

# **Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY**

Near Jnana Bharathi Campus, Bengaluru-560 056.

(An Autonomous Institution, Aided by Government of Karnataka)



## **DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

### **Cloud Computing Laboratory Report**

Submitted in the Partial Fulfilment of

### **Cloud Programming Laboratory**

**Course Code: 18CSL77**

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## SALESFORCE

Salesforce is an American cloud-based software company headquartered in San Francisco, California. It provides customer relationship management (CRM) service and also provides enterprise applications focused on customer service, marketing automation, analytics, and application development.

### History

The company was founded on February 3, 1999 by former Oracle executive Marc Benioff, together with Parker Harris, Dave Hölterhoff, and Frank Dominguez as a software as a service (SaaS) company, and was launched publicly between September and November 1999. In June 2004, the company had its initial public offering on the New York Stock Exchange under the stock symbol CRM and raised US\$110 million. Early investors include Larry Ellison, Magdalena Yesil, Halsey Minor, Stewart Henderson, Mark Iscaro, and Igor Sill, a founding member of Geneva Venture Partners. In October 2014, Salesforce announced the development of its Customer Success Platform to tie together Salesforce's services, including sales, service, marketing, analytics, community, and mobile apps. In October 2017, Salesforce launched a Facebook Analytics tool for business-to-business marketers. In September 2018, Salesforce partnered with Apple intended on improving apps for businesses. In February 2020, co-chief executive officer Keith Block stepped down from his position in the company. Marc Benioff remained as chairman and chief executive officer. On December 1, 2020, it was announced that Salesforce would acquire Slack for \$27.7 billion. The acquisition closed on July 21. In February 2021, Salesforce announced that CFO Mark Hawkins would be retiring from his position after six years of working for the company; however, retaining a position as CFO emeritus until October. Amy Weaver was selected as his replacement.

Salesforce.com's customer relationship management (CRM) service comprises several broad categories: Commerce Cloud, Sales Cloud, Service Cloud, Data Cloud (including Jigsaw), Marketing Cloud, Community Cloud (including Chatter), Manufacturing Cloud, Analytics Cloud, App Cloud, Vaccine Cloud, IoT and Work.com with over 100,000 customers.

### Main services

Salesforce's main services are tools for case, task and issue management. It also gives customers tracking abilities for their raised cases and conversation features for social networking Web sites, provides analytical tools and other services including email alert, Google search, and access to customers' entitlement and contracts. They also partner with companies like IBM, Accenture, and Saggezza to help integrate Salesforce's cloud-based services into their businesses.

### Lightning Platform

Lightning Platform (also known as Force.com) is a platform as a service (PaaS) that allows developers to create add-on applications that integrate into the main Salesforce.com application. [failed verification] These third-party applications are hosted on Salesforce.com's infrastructure.

Force.com applications are built using declarative tools, backed by Lightning [further explanation needed] and Apex, a proprietary Java-like programming language for Force.com, as well as Visualforce, a framework including an XML syntax typically used to generate HTML. The Force.com platform typically receives three complete releases a year. As the platform is provided as a service to its developers, every single development instance also receives all these updates.

In 2015, a new framework for building user interfaces – Lightning Components – was introduced in beta. Lightning components are built using the open-source Aura Framework but with support for Apex as the server-side language instead of Aura's JavaScript dependency. This has been described as an alternative to, not necessarily a replacement for, Visualforce pages.

As of 2013, the Force.com platform has 1.4 million registered developers. Lightning Base Components is the component library built on top of Lightning Web Components.

## **Experience Cloud**

Experience Cloud (formerly Community Cloud) provides Salesforce customers the ability to create online web properties for external collaboration, customer service, channel sales, and other custom portals in their instance of Salesforce. Tightly integrated to Sales Cloud, Service Cloud, and App Cloud, Experience Cloud can be quickly customized to provide a wide variety of web properties. Experience Cloud combines the functionality of the former Salesforce Customer and Partner Portals with some additional features.

## **Work.com**

\Work.com, previously Rypple, is a social performance management platform for managers and employees. It allows continuous coaching, real-time feedback, and recognition. It is aimed at sales management, customer service, marketing, and can be utilised by human resource departments.

Work.com, then known as "Rypple", was founded by Daniel Debow and David Stein, to create a simple way of asking for feedback anonymously at work. The company was formed in May 2008 and their client list included Mozilla, Facebook, LinkedIn and the Gilt Groupe. Rypple aims to get employees to build and manage their own coaching networks.

In September 2011, Rypple announced that they had hired Bohdan Zabawskyj as its Chief Technology Officer. In 2011, Rypple developed a more formalized management methodology called OKR ("Objectives and Key Results") for Spotify. Rypple also partnered with Facebook to create "Loops", short for "feedback loops", which gathers feedback from co-workers, including praise, progress against goals, and coaching from supervisors into one channel.

In December 2011, Salesforce.com announced that they would acquire Rypple. The transaction was completed in 2012 and Rypple was rebranded as Work.com in September 2012.

## **AppExchange**

Launched in 2005, the Salesforce AppExchange is an online application marketplace for third-party applications that run on the Force.com platform. Applications are available for free, as well as via yearly or monthly subscription models. Applications available range from integrations with SharePoint to mobile approval management. As of June 2016, it features 2,948 applications which have driven 3+ million installs. The "AppExchange" is also a place customers can search for cloud consulting partners to help them implement the technology in their own organization. Cloud consulting partners for Salesforce include large companies like IBM's "Bluewolf" and Accenture as well as smaller ones like Cloudrach.

## MyTrailhead

Launched in 2019, Salesforce's myTrailhead is an online training platform that can be customized for the specific needs of its customers. The platform extends functionality to provide users with training content specific to their usage of Salesforce and enables them to create and publish their own training content and programs.

## Technologies

Salesforce is powered by the Model–view–controller architecture.

## Apex

Apex is a proprietary programming language provided by the Force.com platform to developers similar to Java and C#. It is a strongly typed, object-oriented, case- insensitive programming language, following a dot-notation and curly-brackets syntax. Apex can be used to execute programmed functions during most processes on the Force.com platform including custom buttons and links, event handlers on record insertion, update, or deletion, via scheduling, or via the custom controllers of Visualforce or Lightning Experience pages.

Due to the multitenant nature of the platform, the language has strictly imposed governor limitations to guard against any code monopolizing shared resources. Salesforce provides a series of asynchronous processing methods for Apex to allow developers to produce longer-running and more complex Apex code.

## Lightning

In 2014, Salesforce made public the front end of its platform, called Lightning. This component-based framework is what the Salesforce mobile app is built on. Salesforce built on this framework in 2015 by releasing the Lightning Design System, an HTML style framework with default CSS styling built in. This framework allows customers to build their own components to either use in their internal instances or sell on the AppExchange.

Lightning Experience, released in 2016, is the new redesigned interface in Salesforce for processes enhancement. Since then all the apps available on AppExchange need to be Lightning and those built on Classic have to migrate to Lightning as Classic is not to be updated any more by Salesforce. The platform offers an option for developers to employ migration techniques to enable the new user-friendly interface and switch to Lightning.

## What is Salesforce used for?

- Engage customers with relevant, empathetic digital marketing from anywhere.
- Sell smarter and grow your business faster from anywhere.
- Quickly launch and scale ecommerce built around your customer — from anywhere.
- Provide great customer service from anywhere.
- Go digital fast and empower your teams to work from anywhere.

## Part A - 1A - Creation of web applications on Salesforce Cloud Platform

### Q1) Create a web application to enter student details like Name, USN, Semester, Section and CGPA to a database on Salesforce Cloud Platform

The screenshot shows the Salesforce Object Manager interface. The top navigation bar includes 'Create a Field Service Trailhead !', 'Object Manager | Salesforce', and a search bar. Below the navigation is a toolbar with icons for Home, Object Manager, Setup, and other functions. The main area is titled 'Object Manager' and displays a table of objects. The columns are labeled: LABEL, API NAME, TYPE, DESCRIPTION, LAST MODIFIED, and DEPLOYED. The table lists various objects such as Account, Activities, Activity, Alternative Payment Method, API Anomaly Event Store, Art, Artist, Asset, Asset Action, Asset Action Source, Asset Relationship, Asset State Period, and Associated Location. Most objects are Standard Objects, except for Art, Artist, and Asset which are Custom Objects.

1. Launch your Salesforce Trailhead Playground by opening any module and Switch to Lightning Experience if you are currently in Salesforce Classic by clicking your picture in the right top corner and then click on -Switch to Lightning Experience|.
2. Then go to Setup gear icon and click -Setup|.
3. Click on -Object Manager| and click -Create> Custom Object| to create new Custom Object.
4. Name the object -Student|.
5. Allow Reports and Allow Search.
6. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object|.
7. To create a Tab for the Object: Select any Tab Style for the object —Student|. Click Next, Next, leave the defaults and save.

To add fields to the Object: Go to -Fields & Relationships| option of Student object and Click -New.

The screenshot shows the 'Edit Custom Object Student' configuration page. The left sidebar has a tree view with options like Details, Fields & Relationships, Page Layouts, Lightning Record Pages, Buttons, Links, and Actions, Compact Layouts, Field Sets, Object Limits, Record Types, Related Lookup Filters, Search Layouts, List View Button Layout, Restriction Rules, and Scoping Rules. The main area is titled 'Edit Custom Object Student' and contains a 'Custom Object Definition Edit' form. It includes sections for 'Custom Object Information' (Label: Student, Plural Label: Students), 'Object Name' (Object Name: Student, Example: Account), 'Description' (a large text input field), and 'Context Sensitive Help Setting' (radio buttons for standard help or Visualforce page). At the bottom, there is a note about Record Name and a 'Content Name' dropdown set to 'None'. The top right of the form has 'Save', 'Save & New', and 'Cancel' buttons.

Add the following fields one after the other:

1. Field Label: USN (Length 10), Data Type: Text, provide an example USN as Help Text, make it as Required Field and Don't allow Duplicate Values and make it as Case Insensitive.
2. Field Label: Section (Length 1), Data Type: Text, make it as Required Field.
3. Field Label: Semester (Length 1, 0), Data Type: Number, make it as RequiredField.
4. Field Label: CGPA (Length 2, 2), Data Type: Number, make it as RequiredField.

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
CGPA	CGPA_c	Number(2, 2)		
Created By	CreatedById	Lookup(User)		
Last Modified By	LastModifiedById	Lookup(User)		
Owner	OwnerId	Lookup(User, Group)		
Section	Section_c	Text(1)		
Semester	Semester_c	Number(1, 0)		
Student Name	Name	Text(80)		
USN	USN_c	Text(10) (Unique Case Insensitive)		

### Semester Validation:

To add a rule to the Semester so that it should always be greater than 0 and less than or equal to 8.

1. Go to Validation Rule of Student Object and click -New|.
2. Name it as -Semester validation|.
3. Error Condition Formula: OR (Semester\_c >8, Semester\_c <=0).
4. Error Message: Please Enter a Semester from 1-8.
5. Error Location: Field – Semester.
6. Click Save.

Rule Name	Semester_validation
Error Condition Formula	OR(Semester_c >8, Semester_c <=0)
Error Message	Please Enter a Semester from 1-8
Description	
Created By	1DA19CS068 K SRUSTI PRIYA 12/9/2022, 5:14 AM
Active	✓
Error Location	Semester
Modified By	1DA19CS068 K SRUSTI PRIYA 12/9/2022, 5:14 AM

## CGPA Validation:

To add a rule to the CGPA so that it should not take CGPA greater than 10:

1. Go to Validation Rule of Student Object and click -New||
2. Name it as -CGPA validation||.
3. Error Condition Formula: CGPA\_c > 10
4. Error Message: Please Enter a Correct CGPA.
5. Error Location: Field –CGPA
6. Click Save

Validation Rule Detail
Role Name: CGPA_validation Error Condition Formula: CGPA_c > 10 Error Message: Please Enter a Correct CGPA Description: Created By: 1DA19CS068_K_SRUSTI PRIYA 12/9/2022, 5:15 AM Modified By: 1DA19CS068_K_SRUSTI PRIYA 12/9/2022, 5:15 AM

## USN Validation:

To add a rule to the USN so that it should validate only student's serial number.

1. Go to Validation Rule of Flight Object and click -New||
2. Name it as -USN Validation||.
3. Error Condition Formula: NOT(REGEX(USN\_c,"[1-5]{1}+[A-Z]{2}+[0-9]{2}+[A-Z]{2}+[0-9]{3}"))
4. Error Message: Please enter a valid USN.
5. Error Location: Field – USN
6. Click Save.

Validation Rule Detail
Role Name: USN_validation Error Condition Formula: NOT(BEGINS(USN_c,'1DA')) Error Message: Please Enter a valid USN Description: Created By: 1DA19CS068_K_SRUSTI PRIYA 12/9/2022, 5:17 AM Modified By: 1DA19CS068_K_SRUSTI PRIYA 12/9/2022, 5:17 AM

## Name validation:

1. To add a rule to the Student Name so that the name should only start with letter but not digit:
2. Go to Validation Rule of Student Object and click -New||
3. Name it as -Student Name Validation||
4. Error Condition Formula: -NOT (REGEX (Name,"[a-zA-Z]+[a-zA-Z]+"))||
5. Error Message: -Please Enter a valid name||.
6. Error Location: Field –Student Name.
7. Click Save.

The screenshot shows the Salesforce Setup interface for creating a new Validation Rule. The page title is "Student Validation Rule". The validation rule details are as follows:

- Rule Name:** Student\_Name\_Validation
- Error Condition Formula:** NOT(REGEX(Name,"[a-zA-Z]+[a-zA-Z]+"))
- Error Message:** Please Enter a valid name
- Description:** (empty)
- Created By:** 1DA19CS068 K SRUSTI PRIYA, 12/9/2022, 5:13 AM
- Modified By:** 1DA19CS068 K SRUSTI PRIYA, 12/9/2022, 5:13 AM
- Active:** checked
- Error Location:** Student Name

The screenshot shows the Salesforce Lightning interface for creating a new student record. The "Information" section contains the following fields:

- \* Student Name:** 1priya (highlighted in yellow)
- Please Enter a valid name:** (error message)
- \* USN:** 1da19cs0 (highlighted in yellow)
- Please Enter a valid USN:** (error message)
- \* Section:** a
- \* Semester:** 7
- \* CGPA:** 9.20

A modal dialog box displays the error message: "We hit a snag." with the sub-instruction: "Review the following fields" followed by a bulleted list: "• USN" and "• Student Name".

## To create an application:

1. Go to -Setup| and type -App Manager| in Quick Find Box.
2. Click on -New Lightning App| to create a Lightning Application.
3. Name it as -Student Details|, give the description for your application.
4. Uploading Image and changing colours are optional, then click Next.
5. Navigation Style: Standard Navigation, click Next.
6. No need to add any Utility Bar, click Next.
7. Add the following Items: Students, Reports and Dashboards, click Next.
8. Assign it to System Administrator Profile by selecting System Administrator and pressing right arrow and then click Save & Finish.
9. Go to App Manager, select your application and select Students and click -New| to add some details to your application.

Make sure you will get error messages when you give invalid Name, USN, Semester and CGPA.

The screenshot shows the Salesforce Lightning Experience. The URL is wise-koala-i08awp-dev-ed.trailblaze.lightning.force.com/lightning/r/Student01\_c/a015h00001q3oY2AAI/view. The page title is "Student Details". The main content area shows a "Details" card for a student named "Darshan". The card includes fields for Student Name (Darshan), USN (1DA19CS200), Section (D), Semester (5), and CGPA (9.99). It also shows the Owner as "1DA19CS068 K SRUSTI PRIYA" and the Last Modified By field with the same information. The bottom of the card shows the creation date and time: 12/16/2022, 5:55 AM. The browser taskbar at the bottom shows various icons and the system status: 21°C Clear, ENG, 21:27, 28-01-2023.

## Reports and Dashboards:

### To Create a Students Report

The screenshot shows the Salesforce Lightning Experience. The URL is wise-koala-i08awp-dev-ed.trailblaze.lightning.force.com/lightning/r/Report/0005h0000072PRIFA2/view?queryScope=userFolders. The page title is "Student Report". The main content area shows a table titled "Report: Students Student Report". The table lists student records grouped by section (A, B, C, D). The columns are Student Name, USN, Semester, and CGPA. The table shows data for sections A, B, C, and D, with subtotals and a grand total. The bottom of the table shows row counts, detail rows, subtotals, and a grand total. The browser taskbar at the bottom shows various icons and the system status: 21°C Clear, ENG, 21:28, 28-01-2023.

Total Records	Total Semester	Total CGPA		
11	59	100.45		
<b>Section +</b>	<b>Student: Student Name</b>	<b>USN</b>	<b>Semester</b>	<b>CGPA</b>
A (2)	Kerthi	1DA19IS023	6	8.70
	Rajath	1DA19CS056	8	9.20
<b>Subtotal</b>			14	17.90
B (4)	K Srusti Priya	1DA19CS068	7	9.00
	Yashas	1DA19IS013	6	9.25
	Pooja Hegde	1DA19IS056	2	8.38
	Vishnu	1DA20CS070	5	9.50
<b>Subtotal</b>			20	36.13
C (2)	Lakshmi Priya	1DA19CS088	4	9.50
	Prem	1DA19EC018	8	9.78
<b>Subtotal</b>			12	19.28
D (3)	Sandy	1DA19CS024	3	8.27
	Darshan	1DA19CS200	5	9.99
	Karan	1DA19CS043	5	8.88
<b>Subtotal</b>			13	27.14

Go to -Reports tab|| Click on -New Folder|| And give it any name and Click Save.

1. Click on -New Report|| and from search bar Search for -Students|| and then select it and then click continue.
2. Add the required Columns to get the Completed Entered data.
3. If you Want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.
4. Click on save and name the report as —New Students Report|| and then select the folder which you have created.
5. Click Save and then Click Run

To Create a Students Dashboard:

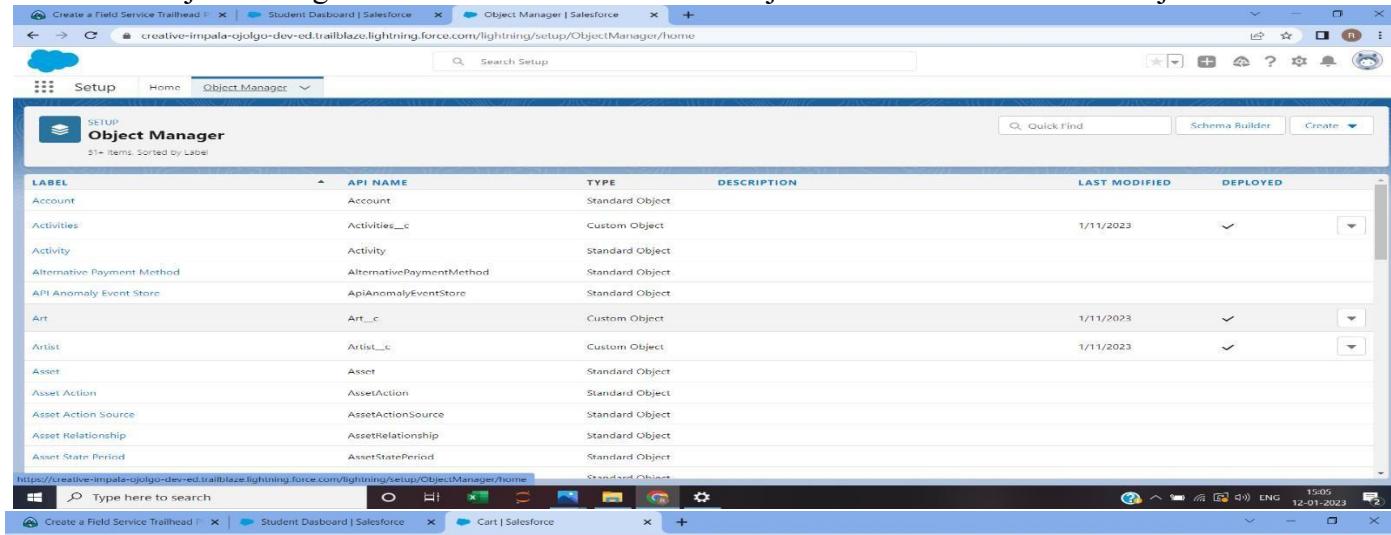
1. Go to -Dashboard tab|| and then click on -New Folder|| and give it any Name.
2. Click on -New Dashboard|| and then name it as —Students Dashboard|| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run.

## Q2) Create a Web Application to implement an online cart for adding items to a shopping cart and deleting it.

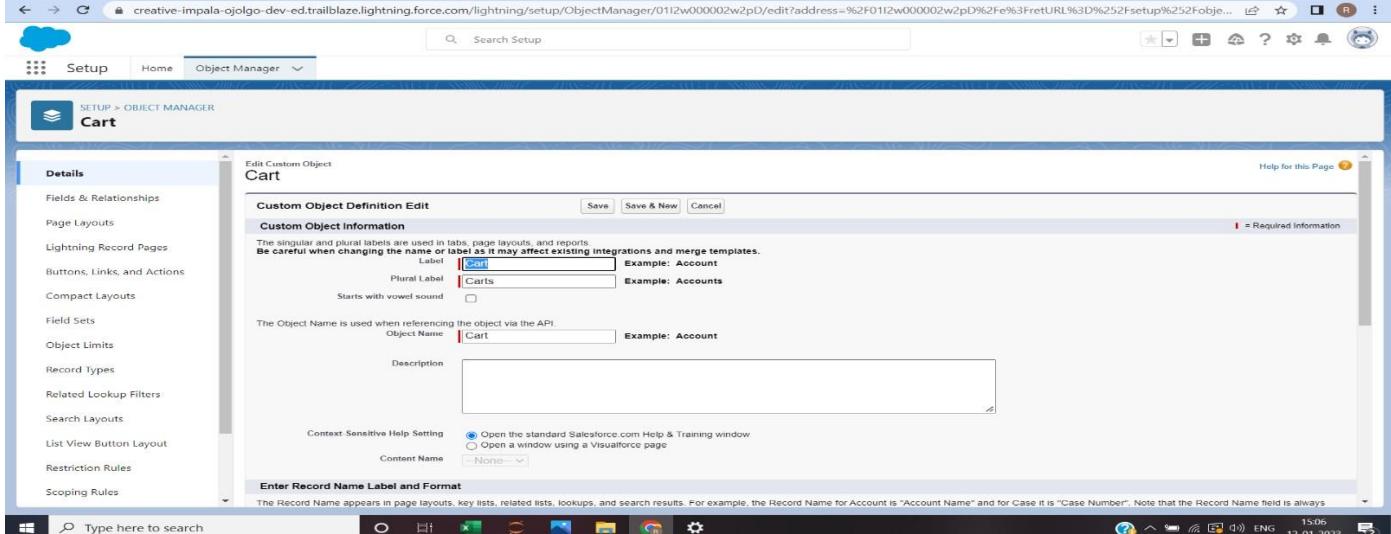
Launch your Salesforce Trailhead Playground by opening any module and Switch to Lightning Experience if you are currently in Salesforce Classic by clicking your picture in the right top corner and then click on -Switch to Lightning Experience|.

Then go to Setup gear icon and click -Setup|.

Click on -Object Manager| and click -Create> Custom Object| to create new Custom Object.



The screenshot shows the Salesforce Object Manager page. The URL is <https://creative-impala-ojolgo-dev-ed.trailblaze.lightning.force.com/lightning/setup/ObjectManager/home>. The page lists various objects: Account, Activities, Activity, Alternative Payment Method, API Anomaly Event Store, Art, Artist, Asset, Asset Action, Asset Action Source, Asset Relationship, Asset State Period, and several others. The 'Cart' object is visible in the list.

The screenshot shows the 'Edit Custom Object Definition Edit' page for the 'Cart' object. The URL is <https://creative-impala-ojolgo-dev-ed.trailblaze.lightning.force.com/lightning/setup/ObjectManager/0112w000002w2pD/edit?address=%2F0112w000002w2pD%2Fe%3FretURL%3D%252Fsetup%252Fobj...>. The page includes fields for Label (Cart), Plural Label (Carts), Object Name (Cart), Description, and Context-Sensitive Help Setting (Open the standard Salesforce.com Help & Training window).

1. Name the object -Cart|.
2. Allow Reports and Allow Search.
3. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object|
4. To create a Tab for the Object: Select any Tab Style for the object —Cart|. Click Next, Next, leave the defaults and save.

To add fields to the Object:

Go to -Fields & Relationships| option of cart object and Click -New|.

Add the following fields one after the other:

- Field Label: Item Name, Data Type: Text Area, make it as Required Field.

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Cart Name	Name	Text(80)		✓
Category	Category__c	Picklist		▼
Created By	CreatedById	Lookup(User)		▼
Item Name	Item_Name__c	Text Area(255)		▼
Last Modified By	LastModifiedById	Lookup(User)		▼
Owner	OwnerId	Lookup(User,Group)		✓
Price	Price__c	Currency(16, 2)		▼
Quantity	Quantity__c	Number(18, 0)		▼

- Field Label: Category, Data Type: Picklist, click radio button in front of Enter values, with each value separated by a new line value are: Books, Electronics & Accessories, Furniture & Home Appliances, Fashion – Men, Fashion – Women, Fashion – Kids, Footwear and Others.
- Make it as Required Field and Restrict the values to the values in the picklist.
- Field Label: Quantity, Data Type: Number, make it as Required Field.
- Field Label: Price, Data Type: Currency (Length 16, Decimal Places 2), Make it as Required Field.

### To create an application:

1. Go to -Setup| and type -App Manager| in Quick Find Box.
2. Click on -New Lightning App| to create a Lightning Application.
3. Name it as -Online Shopping Cart|, give the description for your application.
4. Uploading Image and changing colours are optional, then click Next.
5. Navigation Style: Standard Navigation, click Next.
6. No need to add any Utility Bar, click Next.
7. Add the following Items: Carts, Reports and Dashboards, click Next.
8. Assign it to System Administrator Profile by selecting System Administrator and pressing right arrow and then click Save & Finish.
9. Go to App Manager, select your application and select Carts and click -New| to add some details to your application.

**Fashion kids cart**

**Details**

cart Name: Fashion kids cart

Owner: 1DA19CS068 K SRUSTI PRIYA

Item Name: Skirt

Category: Fashion - Kids

Quantity: 9

Price: \$240.00

Created By: 1DA19CS068 K SRUSTI PRIYA, 12/16/2022, 10:36 PM

Last Modified By: 1DA19CS068 K SRUSTI PRIYA, 12/16/2022, 10:36 PM

**New cart**

**Information**

\* cart Name: cloth

\* Item Name: hoodie

\* Category: Fashion - Women

\* Quantity: t

Enter a valid value

\* Price: \$1,200.00

We hit a snag.

Review the following fields

- Quantity

Cancel Save & New Save

## Reports and Dashboards:

To Create a Carts Report:

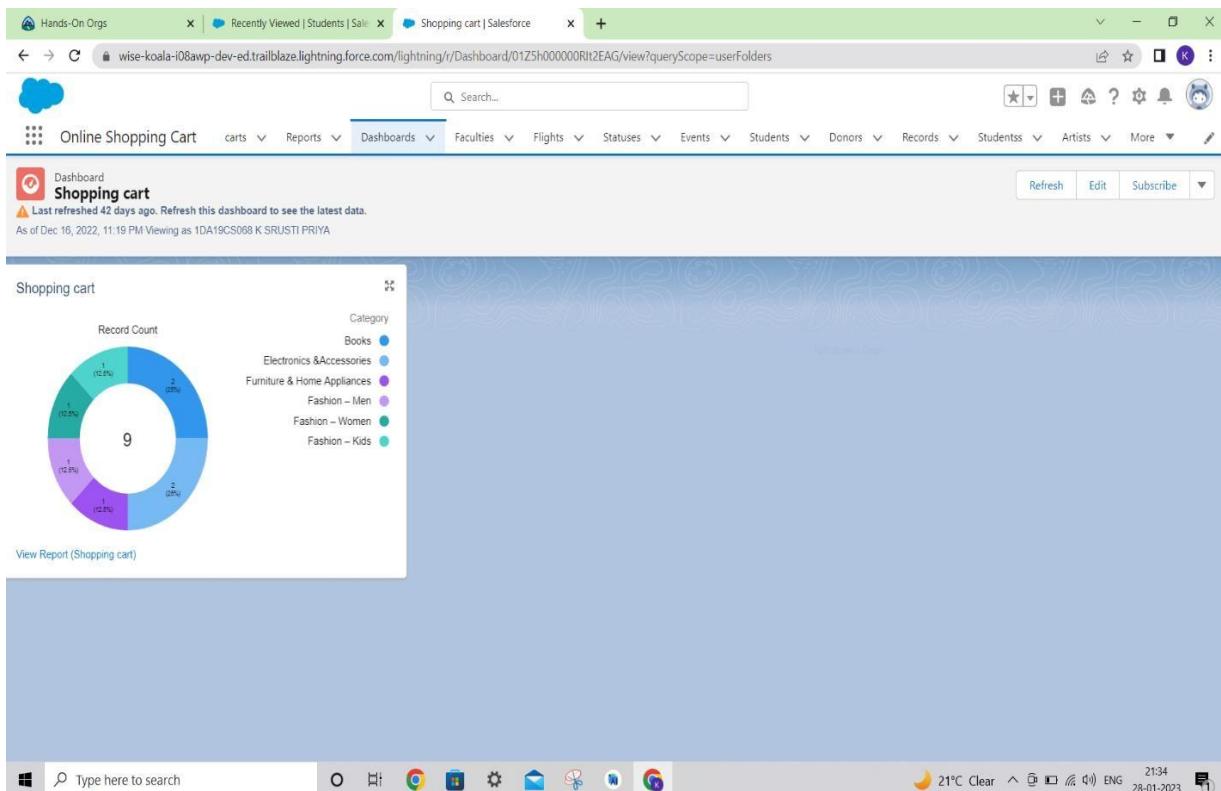
1. Go to -Reports tab|| Click on -New Folder|| And give it any name and then click Save.
2. Click on -New Report|| and from search bar Search for -Carts|| and then select it and click Continue.
  - Add the required Columns to get the Completed Entered data.
3. If you Want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.
4. Click on save and name the report as —New Carts Report|| and then select the folder which you have created.
5. Click Save and then Click Run

Category	Price	Item Name	Quantity	8								9				10								Total	
				Flipflops	Subtotal	Jacket	Knightrider	Skirt	Wings of Fire	Subtotal	Dinning set	Joggers	Laptop	Mobile	Subtotal	Dinning set	Joggers	Laptop	Mobile	Subtotal					
Books	\$120.00	Record Count		0	0	1	0	1	2	0	0	0	0	0	0	0	2								
		Subtotal		0	0	0	1	0	1	2	0	0	0	0	0	0	2								
Electronics &Accessories	\$20,000.00	Record Count		0	0	0	0	0	0	0	0	0	0	0	0	1	1								
		\$35,000.00	Record Count	0	0	0	0	0	0	0	0	0	0	0	1	0	1								
		Subtotal		0	0	0	0	0	0	0	0	0	0	0	1	1	2								
Furniture & Home Appliances	\$3,500.00	Record Count		0	0	0	0	0	0	0	1	0	0	0	0	1	1								

Details (9 Rows) (1) Click an intersection in the table above to filter details.

To Create a Carts Dashboard:

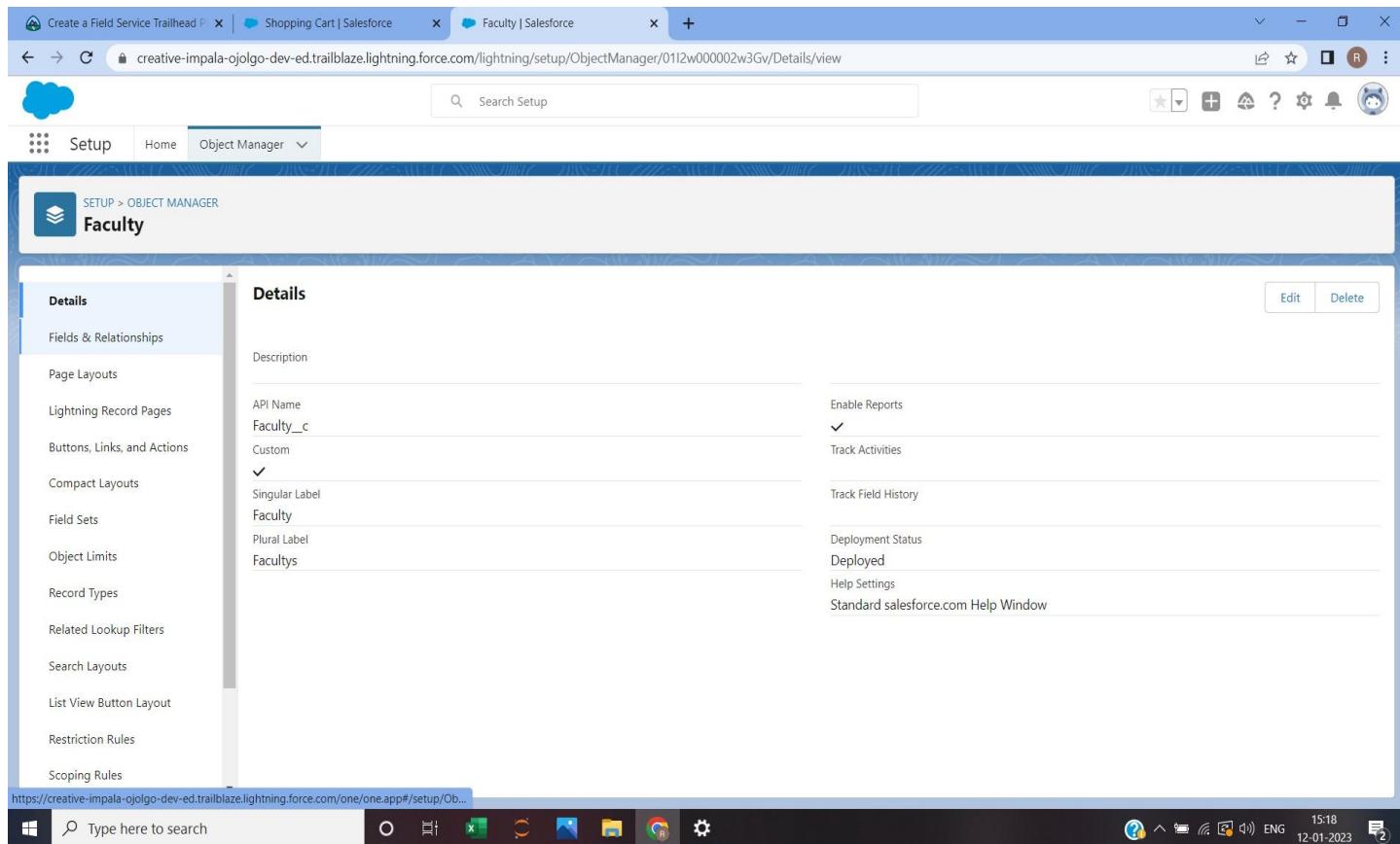
1. Go to -Dashboard tab|| and then click on -New Folder|| and give it any Name
2. Click on -New Dashboard|| and then name it as —Shopping cart|| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run



**Q3) Create a web application to enter the faculty details like faculty ID, faculty name, and salary to a database and calculate the income tax to be paid by the faculty at the end of the financial year.**

Launch your Salesforce Trailhead Playground by opening any module and Switch to Lightning Experience if you are currently in Salesforce Classic by clicking your picture in the right top corner and then click on -Switch to Lightning Experience|.

Then go to Setup gear icon and click -Setup|.



1. Click on -Object Manager| and click -Create> Custom Object| to create new Custom Object.
2. Name the object -Faculty|
3. Allow Reports and Allow Search.
4. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object|
5. To create a Tab for the Object: Select any Tab Style for the object —Faculty|. Click Next, Next, leave the defaults and save.

The screenshot shows the Salesforce Setup interface with the Object Manager selected. Under the Faculty object, the Fields & Relationships section is displayed. It lists six items, sorted by Field Label. The fields include:

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Created By	CreatedById	Lookup(User)		
Faculty Name	Name	Text(80)		<input checked="" type="checkbox"/>
ID	ID_c	Text(10) (External ID) (Unique Case Insensitive)		<input checked="" type="checkbox"/>
Last Modified By	LastModifiedById	Lookup(User)		
Owner	OwnerId	Lookup(User,Group)		<input checked="" type="checkbox"/>
Salary	Salary__c	Currency(16, 2)		

To add fields to the Object:

Go to -Fields & Relationships|| option of Student object and Click -New||

Add the following fields one after the other:

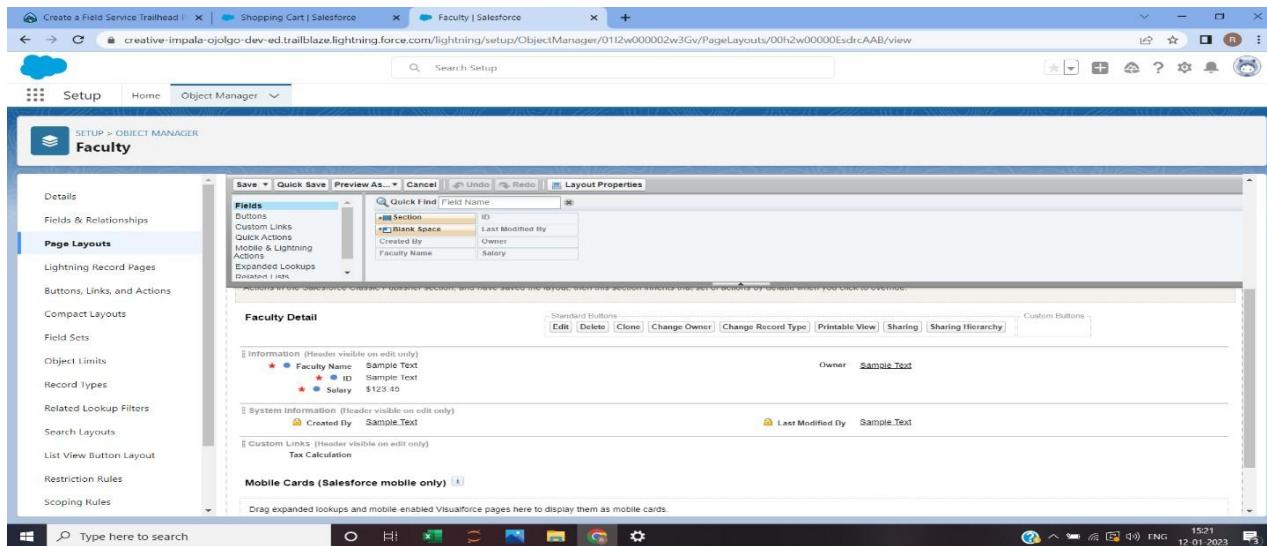
- Field Label: ID (Length 10), Data Type: Text, provide an example ID as Help Text, make it as Required Field, don't allow Duplicate Values, make it as Case Insensitive and Set this field as the unique record identifier from an external system
- Field Label: Salary, Data Type: Currency (Length 16, Decimal Places 2), Make it as Required Field

The screenshot shows the Salesforce Setup interface with the Object Manager selected. Under the Faculty object, the Buttons, Links, and Actions section is displayed. A new custom button or link named "Tax Calculation" is being created. The configuration includes:

Label	Name	Behavior	Object Name
Tax Calculation	Tax_Calculation	Display in new window	Faculty
		Button or Link URL: https://incometaxindia.gov.in/Pages/tools/income-tax-calculator-234ABC.aspx	Link Encoding: Unicode (UTF-8)
		Height (in pixels): 600	Display Type: Detail Page Link
		Width (in pixels):	Show Address Bar: <input type="checkbox"/>
		Window Position: No Preference	Show Scrollbars: <input checked="" type="checkbox"/>
		Resizable: <input checked="" type="checkbox"/>	Show Toolbars: <input type="checkbox"/>
			Show Menu Bar: <input type="checkbox"/>
			Show Status Bar: <input type="checkbox"/>
			Modified By: Mahendar Patel, 14/12/2023, 1:41 pm

To calculate Income Tax to be paid:

1. Go to -Buttons, Links and Actions of Faculty Object and click -New Button or Link
2. Name it as -Tax Calculation
3. Select the radio button -Detail Page Link as it is a website link.
4. Behavior: Display in new window Content Source: URL.
5. Field Type: Faculty
6. In the empty space provided, type <https://www.incometaxindia.gov.in/Pages/tools/income-tax-calculator-234ABC.aspx>
7. It is a link which redirects to the income tax calculation website.
8. Link Encoding: Unicode (UTF-8).
9. Click Save
10. Go to Page Layout, Click Faculty Layout.
11. Click Custom Links, Drag and drop the -Tax Calculation link in the Custom Link area.
12. Click Save



To add a rule to the faculty name so that it should take only valid names:

1. Go to Validation Rule of Faculty object and click -New
2. Name it as -Name Validation
3. Error Condition Formula: NOT (REGEX (Name, " [a-zA-Z]+ [a-zA-Z]+")).
4. Error Message: Please Enter a valid name.
5. Error Location: Field – Faculty name.
6. Click Save

The screenshot shows the Salesforce Object Manager page for a validation rule named "Name\_Validation". The rule details are as follows:

- Rule Name:** Name\_Validation
- Error Condition Formula:** NOT(REGEX(Name, "[a-zA-Z]+[a-zA-Z]+"))
- Error Message:** Please Enter a valid name.
- Description:** (empty)
- Created By:** Mahendar Patel, 02/01/2024, 10:44 am
- Active:** checked
- Error Location:** Faculty Name
- Modified By:** Mahendar Patel, 02/01/2024, 10:44 am

## To create an application:

1. Go to -Setup| and type -App Manager| in Quick Find Box.
2. Click on -New Lightning App| to create a Lightning Application.
3. Name it as -Faculty Database|, give the description for your application.
4. Uploading Image and changing colours are optional, then click Next.
5. Navigation Style: Standard Navigation, click Next.

## Navigation Items

Choose the items to include in the app, and arrange the order in which they appear. Users can personalize the navigation to add or move items, but users can't remove or rename the items that you add. Some navigation items are available only for phone or only for desktop. These items are dropped from the navigation bar when the app is viewed in a format that the item doesn't support.

The screenshot shows the "Available Items" and "Selected Items" sections in the App Manager:

- Available Items:** A search bar containing "dashboard".
- Selected Items:** A list of items:
  - faculties
  - Reports
  - Dashboards

6. No need to add any Utility Bar, click Next.
7. Add the following Items: Faculties, Reports and Dashboards, click Next.
8. Assign it to System Administrator Profile by selecting System Administrator and pressing right arrow and then click Save & Finish.

Go to App Manager, select your application and select Faculties and click -New|| to add some details to your application.

Click the entry you added, go to details. Make sure you will get an error message when you enter an invalid name and invalid id.

The screenshot shows the Faculty details page in Salesforce. The faculty record for 'Mehul' is displayed. Key details include:

- Faculty Name:** Mehul
- ID:** 0078
- Salary:** ₹1,00,000.00
- Owner:** Mahendar Patel
- Created By:** Mahendar Patel on 02/01/2024, 10:50 am
- Last Modified By:** Mahendar Patel on 02/01/2024, 10:50 am

The screenshot shows the 'New Faculty' creation dialog in Salesforce. The 'Information' section contains the following fields:

- \*Faculty Name:** 21Naik Mehul (highlighted with a red border)
- \*ID:** 0078
- \*Salary:** ₹1,00,000.00

An error message box is displayed, stating:

**We hit a snag.**

Please Enter a valid name.

Review the following fields

- Faculty Name

Buttons at the bottom of the dialog include: Cancel, Save & New, and Save.

Press the -Tax Calculation| link to calculate income tax.

Click OK so that it will redirect you to the income tax calculator website.

The screenshot shows a Microsoft Edge browser window with multiple tabs open. The active tab is 'incometaxindia.gov.in/Pages/tools/income-tax-calculator-234ABC.aspx'. The page header includes the Indian Government logo and the text 'Income Tax Department, Government of India'. A navigation bar at the top has links for Home, About Us, Taxpayers' Charter, Grievance Redressal, Forms/Downloads, Taxpayer Services, Publicity Campaign, Contact us, and Feedback. Below this is a breadcrumb trail: 'Income Tax Department > Tax Tools > Income and Tax calculator'. The main content area is titled 'INCOME AND TAX CALCULATOR' and contains fields for Assessment Year (dropdown), Tax Payer (dropdown set to 'Individual'), Male / Female / Senior Citizen (dropdown), Residential Status (dropdown), Income from Salary (text input), Income From House Property (text input with 'Show Details' button), and Capital Gains (text input with 'Show Details' button). To the right, there are three expandable sections: 'TAX INFORMATION AND SERVICES', 'TAX LAWS & RULES', and 'INTERNATIONAL TAXATION'. The bottom of the screen shows the Windows taskbar with various pinned icons and the system clock indicating 15:26 on 12-01-2023.

## Reports and Dashboards:

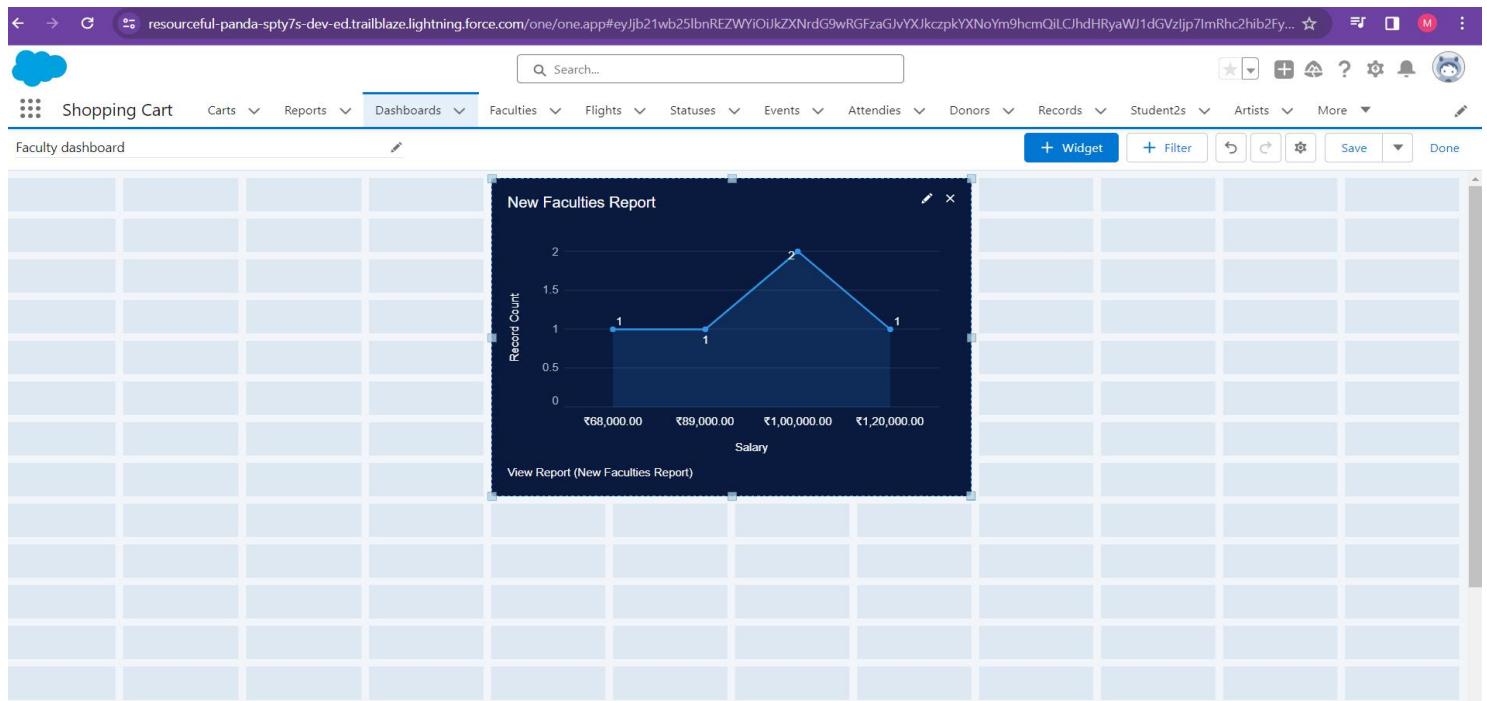
To Create a Faculty Report:

1. Go to -Reports tab|| Click on -New Folder|| And give it any name and click on Save.
2. Click on -New Report|| and from search bar Search for -Faculty|| and then select it then Click Continue.
3. Add the required Columns to get the Complete Entered data.
4. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.
5. Click on save and name the report as —New Faculties Report|| and then select the folder which you have created.
6. Click Save and then Click Run

Salary	Faculty Name	ID
\$68,000.00 (1)	Somesh	001
<b>Subtotal</b>		
\$89,000.00 (1)	Harsha	098
<b>Subtotal</b>		
\$1,00,000.00 (2)	Ramesh	AIT09
	Mehul	0078
<b>Subtotal</b>		
\$1,20,000.00 (1)	Mohan	013
<b>Subtotal</b>		
<b>Total (5)</b>		

To Create a Faculty Dashboard:

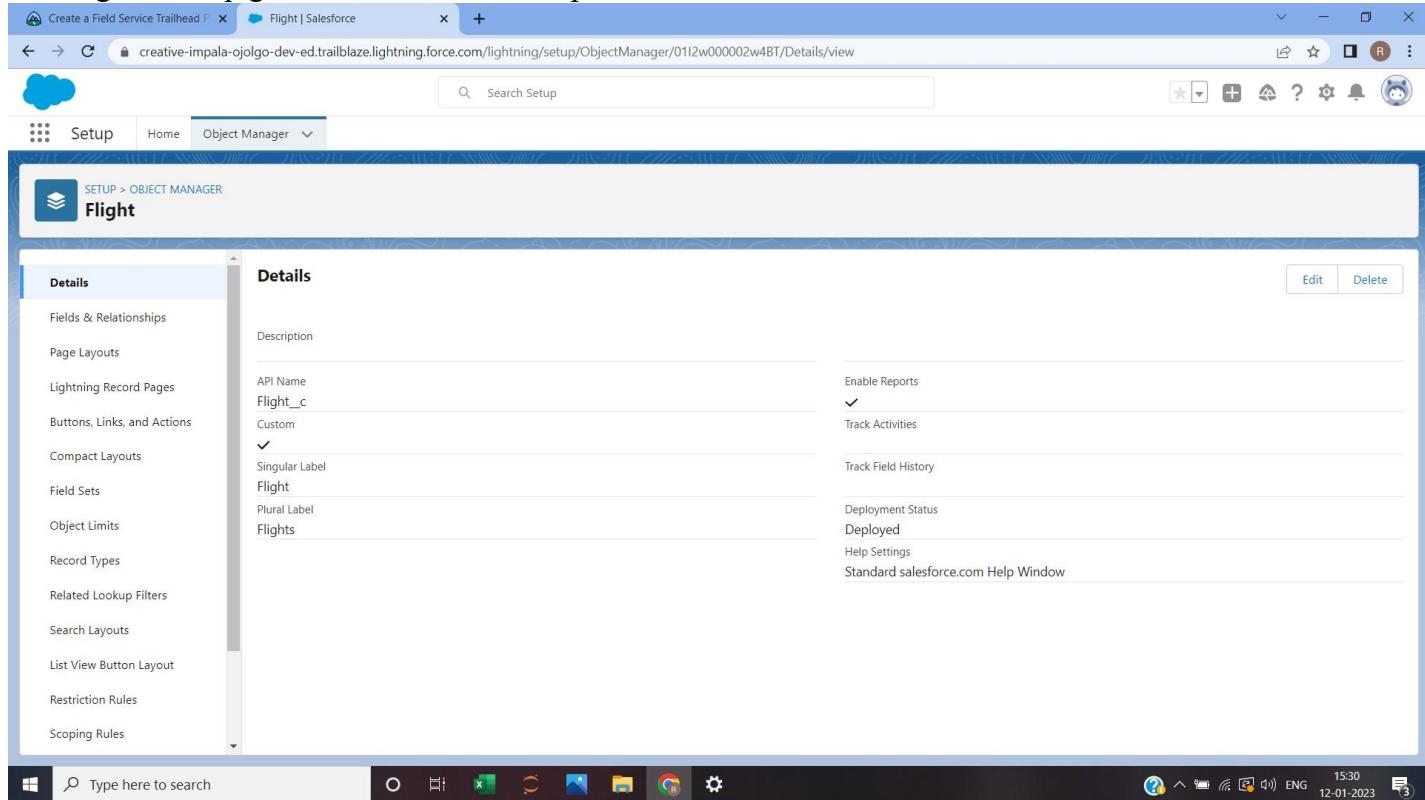
1. Go to -Dashboard tab|| and then click on -New Folder|| and give it any Name.
2. Click on -New Dashboard|| and then name it as -Income Tax Dashboard|| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run



#### **Q4) Create a web application to book a flight from a source to destination and store the status of flight, and departure timings on database.**

Launch your Salesforce Trailhead Playground by opening any module and Switch to Lightning Experience if you are currently in Salesforce Classic by clicking your picture in the right top corner and then click on -Switch to Lightning Experience||

Then go to Setup gear icon and click -Setup||.



1. Click on -Object Manager|| and click -Create > Custom Object|| to create new Custom Object.
2. Name the object -"Flight".
3. Allow Reports and Allow Search.
4. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object||.
5. To create a Tab for the Object: Select any Tab Style for the object —Flight||. Click Next, then, leave the defaults and save.

#### **To add fields to the Object:**

Go to -Fields & Relationships|| option of Student object and Click

-New. Add the following fields one after the other:

- Field Label: Source, Data Type: Text Area, make it as Required Field.
- Field Label: Destination, Data Type: Text Area, make it as Required Field.

Field Label: Departure Timing, Data Type: Date/Time, make it as Required Field

The screenshot shows the Salesforce setup interface for the Flight object. On the left, a sidebar lists various configuration options such as Page Layouts, Lightning Record Pages, Buttons, Links, and Actions, Compact Layouts, Field Sets, Object Limits, Record Types, Related Lookup Filters, Search Layouts, List View Button Layout, Restriction Rules, and Scoping Rules. The main content area is titled 'Fields & Relationships' and displays a table with the following data:

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Created By	CreatedById	Lookup(User)		
Departure Timing	Departure_Timing__c	Date/Time		
Destination	Destination__c	Text Area(255)		
Flight Name	Name	Text(80)		
Last Modified By	LastModifiedById	Lookup(User)		
Owner	OwnerId	Lookup(User,Group)		
Source	Source__c	Text Area(255)		

## Validation Rules:

### Date and time Validation:

To add a rule to the departure timing so that it is greater than today's date and the present time:

1. Go to Validation Rule of Flight Object and click -New||
2. Name it as —Date Time should be in Range||
3. Error Condition Formula: `Departure_Timing__c<NOW()`
4. Error Message: Departure Date/Time cannot be in past of present.
5. Error Location: Field – Departure Timings.
6. Click Save

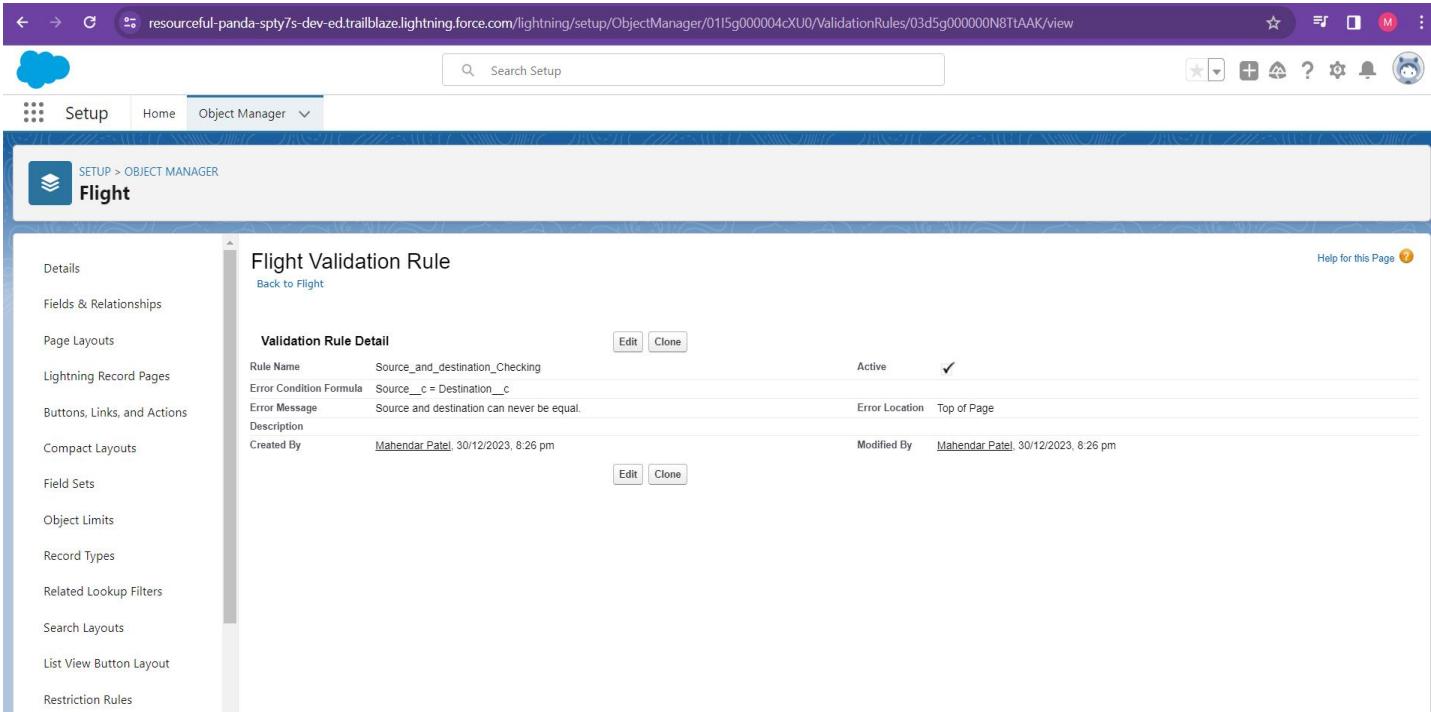
The screenshot shows the Salesforce setup interface for the Flight Validation Rule. The validation rule is named 'Date\_Time\_should\_be\_in\_Range'. It is active and has the following details:

- Rule Name:** Date\_Time\_should\_be\_in\_Range
- Error Condition Formula:** `Departure_Timing__c<NOW()`
- Error Message:** Departure Date/Time cannot be in past or present.
- Description:** Mahendar Patel, 30/12/2023, 8:24 pm
- Created By:** Mahendar Patel
- Modified By:** Mahendar Patel, 30/12/2023, 8:24 pm

## Source and Destination Validation:

To add a rule to the Source and destination so that source and destination should not be equal:

1. Go to Validation Rule of Flight Object and click -New||
2. Name it as -Source and destination Checking||
3. Error Condition Formula: Source\_c = Destination\_c
4. Error Message: Source and destination can never be equal.
5. Error Location: Top of the Page.
6. Click Save.



