- computer a machine that can be programmed to automatically perform a sequence of operations

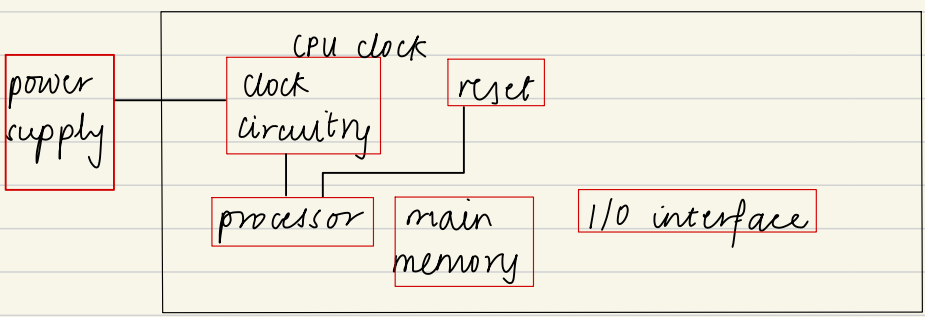
components of a microcomputer

inspired by Von Neumann

- anthlon 64-bit processor
- SDRAM memory modules main memory
- I/O interfaces

connected by a bus structure

collection of wires through which binary information can be transferred in parallel



- CPU clock : a series of pulses that syncs the rest
- reset circuitry

clock : most computers are synchronous and driven by a master or system clock

- speed performance of the computer is governed by the frequency of the clock
- CPU requires a fixed number of clock ticks (cycles) to execute each instruction (freq)
- lower temp ⇒ capable of higher frequencies
- in a complex system with multiple components, you have different clock freq for each component derived from one master clock

↓

registers, arithmetic & logic units } close to the CPU core, must be clocked faster than

memory or peripheral access } external components which are clocked slower

- access speed of memory determines the performance of a computer

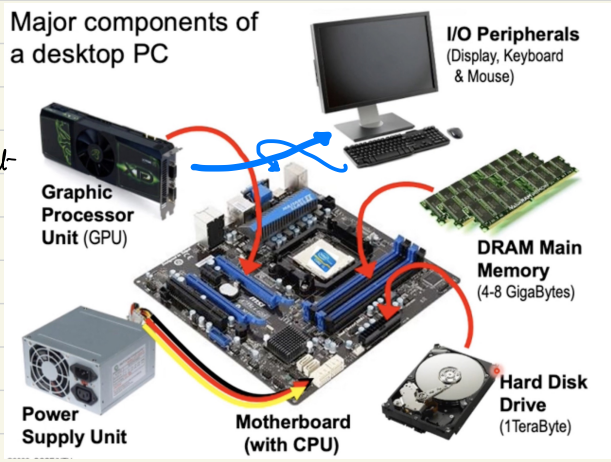
reset circuitry : provides an external signal that asserts the reset pin when power is applied that returns the CPU into a known state

- an active-low signal on the reset pin for a substantial duration (several clock cycles) is required to reset the CPU
  - ↳ active low because most logic families can sink more current than they can source and so fan-out and noise immunity
- on asserting reset, CPU is put into a known initial state where the boot-up code can execute (OS is loaded from the hard disk to the RAM)

inside a desktop personal computer

- major components → motherboard w/ CPU
  - → DRAM main memory (4-8 GB)
  - → power supply unit
  - → hard disk drive (1 TeraByte)

important as it is works out all that we see

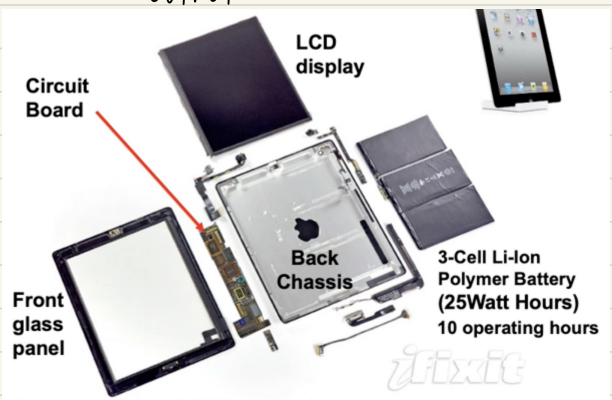


inside an ipad

OUTPUT

MOTHER BOARD-ISH

INPUT



this was a crazy break-through

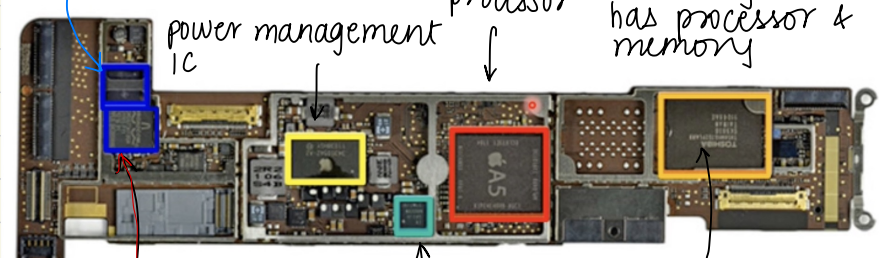
literally, processor memory

package-on-package system on a chip. desg. apple, made by samsung has processor & memory

touchscreen driver

processor

power management IC



touchscreen controller (converts signals into electric)

LCD timing controller (ASIC)

flash - NAND secondary memory

Benefits of PoP packaging

- what is it? : IC packaging technique that vertically stacks and interconnects separate packages via ball grid array (BGA) (memory, cpu)
- save space on motherboard
- minimizes track length between CPU and memory - faster signal propagation and reduced electrical noise
- all diff components can be tested separately before assembly

A5 processor

- built in I/O interfaces
- supports is system-on-chip (SoC)
- dual core ARM Cortex-A9 CPU
- 1 GHz CPU clock (can be dynamically reduced to save battery life