Sri Lanka Institute of Information Technology

DISTRIBUTED SYSTEMS(SE3020)

Assignment 2

Assignment Report

IT number	Name
IT17182638	Hewapathirana C.D.D
IT17182324	Maheshani H.M.P

CONTENT

INTRODUCTION

In here, ‘Fire alarm monitoring system’ is implemented using below mentioned technologies. ReactJS is used for the front-end(in the Web Client as the client side). As the backend, NodeJS and ExpressJS were used for the server side(REST API). In addition to that, as a service, sending automated emails is implemented using Nodemailer module. As well as in here, it is used to send dummy messages for sending messages service. Desktop client is developed using RMI server and an RMI desktop client. And MongoDB is used as the database to store the data. For communication between clients and the backend, JSON is used as the communication method.

Here, it is not used MongoDB local database but MongoDB Atlas cloud which is the global cloud database service which allows to host and manage the data in the cloud. MongoDB Atlas cloud is flexible and scalable document-based database and available as a fully managed service.

In web client, it is implemented using ReactJS and used Bootstrap themes. Axios library is used to send requests to the API. In the REST API is implemented considering the SOA principles. By using this, it can be achieved interoperability between different applications easily. The RMI client service is developed using Java language.

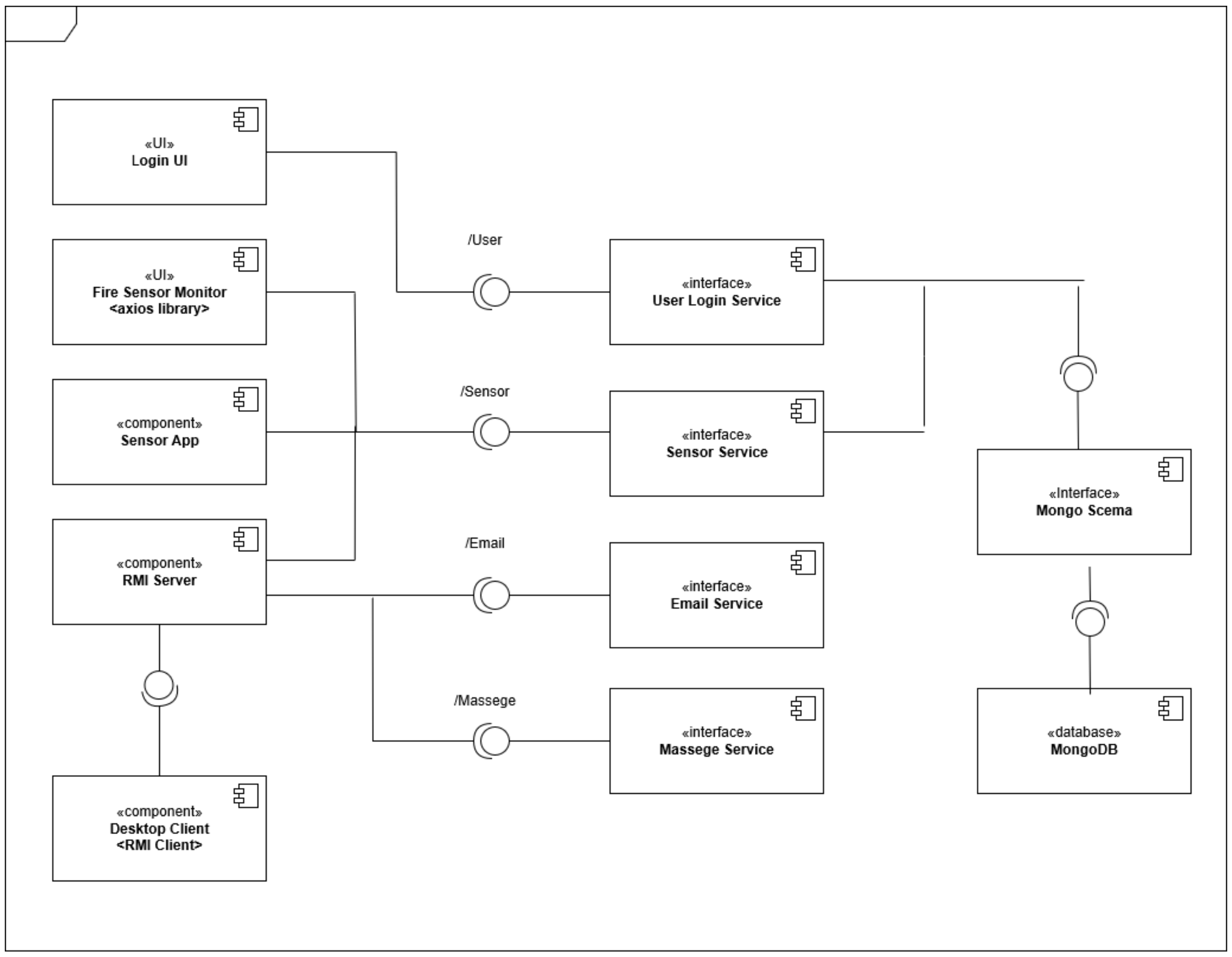
Simply, the workflow of this ‘Fire Alarm Monitoring System’ as following.

As a user, admin can login through the desktop client can add sensors and edit the details of added sensors. When adding sensors, it includes the sensor number, floor number and room number. Then the added sensors are updated each 30 seconds by the Sensor app. Using the web client, it can be viewed the details about all added sensors with the status, smoke level and co2 level which mainly considered. And also, in web client it shows all sensor details. If smoke level or co2 level is above 5, then that field is shown in red which shows as a warning and below 5, then that field is shown in green which shows no harm. Each 40 seconds, web client calls the REST API and get the updates. RMI server is reading the sensor status details in every 5 seconds. When reading, if any added sensor has smoke level or co2 level above 5, then RMI server sends emails to the admins and show messages using dummy messages service as an alert in the server console. Also, in the desktop client, if the smoke level or co2 level is above 5, shows an alert.

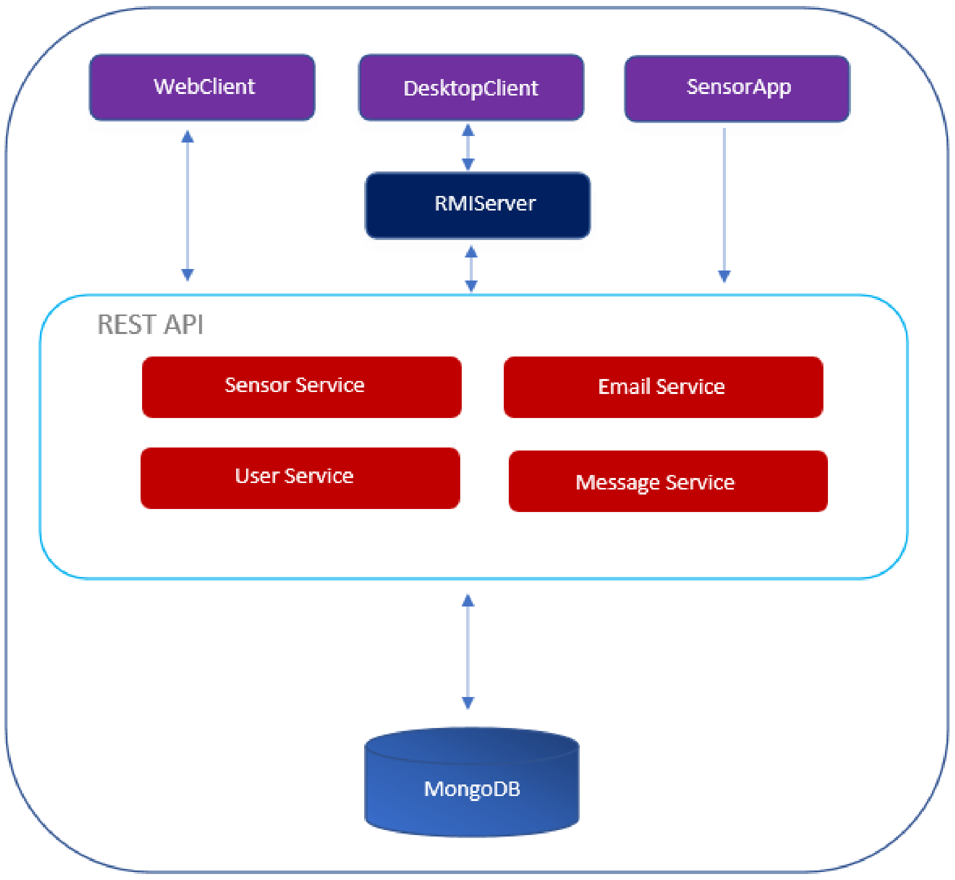
In conclusion, this ‘Fire Alarm Monitoring System’ is combination of a website(frontend) and a REST API (backend) which is accompanied by the MongoDB database.

