Advanced CRUD Database Project

Author

```
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Web Application

GitHub Repository

Introduction

As part of my job as system administrator I have a responsibility of the daily management of our Cinema software “Vista”. As I administrate the different level of databases one of my struggles is the management of a rational database which requires separating the data. Which in term requires information to be stored in different areas of the program. This can be time consuming as requires lots of opening, closing different windows to manage a user or item.

To solve this issue, I want to create a much simpler program that allows me to access and view all information as a User Management system minimizing the closing of windows.

System Overview

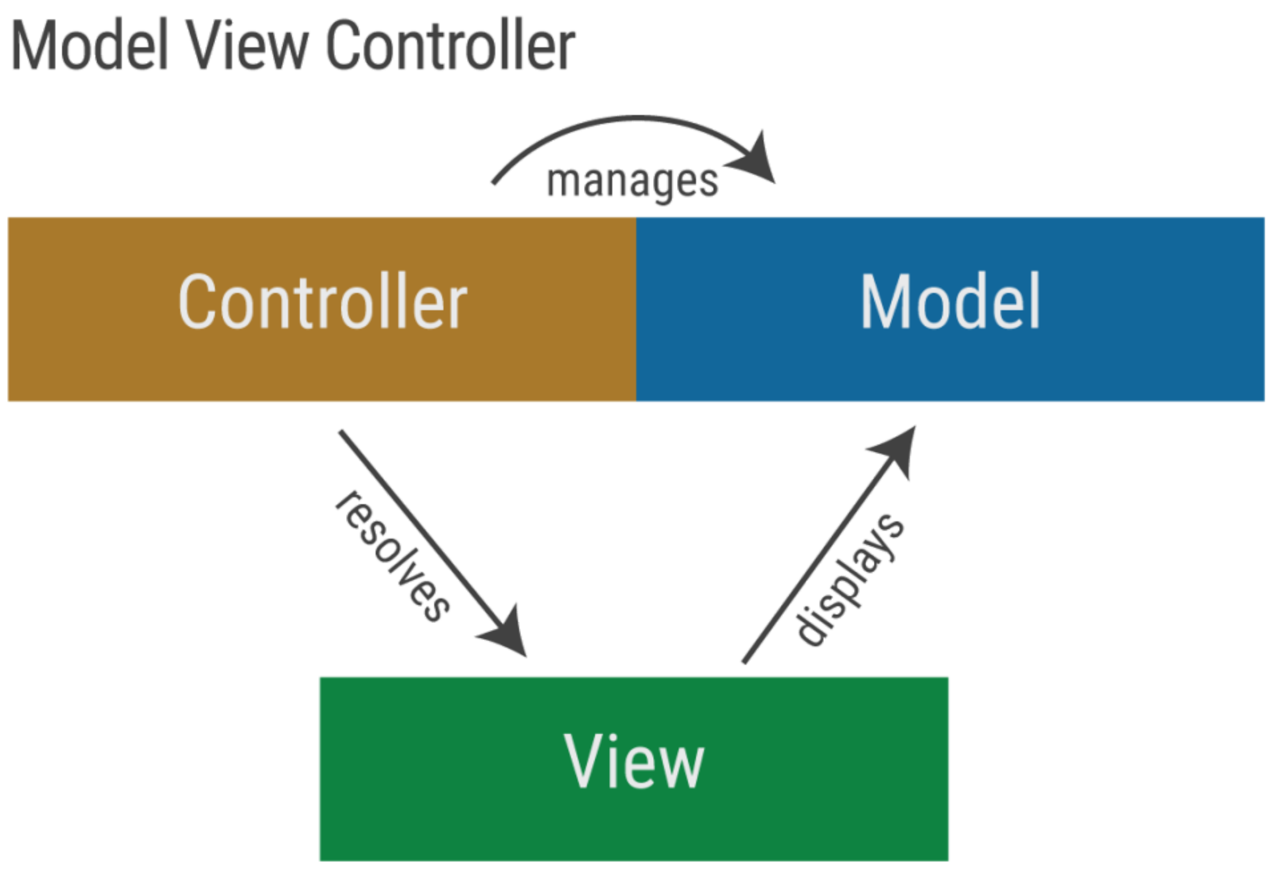
Backend

To support me with my assignment I required to installed a few dependencies to help achieve such tasks.

- NodeJS
- ejs
- Express
- Mongoose
- Morgan
- Nodemon
- Body-parse
- dot env

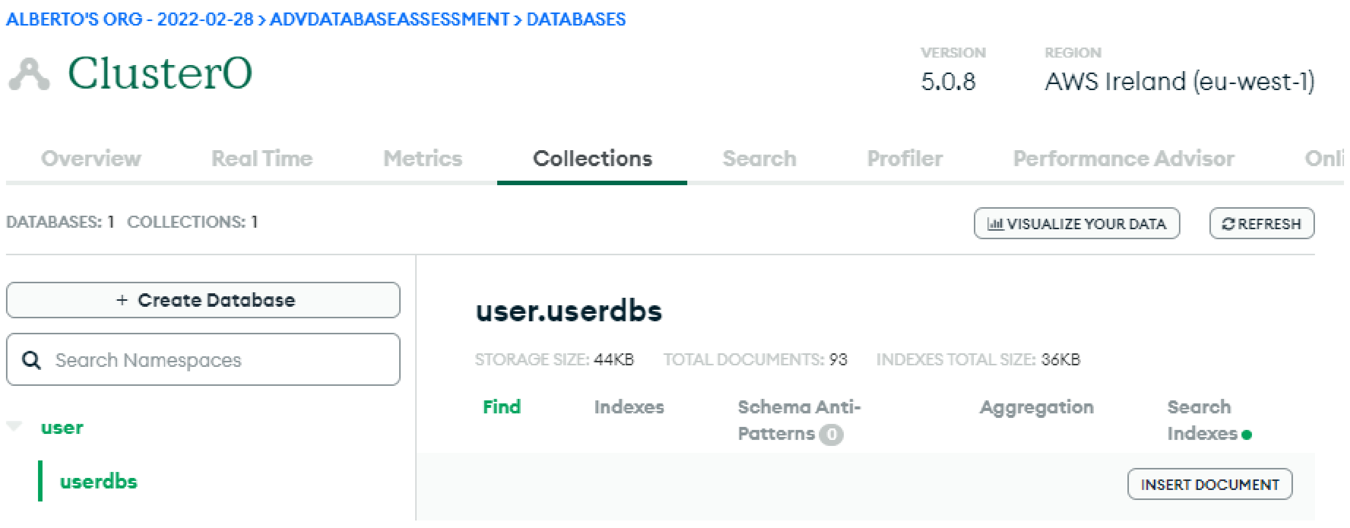
Project Structure - MVC

Using the MVC structure we are able to separate the application into three logical components: the model, the view and the controller. These components are built to handle specific developments of the application. This structure is is frequently used as an industry-standard web development framework to create scalable projects.



Model

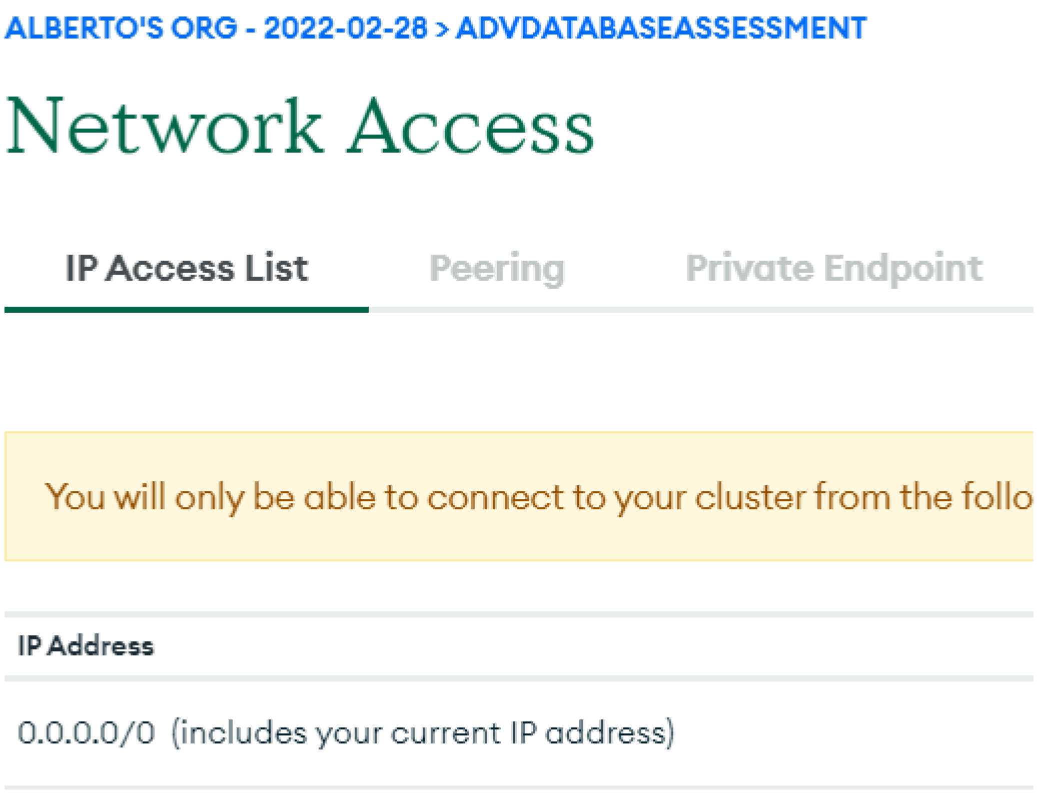
The model looks at the data, for this project MongoDB is the data storage client where we create, write, edit and delete to.



Connecting the the application is handled by the `Controller`. One of the reason as why MongoDB is a suitable application is due to the ability to connect directly as a host, through suitable providers. This format of availability is used via MongoDB Atlas. A more simple tool to use, where the UI is more friendlier to the eye is MongoDB Compass.

As this project is based of Atlas, to allow access to the database we require to adjust another security feature that MongoDB provides. Network Access. We this can be adjusted in the security/network section and can add that only specific IP Address can access. Suitable when working on a private project.

As we require access to this data from several. unknown, IP Address' we can set the ip to 0.0.0.0/0. As long as you have the admin and password to this database then its accessible from anywhere.

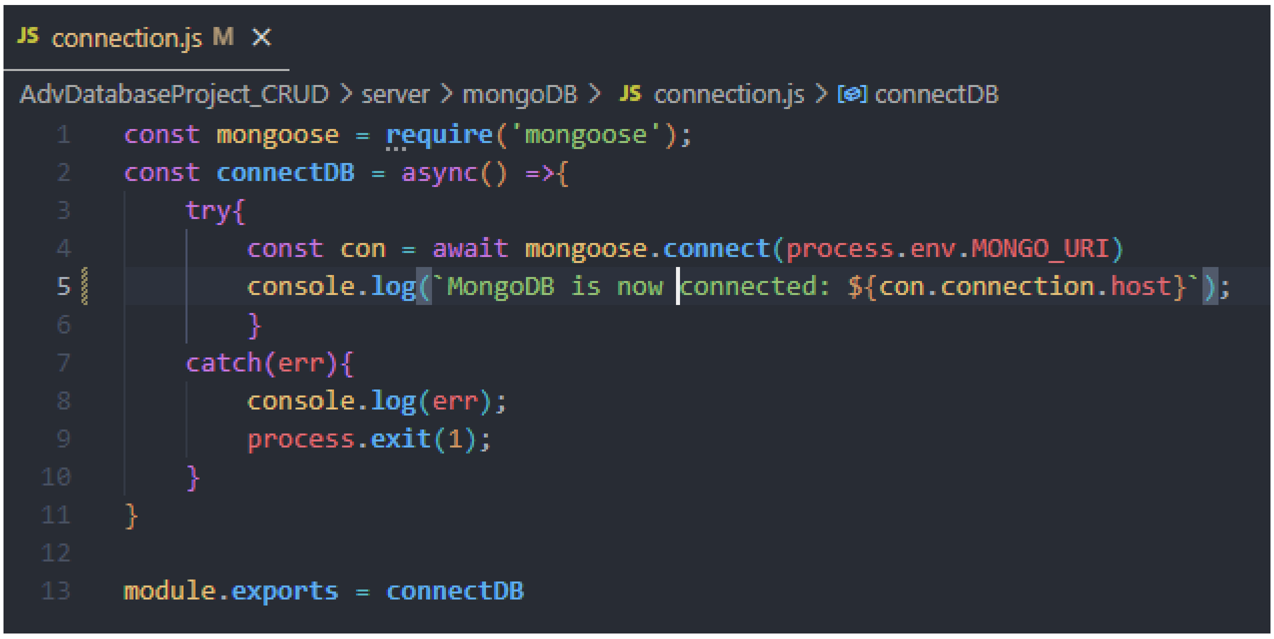

ALBERTO'S ORG - 2022-02-28 > ADVDATABASEASSESSMENT

Network Access

You will only be able to connect to your cluster from the follo

IP Address
0.0.0.0/0 (includes your current IP address)

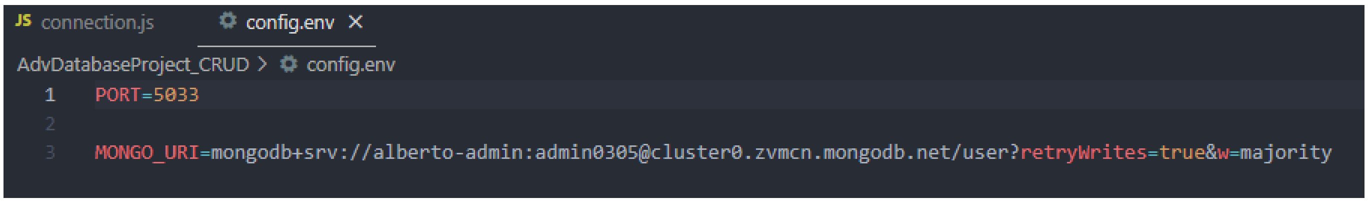
Following through the next step to connecting to MongoDB, from Visual Studios, is to write up the code. The dependencies that is required to access MongoDB is "Mongoose". Below you can see an image of this code where we have successfully connected to MongoDB.


connection.js M
AdvDatabaseProject_CRUD > server > mongoDB > connection.js > connectDB

