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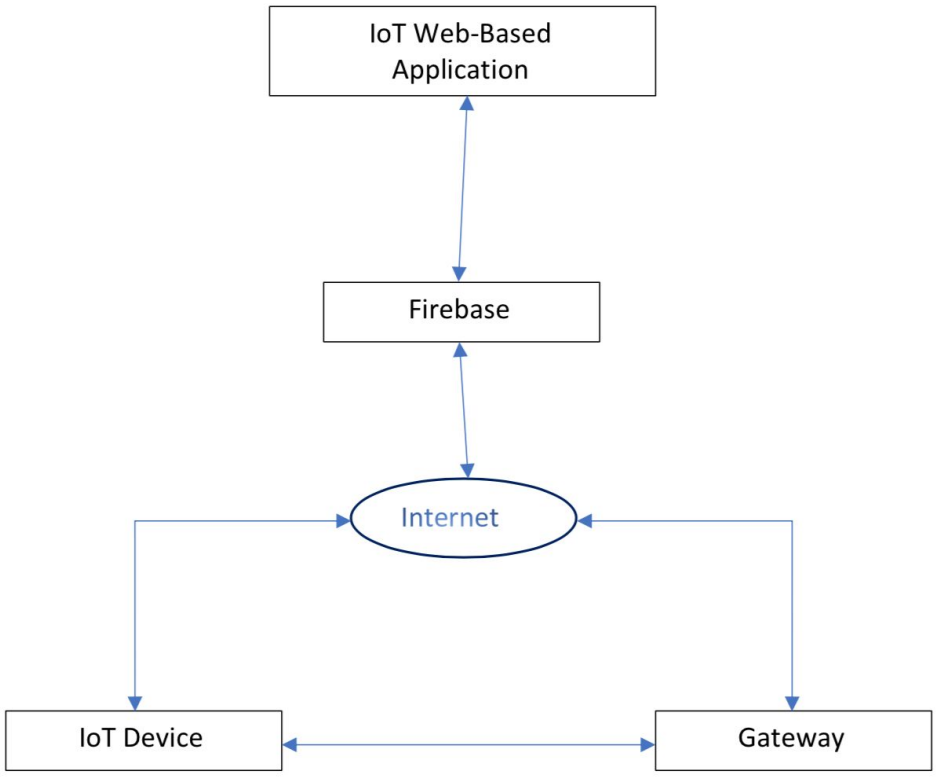
INF 551

Smart Home

Using Google's Firebase cloud database, we managed a set of smart home devices, such as the Nest thermostat, Ring Doorbell, and LIFX light bulb.

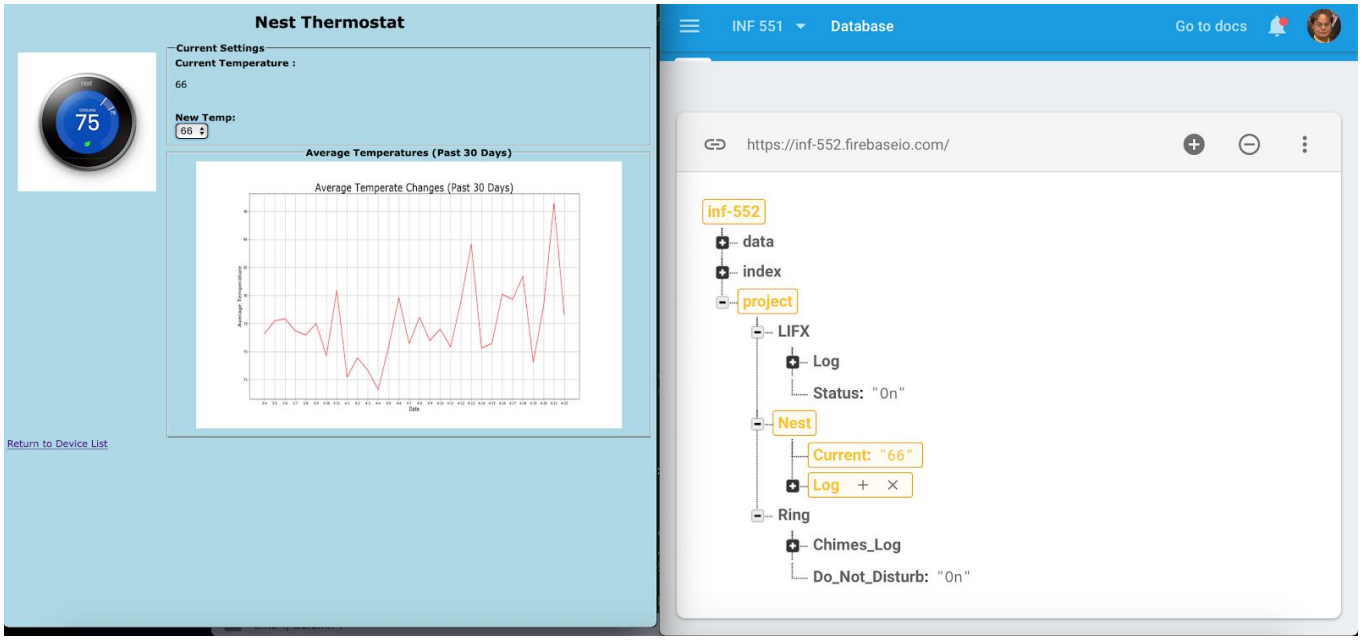
Overview of the IoT functionality:

