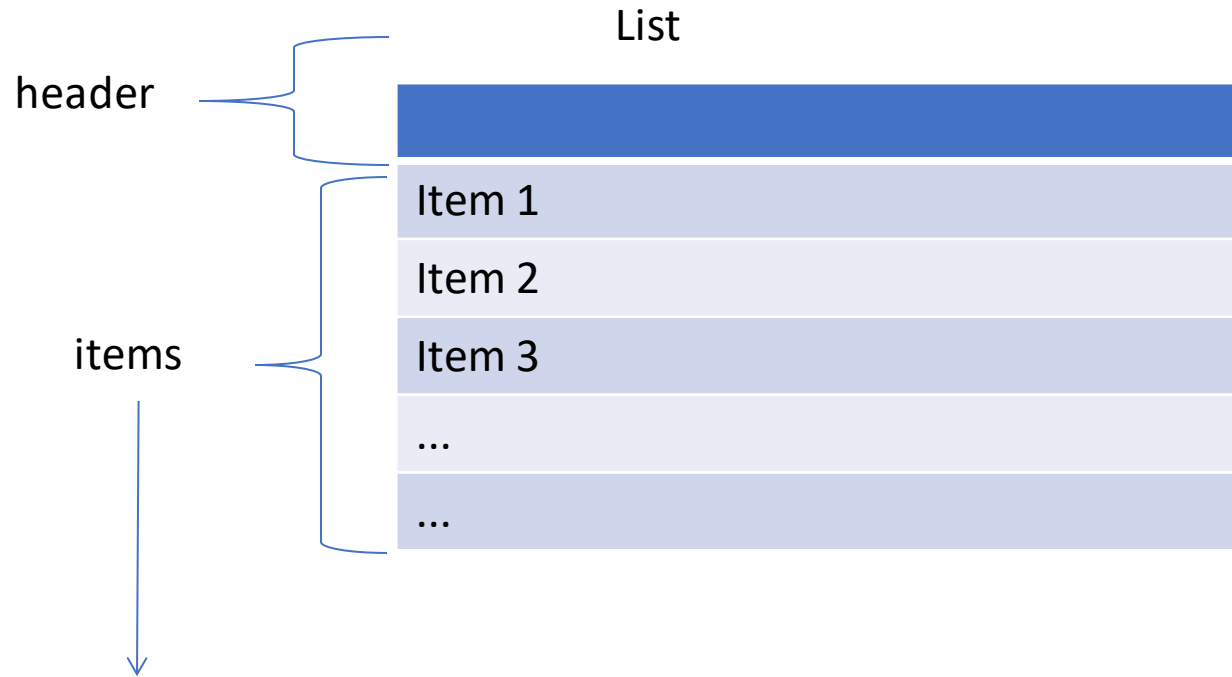
items

Path: binding path from where it takes the data from (optional)
Template: decide which type of list item we want to use

sap.m.ListBase

items

sap.m.List

sap.m.ListItemBase

sap.m.DisplayListItem

sap.m.ObjectListItem

sap.m.InputListItem

sap.m.ColumnListItem

sap.m.StandardListItem

sap.m.ActionListItem

sap.m.FeedListItem

sap.m.CustomListItem
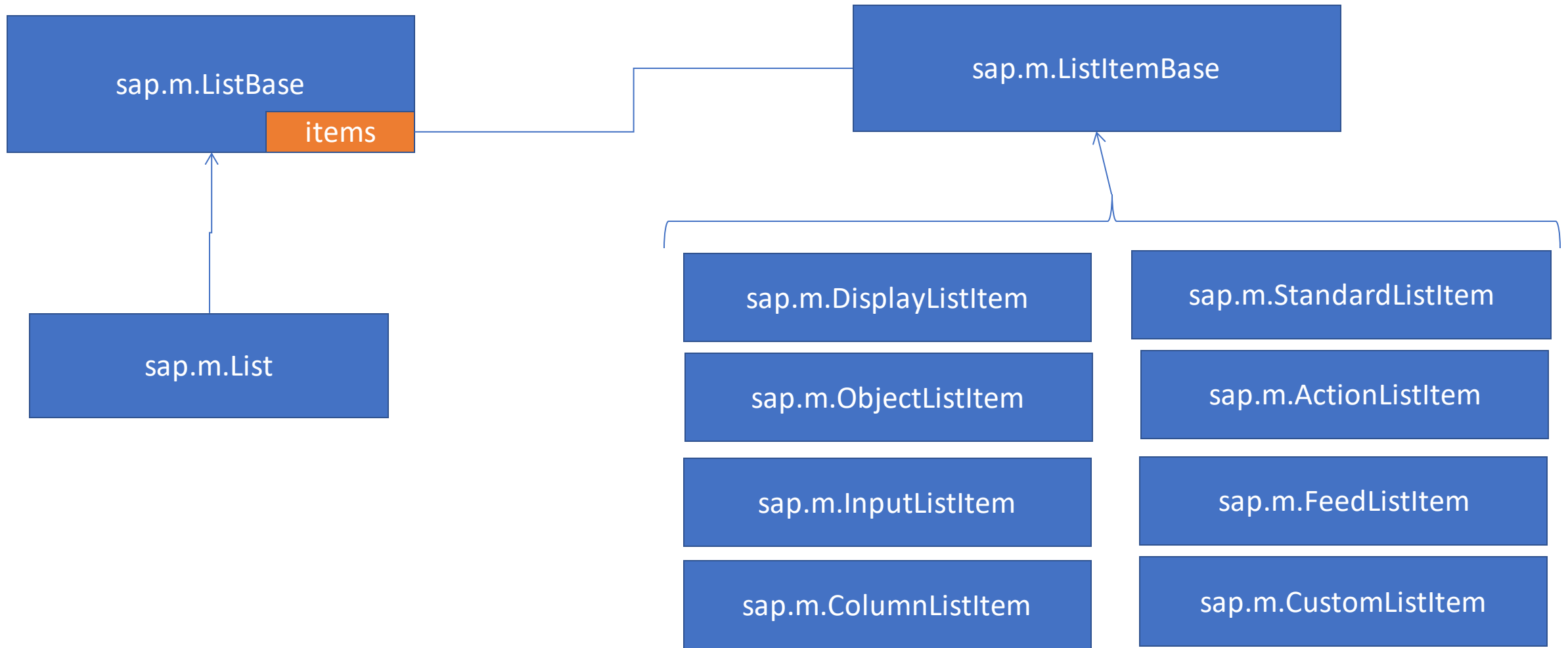
500 fruits, will you add 500 list items manually like today?

No.

What would do?

Binding. - aggregation binding with list control (just like rows of tables)

Exercise: Design a json for fruit store. This JSON will have 3 entitysets (fruits: [], cities: [], suppliers: [])

Each ES has to have multiple records, May be 20 Fruits, 10 cities and 15 suppliers.

Fruits (20): name, color, benefit, availability (Available, Out of Stock, Discontinued), image, price, currency

Cities (10): city, state, famous

Suppliers (15): name, city, sinceWhen (yyyy-mm-dd), country, supplierId (1001,1002,1003,1004)

Deadline Next 12 hours.

