

# WEB TECHNOLOGY

## LABORATORY MANUAL

Third Year ( SEM - I )  
(2024-2025)



**DEPARTMENT OF AIML**  
**GENBA SOPANRAO MOZE COLLEGE OF**  
**ENGINEERING, Balewadi, Pune.**

**Course Objectives:**

1. To understand basic concepts of web programming and scripting languages.
2. To learn Version Control Environment.
3. To learn front end technologies and back end technologies.
4. To understand mobile web development.
5. To comprehend web application deployment.

**Course Outcomes:**

On completion of the course, students will be able to–

**CO1:** Develop Static and Dynamic responsive website using technologies HTML, CSS, Bootstrap and AJAX.

**CO2:** Create Version Control Environment.

**CO3:** Develop an application using front end and backend technologies.

**CO4:** Develop mobile website using JQuery Mobile.

**CO5:** Deploy web application on cloud using AWS.

## **GENERAL LABORATORY INSTRUCTIONS**

1. Students are advised to come to the laboratory at least 5 minutes before (to the starting time), those who come after 5 minutes will not be allowed into the lab.
2. Plan your task properly much before to the commencement, come prepared to the lab with the synopsis / program / experiment details.
3. Student should enter into the laboratory with: a. Laboratory observation notes with all the details (Problem statement, Aim, Algorithm, Procedure, Program, Expected Output, etc.,) filled in for the lab session. b. Laboratory Record updated up to the last session experiments and other utensils (if any) needed in the lab. c. Proper Dress code and Identity card.
4. Sign in the laboratory login register, write the TIME-IN, and occupy the computer system allotted to you by the faculty.
5. Execute your task in the laboratory, and record the results / output in the lab observation note book, and get certified by the concerned faculty.
6. All the students should be polite and cooperative with the laboratory staff, must maintain the discipline and decency in the laboratory.
7. Computer labs are established with sophisticated and high end branded systems, which should be utilized properly.
8. Students / Faculty must keep their mobile phones in SWITCHED OFF mode during the lab sessions. Misuse of the equipment, misbehaviors with the staff and systems etc., will attract severe punishment.
9. Students must take the permission of the faculty in case of any urgency to go out; if anybody found loitering outside the lab / class without permission during working hours will be treated seriously and punished appropriately.
10. Students should LOG OFF/ SHUT DOWN the computer system before he/she leaves the lab after completing the task (experiment) in all aspects. He/she must ensure the system / seat is kept properly.

## DEPARTMENT OF INFORMATION TECHNOLOGY

### List of Assignments

**Subject: Web Technology**

**Practical: 4 Hours/Week**

**Class: TE (AIML)**

**Practical: 25 Marks**

**Term Work: 25 Marks**

## INDEX

Sr.No	List of Assignments
1	Create a responsive web page which shows the ecommerce/college/exam admin dashboard with sidebar and statistics in cards using HTML, CSS and Bootstrap.
2	Write a JavaScript Program to get the user registration data and push to array/local storage with AJAX POST method and data list in new page.
3	Create version control account on GitHub and using Git commands to create repository and push your code to GitHub
4	Create Docker Container Environment (NVIDIA Docker or any other).
5	Create an Angular application which will do following actions: Register User, Login User, Show User Data on Profile Component
6	Create a Node.JS Application which serves a static website.
7	Create four API using Node.JS, ExpressJS and MongoDB for CRUD Operations on assignment 5.
8	Create a simple Mobile Website using jQuery Mobile.
9	Develop a web application using full stack development technologies in any of the following domains: 1. Social Media 2. ecommerce 3. Restaurant 4. Medical 5. Finance 6. Education 7. Any other

## Assignment 1:

Create a responsive web page which shows the ecommerce/college/exam admin dashboard with sidebar and statistics in cards using HTML, CSS and Bootstrap.

### Theory:

#### I. HTML:

- HTML stands for Hyper Text Markup Language
- HTML is the standard markup language for creating Web pages
- HTML describes the structure of a Web page
- HTML consists of a series of elements
- HTML elements tell the browser how to display the content
- HTML elements label pieces of content such as "this is a heading", "this is a paragraph", "this is a link", etc

A simple HTML Document

```
<!DOCTYPE html>
<html>
<head>
<title>Page Title</title>
</head>
<body>

<h1>My First Heading</h1>
<p>My first paragraph.</p>

</body>
</html>
```

- The `<!DOCTYPE html>` declaration defines that this document is an HTML5 document
- The `<html>` element is the root element of an HTML page
- The `<head>` element contains meta information about the HTML page
- The `<title>` element specifies a title for the HTML page (which is shown in the browser's title bar or in the page's tab)
- The `<body>` element defines the document's body, and is a container for all the visible contents, such as headings, paragraphs, images, hyperlinks, tables, lists, etc.
- The `<h1>` element defines a large heading
- The `<p>` element defines a paragraph

## II. CSS:

- CSS stands for Cascading Style Sheets
- CSS describes how HTML elements are to be displayed on screen, paper, or in other media
- CSS saves a lot of work. It can control the layout of multiple web pages all at once
- External stylesheets are stored in CSS files
- CSS is used to define styles for your web pages, including the design, layout and variations in display for different devices and screen sizes.

### Simple CSS example

```
<!DOCTYPE html>
<html>
<head>
<style>
body {
  background-color: lightblue;
}

h1 {
  color: white;
  text-align: center;
}

p {
  font-family: verdana;
  font-size: 20px;
}
</style>
</head>
<body>

<h1>My First CSS Example</h1>
<p>This is a paragraph.</p>

</body>
</html>
```

### III. Bootstrap:

Bootstrap is a free and open-source tool collection for creating responsive websites and web applications. It is the most popular HTML, CSS, and JavaScript framework for developing responsive, mobile-first websites. It solves many problems which we had once, one of which is the cross-browser compatibility issue. Nowadays, the websites are perfect for all the browsers (IE, Firefox, and Chrome) and for all sizes of screens (Desktop, Tablets, Phablets, and Phones).

Why Bootstrap?

- Faster and Easier Web Development.
- It creates Platform-independent web pages.
- It creates Responsive Web-pages.
- It is designed to be responsive to mobile devices too.
- It is Free! Available on [www.getbootstrap.com](http://www.getbootstrap.com)
- Simple Example

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>Bootstrap Example</title>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
  <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></script>
  <script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>
</head>
<body>

  <div class="container">
    <h1>My First Bootstrap Page</h1>
    <p>This is some text.</p>
  </div>

</body>
</html>
```

Bootstrap CDN

```
<!-- Latest compiled and minified CSS -->
<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
```

```
<!-- jQuery library -->  
<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></script>  
  
