A diagram of a course

Description automatically generated with medium confidenceSAP

**A diagram of a diagram

Description automatically generated**

What is SAP UI5

SAP UI5 is the new UI technology from SAP to build **responsive web** applications and is the successor of SAP GUI, Webdynpro and BSP. It is a framework which is based on libraries to quick design user experience.

Framework - collection of libraries

Library - collection of classes

Class - collection of properties, events, methods and aggregations

So basically SAP provide the facility to build our user experience, which is going to help the companies to build web applications which can run on mobile devices any platform and any browser.

**Responsive Web Application** - An application which adopt itself according the device, platform and browser. so that is the definition of responsive application.

So when we will build responsive web application using UI5 then make sure that application works on any platform and any device.

Follow Below Steps in order to build UI5 application

1. We are going to launch our development tool call SAP Business Application Studio. (It is a web-based development tool available in free.)
2. Create a basic skeleton of our project (Which is nothing but a folder inside the best tool). The Folder should have webapp folder (web-application folder)
3. *A screenshot of a computer

   Description automatically generated*Add a index.html file to the webapp folder. *[when we start building applications, it starts with this html file called* ***index.html****]*.

Basically html file consists of **2 parts** -> Header Body.

A screenshot of a computer screen

Description automatically generatedHeader is brain and

Body is what the content we want to show to the user.

1. Now we use **ui5 framework** in html file, to use ui5 framework we need to call them. So basically we use **script tag** in html to load or call 3rd party libraries/framework. We use this tag in **header part**

|  |  |  |
| --- | --- | --- |
| Factors | SAP Business Application Studio (BAS) | VS Code |
| Usage : Online/Offline | The tool can only be used in online mode | The tool can be used in offline mode |
| Owns this tool | SAP is offering this tool in SAP BTP(Business Technology Platform) | Offered by microsoft, which is for download |
| Cost | Trial mode for 90 days it is free. But after, it will cost 2-6 EUR per month per user. | Lifetime free |
| Speed | Sometimes the speed and performance is not good. | It depends on local machine, but still its performance is very good. |
| Responsible for code backup | All code which we write are store on internet, so anytime if device is lost or damaged, we can continue with other device as well. | As it is offline, code is not store on internet. Here you are responsible for backup. |
| Tech | It is a baby of VS code, infact SAP downloaded the source code of vs code and published as BAS | It is more supreme and it is original. |
| Limitations | It is a multi-cloud development tool provides all development capabilities for UI5, Native HANA | As per UI5 concerned except adaptation project, it supports everything |

**Development tools for Ui5 Applications (video-02).**

# BTP (Business Technology Platform)

BTP stands for Business Technology Platform which is platform as a Service (PaaS) to allow development teams to design, develop, deliver, test, manage end to end applications in the cloud.

For learning purpose for 90 days SAP is offering free BTP account – we can register through gmail.

Runtime

Virtualization

Tools

OS

Networking

Hardware

BTP

So before develop/build any software we need to have setup for all this things **hardware, software, networking, OS, Virtualization, Tools, Runtime** for each employee. So basically it is a time consuming and expensive. So to remove this problem BTP is providing a platform, where we no need to setup all these things, just we need to take subscription for BTP and we can continue to building the app.

# BAS (Business Application Studio)

A screenshot of a computer

Description automatically generatedBAS is a multi-cloud development tool which is a development tool service inside BTP. SAP recommend this tool for development applications for SAP UI5 and Fiori technology. This tool can be used only when you are connected to internet.

# Dev Space

A dev space is private area for developer which confine the requirements to develop a particular application. SAP installs all the recommended tools needed to build Fiori apps in the dev space for us. It is a virtual machine running in the cloud.

* It isolate developers work from each other.
* When a developer does something wrong, which cause a system corruption, it won’t affect to the other developer.
* In trial account we can run max 2 dev space. And one will be running at a time.
* After starting the dev space, click on the **open folder** and choose Projects
* In the Project folder create a new project.
* Add index.html file with some content.
* Go to extension and install Live server extension (one time)
* Right click on the index.html file and choose run with five server.

# VS Code – Tool in local machine

Pre-requisites

1. Download and install node js. [Click here and Get Link](https://nodejs.org/en/download) (Only **v16.19.0**)
2. Download and install vs code. [Click here and Get Link](https://code.visualstudio.com/download)
3. You can check node js is ready or not by command : node -v
4. VS codes needs a workspace, it is a folder on your computer where you keep all the projects and files
5. Once VS code is installed, we also need to download the live server (Like we did in BAS)

# Client Server Architecture**(video-03)**

Client-server architecture is a type of computer network where multiple clients request and receive files and services from a centralized server over a local or internet connection. A client uses an application as an interface to connect to the server.

# Request Response Architecture

Server

Browser(Client)

[Mobile, Workstation, Laptop]

Request- ***header, body(opt)***

Internet

**port**

response – ***header, body (html, text, pdf, image, Json, xml, word)***

* GET – read the data from server
* POST – Insert data from server
* PUT – Update the data
* DELETE – Delete the data

types of request

**Port** – it is like a door, once request goes first it comes to port and port is listen which type of request it is then it process in the server and from the data -base it validate the request and then it gives the response. This is how any web application works, and this is how also our Fiori application will work.

So when we want to build applications and run from client side, then we need to understand the Web Technologies

**Web Technologies**

* **HTML**
* **CSS**
* **Java Script**
* **J Query**

HTML And HTML5

HTML stands from hyper text markup language. It is used to create static web page. We can not do any dynamic operation in web page with help of html. HTML introduced in 1991.

* HTML is markup language, not programming language.
* HTML is purely tag based
* These tags are released by the company named W3 School.
* All browser vendors are part of it.
* Browser directly understand html.
* An HTML page consists of head (brain) and body (content part user will see)

|  |  |
| --- | --- |
| YEAR | VERSION |
| 1991 | HTML |
| 1995 | HTML 2.0 |
| 1997 | XHTML |
| 1999 | HTML 4.0 |
| 2014 | HTML 5 |

# Difference between HTML5 and UI5

HTML5 is a markup language and it doesn't have programming capabilities but SAP UI5 is a framework which is based on libraries approach to build web applications.

 HTML5 is mainly for the purpose of creating a simple webpage without formatting and logic but UI5 provides standard style and components to build rich UIs

# Funda Fox

* An HTML page is also known as HTML document.
* All HTML elements will follow below syntax.

<tagName property=””>CONTENT</tagName>

* There are some exceptions where you can skip writing end-tag.
* HTML is case sensitive, but it is good practice to write tags in small letters.
* We can use CTRL + SPACE to show code completion, in any tools.
* HTML at runtime produced a tree data structure, where the nodes of the tree are html element,
* This data structure is known as ***Document Object Model (DOM)***
* We can see this data structure by clicking **F12** key

# What is DOM

**A screenshot of a computer code

Description automatically generatedDom** is nothing but a tree data structure, which is produced by html, when you execute html. where the nodes of the tree are html element,

# HTML <!DOCTYPE> Declaration

All HTML documents must start with a <!DOCTYPE> declaration.