The screenshot shows the Salesforce Setup interface for the Flight object. On the left, there's a sidebar with various tabs like Details, Fields & Relationships, Page Layouts, etc. The main area is titled 'Flight Validation Rule' and shows the following details:

Validation Rule Detail	
Rule Name	Source_and_destination_Checking
Error Condition Formula	Source_c = Destination_c
Error Message	Source and destination can never be equal.
Description	
Created By	Mahendar Patel   30/12/2023, 8:26 pm
Modified By	Mahendar Patel   30/12/2023, 8:26 pm

Buttons at the bottom right of the detail pane are 'Edit' and 'Clone'. The status bar at the top indicates the URL: resourceful-panda-spy7s-dev-ed.trailblaze.lightning.force.com/lightning/setup/ObjectManager/011g000004cXU0/ValidationRules/03d5g000000N8TtAAK/view

Create one more object to provide status of the flight:

1. Name the Object – “Status”
2. Allow Reports and Allow Search.
3. Check the box in front of –Launch New Custom Tab Wizard after saving this custom object||
4. Create a Tab for the Object.

resourceful-panda-spty7s-dev-ed.trailblaze.lightning.force.com/lightning/setup/ObjectManager/01Ig000004cXdd/Details/view

**Status**

**Details**

Description

API Name: Status\_\_c  
Custom  
Singular Label: Status  
Plural Label: Statuses

Enable Reports  
✓  
Track Activities  
Track Field History  
Deployment Status: Deployed  
Help Settings  
Standard salesforce.com Help Window

**Fields & Relationships**

To add fields to the Object: Go to -Fields & Relationships| option of Student object and Click -New|. Add the following fields one after the other:

- Field Label: Flight Name, Data Type: Master-Detail Relationship, Related to: Flight. Sharing Setting: Read-Only. Leave the defaults and save. Master – Detail relationship is provided to enter status only to the existing flights.
- Field Label: Flight Status, Data Type: Picklist, click radio button in front of Enter values, with each value separated by a new line. Values are: Arrived, Cancelled, Delayed and Departed. Make it as Required Field and Restrict the values to the values in the picklist.

resourceful-panda-spty7s-dev-ed.trailblaze.lightning.force.com/lightning/setup/ObjectManager/01Ig000004cXdd/FieldsAndRelationships/view

**Status**

**Fields & Relationships**

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Created By	CreatedById	Lookup(User)		
Flight Name	Flight_Name__c	Master-Detail(Flight)		✓
Flight Status	Flight_Status__c	Picklist		
Last Modified By	LastModifiedById	Lookup(User)		
Status Name	Name	Text(80)		✓

**Fields & Relationships**

5 Items, Sorted by Field Label

Quick Find | New | Deleted Fields | Field Dependencies | Set History Tracking

Details

Fields & Relationships

Page Layouts

Lightning Record Pages

Buttons, Links, and Actions

Compact Layouts

Field Sets

Object Limits

Record Types

Related Lookup Filters

Search Layouts

List View Button Layout

Restriction Rules

Scoping Rules

### To create an application:

1. Go to -Setup| and type -App Manager| in Quick Find Box.
2. Click on -New Lightning App| to create a Lightning Application.
3. Name it as -Flight Details|, give the description for your application.
4. Uploading Image and changing colours are optional, then click Next.
5. Navigation Style: Standard Navigation, click Next.
6. No need to add any Utility Bar, click Next.
7. Add the following Items: Flights, Statuses, Reports and Dashboards, click Next.
8. Assign it to System Administrator Profile by selecting System Administrator and pressing right arrow and then click Save & Finish.

**New Lightning App**

**App Details & Branding**

Give your Lightning app a name and description. Upload an image and choose the highlight color for its navigation bar.

**App Details**

\* App Name

\* Developer Name

Description

**App Branding**

Image

Primary Color Hex Value  #0070D2

Org Theme Options  Use the app's image and color instead of the org's custom theme

Go to App Manager, select your application and select Flights and click -New| to add some details to your application

The screenshot shows the Salesforce Lightning App Builder interface. At the top, the URL is `resourceful-panda-spy7s-dev-ed.lightning.force.com/lightning/r/Flight_c/a075g00000HTFW3AAP/view`. The page title is "Flight Indigo". The main content area displays a "Flight" record with the following details:

- Flight Name:** Indigo
- Source:** Belagavi
- Destination:** Goa
- Departure Timing:** 10/01/2024, 12:00 pm
- Owner:** Mahendar Patel
- Created By:** Mahendar Patel, 30/12/2023, 9:50 pm
- Last Modified By:** Mahendar Patel, 30/12/2023, 9:50 pm

Make sure you will get an error message when you try to give the Departure Timing less than the current time and today's date

The screenshot shows a Salesforce Lightning page titled "Edit Indigo". The page displays flight details: Flight Name (Indigo), Source (Belagavi), Destination (Goa). Under "Departure Timing", the date is set to 01/01/2024 and the time is 12:00 pm. A red error message box appears, stating "We hit a snag." with the sub-instruction "Review the following fields: Departure Timing". The status bar at the bottom indicates "Departure Date/Time cannot be past or present".

## Reports and Dashboards:

To Create a Flights Report:

1. Go to -Reports tab| Click on -New Folder| And give it any name and then click Save.
2. Click on -New Report| and from search bar Search for -Flights| and then select it and Click
3. Click on save and name the report as —New Flights Report| and then select the folder which you have created.
4. Click Save and then Click Run.

The screenshot shows a Salesforce Lightning report titled "Report: Flights New Flights Report". The table displays flight data with 5 total records. The columns are: Departure Timing, Flight: Flight Name, Source, and Destination. The data rows are:

Departure Timing	Flight: Flight Name	Source	Destination
03/01/2024 (1)	Soice jet	Bangalore	Jodhpur
<b>Subtotal</b>			
10/01/2024 (1)	Indigo	Belagavi	Goa
<b>Subtotal</b>			
16/01/2024 (1)	Kingfisher	Bangalore	Surat
<b>Subtotal</b>			
31/01/2024 (1)	Vistara	Mumbai	Delhi
<b>Subtotal</b>			
05/03/2024 (1)	Emirates	Bangalore	Dubai
<b>Subtotal</b>			
<b>Total (5)</b>			

At the bottom, there are checkboxes for Row Counts, Detail Rows, Subtotals, and Grand Total.

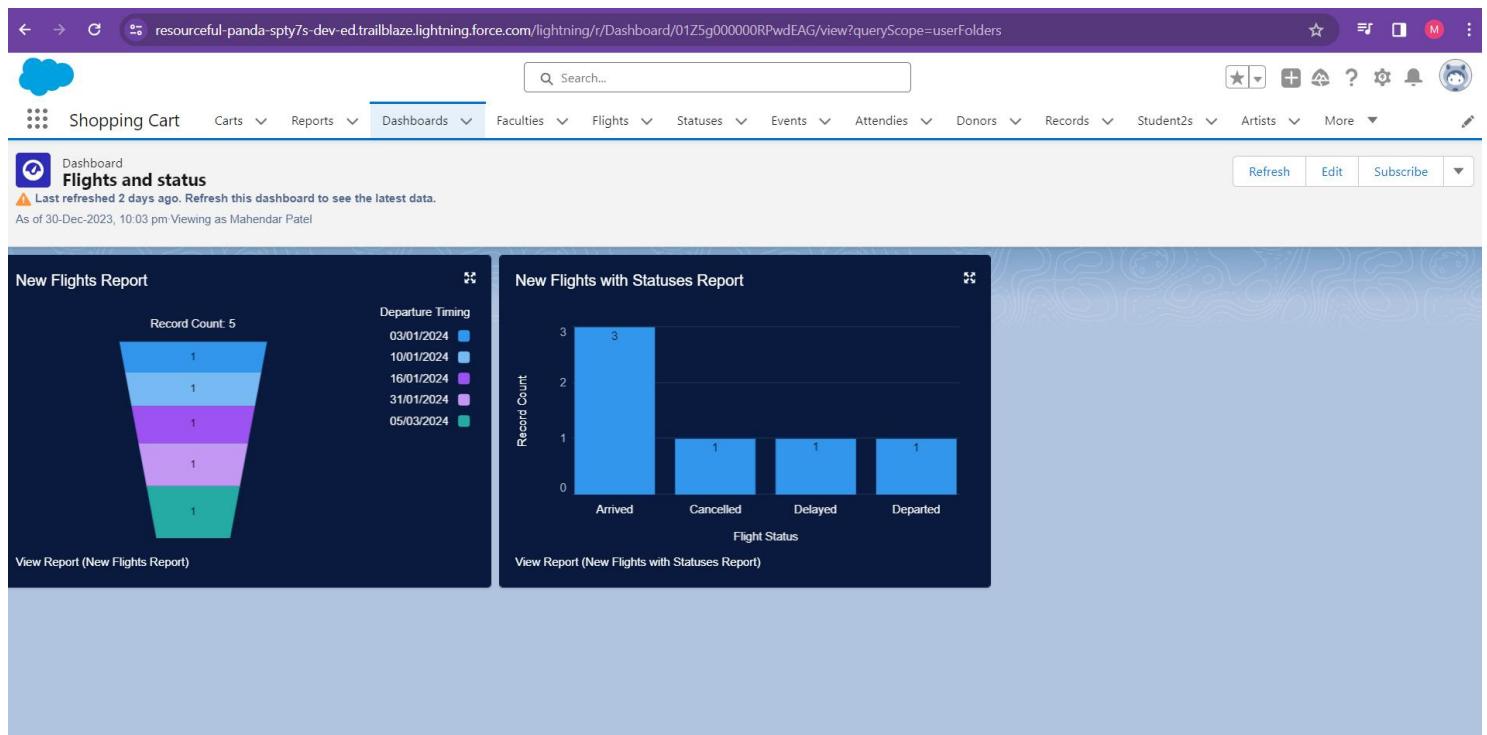
### To Create a Status Report:

1. Go to -Reports tab|| Click on -New Folder|| And give it any name and then click Save.
2. Click on -New Report|| and from search bar Search for -"Flights with Status" and then select it and then click Continue.
3. Add the required Columns to get the Complete Entered data.
4. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.
5. Click on save and name the report as —New Flights with status Report|| and then select the folder which you have created.
6. Click Save and then Click Run

Flight Status	Flight Name	Destination	Source
Arrived (3)	Emirates	Dubai	Bangalore
	Kingfisher	Surat	Bangalore
	Soice jet	Jodhpur	Bangalore
<b>Subtotal</b>			
Cancelled (1)	Indigo	Goa	Belagavi
<b>Subtotal</b>			
Delayed (1)	Vistara	Delhi	Mumbai
<b>Subtotal</b>			
Departed (1)	Emirates	Dubai	Bangalore
<b>Subtotal</b>			
<b>Total (6)</b>			

### To Create a Status Dashboard:

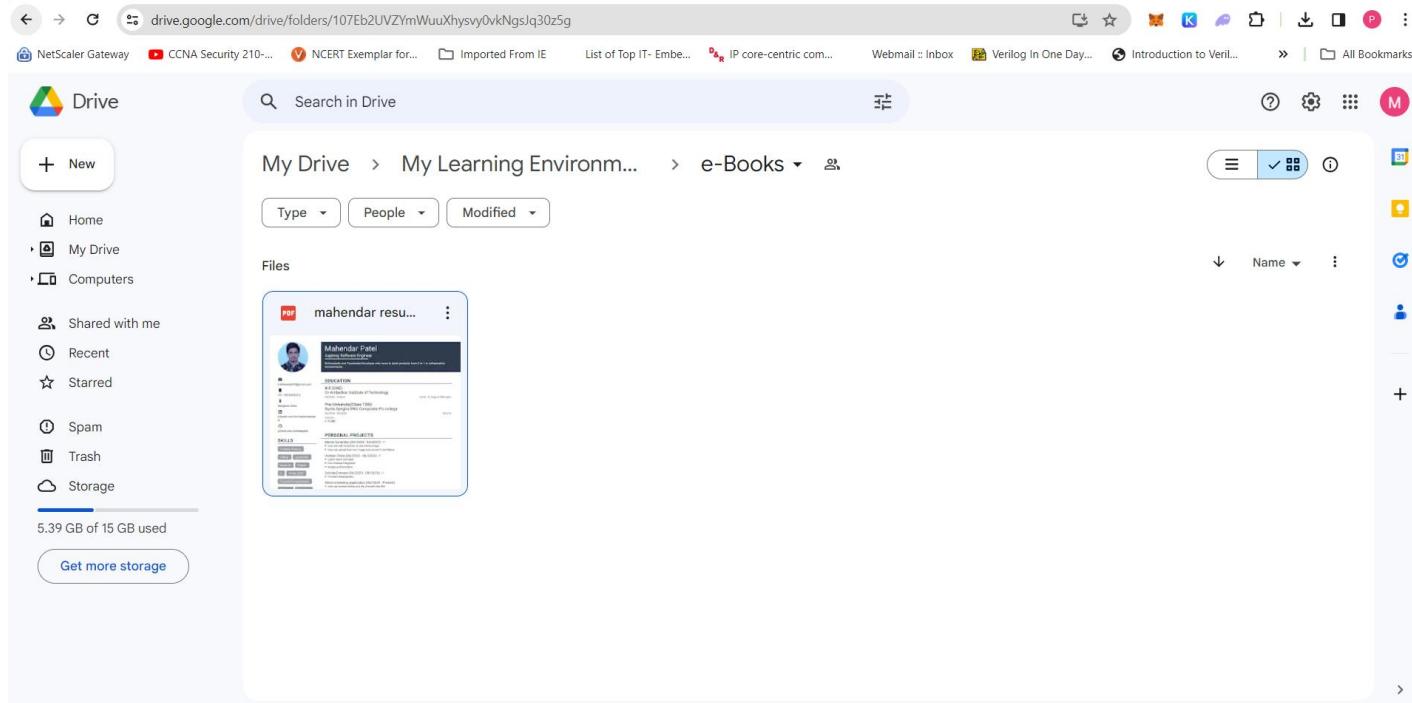
1. Go to -Dashboard tab|| and then click on -New Folder|| and give it any Name.
2. Click on -New Dashboard|| and then name it as -Status|| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run.



## **Q5) Create a collaborative learning environment for a particular learning topic using Google Apps. Google Drive, Google Docs and Google Slides must be used for hosting e-books, important articles and presentations.**

Open <http://drive.google.com/> and Sign In with your google account.

Create a new folder named -My Learning Environment| by clicking -New| button on the top left corner.

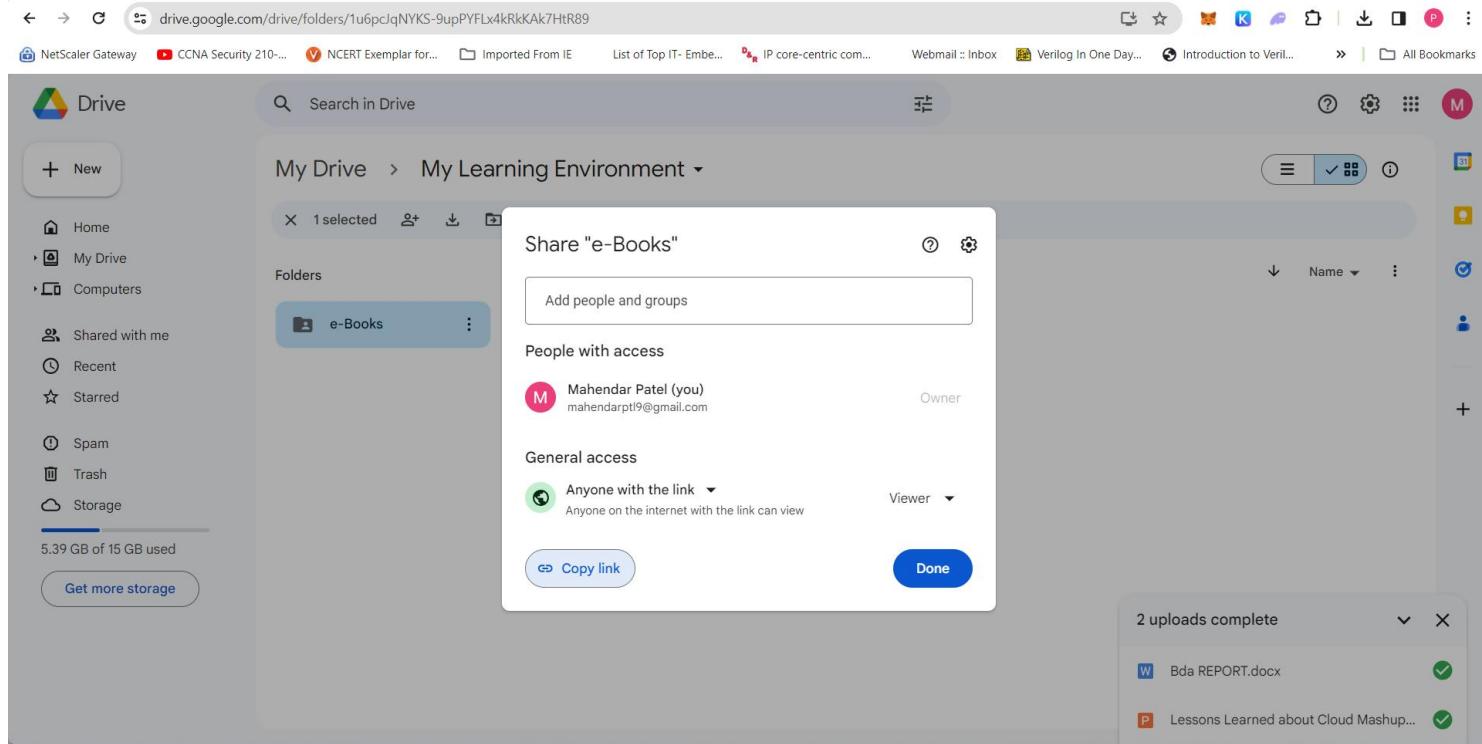


Right click on the folder created and tap -Share| then click on -Advanced|.

Under the -Who has Access| section click on -Change| of the first option.

Now check on the -On- Public on the web| option & set the Access to -Can View Only| and Click Save. This will make your folder to be accessible by anyone on the internet to view its contents and download them

Copy the link and post it or share it to anyone you like.

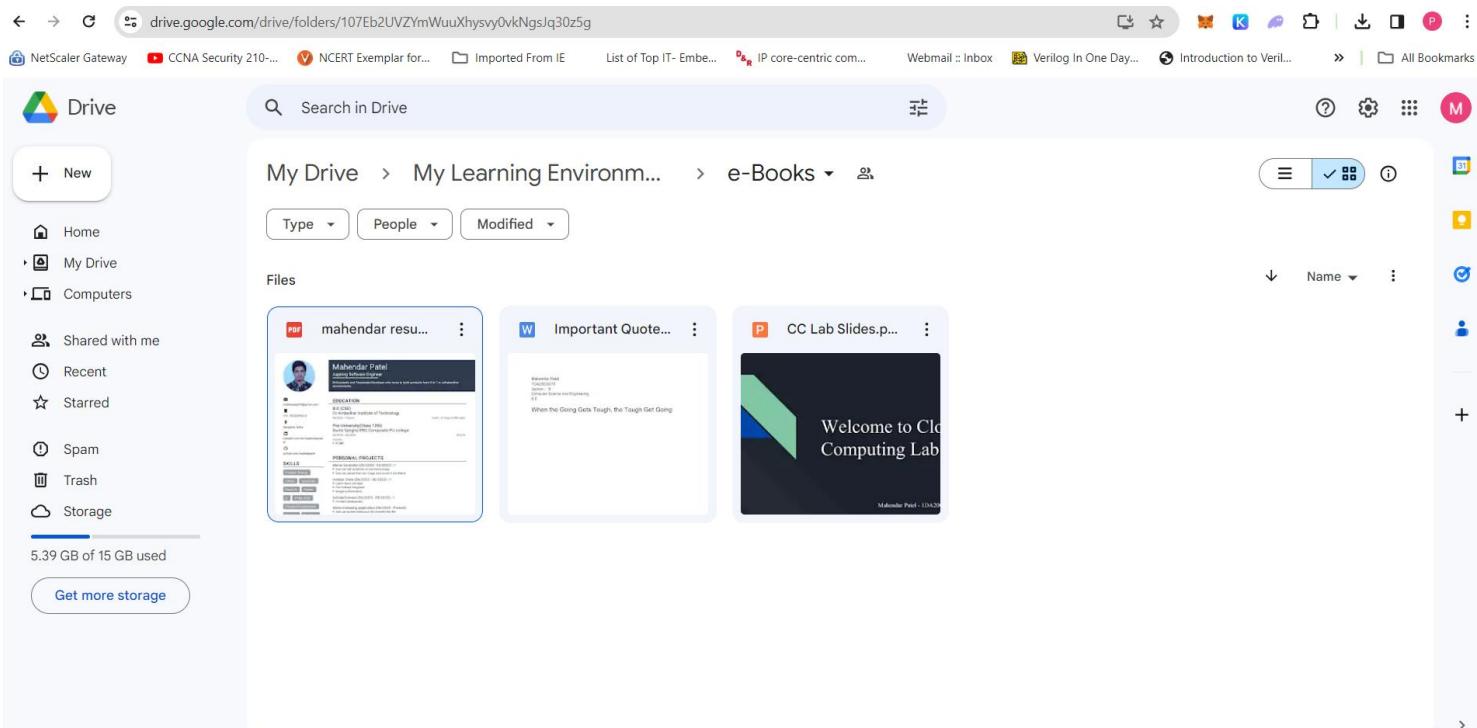


### Adding Learning Contents to your Environment:

Double click on the folder you just created and click -New|| button again.

Add these items:

- Folder: Named –E-Books|| where you will open the folder and click –New|| and –Upload a file|| like a Book from your hard drive



- Google Docs: Named -Important Quotes| where you will add some important links to the doc file. The file will keep saving hence you need to press save. click -Share| if you wish to share it

Mahendar Patel  
1DA20CS070  
Section - 'B'  
Computer Science And Engineering  
B.E

When the Going Gets Tough, the Tough Get Going

**Introducing pageless format**

The pageless format allows you to add wide images and tables, and view documents without the interruption of page breaks. You can change the format for any of your documents from **File → Page setup**. [Learn more](#)

[Dismiss](#) [Try it](#)

- Google Slide: Named -Welcome Folks| make a few changes and add your content and choose your theme

Welcome to Cloud Computing Lab

Mahendar Patel - 1DA20CS070

- You may also add many other items as necessary.

At any point in future if you wish to share this environment right click on the folder and click share. Copy the link and share.

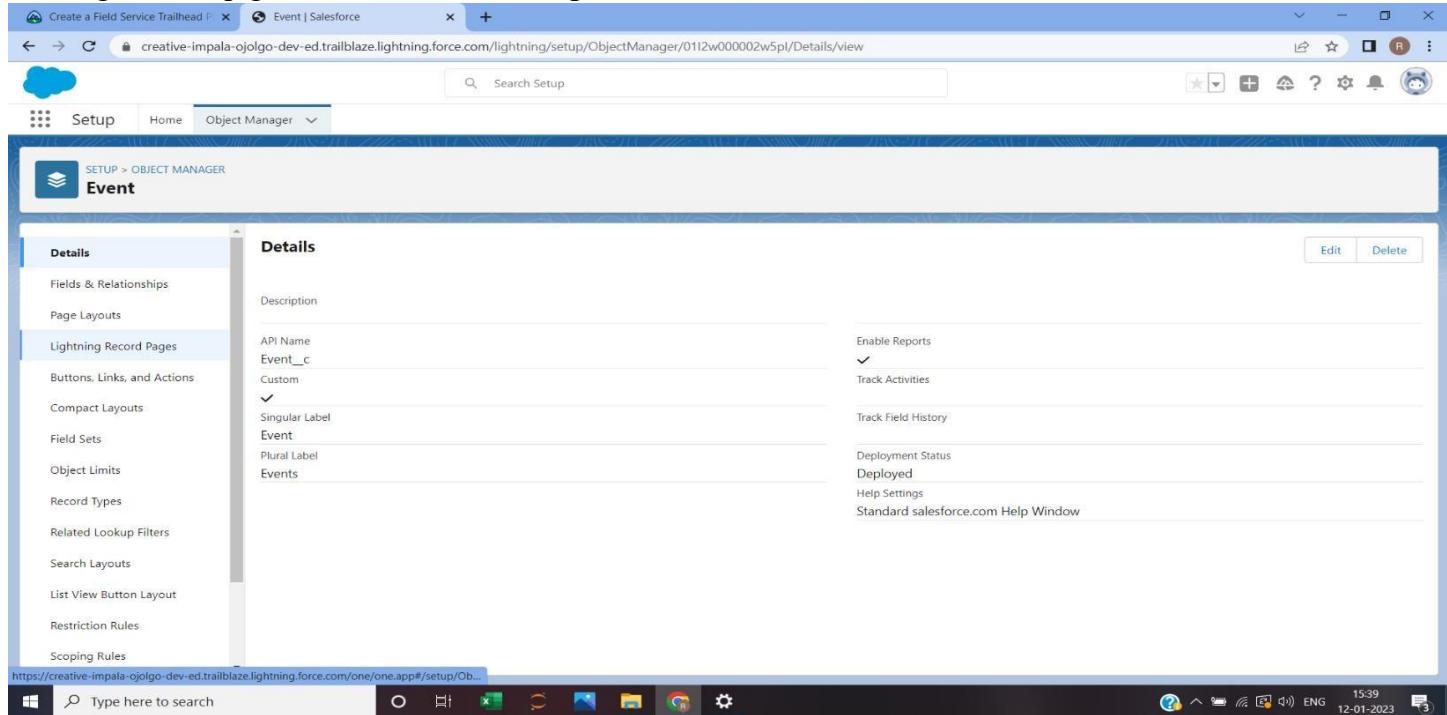
Link-

( [https://drive.google.com/drive/folders/1XmaQ6zj3zhwZo6gsF7iL-hSLzy0U\\_vMa?usp=sharing](https://drive.google.com/drive/folders/1XmaQ6zj3zhwZo6gsF7iL-hSLzy0U_vMa?usp=sharing) )

## **Q6) Develop Department events registration app with an object containing event name, date/time, venue as parent relationship, another object containing student name, branch, event name, date/time, venue as child relationship.**

Launch your Salesforce Trailhead Playground by opening any module and Switch to Lightning Experience if you are currently in Salesforce Classic by clicking your picture in the right top corner and then click on -Switch to Lightning Experience||.

Then go to Setup gear icon and click -Setup||.



1. Click on -Object Manager|| and click -Create > Custom Object|| to create new Custom Object.
2. Name the object -Event||.
3. Allow Reports and Allow Search.
4. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object||.
5. To create a Tab for the Object:
6. Select any Tab Style for the object -Event||. Click Next, Next, leave the defaults and save.

### **To add fields to the Object:**

Go to -Fields & Relationships|| option of Student object and Click -New||.

Add the following fields one after the other:

- Field Label: Event Time, Data Type: Date/Time, make it as Required Field.
- Field Label: Event Venue, Data Type: Text Area, make it as Required Field.

**Fields & Relationships**

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Created By	CreatedBy	Lookup(User)		
Event Name	Name	Text(80)		✓
Event Time	Event_Time__c	Date/Time		
Event Venue	Event_Venue__c	Text Area(255)		
Last Modified By	LastModifiedBy	Lookup(User)		
Owner	OwnerId	Lookup(User,Group)		✓

To add a rule to the Event Date/Time so that it is greater than today's date and the present time:

1. Go to Validation Rule of Event Object and click -New!.
2. Name it as -Date and Time in Range!.
3. Error Condition Formula: Event\_Time\_c < NOW ()
4. Error Message: Date or time less than the current one.
5. Error Location: Field – Event Time.
6. Click Save.

**Event Validation Rule**

Validation Rule Detail	Active
Rule Name: Date_and_Time_in_Range	✓
Error Condition Formula: Event_Time__c < NOW ()	
Error Message: Date or time less than the current one.	Error Location: Event Time
Description: Mahendar Patel, 30/12/2023, 10:42 pm	Created By: Mahendar Patel, 30/12/2023, 10:42 pm
	Modified By: Mahendar Patel, 30/12/2023, 10:42 pm

Create one more object to store student details:

1. Name the Object -Student1|.
2. Allow Reports and Allow Search.
3. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object|.
4. Create a Tab for the Object.

To add fields to the Object:

Go to -Fields & Relationships| option of Student object and Click -New|.

Add the following fields one after the other:

- Field Label: Event Name, Data Type: Text.
- Field Label: Event Time, Data Type: Master-Detail Relationship, Related to: Event. Sharing Setting: Read-Only. Leave the defaults and save.
- Field Label: Event Venue, Data Type: Look up Relationship, Related to: Event.
- Field Label: Branch, Data Type

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Branch	Branch_c	Text(20)		
Created By	CreatedBy	Lookup(User)		
Event Name	Event_Name_c	Text(20)		
Event Time	Event_Time_c	Master-Detail(Event)	✓	▼
Event Venue	Event_Venue_c	Lookup(Event)	✓	▼
Last Modified By	LastModifiedBy	Lookup(User)		
Student1 Name	Name	Text(80)	✓	▼

Text, Make it as a Required Field.

To create an application:

- Go to -Setup| and type -App Manager| in Quick Find Box.
- Click on -New Lightning App| to create a Lightning Application.
- Name it as -Events' Registrations|, give the description for your application.
- Uploading Image and changing colors are optional, then click Next.
- Navigation Style: Standard Navigation, click Next.
- No need to add any Utility Bar, click Next.
- Add the following Items: Events, Students, Reports and Dashboards, click Next.
- Assign it to System Administrator Profile by selecting System Administrator and pressing right arrow and then click Save & Finish.

Go to App Manager, select your application and select Events and click -New| to add some details to your application.

The screenshot shows the Salesforce Lightning interface. The top navigation bar includes links for Shopping Cart, Carts, Reports, Dashboards, Faculties, Flights, Statuses, Events (which is the active tab), Attendees, Donors, Records, Student2s, Artists, and More. A search bar is at the top right. Below the navigation is a header bar with a green icon labeled 'Event Ethnic Day', and buttons for 'New Contact', 'Edit', and 'New Opportunity'. The main content area displays the 'Details' tab for the event 'Ethnic Day'. It shows fields for Event Name (Ethnic Day), Owner (Mahendar Patel), Event Time (27/03/2024, 12:00 pm), Event Venue (Open Auditorium), Created By (Mahendar Patel), and Last Modified By (Mahendar Patel). There are edit icons next to each field.

Make sure you will get an error message when you try to give the Event Time less than the current time and today's date and also you can't select events which are not there in the list.

This screenshot shows the same Salesforce interface but with an error message. The 'Edit Ethnic Day' dialog is open. The 'Event Time' field is highlighted in red, indicating it is required. A tooltip message says 'Date or time less than the current one.' The 'Event Name' field contains 'Ethnic Day', 'Owner' is 'Mahendar Patel', and 'Event Venue' is 'Open Auditorium'. The 'Created By' and 'Modified By' fields show 'Mahendar Patel, 30/12/2023, 11:27 pm'. A modal window titled 'We hit a snag.' lists the error: 'Review the following fields • Event Time'. It has 'Cancel', 'Save & New', and 'Save' buttons.

## Reports and Dashboards:

To Create an Event Report:

1. Go to -Reports tab|| Click on -New Folder|| And give it any name and Click Save.
2. Click on -New Report|| and from search bar Search for -"Events" and then select it then Click Continue.
3. Add the required Columns to get the Complete Entered data.
4. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.
5. Click on save and name the report as —New Events Report|| and then select the folder which you have created.
6. Click Save and then Click Run

Event: Event Name	Event Time	Event Venue
Ethnic Day (1)	27/03/2024, 12:00 pm	Open Auditorium
<b>Subtotal</b>		
Intellectual Property Rights (1)	30/04/2024, 12:00 pm	Online
<b>Subtotal</b>		
Interrupt (1)	20/02/2024, 12:00 pm	JPN Auditorium
<b>Subtotal</b>		
Kalarava (1)	24/01/2024, 12:00 pm	Dr AIT
<b>Subtotal</b>		
Matri (1)	31/12/2023, 12:00 pm	Dr AIT Open Auditorium
<b>Subtotal</b>		
Nishi's Marriage (1)	06/11/2025, 12:00 pm	Dr AIT, Bangalore
<b>Subtotal</b>		
<b>Total (6)</b>		

Row Counts  Detail Rows  Subtotals  Grand Total

To Create a Students Report:

1. Go to -Reports tab|| Click on -New Folder|| And give it any name and Click Save.
2. Click on -New Report|| and from search bar Search for -Students with Events|| and then select it then Click Continue.
3. Add the required Columns to get the Complete Entered data.
4. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.
5. Click on save and name the report as —New Events with Students Report|| and then select the folder which you have created.

Event: Event Name	Attendee: Attendee Name
Ethnic Day (2)	Mahee Chiku
<b>Subtotal</b>	
Intellectual Property Rights (1)	Akash
<b>Subtotal</b>	
Interrupt (1)	Nishi
<b>Subtotal</b>	
Kalarava (1)	Kat
<b>Subtotal</b>	
Maitri (1)	Ganagadhar
<b>Total (6)</b>	

Row Counts: Detail Rows: Subtotals: Grand Total:

To Create a Student1 Dashboard:

1. Go to -Dashboard tab| and then click on -New Folder| and give it any Name.
2. Click on -New Dashboard| and then name it as -Students with Events Dashboard| and select folder that you have created, Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run.

**Events Report**

Record Count: 6

Category	Count
Ethnic Day	1
Intellectual Property Rights	1
Interrupt	1
Kalarava	1
Maitri	1
Nish's Marriage	1

[View Report \(Events Report\)](#)

**New Events with Attendies Report**

Value: 6

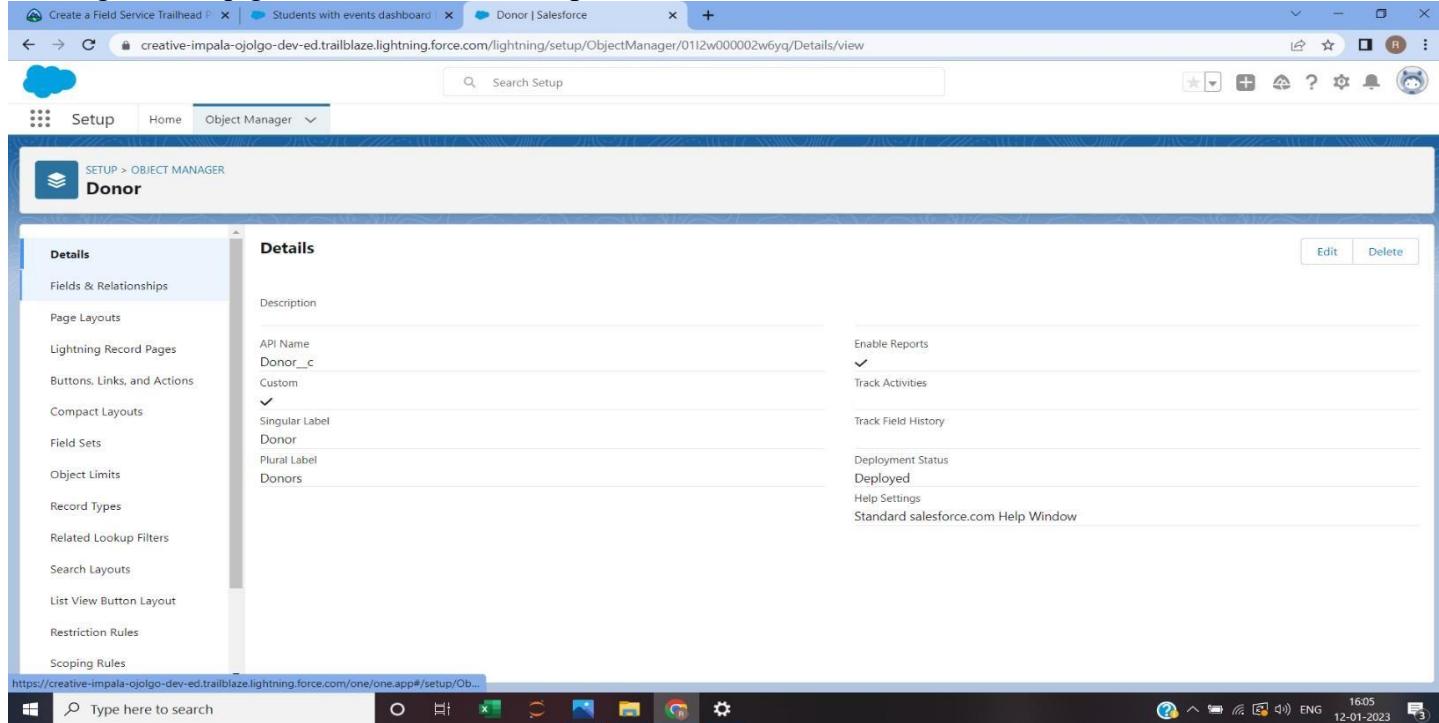
Scale: 0 to 100

[View Report \(New Events with Attendies Report\)](#)

**Q7) Develop Blood Donation registration app with an object which records donors name, age and blood group as parent relationship and another object containing haemoglobin level, donated or not details.**

Launch your Salesforce Trailhead Playground by opening any module and Switch to Lightning Experience if you are currently in Salesforce Classic by clicking your picture in the right top corner and then click on -Switch to Lightning Experience||

Then go to Setup gear icon and click -Setup||.



1. Click on -Object Manager|| and click -Create > Custom Object|| to create new Custom Object.
2. Name the object -Donor||
3. Allow Reports and Allow Search.
4. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object||.
5. To create a Tab for the Object: Select any Tab Style for the object -Donor||. Click Next, Next, leave the defaults and save.

To add fields to the Object:

Go to -Fields & Relationships|| option of Student object and Click -New||.

Add the following fields one after the other:

- Field Label: Age, Data Type: Number (3,0).
- Field Label: Blood Group, Data Type: Picklist, click radio button in front of Enter values, with each value separated by a new line. Values are: A+ve, B+ve, A-ve, B-ve, O+ve, O-ve, AB+ve, AB-ve. Make it as Required Field and Restrict the values to the values in the Picklist.
- Field Label: Gender, Data Type: Picklist, click radio button in front of Enter values, with each value separated by a new line. Values are: Male, Female, Others.
- Field Label: Weight, Data Type: Number (3,2).

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Age	Age_c	Number(3, 0)		
Blood Group	Blood_Group_c	Picklist		
Created By	CreatedById	Lookup(User)		
Donor Name	Name	Text(80)		✓
Gender	Gender_c	Picklist		
Last Modified By	LastModifiedById	Lookup(User)		
Owner	OwnerId	Lookup(User/Group)		✓
Weight	Weight_c	Number(3, 2)		

### Create one more object to store Collection details:

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Age	Age_c	Master-Detail(Donor)		✓
Blood Group	Blood_Group_c	Lookup(Donor)		✓
Created By	CreatedById	Lookup(User)		
Donor Name	Donor_Name_c	Lookup(Donor)		✓
Haemoglobin Level	Haemoglobin_Level_c	Number(2, 2)		
Last Modified By	LastModifiedById	Lookup(User)		
Re Name	Re_Name_c	Text(80)		
Record Name	Name	Text(80)		✓
Status	Status_c	Picklist		

1. Name the Object - "Record".
2. Allow Reports and Allow Search.
3. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object||
4. Create a Tab for the Object.

To add fields to the Object:

Go to -Fields & Relationships|| option of Student object and Click -New||.

Add the following fields one after the other:

- Field Label: Haemoglobin level, Data Type: Number (2,2).
- Field Label: Donor Name, Data Type: Look up Relationship, Related to: Donor.
- Field Label: Blood Group, Data Type: Look up Relationship, Related to: Donor.
- Field Label: Age, Data Type: Master-Detail Relationship, Related to: Donor. Sharing Setting: Read-Only. Leave the defaults and save.
- Field Label: Status, Data Type: Picklist, Values: Donated, Not Donated, Make it as a Required Field.

## Validation Rules:

### Age Validation:

1. To add a rule to the Donor age so that it is greater than 18 years:
2. Go to Validation Rule of Donor Object and click -New||
3. Name it as -Age Validation||.
4. Error Condition Formula: age\_c < 18.
5. Error Message: Age must be greater than 18.
6. Error Location: Field – Age.
7. Click Save

The screenshot shows the Salesforce Object Manager interface for the 'Donor' object. On the left, a sidebar lists various configuration options: Details, Fields & Relationships, Page Layouts, Lightning Record Pages, Buttons, Links, and Actions, Compact Layouts, Field Sets, Object Limits, Record Types, Related Lookup Filters, Search Layouts, List View Button Layout, Restriction Rules, and Scoping Rules. The main content area is titled 'Donor Validation Rule' and displays the following details:

Validation Rule Detail	
Rule Name	Age_Validation
Error Condition Formula	OR (Age__c < 18, Age__c > 75)
Error Message	Age must be greater than 18.
Description	
Created By	Mahendar Patel, 31/12/2023, 12:19 am
Modified By	Mahendar Patel, 31/12/2023, 12:31 am
Active	<input checked="" type="checkbox"/>
Error Location	Age

### Weight Validation:

To add a rule to the Donor Weight so that it Should be greater than 50:

1. Go to Validation Rule of Donor Object and click -New||
2. Name it as -Weight Validation||.
3. Error Condition Formula: weight\_c < 50.
4. Error Message: Eat more and gain your weight to 50 kgs.
5. Error Location: Field –weight.
6. Click Save

The screenshot shows the Salesforce Setup interface for the 'Donor' object. On the left, a sidebar lists various setup categories like Details, Fields & Relationships, Page Layouts, etc. The main content area is titled 'Donor Validation Rule' and displays the 'Validation Rule Detail' for 'Weight\_Validation'. The rule details are as follows:

- Rule Name:** Weight\_Validation
- Error Condition Formula:** Weight\_\_c < 50
- Error Message:** Eat more and gain your weight to 50 kgs.
- Description:** Created By Mahendar Patel, 31/12/2023, 12:20 am
- Active:** checked
- Error Location:** Weight
- Modified By:** Mahendar Patel, 31/12/2023, 12:20 am

Buttons for 'Edit' and 'Clone' are available at the top right of the detail view.

## To create an application:

1. Go to -Setup| and type -App Manager| in Quick Find Box.
2. Click on -New Lightning App| to create a Lightning Application.
3. Name it as -Blood Donation|, give the description for your application.
4. Uploading Image and changing colors are optional, then click Next.
5. Navigation Style: Standard Navigation, click Next.
6. No need to add any Utility Bar, click Next.
7. Add the following Items: Donors, Records, Reports and Dashboards, click Next.
8. Assign it to System Administrator Profile by selecting System Administrator and pressing right arrow and then click Save & Finish.

The screenshot shows the 'New Lightning App' configuration screen. The 'App Details & Branding' section includes:

- App Name:** Blood Donation
- Developer Name:** Blood\_Donation
- Description:** life saver
- Image:** A red blood drop icon.
- Primary Color Hex Value:** #0070D2

A note above the app name field says: "This name appears in the navigation bar so your users can see the name of the app they're currently using." The 'Next' button is visible at the bottom right of the form.

Donor Nishanth

Related Details

Owner: Mahendar Patel

Donor Name: Nishanth

Age: 20

Blood Group: O+ve

Gender: Male

Weight: 65.00

Created By: Mahendar Patel, 31/12/2023, 12:34 am

Last Modified By: Mahendar Patel, 31/12/2023, 12:37 am

Go to App Manager, select your application and select Donors and click -New| to add some details to your application.

Make sure you can't donate when your age is less than 18 years and when your weight is not 50 kgs.

Edit Nishanth

\* = Required Information

\* Donor Name: Nishanth

\* Age: 6

Age must be greater than 18.

\* Blood Group: O+ve

\* Gender: Male

Weight: 45.00

We hit a snag.

Review the following fields

- Age
- Weight

Cancel Save & New Save

## Reports and Dashboards:

To Create a Donor Report:

1. Click on -New Report|| and from search bar Search for -“Donors” and then select it and then click on Continue.
2. Add the required Columns to get the Complete Entered data.
3. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.
4. Click on save and name the report as -New Donor Report|| and then select the folder which you have created.
5. Click Save and then Click Run.

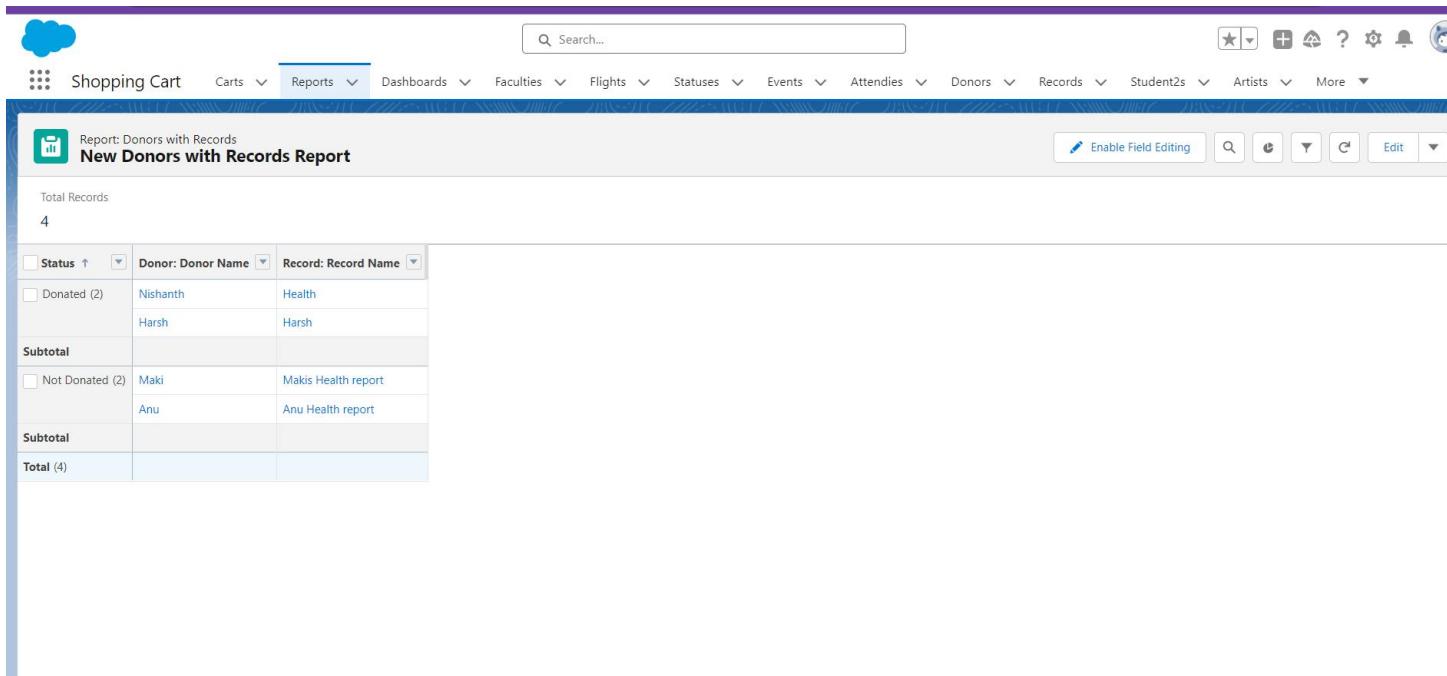
The screenshot shows the Salesforce Lightning interface for creating a report. The top navigation bar includes links for Shopping Cart, Carts, Reports, Dashboards, Faculties, Flights, Statuses, Events, Attendees, Donors, Records, Student2s, Artists, and More. The main area is titled "REPORT" and shows "New Donors Report". On the left, the "Fields" sidebar lists "Groups" (Blood Group), "Columns" (Donor: Donor Name, # Weight, Gender), and "Outline" and "Filters" sections. The main preview area displays a table with the following data:

Blood Group	Donor: Donor Name	Weight	Gender
A+ve (1)	Anu	70.00	Male
<b>Subtotal</b>		70.00	
B+ve (1)	Mahi	75.00	Male
<b>Subtotal</b>		75.00	
A-ve (1)	Rekha	59.00	Female
<b>Subtotal</b>		59.00	
O+ve (2)	Harsh	51.00	Male
	Nishanth	65.00	Male
<b>Subtotal</b>		116.00	
AB+ve (1)	Maki	55.00	Female
<b>Subtotal</b>		55.00	
<b>Total (6)</b>		375.00	

At the bottom, there are checkboxes for Row Counts, Detail Rows, Subtotals, and Grand Total, all of which are checked. There is also a "Conditional Formatting" button.

To Create a Records Report:

1. Go to -Reports tab|| Click on -New Folder|| And give it any name then click on Save.
2. Click on -New Report|| and from search bar Search for -“Donors with records” and then select it and then click on Continue.
3. Add the required Columns to get the Complete Entered data.
4. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.
5. Click on save and name the report as —New Donors with record Report|| and then select the folder which you have created.
6. Click Save and then Click Run.



The screenshot shows a web-based reporting application with a header navigation bar. The header includes a cloud icon, a search bar, and various menu items such as Shopping Cart, Carts, Reports, Dashboards, Faculties, Flights, Statuses, Events, Attendees, Donors, Records, Student2s, Artists, More, and a user profile icon.

The main content area displays a report titled "Report: Donors with Records" and "New Donors with Records Report". It shows a table with the following data:

Status	Donor Name	Record Name
Donated (2)	Nishanth Harsh	Health Harsh
<b>Subtotal</b>		
Not Donated (2)	Maki Anu	Makis Health report Anu Health report
<b>Subtotal</b>		
<b>Total (4)</b>		

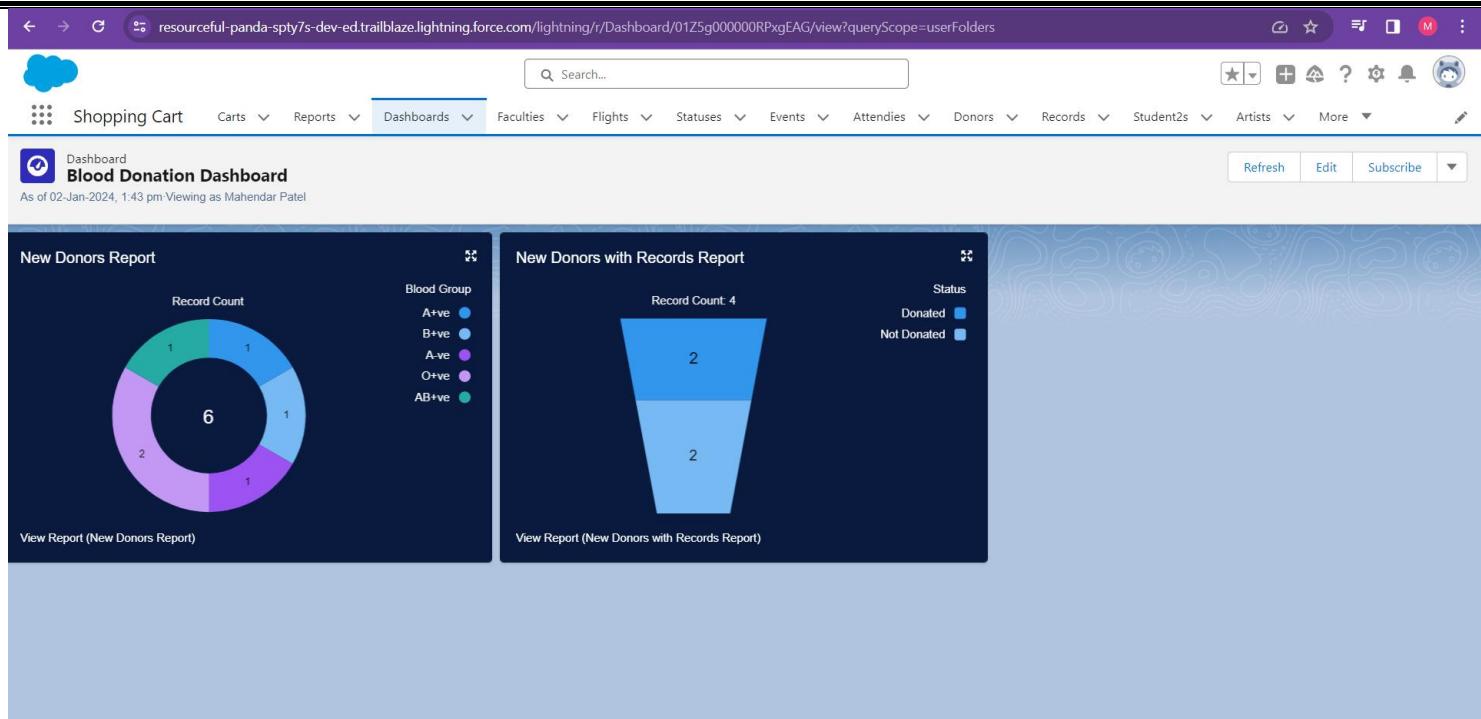
At the top right of the report area, there are buttons for "Enable Field Editing", "Search", "Print", "Copy", and "Edit".

### To Create a Donor Dashboard:

1. Go to -Dashboard tab| and then click on -New Folder| and give it any Name.
2. Click on -New Dashboard| and then name it as -Donors Dashboard| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run

### To Create a Records Dashboard:

1. Go to -Dashboard tab| and then click on -New Folder| and give it any Name.
2. Click on -New Dashboard| and then name it as -Donors with record Dashboard| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run.



## Q8) Develop Attendance maintenance app with an object to record student details and attendance and a provide a link to college websites' results webpage.

Launch your Salesforce Trailhead Playground by opening any module and Switch to Lightning Experience if you are currently in Salesforce Classic by clicking your picture in the right top corner and then click on -Switch to Lightning Experience||

Then go to Setup gear icon and click -Setup||.

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Created By	CreatedById	Lookup(User)		
Last Modified By	LastModifiedById	Lookup(User)		
Owner	OwnerId	Lookup(User,Group)		✓
Semester	Semester__c	Number(2, 0)		
Student Name	Name	Text(80)		✓
Technical Branches	Technical_Branches__c	Picklist		
Total Attendance %	Total_Attendance__c	Percent(3, 2)		
USN	USN__c	Text(10) (Unique Case Insensitive)		✓

1. Click on -Object Manager|| and click -Create > Custom Object|| to create new Custom Object.
2. Name the object -Student2||.
3. Allow Reports and Allow Search.
4. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object||.
5. To create a Tab for the Object: Select any Tab Style for the object -Student2||. Click Next, Next, leave the defaults and save.

To add fields to the Object:

Go to -Fields & Relationships|| option of Student object and Click -New||.

Add the following fields one after the other:

- Field Label: USN (Length 10), Data Type: Text, provide an example USN as Help Text, make it as Required Field and Don't allow Duplicate Values and make it as Case Insensitive
- Field Label: Technical Branches, Data Type: Picklist, click radio button in front of Enter values, with each value separated by a new line. Values are: CSE, ISE, TCE, EEE, EC etc. Make it as Required Field and Restrict the values to the values in the picklist.
- Field Label: Total Attendance %, Data Type: Percent (3,2).
- Field Label: Semester, Data Type: Number (2,0).

## To include Custom Links:

1. Go to -Buttons, Links and Actions of -Student Object and click -New Button or Link.
2. Name it as -Check Details.
3. Select the radio button -Detail Page Link as it is a website link.
4. Behaviour: Display in new window.
5. Content Source: URL.
6. Field Type: Student.
7. In the empty space provided, type <http://www.drait.edu.in/> It is a link which redirects to the income tax calculation website.
8. Link Encoding: Unicode (UTF-8).
9. Click Save
10. Go to Page Layout, Click Student2 Layout.
11. Click Custom Links, Drag and drop the -Check Details link in the Custom Link area.
12. Click save.

## To create an application:

1. Go to -Setup and type -App Manager in Quick Find Box.
2. Click on -New Lightning App to create a Lightning Application.
3. Name it as -Attendance Management, give the description for your application.
4. Uploading Image and changing colors are optional, then click Next.
5. Navigation Style: Standard Navigation, click Next.
6. No need to add any Utility Bar, click Next.
7. Add the following Items: Student2, Records, Reports and Dashboards, click Next.
8. Assign it to System Administrator Profile by selecting System Administrator and pressing right arrow and then click Save & Finish.

Go to App Manager, select your application and select Student and click -New to add some details to your application.

Make Sure you are redirected to the college website when you click on the Check Details Link.

Student Attendance  
Mehul

Related Details

Student Name: Mehul

Owner: Mahendar Patel

USN: 1DA20CS078

Technical Branches: ISE

Total Attendance %: 95.00%

Semester: 7th Sem

Created By: Mahendar Patel, 31/12/2023, 1:55 am

Last Modified By: Mahendar Patel, 31/12/2023, 1:55 am

[Check Details](#)

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## Reports and Dashboards:

To Create a Student Report:

1. Go to -Reports tab|| Click on -New Folder|| And give it any name then click Save
2. Click on -New Report|| and from search bar Search for -Attendance Management|| and then select it then click Continue.
3. Add the required Columns to get the Complete Entered data.
4. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.
5. Click on save and name the report as —New Students Report|| and then select the folder which you have created.
6. Click Save and then Click Run.

Technical Branches	Student Attendance: Student Name	USN
CSE (2)	Mahee Nishanth	1DA20CS070 1DA20CS083
Subtotal		
ISE (1)	Mehul	1DA20CS078
Subtotal		
EEE (1)	Raza	1DA20CS077
Subtotal		
ECE (1)	Sahil	1DA20CS105
Subtotal		
Total (5)		

To Create a Student Dashboard:

1. Go to -Dashboard tab|| and then click on -New Folder|| and give it any Name.
2. Click on -New Dashboard|| and then name it as -Attendance Management|| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run

← → ⌂ resourceful-panda-spty7s-dev-ed.trailblaze.lightning.force.com/lightning/r/Dashboard/01Z5g000000RPyZEAW/view?queryScope=userFolders

Cloud Computing Lab

Shopping Cart Carts Reports Dashboards Faculties Flights Statuses Events Attendees Donors Records Student2s Artists More

Dashboard Student Attendance As of 02-Jan-2024, 2:02 pm Viewing as Mahendar Patel

New Student2s Report

View Report (New Student2s Report)

## **Q9) Create a web application with objects to maintain database of an art gallery which contains objects like artists, arts, inventory and provide a link to any of the art gallery website.**

Launch your Salesforce Trailhead Playground by opening any module and Switch to Lightning Experience if you are currently in Salesforce Classic by clicking your picture in the right top corner and then click on -Switch to Lightning Experience|.

Then go to Setup gear icon and click -Setup|.

1. Click on -Object Manager| and click -Create > Custom Object| to create new Custom Object.
2. Name the object -Artist|.
3. Allow Reports and Allow Search.
4. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object|.
5. To create a Tab for the Object: Select any Tab Style for the object -Artist|. Click Next, Next, leave the defaults and save.

To add fields to the Object:

Go to -Fields & Relationships| option of Student object and Click -New|.

Add the following fields one after the other:

- Field Label: ID (Length 10), Data Type: Text, provide an example ID as Help Text, make it as required Field, don't allow Duplicate Values, make it as Case Insensitive and Set this field as the unique record identifier from an external system.
- Field Label: Art Name and Details, Data Type: Text, Make it as a required field.
- Field Label: Style, Data Type: Picklist. Values: Pencil Sketching, craft design, free hand, Human portrait, drawing, painting etc. Make it as Required Field and restrict values to the values in the picklist.

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Art Name and Details	Art_Name_and_Details_c	Text(20)		
Artist Name	Name	Text(80)		
Created By	CreatedById	Lookup(User)		
ID	ID_c	Text(10) (Unique Case Insensitive)		
Last Modified By	LastModifiedById	Lookup(User)		
Owner	OwnerId	Lookup(User,Group)		
Style	Style_c	Picklist		

Create one more object to store Collection details:

1. Name the Object -Art||.
2. Allow Reports and Allow Search
3. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object||.
4. Create a Tab for the Object.

To add fields to the Object:

Go to -Fields & Relationships|| option of Student object and Click -New||.

Add the following fields one after the other:

- Field Label: Art Name and Details, Data Type: Master-Detail Relationship, Related to: Artist. Sharing Setting: Read-Only. Leave the defaults and save.
- Field Label: ID (Length 10), Data Type: Text, provide an example ID as Help Text, make it as required Field, don't allow Duplicate Values, make it as Case Insensitive and Set this field as the unique record identifier from an external system.

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Art Name	Name	Text(80)		
Art Name and Details	Art_Name_and_Details__c	Master-Detail(Artist)		
Created By	CreatedById	Lookup(User)		
ID	ID__c	Text(10) (External ID) (Unique Case Insensitive)		✓
Last Modified By	LastModifiedById	Lookup(User)		

Create one more object to store inventory details:

1. Name the Object -Inventory||.
2. Allow Reports and Allow Search.
3. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object||.
4. Create a Tab for the Object.

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Created By	CreatedById	Lookup(User)		
Inventory Name	Name	Text(80)		<input checked="" type="checkbox"/>
Last Modified By	LastModifiedById	Lookup(User)		
Owner	OwnerId	Lookup(User,Group)		<input checked="" type="checkbox"/>
Price	Price__c	Currency(16, 0)		
Quantity	Quantity__c	Number(16, 0)		

To add fields to the Object:

Go to -Fields & Relationships|| option of Student object and Click -New||.

Add the following fields one after the other:

- Field Label: Quantity, Data Type: Number. Make it as a required field.