Nagpur – The Orange City. Nagpur is synonymous with Oranges. …

Mahabaleshwar – Strawberry. …

Ratnagiri – Alphonso Mangoes. …

Nashik – Grapes. …

Siliguri – Pinapples. …

Jalgaon – Bananas. …

Dahanu Bordi – Chiku Orchards. …

Goa – Cashew Nuts

JSON Model which is global

oda
ta
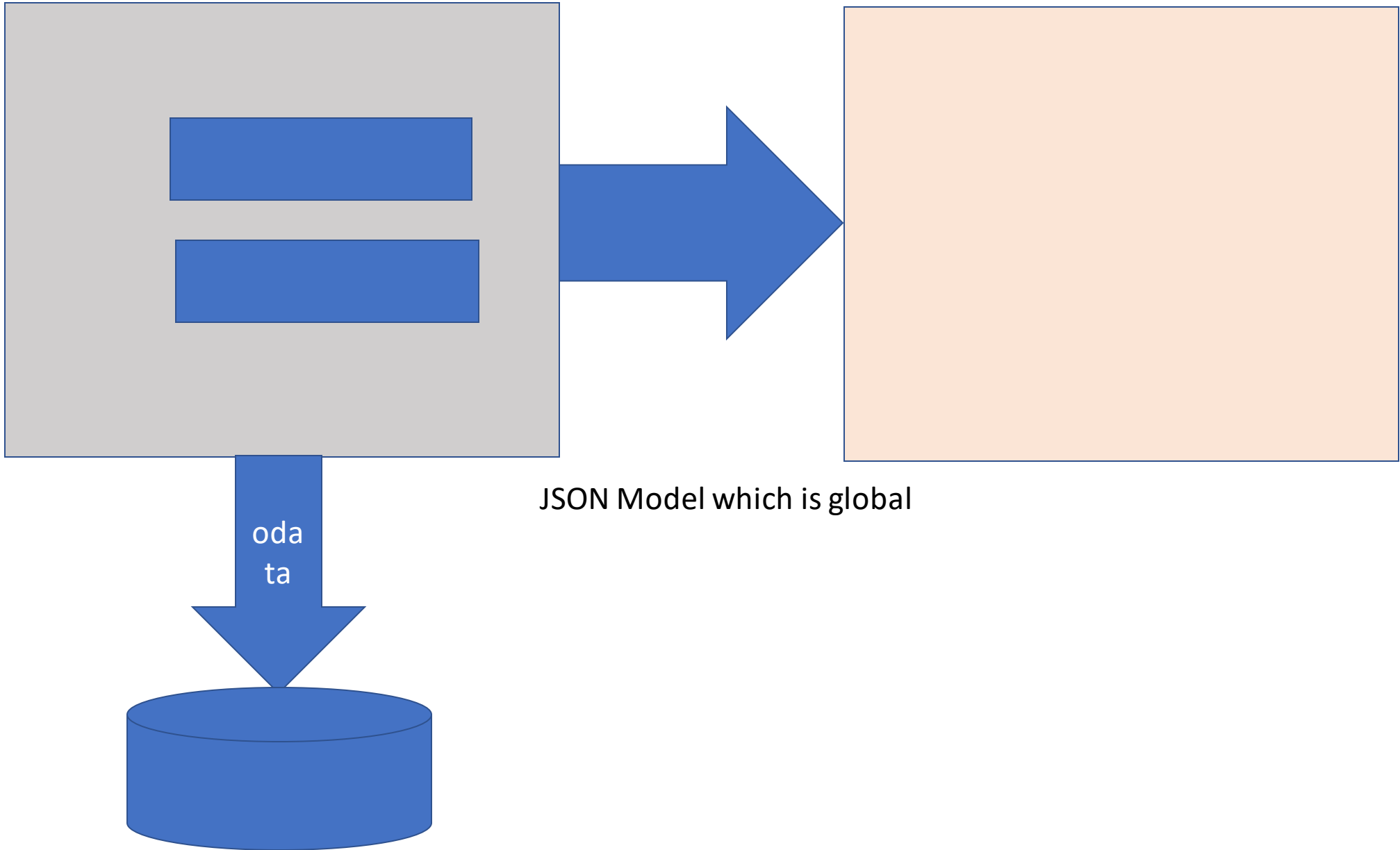
SAP Fiori Worklist Application: An application where first screen displays list of data and when we select an item, it navigates to next screen and display details of selected item.

Transactional App 60%	Analytical App 40%	Fact Sheet App
Work List	OVP	
Master Detail	ALP	
Editable	Smart Filter	
SAP UI5 kind	KPI Tile	
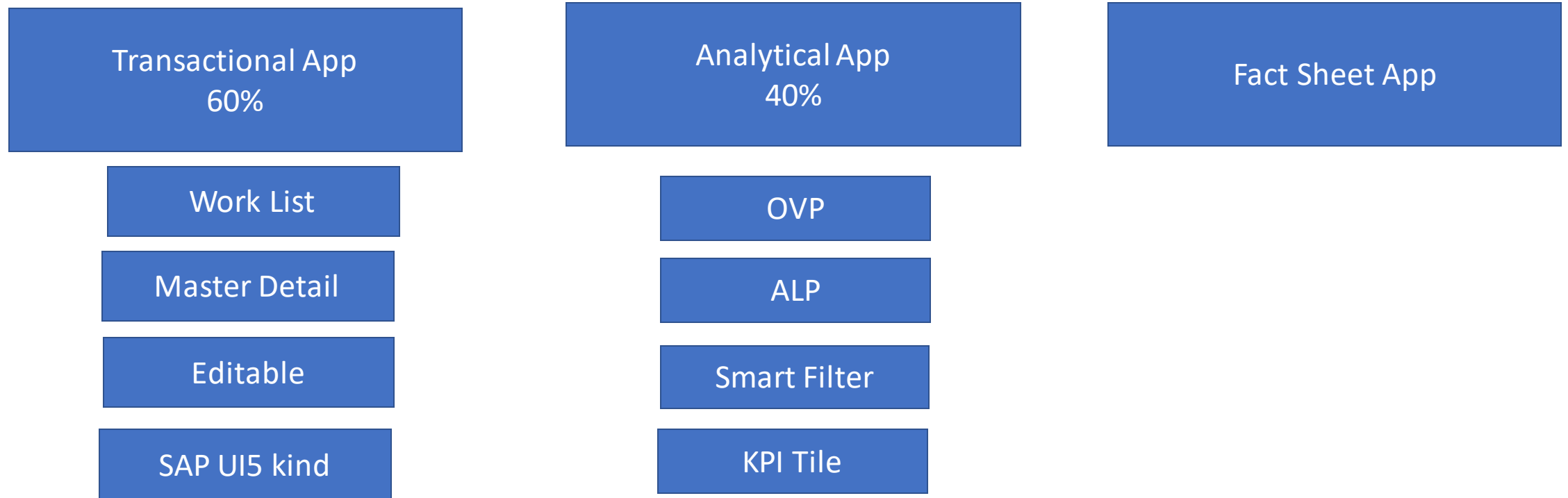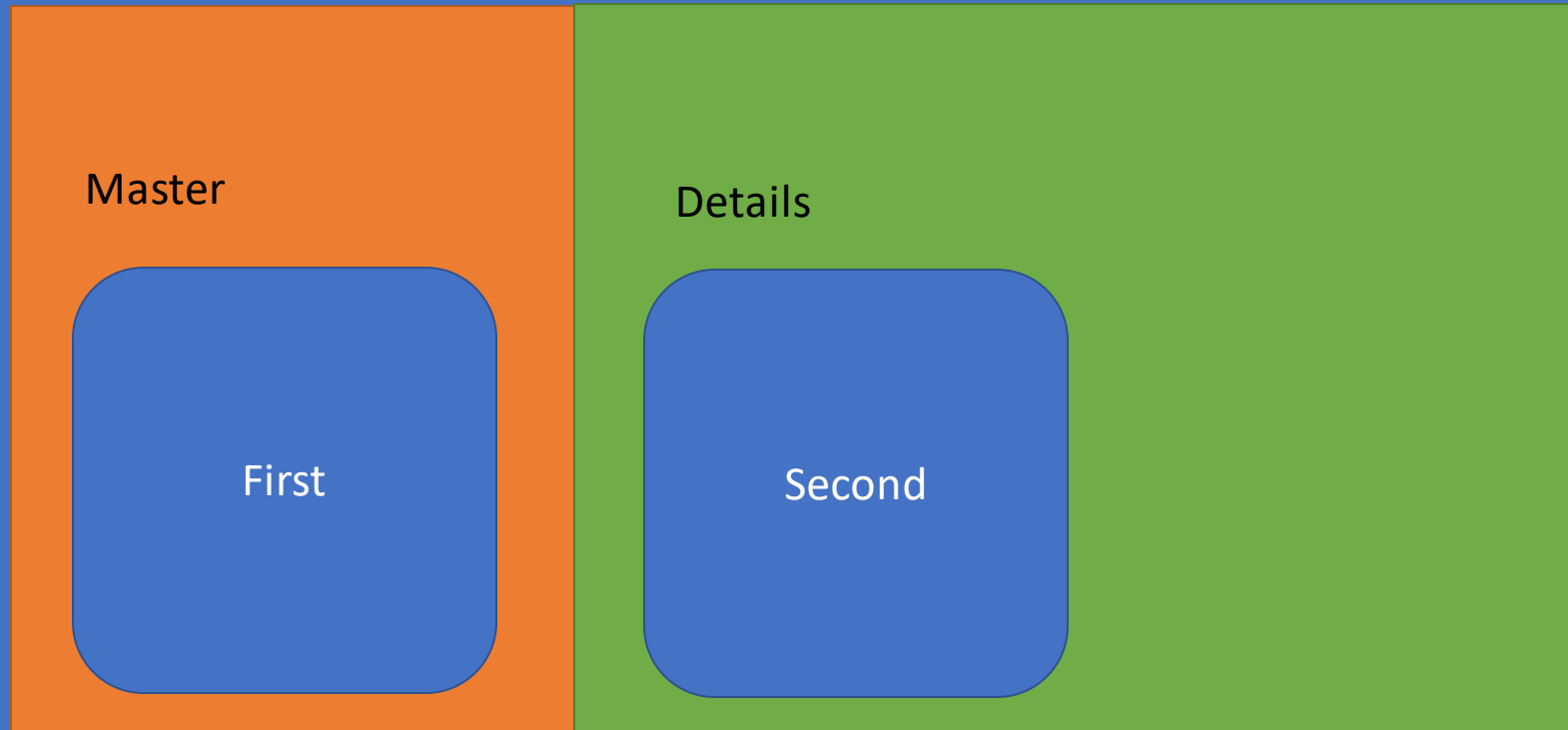
In real time Fiori apps we do not use App or SplitApp for navigation, we use concept of Router.

