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Homework 5: System Design and Modeling

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Rev. 3

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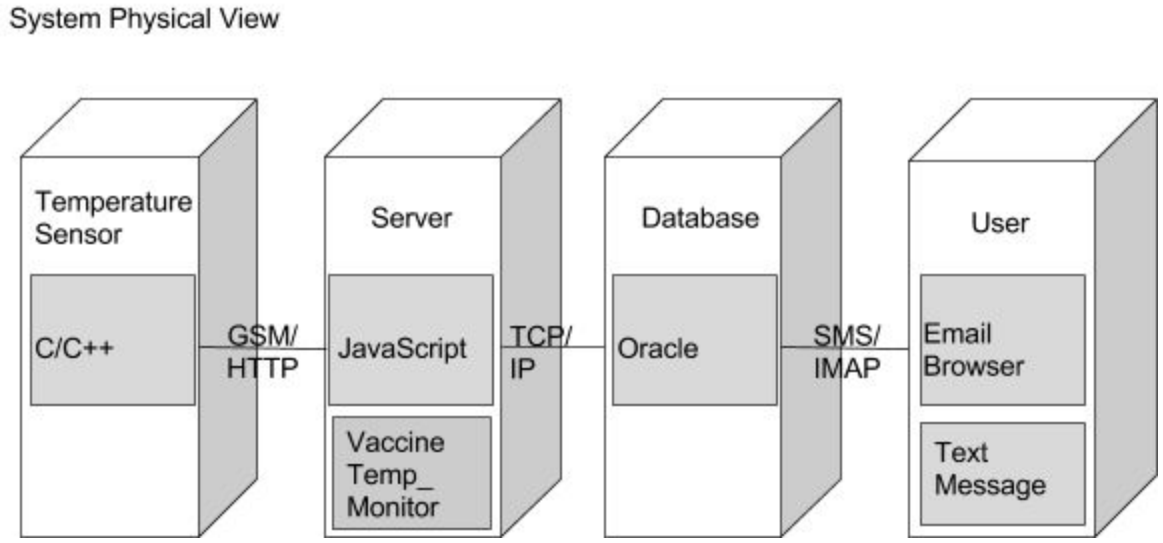
Design Assumptions and Decisions

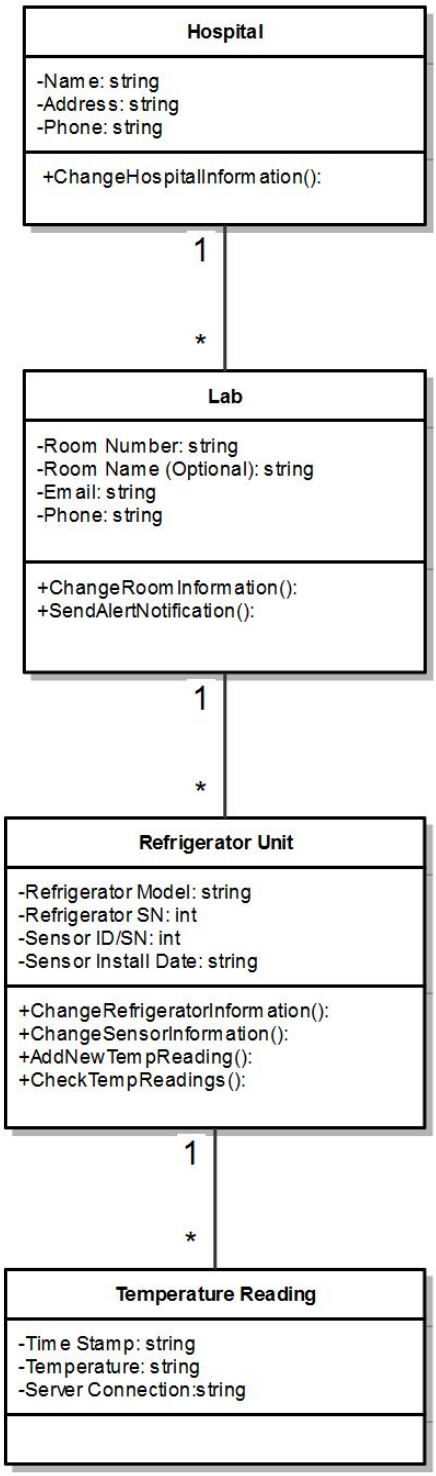
- The brand of refrigerator and serial number will be cataloged (for future reference in case one brand is observed to be more prone to failure)
- Temperature is measured in degrees celsius
- Temperature readings are taken once every 30 minutes
- System runs off of batteries, and therefore should send an alert when batteries are low
- System data is sent via GSM
- The temperature inside the refrigerator is equal at every point
- The monitoring system could be placed anywhere inside the fridge
- The parts used to build the monitoring system must withstand the refrigerator temperatures
- The server will check the temperature readings and alert user if temperature is out of bounds
- Logged data is automatically deleted every 3 months from server
- Temp sensor has a 7 segment display to display last temperature
- If server cannot send data on third time, we display err on display and buzz built in buzzer (buzzer for server errors)
- Server will send notification to Doctor/Nurse if it doesn't get any readings for 6 hours
- The timestamp will be a UNIX timestamp i.e. seconds until epoch
- A low battery notification means that temperature sensor battery has 20% battery life left or less
- The temperature reading is converted into a digital value using a 8 bit ADC
- The conversion to degrees celsius is done on the microcontroller

UML physical view

Software: C/C++, Javascript, Oracle, Email Browser or Text Message
Hardware: Temperature sensor, Server, Database, User