The declaration is not an HTML tag. It is an "information" to the browser about what document type to expect.

A screen shot of a computer

Description automatically generatedIn HTML 5, the declaration is simple: <!DOCTYPE html>

# HTML <meta> Tag

The <meta> tag defines metadata about an HTML document. Metadata is data (information) about data.

<meta> tags always go inside the <head> element, are typically used to specify character set, page description, keywords, author of the document, and viewport settings. Metadata is used by browsers (how to display content or reload page), search engines (keywords), and other web services.

A screen shot of a computer code

Description automatically generated

The charset attribute specifies the character encoding for the HTML document.

The description attribute specifies the description of my web page.

The author specifies the author of the web page

The keyword specifies the keyword of the web page, this keyword used by the search engine.

# HTML Headings

HTML headings are defined with the <h1> to <h6> tags.

<h1> defines the most important heading. <h6> defines the least important heading.

A screenshot of a computer code

Description automatically generatedA white background with black text

Description automatically generated

# HTML <em> Tag

The <em> tag is used to define emphasized text. The content inside is typically displayed in **italic.**

# Comments in html

To comment the html line enter the Command **CTRL + /**

# HTML <p> Tag

The <p> tag defines a paragraph in html.

# HTML <a> Tag

The <a> tag defines a hyperlink, which is used to link from one page to another.

The most important attribute of the <a> element is the href attribute, which indicates the link's destination.

# HTML <img> Tag

The <img> tag is used to embed an image in an HTML page.

The <img> tag has two required attributes:

**src** - Specifies the path to the image

**alt** - Specifies an alternate text for the image, if the image for some reason cannot be displayed

**Note:** Also, always specify the width and height of an image

# HTML Unordered Lists

The HTML <ul> tag defines an unordered (bulleted) list.

An unordered list starts with the <ul> tag. Each list item starts with the <li> tag.

The list items will be marked with bullets (small black circles) by default:

***write a html code to describe yourself with the help of heading, paragraph, anchor, image and line brake tags and give the meta information also on the html and doctype also mention***

# HTML Ordered Lists

The HTML <ol> tag defines an ordered list. An ordered list can be numerical or alphabetical.

An ordered list starts with the <ol> tag. Each list item starts with the <li> tag.

The type attribute of the <ol> tag, defines the type of the list item marker:

|  |  |
| --- | --- |
| type="1" | The list items will be numbered with numbers (default) |
| type="A" | The list items will be numbered with uppercase letters |
| type="a" | The list items will be numbered with lowercase letters |
| type="I" | The list items will be numbered with uppercase roman numbers |
| type="i" | The list items will be numbered with lowercase roman numbers |

A screenshot of a computer code

Description automatically generated

**write a html code to add your skills as ordered list and add your hobby as un-ordered list.**

# HTML <label> Tag

In the label tag we define a attribute **for** that binds or connect to the input element such as text, email, password, text area etc. So that when ever user click on the label it directly redirects to the user to the input.

**Note :** The <label> tag needs a ***for*** attribute whose value is the same as input **id.**

# HTML <input> Tag

The <input> tag specifies an input field where the user can enter data.

The <input> element is the most important form element.

A screenshot of a computer program

Description automatically generatedThe <input> element can be displayed in several ways, depending on the **type** attribute.

# HTML <form> Tag

An **HTML form** is *a section of a document* which contains controls such as text fields, password fields, checkboxes, radio buttons, submit button, menus etc.

An HTML form facilitates the user to enter data that is to be sent to the server for processing. HTML forms are required if you want to collect some data from of the site visitor.

**There are two attributes of the form tag that we should be familiar with:**

* There is a attribute called **action** in the form tag, where we pass the server URL, so when user submit the form it redirects to that URL.
* The **method** attribute is used to upload the data. The most commonly used attributes are the GET and POST methods. Default is **GET**

# HTML – Blocks (Video-4)

All the HTML elements can be categorized into two categories **(a)** Block Level Elements **(b)**Inline Elements.

# Block Elements

Block elements are the type of elements who is having line break before and after them. example, the <p>, <h1>, <h2>, <h3>, <h4>, <h5>, <h6> etc are the block level element.

# Inline Elements

Inline elements, on the other hand, can appear within sentences and do not have to appear on a new line of their own. The <b>, <i>, <u>, <em> etc are all inline elements.

# The <div> tag

This is the very important block level tag/element which plays a big role in grouping various other HTML elements and applying CSS on group of elements.

# The <span> tag

The HTML <span> is an inline element and it can be used to group inline-elements in an HTML document. This tag also does not provide any visual change on the block but has more meaning when it is used with CSS.

# HTML Audio

The HTML <**audio**> element is used to play an audio file on a web page. The **controls** attribute adds audio controls, like play, pause, and volume. **Src** It specifies the source URL of the audio file.

# HTML Video

The HTML <**video**> element is used to show a video on a web page. The **controls** attribute adds audio controls, like play, pause, and volume. **Src** It specifies the source URL of the video file.

**write a html code to create form with all input field and add video and audio also to the form and use block level element to segregate them**

# HTML Tables

HTML **table** tag allow web developers to arrange data into rows and columns.

In consists of **thead** and **tbody.**

The <thead> tag is used to group header content in an HTML table.

The <th> tag defines a header cell in an HTML table.

The <tbody> tag is used to group the body content in an HTML table.

The <td> tag defines a standard data cell in an HTML table.

The <tr> tag defines a row in an HTML table.

# HTML Iframe

An HTML iframe is used to display a web page within a web page. The HTML <iframe> tag specifies an inline frame.

# Syntax

<iframe src="*url*" title="description"></iframe>

Use the height and width attributes to specify the size of the iframe.

# CSS

CSS stands for cascading style sheet. We can create HTML content but we can not format is using html. If we use html formatting, it becomes a nightmare for developers because of high efforts required.

To solve this problem CSS came into picture, It is used to format and beautify html content without much effort.

***There are 3 ways we can apply CSS on html content :***

* Inline css
* Internal css
* External css

**write a html code to create table with 3 row and cloumn, and add audio and video also as row value and and add a iframe also**

# **Inline CSS**

An inline style may be used to apply a unique style for a single element. To use inline styles, add the **style** attribute to the particular element. The style attribute can contain any CSS property.

