

Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY

(An Autonomous Institute, Affiliated to Visvesvaraya Technological University, Belagavi, Accredited by NAAC, with 'A' Grade)

Near Jnana Bharathi Campus, Bengaluru – 560056



SCHOOL OF COMPUTER SCIENCE AND ENGINEERING INFORMATION SCIENCE & ENGINEERING PROGRAMME

ADVANCE CLOUD COMPUTING LAB

SUBCODE: 22ISL76

REPORT

SUBMITTED BY

Faculty-in-charge: MALATHI P

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Certificate

This is to certify that the **Advanced Cloud Computing Laboratory Work** has been Successfully carried out by ____ bearing **USN: _____**, a bonafide student Of **Dr. Ambedkar Institute of Technology**, in partial fulfillment of the requirements for the award of the **Bachelor of Engineering degree in Information Science and Engineering** of **Visvesvaraya Technological University, Belagavi**, during the academic year **2025–2026**.

It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report. The **Advanced Cloud Computing Lab Manual** has been approved as it satisfies the academic requirements prescribed by **Visvesvaraya Technological University** for the said degree.

Signature of the Faculty In-charge

Mrs. Malathi P

Associate Professor,
ISE Programme,
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Signature of the HOD

Dr. Prabha. R

Professor and HEAD,
ISE Programme,
Dr.AIT, Bengaluru – 56.

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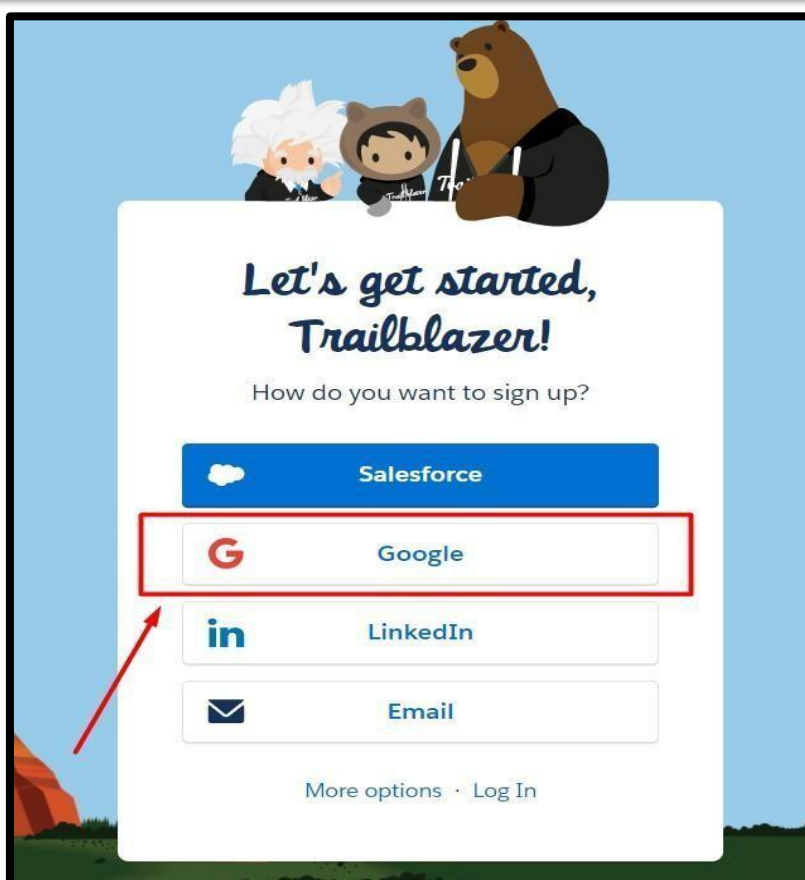
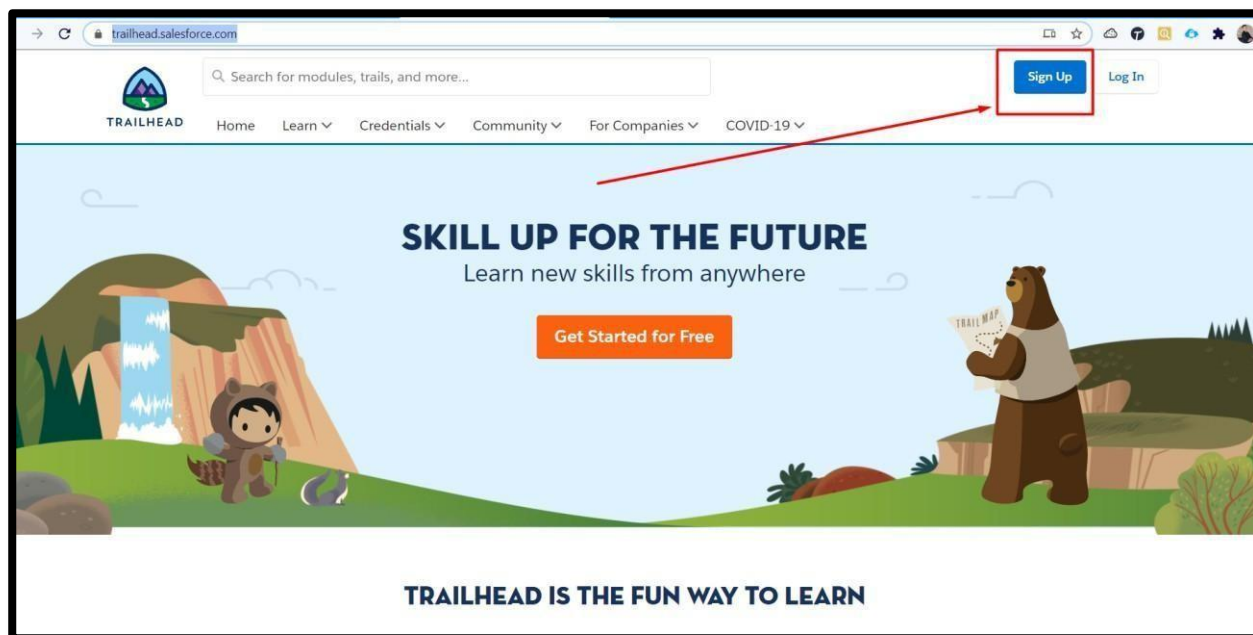
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INTRODUCTION

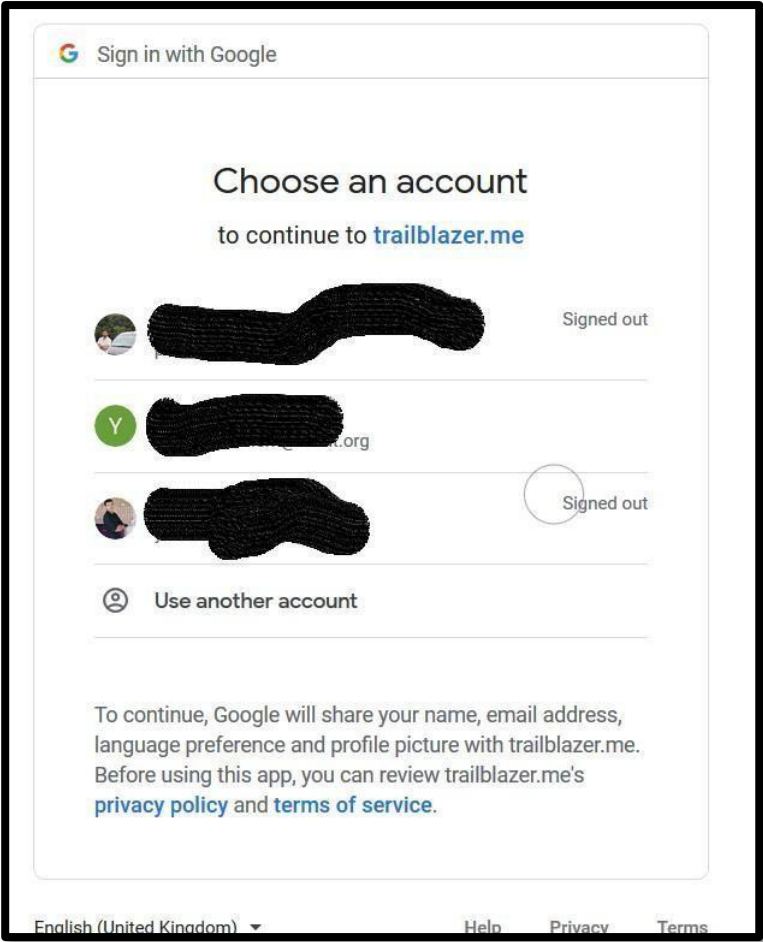
Steps to login for Trailhead using Gmail

Step 1: Copy the below link in your browser, <http://trailhead.salesforce.com/> and click on Sign Up