**To give a link to any art gallery website:**

1. Go to -Buttons, Links and Actions|| of Art Object and click -New Button or Link||.
2. Name it as -Gallery||.
3. Select the radio button -Detail Page Link|| as it is a website link.
4. Behaviour: Display in new window.
5. Content Source: URL 27. Field Type: Gallery.
6. In the empty space provided, type, <http://www.aakritiartgallery.com/> Link
7. Encoding: Unicode (UTF-8).
8. Click Save.
9. Go to Page Layout, Click Art Layout.
10. Click Custom Links, Drag and drop the -Gallery|| link in the Custom Link area.
11. Click save.

The screenshot shows the Salesforce Setup interface for creating a custom button or link. The left sidebar lists various setup categories, and the main area is titled "Art Custom Button or Link Gallery". The "Custom Button or Link Detail" section contains the following information:

Label	Gallery	Object Name	Art
Name	Gallery	Link Encoding	Unicode (UTF-8)
Behavior	Display in new window	Display Type	Detail Page Link
Button or Link URL	<a href="https://www.nga.gov/">https://www.nga.gov/</a>	Show Address Bar	<input type="checkbox"/>
Height (in pixels)	600	Show Scrollbars	<input checked="" type="checkbox"/>
Width (in pixels)		Show Toolbars	<input type="checkbox"/>
Window Position	No Preference	Show Menu Bar	<input type="checkbox"/>
Resizable	<input checked="" type="checkbox"/>	Show Status Bar	<input type="checkbox"/>
Description			
Created By: Mahendar Patel, 31/12/2023, 12:24 pm		Modified By: Mahendar Patel, 31/12/2023, 12:24 pm	

Buttons at the bottom include Edit, Window Open Properties, Delete, and Where is this used?

To add a rule to the Artist id so that it should take valid id:

1. Go to Validation Rule of Artist Object and click -New!.
2. Name it as —Artist id validation!.
3. Error Condition Formula: NOT(BEGINS(ID\_c,'ART')).
4. Error Message: Please Enter a Valid id of an artist.
5. Error Location: Field –id.
6. Click Save

The screenshot shows the Salesforce Setup interface for creating a validation rule for the Artist object. The left sidebar lists various setup categories, and the main area is titled "Artist Validation Rule". The "Validation Rule Detail" section contains the following information:

Rule Name	Artist_Id_validation	Active	<input checked="" type="checkbox"/>
Error Condition Formula	NOT(BEGINS(ID_c,'ART'))	Error Location	ID
Error Message	Please Enter a Valid id of an artist.	Created By	Mahendar Patel, 31/12/2023, 12:29 pm
Description		Modified By	Mahendar Patel, 31/12/2023, 12:29 pm

Buttons at the bottom include Edit and Clone.

### To create an application:

1. Go to -Setup| and type -App Manager| in Quick Find Box.
2. Click on -New Lightning App| to create a Lightning Application.
3. Name it as -Art Gallery Database|, give the description for your application.
4. Uploading Image and changing colours are optional, then click Next.
5. Navigation Style: Standard Navigation, click Next.
6. No need to add any Utility Bar, click Next.
7. Add the following Items: Artists, Arts, Inventories, Reports and Dashboards, click Next.
8. Assign it to System Administrator Profile by selecting System Administrator and pressing right arrow and then click Save & Finish.

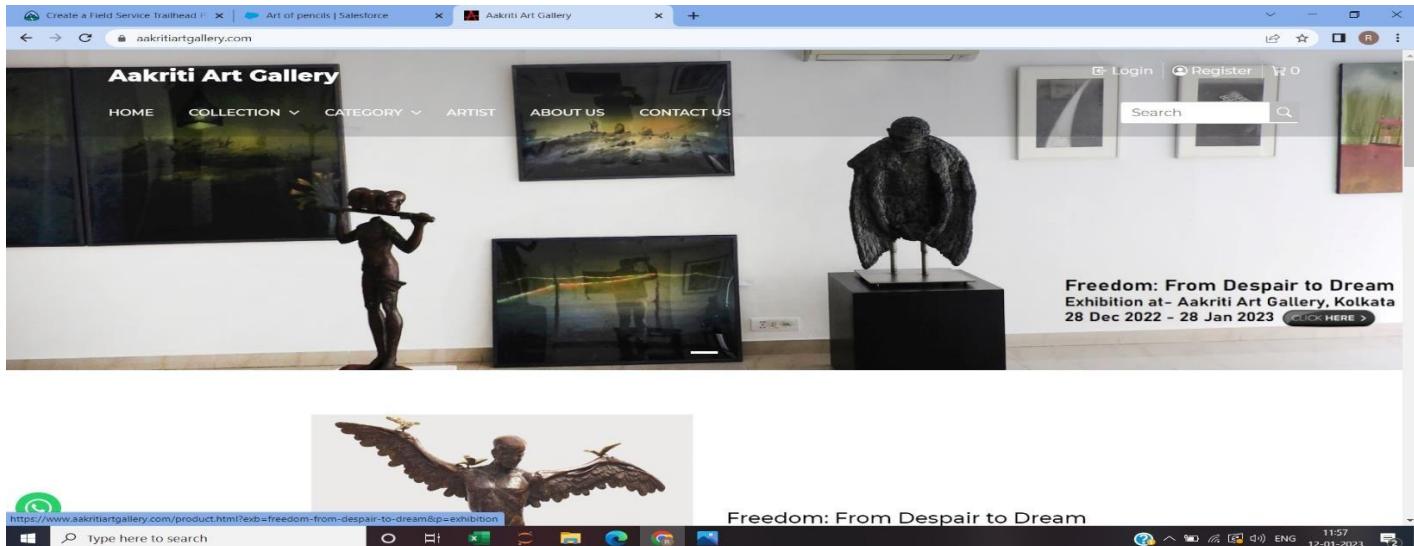
Go to App Manager, select your application and select Faculties and click -New| to add some details to your application.

The screenshot shows the Salesforce Lightning App Manager interface. At the top, there's a navigation bar with links like Shopping Cart, Carts, Reports, Dashboards, Faculties, Flights, Statuses, Events, Attendees, Donors, Records, Student2s, Artists, and More. Below the navigation bar, there's a search bar and a toolbar with icons for star, plus, question mark, gear, and bell. The main area displays a card for an 'Artist' named 'Nishi'. The card has tabs for 'Related' and 'Details'. Under 'Details', there are fields for 'Artist Name' (Nishi), 'ID' (ART009), 'Art Name and Details' (Surreal painting of a child dreaming), 'Style' (Human portrait), 'Created By' (Mahendar Patel, 31/12/2023, 12:37 pm), and 'Last Modified By' (Mahendar Patel, 31/12/2023, 12:37 pm). The card also shows an 'Owner' section with a profile picture of Mahendar Patel.

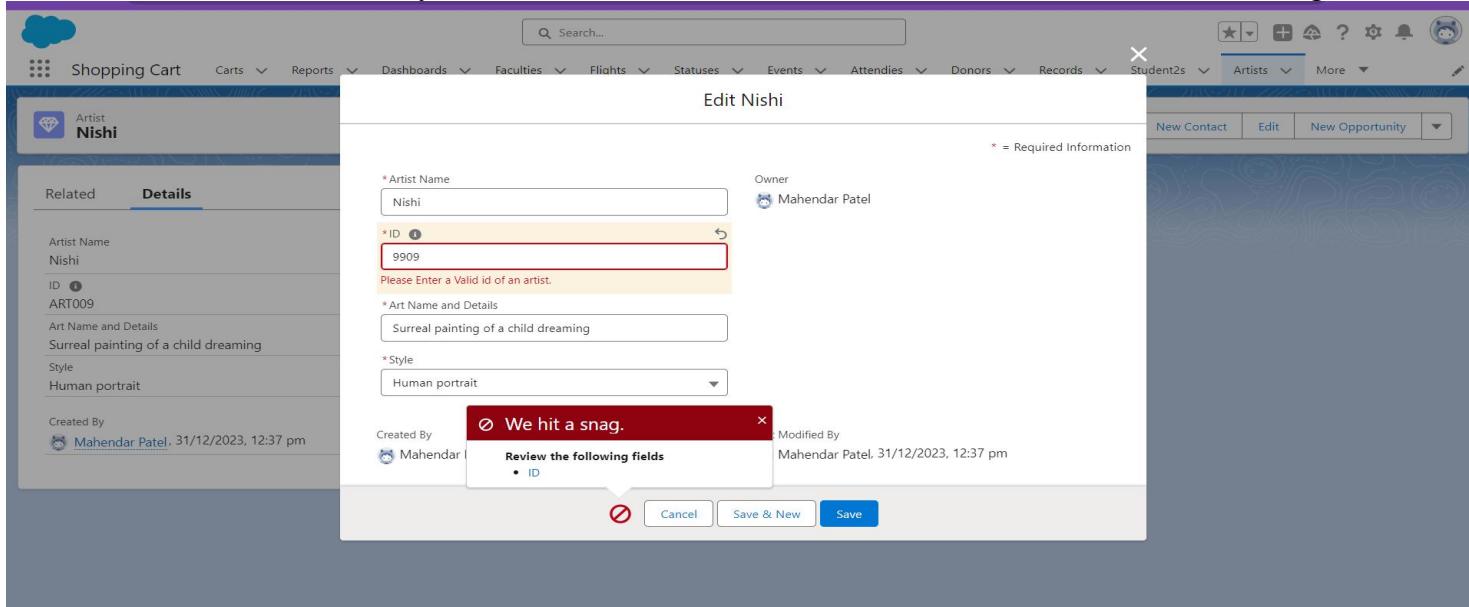
This screenshot shows the same Salesforce Lightning App Manager interface as the previous one, but with a different application card. The card is for an 'Art' named 'Enchanted Forest'. It has the same structure with tabs for 'Related' and 'Details'. The 'Details' tab shows fields for 'Art Name' (Enchanted Forest), 'Artist' (Raja), 'ID' (ART077), 'Created By' (Mahendar Patel, 31/12/2023, 1:16 pm), and 'Last Modified By' (Mahendar Patel, 31/12/2023, 1:16 pm). There is also a 'Gallery' section at the bottom of the card.

Click the entry you added, go to details.

Press the -Gallery|| link to check the details.



Click OK so that it will redirect you to the website. Make sure it should an error when an invalid id is given.



## Reports and Dashboards:

To Create an Artists Report:

1. Go to -Reports tab|| Click on -New Folder|| And give it any name and Click Save.
2. Click on -New Report|| and from search bar Search for - “Artists” and then select it and then Click Continue.
3. Add the required Columns to get the Complete Entered data.
4. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.
5. Click on save and name the report as -New Artists Report|| and then select the folder which you have created.
6. Click Save and then Click Run

The screenshot shows a Salesforce Lightning interface with a report titled "Report: Artists New Artists Report". The report displays 5 total records. The columns are "Style" and "Artist: Artist Name". The data is grouped by style, with subtotals for each. The entries are:

Style	Artist: Artist Name
craft design (1)	Raja
<b>Subtotal</b>	
free hand (1)	Mehul
<b>Subtotal</b>	
Human portrait (1)	Nishi
<b>Subtotal</b>	
painting (2)	Mahee Chandru
<b>Subtotal</b>	
<b>Total (5)</b>	

### To Create an Arts Report:

1. Go to – Reports tab|| Click on –New Folder|| And give it any name.
1. Click on –New Report|| and from search bar Search for –Artists with Arts|| and then select it.
2. Add the required Columns to get the Complete Entered data.
3. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.
4. Click on save and name the report as –New Artists with Arts Report|| and then select the folder which you have created.
5. Click Save and then Click Run

The screenshot shows a Salesforce Lightning interface with a report titled "Report: Artists with Arts New Artists with Arts Report". The report displays 5 total records. The columns are "Artist: Artist Name", "Art: Art Name", and "ID". The data is grouped by artist, with subtotals for each. The entries are:

Artist: Artist Name	Art: Art Name	ID
Raja	Enchanted Forest	ART077
<b>Subtotal</b>		
Mehul	Reflections in the Rain	ART078
<b>Subtotal</b>		
Nishi	Stellar Dreams	ART009
<b>Subtotal</b>		
Mahee	Dystopian Industrial Cityscape	ART007
Chandru	Ballet in the Moonlight	ART001
<b>Subtotal</b>		
<b>Total (5)</b>		

### To Create an Inventory Report:

1. Go to –Reports tab|| Click on –New Folder|| And give it any name.
2. Click on –New Report|| and from search bar Search for –Inventories|| and then select it.
3. Add the required Columns to get the Complete Entered data.
4. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.

5. Click on save and name the report as -New Inventories Report| and then select the folder which you have created.
6. Click Save and then Click Run.

The screenshot shows a Salesforce Lightning interface. At the top, there's a navigation bar with links like Shopping Cart, Reports, Dashboards, Faculties, Flights, Statuses, Events, Attendees, Donors, Records, Student2s, Artists, and More. A search bar is also present. Below the navigation, a title bar says "Report: Inventories New Inventories Report". The main content area contains a table with the following data:

	Inventory: Owner Name	Inventory: Inventory Name	Quantity
Mahendar Patel (4)	Inventory 3	5	
	Inventory 4	2	
	Inventory 2	1	
	Inventory 1	3	
<b>Subtotal</b>		11	
<b>Total (4)</b>		11	

At the bottom of the report area, there are several checkboxes labeled "Row Counts", "Detail Rows", "Subtotals", and "Grand Total", all of which are checked.

#### To Create an Artists Dashboard:

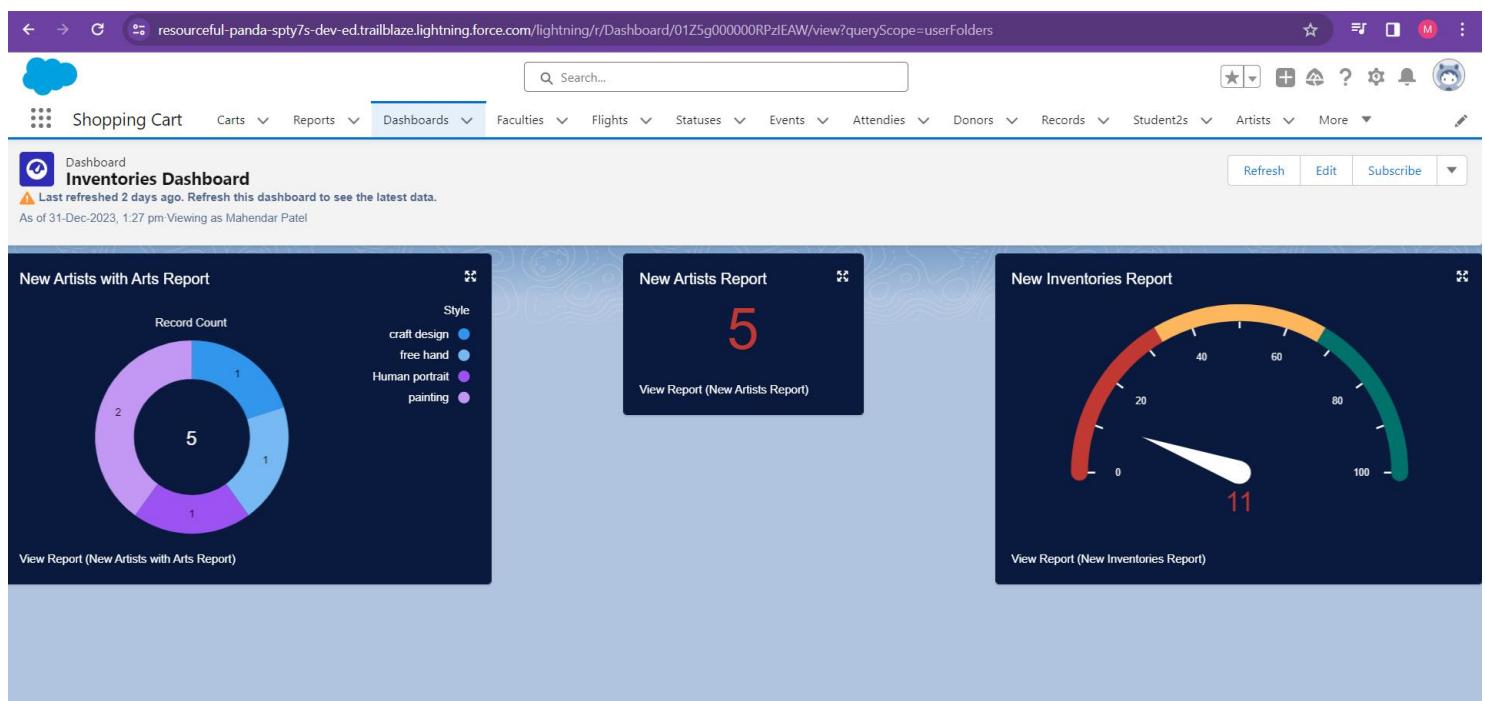
1. Go to -Dashboard tab|| and then click on -New Folder|| and give it any Name.
2. Click on -New Dashboard|| and then name it as -Art Gallery Dashboard|| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run

#### To Create an Arts Dashboard:

1. Go to -Dashboard tab|| and then click on -New Folder|| and give it any Name.
2. Click on -New Dashboard|| and then name it as -Artists with art Dashboard|| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run.

#### To Create an Inventory Dashboard:

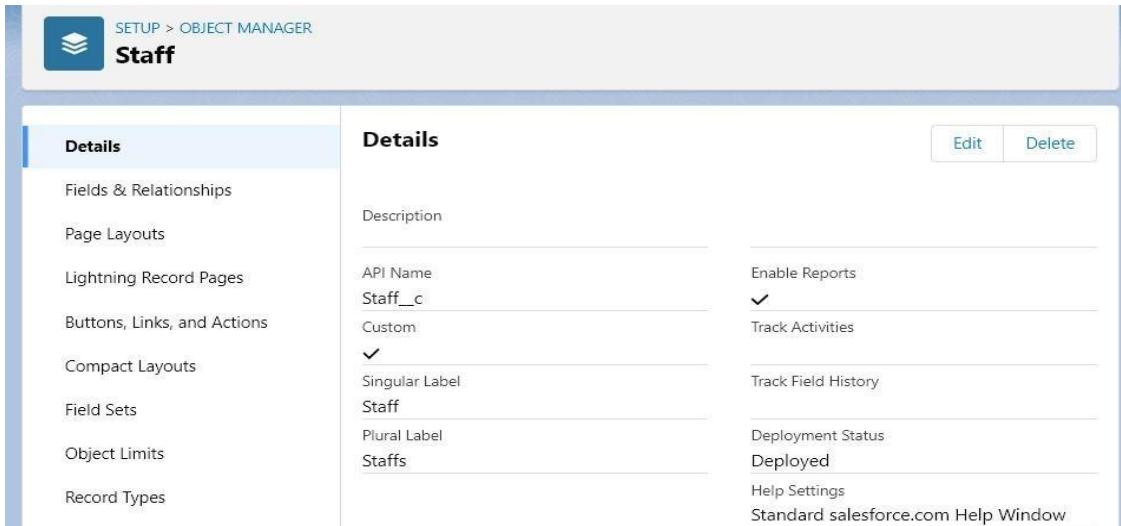
1. Go to -Dashboard tab|| and then click on -New Folder|| and give it any Name.
2. Click on -New Dashboard|| and then name it as -Inventory Dashboard|| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run



## **Q10) Create a web application with objects to record details about staff, syllabus and activities of a department and provide a link to college website from any of the objects.**

Launch your Salesforce Trailhead Playground by opening any module and Switch to Lightning Experience if you are currently in Salesforce Classic by clicking your picture in the right top corner and then click on -Switch to Lightning Experience||

Then go to Setup gear icon and click -Setup||.



1. Click on -Object Manager|| and click -Create > Custom Object|| to create new Custom Object.
2. Name the object -Staff||.
3. Allow Reports and Allow Search.
4. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object||.
5. To create a Tab for the Object: Select any Tab Style for the object -Staff||. Click Next, Next, leave the defaults and save.

To add fields to the Object:

Go to -Fields & Relationships|| option of Student object and Click -New||.

Add the following fields one after the other:

- Field Label: ID (Length 10), Data Type: Text, provide an example ID as Help Text, make it as Required Field, don't allow Duplicate Values, make it as Case Insensitive and Set this field as the unique record identifier from an external system.
- Field Label: Branch, Data Type: Text, Make it as a required field.

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Branch	Branch_c	Text(50)		
Created By	CreatedById	Lookup(User)		
ID	ID_c	Text(10) (External ID) (Unique Case Insensitive)		✓
Last Modified By	LastModifiedById	Lookup(User)		
Owner	OwnerId	Lookup(User,Group)		✓
Staff Name	Name	Text(80)		✓

Create one more object to store Syllabus details:

1. Name the Object -Syllabus||.
2. Allow Reports and Allow Search.
3. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object||
4. Create a Tab for the Object.

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Created By	CreatedById	Lookup(User)		
Credits	Credits_c	Number(18, 0)		
Last Modified By	LastModifiedById	Lookup(User)		
Owner	OwnerId	Lookup(User,Group)		✓
Subject code	Subject_code_c	Text(50)		
Syllabus Name	Name	Text(80)		✓

To add fields to the Object:

Go to -Fields & Relationships|| option of Student object and Click -New||.

Add the following fields one after the other:

- Field Label: Subject Code, Data Type: Text.
- Field Label: Credits, Data Type: Number.

Create one more object to store department activities' details:

1. Name the Object -Activities||.
2. Allow Reports and Allow Search.
3. Check the box in front of -Launch New Custom Tab Wizard after saving this custom object||
4. Create a Tab for the Object.

To add fields to the Object:

Go to -Fields & Relationships|| option of Student object and Click -New||.

Add the following fields one after the other:

- Field Label: Details, Data Type: Text. Make it as a required field

FIELD LABEL	FIELD NAME	DATA TYPE	CONTROLLING FIELD	INDEXED
Activities Name	Name	Text(80)		✓
Created By	CreatedById	Lookup(User)		
Details	Details__c	Text(80)		
Last Modified By	LastModifiedById	Lookup(User)		
Owner	OwnerId	Lookup(User,Group)		✓

## Validation Rules:

### Staff id Validation:

1. To add a rule to the Staff is so that it should take only valid ids:
2. Go to Validation Rule of Staff Object and click -New||
3. Name it as -Staff id validation||.
4. Error Condition Formula: NOT(BEGINS(ID\_c,'STAFF')).
5. Error Message: Please enter a valid staff Id.
6. Error Location: Field – ID.
7. Click Save.

The screenshot shows the Salesforce Object Manager interface for the 'Staff' object. On the left, a sidebar lists various setup options like Details, Fields & Relationships, Page Layouts, and Lightning Record Pages. The main content area is titled 'Staff Validation Rule' and displays the following details:

Validation Rule Detail	
Rule Name	Staff_id_validation
Error Condition Formula	NOT(BEGINS(ID__C,'STAFF'))
Error Message	Please enter a valid staff id.
Description	
Created By	Mahendar Patel, 31/12/2023, 6:13 pm
Modified By	Mahendar Patel, 31/12/2023, 6:13 pm

Buttons for 'Edit' and 'Clone' are located at the top right of the detail section. The status 'Active' is checked. The 'Error Location' is set to 'ID'. A 'Help for this Page' link is at the top right of the main content area.

### To add a rule to the Subject code so that it should not take invalid sub code:

1. Go to Validation Rule of Syllabus Object and click -New|.
2. Name it as - “Sub code validation”
3. Error Condition Formula: NOT (REGEX (Subject\_Code\_\_c, -[0-9]{2} +[a-z] [A-Z]{2} + [0-9]{2} +)).
4. Error Message: Please Enter a valid Subject code.
5. Error Location: Field – Subject Code.
6. Click Save

The screenshot shows the Salesforce Object Manager interface for the 'Syllabus' object. The sidebar on the left is identical to the previous screenshot. The main content area is titled 'Syllabus Validation Rule' and displays the following details:

Validation Rule Detail	
Rule Name	Sub_code_validation
Error Condition Formula	NOT(REGEX(Subject_Code__c, "[a-zA-Z]+[0-9]+"))
Error Message	Please Enter a valid Subject code.
Description	
Created By	Mahendar Patel, 31/12/2023, 1:49 pm
Modified By	Mahendar Patel, 31/12/2023, 1:49 pm

Buttons for 'Edit' and 'Clone' are located at the bottom right of the detail section. The status 'Active' is checked. The 'Error Location' is set to 'Subject Code'. A 'Help for this Page' link is at the top right of the main content area.

## To add a rule to the Credits so that it Should not take more than 4 credits:

1. Go to Validation Rule of Syllabus Object and click -New|.
2. Name it as -Credits validation|.
3. Error Condition Formula: OR (credits\_c >4, Credits\_c <=0).
4. Error Message: Please Enter the credits which is less than 4.
5. Error Location: Field –Credit.
6. Click Save.

The screenshot shows the Salesforce Setup interface for the Syllabus object. On the left, there is a sidebar with various options like Details, Fields & Relationships, Page Layouts, etc. The main area is titled "Syllabus Validation Rule" and displays the following details:

Validation Rule Detail	
Rule Name	Credits_validation
Error Condition Formula	OR(Credits_c >4, Credits_c <=0)
Error Message	Please Enter the credits which is less than 4
Description	
Created By	Mahendar Patel, 31/12/2023, 1:49 pm
Modified By	Mahendar Patel, 31/12/2023, 1:49 pm

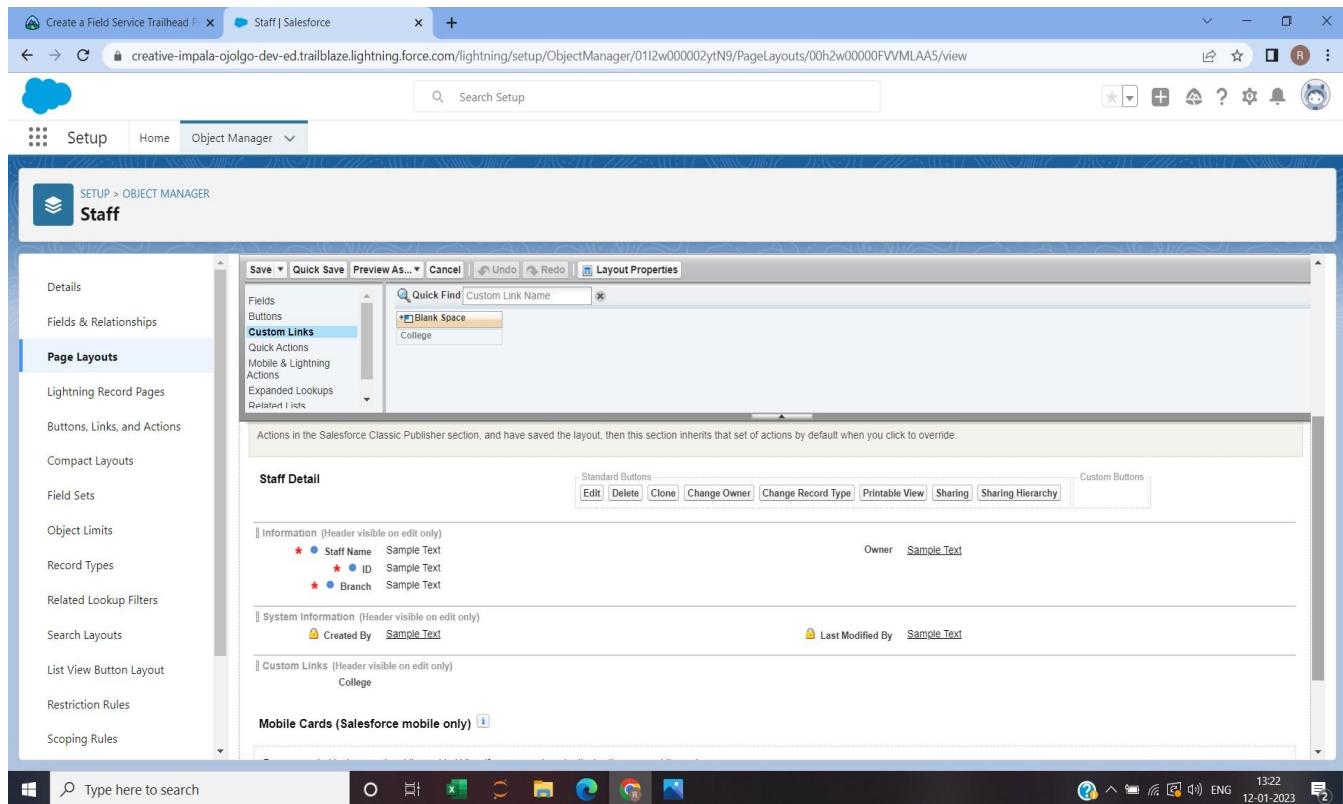
To give a link to college website:

1. Go to -Buttons, Links and Actions| of Art Object and click -New Button or Link|.
2. Name it as -College|.

The screenshot shows the Salesforce Setup interface for the Staff object. On the left, there is a sidebar with various options like Details, Fields & Relationships, Page Layouts, etc. The main area is titled "Staff Custom Button or Link" and displays the following details:

Custom Button or Link Detail	
Label	College
Name	College
Behavior	Display in new window
Button or Link URL	<a href="http://www.drait.edu.in/">http://www.drait.edu.in/</a>
Height (in pixels)	600
Width (in pixels)	
Window Position	No Preference
Resizable	<input checked="" type="checkbox"/>
Description	
Created By	Mahendar Patel, 31/12/2023, 6:17 pm
Modified By	Mahendar Patel, 31/12/2023, 6:17 pm

3. Select the radio button -Detail Page Link as it is a website link.
4. Behaviour: Display in new window.
5. Content Source: URL.
6. Field Type: College.
7. In the empty space provided, type <https://www.drait.edu.in/>
8. Link Encoding: Unicode (UTF-8).
9. Click Save
10. Go to Page Layout, Click Activities Layout.
11. Click Custom Links, Drag and drop the -College link in the Custom Link area.
12. Click Save.



To create an application:

1. Go to -Setup and type -App Manager in Quick Find Box.
2. Click on -New Lightning App to create a Lightning Application.
3. Name it as -Department Details, give the description for your application.
4. Uploading Image and changing colours are optional, then click Next.
5. Navigation Style: Standard Navigation, click Next.
6. No need to add any Utility Bar, click Next.
7. Add the following:
8. Items: Staff, Syllabuses, Activities, Reports and Dashboards, click Next.
9. Assign it to System Administrator Profile by selecting System Administrator and pressing right arrow and then click Save & Finish.

The screenshot shows a Salesforce Lightning page for a Staff record. The URL is [https://resourceful-panda-spty7s-dev-ed.trailblaze.lightning.force.com/lightning/r/Staff\\_c/a0K5g00000LSjWrEAP/view](https://resourceful-panda-spty7s-dev-ed.trailblaze.lightning.force.com/lightning/r/Staff_c/a0K5g00000LSjWrEAP/view). The page title is "Staff Venkatesh reddy". The "Details" tab is selected. The record contains the following fields:

- Staff Name: Venkatesh reddy
- ID: STAFF021
- Branch: EEE
- Salary: 1,50,000
- Created By: Mahendar Patel, 31/12/2023, 6:35 pm
- Last Modified By: Mahendar Patel, 31/12/2023, 6:35 pm
- College: (empty)

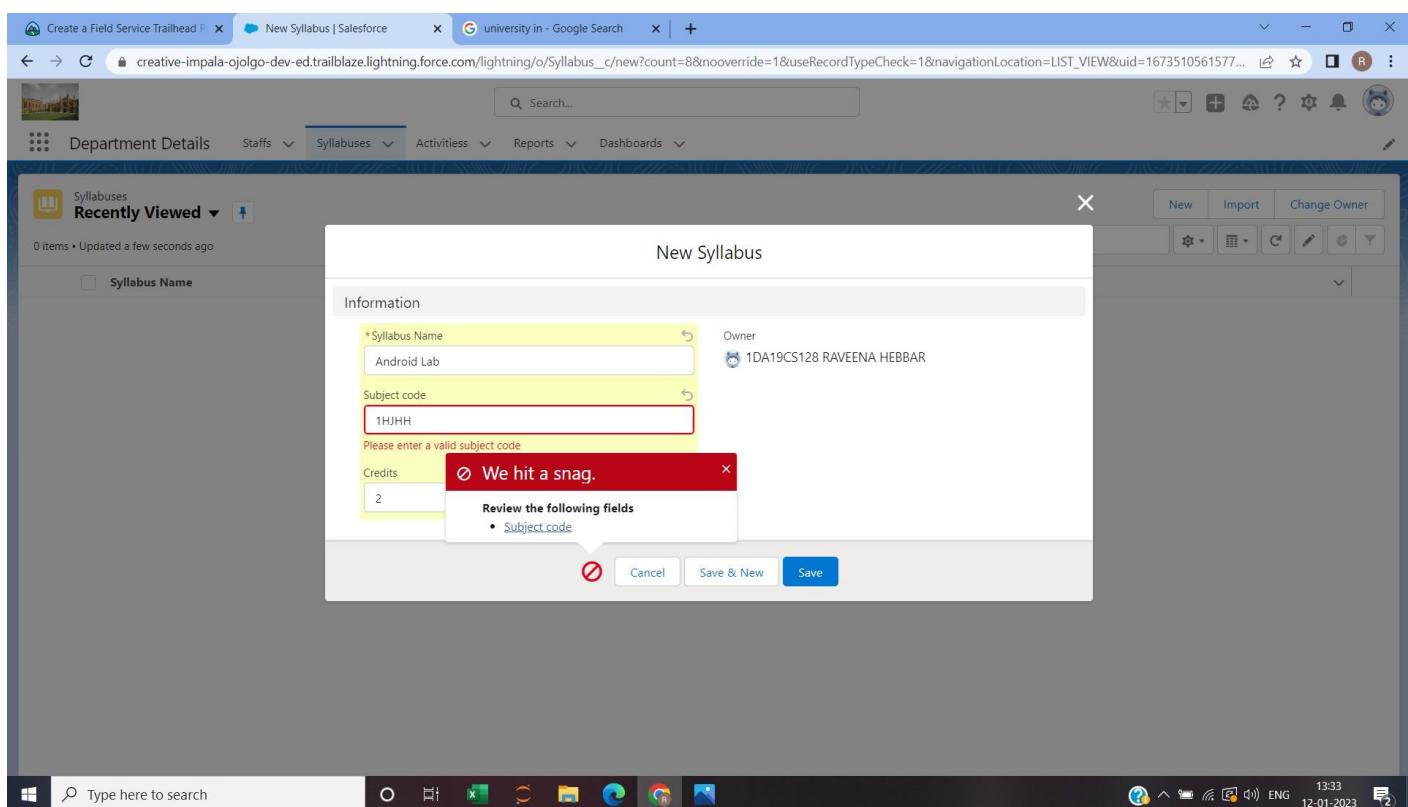
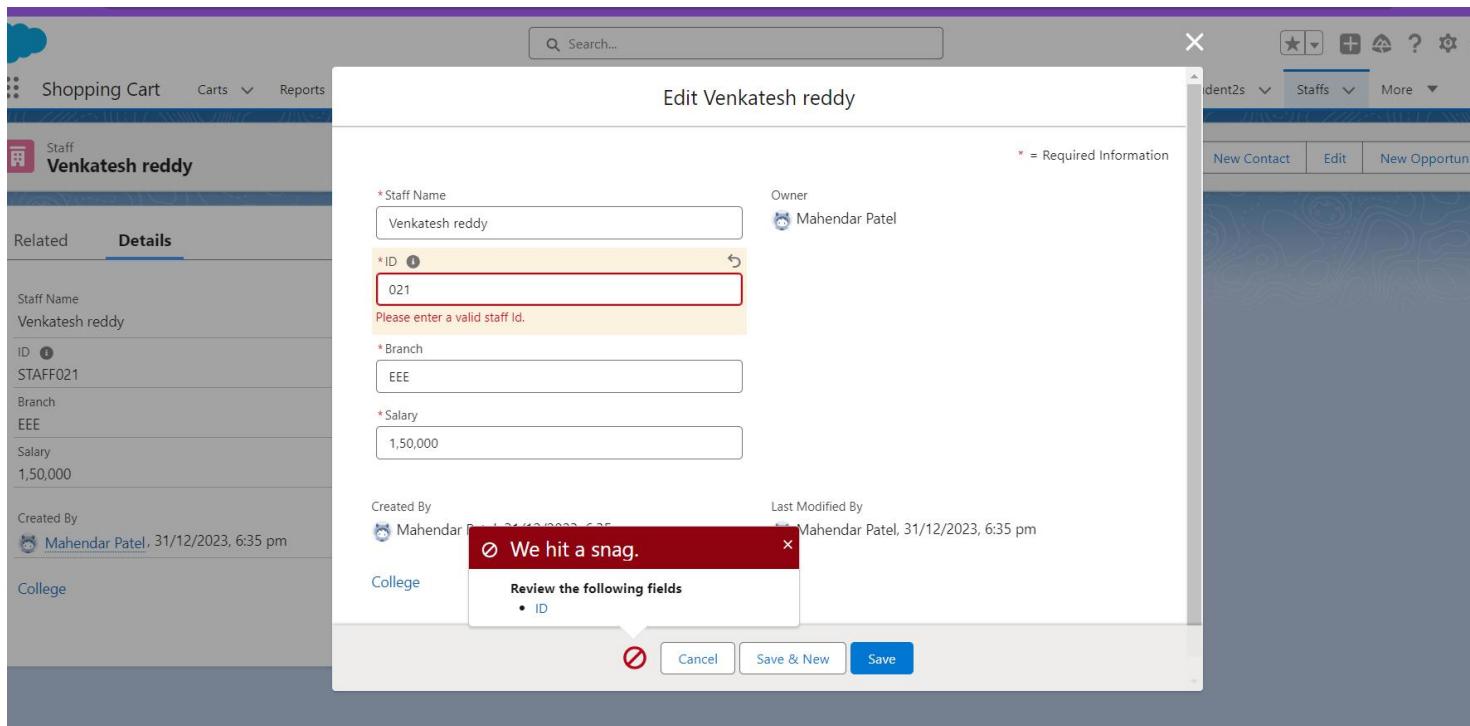
The screenshot shows a Salesforce Lightning page for a Syllabus record. The URL is [https://resourceful-panda-spty7s-dev-ed.trailblaze.lightning.force.com/lightning/r/Syllabus\\_c/a0l5g00000JHxIReA1/view](https://resourceful-panda-spty7s-dev-ed.trailblaze.lightning.force.com/lightning/r/Syllabus_c/a0l5g00000JHxIReA1/view). The page title is "Syllabus Cloud Computing". The "Details" tab is selected. The record contains the following fields:

- Syllabus Name: Cloud Computing
- Subject Code: CS71
- Credits: 4
- Created By: Mahendar Patel, 31/12/2023, 6:38 pm
- Last Modified By: Mahendar Patel, 31/12/2023, 6:38 pm

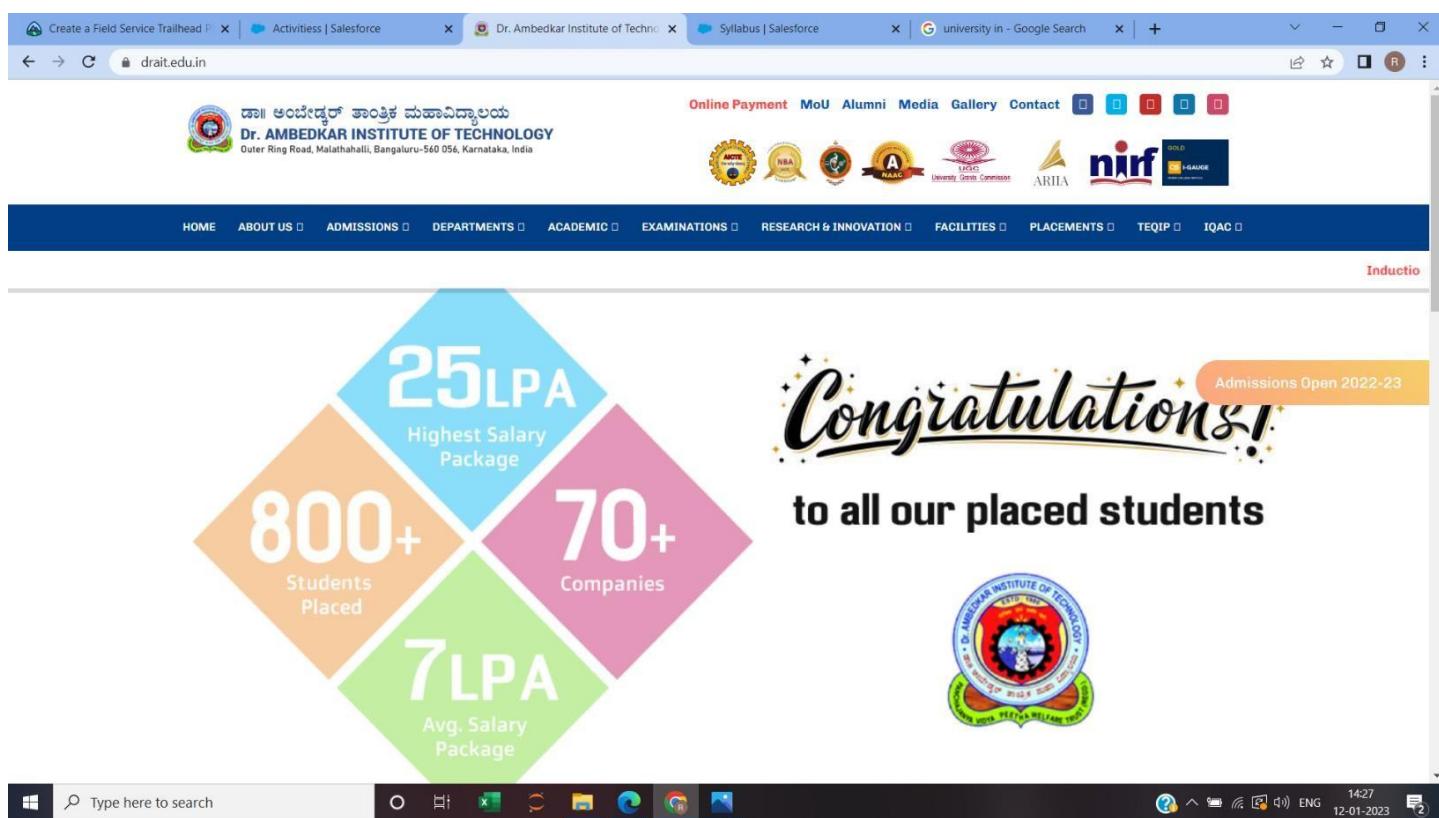
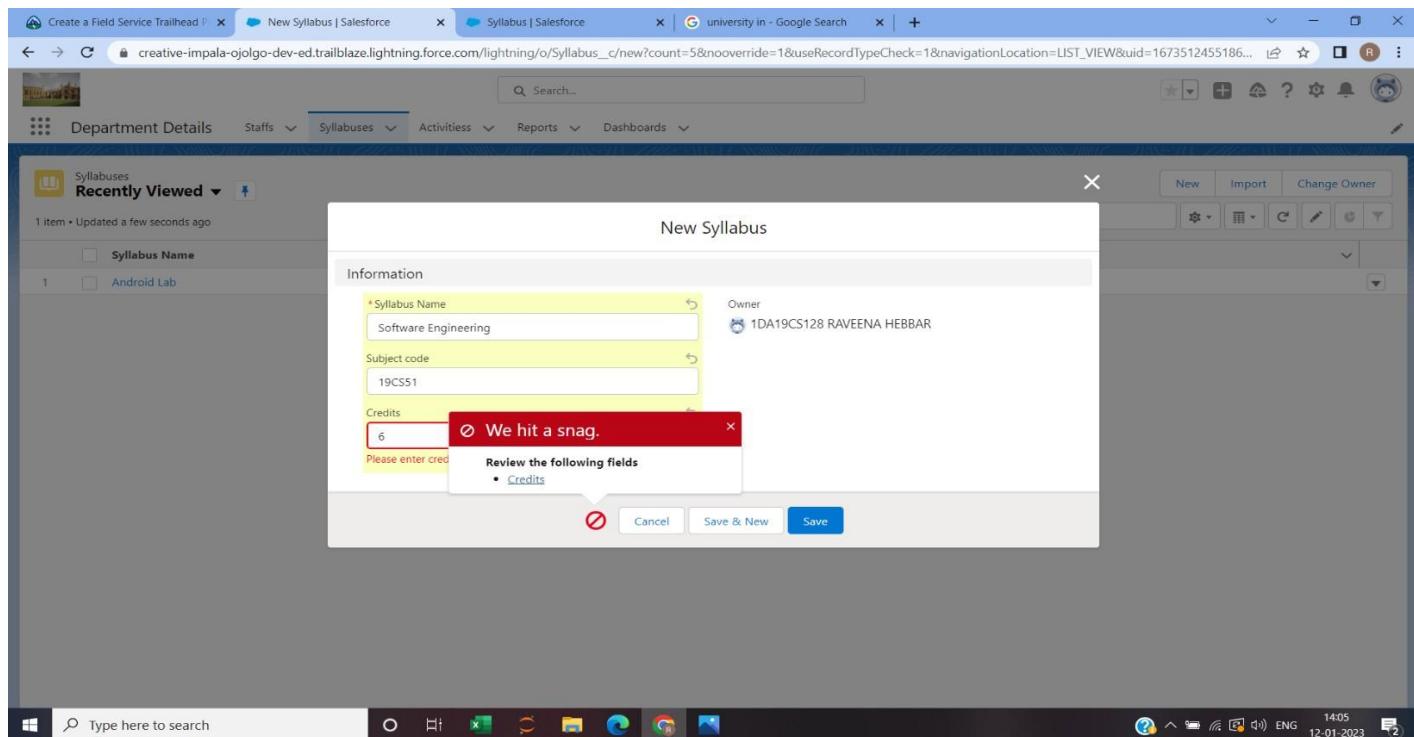
Go to App Manager, select your application and select Faculties and click -New|| to add some details to your application.

Click the entry you added, go to details.

Press the -College|| link to check the details.



Click OK so that it will redirect you to the website. Make Sure You will get an error when u give invalid staff id, credits and Subject code.



## Reports and Dashboards:

### To Create a Staff Report:

1. Go to -Reports tab| Click on -New Folder| And give it any name then select Save.
2. Click on -New Report| and from search bar Search for -Staffs| and then select it then select Continue.
3. Add the required Columns to get the Complete Entered data.
4. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups| otherwise it is optional.

5. Click on save and name the report as —New Staffs Report|| and then select the folder which you have created.
6. Click Save and then Click Run.

The screenshot shows a Salesforce report interface. The title bar says 'Report: Staffs New Staffs Report'. The main content is a table with columns: Branch, Staff: Staff Name, and ID. The data is grouped by Branch:

Branch	Staff: Staff Name	ID
Civil (1)	Bhanumathi N	STAFF104
<b>Subtotal</b>		
CSE (1)	Pravcena M V	STAFF101
<b>Subtotal</b>		
ECE (1)	Shalini G	STAFF102
<b>Subtotal</b>		
EEE (1)	Sharmitha S	STAFF105
<b>Subtotal</b>		
ISE (2)	MURALI	STAFF107
	Sharmathi D	STAFF106
<b>Subtotal</b>		
Mechanical (1)	Manjunath M	STAFF108
<b>Subtotal</b>		
<b>Total (7)</b>		

At the bottom, there are buttons for Row Counts, Detail Rows, Subtotals, and Grand Total, all set to checked. The status bar at the bottom right shows 14:13 12-01-2023.

### To Create a Syllabus Report:

1. Go to -Reports tab|| Click on -New Folder|| And give it any name then select Save.
2. Click on -New Report|| and from search bar Search for -Syllabus|| and then select it then select Continue.
3. Add the required Columns to get the Complete Entered data.
4. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.
5. Click on save and name the report as —New Syllabus Report|| and then select the folder which you have created.
6. Click Save and then Click Run

The screenshot shows a Salesforce report interface. The title bar says 'Report: Syllabuses New Syllabuses Report'. The main content is a table with columns: Credits, Syllabus: Syllabus Name, and Subject code. The data is grouped by Credits:

Credits	Syllabus: Syllabus Name	Subject code
2 (1)	Android Lab	19CS76
<b>Subtotal</b>		
3 (2)	Software Engineering	19CS51
	Operating System	19CS35
<b>Subtotal</b>		
4 (2)	Cloud Computing	19CS72
	Python Programming	19CS43
<b>Subtotal</b>		
<b>Total (5)</b>		

At the bottom, there are buttons for Row Counts, Detail Rows, Subtotals, and Grand Total, all set to checked. The status bar at the bottom right shows 14:14 12-01-2023.

### To Create an Activities Report:

1. Go to -Reports tab|| Click on -New Folder|| And give it any name then select Save.
2. Click on -New Report|| and from search bar Search for -Activities|| and then select it then select Continue.
3. Add the required Columns to get the Complete Entered data.
4. If you want the report to be grouped by any specific Fields then Search for the field in —Add groups|| otherwise it is optional.

5. Click on save and name the report as —New Activities Report|| and then select the folder which you have created.
6. Click Save and then Click Run

Activities: Activities Name	Record Count
Coding	1
Interview	1
Mind game	1
Quiz	1
Team Leading	1
<b>Total</b>	<b>5</b>

### To Create a Staff Dashboard:

1. Go to -Dashboard tab|| and then click on -New Folder|| and give it any Name.
2. Click on -New Dashboard|| and then name it as -Staff dashboard|| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run

### To Create a Syllabus Dashboard:

1. Go to -Dashboard tab|| and then click on -New Folder|| and give it any Name.
2. Click on -New Dashboard|| and then name it as -Syllabus dashboard|| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run.

### To Create an Activities Dashboard:

1. Go to -Dashboard tab|| and then click on -New Folder|| and give it any Name.
2. Click on -New Dashboard|| and then name it as -Activities dashboard|| and select folder that you have created Click on Create.
3. Click on the report that you have created and click on that and click select.
4. Select any style to represent the data in dashboard.
5. Add any filter(s), otherwise it is optional.
6. Click on Save and Click Run

resourceful-panda-spty7s-dev-ed.trailblaze.lightning.force.com/lightning/r/Dashboard/01Z5g00000RQOLEAW/view?queryScope=userFolders

The screenshot shows a dashboard titled "Department Details" with a search bar and navigation links for Shopping Cart, Carts, Reports, Dashboards, Faculties, Flights, Statuses, Events, Attendees, Donors, Records, Student2s, Staffs, and More.

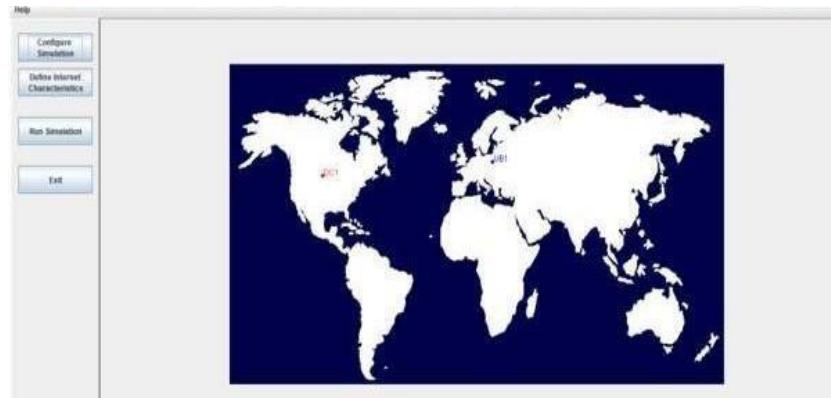
**New Staffs Report:** A horizontal bar chart titled "Sum of Salary" showing salary distribution by branch. The Y-axis lists branches: CSE, EC, and EEE. The X-axis ranges from 0 to 360k. Data points: CSE (350k), EC (200k), EEE (150k).  
Branch	Sum of Salary
CSE | 350k  
EC | 200k  
EEE | 150k

**New Activities Report:** A gauge chart showing a value of 3. The scale ranges from 0 to 100, with segments colored red (0-40), yellow (40-60), and green (60-100).  
Value: 3

**New Syllabuses Report:** A table showing syllabus names and credits.  
Syllabus: Syllabus Name	Credits
Android Programming | 4  
Cloud Computing | 4

## CLOUD ANALYST

Cloud Analyst is a tool developed at the University of Melbourne whose goal is to support evaluation of social networks tools according to geographic distribution of users and data centres. In this tool, communities of users and data centers supporting the social networks are characterized and, based on their location; parameters such as user experience while using the social network application and load on the data centre are obtained/logged.



Cloud Analyst is developed by Bhathiya Wickremasinghe et al. at the CLOUDS Laboratory. It is built on top of CloudSim and separates the simulation experimentation from a programming task enabling one to concentrate on the simulation parameters rather than the technicalities of programming. Simulation in Cloud Analyst involves the following steps:

- i. Defining and configuration of User Bases.
- ii. Defining and configuring Data Centers
- iii. Allocating of Virtual Machines in Data Centers.
- iv. Review and Adjustment of various other parameters such as Packet size, Number of packets, Bandwidth, and Load balancing policies.

The Cloud Analyst enables us to model different scenarios of CSPs and User Bases, and provides a comprehensive output detailing the response time, Data Center processing time and total cost involved in the communication and computation.

### **Installing and Running Cloud Analyst:**

1. Download CloudAnalyst
2. Extract the files from the zip file which will give following folder structure.
3. Click on run.bat file.

