Multithreaded programming in C/C++ and JAVA

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What is multithreading?

• Processor switches between different threads fast
• User perceives the threads as running at the same time
Multithreading in C/C++

• Creating a thread

1. Thread ID
   `pthread_t` is used to declare the thread ID
   Example: `pthread_t thread[20];`

2. Call `pthread_create()`
   ```c
   int pthread_create(
       pthread_t *thread,        // thread ID’s address
       const pthread_attr_t *attr,  // thread’s attribution
       void *(*start_routine)(void *), // address of the function
       void *arg                    // argument to the function
   );
   ```
Multithreading in C/C++

• Function in the thread

```c
void *start_routine(void *arg)
{
    /**
     * sth to do
     */
}
```

• `#include <pthread.h>`

```sh
gcc –pthread yourprogramname.c
```
Multithreading in JAVA

Java defines two ways in which this can be accomplished:

• You can implement the Runnable interface.
• You can extend the Thread class.
Multithreading in JAVA

- Implement Runnable Interface

```java
public static void main(String[] args) {
    MyThread mt = new MyThread();
    new Thread(mt).start();  // execute the run function
}

class MyThread implements Runnable {
    public void run() {  // the only method in the Runnable
        /* sth to do */
    }
}
```
Multithreading in JAVA

• Extend Thread Class
public static void main(String[] args)
{
    MyThread mt = new MyThread();
    mt.start();        // execute the run function in the thread
}
class MyThread extends Thread
{
    public void run() // override the run method of Thread
    {
        /* sth to do */
    }
}
References:

Creating Multi-threaded C++ Code
http://codebase.eu/tutorial/posix-threads-c/

Pthreads and Semaphores
http://condor.depaul.edu/glancast/443class/docs/pthreads.html

Java-Multithreading Programming Tutorial:
http://www.tutorialspoint.com/java/java_multithreading.htm

Javadoc
http://docs.oracle.com/javase/7/docs/api/