Project1 实验报告

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程序功能说明

1. 输入不含变量的整数/浮点数表达式
2. 实现对算术混合运算表达式的求值
3. 额外实现了乘方功能

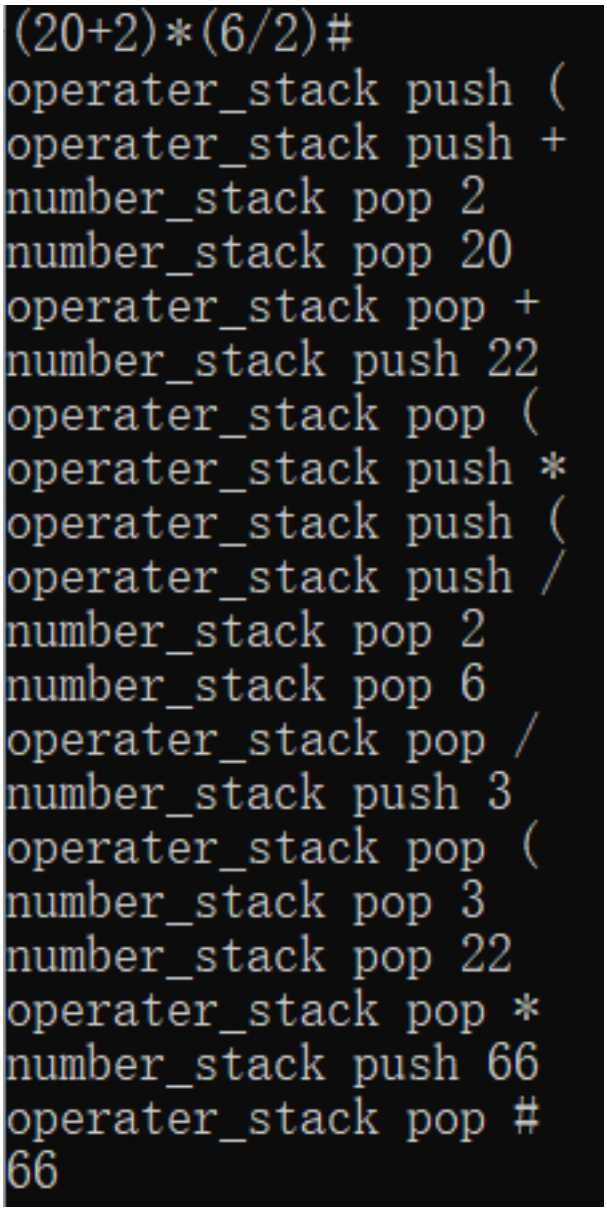
程序运行展示

输入数字及加法

```
1024.64#
operater_stack pop #
1024.64

1+2+3+4#
operater_stack push +
number_stack pop 2
number_stack pop 1
operater_stack pop +
number_stack push 3
operater_stack push +
number_stack pop 3
number_stack pop 3
operater_stack pop +
number_stack push 6
operater_stack push +
number_stack pop 4
number_stack pop 6
operater_stack pop +
number_stack push 10
operater_stack pop #
10
```