```
1   const mongoose = require('mongoose');
2   const connectDB = async() =>{
3       try{
4           const con = await mongoose.connect(process.env.MONGO_URI)
5           console.log(`MongoDB is now connected: ${con.connection.host}`);
6           }
7       catch(err){
8           console.log(err);
9           process.exit(1);
10      }
11  }
12
13  module.exports = connectDB
```

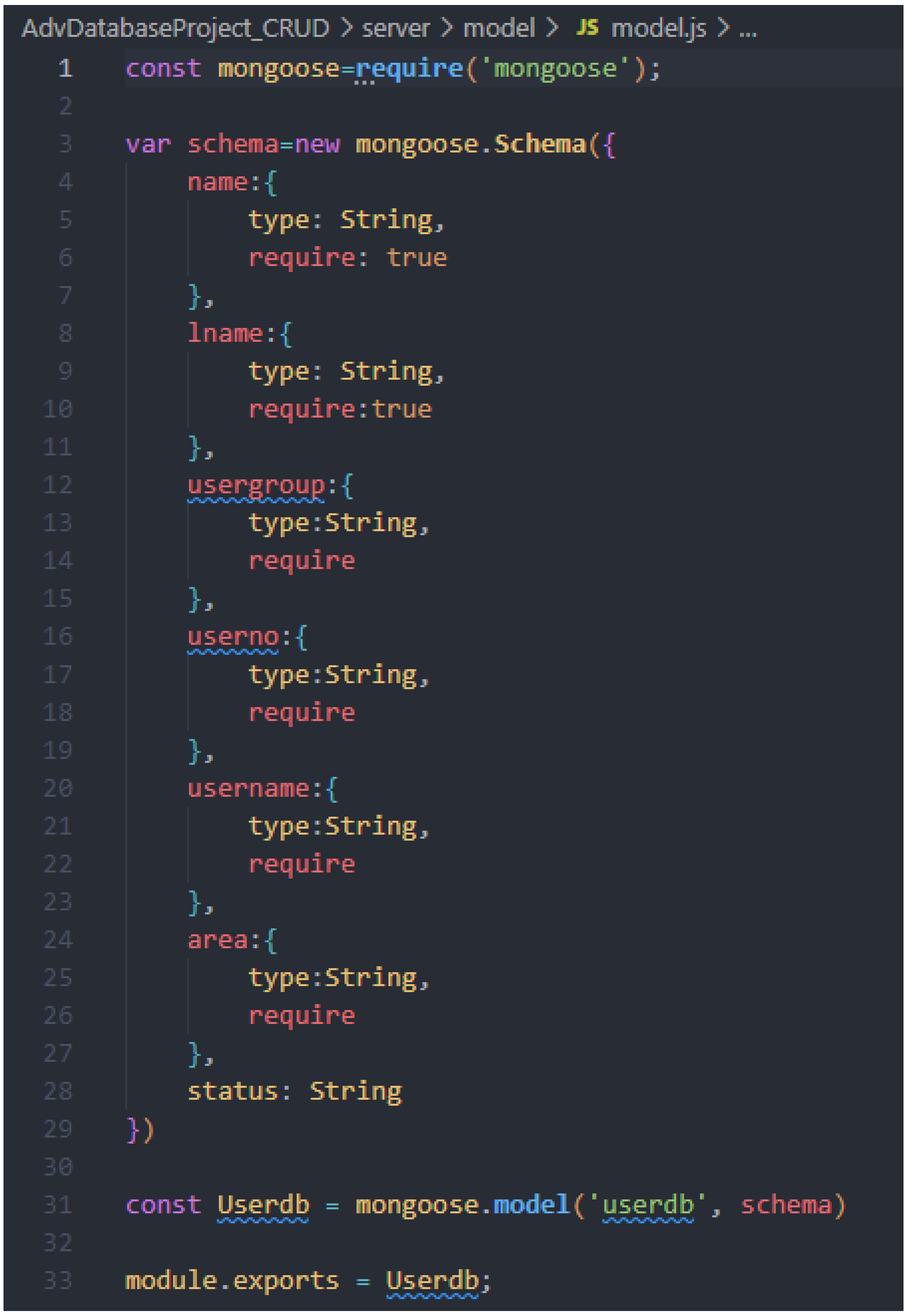
One of the key aspects I always try to incorporate is the log in of information. Line 5 on the code just does that. Once we have successfully connected and found this db it will inform you on the terminal, and if it fails this will also acknowledge in line 8.

Looking at Line 4 of the code, you will see that we are directing this to an env file. Using a dotenv file is a form of security where you would store secret information that is for and stored on your computer. In this case this is where I would hold my private admin name and password for my eyes only. If this was to be a group project, then each individual would require to have their own personal dotenv file due to the sensitivity. (Line 3)



```
1   PORT=5033
2
3   MONGO_URI=mongodb+srv://alberto-admin:admin0305@cluster0.zvmcn.mongodb.net/user?retryWrites=true&w=majority
```

With the MongoDB now connected, the thought process behind the data is how do I wish to present this data. As this plays a vital point for the model. As we will be creating, reading and updating this model. As well as MongoDB is a nonrelational type of database, which mean there are no tables and connectors involved between them like your standard database. the model for MongoDB is called a schema.