HIGH LEVEL ARCHITECTURAL DIAGRAM

Component Diagram

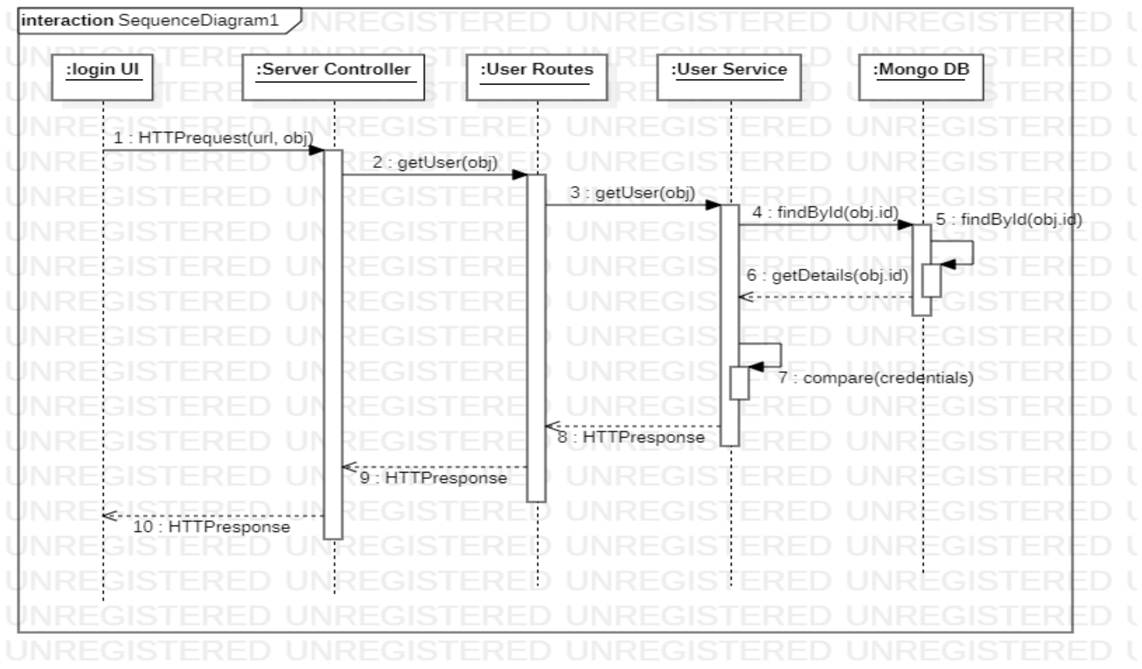


Architecture diagram



SERVICES WITH WORKFLOWS

I. User Login Service



- When a user, login to the system as admin, after adding the credentials, those credentials are passed through a HTTP POST request of URL (user / create) to the REST API. Then the REST API server will call user routes. After that user routes will call the user service requesting the User Login Service while passing the admin credentials. And then compare those credentials with the details in MongoDB. Then it will pass the response as HTTP response.

Security Mechanism for Sign in and sign up

- It is achieved using hashing the password. It is implemented using npm ‘bcrypt’ module.

```
/*
 * hash the password
 */
bcrypt.hash(req.body.Password,10,(err, hash) =>{
    if(err){
        return res.status(500).json({
            error: err
        })
```

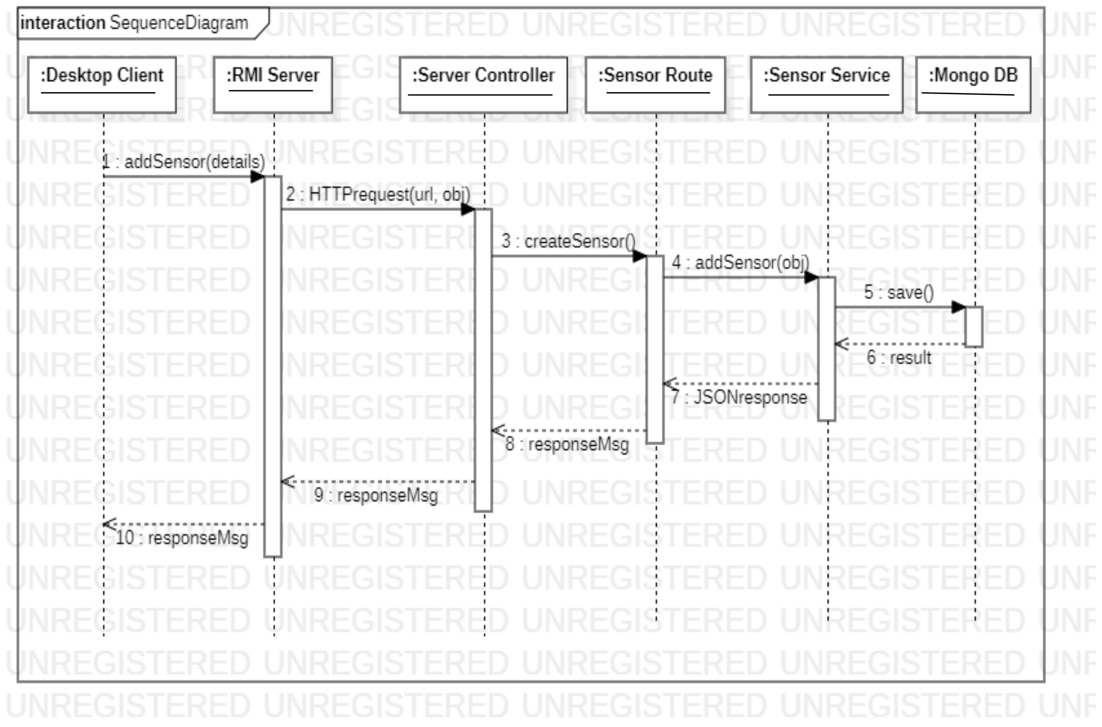
```
                }else{
                    /*
                     * Create the User Schema
                     */

                    const nwuser = new User({
                        _id:mongoose.Types.ObjectId(),
                        Username: req.body.Username,
                        Password: hash
                    });
```

- When sign in password is compared with hashing password.

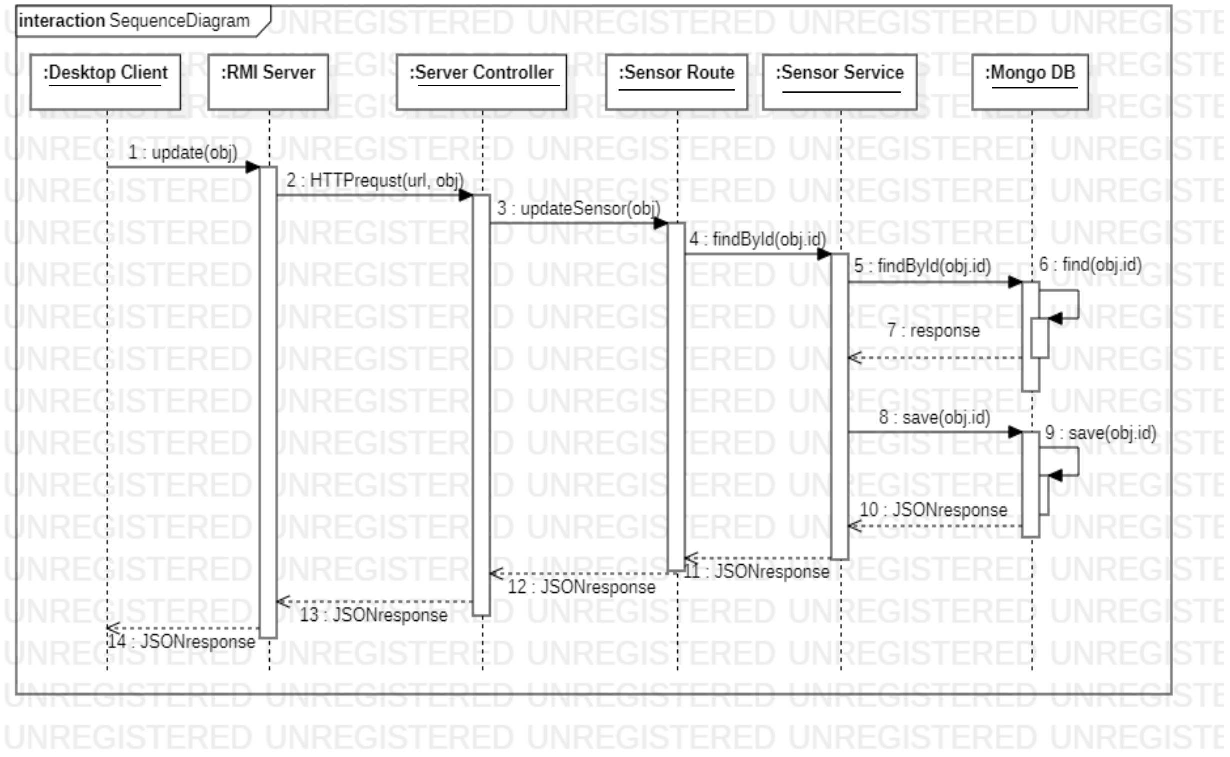
```
/*
 * Compare the entered passwaord with exisiting password
 */
bcrypt.compare(req.body.Password, user[0].Password,(err,result) => {
    if(err){
        return res.send({message :'Password does not match!!!!!'});
    }
```