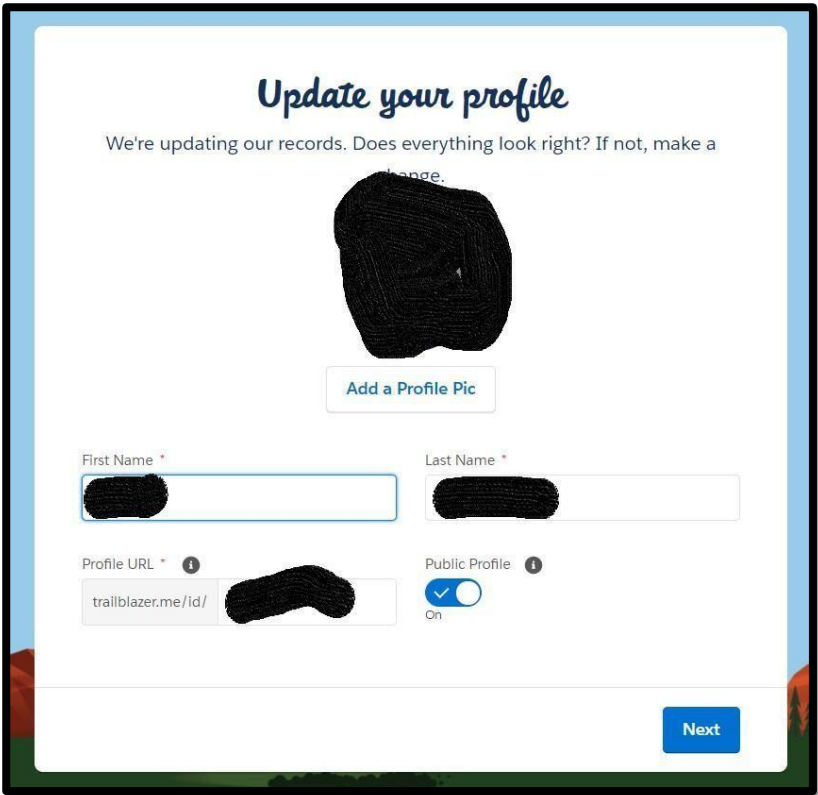
Step 2: You will be directed to one more screen click on Google



Step 3: Select google account which you want to be logged in as



Step 4: Fill in all the details



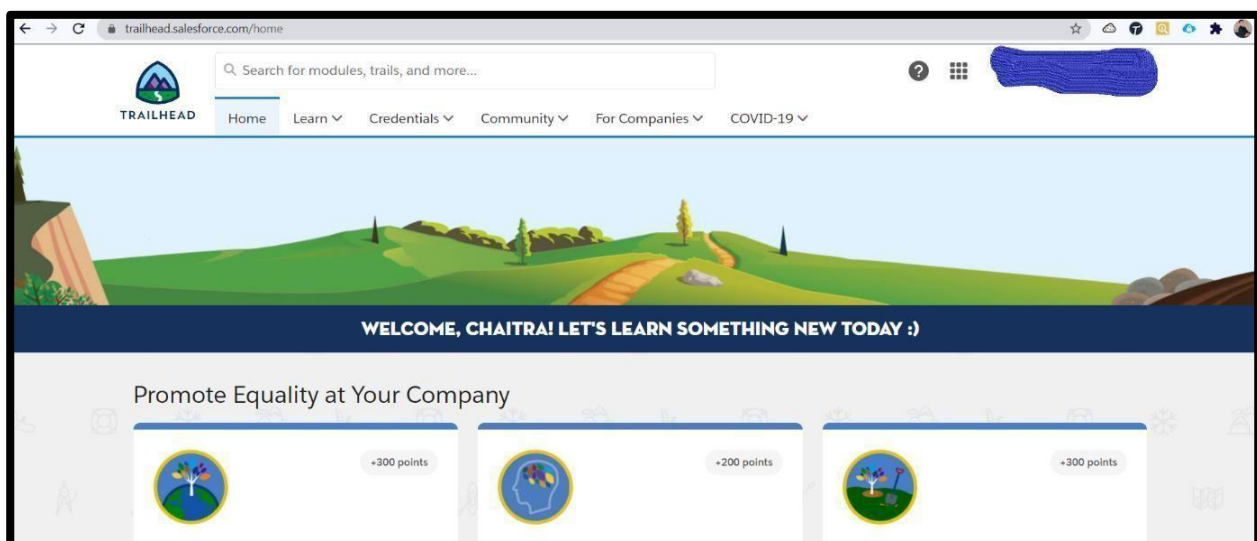
Complete your profile

Thanks, [REDACTED] Now just confirm a few more details and you're all set!

Company Name * Dr.Ambedkar institute of technology	Job Title
Role Name * Developer	Relationship To Salesforce * Non-Customer / Prospect
Country Name * India	State * Karnataka

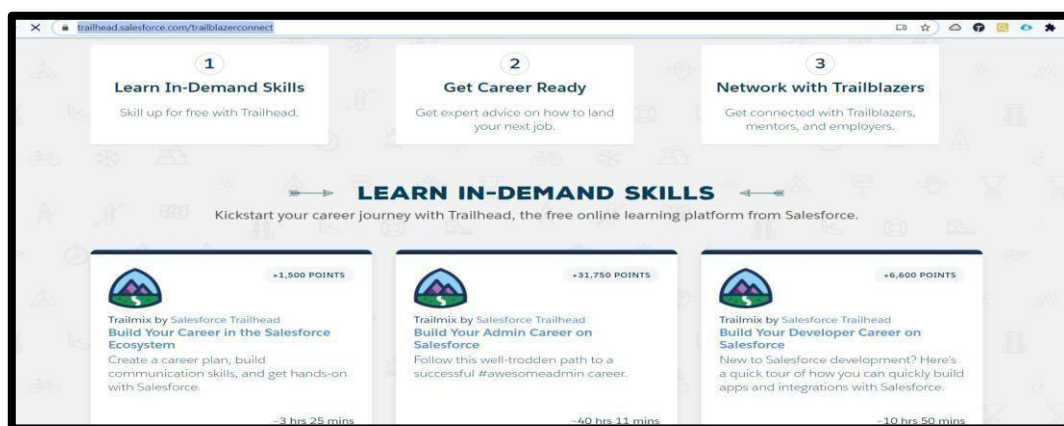
☐ By checking this box, I am agreeing to the Salesforce.com Program Agreement and the Development Master Subscription Agreement, and acknowledging the Privacy Statement *

Step 5: Fill in All the details



After logging in go to this url and complete all the trailmixes and modules

<https://trailhead.salesforce.com/trailblazerconnect>

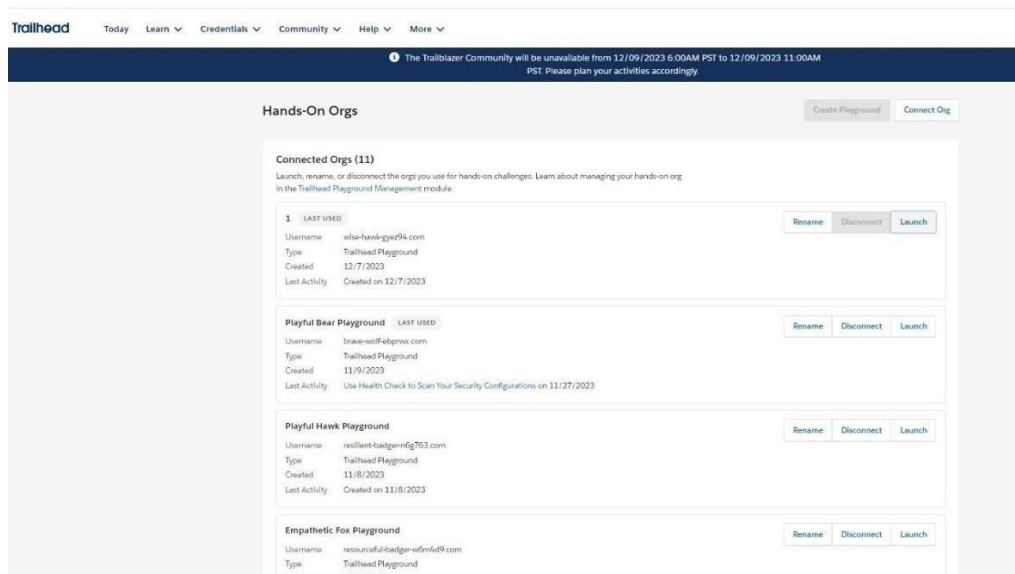


PROGRAM 1

1. Create a webapplication to enter student details like Name, USN, Semester, Section and CGPA to a database on Salesforce Cloud Platform.

Steps:

1. Launch Salesforce Trailhead Playground by going to <https://trailhead.salesforce.com>. Now switch to Hands on Orgs by clicking your picture in the top right corner and then click on “Hands on Orgs”.
2. Click on create playground to create a new one. And follow the instructions.
3. After creating the playground click on Launch.
4. Click on the gear icon on top right menu and click “setup.”
5. Now is the time to create our objects, hence we navigate to “Object Manager” hover on “Create” and click on “Custom Object” under it.



