Intro. to Network Programming 2020 Spring

Homework 4 - Bulletin Board System: Pub/Sub system

Due on Sunday, June 14, 2020 by 23:55

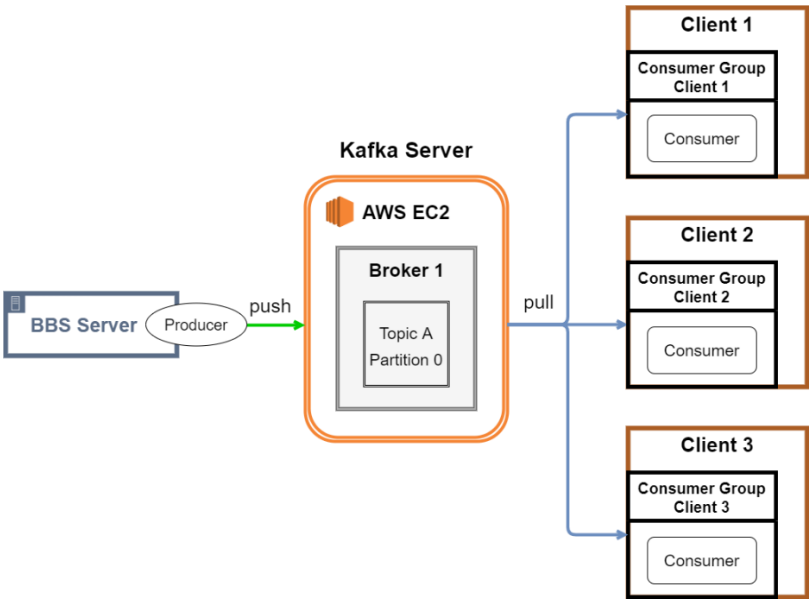
1. Introduction

In this part, you are going to implement the **subscription features for the BBS service.** The event will be raised whenever the client creates a new post that title contains the keyword subscribed by any other client.

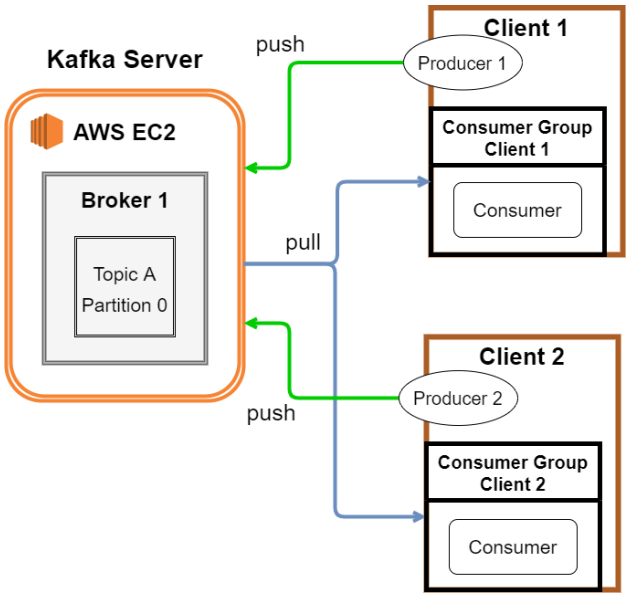
2. Example Architecture using Apache Kafka

The middleware server will get a message/record from the producer when there has a new post and also notify the client(s) who have subscribed to the specified topic.

A. BBS server is a producer, and each client is a consumer



B. Each client act as both a producer and a consumer



3. Requirements

The service can serve **at least 10 clients.** Your **server** and **client program** must be able to **handle all commands in the previous part (output results must be the same as the previous part)**. For some commands such as **whoami**, **exit**, **logout**, **create-board**, **list-board ##<key>** and **list-post <board-name> ##<key>**, your client program only sends the command to the server and gets the corresponding result from the server. However, there are new commands that your client program will **subscribe to the new post**. These commands are described as follows:

Command format	Description	Result	
subscribe --board <board-name> --keyword <keyword> (command and arguments are in the **same line**)	Subscribe the board with a keyword, **notify** the client whenever the event be raised. *Note [1]:* ***Can subscribe the same board multiple times with different keywords.*** *Notify user once the new post with specified board* ***which title contains one of the keywords*** *Note [2]: Subscribe objective (board)* ***can be nonexistent***	Success	Subscribe successfully (The notify message should at least include ***board***, ***title,*** and ***author***)
		Fail (1)	Please login first
		Fail (2)	[Invalid option] usage: subscribe --board <board-name> --keyword <keyword>
		Fail (3)	Already subscribed
subscribe --author <author-name> --keyword <keyword> (command and arguments are in the **same line**)	Subscribe the author with a keyword, **notify** the client whenever the event be raised. *Both notes [1] and [2] are same as the previous one (change objective to author)* ↑	Success	*same as the previous one*
		Fail (1)	*same as the previous one*
		Fail (2)	Invalid option: usage: subscribe --author <author-name> --keyword <keyword>
		Fail (3)	*same as the previous one*
unsubscribe --board <board-name>	Unsubscribe the board from the server (or middleware server) and remove all the keywords associated with a specified board.	Success	Unsubscribe successfully
		Fail (1)	Please login first
		Fail (2)	You haven't subscribed <board-name>
unsubscribe --author <author-name>	Unsubscribe the author from the server (or middleware server) and remove all the keywords associated with a specified author.	Success	Unsubscribe successfully
		Fail (1)	Please login first
		Fail (2)	You haven't subscribed <author-name>
list-sub	List the information about the subscribed board(s) and author(s).	Success	*List all the subscribed info*
		Fail (1)	Please login first

4. Scenario

Run your server first, and run your client program to connect to your server. The sample outputs of the client program are listed as follows:

Client 1	Client 2	Client 3
bash$ ./client 127.0.0.1 7777 ********** ** Welcome to the BBS server. ** ********** **% register** Paul paul@cs.nctu.edu.tw 12345 Register successfully.	bash$ ./client 127.0.0.1 7777 ********** ** Welcome to the BBS server. ** ********** **% register** Brad brad@cs.nctu.edu.tw 12345 Register successfully.	bash$ ./client 127.0.0.1 7777 ********** ** Welcome to the BBS server. ** ********** **% register** Gary gary@cs.nctu.edu.tw 12345 Register successfully.
% login Paul 12345 Welcome, Paul.	**% login** Brad 12345 Welcome, Brad.	**% login** Gary 12345 Welcome, Gary.
	% subscribe --board HW4_Board **--keyword** Project Subscribe successfully	**% subscribe --author** Jason **--keyword** hw4 Subscribe successfully
% create-board HW4_Board Create board successfully.		
	% subscribe --board HW4_Board **--keyword** Project Already subscribed **% subscribe --author** Bryant **--keyword** exam Subscribe successfully	**% subscribe --author** Paul **--keyword** HW Subscribe successfully **% subscribe --author** Paul **--keyword** post Subscribe successfully **% unsubscribe --author** Brad You haven't subscribed Brad
% create-post HW4_Board **--title** About Project **--content** HW4… Create post successfully.		
	% *[HW4_Board] About Project – by Paul* **% list-board** ##HW Index Name Moderator 1 HW4_Board Paul	
% create-post HW4_Board **--title** About HW and Exam **--content** blablabla Create post successfully.	**% unsubscribe --author** Bryant Unsubscribe successfully	
	% list-sub Board: HW4_Board: Project	**% *[HW4_Board]** About HW and Exam – by Paul* **% list-sub** Author: Jason: hw4; Paul: HW, post

5. Notes

1. **About implementation**:

   - There is **no limitation on your implementation.** You can choose whatever which framework, library, or even implement the logic by yourself, as long as it can achieve the goal of spec.

   - The output message should show the information **at least greater or equal to mentioned in the requirements**. In addition, it not restricted in any format.

2. **About Kafka environment setup:**

   - Please refer to the slide in E3 – *Apache Kafka Installation and Configuration*.

3. **About Kafka clients**:

   - C/C++
     - https://github.com/edenhill/librdkafka
   - Python
     - https://github.com/dpkp/kafka-python
     - https://github.com/confluentinc/confluent-kafka-python
   - Node.js
     - https://github.com/Blizzard/node-rdkafka
     - https://github.com/tulios/kafkajs
     - https://github.com/SOHU-Co/kafka-node

6. Grading Policy (100%)

- [20%] Commands from previous parts
- [30%] Subscribe part
- [30%] Unsubscribe part
- [20%] List-sub part

7. Submission

Please upload a zip file called "hw4_{$student_id}.zip" (e.g., hw4_0516000.zip) that includes your source code. It must include at least your **server source code** and **client source code**. The submission that doesn't follow the rule will **get 20% punishment** on the grade.

You will get **0 points** on this project for **plagiarism**.