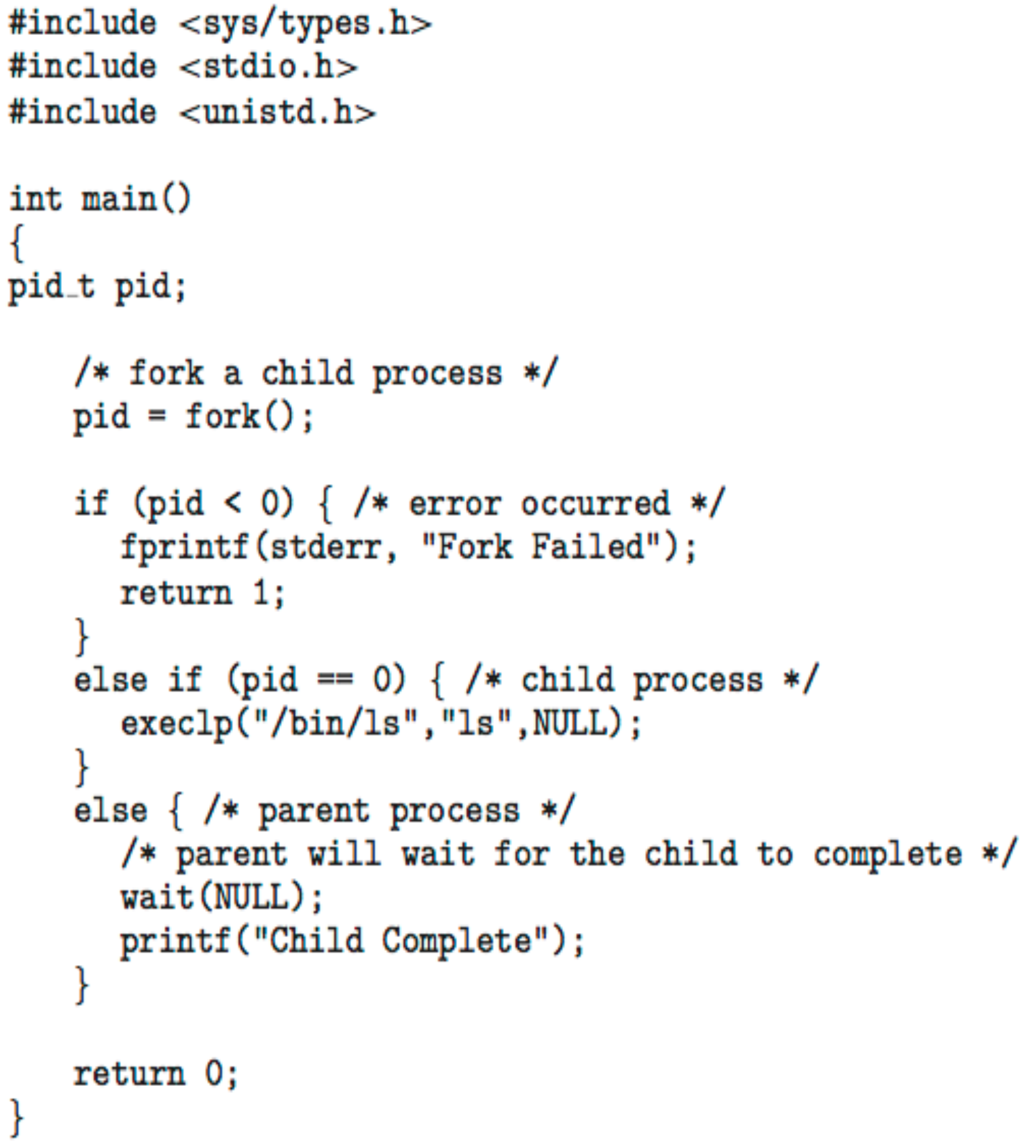
EECE.4810/EECE.5730: Operating Systems

Spring 2017

Lecture 3: Key Questions

January 25, 2017

1. (Review) Describe the operation of this basic program, which ultimately represents two separate processes.



```
#include <sys/types.h>
#include <stdio.h>
#include <unistd.h>

int main()
{
pid_t pid;

   /* fork a child process */
   pid = fork();

   if (pid < 0) { /* error occurred */
      fprintf(stderr, "Fork Failed");
      return 1;
   }
   else if (pid == 0) { /* child process */
      execlp("/bin/ls","ls",NULL);
   }
   else { /* parent process */
      /* parent will wait for the child to complete */
      wait(NULL);
      printf("Child Complete");
   }

   return 0;
}
```

2. Describe how processes are terminated.

3. What are the two models of interprocess communication?

4. Describe the basics of the producer-consumer problem.

5. Describe the following pseudo-code, which represents a bounded-buffer implementation of a producer-consumer setup using shared memory IPC.

```
// Basic setup
#define BUFFER_SIZE 10
typedef struct {
     . . .
} item;
item buffer[BUFFER_SIZE];
int in = 0;
int out = 0;


// Producer
item next_produced;
while (true) {
     /* produce an item in next produced */
     while (((in + 1) % BUFFER_SIZE) == out)
          ; /* do nothing */
     buffer[in] = next_produced;
     in = (in + 1) % BUFFER_SIZE;
}

// Consumer
item next_consumed;
while (true) {
     while (in == out)
          ; /* do nothing */
     next_consumed = buffer[out];
     out = (out + 1) % BUFFER_SIZE;
     /* consume the item in next consumed */
}
```

6. Describe the basics of interprocess communication through message passing.

7. How do processes communicate using direct communication?

8. How do processes communicate using indirect communication?

9. How and why are messages buffered in a communication link?

10. Describe each of the methods of communication used in client-server systems.