```
const mongoose=require('mongoose');

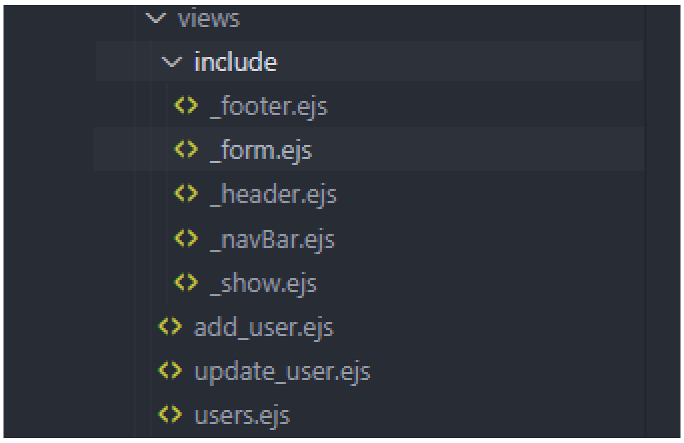
var schema=new mongoose.Schema({
    name:{
        type: String,
        require: true
    },
    lname:{
        type: String,
        require:true
    },
    usergroup:{
        type:String,
        require
    },
    userno:{
        type:String,
        require
    },
    username:{
        type:String,
        require
    },
    area:{
        type:String,
        require
    },
    status: String
})

const Userdb = mongoose.model('userdb', schema)

module.exports = Userdb;
```

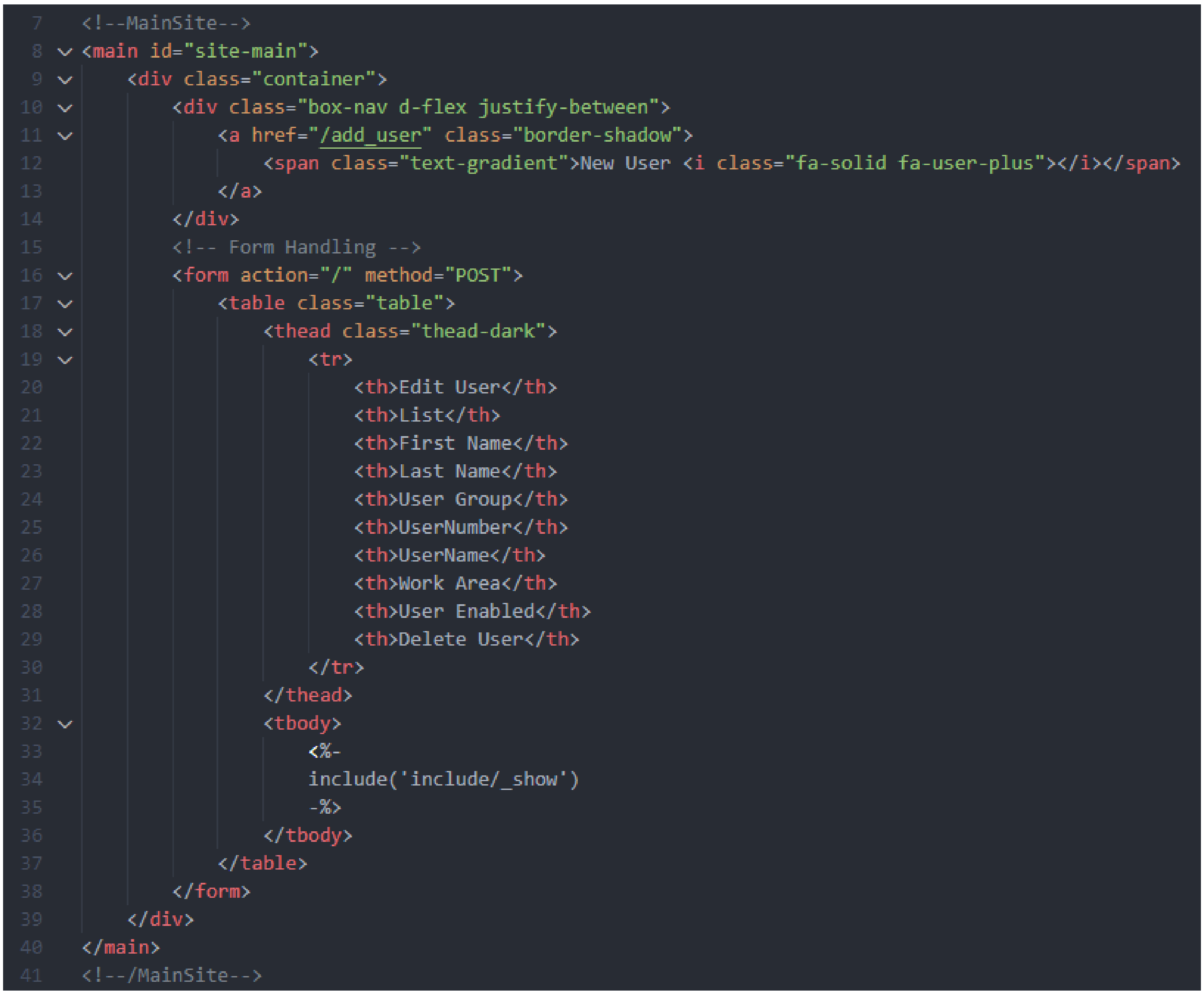
Views

Views is where we store what the user will see, the html files. Instead we are using ejs files as with ejs as with ejs its a simple tool that allows us to markup html format with Javascript to make it more usable or interactive.



```
views
  include
    _footer.ejs
    _form.ejs
    _header.ejs
    _navBar.ejs
    _show.ejs
  add_user.ejs
  update_user.ejs
  users.ejs
```

The starting home page is the table list of all the staffing within the work area.



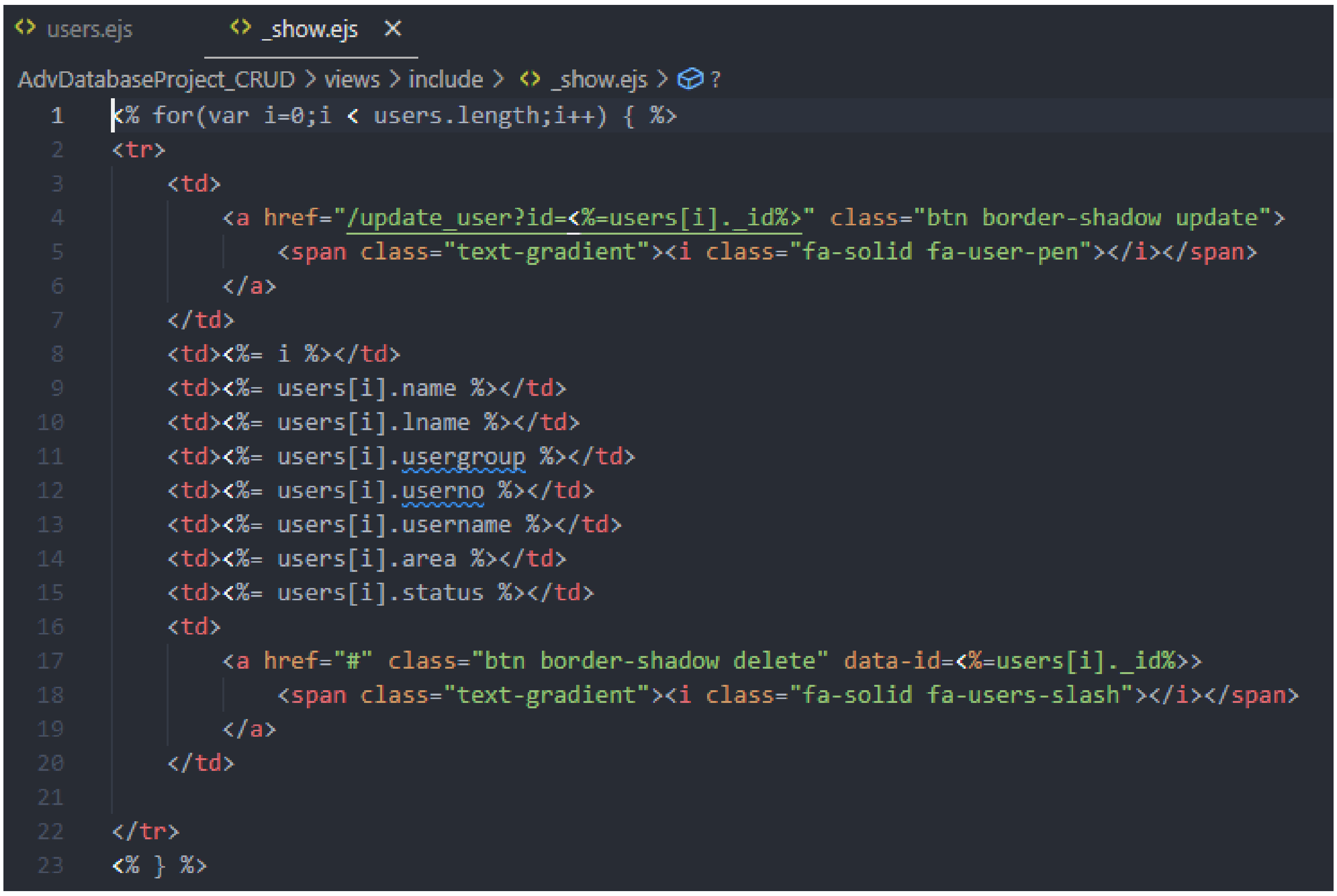
```
<!--MainSite-->
<main id="site-main">
    <div class="container">
        <div class="box-nav d-flex justify-between">
            <a href="/add_user" class="border-shadow">
                <span class="text-gradient">New User <i class="fa-solid fa-user-plus"></i></span>
            </a>
        </div>
        <!-- Form Handling -->
        <form action="/" method="POST">
            <table class="table">
                <thead class="thead-dark">
                    <tr>
                        <th>Edit User</th>
                        <th>List</th>
                        <th>First Name</th>
                        <th>Last Name</th>
                        <th>User Group</th>
                        <th>UserNumber</th>
                        <th>UserName</th>
                        <th>Work Area</th>
                        <th>User Enabled</th>
                        <th>Delete User</th>
                    </tr>
                </thead>
                <tbody>
                    <%-
                    include('include/_show')
                    -%>
                </tbody>
            </table>
        </form>
    </div>
</main>
<!--/MainSite-->
```

The primary requirement for the front page was the table design, nothing to complicated to structure out, follow up by the design to make the user interface more presentable and easier on the eye.

As the primary reason why we used ejs, I used javascript to pull in the data that we have stored in MongoDB. This can be seen in Lines 33 - 35.

One of the new methods I discovered during my research was how to manage and make my coding more cleaner and easier to manage. Rather than having a whole page of coding where finding a section I want to edit will make it more difficult, we can simplify the page and remove sections and display what we need.

If we look at where the javascript code is saved for Lines 33 - 35;

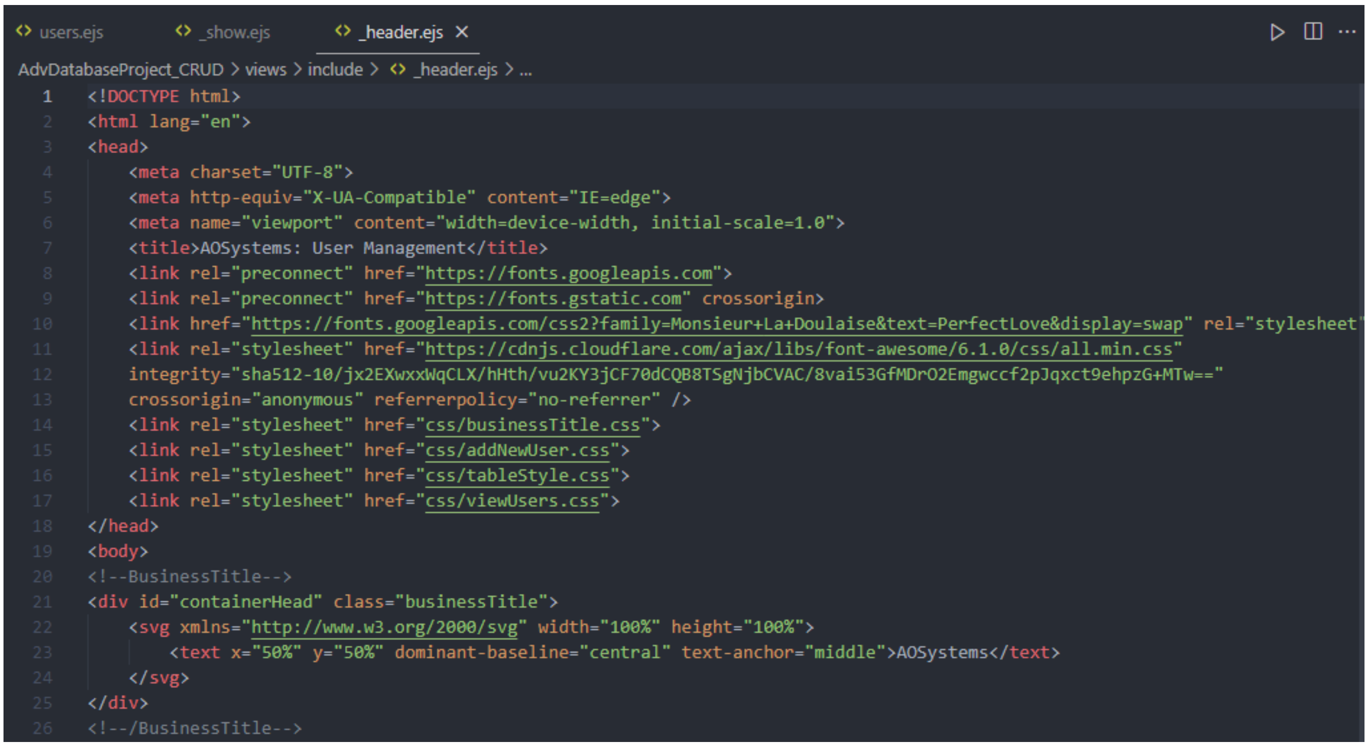


