General Register Organization

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Introduction

Types of CPU Organization :

1. Single Accumulator Organization
2. **General Register Organization**
3. Stack Organization

General Register Organiztion

- A general register organization is a digital circuit used to store and manipulate data in a computer system. It typically consists of multiple registers, each of which can hold a certain number of bits of information. Registers are typically accessed through a register address, which identifies the specific register to be accessed.

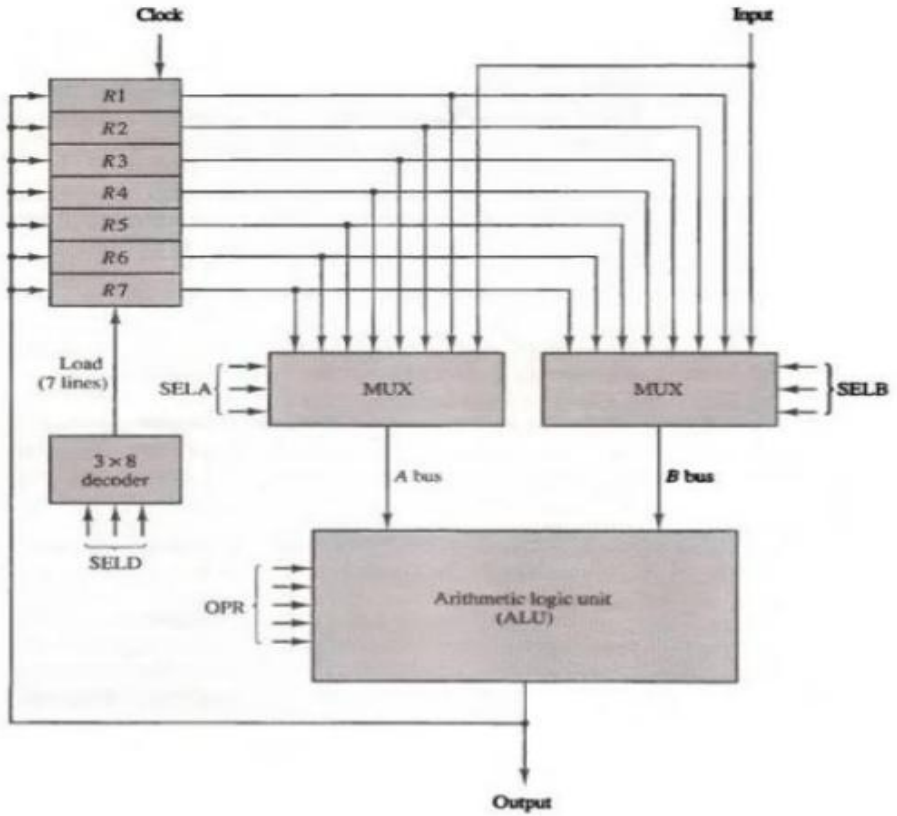
Innovative aspects

- High-speed operation: Registers that can operate at high clock frequencies or that are optimized for specific tasks can provide improved performance for certain types of applications.
- Improved fault tolerance: Registers that can detect and correct errors, or that have redundancy built in, can help improve the reliability of a system.

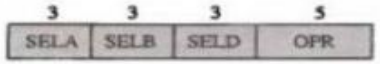
Algorithm for a general register organization:

1. Initialize the registers with their initial values.
2. Wait for a request from the processor to perform an operation on the registers.
3. Determine the type of operation to be performed based on the request.
4. Select the appropriate registers based on the operation.
5. Read the data from the selected registers and perform the required operation.
6. Write the result back to the selected registers.
7. Update any flags or status bits to indicate the result of the operation.
8. Notify the processor that the operation has been completed.
9. Return to step 2 and wait for the next request.

Block Diagram



(a) Block diagram



(b) Control word

Figure 8-2 Register set with common ALU.