The screenshot shows the Salesforce Object Manager interface. At the top, there's a navigation bar with 'Setup', 'Home', and 'Object Manager'. Below this, a search bar is visible. The main content area displays a list of standard objects with columns: LABEL, API NAME, TYPE, DESCRIPTION, and LAST MODIFIED. The list includes objects like Account, Activity, AlternativePaymentMethod, API Anomaly Event Store, Asset, Asset Action, Asset Action Source, Asset Relationship, Asset State Period, Associated Location, Authorization Form, Authorization Form Consent, Authorization Form Data Use, Authorization Form Text, Business Brand, Campaign, Campaign Member, Card Payment Method, Case, and Case Related Issue.

LABEL	API NAME	TYPE	DESCRIPTION	LAST MODIFIED
Account	Account	Standard Object		
Activity	Activity	Standard Object		
Alternative Payment Method	AlternativePaymentMethod	Standard Object		
API Anomaly Event Store	ApiAnomalyEventStore	Standard Object		
Asset	Asset	Standard Object		
Asset Action	AssetAction	Standard Object		
Asset Action Source	AssetActionSource	Standard Object		
Asset Relationship	AssetRelationship	Standard Object		
Asset State Period	AssetStatePeriod	Standard Object		
Associated Location	AssociatedLocation	Standard Object		
Authorization Form	AuthorizationForm	Standard Object		
Authorization Form Consent	AuthorizationFormConsent	Standard Object		
Authorization Form Data Use	AuthorizationFormDataUse	Standard Object		
Authorization Form Text	AuthorizationFormText	Standard Object		
Business Brand	BusinessBrand	Standard Object		
Campaign	Campaign	Standard Object		
Campaign Member	CampaignMember	Standard Object		
Card Payment Method	CardPaymentMethod	Standard Object		
Case	Case	Standard Object		
Case Related Issue	CaseRelatedIssue	Standard Object		

6. Name the object as “Student”. Allow reports and search 22ISL5083 Cloud Computing Lab 1DA22IS007. Go back to home, search for Tab, navigate to custom object tab and click on new. Create a tab for “student” object.

8. Now let’s add fields to the object: Go to “Fields & Relationships” option of student object and click “New”.

9. Add the following fields one by one: Field Label: USN, Length: 10, Data Type: Text, provide an example as Help Text, make it as required field and don’t allow duplicate values and make it as case insensitive. \ Field Label: Section, Data Type: Picklist, provide the sections you could think of, make it as required. \ Field Label: Semester, Data Type: Picklist, provide 1-8 numbers, make it as required. \ Field Label: CGPA, Length: 2, Decimal Place: 2, Data Type: Number, make it as required field. \ Optionally we can also add phone number and email ID.

10. Let’s start validating each data

FIELD LABEL	FIELD NAME	DATA TYPE
CGPA	CGPA__c	Number(2, 2)
Created By	CreatedById	Lookup(User)
Email	Email__c	Text(80)
Last Modified By	LastModifiedById	Lookup(User)
Mobile	Mobile__c	Text(10)
Owner	OwnerId	Lookup(User Group)
Section	Section__c	Picklist
Semester	Semester__c	Picklist
Student Name	Name	Text(80)
USN	USN__c	Text(10) (Unique Case Insensitive)

a. Name validation –

Go to validation rule and click “New” Name it as “Student name validation” Error condition Formula:

“NOT(REGEX(Name, “[a-zA-Z]+[a-zA-Z]+”))”

Error Message: “Please Enter a valid name”. Error Location: Field – Student name Click Save

Define a validation rule by specifying an error condition and a corresponding error message. The error condition is written as a Boolean formula expression that returns true or false. When the formula expression returns true, the save will be aborted and the error message will be displayed. The user can correct the error and try again.

Validation Rule Edit Save Save & New Cancel

Rule Name: Student_name_validation

Active: ☒

Description:

Error Condition Formula

Example: `Discount_Percent__c > 30` [View Examples...](#)

Display an error if Discount is more than 30%.

If this formula expression is true, display the text defined in the Error Message area.

Insert Field: Insert Operator:

Functions: ABS, ACOS, ADDMONTHS, AND, ASC, ASIN, Insert Selected Function, ABS(number), Returns the absolute value of a number; a number without its sign. [Help on this function](#)

Check Syntax: No errors found

Error Message

Example: `Discount_Percent__c > 30`

This message will appear when Error Condition formula is true.

Error Message: Please enter a valid name

This error message can either appear at the top of the page or below a specific field on the page.

Error Location: ☐ Top of Page ☒ Field: Student Name

Save Save & New Cancel

b. USNvalidation - -

Go to validation rule and click “New” Name it as “USN validation” Error condition Formula:

“NOT(REGEX(USN c, "[1-4]{1}[A-Z]{2}[0-9]{2}[A-Z]{2}[0-9]{3}"))” ---

Error Message: “Please Enter a valid USN”.

Error Location: Field– USN Click Save

The screenshot shows the Salesforce Setup page for a 'Student' user. The left sidebar contains a navigation menu 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', 'Scoping Rules', 'Triggers', 'Flow Triggers', and 'Validation Rules' (which is highlighted). The main content area is titled 'Validation Rule Edit' and includes the following sections:

- Rule Name:** USN_validation
- Active:** ☒
- Description:** (empty text box)
- Error Condition Formula:**
 - Example: `Discount_Percent__c > 30` More Examples...
 - If this formula expression is true, display the text defined in the Error Message area
 - Buttons: Insert Field, Insert Operator
 - Formula: `NOT (REGEX (USN__c , "[1-4]{1}[A-Z]{2}[0-9]{2}[A-Z]{2}[0-9]{3}"))`
 - Buttons: Check Syntax
- Functions:**
 - Dropdown: -- All Function Categories --
 - List: ABS, ACOS, ADOMONTHS, AND, ASCII, ASIN
 - Buttons: Insert Selected Function, Help on this function
- Error Message:**
 - Example: Discount percent cannot exceed 30%
 - This message will appear when Error Condition formula is true
 - Error Message: Enter a valid USN
 - This error message can either appear at the top of the page or below a specific field on the page
 - Error Location: ☐ Top of Page ☒ Field USN

At the bottom of the 'Error Message' section are buttons for 'Save', 'Save & New', and 'Cancel'.

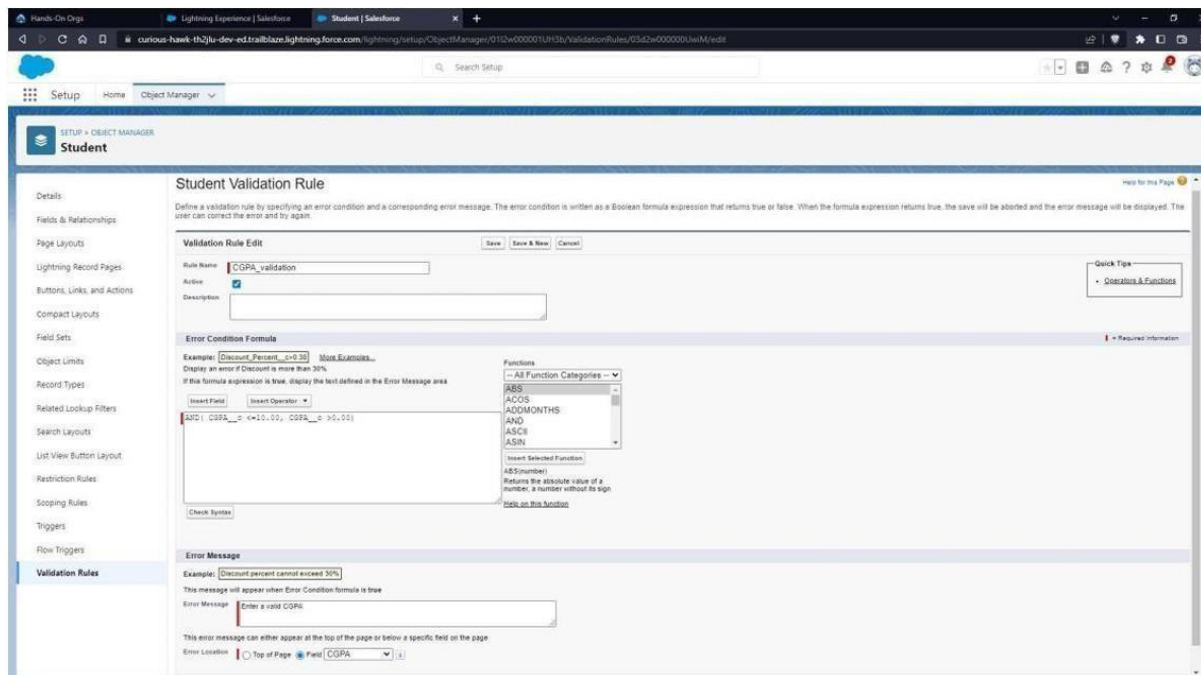
c. .CGPAvalidation–

Go to validationrule and click “New” 21CSL5083 Cloud Computing Lab 1DA22IS005

-- Name it as “CGPAvalidation” Error condition Formula: “AND(CGPA c<=10.00, CGPA c>0.00)”

Error Message: “Please Enter a valid CGPA”.