```
<% for(var i=0;i < users.length;i++) { %>
<tr>
    <td>
        <a href="/update_user?id=<%=users[i]._id%>" class="btn border-shadow update">
            <span class="text-gradient"><i class="fa-solid fa-user-pen"></i></span>
        </a>
    </td>
    <td><%= i %></td>
    <td><%= users[i].name %></td>
    <td><%= users[i].lname %></td>
    <td><%= users[i].usergroup %></td>
    <td><%= users[i].userno %></td>
    <td><%= users[i].username %></td>
    <td><%= users[i].area %></td>
    <td><%= users[i].status %></td>
    <td>
        <a href="#" class="btn border-shadow delete" data-id=<%=users[i]._id%>>
            <span class="text-gradient"><i class="fa-solid fa-users-slash"></i></span>
        </a>
    </td>

</tr>
<% } %>
```

Has we have this code embedded into the main homepage, this would look a lot messier. Now we can read it clearly when we wish to change or edit.

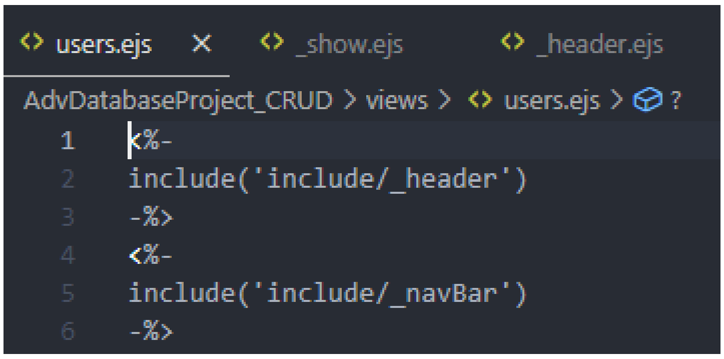
Another useful use for this separation was separating the header. The header will always need to be available in every page you create for you application/website. The header alone can have a long lists of links, as per the image below.



users.ejs
_show.ejs
_header.ejs
AdvDatabaseProject_CRUD > views > include > _header.ejs > ...

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>AOSystems: User Management</title>
    <link rel="preconnect" href="https://fonts.googleapis.com">
    <link rel="preconnect" href="https://fonts.gstatic.com" crossorigin>
    <link href="https://fonts.googleapis.com/css2?family=Monsieur+La+Doulaise&text=PerfectLove&display=swap" rel="stylesheet"
    <link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/6.1.0/css/all.min.css"
    integrity="sha512-10/jx2EXwxxWqCLX/hHth/vu2KY3jCF70dCQB8TSgNjbCVAC/8vai53GfMDrO2Emgwccf2pJqxct9ehpzG+MTw=="
    crossorigin="anonymous" referrerpolicy="no-referrer" />
    <link rel="stylesheet" href="css/businessTitle.css">
    <link rel="stylesheet" href="css/addNewUser.css">
    <link rel="stylesheet" href="css/tableStyle.css">
    <link rel="stylesheet" href="css/viewUsers.css">
</head>
<body>
<!--BusinessTitle-->
<div id="containerHead" class="businessTitle">
    <svg xmlns="http://www.w3.org/2000/svg" width="100%" height="100%">
        <text x="50%" y="50%" dominant-baseline="central" text-anchor="middle">AOSystems</text>
    </svg>
</div>
<!--/BusinessTitle-->
```

Now we can create a new page with a simple javascript header code. And review the code above on a separate area. Any editing of this header page will automatically be updating every page connected, rather than manually adapting them one by one.

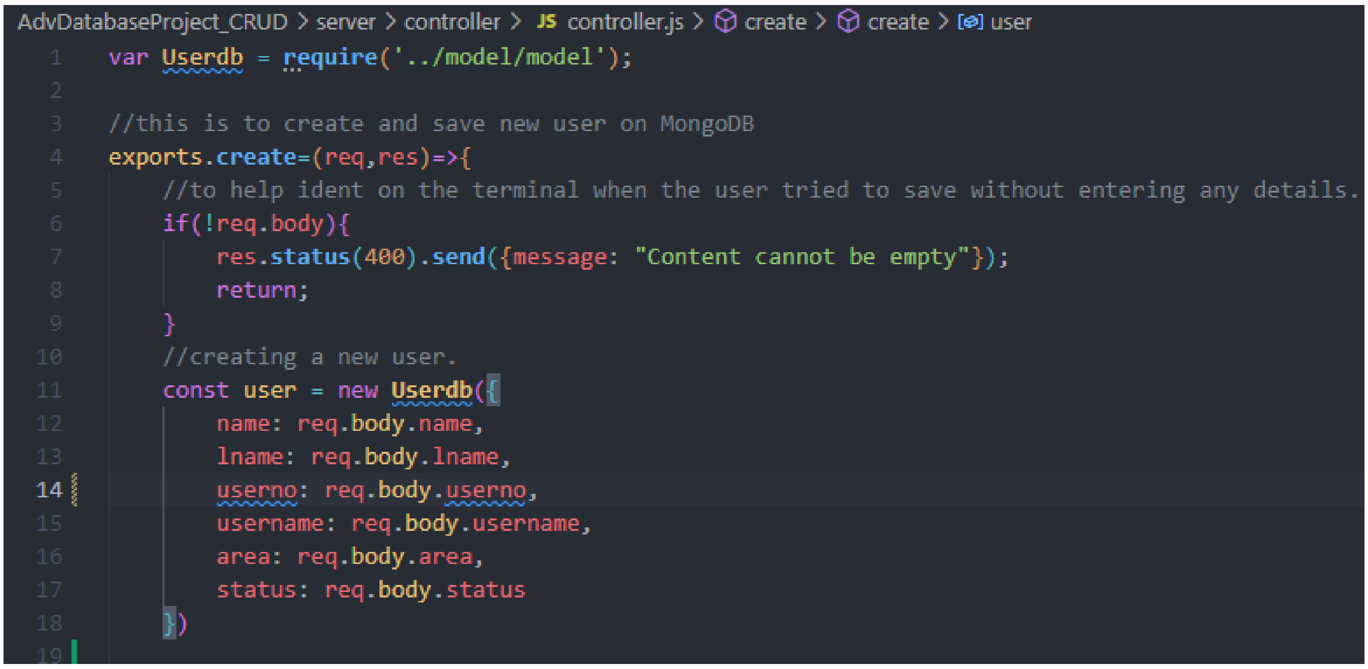


```
<%-
include('include/_header')
-%>
<%-
include('include/_navBar')
-%>
```

