Experiment No. 1

1. **Aim**: To recognize and study various components of Personal Computer.
2. **Hardware / Software Required**:
   Cabinet, SMPS, HDD, processor, Motherboard, Ram, IDE cable, ROM, System fan and CPU fan, Tool kit.
3. **Theory**:
   The basic components of a PC are: 1. Input Unit
   2. Output unit
   3. Memory unit
   4. Control unit
   5. Arithmetic logic unit
   1. Input Unit: - It is the unit through which data/instructions can be entered into the computers. E.g. Keyboard, Mouse etc.
   2. Output Unit: - It is the unit by which we can get output from the entered input from the computer. E.g. Monitors, Printer, Speaker etc.
   3. Memory Unit: - It stores the information by providing facility to the CPU actively by providing necessary data to the CPU. Memory units are of two types:
   • Primary memory: - It is also of two types
   RAM: - It can be randomly accessed. Memory is temporarily used because when the power goes off; all the data stored in it is erased. So It is volatile in nature. It can be read and the data can be written into it.

ROM: - It is also randomly accessed. It is only a read memory unit. It is non-volatile in nature. It can be read only but data can't be written into

it.

• Secondary memory.

4. Control unit**: -** It is the unit which controls the flow of information through the processor and coordinates the activities of other units which are within it. So it is the brain within the brain as it controls what happens inside the processor. It generates timing signals and control signals for well coordination.

5. Arithmetic logic unit Input Unit: **-** It performs arithmetic operations like addition, subtraction etc. and logical operations like AND, OR, NAND etc. It works at an electronic speed but the device attached to it works at low speed. That's why processors can handle all the peripheral devices at a time. IT establishes good coordination between the other four functional units.

Configuration of PC:

1. Processor: - The microprocessor accepts inputs from the user in the form of data and instruction. It processes the information and instruction and then sends the processed information to the output device.
2. Motherboard:-It is the main circuit of the PC. It contains the interface for the microprocessor, BIOS, Memory and storage device needed to control peripheral devices such as monitor, keyboard, mouse etc.
3. RAM: - It stores data temporarily. So it is called volatile.
4. HDD: - IT is a secondary storage device for permanent data storage device i.e. placed
   in the system. It is similar to human brain where all the past to present events are stored.
5. FDD: It is an external storage device. It is magnetic round disc enclosed in a plastic
   jacket. Today we have a double size high quality to density disk with 1.44 MB of size.
6. DVD RAM: The Digital versatile disc stored digitally. A DVD writer is a DVD player as well as a writer.
7. TFT monitor: - It is an output device through which we can read data.
8. Cabinet: - outer covering of CPU.
9. Keyboard: - It is a primary input device of the PC similar to a typewriter.

. Mouse: - It is used to point to the desired position in the computer. It is also an input

device.

10. UPS: - It is the device that produces supply to the PC. It provides all the time of power cut. So we can save the current data and shut down properly. Speaker: It is an
    output device through which the CPU can produce sound for the user.
11. Cabinet: - outer covering of CPU.
12. Speaker: - It is an output device through which the CPU can produce sound for the user.

4. OBSERVATION:

5. Conclusion:

Various components of the computer are studied such as input unit, output unit, memory unit, ALU and control unit. The configuration of various components of the PC are identified and studied.

6. References:

https://youtu.be/_w0ll7hnCm8

https://www.idtech.com/blog/parts-of-a-computer

Experiment No. 2

1. **Aim:** Dismantling & assembling of PC
2. **Hardware / Software Required:**
   Cabinet, SMPS, HDD, processor, Motherboard, Ram, IDE cable, ROM, System fan and CPU fan, Tool kit.
3. **Theory:**
   The first step to building a computer is acquiring the parts. A computer is made up of a case (or chassis) which houses several important internal components, and provides places to connect the external components, including non-peripherals.

4. Procedure:

Step 1: Prepare the case

Remove the empty computer case from its packing and remove both side panels and take out any items that may be inside the case. Place it on the work space so that the motherboard faces up.

Step 2: Installing the Motherboard rises

Inspect whether the motherboard risers are installed properly, if not then install it properly so that the motherboard will not be in direct contact with the metal case.

Step 3: Installing the Drives and mother-board in the case

1. Remove side panel

Remove the side panel from the case in order to gain access to the cabinet as well as the motherboard properly.

