Introduction to Embedded Systems

Young W. Lim

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Processor

- Control Unit
- Datapaths : Internal Buses
- Registers
- ALU (Arithmetic Logical Unit)
  - 2's complementer
  - shifters
  - status flags
  - arithemetic & logic circuits
  -

Types of Processors

- CISC
- RISC
  -

Memories

- Volatile
- Non-volatile
- DRAM
- SRAM
- EEPROM
- Flash
- SDRAM

Memory System

- Memory Controller
- Memory Management Unit (MMU)
- Cache
- Direct Memory Access (DMA)

IO Devices

- IO Controller
  -
- Polling
- Interrupt
- DMA

System Buses

- Data Bus
- Address Bus
- Control Bus

- Von Neuman Architecture
- Harvard Architecture

Embedded System Design

- Hardware Design
- Software Design

Hardware Design

- Electronic Schematic
- PCB (Printed Circuit Boards)
  - electrically connects electronic components using conductive tracks, pads and other features etched from copper sheets laminated onto a non-conductive substrate.

Device Driver

a computer program that operates or controls a particular type of device that is attached to a computer. A driver provides a software interface to hardware devices, enabling operating systems and other computer programs to access hardware functions without needing to know precise details of the hardware being used.

- Character Device
- Block Device
- Network Device

Types of Linux Device Driver

- Character Device
  - is read and written directly without buffering, for example the system's serial ports /dev/cua0 and /dev/cua1.
- Block Device
  - can only be written to and read from in multiples of the block size, typically 512 or 1024 bytes.
  - accessed via the buffer cache and may be randomly accessed, that is to say, any block can be read or written no matter where it is on the device.
  - can be accessed via their device special file but more commonly they are accessed via the file system. Only a block device can support a mounted file system.
- Network Device
  - is accessed via the BSD socket interface and the networking subsytems described in the Networking chapter (Chapter network-chapter).

Debugging Embedded Systems

- In-Circuit Emulators
- JTAG/BDM debuggers
- Custom Hardware
- LEDs and switches
- Serial or other communication ports.

Reference

[1] H. B. Ahn , “Learning Embedded Linux System using ARM processors”, 2nd ed.