<!-- Latest compiled JavaScript -->  
<script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>
```



## **Assignment 2:**

Write a JavaScript Program to get the user registration data and push to array/local storage with AJAX POST method and data list in new page.

### **Theory:**

AJAX stands for Asynchronous JavaScript and XML. AJAX is a new technique for creating better, faster, and more interactive web applications with the help of XML, HTML, CSS, and JavaScript.

Ajax uses XHTML for content, CSS for presentation, along with Document Object Model and JavaScript for dynamic content display.

With AJAX, when you hit submit, JavaScript will make a request to the server, interpret the results, and update the current screen. In the purest sense, the user would never know that anything was even transmitted to the server. XML is commonly used as the format for receiving server data, although any format, including plain text, can be used. AJAX is a web browser technology independent of web server software.

A user can continue to use the application while the client program requests information from the server in the background. Intuitive and natural user interaction. Clicking is not required, mouse movement is a sufficient event trigger. Data-driven as opposed to page-driven.

AJAX is based on the following open standards –

- Browser-based presentation using HTML and Cascading Style Sheets (CSS).
- Data is stored in XML format and fetched from the server.
- Behind-the-scenes data fetches using XMLHttpRequest objects in the browser.
- JavaScript to make everything happen

AJAX cannot work independently. It is used in combination with other technologies to create interactive webpages.

- JavaScript

- Loosely typed scripting language.

- JavaScript function is called when an event occurs in a page.

- Glue for the whole AJAX operation.

- DOM

- API for accessing and manipulating structured documents.
- Represents the structure of XML and HTML documents.
- CSS
- Allows for a clear separation of the presentation style from the content and may be changed programmatically by JavaScript
- XMLHttpRequest
- JavaScript object that performs asynchronous interaction with the server.

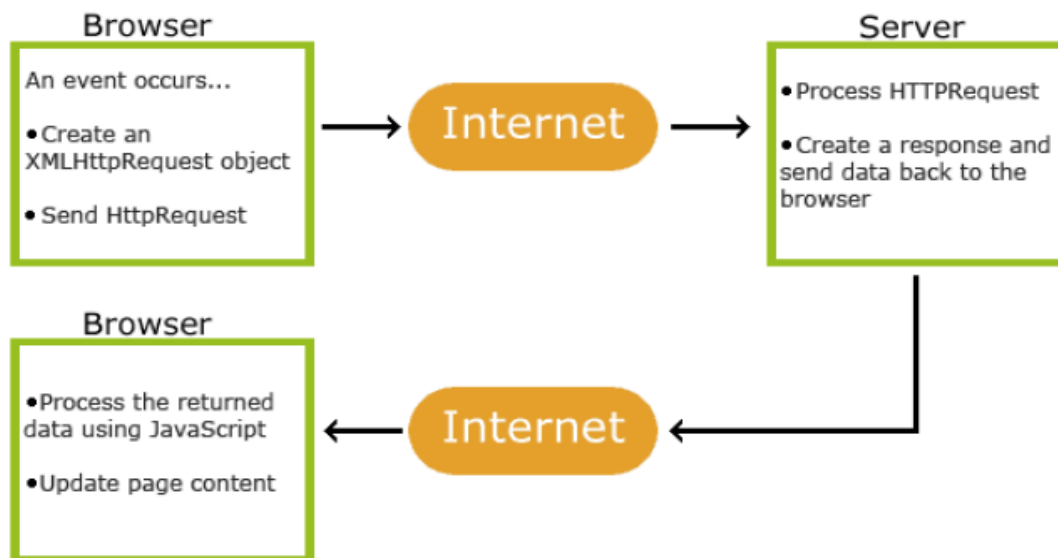


Fig 1. How AJAX works

### AJAX – Events : onreadystatechange Event Properties

Property	Description
onReadyStateChange	It is called whenever readystate attribute changes. It must not be used with synchronous requests.

readyState	<p>represents the state of the request. It ranges from 0 to 4.</p> <ul style="list-style-type: none"> <li>• 0: request not initialized (open() is not called.)</li> <li>• 1: server connection established (open is called but send() is not called.)</li> <li>• 2: request received (send() is called, and headers and status are available.)</li> <li>• 3: processing request (Downloading data; responseText holds the data.)</li> <li>• 4: request finished and response is ready (The operation is completed fully.)</li> </ul>
status	<p>200: "OK"</p> <p>403: "Forbidden"</p> <p>404: "Page not found"</p>

### XMLHttpRequest object properties

Property	Description
readyState	An integer from 0. . 4. (0 means the call is uninitialized, 4 means that the call is complete.)
onreadystatechange	Determines the function called when the objects readyState changes.
responseText	Data returned from the server as a text string (read-only).

responseXML	Data returned from the server as an XML document object (read-only).
status	HTTP status code returned by the server
statusText	HTTP status phrase returned by the server

### XMLHttpRequest object methods

<b><u>Method</u></b>	<b><u>Description</u></b>
open('method', 'URL', asyn)	Specifies the HTTP method to be used (GET or POST as a string, the target URL, and whether or not the request should be handled asynchronously (asyn should be true or false, if omitted, true is assumed).
send(content)	Sends the data for a POST request and starts the request, if GET is used you should call send(null).
setRequestHeader('x','y')	Sets a parameter and value pair x=y and assigns it to the header to be sent with the request.
getAllResponseHeaders()	Returns all headers as a string.
getResponseHeader(x)	Returns header x as a string.
abort()	Stops the current operation.

Sample code :

**ajaxcommunication.html**

```
<html>

<body>

  <div id="xyz">

    Hello Friends <br>

    Welcome to Pune!!!!<br>

    <button type="button" onclick="load()">

      Submit

    </button>

  </div>

  <script>

    function load(){

      var req=new XMLHttpRequest()

      req.onreadystatechange=function() {

        if(this.readyState == 4 && this.status == 200){

          document.getElementById("xyz").innerHTML=this.responseText

        }

      }

      req.open('GET','data.txt',true)

      req.send()

    }

  </script>

</body>
```

</html>

form.js

```
$(document).ready(function () {  
  $("form").submit(function (event) {  
    var formData = {  
      name: $("#name").val(),  
      email: $("#email").val(),  
      superheroAlias: $("#superheroAlias").val(),  
    };  
  
    $.ajax({  
      type: "POST",  
      url: "process.php",  
      data: formData,  
      dataType: "json",  
      encode: true,  
    }).done(function (data) {  
      console.log(data);  
    });  
  
    event.preventDefault();  
  });  
});
```

## Processing an AJAX Form

**Name**

Name is required.

**Email**

Email is required.

**Superhero Alias**

Superhero alias is required.

### Assignment 3:

Create version control account on GitHub and using Git commands to create repository and push your code to GitHub.

Theory:

#### 1. What is Git?

Git is a popular version control system. It was created by Linus Torvalds in 2005, and has been maintained by Junio Hamano since then.

It is used for:

- Tracking code changes
- Tracking who made changes
- Coding collaboration

#### 2. What does Git do?

- Manage projects with Repositories
- Clone a project to work on a local copy
- Control and track changes with Staging and Committing
- Branch and Merge to allow for work on different parts and versions of a project
- Pull the latest version of the project to a local copy
- Push local updates to the main project

#### 3. Working with Git

- Initialize Git on a folder, making it a Repository
- Git now creates a hidden folder to keep track of changes in that folder
- When a file is changed, added or deleted, it is considered modified
- You select the modified files you want to Stage
- The Staged files are Committed, which prompts Git to store a permanent snapshot of the files
- Git allows you to see the full history of every commit.
- You can revert back to any previous commit.
- Git does not store a separate copy of every file in every commit, but keeps track of changes made in each commit!

#### 4. Why Git?

- Over 70% of developers use Git!
- Developers can work together from anywhere in the world.
- Developers can see the full history of the project.
- Developers can revert to earlier versions of a project.

#### 5. What is GitHub

- Git is not the same as GitHub.
- GitHub makes tools that use Git.
- GitHub is the largest host of source code in the world, and has been owned by Microsoft since 2018.

#### 6. Steps to Push and PULL version control repository to GitHub

Step No	Command	Description
1	Git Installation	Download Git from the website: <a href="https://www.git-scm.com/">https://www.git-scm.com/</a>
2	Command line >git --version	If Git is installed, it should show something like git version X.Y
3	<code>git config --global user.name "w3schools-test"</code> <code>git config --global user.email "test@w3schools.com"</code>	Configure Git Change the user name and e-mail address to your own
4	<code>mkdir myproject</code> <code>cd myproject</code>	Creating Git Folder
5	<code>git init</code>	Initialize Git  Initialized empty Git repository in /Users/user/myproject/.git/
6	<code>git status</code>	To check the status
7	<code>git add index.html</code>	Add file to staging environment
8	<code>git add --all</code>	add all files in the current directory to the Staging Environment:



9	<code>git commit -m "First release of Hello World!"</code>	The committ command performs a commit, and the -m "message" adds a message.
10	<code>git commit -a -m "Updated index.html with a new line"</code>	Skips staging environment
11	<code>git log</code>	To view the history of commits for a repository, you can use the log command
12	<code>git command -help</code>	See all the available options for the specific command
13	<code>git help --all</code>	See all possible commands
14	<code>git commit -help</code>	See help for specific command
15	<code>git branch hello-world-images</code>	a branch is a new/separate version of the main repository. This command creates a new branch hello-world-images
16	<code>git checkout hello-world-images</code>	checkout is the command used to check out/ move to a branch
17	<code>git checkout master</code>	Used to switch between branches
18	<a href="https://github.com/">https://github.com/</a>	Create a new account on github
19		Create a Repository on GitHub
20	<code>git remote add origin https://github.com/w3schools-test/hello-world.git</code>	Push Local Repository to GitHub
21	<code>git push --set-upstream origin master</code>	push master branch to the origin url,
22		go back into GitHub and see that the repository has been updated:
23	<code>git fetch origin</code>	fetch gets all the change history of a tracked branch/repo
24	<code>git merge origin/master</code>	merge combines the current branch, with a specified branch.

25	<code>git pull origin</code>	<p>pull is a combination of fetch and merge</p> <p>It is used to pull all changes from a remote repository into the branch you are working on.</p>
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## Assignment 4:

Create Docker Container Environment (NVIDIA Docker or any other).

Theory:

A Docker container is a mechanism for bundling a Linux application with all of its libraries, data files, and environment variables so that the execution environment is always the same, on whatever Linux system it runs and between instances on the same host.

### Installing Docker and NVIDIA Docker

Before we can get started building containerized GPU applications, let's make sure you have the prerequisite software installed and working properly. You will need:

- Up-to-date NVIDIA drivers for your system.
- Docker. You can follow the installation instructions [here](#).
- `nvidia-docker` You can follow the installation instructions [here](#).

To help with the installation, we have created an ansible role to perform the docker and nvidia-docker install. Ansible is a tool for automating configuration management of machines and deployment of applications.

To test that you are ready to go, run the following command. You should see output similar to what is shown.

