LAB 5

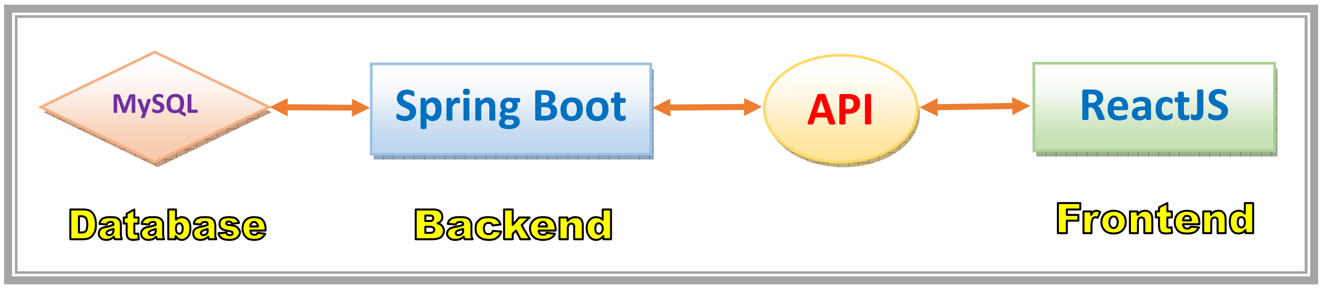
CONSUME RESTFUL API WITH REACTJS

➢ CONTENT

- Introduce to ReactJS
- Consume API with ReactJS

❖ INTRODUCTION

- ReactJS is a JavaScript library for building user interfaces. It was developed and is maintained by Facebook and is widely used for building web applications. It allows developers to create reusable UI components and manage the state of their application, making it easier to build complex user interfaces.
- Some alternatives to ReactJS:
  - AngularJS
  - VueJS
- Some ways to consume Restful API with ReactJS:
  - *Axios: a promise-based HTTP client*
  - Fetch API: a browser built-in web API
- System architecture diagram:



➢ INSTRUCTION

1. Use previous Java Spring Boot project as back-end.

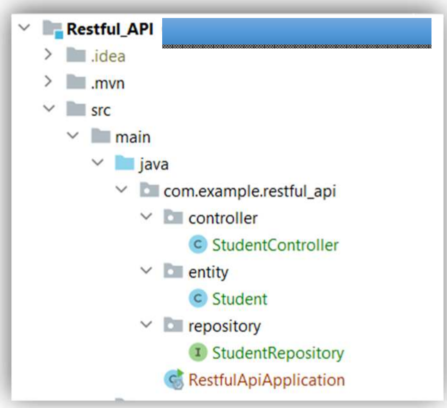
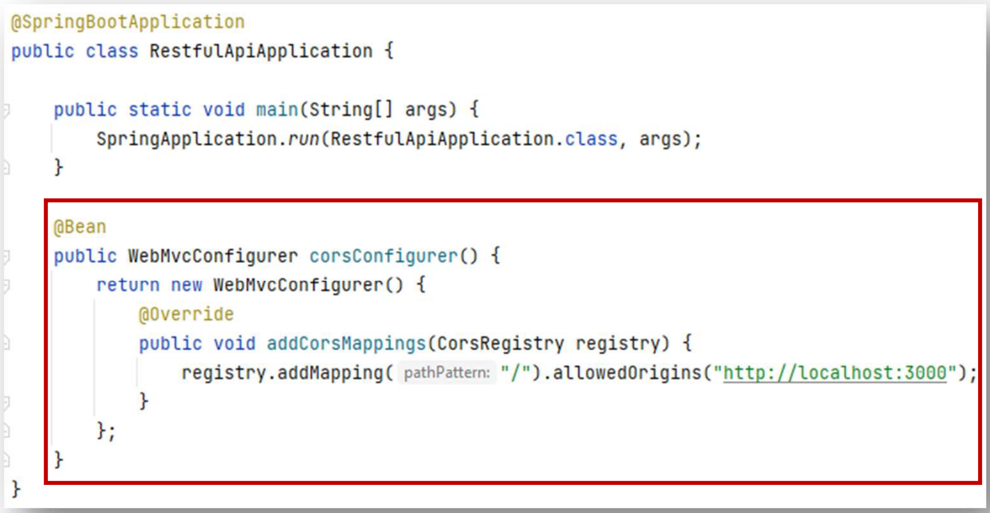