4. The user can then configure the simulation which includes

- Simulation Duration
- Number of User Bases
- Service broker policy
- Data Center Configuration
- Load Balancing Policy

5. To run the simulation, click on Run Simulation.

Name	Region	User per Hr	Data Size per Request (bytes)	Peak Hours Start (GMT)	Peak Hours End (GMT)	Avg Peak Users	Avg Off-Peak Users
UB1	2	60	100	3	9	1000	100

Data Center	# VMs	Image Size	Memory	BW
DC1	5	10000	512	1000

## Cloud Analyst Simulations

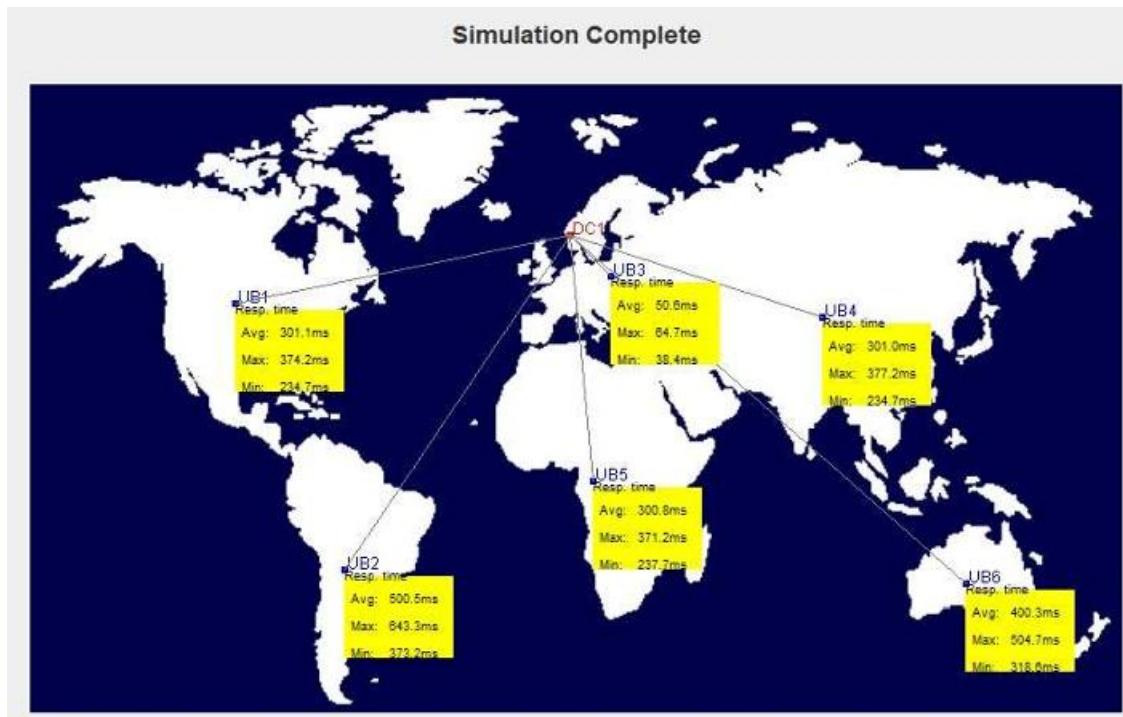
Exp. No		Experiment List							
PART-A									
1	a)	Creation of web applications on Salesforce cloud Platform.							
	b)	Use the following userbase configuration to simulate following scenarios for the given data centre and virtual machine configuration and answer to the following questions. <b>Scenario-1:</b> Nearest data center with round robin policies <b>Scenario-2:</b> Optimize response time with round robin policies							
		User base	Region	Data center	Peak-hour users	Off-peak hour users	Virtual machines		
		UB1	North America	--	1000	500	DC1-50		
		UB2	South America	--	800	1200			
		UB3	Europe	D	2000	1000			
				C1					
		UB4	Africa	--	500	300			
		UB5	Asia		3000	300			
		UB6	Ocenia		1500	150			
		i) Tabulate the overall response time of all the scenarios and plot a line graph ii) Plot a bar graph for the data processing time of all the scenarios iii) Compare average response time by regions of all scenarios by plotting line graph iv) Using Pie chart show the total cost spent for each scenario							
2	a)	Install Virtualbox/VMware Workstation with different flavours of linux and execute some C programs							
	b)	Simulate the following scenarios for the given userbase, data centre and virtual machine configuration and answer to the given questions							
		Scenario	Scenario Description			Load Balancing algorithm	Service broker policy		
		1	One data center with 50 Virtual Machines for UB1			Nearest Data Centre	Round robin		
		2	Two data centers with 25 and 50 Virtual Machines respectively for UB1						
		3	Three data centers with 100,75 and 25 Virtual Machines respectively for UB1						
		i) Tabulate the overall response time and data processing of all the scenarios and plot the bar graph ii) Plot a line graph of data center request servicing time of all the data centers for all the scenarios iii) Compare average response time by regions of all scenarios by plotting line graph iv) Mention the data centers used by the UB2,UB3, UB4 and UB5							

3	a)	Install Google App Engine. Create hello world app and other simple web applications using python/java.																																													
	b)	Simulate the following scenarios for given data centre, data centre and virtual machine configuration and answer the following questions <b>Scenario 1:</b> closest data center and round robin policies <b>Scenario 2:</b> optimize response time and round robin policies Use the following userbase configuration for all the scenarios																																													
<table border="1"> <thead> <tr> <th>User base</th><th>Region</th><th>Data center</th><th>Peak-hour users</th><th>Off-peak hour users</th><th>Virtual machines</th><th></th><th></th></tr> </thead> <tbody> <tr> <td>UB1</td><td>North America</td><td>DC1, DC3</td><td>1000</td><td>500</td><td>DC1-50</td><td>DC3-100</td><td></td></tr> <tr> <td>UB2</td><td>South America</td><td>---</td><td>800</td><td>1200</td><td></td><td></td><td></td></tr> <tr> <td>UB3</td><td>Europe</td><td>DC4</td><td>2000</td><td>1000</td><td>DC4-150</td><td></td><td></td></tr> <tr> <td>UB4</td><td>Africa</td><td>--</td><td>500</td><td>300</td><td></td><td></td><td></td></tr> </tbody> </table>								User base	Region	Data center	Peak-hour users	Off-peak hour users	Virtual machines			UB1	North America	DC1, DC3	1000	500	DC1-50	DC3-100		UB2	South America	---	800	1200				UB3	Europe	DC4	2000	1000	DC4-150			UB4	Africa	--	500	300			
User base	Region	Data center	Peak-hour users	Off-peak hour users	Virtual machines																																										
UB1	North America	DC1, DC3	1000	500	DC1-50	DC3-100																																									
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UB3	Europe	DC4	2000	1000	DC4-150																																										
UB4	Africa	--	500	300																																											
<ul style="list-style-type: none"> <li>i) Tabulate and compare the Average response time and data processing time of all the scenarios by plotting the line graph</li> <li>ii) Tabulate the response time of user bases in all scenarios and compare these by plotting bar graph. Which user base is taking maximum time among three scenarios? Why</li> <li>iii) Calculate the data transmission time from DC1 to UB2</li> <li>iv) Plot the bar graph for data center cost of all scenarios</li> </ul>																																															

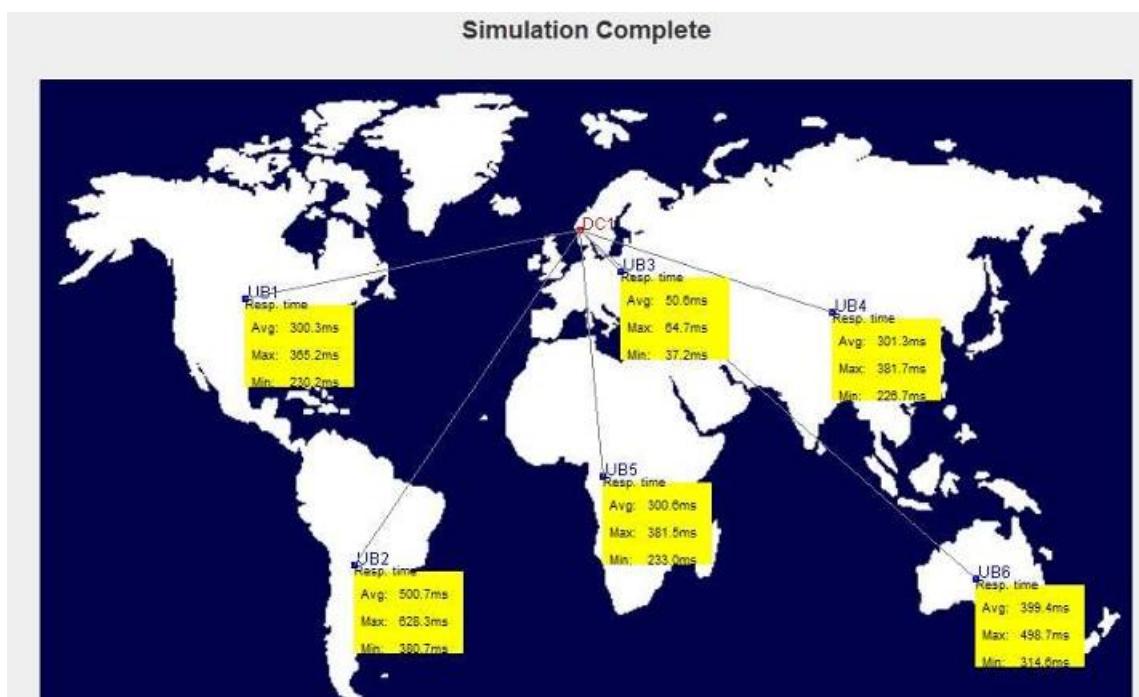
4	a)	Create a RDS and launch in your custom VPC network.																																																													
	b)	Analyze the various service broker policies for the following configuration and answer the following questions.																																																													
<table border="1"> <thead> <tr> <th>Parameter</th><th>Value Used</th></tr> </thead> <tbody> <tr> <td>UB Name</td><td>UB1</td></tr> <tr> <td>Region</td><td>2</td></tr> <tr> <td>Request Per User Per Hour</td><td>60</td></tr> <tr> <td>Data Size Per Request</td><td>100</td></tr> <tr> <td>Peak hour start(GMT)</td><td>3</td></tr> <tr> <td>Peak hour end (GMT)</td><td>9</td></tr> <tr> <td>Avg Peak Users</td><td>40000</td></tr> <tr> <td>Avg Off Peak Users</td><td>4000</td></tr> <tr> <td>DC 1 – No Of VM</td><td>75</td></tr> <tr> <td>DC 2 – No Of VM</td><td>50</td></tr> <tr> <td>DC 3 – No Of VM</td><td>25</td></tr> <tr> <td>VM Image Size</td><td>10000 MB</td></tr> <tr> <td>VM Memory</td><td>512 MB</td></tr> <tr> <td>VM Bandwidth</td><td>1000 bps</td></tr> <tr> <td>DC 1 – No Of Physical Machine</td><td>2</td></tr> <tr> <td>DC 2 – No Of Physical Machine</td><td>2</td></tr> <tr> <td>DC 3 – No Of Physical Machine</td><td>2</td></tr> <tr> <td>DC – Memory Per Machine</td><td>204800 Mb</td></tr> <tr> <td>DC – Storage Per Machine</td><td>100000000 Mb</td></tr> <tr> <td>DC – Available BW Per Machine</td><td>1000000</td></tr> <tr> <td>DC – No Of Processors Per Machine</td><td>4</td></tr> <tr> <td>DC – Processor Speed</td><td>10000 MIPS</td></tr> <tr> <td>DC – VM Policy</td><td>Time Shared</td></tr> <tr> <td>User Grouping Factor</td><td>1000</td></tr> <tr> <td>Request Grouping Factor</td><td>100</td></tr> <tr> <td>Executable Instruction Length</td><td>500</td></tr> <tr> <td>Load Balancing Policy</td><td>Throttled</td></tr> </tbody> </table>								Parameter	Value Used	UB Name	UB1	Region	2	Request Per User Per Hour	60	Data Size Per Request	100	Peak hour start(GMT)	3	Peak hour end (GMT)	9	Avg Peak Users	40000	Avg Off Peak Users	4000	DC 1 – No Of VM	75	DC 2 – No Of VM	50	DC 3 – No Of VM	25	VM Image Size	10000 MB	VM Memory	512 MB	VM Bandwidth	1000 bps	DC 1 – No Of Physical Machine	2	DC 2 – No Of Physical Machine	2	DC 3 – No Of Physical Machine	2	DC – Memory Per Machine	204800 Mb	DC – Storage Per Machine	100000000 Mb	DC – Available BW Per Machine	1000000	DC – No Of Processors Per Machine	4	DC – Processor Speed	10000 MIPS	DC – VM Policy	Time Shared	User Grouping Factor	1000	Request Grouping Factor	100	Executable Instruction Length	500	Load Balancing Policy	Throttled
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Load Balancing Policy	Throttled																																																														
<ul style="list-style-type: none"> <li>a) Tabulate and compare the data processing time of service broker policies by plotting the line graph</li> <li>b) Tabulate and compare response time of service broker policies by plotting the bar graph</li> <li>c) Tabulate the cost for service broker policies and represent it using pie chart</li> <li>d) Which service broker policy is best and why?</li> </ul>																																																															

5	a)	Create a file in one virtual machine and transfer it another virtual machine files from one virtual machine.																									
	b)	Analyze the various load balancing algorithms for the given userbase, data centre and virtual machine configuration and answer the following questions. Consider the following userbase configuration for all load balancing algorithms																									
Number of User bases		06																									
Region for the userbases		UB1-South America, UB2-Asia, UB3-North America, UB4-Europe, UB5-Africa, UB6-Ocenia																									
Average peak users for all the user bases		10000																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">Average off-peak users for all the user bases</td><td style="width: 25%;">100</td><td style="width: 25%"></td><td style="width: 25%"></td></tr> <tr> <td>Peak hours' time</td><td>Depends on the region</td><td></td><td></td></tr> <tr> <td>Data centers in each user base</td><td>UB1-1, UB2-2, UB3-1, UB4-3, UB5-2, UB6-1</td><td></td><td></td></tr> <tr> <td>Virtual machines in each data center</td><td>6</td><td></td><td></td></tr> <tr> <td>Simulation time</td><td>10 mins</td><td></td><td></td></tr> <tr> <td>Service broker policy</td><td>Nearest data center</td><td></td><td></td></tr> </table> <p>a) Tabulate and compare the data processing time of load balancing algorithms by plotting the line graph  b) Tabulate the response time of load balancing algorithms by plotting the bar graph  c) Tabulate the response time by region for load balancing algorithms and plot bar graph  d) Which load balancing algorithm is best and why?</p>				Average off-peak users for all the user bases	100			Peak hours' time	Depends on the region			Data centers in each user base	UB1-1, UB2-2, UB3-1, UB4-3, UB5-2, UB6-1			Virtual machines in each data center	6			Simulation time	10 mins			Service broker policy	Nearest data center		
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Virtual machines in each data center	6																										
Simulation time	10 mins																										
Service broker policy	Nearest data center																										

## 1). Closest



## 2). Optimized



Results of the Simulation Completed at: 03/12/2021 09:59:38

### Overall Response Time Summary

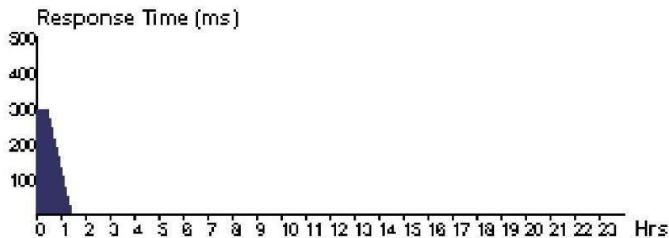
	Avg (ms)	Min (ms)	Max (ms)
Overall response time:	304.32	37.43	632.82
Data Center processing time:	0.44	0.02	1.25

### Response Time by Region

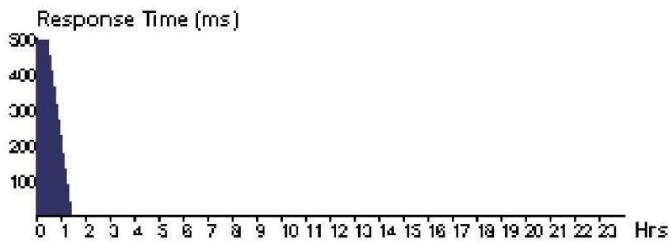
Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	300.49	232.72	364.71
UB2	500.10	385.27	632.82
UB3	50.16	37.43	65.68
UB4	300.34	229.69	367.67
UB5	299.44	222.16	370.67
UB6	398.41	320.15	492.16

### User Base Hourly Response Times

UB1

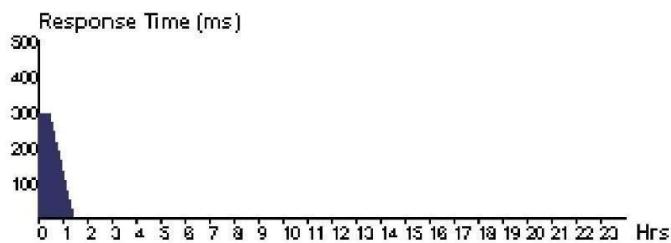
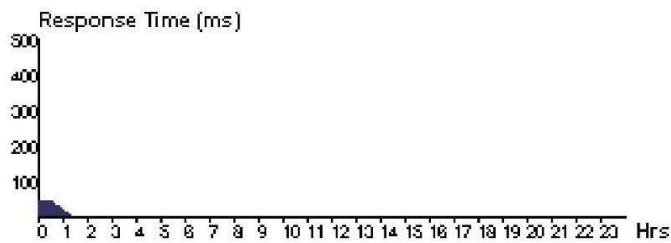


UB2

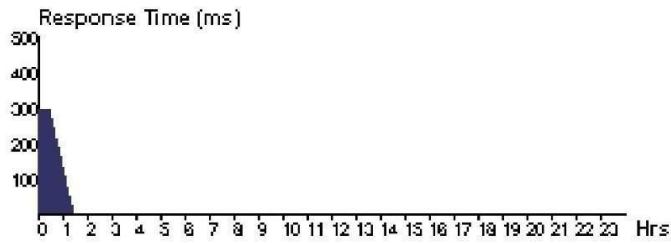


UB3

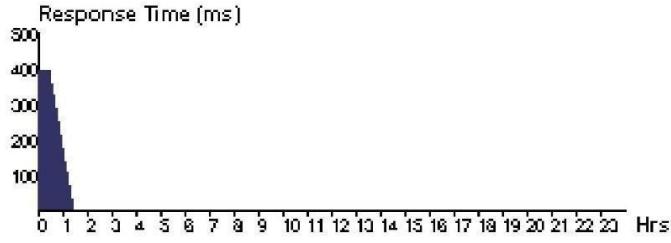
UB4



UB5



UB6



#### Data Center Request Servicing Times

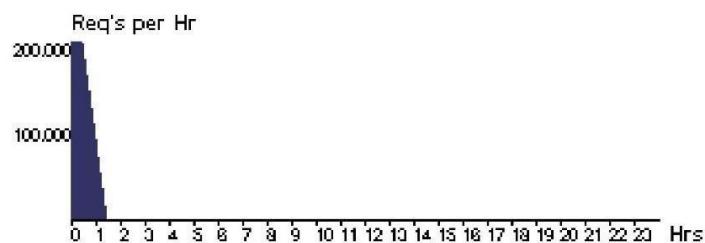
Data Center	Avg (ms)	Min (ms)	Max (ms)
DC1	0.44	0.02	1.25

#### Data Center Hourly Average Processing Times

DC1

#### Data Center Hourly Loading

DC1



Cost

Total Virtual Machine Cost (\$): 0.50  
Total Data Transfer Cost (\$): 2.20  
Grand Total: (\$) 2.70

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC1	0.50	2.20	2.70

Results of the Simulation Completed at: 03/12/2021 10:06:17

### Overall Response Time Summary

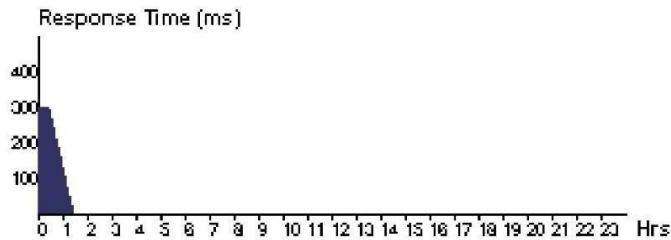
	Avg (ms)	Min (ms)	Max (ms)
Overall response time:	304.37	37.41	630.34
Data Center processing time:	0.44	0.03	1.21

### Response Time by Region

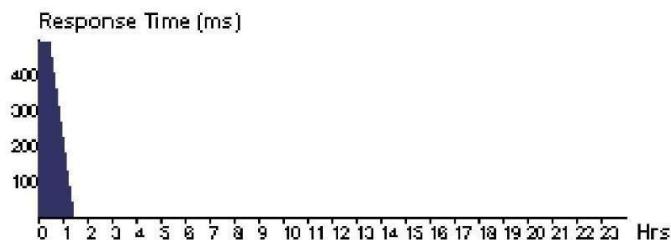
Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	300.35	214.70	367.67
UB2	499.96	370.26	630.34
UB3	50.21	37.41	64.18
UB4	299.99	225.17	394.68
UB5	299.79	229.66	364.66
UB6	400.72	314.15	490.14

### User Base Hourly Response Times

UB1

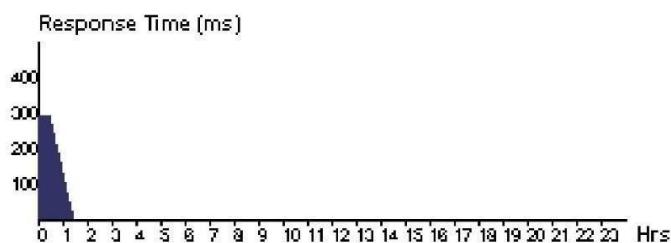
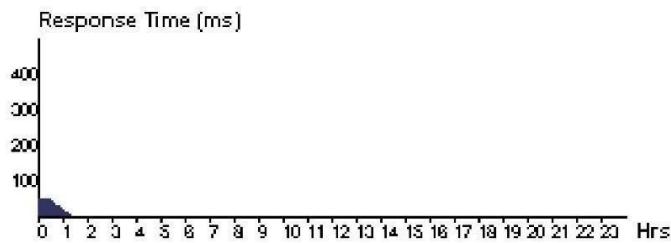


UB2

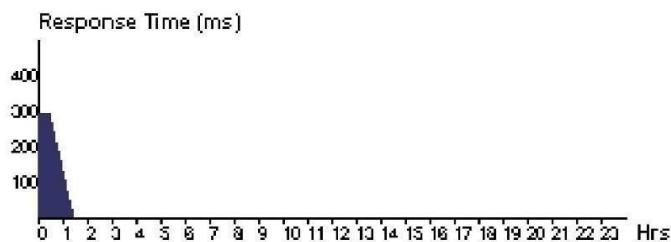


UB3

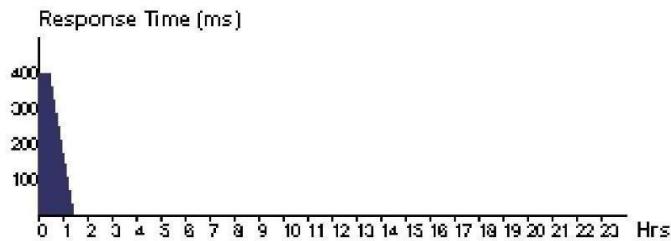
UB4



UB5



UB6



#### Data Center Request Servicing Times

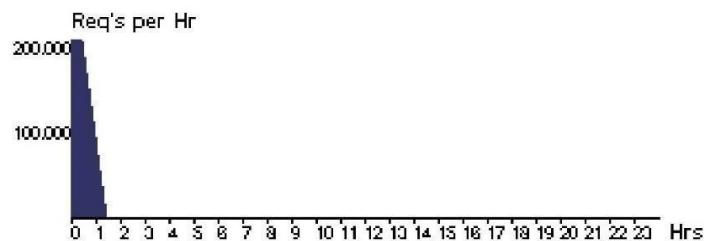
Data Center	Avg (ms)	Min (ms)	Max (ms)
DC1	0.44	0.03	1.21

#### Data Center Hourly Average Processing Times

DC1

#### Data Center Hourly Loading

DC1

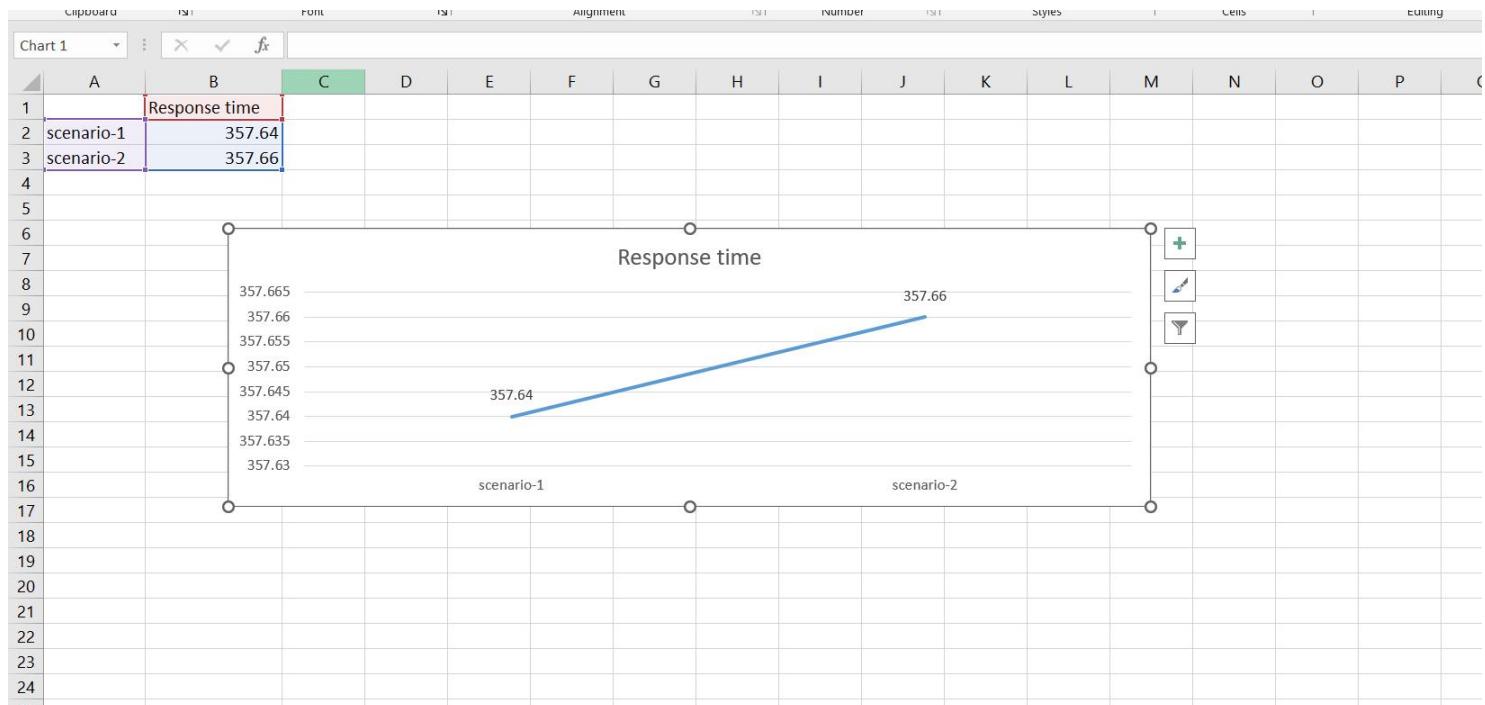


Cost

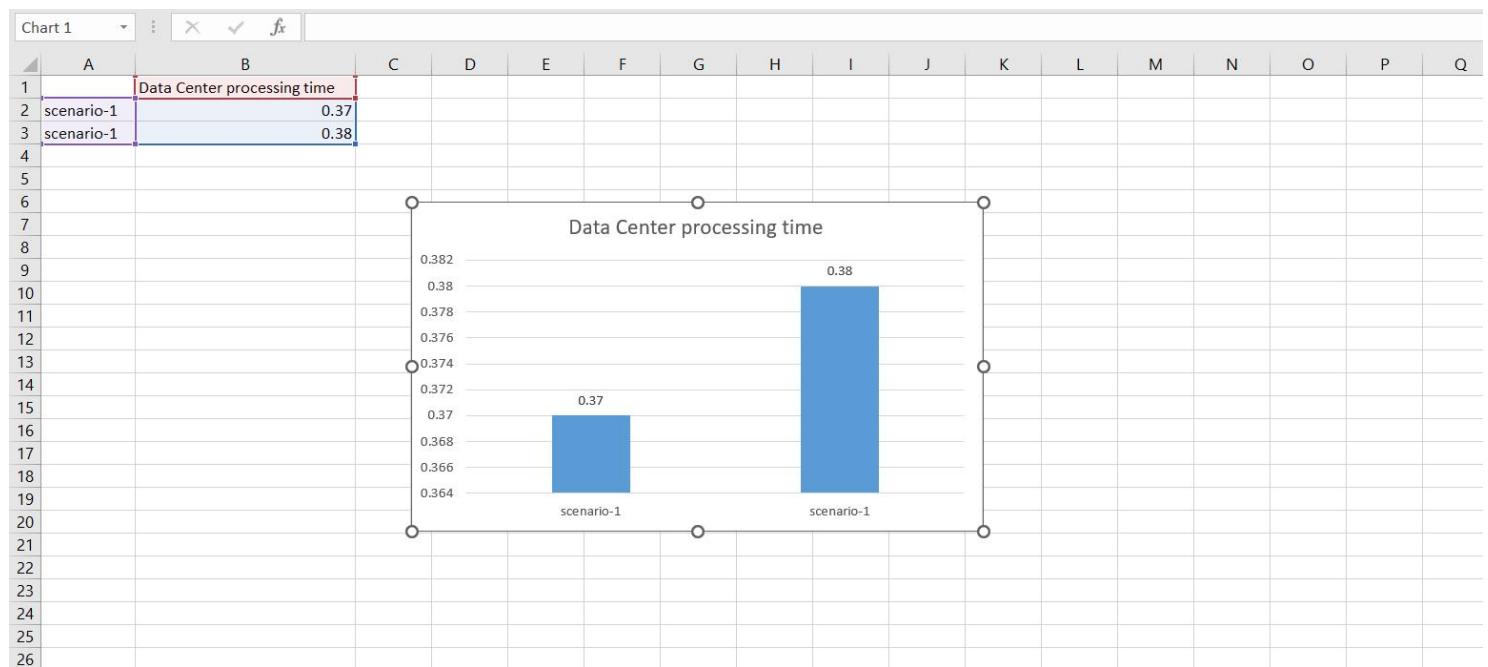
Total Virtual Machine Cost (\$):	0.50
Total Data Transfer Cost (\$):	2.20
Grand Total: (\$)	2.70

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC1	0.50	2.20	2.70

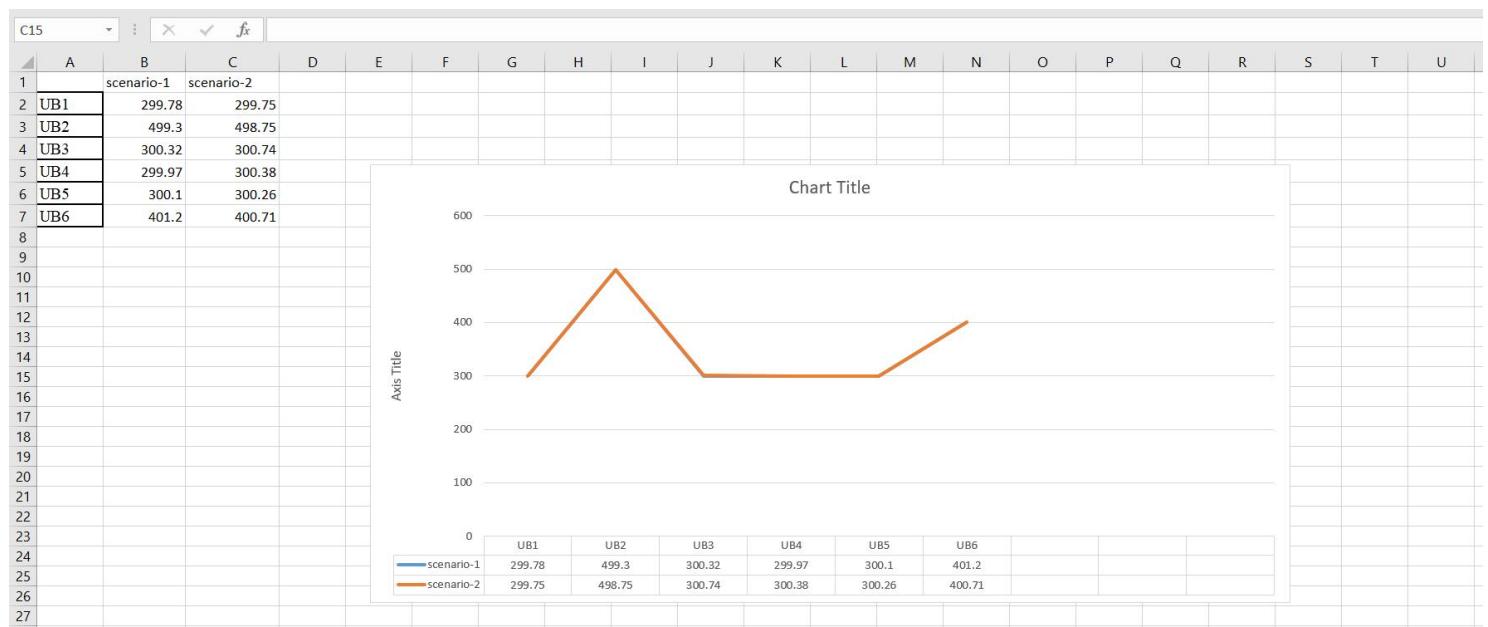
i) Tabulate the overall response time of all the scenarios and plot a line graph



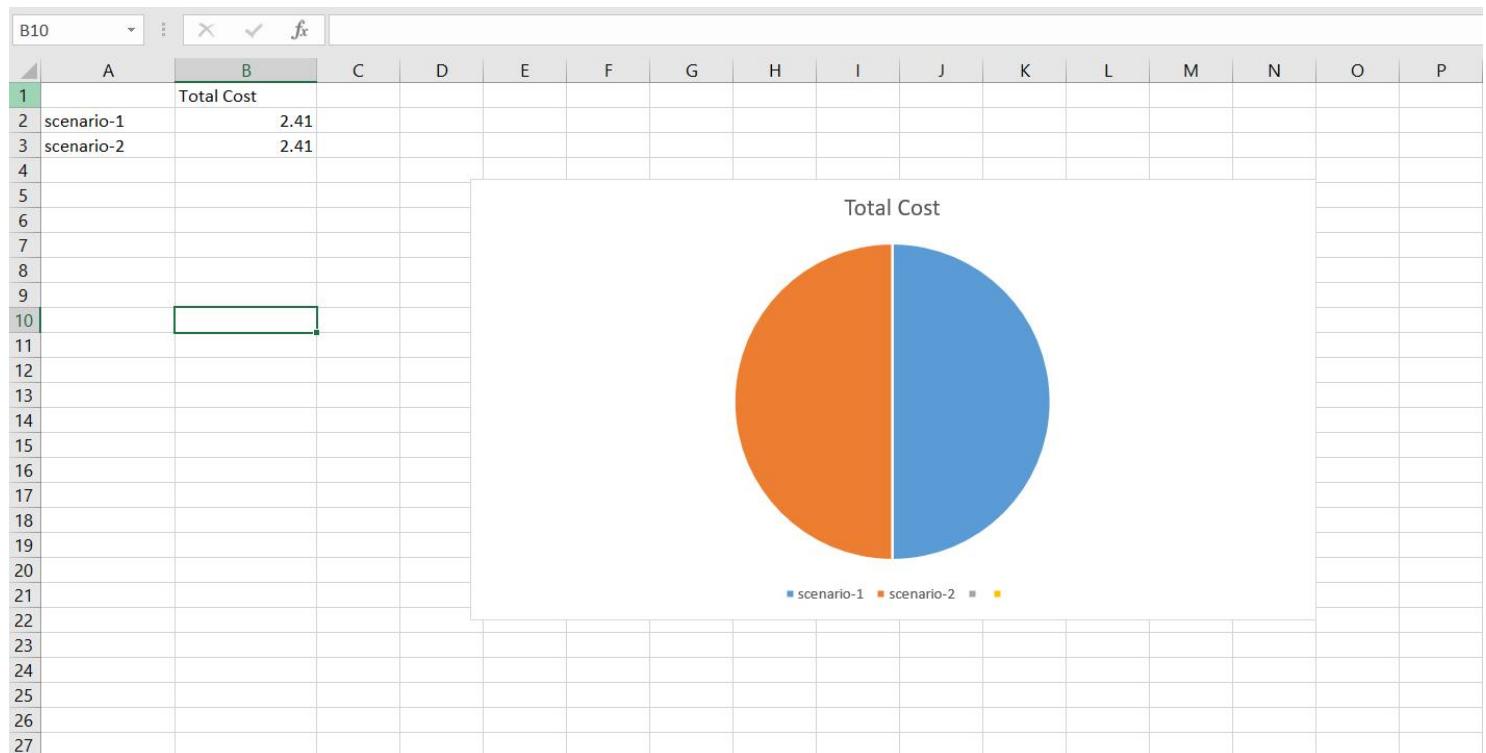
ii) Plot a bar graph for the data processing time of all the scenarios



iii) Compare average response time by regions of all scenarios by plotting line graph

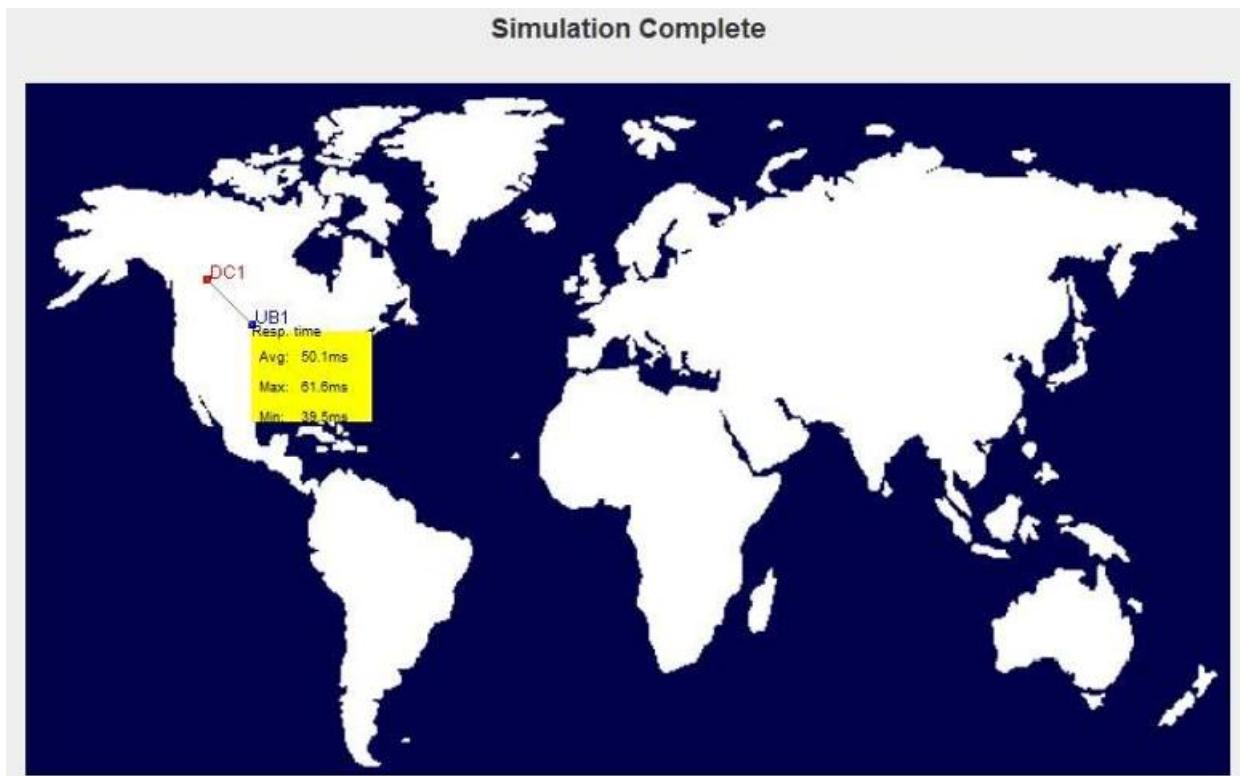


iv) Using Pie chart show the total cost spent for each scenario



2).

Scenario 1



Scenario 2



Results of the Simulation Completed at: 09/12/2021 14:36:24

### Overall Response Time Summary

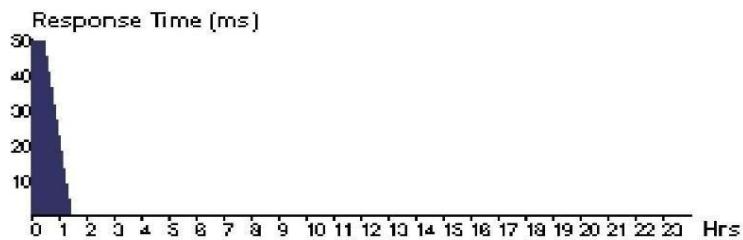
	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
Overall response time:	50.09	39.55	61.61
Data Center processing time:	0.48	0.01	0.86

### Response Time by Region

<b>Userbase</b>	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
UB1	50.09	39.55	61.61

### User Base Hourly Response Times

UB1



### Data Center Request Servicing Times

<b>Data Center</b>	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
DC1	0.48	0.01	0.86

### Data Center Hourly Average Processing Times

DC1

### Data Center Hourly Loading

DC1



Cost

Total Virtual Machine Cost (\$): 0.51

Total Data Transfer Cost (\$): 0.06

Grand Total: (\$) 0.57

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC1	0.51	0.06	0.57

Results of the Simulation Completed at: 09/12/2021 14:38:16

### Overall Response Time Summary

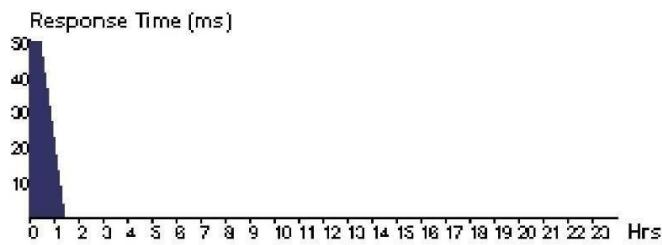
	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
Overall response time:	51.03	40.26	63.38
Data Center processing time:	1.42	0.03	2.63

### Response Time by Region

Userbase	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
UB1	51.03	40.26	63.38

### User Base Hourly Response Times

UB1



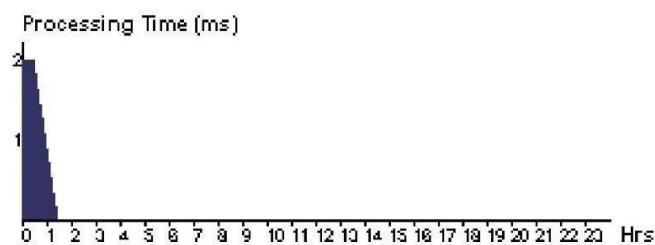
### Data Center Request Servicing Times

Data Center	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
DC1	0.67	0.03	1.08
DC2	2.20	0.38	2.63

### Data Center Hourly Average Processing Times

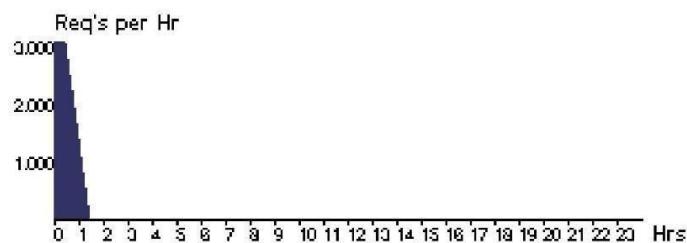
DC1

DC2

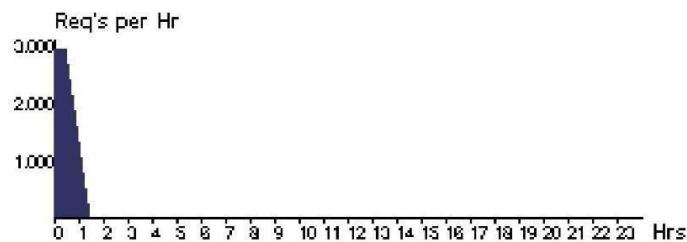


Data Center Hourly Loading

DC1



DC2



Cost

Total Virtual Machine Cost (\$): 10.14

Total Data Transfer Cost (\$): 0.06

Grand Total: (\$) 10.20

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC2	7.61	0.03	7.64
DC1	2.54	0.03	2.57

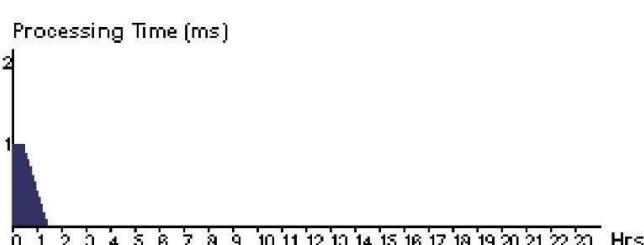
**Overall Response Time**

Overall

Data

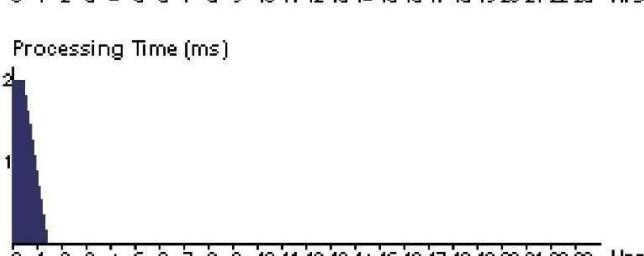
**Response Time**

U1
U2

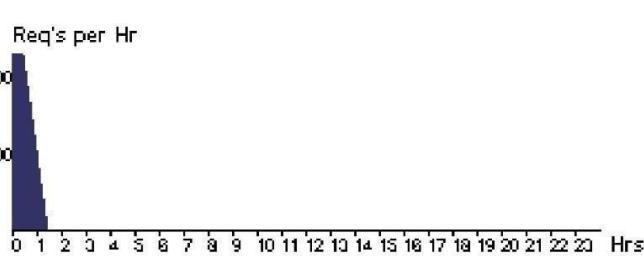
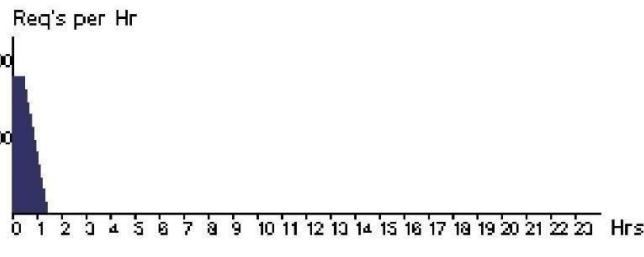
**User Base H****UB1**

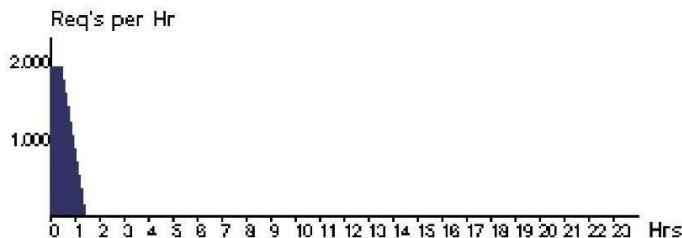
Responses

Responses	Frequency
0.5	~45
1.0	~35
1.5	~25
2.0	~15
2.5	~10
3.0	~5

**Data Center****DC3**

DC1
DC2
DC3
DC4
DC5

**Data Center****Data Center Hourly Loading****DC1****DC1****DC2**



**Cost**

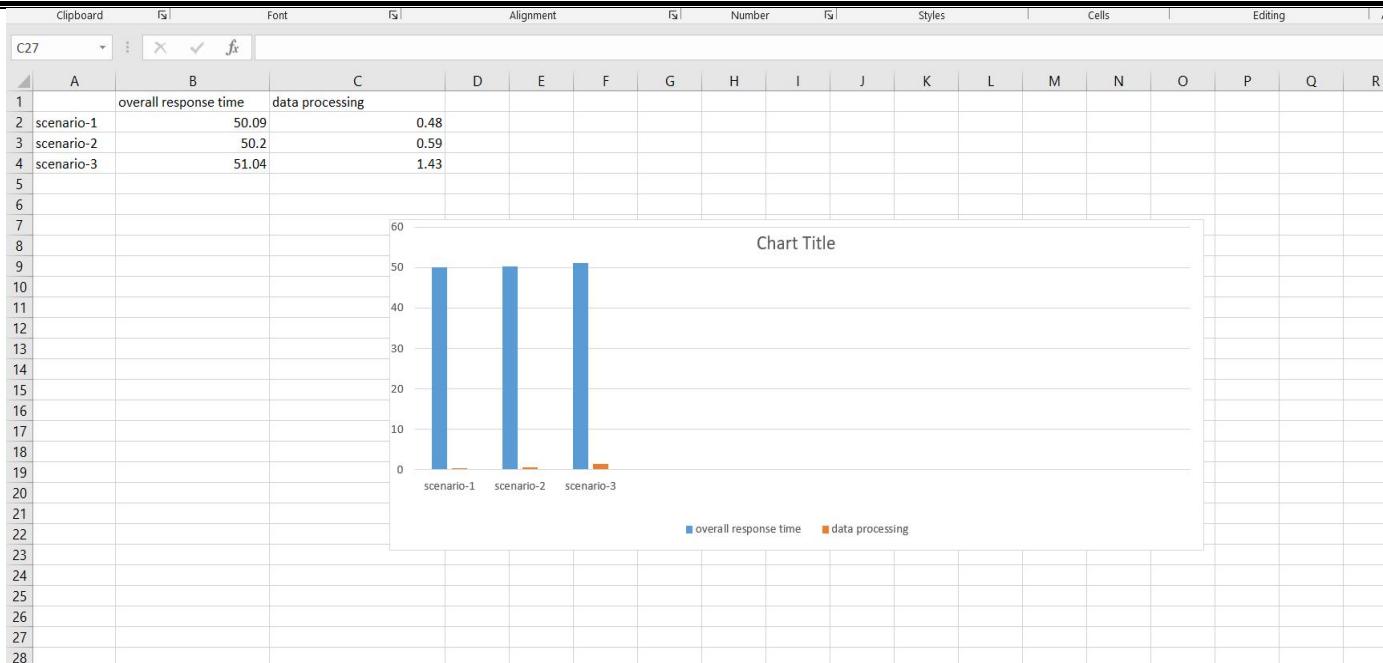
Total Virtual Machine Cost (\$): 18.25

Total Data Transfer Cost (\$): 0.06

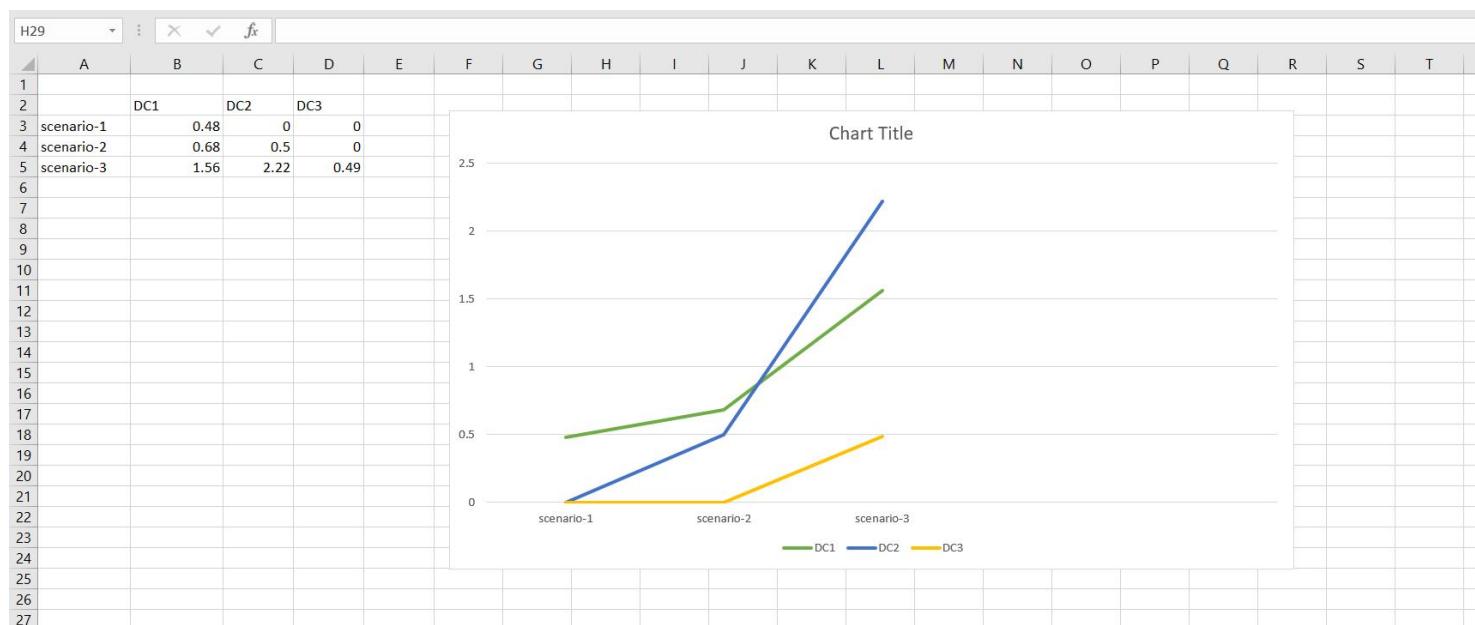
Grand Total: (\$) 18.32

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC2	7.61	0.02	7.62
DC1	10.14	0.02	10.16
DC3	0.51	0.02	0.53

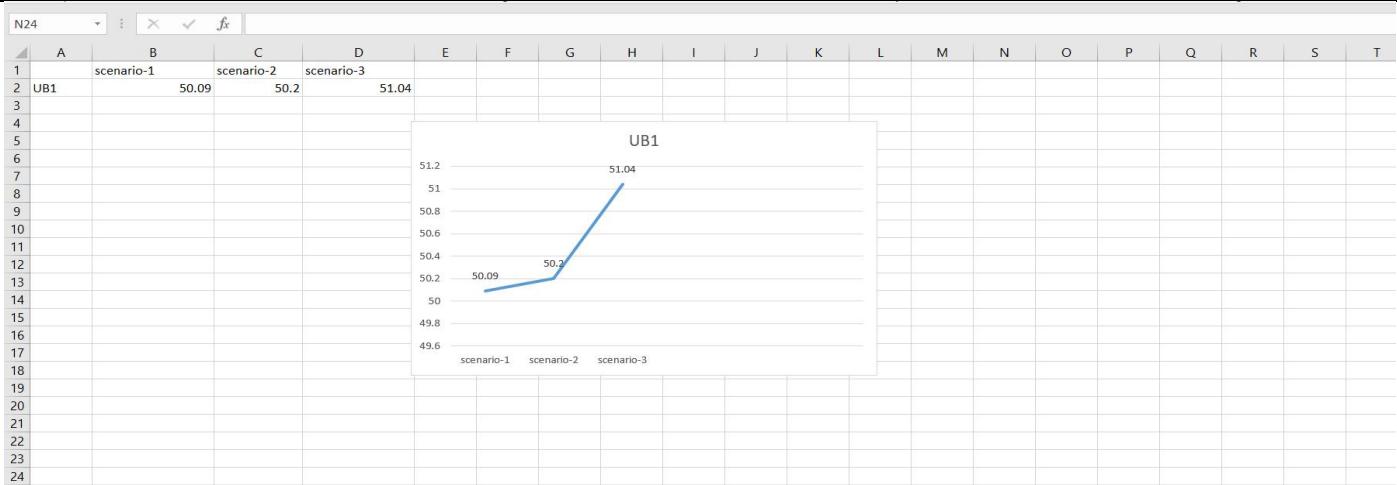
- i) Tabulate the overall response time and data processing of all the scenarios and plot the bar graph



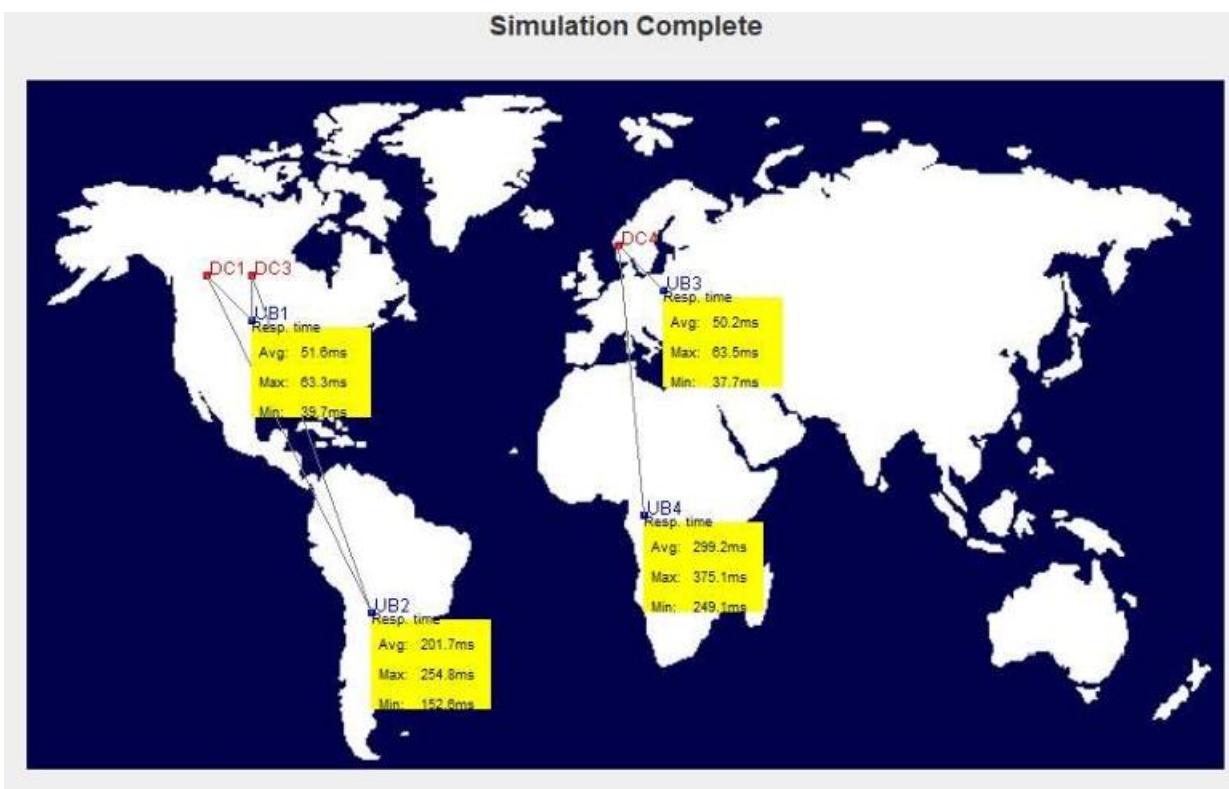
ii) Plot a line graph of data center request servicing time of all the data centers for all the scenarios



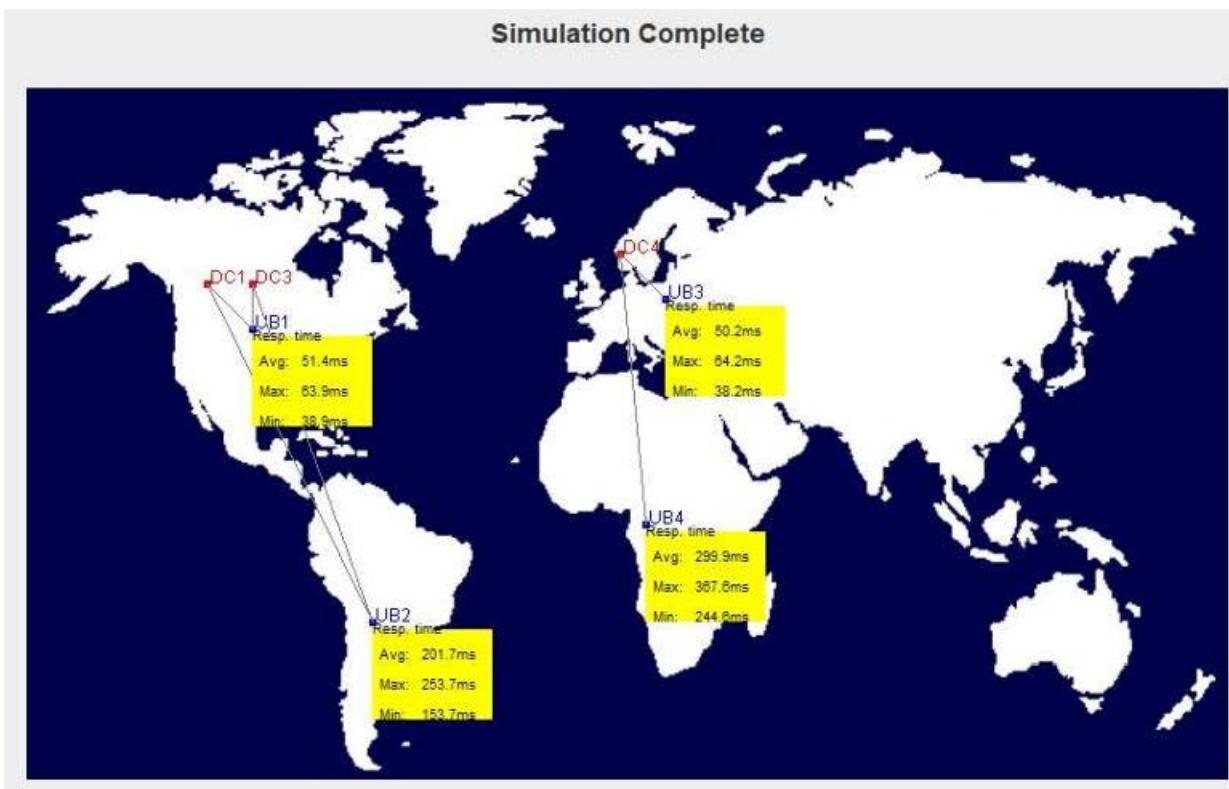
iii) Compare average response time by regions of all scenarios by plotting line graph



### 3). Closest



Optimized



Results of the Simulation Completed at: 09/12/2021 14:45:45

### Overall Response Time Summary

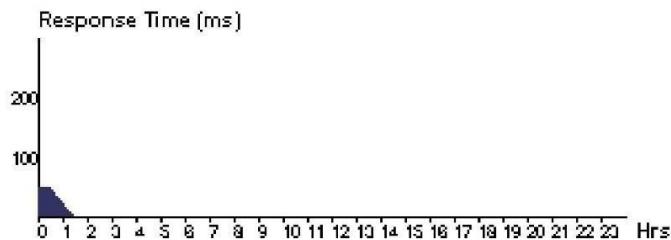
	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
Overall response time:	125.37	37.68	375.14
Data Center processing time:	1.24	0.02	3.28

### Response Time by Region

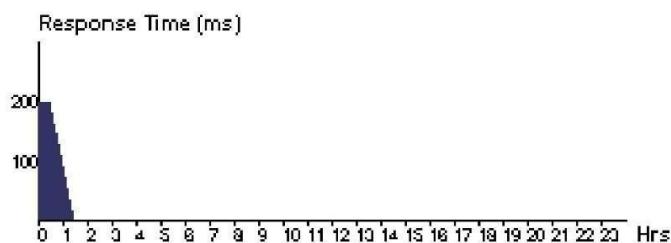
Userbase	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
UB1	51.59	39.66	63.66
UB2	201.65	151.73	254.76
UB3	50.16	37.68	63.45
UB4	299.18	243.14	375.14

### User Base Hourly Response Times

UB1

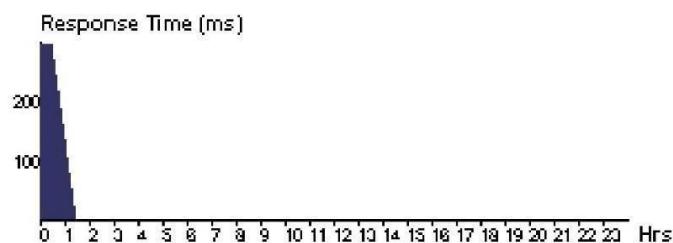
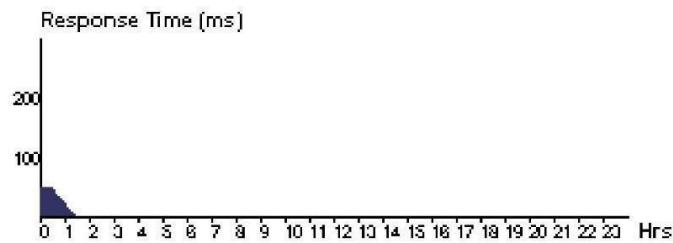


UB2



UB3

UB4



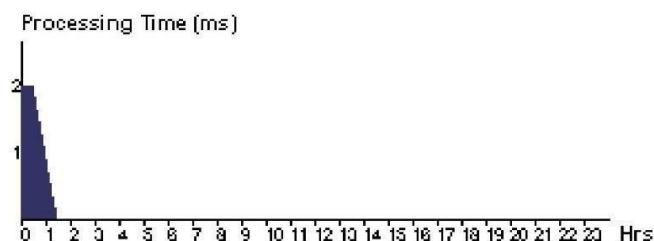
#### Data Center Request Servicing Times

Data Center	Avg (ms)	Min (ms)	Max (ms)
DC1	0.77	0.21	1.40
DC3	2.64	0.62	3.28
DC4	0.51	0.02	1.26

