

18CSC304J/ Compiler Design

Submitted By:- ANANNYA P. NEOG (RA1911003010367)

Exp-7: Shift Reduce Parsing

Aim:- To write code to implement Shift Reduce Parsing

Codes:-

```
gram = {
    "E":["E*E","E+E","i"]
}
starting_terminal = "E"
inp = "i+i*i"

# # example 2
# gram = {
#     "S":["S+S","S*S","i"]
# }
# starting_terminal = "S"
# inp = "i+i*i"

# # example 3
# gram = {
#     "E":["2E2","3E3","4"]
# }
# starting_terminal = "E"
# inp = "2324232$"

stack = "$"
print(f'{"Stack": <15}<'+" | "+f'{"Input Buffer": <15}<'+" | "+f'Parsing Action')
print(f'{"-":<50}<')

while True:
    action = True
    i = 0
    while i<len(gram[starting_terminal]):
        if gram[starting_terminal][i] in stack:
            stack = stack.replace(gram[starting_terminal][i],starting_terminal)
            print(f'{"stack: <15}<'+" | "+f'{"inp: <15}<'+" | "+f'Reduce S->{gram[starting_terminal][i]}')
            i=-1
            action = False
        i+=1
    if len(inp)>1:
        stack+=inp[0]
        inp=inp[1:]
        print(f'{"stack: <15}<'+" | "+f'{"inp: <15}<'+" | "+f'Shift')
        action = False

    if inp == "$" and stack == (" $" + starting_terminal):
        print(f'{"stack: <15}<'+" | "+f'{"inp: <15}<'+" | "+f'Accepted')
```

break

if action:

print(f'{stack: <15}'+ "|" + f'{inp: <15}'+ "|" + f'Rejected')

break

```
main.py
1 # example 1
2 gram = {
3     "E":["E*E","E+E","i"]
4 }
5 starting_terminal = "E"
6 inp = "i+i*i"
7
8 # example 2
9 gram = {
10     "S":["S+S","S*S","i"]
11 }
12 starting_terminal = "S"
13 inp = "i+i*i"
14
15 # example 3
16 gram = {
17     "E":["2E2","3E3","4"]
18 }
19 starting_terminal = "E"
20 inp = "2324232$"
21
22
23 stack = "$"
24 print(f'{"Stack": <15}'+ "|" + f'{"Input Buffer": <15}'+ "|" + f'Parsing Action')
25 print(f'{"-": <50}')
26
27 while True:
28     action = True
29     i = 0
30     while i < len(gram[starting_terminal]):
31         if gram[starting_terminal][i] in stack:
32             stack = stack.replace(gram[starting_terminal][i], starting_terminal)
33             print(f'{stack: <15}'+ "|" + f'{inp: <15}'+ "|" + f'Reduce S->{gram[starting_terminal][i]}')
34             i = i + 1
35             action = False
36         i = i + 1
37     if len(inp) > 1:
38         stack += inp[0]
39         inp = inp[1:]
40         print(f'{stack: <15}'+ "|" + f'{inp: <15}'+ "|" + f'Shift')
41         action = False
42
43     if inp == "$" and stack == (" $" + starting_terminal):
44         print(f'{stack: <15}'+ "|" + f'{inp: <15}'+ "|" + f'Accepted')
45         break
46
47     if action:
48         print(f'{stack: <15}'+ "|" + f'{inp: <15}'+ "|" + f'Rejected')
49         break
```

Output:-

i) When input is:

```
gram = {
    "E":["E*E","E+E","i"]
}
```

starting_terminal = "E"

inp = "i+i*i"

