CS564 – Programming Assignment 3

1   Improving Your Distributed System - Concurrent Design (20 pts)

In this assignment, you will improve the distributed system that you have built in Assignment 2 by implementing some concurrent design ideas at the server side. That way, your server can start handling multiple requests simultaneously.

You should implement two different solutions: *bag of tasks*, and *work partitioning*, as described below.

1.1   Bag of Tasks

To implement the Bags of Tasks solution, you should create multiple threads at the server side, and each of them is responsible for dealing with one request from the beginning to the end. That is to say, a thread should take care of the request all by itself. All threads can be implemented using the same piece of code. Bag of Tasks is the easiest way to implement concurrency on a sever, and it can be achieved by extending your existing server code from Assignment 2. Recall the gopher example we discussed in Lecture 4, shown in Figure 1.
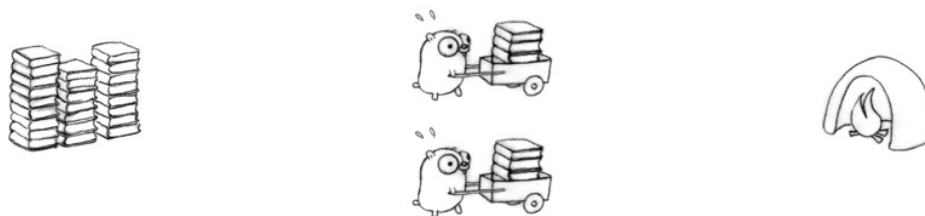

Figure 1: Bag of Tasks

1.2   Work Partitioning

The Work Partitioning solution requires a bit more thinking. You should analyze the workload on the server side, divide it in a reasonable way, and then implement the threads for those separate tasks. Recall the gopher example we discussed in Lecture 4, shown in Figure 2.

1.3   Testing

To test your implementation, extend your client code so that it repeatedly sends 100 requests (make it automatic so a user doesn't have to type in the words, please :-)). Also, modify your
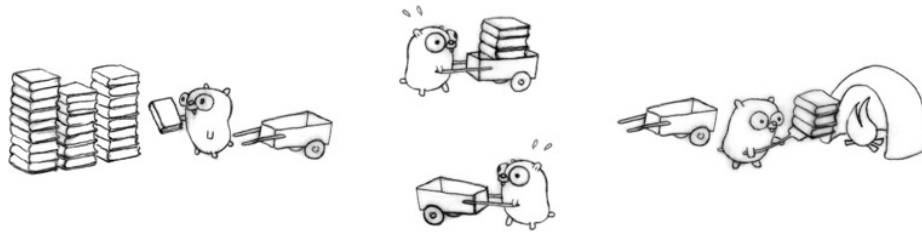
Figure 2: Work Partitioning

server code, so that it prints out a log file, which contains entries in the format of "thread ID — work description". For example, a log file for the Bag of Tasks solution may look like this:

Thread 1 – search for word "THIS"
Thread 2 – search for word "IS"
Thread 3 – search for word "MY"
Thread 2 – search for word "LOG"

Note that for the Work Partitioning solution, the work description should look differently.

2 Submission

Submit the following files:

1. Source files, in zip file (please do not use rar);

2. A text file `TestRuns.txt` which contains several test runs (output from both the server side and the client side);

3. The log file from the server side.

This assignment is due at 11:59pm on 2/9/2019.