**Syntax : *Style=”prop:val;prop:val”***

***Disadvantage :*** *Will invite more and more maintenance for the developer because it is not re-useable.*

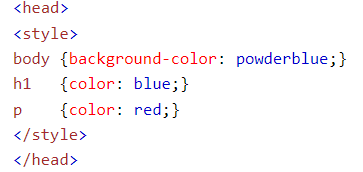
# **Internal CSS**

An internal style sheet may be used to apply unique style for an html page. The internal style is defined inside the <**style**> element, inside the **head** section.

**Syntax : selector {**

**Selector is an identifier to target the html element(s)**

* **tagName**
* **.className**
* **#id**

** Prop : val,**

**Prop : val,**

**…..**

**}**

# **External CSS**

With an external style sheet, you can change the look of an entire website by changing just one file!

For use the external CSS file it uses a tag called **link** tag and this tag should be put inside the **head** section. CSS file extension is **.css** file

# 

# Pixel or px in css

px. Pixels, or px , are one of the most common length units in CSS. In CSS, 1 pixel is formally defined as 1/96 of an inch.

# CSS Borders

The CSS border properties allow you to specify the style, width, and colour of an element's border.

A text on a white background

Description automatically generatedThe border-style property specifies what kind of border to display.

The border-width property specifies the width of the four borders.

The border-color property is used to set the color of the four borders.

*Note : For specify the border we need theses 3 property border-style, border-width, border-color  ( border-width, border-color optional) and border-style is mandatory but instead of specifying these 3 property we can specify it at once*

**Syntax :** **border** : border-width border-style border-color;

# Float in CSS

The CSS float property specifies how an element should float.

The float property can have one of the following values:

left - The element floats to the left of its container.

right - The element floats to the right of its container

none - The element does not float (will be displayed just where it occurs in the text). This is default

inherit - The element inherits the float value of its parent.

**write a html code to describe about 3 topic and topic will be surrounded by border and add margin, padding also, and style using css and will be float by left.** **and keep remaining element as it is.**

# Clear in CSS

The clear property controls the flow next to floated elements.

The clear property specifies what should happen with the element that is next to a floating element.

# What is Responsive Web design

A web design which adapt itself to the different screen sizes. You no need to code separately for the mobile and tablet.

# CSS Box Model

The **CSS box model** is a container that contains multiple properties including borders, margins, padding, and the content itself. It is used to develop the design and structure of a web page

Explanation of the different parts:

* **Content** - The content of the box, where text and images appear
* **Padding** - Clears an area around the content. The padding is transparent
* **Border** - A border that goes around the padding and content
* **Margin** - Clears an area outside the border. The margin is transparent

# Font Weight & Font Family & Font Family

The font-weight property sets how thick or thin characters in text should be displayed.

A font family is a collection of fonts that share similar design elements.

The font-style CSS property sets whether a font should be styled with a normal, italic, or oblique face from its font-family

# Opacity Property

A bridge with railings and trees

Description automatically generatedOpacity Property is used to specify of the clarity of an image.

# What are Pseudo-classes?

A pseudo-class is used to define a special state of an element.

For example, it can be used to:

* Style an element when a user mouses over it
* Style an element when it gets focus

# Syntax Example of Pseudo Class

The syntax of pseudo-classes: [**:hover**](https://www.w3schools.com/cssref/sel_hover.asp) **🡪🡪** a:hover

selector:pseudo-class { [**:focus**](https://www.w3schools.com/cssref/sel_focus.asp) **🡪🡪** a:focus  
  property: value;  
}

# What are the styling order for different selector

Tag Based Style🡪Class Based Style🡪Id Based Style.

Id based style always takes higher priority than the Class based style. Class based style always takes higher priority than the Tag based style

# Border Collapse

The border-collapse property sets whether **table** borders should collapse into a single border or be separated as in standard HTML. Only with the **table** tag we can add border-collapse property

**CSS Syntax**

border-collapse: separate|collapse|initial|inherit;

**write a html code where add 3 image with low clarity(opacity=.1) and after mouse hover it should show the perfection(opacity=1)**

# nth-child(odd/even)

The :**nth-child**selector allows you to select one or more elements based on their source order,

Example : here we can select the child based o odd, even.

*/\* Select the first list item \*/*

li:nth-child(1) { }

*/\* Select the 5th list item \*/*

li:nth-child(5) { }

*/\* Select every other list item starting with first \*/*

li:nth-child(odd) { }

*/\* Select every other list item starting with first \*/*

li:nth-child(even) { }

**write a html code where create a table having multiple row and the even and odd row should have different colour to identify. collapse the border**

# What is Java Script

**JavaScript** is a lightweight, cross-platform, single-threaded, and interpreted compiled programming language. It is also known as the scripting language for webpages.  JavaScript can be used for [Client-side](https://www.geeksforgeeks.org/server-side-client-side-programming/) developments as well as [Server-side](https://www.geeksforgeeks.org/server-side-client-side-programming/) developments.

# What JavaScript Do

JS can show the output to the user

It can validate user input

It is used to code processing logic

We can change the CSS at runtime

Apply/make dynamic changes to our app

# What are the output functions in JavaScript

JavaScript can "display" data in different ways:

* **The innerText property sets or returns the text of an element :innerText**.
* **Write some text directly to the HTML output:** **document.write().**
* **Writing into an alert box, using** **window.alert().**
* **Writing into the browser console, using** **console.log().**

# How to apply JavaScript

**Inline JavaScript –** When the JS code is applied at html element level using **event=”code”**. This is not reusable, hence causing heavy maintenance.

**Internal JavaScript –**The JS code is written at page level inside a **<script>** tag. This **script** tag will be inside the **head** tag. of We will create a function to modularize and reuse the code.

**External JavaScript –** The JS code is referred from an external JS file which is marked with extension **.JS** We use **<script src = “reference”>**

# Funda Fox

JavaScript is a case-sensitive programming language **e.g. I or i** both are different variables.

Every statement in JS code ends with semi-colon (;)

All browser directly understand JS so we can try the code in the console directly.

**JS has 2 important system variables which offered.**

**Document –** It is a object of the DOM, using this we can manipulate and get access to the HTML elements of our page. It contains APIs (function) like

**document.getElementById,**

**document.getElementByClassName,**

**document.getElementByTagName.**

**Window** – It is a object of the browser window.  It represents the browser's window.

In JavaScript we follow the camel case naming convention for variables, functions etc. First letter of every word is small and next consecutive words first letter is capital e.g. 🡪 **iLoveIndia, weLearnJavaScript.**

In JavaScript we can declare variables using let and var keywords

The JavaScript always written w.r.t events of an html element.

In JavaScript for a variable we no need to declare the data-type, it automatically detects the data type based on the value.

