Project Report of CSCI2720

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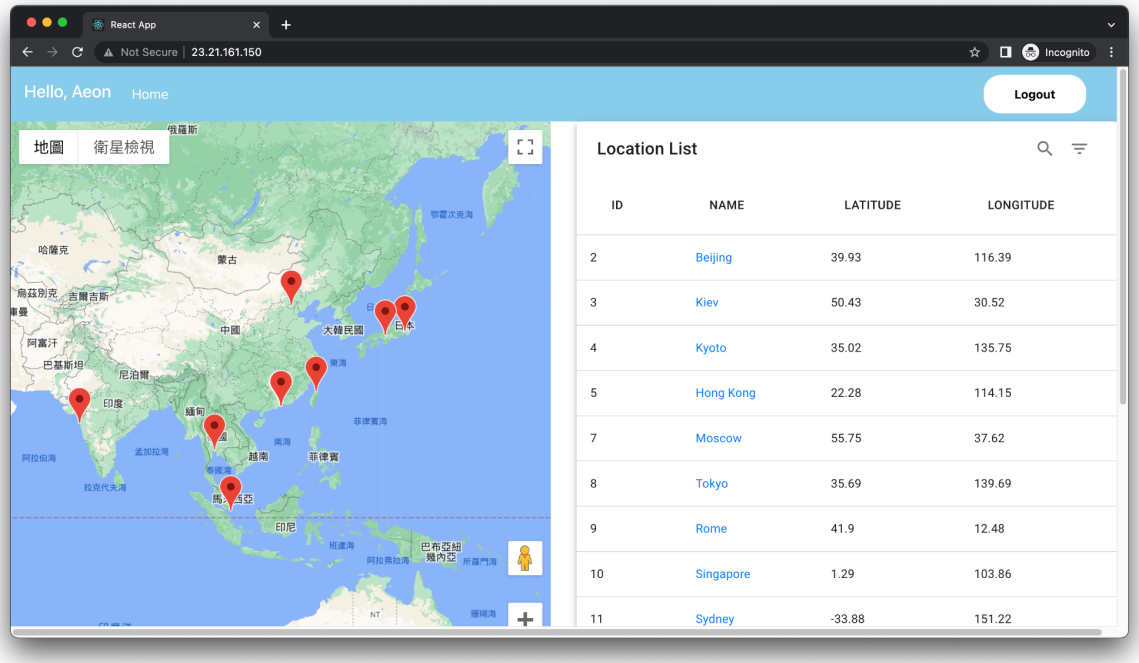
1 Abstract



The web application is developed for looking at real-time weather data. A user management system is set up for the web application so users can save for their favourite locations and leave comments on each location.The user interface is developed by React framework plus Material UI library and Bootstrap.The server-side programme applies Node.js framework with Mongodb as the web application database. In addition to the basic functionalities listed in the specification, we have some extra functions like sending email to verify the account. Also,we have put our effort on the user interface to enhance the user experience.For example, some “error” and “success” message will show to let the admin know whether it is a valid operation or not.

2 Methodologies

2.1 Programming Language & important algorithm we have used

For the programming Language,we mainly use Javascript to implement all the functionalities in the project. Javascript allows asynchronous operation like fetch and can build web applications directly without reloading the page every time. Javascript can also be used to dynamically modify the web content to update the user interface by using the virtual DOM and it can also be used to generate http requests and run on servers through Node.js.

For the routing in the React ,we perform conditional routing for user and admin using React Router. If the user log in ,the token will be assigned to localstorage so that the app can identify whether it is logged in or not. If the admin has logged in , the admin token will be assigned to localstorage so that the web app knows he/ she is an admin and routes him/her to the admin page. If the user or admin is authorized, then they can go to the page otherwise the page will not render. If the user or admin logs out, the token or admin token on the localstorage will be removed. A token is generated by using Json web token library.

2.2 Design of data schemas and models of database

Location schemas

location (Id: number, name: string, Latitude: number, Longitude: number,Region: string, Country: string, TimeZone: string, Temp_c: number, Wind_kph: number, Wind_degree: number, Wind_dir: string, Pressure_mb: number, Precip_mm: number, Humidity: number, Cloud: number, Feelslike_c: number, vis_km: number, Uv: number, Last_udated: string)

User schemas

user (firstName: string, lastName: string, email: string, username:string , password: string(hash), favlocation_id: array , is_admin: bool (default:false), verified: bool(default:false))

Comment schemas

comment (postTime: datetime, content: string, location_id: number (ref: location),user_id: number (ref: user))

Token schemas

token(userId: number (ref: user), token: string, createdAt: datetime)

2.3 Description of all libraries/frameworks we have used

React :[1]

- has an extra in-memory data structure for the DOM as ReactDOM
- provides conditional rendering

Node.js.

