

# **Emerging Technology Practical**

## **On CLOUD COMPUTING**

AWS (Amazon Cloud Computing)

# Practical : 1

## Setting up a Cloud Account

### Amazon Web Services (AWS) – Overview

#### What is AWS?

**Amazon Web Services (AWS)** is a cloud computing platform provided by Amazon. It offers a wide range of **on-demand cloud services** such as computing power, storage, databases, machine learning, networking, and more — all delivered over the internet on a pay-as-you-go model.

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### Key Features of AWS

#### 1. Compute Services

- EC2 (virtual servers), Lambda (serverless), Elastic Beanstalk (auto-scaling apps)

#### 2. Storage Services

- S3 (object storage), EBS (block storage), Glacier (archival)

#### 3. Database Services

- RDS (relational DBs), DynamoDB (NoSQL), Redshift (data warehouse)

#### 4. Networking

- VPC, Route 53 (DNS), CloudFront (CDN)

#### 5. Security & Monitoring

- IAM (user access), CloudWatch (monitoring), GuardDuty (threat detection)

#### 6. AI & ML Services

- SageMaker, Rekognition, Comprehend

## 7. DevOps & Developer Tools

- CodePipeline, CodeBuild, CloudFormation

## 8. Global Infrastructure

- Available in multiple **regions and availability zones** for high reliability.

## Advantages of AWS

- **Scalability:** Automatically scale resources up or down.
  - **Cost-Effective:** Pay-as-you-go pricing model.
  - **Reliable:** 99.99% uptime, backup options, failover mechanisms.
  - **Secure:** Enterprise-grade security with compliance support.
  - **Flexible:** Supports many operating systems, programming languages, and frameworks.
  - **Global Reach:** Available across many regions worldwide.
- 

## Disadvantages of AWS

- **Complex Pricing:** Can get expensive if not monitored correctly.
  - **Learning Curve:** Steep for beginners due to the vast number of services.
  - **Dependency on Internet:** Needs stable internet access.
  - **Vendor Lock-in:** Hard to migrate away once integrated deeply.
- 

## Who Uses AWS?

- **Startups:** For quick app deployment without infrastructure investment.
- **Enterprises:** For scalable global systems, data storage, and disaster recovery.
- **Government Agencies:** For secure and compliant infrastructure.
- **Developers & DevOps Teams:** For building, testing, and deploying code.
- **Data Scientists:** For training and deploying machine learning models.

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## Where is AWS Used?

- Web hosting & application deployment
- Machine learning & AI services
- Data backup & disaster recovery
- Big data analytics
- Internet of Things (IoT)
- Mobile & game development
- Video streaming & content delivery