For (var i=0;i<oList.getSelectedItems().length;i++)
{
        console.log(oList.getSelectedItems()[i].getBindingContextPath());
}

Input

getBinding("name of aggregation or property")
getBinding("items").filter()

oContext = getBindingContext("path")
Data object

Leave req of user

1000s of req

HANA
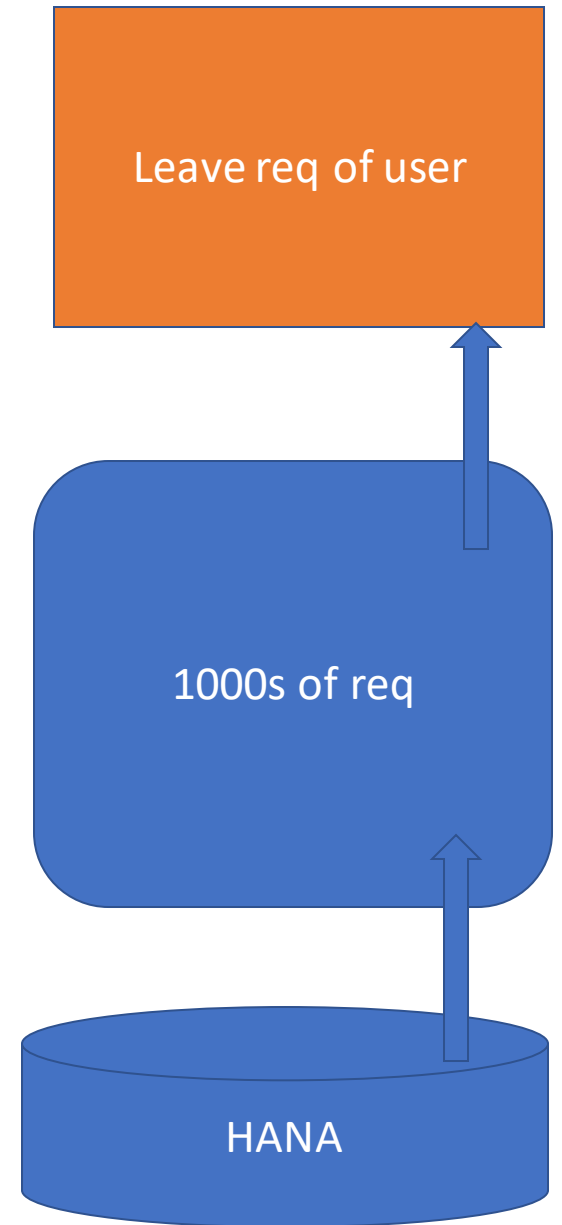
Table in Fiori (sap.m.Table)
Is a multi column list control.

Component.js
Component.js in SAP fiori wraps the complete functionality of your application. If you want to integration your fiori application to SAP Fiori Launchpad, You must use a Component.js file in your application.
Technically, it is a reuse of **sap.ui.core.UIComponent** class.
Funda fox:
➢ if you want a fiori application called as *"fiori-like app"* You must have to have Component.js in your app.
➢ You must always have one Component.js file at the app level, it is not possible to have more than one component.js file inside an app.
➢ The file name HAS to be **Component.js**
➢ it is a good practice that we put the file inside the root folder.
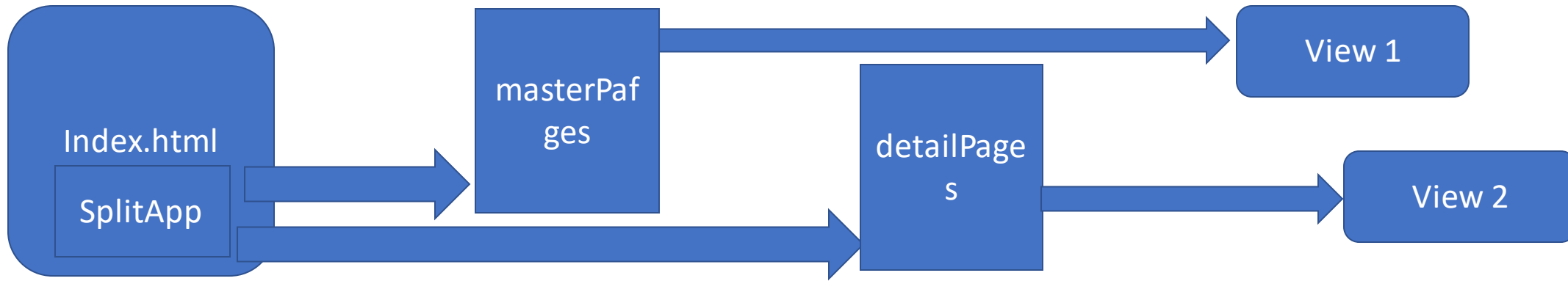
KILL the dependency on Index.html, remember that in a productive fiori app system, there is no concept of index.html. Index.html however will be used for local testing.

For more www.onlinefioritrainings.com
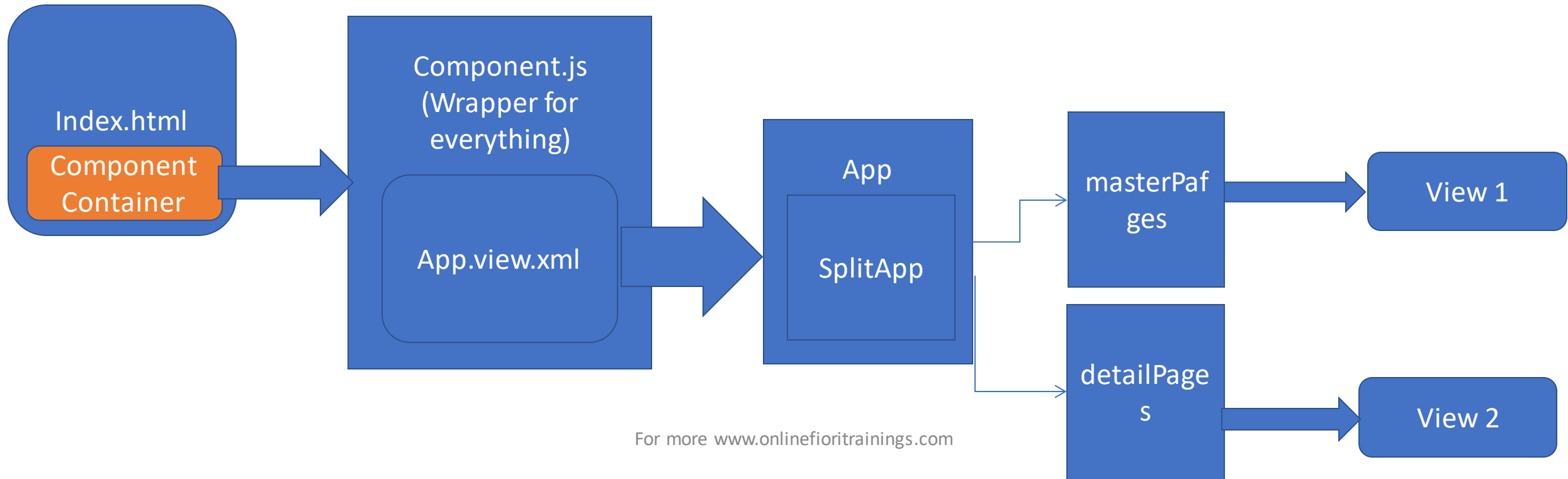
Component.js drives followings:

➤ Information about your application like version, name, author, type
➤ Details about supported devices and themes
➤ Odata service information
➤ Complete end to end navigation between pages and views – ***Object inside Router***
➤ Dependencies on SAP UI5 and Fiori
➤ Dependencies on other app
➤ ABAP system deployment information
➤ Models – JSON, XML, Resource, OData
➤ Global methods
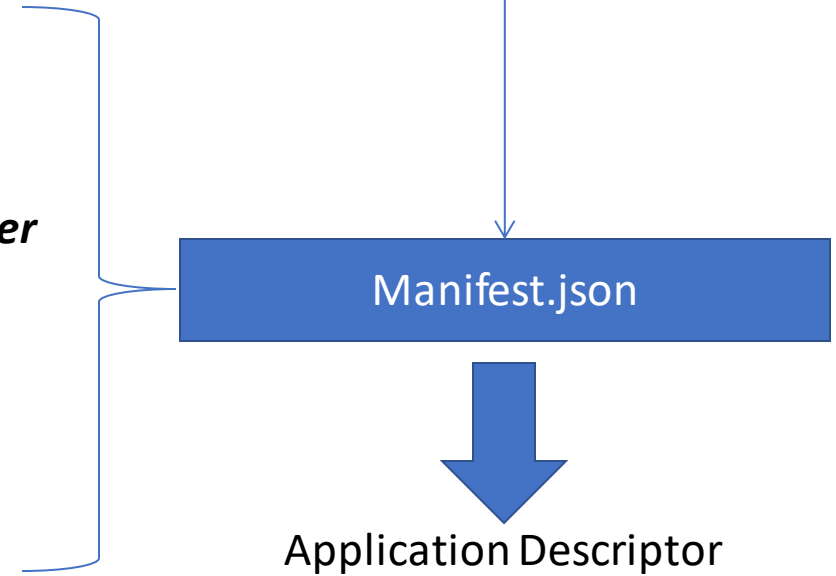
Manifest.json – it is a json file which has details about your entire application.
```
{
        //fiori app version and details like directory of i18n, application title, description etc.
        "sap.app":{},
        //Dependency management for ui5 libs and themes, devices etc.
        "sap.ui":{},
        //Routing configuration for navigation between views
        "sap.ui5":{}
}
```

Manifest.json

Application Descriptor

Router: Is a ready made object offered by UI Component class which is used to create Component.js

Router takes care of followings:
1. Instantiation of **all the views** including **App View**.
2. It controls the complete navigation of your application. In order to do that, Router need Routing configuration. The routing configuration is maintained by developer inside Manifest.json