2. Remove front external drive panel

Remove the drive bay blanking the spaces. So that we can install the required drives properly and freely.

3. Installing external drives

With the blanking places removed slide the drives into their corresponding bays.

4. Case screws

Fix the drives using the case screw provided. The screw should not be so tightly placed, otherwise it may harm the respective components of the PC.

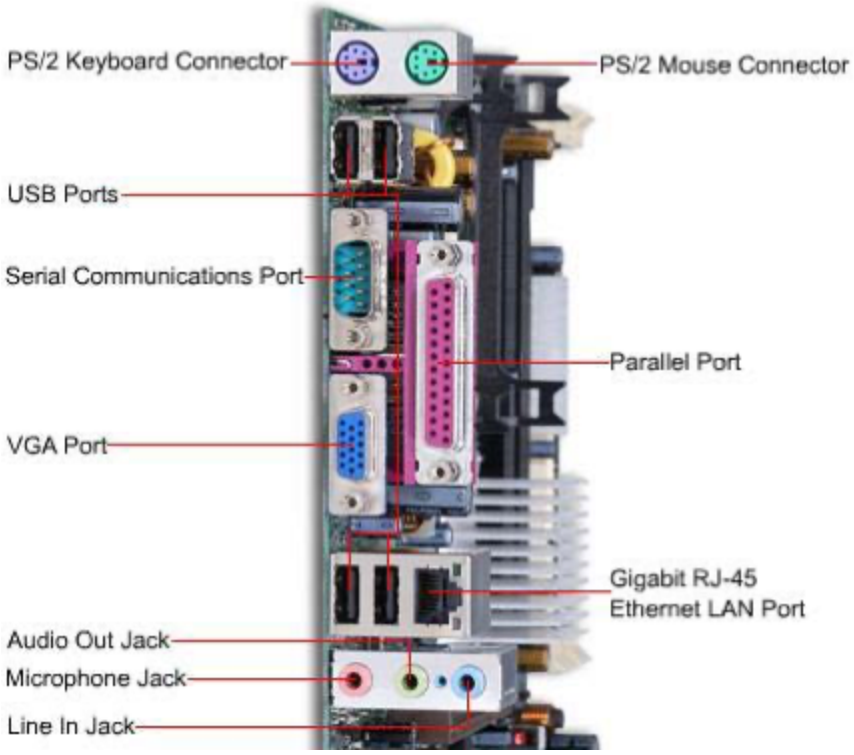
5. Fixing the drives

Fix the optical and floppy drives into its places with screws properly.

6. Drives installed

The optical and floppy drives are located in the correct bays in the pc case.

