DIGITAL LOGIC

SECR1013 – SECTION 04

FACULTY OF COMPUTING

SEM 1 – 2024/2025

DIGITAL LOGIC PROJECT

Network Packet Transmission Monitoring System

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Dedication & Acknowledgement

Before we begin our report, we would like to thank Ts. Dr. Nur Haliza binti Abdul Wahab for educating us on Digital Logic in the 1st Semester of Session 24/25. Dr. Liza has been very helpful and paid keen attention to our studies, providing us sufficient material to study effectively and we would like to express our greatest appreciation for her effort on that. Her patience in teaching us and answering our difficult questions is also much appreciated.

To summarise what this project consists of, and to put it in short terms, we are to send data from one PC within a lab to another PC, in another lab, as well as determine how much data we wish to send.

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Problem

A group of computers in Lab 1 are connected to a group of computers in Lab 2 via one cable. We want to transmit a number of packet data (defined from user) from one source computer in Lab 1 to another destination computer in Lab 2. Design and simulate circuit to execute the packet transmission using Deeds.

Components / Functions

To design and simulate the execution of packet transmission(s), we used Deeds. Certain components and functions are, of course, **required** to make up the system.

- Between Labs Connection Function
- Count Up Counter Function / Monitoring Packet Transfer Function
- Comparator Function
- Clock Enabler Function

Solution

We solved this problem by using the following components :

- MUX and DeMUX [Between Labs Connection Function]

  A multiplexer and demultiplexer is used to let the users choose the printing properties themselves. There are **two** multiplexers and **two** demultiplexers in this system but to complete the requirements for the system, only **one** multiplexer and **one** demultiplexer is necessary. The purpose of the first multiplexer is to connect computers from Lab 1 to Lab 2. The second multiplexer's purpose will be explained later in the features section in later pages.

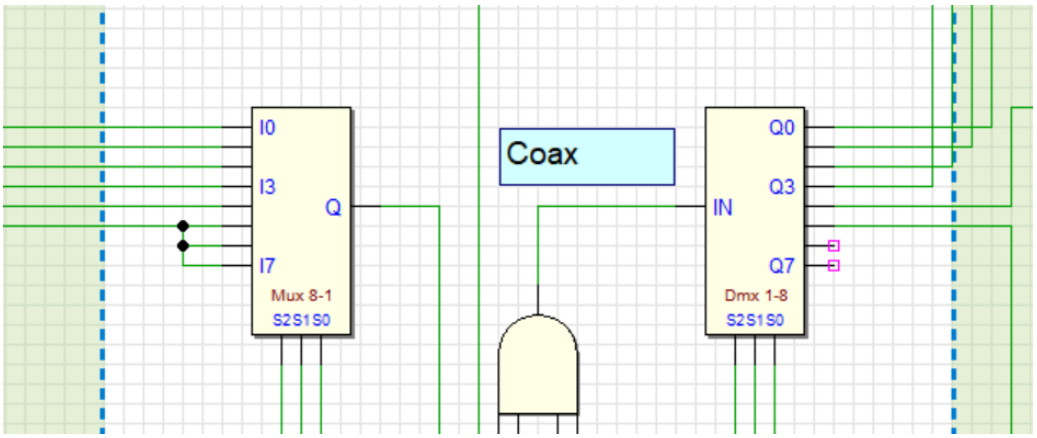
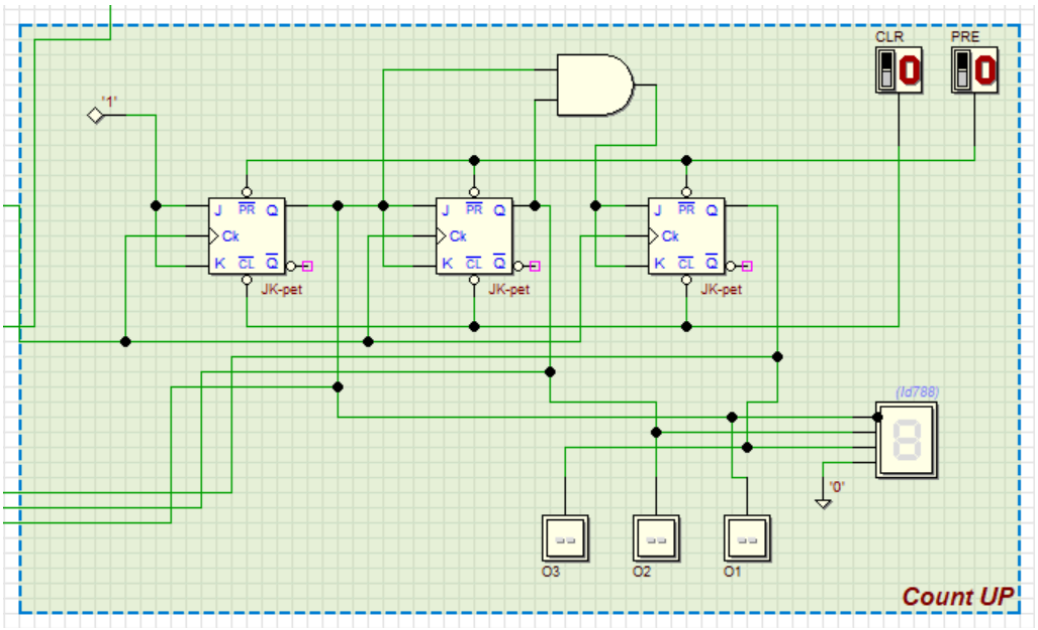