Figure 1 – Java Spring Boot project structure (back-end)

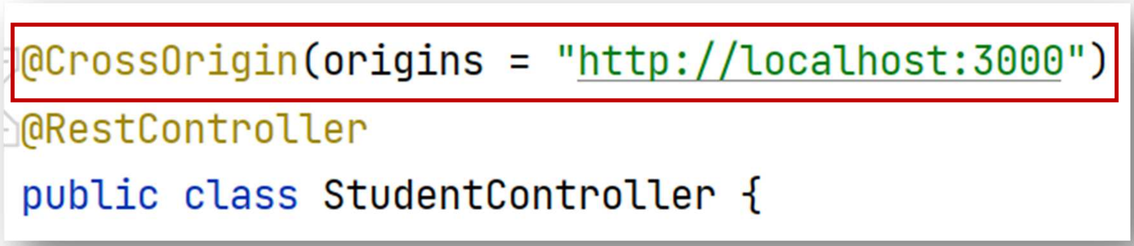
2. **Important:** Must enable CORS (Cross-Origin Resource Sharing) either locally for each controller or globally for the whole project.

   Note: Without enabled CORS, the back-end & front-end sides can not communicate and exchange data using API.



```java
@SpringBootApplication
public class RestfulApiApplication {

    public static void main(String[] args) {
        SpringApplication.run(RestfulApiApplication.class, args);
    }

    @Bean
    public WebMvcConfigurer corsConfigurer() {
        return new WebMvcConfigurer() {
            @Override
            public void addCorsMappings(CorsRegistry registry) {
                registry.addMapping( pathPattern: "/").allowedOrigins("http://localhost:3000");
            }
        };
    }
}
```

*Figure 2 – Enable CORS globally - **RestfulApiApplication.java***



```java
@CrossOrigin(origins = "http://localhost:3000")
@RestController
public class StudentController {
```

*Figure 3 - Enable CORS locally in each controller - **StudentController.java***

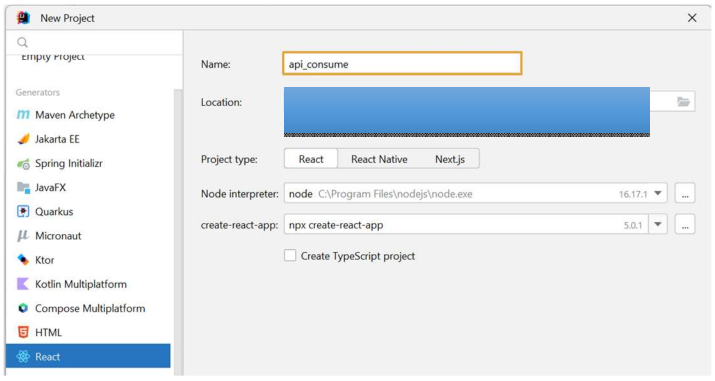
<u>**Note:**</u>

- *Default port for Java Spring Boot is 8080*
- *Default port for ReactJS is 3000*

3. Start the web server to run Java Spring Boot project then leave it on to share APIs to ReactJS. Do not *STOP* this server

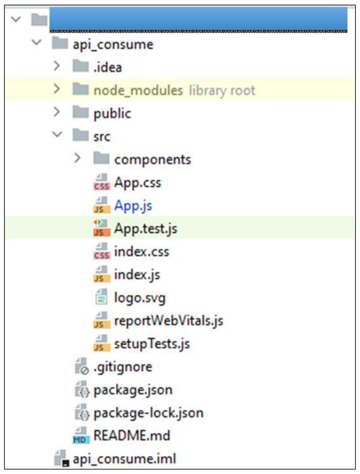
<u>**Note:**</u> Both servers for front-end & back-end must run at the same time. ⇨ Open 2 projects in 2 independent IntelliJ windows or open Java Spring Boot project in IntelliJ and ReactJS in Visual Studio Code (or other alternative)