In JavaScript **=** is assignment operator and **== & ===** used to compare

**==** is used to just compare value

**===** is used to compare value and data type

# Difference Between var and let

|  |  |  |
| --- | --- | --- |
| **SN** | **var** | **let** |
| 1. | It has global scope. | It is limited to block scope. |
| 2. | It can be declared globally and can be accessed globally. | It can be declared globally but cannot be accessed globally. |
| 4. | Variable declared with var keyword can be re-declared and updated in the same scope. **Example:**  function varGreeter(){  var a = 10;  var a = 20; //a is replaced  console.log(a);  }  varGreeter(); | Variable declared with let keyword can be updated but not re-declared. **Example:**  function varGreeter(){  let a = 10;  let a = 20; //SyntaxError:  //Identifier 'a' has already been declared  console.log(a);  }  varGreeter(); |

# Types of variable in JS

|  |  |  |
| --- | --- | --- |
| Scalar Variables | Array | Objects |
| Hold single value. The value will get overwritten if we assign another value  var variableName = value  Or  let variableName = value | **Arrays are used to store multiple values of same Datatype.**  **They are declare using []**  **The element are accessed using the index of the element.**  **The index of the first element starts from 0**  **Var arrFruit = [“Apple”, ”Banana”]** | **The Objects are used to store multiple values of different Datatype in structure format.**  **They are created using curly braces. It contains key value pairs.**  **{ “key” : value,**  **“key” : value,**  **“key” : value,**  **………..**  **}** |

# JavaScript Practice

A screenshot of a computer program

Description automatically generatedA screenshot of a computer program

Description automatically generated

A screenshot of a computer code

Description automatically generated

**write a JavaScript program to iterate the array using for loop and for each loop. Concat the element, check the datatype using typeof() operator, convert the string to number using parseInt()**

# typeof Operator

A screenshot of a computer code

Description automatically generatedYou can use the typeof operator to find the data type of a JavaScript variable.

# parseInt() in JavaScript

The **parseInt()** function parses a string and returns an integer.

# JavaScript String concat()

The concat() method joins two or more strings.

**Syntax :** string.concat(string1, string2, ..., stringX)

# Introduction to JavaScript anonymous functions

An anonymous function is a function without a name.

**The following shows how to define an anonymous function:**

**(function () {**

**//...**

**});**  Note that if you don’t place the anonymous function inside the (), you’ll get a syntax error.

# 

# The For in Loop

The JavaScript for in statement loops through the properties of an Object:

### **Syntax**

for (key in object) {  
  // *code block to be executed*  
}

A screenshot of a computer code

Description automatically generatedA screenshot of a computer code

Description automatically generated

A screenshot of a computer

Description automatically generated

**write a JavaScript program to iterate the object using for loop**

# JavaScript Events

JavaScript's interaction with HTML is handled through events that occur when the user or the browser manipulates a page.

A screenshot of a computer screen

Description automatically generatedWhen the page loads, it is called an event. When the user clicks a button, that click too is an event.

A black screen with white text

Description automatically generated

write a html code, where after click the button it should show the alert popup.

# JavaScript Event Handlers

Event handlers can be used to handle and verify user input, user actions, and browser actions: Things that should be done every time a page loads. Things that should be done when the page is closed. Action that should be performed when a user clicks a button.

# Function in JavaScript

A JavaScript function is a block of code designed to perform a particular task.

**Anonymous Function**

An anonymous function is a function without a name. The following shows how to define an anonymous function:

**function(p1, p2) {**

**console.log('Anonymous function');**

**};**

**Named Function**

An named function is a function, where we give the function name.

**function name(parameter1, parameter2, parameter3) {**

**A screenshot of a web page

Description automatically generated // code to be executed**

**}**

# Debugger Shortcut

We can debug **js** code directly in the browser by clicking F12 (which is browser developer toolbar). Here we can see the function under the sources tab.

The debugger is set by clicking on the line or using debugger statement.

Once the debugger is hit the following shortcuts can be used.

**ABAP JS**

**Step Over F6 F10**

**Step in F5 F11**

**Step Out F7 Shift + F11**

**Continue F8 F8**

# Validate User Input using JavaScript

A screenshot of a login box

Description automatically generatedWhen User gives username and password and we validate the credentials using JavaScript if successful then will redirect to home page otherwise will throw error. Using JavaScript we do this validation.

**write a html code, where user give the credentials and it should validate the user input**

# What Is Method Chaining?

Method chaining, or simply chaining, in JavaScript can be defined as when one or more sequential methods get invoked from an object without the introduction of unnecessary variables. The sole purpose of chaining is to make our code more readable and reduce the redundancy within.

# Asynchronous Non-Blocking IO

A screen shot of a diagram

Description automatically generated

When in the application user try to save data, then until save the data in the backend, user need to wait. Basically users are locked, they can not perform any action on UI, until the processing getting completed. This is call **Synchronous programming**. But it is wasting time to user, because user can not perform action.

On the other hand, in the Asynchronous programming user no need to wait until the process complete. User locked for very short time almost we can say non-blocking programming. In this case user is un-blocked, once the process of saving the data is finished then user get notified. This JavaScript allow to developer to send the notification to the end-user once process is finished this thing can be implemented with the help of **callback function / promise** technique.

**write a JavaScript program for asynchronous programming and call-back function..**

# Java Script Can change the CSS at Runtime

With the help of JavaScript, we can change the css style at runtime. With the help of JavaScript function.

**write a html code, where we can change the css at runtime using JavaScript.**

# Dynamic changes in Application with help of JavaScript

Here the dynamic changes we are going to do is if user click on a Button, then dynamic text should appear on the screen.

The steps we are going to do is.

First we will a **div tag** with empty element, which is having Id

**<div id="canvas"></div>**

Will create a button with **onclick** event.

**<button onclick="onDraw()">Write Something For Me</button>**

* A diagram of a graph

  Description automatically generated with medium confidenceCreate a new html element object.
* Create a text Node.
* Append the text node inside the html element.
* Get the object of canvas.
* A diagram of a text node

  Description automatically generatedAppend our newly created element to the canvas.

**write a html code, where we can generate dynamic text in the html page with the help of JavaScript**

# JQuery

jQuery is a lightweight, "write less, do more", JavaScript library. It is Open Source. The purpose of jQuery is to make it much easier to use JavaScript on your website.

There are lots of other JavaScript libraries out there, but jQuery is probably the most popular, and also the most extendable.

