13 Jul 2023

Questions 1 & 2 are mandatory.
Out of other questions you have to answer 1, so choose wisely.
All problems other than [1] will require you to code, so code well.
We expect you to provide gists in github or a github project - which compiles and runs.

1. Mandatory : Elaborate what your internship or academic projects were?
    a. What did the system do?
    b. What other systems have you seen in the wild like that?
    c. How do you approach the development problem?
    d. What were interesting aspects where you copied code from Stack Overflow?
    e. What did you learn from some very specific copy paste? Mention explicitly some of them.

2. Mandatory: Many mobile apps would love to log the location of the app user, periodically in terms of latitude and longitude. To do so, we certainly need to store data coming from many, many users (millions) over a large amount of time, years may be. Create the "back-end" end point for such a location dump.

    1. Mobile apps should be able to show the locations of the user in a map from T1 to T2 time.
    2. Total users will be in millions.
    3. Each App will dump the location to the back end point every 10 minutes, per day, from 10 AM to 8 PM.
    4. The cost of the back-end should not exceed 50 dollars a month.
    5. Use Cowj project to create such a back-end infra. https://github.com/nmondal/cowj

3. There is one database. Let's say it is hosted locally and one of the team members migrates it to AWS or GCP. How can one confirm that the copied data is the same as the original data ? What would be the check points ?
    Imagine that data from table is of the form : List<Map<String,String>>

4. Write a function to parse any valid json string into a corresponding Object, List, or Map object. You can use C,C++, Java, Scala, Kotlin, Python, Node. Note that the integer and floating point should be arbitrary precision.

5. There is an API that one must call to get data. The trouble is it will not let you cross the limit of call - say 15 calls per minute. If you cross the limit, the system penalises you by one additional minute of penalty where you can not make any call. Here is how the API looks like: function string call_me(string input).

    Propose a solution by which:

6. You would be able to use the API within the safe limit.
7. What happens if you are supposed to call the API 20 times per minute? Is there any way to accomplish this?
8. If you were the API designer, what would you do to implement this behaviour?

9. Banking works by transferring money from account A to account B. Most of the time account A is in one bank while account B is another bank. Implement the code to transfer money. Remember, payee's code runs on a different computer than that of the receiver's code.

    1. What are the issues in such a system?
    2. What can we do to mitigate some of the issues ?
    3. Write the fixing yourself to demonstrate the mitigations.