MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF COMPUTING AND INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE
SYSTEMS PROGRAMMING
CCS 3301 BCS
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1. **Explain how the following are used in systems programming**
a) System calls - provides the services of the operating system to the user programs via Application Program Interface

b) Application programming Interface - to integrate new applications with existing software systems.
c) Process control block – Used to store all the information about a processes.
d) Data Structure - to implement the physical forms of abstract data types and necessary for designing efficient algorithms.
e) Thread - Effective Utilization of Multiprocessor system.
f) File table - manages access to both the content of files and the metadata about those files.

2. **Briefly explain how two user process share data using shared memory mechanisms. State steps involved. For each step give function prototype/ signature**
The user just writes data to the process memory, and the operating systems dumps the data to the file. When two processes map the same file in memory, the memory that one process writes is seen by another process, so memory mapped files can be used as an inter-process communication mechanism

Steps
- Create the shared memory segment or use an already created shared memory segment
- Attach the process to the already created shared memory segment
- Detach the process from the already attached shared memory segment
- Control operations on the shared memory segment

3. Briefly explain any three system call stating parameters required for process to process communication using message queue
- msgget() - function returns the message queue identifier associated with the argument key
  parameters
- msgsnd() - send message to a message queue
  parameters
- msgrcv() - recives messages from a messages queue
  parameters

4. Discus any three memory management scheme deployed in modern operating systems.
Partitioning - dividing the main memory into chunks of the same or different so that they can be assigned to a process in the main memory.
Fragmentation - Fragmentation is an unwanted problem in the operating system in which the processes are loaded and unloaded from memory, and free memory space is fragmented.
Segmentation - technique in which the memory is divided into the variable size parts to assign processes to main memory

5 Write a code to :
a) Shut down a computer

```c
#include <stdio.h>
#include <stdlib.h>

int main()
{
system("C:\\WINDOWS\\System32\\shutdown /s");

}
```

List all processes using memory above 100mb

```c
#include <stdio.h>
#include <stdlib.h>
int main()
{
    while(1)
    {
        void *m = malloc(1024*1024);
        memset(m,0,1024*1024);
    }

}
```

Hide all file with extension .hxy
```c
#include <stdio.h>
#include<stdlib.h>
int main ( int argc, char *argv[] ) {
  if ( argc != 2 ) {

    printf( "usage: %s BOOL\n", argv[0] );
  } else if ((strcmp (argv[1], "YES") == 0) || (strcmp (argv[1], "NO") == 0)) {
        char buf[256];
        sprintf(buf, "defaults write com.apple.Finder AppleShowAllFiles %s \n killall Finder", argv[1]);
        system(buf);
}
```

List all folders in drive D
```c
#include <stdio.h>
#include <dirent.h>
int main()
{
   struct dirent *de;
   DIR *dr = opendir(".");

   while ((de = readdir(dr)) != NULL)
        printf("%s\n", de->d_name)
   closedir(dr);

}
```

6. Briefly explain how user program larger than available main memory can be executed without degrading overall system performance.
Paging – Function of memory management where computer will store and return data from devices secondary storage to primary storage