II. Add Sensor Service



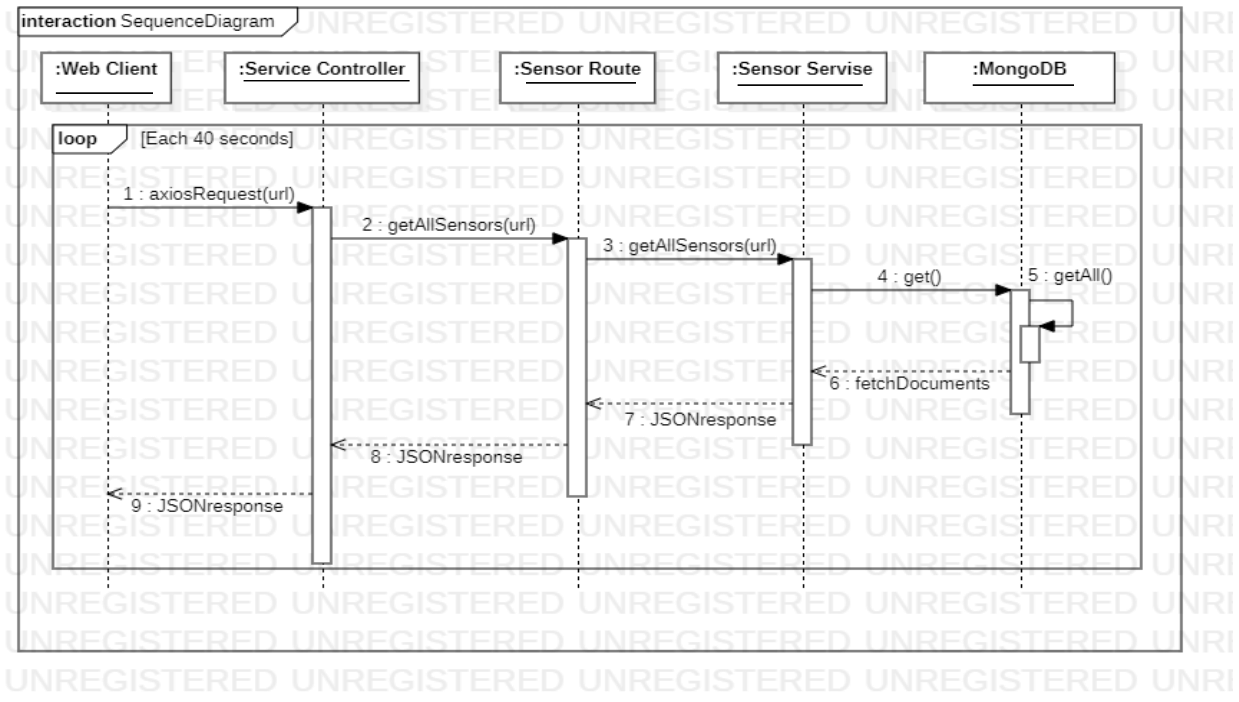
- When adding a sensor, admin has to enter the sensor details such as sensor id, floor number and room number. Then those details will pass to the Sensor Service requesting for creating a new server through a HTTP POST request or URL / sensor / create. Then new sensor is created, and sensor details are stored in the MongoDB. Then the response is passed through a response message by the server.

III. Update Sensor Service



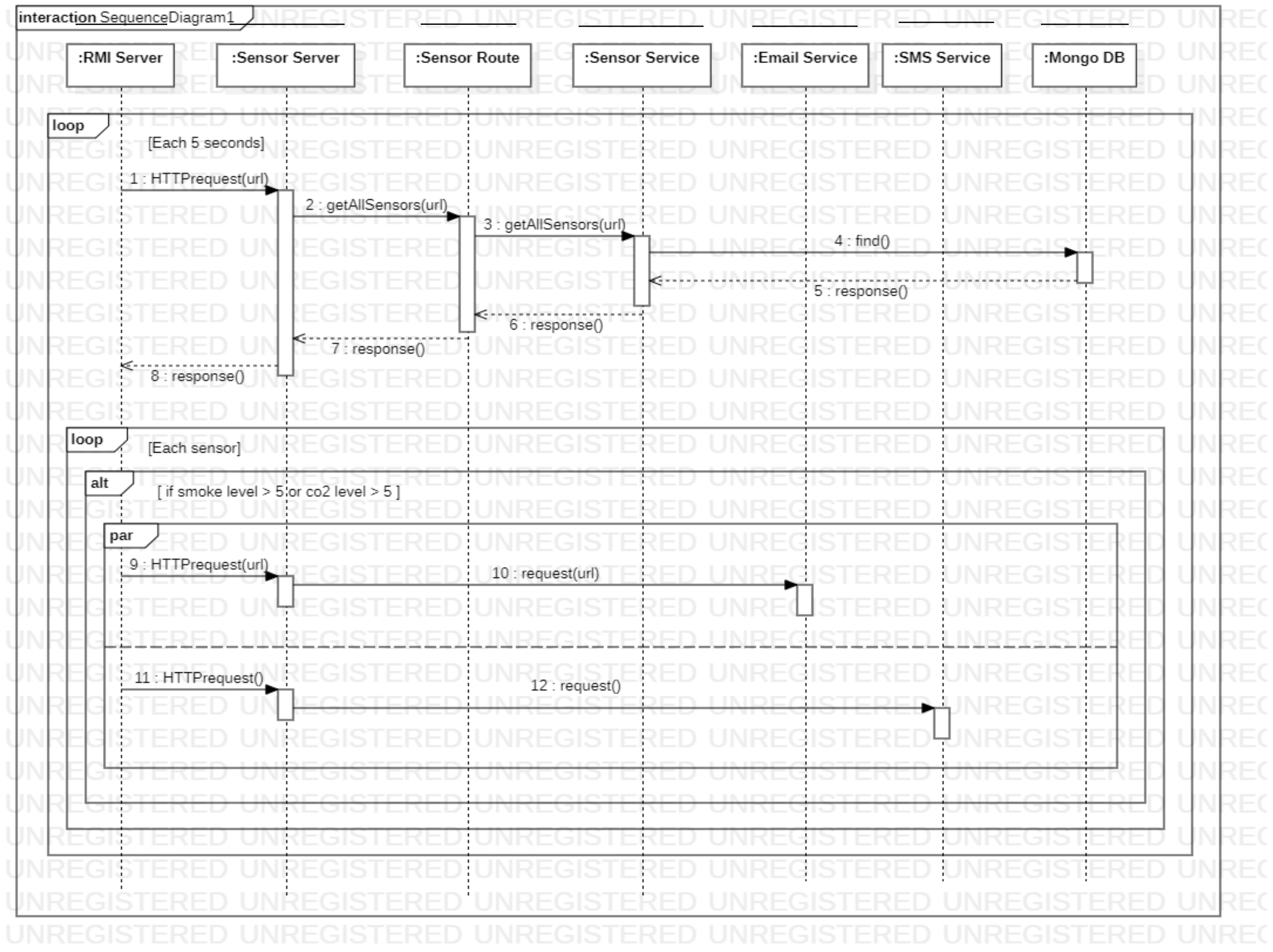
- When an admin wants to update an existing sensor, the request is passed through a HTTP PUT request including a sensor object. Using the sensor object id, it is requested for updating the sensor from the Update Sensor Service in Sensor Service. Then the sensor object id will pass to the MongoDB. Then find the existing sensor which match with the passed sensor id. After that, save the update details in the database of the particular sensor object id. Then server will pass the response as a JSON response.

IV. Get Sensor Details Service



If an admin wants to retrieve the existing sensor details, it is requested through the axios GET request with the URL (`axios.get('http://localhost:5000/sensor/')`). Then that request is sent to the Sensor Service, requesting Get Sensor Details Service using the URL. After that, the database retrieves the all data of sensors and fetch the details to the Get Sensor Details Service. Then server will pass the response as JSON response. Each 40 seconds, this process is done. Like this, desktop client also get updates through RMI server, each 30 seconds.

V. Email and SMS Service



- If smoke level or co2 level is above 5 in any sensor, a warning message should be sent as an email and a message. First, it needs to be checked the details of all existing sensors. RMI server reads the sensor details each 5 seconds. If there is any details about smoke level or co2 level is above 5 of any sensor, it should send email or message. For each sensor, this should be checked. Then RMI server send a HTTP request with the URL to the Email Service and SMS (Message) Service. Then admin is informed about the danger. Though Email service and SMS service mentioned in here as a one service for the ease of demonstration, those services are considered as two services.

APPENDIX

WebClient (front-end)

Monitor.js

```
import React, { Component } from 'react';
import axios from 'axios';
import { MDBTable, MDBTableBody, MDBTableHead } from 'mdbreact';
import Details from './details';
import {Card} from 'react-bootstrap';
class monitor extends Component {
    constructor(props) {
        super(props);
        this.state = {
            FireDetail : []
         }
    }
    componentDidMount(){
        this.getDetails();
        this.interval = setInterval(() => {
          this.getDetails();
        }, 40000);
    }
    getDetails() {
        axios.get('http://localhost:5000/sensor/')
        .then(response => {
            this.setState({ FireDetail: response.data });
        })
        .catch(function (error) {
            console.log(error);
        })
      }
    tableRow(){
        return this.state.FireDetail.map(function(object, i){
            return <Details obj={object} key={i} />;
        });
    }
    render() {
        return (
            <Card className="text-center">
            <Card.Header style={{color:"red"}}><h5>Fire Sensor Monitor</h5></Card
.Header>
            <Card.Body>
```

```
                <center>
                <MDBTable small style={{ marginTop: 20, width:"1000px" }}>

                    <MDBTableHead>
                    <tr className="text-center">
                        <th>Sensor ID</th>
                        <th>Floor No</th>
                        <th>Room No</th>
                        <th>CO2 Level</th>
                        <th>Smoke Level</th>
                        <th>Status</th>

                    </tr>
                    </MDBTableHead>
                    <MDBTableBody>
                    { this.tableRow() }
                    </MDBTableBody>

                </MDBTable>
                </center>
            </Card.Body>
            <Card.Footer className="text-muted"></Card.Footer>
            </Card>
        );
    }
}
export default monitor;
```

Details.js

```
import React, { Component } from 'react';
import {Alert} from 'react-bootstrap';
class details extends Component {
    constructor(props) {
        super(props);
        this.state = {  }
    }
    render() {
        return (
            <tr className="text-center">
            <td> {this.props.obj.SensorID} </td>
            <td> {this.props.obj.FloorNo}  </td>
            <td> {this.props.obj.roomNo}   </td>
            <td >
               {(this.props.obj.Co2Level > 5) ?
```

```
                    <Alert variant="danger">
                        {this.props.obj.Co2Level}
                    </Alert>
                    :
                    <Alert variant="success ">
                        {this.props.obj.Co2Level}
                    </Alert>
                }
            </td>
            <td>
                {(this.props.obj.smokeLevel > 5) ?
                    <Alert variant="danger">
                        {this.props.obj.smokeLevel}
                    </Alert>
                    :
                    <Alert variant="success ">
                        {this.props.obj.smokeLevel}
                    </Alert>
                }
            </td>
            <td> {this.props.obj.status} </td>
        </tr>
         );
    }
}
export default details;
```