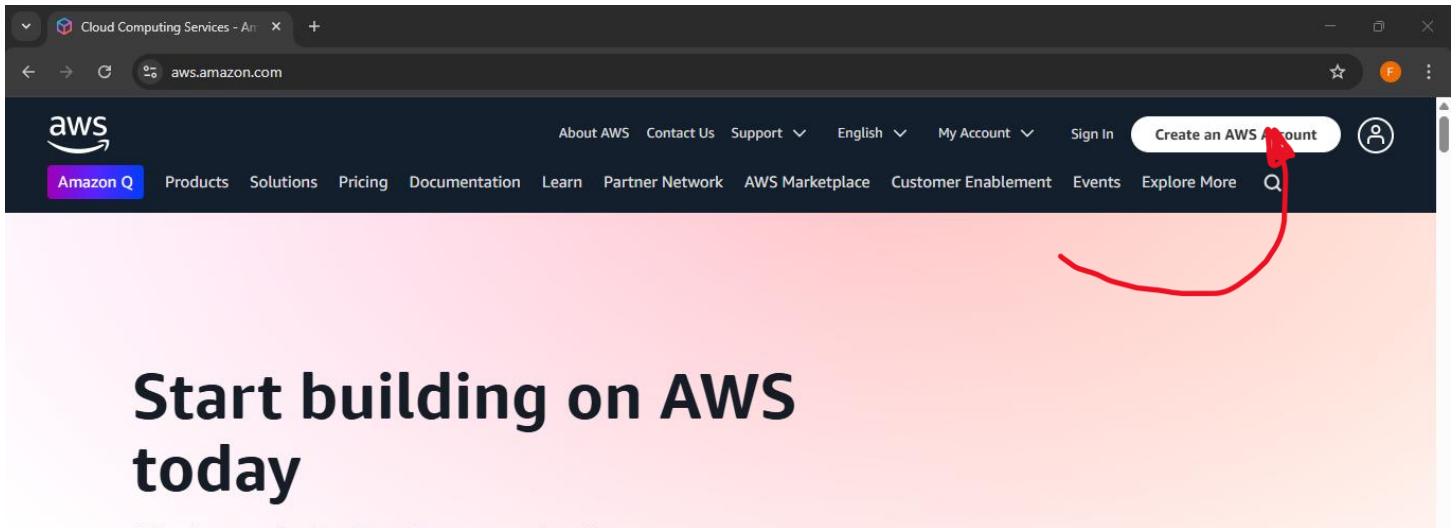


# Ready for AWS Account Creation?

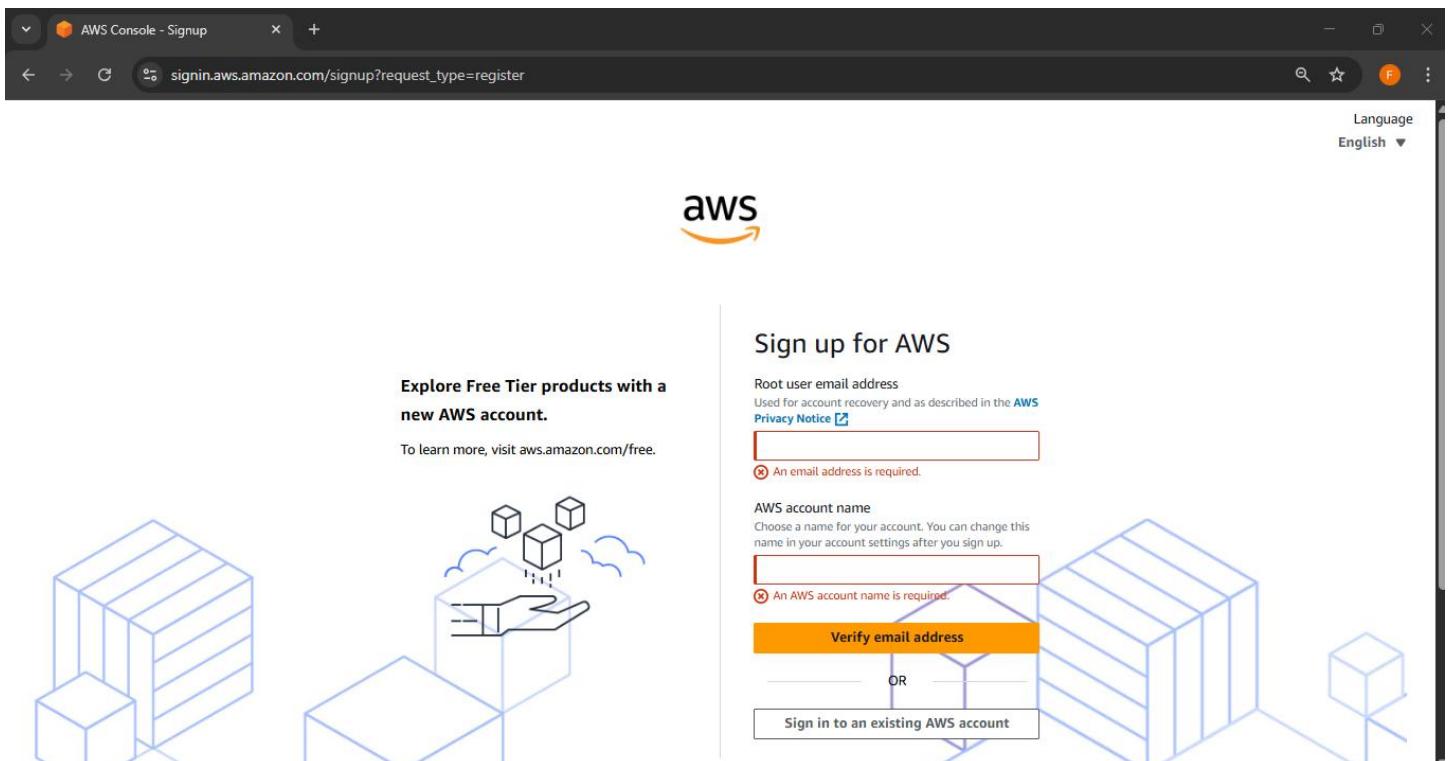
**Step 1 : Go to: <https://aws.amazon.com>**

The screenshot shows the AWS homepage. At the top, there's a navigation bar with links for About AWS, Contact Us, Support, English, My Account, Sign In, and Create an AWS Account. Below the navigation bar, there's a search bar and a menu with options like Products, Solutions, Pricing, Documentation, Learn, Partner Network, AWS Marketplace, Customer Enablement, Events, Explore More, and a magnifying glass icon for search. The main content area features a large, bold text "Start building on AWS today". Below this, a paragraph reads: "Whether you're looking for generative AI, compute power, database storage, content delivery, or other functionality, AWS has the services to help you build sophisticated applications with increased flexibility, scalability, and reliability". At the bottom, there are two buttons: "Get started for free" and "Contact an AWS specialist". A dark sidebar on the right contains a message bubble with the text "Hi, I can connect you with an AWS representative or answer questions you have on AWS." and a small red notification badge with the number "1".

## Step 2 : Click on “Create an AWS Account”



## Step 3 : Sign up for AWS



## Step 4 : Enter Verification code (Confirm you are you)

The screenshot shows the AWS sign-up interface. At the top right, it says "Language English". The main heading is "Sign up for AWS". Below it, a section titled "Confirm you are you" contains the text "Making sure you are secure -- it's what we do." and "We sent an email with a verification code to [frontenddomination999@gmail.com](#).(not you?)". It includes a "Verification code" input field, a "Verify" button, and a "Resend Code 39" link. A note at the bottom says "Didn't get the code? Codes can take up to 5 minutes to arrive. Check your spam folder." The background features a 3D wireframe server tower and floating 3D cubes.

## Step 5 : Create your password

The screenshot shows the AWS sign-up interface. At the top right, it says "Language English". The main heading is "Sign up for AWS". Below it, a section titled "Create your password" contains a green box with the message "It's you! Your email address has been successfully verified." It includes fields for "Root user password" and "Confirm root user password", both with placeholder text "Create a password". A "Continue (step 1 of 5)" button is visible. A note at the bottom says "Your password provides you with sign in access to AWS, so it's important we get it right." A "Sign in to an existing AWS account" link is also present. The background features a 3D wireframe server tower and floating 3D cubes.

## Step 6: Fill Contact Information

**aws**

### Sign up for AWS

#### Contact Information

How do you plan to use AWS?

Business - for your work, school, or organization

Personal - for your own projects

Who should we contact about this account?

Full Name

Country Code      Phone Number  
 +91     222-333-4444

Country or Region  
 United States

**Free Tier offers**

All AWS accounts can explore 3 different types of free offers, depending on the product used.

**Always free**  
Never expires

**12 months free**  
Start from initial sign-up date

**Trials**  
Start from service activation date

Address line 1

Address line 2  
 Apartment, suite, unit, building, floor, etc.

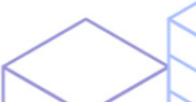
City

State, Province, or Region

Postal Code

I have read and agree to the terms of the [AWS Customer Agreement](#).

**Agree and Continue (step 2 of 5)**



## Step 7 : Billing Information

**aws**

### Sign up for AWS

#### Billing Information

Billing country  
Your billing country determines the payment methods available to you to pay for AWS services.  
 India

Credit or Debit card number

AWS accepts most major credit and debit cards. To learn more about payment options, review our [FAQ](#)

Expiration date  
 Month     Year

Security code   
 CVV/CVC

Cardholder's name

Save card and charge automatically for

Save card and charge automatically for future payments. [Learn more](#).

 Automatic payments (e-mandates) currently doesn't support RuPay and AMEX cards.

Billing address  
 Use my contact address  
village Timalpur ,Saidabad ,jahanabad,patna ,Bihar Gandhinagar Gujarat 382355 IN

Use a new address

Do you have a PAN?  
Permanent Account Number (PAN) is a ten-digit alphanumeric number issued by the Indian Income Tax Department. This 10-digit number is printed on the front of your PAN card.