- open-source development platform
- excutes javascript code and listen HTTP request on the server side in our poject

Bcrypt:

- library for Node.js
- uses a salt and encrypts the password data in our project

mongoose:

- a Node.js-based Object Data Modeling library for MongoDB
- create schema and perform CRUD operation in our project

nodemailer:

- a Node.js module
- allowing user send email with server

express:

- a Node.js web application framework
- a board of features for building web applications and APIs

Joi:

- a module in Node.js
- validating data using schema

bodyParser:

- body parsing middleware
- To pass and read inputs in frontend request body

cors:

- Cross-Origin Resource Sharing
- Enable All CORS Requests before configuring routes

WeatherAPI.com:

- Data is available as JSON
- Handle the following data with location: temp_c, wind_kph, wind_dir, humidity, precip_mm, vis_km

Amazon EC2:

- Amazon Elastic Compute Cloud
- Deploying web server using apache

Google Maps Platform APIs

- react-google-maps/api
- free
- real-world location map

Json web token

- token can be signed using a secret and generated as a string

2.4 Comparison to other platforms

Advantages that React over Angular:[2]

- Virtual DOM implementation and rendering optimizations
- Simple to switch between React versions (don't have to install updates one by one)
- Have access to a wide range of pre-built solutions

Disadvantages that React over Angular:[2]

- Angular has better Web app performance
- Angular is better suited for entreprises

Advantages that MongoDB over MySQL:[3]

- MongoDB database can be scaled both vertically and horizontally but MySQL can only be scaled vertically.
- MongoDB database is more flexible in terms of data schema. No prior schema is required in MongoDB.
- MongoDB has no schema requirement therefore less risks will be involved

Disadvantages that MongoDB over MySQL:[3]

- The speed of selecting data across multiple schemas in MongoDB is relatively lower than MySQL.
- MongoDB does not support join operation but MySQL supports join operation which makes data searching easier

Advantages that Express over Koa.js:[4]

- Express is the most popular framework for Node.js which has a rich open-source resource
- Express support middleware allowing install useful tools for performance improvement
- Express can easily integrates with mongodb

Disadvantages that Express over Koa.js:[4]

- Unlike Express, Koa.js doesn't use callbacks which can avoid chaos
- Koa can simply write functions and do not require another layer of software

References

[1]C.-jee CHAU, “09. An Introduction to ReactJS.”

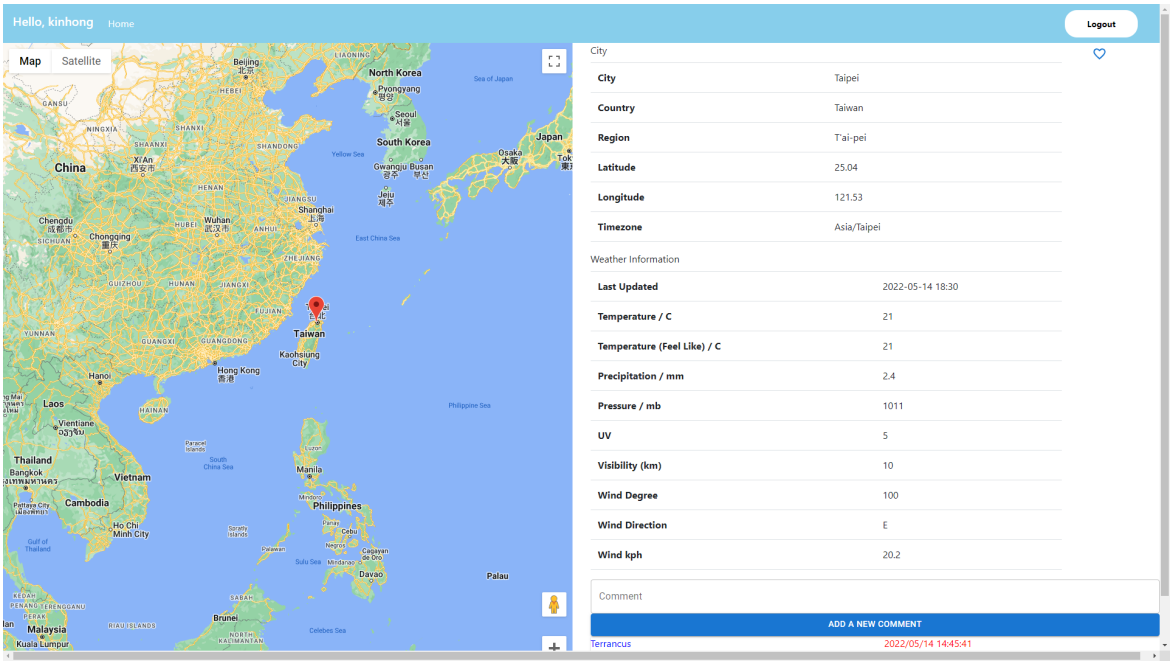
[2]“Angular vs react: Difference between angular and react,” *InterviewBit*, 01-Apr-2022. [Online]. Available: https://www.interviewbit.com/blog/angular-vs-react/#:~:text=React%20is%20a%20library%2C%20but,React%20works%20a%20bit%20faster. [Accessed: 13-May-2022].

