VLSI Lab

LABORATORY MANUAL

Spring 2019

LAB 09

Title of Lab Experiment: Implementation of Layout of Multi-bit ALU using L-Edit

Engr. Rashid Karim

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STUDENT NAME	ROLL NO	SEC

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LAB ENGINEER SIGNATURE & DATE

MARKS AWARDED: /10

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LAB:	09	Implementation of Layout of Multi-bit ALU using L-Edit

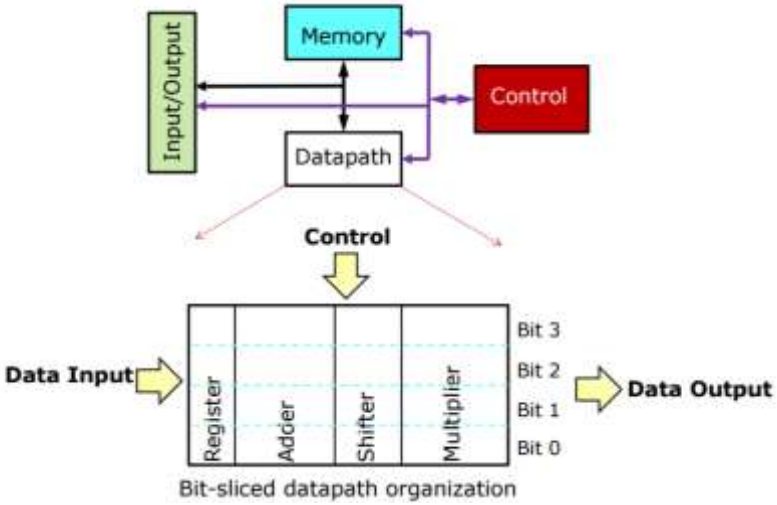
1. Learning Objectives:

a. Data path designing(Multi bit).

2. Equipment Required:

Software : L-Edit

3. Introduction:



A common design practice decomposes the system in two parts:

- ✓ A Data Path (DP): a collection of interconnected modules that perform all the relevant computation on the data: it can use both combinational and sequential components
- ✓ A Control Unit (CU) that coordinates the behavior of the Data Path by issuing appropriate control signals that guarantee the correct sequence of operations.

How to Design a Processor:

step-by-step

- ✓ Analyze instruction set => datapath requirements – the meaning of each instruction is given by the register transfers – datapath must include storage element .
- ✓ Select set of datapath components and establish clocking methodology
- ✓ Assemble datapath meeting the requirements
- ✓ Analyze implementation of each instruction to determine setting of control points that effects the register transfer.
- ✓ Assemble the control logic

Functional blocks of a datapath:

In computer processors, the datapath often consists of the following functional blocks, or some variation thereof:

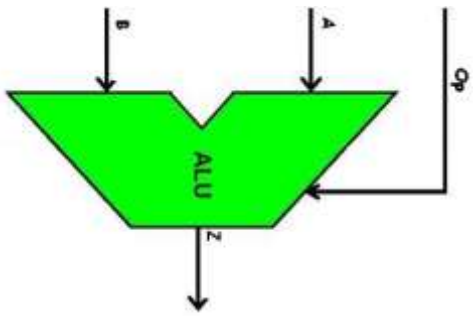
- ✓ The instruction register stores the current instruction to be executed.
- ✓ The program counter (PC) stores the address of the next instruction to be fetched.
- ✓ The memory address register (MAR) is a register that either stores the memory address from which data will be fetched to the CPU or the address to which data will be sent and stored.
- ✓ The memory data register (MDR) is a register of a computer's control unit that contains the data to be stored in the computer storage (e. g. RAM), or the data after a fetch from the computer storage.

Arithimatic Logic Unit

An **arithmetic logic unit** (ALU) is a digital electronic circuit that performs arithmetic and bitwise logical operations on integer binary numbers. It is a fundamental building block of the central processing unit (CPU) found in many computers. This is in contrast to a floating-point unit (FPU), which is a digital circuit that operates on floating point numbers with the aid of one or more internal ALUs. Powerful and complex ALUs are often used in modern, high performance CPUs, FPUs and graphics processing units (GPUs). A single CPU, FPU or GPU may contain multiple ALUs.

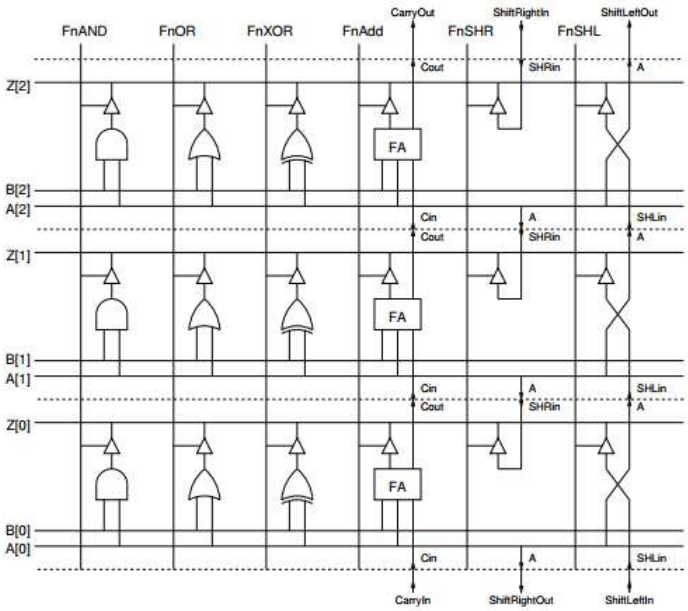
The inputs to an ALU are the data to be operated on (called operands) and a code indicating the operation to be performed; the ALU's output is the result of the performed operation. In many designs, the ALU also exchanges additional information with a status register, which relates to the result of the current or previous operations.