Error Location: Field – CGPA Click Save

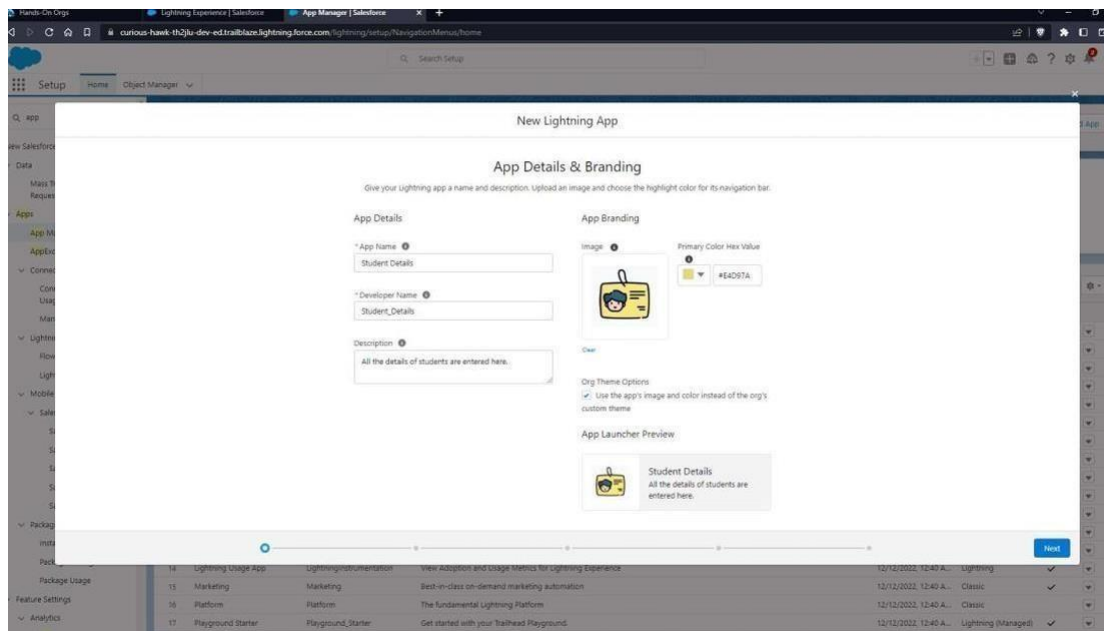


d. Similarly give validation rules for email and phone number if you have added.

11. Now create an application: navigate to home and search for “App Manager”. Click on it

12. Click on “New Lightning App” to create a Lightning Application.

13. Name it as “Student Details”, give your description, upload an image and change colors as you wish, click on “Next”.



14. Set navigation style to standard navigation click next, let the utility bar have defaults so click next.

15. In navigation items add Dashboard, Reports and Student click next.

16. Assign it to System Administrator profile then click save and finish.

17. Click on app launcher (3x3 dots on top left corner) then click on view all, you’ll see your

application. Click on it.

18. Enter the details.

19. Now let's check what happens if we give invalid details.

20. Enter few more details. Now we can use the reports and dashboard.

21. First let us create a student report a. Navigate to "Reports" tab and click on "New folder", give any name and click save.

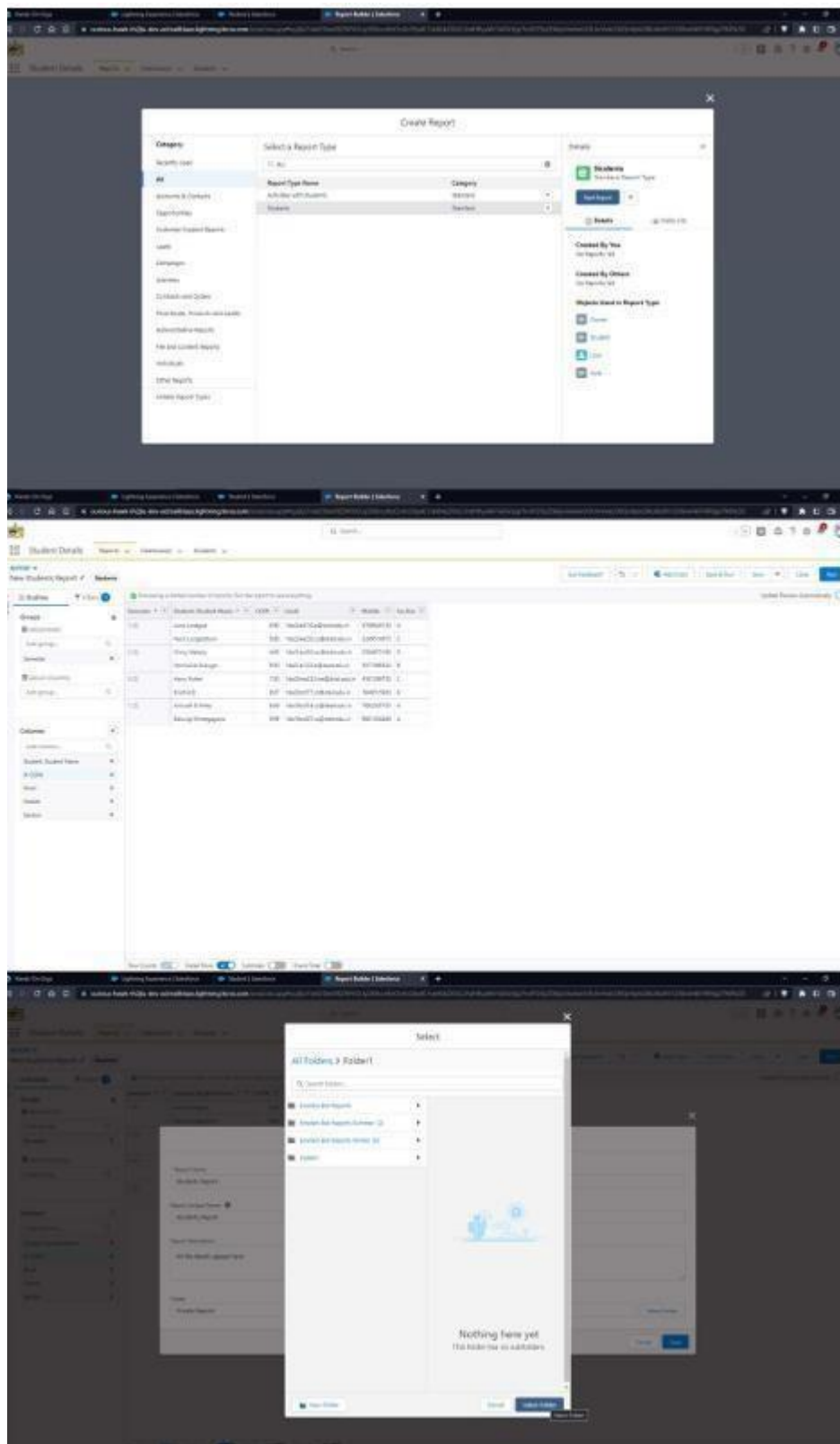
b. Click on "New Report" and search for "Students", select it and click on "Start Report"

c. On left you see Add column option. From there add all the columns you require.

d. Also add a group if you wish to.

e. Click on save and name the report as "Student Report" and save it in folder you had created.

f. Click on Save and then Run.