Anubhav where is your session recordings
1. Open a browser, a browser is an application in windows to browse internet. Make sure you know what is internet and computer.
2. After opening type the below link : https://sites.google.com/site/sapfioribatch717/
3. Wait for some time till the page loading completes.
4. On the top you will see title **sapfioribatch717**
5. There is a toolbar on top, in which you are at Home page
6. Search if you can find Session recording tab
7. Use your mouse left click to click on that tab.
8. If yes, you can see session recording.
Sales order-> one of line item -> line item details -> **scheduling info**
1. **Taking user to a direct place where the right information lies. Every url has an end point addressing to a unique page.**
2. **When we have multiple url end points and we navigate, the browser tracks the end points automatically. All the browser will keep track of history and browser back and forward button will work.**

Steps to use Router in SAP Fiori
1. **Invoke the router**
   in init function of Component.js, we need to call parent class. this.getRouter()
   You need to now call initialize() method of the router

2. Make sure before we do that, we must specify the Routing configuration

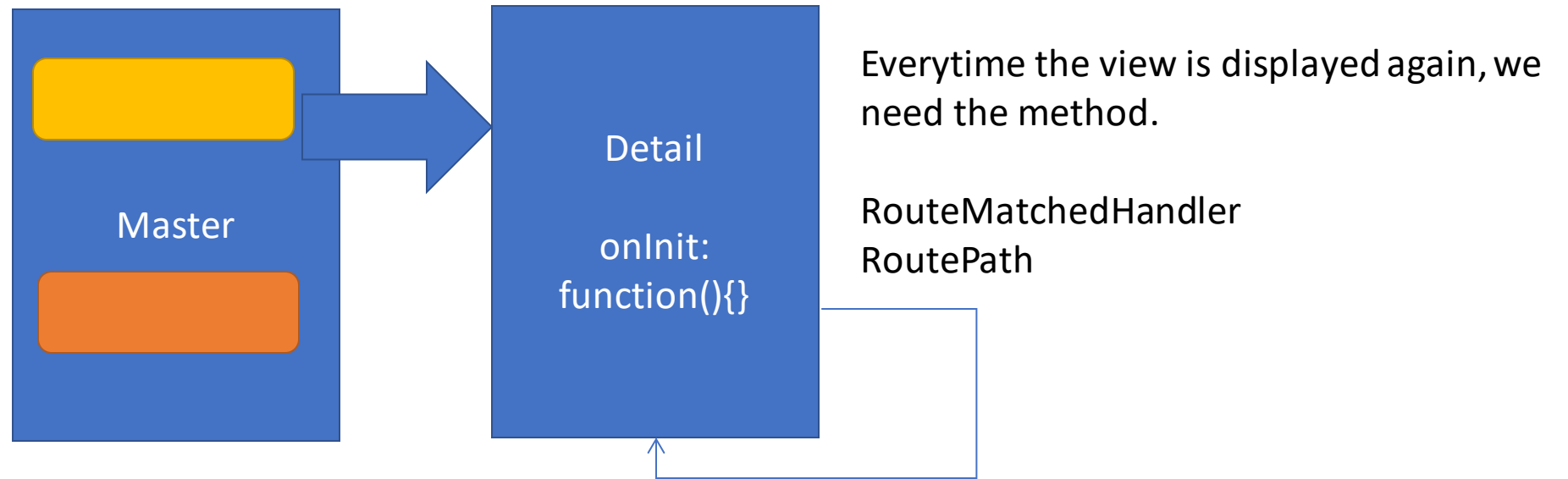2.1 – the root view – the initial view which will be launched. App.view.xml
Define it in sap.ui5 section as a json, view name, type, id
2.2 – define main routing configuration to load your other views inside the split app or app.

```
"routing":{
    "config" :{
            //router class
            //view types
            //view path
            //control id
    },
    "routes":[
            {
                        pattern : url end point,
                        name: "name of the route",
                        target: "target1"
            }
    ],
    "targets":{
            each target is equals to one view instantiation
    }
}
```

Funda fox:
When we have new application structure including App view, we need to set the data model at App view level never at application level.

Master

Detail

onInit:
function(){}

Everytime the view is displayed again, we need the method.

RouteMatchedHandler
RoutePath

1. Component js – it is a wrapper of complete application functionality, used for LPD integration.
2. Manifest.json – JSON file which complements Componentjs, All the required properties, dependencies, routing config, themes, model etc. Defined inside 3 sections of manifest file,. This was linked to Component.js.
3. Router – In order to create the object of all the views, and navigation between views was taken care by Router. Mandatory specify the routing configuration. Initialized the router.
4. History has to be keep tracked, element binding needs to be done with selected item. How do we know inside detail view what was selected by user?
   1. Get the list object and get selected item index. This way will not let the browser track every selection. To make every selection unique, we have added a variable to Route.
   2. When we select the item we are passing variable value (thor).
5. We have to implement a RouteMatchedHandler method which will trigger every time the Route changes. In this method now we can read the route index and bindElement with view for the item.

SAP UI5 doesnt become a bottleneck for developer.
If there is a UI control which you may need, and not available in Standard controls. You can design your own control.

1. Which is immediate the parent class of all the UI5 controls?
   sap.ui.core.Control
2. Which keyword you use in JS to indicate inheritance?
   extend

What SAP UI5 does behind scenes?
Converts the code to Equivalent HTML.
SAP UI5 Runtime Environment – Renderer

Exercise:
In this custom control heading, add a property for background color and border color. We should be able to pass the property
    from our xml view.

Google offers verity of services on internet, at the same time it allows us to integrate these services with our web applications. For integration purpose, it provides us different JS APIs.

How did you refer the jQuery?
<script src="path" >

How to integrate:
1. Reference the google map api java script API in your application.
2. Create a custom control, this custom control when used, produces a **div** tag.
3. We will call the google map API and this API will generate the map and place inside the area (you have to pass address of the area where the map will display).

Screen

Map
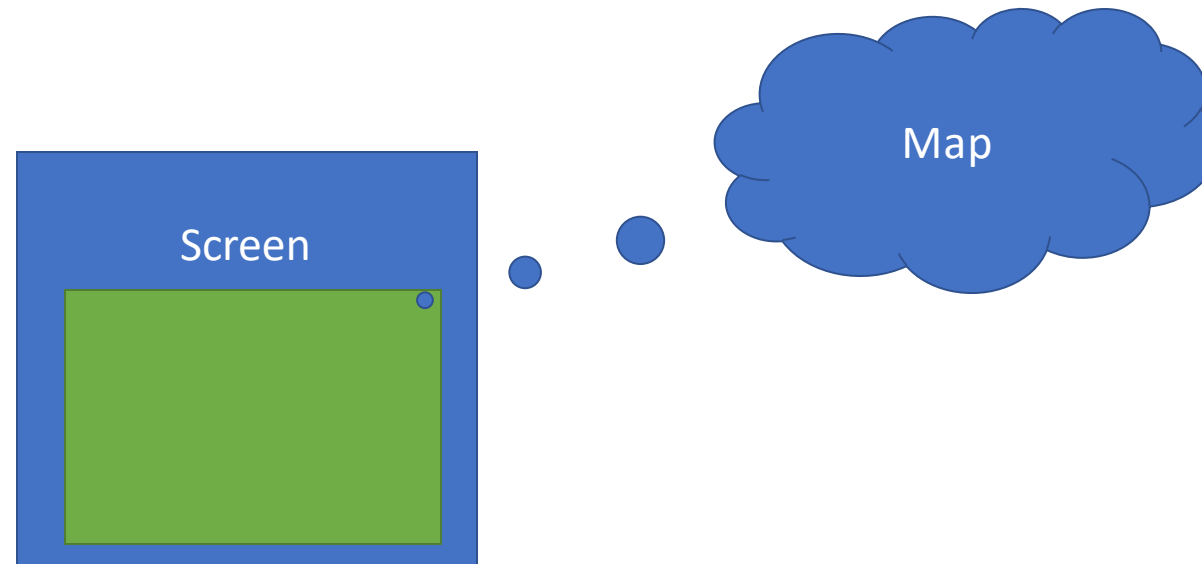
Fragments : Light weight UI parts used to modularize the Application UI. They are typically created as a separate file and combined with views @ Runtime or design time.

Funda Fox:

They do not have their own controller. They relay on controller of host.
Parasite: which doesnt cook its food own its own, it relies on the food cooked by host.

Exmple: I have a need to create address fields again and again, like permanent address, temp address, office address etc. Typically address UI has fields like Name, Address line, Landmark, pin code, city, country, PO Box, Street, House no.