Yes

No

You can go on the Tax Settings Page on Billing and Cost Management Console to update your PAN information.

**Verify and continue (step 3 of 5)**

You might be redirected to your bank's website to authorize the verification charge.

## Step 7: Confirm your identity



### Sign up for AWS

#### Confirm your identity (i) Info

##### Primary purpose of account registration

Choose one that best applies to you. If your account is tied to a business, select the one that applies to your business.

##### Ownership type

Choose your ownership relation to the account. Based on your selection, you may be asked to complete additional customer verification steps.

I consent to allowing AWS to use and send the information above to a third-party service for identity verification purposes.



### Sign up for AWS

#### Confirm your identity

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.

How should we send you the verification code?

- Text message (SMS)  
 Voice call

##### Country or region code

##### Mobile phone number

8011288953

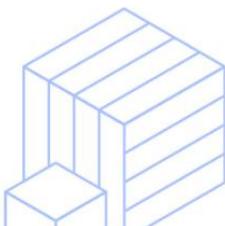


### Sign up for AWS

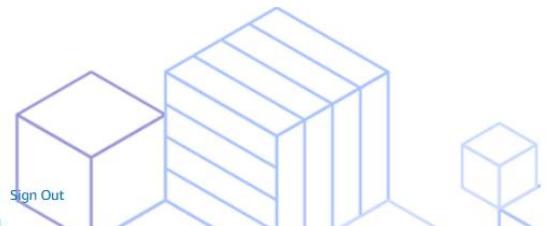
#### Confirm your identity

##### Verify code

Having trouble? Sometimes it takes up to 10 minutes to retrieve a verification code. If it's been longer than that, [return to the previous page](#) and try again.



[Privacy Policy](#) | [Terms of Use](#) | [Cookie Preferences](#) | [Sign Out](#)  
Amazon Web Services, Inc. or its affiliates. All rights reserved.



## Step 8 (Final Step): Select a Support plan

Sign up for AWS

Select a support plan

Choose a support plan for your business or personal account. [Compare plans and pricing examples](#)

You can change your plan anytime in the AWS Management Console.

Basic support - Free

- Recommended for new users just getting started with AWS
- 24x7 self-service access to AWS resources
- For account and billing issues only
- Access to Personal Health Dashboard & Trusted Advisor



Developer support - From \$29/month

- Recommended for developers experimenting with AWS
- Email access to AWS Support during business hours
- 12 (business)-hour response times



Business support - From \$100/month

- Recommended for running production workloads on AWS
- 24x7 tech support via email, phone, and chat
- 1-hour response times
- Full set of Trusted Advisor best-practice recommendations



Need Enterprise level support?

From \$15,000 a month you will receive 15-minute response times and concierge-style experience with an assigned Technical Account Manager. [Learn more](#)

[Complete sign up](#)

aws.amazon.com/registration-confirmation/

aws

About AWS Contact Us Support English My Account Sign In to the Console

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Congratulations!

Thank you for signing up with AWS.

We are activating your account, which should take a few minutes. You will receive an email when this is complete.

[Go to the AWS Management Console](#)

Feedback

## Congratulations!

Thank you for signing up with AWS.

We are activating your account, which should take a few minutes. You will receive an email when this is complete.

[Go to the AWS Management Console](#)



# Go to the AWS Management Console

The screenshot shows the AWS Management Console Home page. At the top, there is a navigation bar with the AWS logo, a search bar, and various icons. The top right corner shows the region as "Europe (Stockholm)" and the user as "SunilKumar". Below the navigation bar, the main content area is divided into two main sections:

- Recently visited:** This section shows a large cube icon and a message stating "No recently visited services". It includes a link to "View all services".
- Applications:** This section shows a message "No applications" and "Get started by creating an application." It includes a "Create application" button and a search bar for finding applications.

At the bottom of the page, there are links for CloudShell, Feedback, Privacy, Terms, and Cookie preferences, along with a copyright notice: "© 2025, Amazon Web Services, Inc. or its affiliates."