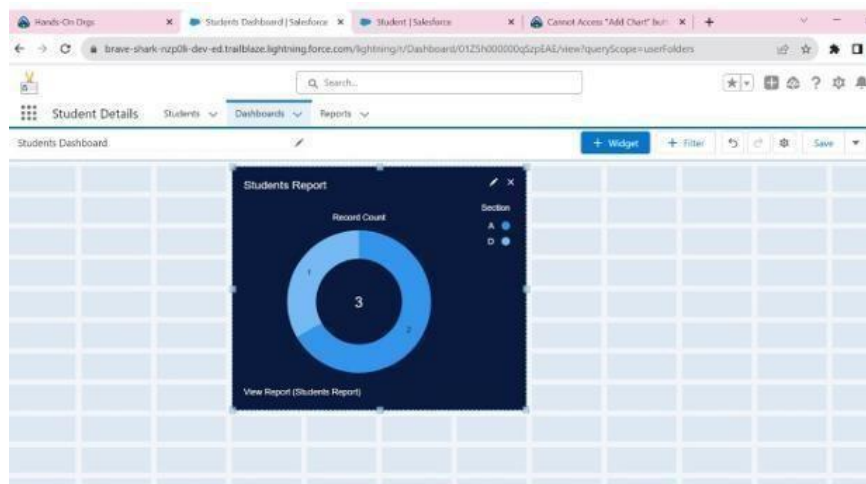
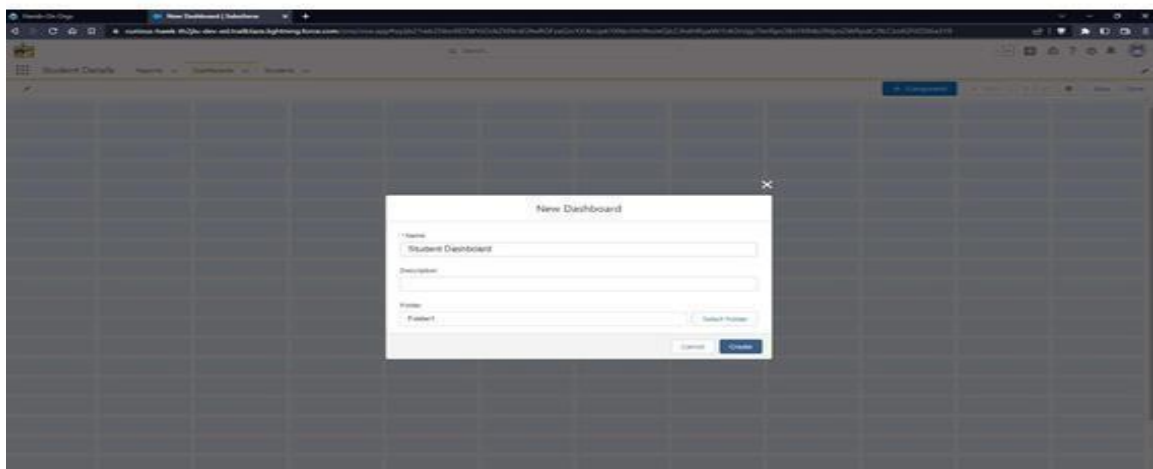
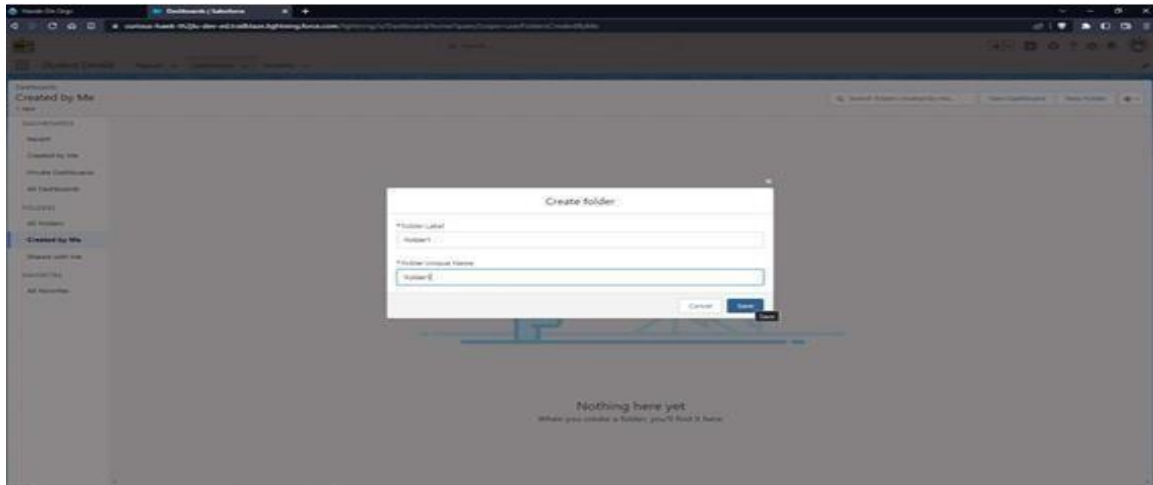
b. Click on “New Dashboard” and then name it as “Students Dashboard” and select folder that you have created. Click on Create.

c. Click on the report that you have created and click on that and click select.

d. Select any style to represent the data in dashboard.

e. Add any filter(s), otherwise it is optional.

f. Click on Save and Click Run.



PROGRAM 2

2. Create a web application to implement an online cart for adding items to a shopping cart and deleting it.

Steps:

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 Setupgear icon and click “Setup”.
3. Click on “Object Manager” and click “Create> Custom Object” to create new Custom Object.
4. Name the object “Cart”.
5. Allow Reports and Allow Search.
6. Check the box in front of “Launch New Custom Tab Wizard after saving this custom object”.

The screenshot shows the 'New Custom Object' setup page in Salesforce. The page is titled 'New Custom Object' and has a search bar at the top. The main content area is divided into several sections:

- Custom Object Information:** This section contains fields for 'Label' (set to 'Cart'), 'Plural Label' (set to 'Carts'), 'Object Name' (set to 'Cart'), and 'Description'. There are also checkboxes for 'Starts with vowel sound' and 'Customizable Help Setting'.
- Enter Record Name Label and Format:** This section contains a 'Record Name' field (set to 'Cart Name') and a 'Data Type' dropdown menu (set to 'Text').
- Optional Features:** This section contains checkboxes for 'Allow Reports', 'Allow Activities', 'Track Field History', 'Allow in Chatter Groups', and 'Enable Licensing'.
- Object Classification:** This section contains checkboxes for 'Allow Sharing', 'Allow Bulk API Access', and 'Allow Streaming API Access'.
- Deployment Status:** This section contains a checkbox for 'In Development'.

To create a Tab for the Object:

Select any Tab Style for the object “Cart”. Click Next, Next, leave the defaults and save.

8. To add fields to the Object: Go to “Fields & Relationships” option of Student object and Click “New”.

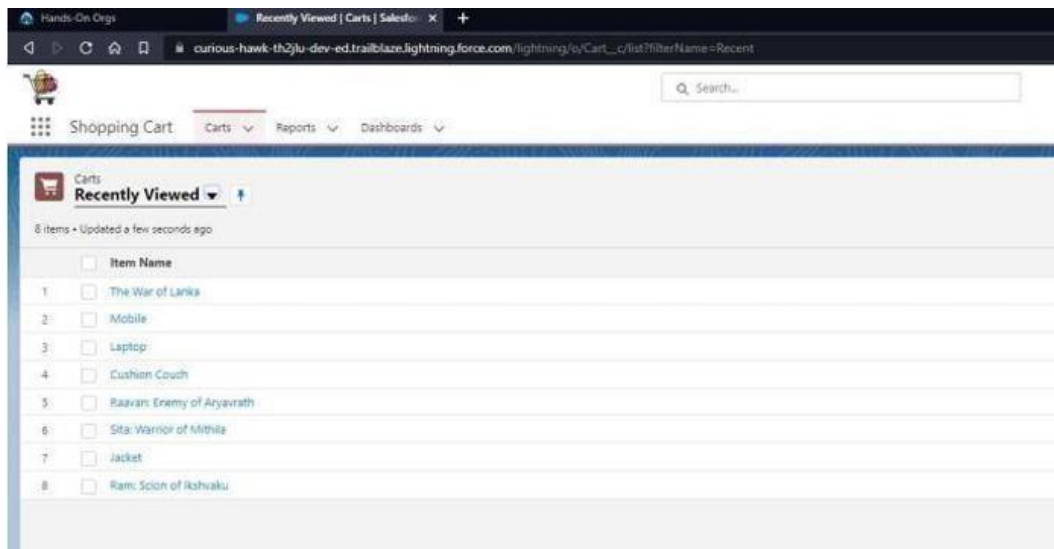
9. Add the following fields one after the other:

- Field Label: ItemName, Data Type: Text Area, make it as Required Field.
- Field Label: Category, Data Type: Picklist, click radio button in front of Enter values, with each value separated by a new line. Values 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.

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

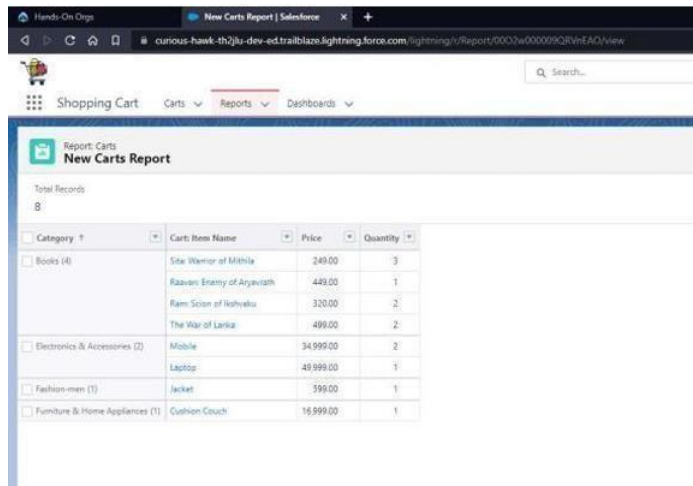
To create an application:

10. Go to “Setup” and type “App Manager” in Quick Find Box.
11. Click on “New Lightning App” to create a Lightning Application.
12. Name it as “Online Shopping Cart”, give the description for your application.
13. Uploading Image and changing colours are optional, then click Next.
14. Navigation Style: Standard Navigation, click Next.
15. No need to add any Utility Bar, click Next.
16. Add the following Items: Carts, Reports and Dashboards, click Next.
17. Assign it to System Administrator Profile by selecting System Administrator and pressing right arrow and then click Save & Finish.
18. Go to App Manager, select your application and select Carts and click “New” to add some details to your application.