Figure 1.0 MUX and DeMUX from Lab A to Lab B

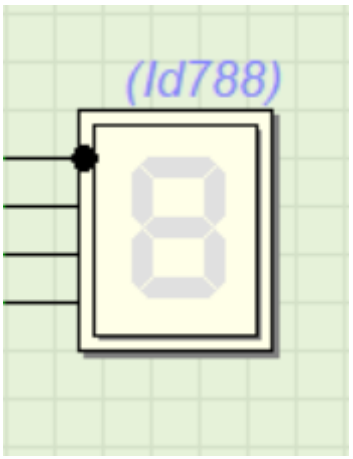
- 3-bit Count Up Counter [Count Up Counter Function]

  This 3-bit Count Up Counter consists of **3 Synchronous, T flip-flop**s. The function of the counter is to monitor packets that are transferred from Lab A to Lab B. The **defined max number of packets** to be transferred from one source of computer to another computer is **8**. The Count Up Counter task to monitor packets is designed based on the already defined max number of packets.



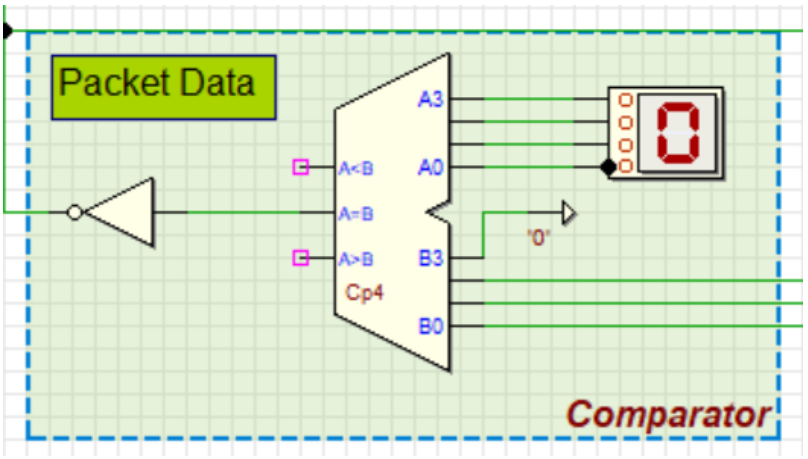
- Display for Packet Transfer Monitoring

  Following up from the Counter we use a one digit, 7 segment hex display and 1 bit output display.



