Operating System Concepts Weekly

Week 3

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1

In which lines are the critical sections of all shared variables?

1. Line 7 and lines 14 - 18
2. Lines 8 - 11 and lines 19 - 27

Is mutual exclusion guaranteed? Why?

1. No, because T2 accesses x without checking the mutex.
2. Yes, because T1 only ever accesses their critical section when the mutex is free and so does T2.

2

Critical Section

The critical sections are in lines 11 - 18, basically the entire T function.

Updated code

```
1  const int total = 10000000;
2  int next = 0;
3  int output [total];
4
5  mutex m;
6
7  int f (int x) {
8    // f does not make use of the global variables
9    ...
10 }
11
12 void T() {
```

```
  m.lock();
  int index = next;
  next = next + 1;

  while (index < total) {
    output[index] = f(index);
    index = next;
    next + next + 1;
  }
  m.unlock();
}
```

3

```
semaphore s = 1;
semaphore t = 0;

void T1() {
  while (true) {
    task1();
    signal(t);
    wait(s);
  }
}

void T2() {
  while (true) {
    wait(t);
    task2();
    signal(s);
  }
}
```

If s and t are swapped, nothing happens, because the initial state of both of them are to be inactive. This means that if they are swapped, they still behave in the exact same way.