

COP 3330, Spring 2013

Threads - 1

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04-15-13

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Topics

- Threads

Sequential Execution

- Many programs (probably most of the ones you've written) have sequential execution
- The steps of the program occur in the order in which they were written
- Only one thing happens at a time
- This is not the only way things can be done!

Processes

- A process is a program that is executing
- For a long time, computers have been able to run multiple processes concurrently (at the same time)
- Try opening your Task Manager and looking at all the processes that are concurrently running on your computer right now.

Processes

- On many computers, processes don't actually run at the same time, but the OS switches between processes so fast that a human can't tell the difference
- With the advent of multi-core and hyperthreaded CPUs, some computers can actually have multiple processes running simultaneously

Threads

- It is possible for a single process to have multiple sub-tasks that run concurrently
- These are known as threads
- Threads are sometimes called lightweight processes

Threads

- Why use threads?
 - Make it so that slower operations don't get in the way of quicker operations
 - Slow operations are things like printing on a printer, interaction with the user, accessing the internet, using the hard drive, etc.
 - Fast operations are things like arithmetic, array access of data in memory

Threads

- Why use threads?
 - Take full advantage of advanced computing hardware
 - A multi-core CPU doesn't speed up a process with only one thread!

Thread and Runnable

- The Thread class in java.lang can be used to start new threads
- One way to create a new thread is to write a class that extends Thread and override the run method
- Another way is to pass an object that implements Runnable to the constructor of Thread
- *Either way, you must call the `start` method on the Thread object in order to begin execution*

Example

- Creation of threads
 - Using Runnable interface
 - run() method
 - Extending Thread class
 - run() method

Example (Try @ home)

- Write a program with a button that, when clicked, draws random dots all over a canvas