App.js

```
import React, { Component } from 'react';
import 'bootstrap/dist/css/bootstrap.min.css';
import Monitor from './Component/monitor';

class App extends Component {
  render() {
    return (
      <div>
          <Monitor />
      </div>
     );
  }
}
export default App;
```

Back-End (Server – REST API)

Server.js

```
const express = require('express');
const cors = require('cors');
const mongoose = require('mongoose'); // help to connect mongodb database
const texts = require('./constants/texts');//take constant to prompt messages
const serverMessages = texts.server;

//create express server
const app = express();
const port = process.env.PORT || 5000;

//middlewares
app.use(cors());  // cors middaleware
app.use(express.json()); // allows to get JSON


//connect to the mongoDB Atlas
mongoose.connect(serverMessages.MONGODB_URL,
{
    useNewUrlParser:true,useUnifiedTopology: true
})
.then(() =>{
    console.log(serverMessages.DB_CONNECTED);
})
.catch(()=>{
    console.log(serverMessages.DB_NOT_CONNECTED);
});

/*
 * routes the request to the user route
 */
const userRoute = require('./routes/userRouter');
app.use('/user', userRoute);

/*
 * routes the request to the sensor route
 */
const sensorRoute = require('./routes/SensorRouters');
app.use('/sensor', sensorRoute);

/*
 * routes the request to the email Route
 */
```

```
const emailRoute = require('./routes/emailRouters');
app.use('/email', emailRoute);

/*
 * routes the request to the sms Route
 */
const smsRoute = require('./routes/smsRouters');
app.use('/sms', smsRoute);


/*
 * Backend server is lisenting to the port 5000
 */
app.listen(port, () => {
    console.log(serverMessages.SERVER + port);
});
```

Routes

User routes

```
const express = require("express");
const usersRouter = express.Router();
const UsersController = require('../controllers/UserController');// get the user 
controller

usersRouter.post("/sign-up", UsersController.user_signup);//user sign up endpoint
usersRouter.post('/sign-in', UsersController.userSignin); //user sign in endpoint

module.exports = usersRouter;
```

Sensor routes

```
const express = require("express");
const SensorRoute = express.Router();
const SensorController = require("../controllers/SensorController");//get the sen
sor controller

SensorRoute.post("/create", SensorController.addSensor);     // sensor create end
point
SensorRoute.get("/", SensorController.getAllSensor);         // get ALl sensor en
dpoint
```

```
SensorRoute.get("/:id", SensorController.getSensor);         // get Sensor by id
endpoint
SensorRoute.put("/update/:id", SensorController.editSensor); // Update Sensor end
point
SensorRoute.delete("/delete/:id", SensorController.deleteSensor);// delete Sensor
 endpoint

module.exports = SensorRoute;
```

Email routes

```
const express = require("express");
const EmailRoutes = express.Router();
const EmailControllers = require("../controllers/EmailController"); //get the ema
il controller

EmailRoutes.post("/send", EmailControllers.sendEmail); // email send endpoint

module.exports = EmailRoutes;
```

SMS routes

```
const express = require("express");
const smsRoute = express.Router();
const smsController = require("../controllers/SmslController"); //get the sms con
troller

smsRoute.post("/send", smsController.sendSms); // sms send endpoint

module.exports = smsRoute;
```

Model

Sensor Model

```
const mongoose = require('mongoose');
const Schema = mongoose.Schema;
/*
 * Sensor schema
 */
let Sensor = new Schema({
    SensorID: {
        type: String,
        required: true
    },
    FloorNo: {
        type: Number,
        required: true
    },
    roomNo: {
        type: Number,
        required: true
    },
    smokeLevel: {
        type: Number,
        default:0
    },
    Co2Level: {
        type: Number,
        default:0
    },
    status: {
        type: String,
        default:null
    }
},{
    collection: 'Sensor'
});


module.exports = mongoose.model('Sensor',Sensor);
```

User model

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

/*
 * User schema
 */

let User = new Schema({
    _id: {
        type:String,
        required: true
    },
    Username: {
        type: String,
        required: true,
        unique: true,
        match: /[a-z0-9!#$%&'*+/=?^_`{|}~-]+(?:\.[a-z0-9!#$%&'*+/=?^_`{|}~-
]+)*@(?:[a-z0-9](?:[a-z0-9-]*[a-z0-9])?\.)+[a-z0-9](?:[a-z0-9-]*[a-z0-9])?/
    },
    Password: {
        type: String,
        required: true
    },
    LoginTime: {
        type: Date,
        default:null
    },
},{
    collection: 'User'
});


module.exports = mongoose.model('User', User);
```

Controllers

UserController.js

```
const mongoose = require("mongoose");
const bcrypt = require('bcrypt');
const User = require('../model/user');


/*
 * post request calls to the user_signup in userController class to insert a new
user
 */
exports.user_signup = (req,res,next) => {

    const {Username} = req.body;

    //find whether User Already exist or not
    User.find({Username})
        .exec()
        .then(user => {

            if(user.length >= 1){
                return res.json({
                    message: 'Already exist'
                });

            }else{

                /*
                 * hash the password
                 */
                bcrypt.hash(req.body.Password,10,(err, hash) =>{
                    if(err){
                        return res.status(500).json({
                            error: err
                        })
                    }else{
                        /*
                         * Create the User Schema
                         */

                        const adduser = new User({
                            _id:mongoose.Types.ObjectId(),
                            Username: req.body.Username,
                            Password: hash
                        });

                        adduser
                            .save()
                            .then(result => {
                                console.log('User is Created',result);
                                res.status(200).json({
                                    success:true,
                                    message: 'User is Created'
                                })
                            })
                            .catch( err =>{
                                console.log(err);
                                res.status(500).json({
                                    error: err
                                })
                            });
                    }
                });
            }
        })
}
```

```
/*
 * post request calls to the user Signin in userController class to login
 */

exports.userSignin =(req,res,next) => {

    User.find({Username:req.body.Username}).exec().then(user => {

        if(user.length < 1){
            return res.send({message:'not a User'});
        }
        /*
         * Compare the entered passwaord with exisiting password
         */
        bcrypt.compare(req.body.Password, user[0].Password,(err,result) => {
            if(err){
                return res.send({message :'Password not match'});
            }
            if(result){

                user[0]._id = user[0]._id;
                user[0].LoginTime = Date.now();
                user[0]
                    .save()
                    .then(result => {
                        console.log("User:"+user[0]._id+"Login-Time"+Date.now());
                    })
                    .catch( err =>{
                        console.log(err);
                    });

                return res.status(200).json({
                    success:true,
                    message:'successful',
                });
            }else{
                return res.status(401).send('not a user');
            }
        })
    });
}
```

SensorController.js

```
const mongoose = require("mongoose");
const bcrypt = require('bcrypt');
const Sensor = require('../model/sensor');

/*
 * post request calls to the addSensor in SensorController class to insert a new
Sensor
 */

exports.addSensor = (req, res, next) => {

    const {body} = req;

    const {
        SensorID,
        FloorNo,
        roomNo,
    } = body;

/*
 * check the sensor id already exist
 */
    Sensor.find({
        SensorID
    }).exec()
      .then(sensor => {

        if(sensor.length >= 1){
            return res.json({
                message : 'sensor already exist'
            });
        }else{

            /*
             * Create the sensor schema
             */

            const newsensor = new Sensor();
            newsensor.SensorID = SensorID;
            newsensor.FloorNo = FloorNo;
            newsensor.roomNo = roomNo;

            /*
```

```
             * Save the sensor schema
             */
            newsensor
                .save()
                .then(result => {
                    console.log(result);
                    res.status(200).json({
                        message: 'Sensor successfully created'
                    })
                })
                .catch(err => {
                    console.log(err);
                });

        }
    });
}

/*
 * Get the all sensors
 */
exports.getAllSensor = (req, res) => {
    Sensor.find((err, sensor) => {
        if(err){
            console.log(err);
        }
        else {
            res.json(sensor);
        }
    });
}

/*
 * Get the specific sensor
 */
exports.getSensor = (req, res) => {
    let sensorid = req.params.id;
    Sensor.findById(sensorid)
    .then(sensor => res.json(sensor))
    .catch(err => res.status(400).json('Error: ' + err));
}


/*
```

```
 * PUT request calls to the editSensor in SensorController class to Update a exis
ting sensor
 */
exports.editSensor = (req, res) => {

    const {body} = req;

    const {
        SensorID,
        FloorNo,
        roomNo,
        smokeLevel,
        Co2Level,
        status
    } = body;

    /*
     * find the sensor
     */
    Sensor.findById(req.params.id, (err, sensor) => {
        if (!sensor)
            res.status(404).send({
                message:"sensor is not found"});
        else {
            sensor.SensorID = SensorID;
            sensor.FloorNo = FloorNo;
            sensor.roomNo = roomNo;
            sensor.smokeLevel = smokeLevel;
            sensor.Co2Level = Co2Level;
            sensor.status = status;

             /*
              * update the sensor
              */
            sensor
            .save().then(sensor => {
                res.json({
                    message:'Update sensor complete'});
            })
            .catch(err => {
                res.status(400).send({
                    message:"unable to update the database"});
            });
        }
    });
}


exports.deleteSensor = (req,res,next) => {
    Sensor.remove({_id: req.params.id})
        .exec()
        .then(result => {
            res.status(200).json({
                message: "sensor deleted"
            });
        })
        .catch(err => {
            console.log(err);
            res.status(500).json({
                error:err
            });
        });
}
```

SmsController.js

