Input and Output Fundamentals

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Overview

- Look at I/O mechanisms
  - How we implement and control access to devices
  - Clocks and Timers
    - Used to control and synchronise operations

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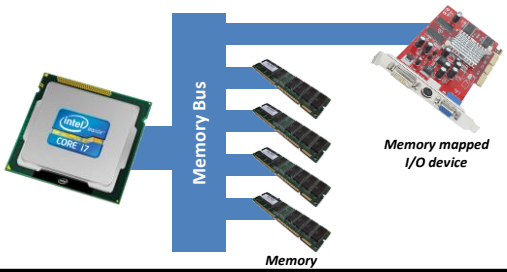
Memory Mapped I/O

- I/O devices visible as normal memory locations
  - Easily accessed using C pointers



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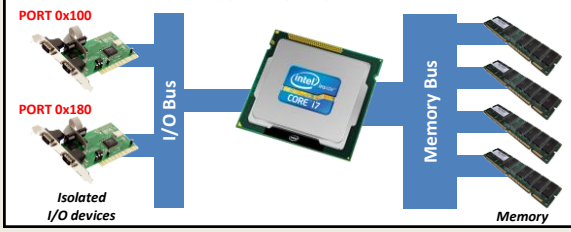
Isolated I/O

- Separate bus for I/O devices
  - Easier interfacing: distinct from high-speed memory bus
  - Accessed via special instructions
    - Generally not supported by compilers (must use assembler)



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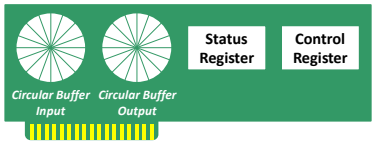
Optimising Memory Use

- Circular buffers help improve data throughput
  - Help decouple operation of processor and device
- Status Register holds flags for
  - Device ready
  - Data available, etc.



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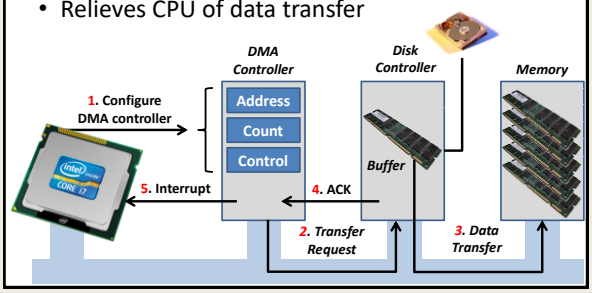
Direct Memory Access

- Alternative to programmed I/O
- Relieves CPU of data transfer



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Clocks and Timers

- Real Time Clock (RTC)
  - Returns encoding of current date
- Programmable Interrupt Timer (PIT)
  - Creates periodic event at set/ configurable interval
  - Used to invoke periodic kernel tasks
  - If frequency too
    - Low: Kernel can seem unresponsive
    - High: OS spends too much time servicing timer

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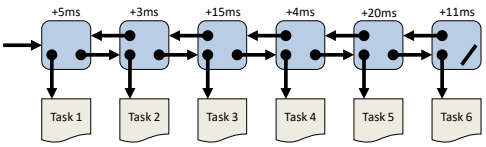
Avoiding Fine Grained Timers

- Create event queue
  - Timer configured to fire when next task due, rather than at set period
  - Set interval timer to time delta (+*n* ms) to next event
- Technique used widely: OSs, simulators, etc.



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