```
ryan@titanx:~$ nvidia-docker run --rm hello-world
Using default tag: latest
latest: Pulling from library/hello-world
a9d36faac0fe: Pull complete
Digest: sha256:e52be8ffeb1f374f440893189cd32f44cb166650e7ab185fa7735b7dc48d619
Status: Downloaded newer image for hello-world:latest
```

[Hello from Docker.](#)

This message shows that your installation appears to be working correctly.

[... simplified output ...]

Now that everything is working, let's get started with building a simple GPU application in a container.

## Development Environment

The Docker equivalent of installing the CUDA development libraries is the following command:

```
nvidia-docker pull nvidia/cuda
```

This command pulls the latest version of the nvidia/cuda image from Docker Hub, which is a cloud storage service for container images. Commands can be executed in this container using docker run. The following is an invocation of nvcc --version in the container we just pulled.

```
ryan@titanx:~$ nvidia-docker run --rm -ti nvidia/cuda nvcc --version
nvcc: NVIDIA (R) Cuda compiler driver
Copyright (c) 2005-2015 NVIDIA Corporation
Built on Tue_Aug_11_14:27:32_CDT_2015
Cuda compilation tools, release 7.5, V7.5.17
```

If you need CUDA 6.5 or 7.0, you can specify [a tag for the image](#). A list of available CUDA images for Ubuntu and CentOS can be found on the [nvidia-docker wiki](#). Here is a similar example using CUDA 7.0.

```
ryan@titanx:~$ nvidia-docker run --rm -ti nvidia/cuda:7.0 nvcc --version
Unable to find image 'nvidia/cuda:7.0' locally
7.0: Pulling from nvidia/cuda
6c953ac5d795: Already exists
[ ... simplified layers -- ubuntu base image ... ]
68bad08eb200: Pull complete
[ ... simplified layers -- cuda 7.0 toolkit ... ]

Status: Downloaded newer image for nvidia/cuda:7.0
nvcc: NVIDIA (R) Cuda compiler driver
Copyright (c) 2005-2015 NVIDIA Corporation
Built on Mon_Feb_16_22:59:02_CST_2015
Cuda compilation tools, release 7.0, V7.0.27
```

you can explore the development image by running a container that executes a bash shell.

```
nvidia-docker run --rm -ti nvidia/cuda:7.5 bash
```

## Assignment 5:

Create an Angular application which will do following actions: Register User, Login User, Show User Data on Profile Component.

Theory:

Useful link - <https://www.tutorialsteacher.com/angular/install-angular>

1. Angular requires a current, active LTS(long term support) or maintenance LTS version of Node.js and NPM.

install node.js <https://nodejs.org/>

It will automatically install NPM - node package manager

2. Install Angular CLI

```
npm install -g @angular/cli@latest
```

To Create Angular 2 Application Angular CLI is required

3. To create new project

















through CLI go to folder of the new project

Give command as -

```
ng new project-name
```

press ENTER

The project will be created as directory structure below –

-  .angular
-  .git
-  .vscode
-  node\_modules
-  src
-  .browserslistrc
-  .editorconfig
-  .gitignore
-  angular.json
-  karma.conf.js
-  package.json
-  package-lock.json
-  README.md
-  tsconfig.app.json
-  tsconfig.json
-  tsconfig.spec.json

Open folder src/app

Modify app.module.ts for form application

```
import { NgModule } from '@angular/core';
import { BrowserModule } from '@angular/platform-browser';

import { AppRoutingModule } from './app-routing.module';
import { AppComponent } from './app.component';
import { FormsModule } from '@angular/forms'

@NgModule({
  declarations: [
    AppComponent
  ],
  imports: [
    BrowserModule,
    AppRoutingModule,
    FormsModule,
  ],
  providers: [],
  bootstrap: [AppComponent]
})
export class AppModule { }
```

Open app.component.html

Write html code for form (representative code is mentioned here, modify for multiple inputs)

```
<h1>Simple Form</h1>
```

```
<form #simpleForm = "ngForm" (ngSubmit) = "getValues(simpleForm.value)">
  <input type="text" ngModel name = "user" placeholder = "Enter Name">
  <br> <br>
  <input type="text" ngModel name = "age" placeholder = "Enter age">
  <br> <br>
  <input type="text" ngModel name = "city" placeholder = "Enter city">
  <br> <br>
  <button>Get user value</button>
</form>
```

[Make changes in app.component.ts](#)

```
import { Component } from '@angular/core';

