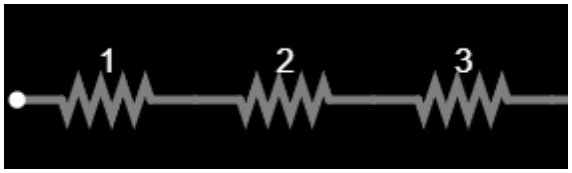
Advanced Circuit Analyzer Project

Description:

Your task is to develop a C++ program that calculates the total resistance of an electrical circuit based on a user-provided string description. The electrical circuit will be described as One String, where the type of connection between resistors is represented by either 'S' (Series) or 'P' (Parallel). Characters are either separated by spaces or commas.

For example, the user input: S 1 2 3 e describes the following circuit:



- ***Resistor value will be integer or float number.***
- ***Types of electrical circuit:***
  1- ***Series (will be represented as S or s)***
  2- ***Parallel (will be represented as P or p)***
- ***It is guaranteed that each connection will end by e (ex: S 1 1 e)***

Your application should provide the following features:

1. ***Enable users to input electrical circuit configurations using one string representation. (The input is one string only)***
2. ***The Circuit Analyzer must handle electrical circuit that has up to m resistors. Where m < 20.***
3. ***The Circuit Analyzer must handle n Parent type of electrical circuit with multiple Childs connections, as we can replace 1 resistor value by a connection. Where n < 20.***
   (ex: P 1 2 S 1 1 e e Act as P 1 2 2 e [n=2])
4. ***Establish a systematic approach to evaluate the circuit and generate the desired output.***
   (output: The total resistance = X)

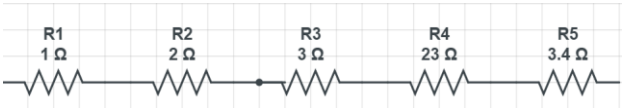
5. ***Error handling:***
   A- Program must check on the number of resistors, for Series connection it must have 1 resistor or more, for Parallel connection it must have 2 resistors or more, otherwise you must print error message "Incorrect Input".
   B- Program must check that the only accepted connection is S or P, otherwise you must print the error message "Wrong Description".

6. Helpful Insights:

Series	Parallel
$R_T = R_1 + R_2 + \ldots + R_n$	$\frac{1}{R_{equiv}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots \frac{1}{R_n}$
Convert char to int	
char x1 = '3'; ***int x2 = x1 - '0'; // this will convert '3' into 3 as a digit not a letter and store it inside x2***	
To Terminate a program	
exit(0);	

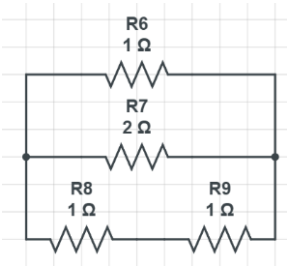
Different Test cases that program can handle:

1- S 1 2 3 23 3.4 e



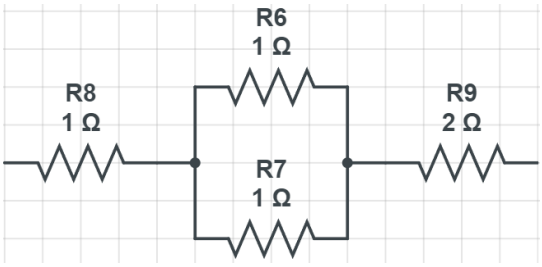
Output: The total resistance = 32.4

2- P 1 2 S 1 1 e e



Output: The total resistance = 0.5

3- S 1 P 1 1 e 2 e



Output: The total resistance = 3.5

4- P 1 2 w 1 1 e e

Output: Wrong Description

Results Evaluation

- ***You should do it similarly to what is described.***
- ***Score is based on the above submissions and the code clearness (well written and commented).***
- ***Using stringstream() or strtok() is NOT ALLOWED.***

Plagiarism

You are not allowed to copy code / external work and claim it as yours (even with slight modifications like changing variable names). Plagiarism will not be tolerated. Your work will be checked for plagiarism:

- ***Manually.***
- ***Using software tools.***

However, you can learn the ideas from external sources, then write your own code.

Submission

This is an individual project you need to upload the cpp file on LMS; YourStudentCode.cpp (ex: 160057.cpp)

NOTE:

- ***ONLY ONE FILE IS REQUIRED TO BE SUBMITTED WITH THE STUDENT ID WITHOUT ANY FURTHER FILES OR FOLDERS.***
- ***ANYTHING ELSE WILL RESULT IN 0 SCORE, AS AN AUTOMATED SYSTEM WILL HANDLE FETCHING AND MARKING THE PROJECT.***
- ***SUBMISSION AFTER THE DEADLINE WILL RESULT IN 0 SCORE.***