4. Create a new ReactJS project as front-end, which consumes Restful API



Name: api_consume
Location:
Project type: React | React Native | Next.js
Node interpreter: node C:\Program Files\nodejs\node.exe 16.17.1
create-react-app: npx create-react-app 5.0.1
☐ Create TypeScript project

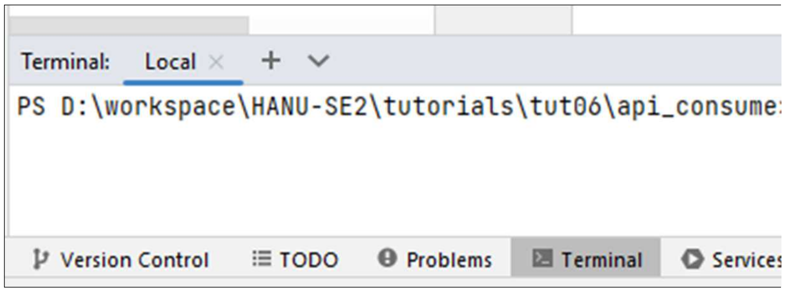
Figure 4 - Create new ReactJS project



```
api_consume
  .idea
  node_modules  library root
  public
  src
    components
    App.css
    App.js
    App.test.js
    index.css
    index.js
    logo.svg
    reportWebVitals.js
    setupTests.js
  .gitignore
  package.json
  package-lock.json
  README.md
api_consume.iml
```

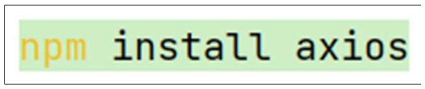
Figure 5 - ReactJS project structure (front-end)

5. Install Axios library (module/package) by running below command in integrated terminal at bottom left corner



```
PS D:\workspace\HANU-SE2\tutorials\tut06\api_consume
```

Figure 6 - Set default Terminal



```
npm install axios
```

Figure 7 - Axios module installation

6. Create **components** package in **src** folder of ReactJS project

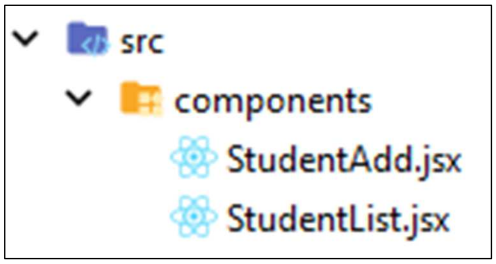
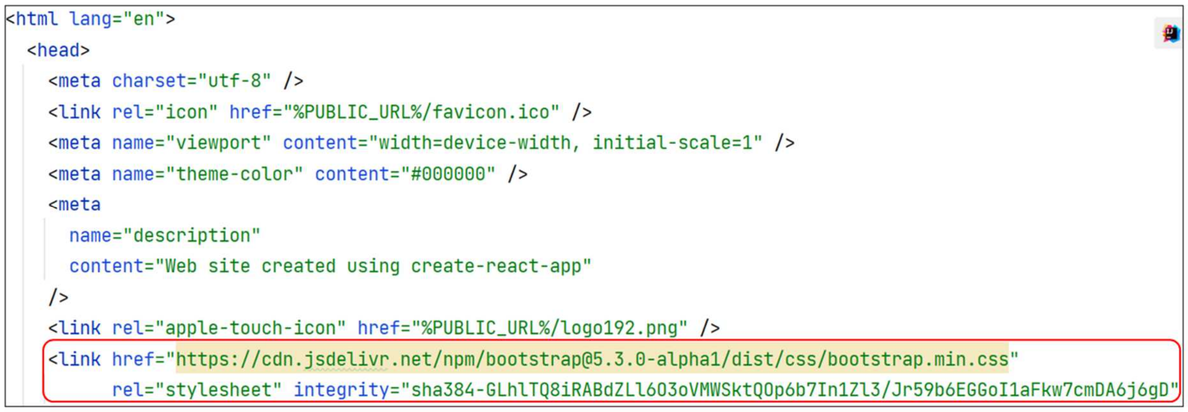