Controller

Finally we look at how all this is managed by the controller. The controller is responsible for processing incoming requests, performing the operation of the model. So in my system the controller deals with my whole CRUD application.#

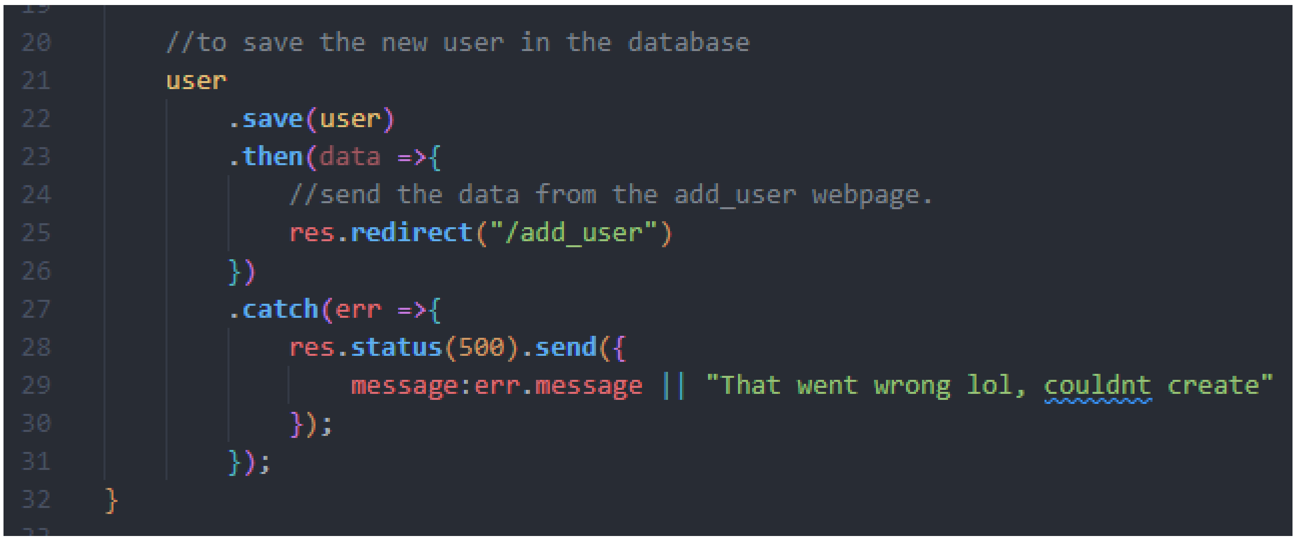
To start the controller requires to bring forward the model that we are using from the model folder



AdvDatabaseProject_CRUD > server > controller > JS controller.js > create > create > user

```
 1  var Userdb = require('../model/model');
 2
 3  //this is to create and save new user on MongoDB
 4  exports.create=(req,res)=>{
 5      //to help ident on the terminal when the user tried to save without entering any details.
 6      if(!req.body){
 7          res.status(400).send({message: "Content cannot be empty"});
 8          return;
 9      }
10      //creating a new user.
11      const user = new Userdb({
12          name: req.body.name,
13          lname: req.body.lname,
14          userno: req.body.userno,
15          username: req.body.username,
16          area: req.body.area,
17          status: req.body.status
18      })
19
```

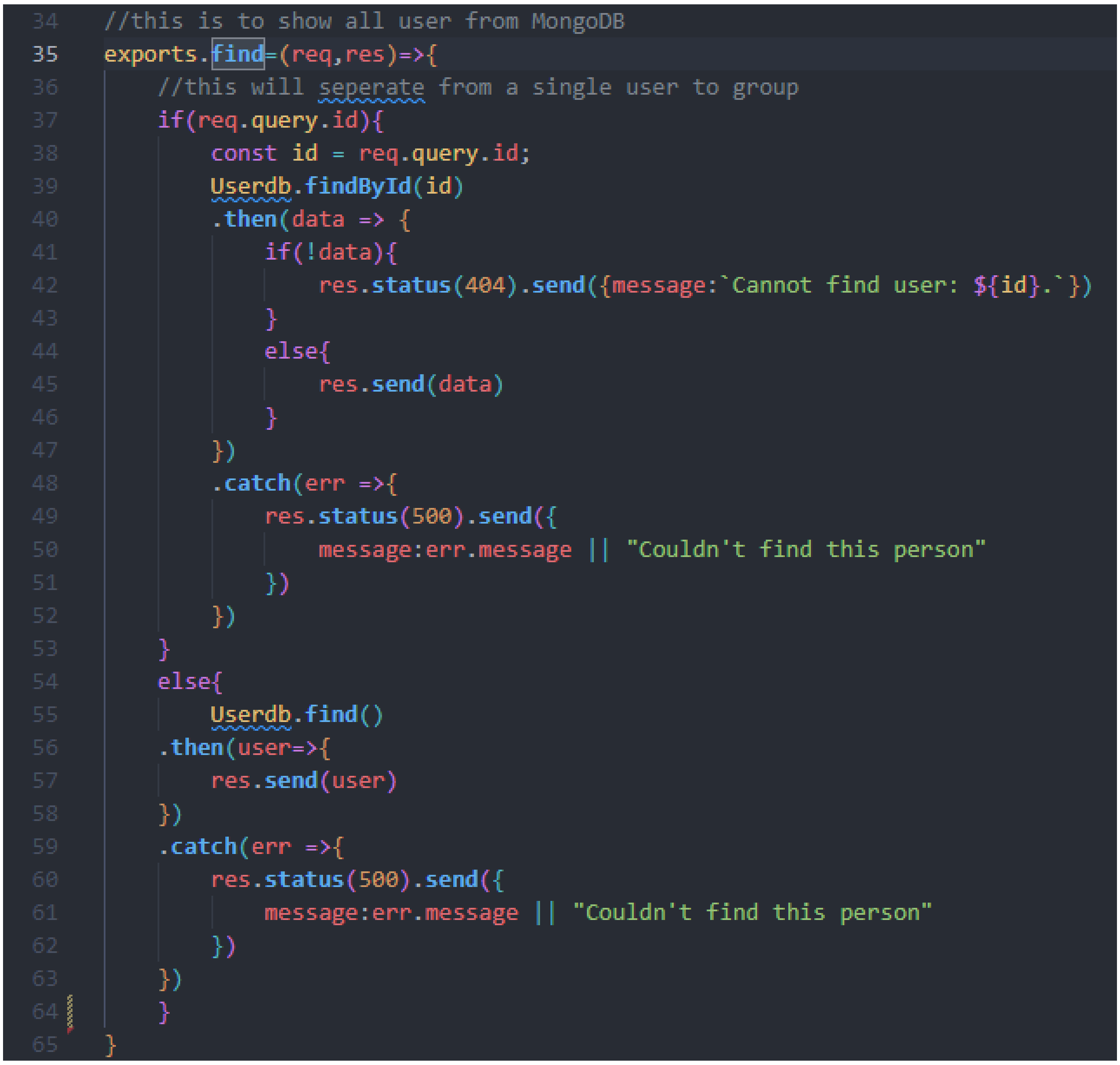
Line 1 defines that this page requires the information from the `model` from its directory.



```
20      //to save the new user in the database
21      user
22          .save(user)
23          .then(data =>{
24              //send the data from the add_user webpage.
25              res.redirect("/add_user")
26          })
27          .catch(err =>{
28              res.status(500).send({
29                  message:err.message || "That went wrong lol, couldnt create"
30              });
31          });
32  }
```

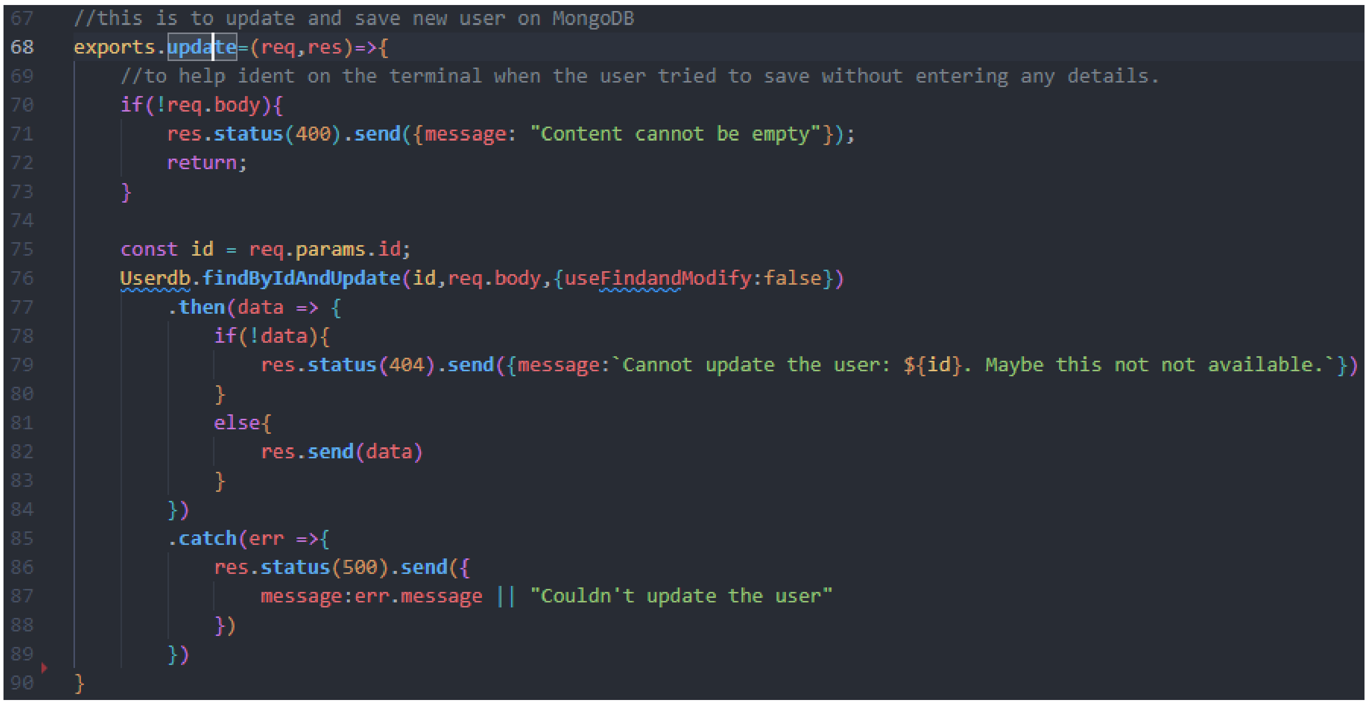
We can now look at creating, the code is based of the schema from the model and once the fields have been filled then the role of this controller is to send the data to the `router` from the webpage.