#### Data Center Hourly Average Processing Times

DC1

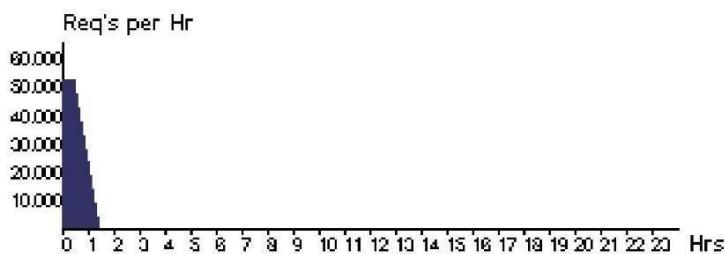
DC3



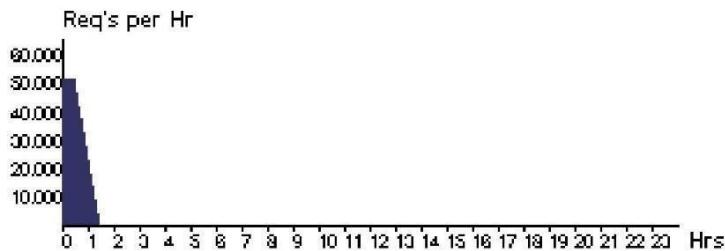
DC4

### Data Center Hourly Loading

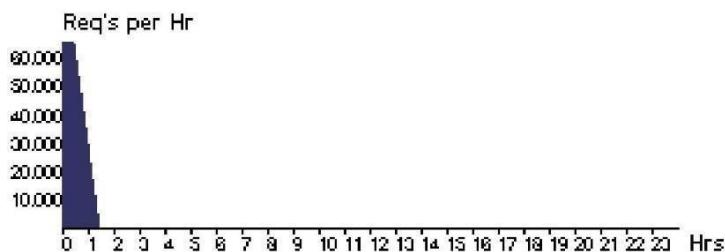
DC1



DC3



DC4



### Cost

Total Virtual Machine Cost (\$): 15.56

Total Data Transfer Cost (\$): 1.78

Grand Total: (\$) 17.34

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC1	5.02	0.55	5.57

DC4	0.50	0.69	1.19
DC3	10.04	0.55	10.58

Results of the Simulation Completed at: 09/12/2021 14:47:11

### Overall Response Time Summary

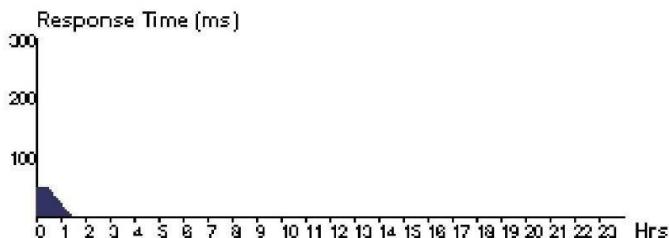
	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
Overall response time:	125.38	38.18	367.63
Data Center processing time:	1.19	0.02	3.28

### Response Time by Region

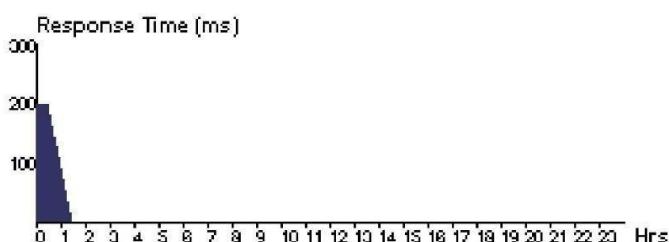
<b>Userbase</b>	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
UB1	51.34	38.92	64.04
UB2	201.69	151.86	252.68
UB3	50.18	38.18	64.19
UB4	300.00	244.64	367.63

### User Base Hourly Response Times

UB1

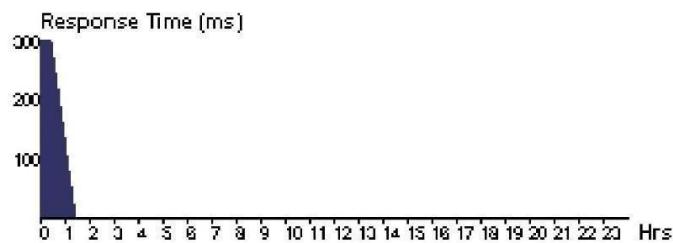
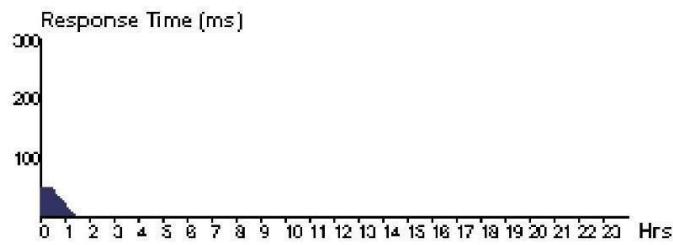


UB2



UB3

UB4



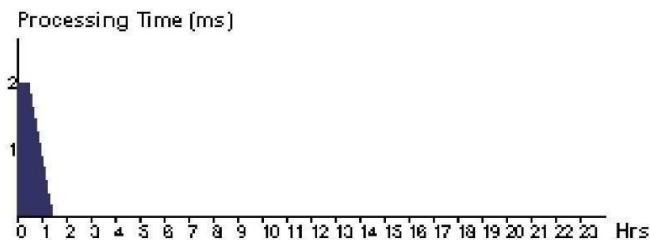
#### Data Center Request Servicing Times

Data Center	Avg (ms)	Min (ms)	Max (ms)
DC1	0.79	0.22	1.40
DC3	2.63	0.60	3.28
DC4	0.51	0.02	1.08

#### Data Center Hourly Average Processing Times

DC1

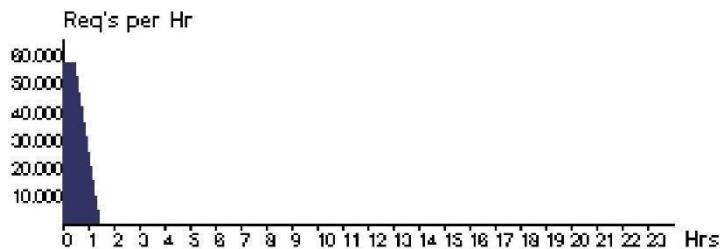
DC3



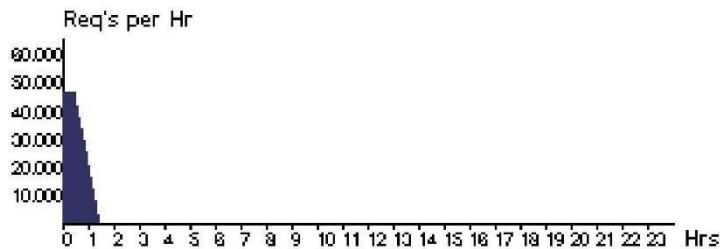
DC4

### Data Center Hourly Loading

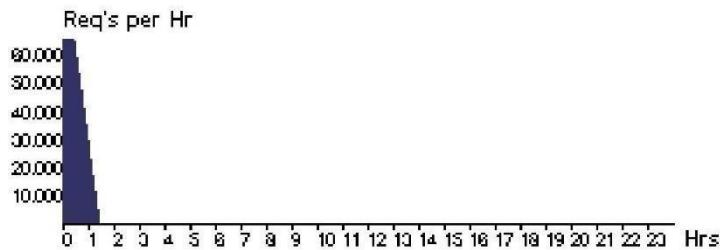
DC1



DC3



DC4



Cost

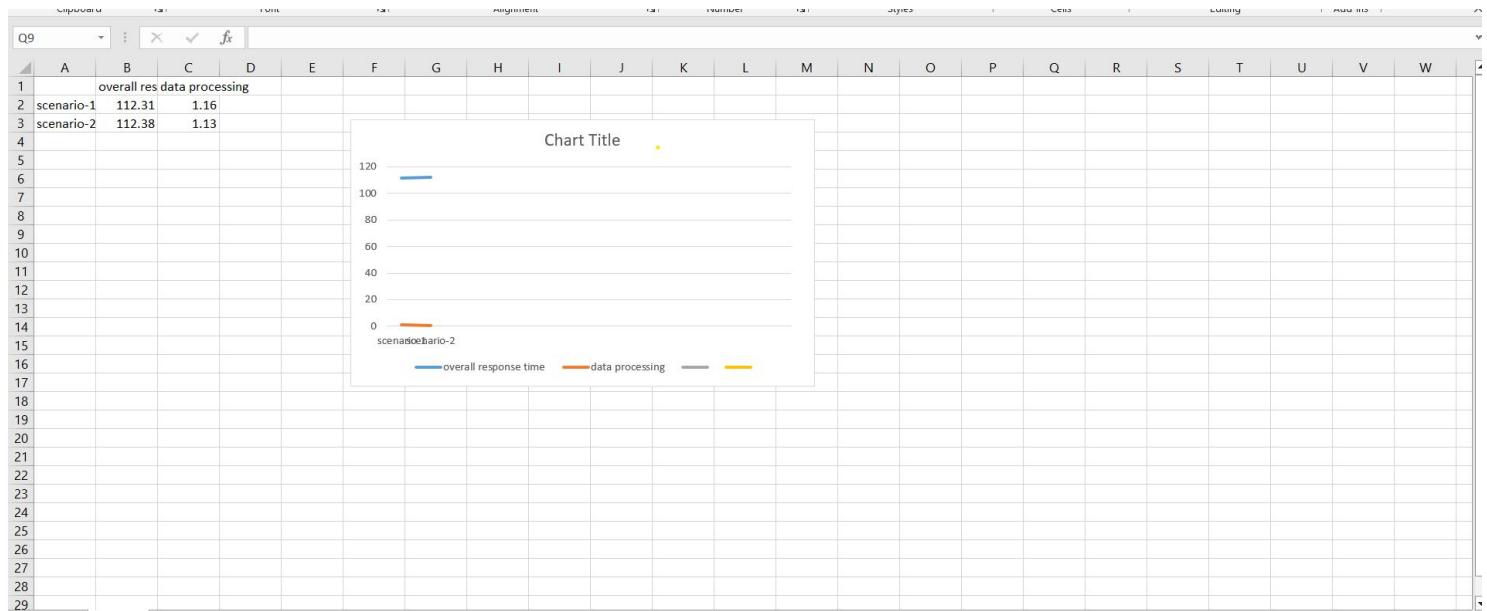
Total Virtual Machine Cost (\$): 15.56

Total Data Transfer Cost (\$): 1.78

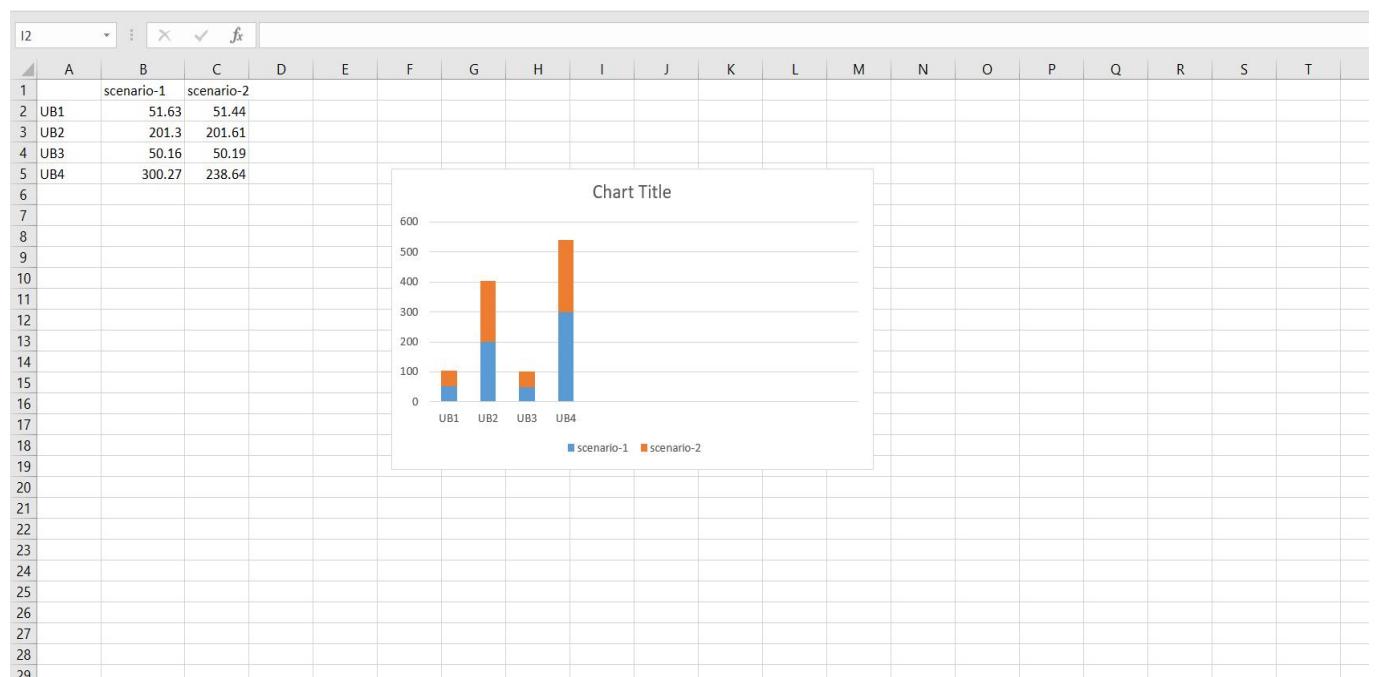
Grand Total: (\$) 17.34

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC1	5.02	0.61	5.62
DC4	0.50	0.69	1.19
DC3	10.04	0.49	10.53

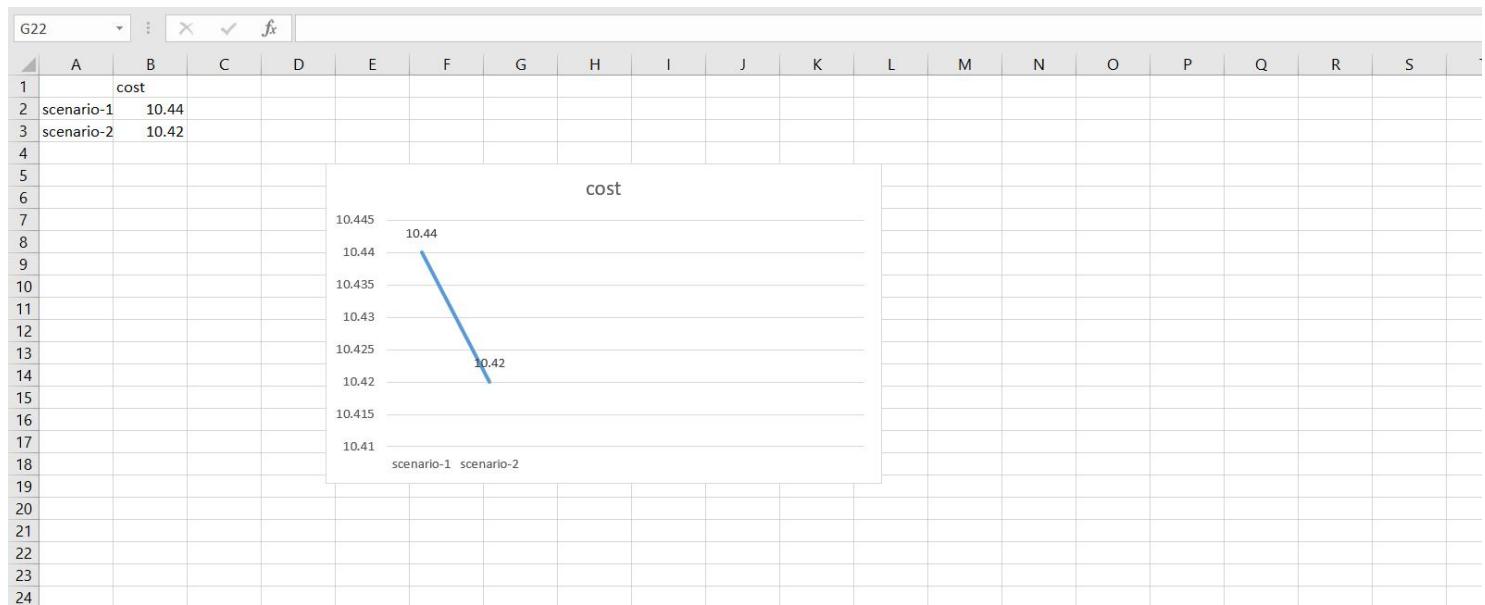
- i) Tabulate and compare the Average response time and data processing time of all the scenarios by plotting the line graph



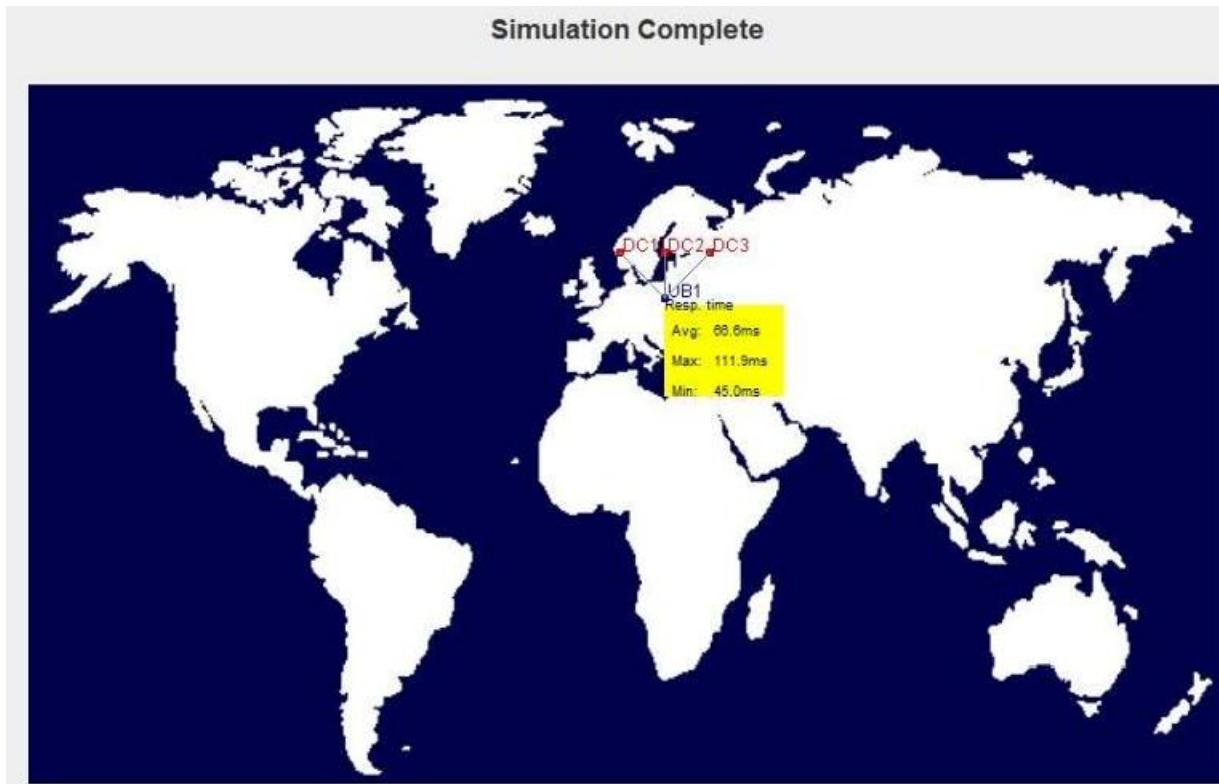
- ii) Tabulate the response time of user bases in all scenarios and compare these by plotting bar graph. Which user base is taking maximum time among three scenarios? Why



iii) Plot the bar graph for data center cost of all scenarios



4)



---

Results of the Simulation Completed at: 09/12/2021 14:49:43

### Overall Response Time Summary

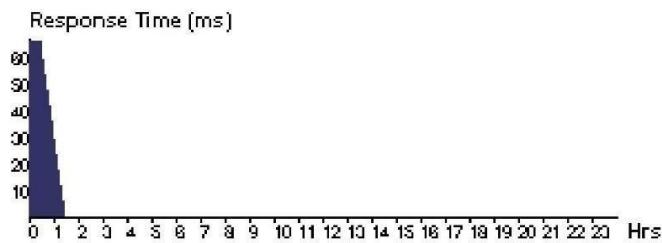
	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
Overall response time:	66.73	44.66	111.86
Data Center processing time:	17.17	0.47	47.03

### Response Time by Region

Userbase	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
UB1	66.73	44.66	111.86

### User Base Hourly Response Times

UB1



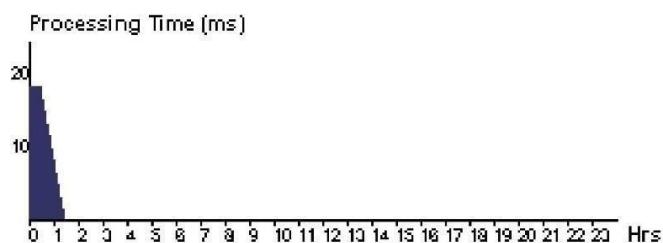
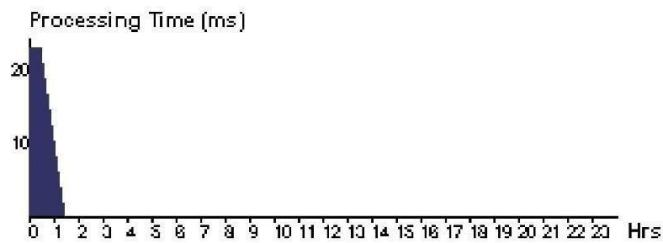
### Data Center Request Servicing Times

Data Center	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
DC1	23.98	0.47	47.03
DC2	18.53	1.07	32.00
DC3	8.58	0.55	16.68

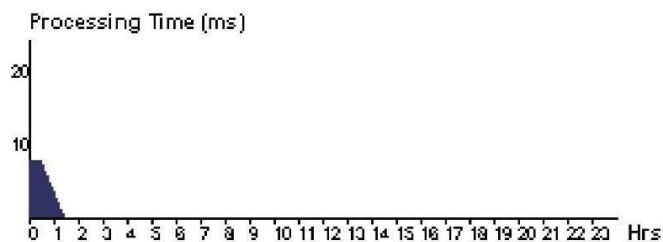
### Data Center Hourly Average Processing Times

DC1

DC2

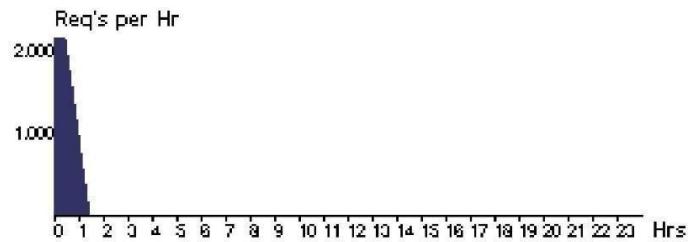


DC3

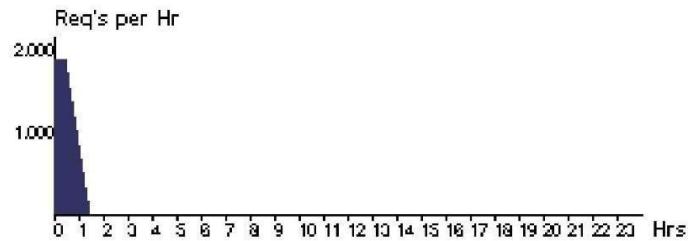


#### Data Center Hourly Loading

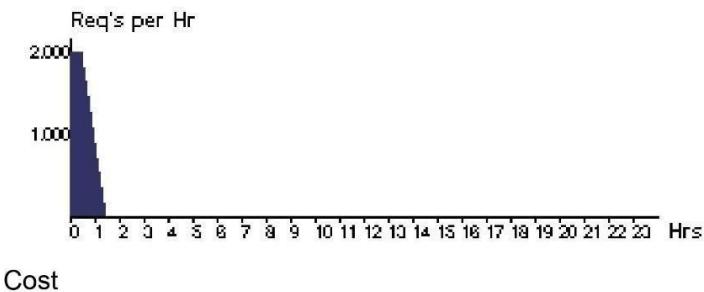
DC1



DC2



DC3



Cost

Total Virtual Machine Cost (\$): 15.21

Total Data Transfer Cost (\$): 0.06

Grand Total: (\$) 15.27

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC2	5.07	0.02	5.09
DC1	7.61	0.02	7.63
DC3	2.54	0.02	2.55

Results of the Simulation Completed at: 09/12/2021 14:50:50

### Overall Response Time Summary

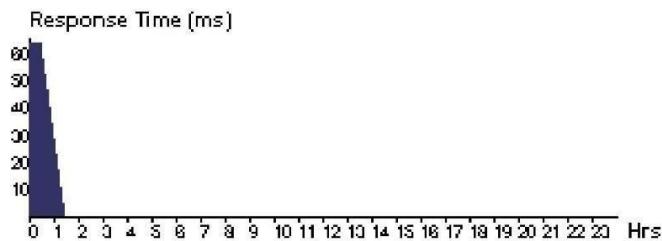
	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
Overall response time:	64.96	41.61	101.28
Data Center processing time:	15.23	0.40	47.53

### Response Time by Region

Userbase	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
UB1	64.96	41.61	101.28

### User Base Hourly Response Times

UB1



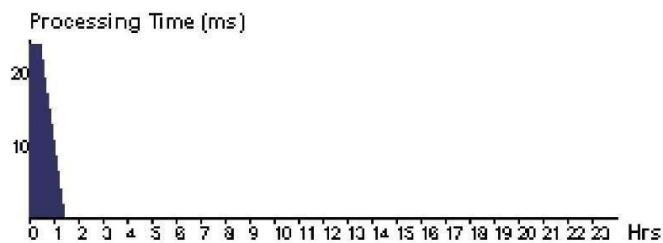
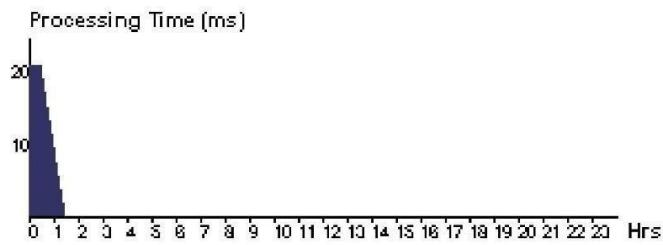
### Data Center Request Servicing Times

Data Center	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
DC1	21.19	1.18	47.53
DC2	24.52	0.82	31.69
DC3	8.34	0.40	16.84

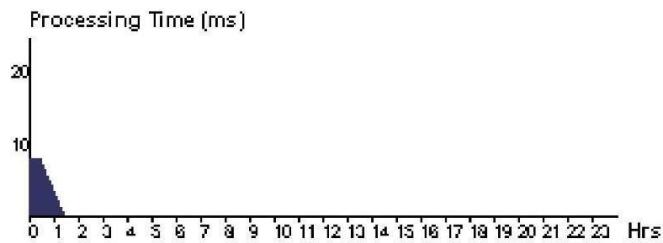
### Data Center Hourly Average Processing Times

DC1

DC2

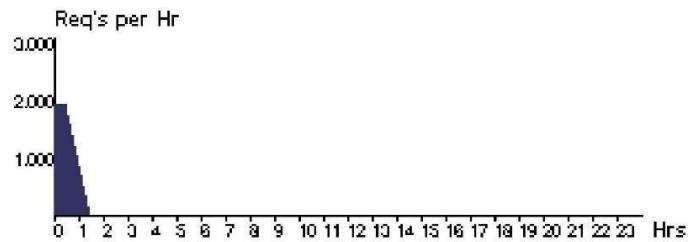


DC3

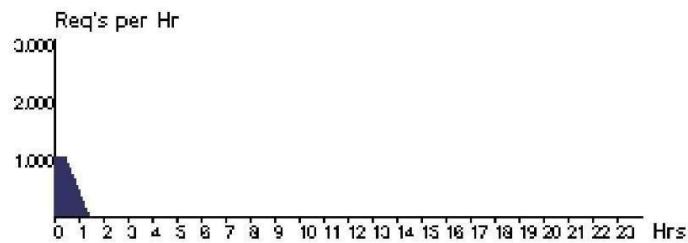


#### Data Center Hourly Loading

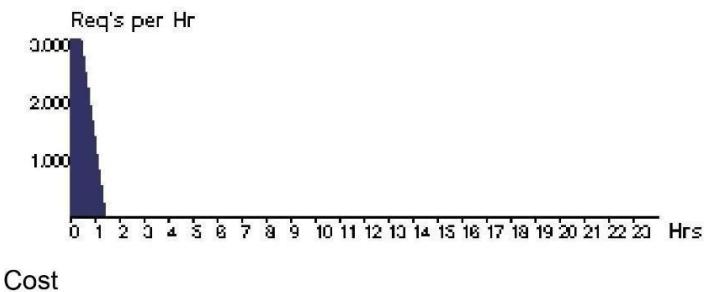
DC1



DC2



DC3



Cost

Total Virtual Machine Cost (\$): 15.21

Total Data Transfer Cost (\$): 0.06

Grand Total: (\$) 15.27

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC2	5.07	0.01	5.08
DC1	7.61	0.02	7.62
DC3	2.54	0.03	2.56

Results of the Simulation Completed at: 09/12/2021 14:51:55

### Overall Response Time Summary

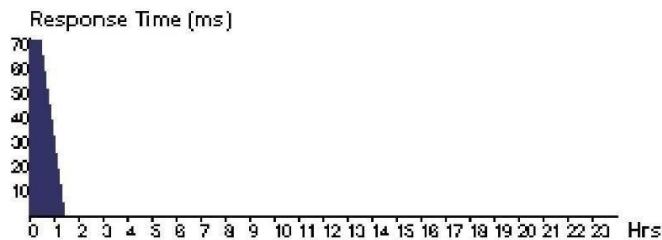
	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
Overall response time:	72.06	44.73	115.46
Data Center processing time:	22.37	0.40	63.62

### Response Time by Region

Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	72.06	44.73	115.46

### User Base Hourly Response Times

UB1



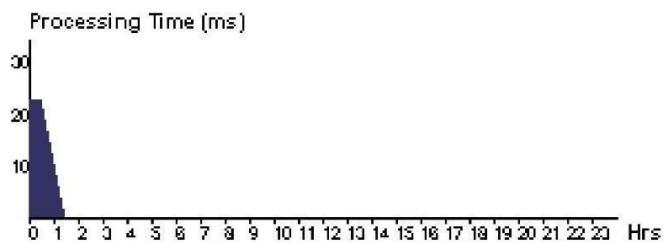
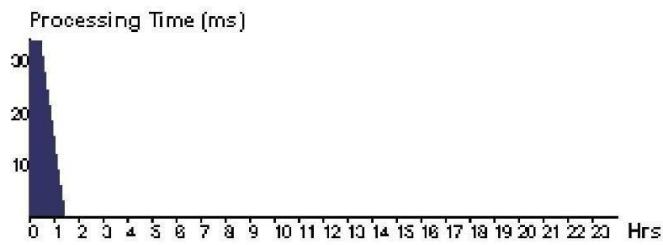
### Data Center Request Servicing Times

Data Center	Avg (ms)	Min (ms)	Max (ms)
DC1	34.10	1.13	63.62
DC2	23.20	0.65	53.47
DC3	9.94	0.40	36.43

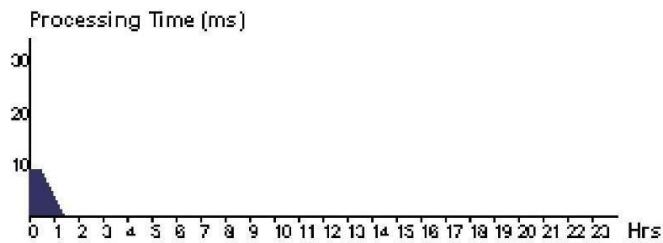
### Data Center Hourly Average Processing Times

DC1

DC2

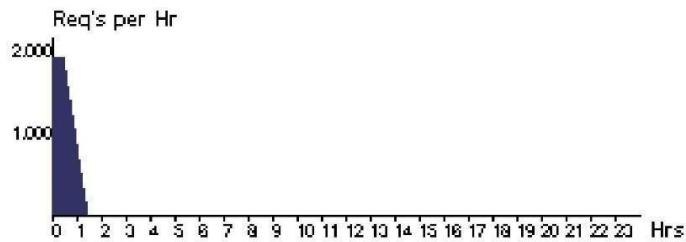


DC3

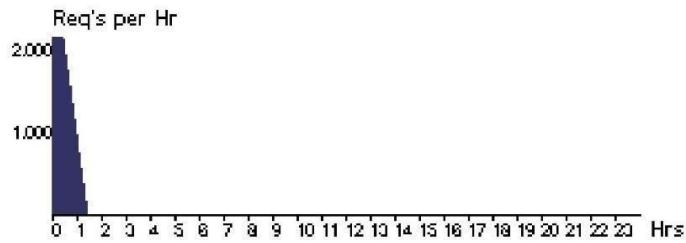


#### Data Center Hourly Loading

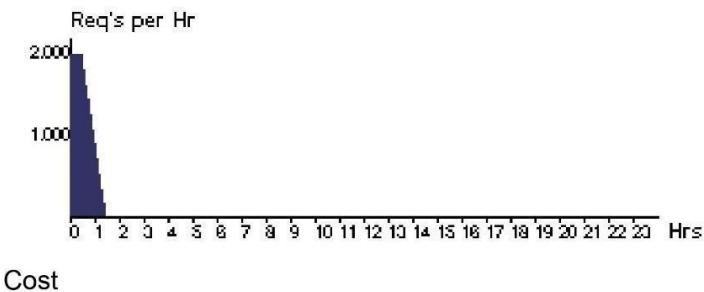
DC1



DC2



DC3



Cost

Total Virtual Machine Cost (\$): 19.71

Total Data Transfer Cost (\$): 0.06

Grand Total: (\$) 19.77

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC2	6.67	0.02	6.69
DC1	8.82	0.02	8.84
DC3	4.22	0.02	4.24

---

Results of the Simulation Completed at: 09/12/2021 14:54:20

### Overall Response Time Summary

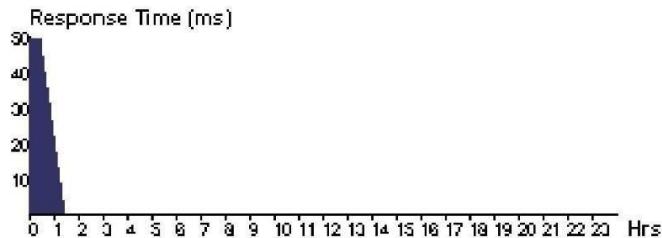
	Avg (ms)	Min (ms)	Max (ms)
Overall response time:	50.16	37.62	60.91
Data Center processing time:	0.49	0.02	0.92

### Response Time by Region

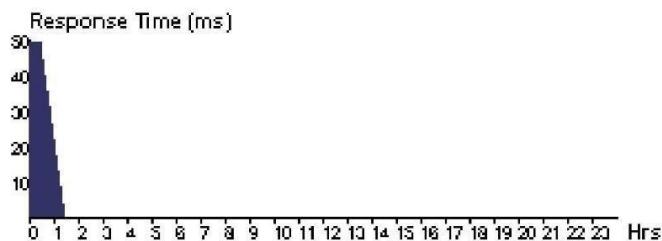
Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	50.09	37.62	60.37
UB2	50.24	42.17	58.67
UB3	50.43	42.16	60.91
UB4	49.43	39.16	58.66
UB5	50.62	42.66	60.91
UB6	50.19	42.59	59.88

### User Base Hourly Response Times

UB1

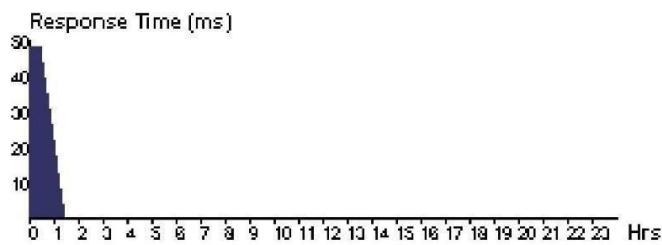
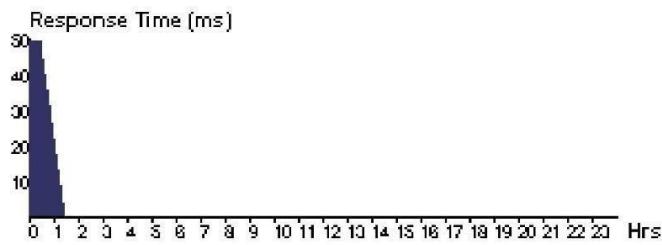


UB2

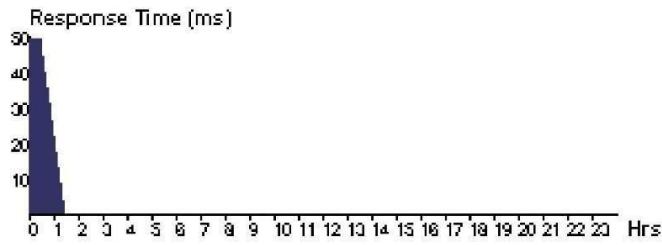


UB3

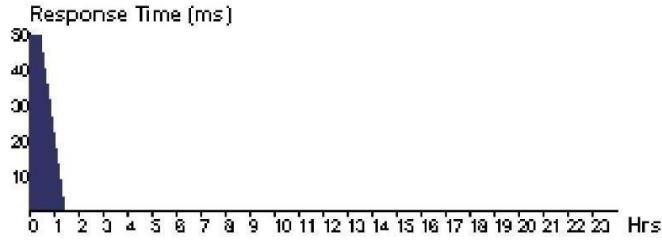
UB4



UB5



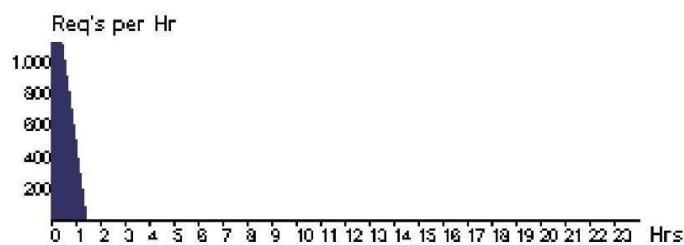
UB6



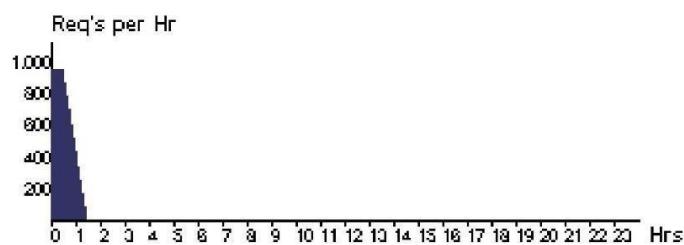
#### Data Center Request Servicing Times

Data Center	Avg (ms)	Min (ms)	Max (ms)
DC10	0.49	0.09	0.88
DC1	0.40	0.03	0.86
DC2	0.52	0.10	0.92
DC3	0.52	0.11	0.92
DC4	0.54	0.02	0.91
DC5	0.47	0.15	0.90
DC6	0.57	0.09	0.90
DC7	0.46	0.03	0.90
DC8	0.52	0.07	0.90

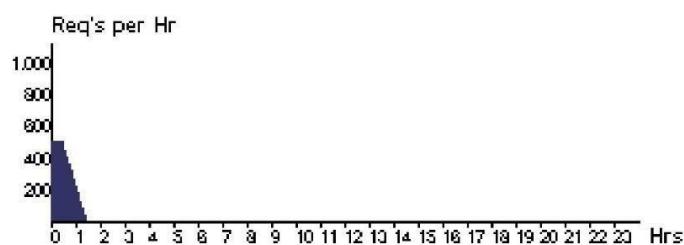
DC1



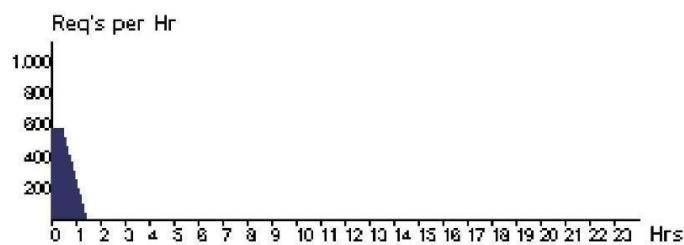
DC10



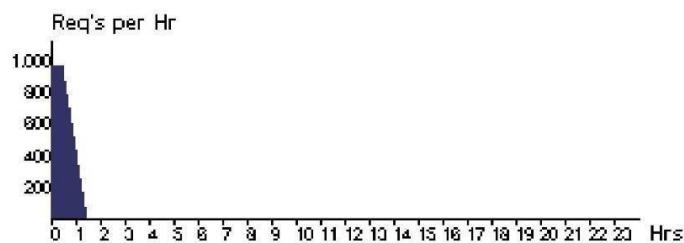
DC2



DC3

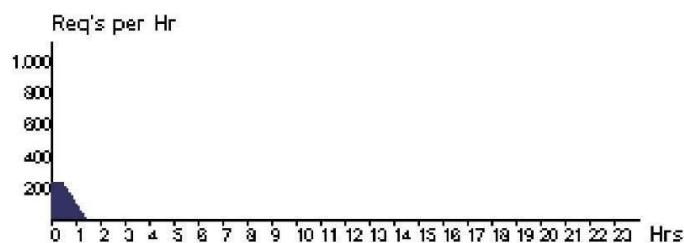
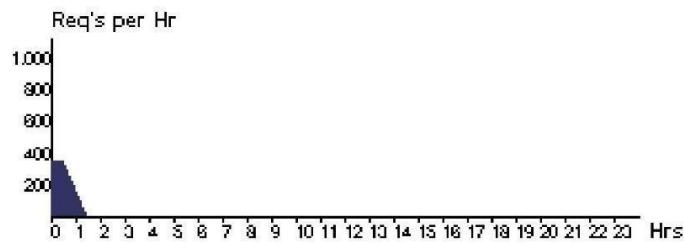


DC4

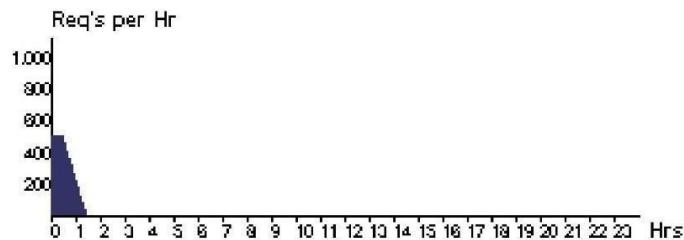


DC5

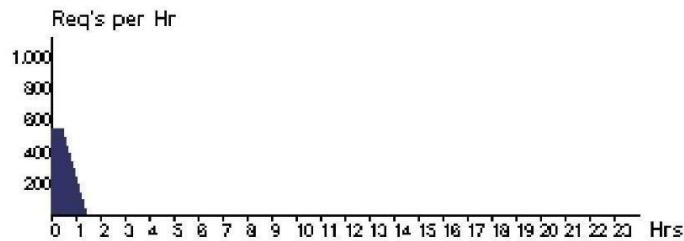
DC6



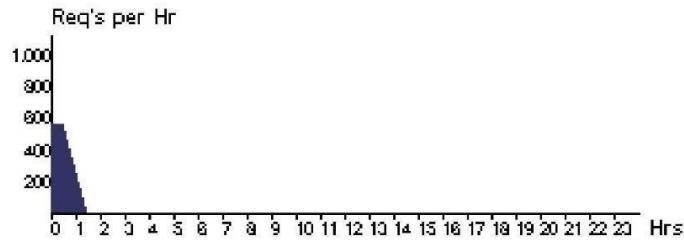
DC7



DC8



DC9

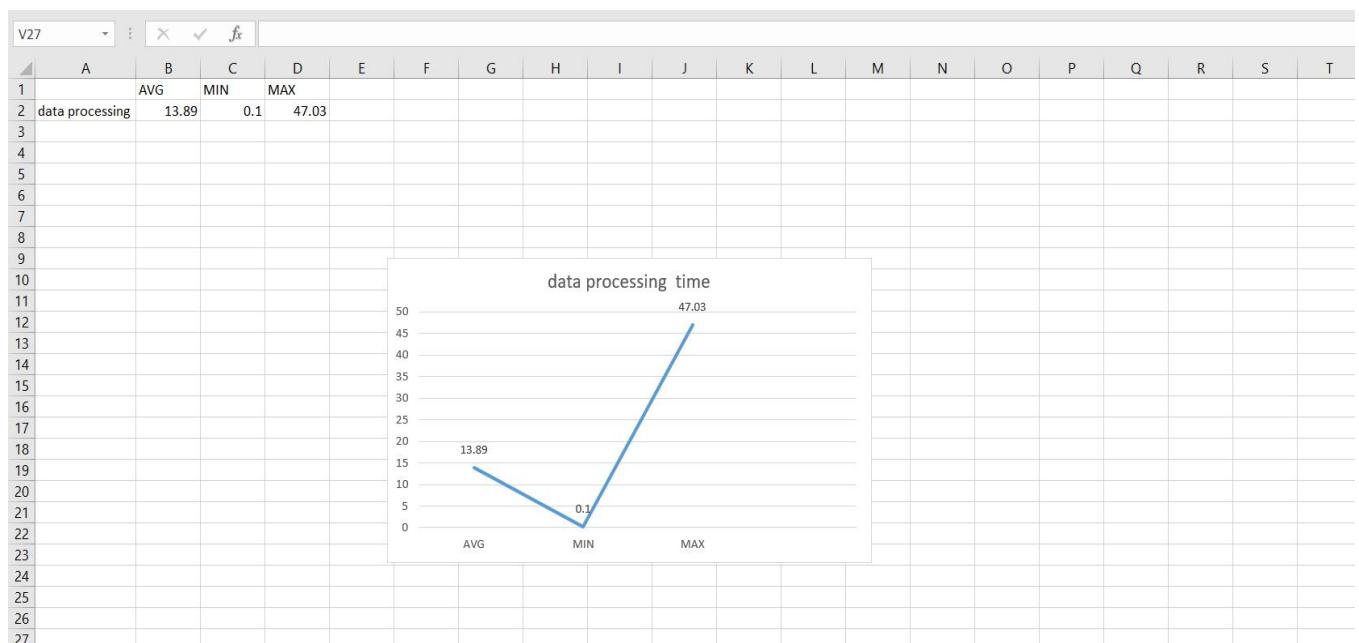


Cost

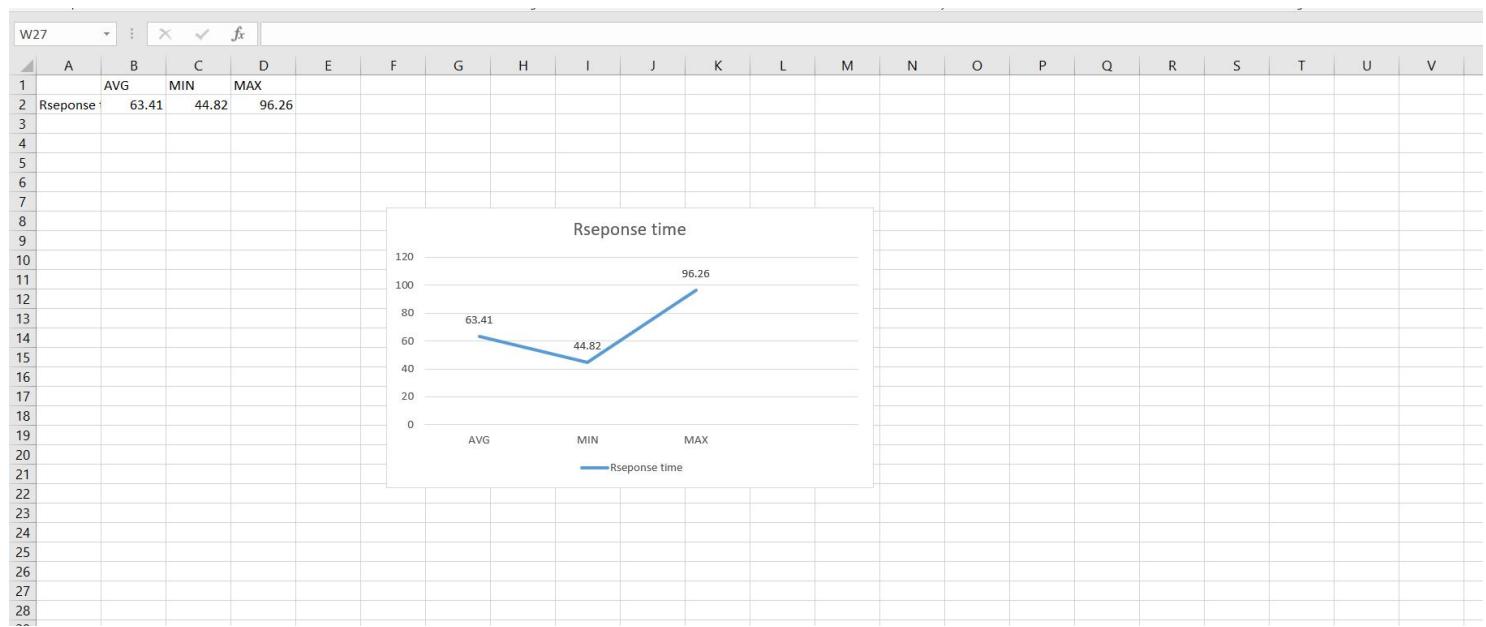
Total Virtual Machine Cost (\$):	0.99
Total Data Transfer Cost (\$):	0.07
Grand Total: (\$)	1.05

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC10	0.08	0.01	0.09
DC2	0.10	0.01	0.11
DC1	0.10	0.01	0.11
DC4	0.10	0.01	0.11
DC3	0.10	0.01	0.11
DC6	0.10	0.00	0.10
DC5	0.10	0.00	0.10
DC8	0.10	0.01	0.11
DC7	0.10	0.01	0.11
DC9	0.10	0.01	0.11

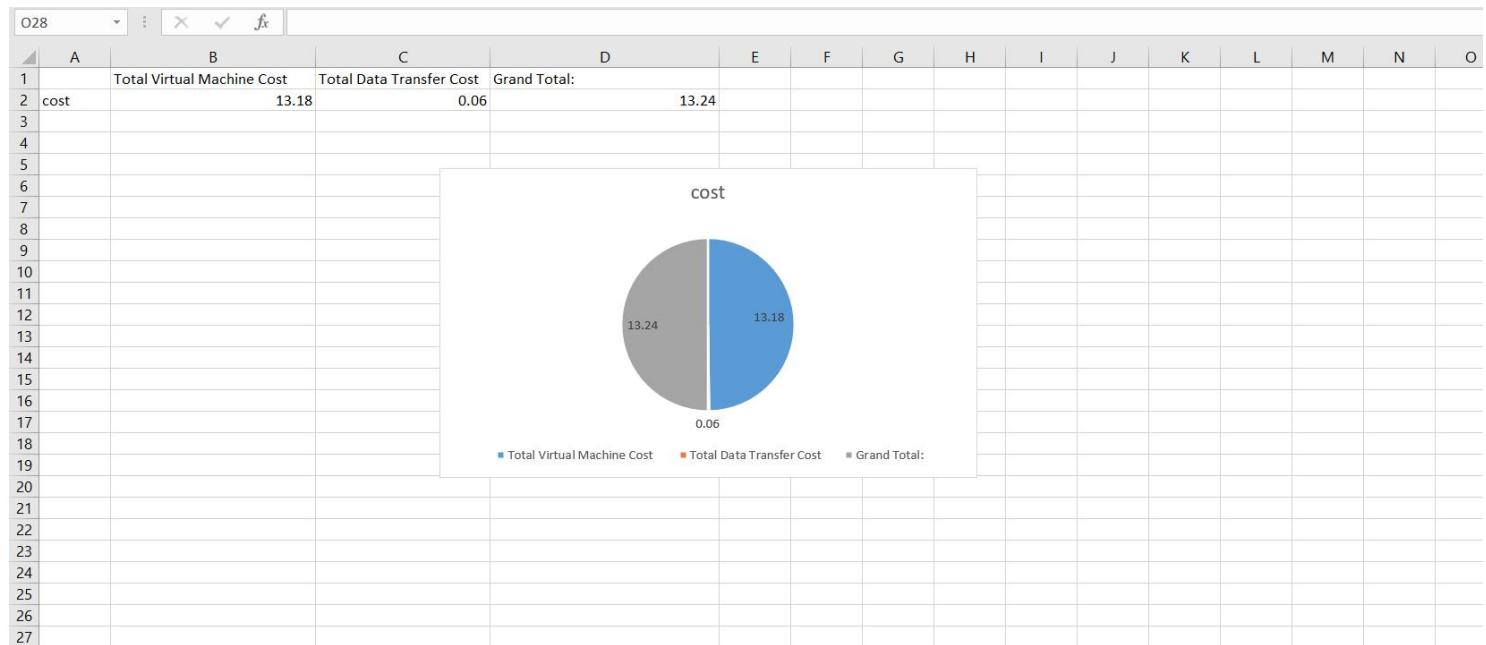
- a) Tabulate and compare the data processing time of service broker policies by plotting the line graph



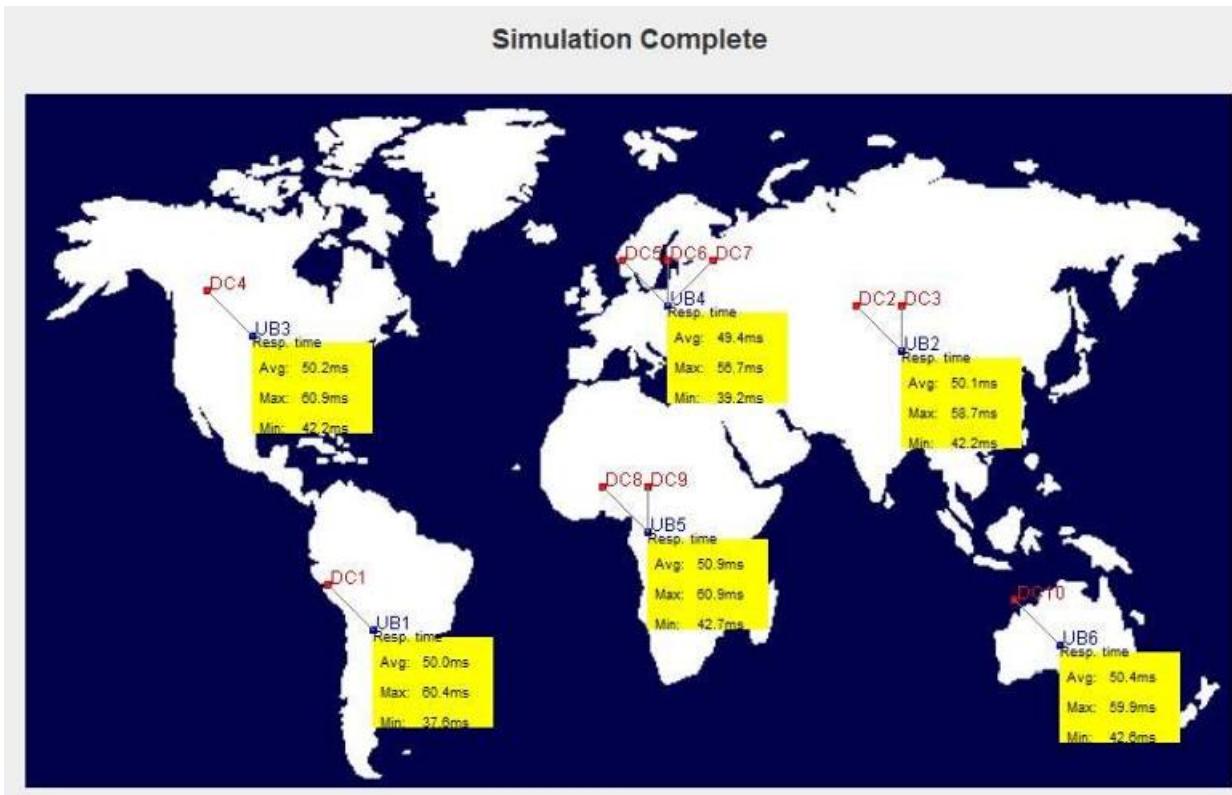
b) Tabulate and compare response time of service broker policies by plotting the bar graph



c) Tabulate the cost for service broker policies and represent it using pie chart



5).



