



King Saud University
College of Computer and Information Sciences
Department of Computer Science

CSC 220: Computer Organization

Lab Project

Due Date: Sunday, Jun 4

Project Description: The aim of this project is to design an 8-bit Function Unit Combining Arithmetic Logic Unit (ALU) and a Shifter that can perform the operations given in table 1 below.

1. Use X and Y as 8 bits input and G as 8 bits output as shown in Figure 1.
2. S0, S1, S2 and S3 represent the selection code of the operations.
3. Three status bits V (overflow), C (carry), N (negative) are related to arithmetic operations and status bit Z (zero) is related to both arithmetic and logic operation.
4. Use constant inputs when needed.
5. Test your designed Function Unit with necessary tables.

Marking: Total marks for the project is five (5).

Groups:

1. Each group should contain 2 students only. The maximum group size is 2 students.
2. Members of the group must belong to the same section.
3. Only one of the group members is responsible to submit the project.
4. Late submissions will NOT be accepted.

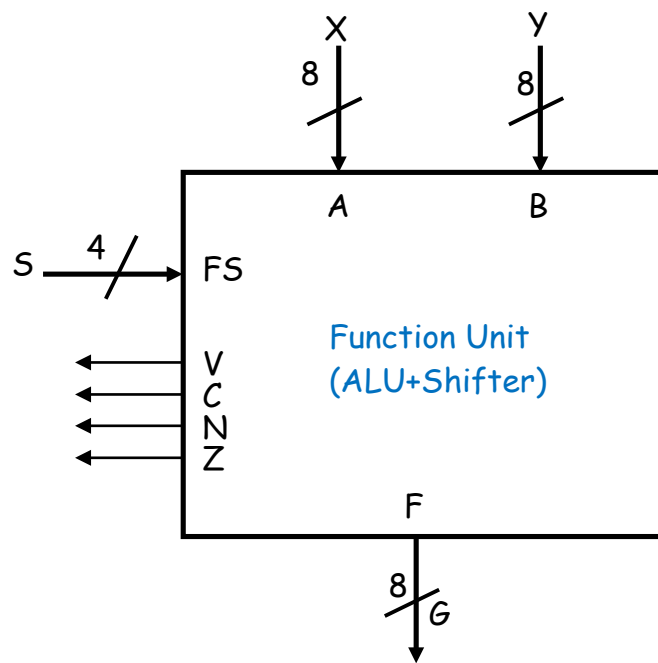


Figure 1: Block diagram of 5-bit Function Unit

Table1: Set of operations

S3	S2	S1	S0	Operation
0	0	0	0	$G=X+Y$
0	0	0	1	$G=X+Y+1$
0	0	1	0	$G=X+Y'$
0	0	1	1	$G=X-Y$
0	1	0	0	$G=2X$
0	1	0	1	$G=2X+1$
0	1	1	0	$G=X$
0	1	1	1	$G=X+1$
1	0	0	0	$G=X \text{ AND } Y'$
1	0	0	1	$G= X \text{ OR } Y'$
1	0	1	0	$G=X \text{ XOR } Y$
1	0	1	1	$G= X'$
1	1	0	0	$G=Y$
1	1	0	1	$G= \text{Switch Tail Right } Y$
1	1	1	0	$G= \text{Arithmetic Shift Right } Y$
1	1	1	1	$G= \text{Logical Shift Left } Y$

Submission: (Upload your project on LMS before **Sunday, Jun 4- 11:59 PM**)

You need to submit the following:

1. Your **circuit** in Logisim file. (.circ).
2. A **PDF** file contains: a screenshot of your circuit and test cases for each operation. In each case you need to specify the value of S, X and Y with the corresponding output as following:

Input				Operation	Input		Expected output				
S ₃	S ₂	S ₁	S ₀		X	Y	G	C	V	N	Z
0	0	0	0	$G=X+Y$	0000 0011	0000 0010	0000 0101	0	0	0	0

Note:

1. Use the same values of X and Y as in the table above for all the test cases.
2. Use **X** in case you don't care what the value of inputs or status bits.
3. One screenshot of your circuit is enough.

Submission instructions:

1. Put your files (circuit + PDF) in one folder.
2. Name the folder with *Your names*.
3. Compress the folder and upload it on LMS.
4. Only one of the group members is responsible to submit the project (one submission per group).