@Component({
  selector: 'app-root',
  templateUrl: './app.component.html',
  styleUrls: ['./app.component.css']
})
export class AppComponent {
  title = 'AngProj1';
  getValues(val:any)
  {
    console.log(val);
  }
}
```

Here getValue() function which is called in form file is defined.

You can check inputted values through form in console.

build application:

1. Use Angular CLI command ng serve -o to build an application.

The -o indicates to open it automatically in the default browser.

2. Use NPM command 'npm start' to build an application

<http://localhost:4200> to see the application home page.

3. Open the terminal in VS Code from menu Terminal -> New Terminal,

and type ng serve -o command and press enter,

You can send the form contents from console to other page.

On the basis of above implementation, you can design login user, show user data.



## Assignment 6:

Create a Node.JS Application which serves a static website.

Theory:

Installation : Node.js (site – Node.js), Express.js(installed through cmd)

### Theory :

#### Node.js overview

In basic terms, Node is an open source cross-platform library for server-side programming that permits clients to develop web applications rapidly. With Node, we can execute JavaScript applications or network applications. Its basic modules are engraved in JavaScript.

It is generally utilized for server applications in real-time. Node.js permits JavaScript to execute locally on a machine or a server.

Node.js gives numerous systems to utilize. One of such structures is Express.js. It is more valuable and mainstream than the different structures of Node.js.

#### Features of Node.js

- **Versatility:** Node is incredibly adaptable as the server reacts in a non-blocking way.
- **Zero Buffering:** Applications yield the measurements in enormous pieces. This gives the advantage of 'No buffering' to developers.
- **Network:** Node.js upholds an open-source community. This is the main explanation that numerous glorious modules have been added to Node.js applications over time.
- **Occasion driven Input and output:** APIs of Node.js are non-blocking, meaning that the server won't wait for the arrival of information from an API. Rather, it will move to another API.

#### Advantages of Node.js

- **Easy to learn:** Node is quite simple for developers to utilize and learn. Learning Node.js is less difficult than React.
- **Better Performance:** Node.js takes the code of JavaScript via Google's V8 JavaScript engine. The main advantage of this process is that it complies with the JavaScript code directly into the machine code
- **Freedom:** Node.js offers a lot of freedom when it comes to development. There are generally less constraints with Node.

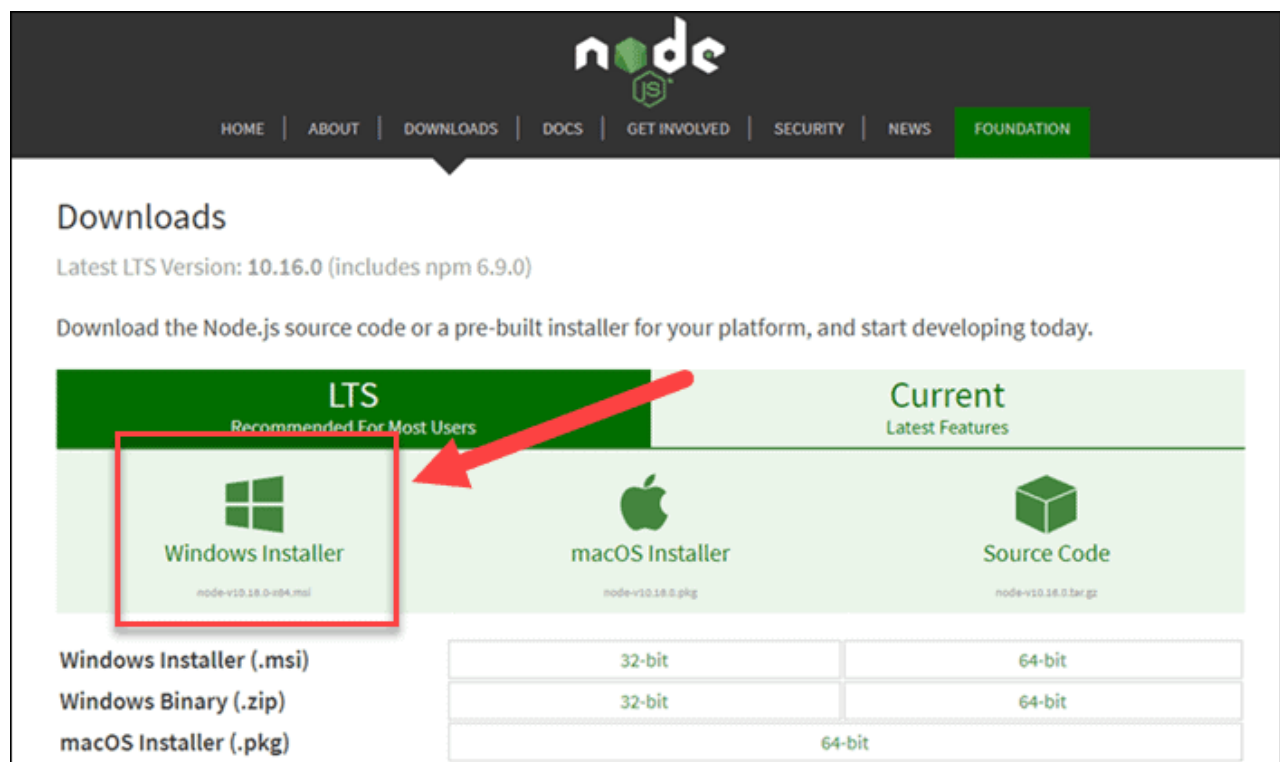
#### Limitations of Node.js

- **Programming interface isn't steady:** The Application Programming Interface (API) of Node can be challenging to work with. It changes regularly and doesn't remain stable.

- **No strong library support system:** JavaScript does not hold a strong library system. This limits the developers to implement even common programming tasks using Node.js.
- **How to Install Node.js and NPM on Windows**

## Step 1: Download Node.js Installer

In a web browser, navigate to <https://nodejs.org/en/download/>. Click the **Windows Installer** button to download the latest default version. At the time this article was written, version 10.16.0-x64 was the latest version. The Node.js installer includes the NPM package manager.



## Step 2: Install Node.js and NPM from Browser

1. Once the installer finishes downloading, launch it. Open the **downloads** link in your browser and click the file. Or, browse to the location where you have saved the file and double-click it to launch.
2. The system will ask if you want to run the software – click **Run**.
3. You will be welcomed to the Node.js Setup Wizard – click **Next**.

4. On the next screen, review the license agreement. Click **Next** if you agree to the terms and install the software.
5. The installer will prompt you for the installation location. Leave the default location, unless you have a specific need to install it somewhere else – then click **Next**.
6. The wizard will let you select components to include or remove from the installation. Again, unless you have a specific need, accept the defaults by clicking **Next**.
7. Finally, click the **Install** button to run the installer. When it finishes, click **Finish**.

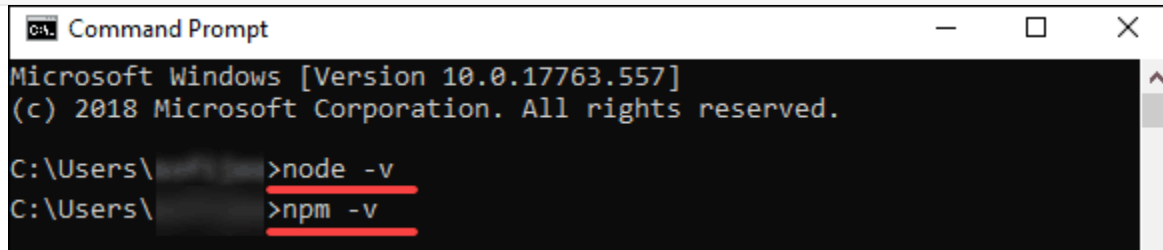
### Step 3: Verify Installation

Open a command prompt (or PowerShell), and enter the following:

```
node -v
```

The system should display the Node.js version installed on your system. You can do the same for NPM:

```
npm -v
```



The screenshot shows a Windows Command Prompt window titled "Command Prompt". The window content includes the text "Microsoft Windows [Version 10.0.17763.557]" and "(c) 2018 Microsoft Corporation. All rights reserved." Below this, the command prompt shows the execution of two commands: "C:\Users\ >node -v" and "C:\Users\ >npm -v". The command prompt is dark-themed with white text. The window has standard Windows window controls (minimize, maximize, close) in the top right corner.

### Assignment 7:

Create four API using Node.JS, ExpressJS and MongoDB for CRUD Operations on assignment 5.

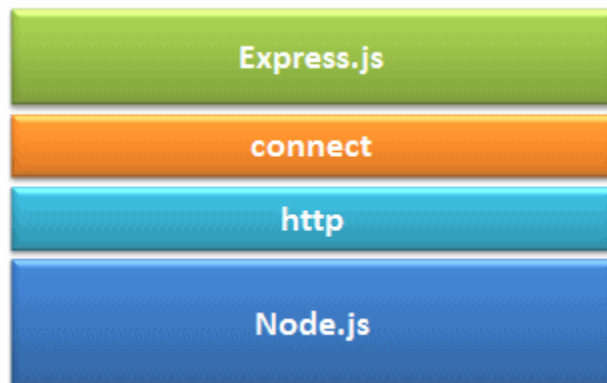
Theory:

### Express.js

"Express is a fast, unopinionated minimalist web framework for Node.js" - official web site: [Expressjs.com](https://expressjs.com)

Express.js is a web application framework for Node.js. It provides various features that make web application development fast and easy which otherwise takes more time using only Node.js.

Express.js is based on the Node.js middleware module called **connect** which in turn uses **http** module. So, any middleware which is based on connect will also work with Express.js.



### Advantages of Express.js

1. Makes Node.js web application development fast and easy.
2. Easy to configure and customize.
3. Allows you to define routes of your application based on HTTP methods and URLs.
4. Includes various middleware modules which you can use to perform additional tasks on request and response.
5. Easy to integrate with different template engines like Jade, Vash, EJS etc.
6. Allows you to define an error handling middleware.
7. Easy to serve static files and resources of your application.
8. Allows you to create REST API server.
9. Easy to connect with databases such as MongoDB, Redis, MySQL

## Steps :

1. Install Node.js
2. Setting up express.js
3. Structuring files
4. Creating your express server
5. Servicing your static files
6. Building your web page
7. Running your project

Open Node.js command terminal & run the following in your terminal-

- Setting up express.js

1. Create a new directory for your project - mkdir **your-project-name**
2. Change into your new directory - cd **your-project-name**
3. Initialize a new Node project with defaults. This will set a package.json file to access your dependencies: npm init -y
4. Create your entry file, index.js. This is where you will store your Express server: if you are working on Linux, you can run : touch index.js. if you are working on windows, you can edit in VSCode
5. Install Express as a dependency : npm install express --save
6. Edit package.json. Within your package.json, update your start script to include node and your index.js file.

Let **express-static-file-tutorial** is your project name

## Package.json

