

ECE531: Advanced Operating Systems – Homework 8
Locking / IPC

Due: Friday, 1 December 2023, 5:00pm

1. Question (10pts)

Answer the below questions in a document (text, pdf, etc).

(a) Look at the following memory allocate code from our operating system.

- i. At which points (A, B, C, D, E) would you put a lock instruction? Why?
- ii. At which points (A, B, C, D, E) would you put an unlock instruction? Why?

```
void *memory_allocate(uint32_t size) {  
  
    int first_chunk, num_chunks, i;  
    // POINT A  
    if (size==0) size=1;  
    num_chunks = ((size-1)/CHUNK_SIZE)+1;  
    // POINT B  
    first_chunk=find_free(num_chunks);  
    if (first_chunk<0) {  
        printk("Error!\n");  
    }  
    // POINT C  
    return NULL;  
    }  
    for(i=0;i<num_chunks;i++) memory_mark_used(first_chunk+i);  
    // POINT D  
    memset((void *) (first_chunk*CHUNK_SIZE), 0, num_chunks*CHUNK_SIZE);  
    // POINT E  
    return (void *) (first_chunk*CHUNK_SIZE);  
}
```

(b) Name one inter-process communication (IPC) method found in the Linux kernel, and what syscall is involved in using it.

2. Submit your work

- Submit a document containing the answers to the assignment via e-mail (text, pdf, etc) and send it to me by the deadline.