```
const nodeMailer = require('nodemailer');
const texts = require('../constants/texts');
const emailConfig = texts.emailConfigure;

/*
 * POST request calls to the sendSms in SmsController class to send a sms
 */
exports.sendSms = (req, res, next) => {

    const {body} = req;
    const {
        FloorNb,
        roomNo,
        Co2Level,
        smokeLevel,
        email
    } = body;

    let message = "***** Warning ****** \n"+ "Please pay Attention \n" +
                FloorNb + " th floor room nb "+ roomNo +
                '\n CO2 level : ' + Co2Level +
                '\n Smoke level : ' + smokeLevel + '\n'
    //print the sms in the console
    console.log(message);
    res.status(200).json({
        message: 'SMS successfully send'
    })
}
```

EmailController.js

```
// include the nodemailer module
const nodeMailer = require('nodemailer');
const texts = require('../constants/texts');
const emailConfig = texts.emailConfigure;


/*
 * POST request calls to the sendEmail in EmailController class to send a email
 */
exports.sendEmail = (req, res, next) => {

    //get the request details from the body
    const {body} = req;
    const {
        FloorNb,
        roomNo,
        Co2Level,
        smokeLevel,
        email
    } = body;

    //setup sender email
    const EmailSender = nodeMailer.createTransport({
        service: 'gmail',
        auth: {
            user: emailConfig.Email,
            pass: emailConfig.password
        }
    });

    //setup reciver email
    let mailOption = {
        from : emailConfig.Email,
        to : email,
        subject : 'Warning\n',
        text : 'Please pay Attention\n'+
        FloorNb +' th floor room nb '+ roomNo +
        '\n CO2 level : ' + Co2Level +
        '\n Smoke level : ' + smokeLevel + '\n'
    };


    //send email
    EmailSender.sendMail(mailOption, (err,info) => {
            if(err){
                console.log(err);
            }else{
                console.log('Email Sent : ' + info.response);
                res.status(200).json({
                    message: 'email successfully send'
                })
            }
    });
}
```

Texts.js

```
module.exports = {

    //constant values
    server: {
        //MongoDB application connection URL
        MONGODB_URL : "mongodb+srv://chamil:Chamil123@firesensor-
aurwy.gcp.mongodb.net/test?retryWrites=true&w=majority",
        DB_CONNECTED : "Database is connected ",
        DB_NOT_CONNECTED : "Can not connect to the database ",
        SERVER : "Server is running on Port : "
    },

    //sender email and password
    emailConfigure : {
        Email : 'chamilpearson@gmail.com',
        password: 'Sliit#*1996'

    }
}
```

RMI SERVER

FireSensor.java (Server interface)

```
package DekstopClient;
import java.io.IOException;
import org.json.JSONArray;
import org.json.JSONException;
/**
 *
 * @author UDILUCH
 */
public interface FireSensor extends java.rmi.Remote{

        //get the initial temparature
        public String getSensor() throws java.rmi.RemoteException, IOException, J
SONException;

        // set the update status
        public void updateStatus() throws java.rmi.RemoteException, IOException,
JSONException;

        //get the updated status
        public String Getupdate() throws java.rmi.RemoteException, IOException, J
SONException;

        //Expose remote method for registration of the server object's listner li
st
        public void addTemperatureListener(SensorListner listener )throws java.rm
i.RemoteException;

        //remote method to unregister from the server object
        public void removeTemperatureListener(SensorListner listener )throws java
.rmi.RemoteException;

        //add sensor details
        public String addSensorDetails(String id, int floorno, int roomNo)throws
java.rmi.RemoteException, IOException, JSONException;

        //update the sensor details
        public String UpdateSensorDetails(String Sid, int floorno, int roomNo, St
ring id,int co2, int smoke, String status)throws java.rmi.RemoteException, IOExce
ption, JSONException;