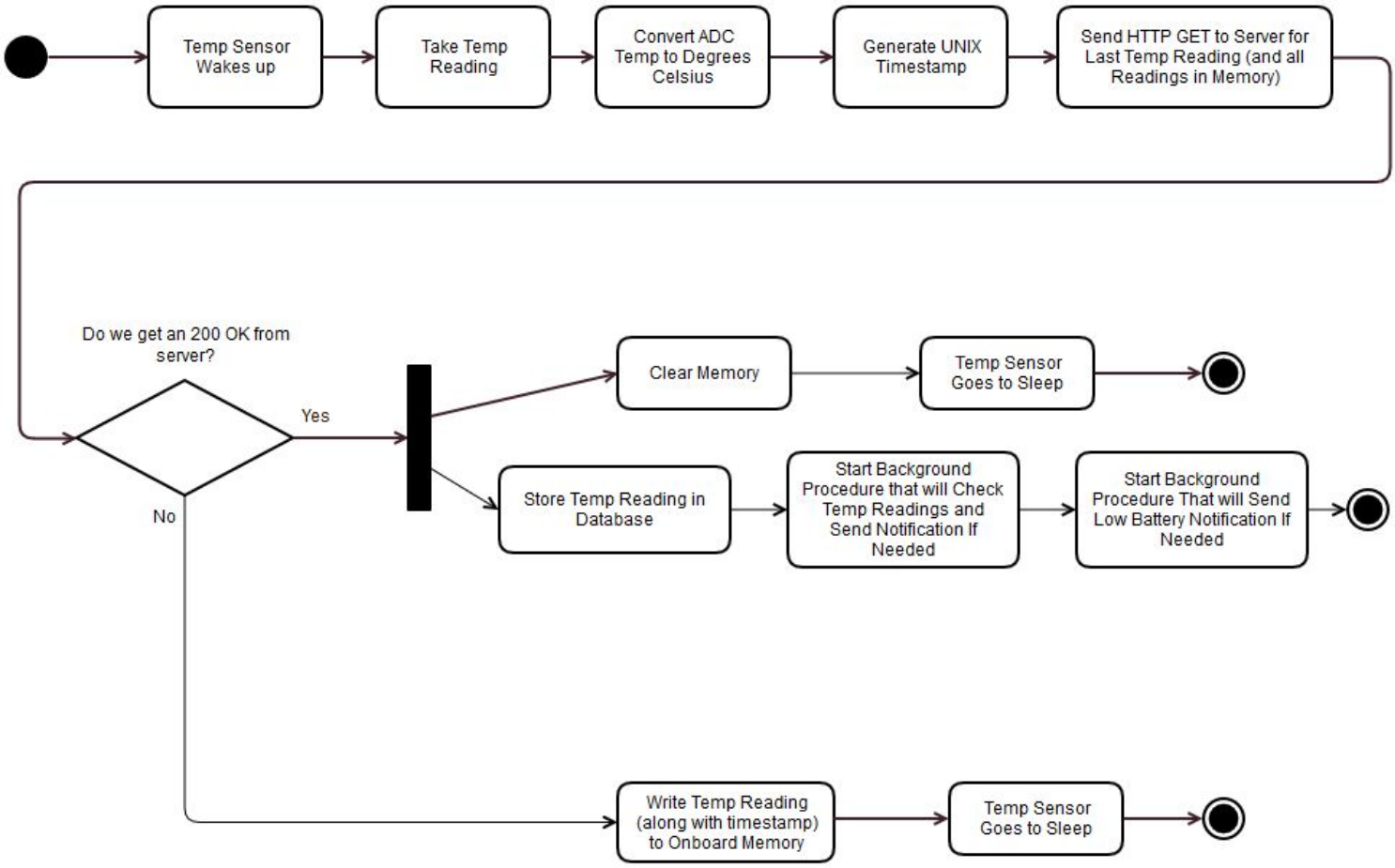
UML Class Diagram



UML Use-Case

Use-Case	Adding a Vaccine Temperature Sensor
Actors	Doctor or Nurse
Steps	Required actions for adding a vaccine temperature sensor 1) Order the temperature sensor kit online 2) Once kit is received, setup the temperature sensor by visiting the website listed on the kit a. Make new account for the hospital b. Follow online instructions for new entry i. Enter hospital ID ii. Enter associated lab ID iii. Enter refrigerator serial number iv. Enter temperature sensor ID/SN c. Enter the temperature range that the vaccine should be stored in i. Specify how often to take a temperature reading d. Enable notifications (via text message or email, or both) i. Sensor has low battery notification ii. Refrigerator temperature is out of bounds notification 3) Place the temperature sensor anywhere inside the refrigerator 4) Verify that the sensor is communicating with the server a. Visit associated website to verify status 5) Obtain temperature readings from the server
Stimulus	Doctor or nurse orders the vaccine temperature sensor kit online
Response	Kit is sent after payment is verified. Once the temperature sensor is installed, the server responds if it's receiving data from the sensor.

UML Activity View



HTTP GET Specification

Base HTTPS URL

https://vaccinetempmonitor.org/api/v1/

Parameters

Name	Type	Description
sensor_id	int	The ID of the temperature sensor reporting the information. This is a unique identifier that is given by each temperature sensor so the server knows where (what hospital, lab, refrigerator, etc) the temperature readings coming from.
temperature	int	The temperature reading inside the refrigerator. The units are degrees celsius.
timestamp	int	The timestamp of the temperature reading. Please note this is a Unix timestamp, seconds since the unix epoch.
low_battery	boolean	Lets the server know whether it should send out a low battery notification to the doctor/nurse, so they know it's time to replace the batteries on their temperature sensor.

Example URL

https://vaccinetempmonitor.org/api/v1/?sensor_id=4324&temp=23123&time_stamp=1479333441&low_battery=false