Controller	View	Fragment
Validate: function(){	Permanent	Address Data fields
}	Office	validate
	Temporary	
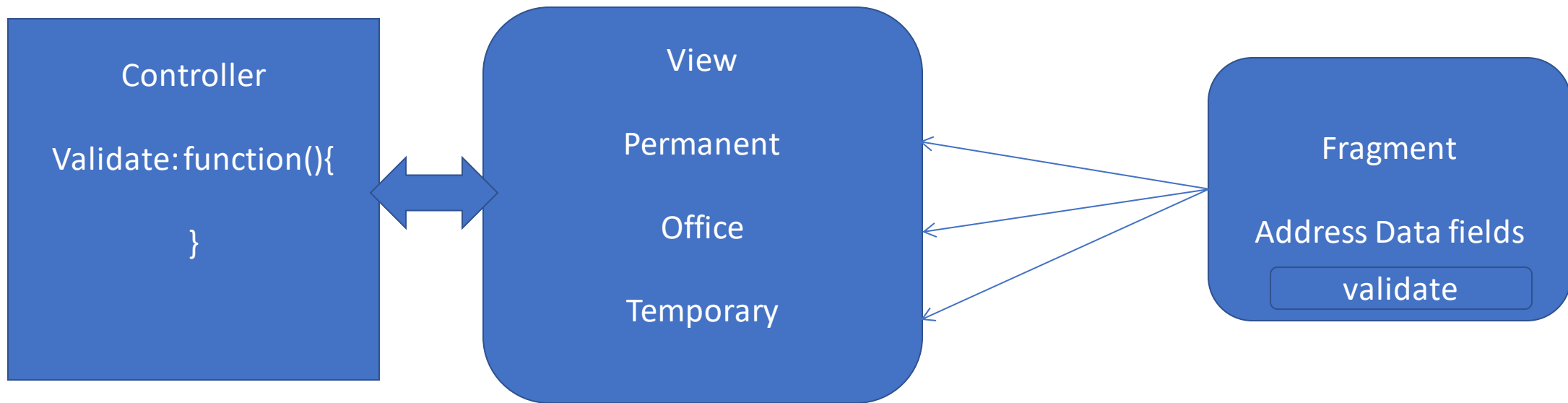
Define:

<core:FragmentDefinition xmlns:core="sap.ui.core" xmlns="sap.m"></core:FragmentDefinition>

Consume The fragment in View (Embed mode)

<core:Fragment name="path">

Instantiating the object of Fragment using JS code

```
var oFragment = new sap.ui.xmlfragment("path", this);
oFragment.method();
```

Use Case:
You are working in the fruit store software department, you need to design 2 popups.
1. When user click on settings button on the table toolbar*, a popup* with supplier details should appear.
2. When click on F4 help of our input field, a City *popup* should also come up. On selection of a city in the popup, the city should be added to the input field.

What is common in above 2 requirement?
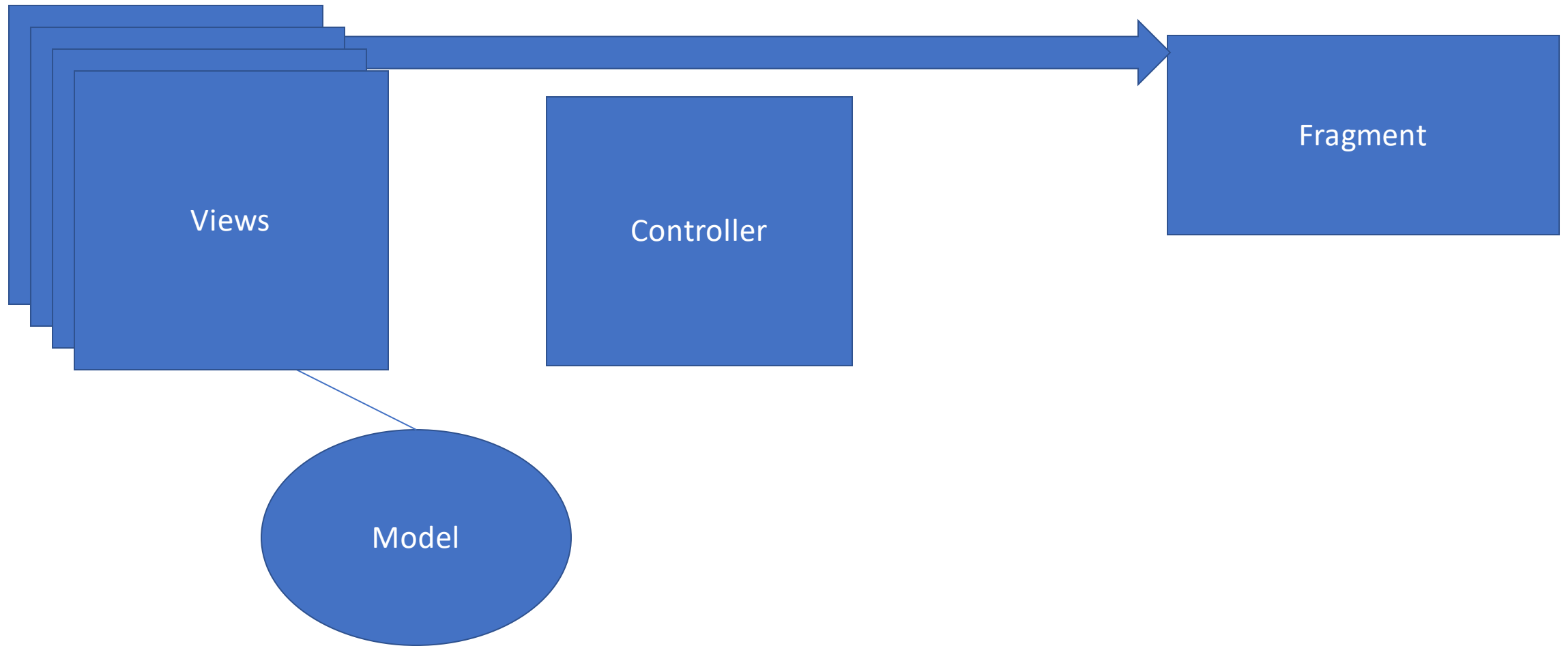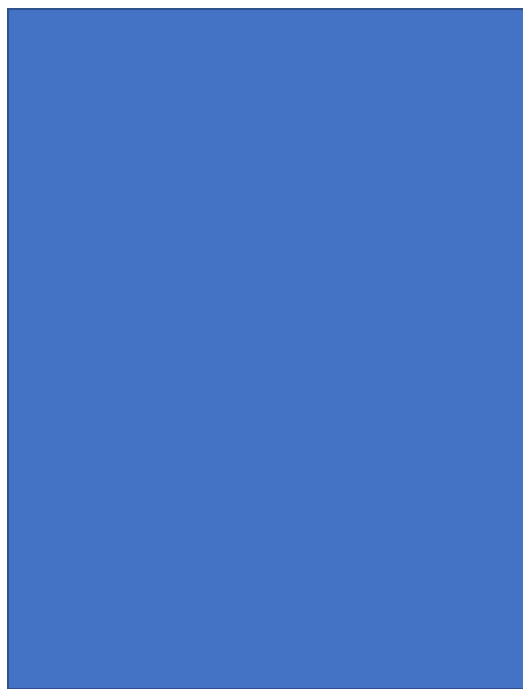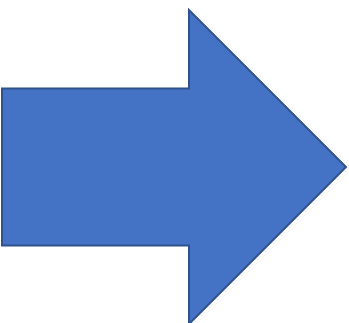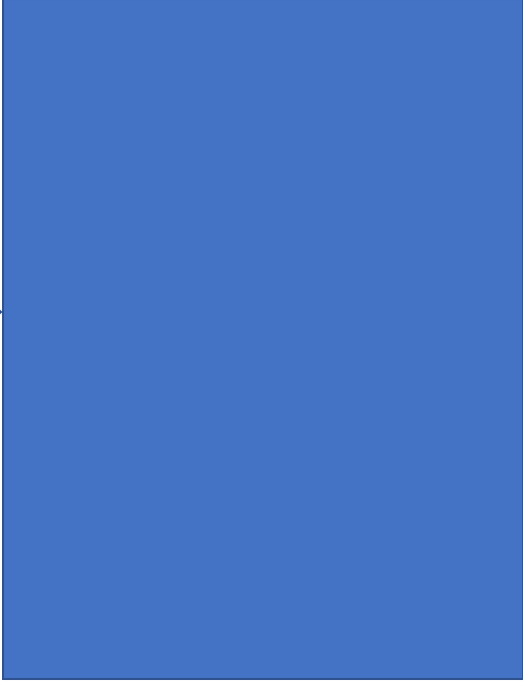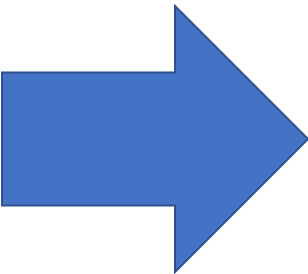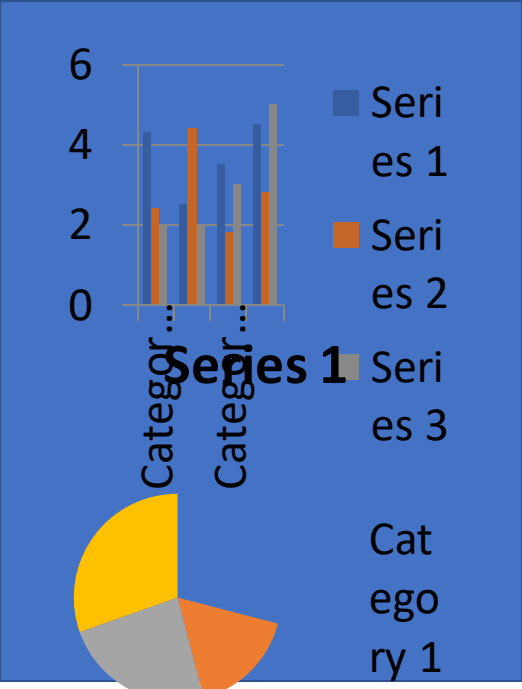
OData Stands for Open Data Protocol, widely used to communicate over internet these days. It follows REST (Representational State Transfer) principle.