Create Report –

- Go to “Reports tab” Click on “New Folder” And give it any name and then click Save. Click on “New Report” and from search bar Search for “Carts” and then select it and click Continue.
- If you Want the report to be grouped by any specific fields, then Search for the -- field in “Add groups” otherwise it is optional.
- Click on save and name the report as “New Carts Report” and then select the folder which you have created.



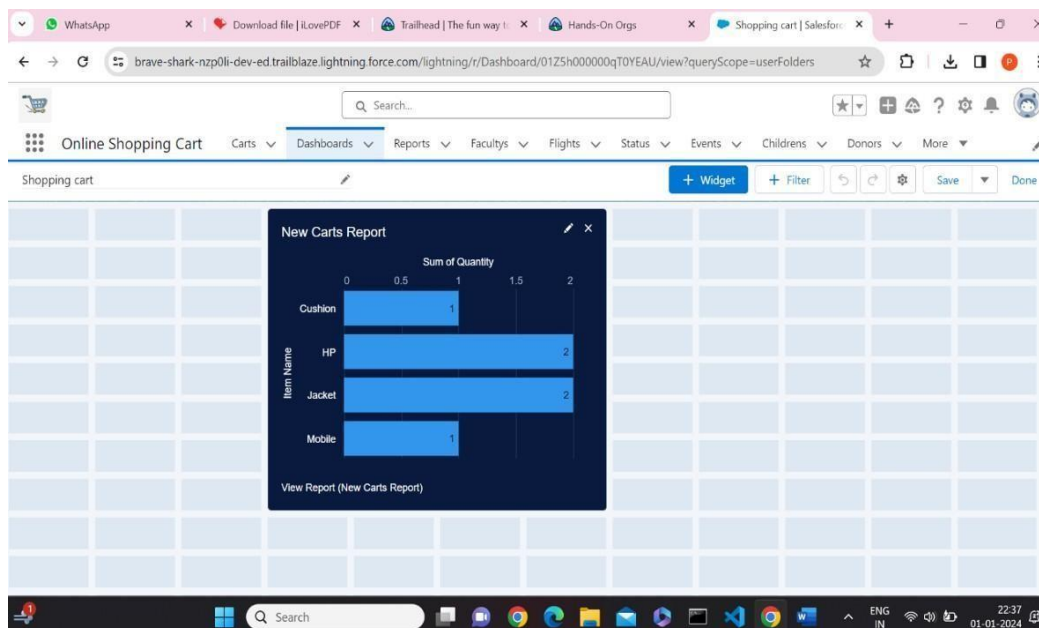
Report: Carts
New Carts Report

Total Records: 8

Category	Item Name	Price	Quantity
Books (4)	Sita Warrior of Mithila	249.00	3
	Ravana Enemy of Aryavarth	449.00	1
	Ram Scion of Kothavatu	320.00	2
	The War of Lanka	499.00	2
Electronics & Accessories (2)	Mobile	34,999.00	2
	Laptop	49,999.00	1
Fashion-men (1)	Jacket	599.00	1
Furniture & Home Appliances (1)	Cushion Couch	16,999.00	1

Create Dashboard –

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



PROGRAM 3

Google App Engine (GAE)

Introduction

- Google App Engine (GAE) is a Platform as a Service (PaaS) for developing and hosting web applications in Google-managed data centers.
- Applications are sandboxed and run across multiple servers.
- GAE offers automatic scaling — as user requests increase, more resources are automatically allocated.
- It is free up to certain limits (in the standard environment); beyond that, usage fees apply for storage, bandwidth, or instance hours.
- Launched: April 2008 (preview); Full release: September 2011.

Supported Languages & Frameworks GAE supports:

- Languages: Go, PHP, Java, Python, Node.js, .NET, Ruby, and others via custom runtimes. Python:
- Compatible frameworks: Django, CherryPy, Pyramid, Flask, web2py, webapp2, and others.
- Any Python framework using WSGI via CGI adapter can be uploaded.
- Supports third-party pure Python libraries. Java:
- Based on Servlet 2.5 (Jetty Web Server).
- Supports JSP, JSF, and Spring Framework (with some workarounds).
- JPA, JDO, and low-level API are used to access Google Cloud Datastore.
- Other tools: Objectify, Slim3, Jello framework.
- Limited Spring Security and Struts 2 support.
- Django can work on App Engine using Django-nonrel for non-relational databases.

Key Features

- Blobstore: Serves large data objects.
- GAE Cloud Storage: Data object storage.
- Page Speed Service: Optimizes webpage loading time.
- URL Fetch Service: Efficient HTTP requests and responses.
- Memcache: Fully managed in-memory datastore.

Benefits of GAE

1. Ease of Use: Fully managed — no infrastructure handling required.
2. Built-in APIs: Enable diverse application building.

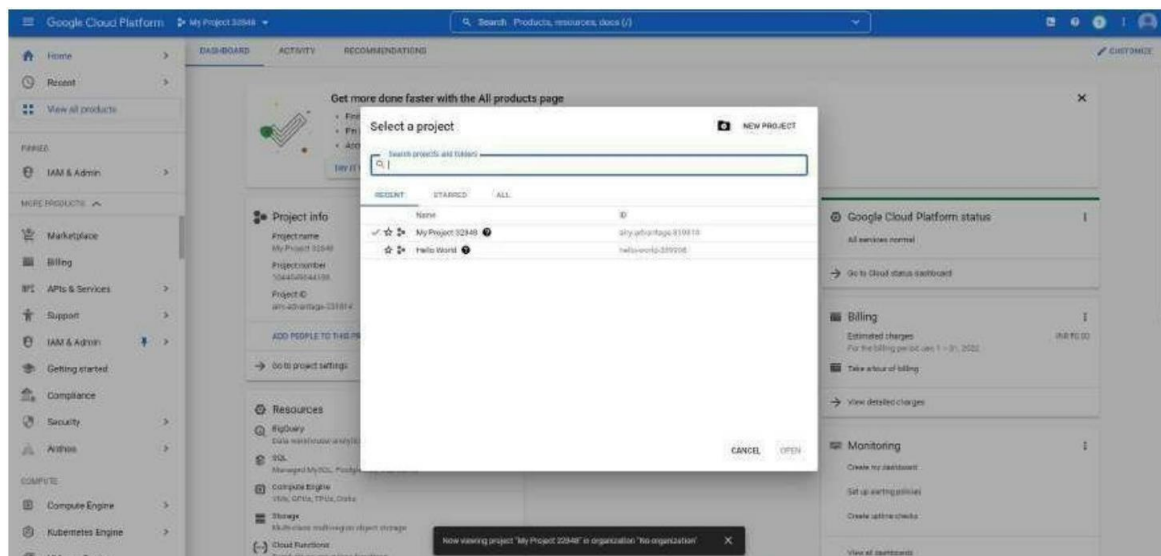
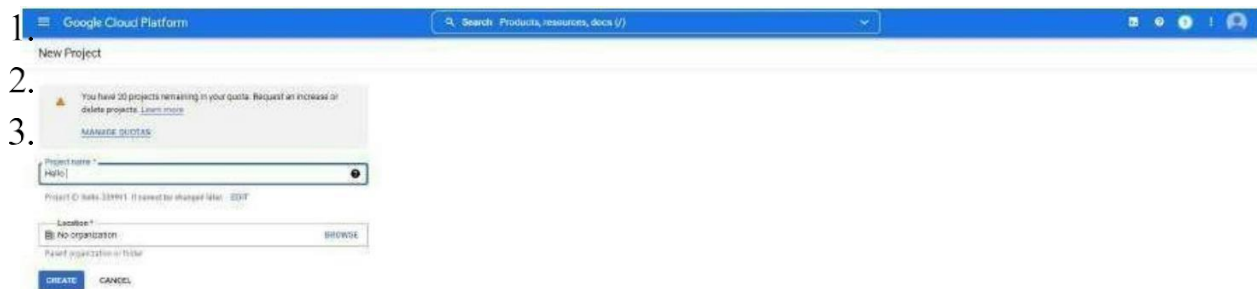
3. Debugging& Monitoring: Access to application logs.
4. Pay-per-use: Chargedonlyfor used resources.