[3]C. Deshpande, “MongoDB vs. mysql: Which one is Better,” *Simplilearn.com*, 14-Feb-2022. [Online]. Available: https://www.simplilearn.com/tutorials/mongodb-tutorial/mongodb-vs-mysql#mysql_vs_mongodb_oneonone_comparision. [Accessed: 14-May-2022].

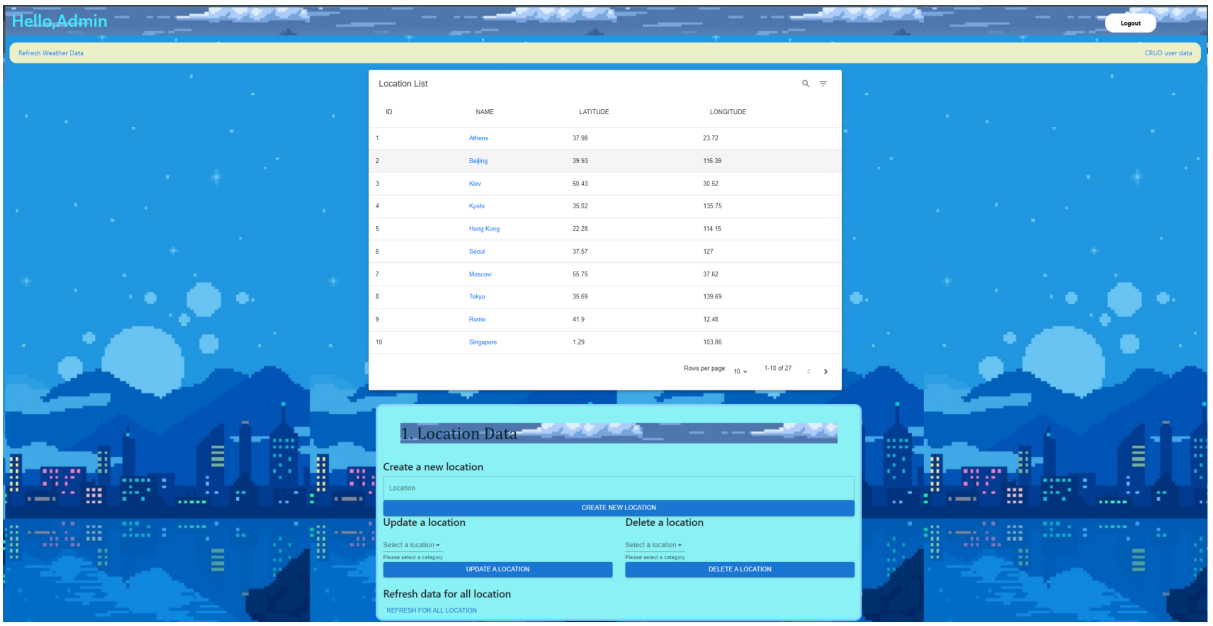
[4] “Best node.js framework: Choose among 10 tools,” *Jelvix*, 21-Dec-2020. [Online]. Available: https://jelvix.com/blog/best-nodejs-frameworks. [Accessed: 13-May-2022].

Appendix

Location detail and comment page



Admin CRUD Location data page



Admin CRUD user data page