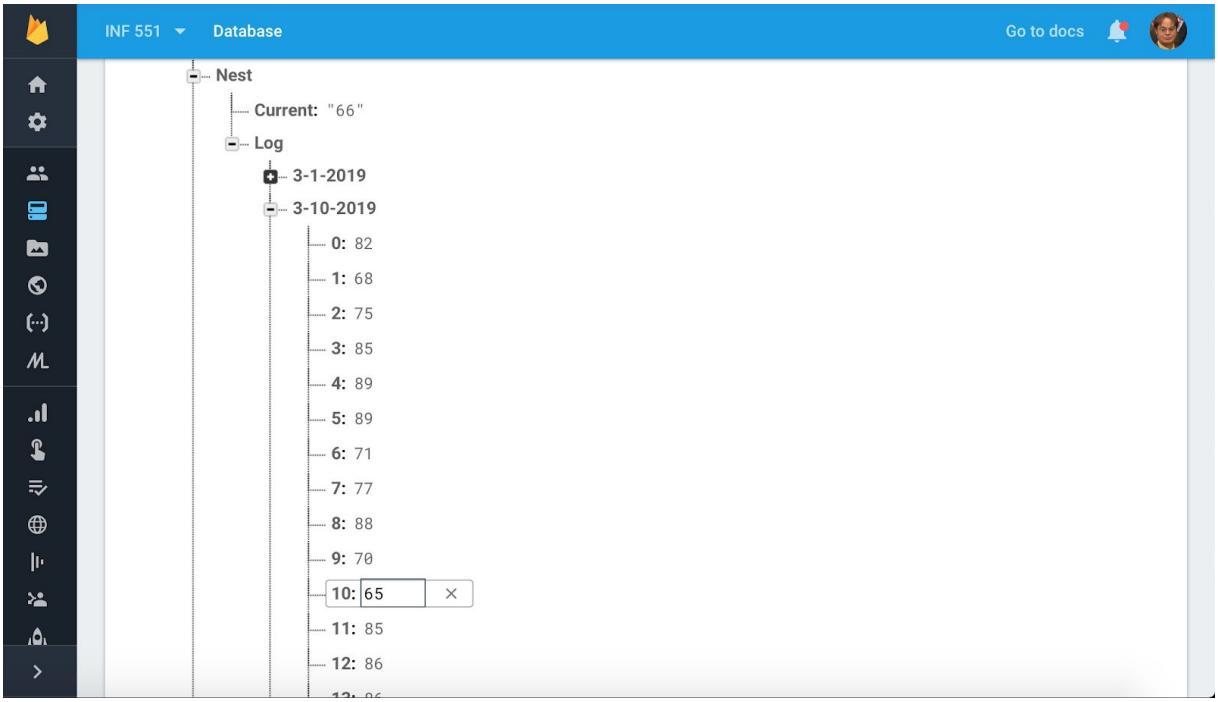


UI Components

NEST device (thermostat) :

NEST is a smart thermostat for controlling the temperatures in homes.The NEST device provides us the temperatures and the temperatures are stored in a log. The UI displays the statistics such as range of average temperatures over the past 30 days. We can control the temperature of the NEST device using the application.