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Results of the Simulation Completed at: 09/12/2021 14:55:35

### Overall Response Time Summary

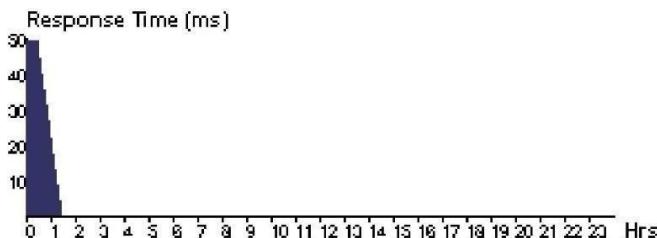
	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
Overall response time:	50.16	37.62	60.93
Data Center processing time:	0.49	0.02	0.92

### Response Time by Region

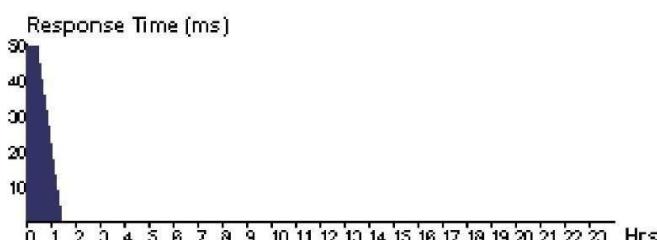
Userbase	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
UB1	50.11	37.62	60.12
UB2	50.42	42.17	60.93
UB3	50.00	42.16	60.91
UB4	49.61	39.16	60.41
UB5	50.54	42.66	57.66
UB6	50.28	42.59	59.88

### User Base Hourly Response Times

UB1

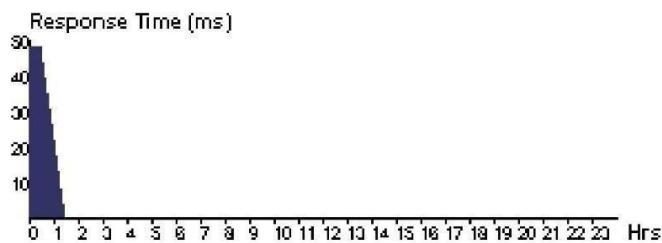
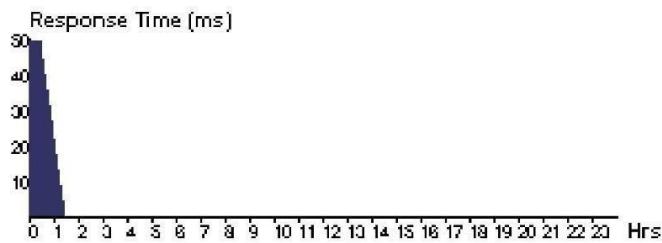


UB2

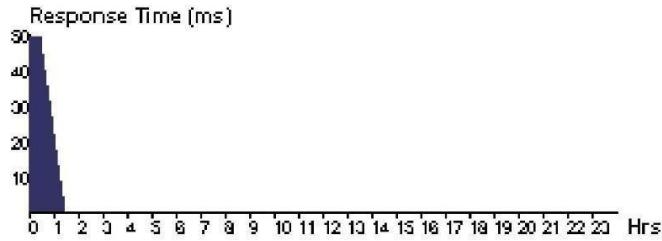


UB3

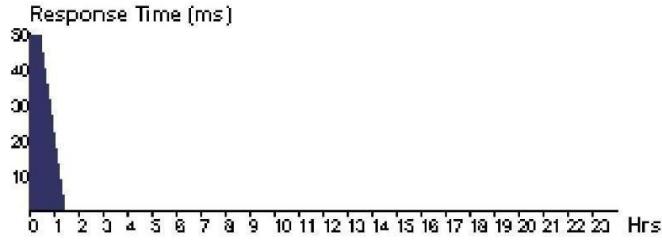
UB4



UB5



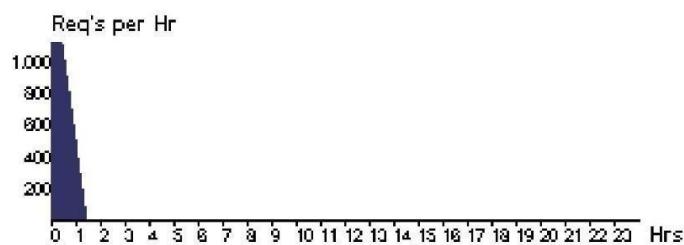
UB6



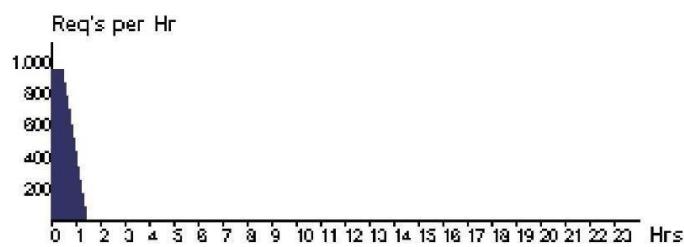
### Data Center Request Servicing Times

Data Center	Avg (ms)	Min (ms)	Max (ms)
DC10	0.48	0.09	0.88
DC1	0.42	0.03	0.86
DC2	0.53	0.11	0.92
DC3	0.52	0.10	0.92
DC4	0.52	0.02	0.91
DC5	0.46	0.15	0.90
DC6	0.51	0.15	0.90
DC7	0.45	0.08	0.90
DC8	0.57	0.07	0.91

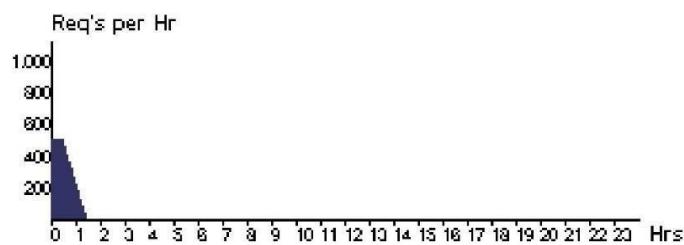
DC1



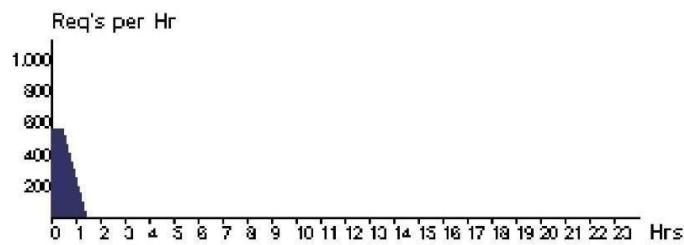
DC10



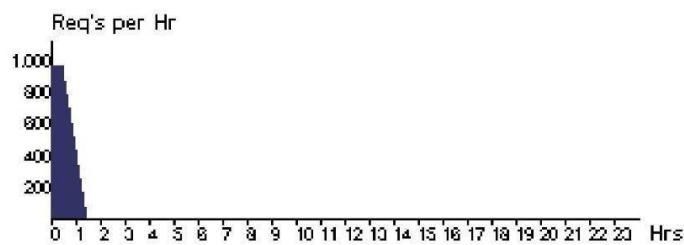
DC2



DC3

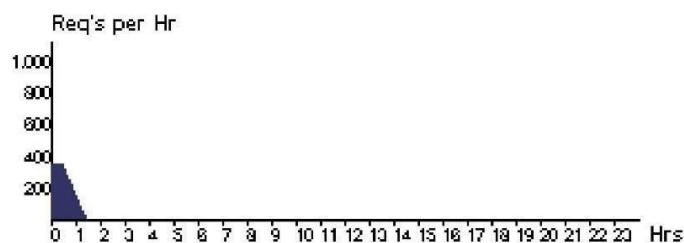
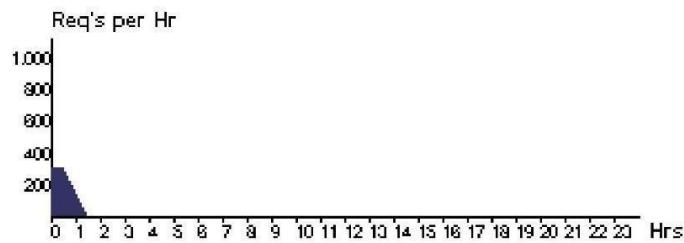


DC4

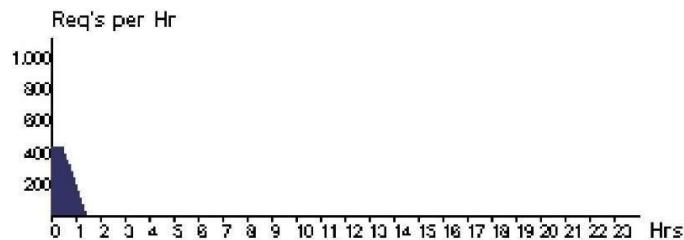


DC5

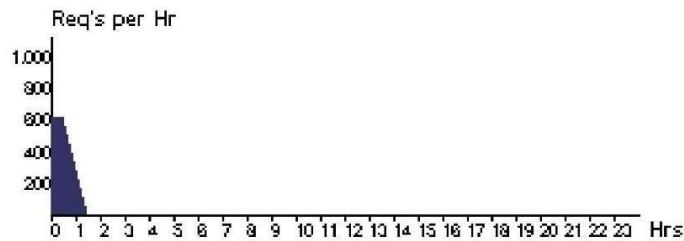
DC6



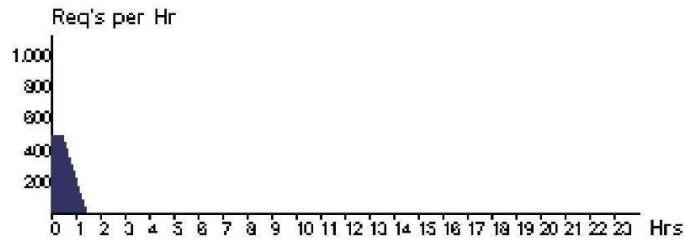
DC7



DC8



DC9



Cost

Total Virtual Machine Cost (\$):	0.99
Total Data Transfer Cost (\$):	0.07
Grand Total: (\$)	1.05

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC10	0.08	0.01	0.09
DC2	0.10	0.01	0.11
DC1	0.10	0.01	0.11
DC4	0.10	0.01	0.11
DC3	0.10	0.01	0.11
DC6	0.10	0.00	0.10
DC5	0.10	0.00	0.10
DC8	0.10	0.01	0.11
DC7	0.10	0.00	0.11
DC9	0.10	0.01	0.11

Results of the Simulation Completed at: 09/12/2021 14:56:36

### Overall Response Time Summary

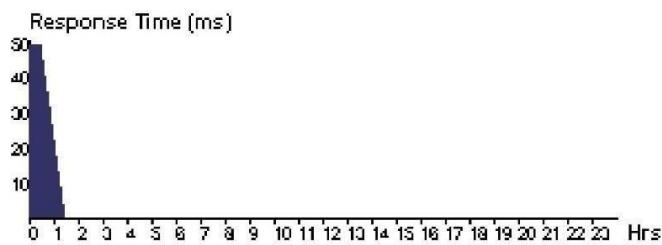
	<b>Avg (ms)</b>	<b>Min (ms)</b>	<b>Max (ms)</b>
Overall response time:	50.16	37.62	60.91
Data Center processing time:	0.49	0.02	0.92

### Response Time by Region

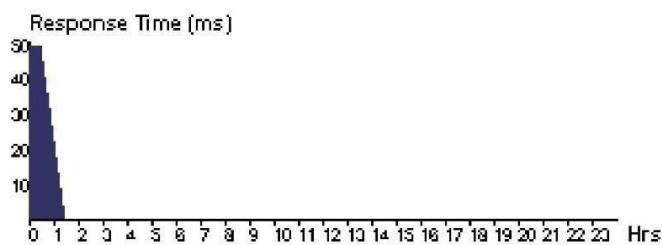
Userbase	Avg (ms)	Min (ms)	Max (ms)
UB1	50.01	37.62	60.37
UB2	50.22	43.07	58.67
UB3	50.33	42.16	60.91
UB4	49.49	39.16	58.66
UB5	50.66	42.16	57.66
UB6	50.30	42.59	59.88

### User Base Hourly Response Times

UB1

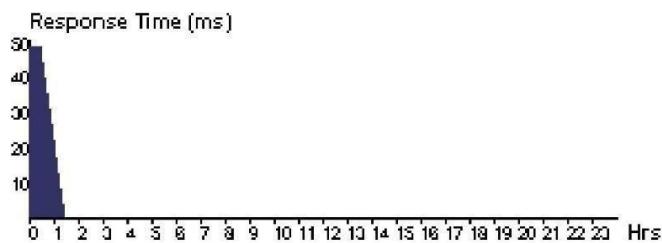
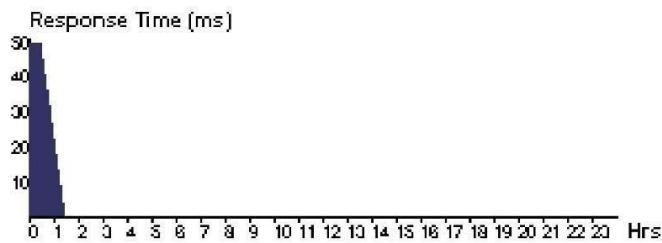


UB2

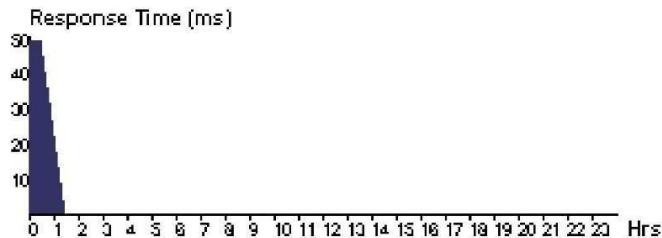


UB3

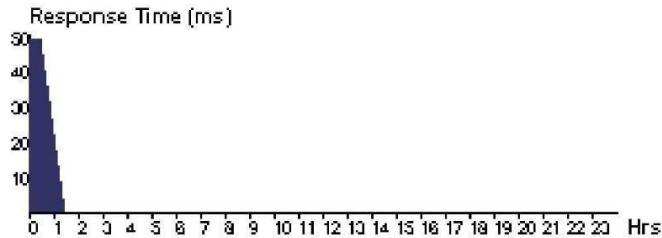
UB4



UB5



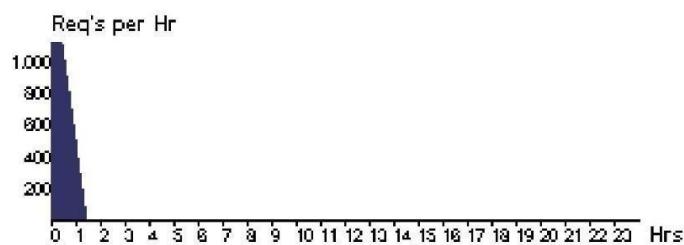
UB6



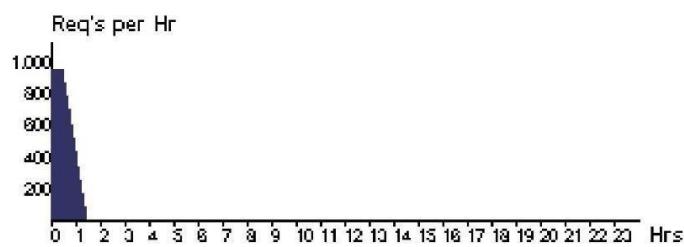
#### Data Center Request Servicing Times

Data Center	Avg (ms)	Min (ms)	Max (ms)
DC10	0.49	0.09	0.88
DC1	0.43	0.03	0.86
DC2	0.53	0.11	0.92
DC3	0.51	0.10	0.92
DC4	0.52	0.02	0.91
DC5	0.46	0.09	0.90
DC6	0.48	0.03	0.90
DC7	0.49	0.08	0.90
DC8	0.52	0.07	0.91

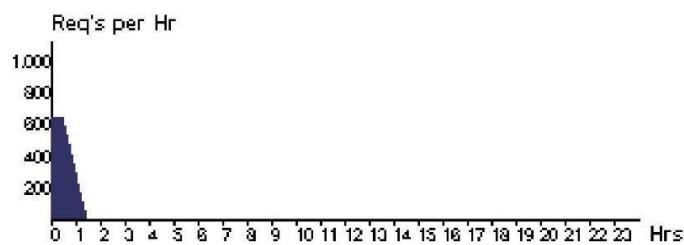
DC1



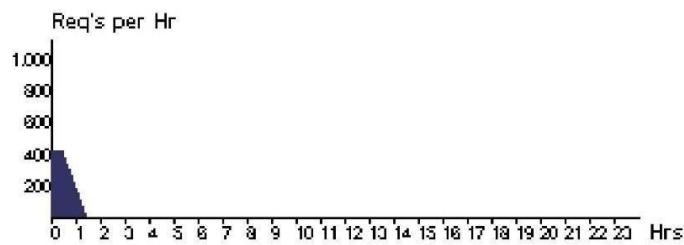
DC10



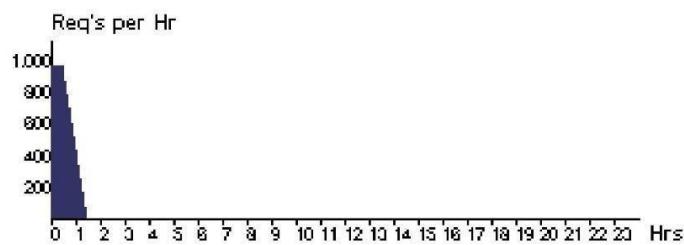
DC2



DC3

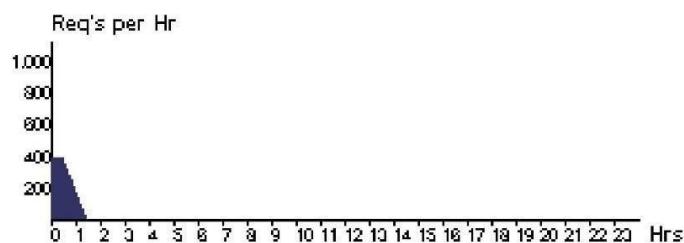
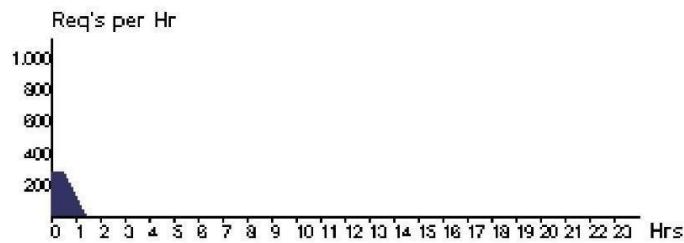


DC4

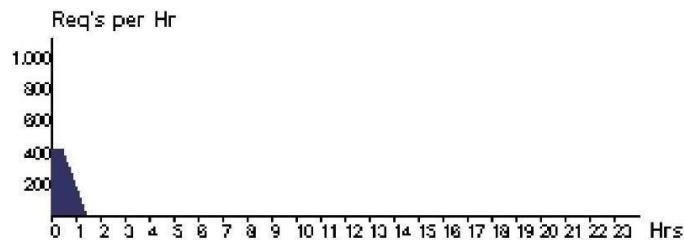


DC5

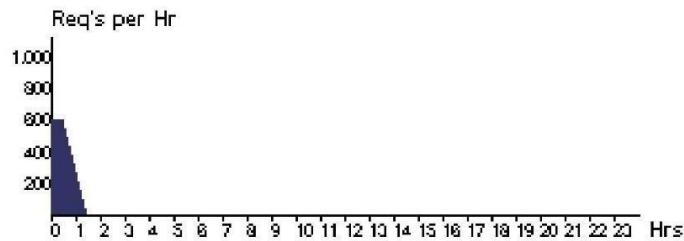
DC6



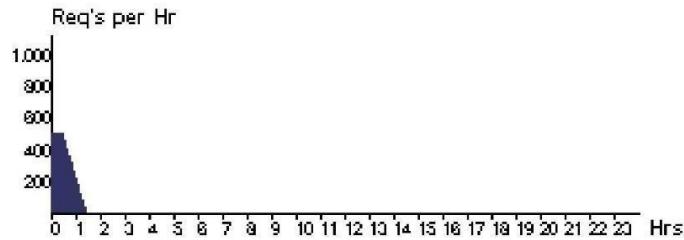
DC7



DC8



DC9

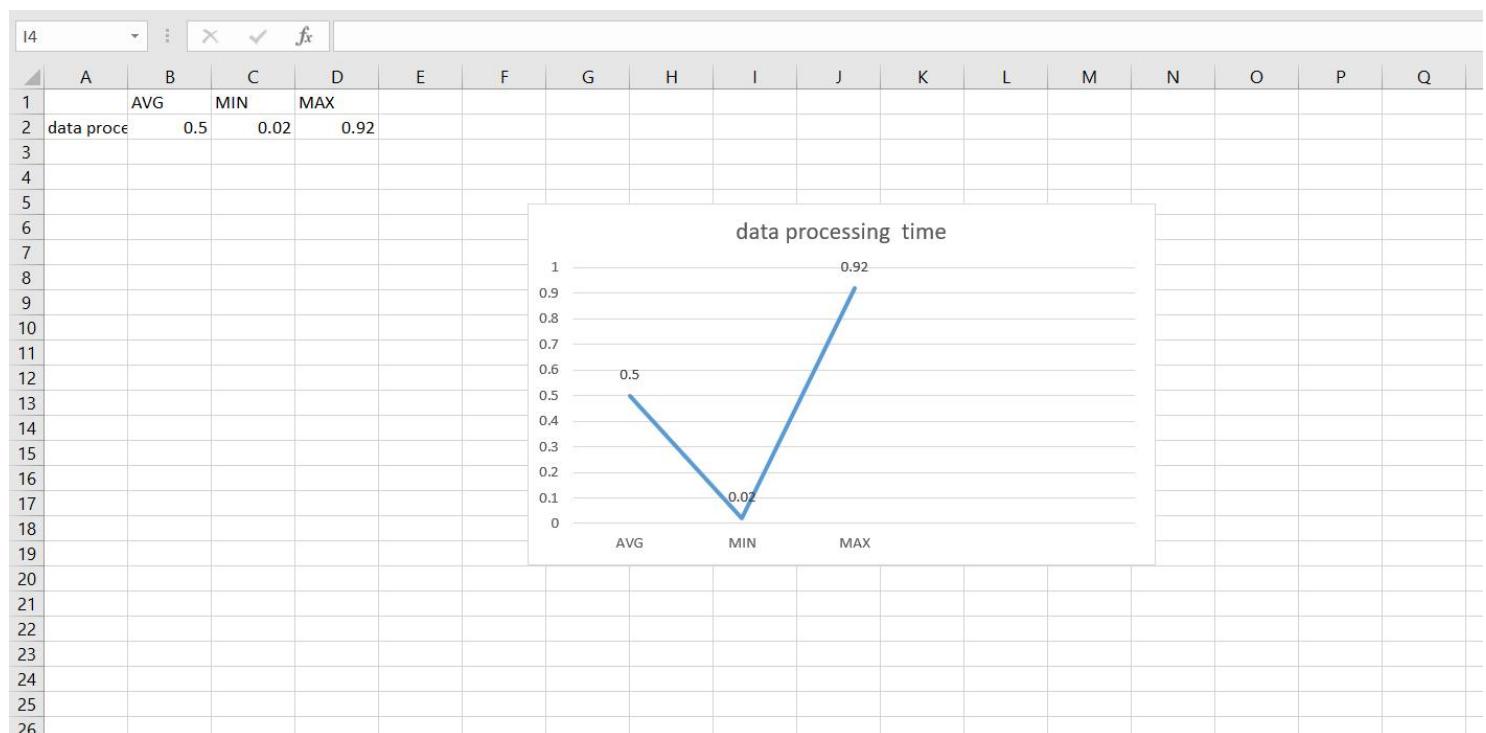


Cost

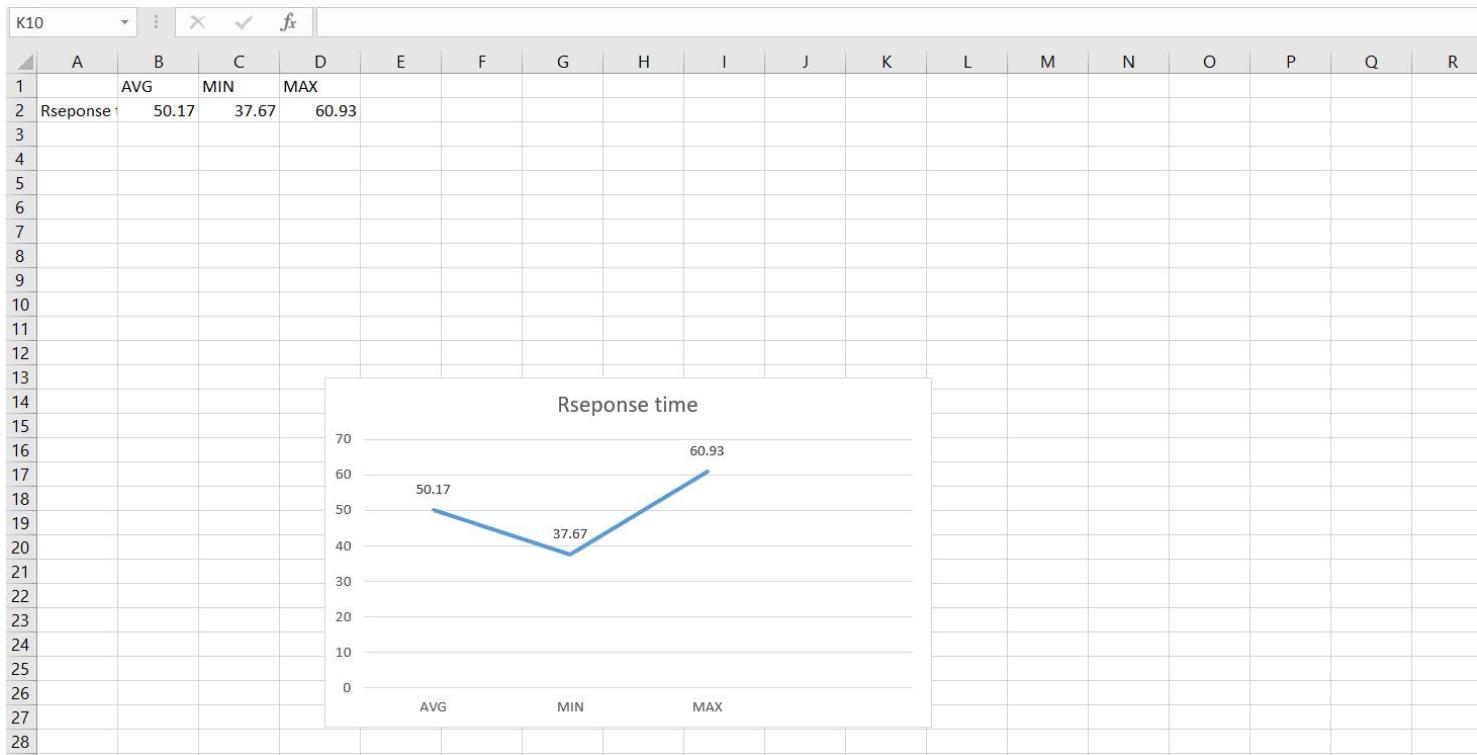
Total Virtual Machine Cost (\$):	0.99
Total Data Transfer Cost (\$):	0.07
Grand Total: (\$)	1.05

Data Center	VM Cost \$	Data Transfer Cost \$	Total \$
DC10	0.08	0.01	0.09
DC2	0.10	0.01	0.11
DC1	0.10	0.01	0.11
DC4	0.10	0.01	0.11
DC3	0.10	0.00	0.10
DC6	0.10	0.00	0.10
DC5	0.10	0.00	0.10
DC8	0.10	0.01	0.11
DC7	0.10	0.00	0.10
DC9	0.10	0.01	0.11

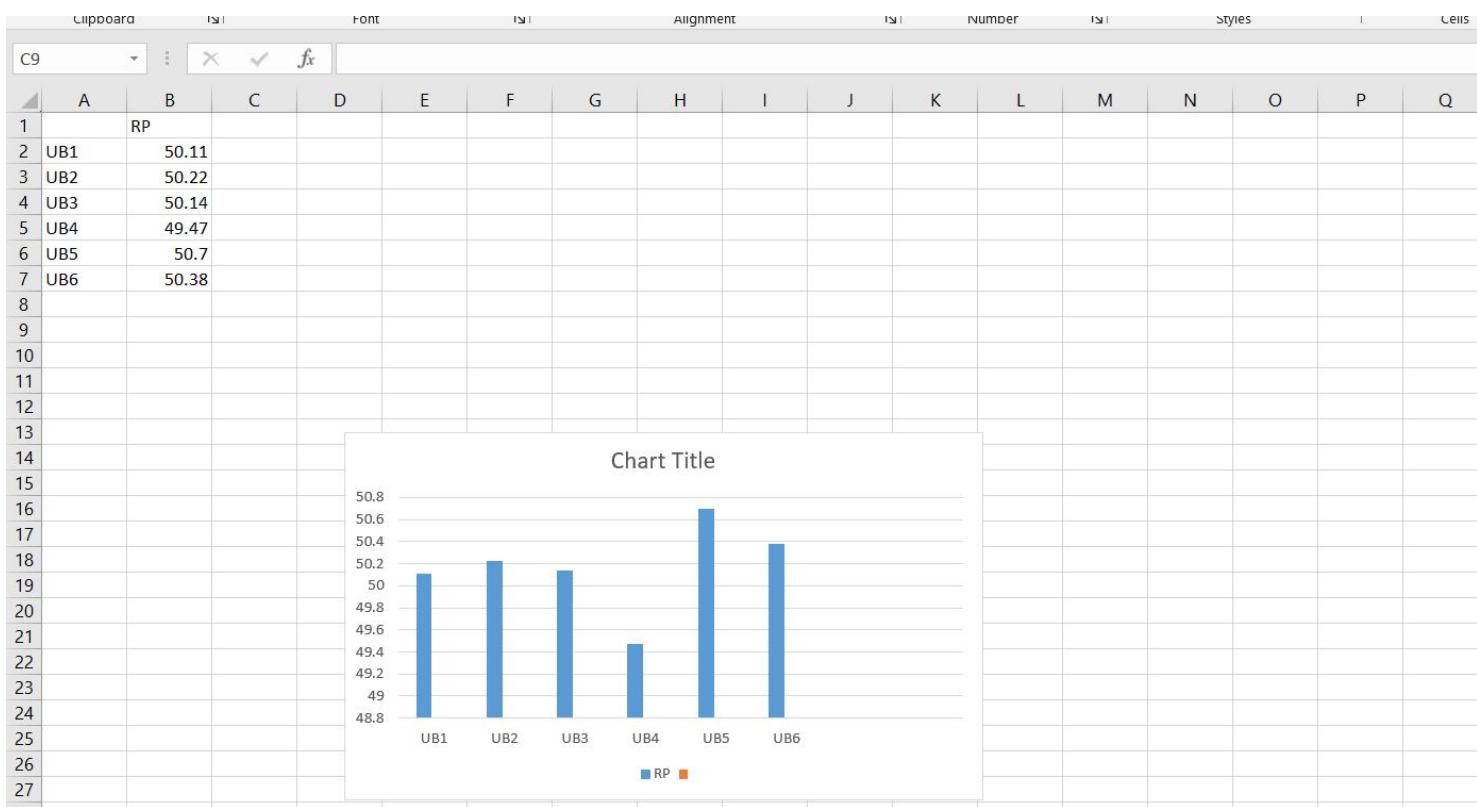
- a) Tabulate and compare the data processing time of load balancing algorithms by plotting the line graph



b) Tabulate the response time of load balancing algorithms by plotting the bar graph



c) Tabulate the response time by region for load balancing algorithms and plot bar graph



## 4A - Create a RDS and launch in your custom VPC network

Step 1: Open -AWS Management Console|. Click on -VPC| service.

Step 2: Click -Subnets| on the left panel.

Step 3: Now you can see there is one subnet group (Public Subnet) created in your VPC (Your VPC id/11.0.0.0/16). Now Click on -Create Subnet| button.

The screenshot shows the AWS Management Console Home page. The navigation bar at the top has 'aws' and 'Services' selected, with 'vpc' typed into the search bar. Below the navigation bar, there's a banner about new Managed Instances, Ops summary, and Patch compliance widgets. On the left, there's a 'Recently visited' sidebar with links to EC2, S3, AWS Cost Explorer, RDS, VPC, and AWS Budgets. To the right, there's a 'Welcome to AWS' section with links to Getting started with AWS, Training and certification, and What's new with AWS. At the bottom, there are sections for AWS Health and Cost and usage, along with a search bar and system status indicators.

The screenshot shows the VPC Management Console. The URL in the address bar is ap-south-1.console.aws.amazon.com/vpc/home?region=ap-south-1#CreateVpc:createMode=vpcOnly. The navigation bar shows 'VPC > Your VPCs > Create VPC'. The main page is titled 'Create VPC' with a sub-section 'VPC settings'. It includes fields for 'Resources to create' (radio buttons for 'VPC only' and 'VPC and more', with 'VPC only' selected), 'Name tag - optional' (text input field containing 'myvpc1'), 'IPv4 CIDR block' (radio buttons for 'IPv4 CIDR manual input' and 'IPAM-allocated IPv4 CIDR block', with 'IPv4 CIDR manual input' selected), and 'IPv4 CIDR' (text input field containing '10.0.0.0/24'). There are also sections for 'IPv6 CIDR block' (radio buttons for 'No IPv6 CIDR block', 'IPAM-allocated IPv6 CIDR block', 'Amazon-provided IPv6 CIDR block', and 'IPv6 CIDR owned by me', with 'No IPv6 CIDR block' selected). The bottom of the screen shows the Windows taskbar with various pinned icons and system status.

Step 4: Give a Name to the subnet and select you own VPC from the -VPC drop down|. Select an -availability zone| (Which is not used by -Public Subnet| of your VPC). Give CIDR block range. Click on -Yes, Create| button.

Step 5: Now you can see the subnet is created in your VPC.

Step 6: Click on -Services|. Click on -RDS| service.

Step 7: Click on -Subnet Groups| on the left panel. (Note: Before creating the subnet groups you need to note down your VPC ID and subnets for that VPC).

Step 8: Click on -Create DB Subnet Group| button.

Step 9: Give a name to the -Subnet|. Select your own -VPC ID|. Select the -Availability Zone| and -subnet|. Click on -Add| button.

The screenshot shows the AWS VPC Management Console. A success message at the top says "You successfully created **vpc-0c86b3413b4caec40 / myvpc1**". The main pane displays the details of the VPC **vpc-0c86b3413b4caec40 / myvpc1**. The "Details" tab is selected, showing the following information:

VPC ID	<b>vpc-0c86b3413b4caec40</b>	State	<b>Available</b>	DNS hostnames	Disabled
Tenancy	<b>Default</b>	DHCP option set	<b>dopt-005ecff724b30180e</b>	Main route table	<b>rtb-0a03398e351a03c5e</b>
Default VPC	<b>No</b>	IPv4 CIDR	<b>10.0.0.0/26</b>	IPv6 pool	-
Network Address Usage metrics	<b>Disabled</b>	Route 53 Resolver DNS Firewall rule groups	-	Owner ID	<b>385439770750</b>

A context menu is open on the right side, with the "Edit CIDRs" option highlighted. Below the main pane, there's a "CIDRs" section with a table:

Address type	CIDR	Network Border Group	Pool	Status
IPv4	<b>10.0.0.0/26</b>	-	-	<b>Associated</b>

The left sidebar shows navigation options like VPC dashboard, EC2 Global View, and various VPC components like Subnets, Route tables, and Internet gateways. The bottom of the screen shows the Windows taskbar with various pinned icons.

Step 10: Now select another -Availability Zone| and -Subnet|. Click on -Yes, Create| button. (Note: Before clicking on -Yes, create| check that two subnets are added or not)

Step 11: Now you can see that -DB subnet group| is created.

Step 12: Click on -RDS Dashboard| on the left panel. Click on -Get Started| button

Step 13: Select your desired -Database Engine| from the list and click on -Select| button.

**Edit CIDRs** Info

Add or remove CIDR blocks for your VPC.

**IPv4 CIDRs** Info

CIDR	Status	Action
10.0.0.0/26	Associated	Remove
11.0.0.0/26	Associated	Remove

[Add new IPv4 CIDR](#)

**IPv6 CIDRs** Info

CIDR (Network border group)	Pool	Status
You have no IPv6 CIDR blocks associated with your VPC.		

[Add new IPv6 CIDR](#)

[Close](#)

**Amazon RDS**

- Dashboard
- Databases**
- Performance insights
- Snapshots
- Exports in Amazon S3
- Automated backups
- Reserved instances
- Proxies

- Subnet groups
- Parameter groups
- Option groups
- Custom engine versions
- Zero-ETL integrations New

- Events
- Event subscriptions

**Databases (1)**

DB identifier	Status	Role	Engine	Region & AZ	Size	Recommendations	CPU
db-1da20cs070	Available	Instance	MySQL Community	eu-north-1a	db.t3.micro	-	-

[View connection details](#)

**Successfully created database db-1da20cs070**

You can use settings from db-1da20cs070 to simplify configuration of [suggested database add-ons](#) while we finish creating your DB for you.

**Introducing Aurora I/O-Optimized**

Aurora's I/O-Optimized [\[ \]](#) is a new cluster storage configuration that offers predictable pricing for all applications and improved price-performance, with up to 40% costs savings for I/O-intensive applications.

**RDS > Databases**

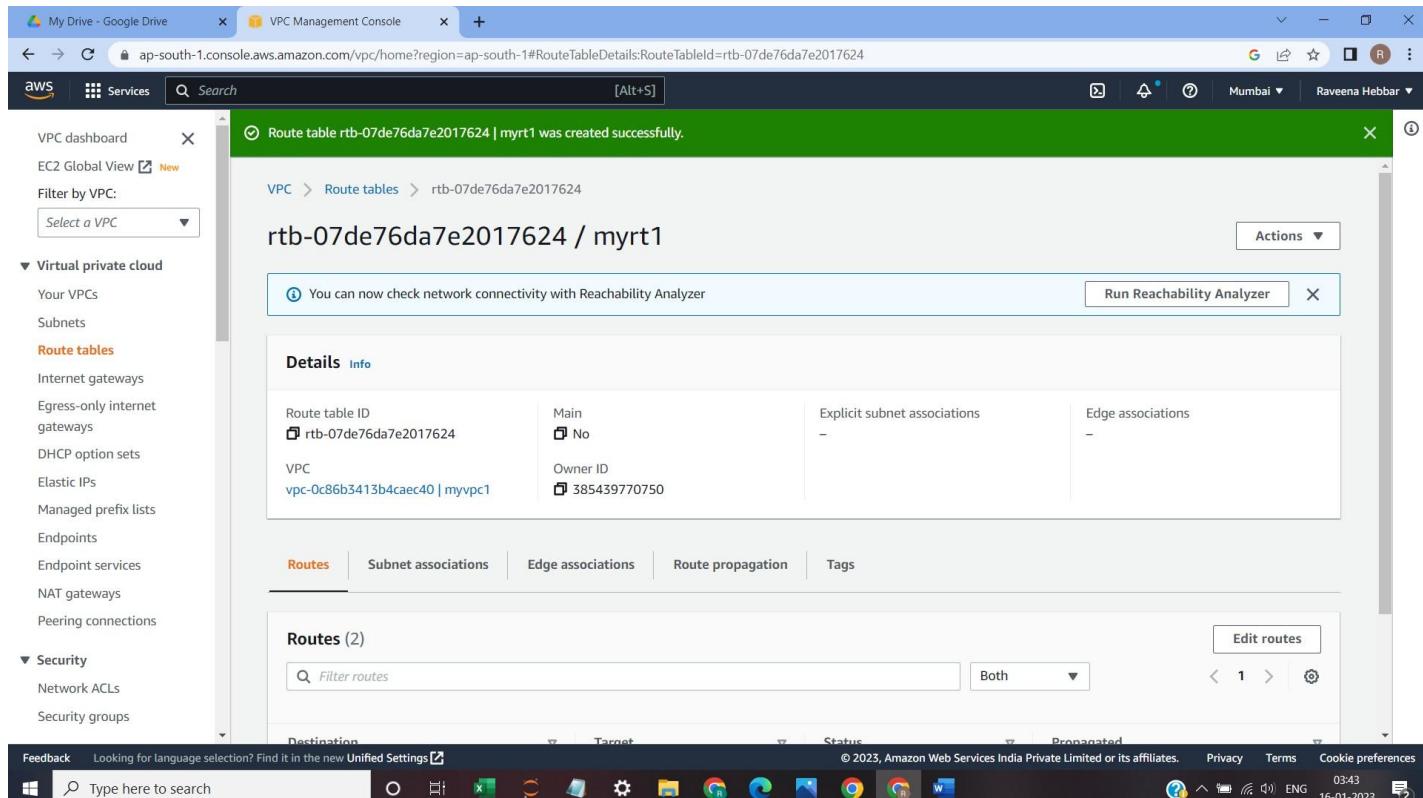
**Consider creating a Blue/Green Deployment to minimize downtime during upgrades**

You may want to consider using Amazon RDS Blue/Green Deployments and minimize your downtime during upgrades. A Blue/Green Deployment provides a staging environment for changes to production databases. [RDS User Guide](#) [Aurora User Guide](#)

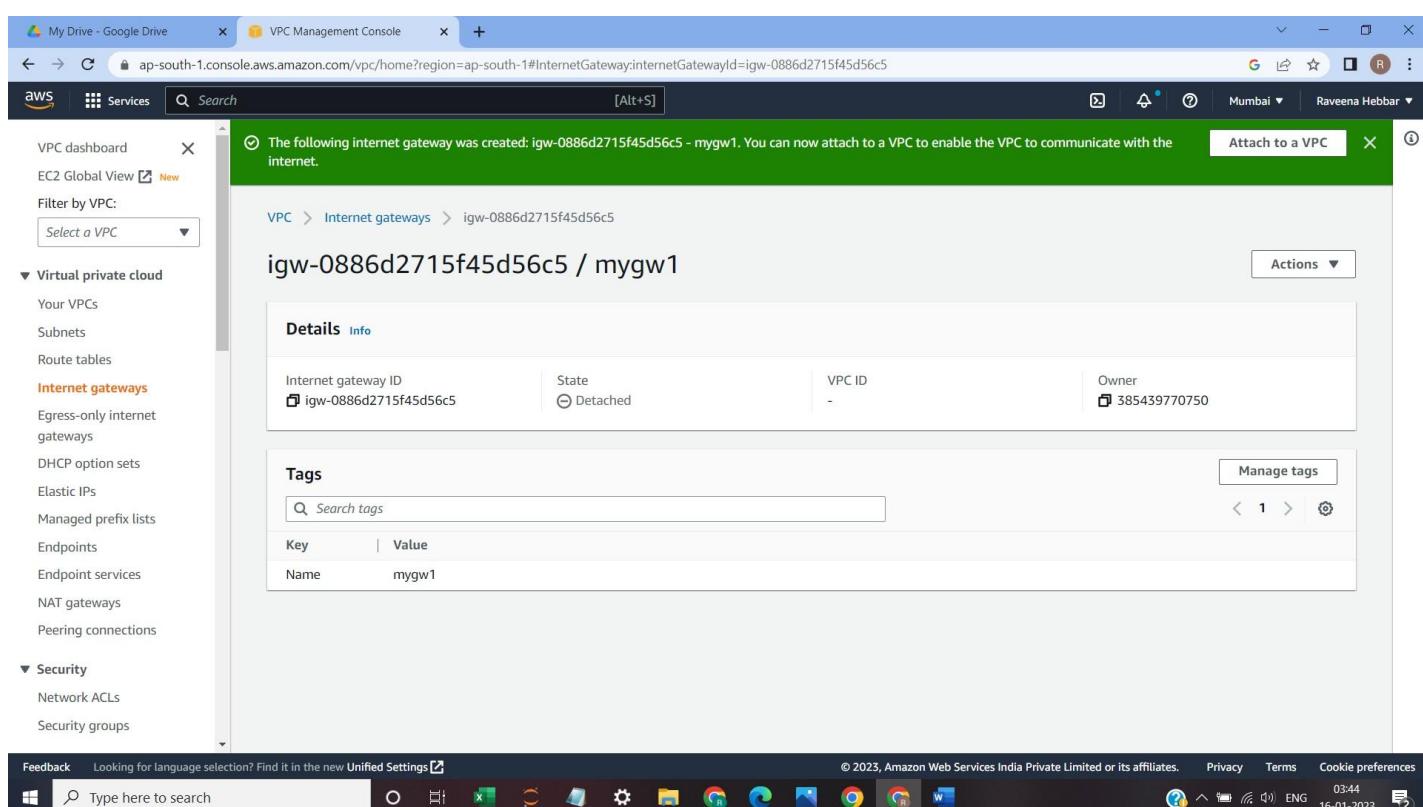
[Create database](#)

Step 14: If you want multi-AZ Deployment, select the -first radio button|| otherwise select the -second radio button||. Click on -Next|| button.

Step 15: Select your desired DB instance from the -DB Instance Class|| drop down. Select Multi-AZ option from the drop down. Select the storage type from the drop down and give 95 your desired storage space range. Enter the Details (DB instance Identifier, Master user name, password and confirm password). Click on -Next|| button.



The screenshot shows the AWS VPC Management Console with a success message: "Route table rtb-07de76da7e2017624 | myrt1 was created successfully." The details panel shows the Route table ID as rtb-07de76da7e2017624, Main status as No, and VPC owner ID as 385439770750. The Routes tab lists two routes.

The screenshot shows the AWS VPC Management Console with a success message: "The following internet gateway was created: igw-0886d2715f45d56c5 - mygw1. You can now attach to a VPC to enable the VPC to communicate with the internet." The details panel shows the Internet gateway ID as igw-0886d2715f45d56c5, State as Detached, and Owner as 385439770750. The Tags tab lists a single tag named "mygw1".

Step 16: Select your own VPC ID from the -VPC Dropdown|. Select the -public accessibility| from the dropdown. Select your desired Availability Zone from the dropdown. Give a name to your Database and check the database port is and mention the -Backup retention period| as per your needs and if you want a Time frame for your backup, configure the time frame from -Backup Window| Dropdown. Click on -Launch DB Instance| button.

The screenshot shows the AWS RDS Management Console with the URL [ap-south-1.console.aws.amazon.com/rds/home?region=ap-south-1#create-db-subnet-group](https://ap-south-1.console.aws.amazon.com/rds/home?region=ap-south-1#create-db-subnet-group). The left sidebar shows navigation options like Dashboard, Databases, Query Editor, etc. The main content area is titled 'Create DB subnet group'. It has two main sections: 'Subnet group details' and 'Add subnets'. In 'Subnet group details', there are fields for 'Name' (set to 'database'), 'Description' (set to 'all databases'), and 'VPC' (set to 'myvpc1'). Below this is the 'Add subnets' section, which currently has no subnets listed.

Step 17: Click on -Close|| button.

Step 18: Now you can see one DB instance is created. (It will take 5-10min to create the database instance). You will have the DB name, VPC ID, End Point (which is used to connect to the DB Instance from your EC2 instance) and etc...

The screenshot shows the AWS RDS Management Console with the URL [eu-north-1.console.aws.amazon.com/rds/home?region=eu-north-1#databases](https://eu-north-1.console.aws.amazon.com/rds/home?region=eu-north-1#databases). The left sidebar shows navigation options like Dashboard, Databases, Query Editor, etc. A modal window titled 'Creating database db-1da20cs070' is open, stating 'Your database might take a few minutes to launch.' and 'You can use settings from db-1da20cs070 to simplify configuration of suggested database add-ons while we finish creating your DB for you.' Below the modal, the main content area shows the 'Databases' list. It has a header with columns: DB identifier, Status, Role, Engine, Region & AZ, Size, Recommendations, and CPU. There is one entry: 'db-1da20cs070' (Status: Creating, Instance: MySQL Community, Region & AZ: eu-north-1a, Engine: db.t3.micro).

The screenshot shows the AWS RDS console interface. On the left, there's a sidebar with various options like Dashboard, Databases, Performance insights, Snapshots, Exports in Amazon S3, Automated backups, Reserved instances, Proxies, Subnet groups, Parameter groups, Option groups, Custom engine versions, Zero-ETL integrations, Events, and Event subscriptions. The main area has a green banner at the top stating "Successfully created database db-1da20cs070". Below it, there's a blue banner about Aurora I/O-Optimized. The main content area shows a table titled "Databases (1)" with one entry: db-1da20cs070, which is Available, an MySQL Community instance in eu-north-1a, db.t3.micro size. There are buttons for Group resources, Modify, Actions, Restore from S3, and Create database.

Note: To connect to the Database from your Ec2 Instance, you need the following.

- a). RDS end point.
- b) Database Name.
- c) Master username.
- d) Master Password.
- e) Port Number.

## **2A - Install Virtualbox/VMware Workstation with different flavours of linux and execute some C programs**

### **Virtual Box**

VirtualBox is a powerful x86 and AMD64/Intel64 virtualization product for enterprise as well as home use. Not only is VirtualBox an extremely feature rich, high-performance product for enterprise customers, it is also the only professional solution that is freely available as Open-Source Software under the terms of the GNU General Public License (GPL) version 2. See "About VirtualBox" for an introduction.

Presently, VirtualBox runs on Windows, Linux, Macintosh, and Solaris hosts and supports a large number of guest operating systems including but not limited to Windows (NT 4.0, 2000, XP, Server 2003, Vista, Windows 7, Windows 8, Windows 10), DOS/Windows 3.x, Linux (2.4, 2.6, 3.x and 4.x), Solaris and Open Solaris, OS/2, and OpenBSD.

VirtualBox is being actively developed with frequent releases and has an ever-growing list of features, supported guest operating systems and platforms it runs on. VirtualBox is a community effort backed by a dedicated company: everyone is encouraged to contribute while Oracle ensures the product always meets professional quality criteria.

### **History**

VirtualBox was first offered by Innotek GmbH from Weinstadt, Germany, under a proprietary software license, making one version of the product available at no cost for personal or evaluation use, subject to the VirtualBox Personal Use and Evaluation License (PUEL). In January 2007, based on counsel by LiSoG, Innotek GmbH released VirtualBox Open-Source Edition (OSE) as free and open-source software, subject to the requirements of the GNU General Public License (GPL), version 2. Innotek GmbH also contributed to the development of OS/2 and Linux support in virtualization and OS/2 ports of products from Connectix which were later acquired by Microsoft. Specifically, Innotek developed the "additions" code in both Windows Virtual PC and Microsoft Virtual Server, which enables various host-guest OS interactions like shared clipboards or dynamic viewport resizing.

Sun Microsystems acquired Innotek in February 2008. Following the acquisition of Sun Microsystems by Oracle Corporation in January 2010, the product was re-branded as "Oracle VM VirtualBox". In December 2019, VirtualBox started supporting only hardware-assisted virtualization, dropping support for Software-based one.

### **Features**

- Snapshots of the RAM and storage that allow reverting to a prior state.
- Screenshots and screen video capture
- "Host key" for releasing the keyboard and mouse cursor to the host system if captured (coupled) to the guest system, and for keyboard shortcuts to features such as configuration, restarting, and screenshot. By default, it is the right-side CTRL key.
- Mouse pointer integration, meaning automatic coupling and uncoupling of mouse cursor when moved inside and outside the virtual screen, if supported by guest operating system.
- Seamless mode – the ability to run virtualized applications side by side with normal desktop applications Shared clipboard
- Shared folders through "guest additions" software

- Special drivers and utilities to facilitate switching between systems
- Ability to specify amount of shared RAM, video memory, and CPU execution cap
- Ability to emulate multiple screens
- Command line interaction (in addition to the GUI)
- Public API (Java, Python, SOAP, XPCOM) to control VM configuration and execution
- Nested paging for AMD-V and Intel VT (only for processors supporting SLAT and with SLAT enabled)
- Limited support for 3D graphics acceleration (including OpenGL up to (but not including) 3.0 and Direct3D 9.0c via Wine's Direct3D to OpenGL translation)
- SMP support (up to 32 virtual CPUs per virtual machine), since version 3.0
- Teleportation (aka Live Migration)
- 2D video output acceleration (not to be mistaken with video decoding acceleration), since version 3.1
- EFI has been supported since version 3.1 (Windows 7 guests are not supported).

## VM Ware

VMware, Inc. is an American cloud computing and virtualization technology company with headquarters in California. VMware was the first commercially successful company to virtualize the x86 architecture. VMware's desktop software runs on Microsoft Windows, Linux, and macOS, while its enterprise software hypervisor for servers, VMware ESXi, is a bare-metal hypervisor that runs directly on server hardware without requiring an additional underlying operating system. VMware's most notable products are its hypervisors. VMware became well known for its first type 2 hypervisor known as GSX. This product has since evolved into two hypervisor product lines: VMware's type 1 hypervisors running directly on hardware and their hosted type 2 hypervisors. VMware software provides a completely virtualized set of hardware to the guest operating system. VMware software virtualizes the hardware for a video adapter, a network adapter, and hard disk adapters. The host provides pass-through drivers for guest USB, serial, and parallel devices. In this way, VMware virtual machines become highly portable between computers, because every host looks nearly identical to the guest. In practice, a system administrator can pause operations on a virtual machine guest, move or copy that guest to another physical computer, and their resume execution exactly at the point of suspension. Alternatively, for enterprise servers, a feature called vMotion allows the migration of operational guest virtual machines between similar but separate hardware hosts sharing the same storage (or, with vMotion Storage, separate storage can be used, too). Each of these transitions is completely transparent to any users on the virtual machine at the time it is being migrated.

VMware's products predate the virtualization extensions to the x86 instruction set, and do not require virtualization-enabled processors. On newer processors, the hypervisor is now designed to take advantage of the extensions. However, unlike many other hypervisors, VMware still supports older processors. In such cases, it uses the CPU to run code directly whenever possible (as, for example, when running user-mode and virtual 8086 mode code on x86). When direct execution cannot operate, such as with kernel-level and real-mode code, VMware products use binary translation (BT) to re-write the code dynamically. The translated code gets stored in spare memory, typically at the end of the address space, which segmentation mechanisms can protect and make invisible. For these reasons, VMware operates dramatically faster than emulators, running at more than 80% of the speed that the virtual guest operating system would run directly on the same hardware. In one study VMware claims a slowdown over native ranging from 0–6 percent for the VMware ESX Server.

## Products:

### Desktop software

VMware Workstation, introduced in 1999, was the first product launched by VMware. This software suite allows users to run multiple instances of x86 or x86-64 -compatible operating systems on a single physical personal computer. Workstation Pro version 15.5.1 was released in Nov 2019.

VMware Fusion provides similar functionality for users of the Intel Mac platform, along with full compatibility with virtual machines created by other VMware products.

VMware Workstation Player is freeware for non-commercial use, without requiring a license, and available for commercial use with permission. It is similar to VMware Workstation, with reduced functionality.

### Server software

VMware ESXi, an enterprise software product, can deliver greater performance than the freeware VMware Server, due to lower system computational overhead. VMware ESXi, as a "bare-metal" product, runs directly on the server hardware, allowing virtual servers to also use hardware more or less directly. In addition, VMware ESXi integrates into VMware vCenter, which offers extra services.

### Cloud management software

VMware vRealize Suite – a cloud management platform purpose-built for a hybrid cloud.

VMware Go is a web-based service to guide users of any expertise level through the installation and configuration of VMware vSphere Hypervisor.

VMware Cloud Foundation – Cloud Foundation provides an easy way to deploy and operate a private cloud on an integrated SDDC system.

VMware Horizon View is a virtual desktop infrastructure (VDI) product.

### Application management

The VMware Workspace Portal was a self-service app store for workspace management.

### Storage and availability

VMware's storage and availability products are composed of two primary offerings:

VMware vSAN (previously called VMware Virtual SAN) is software-defined storage that is embedded in VMware's ESXi hypervisor. The vSphere and vSAN software run on industry-standard x86 servers to form a hyper-converged infrastructure (or HCI). However, network operators need to have servers from HCL (Hardware Compatibility List) to put one into production. The first release, version 5.5, was released in March 2014. The 6th generation, version 6.6, was released in April 2017. New features available in VMware vSAN 6.6 include native data at rest encryption, local protection for stretched clusters, analytics, and optimized solid-state drive performance. The VMWare 6.7 version was released in April 2018. Users now have improved monitoring tools and new workflows, it is closer to feature parity. The vCenter Server Appliance architecture is moving around to an easy deployment method.

VMware Site Recovery Manager (SRM) automates the failover and failback of virtual machines to and from a secondary site using policy-based management.

## Networking and security products

VMware NSX is VMware's network virtualization product marketed using the term software-defined data centre (SDDC). The technology included some acquired from the 2012 purchase of Nicira. Software Defined Networking (SDN) allows the same policies that govern Identity and Access Management (IAM) to dictate levels of access to applications and data through a totally converged infrastructure not possible with legacy network and system access methods.

## Other products

Workspace ONE allows mobile users to access apps and data.

The VIX (Virtual Infrastructure eXtension) API allows automated or scripted management of a computer virtualized using either VMware's vSphere, Workstation, Player, or Fusion products. VIX provides bindings for the programming languages C, Perl, Visual Basic, VBscript and C#.

Herald is a communications protocol from VMware for more reliable Bluetooth communication and range finding across for mobile devices. Herald code is available under an Open-source license and was implemented in the Australian Government's COVID Safe app for contact tracing on 19 December 2020.

## Guest OS

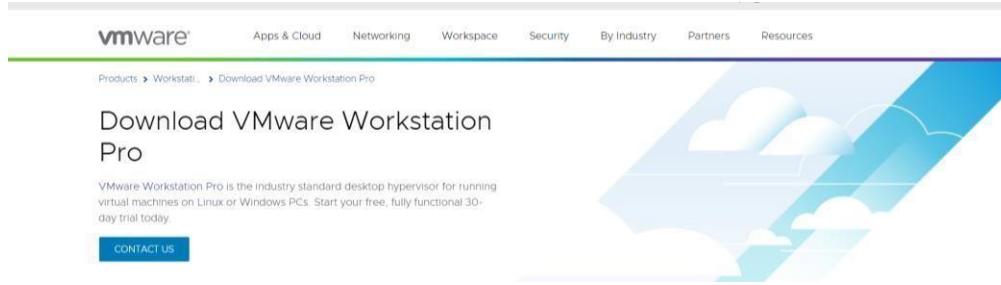
A guest operating system (guest OS) is an operating system (OS) that is secondary to the OS originally installed on a computer, which is known as the host operating system. The guest OS is either part of a partitioned system or part of a virtual machine (VM) setup. A guest OS provides an alternative OS for a device.

In disk partitioning, a guest OS is simply another instance of the same operating system that can boot up for controlling a certain partitioned memory set. A virtual machine (VM) process is much different, in that a guest OS can be a different OS alternative. In VM setups, a guest OS is delivered through a virtual machine environment through a tool called a hypervisor. Again, the machine will typically have a host OS, where the guest OS will operate "within" the host OS. This can lead to limitations on file saving and other operations within the guest OS, depending on whether the guest OS is said to be "persistent."

Part of the emergence of guest operating systems in VM systems has to do with the benefits provided by virtualization. These revolutions in computing coincide with the more general concept of cloud computing, where resources are delivered, rather than hosted, in physical local hardware setups. In addition, a guest OS often takes advantage of a lean OS to build, where memory requirements are further alleviated. VM setups can help with licensing issues, system requirements, and more, making these an attractive part of outsourced computing services.

Step 1: To download and install the VMware product visit the official website of VMware.

<https://www.vmware.com/in/products/workstation-pro/workstationproevaluation.html>



Step 2: Click on Download VM WorkStation for Windows. The installation file gets downloaded in the specified location and is now ready for installation.

Step 3: Click on the download file to install the VMWare Workstation 16 Pro. Popup will appear

Step 4: Once the initialization gets completed, Click Next



Step 5: Accept the terms and click on Next. In the next screen, it will ask for some additional features, it is not mandatory to check this box. Click on Next.

Step 6: On the next screen, some checkboxes are populated, Check them as per your requirement. Click on Next.

Step 7: At this step, VMware Workstation is ready to install. Click on Install.



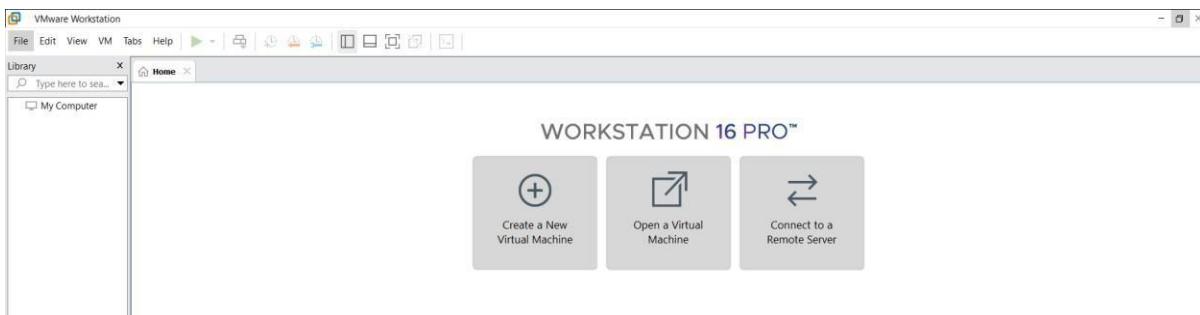
Step 8: Once the installation gets completed you will see the following dialogue box. Click on Finish. If you have purchased the product and have a license key, then you can click on License to enter the key.

Step 9: Upon Finish, the window will close, and You can see VMware Workstation installed icon on your Desktop. Double Click on the Icon to open the application.

Step 10: For the first time opening, if you have not entered the License key in the previous steps, then it will ask for a license key.

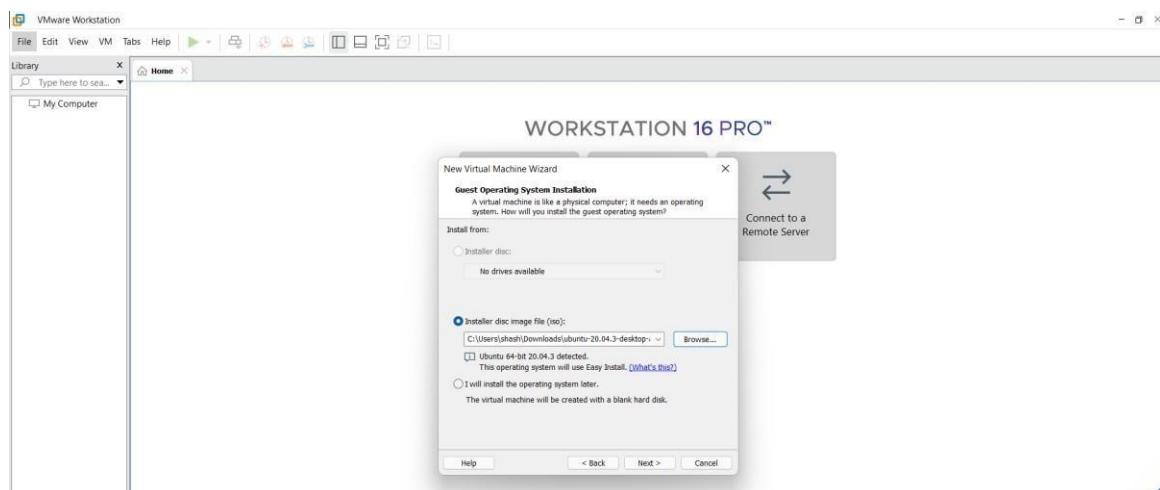


Finally, this will open a window of VMware Workstation Pro.



**Step 11:** Click on File □ New Virtual Machine. A New Virtual Machine Wizard will appear. Click on Typical.

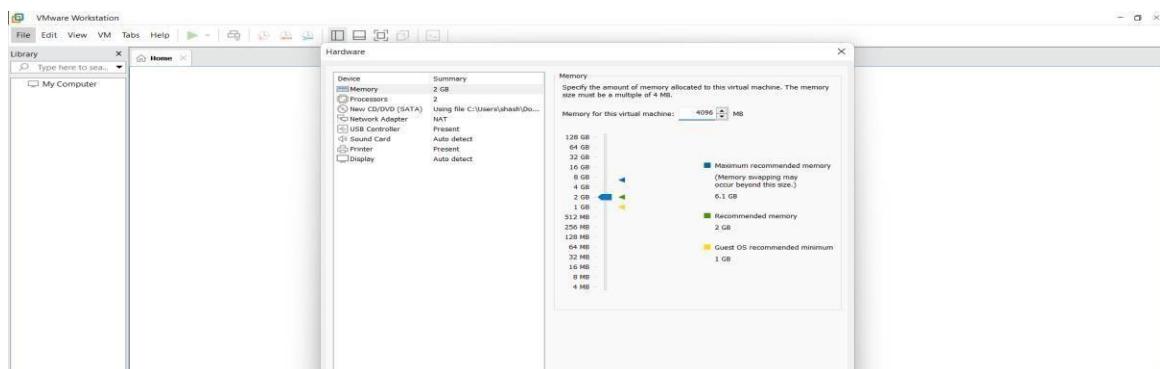
**Step 12:** Select the ISO File and click on Next



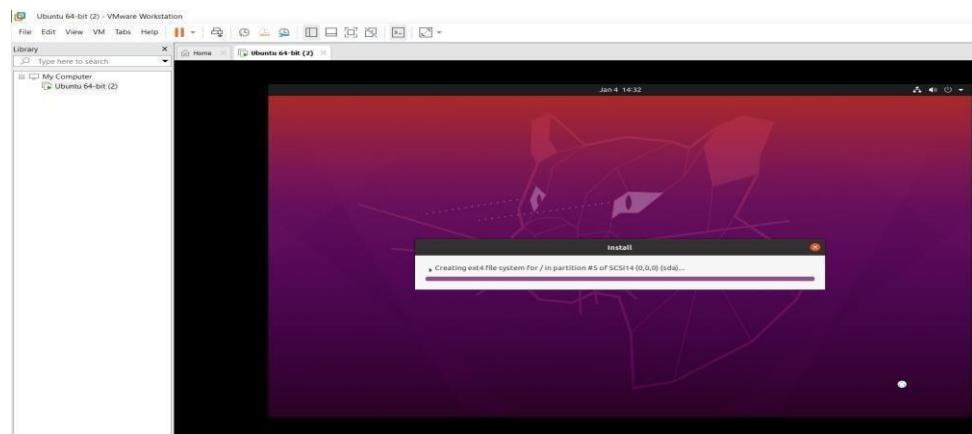
**Step 13:** Fill in the required details such as username, password and click on next.