```
{
  "name": "express-static-file-tutorial",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "start": "node index.js" // change start value as node index.js
  },
  // This will allow you to use the npm start command in your
terminal to launch
  "keywords": [],
  "author": "Paul Halliday",
  "license": "MIT"
}
```

- Structuring Your Files

To store your files on the client-side, create a `public` directory and include an `index.html` file

`express-static-file-tutorial`

```
| - index.js
| - public
|   | - index.html
```

- Creating Your Express Server

**Edit `index.js` file**

`Index.js`

```
const express = require('express');
const app = express();
const PORT = 3000;
```

```
app.use(express.static('public')); // represents application is serving static webpage in
public directory
```

```
app.get('/', (req, res) => {
  res.send('Hello World!');
});
```

```
app.listen(PORT, () => console.log(`Server listening on port: ${PORT}`));
```

First of all, import the `Express.js` module.

In the above example, we imported `Express.js` module using `require()` function. The `express` module returns a function. This function returns an object which can be used to configure Express application (`app` in the above example).

The `app` object includes methods for routing HTTP requests, configuring middleware, rendering HTML views and registering a template engine.

The `app.listen()` function creates the Node.js web server at the specified host and port. It is identical to Node's `http.Server.listen()` method. Instead of `Get()`, `post()`, `put()` and `delete()` methods can be used.

- Building Your Web Page – client side

Navigate to your `index.html` file in the `public` directory. Populate the file with body and image elements:

[label `index.html`]

