

Learning Objectives-

Interact with OS in C via **system** calls
 Understand how OS allocates, deallocates and accesses memory
 Understand and use **virtual memory**
 Create, use, manipulate **processes** and **threads**
 Understand how OS **schedules** processes and threads
 Communicate and **synchronize** between threads and processes
 Determine when **deadlock and race conditions** may occur and how to avoid them
 Manipulate **filesystem** structures (inodes etc)
 Communicate across **networks**

1. Why is CS241 hard? Aka “Look Mom no training wheels!”

2. What’s the difference between a program image and a process?

Can we sketch overleaf the contents of the address space of a process?
 include Environment, Program Arguments, Stack, Heap, Uninitialized vars, Initialized vars, Code

3. Things to get up to speed on before we can talk about threads or system calls in detail

C != C++;
 Lifetime of variables; global vs stack vs heap
 Arrays;
 Buffered I/O;
 Pointers; use of * and &
 C string gotchas;
 Heap memory allocation

C library I/O (fprintf, fopen, puts, getchar...) uses low level
 POSIX calls (read, write, open)

4. Explain what is going on in each line and how many bytes are allocated and where.

```
01 void test() {
02     char* t1 = "hi";
03     char t2[] = "ab";
04
05     *t2 = 'A';
06     *(t2 + 1) = 'B';
07     t2[1] = 'B';
08     *t1 = 'H';
09 }
```

5. Can one process create another process?

6. What is sizeof(int) ?

7. What is sizeof(char) ?

8. What is sizeof(char*) ?

9. int A[8]; So what is sizeof(A) ?

10. What are malloc, calloc, realloc and free? Why are they hard?

11. A program calls printf("Hello")
 when does the C library call write?

12. MPs, lab assignments, Forum policy. Honors course

13. strtok, strcpy, strcmp, memset, memmove?