With data now available in the database, the key responsibility of the code below is be able to pull up and read the data that is available and list them in the `homepage`



```
//this is to show all user from MongoDB
exports.find=(req,res)=>{
    //this will seperate from a single user to group
    if(req.query.id){
        const id = req.query.id;
        Userdb.findById(id)
        .then(data => {
            if(!data){
                res.status(404).send({message:`Cannot find user: ${id}.`})
            }
            else{
                res.send(data)
            }
        })
        .catch(err =>{
            res.status(500).send({
                message:err.message || "Couldn't find this person"
            })
        })
    }
    else{
        Userdb.find()
    .then(user=>{
        res.send(user)
    })
    .catch(err =>{
        res.status(500).send({
            message:err.message || "Couldn't find this person"
        })
    })
    }
}
```

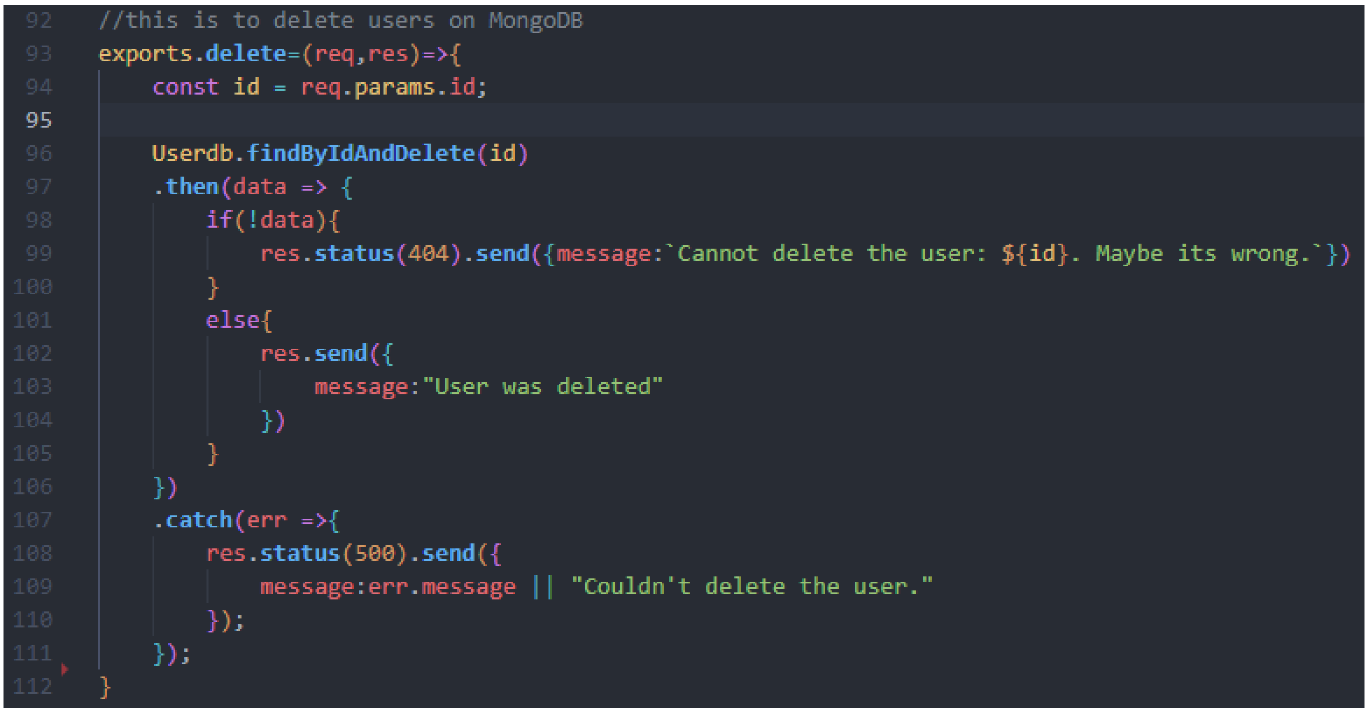
This in turn is followed by updating. As part of read, when the user clicks to edit the file, this will direct them to a form with a read information already available to be edited. Once they have done the required update, in clicking save this will direct them to the `router` then to the database.



```
//this is to update and save new user on MongoDB
exports.update=(req,res)=>{
    //to help ident on the terminal when the user tried to save without entering any details.
    if(!req.body){
        res.status(400).send({message: "Content cannot be empty"});
        return;
    }

    const id = req.params.id;
    Userdb.findByIdAndUpdate(id,req.body,{useFindandModify:false})
        .then(data => {
            if(!data){
                res.status(404).send({message:`Cannot update the user: ${id}. Maybe this not not available.`})
            }
            else{
                res.send(data)
            }
        })
        .catch(err =>{
            res.status(500).send({
                message:err.message || "Couldn't update the user"
            })
        })
}
```

Finally we handle the delete.



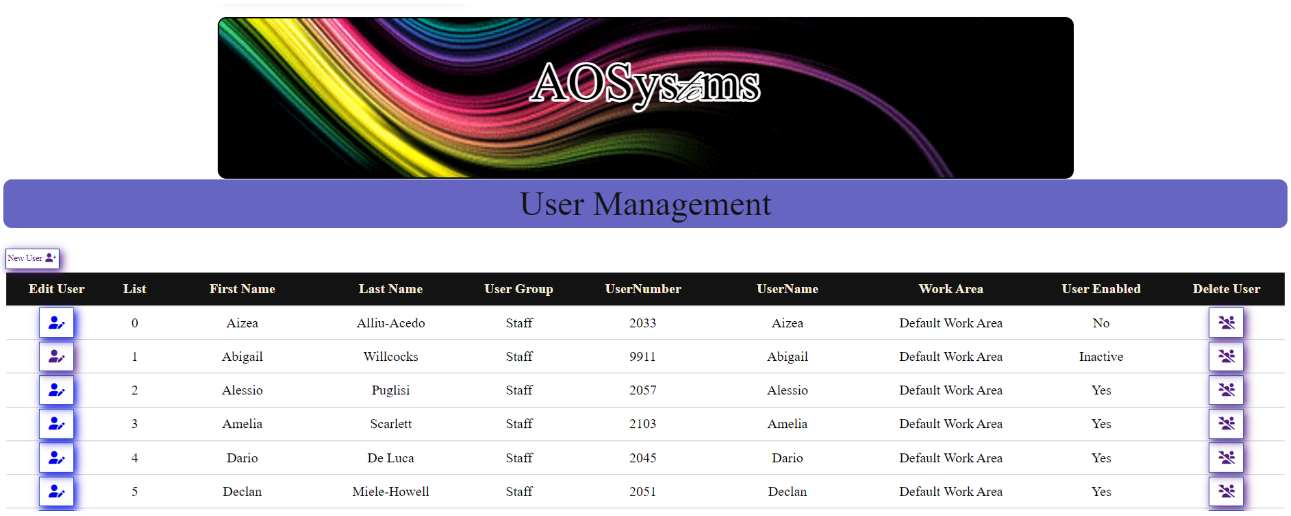
```
//this is to delete users on MongoDB
exports.delete=(req,res)=>{
    const id = req.params.id;

    Userdb.findByIdAndDelete(id)
    .then(data => {
        if(!data){
            res.status(404).send({message:`Cannot delete the user: ${id}. Maybe its wrong.`})
        }
        else{
            res.send({
                message:"User was deleted"
            })
        }
    })
    .catch(err =>{
        res.status(500).send({
            message:err.message || "Couldn't delete the user."
        });
    });
}
```

Front End

Design

The key concept of this system is that we are trying to make things more efficient. Keep things in one place. As per the `introduction`. But as well as we want things smooth.