```
<html>
  <head>
    <title>Hello World!</title>
  </head>
  <body>
    <h1>Hello, World!</h1>
     //download & store image in public directory
  </body>
</html>
```

(Instead of building Hello world application, building applications like student's Registration form/main page of website is recommended)

## Running Your Project

In your terminal, launch your Express project

**npm start**

It will display

**Server listening on port : 3000**

Open your web browser, and navigate to <http://localhost:3000>.

## Assignment 8:

Create a simple Mobile Website using jQuery Mobile.

Theory:

### jQuery Mobile

jQuery Mobile is a user interface framework, built on jQuery Core and used for developing responsive websites or applications that are accessible on mobile, tablet, and desktop devices. It uses features of both jQuery and jQueryUI to provide API features for mobile web applications. This tutorial will teach you the basics of jQuery Mobile framework. We will also discuss some detailed concepts related to jQuery Mobile.

Why Use jQuery Mobile?

- It creates web applications that it will work the same way on the mobile, tablet, and desktop devices.
- It is compatible with other frameworks such as PhoneGap, Whitelight, etc.
- It provides a set of touch-friendly form inputs and UI widgets.

Features of jQuery Mobile

- It is built on jQuery Core and "write less, do more" UI framework.
- It is an open source framework, and cross-platform as well as cross-browser compatible.
- It is written in JavaScript and uses features of both jQuery and jQuery UI for building mobile-friendly sites.

Download jQuery Mobile

When you open the link <https://jquerymobile.com/>, you will see there are two options to download jQuery mobile library.





Click the *Stable* button, which leads directly to a ZIP file containing the CSS and JQuery files, for the latest version of jQuery mobile library. Extract the ZIP file contents to a jQuery mobile directory.

This version contains all files including all dependencies, a large collection of demos, and even the library's unit test suite. This version is helpful to getting started.

## **Assignment 9:**

Deploy/Host Your web application on AWS VPC or AWS Elastic Beanstalk. Mini Project  
Develop a web application using full stack development technologies in any of the following domains:

1. Social Media
2. ecommerce
3. Restaurant
4. Medical
5. Finance
6. Education

7. Any other

## **What is Cloud Computing?**

Cloud computing is a term referred to storing and accessing data over the internet. It doesn't store any data on the hard disk of your personal computer. In cloud computing, you can access data from a remote server.

## **What is AWS?**

The full form of AWS is Amazon Web Services. It is a platform that offers flexible, reliable, scalable, easy-to-use and, cost-effective cloud computing solutions.

AWS is a comprehensive, easy to use computing platform offered Amazon. The platform is developed with a combination of infrastructure as a service (IaaS), platform as a service (PaaS) and packaged software as a service (SaaS) offerings.