Mathematician John von Neumann proposed the ALU concept in 1945 in a report on the foundations for a new computer called the EDVAC.



4. Procedure :

Block diagram.



5. Task:

Implement and test layout of 2 bit ALU using L-Edit.

Submission Declaration by the Student:

In submitting this lab write-up to the Lab Engineer/Instructor, I hereby declare that:

- ☐ I have performed all the practical work myself
- ☐ I have noted down actual measurements in this writeup from my own working
- ☐ I have written un-plagarised answers to various questions
- ☐ I have/have not obtained the desired objectives of the lab.

Reasons of not obtaining objectoves (if applicable):

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Student's signature and Date

Student Evaluation by the Lab Engineer:

The Lab Engineer can separate this page from the writeup and keep it for his/her own record. It must be signed by the student with date on it.

- ☐ **Lab Work:** objectives achieved (correctness of measurements, calculations, answers to questions posed, conclusion)
  _____/30
- ☐ **Lab Writeup:** Neatness, appropriateness, intime submission
  _____/10
- ☐ **Troubleshooting:** Were the student able to troubleshoot his/her work when it was purposedly changed?
  _____/10
- ☐ **TOTAL:**
  _____/50

Feedback on student behaviour:

Encircle your choice. -2 means poorest/worst/extremely inadequate/irrevlevant, 0 gives an average score, and +2 means best/most relevant/most adequate.

- ☐ Did the student join the lab at the start/remained in lab? -2 -1 0 1 2
- ☐ Did the student remain focused on his/her work during lab? -2 -1 0 1 2
- ☐ Rate student's behaviour with fellows/staff/Lab Engineer? -2 -1 0 1 2

- ☐ Did the student cause any distraction during the Lab? -2 -1 0 1 2
- ☐ Was the student found in any sort of plagiarism? -2 -1 0 1 2

Additional comments (if any) by the Lab Engineer:

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Lab Engineer's signature and Date

Student's feedback: [Separate this page; fill it; drop in the Drop Box.]

- ☐ Providing feedback for every lab session is optional. No feedback means you are satisified
- ☐ The Lab Committee will consider only duly filled forms submitted within one week after the lab
- ☐ This feedabck is for LAB session: LAB Number: _____, Date: _____
- ☐ General (to provide feedback on a persistent practice/ocurrence in LABs).
- ☐ Your current CGPA is in the range 4.00 to 3.00/2.99 to 2.00/1.99 to 1.00/0.99 to 0.00

This feedback is:

- ☐ For a Particular
- ☐ Who conducted the LAB? _____
- ☐ Actual Start time: _____ Total Duration of Lab: _____
- ☐ Instruction Duration: _____ Practical Duration: _____
- ☐ LAB writeup available before LAB? Yes/No with the Photocopier/in LAB/in SLATE

- Had the theory related to lab been covered in theory class? Yes/No

Encircle your choice. -2 means poorest/worst/extremely inadequate/irrevlevant, 0 gives an average score, and +2 means best/most relevant/most adequate.

Instruction Session	Was duration of instruction session adequate?	-2	-1	0	+1	+2
	How much did you understand about the practical?	-2	-1	0	+1	+2
	How much content was irrelevant to the practical?	-2	-1	0	+1	+2
	Did the instructor allowed Q/A and discussion?	-2	-1	0	+1	+2
Practical	Did you get sufficient time for practical?	-2	-1	0	+1	+2
Lab Engineer	Presence in lab at all time?	-2	-1	0	+1	+2
	Ability to convey?	-2	-1	0	+1	+2
	Readiness to help during practical?	-2	-1	0	+1	+2
	Readiness to discuss theoretical aspects?	-2	-1	0	+1	+2
	Helps in troubleshooting?	-2	-1	0	+1	+2
	Guides hows & whys of troubleshooting?	-2	-1	0	+1	+2
Staff	How friendly was the lab staff?	-2	-1	0	+1	+2
	Presence of staff throughout the lab session?	-2	-1	0	+1	+2
	Impact of availability of staff on your practical?	-2	-1	0	+1	+2
Equipment	Performance of Electronic Instruments?	-2	-1	0	+1	+2
	Performance of Breadboard/experiment kit?	-2	-1	0	+1	+2
	Performance of circuit components esp. ICs?	-2	-1	0	+1	+2
Overall	Your overall rating for the whole lab session?	-2	-1	0	+1	+2

Other comments:

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