**Step 14:** Name the virtual machines.

**Step 15:** Allocate the memory and select Split virtual disk into multiple files and click on next. Click on Customize Hardware. Set the memory size to 4GB



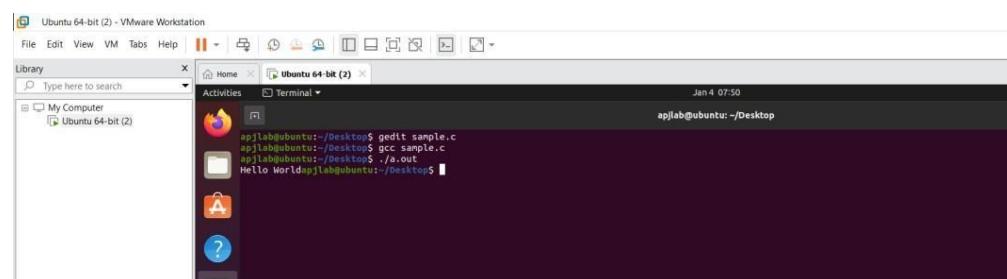
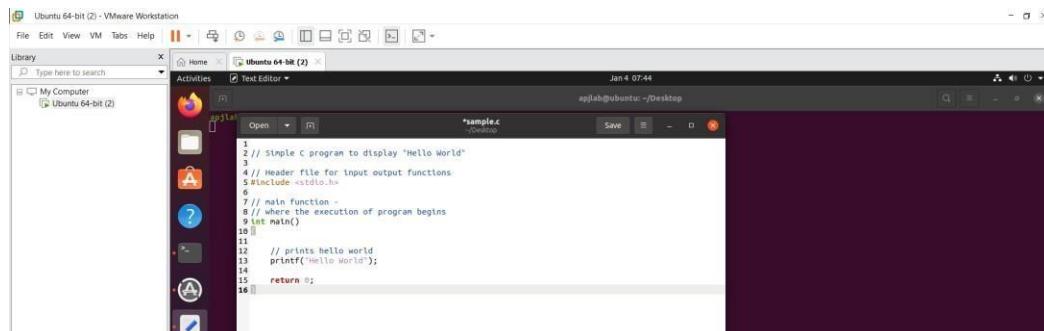
Step 16 : Click on Finish. You can see that Ubuntu gets installed in the VM Ware Workstation.



Step 17: Login and Open Terminal and Execute a simple C Program

Step 18: Using gedit write a simple C Code. Use the following commands on the terminal:

- To Open the Editor - gedit sample.c
- To Compile the code - gcc sample.c
- To Get the output - ./a.out



## 5A - Create a file in one virtual machine and transfer/share it with the host machine.

### Virtualization and File Sharing

#### Virtualization

Virtualization is the process of running a virtual instance of a computer system in a layer abstracted from the actual hardware. Most commonly, it refers to running multiple operating systems on a computer system simultaneously. To the applications running on top of the virtualized machine, it can appear as if they are on their own dedicated machine, where the operating system, libraries, and other programs are unique to the guest virtualized system and unconnected to the host operating system which sits below it.

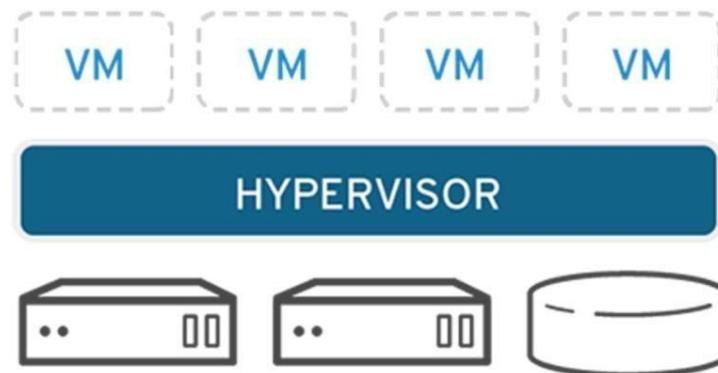
There are many reasons why people utilize virtualization in computing. To desktop users, the most common use is to be able to run applications meant for a different operating system without having to switch computers or reboot into a different system. For administrators of servers, virtualization also offers the ability to run different operating systems, but perhaps, more importantly, it offers a way to segment a large system into many smaller parts, allowing the server to be used more efficiently by a number of different users or applications with different needs. It also allows for isolation, keeping programs running inside of a virtual machine safe from the processes taking place in another virtual machine on the same host.

#### Working of Virtualization:

Software called hypervisors separate the physical resources from the virtual environments—the things that need those resources. Hypervisors can sit on top of an operating system (like on a laptop) or be installed directly onto hardware (like a server), which is how most enterprises virtualize. Hypervisors take your physical resources and divide them up so that virtual environments can use them.

Resources are partitioned as needed from the physical environment to the many virtual environments. Users interact with and run computations within the virtual environment (typically called a guest machine or virtual machine). The virtual machine functions as a single data file. And like any digital file, it can be moved from one computer to another, opened in either one, and be expected to work the same.

When the virtual environment is running and a user or program issues an instruction that requires additional resources from the physical environment, the hypervisor relays the request to the physical system and caches the changes—which all happens at close to native speed (particularly if the request is sent through an open-source hypervisor based on KVM, the Kernel-based Virtual Machine).



## File Sharing

Transferring Files to and from Virtual Machines can be done in the following ways:

- Creating a Shared Folder in VirtualBox
- Dragging and Dropping Files in VirtualBox
- Managing Files with NextCloud

### Creating a Shared Folder in VirtualBox

A shared folder is a folder that makes its files available on both the guest machine and the host machine at the same time. Creating a shared folder between the guest and the host allows you to easily manage files that should be present on both machines. The course virtual machines are ready to use shared folders right away, but if you are using the virtual machine on your personal computer, then you will need to specify which folder to use as shared storage.

### Shared Folders on SCS Lab Computers using Course VMs:

If you are using a course VM on a lab computer, it is likely that a shared folder has already been set up for you. On the desktop of your course VM, you should notice a folder titled Shared Folders. Inside this folder, you will find any folders that have been shared between the course VM and lab computers. You should see two folders that have already been configured for you: Z\_DRIVE and Temp. Z\_DRIVE gives you access to your Windows Account Z:\ drive. This is storage that is persistent to your SCS account and available as a network drive on the lab computers. Temp gives you access to the folder found at D:\temp on the lab computer. Files stored in this folder are local to the machine, meaning that they can be accessed faster but will delete from the system when you log out. If you are working with data that you will need to use again, use the Z\_DRIVE for your shared folder. If you need a faster read/write speed, use the Temp folder, but remember to back up your files, or they will be deleted when you log off the computer.

### Shared Folders on Personal Computers

If you are using your own personal machine, you will need to configure VirtualBox to look in the right place for your shared files. First, click on the guest machine you intend to share files with. From there, you can select the guest Settings and navigate to Shared Folders on the left side menu. To create a new shared folder, either click the New Folder icon on the right menu or right-click the empty list of shared folders and click Add Shared Folder. From here, there are six options:

- **Folder Path:** The folder name on the host machine. Click the drop-down menu and navigate to the folder you would like to share.
- **Folder Name:** This is the name of the folder as it will appear on the guest machine.
- **Read-Only:** If you check read-only, the guest machine will be unable to write changes to the folder. This is valuable when you only want to send files to the virtual machine, but do not want to risk having the files modified by the guest.
- **Auto-Mount:** When any external storage is connected to a computer, it must be mounted in order to be used. It is recommended that you turn on auto-mounting unless you are familiar with the process of mounting a drive yourself.

- **Mount Point:** Unless you already know about mount points, leave this blank.
- **Make Permanent:** If you check this, the shared folder will be a permanent machine folder. If it is not checked, the folder will not be shared after a shutdown.

On the course virtual machines, when you load into the desktop, you should see a folder labelled Shared Folders. In there, you will see any folders that are currently mounted and being shared.

### Dragging and Dropping Files in VirtualBox

If you only need to transfer a few files quickly, you can simply drag and drop the files in. On the top bar of the running guest machine, click on Devices > Drag and Drop and make sure that Bidirectional is selected. This means that you will be able to drag files from the host to the guest and from the guest to the host. Once bidirectional drag and drop is checked, you should be able to begin dragging and dropping files.

**NOTE:** Sometimes when dragging files into the course VM, you may not be able to drag them into the file browser directly. If you encounter this issue, you should drag your files onto the Desktop and move the files around from there. You should see the cursor change when it is ready to drop files.

You can also drag files from the guest machine into the host. To do this, simply open the file browser on the host to where you would like to drop the files and drag the files from the virtual machine into the file browser of the host. File transfers should be pretty quick; if the virtual machine seems stuck when transferring, simply cancel the transfer and try again.

### Managing Files with NextCloud

On any virtual machine, including VirtualBox, VMWare, or the virtual machines hosted on the SCS OpenStack, you can access the SCS NextCloud services to move files between multiple machines and your SCS Windows Account storage. NextCloud offers you all of your SCS storage in one remote location, similar to how you might use other file hosting services like Dropbox or Google Drive. Before trying to use NextCloud, you should check that you can access the service by logging in here. If you can access the NextCloud services, you can browse the various file storage services available to you:

- **Linux Home:** These are the files from your SCS Linux Account
- **Windows Home:** These are the files from your SCS Windows Account and your lab Z:\ drive.
- **NextCloud:** In addition to the other storage accounts provided to you by the SCS, you can also upload up to 20GB of files directly to NextCloud.

With NextCloud, you can upload your files from any machine with an internet connection and download them onto any other machine with an internet connection. For example, you can move project files off of your virtual machine, onto the NextCloud storage, and then download them on your personal laptop. Alternatively, you can upload files from your personal PC onto the NextCloud storage, place them into the Windows home folder, and access those files from either the lab Z:\ drive or download them on a virtual machine like VirtualBox or OpenStack.

## **Uploading Files to NextCloud from a Lab Computer**

If you would like to upload files from a lab computer, the easiest way to do this is to place the files you would like to transfer into your Z:\ drive. These files will be automatically backup into your NextCloud storage under the Windows home folder. After that, you can move them into the main NextCloud storage or choose to keep them in your Z:\drive.

## **Uploading Files to NextCloud from a VM or Other PC**

If you would like to upload files from either a VM or any other computer, you can log in to the NextCloud service using any of the available interfaces, such as the web interface. Press the -+l icon in the top left of the file browser and select Upload File. From here, you can choose to keep it in the main NextCloud storage, move it into your Windows Account storage (the Windows home folder), or into your Linux Account storage (the Linux Home folder).

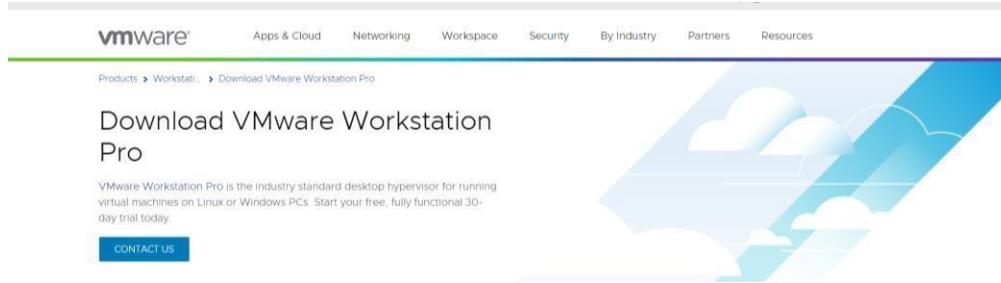
## **Downloading NextCloud Files to a VM or Other PC**

Once your files are uploaded, you will be able to download those files onto any machine, which can connect to NextCloud. First, log in to your preferred NextCloud interface (e.g., the web interface). Navigate to the folder which contains the files you would like to download. Once you are in the target folder, click the checkbox next to each file you would like to download. Above the file listing, you should notice the context bar changing to tell you how many files you have selected and a button labelled Actions. Click Actions > Download.

If you selected a single file, it will prompt you to confirm the download. If you have chosen more than one file, NextCloud will place all of the selected files into a zip archive. Before you can use the files, you will need to extract them from the archive. Once you have downloaded your file or extracted your archive, you are ready to use your files on your machine.

Step 1: To download and install the VMware product visit the official website of VMware.

<https://www.vmware.com/in/products/workstation-pro/workstationproevaluation.html>



Step 2: Click on Download VM WorkStation for Windows. The installation file gets downloaded in the specified location and is now ready for installation.

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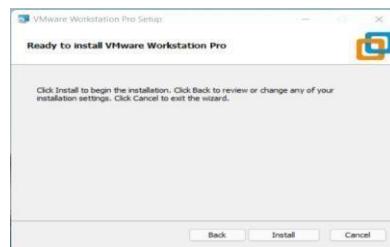
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Step 5: Accept the terms and click on Next. In the next screen, it will ask for some additional features, it is not mandatory to check this box. Click on Next.

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Step 7: At this step, VMware Workstation is ready to install. Click on Install.



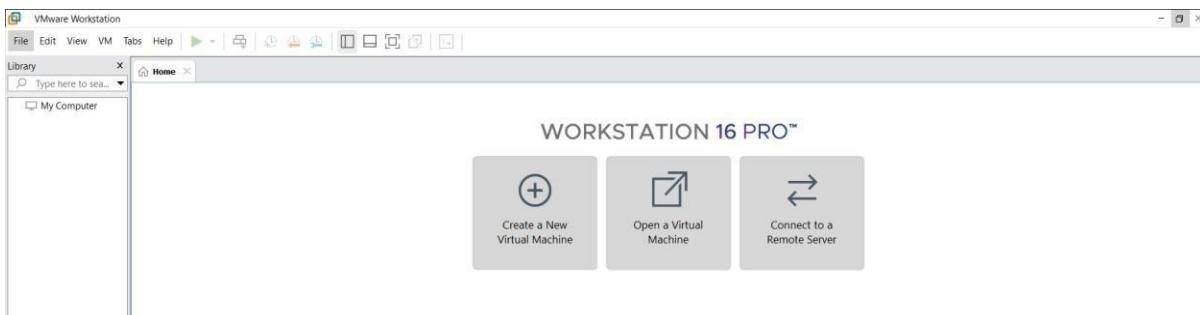
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Step 9: Upon Finish, the window will close, and You can see VMware Workstation installed icon on your Desktop. Double Click on the Icon to open the application.

Step 10: For the first time opening, if you have not entered the License key in the previous steps, then it will ask for a license key.

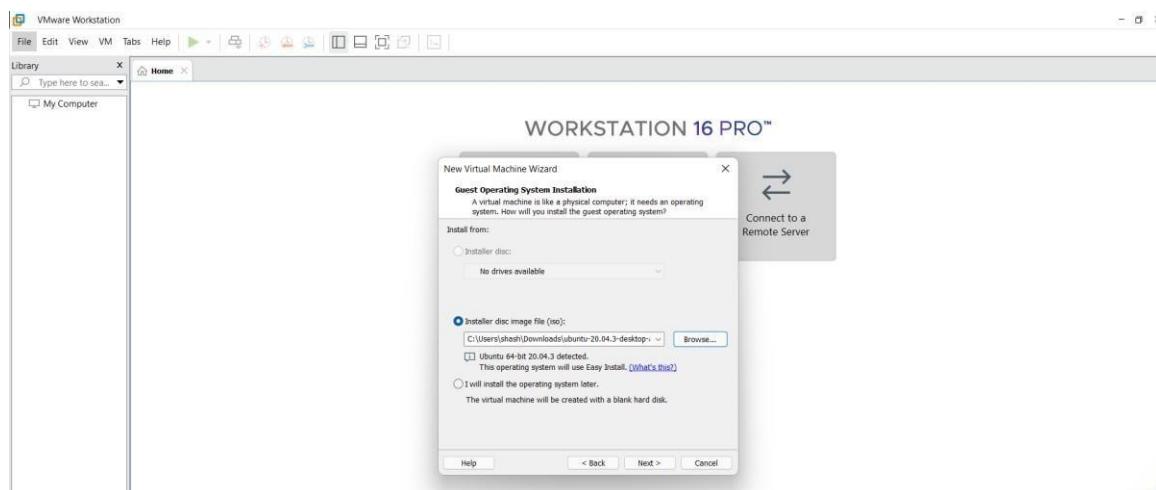


Finally, this will open a window of VMware Workstation Pro.



**Step 11:** Click on File □ New Virtual Machine. A New Virtual Machine Wizard will appear. Click on Typical.

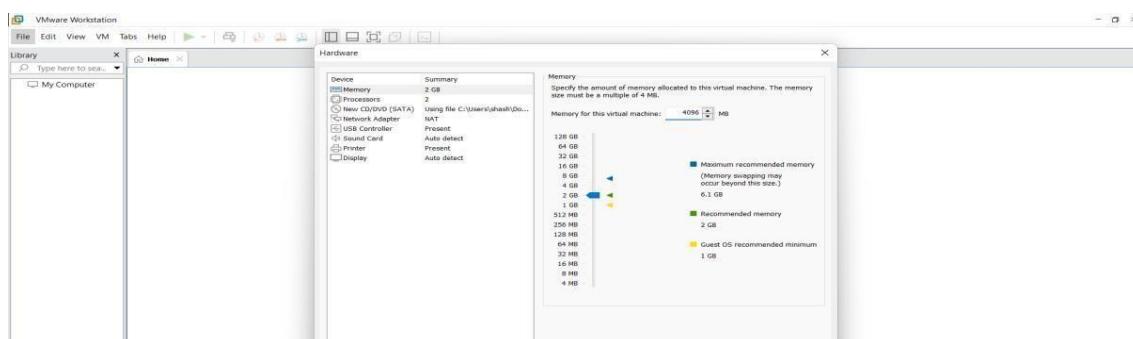
**Step 12:** Select the ISO File and click on Next



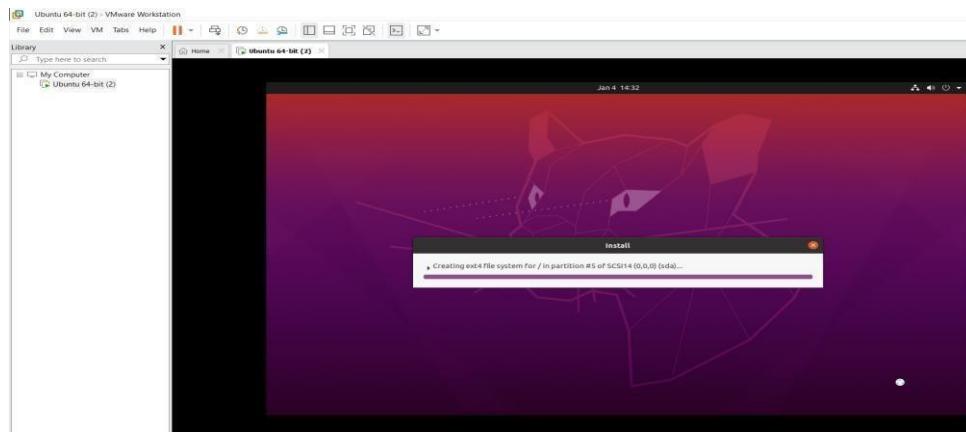
**Step 13:** Fill in the required details such as username, password and click on next.

**Step 14:** Name the virtual machines.

**Step 15:** Allocate the memory and select Split virtual disk into multiple files and click on next. Click on Customize Hardware. Set the memory size to 4GB



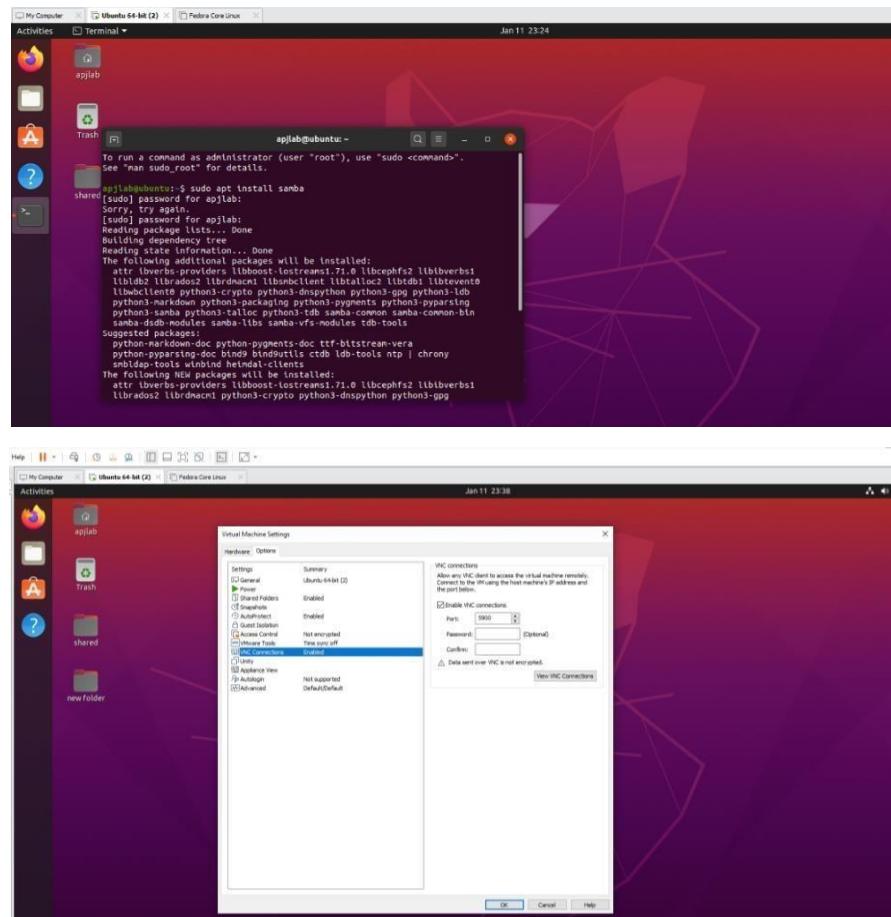
**Step 16 : Click on Finish.** You can see that Ubuntu gets installed in the VM Ware Workstation.



Step 17: Open the terminal and type the following command:

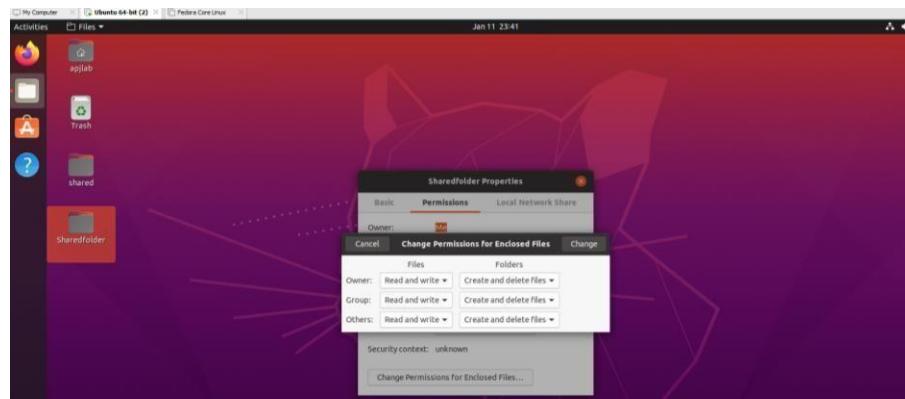
**sudo apt install samba**

Wait for the installation to complete and close the terminal.



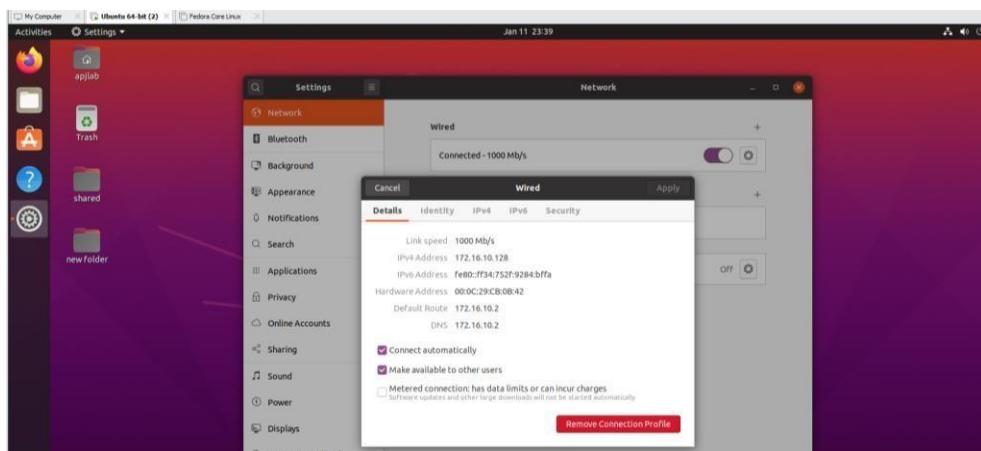
Step 18: Click on VM on top and click on Settings. A window appears. Click on Options and Enable Shared Folders, Auto Protect, VNC Connections and click on OK

Step 19: Click on permissions and set Read and Write Permissions for Owner, Group and Others.

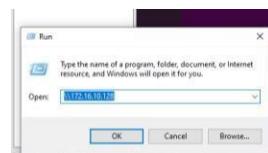


Step 20: Close all the windows and click on Settings

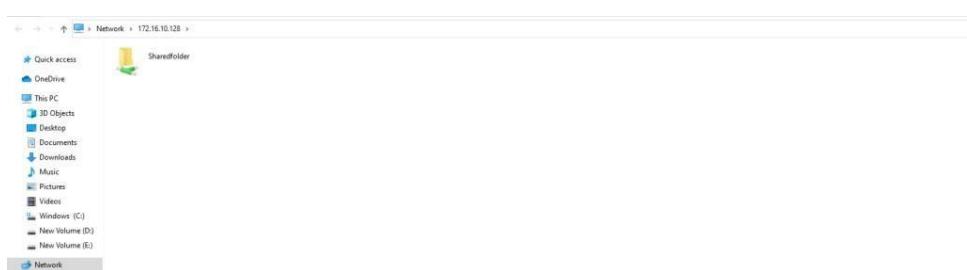
Step 21: Click on Wired Settings and window appears as shown in the below picture. Copy the IPv4 address.



Step 22: Open RUN on Windows and type the IP Address with the -\\|. For example, if the IPv4 Address copied is 172.16.10.128 in the Run window enter <\\172.16.10.128>

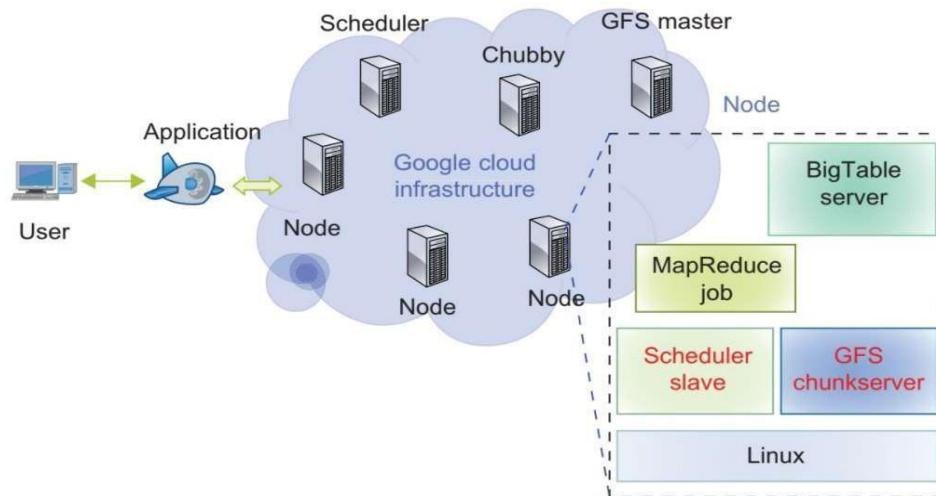


Step 23: A window appears showing the folder that was shared. The user can now access the folder.



### 3A - Install Google App Engine. Create hello world app and other simple web applications using python/java

**Google App Engine** (often referred to as GAE or simply App Engine) is a cloud computing platform as a service for developing and hosting web applications in Google-managed data centers. Applications are sandboxed and run across multiple servers. App Engine offers automatic scaling for web applications—as the number of requests increases for an application, App Engine automatically allocates more resources for the web application to handle the additional demand. The service is free up to a certain level of consumed resources and only in standard environment but not in flexible environment. Fees are charged for additional storage, bandwidth, or instance hours required by the application. It was first released as a preview version in April 2008 and came out of preview in September 2011.



Google App Engine primarily supports Go, PHP, Java, Python, Node.js, .NET, and Ruby applications, although it can also support other languages via "custom runtimes". Python web frameworks that run on Google App Engine include Django, CherryPy, Pyramid, Flask, web2py and webapp2, as well as a custom Google-written webapp framework and several others designed specifically for the platform that emerged since the release. Any Python framework that supports the WSGI using the CGI adapter can be used to create an application; the framework can be uploaded with the developed application. Third-party libraries written in pure Python may also be uploaded.

Google App Engine supports many Java standards and frameworks. Core to this is the servlet 2.5 technology using the open-source Jetty Web Server, along with accompanying technologies such as JSP. Java Server Faces operates with some workarounds. A newer release of App Engine Standard Java in Beta supports Java8, Servlet 3.1 and Jetty9. Though the integrated database, Google Cloud Datastore, may be unfamiliar to programmers, it is accessed and supported with JPA, JDO, and by the simple low-level API. There are several alternative libraries and frameworks you can use to model and map the data to the database such as Objectify, Slim3 and Jello framework. The Spring Framework works with GAE. However, the Spring Security module (if used) requires workarounds. Apache Struts 1 is supported, and Struts 2 runs with workarounds. The Django web framework and applications running on it can be used on App Engine with modification. Django-nonrel aims to allow Django to work with non-relational databases and the project includes support for App Engine.

## Reliability and support

- All billed App Engine applications have a 99.95% uptime SLA.
- App Engine is designed in such a way that it can sustain multiple datacentre outages without any downtime. This resilience to downtime is shown by the statistic that the High Replication Datastore saw 0% downtime over a period of a year.
- Paid support from Google engineers is offered as part of Premier Accounts.

## Bulk downloading

SDK version 1.2.2 adds support for bulk downloads of data using Python. The open-source Python projects gaebar, appocket, and gawsh also allow users to download and back up App Engine data. No method for bulk downloading data from GAE using Java currently exists.

## Restrictions

- Developers have read-only access to the filesystem on App Engine. Applications can use only virtual filesystems, like gae-filestore.
- App Engine can only execute code called from an HTTP request (scheduled background tasks allow for self-calling HTTP requests).
- Users may upload arbitrary Python modules, but only if they are pure-Python; C and Pyrex modules are not supported.
- Java applications may only use a subset (The JRE Class White List) of the classes from the JRE standard edition. This restriction does not exist with the App Engine Standard Java8 runtime.
- A process started on the server to answer a request can't last more than 60 seconds (with the 1.4.0 release, this restriction does not apply to background jobs anymore).
- Does not support sticky sessions (a.k.a. session affinity), only replicated sessions are supported including limitation of the amount of data being serialized and time for session serialization.

App Engine provides more infrastructure to make it easy to write scalable applications, but can only run a limited range of applications designed for that infrastructure. App Engine's infrastructure removes many of the system administration and development challenges of building applications to scale to hundreds of requests per second and beyond. Google handles deploying code to a cluster, monitoring, failover, and launching application instances as necessary. While other services let users install and configure nearly any \*NIX compatible software, App Engine requires developers to use only its supported languages, APIs, and frameworks. Current APIs allow storing and retrieving data from the document-oriented Google Cloud Datastore database; making HTTP requests; sending e-mail; manipulating images; and caching. Google Cloud SQL can be used for App Engine applications requiring a relational MySQL compatible database backend. Per-day and per-minute quotas restrict bandwidth and CPU use, number of requests served, number of concurrent requests, and calls to the various APIs, and individual requests are terminated if they take more than 60 seconds or return more than 32MB of data.

Google App Engine's integrated Google Cloud Datastore database has a SQL-like syntax called "GQL" (Google Query Language). GQL does not support the Join statement. Instead, one-to-many and many-to-many relationships can be accomplished using ReferenceProperty (). Google Firestore is the

successor to Google Cloud Datastore and replaces GQL with a document-based query method that treats stored objects as collections of documents.

### **Google App Engine Features:**

- Blob store for serving large data objects;
- GAE Cloud Storage for storing data objects;
- Page Speed Service for automatically speeding up webpage load times;
- URL Fetch Service to issue HTTP requests and receive responses for efficiency and scaling; and
- Memcache for a fully managed in-memory data store.

### **Benefits of GAE**

- Ease of setup and use. GAE is fully managed, so users can write code without considering IT operations and back-end infrastructure. The built-in APIs enable users to build different types of applications. Access to application logs also facilitates debugging and monitoring in production.
- Pay-per-use pricing. GAE's billing scheme only charges users daily for the resources they use. Users can monitor their resource usage and bills on a dashboard.
- Scalability. Google App Engine automatically scales as workloads fluctuate, adding and removing application instances or application resources as needed.
- Security. GAE supports the ability to specify a range of acceptable Internet Protocol (IP) addresses. Users can allow list specific networks and services and blocklist specific IP addresses.

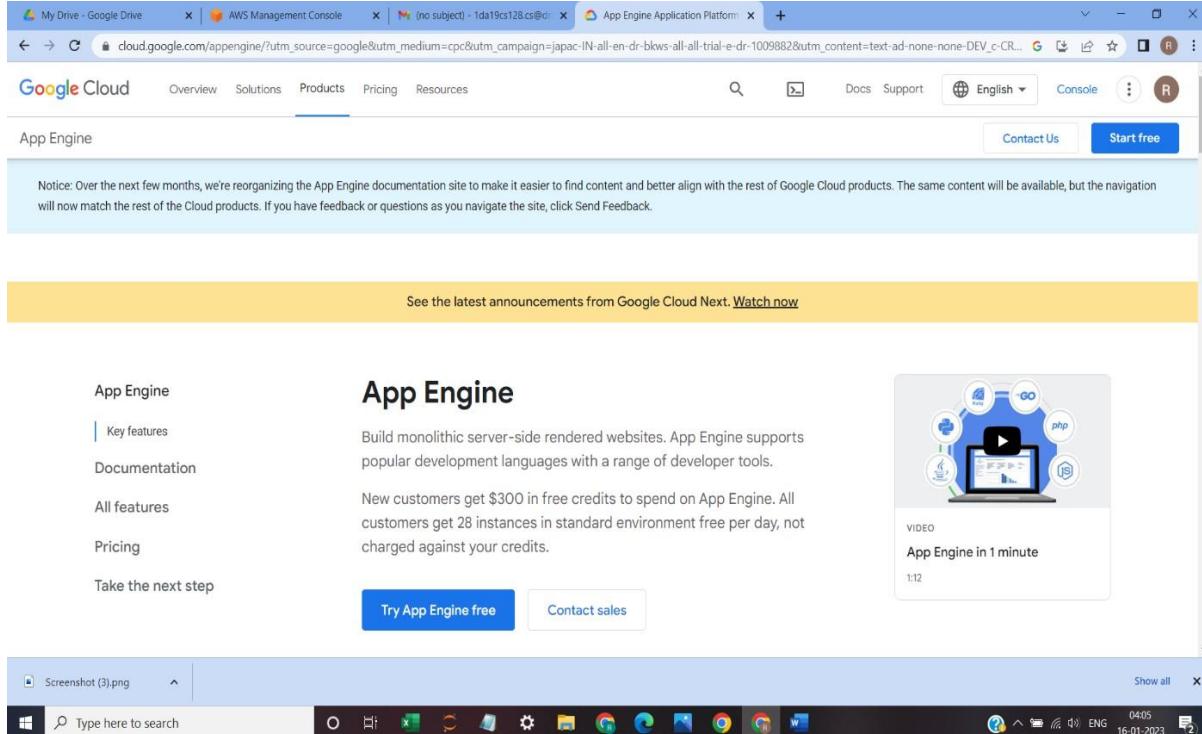
### **GAE challenges**

- Lack of control. Although a managed infrastructure has advantages, if a problem occurs in the back-end infrastructure, the user is dependent on Google to fix it.
- Performance limits. CPU-intensive operations are slow and expensive to perform using GAE. This is because one physical server may be serving several separate, unrelated app engine users at once who need to share the CPU.
- Limited access. Developers have limited, read-only access to the GAE filesystem.
- Java limits. Java apps cannot create new threads and can only use a subset of the Java runtime environment standard edition classes.

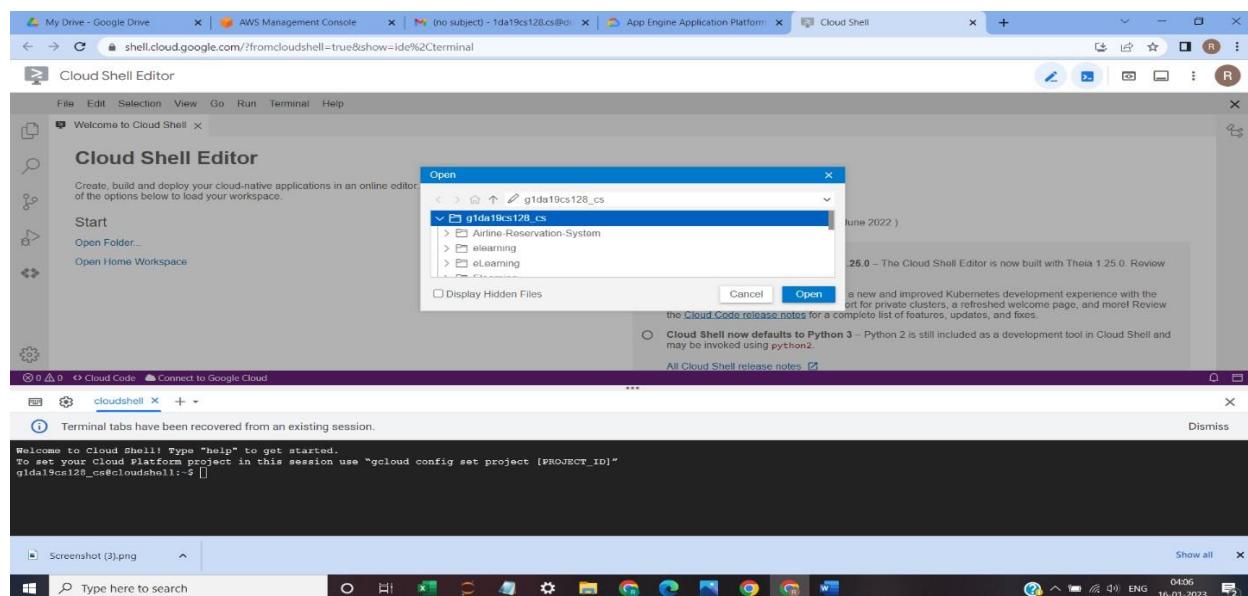
## Install Google App Engine. Create hello world app and other simple web applications using python/java

Step 1: Create an account on Google App Engine.

Step 2: Log in to your Google App Engine Account.



Step 3: Create a New Project and give a Project Name and click on create.



Step 4: Once the project is created click on Activate Cloud Shell on the top right corner.

Step 5: Once the cloud shell gets activated type the following command in the terminal and choose the region as South Asia

```
gcloud app create
```

Click on Open Editor.

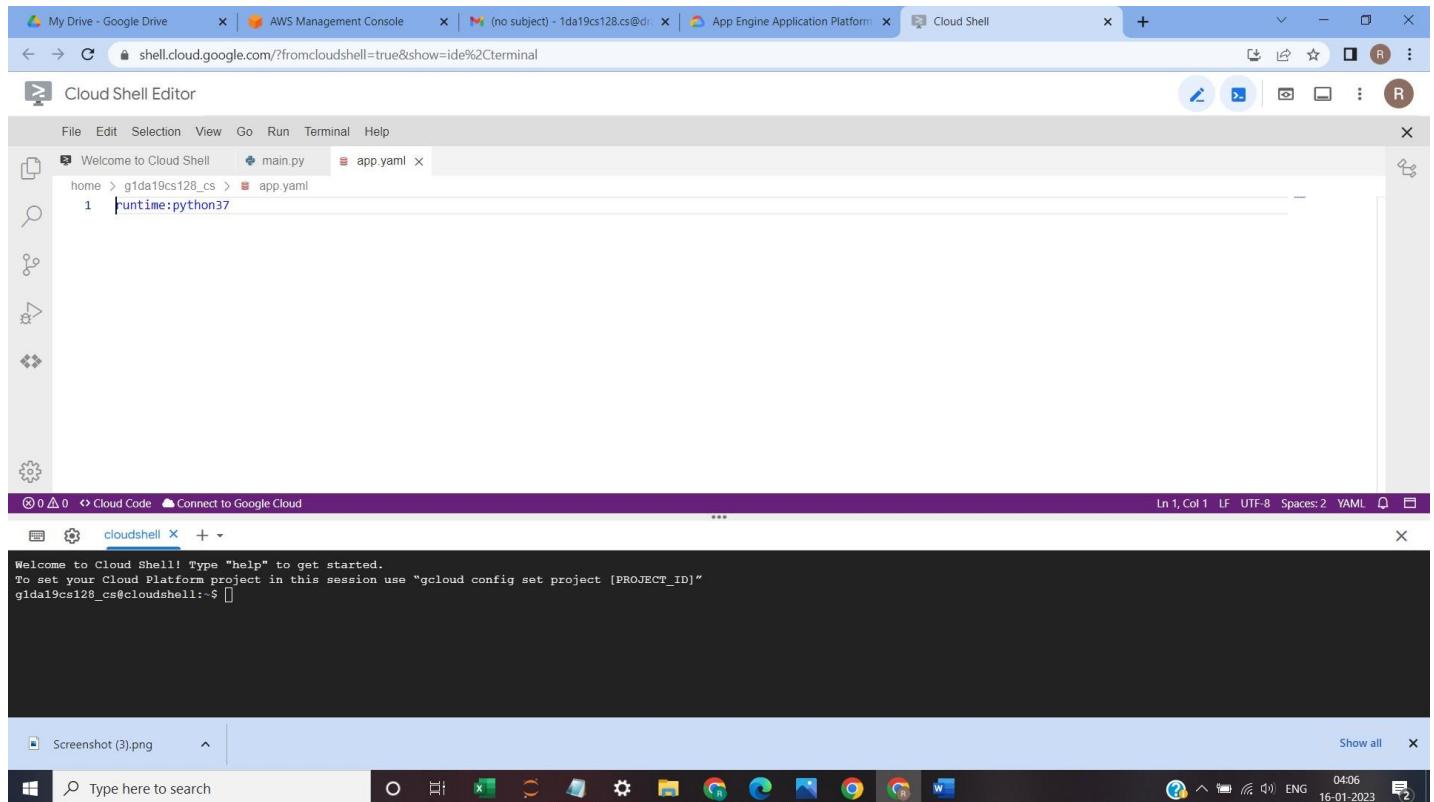
Step 6: Click on File, then, New File.

Step 7: Name the File as main.py and type the following code:

```
from flask import Flask
app = Flask(__name__)
@app.route('/')
def index():
    return 'Hello World'
app.run(host='127.0.0.1', port=80)
```

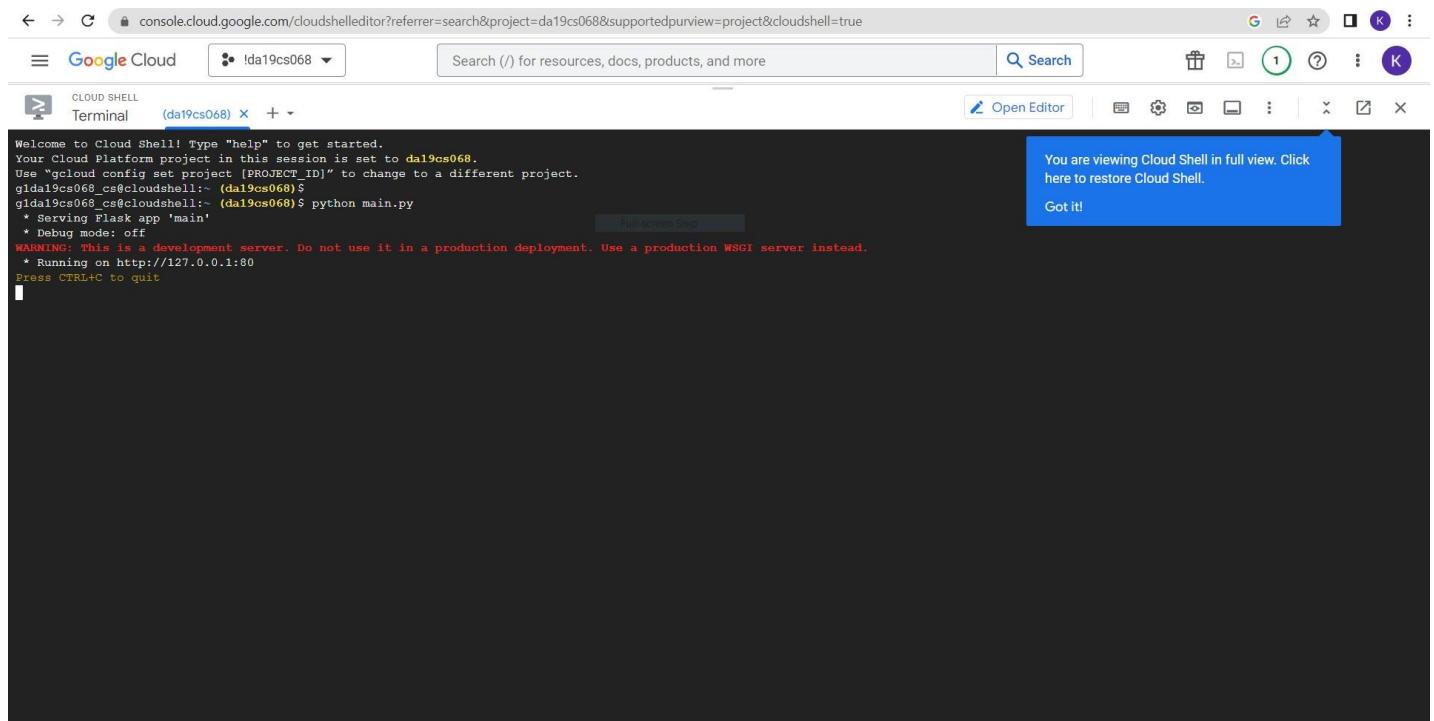
The screenshot shows a browser-based Cloud Shell interface. At the top, there are several tabs: 'My Drive - Google Drive', 'AWS Management Console', '(no subject) > 1da19cs128.cs@ctrl...', 'App Engine Application Platform', and 'Cloud Shell'. Below the tabs, the URL is shell.cloud.google.com/?fromcloudshell=true&show=id%2Cterminal. The main area has a title 'Cloud Shell Editor' and a toolbar with icons for file operations. A file tree on the left shows 'Welcome to Cloud Shell' and 'main.py'. The code editor contains the provided Python code. Below the editor is a terminal window titled 'cloudshell' with the message: 'Welcome to Cloud Shell! Type "help" to get started. To set your Cloud Platform project in this session use "gcloud config set project [PROJECT\_ID]"'. The bottom of the screen shows a Windows taskbar with various icons and a system tray.

Step8: Create a app.yaml file



**Step 9:** Go to terminal and type the following command

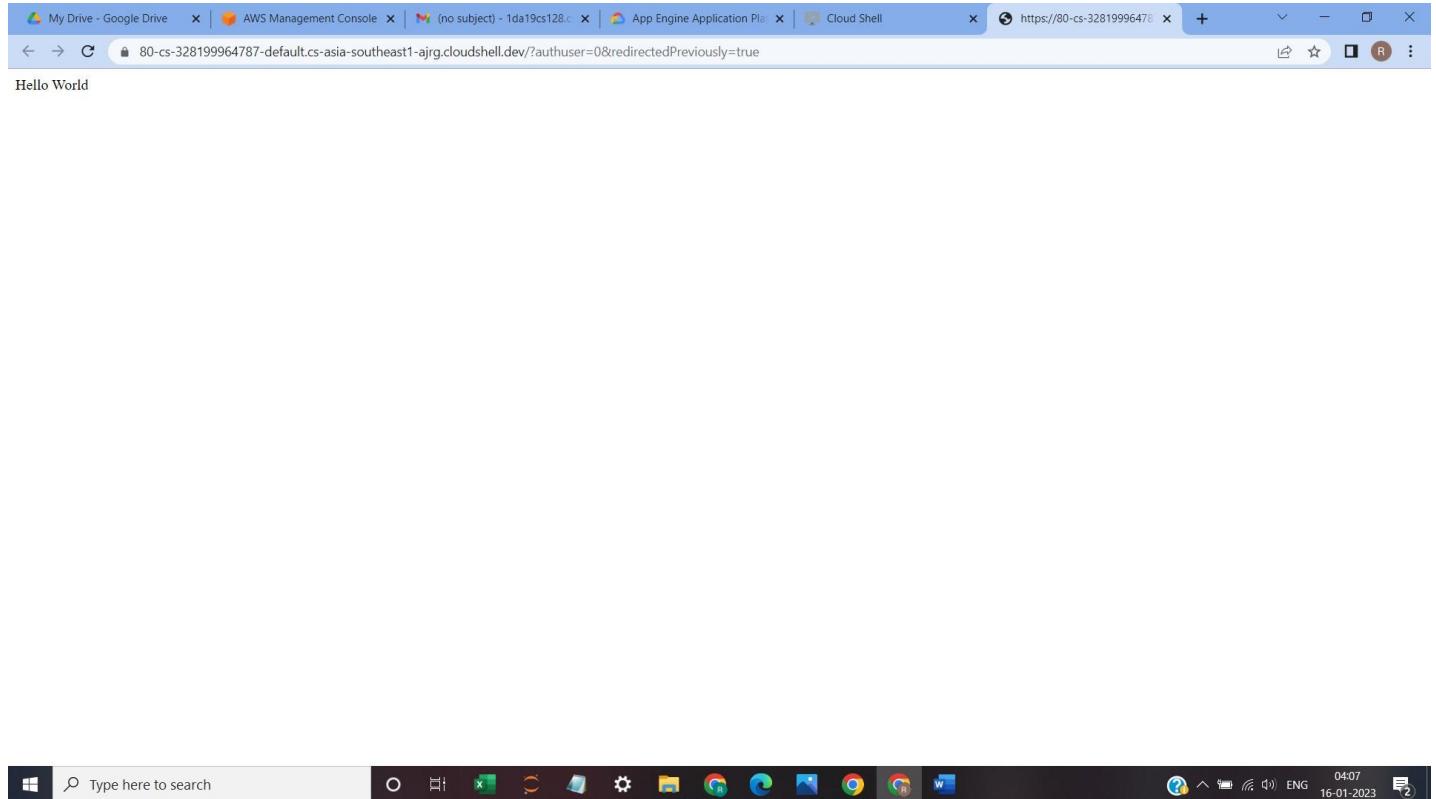
*python main.py*



Note: If Flask is not installed, please use the following command

*pip install flask*

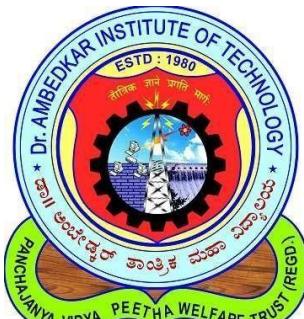
Step 10: Open the https link



# **Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY**

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(An Autonomous Institution, Aided by Government of Karnataka)



**MINI PROJECT REPORT  
ON**

**“Meme Generator”**

**BACHELOR OF ENGINEERING  
IN**

**COMPUTER SCIENCE AND ENGINEERING**

**SUBMITTED  
BY**

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1DA20CS070**

**UNDER THE GUIDANCE OF**

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**Department of Computer Science & Engineering  
2023-24**

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Aided By Govt. of Karnataka

## **CERTIFICATE**

This is to certify that the project entitled "**Meme Generator**" submitted in the partial fulfillment of the requirement of the 7th semester Cloud Computing laboratory curriculum during the year 2023-24 is a result of bonafide work carried out by-

**Mahendar Patel**  
**1DA20CS070**

Signature of the guide

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2. External Examiner \_\_\_\_\_

**Dr. Siddaraju,**  
Head of Department  
Department of CSE, Dr.AIT

## ACKNOWLEDGEMENT

The sense of contention and elation that accompanies the success of this seminar and the report could be incomplete without mentioning the names of people who have helped me in accomplishing them, people whose constant guidance, support and encouragement resulted in the realization.

I consider myself privileged to express our gratitude and respect towards all those who guided me through the project, "**Meme Generator**".

I take this opportunity to thank, **Dr. M Meenakshi, Principal, Dr. Ambedkar Institute of Technology**, Bengaluru for his support and encouragement.

I am grateful to **Dr. Siddaraju, Head of Department, CSE, Dr. Ambedkar Institute of Technology**, Bengaluru for providing encouragement and support.

I consider ourselves privileged to express our gratitude and respect towards our guide **Dr Smitha Shekar B** and **Dr Asha K N** for constant guidance and support for the completion of the project.

Lastly, I thank all the members of the staff both teaching and non-teaching, friends and last but not the least our parents and family, for helping me directly or indirectly in the completion of the project.

**Mahendar Patel**

## ABSTRACT

The Meme Generator Project is an innovative web application developed using React.js and integrated with the Imgflip API, designed to provide users with a dynamic and engaging platform for creating personalized memes. This abstract delves into the key features, functionalities, and objectives of the project, highlighting its significance in the realm of online content creation.

The primary goal of the Meme Generator Project is to offer users a seamless and enjoyable experience in generating memes. Leveraging the Imgflip API, the project dynamically retrieves random meme images, ensuring a diverse and entertaining collection for users to choose from. The integration with React.js, a popular JavaScript library for building user interfaces, enables a responsive and interactive design, enhancing the overall user experience.

One of the distinctive features of the Meme Generator is its user-friendly interface. The application allows users to effortlessly add custom text captions to both the top and bottom of selected meme images. What sets this project apart is the introduction of dynamically generated captions, injecting an element of randomness into each meme creation. This approach not only simplifies the meme-making process but also adds an element of surprise and creativity to the user's experience.

In conclusion, the Meme Generator Project represents a convergence of creativity, technology, and user-centric design. By seamlessly integrating React.js with the Imgflip API, the project offers a unique and entertaining platform for meme creation. The emphasis on dynamic text generation, transparency, and user control distinguishes this project in the landscape of online content creation tools. As the digital space continues to evolve, the Meme Generator Project exemplifies a forward-looking approach to user experience, providing a glimpse into the potential of innovative web applications.

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# CHAPTER-1

## INTRODUCTION

In the dynamic landscape of online content creation, the Meme Generator Project emerges as a beacon of creativity and user engagement. Developed using the versatile React.js library and seamlessly integrated with the Imgflip API, this project aims to redefine the meme-making experience. This introduction provides a comprehensive overview of the project's inception, key components, and its role in addressing the evolving needs of meme enthusiasts.

The Meme Generator Project stands at the intersection of two powerful technologies—React.js and the Imgflip API. React.js, a JavaScript library renowned for building user interfaces with efficiency and flexibility, becomes the canvas upon which the project unfolds. Paired with the Imgflip API, an API designed for generating memes, the project empowers users to effortlessly create and customize memes with a rich variety of randomly sourced images.

At its core, the project seeks to democratize meme creation, making it accessible to users of all skill levels. The Imgflip API integration ensures a vast and diverse pool of meme templates, ranging from popular internet memes to more obscure and niche selections. This inclusivity in meme choices encourages users to explore their creativity across a spectrum of visual content..

In essence, the Meme Generator Project represents a convergence of technology and creativity, unlocking new possibilities in the realm of online content creation. As users embark on a journey of meme-making with React.js and the Imgflip API, this project stands as a testament to the innovative potential of web applications. The subsequent sections will delve deeper into the project's objectives, functionalities, and the impact of Imgflip API integration on the meme creation landscape.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 JAVA SCRIPT

JavaScript is a dynamic computer programming language. It is lightweight and most commonly used as a part of web pages, whose implementations allow client-side script to interact with the user and make dynamic pages. It is an interpreted programming language with object-oriented capabilities.

JavaScript was first known as **LiveScript**, but Netscape changed its name to JavaScript, possibly because of the excitement being generated by Java. JavaScript made its first appearance in Netscape 2.0 in 1995 with the name **LiveScript**. The general-purpose core of the language has been embedded in Netscape, Internet Explorer, and other web browsers.

The [ECMA-262 Specification](#) defined a standard version of the core JavaScript language.

- JavaScript is a lightweight, interpreted programming language.
- Designed for creating network-centric applications.
- Complementary to and integrated with Java.
- Complementary to and integrated with HTML.
- Open and cross-platform

#### Client-Side JavaScript

Client-side JavaScript is the most common form of the language. The script should be included in or referenced by an HTML document for the code to be interpreted by the browser.

It means that a web page need not be a static HTML, but can include programs that interact with the user, control the browser, and dynamically create HTML content.

The JavaScript client-side mechanism provides many advantages over traditional CGI server-side scripts. For example, you might use JavaScript to check if the user has entered a valid e-mail address in a form field.

The JavaScript code is executed when the user submits the form, and only if all the entries are valid, they would be submitted to the Web Server.

JavaScript can be used to trap user-initiated events such as button clicks, link navigation, and other actions that the user initiates explicitly or implicitly.

## Advantages of JavaScript

The merits of using JavaScript are –

- **Less server interaction** – You can validate user input before sending the page off to the server. This saves server traffic, which means less load on your server.
- **Immediate feedback to the visitors** – They don't have to wait for a page reload to see if they have forgotten to enter something.
- **Increased interactivity** – You can create interfaces that react when the user hovers over them with a mouse or activates them via the keyboard.
- **Richer interfaces** – You can use JavaScript to include such items as drag-and-drop

## 2.2 React

React is a JavaScript library for building user interfaces, and when it comes to creating web applications with React, specific conventions and syntax are employed to signal to computers and web servers that the file contains React code. These conventions adhere to certain file and naming structures and play a crucial role in ensuring that the code is recognized and interpreted correctly. Let's explore the React-specific conventions analogous to the HTML conventions described.

The fundamental identifier in a React application is the JSX (JavaScript XML) syntax, which resembles a combination of JavaScript and XML/HTML. JSX allows developers to write HTML elements and components in a more dynamic and expressive manner within their JavaScript code. Similar to the HTML document type declaration, React begins with the import of the React library, signifying to the code interpreter that this is a React application.

## 2.3 CSS

CSS stands for Cascading Style Sheets. It is a style sheet language which is used to describe the look and formatting of a document written in markup language. It provides an additional feature to HTML. It is generally used with HTML to change the style of web pages and user interfaces. It can also be used with any kind of XML documents including plain XML, SVG and XUL.

CSS is used along with HTML and JavaScript in most websites to create user interfaces for web applications and user interfaces for many mobile applications.

Benefits of CSS:

- 1) Faster Page Speed. More code means slower page speed. ...
- 2) Better User Experience. CSS not only makes web pages easy on the eye, it also allows for user-friendly formatting. ...
- 3) Quicker Development Time. ...
- 4) Easy Formatting Changes. ...
- 5) Compatibility Across Devices.