It is a secure cloud services platform, offering compute power, database storage, content delivery and other functionality to help businesses scale and grow.

In simple words AWS allows you to do the following things- Running web and application servers in the cloud to host dynamic websites.

## **History of AWS**

- 2002- AWS services launched
- 2006- Launched its cloud products
- 2012- Holds first customer event
- 2015- Reveals revenues achieved of \$4.6 billion
- 2016- Surpassed \$10 billion revenue target

- 2016- Release snowball and snowmobile
- 2019- Offers nearly 100 cloud services
- 2021- AWS comprises over 200 products and services

### **Important AWS Services**

Amazon Web Services offers a wide range of different business purpose global cloud-based products. The products include storage, databases, analytics, networking, mobile, development tools, enterprise applications, with a pay-as-you-go pricing model.

### **Applications of AWS services**

Amazon Web services are widely used for various computing purposes like:

- Web site hosting
- Application hosting/SaaS hosting
- Media Sharing (Image/ Video)
- Mobile and Social Applications
- Content delivery and Media Distribution
- Storage, backup, and disaster recovery
- Development and test environments
- Academic Computing
- Search Engines
- Social Networking

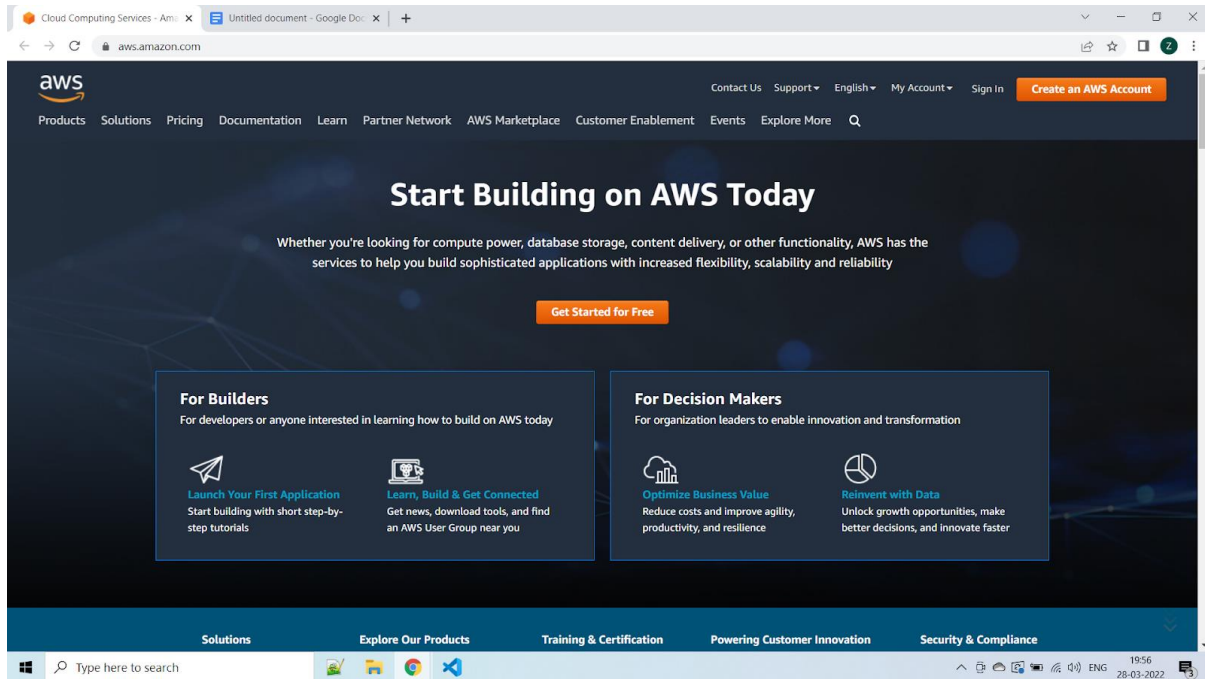
**Creating an AWS Account** is the first step you need to take in order to learn **Amazon Web Services**.

### **Steps to follow are as follows :**

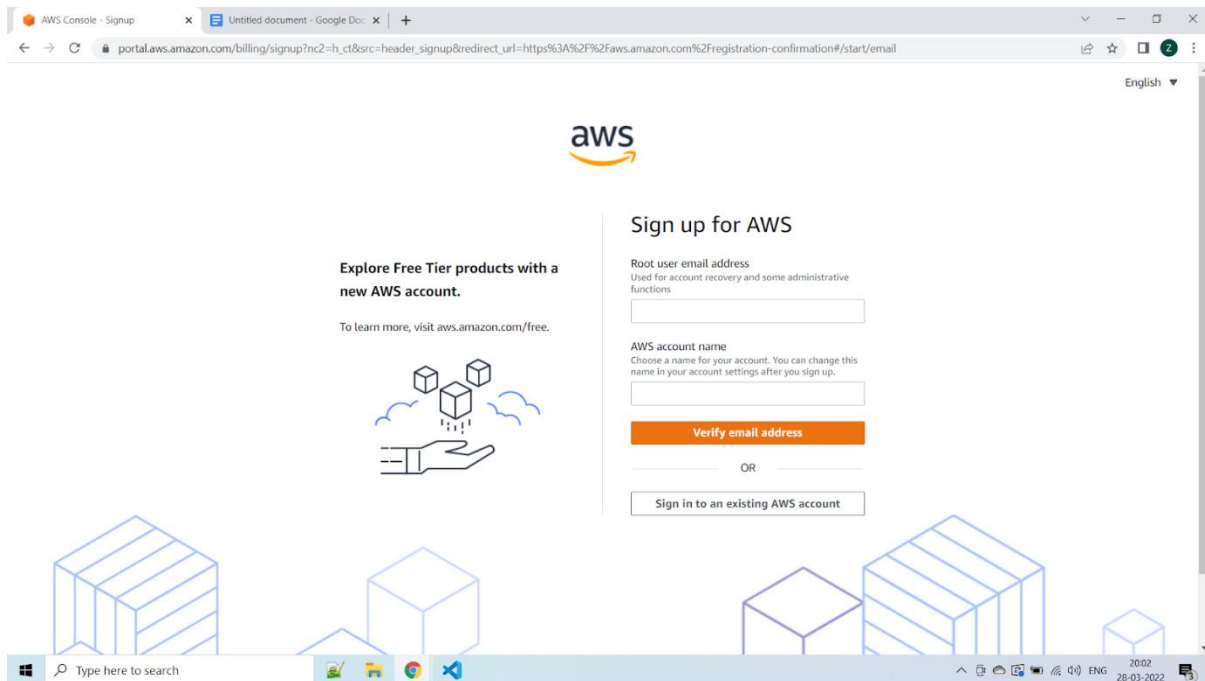
Step 1 – Visiting the Signup Page

Go to <https://aws.amazon.com>

You should see something like below:

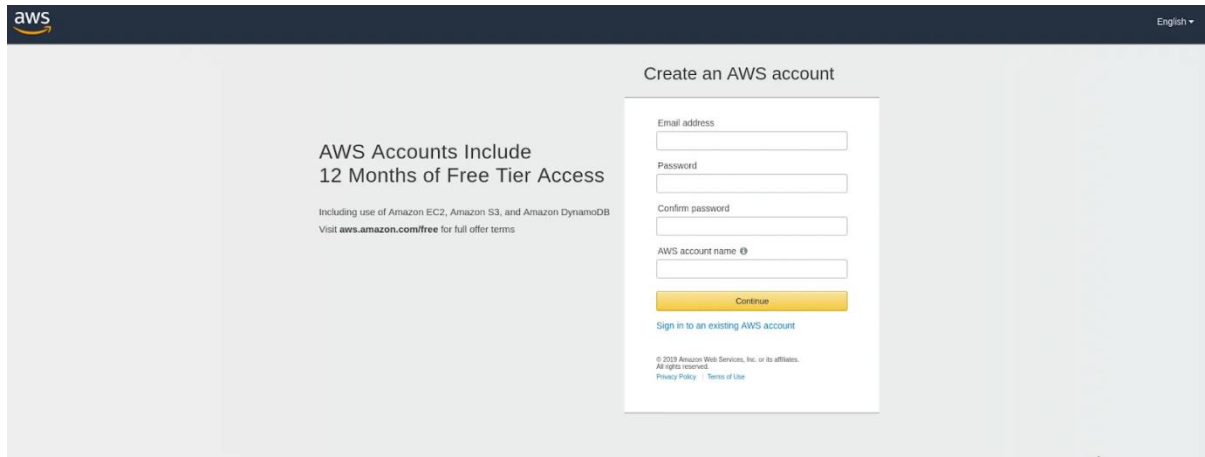


In order to continue, click the **Complete Sign Up** button in the middle of the screen or on the top right corner of the screen. You will see the below screen.



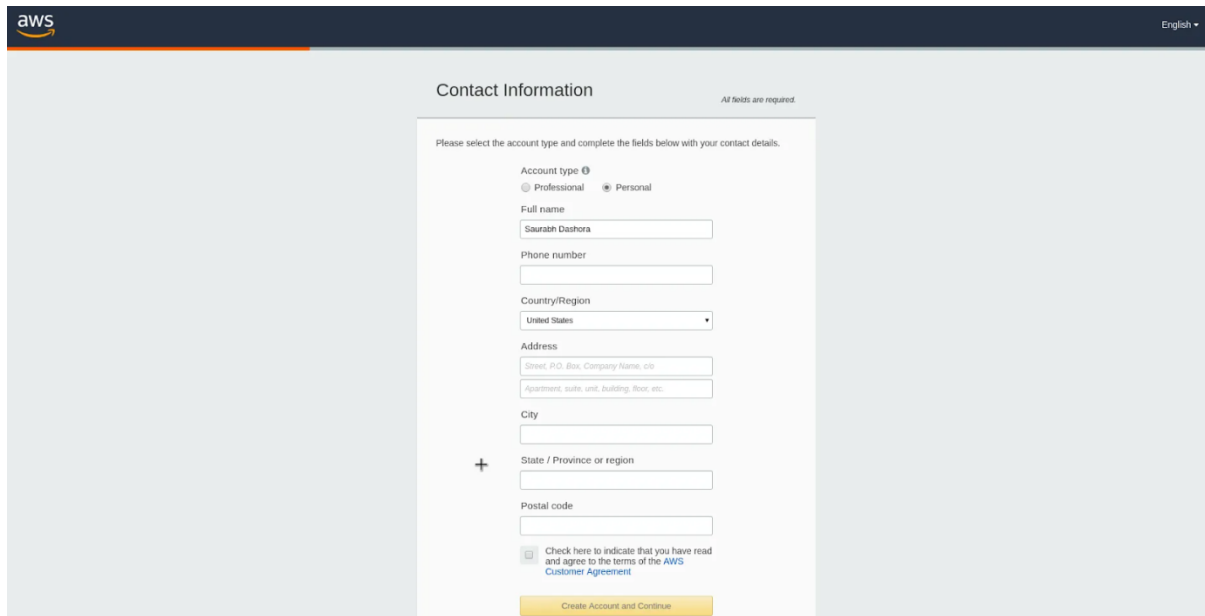
## Step 2 – Entering User Details

After you have chosen to **Create a new AWS account**, you will see the below screen asking for few details.



You can fill up the details as per your requirements and click **Continue**.

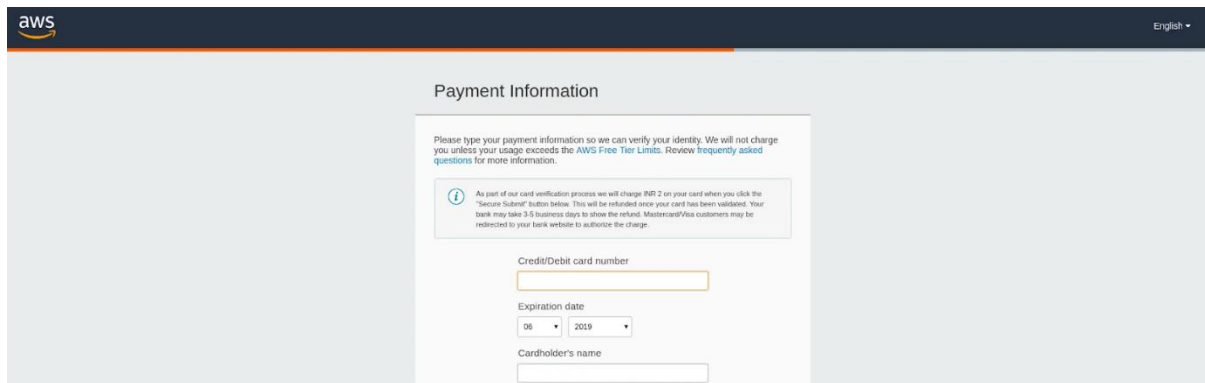
Next you will be asked to fill up your contact details such contact number, country, address and so on. You should fill them up properly because your contact number is important for further steps.



After filling up the details, click on the **Create Account and Continue** button at the bottom of the form.

### Step 3 – Filling up the Credit Card details

For **Creating an AWS Account**, you need to enter your **Credit Card** details.

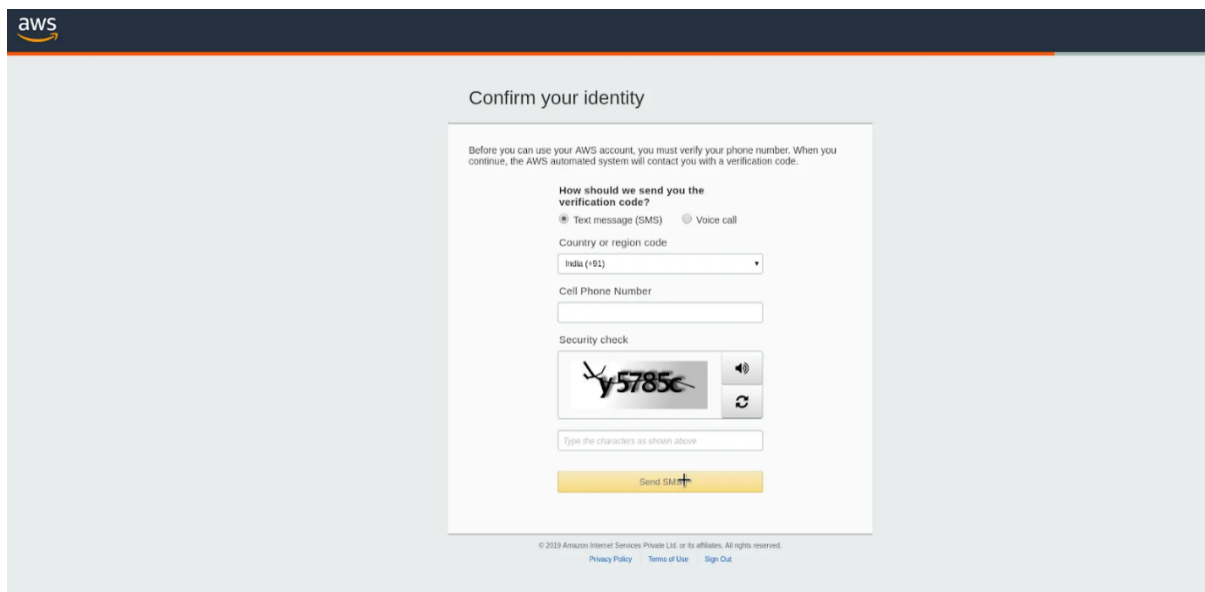


