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Assignment 3

If a 32 bit microprocessor system is designed to access a memory system of total of 256 K bytes what is the Data Bus and the Address Bus lengths of the system. If this micro processor can bring 4 bytes at a time.

Consider a 32-bit microprocessor whose bus cycle is the same duration as that of a 16-bit microprocessor. Assume that, on average, 20% of the operands and instructions are 32 bits long, 40% are 16 bits long and 40% are only 8 bits long.

i) Which micro-processor will give better performance.
ii) Calculate the improvement achieved when fetching instructions and operands with micro processor you mentioned in part i.

Consider two microprocessors having 8 and 16 bit wide external data buses, respectively. The two processors are identical otherwise and their bus cycles take just as long.

i) Suppose all instructions and operands and instructions are two byte long. By what factor do the maximum data transfer rate differs
ii) Repeat part i assuming half of the operands and instructions are one byte long and the other half is two byte long.

Consider a hypothetical microprocessor having 32 bit instructions composed of two fields: the first byte contains the opcode and the remainder the immediate operand or an operand address.

i) What is the maximum directly addressable memory capacity (in bytes)
ii) Discuss the impact on the system speed if the microprocessor bus has
    (a) A 32 bit local address bus and a 16 bit local data bus
    (b) A 16 bit local address bus and a 16 bit local data bus.
iii) How many bits are needed for the program counter and the instruction register?