

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

		Post Office Analogy
ADDRESS	DATA	

Address Space

address bits _____

e.g. _____

Addressability

Example: 8 byte memory space

1-byte addressable		word addressable (1 word = 4 bytes)	
ADDRESS	DATA	ADDRESS	DATA

How many bits are needed for the address?

How many bits are needed for the address?

Example: 32 byte memory space

2-byte addressable		word addressable (1 word = 8 bytes)	
ADDRESS	DATA	ADDRESS	DATA
How many addresses do we have (What is the size of the address space)?		How many addresses do we have (What is the size of the address space)?	
How many bits are needed for the address?		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?