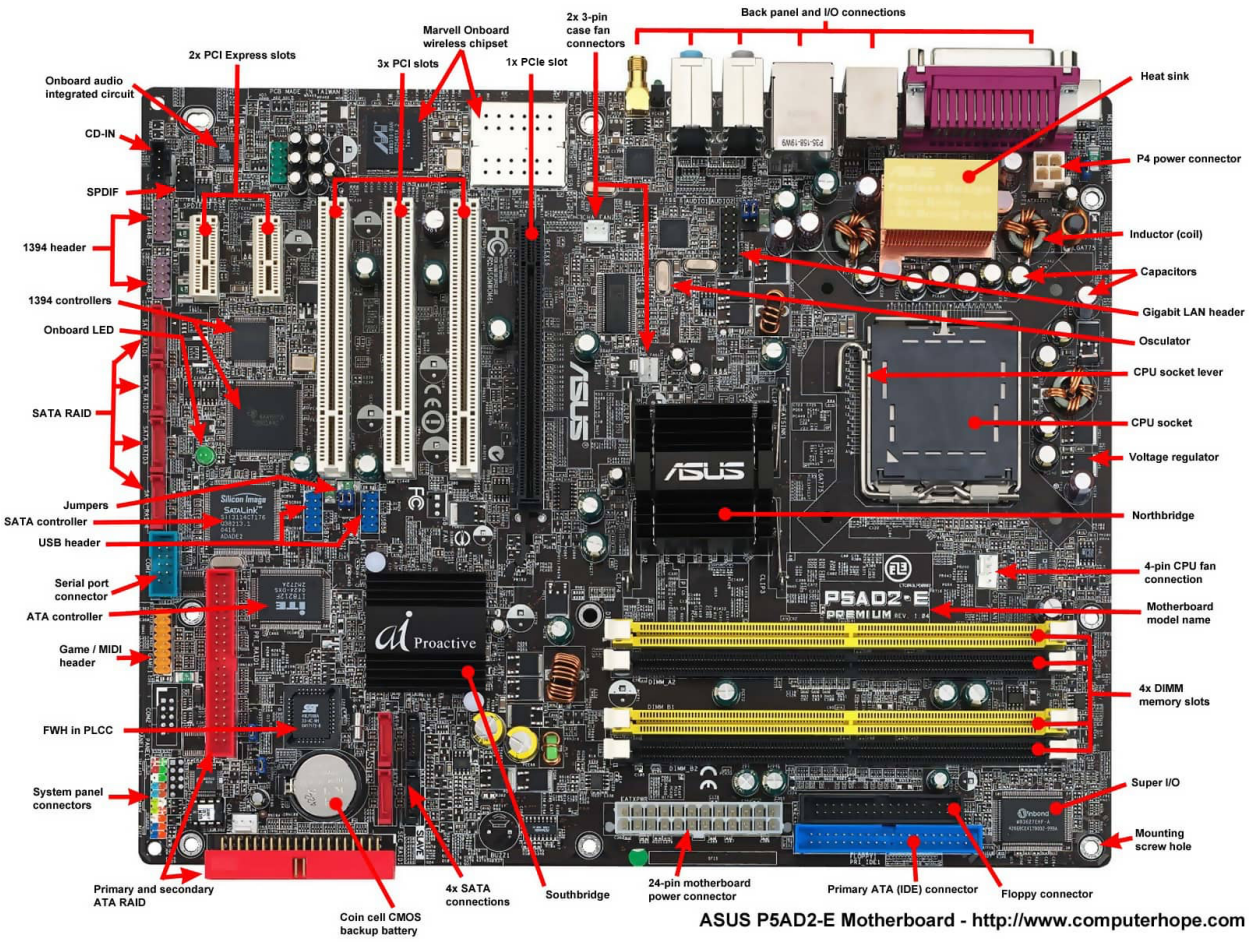
7. Motherboard Mask:



8. Discard unwanted parts

After everything is in its place just discard the unwanted parts that were present initially in the case.

Step 4: Installing motherboard in the case:



ASUS P5AD2-E Motherboard - http://www.computerhope.com

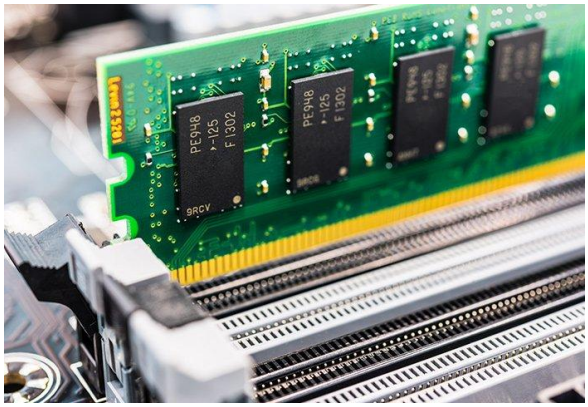
1. **Installing the Processor:**

   Place the CPU into its slot properly seeing the cut marks present in the processor for identification. Care must be given while installing the CPU, if any Pin breaks then the Processor will become useless. Then place the sink and CPU fan properly and lock it with the lock provided.

2. CPU and Fan:

The CPU fan should be placed over the CPU to keep the processor cool.

3. Installing the RAM:



Place the RAM into its slots. Press it to get the RAM Locked. If the RAM is not placed properly then the PC will not start. And will give a beep sound.

4. Installing the power supply:

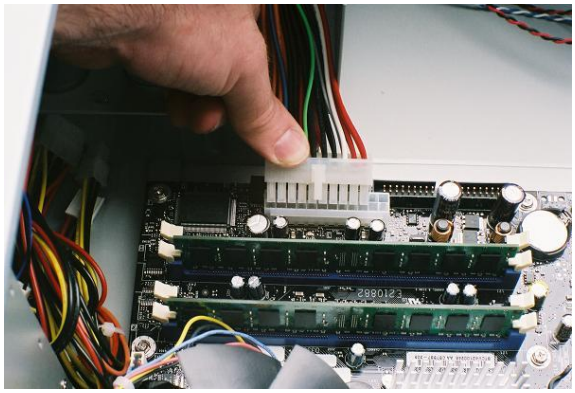
Use the SMPS (Switch Mode Power Supply) cables to give power supply to the individual components of the PC.