Many of the biggest companies on the Web use jQuery, such as:

* *Google*
* *Microsoft*
* *IBM*
* *Netflix*

# How to Apply JQuery

We need to reference jQuery using **<script src=””></script>**

1. Download and reference from local
2. Reference from CDN (Content Distribution Network)

# Syntax of JQuery

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

**$ –** indicates that we are using JQuery

**Selector –** tag, .className, #id

**Action –** function which are offered by JQuery, check the documentation [here](https://api.jquery.com/)

* **write a html code, where we can change the css at runtime using jQuery.**
* **Wap to hide and show the element in web-page using jQuery**
* **Wap to fade-in and Fade-out element using JQuery**

# Why do we need to define 2 script tag when we use JQuery

You typically include two **<script>** tags, one for jQuery and another for your custom JavaScript, because they serve different purposes:

* **jQuery Library:** **<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.7.0/jquery.min.js"></script>**
* **Custom JavaScript Code:** **<script> // Your custom JavaScript code here </script>**

# What is show() and hide() in jQuery

With jQuery, you can hide and show HTML elements with the hide() and show() methods:

**Syntax:**

$(*selector*).hide();  
$(*selector*).show();

# jQuery fadeOut() and fadeIn() Method

The jQuery fadeOut() method is used to fade out a visible element.

The jQuery fadeIn() method is used to fade in a hidden element.

**Syntax:**

$(*selector*).fadeIn();  
$(*selector*).fadeOut();

**write a html code, where we can fadeIn and FadeOut element and after done it should show an alert, with the help of call back and asynchronous programming**

# The animate() Method

The jQuery animate() method is used to create custom animations.

A screen shot of a computer program

Description automatically generated**Syntax:**

$(selector).animate();

**write a html code, where we can animate input field using JQuery.**

**write a html code, where we can animate input field using JQuery and use a callback function.**

# This keyword in JQuery

A computer screen with colorful text

Description automatically generatedso here **this** keyword is basically the pointer of current object, for which *call-back* was fired.so that means if you apply the effect once effect is done, system will call the *call-back* function.

In the above *call-back* function if you access the same object, where effect was applied before, then instead of the **“input”** you can use **“this”**

# Function Recursion

Recursion is a process of calling itself. A function that calls itself is called a recursive function.

**The syntax for recursive function is:**

A computer code with blue lines and orange text

Description automatically generated

Here, the recurse() function is a recursive function. It is calling itself inside the function.

**write a html code, where we can animate input field using JQuery and use a callback function and function recursion for keep automating.**

# Ajax In JQuery

The full form of Ajax is **Asynchronous JavaScript and XML.** The ajax() method in jQuery is used to perform an AJAX request or asynchronous HTTP request.

**Syntax:**

A screen shot of a computer

Description automatically generated$.ajax(“url”)

**{ success: function (data) { ... } }:** This part of the code defines an object with a **success** property. The **success** property is a callback function that will be executed if the AJAX request is successful. When the request is successful, it will provide the retrieved data as a parameter named data to this callback function.

When an AJAX request fails, you can handle the error by providing an error callback function in the AJAX request configuration

**Wap to show the corona confirmed case for any state date wise**

# Node JS

Node JS is a framework which allows us to run java Script code outside the browser. The key element is a node package manager (**npm**) which allows us to reuse billions of lines of code available free on its repository.

# Run JavaScript program using terminal on vs code

To be able to run **Javascript** in Visual Studio Code, we need to have installed **NodeJS** on our system and have a **Javascript** file created with some content.

**Syntax for execute Js code through terminal :** **node { js file name }**

A screen shot of a computer

Description automatically generated

# Create a Node JS Project

We first execute **npm init** command to initialize a node js project, this command will be installed the node js on our computer. This command will ask you some questions to generate a **package.json** file in your project route that describes all the dependencies of your project.

A screen shot of a computer program

Description automatically generated**for example when you set up your build system.**

A screenshot of a computer program

Description automatically generatedAfter you've finished the process of initializing your project using the Node Package Manager, node.js created a **package.json** file in your project's root directory like this one:

# Module in Node JS

In simple terms, a module is a piece of reusable JavaScript code. It could be a **.JS** file or a directory containing **.JS** files. You can export the content of these files and use them in other files.

Modules help developers to follow the DRY (Don't Repeat Yourself) principle in programming.

# Create Your Custom Modules

You can create your own modules, and easily include them in your applications.

Suppose there is **function**, **sumOfTwoNumber, printData** you want to reuse the function then you will create a module and code will be JavaScript code.

function sumOfTwoNumber(a,b)

{ console.log(a+b) }

function printData (data)

{ console.log(data) }

Reuse.js (module)

**module.exports = {**

**sumOfTwoNumber: function (a, b)**

**{ console.log(a + b) }**

**printData : function (data)**

**{ console.log(data) }**

**}**

# Import Module (to reuse the function)

You load the module with the **require** function. You need to pass the name of the module you're loading as an argument to the **require** function.

**Syntax : var someVariable = require('nameOfModule')**

**write a program to manipulate 2 numbers, using custom module in node js**

# Node.js fs.readFile() Method

The **fs.readFile()** method is an inbuilt method which is used to read the file. This method read the entire file

To load the fs module we use **require()** method. For example:

**var fs = require(‘fs’);**

**Syntax:**

**fs.readFile( filename, encoding, callback\_function )**

**Parameters: The method accept three parameters as mentioned above and described below:**

**filename**: It holds the name of the file to read or the entire path if stored at other location.

**encoding**: It holds the encoding of file. Its default value is ‘utf8’.

A black screen with orange and blue text

Description automatically generated**callback\_function**: It is a callback function that is called after reading of file. It takes two parameters:

**err**: If any error occurred.

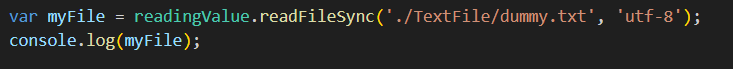
**data**: Contents of the file.

# 

# Node.js fs.readFileSync() Method

The **fs.readFileSync()** method is used to read the file and return its content. in the fs.readFileSync() method, we can read files in a synchronous way, i.e. we are telling node.js to block other parallel processes and do the current file reading process. once the reading process is done, then the remaining node program is executed.

**Syntax:**

****fs.readFileSync( path, options )

**Example**

# Difference between readfilesync and readfile

In **fs.readFile()** method, we can read a file in a non-blocking asynchronous way,

but in the **fs.readFileSync()** method, we can read files in a synchronous way, i.e. we are telling node.js to block other parallel processes and do the current file reading process.

# Can we use jQuery in node js

No we can not use jQuery in node js

# Using express module to building web server

It is a module, for building web server. It is not installed along with node js.

A computer code with text

Description automatically generated with medium confidenceIt is available on internet.

This code is for creating a basic web server using the Express.js framework in Node.js. Here's a breakdown:

It imports the 'express' library.

It initializes an Express application.

It defines a route for handling HTTP GET requests to the root URL ('/') with a callback function that sends the response 'Hello World'.

It starts the server on port 3000.

In summary, when you run this code and access http://localhost:3000 in your web browser, you will see 'Hello World' displayed in the browser. This is a simple example of creating a web server using Express.js.

