LABWORK 5: Longest Path
Student's name: Nguyen Trung Kien
## Student's ID: BI12-224

1. System architecture

a. Code explain

- Map Function (map):
  o This function reads paths from a file line by line and compares their lengths to find the longest one.
  o It takes a file pointer file as input.
  o Within a loop, it reads a line of text (a path) from the file using fgets.
  o It removes the newline character at the end of each path if it exists.
  o Then it compares the length of the current path with the length of the longest path found so far (longest_path), and if the current path is longer, it updates longest_path with the current path.

- Reduce Function (reduce):
  o This function opens a file specified by chunk_path and calls the map function on it.
  o It takes a file path chunk_path as input.
  o It opens the file specified by chunk_path for reading.
  o If the file opening fails, it prints an error message and exits the program.
  o After successfully opening the file, it performs mapping on the file by calling the map function with the file pointer.
  o Finally, it closes the file.

- Main Function:
  o It opens the file "paths.txt" which presumably contains a list of paths.

- o If the file opening fails, it prints an error message and returns 1, indicating an error.
- o It calls the map function to process the entire file and find the longest path.
- o It then closes the file.
- o Finally, it prints the longest path found.

b. Workflow

- Main() opens the file "paths.txt" and processes it using the map function.
- map reads each line, removes the newline character, and updates longest_path if a longer path is found.
- After processing the entire file, Main() prints the longest path found.
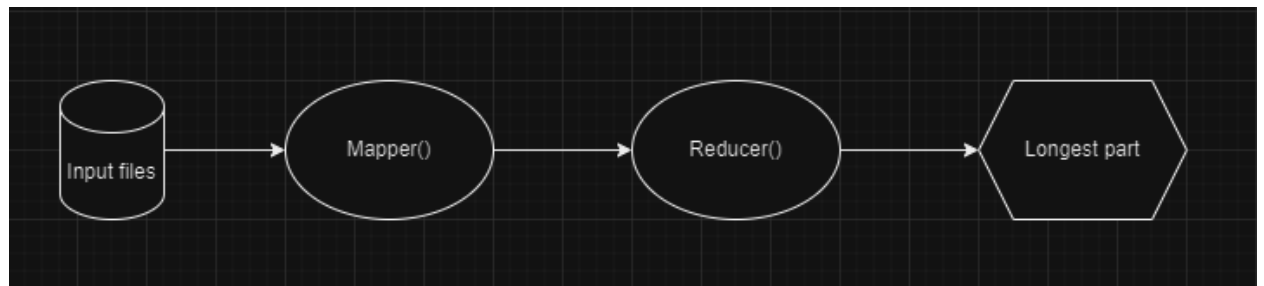
2. Implementation

Figure 1. paths.txt

```
→  ds2024 git:(main) X cd the_longest_path
→  the_longest_path git:(main) X gcc longest_path.c -o longest_path.exe
→  the_longest_path git:(main) X ./longest_path.exe
The longest path found: /home/user/documents/folder/subfolder/file2.txt
```