* What are the basic steps (show all steps) in building a parallel program? Show at least one example.
  + The first step in building a parallel program is to identify sets of tasks that can run concurrently and/or partitions of data that can be processed concurrently.
  + The user than sends the instructions to the master which then sends some of the tasks to the the workers to finish the tasks
  + When the workers are finished with the tasks they return it to the master to check their work
  + If the work is sufficient, then the master sends the finished task back to the user.
  + One example of this would be the use of a parallel program to approximate pi.
* What is MapReduce?
  + MapReduce is a structure and implementation for processing big data in parallel.
* What is map and what is reduce?
  + Both are functions specified by the user. Map is used to produce key/value pairs from other key/value pairs. Reduce is used to merge the created pairs later in the program based off of what key they correspond to.
* Why MapReduce?
  + MapReduce is useful for processing very large amounts of data and is scalable.
* Show an example for MapReduce.
  + MapReduce would be a very good way to crawl through documents or web request logs. Google uses it to manage its huge stores of data.
* Explain in your own words how MapReduce model is executed?
  + The user first prescribes the map and reduce functions to specify how they want the data handled. After that, the data is split up by the map function and processed in parallel. After the data has finished processing, it is sorted and relinked using the reduce function.
* List and describe three examples that are expressed as MapReduce computations.
  + An example of MapReduce would be the Distributed Grep. This is where the map function creates a line if it matches a given pattern. The reduce function becomes an identity function that copies the supplied intermediate data to the output.
  + Another example of MapReduce would be the Reverse-Web Link graph.The map function makes <target, source> pairs for each link in the target URl which is found in a page named “source”. The reduce function adds the list of all source URLs associated with a given target URL and gives the pair : <target, list(source)>.
  + One final example of MapReduce would be a count of URL Access Frequency. The map function processes collections of web pages requests and gives the output <URL, 1>. The reduce function adds all the values for the same URL and outputs a <URL, total count> pair.
* When do we use OpenMP, MPI and, MapReduce (Hadoop), and why?
  + OpenMp is useful for basic uses of parallelism in a programmer’s code like loops because it is efficient, elegant, and relatively straightforward to implement. MPI is useful for scientific applications because they are tightly written and MPI is not good at handling outlier and non-fit cases. MapReduce is especially useful when handling large amounts of data, although it can also be used for scientific applications as opposed to MPI because it is better at handling faults, although it lacks somewhat in performance.
* In your own words, explain what a Drug Design and DNA problem is in no more than 150 words.
  + Designing drugs is about making new ligands that will fit and change the already existing proteins of the body. The problem with that is that it takes a lot of work to be able to decipher which ligands go together to change a particular protein to get the needed result. There seems like there would be a lot of trial and error associated with finding the right ligands to change a certain protein. Keeping track of how well each ligand works with each protein would help the process go faster and might help with future testing.