}
```

FireSensorServer.java

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package DekstopClient;

import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;
import java.io.OutputStream;
import java.net.HttpURLConnection;
import java.net.MalformedURLException;
import java.net.URL;
import java.rmi.Naming;
import java.rmi.RemoteException;
import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;
import java.rmi.server.UnicastRemoteObject;
import java.util.ArrayList;
import java.util.Scanner;
import java.util.Timer;
import java.util.TimerTask;
import java.util.logging.Level;
import java.util.logging.Logger;
import org.json.JSONArray;
import org.json.JSONException;
import org.json.JSONObject;


/**
 *
 * @author UDILUCH
 */
public class FireSensorServer extends UnicastRemoteObject implements FireSensor{


    private ArrayList<SensorListner> list = new ArrayList<SensorListner>();
    String update = "";

    public FireSensorServer() throws java.rmi.RemoteException {
    super();
    }
    @Override
   public  String getSensor() throws RemoteException,IOException, JSONException {

      //create a URL object with the target URI string that accepts the JSON dat
a via HTTP GET method
        URL url= new URL("http://localhost:5000/sensor/");

        //invoke the openConnection method to get the HttpURLConnection object
      HttpURLConnection conn = (HttpURLConnection)url.openConnection();

      conn.setRequestMethod("GET");//send a GET request

      conn.connect(); //Open a connection stream to the corresponding API


      int responsecode = conn.getResponseCode(); //Get the corresponding respons
e code

    BufferedReader in = new BufferedReader(new InputStreamReader(conn.getInputStr
eam()));
        String inputLine;
        StringBuffer response = new StringBuffer();

     //read the data line by line from the input stream using readLine method
      while ((inputLine = in .readLine()) != null) {
            response.append(inputLine);
      } in .close();

      // print result
      System.out.println("\nJSON data in string format");
      System.out.println(response);

      return response.toString();
    }
```

```
//Implement the remote method to register listner in the listner list
    @Override
    public void addTemperatureListener(SensorListner listener) throws RemoteExcep
tion {
        list.add(listener);
    }


    //Implement the remote method to unregister listner in the listner list
    @Override
    public void removeTemperatureListener(SensorListner listener) throws RemoteEx
ception {
       list.remove(listener);
    }


    @Override
    public String addSensorDetails(String id, int floorno, int roomNo) throws Rem
oteException, IOException, JSONException {
        String message = null;

        //creating a custom JSON String
        final String REQ_PARAM = "{\n" + "\"FloorNo\": "+floorno+",\r\n" +
                        "    \"roomNo\": "+roomNo+",\r\n" +
                        "    \"SensorID\": \""+id+"\"" + "\n}";
    System.out.println(REQ_PARAM);

        //create a URL object with the target URI string that accepts the JSON da
ta via HTTP POST method
        URL obj = new URL("http://localhost:5000/sensor/create/");

        //invoke the openConnection method to get the HttpURLConnection object
    HttpURLConnection postConnection = (HttpURLConnection) obj.openConnection();

    postConnection.setRequestMethod("POST"); //send a POST request

        //parameter has to be set to send the request body in JSON format
    postConnection.setRequestProperty("Content-Type", "application/json");

        // enable the URLConnection object's doOutput property to true
    postConnection.setDoOutput(true);

        //Open the DataOutputStream object
    OutputStream ost = postConnection.getOutputStream();
    ost.write(REQ_PARAM.getBytes());
    ost.flush();
    ost.close();
    int responseCode = postConnection.getResponseCode(); //Check the response cod
e
    System.out.println("POST Response Code :  " + responseCode);
    System.out.println("POST Response Message : " + postConnection.getResponseMes
sage()); //print response message

    //response code is OK then create the input stream to read the returned data
    if (responseCode == HttpURLConnection.HTTP_OK) { //success
            BufferedReader inBuf = new BufferedReader(new InputStreamReader(

            postConnection.getInputStream()));
            String input;
            StringBuffer response = new StringBuffer();

            //read the data line by line from the input stream using readLine met
hod
            while ((input = inBuf .readLine()) != null) {
                response.append(input);
            } inBuf .close();
            // print result
            System.out.println(response.toString());
            String inline2 = "["+ response+"]";

            //create json array
            JSONArray jsonar = new JSONArray(inline2);

            for (int i = 0; i < jsonar.length(); i++) {
                //read json array one by one using json object
                JSONObject album = jsonar.getJSONObject(i);
                message = album.getString("message");

            }

            return message; // return thr message

    } else {
        System.out.println("POST NOT WORKED");
    }

        return message;// return thr message
    }
```

```
 @Override
 public String UpdateSensorDetails(String Sid, int floorno, int roomNo, String id
,int co2, int smoke, String status) throws RemoteException, IOException, JSONExce
ption {
        String message = null;
         //creating a custom JSON String
        final String REQ_PARAM = "{\n" + "\"FloorNo\": "+floorno+",\r\n" +
                                "    \"roomNo\": "+roomNo+",\r\n" +
                                "    \"Co2Level\": "+co2+",\r\n" +
                                "    \"smokeLevel\": "+smoke+",\r\n" +
                                "    \"status\": \""+status+"\",\r\n" +
                                "    \"SensorID\": \""+Sid+"\"" + "\n}";
        System.out.println(REQ_PARAM);

        //create a URL object with the target URI string that accepts the JSON da
ta via HTTP PUT method
        URL obj = new URL("http://localhost:5000/sensor/update/"+id);

        //invoke the openConnection method to get the HttpURLConnection object
        HttpURLConnection postConnection = (HttpURLConnection) obj.openConnection
();

        postConnection.setRequestMethod("PUT"); //send a POST request

        //parameter has to be set to send the request body in JSON format
        postConnection.setRequestProperty("Content-Type", "application/json");

        // enable the URLConnection object's doOutput property to true
        postConnection.setDoOutput(true);

        //Open the DataOutputStream object
        OutputStream ost = postConnection.getOutputStream();
        ost.write(REQ_PARAM.getBytes());
        ost.flush();
        ost.close();
        int responseCode = postConnection.getResponseCode(); //Check the response
 code
        System.out.println("POST Response Code :  " + responseCode);
        System.out.println("POST Response Message : " + postConnection.getRespons
eMessage()); //print response message

        //response code is OK then create the input stream to read the returned d
ata
        if (responseCode == HttpURLConnection.HTTP_OK) { //success
            BufferedReader inBuf = new BufferedReader(new InputStreamReader(
            postConnection.getInputStream()));
            String input;
            StringBuffer response = new StringBuffer();

            //read the data line by line from the input stream using readLine met
hod
            while ((input = inBuf .readLine()) != null) {
            response.append(input);
            } inBuf .close();
            // print result
            System.out.println(response.toString());
            String inline2 = "["+ response+"]";

            //create json array
            JSONArray jsonar = new JSONArray(inline2);


            for (int i = 0; i < jsonar.length(); i++) {
                 //read json array one by one using json object
                JSONObject album = jsonar.getJSONObject(i);
                message = album.getString("message");

            }

            return message; // return thr message

    } else {
        System.out.println("POST NOT WORKED");
    }

        return message;// return thr message
    }



   // notify the listners
   private void notifyListeners(String result) throws IOException, JSONException{

        for(SensorListner Listner : list) {
            try {
                //call to the callback method
                Listner.SensorChanged(result);

            } catch (RemoteException e) {
                e.printStackTrace();
            }
        }

    }



    // update the sensor details every 15 seconds
    public void updateStatus(){
          // start timer object
          TimerTask task = new TimerTask() {
          @Override
          public void run() {
             try {

                   update = getSensor(); //get the update
                   sentEmailMsg(update); // call the sentEmailMsg method to send
email and messages
                   SendAlertCo2Smoke(update); // notify the client

             } catch (IOException ex) {
               Logger.getLogger(FireSensorServer.class.getName()).log(Level.SEVER
E, null, ex);
             } catch (JSONException ex) {
               Logger.getLogger(FireSensorServer.class.getName()).log(Level.SEVER
E, null, ex);
             }
          }
        };

        Timer timer = new Timer();
        long delay = 0;
        long intevalPeriod = 1 * 15000; // RMI sever get upto date every 15 secon
ds
        // schedules the task to be run in an interval
        timer.scheduleAtFixedRate(task, delay,intevalPeriod);


    }
```

```
// send notification to client using callback method
 public void SendAlertCo2Smoke(String result) throws IOException, JSONException {

        notifyListeners(result); // notify listner when co2 or smoke level > 5

 }


// send email, sms when co2 level or smoke level move to greater than 15
public void sentEmailMsg(String result) throws JSONException, MalformedURLExcepti
on, IOException{

        JSONArray jsonar = new JSONArray(result.toString());

        for (int i = 0; i < jsonar.length(); i++) {

            JSONObject album = jsonar.getJSONObject(i);

            String email = "chamildilu@gmail.com";
            int co2   =  album.getInt("Co2Level");
            int smoke =  album.getInt("smokeLevel");
            int floor =  album.getInt("FloorNo");
            int room  =  album.getInt("roomNo");

            final String REQ_PARAMS = "{\n" + "\"FloorNb\": "+floor+",\r\n" +
                                       "    \"roomNo\": "+room+",\r\n" +
                                       "    \"Co2Level\": "+co2+",\r\n" +
                                       "    \"smokeLevel\": "+smoke+",\r\n" +
                                       "    \"email\": \""+email+"\"" + "\n}";



            if(co2 > 5 || smoke > 5 ){



                System.out.println(REQ_PARAMS);

                //create a URL object with the target URI string that accepts the
 JSON data via HTTP POST method
                URL obj = new URL("http://localhost:5000/email/send/");

                //invoke the openConnection method to get the HttpURLConnection o
bject
```

```
                HttpURLConnection postConnection = (HttpURLConnection) obj.openCo
nnection();

                postConnection.setRequestMethod("POST");//send a POST request

                //parameter has to be set to send the request body in JSON format
                postConnection.setRequestProperty("Content-
Type", "application/json");

                // enable the URLConnection object's doOutput property to true
                postConnection.setDoOutput(true);

                //Open the DataOutputStream object
                OutputStream ost = postConnection.getOutputStream();
                ost.write(REQ_PARAMS.getBytes());
                ost.flush();
                ost.close();
                int responseCode = postConnection.getResponseCode();
                System.out.println("POST Response Code :  " + responseCode);
                System.out.println("POST Response Message : " + postConnection.ge
tResponseMessage());

                //response code is OK then create the input stream to read the re
turned data
                if (responseCode == HttpURLConnection.HTTP_OK) { //success
                    BufferedReader inBuf = new BufferedReader(new InputStreamRead
er(postConnection.getInputStream()));
                    String input;
                    StringBuffer response = new StringBuffer();
                    while ((input = inBuf .readLine()) != null) {
                response.append(input);
                    } inBuf .close();
                    // print result
                    System.out.println(response.toString());
                } else {
                    System.out.println("POST NOT WORKED");
                }

            }
            if(co2 > 5 || smoke > 5 ){

                URL obj = new URL("http://localhost:5000/sms/send/");
                HttpURLConnection postConnection = (HttpURLConnection) obj.openCo
nnection();
                postConnection.setRequestMethod("POST");

                postConnection.setRequestProperty("Content-
Type", "application/json");
                postConnection.setDoOutput(true);
                OutputStream ost = postConnection.getOutputStream();
                ost.write(REQ_PARAMS.getBytes());
                ost.flush();
                ost.close();
                int responseCode = postConnection.getResponseCode();
                System.out.println("POST Response Code :  " + responseCode);
                System.out.println("POST Response Message : " + postConnection.ge
tResponseMessage());
                if (responseCode == HttpURLConnection.HTTP_OK) { //success
                    BufferedReader inBuf = new BufferedReader(new InputStreamRead
er(postConnection.getInputStream()));
                    String input;
                    StringBuffer response = new StringBuffer();
                    while ((input = inBuf .readLine()) != null) {
                    response.append(input);
                    } inBuf .close();
                    // print result
                    System.out.println(response.toString());
                } else {
                    System.out.println("POST NOT WORKED");
                }
            }
        }
    }


    // return the updated sensor details
     public String Getupdate(){
         return update;
     }
    public static void main(String[] args)  {
    System.out.println("Loading temperature service");


    try {

            FireSensorServer sensor = new FireSensorServer();
            //register the sensor sever
            Registry reg = LocateRegistry.createRegistry(1099);

            reg.rebind("FireSensor", sensor);


            sensor.updateStatus();


            } catch (RemoteException re) {
        System.err.println("Remote Error - " + re);
            } catch (Exception e) {
        System.err.println("Error - " + e);
            }

    }
}
```

RMI CLIENT

SensorListner.java

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template file in the editor.
 */
package DekstopClient;

//this is callback interface
//this is also remote interface of the client
public interface SensorListner extends java.rmi.Remote{

    //This will expose the remote method which will give the changed Sensor deyta
ils
    public void SensorChanged(String object) throws     java.rmi.RemoteException;
}
```

SensorMonitor.java

```
package DekstopClient;

import java.io.IOException;
import java.net.MalformedURLException;
import java.rmi.Naming;
import java.rmi.NotBoundException;
import java.rmi.Remote;
import java.rmi.RemoteException;
import java.rmi.server.UnicastRemoteObject;
import java.util.logging.Level;
import java.util.logging.Logger;
import org.json.JSONArray;
import org.json.JSONException;

/**
 *
 * @author UDILUCH
 */
```

```java
public class SensorMonitor extends UnicastRemoteObject implements SensorListner{

    static String reading, changed = null;
    static FireSensor sensor;

    public SensorMonitor() throws RemoteException {
    }

    public static void main(String[] args) throws RemoteException, IOException, J
SONException, NotBoundException {
        try {
            String registration = "rmi://localhost:1099/FireSensor";

            Remote remoteService = Naming.lookup(registration);

            //getting the reference of remote server interface
             sensor = (FireSensor) remoteService;

            //This is blocking call
            reading = sensor.getSensor();

            SensorMonitor monitor = new SensorMonitor();

            //client object to register to the server
            sensor.addTemperatureListener(monitor);

         } catch (MalformedURLException mue) {
        }
    }


    // call RMI server to add details of the sensor
    public static String addDetails(String id, int floor, int room) throws IOExce
ption, RemoteException, JSONException, NotBoundException{
        String registration = "rmi://localhost:1099/FireSensor";
        Remote remoteService = Naming.lookup(registration);
        sensor = (FireSensor) remoteService;
        String result =  sensor.addSensorDetails(id, floor, room);

        return  result;
    }
    // call RMI server to Update details of the sensor
     public static String UpdateDetails(String Sensorid, int floor, int room, Str
ing id, int co2, int smoke, String status) throws IOException, RemoteException, J
SONException, NotBoundException{
        String registration = "rmi://localhost:1099/FireSensor";
        Remote remoteService = Naming.lookup(registration);
        sensor = (FireSensor) remoteService;
        String result =  sensor.UpdateSensorDetails(Sensorid, floor, room, id, co
2,smoke, status);

        return  result;
    }


   //implement the callback method at the client side
    public void SensorChanged(String object) throws RemoteException {

      changed = object;
      MonitorApp app = new MonitorApp();

        try {

            app.showAlert(object);// call showAtlert method to show alerts

        } catch (JSONException ex) {
            Logger.getLogger(SensorMonitor.class.getName()).log(Level.SEVERE, nul
l, ex);
        }
    }