# **Practical 2**

## **Deploying a Web Application on Cloud**









# Practical 3

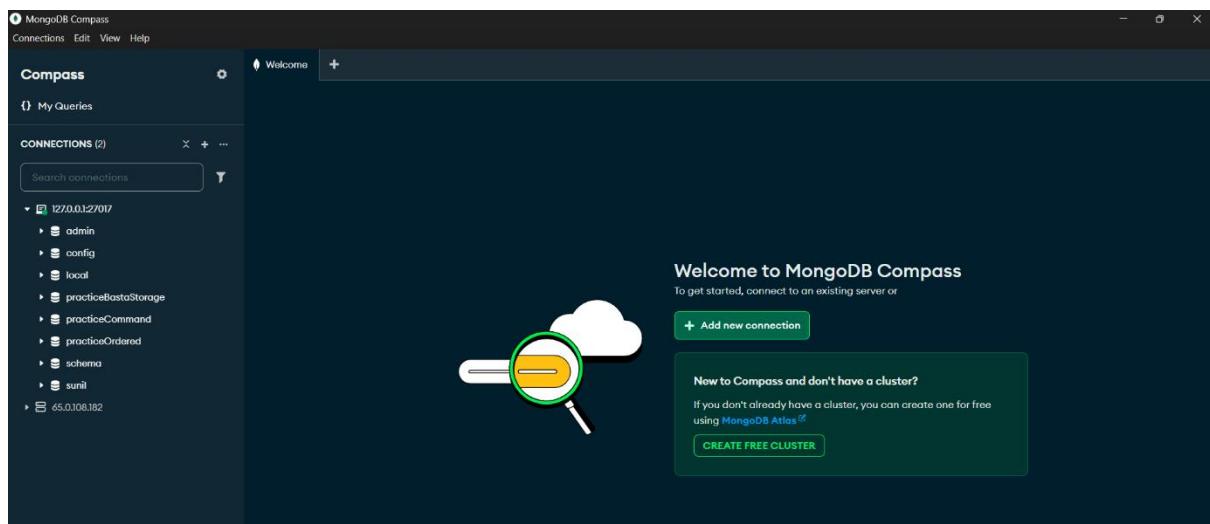
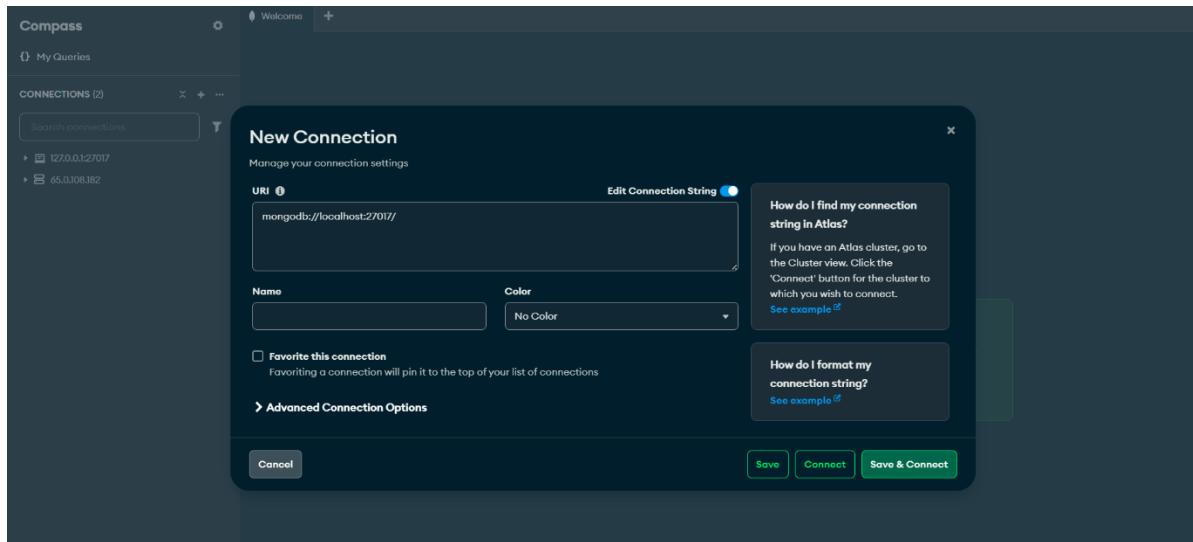
## Building a Data Warehouse using NoSQL ( MongoDB ) Database Management System (DBMS)



### BastaStorage – DataBase Workflow Description

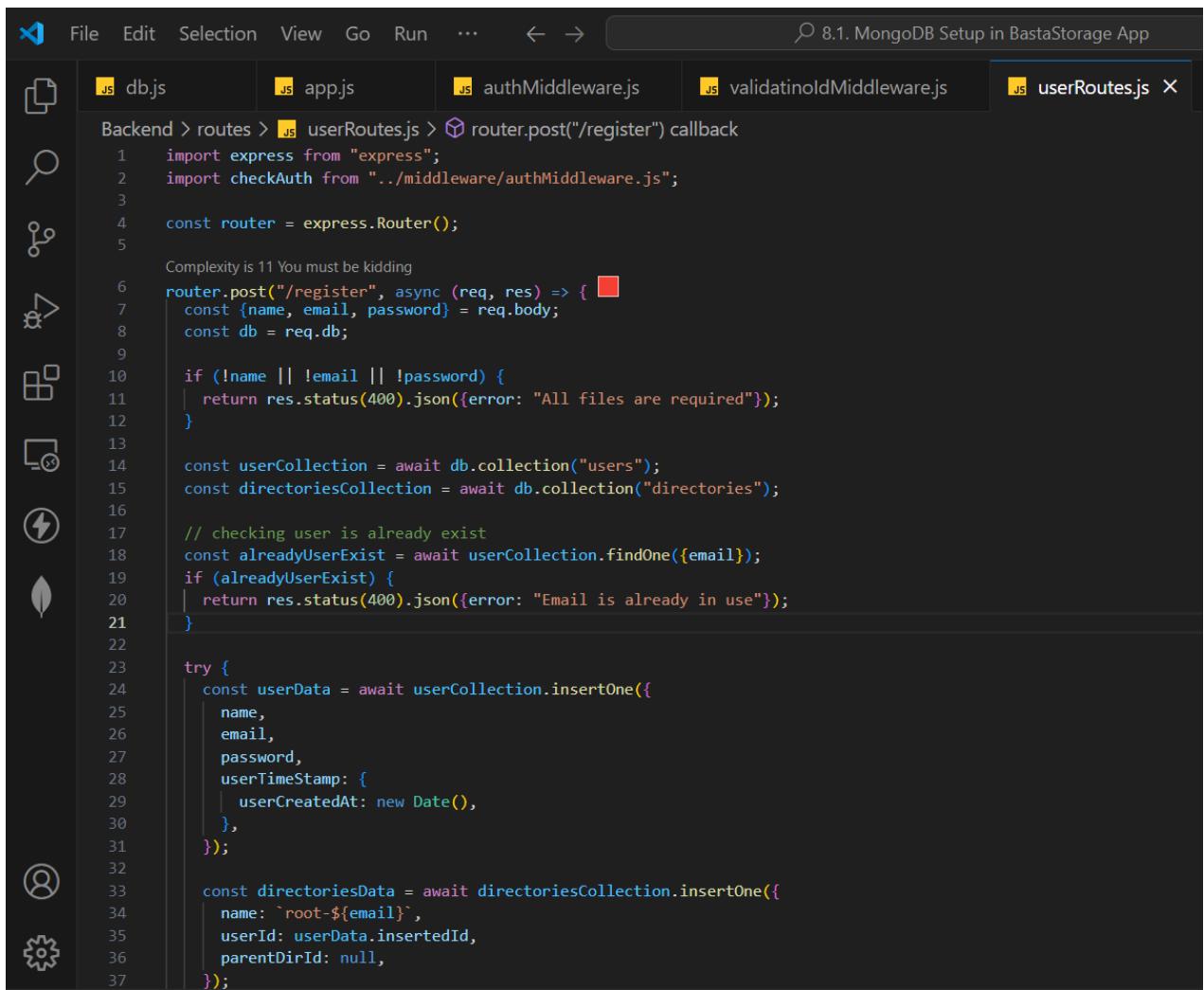
#### Step 1: MongoDB Connection

- Connect to MongoDB using the appropriate driver (e.g., Mongoose for Node.js).