Odata is not SAP technology. Odata was initially developer by company called OASIS, later acquired by Microsoft. It is an open source.

Any communication over the HTTP protocol, will be with Odata service.

Funda Fox:
➢ Odata is the way to communicate with SAP Backend from Fiori.
➢ This is one of the only way for HTTP communication to your SAP Server.
➢ Odata is not the Webservice concept used in SAP earlier.

SAP Servers for Odata and S/4HANA & CDS & HANA & SQL Script & Analytical Apps & Launchpad & Fiori Extensions:
Use your own company server.
1. **Dedicated server – S/4HANA OP 1610 – NW 7.52 with Fiori 2.0 with ADT Access -2500 INR per month per user**
   Practicing every thing including ABAP on HANA, Fiori and Odata.
   Local access of SAP GUI to SAP Server, Locally you can also access Odata services built inside the server. Deploy Fiori applications and test them with Fiori launchpad . You can also connect ABAP server from ADT (ABAP Development Tools for Eclipse – ABAP on Eclipse), connect to HANA DB from HANA Studio (Remote)
2. **Free server from SAP –** You cannot do development in the system. Demo system with only read access. ES4 and ES5 servers. All the read scenarios for Odata can be tested with this free server.
3. **Cloud Application Library** – (Cost per hour for a computer online from AWS or Azure -1.63 USD per hour **12000 INR**)
   If you want to access Odata service from local computer, you need setup SAP Cloud Connector in the server.
   https://www.youtube.com/watch?v=yrk4BjXSdy8&feature=youtu.be&list=PLcxqFaocb9WLtnq-rpXbRy5hnKECxr95G

Presentation → Browser + Mobile Devices Fiori

Embedded Scenario
Central HUB

odata

Application

NW 7.4> → SAP Gateway – Support for OData
Hosts your Fiori Apps, Fiori Launchpad, Roles, Theme Designer

SAP ECC   SAP CRM

DB Layer → HANA

For more www.onlinefioritrainings.com
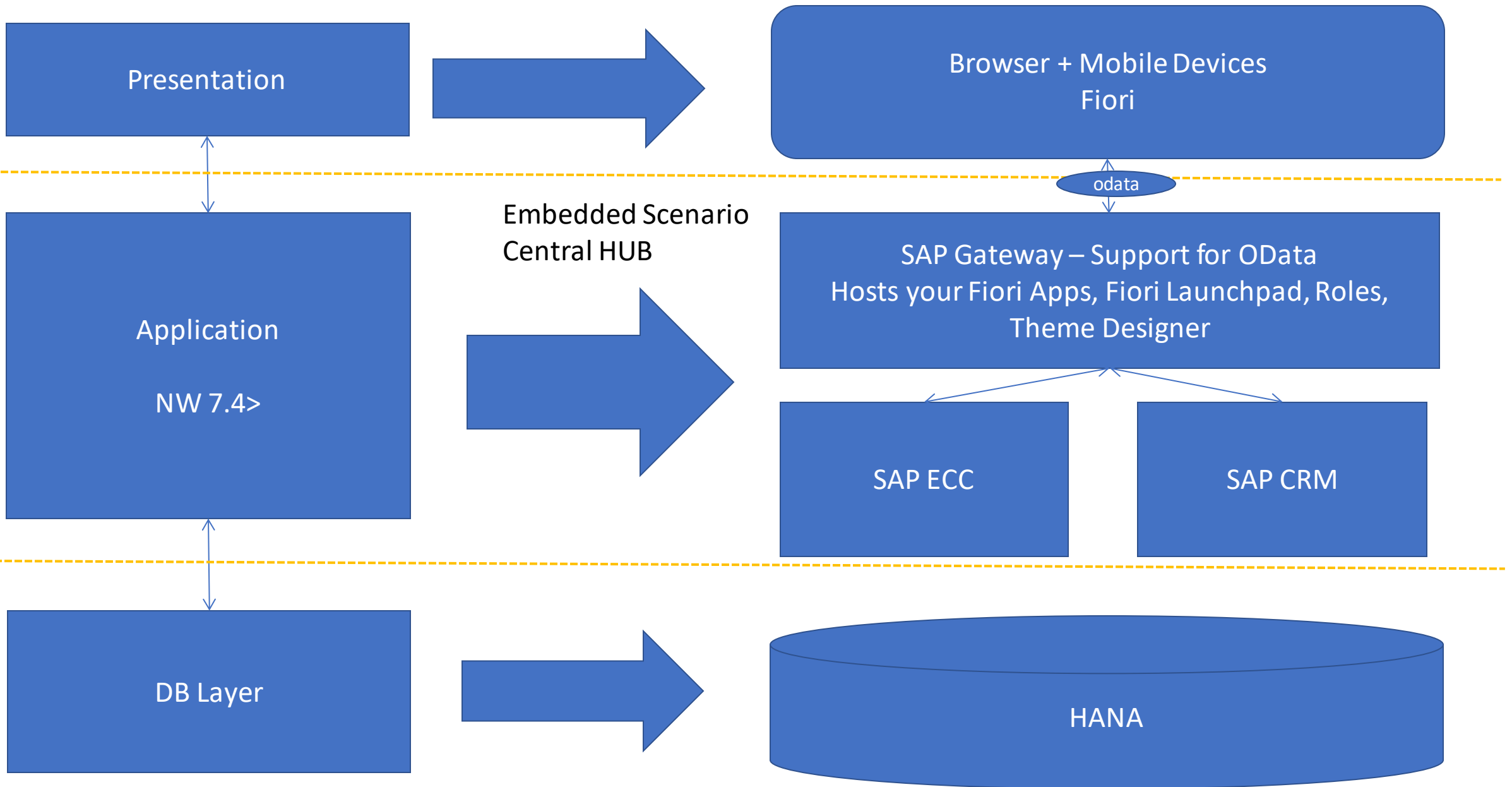
SAP hosts 2 free servers on internet for Odata practicing
These internet facing SAP Servers, so you don't need SAP Cloud connector in middle.

https://blogs.sap.com/2017/06/16/netweaver-gateway-demo-es5-now-in-beta/
https://www.sap.com/india/developer/tutorials/gateway-demo-signup.html
https://sapes5.sapdevcenter.com/sap/bc/gui/sap/its/webgui?sap-client=002&sap-language=EN
https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/

http://hxehost:8090/demo/DemoProject/services/onView.xsodata/MyView?$format=json&$select=COMPANY_NAME,GROSS_AMOUNT

```
service {

// Aggregation example: A view with ID Amount, Month, and Year columns created in sample.test package.
// Call http://host:port/package/file.xsodata/MyView?$select=Year,Amount


  "_SYS_BIC"."demo.DemoProject.models/SALES_WORKLIST"          // Table or View
  as "MyView"                    // Optional entity alias
  with ( "SO_ID","COUNTRY","COMPANY_NAME","CATEGORY","GROSS_AMOUNT")      // Optional list of exposed columns
  key  ("SO_ID")                    // Optional key relevant for view
  aggregates always (SUM of "GROSS_AMOUNT");   // Additional aggregation per column are MIN, MAX, AVG



}
```

Client

Header + Request Body →

← Header + Body (data)

**Server
(Java, ABAP, NodeJS,.NET)**

SQL

DB

Header
Types of data – text/plain, application/json
Type of Req –
POST - Create
GET - Read,
PUT - Update,
DELETE – Delete,
MERGE – Read and update
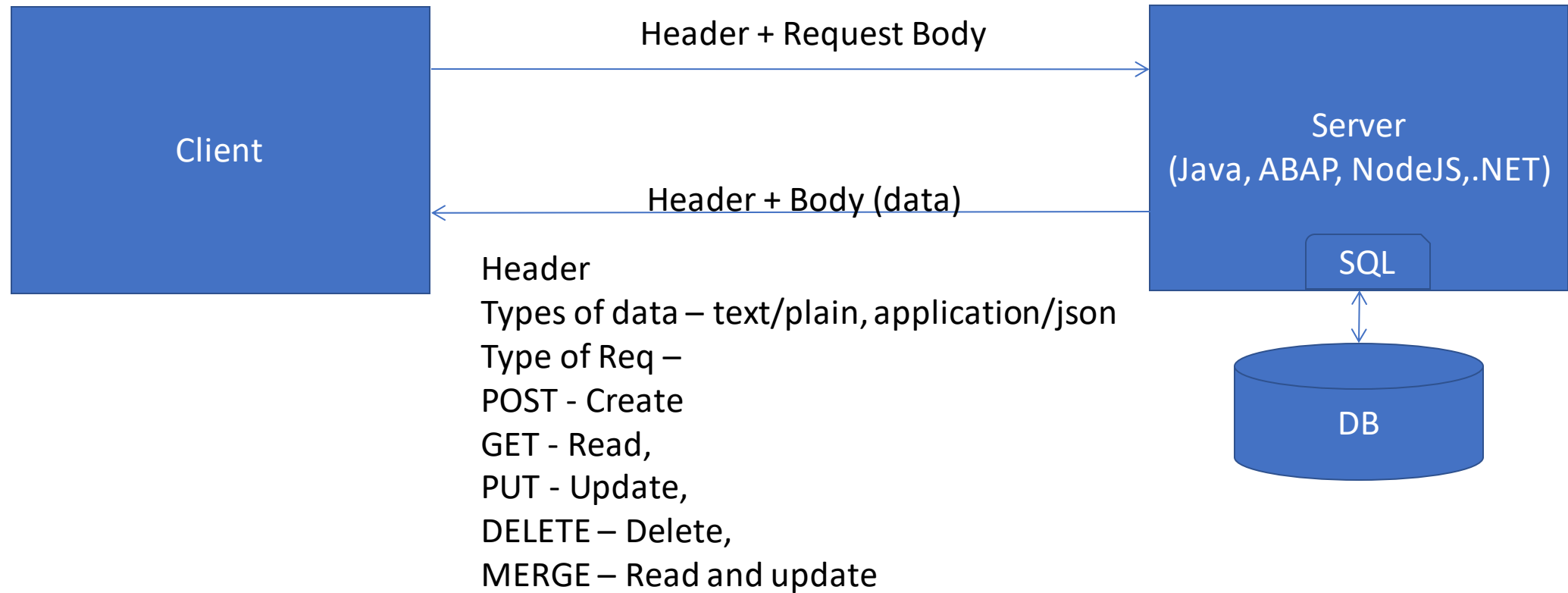
Benefits:
1. Open Source
2. Simple to use, perform verity of operations – CRUD
3. Hides the complexity of SQL behind the scenes, Odata is an abstraction of SQL.
4. Industry standard
5. Multiple technologies to create Odata
6. It is stateless which means many users can talk to Odata server simultaneously