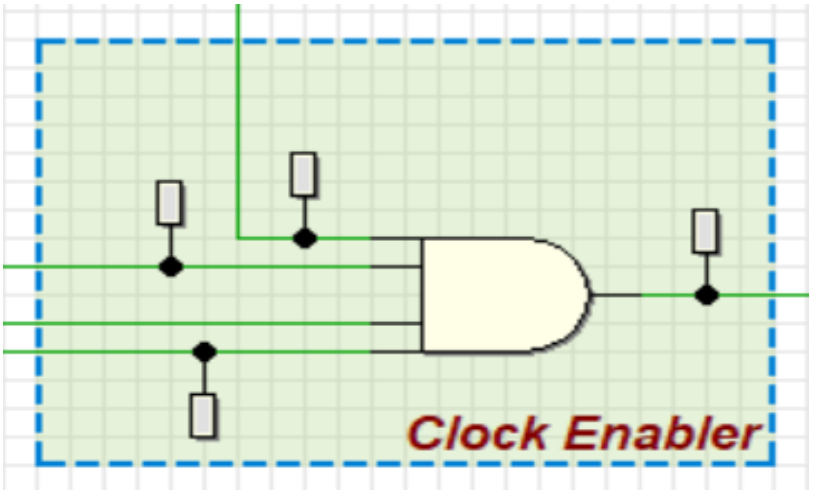
- 4-bit Comparator [Comparator Function]

  The purpose of the comparator is to compare the **max packet number to be transmitted by the computer source** with the **current count packet in the counter**. It's responsible to stop the process of counting packets once the current count packet number is **equal** to the max packet number.



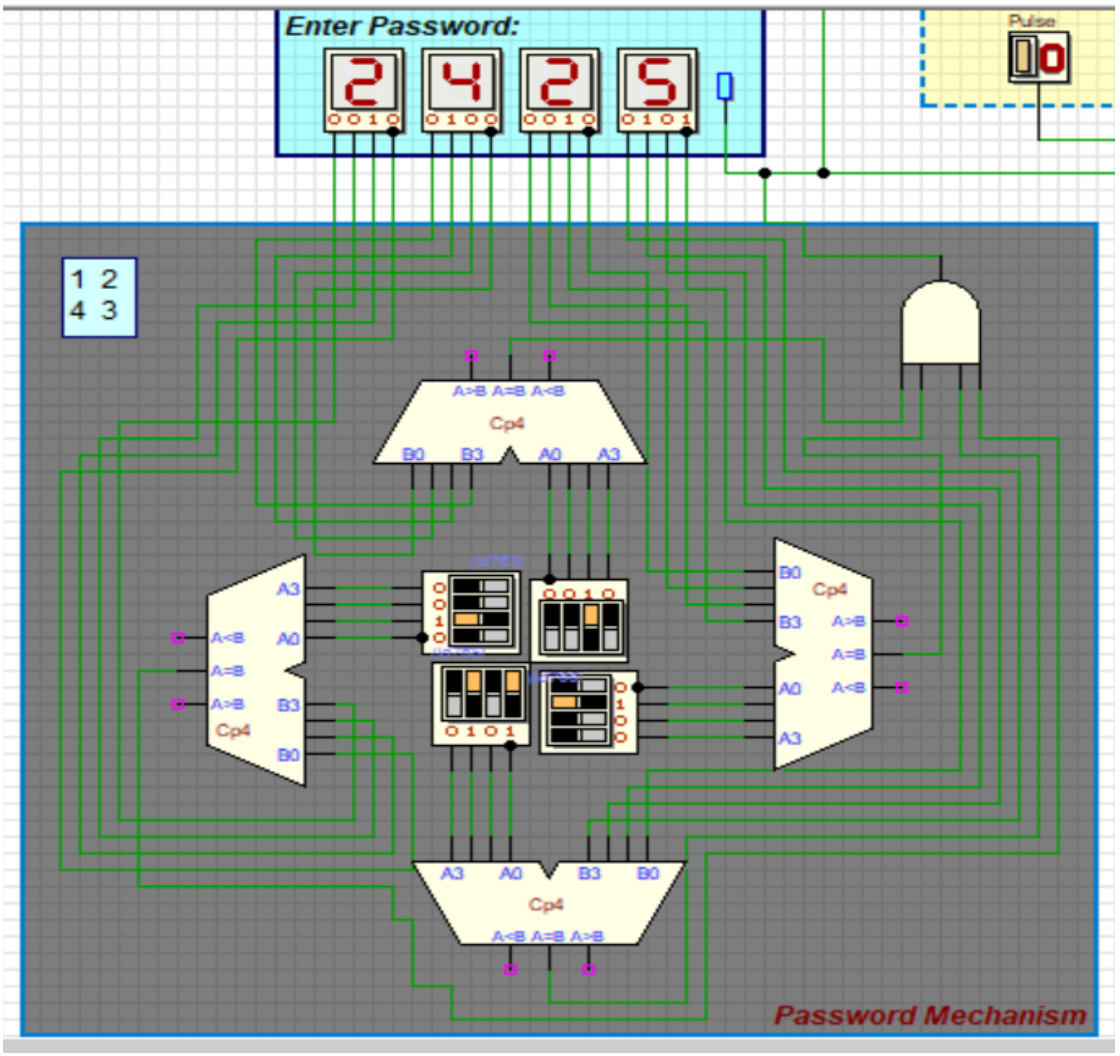
- AND Gate Clock Enabler [Clock Enabler Function]