5. Installing The HDD:

The HDD should be Placed in its proper place and should be connected with the ATA cable or The SATA cable as the port may be. And power supply should be given to it.

6. Connecting the case cable:

Connect the below cables properly as per instruction. And connect the same cable to the motherboard also.



Step 5: Closing The system case by cover

Once all the parts of the PC are connected to its slots properly and firmly just close the system case and screw it properly.

5. Result:

6. Conclusion:

A motherboard is certainly a complicated and important component in your computer system. The choice should not be made lightly, but it should also not be too difficult. It is more important to choose the proper CPU, memory and I/O devices (video cards, hard drives, etc.) and then find the motherboard that supports them. It is not important to know every nuance of every chipset, but it is a good idea to have a general idea about the major features each provides. It is very important to know what your particular needs and requirements are, in terms of hardware support, and what applications you will be running. It is also important to purchase a motherboard based upon more than just price,since a poorly-functioning or defective motherboard will render the entire system next to useless.

7. References:

https://www.shutterstock.com/search/pc+assembly

https://youtu.be/EJemXALSE6U

Experiment No. 3

1. **Aim:** Simulation of Ripple Carry Adder

2. **Hardware / Software Required:** Java

3. **Theory:**

Arithmetic operations like addition, subtraction, multiplication, division are basic operations to be implemented in digital computers using basic gates likr AND, OR, NOR, NAND etc. Among all the arithmetic operations if we can implement addition then it is easy to perform multiplication (by repeated addition), subtraction (by negating one operand) or division (repeated subtraction).
Half Adders can be used to add two one bit binary numbers. It is also possible to create a logical circuit using multiple full adders to add N-bit binary numbers. Each full adder inputs a Cin, which is the Court of the previous adder. This kind of adder is a Ripple Carry Adder, since each carries bit "ripples" to the next full adder. The first (and only the first) full adder may be replaced by a half adder. The block diagram of 4-bit Ripple Carry Adder is shown Figure (a) here below -

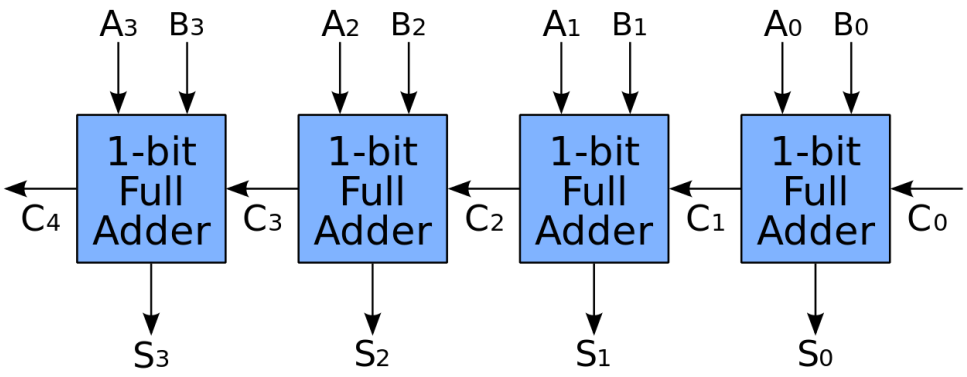


Figure (a): Block diagram of 4-bit Ripple Carry adder.

The layout of ripple carry adder is simple, which allows for fast design time; however, the ripple carry adder is relatively slow, since each full adder must wait for the carry bit to be calculated from the previous full adder. The gate delay can easily be calculated by inspection of the full adder circuit. Each full adder requires three levels of logic. In a 32-bit [ripple carry] adder, there are 32 full adders, so the critical path (worst case) delay is 31 * 2(for carry propagation) + 3(for sum) = 65 gate delays.