Figure 8 - Create ReactJS components

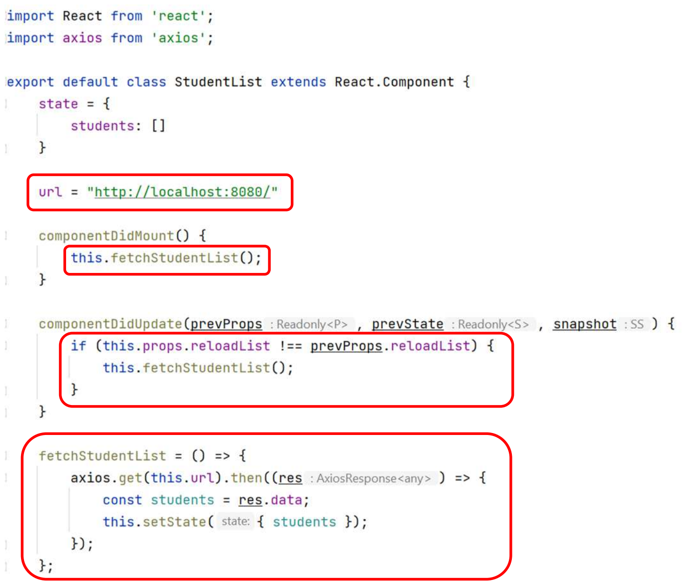
7. **Optional:** Attach Bootstrap to decorate for user interface in **index.html** (located at **public** folder)



```
<html lang="en">
  <head>
    <meta charset="utf-8" />
    <link rel="icon" href="%PUBLIC_URL%/favicon.ico" />
    <meta name="viewport" content="width=device-width, initial-scale=1" />
    <meta name="theme-color" content="#000000" />
    <meta
      name="description"
      content="Web site created using create-react-app"
    />
    <link rel="apple-touch-icon" href="%PUBLIC_URL%/logo192.png" />
    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/css/bootstrap.min.css"
          rel="stylesheet" integrity="sha384-GLhlTQ8iRABdZLl6O3oVMWSktQOp6b7In1Zl3/Jr59b6EGGoI1aFkw7cmDA6j6gD"
```

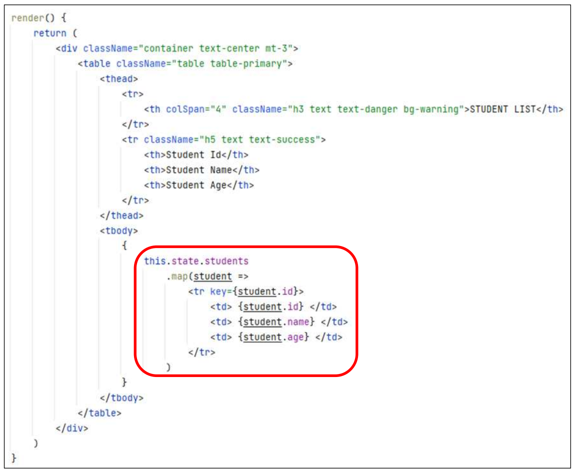
Figure 9 - ***index.html***

8. Create component **StudentList** to fetch student data from API



```
import React from 'react';
import axios from 'axios';

export default class StudentList extends React.Component {
    state = {
        students: []
    }

    url = "http://localhost:8080/"

    componentDidMount() {
        this.fetchStudentList();
    }

    componentDidUpdate(prevProps : Readonly<P> , prevState : Readonly<S> , snapshot : SS ) {
        if (this.props.reloadList !== prevProps.reloadList) {
            this.fetchStudentList();
        }
    }

    fetchStudentList = () => {
        axios.get(this.url).then((res : AxiosResponse<any> ) => {
            const students = res.data;
            this.setState( state: { students });
        });
    };
```

