4ITRC2 Operating System Lab

Lab Assignment 4

**Q: Comprehensive study of different categories of Linux system calls, categorized as**

1. **Process Management System calls**

**fork(), exec(), wait(), exit().**

**fork()**

**Purpose: Creates a new child process.**

**Syntax: pid\_t pid = fork();**

Example:

#include <stdio.h>

#include <unistd.h>

int main() {

pid\_t pid = fork();

if (pid == 0)

printf("This is the child process\n");

else

printf("This is the parent process\n");

return 0;

}

**exec()**

**Purpose: Replaces the current process image with a new one.**

**Syntax: execl(path, arg0, arg1, ..., NULL);**

Example:

#include <unistd.h>

int main() {

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

return 0;

}

**wait()**

**Purpose: Waits for the child process to terminate.**

**Syntax: pid\_t wait(int \*status);**

#include <sys/types.h>

#include <sys/wait.h>

#include <unistd.h>

#include <stdio.h>

int main() {

pid\_t pid = fork();

if (pid == 0)

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

else

wait(NULL);

return 0;

}

exit()

**Purpose: Terminates the process.**

**Syntax: void exit(int status);**

Example:

#include <stdlib.h>

int main() {

exit(0);

}

1. **File Management System calls**

**open(), read(), write(), close().**

**Purpose: Perform file operations (open, read from, write to, and close files).**

Example:

#include <fcntl.h>

#include <unistd.h>

int main() {

int fd = open("example.txt", O\_CREAT | O\_WRONLY, 0644);

write(fd, "Hello, file!\n", 13);

close(fd);

return 0;

}

1. **Device Management System calls**

read(), write(), ioctl(), select().

**ioctl()**

**Purpose: Manipulate underlying device parameters.**

Example:

#include <stdio.h>

#include <fcntl.h>

#include <sys/ioctl.h>

int main() {

int fd = open("/dev/tty", O\_RDONLY);

int result;

ioctl(fd, TIOCMGET, &result);

close(fd);

return 0;

}

**select()**

**Purpose: Monitor multiple file descriptors.**

Example:

#include <stdio.h>

#include <sys/select.h>

#include <unistd.h>

int main() {

fd\_set fds;

FD\_ZERO(&fds);

FD\_SET(0, &fds);

select(1, &fds, NULL, NULL, NULL);

printf("Input detected.\n");

return 0;

}

1. **Network Management System calls**

**socket(), connect(), send(), recv().**

**socket(), connect(), send(), recv()**

* **Purpose**: Create and manage socket-based communication.

**Example**:

#include <stdio.h>

#include <string.h>

#include <sys/socket.h>

#include <arpa/inet.h>

#include <unistd.h>

int main() {

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

struct sockaddr\_in server = {AF\_INET, htons(80), inet\_addr("93.184.216.34")}; // example.com

connect(sock, (struct sockaddr \*)&server, sizeof(server));

send(sock, "GET / HTTP/1.1\r\nHost: example.com\r\n\r\n", 39, 0);

char buffer[1024];

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

printf("Response: %s\n", buffer);

close(sock);

return 0;

}

1. **System Information Management System calls**

**getpid(), getuid(), gethostname(), sysinfo()**

* **Purpose: Get system or process-related information.**

**Example**:

#include <stdio.h>

#include <unistd.h>

#include <sys/sysinfo.h>

int main() {

printf("PID: %d\n", getpid());

printf("UID: %d\n", getuid());

char hostname[1024];

gethostname(hostname, sizeof(hostname));

printf("Hostname: %s\n", hostname);

struct sysinfo info;

sysinfo(&info);

printf("Uptime: %ld seconds\n", info.uptime);

return 0;

}