4. Results:

Circuit diagram:

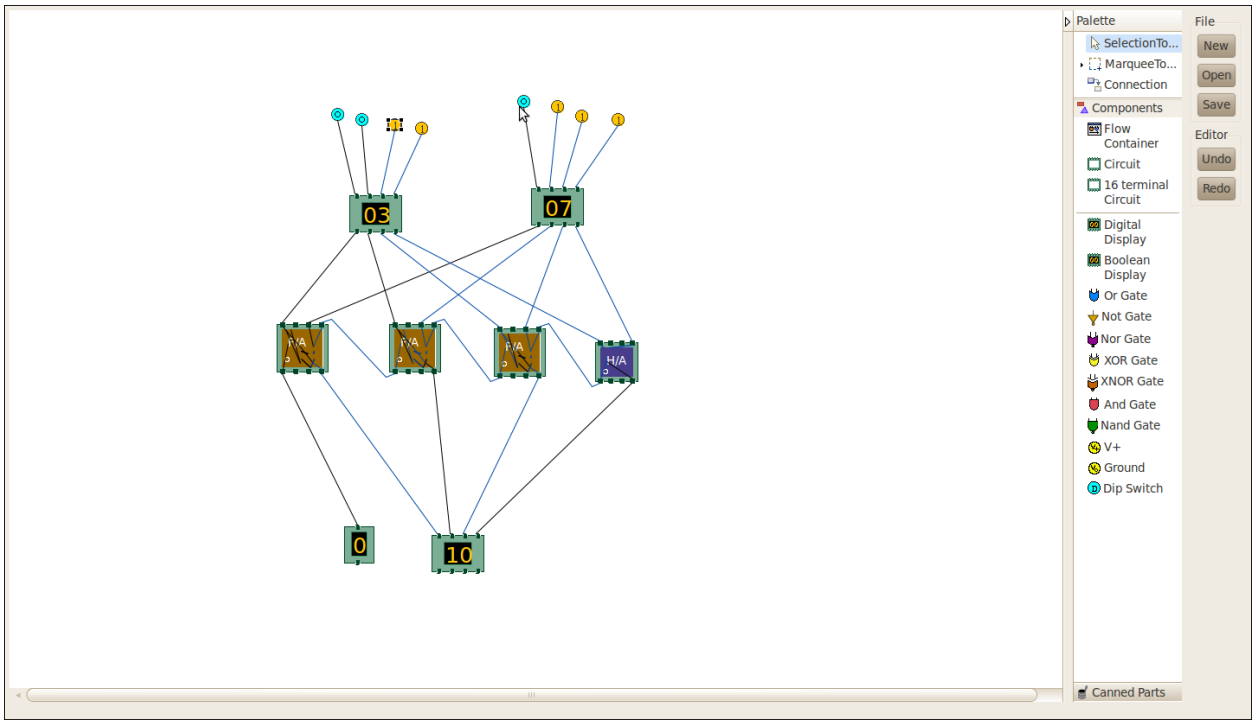


Figure (c): Simulation of Design of Ripple Carry Adder.

5. Conclusion:

A ripple carry adder is a digital circuit that produces the arithmetic sum of two binary numbers. It. can be constructed with full adders connected in cascaded, with the carry output from each full adder connected to the carry input of the next full adder in the chain.

6. References:

https://cse.iitkgp.ac.in/~chitta/coldvl/rca_design.html

https://www.gatevidyalay.com/ripple-carry-adder/

Experiment No. 4

1. **Aim:** Simulation of Carry Look Ahead Adder

2. Hardware / Software Required: Java

3. Theory:

Design of Carry Look Ahead Adder:
To reduce the computation time, there are faster ways to add two binary numbers by using carry look ahead adders. They work by creating two signals P and G known to be Carry Propagator and Carry Generator. The carry propagator is propagated to the next level whereas the carry generator is used to generate the output carry, regardless of input carry. The block diagram of a 4-bit Carry Look Ahead Adder is shown in Figure (a) below -