## Step 2: User Registration and Initial Database Structure

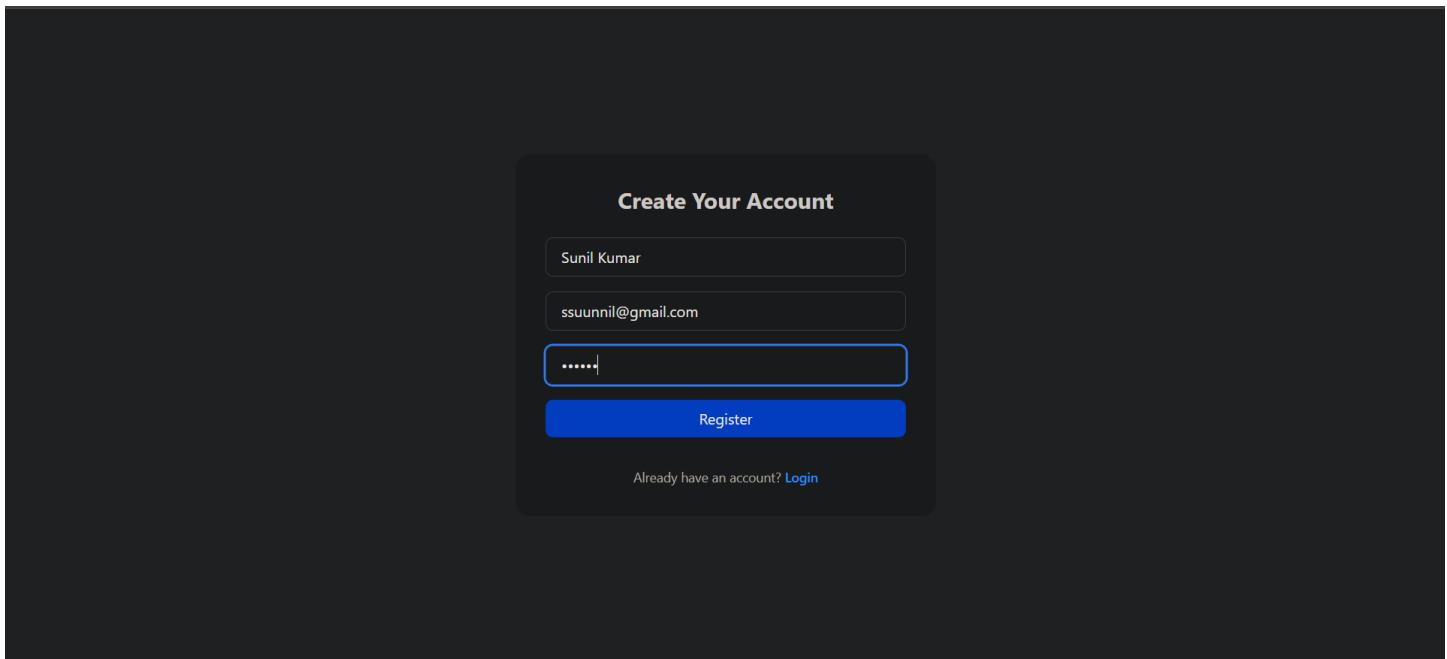
- When a user registers:
  - A new database named **BastaStorage** is created
  - Inside this database:
    - A users collection is created to store user information.
    - A directories collection is created to store user-specific folder and file structure.
- Sample structure:
  - users: contains fields like username, email, password, createdAt, etc.
  - directories: contains fields like userId, folderName, parentId, children, createdAt, etc.



The screenshot shows a code editor interface with a dark theme. The top navigation bar includes File, Edit, Selection, View, Go, Run, and tabs for db.js, app.js, authMiddleware.js, validationMiddleware.js, and userRoutes.js. The left sidebar features icons for file operations like copy, paste, search, and refresh. The main code editor area displays the following JavaScript code:

```
Backend > routes > userRoutes.js > router.post("/register") callback
1 import express from "express";
2 import checkAuth from "../middleware/authMiddleware.js";
3
4 const router = express.Router();
5
6 Complexity is 11 You must be kidding
7 router.post("/register", async (req, res) => {
8   const {name, email, password} = req.body;
9   const db = req.db;
10
11   if (!name || !email || !password) {
12     return res.status(400).json({error: "All files are required"});
13   }
14
15   const userCollection = await db.collection("users");
16   const directoriesCollection = await db.collection("directories");
17
18   // checking user is already exist
19   const alreadyUserExist = await userCollection.findOne({email});
20   if (alreadyUserExist) {
21     return res.status(400).json({error: "Email is already in use"});
22   }
23
24   try {
25     const userData = await userCollection.insertOne({
26       name,
27       email,
28       password,
29       userTimeStamp: {
30         userCreatedAt: new Date(),
31       },
32     });
33
34     const directoriesData = await directoriesCollection.insertOne({
35       name: `root-${email}`,
36       userId: userData.insertedId,
37       parentDirId: null,
38     });
39   }
40
41   res.json({message: "User registered successfully"});
42 }
43
44 module.exports = router;
```

## Login Dashboard



## users data

A screenshot of the MongoDB Compass interface. The title bar shows "MongoDB Compass - 127.0.0.1:27017/BastaStorage.users". The left sidebar shows connections and the current connection is "127.0.0.1:27017" which includes "BastaStorage" and its subcollections: "directories" and "users". The main area is titled "127.0.0.1:27017 > BastaStorage > users". It has tabs for "Documents", "Aggregations", "Schema", "Indexes", and "Validation". The "Documents" tab is selected. A search bar at the top says "Type a query: { field: 'value' } or Generate query". Below it are buttons for "ADD DATA", "EXPORT DATA", "UPDATE", and "DELETE". A results table shows one document:

```
_id: ObjectId('6818c84b9d78751ee2651cdc')
name : "Sunil Kumar"
email : "ssuunnil@gmail.com"
password : "123456"
userTimeStamp : Object
rootDirId : ObjectId('6818c84b9d78751ee2651cdc')
```