# Installing Express

**Installation is done using the npm install command:**

npm install express or npm install express -g

* Running the command npm install express installs the Express.js framework locally within your Node.js project.
* Running the command npm install express -g installs the Express.js framework globally on your system

# res.send() Function

The **res.send()** function basically sends the HTTP response. The body parameter can be a String or a Buffer object or an object or an Array.

# res.sendFile() Function

The **res.sendFile()** function basically transfers the file at the given path and it sets the Content-Type response HTTP header field based on the filename extension.

**write a program to create server request using express module and use res.send(), res.sendFile()**

**write a program to create server request using express module and use query parameter**

**write a program to read file using fs module and user readFile, readFileSync**

# 

# Use of app.use(express.static({**folderName** }));

Suppose I have multiple file like txt file, html file, so for that we no need to create multiple end point like the below

A screen shot of a computer code

Description automatically generatedA screen shot of a computer code

Description automatically generated

With the help of the code **app.use(express.static({folderName}));** we no need to create multiple end-point and multiple port.

In the folderName section we will give the folder name where all the text file or html file is present. And code will be like below

A black screen with white text

Description automatically generated

Here TextFile is a folder where I have **dummy.txt** and **details.txt** file and the port for both text file will be one only and endpoint will be different like

**http://localhost:9000/dummy.txt** [**http://localhost:9000/details.txt**](http://localhost:9000/details.txt)

# npm install

The npm install installs all modules that are listed on **package. json** file and their dependencies. npm update updates all packages in the node\_modules directory and their dependencies.

# **What is SAP UI5**

SAP UI5 is the new UI technology from SAP to build **responsive web** applications and is the successor of SAP GUI, Webdynpro and BSP. It is a framework which is based on libraries to quick design user experience.

Framework - collection of libraries

Library - collection of classes

Class - collection of properties, events, methods and aggregations

So basically SAP provide the facility to build our user experience, which is going to help the companies to build web applications which can run on mobile devices any platform and any browser.

**Responsive Web Application** - An application which adopt itself according the device, platform and browser. so that is the definition of responsive application.

# **UI5 tooling**

Ui5 tooling is a node module. It allows developer to develop ui5 application. It offers multiple module and middleware which help developer to test, connect, manage, build, package, deliver, ui5 application using any tool of your choice.

# Steps to create first ui5 project.

* We need to install SAP UI5 tooling globally which brings a command line like called ui5 command in our computer

**npm install -g @ui5/cli** ----- (ui5 command line interface)

A screenshot of a computer

Description automatically generated**npm install -g @sap/ux-ui5-tooling** ----- (which brings many middle-ware, which helps to connecting to database.)

You can install all those through **cmd** also

* We can confirm the installation using **ui5 --help** and **fiori --help**
* Setup our SAP UI5 project, using the tool. We will follow a project structure, first it will be a node project and then it will be a UI5 project. We need to run **npm init** command to make it node project and **ui5 init** command to make it ui5 project.
* Create a new project folder (Ex. SapUi5Project) add a webapp folder, add a **index.html** file along with **manifest.json** file
* The manifest.json file describes the property of our application, there are 2 mandatory properties **id, type** which mandatorily this Json file should have.
* A screenshot of a computer

  Description automatically generatedOnce done we can initialize node project and ui5 project, using command **npm init**, **ui5 init**

# manifest.json

A screen shot of a computer code

Description automatically generatedjust like **package.json** this file describe the property of a ui5 project.

It has 2 mandatory attribute **“id”** , **“type”.**

And **id** value should be unique.

Once done the creation these two file (manifest.json and index.html) then we will create node project and ui5 project ( using **npm init**, **ui5 init**)

While installing the ui5 init we can face below error.

A black background with white text

Description automatically generatedA black screen with red text

Description automatically generated

A black background with white text

Description automatically generatedA screenshot of a computer program

Description automatically generatedTo solve this issue you need to click on the dropdown button next to the PowerShell button and then click on the command prompt. Then after open the command prompt, then do **ui5 init** it will work. Once both are successful then it will create 2 file in the project directory by seeing this file we can understand that **node** **project** and **ui5** **project** is created.

**Package.json** ------ is a indicator of node project.

**Ui5.yaml** ------------is a indicator of ui5 project

# Reference the Sap UI5 framework

We will reference the sap UI5 framework from CDN. We can find the complete documentation on <https://ui5.sap.com> which is known as UI5 SDK – Software development kit.

A black and orange text

Description automatically generated with medium confidence

# UI5 framework design

The UI5 framework is broadly contain 2 major parts. So at the button or at the heart of the UI5, we have the web development, which includes HTML5, CSS, JS, JQUERY. This is the foundation of the UI5, UI5 is build on the top of these web technologies. Then we have **UI5 Design-Time Component & UI5 Runtime Component.**

**UI5 Design-Time Component will have different libraries. These libraries help to develop applications. So there are core libraries, which get loaded automatically, whenever we load UI5 🡺 sap.ui.core, sap.ui.unified .**

**A screenshot of a computer

Description automatically generatedApart from this we have control libraries. These libraries will not get loaded automatically , as a developer we need to load this library. 🡺 sap.m, sap.ui.table, sap.ui.comp, sap.ui.layout.**

**To understand about more libraries go to** [https://ui5.sap.com/#/api](https://ui5.sap.com/%23/api)

**UI5 Runtime Component consists of something called renderer. The job**

A screenshot of a computer

Description automatically generated**Of renderer to convert the UI5 code to equivalent HTML, CSS code.**

# Explanation of index.html file

A screen shot of a computer

Description automatically generated“**data-sap-ui-libs” --** It is used to specify which SAPUI5 libraries/modules should be loaded for your application.

“**data-sap-ui-theme” --** It allows you to specify which SAPUI5 theme should be applied to your application.

A screen shot of a computer

Description automatically generated“**data-sap-ui-resourceroots” –**  you know and I know that all the resources related stuff are there in the **webapp** folder, but computer don’t know. So here we will tell to our UI5 framework that all my resources related to this project are part of the **webapp** folder. So I will tell to Computer my current working directory is **webapp. Like this** 🡪 So I want to give some alias name **like this** So from now on **webapp** folder will be referenced in my entire project as **donald.** This concept is called as **namespace** concept

# what is namespace concept

namespace is nothing but specifying the name of root directory, where all the project resources are kept, using **data-sap-ui-resourceroots.** Or we can say namespace is a alias name for your project resources.

The significance of this namespace is to reference all the files in your project.

# What is bootstrap

It is basically a initialization code for SAP UI5 framework. How to load ui5 framework at the beginning, whenever application start, that is what this code is called bootstrap code.

# mvc architecture

The full form of **mvc** is Model View And Controller. It is a design pattern used across software industry to develop an application, which is consists of a UI. If you have a user interface, you will always follow the mvc architecture.