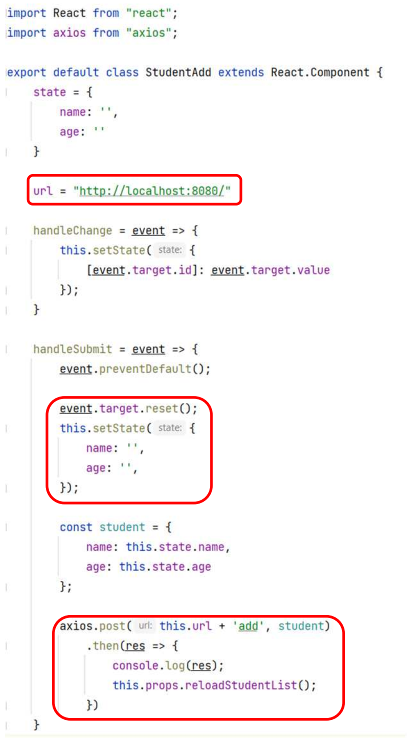
*Figure 10 - **StudentList.jsx (1)***



```
render() {
    return (
        <div className="container text-center mt-3">
            <table className="table table-primary">
                <thead>
                    <tr>
                        <th colSpan="4" className="h3 text text-danger bg-warning">STUDENT LIST</th>
                    </tr>
                    <tr className="h5 text text-success">
                        <th>Student Id</th>
                        <th>Student Name</th>
                        <th>Student Age</th>
                    </tr>
                </thead>
                <tbody>
                    {
                        this.state.students
                            .map(student =>
                                <tr key={student.id}>
                                    <td> {student.id} </td>
                                    <td> {student.name} </td>
                                    <td> {student.age} </td>
                                </tr>
                            )
                    }
                </tbody>
            </table>
        </div>
    )
}
```

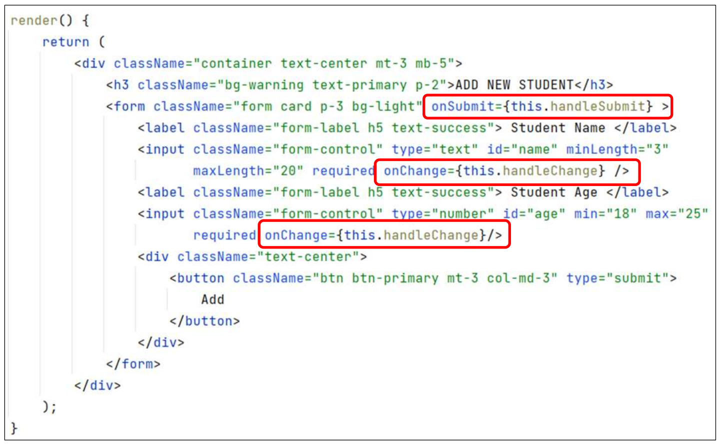
*Figure 11 - **StudentList.jsx (2)***

9. Create module **StudentAdd** to add new student using form. Data from form will be passed to Spring Boot by API then be added to database.



```
import React from "react";
import axios from "axios";

export default class StudentAdd extends React.Component {
    state = {
        name: '',
        age: ''
    }

    url = "http://localhost:8080/"

    handleChange = event => {
        this.setState( state: {
            [event.target.id]: event.target.value
        });
    }

    handleSubmit = event => {
        event.preventDefault();

        event.target.reset();
        this.setState( state: {
            name: '',
            age: '',
        });

        const student = {
            name: this.state.name,
            age: this.state.age
        };

        axios.post( url: this.url + 'add', student)
            .then(res => {
                console.log(res);
                this.props.reloadStudentList();
            })
    }
```

