Computer Networks – Fall 2021

(BS-SE-F21 Morning)
Assignment # 2

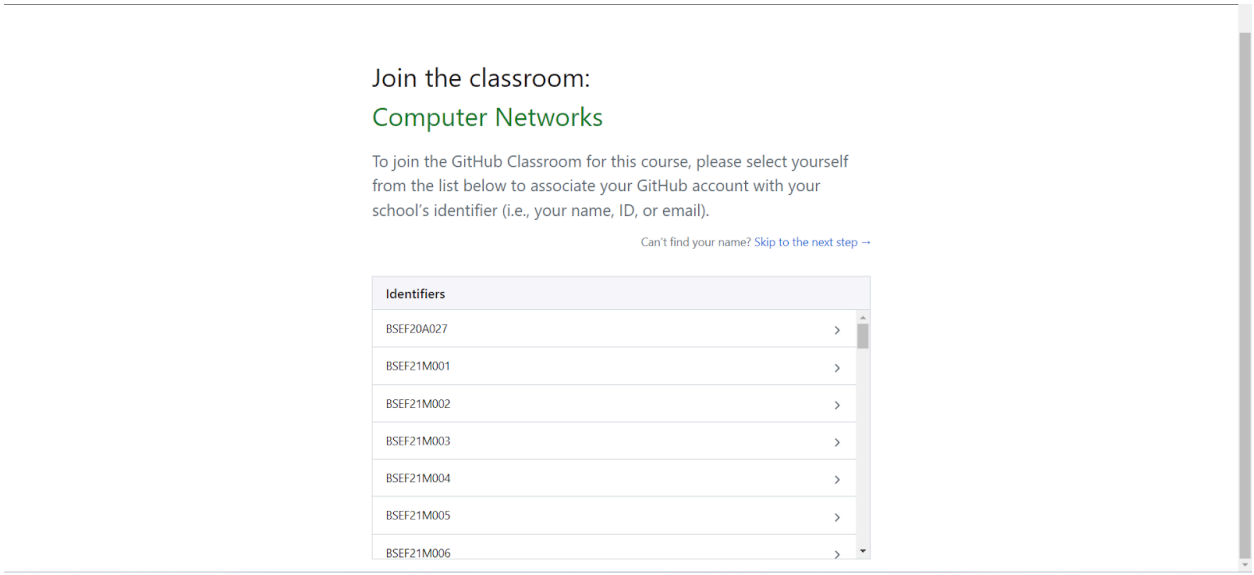
Instructions:

- Attempt the following tasks.
- You can use any programming language and any technology (console, web, mobile, desktop app) for this assignment.
- You must complete all tasks individually. Absolutely **NO collaboration** is allowed.
- Indent your code properly.
- Use meaningful variable and function names. Use the camelCase notation.
- Use meaningful prompt lines/labels for all input/output.
- Late submissions will NOT be accepted, whatever your excuse may be.
- NO Use of Any AI tool can be allowed, any traces can result in 0 marks in the assignment.

Deadline for submission: March 24, 2024, Sunday, 11:59 PM PKT

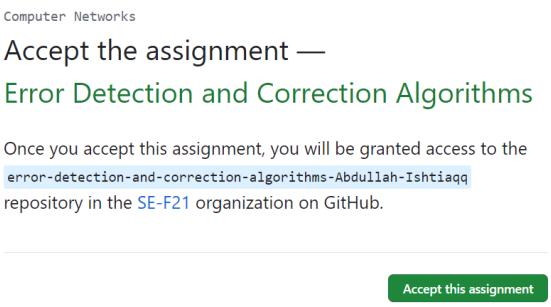
Submission Procedure:

- The platform of Github Classroom will be used for the submission of this assignment.
- Accept the assignment at: https://classroom.github.com/a/-XUNfd4g
- You will be redirected to this screen (Only if you haven't joined the classroom for 1st assignment):