    //get the update of the sensor deatils
    public String getUpdate() throws NotBoundException, MalformedURLException, Re
moteException, IOException, JSONException{
        String registration = "rmi://localhost:1099/FireSensor";
        Remote remoteService = Naming.lookup(registration);
        sensor = (FireSensor) remoteService;
        return sensor.Getupdate();
    }

}
```

Admin Login / Register GUI(UILogin.java)

Sign up

```
  if (!RegUserNAmeText.getText().trim().isEmpty() & !RegPaswrdText.getText().trim
().isEmpty() ) {

            String username = RegUserNAmeText.getText();
            String paswrd = RegPaswrdText.getText();


               if(!username.equals("Enter your Username") & !paswrd.equals("mmmmmm
mmm"))
                {
                     boolean value = false;

                try {

                   value = login.SignUpPOST(username, paswrd);

                } catch (ProtocolException ex) {
                    Logger.getLogger(UILogin.class.getName()).log(Level.SEVERE, n
ull, ex);
                } catch (IOException ex) {
                    Logger.getLogger(UILogin.class.getName()).log(Level.SEVERE, n
ull, ex);
                } catch (JSONException ex) {
                    Logger.getLogger(UILogin.class.getName()).log(Level.SEVERE, n
ull, ex);
                }
                    if(value)
                    {

                       JOptionPane.showMessageDialog(null, "Registration Successf
ull");


                } else {
                     JOptionPane.showMessageDialog(null, "Registration Faild");
                }

            }else{

                  JOptionPane.showMessageDialog(null, "Please fill all feilds");
            }
```

```
        } else if (!RegUserNAmeText.getText().trim().isEmpty() & !RegPaswrdText.g
etText().trim().isEmpty() ) {
            JOptionPane.showMessageDialog(null, "Please enter Confirmation passwo
rd!");

        } else if (!RegUserNAmeText.getText().trim().isEmpty() & RegPaswrdText.ge
tText().trim().isEmpty() ) {
            JOptionPane.showMessageDialog(null, "Please enter Password!");

        } else if (RegUserNAmeText.getText().trim().isEmpty() & !RegPaswrdText.ge
tText().trim().isEmpty() ) {
            JOptionPane.showMessageDialog(null, "Please enter username!");
        }
        else {
            JOptionPane.showMessageDialog(null, "Please fill all feilds");
        }

    }//GEN-LAST:event_SignUpREGMouseClicked
```

Sign In

```
 if (!LoginUserNAme.getText().trim().isEmpty() && !LoginPaswrd.getText().trim().i
sEmpty()) {
            String userN = LoginUserNAme.getText().trim();
            String pass = LoginPaswrd.getText().trim();

             if(!userN.equals("Enter your Username") & !pass.equals("mmmmmmmm") )
             {

                boolean value = false;

                try {

                   value = login.LoginPOST(userN, pass);

                } catch (ProtocolException ex) {
                    Logger.getLogger(UILogin.class.getName()).log(Level.SEVERE, n
ull, ex);
                } catch (IOException ex) {
                    Logger.getLogger(UILogin.class.getName()).log(Level.SEVERE, n
ull, ex);
                } catch (JSONException ex) {
                    Logger.getLogger(UILogin.class.getName()).log(Level.SEVERE, n
ull, ex);
                }

                if (value) {

                   MonitorApp ctool = new MonitorApp();
                   ctool.check = true;
                    ctool.setLogout();
                   ctool.setVisible(true);
                   this.dispose();

            } else {
                JOptionPane.showMessageDialog(null, "Login does not exist!");
            }
            }

             else if (!LoginPaswrd.getText().trim().isEmpty() & LoginUserNAme.get
Text().trim().isEmpty() ) {
                JOptionPane.showMessageDialog(null, "Please fill all feilds");

            }
             else if (!LoginUserNAme.getText().trim().isEmpty()  & LoginPaswrd.ge
tText().trim().isEmpty() ) {
            JOptionPane.showMessageDialog(null, "Please enter  password!");

        } else if (!LoginPaswrd.getText().trim().isEmpty() & LoginUserNAme.getTex
t().trim().isEmpty() ) {
            JOptionPane.showMessageDialog(null, "Please enter Username!");
        }else {
            JOptionPane.showMessageDialog(null, "Please fill all feilds");
        }
     }
  }//GEN-LAST:event_jLabel10MouseClicked
```

Login.java

```
package DekstopClient;

import java.io.BufferedReader;
import java.io.IOException;
import java.io.InputStreamReader;
import java.io.OutputStream;
import java.net.HttpURLConnection;
import java.net.MalformedURLException;
import java.net.ProtocolException;
import java.net.URL;
import org.json.JSONArray;
import org.json.JSONException;
import org.json.JSONObject;

/**
 *
 * @author UDILUCH
 */
public class login {



    public static boolean SignUpPOST(String username,String password) throws Malf
ormedURLException, ProtocolException, IOException, JSONException{

            boolean sucess = false;
            //creating a custom JSON String
        final String REQ_PARAMS = "{\n" +
                "    \"Type\": \"User\",\r\n" +
                "    \"Username\": \""+username+"\",\r\n" +
                "    \"Password\": \""+password+"\"" + "\n}";
        System.out.println(REQ_PARAMS);
            //create a URL object with the target URI string that accepts the JSO
N data via HTTP POST method
        URL obj = new URL("http://localhost:5000/user/sign-up");

            //invoke the openConnection method to get the HttpURLConnection objec
t
        HttpURLConnection postConnection = (HttpURLConnection) obj.openConnection
();

        postConnection.setRequestMethod("POST");//send a POST request
```

```
            //parameter has to be set to send the request body in JSON format
        postConnection.setRequestProperty("Content-Type", "application/json");

            // enable the URLConnection object's doOutput property to true
        postConnection.setDoOutput(true);

            //Open the DataOutputStream object
        OutputStream ost = postConnection.getOutputStream();
        ost.write(REQ_PARAMS.getBytes());
        ost.flush();
        ost.close();
        int responseCode = postConnection.getResponseCode();//Check the response
code
        System.out.println("POST Response Code :  " + responseCode);
        System.out.println("POST Response Message : " + postConnection.getRespons
eMessage());

            //response code is OK then create the input stream to read the return
ed data
        if (responseCode == HttpURLConnection.HTTP_OK) { //success
            BufferedReader inBuf = new BufferedReader(new InputStreamReader(
                postConnection.getInputStream()));
            String input;
            StringBuffer response = new StringBuffer();

                //read the data line by line from the input stream using readLine
 method
            while ((input = inBuf .readLine()) != null) {
                response.append(input);
            } inBuf .close();
            // print result
            System.out.println(response.toString());

                String inline2 = "["+ response+"]";

        //create json array
        JSONArray jsonar = new JSONArray(inline2);


        for (int i = 0; i < jsonar.length(); i++) {

                    //read json array one by one using json object
                    JSONObject album = jsonar.getJSONObject(i);
                    sucess = album.getBoolean("success");
        }
                return sucess;

        } else {
            System.out.println("POST NOT WORKED");
        }

            return sucess;
    }


    public static boolean LoginPOST(String username,String password) throws Malfo
rmedURLException, ProtocolException, IOException, JSONException{

            boolean sucess = false;

            //creating a custom JSON String
        final String REQ_PARAMS = "{\n" +
                "    \"Username\": \""+username+"\",\r\n" +
                "    \"Password\": \""+password+"\"" + "\n}";
        System.out.println(REQ_PARAMS);

            //create a URL object with the target URI string that accepts the JSO
N data via HTTP POST method
        URL obj = new URL("http://localhost:5000/user/sign-in");

            //invoke the openConnection method to get the HttpURLConnection objec
t
        HttpURLConnection postConnection = (HttpURLConnection) obj.openConnection
();

        postConnection.setRequestMethod("POST");//send a POST request

            //parameter has to be set to send the request body in JSON format
        postConnection.setRequestProperty("Content-Type", "application/json");

            // enable the URLConnection object's doOutput property to true
        postConnection.setDoOutput(true);

            //Open the DataOutputStream object
        OutputStream ost = postConnection.getOutputStream();
        ost.write(REQ_PARAMS.getBytes());
        ost.flush();
        ost.close();
        int responseCode = postConnection.getResponseCode();
        System.out.println("POST Response Code :  " + responseCode);
        System.out.println("POST Response Message : " + postConnection.getRespons
eMessage());

            //response code is OK then create the input stream to read the return
ed data
        if (responseCode == HttpURLConnection.HTTP_OK) { //success
            BufferedReader inBuf = new BufferedReader(new InputStreamReader(
                postConnection.getInputStream()));
            String input;
            StringBuffer response = new StringBuffer();

                //read the data line by line from the input stream using readLine
 method
            while ((input = inBuf .readLine()) != null) {
                response.append(input);
            } inBuf .close();
            // print result
            System.out.println(response.toString());

                String inline2 = "["+ response+"]";

               //create json array
            JSONArray jsonar = new JSONArray(inline2);


            for (int i = 0; i < jsonar.length(); i++) {

                    //read json array one by one using json object
                    JSONObject album = jsonar.getJSONObject(i);
                    sucess = album.getBoolean("success");

            }
                   return sucess;

        } else {
            System.out.println("POST NOT WORKED");
        }
            return sucess;
    }

}
```

Fire Sensor Monitor GUI(MonitorApp.java)

Sensor add

```
         String Sid = SensorID.getText();
        int floor = Integer.parseInt(FloorNo.getText());
        int room = Integer.parseInt(roomNo.getText());


          try {
              SensorMonitor sensor1 = new SensorMonitor();
              String result = sensor1.addDetails(Sid, floor, room);
              JOptionPane.showMessageDialog(null, result);

