von Neumann Model

John von Neumann

_____

_____

Instruction

_____

_____

Word

_____

von Neumann Model

PB&J Analogy

Complete the von Neumann model diagram

5 Components

1 - _____

_____

2 - _____

_____

3 - _____

_____

4 - _____

_____

5 - _____

_____

Processing Unit

>> _____

>> PB&J analogy - _____

>> Generally operates on _____

In MIPS, _____

>> At minimum, _____

1 - ALU - _____

2 - GPR - _____

ALU

ALU >> performs _____ _____ >> e.g. _____	Draw an ALU

Registers

Flip flop >> _____ >> _____	Draw a flip flop
Register >> composed of _____ >> _____ _____ _____ >> Stored in a _____ _____ >> MIPS - _____	Draw a 4 bit register

Control Unit

>> _____

>> _____

_____

>> _____

_____

>> PB&J analogy - _____

I/O

>> _____

>> _____

>> PB&J analogy - _____

Memory

ADDRESS	DATA

Post Office Analogy

_____

_____

_____

_____

_____

_____

Address Space

_____

address bits _____

e.g. _____

_____

Addressability

_____

_____

Example: 8 byte memory space

1-byte addressable

ADDRESS	DATA

How many bits are needed for the address?

word addressable (1 word = 4 bytes)

ADDRESS	DATA

How many bits are needed for the address?

Example: 32 byte memory space

2-byte addressable

ADDRESS	DATA

How many addresses do we have (What is the size of the address space)?

How many bits are needed for the address?

word addressable (1 word = 8 bytes)

ADDRESS	DATA

How many addresses do we have (What is the size of the address space)?

How many bits are needed for the address?

Powers of 2

2^{10}	2^{20}	2^{30}	2^{40}	2^{50}

Example: 32KB byte memory space

Assume a 32KB memory is 8 byte addressable. What is the size of the address space? How many bits are needed for the address?

Example: 256GB byte memory space

Assume a 256GB memory is 64 byte addressable. What is the size of the address space? How many bits are needed for the address?