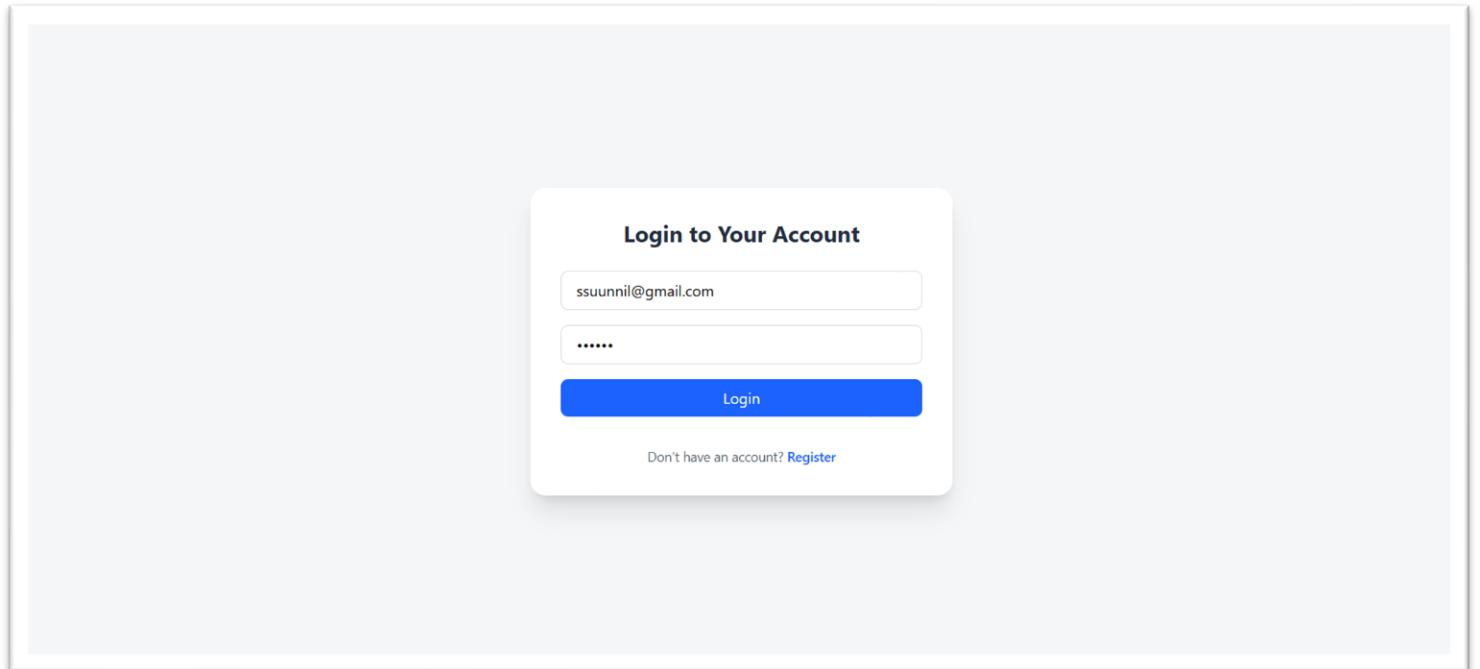
## Directories data

The screenshot shows the MongoDB Compass interface. The left sidebar displays the connection tree under 'BastaStorage'. The main area shows the 'directories' collection with one document listed:

```
_id: ObjectId('6818c84b9d78751ee2651cdc')
name: "root-ssuunnil@gmail.com"
userId: ObjectId('6818c84b9d78751ee2651cdb')
parentDirId: null
```

## Step 3: User Login and Dashboard Access

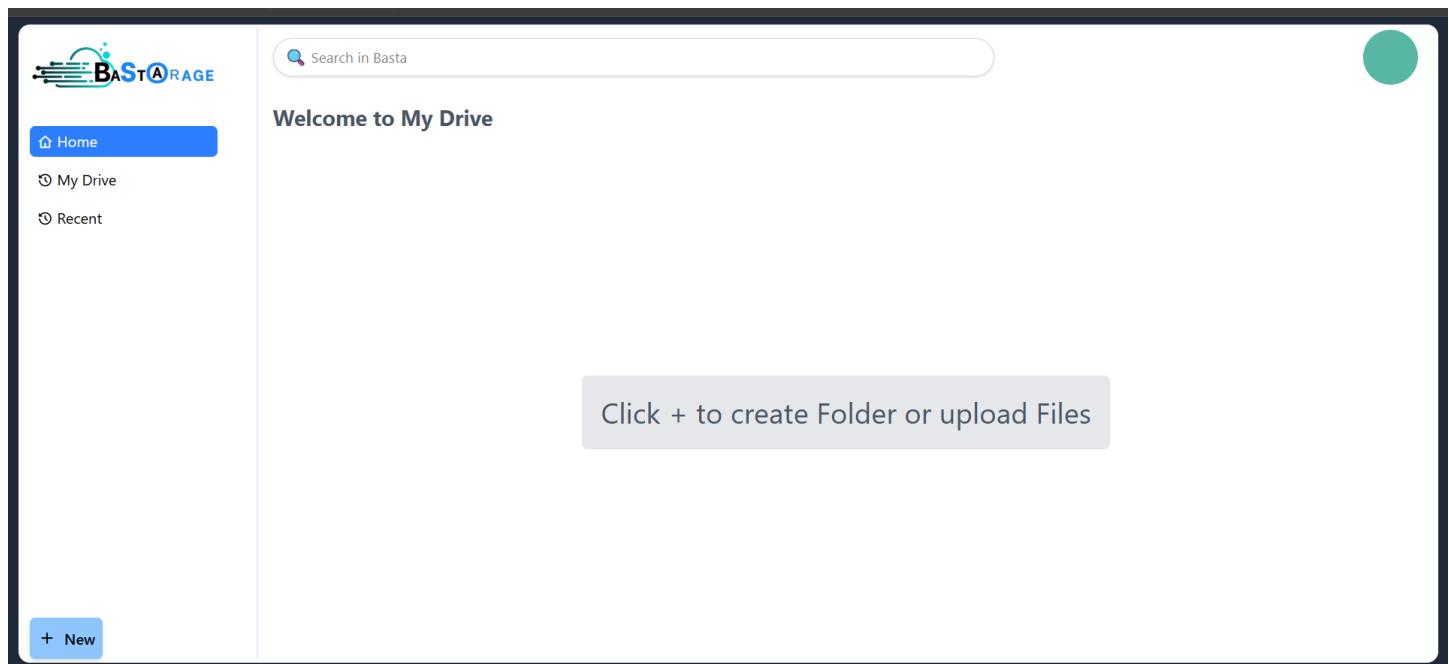
- Once the user logs in:
  - Authentication is performed (e.g., via cookies).
  - On successful login, the BastaStorage Dashboard is displayed to the user.