          } catch (IOException ex) {
              Logger.getLogger(MonitorApp.class.getName()).log(Level.SEVERE, null
, ex);
          } catch (JSONException ex) {
              Logger.getLogger(MonitorApp.class.getName()).log(Level.SEVERE, null
, ex);
          } catch (NotBoundException ex) {
              Logger.getLogger(MonitorApp.class.getName()).log(Level.SEVERE, null
, ex);
          }

       id.setText("");
       SensorID.setText("");
       FloorNo.setText("");
```

Get the table record to the form(by clicking table row)

```
        saveBtn.setVisible(false);
       updateBtn.setVisible(true);

       int i = SensorTable.getSelectedRow();
       TableModel model = SensorTable.getModel();

       //get the selected row details
       String Sensorid = model.getValueAt(i, 0).toString();
       String floor =  model.getValueAt(i, 1).toString() ;
       String room =  model.getValueAt(i, 2).toString() ;
       String co2 =   model.getValueAt(i, 3).toString() ;
       String smoke =  model.getValueAt(i, 4).toString() ;
       String status =  model.getValueAt(i, 5).toString() ;
```

```
        String Iid =  model.getValueAt(i, 6).toString() ;

        id.setText(Iid);
        SensorID.setText(Sensorid);
        FloorNo.setText(floor);
        roomNo.setText(room);
        Co2text.setText(co2);
        SmokeText.setText(smoke);
        StatusText.setText(status);
```

Update selected sensor details

```
         String Sid = SensorID.getText();
         String status = StatusText.getText();
         int floor = Integer.parseInt(FloorNo.getText());
         int room = Integer.parseInt(roomNo.getText());
         int co2 = Integer.parseInt(Co2text.getText());
         int smoke = Integer.parseInt(SmokeText.getText());
         String Iid = id.getText();


          try {
              SensorMonitor sensor1 = new SensorMonitor();
              String result = sensor1.UpdateDetails(Sid, floor, room, Iid,co2,smo
ke,status); // update the sensor details
              JOptionPane.showMessageDialog(null, result);

          } catch (IOException ex) {
              Logger.getLogger(MonitorApp.class.getName()).log(Level.SEVERE, null
, ex);
          } catch (JSONException ex) {
              Logger.getLogger(MonitorApp.class.getName()).log(Level.SEVERE, null
, ex);
          } catch (NotBoundException ex) {
              Logger.getLogger(MonitorApp.class.getName()).log(Level.SEVERE, null
, ex);
          }

        saveBtn.setVisible(true);
       updateBtn.setVisible(false);

       id.setText("");
       SensorID.setText("");
       FloorNo.setText("");
       roomNo.setText("");
       Co2text.setText("");
       SmokeText.setText("");
       StatusText.setText("");
```

Table details show and get the update every 30 seconds

```
      public void showStatmentDetails()

     {
         // each 30 seconds update the Dekstop client object

          TimerTask task = new TimerTask() {
          @Override
          public void run() {
          try {

             DefaultTableModel dft = (DefaultTableModel)SensorTable.getModel();
             dft.setRowCount(0);

              SensorMonitor sensor1 = new SensorMonitor();
              String result = sensor1.getUpdate();
              System.out.println(result);
              JSONArray jsonar = new JSONArray(result.toString());


             for (int i = 0; i < jsonar.length(); i++) {
         JSONObject album = jsonar.getJSONObject(i);

                 // set the value in to the table
                 Vector vector = new Vector();
                 vector.add( album.getString("SensorID") );
                 vector.add( album.getInt("FloorNo") );
                 vector.add( album.getInt("roomNo") );
                 vector.add( album.getInt("Co2Level") );
                 vector.add( album.getInt("smokeLevel") );
                 vector.add( album.getString("status") );
```

```
                    vector.add( album.getString("_id") );

                    dft.addRow(vector);

                }

            } catch (Exception e) {
          }
      }
    };

      Timer timer = new Timer();
      long delay = 0;
      long intevalPeriod = 1 * 30000;
      // schedules the task to be run in an interval
      timer.scheduleAtFixedRate(task, delay,intevalPeriod);
}
```

Callback Alert

```
 //show alert when co2 or smoke level > 5
    public void showAlert(String result) throws JSONException{

            JSONArray jsonar = new JSONArray(result.toString());

            for (int i = 0; i < jsonar.length(); i++) {

          JSONObject album = jsonar.getJSONObject(i);

                 String sensorid = album.getString("SensorID");

                  if(album.getInt("Co2Level") > 5 ){

                     String co2 = sensorid + " : " + "CO2 level increase - " + alb
um.getInt("Co2Level");
                     JOptionPane.showMessageDialog(null,co2);
                 }

                 if(album.getInt("smokeLevel") > 5){
                     String smoke = sensorid + " : " + "Smoke level increase - " +
 album.getInt("smokeLevel");
```

```
                        JOptionPane.showMessageDialog(null, smoke);
                    }
                }
        }
```

Sensor APP (update REST API every 10 seconds)

```
public class timer {

          public static void main(String[] args) {

            TimerTask task = new TimerTask() {

            @Override
            public void run() {
                // task to run goes here
                Random randomGenerator=new Random();


                try {

                    //get the sensor details as JSON every 10 seconds
                     JSONArray jsonar = (JSONArray) getFireDetails();

                     String id = null;
                     String Sensorid = null;
                     int floor, room;
                     String[] arr={"active", "deactive"};

                     for (int i = 0; i < jsonar.length(); i++) {

                         //get the one JSON object
                         JSONObject album = jsonar.getJSONObject(i);

                         id = album.getString("_id");
                         Sensorid = album.getString("SensorID");
                         floor = album.getInt("FloorNo");
                         room = album.getInt("roomNo");

                         int co2 = randomGenerator.nextInt(10) + 1; // set the ra
ndom number between 0-10
                         int smoke = randomGenerator.nextInt(10) + 1;// set the r
andom number between 0-10
                         int idx = randomGenerator.nextInt(arr.length);
```

```
                        String status = (arr[idx]);                   // set the
 status as random

                        //call update sensor to update the details  every 10 sec
onds.
                        updateSensor(id, co2, smoke,status,Sensorid,floor,room);
                    }



                } catch (JSONException | IOException e) {
                    // TODO Auto-generated catch block
                    e.printStackTrace();
                }

              }
            };

            Timer timer = new Timer();
            long delay = 0;
            long intevalPeriod = 1 * 10000; // set the time interval as 10 second
s
            // schedules the task to be run in an interval
            timer.scheduleAtFixedRate(task, delay,intevalPeriod);
          } // end of main



          public static Object getFireDetails() throws JSONException, IOException
 {

                 //create a URL object with the target URI string that accepts th
e JSON data via HTTP GET method
                 URL url= new URL("http://localhost:5000/sensor/");

                 //invoke the openConnection method to get the HttpURLConnection 
object
                 HttpURLConnection conn = (HttpURLConnection)url.openConnection()
;

                 conn.setRequestMethod("GET");//send a GET request

                 conn.connect();//Open a connection stream to the corresponding A
PI
```

```
                int responsecode = conn.getResponseCode();

                BufferedReader inBuf = new BufferedReader(new InputStreamReader(
conn.getInputStream()));
                String input;
                StringBuffer response = new StringBuffer();
                while ((input = inBuf .readLine()) != null) {
                     response.append(input);
                } inBuf .close();
                // print result
                System.out.println("\nJSON data in string format");
                System.out.println(response);

                // get the JSON response
                JSONArray jsonar = new JSONArray(response.toString());

                return jsonar; // return the response as JSON array

          }


          // this method update the rest API every 10 seconds

          private static void updateSensor(String id, int co2, int smoke, String
status,String sensorId, int floor, int room) throws IOException {

               //creating a custom JSON String
                 final String REQ_PARAMS = "{\n" + "\"FloorNo\": "+floor+",\r\n" +
                         "    \"roomNo\": "+room+",\r\n" +
                         "    \"Co2Level\": "+co2+",\r\n" +
                         "    \"smokeLevel\": "+smoke+",\r\n" +
                         "    \"status\": \""+status+"\",\r\n" +
                         "    \"SensorID\": \""+sensorId+"\"" + "\n}";


                 System.out.println(REQ_PARAMS);
                 //create a URL object with the target URI string that accepts the
 JSON data via HTTP PUT method
                 URL obj = new URL("http://localhost:5000/sensor/update/"+id);

                 HttpURLConnection postConnection = (HttpURLConnection) obj.openCo
nnection();

                 postConnection.setRequestMethod("PUT"); //send a POST request
                 //parameter has to be set to send the request body in JSON format
                 postConnection.setRequestProperty("Content-
 Type", "application/json");

                 // enable the URLConnection object's doOutput property to true
                 postConnection.setDoOutput(true);

                 //Open the DataOutputStream object
                 OutputStream ost = postConnection.getOutputStream();
                 ost.write(REQ_PARAMS.getBytes());
                 ost.flush();
                 ost.close();

                 int responseCode = postConnection.getResponseCode();
                 System.out.println("POST Response Code :  " + responseCode);
                 System.out.println("POST Response Message : " + postConnection.ge
 tResponseMessage());

                 //response code is OK then create the input stream to read the re
 turned data
                 if (responseCode == HttpURLConnection.HTTP_OK) { //success
                     BufferedReader inBuf = new BufferedReader(new InputStreamRead
 er(postConnection.getInputStream()));
                     String input;
                     StringBuffer response = new StringBuffer();

                     while ((input = inBuf .readLine()) != null) {
                         response.append(input);
                     } inBuf .close();

                     // print result
                     System.out.println(response.toString());
                 } else {
                     System.out.println("POST NOT WORKED");
                 }
             }

 }
```

END OF THE REPORT

THANK YOU