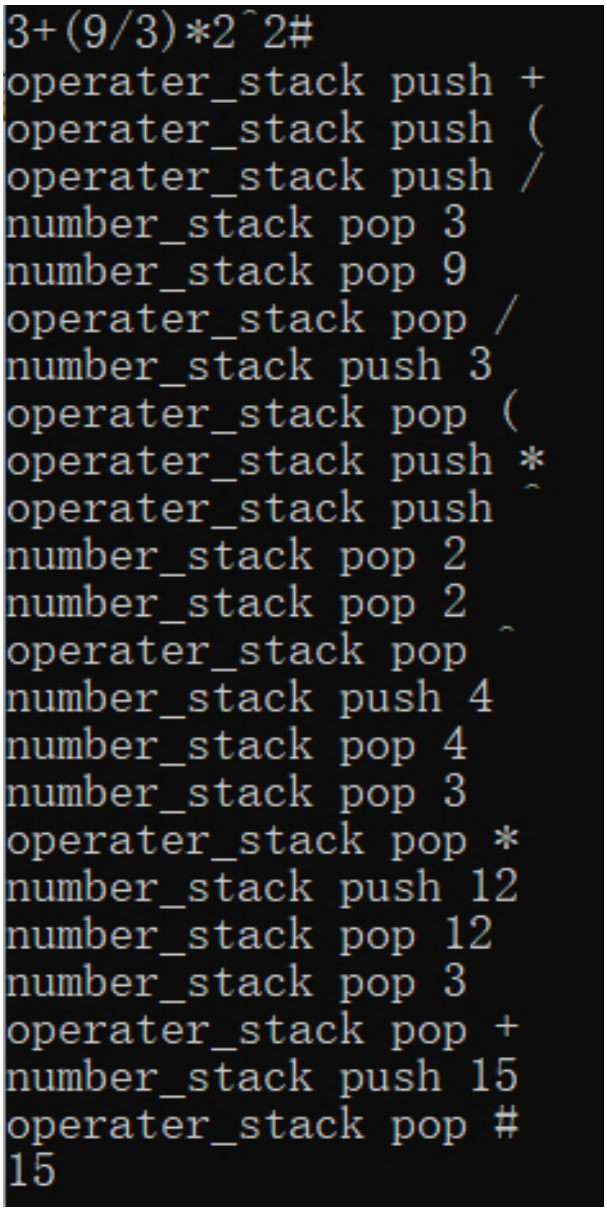
混合运算展示1


(20+2)*(6/2)#
operater_stack push (
operater_stack push +
number_stack pop 2
number_stack pop 20
operater_stack pop +
number_stack push 22
operater_stack pop (
operater_stack push *
operater_stack push (
operater_stack push /
number_stack pop 2
number_stack pop 6
operater_stack pop /
number_stack push 3
operater_stack pop (
number_stack pop 3
number_stack pop 22
operater_stack pop *
number_stack push 66
operater_stack pop #
66

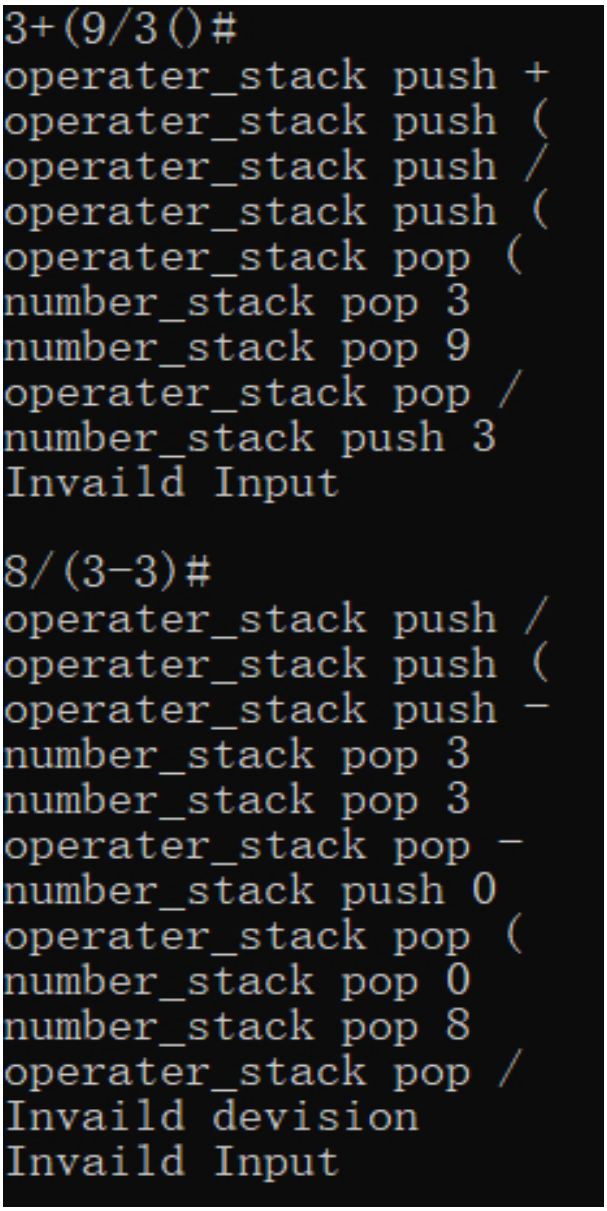
混合运算展示2

```
2*(6+2*(3+6*(6+6)))#
operater_stack push *
operater_stack push (
operater_stack push +
operater_stack push *
operater_stack push (
operater_stack push +
operater_stack push *
operater_stack push (
operater_stack push +
number_stack pop 6
number_stack pop 6
operater_stack pop +
number_stack push 12
operater_stack pop (
number_stack pop 12
number_stack pop 6
operater_stack pop *
number_stack push 72
number_stack pop 72
number_stack pop 3
operater_stack pop +
number_stack push 75
operater_stack pop (
number_stack pop 75
number_stack pop 2
operater_stack pop *
number_stack push 150
number_stack pop 150
number_stack pop 6
operater_stack pop +
number_stack push 156
operater_stack pop (
number_stack pop 156
number_stack pop 2
operater_stack pop *
number_stack push 312
operater_stack pop #
312
```