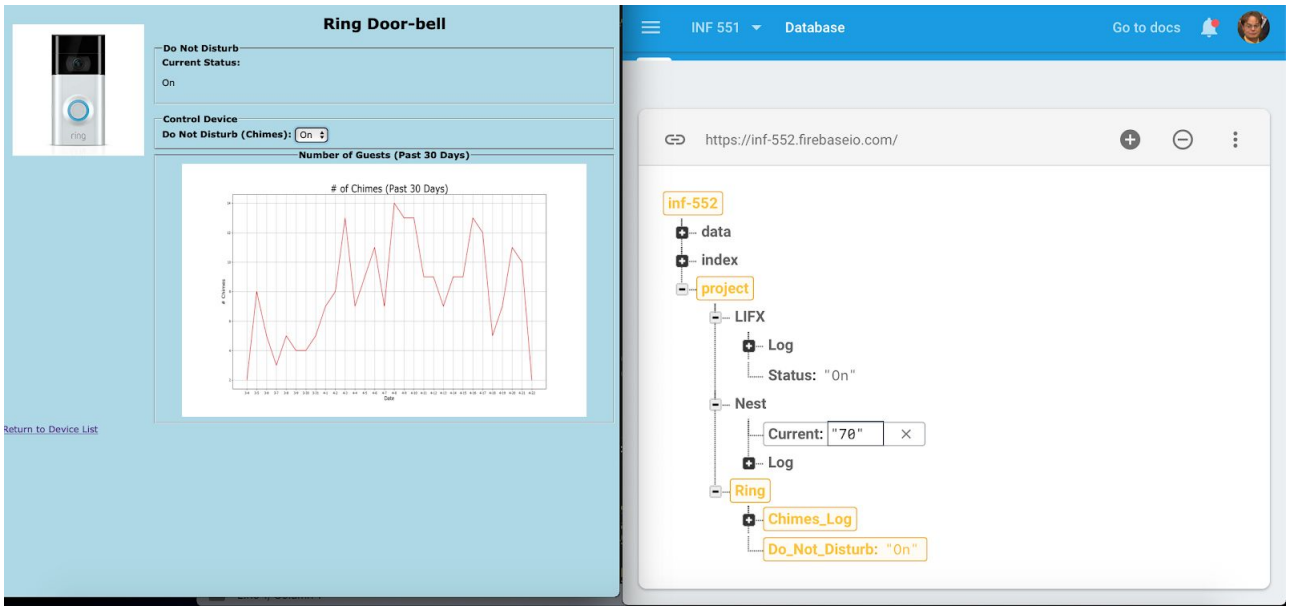


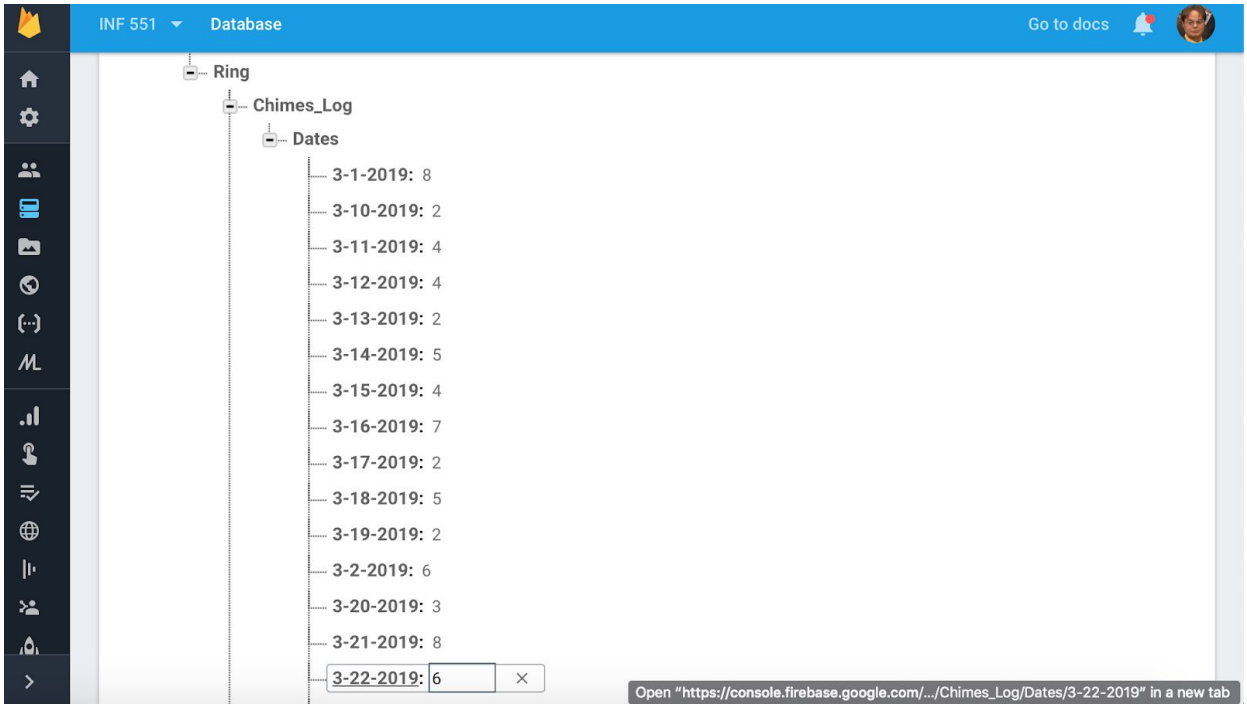


As seen above, once we set the new temperature on the webpage, it gets updated in the log on Firebase.

RING doorbell:

The Ring Video doorbell is a home security product that incorporates outdoor motion based cameras and doorbells. We simulated data, such as ding dongs (with a time-stamp). We can control the device by setting the chimes to Do Not Disturb mode and/or motion snooze. Using the UI, we display the statistics like the number of guests, which is the number of chimes over the past 30 days and the status of the device. In the database, we update the data as well as maintain a log of the chimes which consists of the time stamp and a count of the ding-dongs on a particular day.

