North South University

Department of Electrical & Computer Engineering

Lab Report

Experiment No:	4
Experiment Title:	Design of a Register File
Course Code:	**CSE332L**
Course Name:	**Computer Organization & Architecture Lab**
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Date of Experiment:	2/4/2021
Date of Submission:	2/4/2021

★ Objectives:

- Designing a 16-bit register file
- Designing the interfacing for data reading from any of the registers
- Designing the interfacing for data writing to any of the registers, and implementing a write control signal

★ Equipment

- Logisim software

★ Block diagram:

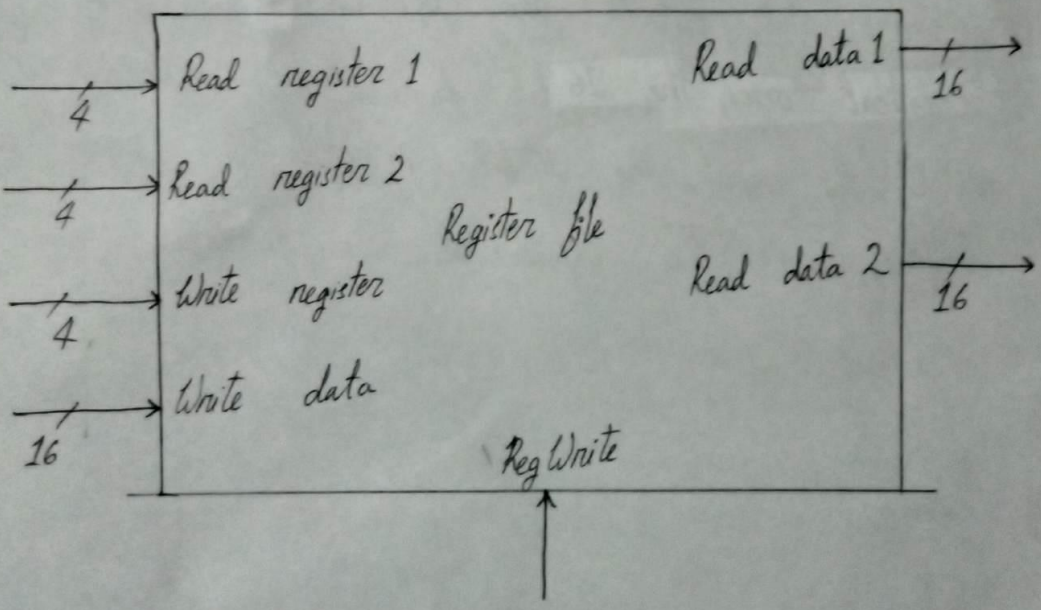
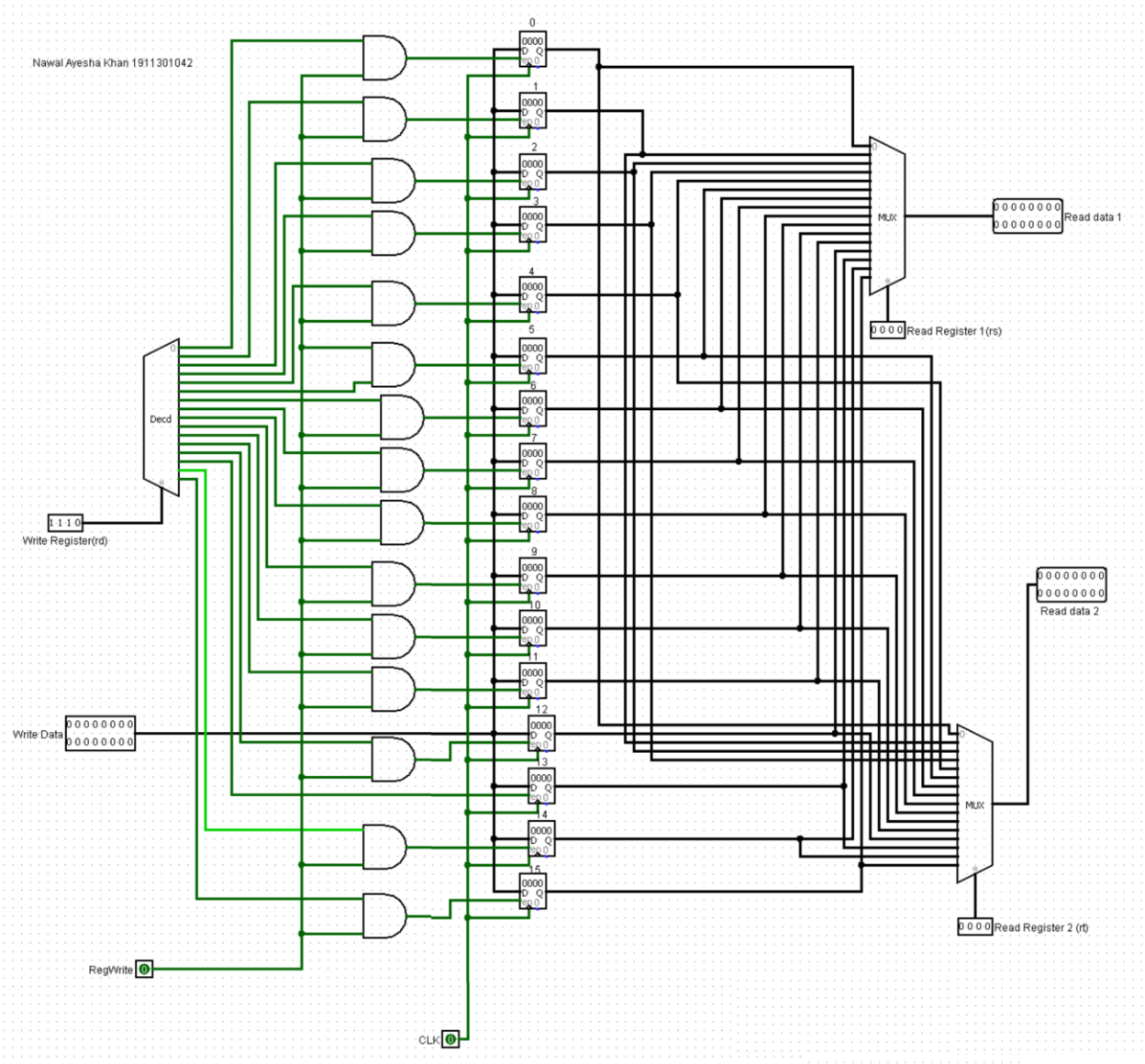


Figure 1: Block diagram for 16-bit register file

Circuit diagram:

Figure 2: Circuit diagram of 16-bit register file



* Discussion: In this experiment, we learned the theory of 16-bit register file using a 4:16 decoder and two 16:1 multiplexers, AND gates, and sixteen registers. We tested the inputs and validated the outputs accordingly. The decoder and AND gates make up the Reg Write control and determine if the destination register will be written to, based on Write register input. Multiplexers determine which registers will be read based on select signal inputs of registers to be read. The experiment was simulated on Logisim. Multiple combinations were applied and outputs are verified. 16-bit registers are used to read 16-bit data from 4-bit addresses. As outputs match the inputs, the 16-bit register file works as designed, and the experiment was successful.