Summary:

So far, we have accomplished the following tasks:

1. Purchase the hardware. Right now we have 5 Raspberry Pi’s and waiting for two more to come. We have a switch and a dozen ethernet cables, power supplies and heat sinks.

2. We have configured each Pi to have a unique serial hostname and built Go compiler with appropriate bash path set up and ready to run code.

3. We have tested communication between the Pi’s as well as between the PC and the Pi’s on simply programs such as server-client acknowledgement.

4. We have a tested version of the master-slave server model written in Go and compilable on the Pi’s, which uses simply ”Get” and ”Put” requests and appropriate hashing mechanism. However, we have not done thorough debugging. In fact, a small communication problem persists in the master implementation that we still need to fix.

Physical Setup:
Old Goals:

We might be a little bit behind schedule (depending on how well we debug on Friday night and Saturday). Specifically, we haven’t attempted adding "Compute" capability to the Pi’s. However, if we can find the bug in the communication problem fast enough, we still have time to implement this capability. Thus, overall speaking, we are roughly on schedule.

However, it’s worth mentioning that we set out to figure out how to make the system work with static IP in a local area network. But we’ve been hinder in the progress of doing so, mainly because if we do static LAN, we might lose the ability to get extra updating softwares from the Internet, such as vim and certain libraries. As a result of this, we might not be able to demo live in the classroom because the CMU routers will certainly not accept connections from the Pi’s. With this being said, it’s still possible that we might have time to fix this problem at the end of this month if everything runs smoothly.

New Goals:

We are basically sticking to our old goals for now since we are roughly on schedule and things are looking pretty good. However, we observed that the boot-time of the master node is really slow and also transmitting a single message also has a high latency. (However, this latency might be amortized if we send a bulk of messages at the same time.) We’re ready to change our perspective from "Pi’s are suitable for distributed servers" to studying the question of "How many Pi’s are comparable to a modern server in terms of perf/sec as well as perf/watt". At the demo, we will most likely show pictures of the system (if we can’t in fact figure out the static IP), with benchmarks on the system including perf/sec and per/watt, comparing to such figures produced by commercial machines. (We are still open to suggestions on comparability problems and how to compare will GHC machines.) Such benchmarks will be produced with all/most of the functionalities proposed by the website, including CPU post/get/compute, GPU image processing and CPU count primes etc. Of the four, we will produce at least 2 solid benchmarks with different emphasis if not all four. Also, depending on time, we might not do the auto load-balancer. Rather, we might choose to focus on using GPU to do image rendering.

Concerns:

Other than time management issues (since this is a BIG project and neither of us has lots of free time), we are mostly worried about the following:

1. The feasibility of demo without static IP. If we decide to tackle this problem, it might potentially create a lot of overhead (changing the network configuration or even the code which includes hardcoded ip addresses) or even break the system. But on the other hand, a live demo would be a lot cooler.

2. The commercial machine we can compare with. Right now the round trip time for one message
is about 5s without any performance tuning. This is definitely not on the same magnitude with the commercial machines. Thus we worry that we won’t be able to prove that the Pi’s are actually preferrable.

3. Measurement of power. This is a rather minor issue because we both have access to the hardware lab in ECE and specifically remember seeing those microUSB wires used to measure voltages. However, if the course staff doesn’t want us to use their equipment, we basically have no other alternatives. (However very unlikely to happen.)