**Lab Assignment 4**

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**Aim: To study and learn about various system calls**

**1. Process Management System Calls**

These system calls are used to manage processes (creating, executing, waiting, and terminating).

* **fork()**:  
  Creates a new process by duplicating the calling process. The new process is called the child process.  
  Example:

pid\_t pid = fork();

* **exec()**:  
  Replaces the current process image with a new process image. It's used to run a new program.  
  Example:

execl("/bin/ls", "ls", NULL);

* **wait()**:  
  Makes the parent process wait until its child process finishes execution.  
  Example:

int status;

wait(&status);

* **exit()**:  
  Terminates the current process and returns an exit status to the operating system.  
  Example:

exit(0);

**2. File Management System Calls**

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Used to create, read, write, and close files.

* **open()**:  
  Opens a file and returns a file descriptor.  
  Example:

int fd = open("file.txt", O\_RDONLY);

* **read()**:  
  Reads data from a file into a buffer.  
  Example:

read(fd, buffer, sizeof(buffer));

* **write()**:  
  Writes data from a buffer to a file.  
  Example:

write(fd, buffer, strlen(buffer));

* **close()**:  
  Closes an opened file descriptor.  
  Example:

close(fd);

**3. Device Management System Calls**

Used to communicate with hardware devices.

* **read()** and **write()**:  
  Same as file read/write, but also used for devices like keyboards, disks, etc.
* **ioctl()**:  
  Used for device-specific input/output operations that can’t be handled with regular system calls.  
  Example:

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ioctl(fd, request, ...);

* **select()**:  
  Monitors multiple file descriptors to see if any are ready for I/O. Useful for non-blocking I/O.  
  Example:

select(nfds, &readfds, &writefds, &exceptfds, &timeout);

**4. Network Management System Calls**

Used for creating and managing network connections.

* **socket()**:  
  Creates a socket for network communication.  
  Example:

int sockfd = socket(AF\_INET, SOCK\_STREAM, 0);

* **connect()**:  
  Connects a socket to a remote address.  
  Example:

connect(sockfd, (struct sockaddr \*)&serv\_addr, sizeof(serv\_addr));

* **send()**:  
  Sends data through a connected socket.  
  Example:

send(sockfd, buffer, strlen(buffer), 0);

* **recv()**:  
  Receives data from a connected socket.  
  Example:

recv(sockfd, buffer, sizeof(buffer), 0);

**5. System Information Management System Calls**

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Used to get information about the system and the current process.

* **getpid()**:  
  Returns the process ID of the calling process.  
  Example:

pid\_t pid = getpid();

* **getuid()**:  
  Returns the user ID of the process.  
  Example:

uid\_t uid = getuid();

* **gethostname()**:  
  Retrieves the standard host name for the current machine.  
  Example:

gethostname(buffer, size);

* **sysinfo()**:  
  Retrieves overall system statistics like uptime, memory, etc.  
  Example:

struct sysinfo info;

sysinfo(&info);