AOSystems

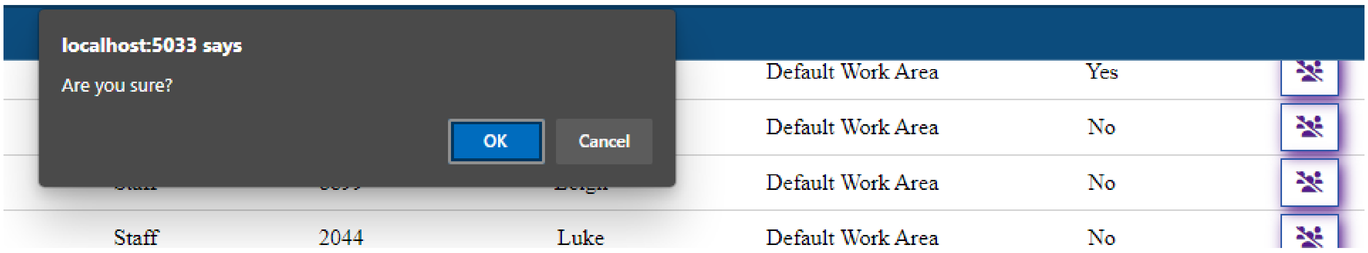
User Management

New User

Edit User	List	First Name	Last Name	User Group	UserNumber	UserName	Work Area	User Enabled	Delete User
	0	Aizea	Alliu-Acedo	Staff	2033	Aizea	Default Work Area	No	
	1	Abigail	Willcocks	Staff	9911	Abigail	Default Work Area	Inactive	
	2	Alessio	Puglisi	Staff	2057	Alessio	Default Work Area	Yes	
	3	Amelia	Scarlett	Staff	2103	Amelia	Default Work Area	Yes	
	4	Dario	De Luca	Staff	2045	Dario	Default Work Area	Yes	
	5	Declan	Miele-Howell	Staff	2051	Declan	Default Work Area	Yes	

The key feature you will find within the design is the business title and the sooth colours. As a business that provides a system its important that this stands out and as well provides some sort of confidence, and this can only be achieved with the right features and design. Another factor that must be considered is the environment where this system is to be used, we know the system is being used in a very customer focused environment, stress level will be high and will need to consider that a soothing pastel color like lavender purple help sooth that tension.

We also see that the key buttons such as the New user, Edit User and Deleting a user is separated with a distance. In a fast paced environment a user may be trying to get an update quickly yet they pressed the delete button by accident. Though we have an extra step to ask "are you sure?",



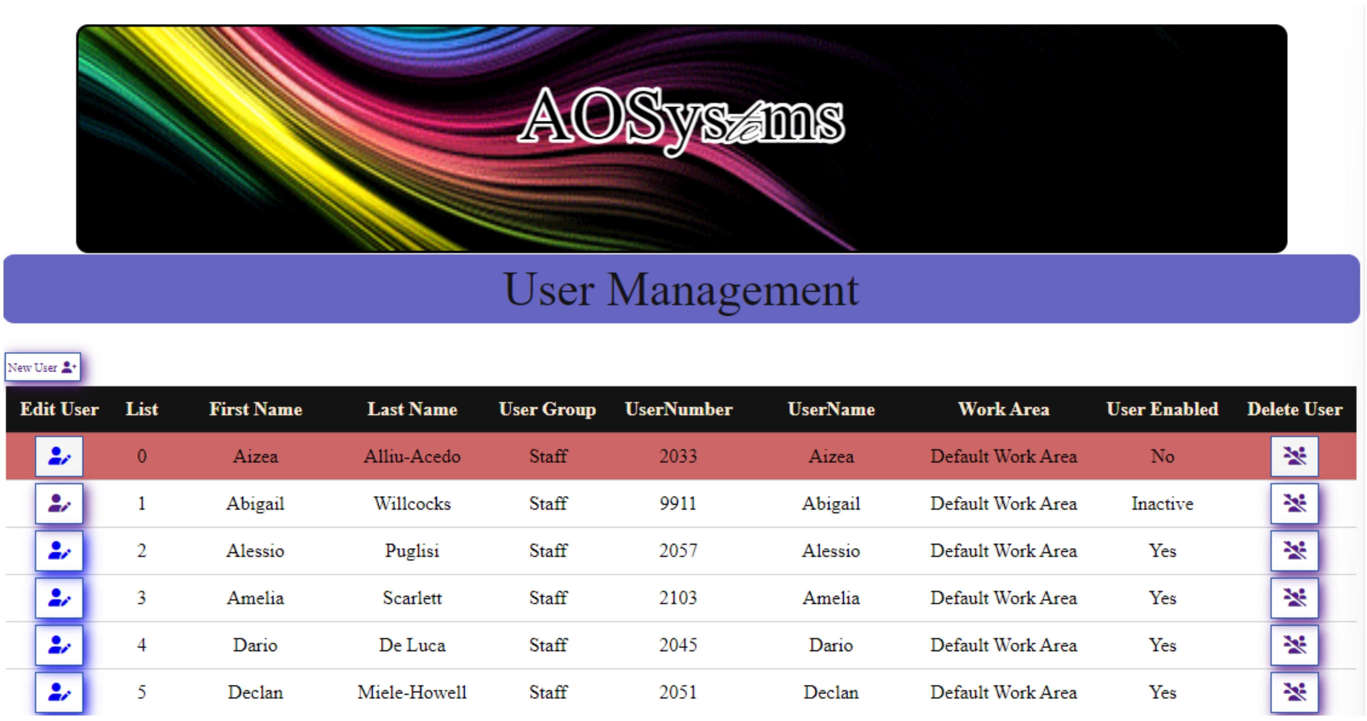
localhost:5033 says

Are you sure?

			Default Work Area	Yes
			Default Work Area	No
			Default Work Area	No
Staff	2044	Luke	Default Work Area	No

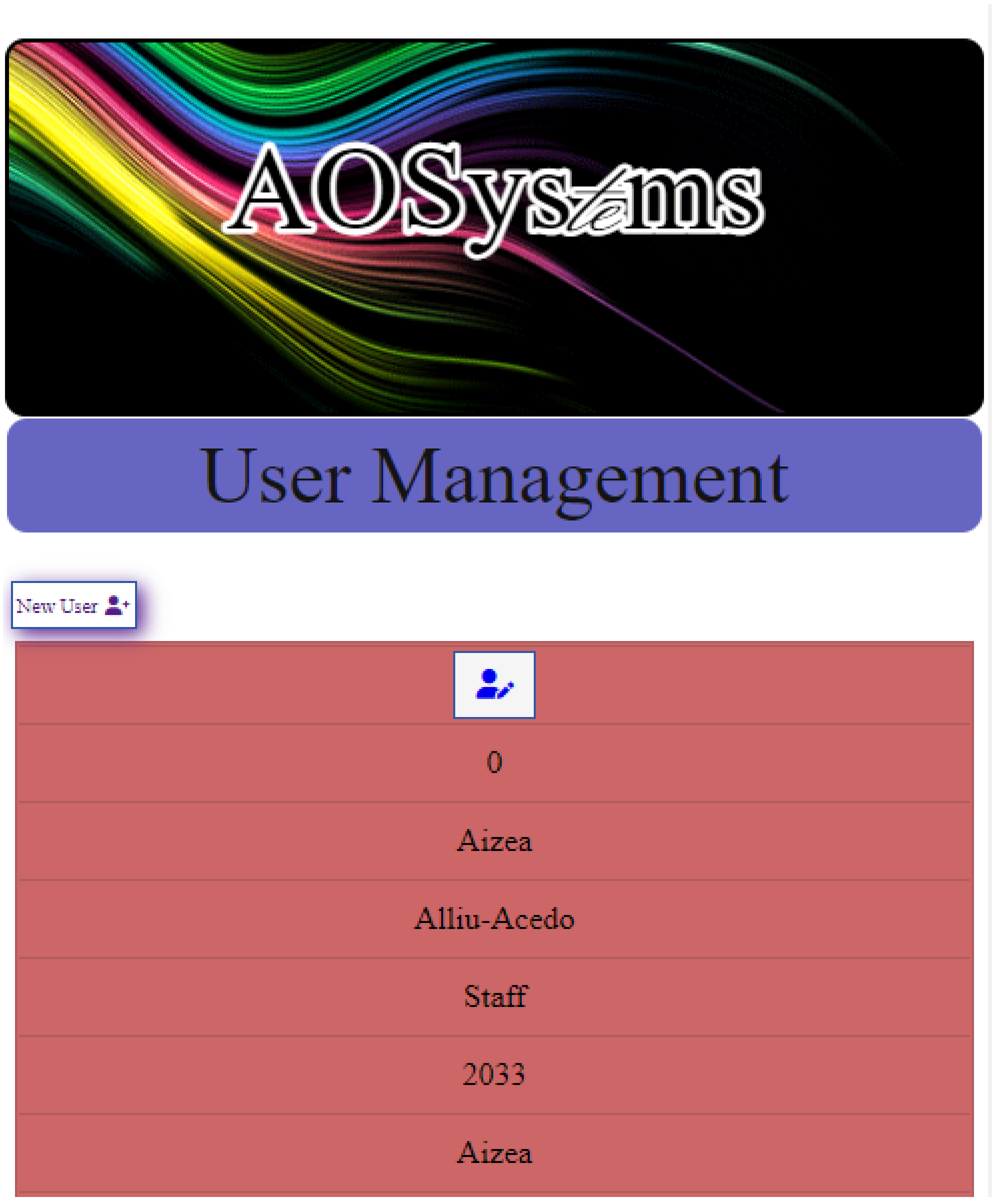
this can become a nuisance and annoyance when you have this issue popping up.

Another key feature we have taken into account, is the highlight row. Our main background consists of the color white, not very good when looking at a list of names but a very neutral color for the user. When the user is hovers the mouse pointer over the the list this will transition to a color. And since its infront of a white color this will pop out more.