## CHAPTER 3

### REQUIREMENT SPECIFICATION

The hardware and software components of a computer system that are required to install and use software efficiently are specified in the SRS. The minimum system requirements need to be meet for program to run at all times on the system.

**Hardware Specification :** The hardware used for development of the project are:

- Processor: Core i7 8750H
- RAM :4 GB DDR4 RAM
- Monitor: 15.6" LED
- Storage:128 GB SSD,1TB HDD
- Keyboard: STANDARD 102 KEYS

**Software Specification:** The software used for development of the project are:

- Operating System: Windows10
- API Used: Imgflip API for Image Generation

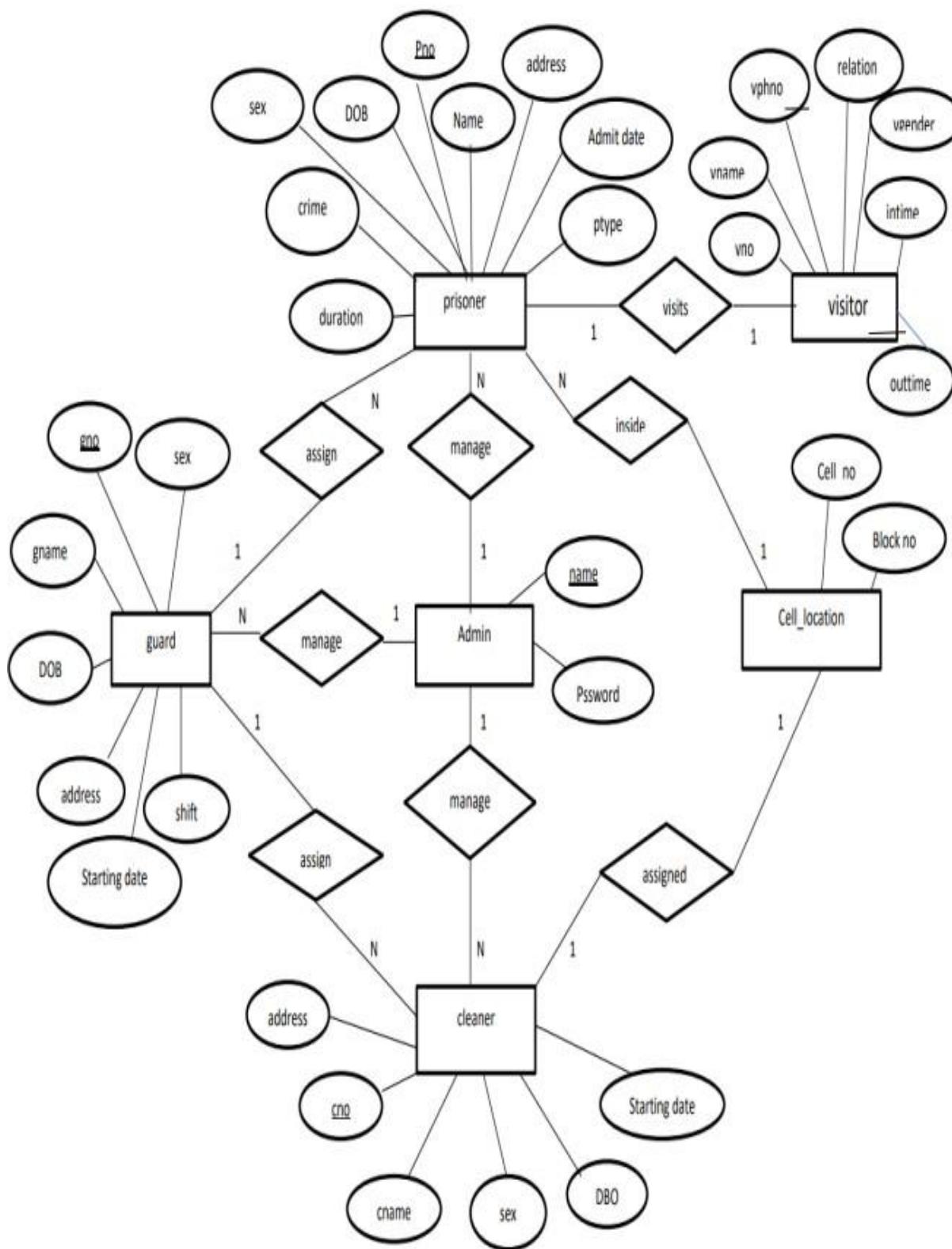
## CHAPTER 4

# DESIGN

### 4.1 ER DIAGRAM

An entity-relationship model (ER model) is a data model for describing the data or information aspects of a business domain or its process requirements, in an abstract way that lends itself to ultimately begin implemented in the database such as a relational database.

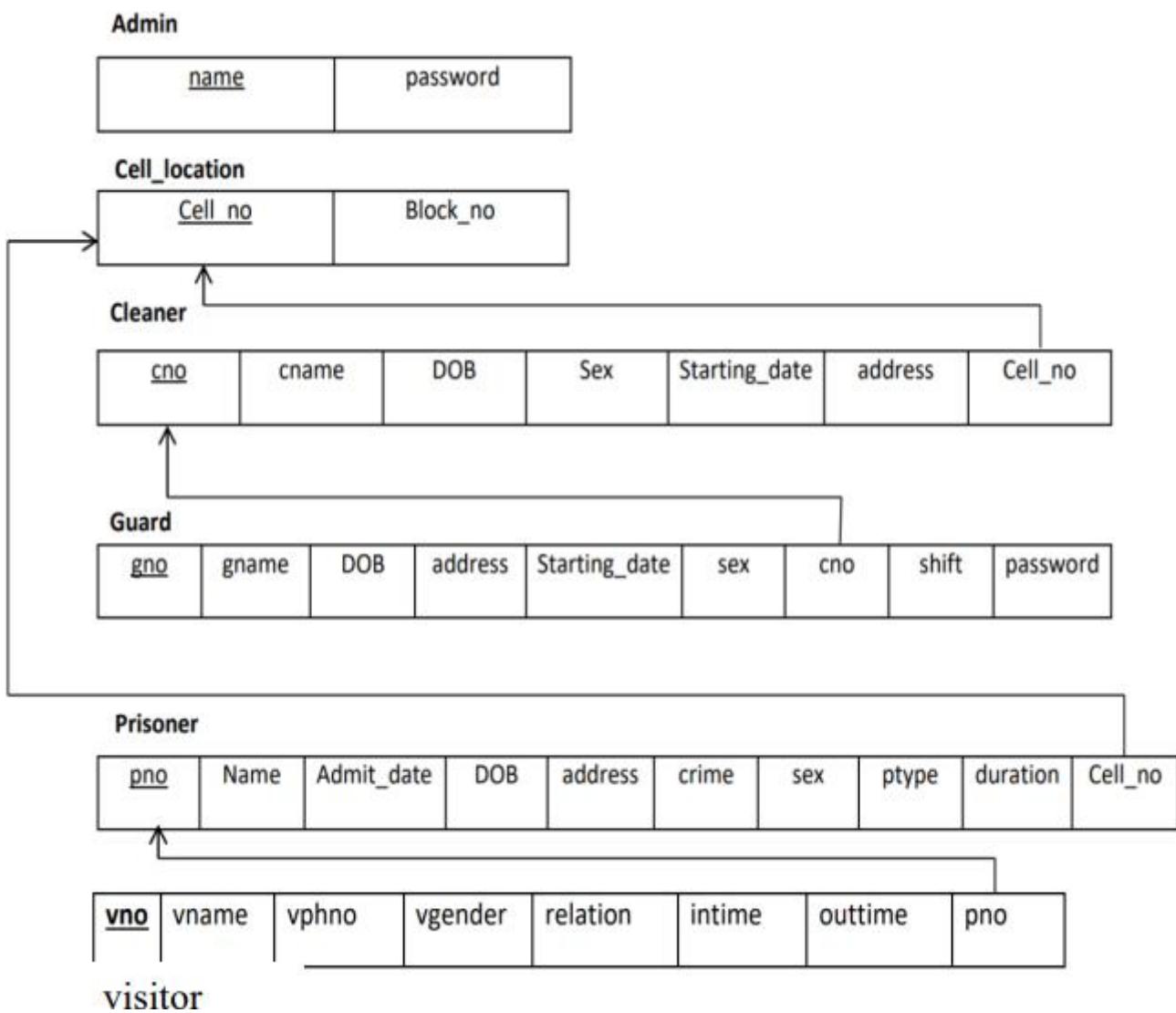
The main components of ER model are entities (things) and the relationship that can exist among them. Entity – relationship modeling was developed by Peter Chen and published in 1976 paper. The ER diagram is drawn to have a better understanding of the whole scenario, it is used to conceptualize the phenomena, actions and interactions between various entities and to arrive at the specific requirements in a comprehensive manner. An entity relation relationship model is the result of using a systematic process to describe and define a subject area of business data. The data is represented as components (entities) that are linked with each other by relationships that express the dependencies and requirements between them, such as: one building may be divided into number of apartments, but one apartment can be located in one building. Entities may have various properties (attributes) that characterize them. Diagrams created to represent these entities, attributes, and relationships graphically are called entity-relationship diagrams. An ER model is typically implemented as database. In the case of a relational database, which stores data in tables, every row of each table represents one instance of an entity. Some data fields in these tables to indexes in other tables; such pointers are physical implementation of the relationships. The three schema approach to software engineering uses three levels of ER models may be developed. A relationship captures how entities are related to one another. Relationships can be thought of as verbs, linking two or more nouns. Entities and relationships can both have attributes. The ER diagram for this database is as shown. Based on the overview of our project, we develop the following Entity Relationship model.



ER Diagram of Prison Management System

## 4.2 SCHEMA DIAGRAM

The design of the database is called a schema. This tells us about the structural view of the database. It gives us an overall description of the database. A database schema defines how the data is organized using the schema diagram. A schema diagram is a diagram which contains entities and the attributes that will define that schema. A schema diagram only shows us the database design. It does not show the actual data of the database. Schema can be a single table or it can have more than one table which is related. The schema represents the relationship between these tables.



Schema Diagram for Prison Management System

## 4.3 DATABASE CREATION

Creation of Tables

### I. ADMIN TABLE

```
CREATE TABLE admin (
    name varchar(20) NOT NULL,
    password varchar(20) NOT NULL );
```

### II. CELL LOCATION TABLE

```
CREATE TABLE cell_location
( cell_no char(4) NOT NULL,
  block_no varchar(10) NOT NULL );
```

### III. CLEANER TABLE

```
CREATE TABLE cleaner
( cno char(4) PRIMARY
KEY,
  cname varchar(20) NOT NULL,
  DOB date NOT NULL,
  sex varchar(6) NOT NULL,
  starting_date date NOT NULL,
  caddress varchar(20) NOT NULL,
  cell_no references cell_location
```

### IV. GUARD TABLE

```
CREATE TABLE guard
( gno char(5) PRIMARY
KEY,
  gname varchar(20) NOT NULL,
```

DOB date NOT NULL,  
address varchar(20) NOT NULL,

```
starting_date date NOT NULL,  
sex varchar(8) NOT NULL,  
cno REFERENCES cleaner, shift varchar(20) NOT NULL,  
password varchar(20) NOT NULL );
```

## V. PRISONER TABLE

```
CREATE TABLE prisoner  
( pno char(4) PRIMARY KEY,  
Name varchar(20) NOT NULL,  
admit_date date NOT NULL,  
DOB date NOT NULL,  
address varchar(20) NOT NULL,  
crime varchar(20) NOT NULL,  
sex varchar(6) NOT NULL,  
ptype varchar(20) NOT NULL,  
duration varchar(30) NOT NULL,  
cell_no REFERENCES cell_location );
```

## VI. VISITOR TABLE

```
CREATE TABLE visitor  
(vno char(3) NOT NULL,  
vname varchar(20) NOT NULL,  
vphno char(10) NOT NULL,  
vgender varchar(20) NOT NULL,  
relation varchar(20) NOT NULL,  
intime varchar(20) NOT NULL,  
outtime varchar(20) NOT NULL,  
pno char(4) NOT NULL );
```

## 4.4 DATA INSERTION

### 1. INSERTION OF ADMIN TABLE

```
INSERT INTO admin (name, password) VALUES('srusti', '123'),  
INSERT INTO admin (name, password) VALUES('raj', '555'),  
INSERT INTO admin (name, password) VALUES ('yam', '5153'),  
INSERT INTO admin (name, password) VALUES ('sam', '333');
```

### 2. INSERTION OF CELL LOCATION TABLE

```
INSERT INTO cell_location VALUES(1001, 'A1block'),  
INSERT INTO cell_location VALUES (1002,'A2block'),  
INSERT INTO cell_location VALUES (1003,'B1block'),  
INSERT INTO cell_location VALUES (1004,'B2block');
```

### 3. INSERTION OF CLEANER TABLE

```
INSERT INTO cleaner VALUES(1000, 'Nitin', '1998-11-12', 'Male', '2000-11-12', 'Goa', 1001),  
INSERT INTO cleaner VALUES (2000, 'Anurag', '1999-11-12', 'Male', '2000-11-12', 'Gujurat',  
1002),  
INSERT INTO cleaner VALUES (3333, 'Adriel', '1996-08-06', 'Male', '2005-06-08', 'Udupi',  
1003), INSERT INTO cleaner VALUES (6363, 'Anany Sagar', '1998-11-11', 'Male', '2018-10-  
20', 'Patna', 1004);
```

### 4. INSERTION OF GUARD TABLE

```
INSERT INTO guard VALUES (1111, 'Askal', '1997-11-13', 'Goa', '2000-11-12', 'Female',1000  
, 'Morning', 'icecream'),  
INSERT INTO guard VALUES (2222, 'Akash', '1998-11-06', 'kerala', '2001-11-06', 'Male',3333,  
'Morning', 'vanilla'),  
INSERT INTO guard VALUES (4444, 'Yemmi', '1996-10-09', 'Delhi', '2006-12-05',  
'Male',2000,'Night', 'Choco');
```

## 5.INSERTION OF PRISONER TABLE

```
INSERT INTO prisoner VALUES(1111, 'Anurag', '2000-11-12', '1997-11-13', 'Patna', 'Murder',
'Male', 'Minimum security', '2 Months', 1001),
```

```
INSERT INTO prisoner VALUES(5153, 'Arav', '2001-04-02', '1992-08-07', 'Ap', 'Murder',
'Male', 'Minimum security', '2 Months', 1002),
```

```
INSERT INTO prisoner VALUES(9999, 'farnaaz', '2002-04-04', '1995-08-06', 'up', 'Murder',
'feMale', 'Maximum security', '5 Months', 1004);
```

## 6.INSERTION OF VISITOR TABLE

```
INSERT INTO visitor VALUES (100, 'Anu', '8970654324', 'Male', 'brother', '10am',
'11am',1111),
```

```
INSERT INTO visitor VALUES (200, 'asha', '895684324', 'feMale', 'mother', '9am',
'11am',5153),
```

```
INSERT INTO visitor VALUES (300, 'Akshay', '8970658424', 'Male', 'friend', '10am',
'11am',9999);
```

## 4.5 FRONT END AND BACK END CONNECTION

A system to satisfy specified requirements. Systems design could see it as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering. If the broader topic of product development –blends the perspective of marketing, design, and manufacturing into a single approach to product development,|| then design is the act of taking the marketing information and creating the design of the product to be manufactured. Systems design is therefore the process of defining and developing systems to satisfy specified requirements of the user. Until the 1990s systems design had a crucial and respected role in the data processing industry. In the 1990s standardization of hardware and software resulted in the ability to build modular systems. The increasing importance of software running on generic platforms has enhanced the discipline of software engineering. Object-oriented analysis and design methods are becoming the most widely used methods for computer systems design. The UML has become the standard language in object-oriented analysis and design. It is widely used for modelling software systems and is increasingly used for high designing non-software systems and organizations.[citation needed] System design is one of the most important phases of software development process. The purpose of the design is to plan the solution of a problem specified by the requirement

---

documentation. In other words the first step in the solution to the problem is the design of the project.

1. mysqli connect () To connect to MySQL using the MySQL Improved extension, follow these steps:

a) Use the following PHP code to connect to MySQL and select a database. Replace username with your username, password with your password, and dbname with the database name:

```
<?php
$mysqli = new mysqli("localhost", "username", "password", "dbname");
?>
```

b) After the code connects to MySQL and selects the database, you can run SQL queries and perform other operations. The connectivity code used in this database is as follows

```
<?php
$servername = "localhost";
$username = "root";
$password = "";
$db = "Prison-Management";
// Create connection
$con = mysqli_connect($servername, $username, $password,$db);
// Check connection
if (!$con) {
    die("Connection failed: " . mysqli_connect_error());
}
?>
```

2. close() - Closing a Database Connection It is not always necessary to close a connection when you are finished, but it is advised. It is, however, necessary to close the connection to the database if you want to open up a new connection to a different database. To close a connection to a database, we use the mysql\_close() function, as follows: mysql\_close();

3. Error Handling It is useful when debugging, and even when you just want to make sure that a database does not behave unexpectedly. Once a query has been created via the mysql\_query() function, any error messages generated will be stored in the mysql\_error() function. Here is a

sample code snippet to display a error message. However, when there is no error messages,a blank string is returned. print mysql\_error().

# CHAPTER 5

## DEVELOPMENT

### FRONT END PAGE CODE:

```
<!DOCTYPE html>

<html >

<head>

<!-- Prison Management System Project - DBMS LAB -->

<meta charset="UTF-8">

<meta http-equiv="X-UA-Compatible" content="IE=edge">

<meta name="viewport" content="width=device-width, initial-scale=1, minimum-scale=1">

<link rel="shortcut icon" href="assets/images/seal-of-the-federal-bureau-of-prisons.svg-
122x122.png"

type="image/x-icon">

<meta name="description" content="FBP - Home Page">

<title>Home</title>

<link rel="stylesheet" href="assets/web/assets/prison-icons/mobirise-icons.css">

<link rel="stylesheet" href="assets/tether/tether.min.css">

<link rel="stylesheet" href="assets/bootstrap/css/bootstrap.min.css">

<link rel="stylesheet" href="assets/bootstrap/css/bootstrap-grid.min.css">

<link rel="stylesheet" href="assets/bootstrap/css/bootstrap-reboot.min.css">

<link rel="stylesheet" href="assets/socicon/css/styles.css">

<link rel="stylesheet" href="assets/dropdown/css/style.css">

<link rel="stylesheet" href="assets/theme/css/style.css">

<link rel="stylesheet" href="assets/prison/css/mbr-additional.css" type="text/css">

</head>

<body>

<section class="menu cid-qTkzRZLJNu" once="menu" id="menu1-0">

<nav class="navbar navbar-expand beta-menu navbar-dropdown align-items-center navbar-
```

```
fixed-top navbar-toggleable-sm">

<button class="navbar-toggler navbar-toggler-right" type="button" data-toggle="collapse"
data-target="#navbarSupportedContent" aria-controls="navbarSupportedContent" aria-
expanded="false" aria-label="Toggle navigation">

<div class="hamburger">

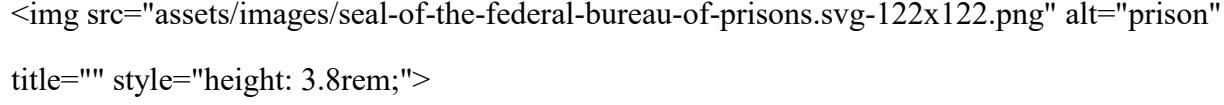
<span></span>
<span></span>
<span></span>
<span></span>

</div>

</button>

<div class="menu-logo">

<div class="navbar-brand">

<span class="navbar-logo">
<a href="#">

</a>
</span>

<span class="navbar-caption-wrap"><a class="navbar-caption text-white display-5"
href="#">Federal Bureau of Prison&ampnbsp</a></span>

</div>

</div>

<div class="collapse navbar-collapse" id="navbarSupportedContent">

<ul class="navbar-nav nav-dropdown" data-app-modern-menu="true"><li class="nav-item">
<a class="nav-link link text-white display-4" href="index.html">
<span class="mbri-home mbr-iconfont mbr-iconfont-btn"></span>Home</a>
</li>
<li class="nav-item">
<a class="nav-link link text-white display-4" href="index.html">
<span class="mbri-search mbr-iconfont mbr-iconfont-btn"></span>
```

---

## About Us

</a>

</li></ul>

<div class="navbar-buttons mbr-section-btn"><a class="btn btn-sm btn-primary display-4" href="index.html">

<span class="mbri-save mbr-iconfont mbr-iconfont-btn "></span>

Try Our App!</a></div>

</div>

</nav>

</section>

<section class="engine"></section><section class="cid-qTkA127IK8 mbr-fullscreen mbr-parallaxbackground" id="header2-1">

<div class="mbr-overlay" style="opacity: 0.5; background-color: rgb(118, 118, 118);"></div>

<div class="container align-center">

<div class="row justify-content-md-center">

<div class="mbr-white col-md-10">

<h1 class="mbr-section-title mbr-bold pb-3 mbr-fonts-style display-1">Welcome to Prison Management System</h1>

<p class="mbr-text pb-3 mbr-fonts-style display-5">

This is a project work done under MAHENDAR PATEL (1DA20CS070) AND KARTIK(1DA19CS070).&nbsp;</p>

<div class="mbr-section-btn"><a class="btn btn-md btn-secondary display-4" href="user\_login.html">User Login</a>

<a class="btn btn-md btn-white-outline display-4" href="admin\_log.html">Admin Panel</a></div>

</div>

</div>

</div>

<div class="mbr-arrow hidden-sm-down" aria-hidden="true">

<a href="#next">

<i class="mbri-down mbr-iconfont"></i>

```
</a>

</div>

</section>

<section class="cid-qTkAaeaxX5" id="footer1-2">
<div class="container">
<div class="media-container-row content text-white">
<div class="col-12 col-md-3">
<div class="media-wrap">
<a href="/">

</a>
</div>
</div>
<div class="col-12 col-md-3 mbr-fonts-style display-7">
<h5 class="pb-3">
Address
</h5>
<p class="mbr-text">
1234 Street Name
<br>City, AA 99999
</p>
</div>
<div class="col-12 col-md-3 mbr-fonts-style display-7">
<h5 class="pb-3">
Contacts
</h5>
<p class="mbr-text">
</p>
</div>
```

```
<div class="col-12 col-md-3 mbr-fonts-style display-7">
<h5 class="pb-3">
Links
</h5>

<p class="mbr-text"><a href="#top">About Federal Bureau of Prison&nbsp;</a><br><a href="#top">Request for bail</a><br><a href="#top">Other enquires</a></p>
</div>
</div>

<div class="footer-lower">
<div class="media-container-row">
<div class="col-sm-12">
<hr>
</div>
</div>

<div class="media-container-row mbr-white">
<p class="mbr-text mbr-fonts-style display-7">
</div>

<div class="col-md-6">
<div class="social-list align-right">
<div class="soc-item">
<a href="index.html" target="_blank">
<span class="mbr-iconfont mbr-iconfont-social socicon-twitter socicon"></span>
</a>
</div>
<div class="soc-item">
<a href="index.html" target="_blank">
<span class="mbr-iconfont mbr-iconfont-social socicon-facebook socicon"></span>
</a>
</div>
<div class="soc-item">
```

```
<a href="index.html">  
  <span class="mbr-iconfont mbr-iconfont-social  
    socicon-youtube socicon"></span>  
</a>  
</div>  
  
<div class="soc-item">  
  <a href="index.html" target="_blank">  
    <span class="mbr-iconfont mbr-iconfont-social socicon-instagram socicon"></span>  
</a>  
</div>  
  
<div class="soc-item">  
  <a href="index.html" target="_blank">  
    <span class="mbr-iconfont mbr-iconfont-social socicon-googleplus socicon"></span>  
</a>  
</div>  
  
<div class="soc-item">  
  <a href="index.html" target="_blank">  
    <span class="mbr-iconfont mbr-iconfont-social socicon-behance socicon"></span>  
</a>  
</div>  
</div>
```

---

```

<script src="assets/dropdown/js/script.min.js"></script>
<script src="assets/touchswipe/jquery.touch-swipe.min.js"></script>
<script src="assets/parallax/jarallax.min.js"></script>
<script src="assets/smoothscroll/smooth-scroll.js"></script>
<script src="assets/theme/js/script.js"></script>
</body>
</html>

```

## 1. ADDING NEW PRISONER

```

<?php session_start();
session_regenerate_id();
require('connect.php');

if($_SERVER["REQUEST_METHOD"] == "POST") {
$no = $_POST['noinput'];
$name = $_POST['nameinput'];
$add = $_POST['addinput'];
$crime = $_POST['crimeinput'];
$sex = $_POST['gender'];
$t = $_POST['type'];
$at_date = $_POST['a_date'];
$d_date = $_POST['date'];
$c = $_POST['c_no'];
$d = $_POST['d_imp'];

$query= "insert into prisoner values
('$no','$name','$at_date','$d_date','$add','$crime','$sex','$t','$d','$c')";

$result = mysqli_query($con,$query);
echo "Successfully Added";
}

?>

```

## 2. DELETING PRISONER

```
<?php session_start();
session_regenerate_id();
require('connect.php');

if($_SERVER["REQUEST_METHOD"] == "POST") {
$no = $_POST['noinput'];
$query= "delete from prisoner where pno = '$no'";
$result = mysqli_query($con,$query);
echo "Successfully Deleted";
}

?>
```

## 3. DISPLAYING ALL PRISONERS

```
<html>
<head>
<style>
table {
border-collapse: collapse;
width: 100%;
}
th, td {
text-align: left;
padding: 8px;
}
tr:nth-child(even){background-color: #f2f2f2}
th {
background-color: #DC2345;
color: white;
```

```
}

.sansserif {

font-family: Arial, Helvetica, sans-serif;

font-size: 25px;

}

</style>

<head/>

<body>

<legend class="sansserif">Prisoner Details</legend>

<hr>

<?php

$con = mysqli_connect("localhost:3307","root","","prison");

//mysqli_select_db($con,"_4nm16is009");

$result = $con->query("SELECT * FROM prisoner");

?>

<table border=1 cellspacing="2" width ="30%">

<tr>

<th>pno</th>

<th>Name</th>

<th>admit_date</th>

<th>DOB</th>

<th>address</th>

<th>crime</th>

<th>sex</th>

<th>ptype</th>

<th>duration</th>

<th>cellno</th>

<tr align = centre>

<?php

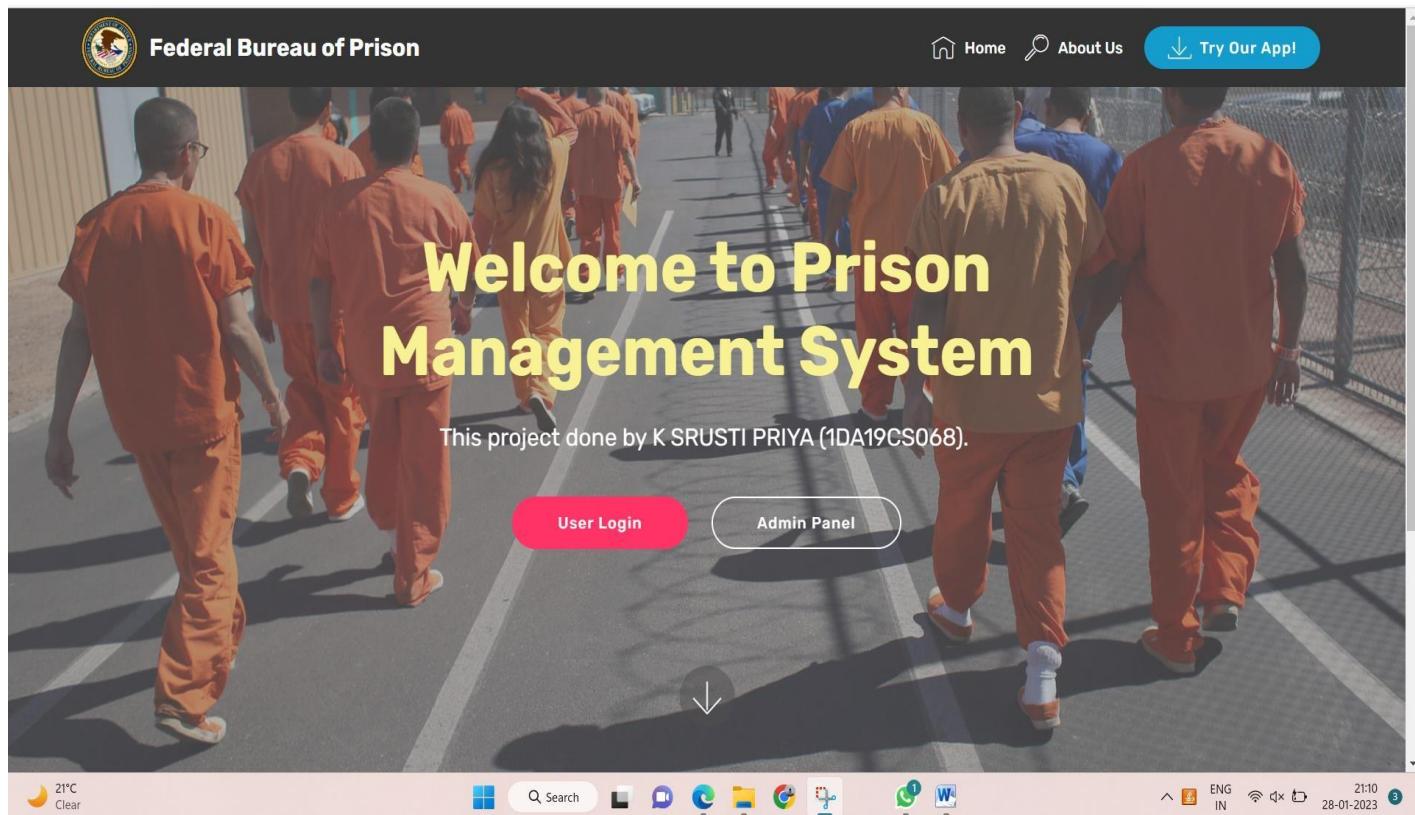
while($row = mysqli_fetch_array($result))
```

```
{  
echo "<td>" . $row['pno'] . "</td>";  
echo "<td>" . $row['Name'] . "</td>";  
echo "<td>" . $row['admit_date'] . "</td>";  
echo "<td>" . $row['DOB'] . "</td>";  
echo "<td>" . $row['address'] . "</td>";  
echo "<td>" . $row['crime'] . "</td>";  
echo "<td>" . $row['sex'] . "</td>";  
echo "<td>" . $row['ptype'] . "</td>";  
echo "<td>" . $row['duration'] . "</td>";  
echo "<td>" . $row['cellno'] . "</td>". "</tr>";  
}  
?  
</table>  
</body> </html>
```

## CHAPTER 6

# RESULTS

The web preview of Prison management system is presented in this section. The database sql source is Connected /imported in Xampp server. Running the localhost host will results as follows



## ADMIN LOGIN

A screenshot of the "Admin Login" portal. The header features the "Federal Bureau of Prison" logo and navigation links for "Home", "About Us", and a "Try" button. Below the header, the text "Admin Login Portal" is displayed. The main form consists of two input fields: "Username" (containing "srusti") and "Password" (containing three dots). A blue "Login" button is positioned below the password field. The entire form is set against a light gray background.

The screenshot shows the header of the website. It features the official seal of the Federal Bureau of Prison on the left, followed by the text "Federal Bureau of Prison" in a bold, sans-serif font. To the right of the text is a search icon consisting of a magnifying glass and the letter "I".

## Add a new Admin

Name:

Password:

## After adding new admin

The screenshot shows the header of the website. It features the official seal of the Federal Bureau of Prison on the left, followed by the text "Federal Bureau of Prison" in a bold, sans-serif font. To the right of the text is a search icon consisting of a magnifying glass and the letter "I".

### Admin Details

name	password
srusti	123
raj	555
yam	5153
sam	333
sandy	6666

## Deleting Admin

The screenshot shows the header of the website. It features the official seal of the Federal Bureau of Prison on the left, followed by the text "Federal Bureau of Prison" in a bold, sans-serif font. To the right of the text are three links: "Home" with a house icon, "About Us" with a magnifying glass icon, and "Try Our App" with a download icon.

Delete admin

name:

## Guard Details

gno	gname	DOB	address	starting_date	sex	cno	shift	password
2222	Akash	1998-11-06	Kerala	2001-11-06	Male	3333	Morning	vanilla
1111	Askal	1997-11-13	Goa	2000-11-12	Female	1000	Morning	icecream
4444	yemmi	1996-10-09	Delhi	2006-12-05	Male	2000	Night	Choco

## Adding new guard

Add a new Guard

Guard No:	8888
Guard Name:	soumya
DOB:	1996-27-07
Address:	karnataka
Admit Date:	2003-09-05
Gender:	<input type="radio"/> Male <input checked="" type="radio"/> Female
cno:	6363
Shift:	<input type="radio"/> Morning <input checked="" type="radio"/> Night
Password:	burj

Submit

## Deleting guard details

Delete Guard Details

Guard No:	8888	<a href="#">Delete</a>
-----------	------	------------------------

## Display all prisoners

### Prisoner Details

pno	Name	admit_date	DOB	address	crime	sex	ptype	duration	cellno
1111	Anurag	2000-11-12	1997-11-13	patna	Murder	Male	Minimum Security	2 Months	1001
5153	Arav	2001-04-02	1992-08-07	Ap	Murder	Male	Minimum Security	2 Months	1002
9999	Farsaz	2002-04-04	1995-08-06	up	Murder	Female	Maximum Security	5 Months	1004

## Adding new prisoner

### Add a new Prisoner

Prisoner No:	5153
Prisoner Name:	sandy
Admit Date:	2002-06-04
DOB:	1991-04-04
Address:	bihar
Committed Crime	kidnapp
Cell no:	1003
Duration of Imprisonment:	6 months
Prisoner Type:	Maximum security
Gender:	<input checked="" type="radio"/> Male <input type="radio"/> Female
<input type="button" value="Submit"/>	

## Deleting prisoner details

### Delete Prisoner Details

Prisoner No:	9999	<input type="button" value="Delete"/>
--------------	------	---------------------------------------

## Display all visitors

The screenshot shows the homepage of the Federal Bureau of Prison. At the top left is the FBI seal. To its right is the text "Federal Bureau of Prison". On the far right are three links: "Home", "About Us", and a blue button labeled "Try Our App!". Below these links is a search bar.

html>

visitor Details

ID	Visitor Name	visitor phno	visitor gender	relation	intime	outtime	prno
100	Anu	8970654324	Male	brother	10am	11am	1111
200	Asha	895684324	female	mother	9am	11am	5153
300	Akhay	8970658424	Male	friend	10am	11am	9999

## Adding new visitor

The screenshot shows a "Add a new visitor" form. At the top left is the FBI seal. To its right is the text "Federal Bureau of Prison". On the far right are three links: "Home", "About Us", and a magnifying glass icon. Below these links is a search bar.

Add a new visitor

visitor No:	400
visitor Name:	saurav
visitor phno:	6366311442
relation:	son
intime:	9am
outtime:	12pm
prisoner no:	5153
visitor Gender:	<input checked="" type="radio"/> Male <input type="radio"/> Female
<input type="button" value="Submit"/>	

## Deleting visitor details

The screenshot shows a "Delete visitor Details" form. At the top left is the FBI seal. To its right is the text "Federal Bureau of Prison". On the far right are three links: "Home", "About Us", and a magnifying glass icon. Below these links is a search bar.

Delete visitor Details

visitor No:	400	<input type="button" value="Delete"/>
-------------	-----	---------------------------------------

## Cell\_location details

Federal Bureau of Prison

- [Home](#)
- [About Us](#)
- [Try Our App!](#)

### cell\_location Details

cell_no	block_no
1001	A1block
1002	A2block
1003	B1block
1004	B2block

## Adding new cell\_location

Add a new Cleaner

cell_no:	<input type="text" value="4567"/>
block_no:	<input type="text" value="A3block"/>
<input type="button" value="Submit"/>	

## Deleting cell\_locations

Delete cell\_location Details

cell_no:	<input type="text" value="4567"/>
<input type="button" value="Delete"/>	

## Display all Cleaners details

The screenshot shows the header of a website for the Federal Bureau of Prison. It features a logo on the left, followed by the text "Federal Bureau of Prison". To the right are three links: "Home", "About Us", and a blue button labeled "Try Our App!".

### Cleaner Details

CB	name	DOB	sex	starting_date	address	cell_no
1000	Nitin	1998-11-12	Male	2000-11-12	Gos	1001
2000	Amit	1999-11-12	Male	2000-11-12	Gujrat	1002
3333	Adiel	1996-08-06	Male	2005-06-08	Udipi	1003
6363	Anney Sagar	1998-11-11	Male	2018-10-20	Patna	1004

## Adding new cleaner details

Add a new Cleaner

Cleaner No:	6363
Cleaner Name:	asha
DOB:	1997-08-04
Gender:	<input type="radio"/> Male <input checked="" type="radio"/> Female
Starting Working Date:	2005-04-04
Address:	mumbai
Assigned Cell no:	1004
<input type="button" value="Submit"/>	

## Deleting cleaner details

Delete Cleaner Details

Cleaner No:	6363	<input type="button" value="Delete"/>
-------------	------	---------------------------------------

## Guard login portal

### User Login Portal

Guard no:

Password:  [①](#)

## Guard portal



### User Portal

<a href="#">Display All Cleaners</a>	<a href="#">Display All Prisoners</a>
<a href="#">Register New Cleaner</a>	<a href="#">Register New Prisoner</a>
<a href="#">Delete Cleaner</a>	<a href="#">Delete Prisoner</a>

## Display all prisoners

### Prisoner Details

pno	Name	admit_date	DOB	address	crime	sex	ptype	duration	cellno
1111	Anurag	2000-11-12	1997-11-13	Patna	Murder	Male	Minimum Security	2 Months	1001
5153	Arav	2001-04-02	1992-08-07	A.P	Murder	Male	Minimum Security	2 Months	1002
9999	Fareez	2002-04-04	1995-08-06	UP	Murder	Female	Maximum Security	5 Months	1004

## Adding new prisoner

### Add a new Prisoner

Prisoner No: 5153

Prisoner Name: sandy

Admit Date: 2002-06-04

DOB: 1991-04-04

Address: bihar

Committed Crime: kidnap

Cell no: 1003

Duration of Imprisonment: 6 months

Prisoner Type: Maximum security

Gender:  Male  
 Female

Submit

## Deleting prisoner details

### Delete Prisoner Details

Prisoner No: 9999

Delete

## CHAPTER 7

### DEPLOYMENT

Software deployment includes all of the steps, processes, and activities that are required to make a software system or update available to its intended users. Today, most IT organizations and software developers deploy software updates, patches and new applications with a combination of manual and automated processes. Some of the most common activities of software deployment include software release, installation, testing, deployment, and performance monitoring.

Software development teams have innovated heavily over the past two decades, creating new paradigms and working methods for software delivery that are designed to meet the changing demands of consumers in an increasingly connected world. In particular, software developers have created workflows that enable faster and more frequent deployment of software updates to the production environment where they can be accessed by users.

#### 7.1 CLOUD DEPLOYMENT

Cloud deployment is the process of deploying an application through one or more hosting models—software as a service (SaaS), platform as a service (PaaS) and/or infrastructure as a service (IaaS)—that leverage the cloud. This includes architecting, planning, implementing and operating workloads on cloud.

#### Advantages of Cloud Deployment:

- Faster and simplified deployments. Automate builds that deploy code, databases and application releases, including resource provisioning.
- Cost savings. Control costs using consumption-based pricing and eliminate capex-heavy on-premises environments.
- Platform for growth. Leverage the global infrastructure provided by cloud service providers (CSPs) to seamlessly expand the business into other geographies.
- New digital business models. Exploit the continuous release of features and services by CSPs, incubate new technologies and innovate digital business models.
- Business resiliency. Architect for the availability and fault-tolerance CSPs offer and ensure disaster recovery and business continuity of applications to make the business resilient.

- Agility and scalability. Use autoscaling and scalability to meet peak demands of the business

without provisioning for excess capacity.

- Geographic reach. Access applications from any location, on any device, leveraging the connectivity backbone of CSPs.
- Operational efficiency. Use the inherent automation enabled by cloud to increase operational efficiency and reduce human effort.
- A competitive edge. Leverage infrastructure as code and development, security and operations to reduce the time to market for new features and stay ahead of the competition.

### **AWS EC2 INSTANCE DEPLOYMENT:**

With over 32 percent of the entire world's public cloud share, it's no surprise that AWS serves more than 190 countries with scalable, reliable, and low-cost infrastructure. One of its most powerful and commonly used services are Amazon EC2 (Elastic Cloud Compute).

Amazon EC2 provides scalable computing capacity in the AWS cloud. Leveraging it enables organizations to develop and deploy applications faster, without needing to invest in hardware upfront. Users can launch virtual servers, configure security and networking, and manage cookies from an intuitive dashboard.

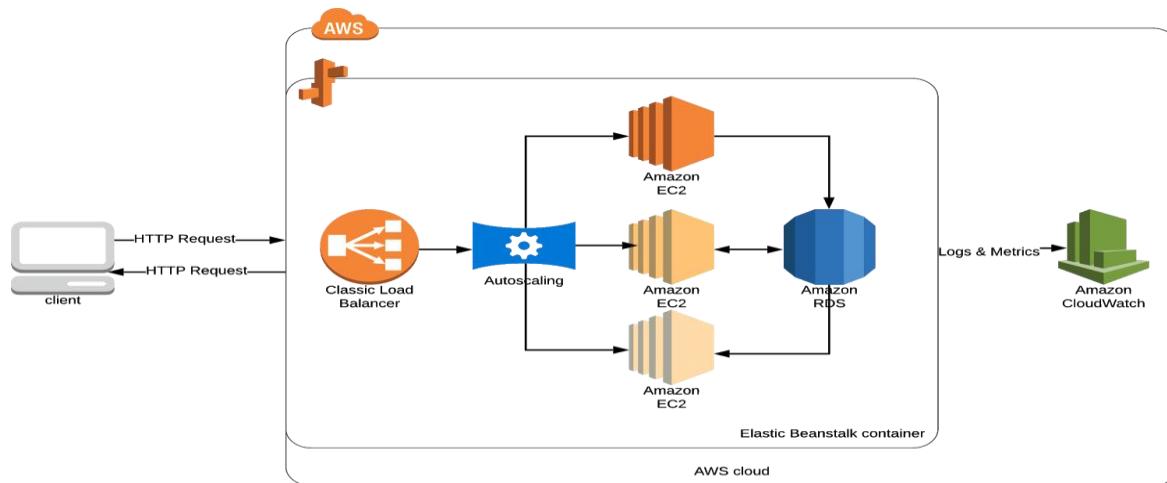
1. You don't require any hardware units
2. Easily scalable (up or down)
3. You only pay for what you use
4. You have complete control
5. Highly secure
6. You can access your assets from anywhere in the world

### **What is AWS EC2?**

Among the vast array of services that Amazon offers, EC2 is the core compute component of the technology stack. In practice, EC2 makes life easier for developers by providing secure, and resizable compute capacity in the cloud. It greatly eases the process of scaling up or down, can be integrated into several other services, and comes with a plan where you only pay for how much you use it.

After we deployed the model on AWS, we got a public ip address to access the website from any devices and AWS manages the traffic.

Our serverless approach has allowed us to remove the need of installing and maintaining servers. It has eliminated the need to pay for the entire service, rather, only pay for what we use, a notable advantage of using AWS to host our model for inference. Other approaches have hosted models on the device, but this makes the application heavier than desired. Using AWS has removed this weight, with the Android app providing the functionality of being able to send an image as an API request and get a response in less than a minute.



### Creation of ec2 instance : Prison-Management

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
AmazonProj	i-0d45f6668caf10043	Stopped	t2.micro	-	No alarms	+ ap-south-1b	-
EducationPortal	i-0da2cc9bf0a57c25c	Stopped	t2.micro	-	No alarms	+ ap-south-1b	-
edu-portal-pr...	i-0ee5871514ea30cb4	Stopped	t2.micro	-	No alarms	+ ap-south-1b	-
<b>hostel-proj</b>	<b>i-040f495e08bfd23d0</b>	<b>Running</b>	<b>t2.micro</b>	<b>2/2 checks passed</b>	<b>No alarms</b>	<b>+ ap-south-1b</b>	<b>ec2-65-2-57-195</b>

**Instance: i-040f495e08bfd23d0 (hostel-proj)**

Details	Security	Networking	Storage	Status checks	Monitoring	Tags
<b>Instance summary</b>						
Instance ID i-040f495e08bfd23d0 (hostel-proj)	Public IPv4 address 65.257.195   open address	Private IPv4 addresses 172.31.15.157				
IPv6 address -	Instance state Running	Public IPv4 DNS ec2-65-2-57-195.ap-south-1.compute.amazonaws.com   open address				
Hostname type IP name: ip-172-31-15-157.ap-south-1.compute.internal	Private IP DNS name (IPv4 only) ip-172-31-15-157.ap-south-1.compute.internal	Elastic IP addresses -				
Answer private resource DNS name IPv4 (A)	Instance type t2.micro	AWS Compute Optimizer finding -				
Auto-assigned IP address 65.257.195.172	VPC ID -					

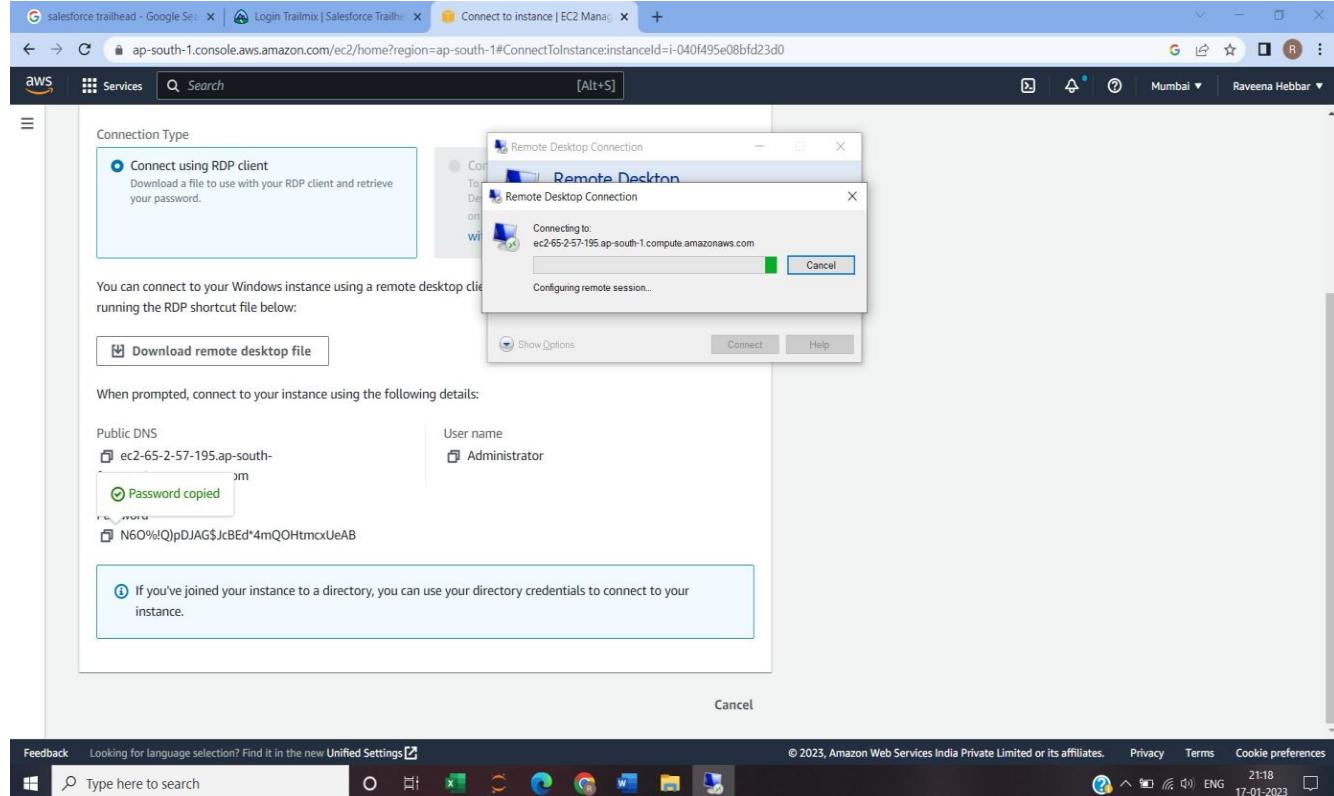
Getting password for the instance created in order to get connected to remote connection.

The screenshot shows the 'Get Windows password' page in the AWS EC2 Management Console. It displays the instance ID (i-040f495e08bfd23d0) and the key pair associated with it (hostelpro). A private key file named 'hostelpro.pem' (1.678KB) has been uploaded. The private key content is shown in a text area, starting with '-----BEGIN RSA PRIVATE KEY-----'. At the bottom, there are 'Cancel' and 'Decrypt password' buttons.

Entering credentials for remote connection

The screenshot shows the 'Connect to instance' page in the AWS EC2 Management Console. It indicates that the public DNS of the instance (ec2-65-2-57-195.ap-south-1.compute.amazonaws.com) has been copied. A 'Windows Security' dialog box is open, prompting for a 'User name' (set to 'Administrator') and 'Password'. The password field contains 'N6O%lQjpDJAG\$JcBED\*4mQOHtmcxUeAB'. The dialog also includes a 'Remember me' checkbox, 'OK' and 'Cancel' buttons, and a note about using directory credentials if joined to a domain.

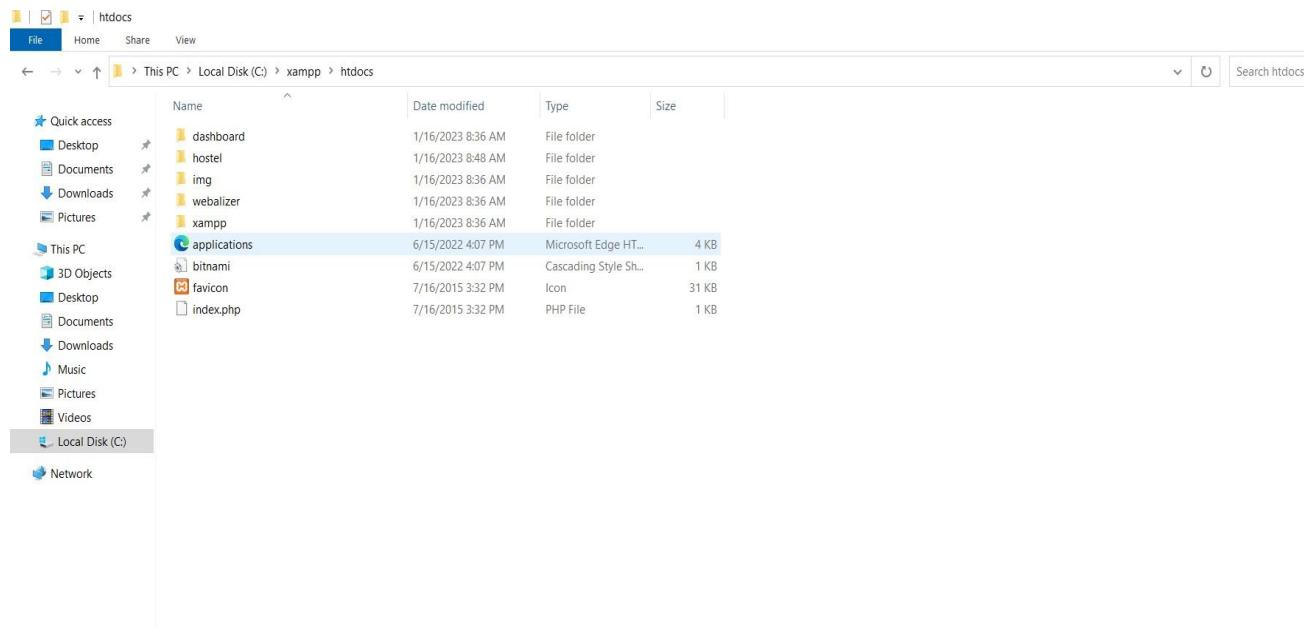
## Remote Desktop Connection



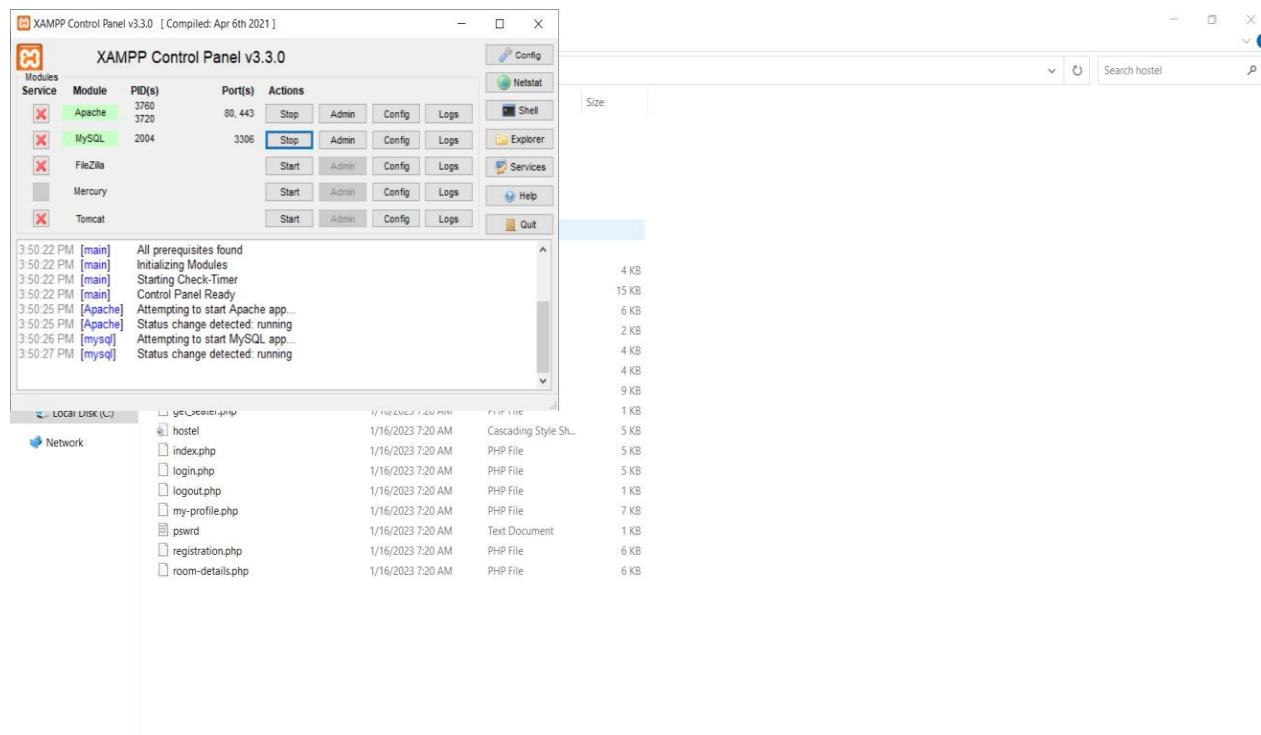
## EC2 Remote Desktop Connection Screen



The zip file has been stored in htdocs of Xampp.



Firstly, the Xampp server is started



Sql source file is imported and new database is created in Xampp.

The screenshot shows the phpMyAdmin interface for the 'hostel' database. The left sidebar lists tables: admin, adminlog, courses, registration, rooms, states, userlog, and userregistration. The main area displays the structure of the 'admin' table, which has 1 row, is InnoDB, uses latin1\_swedish\_ci collation, and is 16.0 KiB in size. Other tables listed have 0 rows, are InnoDB, use latin1\_swedish\_ci collation, and are 16.0 KiB in size. A 'Create new table' button is visible at the bottom.

Table	Action	Rows	Type	Collation	Size	Overhead
admin	Browse Structure Search Insert Empty Drop	1	InnoDB	latin1_swedish_ci	16.0 KiB	-
adminlog	Browse Structure Search Insert Empty Drop	0	InnoDB	latin1_swedish_ci	16.0 KiB	-
courses	Browse Structure Search Insert Empty Drop	7	InnoDB	latin1_swedish_ci	16.0 KiB	-
registration	Browse Structure Search Insert Empty Drop	4	InnoDB	latin1_swedish_ci	16.0 KiB	-
rooms	Browse Structure Search Insert Empty Drop	5	InnoDB	latin1_swedish_ci	16.0 KiB	-
states	Browse Structure Search Insert Empty Drop	36	MyISAM	latin1_swedish_ci	2.8 KiB	-
userlog	Browse Structure Search Insert Empty Drop	5	InnoDB	latin1_swedish_ci	16.0 KiB	-
userregistration	Browse Structure Search Insert Empty Drop	3	InnoDB	latin1_swedish_ci	16.0 KiB	-
<b>8 tables</b>	<b>Sum</b>	<b>61</b>	<b>InnoDB</b>	<b>utf8mb4_general_ci</b>	<b>114.8 KiB</b>	<b>0 B</b>

Localhost is running for Prison management system

The screenshot shows a web browser window for 'Student Hostel Registration' on 'localhost/hostel/'. The title bar says 'localhost / 127.0.0.1 / hostel | ph...'. The page has a dark header with 'Hostel Management System' and a sidebar with 'MAIN' menu items: 'User Registration', 'User Login', and 'Admin Login'. The main content area is titled 'User Login' and contains fields for 'EMAIL' (with placeholder 'Email') and 'PASSWORD' (with placeholder 'Password'), and a blue 'login' button. Below the form is a link 'Forgot password?'

## Public ipv4 dns is copied from instances

The screenshot shows the AWS EC2 Management Console. In the Instances section, an instance named 'hostel-proj' is selected. The tooltip 'Public IPv4 DNS copied' is displayed over the 'Public IPv4 DNS' field, which contains the value 'ec2-65-2-57-195.ap-south-1.compute.amazonaws.com'. Other fields visible include 'Public IPv4 address' (65.257.195), 'Instance state' (Running), 'Private IP DNS name (IPv4 only)' (ip-172-31-15-157.ap-south-1.compute.internal), 'Instance type' (t2.micro), and 'VPC ID'.

The copied ip address is pasted in remote connection.

The screenshot shows a web browser displaying the 'User Login' page of the Hostel Management System. The URL in the address bar is 'ec2-65-2-57-195.ap-south-1.compute.amazonaws.com/hostel/'. The page features a login form with fields for 'EMAIL' and 'PASSWORD', and a 'login' button. A 'Forgot password?' link is also present. On the left, a sidebar lists 'User Registration', 'User Login', and 'Admin Login'.

## CONCLUSION

So, the outcome of all the hard work done for the prison management system is here. It is software that helps the user to work with the prisons easily. This software reduces the amount of manual data entry and gives greater efficiency. The User Interface of it is very friendly and can be easily used by anyone. It also decreases the amount of time taken to write crime details and other modules. In the end, we can say that this software is performing all the tasks accurately and is doing the work for which it is made.

Computer has got clear advantage over the manual system. The computerized system is more reliable, efficient and fast at the end of the project, we can say that computers play a very crucial role in the development of firm. All the daily reports generated by this database system are to be checked by the concerned official so as to ensure that all the transactions have been put through in appropriate accounts and this is tallied with the new vouchers

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# INDUSTRY CERTIFICATE

The screenshot shows a Salesforce Trailblazer profile page for Mahendar Patel. At the top, there's a navigation bar with links for Products, Industries, Customers, Learning, Support, Company, and Salesforce+. On the right, there are contact details: "Contact Us (+44) 800 086 8530" and icons for search and user profile.

The main profile area features a large circular placeholder for a profile picture, followed by the name "Mahendar Patel" and the text "Student at DR. AMBEDKAR INSTITUTE OF TECHNOLOGY, Karnataka, India". Below this, there's a section titled "Tell us about yourself! Add a short bio." with a "Set up" button. A "Career Mode" section is also present, with a "Set up" button.

To the right, a "Trailhead" sidebar displays a badge titled "DOUBLE STAR RANGER" with three stars and a mountain icon. It shows stats: 306 Badges, 100,075 Points, and 38 Trails. A message indicates 49,925 more points to reach "Triple Star Ranger rank". A "Go to Trailhead" button is at the bottom of the sidebar.