**View** is nothing but a screen, where user always interacts. So whenever user does an activity lets say click on a button. Then even will be triggered. To handle this event we have a function written inside the controller. This function is called event handler function, that is what the controller contains. Controller also contains processing logic, which is written in **JS.** If we need to get the data then controller need to go and get the data from model. So model is the place where we have all the data. Suppose if needs to modified it will be informed by controller to the model. The model will inform back to controller that data has been modified. So now controller will get a notification from the model that the data has been modified. And also view will get notification from the controller that the data has been modified. This is how entire engine of entire UI5 application works.

# What is data binding

Data binding is a concept of connecting our **view** directly connect to the **model** so that data exchange can happen between the model and the view.

A diagram of a data binding

Description automatically generated

# Syntax to initialize an object in Ui5

Var objectName = new libraryName.className(sId, sProperties)

**sId –** unique Id of our control

**A screen shot of a computer code

Description automatically generatedsProperties** **–** are the information about the class.

# Views in SAP UI5

There are 4 types of view in Sap UI5

1. JS view – 2~5 %
2. XML view – 99~100 %
3. JSON view – 0 %
4. HTML view – 0%

# What is ui5 serve command used

The **ui5 serve** command is a command-line utility provided by SAPUI5 to serve and run SAPUI5 applications locally during development. This command is part of the SAPUI5 Command Line Interface (CLI) tool

A screen shot of a computer code

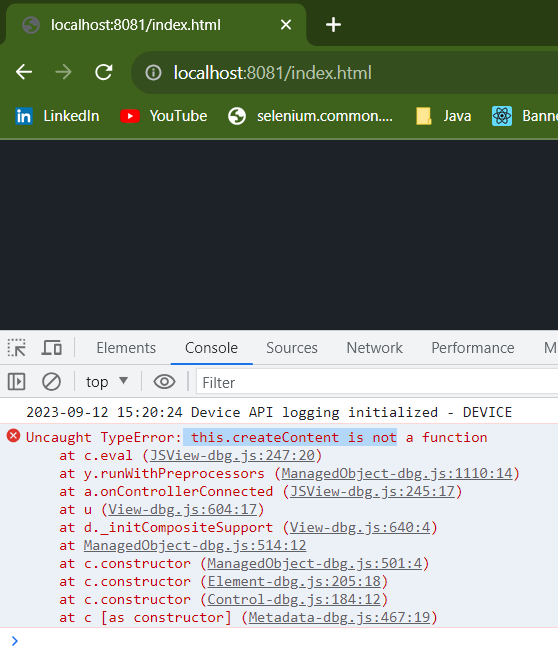
Description automatically generated

You have to create view folder and specify the view, otherwise view will not be load and will throw an exception

A black background with white text

Description automatically generatedModuleError: failed to load 'donald/view/Main.view.js' from ./view/Main.view.js: 404 - Not Found -🡪 it is telling that **Main.view.js** file not found which is inside in **view** folder. So we need to create view folder and need to create **Main.view.js** file. Like this

**Write a program where define the bootstrap UI5 framework, create a view object, place the object to html element. And run the program using ui5 serve command**

**when we create the file Main.view.js (which is empty) in this file it is searching for the createContent function, hence its show this exception in the console.**

A screenshot of a computer program

Description automatically generated **Syntax of create js View**

# Creation of view

A screen shot of a computer program

Description automatically generated

we have defined a JavaScript view using **sap.ui.jsview**. and name of the view is **donald.view.Main**. **createContent: function() {...}:** This is a predefined function in a SAPUI5 view

A screen shot of a computer program

Description automatically generatedA screen shot of a computer

Description automatically generatedvar oBtn = new sap.m.Button("idOfButton", {...}): This line creates a new instance of a SAPUI5 button control (sap.m.Button) with the specified ID ("idOfButton") and additional properties like the button text. return oBtn;: This line returns the button

A screenshot of a computer

Description automatically generated

**Wap to create a button and link using SapUi5**

# Controller in SapUi5

A controller is a class/module is defined in UI5 using following syntax called as asynchronous module loading or AMD like syntax. We also called scaffolding template.

sap.ui.define(

[dependency1, dependency2, dependency3],

function(oD1, oD2, oD3) {

}

Lets say dependency1 take 2 sec to load, dependency2 take 3 sec to load and dependency3 take 5 sec to load. Then it will not take (2+3+5) 10 sec to load as it is **asynchronous module loading**. So all the dependencies will be loading as parallel. So the time to start my module will be the time for highest dependency. Which is 5 sec. by that time all the remaining dependencies will be loaded. That’s why it is called **asynchronous module loading**.

Every **js** file except the view will follow this syntax in UI5.

We want to create a controller, so a controller is a special type of js file with extension **.controller.js**

**Steps to create controller**

must inherit from SAP standard module **sap/ui/core/mvc/Controller**.

So in order to create a controller module, this is mandatory dependency.

A keyword called **extend** is used to define inheritance.

A screenshot of a website

Description automatically generatedSo in order to create a controller module, you must use one of the dependency as this **sap/ui/core/mvc/controller** module.

Every ui5 class can turn into module by replacing “.” with “/”

**Wap to create a controller module and create a ClikMe function which will shows an alert when invoked**

A screen shot of a computer program

Description automatically generated

This is an example of how to define a **controller** in SAPUI5 using the **sap.ui.define method**. This controller is named "**Main**" and extends the **sap.ui.core.mvc.Controller** class. It also defines a function called clickMe, which shows an alert when invoked.

**sap.ui.define**: This method is used to define a module in SAPUI5. In this case, it defines a controller module with a dependency on **'sap/ui/core/mvc/controller'.**

**'sap/ui/core/mvc/controller'**: This is the dependency

**function(Controller) { ... }:** This is the factory function that gets executed when the controller module is loaded. It receives the Controller class as a parameter,

**return Controller.extend("donald.controller.Main", { ... }):** In this line, you are extending the base Controller class to create a custom controller named "**Main**" in the "**donald.controller**" namespace

# Calling the event handler function from view, when button is clicked

So we want to call a function from the **Main.controller.js** class, so to do this we need the **object** of that class. But here sap will automatically create the object of the class. But we need to tell the ui5 that what is the name of my controller, so that sap can create object of that class and give it to us free.

The syntax for telling to ui5 that who is my controller my class.

