

Lab 5

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1.1 What is ROM and what is its primary purpose?

ROM is read only memory programming that allows a computer to start up or regenerate each time it is turned on.

1.2. What is RAM and how is it different from ROM?

RAM is random access memory programming, and it has higher capacity than compared to ROM. The data can be modified or read.

1.3. What is the difference between static RAM and dynamic RAM?

Static RAM is fast and expensive and dynamic RAM is less expensive and slower. Static RAM is used to create the CPU's speed sensitive cache while the dynamic RAM forms the larger system RAM space.

1.4. What type of memory is typically used in USB thumb drives? Why shouldn't we rely on this for critical data storage?

Flash memory doesn't require power to store data and has no moving parts and it is portable. However, it is costly and the more it stores the slower the operation.

Consider a computer with 1GB RAM (1024 MB). Given memory addressing is for each byte, how many bits are needed to address all bytes in the system's RAM?

11 bits

Give a brief description of the Von Neumann and Harvard computing architectures. What are the fundamental differences between the two and for what is each designed to achieve?

Von Neumann architecture – it is an ancient computer architecture based on the stored program computer concept. Same physical memory address is used for instructions and data. While the Harvard architecture is a modern computer architecture based on the Harvard Memory Replay based model. Separate physical memory address is used for instructions and data.

4. What is cache memory and what is its primary role?

It is a supplementary memory system that temporarily stores frequently used instructions and data for quicker processing by the central processing unit of a computer.

5. Explain the concept of an interrupt, and list four common types.

- Maskable interrupts: the hardware interrupts that can be delayed when a highest priority interrupt has occurred to the processor
- Non Maskable interrupt: the hardware that cannot be delayed and immediately be serviced by the processor

- Normal interrupt: the interrupts that are caused by the software instructions are called software instructions
- Exception: exception is nothing but an unplanned interruption while executing a program.

5.1. Polling is an alternative to interrupts? Briefly explain polling and why it is not commonly used.

In interrupt, the device notices the CPU that it requires its attention. Whereas, in polling, CPU steadily checks whether the device needs attention

6. Explain the general concept of a stack - how do they work, and what is their primary purpose.

A stack is a linear data structure, elements are stacked on top of each other. Only the last element added can be accessed, i.e the element at the top of the stack. That is, a stack is a Last In First Out (LIFO) structure. This is the opposite of a queue which is First in First out (FIFO).

6.1. How are stacks useful for handling interrupts?

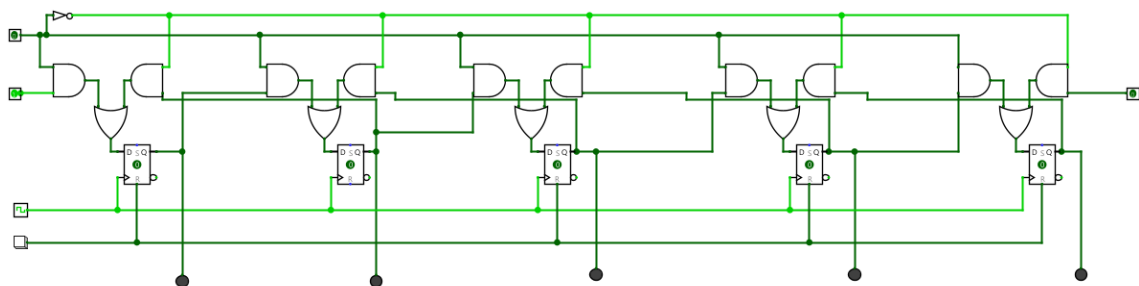
Stack machines, like RISC machines, can have a very quick interrupt response latency. This is because most stack machine instructions are only a single cycle long, so at worst only a few clock cycles elapse before an interrupt request is acknowledged and the interrupt is processed.