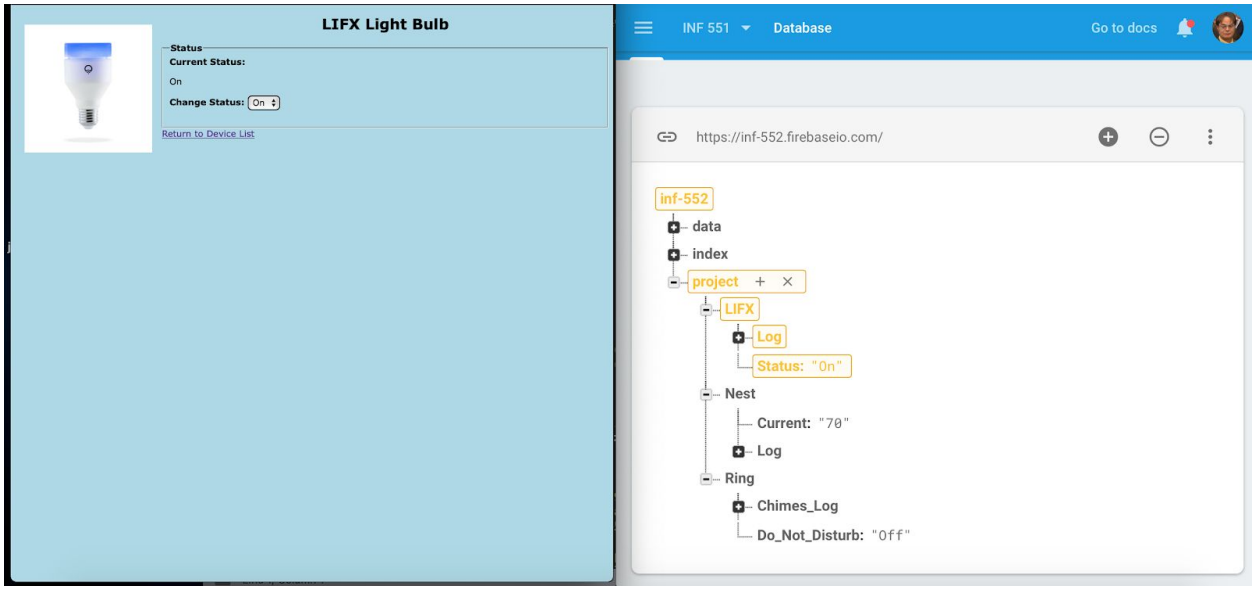


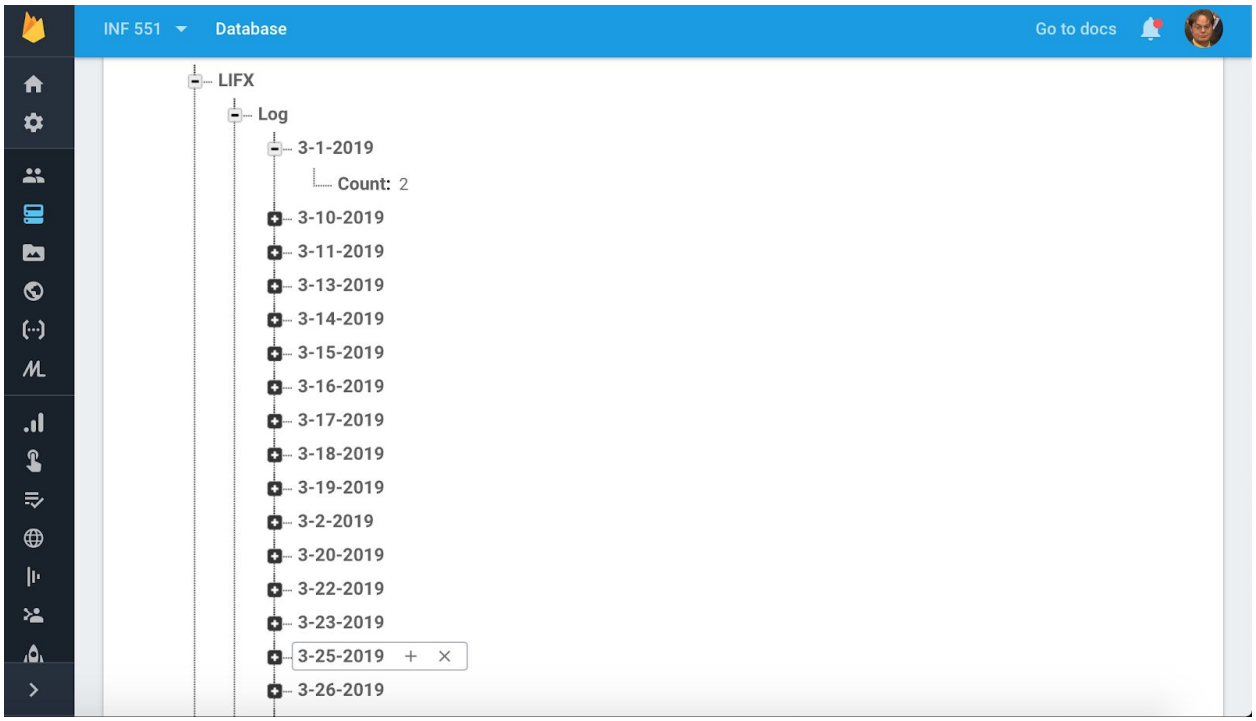


When the status of the doorbell is set to ‘ON’,using the control device, the date count is updated on Firebase.

LIFX Light Bulb:

On the UI of the application, we show the status of the light bulb-ON/OFF and control it using the application. The implementation can be seen as below:





We keep a log that counts how many times the device was switched ON/OFF. Though, it was decided that this data was not useful enough to provide any statistics on the webpage.

Implementation:

The data was simulated and stored into Firebase using Python. We randomly generated data for the LIFX light bulb by randomly selecting dates and and counting the number of switches of the device. For the Ring doorbell, we again randomly select dates and ring the doorbell to count the number of chimes per day to display it's statistics via a time-series on the device UI page. The data for the Nest thermostat was collected in a similar fashion, except instead of counting we record the inputted temperature under the date log to use in the time-series plot displaying average temperature inputs the average temperature inputs into the device per day in the time series plot displayed in the UI.

The UI was developed using HTML and Javascript in Sublime Text. To retrieve the real-time data on the webpage, I used a asynchronous listener to a database reference. The listener is triggered anytime the data changes. To write to the database, I used a database reference and using the `set()` and `update()` for LIFX and Ring since the we are simply counting. Though, for the Nest since we are storing each inputted temperature the `push()` command was used to generate a new key for the temperature value. A "selection" HTML element was used for inputting the data since it was a way to ensure a valid input type for the javascript code to read and write data to Firebase.

Responsibilities:

Rubina - created Python script to simulate data for Firebase, created Javascript code to read and write data into Firebase, created skeleton code for UI

Shivani -writing the final report