Contents

Tips, Tricks, and Pitfalls

Level 6

I: Processes

1. Every time you spawn a child process (i.e., using **start**), another process is created on the operating system. You can see each of these processes in Task Manager (if you are using Windows) or using **top** in Linux.
2. Each call to **start** returns a *handle* to the started process. You should keep this handle, as you will need it to stop the process when you are finished with it (see the next point).
3. Every spawned process should be stopped when finished with it. This is because each process takes up resources on your computer and can slow it down. To this end, you should call **terminate**, which immediately stops the process, even if it's performing any outstanding work. You can also call **join** on the process.

II: Monitoring Queues

1. In the lecture, we demonstrated adding the string 'Done' to the output queue, to signal to the main process that the sub-processes have completed their handling of all work (from the input queue). However, this was for illustrative purposes only -- is actually *not* a good approach as it introduces something called a *race condition*. A race condition is when we have multiple processes (or threads) that are all racing to complete a certain batch of work – there is no way to know which process will complete its work first. In this case, the process that puts 'Done' onto the output queue is the one that happened to notice that the input queue was empty first; this means that the other processes may still be processing their input. If this occurs, the main process will assume that the sub-processes are complete, prior to them actually being complete.

   The simple alternative to putting 'Done' on the output queue (in the lecture example) would be to simply monitor the **len** of the results list in the main process: As soon as the **len** of the results list equals the **len** of the original input queue, then we can be sure that the sub-processes are complete (since each input queue item gives one result).

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