- Memory-mapped IO: I/O devices and memory share the same addr space

- Data registers: Used for actual transfer of data

- Status registers: Information the device is telling us

- Control registers: Allows us to set changeable device characteristics (finish input a char?)

- I/O completion handling: Interrupt-driven & Polling

  - Interrupt-driven: A device signal the CPU when it needs attention

  - Polling: CPU actively checks the status of a device

- Asynchronous I/O: allow programs to continue executing other tasks while waiting for I/O

Note: we will focus on memory-mapped, asynchronous I/O with polling

- KBSR (Keyboard source register) (xFE00)
  - Only use bit 15, which is set when a character is available

- KBDR (Keyboard data register) (xFE02)
  - Use bits 0-7, where the location is read-only and reading clears KBSR

KBSR and KBDR are used for keyboard input

- DSR ( Destination source register) (XFE04)
  - Only use bit 15, which is set when monitor finish processing a char

- DDR ( Destination data register) (XFE06)
  - Use bits 0-7, transferring the data to this addr to output on the monitor
  - Clears DSR

DSR and DDR are used for output

- Purpose of OS: sharing resources and protecting users from themselves and others

- Interrupt: An unscripted subroutine call triggered by an external event
  (Ex: I/O device reports a completion / error)

Note: KBSR and DSR both use bit 14 as Interuption Enable Bit

- TRAP: An instruction that call OS's subroutines (Ex: reading from a file)

- Exceptions: Unanticipated thing has happened
  Ex: hardware error / program error

- Processor Status register: a register that stores information about the current state of the processor

| 15 | 14 - 11 | 10 - 8 | 7 - 3 | 2 - 0 |
|---|---|---|---|---|
| privilege mode | don't use | priority level | don't use | condition codes |

- Bit 15 : 0 → Supervisor mode
  1 → User mode