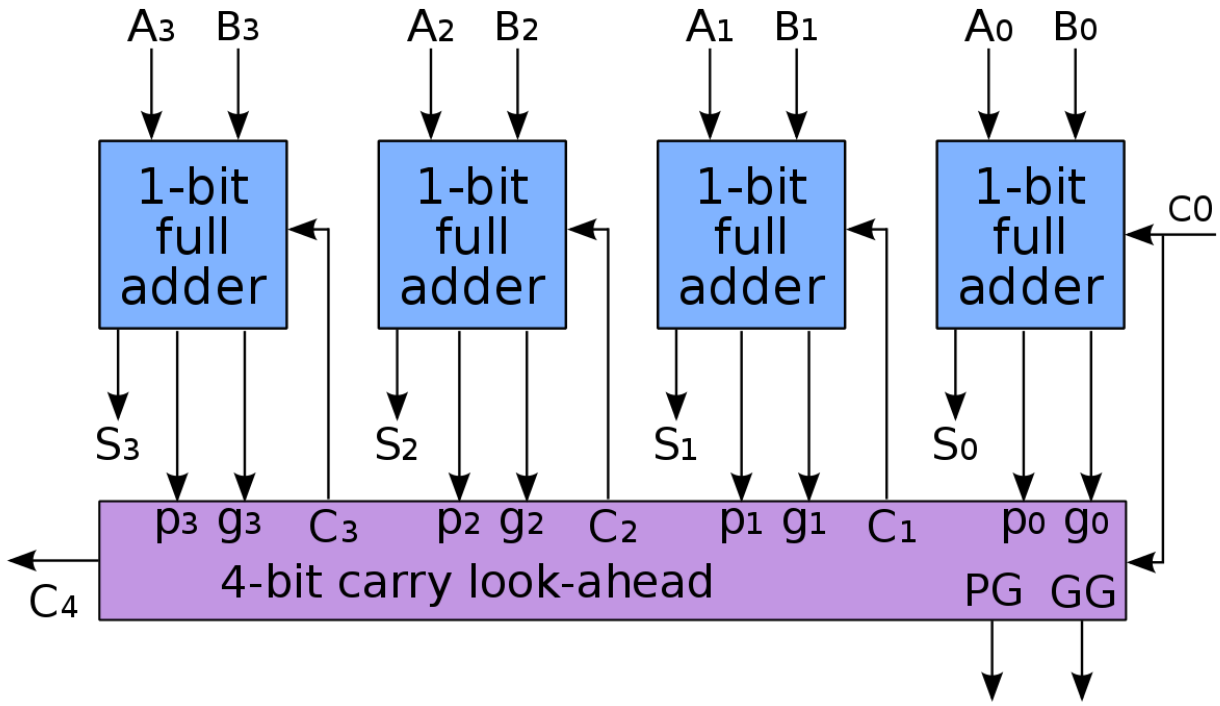


Figure (a): Block diagram of 4-bit carry look ahead adder.

The number of gate levels for the carry propagation can be found from the circuit of full adder. The signal from input carry Cin to output carry Cout requires an AND gate and an OR gate, which constitutes two gate levels. So if there are four full adders in the parallel adder, the output carry C5 would have 2 X 4 = 8 gate levels from C1 to C5. For an n-bit parallel adder, there are 2n gate levels to propagate through.

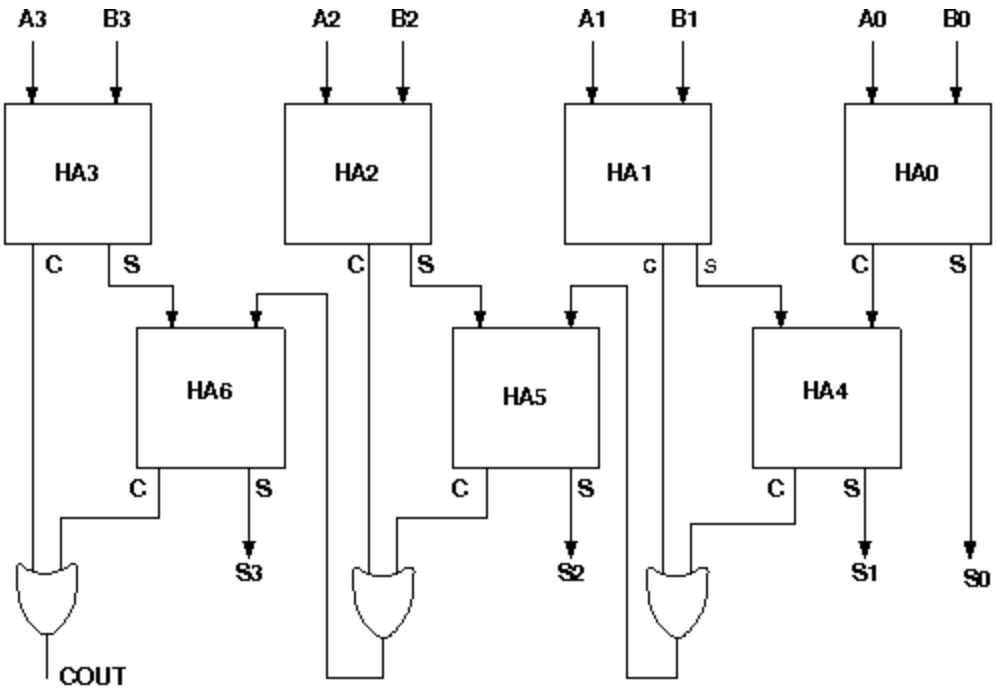


Figure (b): Circuit diagram of Carry Look Ahead Adder

Examining the carry generate and propagate function behavior:

1. check output sum 0000

2. check final output carry 1

3. check intermediate carry bit and sum bit of the unit adders and verify the values of carry generate and propagate function (refer to theory)

4. probing the any port can be done by verifying the color of the wire coming out of the port

5. Color configuration of wire for 5 valued logic supported by the simulator:

- if value is UNKNOWN, wire color= maroon
- if value is TRUE, wire color= blue
- if value is FALSE, wire color= black

o if value is HI IMPEDENCE, wire color= green

o if value is INVALID, wire color= orange

4. Results:

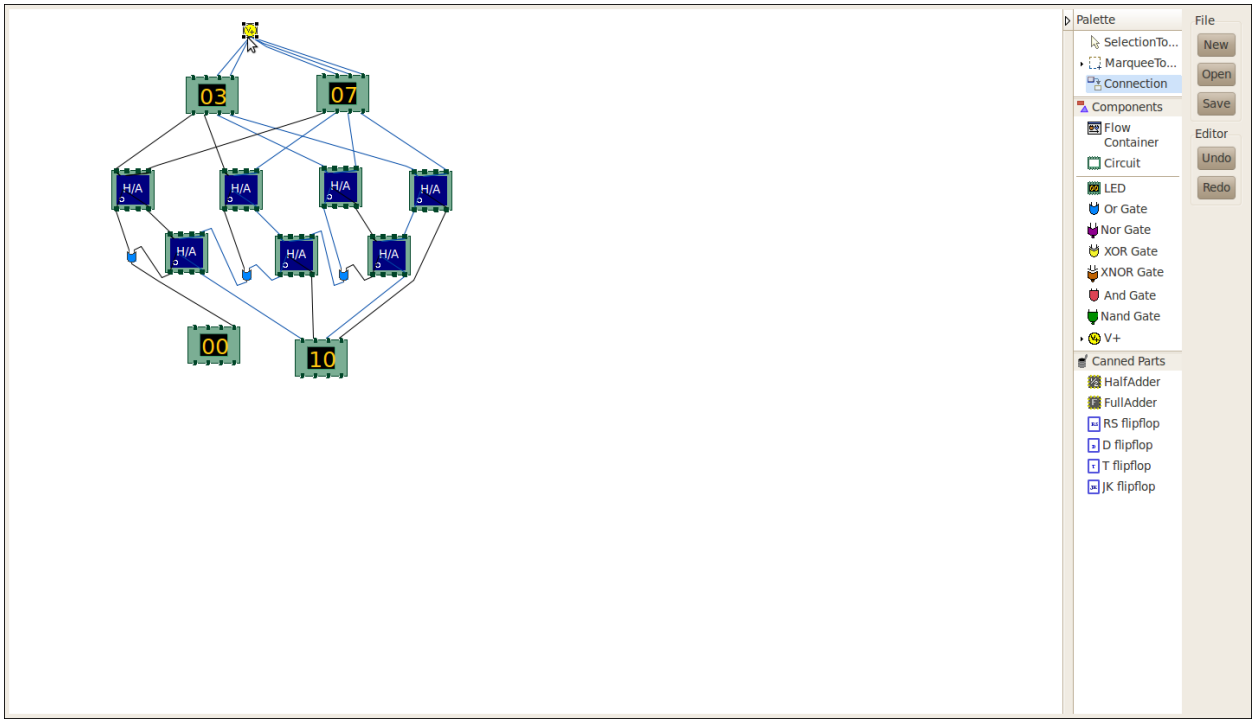


Figure (c): Screenshot of Design of Carry Look Ahead Adder.

5. Conclusion:

A carry-look ahead adder (CLA) or fast adder is a type of adder used in digital logic. A carry-look ahead adder improves speed by reducing the amount of time required to determine carry bits.

6. References:

https://cse.iitkgp.ac.in/~chitta/coldvl/cla_design.html

http://vlabs.iitkgp.ernet.in/coa/exp1/index.html