The screenshot shows a code editor interface with a dark theme. On the left is a vertical toolbar with various icons: a file icon, a search icon, a file tree icon, a file tree with a question mark icon, a refresh icon, a gear icon, and a user icon. The main area displays the code for `userRoutes.js`. The code handles user registration and login routes using Express.js and MongoDB. It includes error handling and cookie-based authentication.

```
File Edit Selection View Go Run ... ← → ⌘ 8.1. MongoDB Setup in BastaStorage App
db.js app.js authMiddleware.js validatinoldMiddleware.js userRoutes.js X
Backend > routes > userRoutes.js > router.post("/register") callback
38 await userCollection.updateOne(
39   {_id: userData.insertedId},
40   {$set: {rootDirId: directoriesData.insertedId}}
41 );
42
43   return res.status(200).json({message: "User Register!"});
44 } catch (error) {
45   console.error("Error in user register route:", error);
46   return res.status(500).json({error: "user not Register"});
47 }
48 }
49 });
50
51 // login route
Complexity is 4 Everything is cool!
52 router.post("/login", async (req, res) => {
53   const {email, password} = req.body;
54   const db = req.db;
55
56   const user = await db
57     .collection("users")
58     .findOne({email}, {projection: {password: 1}});
59
60   if (!user) {
61     return res.status(404).json({error: "Invalid email or password"});
62   }
63
64   res.cookie("uid", user._id, {
65     httpOnly: true,
66   });
67
68   return res.json({message: "login success"});
69 })
70
```