6.2. How are stacks useful in programming?

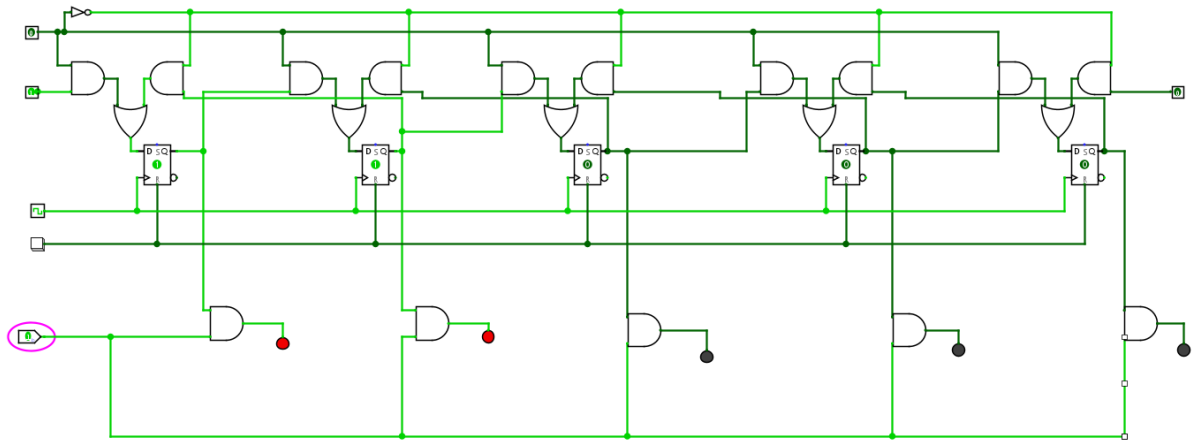
If you mean the stack that's referenced in memory, that is where you store certain variables. You create a bunch of ints, it goes in the stack. You call a function, the current state of your program is pushed into the stack. (there is also the heap, where dynamically allocated variables are stored).

Practical – Stacks of Stacks

11.



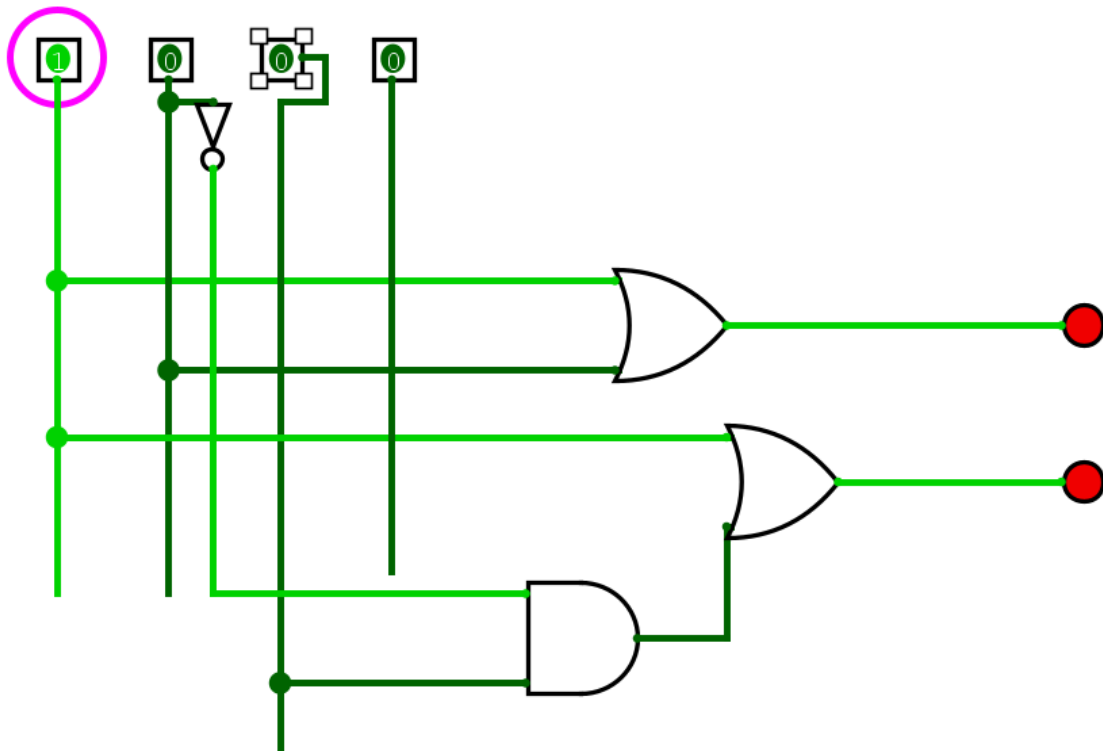
12.



Practical Encoders and Decoders.

Truth table for 4 to 2 priority encoder

Input				Output	
0	0	0	0	0	0
0	0	0	1	0	0
0	0	1	0	0	1
0	1	0	0	1	0
1	0	0	0	1	1



Truth table for 2 to 4 binary decoder.

Input		Output			
0	0	1	0	0	0
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	1

