OSu HW1

110590004 資工三 林奕廷

Writing exercise

1.16

(a)

The device controller needs to set buffers, pointers, and counters for the IO device, and ask the CPU for authorization of memory access. After getting authorized, the controller can directly access the memory.

(b)

The device will send an interrupt to the CPU every time a block gets transferred. When the transfer is over, it will send an interrupt to the CPU too.

(c)

Yes, since the DMA would directly access the memory's bandwidth, it is possible that the user program's memory usage was limited.

2.15

1. Shared Memory

   Strength:

   Faster message passing, due to the system calls being required only to establish the shared-memory region.

   Weakness:

   It is hard to manage synchronization and consistency due to various processes that can access the same shared memory.

2. Message Passing

   Strength:

   No conflicts need to be avoided, which is useful for exchanging smaller amounts of data.

   Easily to implement in a distributed system.

Weakness:

Involved with more system calls to transfer data between processes.

2.19

1. It is easier to expand the OS.

   Easier to export from hardware to hardware.

   More security and reliability

2. Message Passing

3. The main disadvantage is the system-function overhead incurred during message transfer between services or processes, primarily due to the required message copying and process switching.

3.12

When the kernel receives an interrupt or a system call, it saves the context of the sender process into the Process Control Block (PCB). Then, it loads the context of the process scheduled to run from another PCB.

3.18

- Ordinary is more suitable than named:

  When there is only one parent process and one child process needs to communicate with each other, and don’t want any other process to access the pipe.

- Named is more suitable than Ordinary:
  When multiple processes want to communicate with each other without implementing n*n (if there are n processes) ordinary pipes, using a named pipe is much more suitable.