  Clock enabler controls the operation of the counter mentioned in the previous page. As long as every rule is not obeyed, the clock **will not** be enabled.



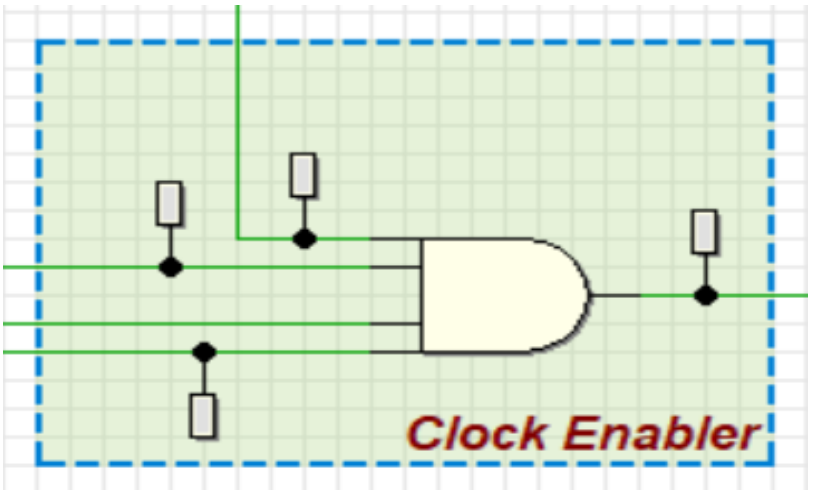
Advanced System Features

1. **Password**

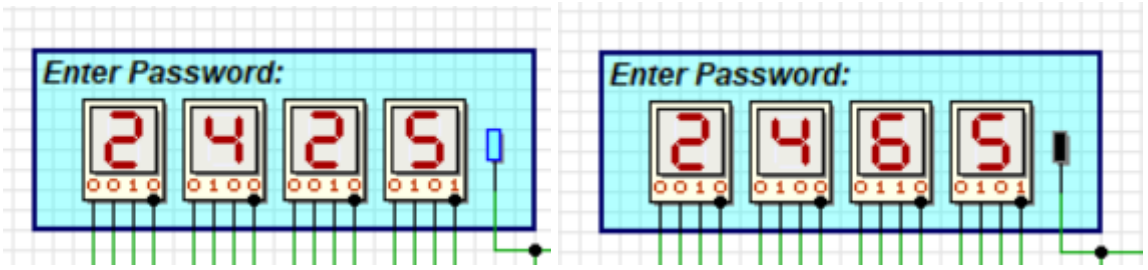


The user must input the correct password if they want the data to be transmitted to the other lab. In this case, we set the password (“2425”). So, it will give extra security when we want to transmit the data to others.