混合运算展示3


3+(9/3)*2^2#
operater_stack push +
operater_stack push (
operater_stack push /
number_stack pop 3
number_stack pop 9
operater_stack pop /
number_stack push 3
operater_stack pop (
operater_stack push *
operater_stack push ^
number_stack pop 2
number_stack pop 2
operater_stack pop ^
number_stack push 4
number_stack pop 4
number_stack pop 3
operater_stack pop *
number_stack push 12
number_stack pop 12
number_stack pop 3
operater_stack pop +
number_stack push 15
operater_stack pop #
15

错误处理展示



部分关键代码及其说明

输入数字

```
if(isdigit(s[i])){
    if(digit_flag && !point_flag){
        tmp = num_stack.top();
        num_stack.pop();
        tmp *= 10;
        tmp += s[i] - '0';
        num_stack.push(tmp);
    }
    else if(digit_flag && point_flag){
        tmp = num_stack.top();
        num_stack.pop();
        tmp += (s[i]-'0') * pow(10, -flag);
        flag++;
        num_stack.push(tmp);
    }
    else{
        num_stack.push(s[i] - '0');
    }
    digit_flag = true;
}
else if(s[i] == '.'){
    point_flag = true;
    digit_flag = true;
    flag = 1;
}
```

用 $bool$ 型变量 $digit\_flag$ 记录上个读入的字符是否为数字，用 $bool$ 型变量 $point\_flag$ 记录次数字是否为小数。

输入操作符

```
digit_flag = false;
point_flag = false;
flag = ope.find(s[i]);
if(flag >= 0 && flag < 8){
    label: flag_1 = ope.find(op_stack.top() );
    if(compare[flag_1][flag] == 0){
        cout << "operater_stack pop " << op_stack.top() << endl;
        op_stack.pop();
    }
    else if(compare[flag_1][flag] == -1){
        op_stack.push(s[i]);
        cout << "operater_stack push " << op_stack.top() << endl;
    }
    else if(compare[flag_1][flag] == 1){
        tmp = num_stack.top();
        num_stack.pop();
        cout << "number_stack pop " << tmp << endl;
        cout << "number_stack pop " << num_stack.top() << endl;
        cout << "operater_stack pop " << op_stack.top() << endl;
        if(op_stack.top() == '+'){
            tmp += num_stack.top();
            num_stack.pop();
            num_stack.push(tmp);
        }
        else if(op_stack.top() == '-'){
            tmp = num_stack.top() - tmp;
            num_stack.pop();
            num_stack.push(tmp);
        }
        else if(op_stack.top() == '*'){
            tmp *= num_stack.top();
            num_stack.pop();
            num_stack.push(tmp);
        }
        else if(op_stack.top() == '/'){
            if(tmp == 0){
                cout << "Invaild devision" << endl;
                break;
            }
            tmp = num_stack.top() / tmp;
            num_stack.pop();
            num_stack.push(tmp);
        }
        else if(op_stack.top() == '^'){
            tmp = pow(num_stack.top(), tmp);
            num_stack.pop();
            num_stack.push(tmp);
        }
        cout << "number_stack push " << num_stack.top() << endl;
        op_stack.pop();
```

```
            goto label;
        }
    }
```

程序运行方式简要说明

1. 输入数字时根据 $bool$ 型变量 $digit\_flag$ 和 $point\_flag$ 读入浮点数，上方有代码说明。
2. 输入操作符时根据优先级进行一系列 $push$ 和 pop 的操作
3. 当操作符比较优先级时可以发现表达式的语法错误，如发现 ”)” 在 ”(” 前的情况，此时要报错并清空两个栈，以准备下次输入。