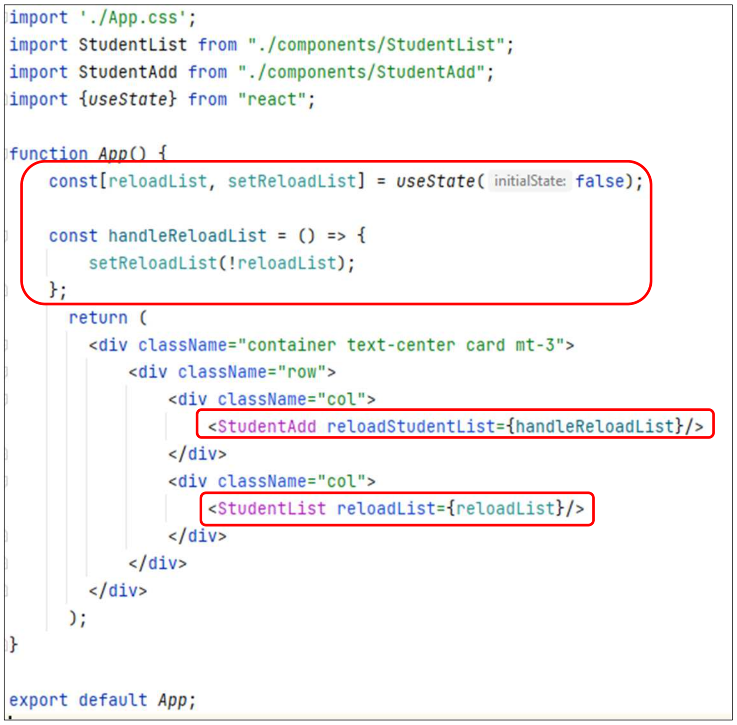
*Figure 12 - **StudentAdd.jsx (1)***



```
render() {
    return (
        <div className="container text-center mt-3 mb-5">
            <h3 className="bg-warning text-primary p-2">ADD NEW STUDENT</h3>
            <form className="form card p-3 bg-light" onSubmit={this.handleSubmit} >
                <label className="form-label h5 text-success"> Student Name </label>
                <input className="form-control" type="text" id="name" minLength="3"
                       maxLength="20" required onChange={this.handleChange} />
                <label className="form-label h5 text-success"> Student Age </label>
                <input className="form-control" type="number" id="age" min="18" max="25"
                       required onChange={this.handleChange}/>
                <div className="text-center">
                    <button className="btn btn-primary mt-3 col-md-3" type="submit">
                        Add
                    </button>
                </div>
            </form>
        </div>
    );
}
```

*Figure 13 - **StudentAdd.jsx (2)***

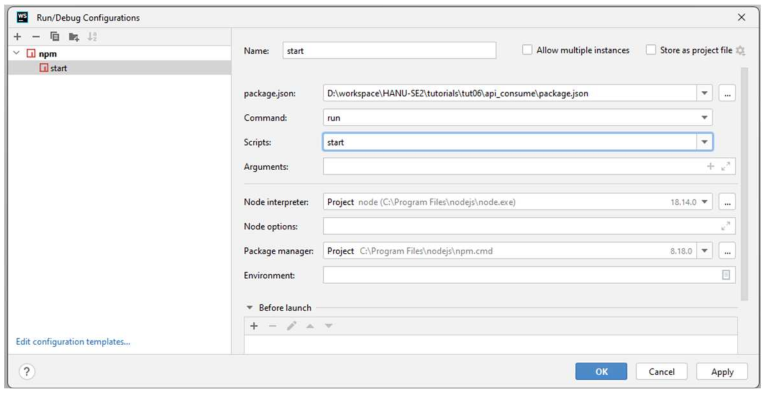
10.Config file **App.js** to add these 2 components



```
import './App.css';
import StudentList from "./components/StudentList";
import StudentAdd from "./components/StudentAdd";
import {useState} from "react";

function App() {
    const[reloadList, setReloadList] = useState( initialState: false);

    const handleReloadList = () => {
        setReloadList(!reloadList);
    };
      return (
        <div className="container text-center card mt-3">
            <div className="row">
                <div className="col">
                    <StudentAdd reloadStudentList={handleReloadList}/>
                </div>
                <div className="col">
                    <StudentList reloadList={reloadList}/>
                </div>
            </div>
        </div>
      );
}

export default App;
```

*Figure 14 - **App.js***

11.Start the ReactJS project with **Shift + F10** or typing "**npm start**" in Terminal.



