

COL-216 Assignment-2

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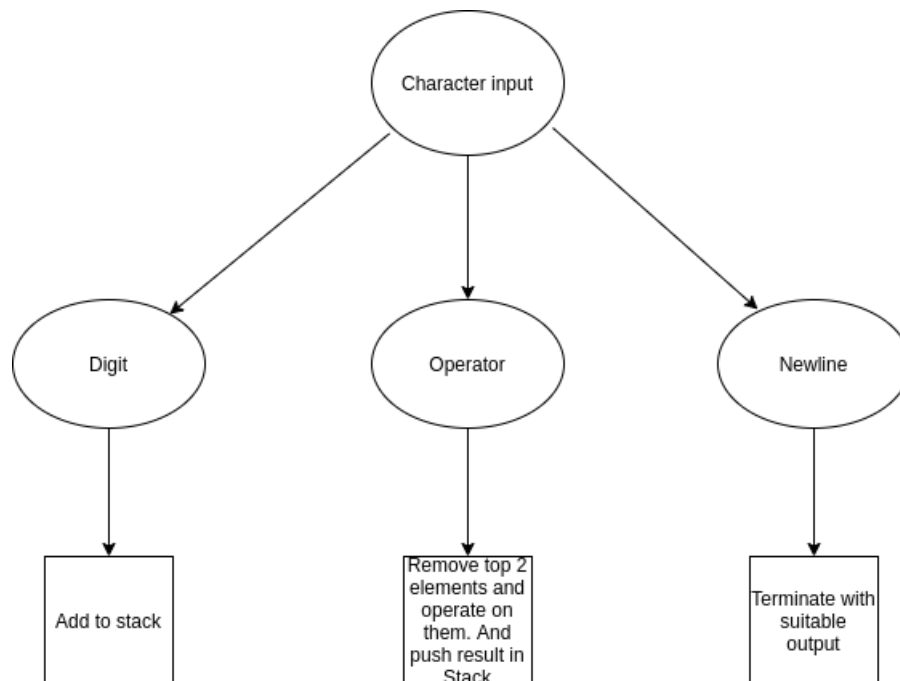
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Aim

Write a MIPS Assembly Program for evaluating an expression in postfix format.

Approach

1. We realized that the stack will be the most handy data structure to evaluate the postfix expressions.
2. We took the input with one character at a time and if it is integer, we added it to stack. If an operator, we operate it on the top 2 elements(if available). If an newline character then terminate the program with suitable output.



Design Decisions

Error handling : We raised error for the cases:

1. Input character is neither a digit nor an operand.
2. If input is operator and stack has less than 2 elements.
3. If the character is newline and the stack has more than one element than or no element.

Testing

We tested the compiled code by manually typing inputs in the console window. We checked if it is calculating correctly for some testcases also checked if it raises the appropriate errors. We tried following inputs:

1. input: "325*+" Output: 13
Expression : 3+(2*5) Expected: 13
> 3 S:[3]
> 2 S:[3 2]
> 5 S:[3 2 5]
> * S:[3 10]
> + S:[13]
> \n Output:13
2. input: "3" Output: 3
Expression : 3 Expected: 3
> 3 S:[3]
> \n Output:13
3. input: "32+=" Output: "Invalid character"
Expression : 3+2= Expected: '=' not recognized
> 3 S:[3]
> 2 S:[3 2]
> + S:[5]
> = Output: Unrecognized character
4. input: "" Output: "Unbalanced postfix expression"
Expected: Empty stack
> \n Output: Unbalanced postfix expression
5. input: "3+5" Output: "Unbalanced postfix expression"
Expected: Invalid expression
> 3 S:[3]
> + Output: Unbalanced postfix expression
6. input: "3x+" Output: "Invalid character"
7. input: "012*3*+45*+6-7+89*-" Output: -45
Expression: ((0+((1*2)*3)+(4*5))-6)+7)-(8*9) Expected: -45
8. input: "0123456789+++++++" Output: 45
Expression: 0+(1+(2+(3+(4+(5+(6+(7+(8+9)))))))) Expected: 45

Where S is the stack