Installation & Setup

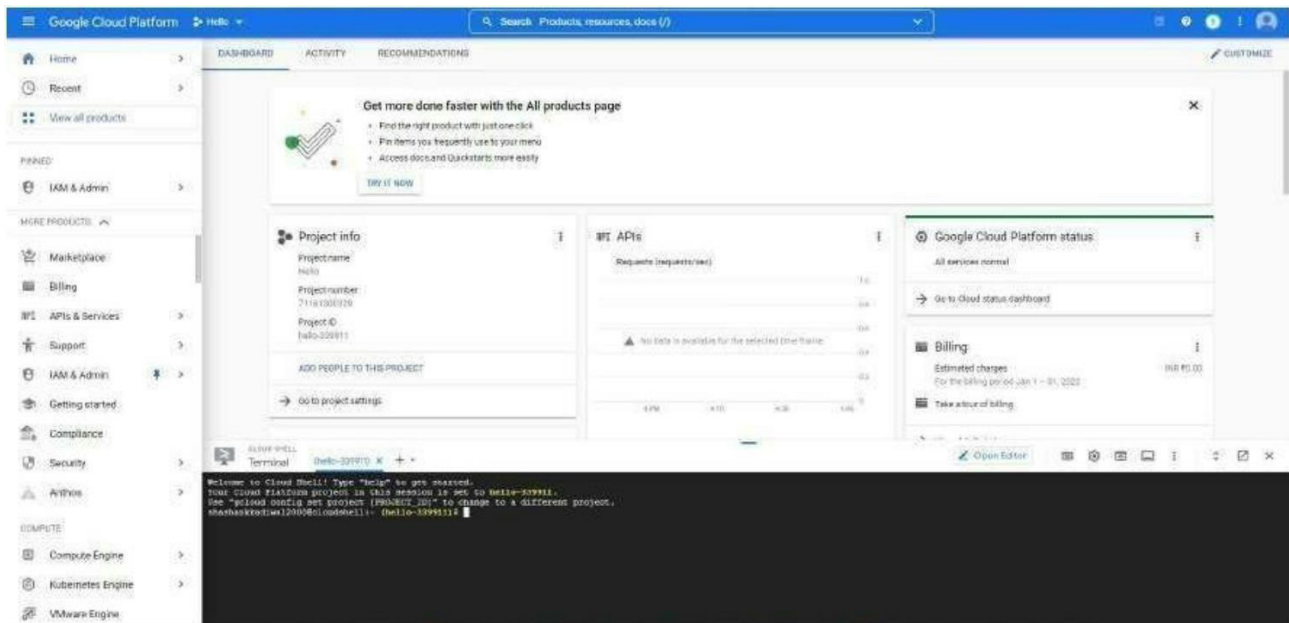
Steps to Create a Hello World App(Python/Java):

Create an account on Google App Engine. Log in to your account.

Create a new project, name it, and click Create.

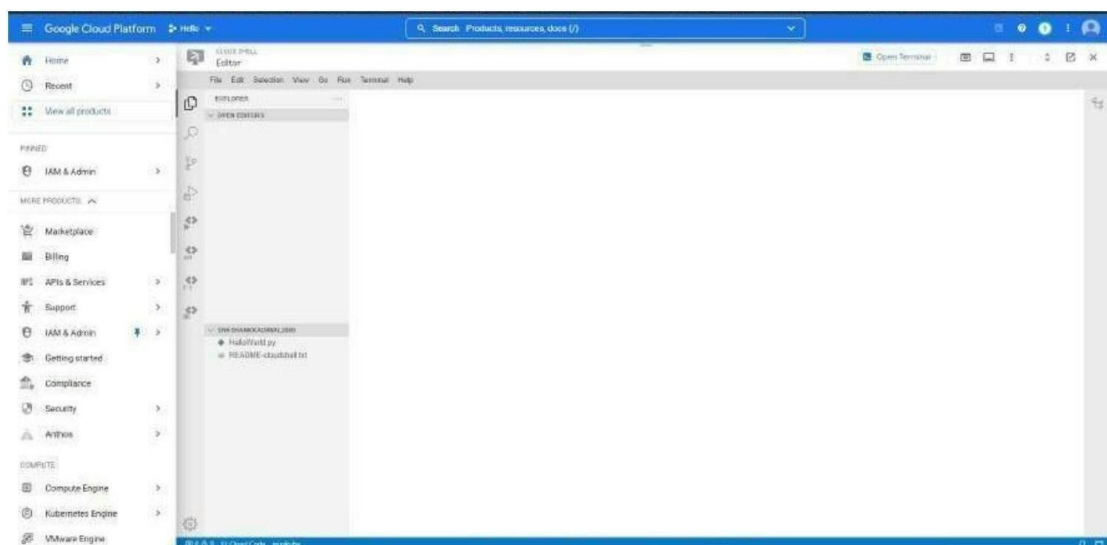


- Once the project is created click on Activate Cloud Shell on the top right corner.

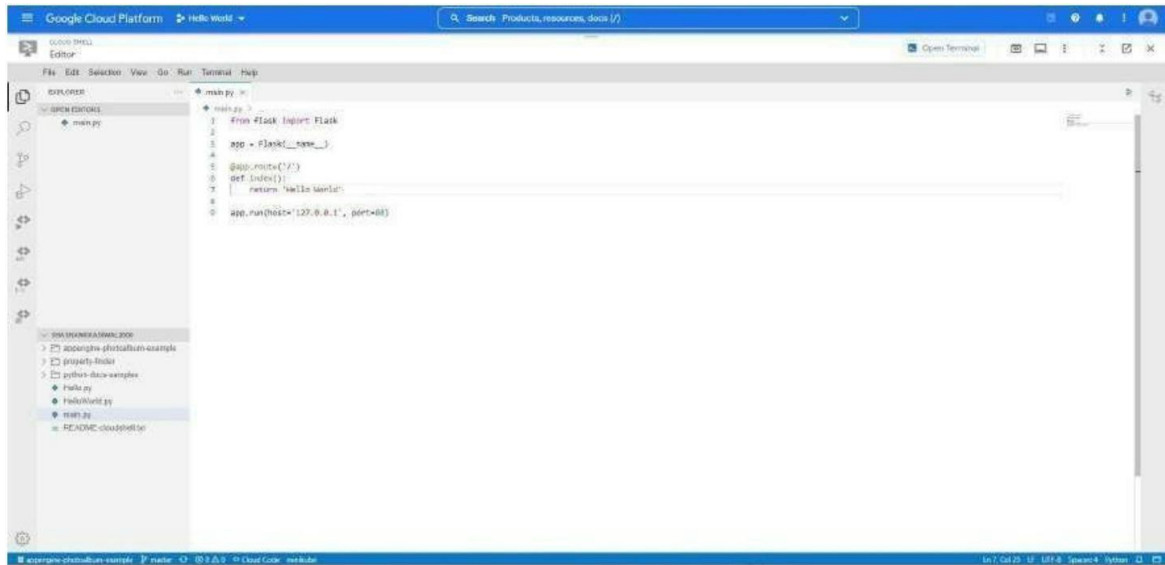


- Open the cloud shell gets activated type the following command in the terminal and

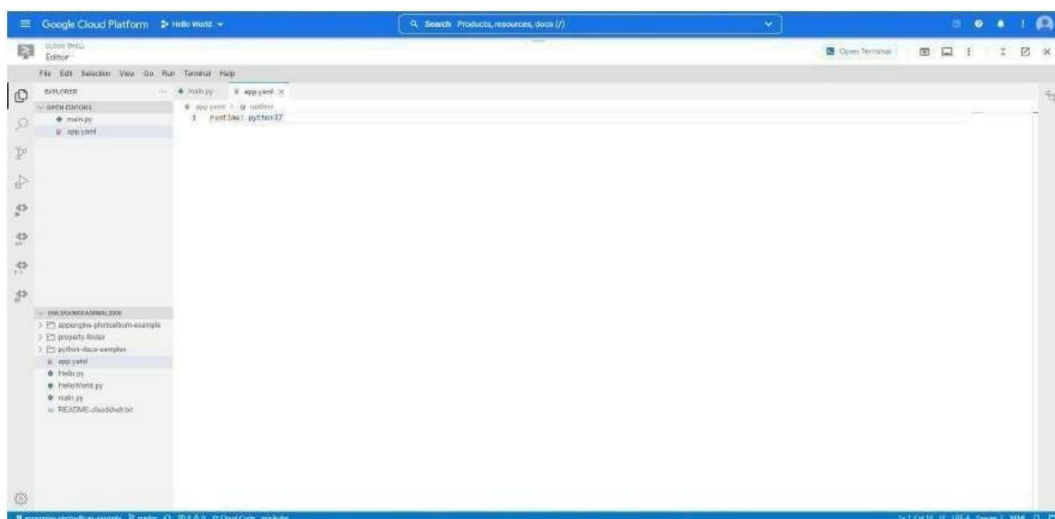
- Choose **region: South Asia.**
- Click **Open Editor.**



- Click **File** → **New File**, name it `main.py`.



- Name the File as `main.py` and type the following code:
`from flask import Flask app = Flask(name) @app.route('/')
def index():`
- Create a `app.yaml` file



PROGRAM 4

4. Display the current date and time using a shell script and store it in a text file.

Problem Statement: Write a shell script to display the current date and time, store it in a file named book.txt, and then display the contents of that file.