Run/Debug Configurations

npm
start

```
Name: start
[ ] Allow multiple instances   [ ] Store as project file

package.json:      D:\workspace\HANU-SE2\tutorials\tut06\api_consume\package.json
Command:           run
Scripts:           start
Arguments:
Node interpreter:  Project  node (C:\Program Files\nodejs\node.exe)  18.14.0
Node options:
Package manager:   Project  C:\Program Files\nodejs\npm.cmd  8.18.0
Environment:
Before launch
```

Figure 15 - Add npm configuration

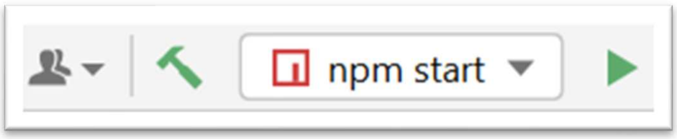
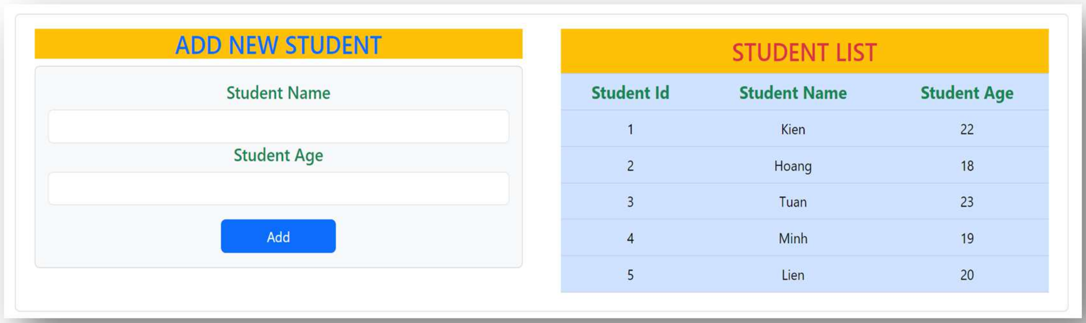


Figure 16 - Start the ReactJS project



ADD NEW STUDENT

Student Name

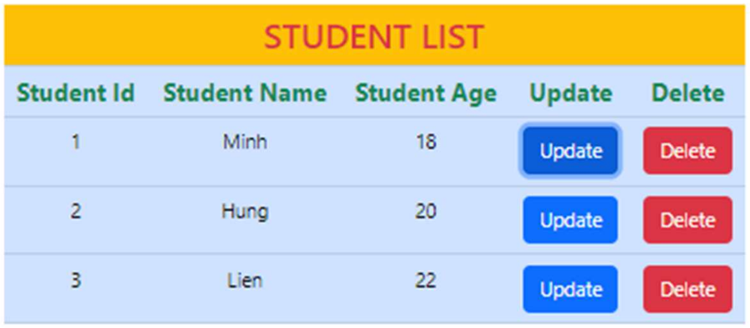
Student Age

Add

STUDENT LIST

Student Id	Student Name	Student Age
1	Kien	22
2	Hoang	18
3	Tuan	23
4	Minh	19
5	Lien	20

Figure 17 – Current result



STUDENT LIST

Student Id	Student Name	Student Age	Update	Delete
1	Minh	18	Update	Delete
2	Hung	20	Update	Delete
3	Lien	22	Update	Delete

Figure 18 - Final result

➢ TO-DO

- Create UPDATE & DELETE components to complete CRUD features
- Create other components to consume remained APIs