Lab Program - 15

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 Write a C Program to implement the operator precedence parsing.

**Code:**

#include <stdio.h>

#include <stdlib.h>

#include <string.h>

#include <ctype.h>

#define MAX 100

char stack[MAX];

int top = -1;

char input[MAX];

// Operator precedence table

int precedence(char op) {

if (op == '\*' || op == '/') return 2;

if (op == '+' || op == '-') return 1;

return 0; // Default for non-operators

}

// Push onto stack

void push(char symbol) {

stack[++top] = symbol;

}

// Pop from stack

char pop() {

return (top >= 0) ? stack[top--] : '\0';

}

// Get the top of the stack

char peek() {

return (top >= 0) ? stack[top] : '$'; // '$' is used as a bottom marker

}

// Check if character is an operator

int is\_operator(char ch) {

return (ch == '+' || ch == '-' || ch == '\*' || ch == '/');

}

// Perform reduction when possible

void reduce() {

while (top >= 2) {

// Check if stack contains "E op E" pattern

if (stack[top] == 'E' && is\_operator(stack[top - 1]) && stack[top - 2] == 'E') {

char op = stack[top - 1]; // Store the operator

pop(); // Remove 'E'

pop(); // Remove operator

pop(); // Remove 'E'

push('E'); // Replace with single 'E'

printf("Reduce: E %c E → E\n", op);

} else {

break; // Stop reducing if no match

}

}

}

// Operator Precedence Parsing Algorithm

void operator\_precedence\_parsing() {

int position = 0;

push('$'); // Push bottom marker

printf("\nOperator Precedence Parsing Steps:\n");

while (position < strlen(input)) {

char current = input[position];

if (strncmp(&input[position], "id", 2) == 0) { // If "id" is encountered

printf("Shift: id\n");

push('E'); // Reduce "id" → E immediately

position += 2; // Move past "id"

}

else if (is\_operator(current)) { // If operator is encountered

while (is\_operator(peek()) && precedence(peek()) >= precedence(current)) {

reduce(); // Reduce before shifting new operator

}

printf("Shift: %c\n", current);

push(current);

position++;

}

else {

printf("Invalid character detected: %c\n", current);

exit(1);

}

}

// Final reduction to ensure only 'E' remains

reduce();

if (top == 1 && stack[top] == 'E' && stack[0] == '$') {

printf("\nParsing successful!\n");

} else {

printf("\nParsing failed!\n");

}

}

int main() {

printf("Enter an arithmetic expression: ");

scanf("%s", input);

operator\_precedence\_parsing();

return 0;

}

**Screenshot for I/O:**