OData service in SAP looks like below

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/

http:// host_name : port_number / path prefix / serviceName

You can pass instructions to your server using url parameters, the server can understand these values and can behave accordingly

/url?firstParam=value&nextParam=value&nextParam2=value
$ indicates Odata operators like $top, $skip, $select, $filter, $expand, $count

Odata service comes with 2 important documents
1. Odata Service Document – This will contain the information about Entity Set. Each Entity Set is an access point of some data. For example, if we want to create, read data for product, we have to use ES **ProductSet**.
2. Odata Metadata Document – Includes the metadata information of each Entity Type, An Entity type is a blue print of EntitySet. It includes all the properties and key fields.

{
"fruits" : [],
"city": [],
"supplier":[]
}

Service document

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/

Service Metadata Document

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/$metadata

How to access data from EntitySet → /EntitySet

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/ProductSet

How to count number of records

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/BusinessPartnerSet/$count

Load data in json format

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/ProductSet**?$format=json**

Imagine you have 1 Bn Sales Orders in system (ERP), If you try to load all records using Odata in Mobile app, will it ever work?

We do paging, load data chunk by chunk. Initially load only x records (20), When user does action on UI like scroll in table or in list, load next chunk of x records. Similar to Buffering concept in youtube.

Loading chunk of size 2

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/ProductSet?$format=json&$top=2

How to load next chunk by skipping first chunk

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/ProductSet?$format=json&$skip=4&$top=2

Selection of certain columns

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/ProductSet?$select=ProductID,Name,Price&$top=1&$format=json

Read Based on PK (In this example ProductID) SELECT SINGLE with PK

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/ProductSet('HT-1010')?$format=json

Funda Fox:

The url never understand special characters and spaces. System will automatically convert them to some %Char.

Search based on where criteria using **$filter**

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/ProductSet?$format=json&$filter=Category%20eq%20%27Projectors%27

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/ProductSet?$format=json&$filter=substringof(%27lenovo%27,%27Name%27)%20eq%20true

http://services.odata.org/V3/(S(4htcwchwu3wzeolz004ehxym))/OData/OData.svc/Products?$format=json&$filter=substringof(%27Cola%27,Name)%20eq%20true

Association: Reading data between multiple entities. VBAK and VBAP

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/SalesOrderSet('0500000002')/ToLineItems?$format=json

Loading main and sub entity data together

https://sapes5.sapdevcenter.com/sap/opu/odata/IWBEP/GWSAMPLE_BASIC/SalesOrderSet('0500000002')?$format=json&$expand=ToLineItems

Orders

1000005
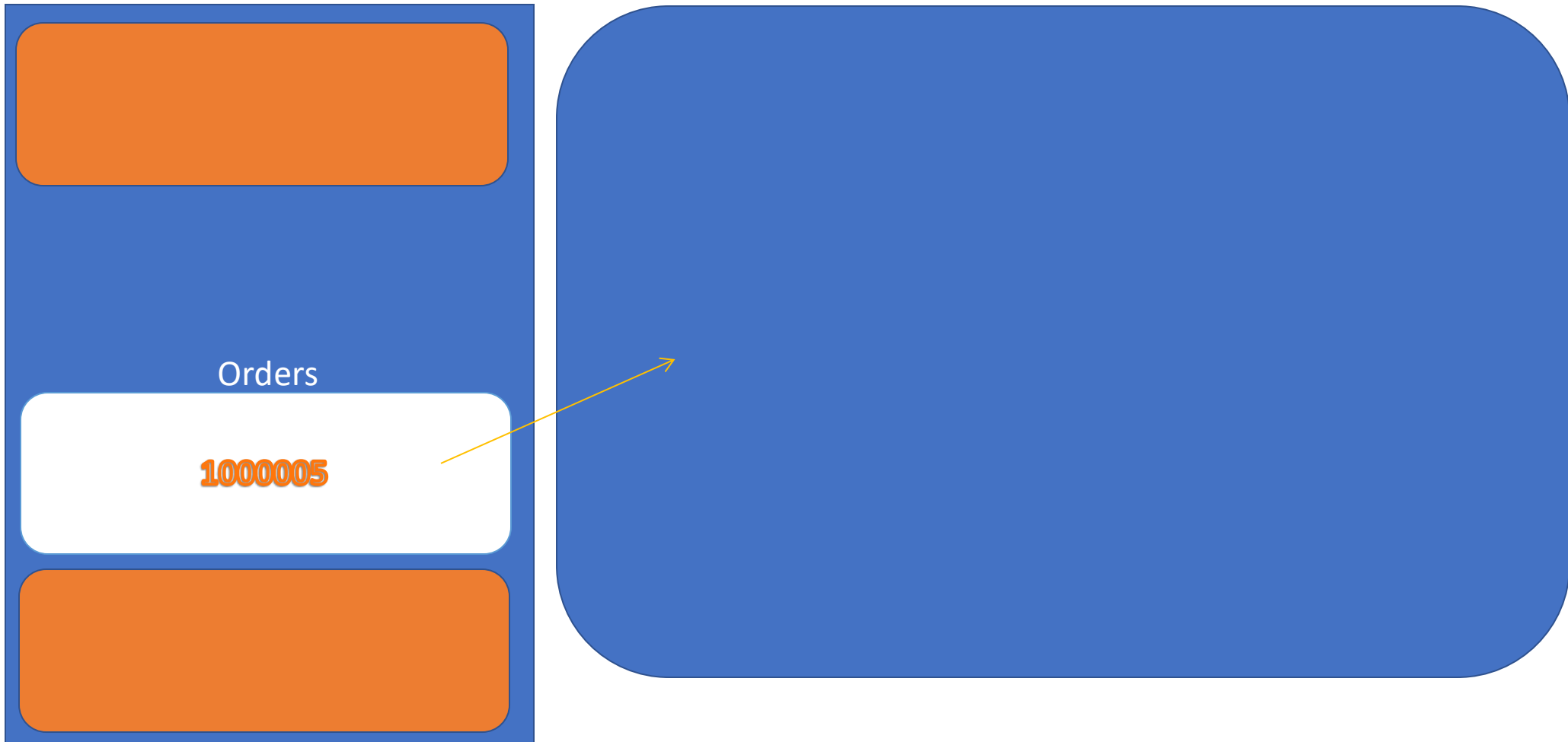
EPM – Enterprise Procurement Model
Only used for practice, demo and training scenarios. Its has sample database tables related to product, purchase orders, BP, sales etc.
There are multiple FMs for performing CRUD operations on these entities

BAPI_EPM as the starting name of the function module.