**getControllerName : function() {**

**return “donald.controller.Main” ;**

**}**

And we will be receiving the object of controller here automatically here

A screen shot of a computer program

Description automatically generated

A screenshot of a computer

Description automatically generatedNow we require a **button** event for click

on the button and that is **press.**

**Then the implementation would be**

**Press : objectName.eventHandlerFunction.**

**Example : press : oController.clickMe**

A screenshot of a computer

Description automatically generated**Wap to create a controller module and create a ClikMe function which will shows an alert when invoked**

# Question

* Can one view has multiple controller – **NO**
* Can one controller used by multiple views – **YES**
* What is the best practice – **Ideally one view should have one controller (1:1)**
* Is it mandatory to keep the view name and controller name same like you did – **NO**

# Under the hood

So lets try to understand under the hood. So whenever you start the application always start from **index.html** file, this is the launching file or starting file of your application. So very first thing we are doing in **index.html** is **bootstrapping.**  We are loading the ui5 framework, from the CDN. Once the ui5 framework is loaded it is ready in the browser too. After that we are telling you to ui5 to create a **view object.** And name of the view is **donald.view.Main.**

A diagram of a software development process

Description automatically generatedAnd we tell to SAP try to load the **Main.view.js**. The moment view load, the first function ui5 call is **getControllerName** and it return the **controller\_address** to ui5. Now ui5 got the address of the controller. Now ui5 create the object of the controller class automatically. After that it will call the constructor of the class automatically **[onInit].** Next it will call the createContent function of our view and pass the object of the controller class. And inside the createContent function it will return the object of the button. This will return the button object to ui5 framework. The Renderer convert the **oBtn** to equivalent html, css code which is understand by browser.

**Exercise :** Add a input field in the view, so whenever user click the button, whatever data entered by user in the input field should come in alert popup.

# Funda Fox

A library name always starts with small letter and a Class name always starts with capital letters. Both will follow the camel case. **Example :** [**sap.m.Button**](https://ui5.sap.com/entity/sap.m.Button)

A screenshot of a computer

Description automatically generatedA screenshot of a computer

Description automatically generated**Enumerators :** these are the constant values, example for button type we use **ButtonType** enumerators.

A close-up of a logo

Description automatically generated

**A screen shot of a computer screen

Description automatically generated**

**A blue screen with white text

Description automatically generatedSyntax : type : sap.m.ButtonType.Attention**

**A pink rectangular sign with black text

Description automatically generated** **type : sap.m.ButtonType.Back**

**type : sap.m.ButtonType.Negative** **etc ….**

For a control we have properties, aggregation, events, function name, they always follow camel case.

In the controller class, we can obtain 2 default object

* Running Application : you can get the object of the entire running application using **sap.ui.getCore()**
* Object of the view inside controller : we can use this.getView(), this is the object of current controller class.

When we run a ui5 app, we don’t use the html tags, we use ui5 controls, an in order to obtain the object of ui5 controls, we should never use the **document.getElementById** because it will provide us the HTML object not the ui5 object. Since we want to use sap ui5 library function, we need sap ui5 object.

To obtain we can use **byId** function on either the app object or view object.

For every property there is setter and getter function. If you have a value property, there will be setValue and getValue functions.

If you are looking for a **property event method or aggregation** and unable to found it in your class. Check the parent class.

**A black and white text

Description automatically generatedA screenshot of a computer

Description automatically generatedIn this case for Input class the parent class is InputBase, so if you not find you can check the check the parent class or you can check this Show browwed proerties**

**To get the parent properties**

# Basic of Object Oriented Programming

When child class inherits the property of the parent class, that is called as inheritance.

A diagram of a relationship between two different types of relationships

Description automatically generated

So let’s take an example of aggregation. Let’s say I have a class called passenger. The relationship between passenger class and Airplane class is aggregation, because both class can function independently **[airplane can fly empty and passenger can travel without airplane]**

So let’s take an example of composition. Let’s say I have a class called pilot. The relationship between pilot class and Airplane class is composition, because both class can function together, can not function independently **[airplane can not fly without pilot]**

**Cardinality :** its tells the relationship between the class.

* How many passengers can fly on one plane **0-n (for aggregation min – 0)**
* How many pilot needs to be there to fly **1-\* (for composition min – 1 )**

# Example of aggregation

A screenshot of a computer

Description automatically generatedIn the Table class there has aggregation, name are **columns, actions.** Whose cardinality is 0..n . And we can have alt types also

A screen shot of a computer

Description automatically generated

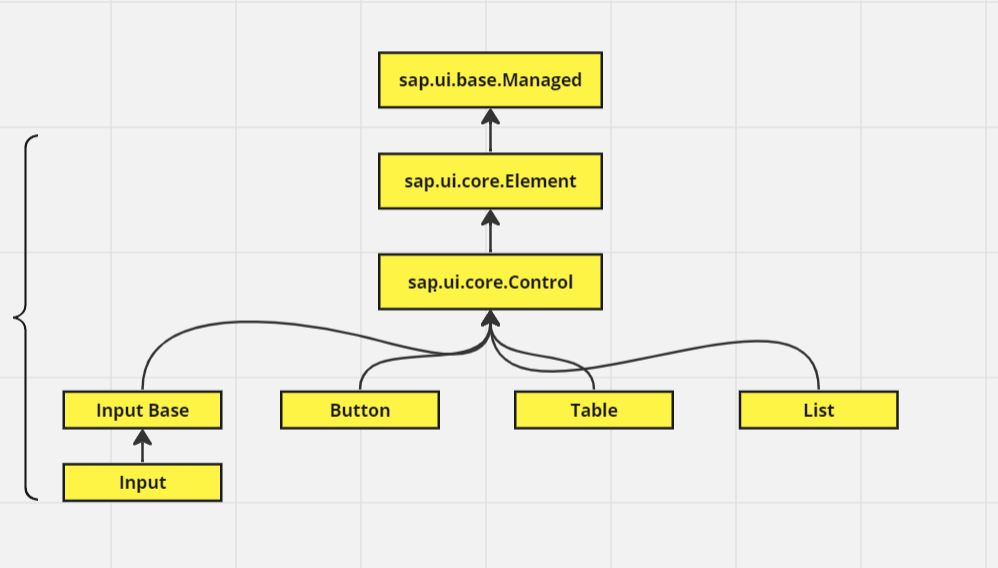
A green and white rectangular frame

Description automatically generated

To implement this, here I will use the **sap.ui.getCore(),** with the help of this we can get the object of entire running application. And will use **byId** to get the of the Input class. And after that we will use **getValue,** to get the value of input.

Here we could have use the **document.getElementById,** but this one only used to get the html element. If we use this we can not able to use the sap method like **getValue.** That’s why we use **sap.ui.getCore()**

# Control Hierarchy

So most of the control class are inherit from **sap.ui.core.Control.**

**While creating a view, we have used a method placeAt, from where we got that**

* We got it from the parent class of the View class i.e. Control class. Some time if you don’t get the method then check the parent class.

# What is xml

So till now we saw JavaScript view, But we don’t use JavaScript view. We will use xml view.

Xml stands for extensible markup language. Which means it is a markup language and not a programming language like html. But unlike html we have a custom tags. In html we have fixed sets of tag, but xml you can create custom tags. Xml is also a tree data structure.