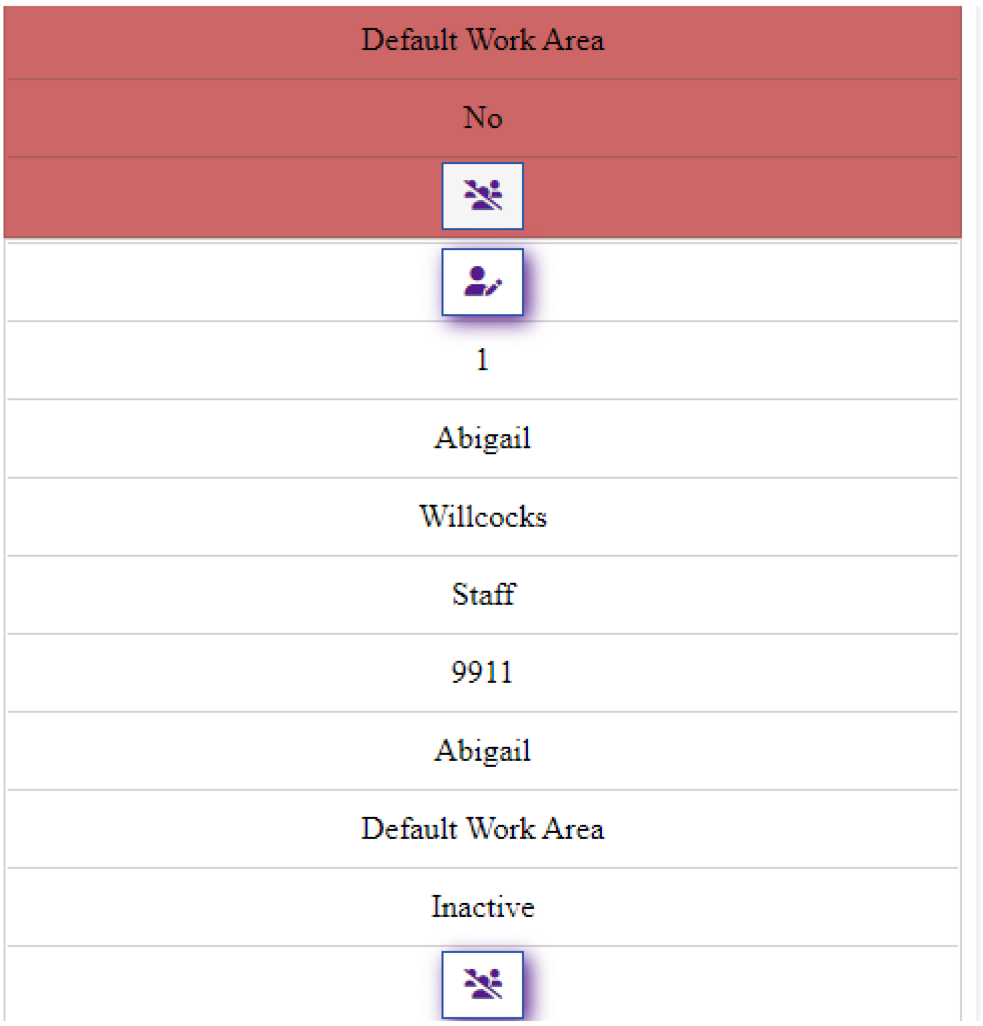


Edit User	List	First Name	Last Name	User Group	UserNumber	UserName	Work Area	User Enabled	Delete User
	0	Aizea	Alliu-Acedo	Staff	2033	Aizea	Default Work Area	No	
	1	Abigail	Willcocks	Staff	9911	Abigail	Default Work Area	Inactive	
	2	Alessio	Puglisi	Staff	2057	Alessio	Default Work Area	Yes	
	3	Amelia	Scarlett	Staff	2103	Amelia	Default Work Area	Yes	
	4	Dario	De Luca	Staff	2045	Dario	Default Work Area	Yes	
	5	Declan	Miele-Howell	Staff	2051	Declan	Default Work Area	Yes	

Finally the final feature I have available for this is the ability to scale down to a mobile form factor. This is very useful for when the user want to use this on the go.



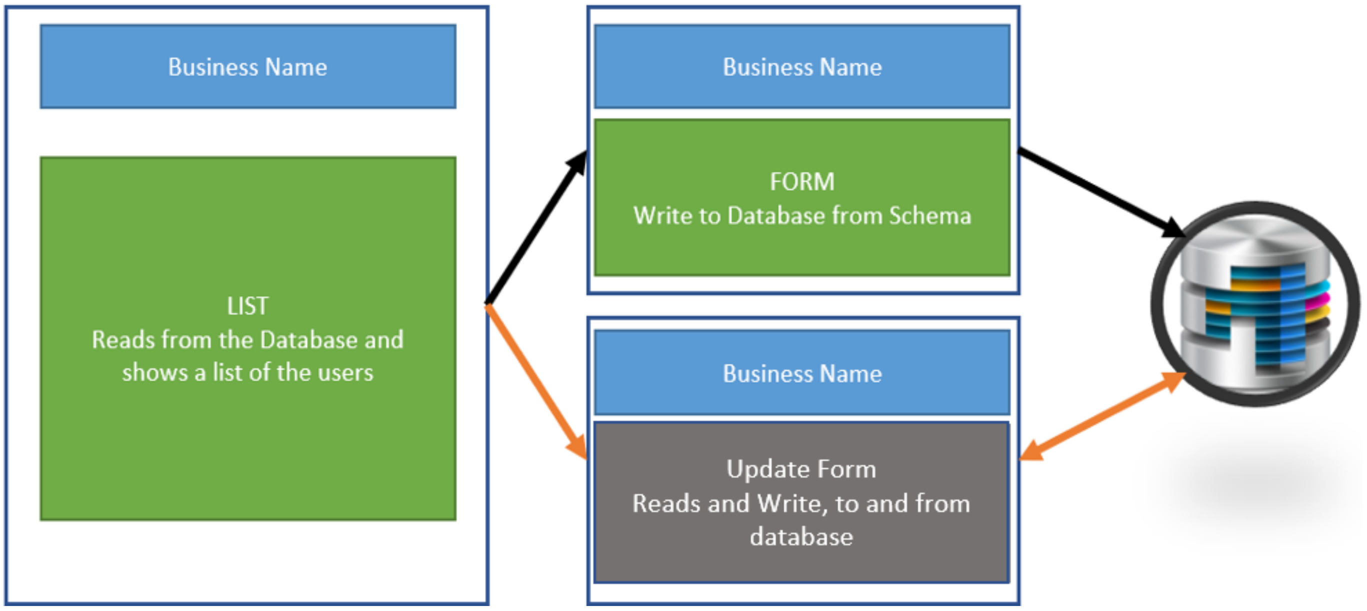
0
Aizea
Alliu-Acedo
Staff
2033
Aizea



Default Work Area
No
1
Abigail
Willcocks
Staff
9911
Abigail
Default Work Area
Inactive

Having considered that the future is mobile, its important that the system must incorporate this to allow easy use and keep to the same standard as what a desktop can do and have.

Interface Design

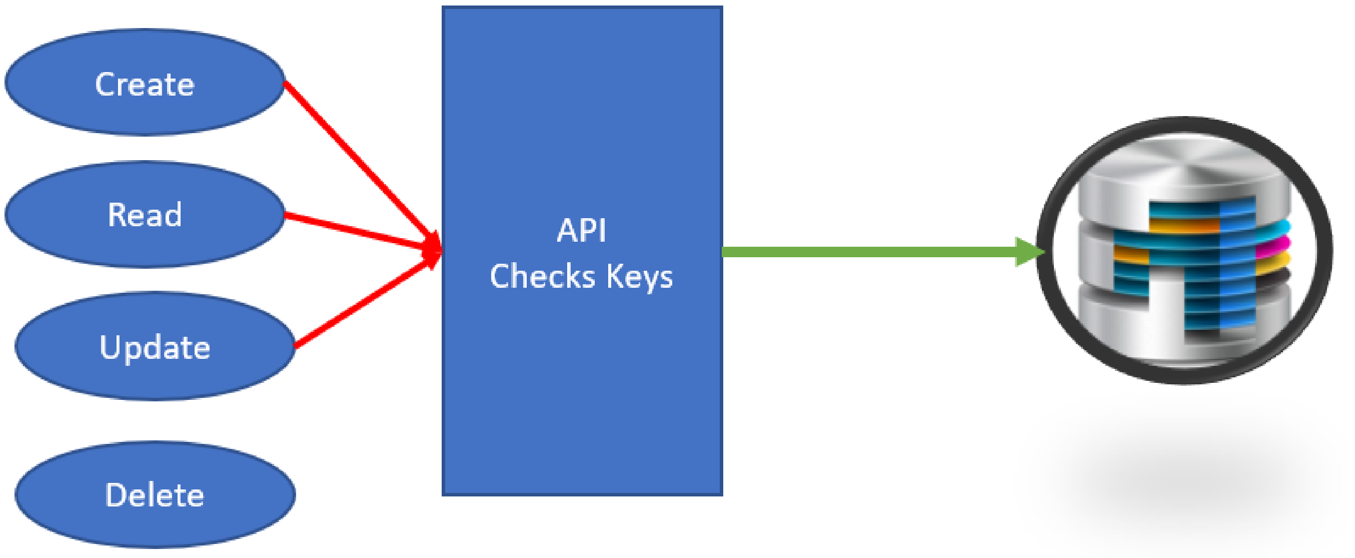

Business Name
LIST
Reads from the Database and shows a list of the users
Business Name
FORM
Write to Database from Schema
Business Name
Update Form
Reads and Write, to and from database

Keeping to the main concept of simplicity, the application is based of 3 primary templates. The primary template will house the list that is read from the database. When selecting "new user", this will lead to a second template that allows you to write to the database. Back at the home screen, if you select "edit user" this will open the third template that reads from the database to show the user details and then you update the database with what you have written. To delete a user we do not require as this is an action on the homepage.

Security and Scalability

Router

As a measure of security I have added APIs into the mix. Once you have an understanding on how this works we are able to create a flow that would support how the system interacts via the API



Security

Security is enhanced when sites use APIs. Whenever you send a request, you aren’t directly linked to a server. You send small amounts of information, the API delivers it, and the server sends it back. This minimizes the risk of a breach or someone accessing the backend of a server.

Scalability

Working with APIs its a lot easier to scale up the project to allow more info to pass through via a secure key. And requires less routes to be created as well as new coding which will overlay the main code.

Conclusion

Referring back to my introduction I was looking to create a system what would be simple, fast, and minimizes the amount of windows needed to view as much information. The reality is that this is the direction the application going with a minimalist's view that is prepped for future. Unfortunately due to time constraints project at works I was not able to create a logging screen for an administrator. Though even with this setup I would be using API links as this in itself is a security function that is the core of my application. As in a scalability point I could assign my project to a third party with partial access via my API