Computer Architecture Assignment 1

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30 September 2015

1 Difference between architecture and organization

Organization is what most people think of when they think of architecture, when organization is mostly defined by the ISA. Organization is the physical layout of the hardware. The layout of the memory stack, how the ICs are alligned onboard are all part of the organization of the computer. This is important as data transfer speeds, power consumption, and system functionality are all affected by the organization.

Architecture is essentially the computer's instruction set. The set of rules that define how the processor will behave, which in turn necessitates organizational features. The architecture may also include the microarchitecture of the processor, or how the processor will implement each instruction in the ISA (a black box to users).

2 Endianness

Endianness is the concept of ordering with respect to bits in the system There are two types of endianness in modern computers, big-endian and little-endian In a big-endian system, the smallest memory address stores the most significant byte of a memory word Little-endian systems store the least significant byte in the largest memory address. Intel's x86 architecture uses little-endian representations. Little-endian systems are also common with microprocessors due to Intel's influence. Big-endian systems are most commonly found in computer networking applications. There is also another type called a mixed-endian system. A mixed system will have a different endianness for 16bit words vs. 32 bit words. Bi-endian processors can operate in little-endian or big-endian mode.

3 Floating point format (IEEE)

Single precision format is known as binary32. Binary32 consists of

- 1 bit sign bit

- 8 bit exponent bit

- 24 bit significand component (23 explicitly stored)

Double precision format is called binary64:

- 1 bit sign bit

- 11 bit exponent bit

- 24 53 significand component (52 explicitly stored)

4 Memory heirarchy