The screenshot shows the 'Payment Information' form in the AWS account creation process. At the top, the AWS logo is on the left and 'English' is on the right. The form title 'Payment Information' is centered. Below it, a message states: 'Please type your payment information so we can verify your identity. We will not charge you unless your usage exceeds the AWS Free Tier Limits. Review frequently asked questions for more information.' A blue information icon is followed by a note: 'As part of our card verification process we will charge ₹100 on your card when you click the "Secure Submit" button below. This will be refunded once your card has been validated. Your bank may take 3-5 business days to show the refund. Mastercard/Visa customers may be redirected to your bank website to authorize the charge.' The form fields include: 'Credit/Debit card number' (text input), 'Expiration date' (dropdowns for month '06' and year '2019'), and 'Cardholder's name' (text input).

After entering the details, click on **Secure Submit** button. It might take a while to process the request depending on your bank/credit card company servers.

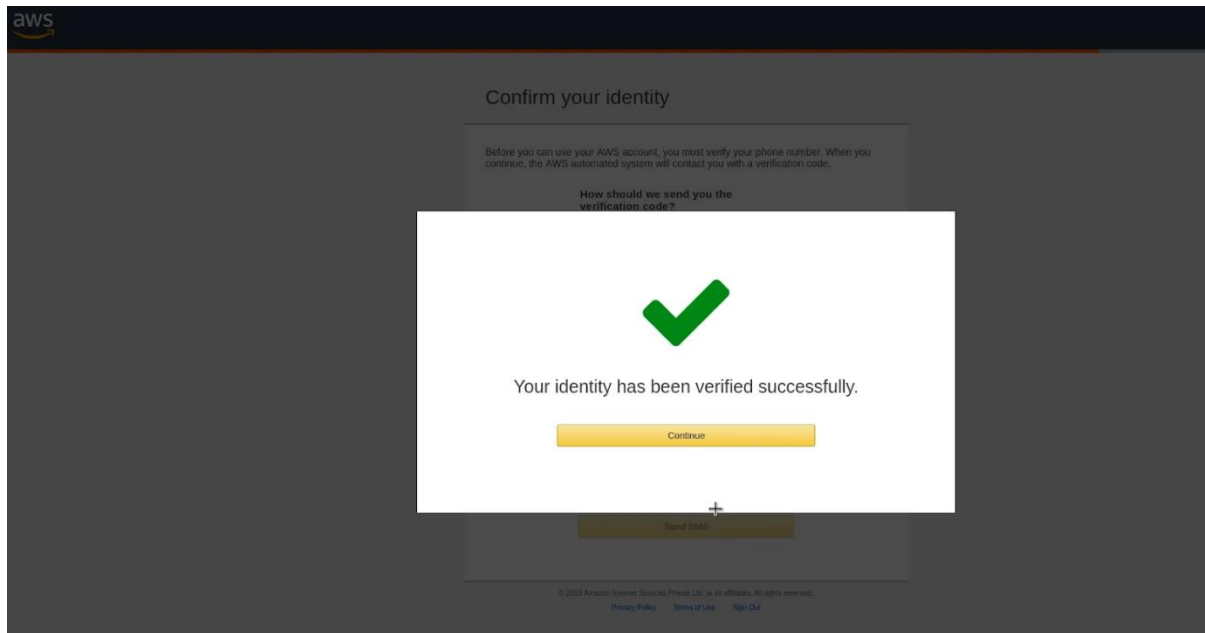
### Step 4 – Identity Confirmation

Once the credit card details are confirmed, you will need to complete the **Identity Confirmation** step. You will see the below screen:

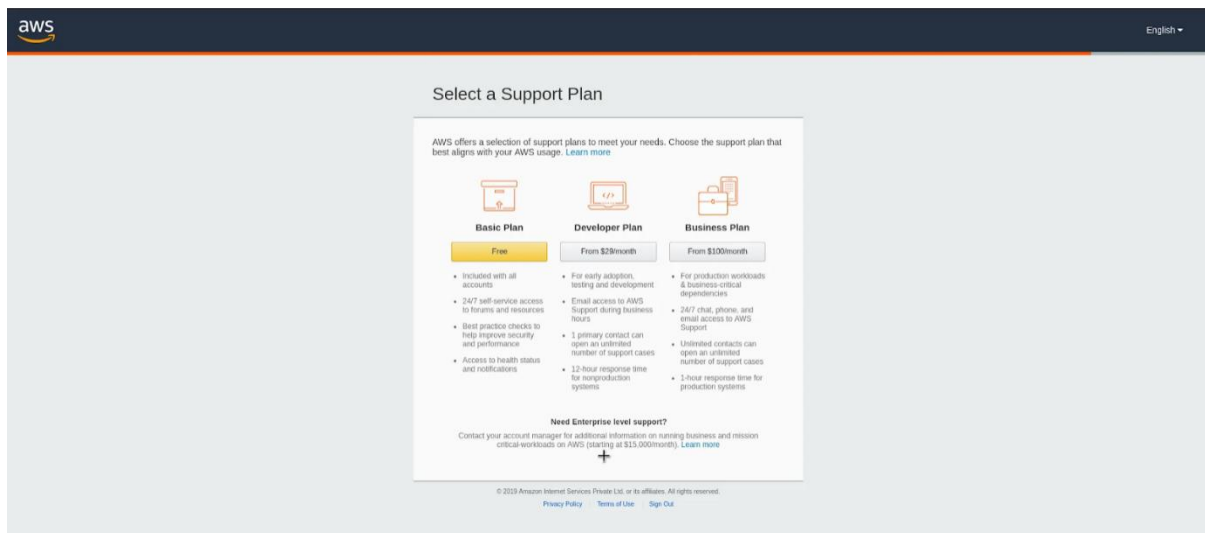


The screenshot shows the 'Confirm your identity' form in the AWS account creation process. At the top, the AWS logo is on the left. The form title 'Confirm your identity' is centered. Below it, a message states: 'Before you can use your AWS account, you must verify your phone number. When you continue, the AWS automated system will contact you with a verification code.' The form asks 'How should we send you the verification code?' with radio buttons for 'Text message (SMS)' (selected) and 'Voice call'. Below this is a 'Country or region code' dropdown menu showing 'India (+91)'. The 'Cell Phone Number' field is a text input. A 'Security check' section displays a CAPTCHA image with the characters 'y5785c' and icons for audio and refresh. Below the CAPTCHA is a text input labeled 'Type the characters as shown above'. At the bottom is a yellow 'Send SMS' button with a plus icon. The footer contains copyright information: '© 2013 Amazon Internet Services Private Ltd. or its affiliates. All rights reserved.' and links for 'Privacy Policy', 'Terms of Use', and 'Sign Out'.

Once you have verified successfully, you should see a screen like below:



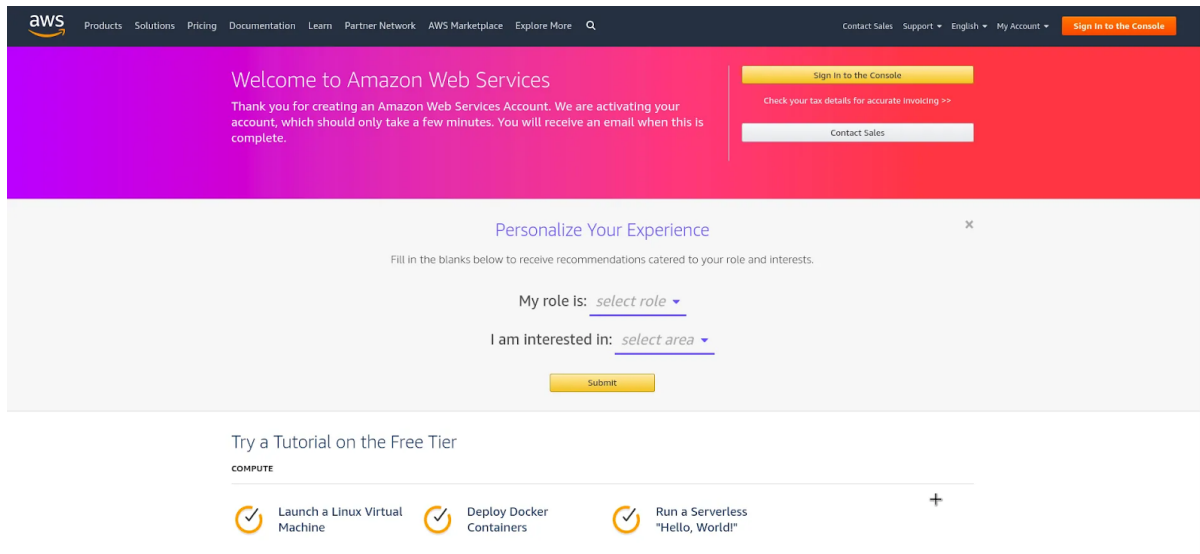
## Step 5 – Selecting a Support Plan



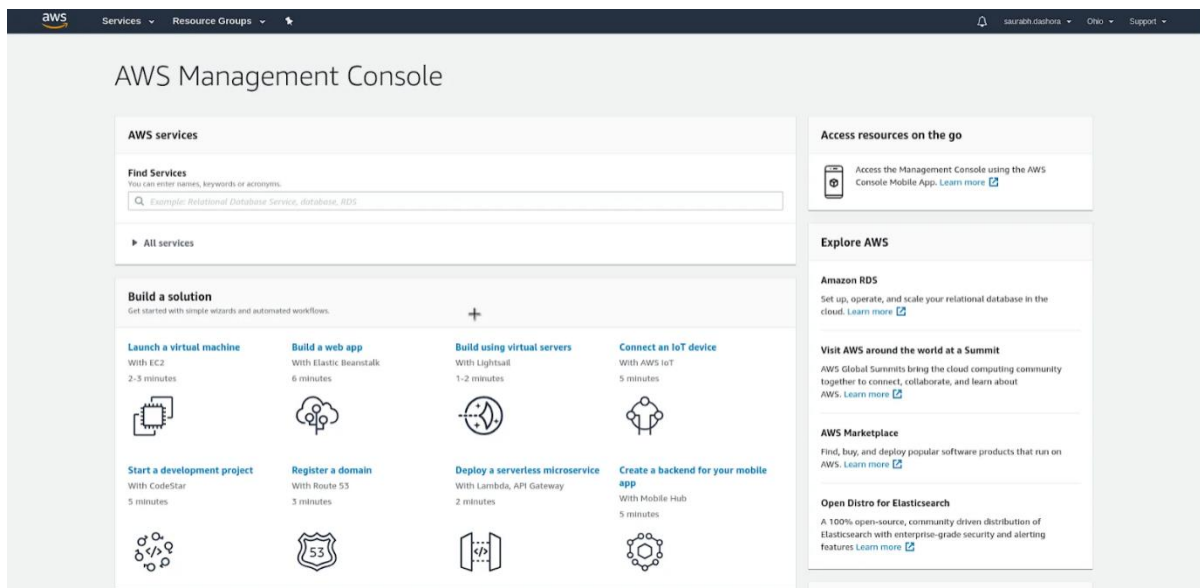
Go for **Basic Plan**. It is Free of cost and great for learning purposes.

The other plans are **Developer Plan** and a **Business Plan**. But both of them are paid options.

Once you select your plan, you will see the below **Welcome** screen. From here on, you can Sign in to your **AWS Console**.



Finally, after logging in, you should be able to see the **AWS Management Console** as below:



If you have reached this far, you have successfully finished **Creating an AWS Account**.



## **Deployment Steps:**

Step 1: Launch a Windows Server Amazon EC2 instance.

Step 2: Configure your source content to deploy to the Windows Server Amazon EC2 instance.

Step 3: Upload your "hello, world!" ...

Step 4: Deploy your Hello World application.

Step 5: Update and redeploy your "hello, world!" ...

Step 6: Clean up your "hello, world!"