Lecture 1

9/7/16

EE2361 - Fall 2016

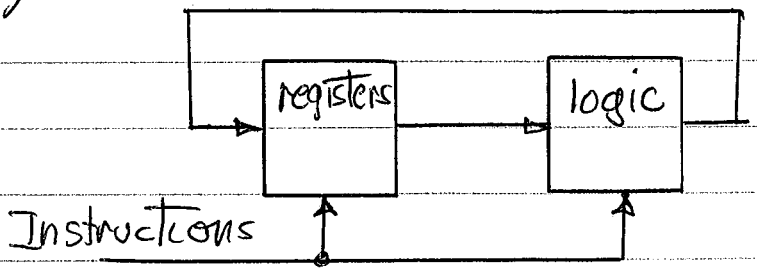
Introduction

What is a microcontroller?

1. The processor

Central Processing Unit

Also known as a CPU, this consists of registers and logic which performs the basic operations on the data. It takes the form



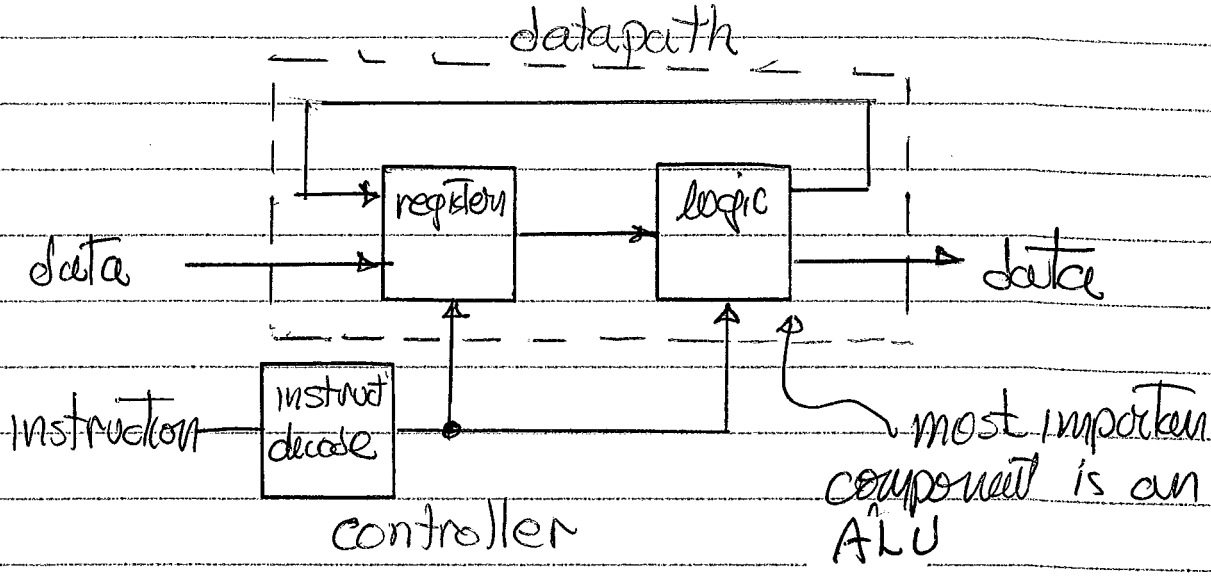
It is basically a large, very complex, finite state machine (FSM) which is controlled by the instructions

The operation can be better understood by rearranging into a

datapath – the logic and registers used to process the data

control – configures datapath for instructions

In the form of a control / datapath



Computer architects are responsible for the design of a processor, the way it is organized has a significant impact on overall system performance

Some important processors include

MIPS, ARM, I86

A <u>microprocessor</u> is a processor (with some <u>additional</u> necessary <u>hardware</u>) on a single chip.

↳ such as cache memory

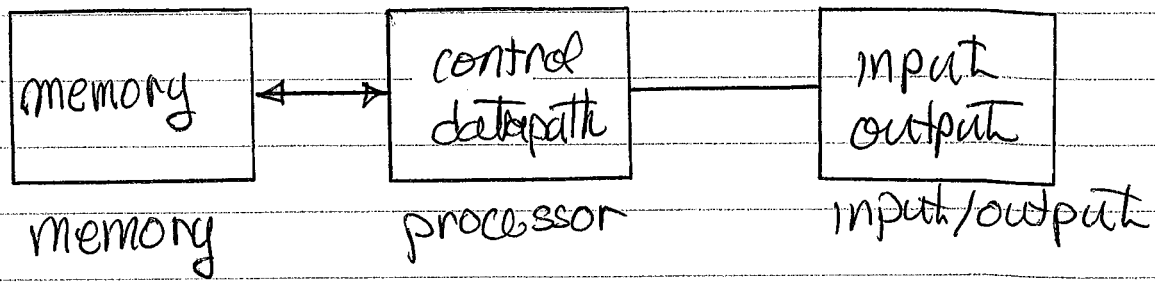
A processor needs additional hardware to be useful. At a minimum it has three main parts

1. The processor
   consists of the datapath (ALU) and the control. (pipelined, etc.

2. Memory
   instructions and data are stored in the memory. results from the processor may also reside in the memory.

3. Input/Output

   The input and the output are used to interact with the outside world



Additional hardware devices, in the form of peripherals, are added to computer systems.

Peripheral devices typically support useful and commonly used applications.

Examples are

- Timers
- Communication interfaces (serial, I^2C, SPI, USB)
- Analog to digital converter (ATD)
- Motor Control (PWM)

To

minimize component count
reduce power and size
increase reliability

stand alone system

The processor, memory, I/O, and peripherals are frequently put on a single chip to create an SoC (System on a Chip)

One form of this is the <u>micro controller</u>