2. **LEDs to Check for Current Flow:**

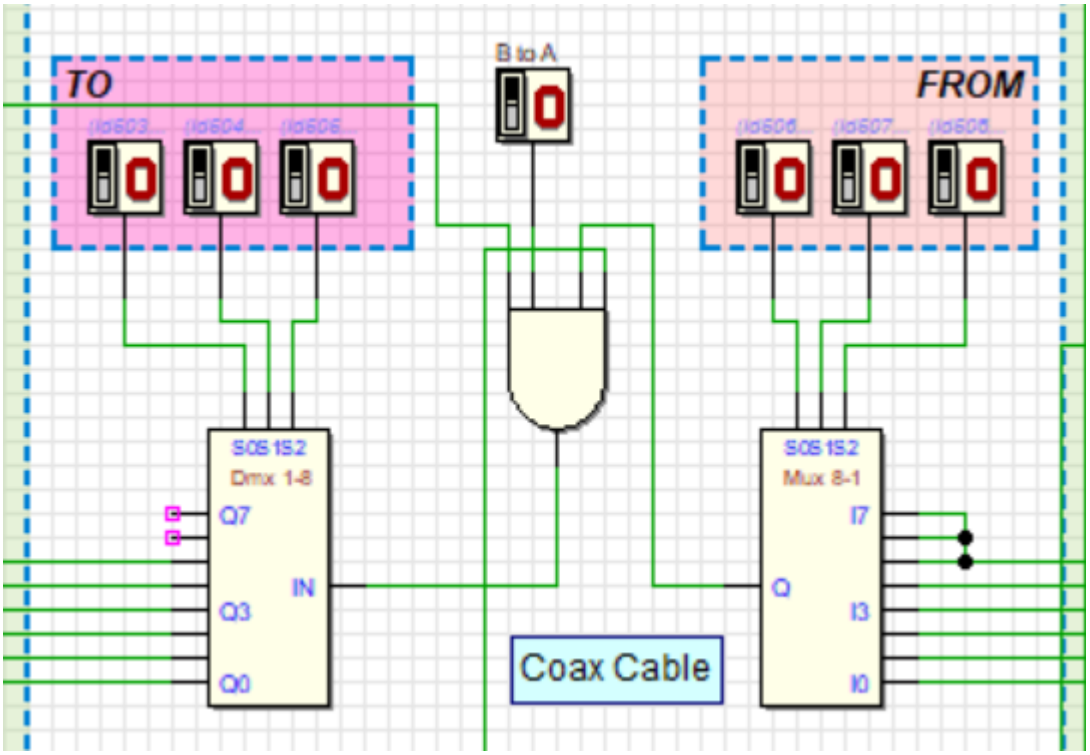


We use the LED to see if there is an error of current flow. It works if the LED lights up and otherwise.



LED lights up when there is a current flow, however LED does not light up otherwise.

3. **Can Transmit data (A to B) and also can transmit data (B to A)**



Users can select which one they want to use in their case. For example, if they want to transmit the data from lab B to Lab A, they must turn on the button (B to A) as shown in figure above. At this time, the button (A to B) must be turned OFF.

Conclusion

In conclusion, we successfully designed and simulated a **Network Packet Transmission Monitoring System** using Digital Logic components and the Deeds simulation tool. Our system effectively transmits data packets between two labs, ensuring secure and accurate data transfer. We utilized key components to achieve our objectives.

We also incorporated advanced features like password protection to enhance the security and reliability of the data transmission process. The system also allows for bidirectional data transmission, allowing flexibility in the system.

Through this project, we gained valuable insights into the practical implementation of digital logic concepts and the importance of designing robust and secure systems. We would like to, once again, express our gratitude to Ts. Dr. Nur Haliza binti Abdul Wahab for her guidance and support throughout this project.

References

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3. Synchronous Counters | Sequential Circuits | Electronics Textbook. (n.d.). Retrieved from https://www.allaboutcircuits.com/textbook/digital/chpt-11/synchronous-counters/

4. anon. (2022). Microsoft - Search. Www.bing.com. Retrieved from https://www.bing.com/ck/a?

Appendices

Task	Name	Time
Acknowledgement and Conclusion	Zereen Teo Huey Huey	1 Hour
Background and Problem	Mek Zhi Qing	1 Hour
Proposed Solution and Component & requirement	Gui Yu Xuan	1 Hour
System Implementation	Woon Zi Jian	1 Hour
	Total time spend:	4 Hours