BAPI_EPM_BP_GET_LIST = all the Business Partners in the system.
BAPI_EPM_BP_GET_DETAIL – read single BP
BAPI_EPM_BP_CREATE – create a new BP
BAPI_EPM_BP_UPDATE – update bp
BAPI_EPM_BP_DELETE – delete the BP
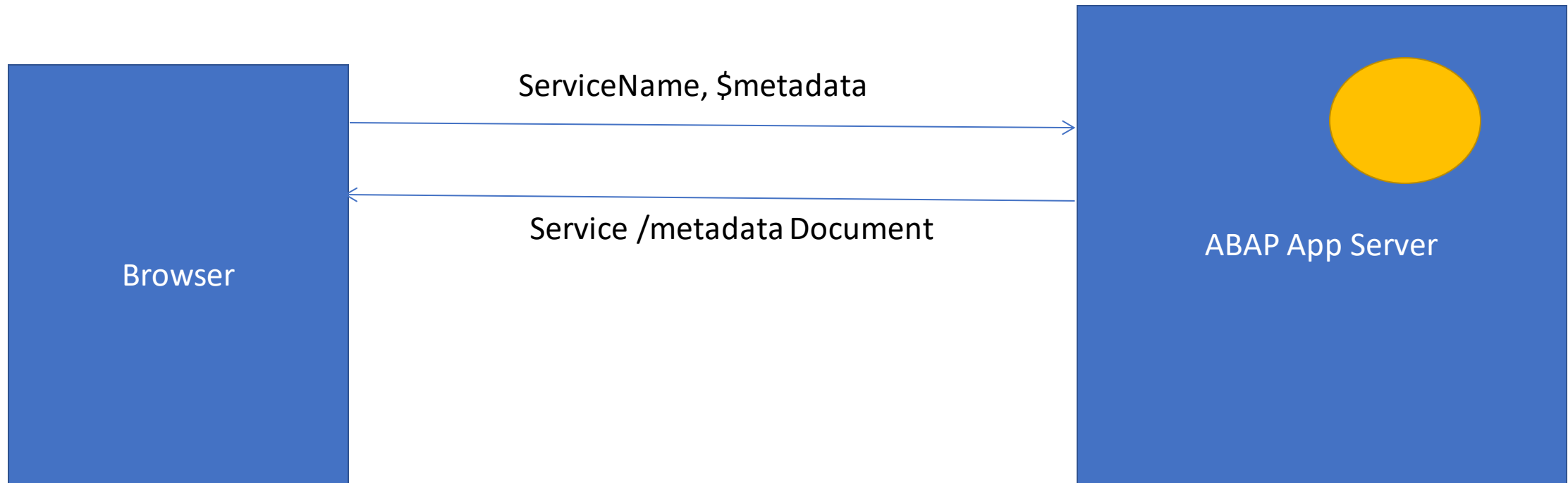
BAPI_EPM_PRODUCT_CREATE – create a new product
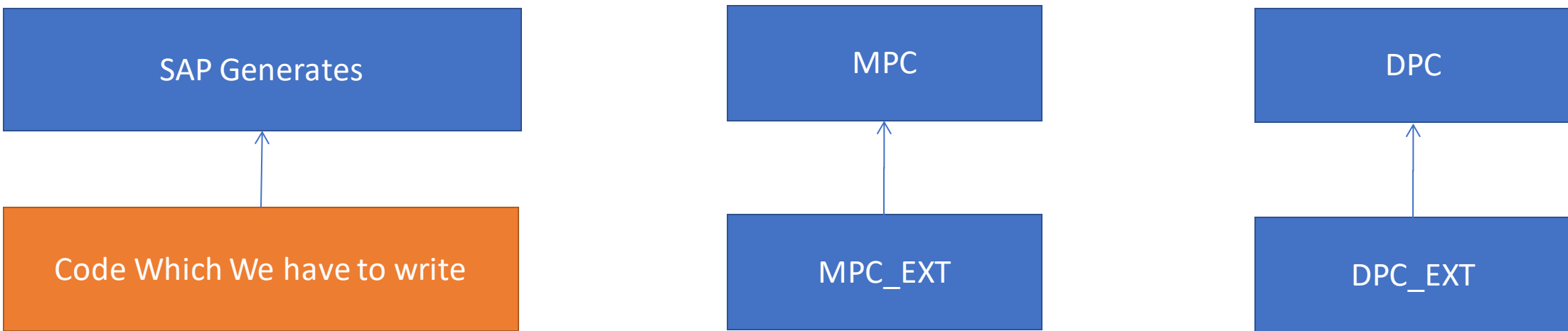BAPI_EPM_PRODUCT_DELETE – delete product
BAPI_EPM_PRODUCT_GET_LIST – get the list of all products
BAPI_EPM_PRODUCT_GET_DETAIL – get details of single product

Runtime Artifact: It includes the placeholders (actually ABAP classes) which will contain the programming code to support the requests coming to Odata, these requests could be accessing
• service document
• metatdata document
• get operation on ES
• post operation on ES
• put operation on ES
• delete operation on ES

ServiceName, $metadata

Service /metadata Document

Browser

ABAP App Server

SAP Generates	MPC	DPC
↑	↑	↑
Code Which We have to write	MPC_EXT	DPC_EXT

1. Risk of over writing sap generated code
2. When we regenerate our service project, All the custom code will be overwritten by SAP.

System generates a class which has SAP generated code and also another class called EXTENSION Class which can be used to write our own code. This way we safeguard SAP generated code and custom code.

➢ Service metadata – Model Definition – Model Provider Class
➢ Service Implementation – Model Implementation – Data Provider Class

Odata Project name _SRV will be the name of the Odata Service which will be generated, needs to be registered once.

SEGW - SAP Gatewy Service Builder
/IWFND/MAINT_SERVICE - Activate and Maintain Services
/IWFND/GW_CLIENT - SAP Gateway Client
/IWFND/ERROR_LOG - SAP Gateway Error Log

For every entity which method to use for implementation

GET_ENTITYSET – Support all the Get operations which supppose to return Multiple records ($top, $skip, $filter, $select etc)
GET_ENTITY – Return only single record based on key
CREATE_ENTITY – Create the new record
UPDATE_ENTITY - update
DELETE_ENTITY - delete

Structure of SELECT OPTION in ABAP

SIGN, OPTION, HIGH and LOW

If you are a good developer, your 30% code is exception handling.
0% - Bad coding


```
<Table id="idTable"

items="{path: 'category3',
parameters: {select: 'MaterialID,MaterialDescription,VendorName,TotaliLPN'}
}"


Var oTable = this.getView().byId("idTable");
oDataModel.read("entityset?$select=cols", function(){
        set your json model
});
oTable.bindItems({
path: "/EntitySet",
Template: new sap)
oTable.getBinding("items").filter("");
```
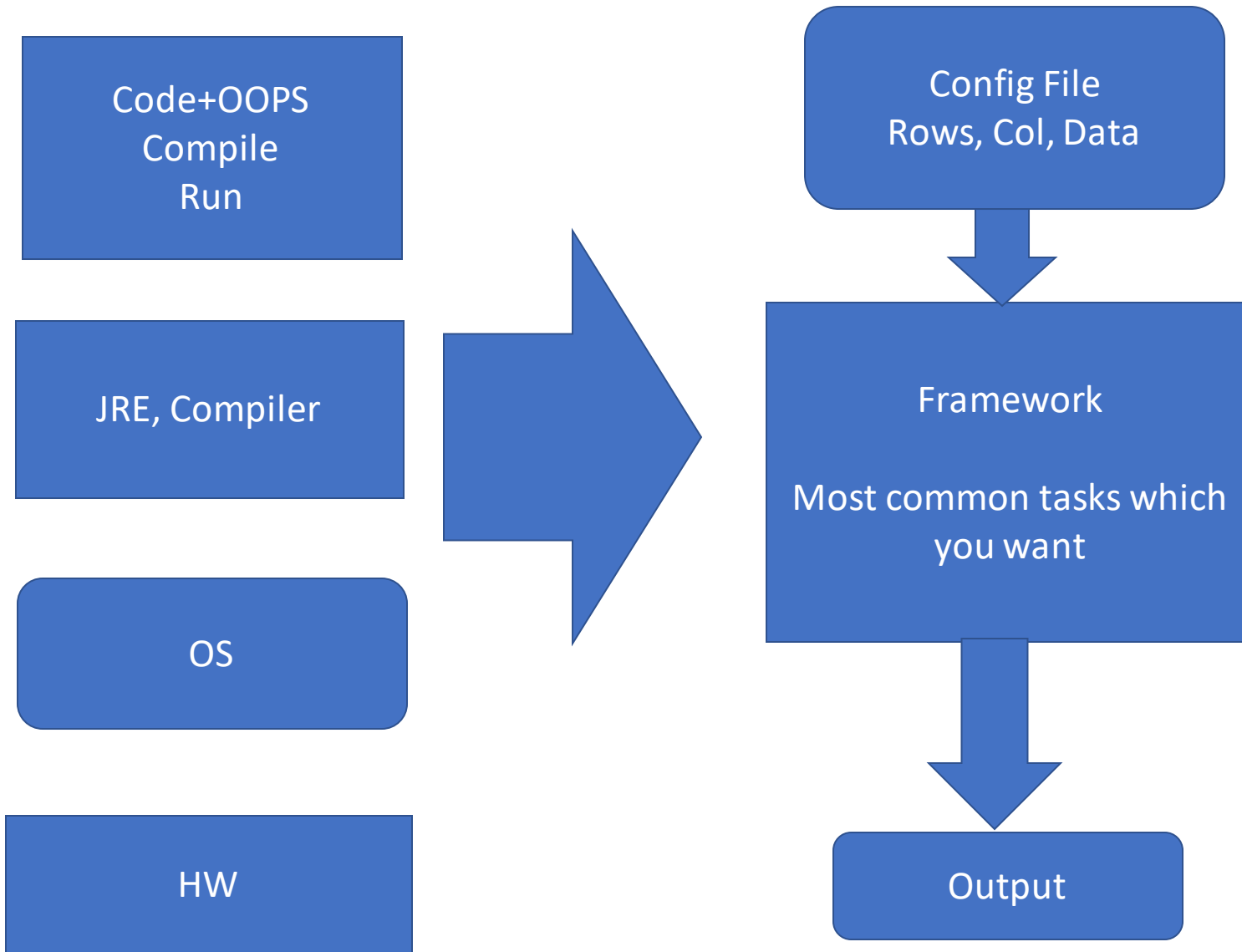
Fiori

Application Layer

Workflow, batch job, back ground prog, manipulation

Example: which is the most expensive product in my system.

Component.js

Manifest.json

1

Controller

oDataModel
oDataModel.read("/
ES",{filters: []},
Success:
function(data)

2

View

List
items: "/localJSONES"