as shown in the following output

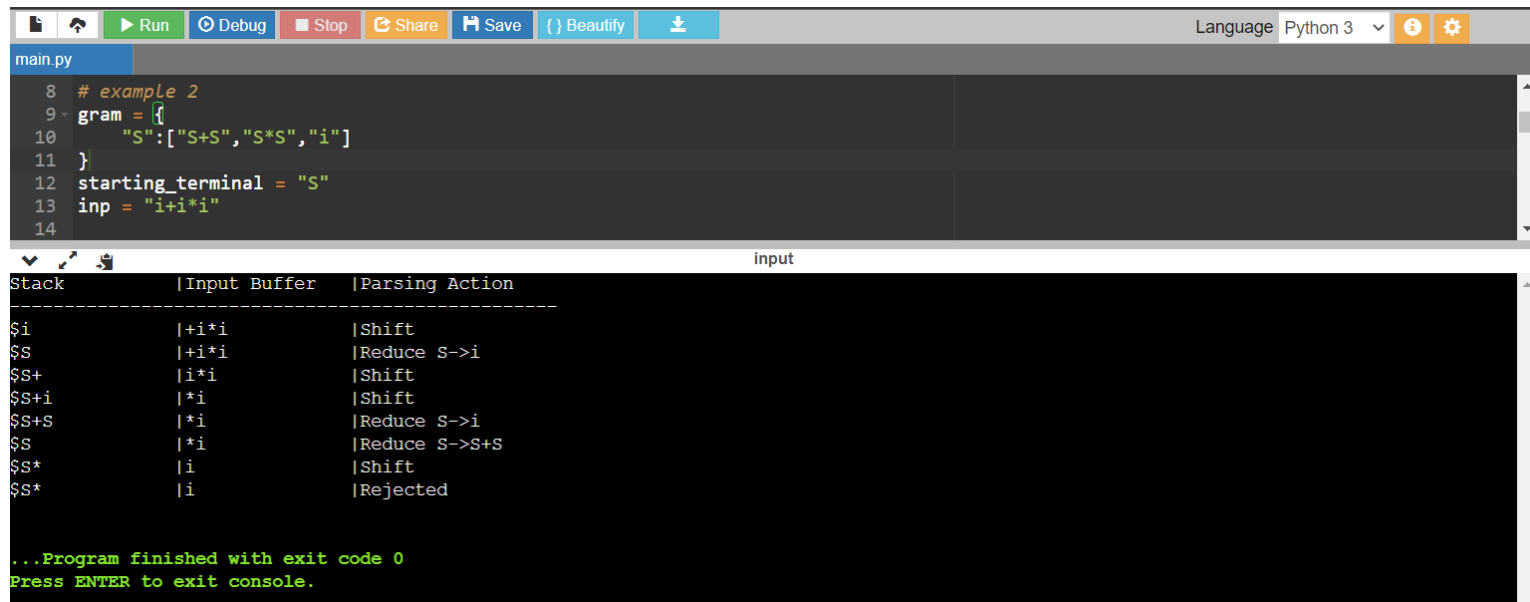
```
main.py
1 # example 1
2 gram = {
3     "E":["E*E","E+E","i"]
4 }
5 starting_terminal = "E"
6 inp = "i+i*i"
7
input
Stack      |Input Buffer  |Parsing Action
-----
$i         |i+i*i        |Shift
$E         |i+i*i        |Reduce S->i
$E+        |i*i          |Shift
$E+i       |i*i          |Shift
$E+E       |i*i          |Reduce S->i
$E         |i*i          |Reduce S->E+E
$E*        |i            |Shift
$E*        |i            |Rejected
...Program finished with exit code 0
Press ENTER to exit console.
```

ii) When input is:

```
gram = {
    "S":["S+S","S*S","i"]
}

starting_terminal = "S"
inp = "i+i*i"
```