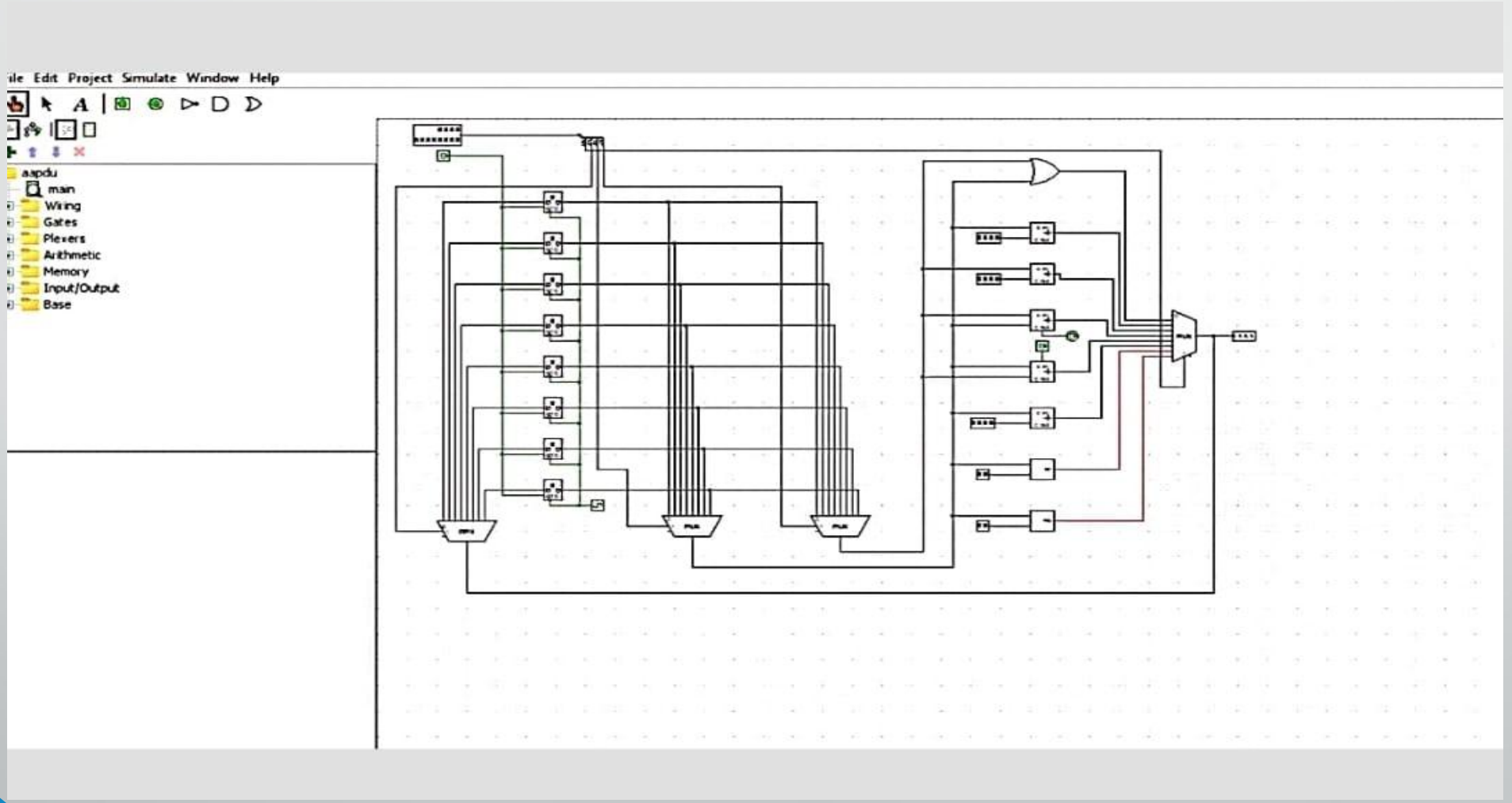
Encoding of Register Selection Field

Binary Code	SELA	SELB	SELD
000	Input	Input	None
001	R1	R1	R1
010	R2	R2	R2
011	R3	R3	R3
100	R4	R4	R4
101	R5	R5	R5
110	R6	R6	R6
111	R7	R7	R7

Encoding of ALU Operations

OPR Select	Operation	Symbol
00000	Transfer A	TSFA
00001	Increment A	INCA
00010	Add A + B	ADD
00101	Subtract A - B	SUB
00110	Decrement A	DECA
01000	ADD A and B	AND
01010	OR A and B	OR
01100	XOR A and B	XOR
01110	Complement A	COMA
10000	Shift right A	SHRA
11000	Shift left A	SHLA

Circuit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aapdu
main
Wiring
Gates
Plexers
Arithmetic
Memory
Input/Output
Base

Conclusion

- In conclusion, a general register organization is a fundamental component in many digital circuits and processors, and is essential for storing and manipulating data within a system. Designing and implementing a general register organization project can provide valuable experience in digital logic design, circuit simulation, and computer architecture.
- Overall, a general register organization project can be a challenging but rewarding experience, providing opportunities to develop valuable skills in digital logic design, computer architecture.

Thank you

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