Homework 1: Firebase

DSCI 551 – Spring 2025

Due: 11:59pm, February 3, 2025, Monday

Points: 100

In this homework, we will use Firebase real-time database to create a chat app. Specifically, your job is to implement a Python function for each of the following tasks. For all tasks, assume that the database configuration is stored in a JSON file: config.json, which has the following content:

{“dburl”: “https://<your realtime database url>/”,

“node”: “chats (or whatever node you want to use to store data for this app”}

In other words, https://<your realtime database url>/chats.json in this case will retrieve the entire content of the chat database. It is up to you how to design the structure of your database as long as it captures the data and requirements stated below.

Note that your implementation should NOT require any indices to be specified in the Rules tab of Firebase console.

1. (Sending chats) Write a Python program function that stores a chat message between two people in the Firebase database (under the specific node as specified in the configuration file).
   Execution format:

   python3 [Student_Name]_hw1.py **send_message** <from> <to> <body>

   for example, python3 John_Smith_hw1.py **send_message** “john” “david” “hello”
   means that john sends a message “hello” to david.

2. (Retrieve most recent): write a Python function that retrieves the most recent message for a person (the message could be either sent or received by the person).
   Execution format:

   python3 [Student_Name]_hw1.py **get_recent** <person>

   for example, python3 John_Smith_hw1.py **get_recent** “john”

   This will return the most recent message for <person>, e.g., “john” as a JSON object. The message should include sender, recipient, body (e.g., “hello”), and timestamp (when the message was sent or received).

   Example output:

   ```
   {"sender": "john", "receiver": "david", "body": "hello","timestamp": 1674539458} or None
   ```

Note that NO two messages have the same timestamp.

Note that your program should NOT download the entire database, and should download only the most recent chat message for the requested person as the recent.py asks for, from your Firebase database.

3. (Retrieve last k): write a Python function that retrieves the latest k chat messages between two people.

   Execution format: python3 [Student_Name]_hw1.py **get_last_k** <person1> <person2> <k>

   For example, python3 John_Smith_hw1.py **get_last_k** “john” “david” 3

   It will retrieve the last 3 messages between john and david as a list of JSON objects. The messages should be ordered by their timestamps with older messages appearing first.

   Example output:

```
[{"sender": "john", "receiver": "david", "body": "nothing
much, how about we go out?", "timestamp": 1737676770},
{"sender": "john", "receiver": "david", "body": "somewhere for
a coffee", "timestamp": 1737676784},
 {"sender": "david", "receiver": "john", "body": "sure",
"timestamp": 1737676812}...] or []
```

   Note that NO two messages have the same timestamp.

   Similarly, your program should NOT download the entire database, and should download only the last k chat message between the two people as requested.

   Permitted libraries: json, requests, sys, datetime.

   Submission details:

   1. A single python file with name: [Student_Name]_hw1.py [replace Student_Name with your name] Eg. John_Smith_hw1.py
   2. Do not copy paste the commands from handout to terminal. Please rewrite the commands in the terminal. PDF format will encode special characters which are different from UTF-8 encoding in the terminal.
   3. Do not modify any contents in the template. Just fill the template by reading the comments.
   4. The test script will accept the return data same as specified in the template.
   5. Testing is done by test script with different test cases. So points will only be awarded if the method returns the expected result.
   6. You will get 0 points if the code breaks for any syntax errors or any other problems. Please test the code thoroughly before submitting.
   7. Please delete the data in firebase when submitting the HW. The database should be empty without any data [keys and values].