as shown in the following output



```
main.py
8 # example 2
9 gram = {
10     "S":["S+S","S*S","i"]
11 }
12 starting_terminal = "S"
13 inp = "i+i*i"
14

Stack | Input Buffer | Parsing Action
-----|-----|-----
$i    | +i*i         | Shift
$$S   | +i*i         | Reduce S->i
$$+   | i*i          | Shift
$$+i  | *i           | Shift
$$+S  | *i           | Reduce S->i
$$S   | *i           | Reduce S->S+S
$$*   | i            | Shift
$$*   | i            | Rejected

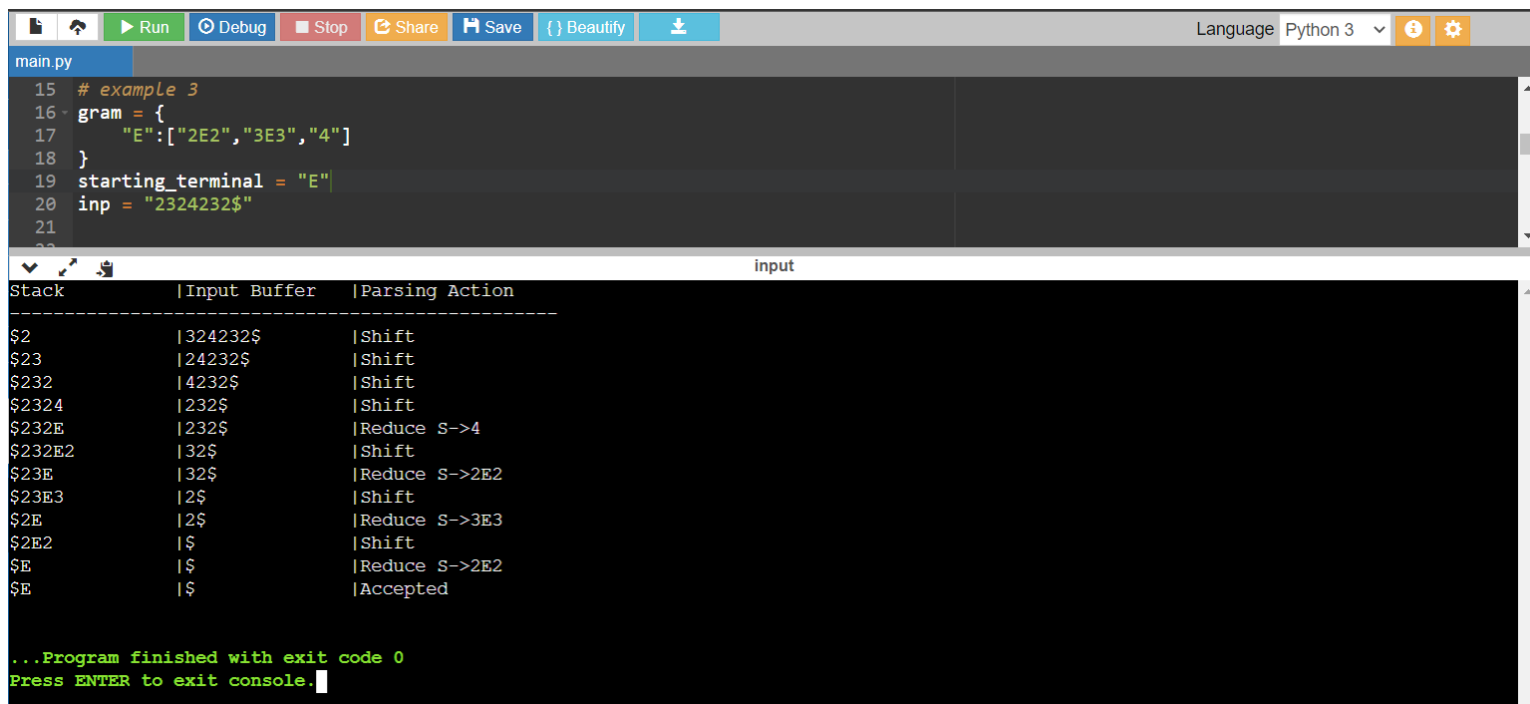
...Program finished with exit code 0
Press ENTER to exit console.
```

iii) When input is:

```
gram = {
    "E":["2E2","3E3","4"]
}

starting_terminal = "E"
inp = "2324232$"
```

as shown in the following output



```
main.py
15 # example 3
16 gram = {
17     "E":["2E2","3E3","4"]
18 }
19 starting_terminal = "E"
20 inp = "2324232$"
21
22

Stack | Input Buffer | Parsing Action
-----|-----|-----
$2    | 2324232$    | Shift
$23   | 24232$      | Shift
$232  | 4232$       | Shift
$2324 | 232$        | Shift
$232E | 232$        | Reduce S->4
$232E2 | 32$         | Shift
$23E  | 32$         | Reduce S->2E2
$23E3 | 2$          | Shift
$2E   | 2$          | Reduce S->3E3
$2E2  | $           | Shift
$E    | $           | Reduce S->2E2
$E    | $           | Accepted

...Program finished with exit code 0
Press ENTER to exit console.
```