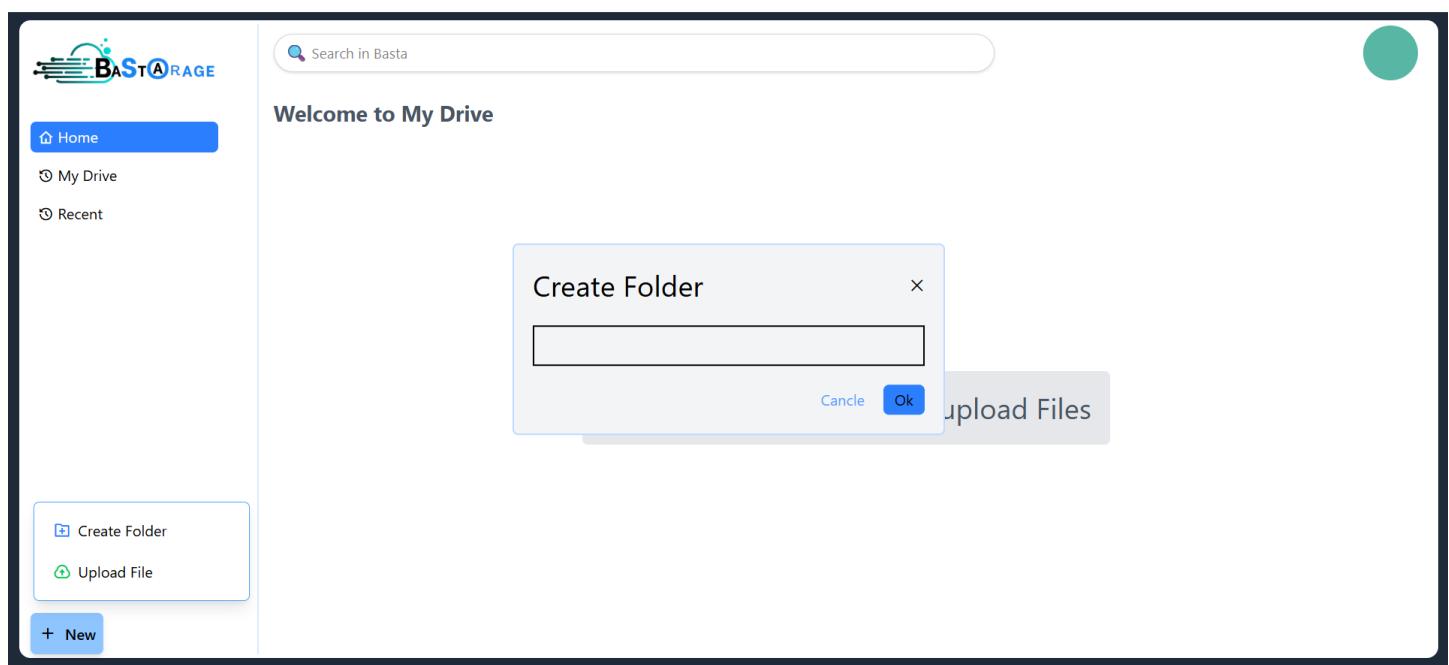
## BastaStorage Dashboard



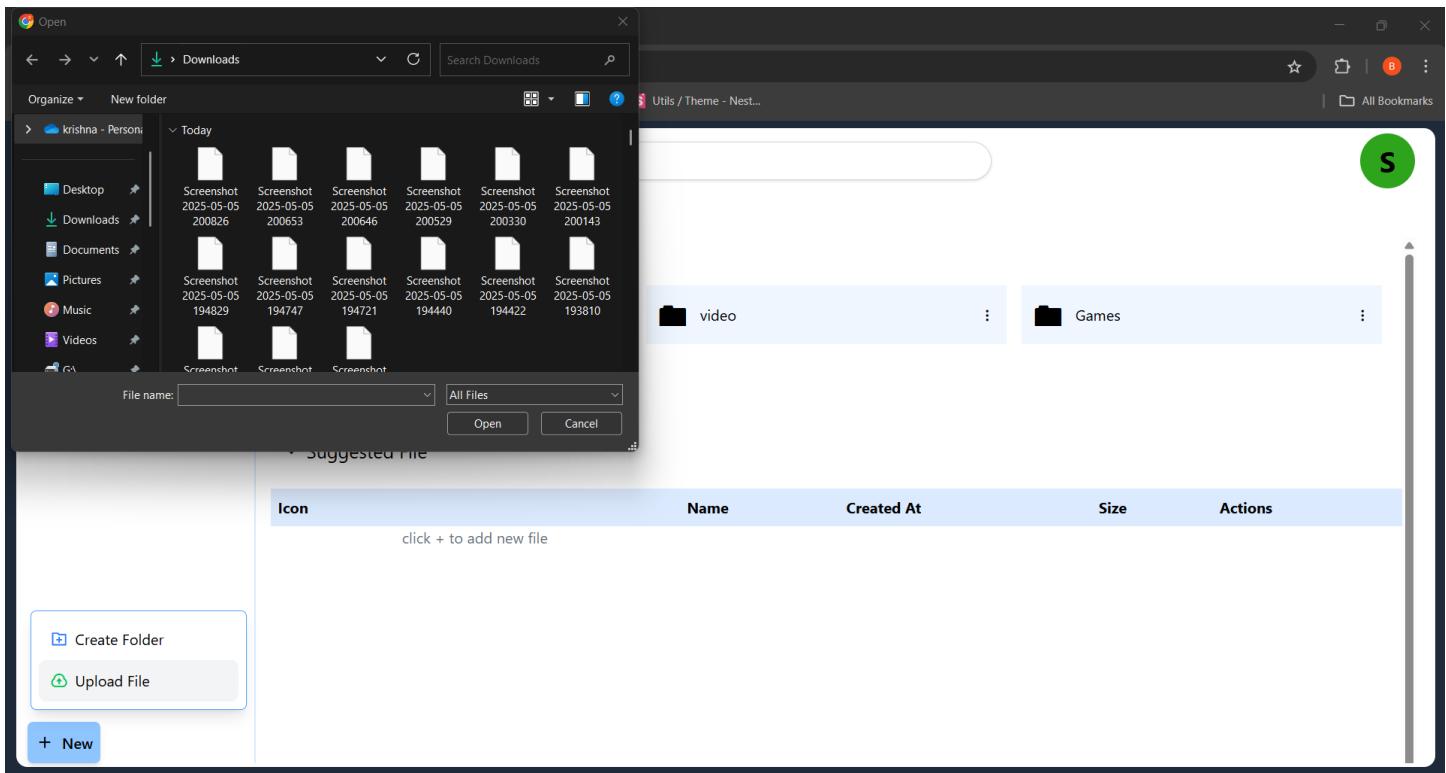
## Step 4: Creating Folders and Uploading Files

- The user can create new directories from the dashboard.
- Each folder creation is stored in the directories collection with user reference.
- Users can also upload files to specific folders.
- File metadata (such as name, size, type, upload time, etc.) is stored in the files collection

### Creating Folders



## uploading files



## Step 5: Displaying Folder and File Structure

- The dashboard shows:
  - A hierarchical structure of all user-created folders.
  - Files inside each folder with appropriate UI components (e.g., icons, download buttons).
- The UI dynamically fetches and renders data from the directories collection to reflect current storage.

The screenshot shows the BastaStorage application interface. On the left is a sidebar with a logo, a search bar, and navigation links for Home, My Drive, and Recent. A 'New' button is at the bottom. The main area is titled 'Welcome to My Drive' and contains sections for 'Suggested Folder' and 'Suggested File'. Under 'Suggested Folder', there are three items: 'folder 1', 'video', and 'Games'. Under 'Suggested File', there are two items: 'Group 1.png' (1.25 MB) and 'PDG.pdf' (24.82 KB). Each item has a three-dot menu icon.

## Step 5: Displaying All Data in MongoDB

### Folders

The screenshot shows the MongoDB Compass interface connected to the 'BastaStorage' database. The 'directories' collection is selected, showing 5 documents. The interface includes tabs for Documents, Aggregations, Schema, Indexes, and Validation. A query builder allows for generating queries. Below the table, there are buttons for ADD DATA, EXPORT DATA, UPDATE, and DELETE. The table displays the following data:

<code>_id</code>	<code>name</code>	<code>userId</code>	<code>parentDirId</code>
<code>ObjectId('6818c84b9d78751ee2651cdc')</code>	"root-ssuunnill@gmail.com"	<code>ObjectId('6818c84b9d78751ee2651cdb')</code>	null
<code>ObjectId('6818cd239d78751ee2651cdd')</code>	"Folder 1"	<code>ObjectId('6818c84b9d78751ee2651cdb')</code>	<code>ObjectId('6818c84b9d78751ee2651cdc')</code>
<code>ObjectId('6818cd359d78751ee2651cde')</code>	"video"	<code>ObjectId('6818c84b9d78751ee2651cdb')</code>	<code>ObjectId('6818c84b9d78751ee2651cdc')</code>
<code>ObjectId('6818cd3c9d78751ee2651cdf')</code>	"Games"	<code>ObjectId('6818c84b9d78751ee2651cdb')</code>	<code>ObjectId('6818c84b9d78751ee2651cdc')</code>

# Files

The screenshot shows the BastaStorage MongoDB interface. The top navigation bar includes tabs for 'Well...', 'users', 'files' (which is the active tab), 'directories', and a '+' button. A status bar at the bottom indicates '127.0.0.1:27017 > BastaStorage > files'. On the right, there's a button to 'Open MongoDB shell'.

The main area has tabs for 'Documents' (2), 'Aggregations', 'Schema', 'Indexes' (1), and 'Validation'. Below these are buttons for 'ADD DATA', 'EXPORT DATA', 'UPDATE', and 'DELETE'. The results section shows two documents:

```
_id: ObjectId('6818cd889d78751ee2651ce1')
extension: ".png"
name: "Group 1.png"
parentDirId: ObjectId('6818c84b9d78751ee2651cdc')
userId: ObjectId('6818c84b9d78751ee2651cdb')
size: "1312390"
> timeStamp: Object

_id: ObjectId('6818cd929d78751ee2651ce2')
extension: ".pdf"
name: "PDG.pdf"
parentDirId: ObjectId('6818c84b9d78751ee2651cdc')
userId: ObjectId('6818c84b9d78751ee2651cdb')
size: "25413"
> timeStamp: Object
```

At the bottom, there are pagination controls: '25' (dropdown), '1–2 of 2', and arrows for navigating through the results. There are also 'Explain', 'Reset', 'Find' (highlighted in green), and 'Options' buttons.