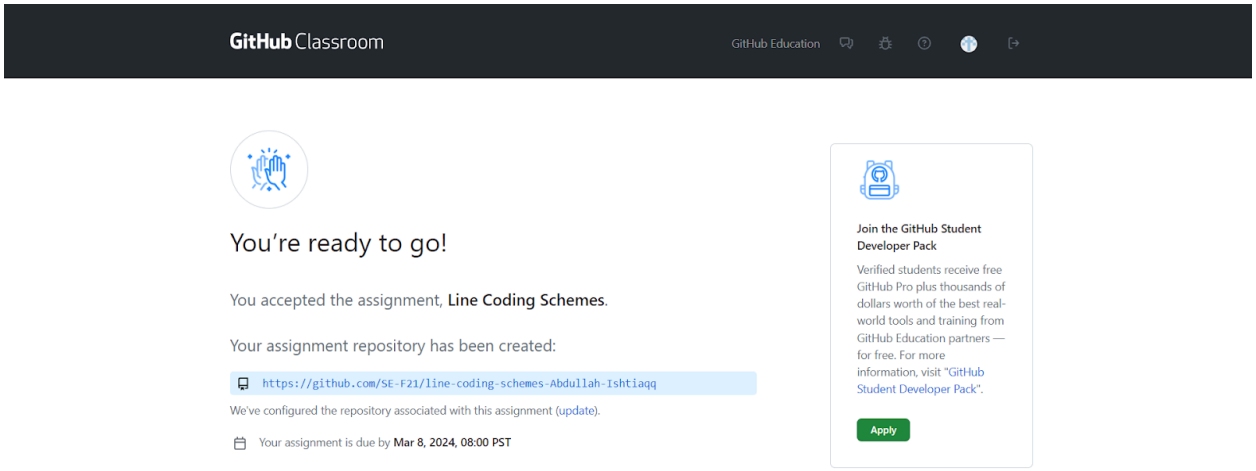


- Select your roll number, **make sure you select your own only**.

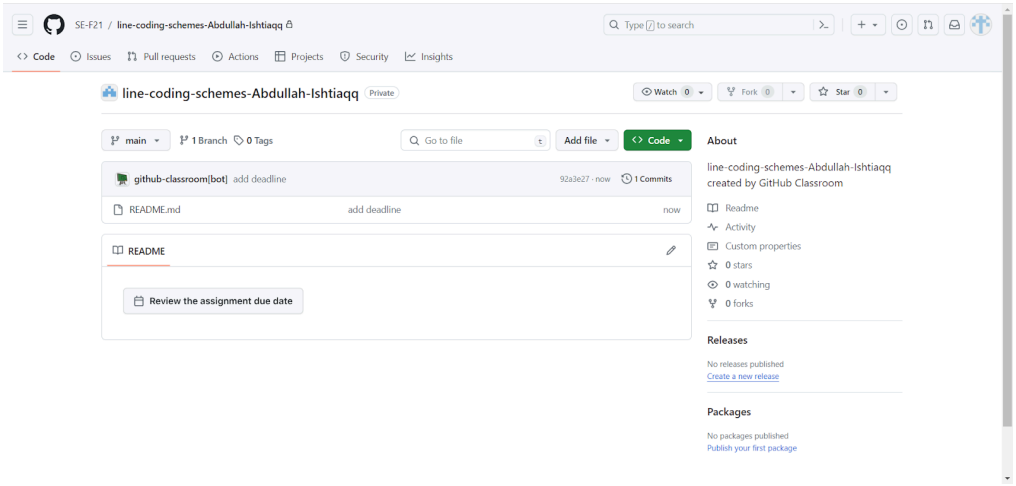
- Accept the assignment on the next screen:



- Github classroom will make a private github repository for your solution. Wait for a while for the link to show up.



- Navigate to the repository link.



- You must use only this repository to push your code. The access to push code will be denied after the deadline ends, so make sure to push in time.

Task # 1 — 10 Marks

Write a program which detects one-bit errors using parity bits. Your program should give the option to the user to either select an even parity bit or an odd parity bit, then take the binary as an input and display the results.

Task # 2 — 25 Marks

a) Write a program that takes binary from the user, asks for the number of rows and columns, and adds even parity bits to the 2D matrix. After that, print the actual bits to be transmitted. Make sure to print the bits in a readable format (e.g. a space after each row of bits).

b) Write a program which attempts to detect multiple-bit errors using 2-D parity bits. You can use only even parity bits in this case. Your program should detect all possible errors, if the detection isn't possible, it should state so. It should ask the number of rows and columns from the user and then take a binary of the same size as input before doing further processing. Remember we are doing this at the receiver's side, so make sure to incorporate the size of parity bits too.

Task # 3 — 25 Marks

a) Write a program that takes binary as an input and displays the message to be transmitted after adding redundant bits according to the Hamming Algorithm.

b) Write a program that takes binary as an input and detects and corrects 1-bit error using Hamming Algorithm.

Task # 4 — 20 Marks

a) Write a program that takes the message and divisor as an input and displays the message to be transmitted after adding redundant bits according to the Cyclic Redundancy Check.

b) Write a program that takes binary as an input and detects errors using the CRC.

Task # 5 — 20 Marks

a) Write a program that takes the binary message as an input and displays the message to be transmitted after adding redundant bits according to Checksum.

b) Write a program that takes binary as an input and detects errors using Checksum.