Steps / Procedure:

1. Open Linux environment:
 - Downloaded Minima Linux(10 KB) ISO file.
 - Opened it using Oracle VirtualBox.
2. Open the terminal:
 - After booting into Minima Linux, opened the terminal window.
3. Create a shell script file:


```
nano date_time.sh
```
4. Type the following script:

```
#!/bin/bash

#Get current date and time components Year=$(date +%Y)
Month=$(date +%m)
Day=$(date +%d)
Hour=$(date +%H)
Minute=$(date +%M)
Second=$(date +%S)

#Write date and time to book.txt
echo "Date and Time: $(date)" >> book.txt
echo "Current Date is: $Day-$Month-$Year" >> book.txt
echo "Current Time is: $Hour:$Minute:$Second" >> book.txt

#Read and display the contents of book.txt file="book.txt"
while read line; do echo
"$line"
```

```
done < "$file"
```

5. Save and exit:

- Press Ctrl+ O to save the file.
- Press Ctrl+ X to exit the editor.

6. Give execute permission:

```
chmod +x date_time.sh
```

7. Run the script:

```
./date_time.sh
```

8. **Output:**

The script displays and saves the current date and time in book.txt as: Date and Time:

Tue Oct 14 08:25:43 IST 2025

Current Date is: 14-10-2025

Current Time is: 08:25:43

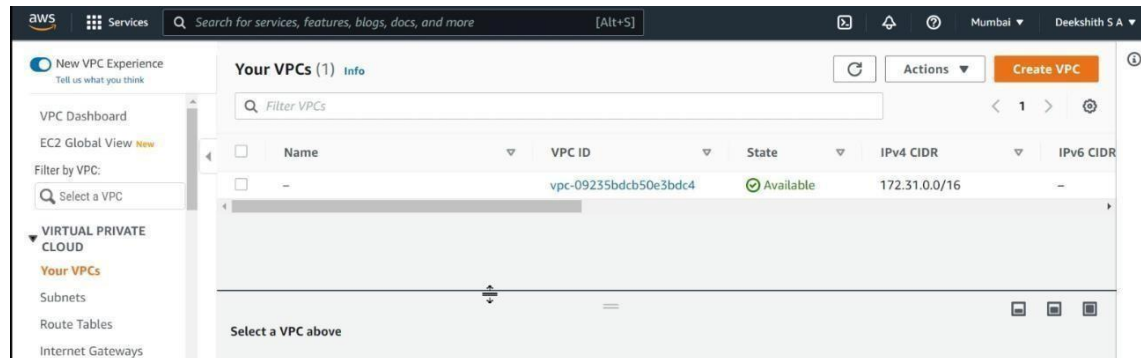
PROGRAM 5

Creating RDS in AWS

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.



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

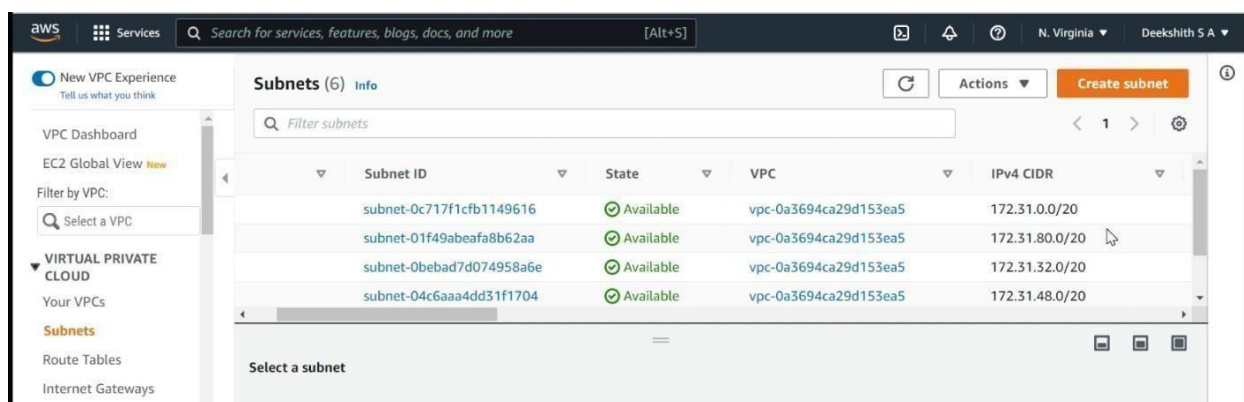
Step 5: Now you can see the subnet is created in your VPC. Step 6:

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.

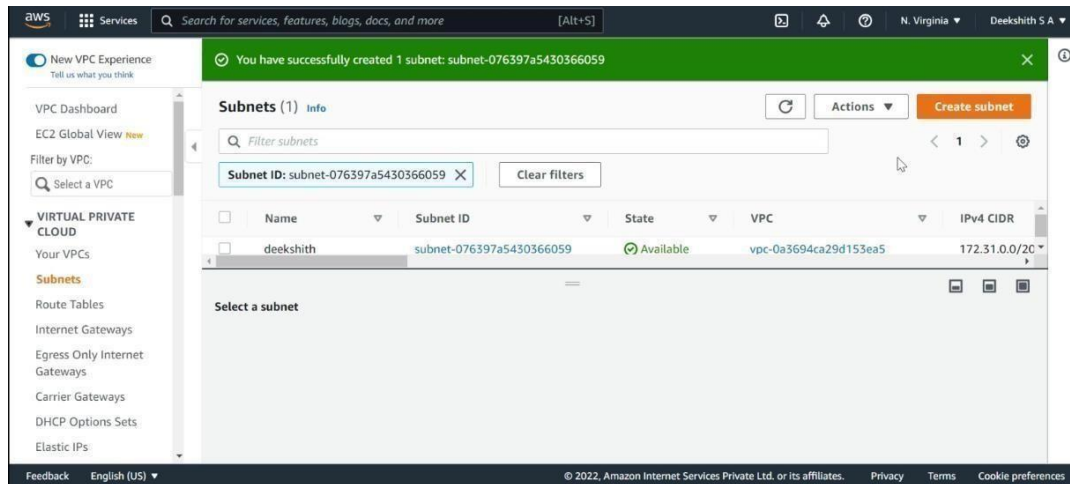


Step 10: Now select another “Availability Zone” and “Subnet”. Click on “Yes, Create” button. (Note: Before clicking on “Yes, create” check that two subnets are added or not)

Step 11: Now you can see that “DB subnet group” is created.

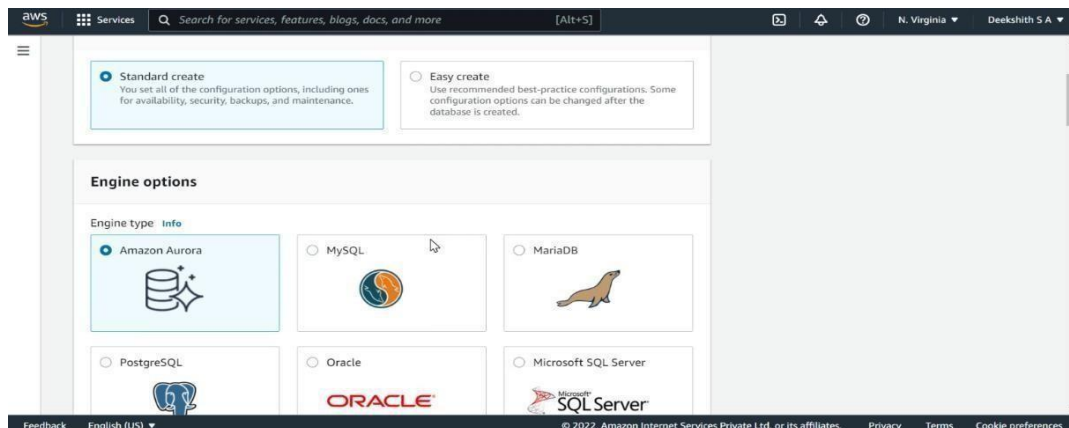
Step 12: Click on “RDSDashboard” on the left panel. Click on “Get Started” button

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



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.



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.

Settings

DB instance identifier [Info](#)
Type a name for your DB instance. The name must be unique across all DB instances owned by your AWS account in the current AWS Region.
database-1deekshith
The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

▼ Credentials Settings

Master username [Info](#)
Type a login ID for the master user of your DB instance.
admin
1 to 16 alphanumeric characters. First character must be a letter.

☐ **Auto generate a password**
Amazon RDS can generate a password for you, or you can specify your own password.

Master password [Info](#)
[Empty field]
Constraints: At least 8 printable ASCII characters. Can't contain any of the following: / (slash), ' (single quote), " (double quote) and @

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...

Amazon RDS

Creating database database-1deekshith
Your database might take a few minutes to launch.

Databases ☒ Group resources [Refresh](#) [Modify](#) [Actions](#) [Restore from S3](#) [Create database](#)

DB identifier	Role	Engine	Region & AZ	Size
database-1deekshith	Instance	Oracle Enterprise Edition	-	db

Actions menu:

- Stop
- Reboot
- Delete**
- Create replica
- Promote
- Take snapshot
- Restore to point in time
- Start database activity stream