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Experiment 7 - Shift Reduce Parsing

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CSE A2

Aim:

To write a program to show Shift Reduce Parsing using Python language.

Algorithm:

1. Start the program.
2. Initialize the required variables.
3. Enter the input symbol.
4. Perform the following:

   for top-of-stack symbol, s, and next input symbol, a

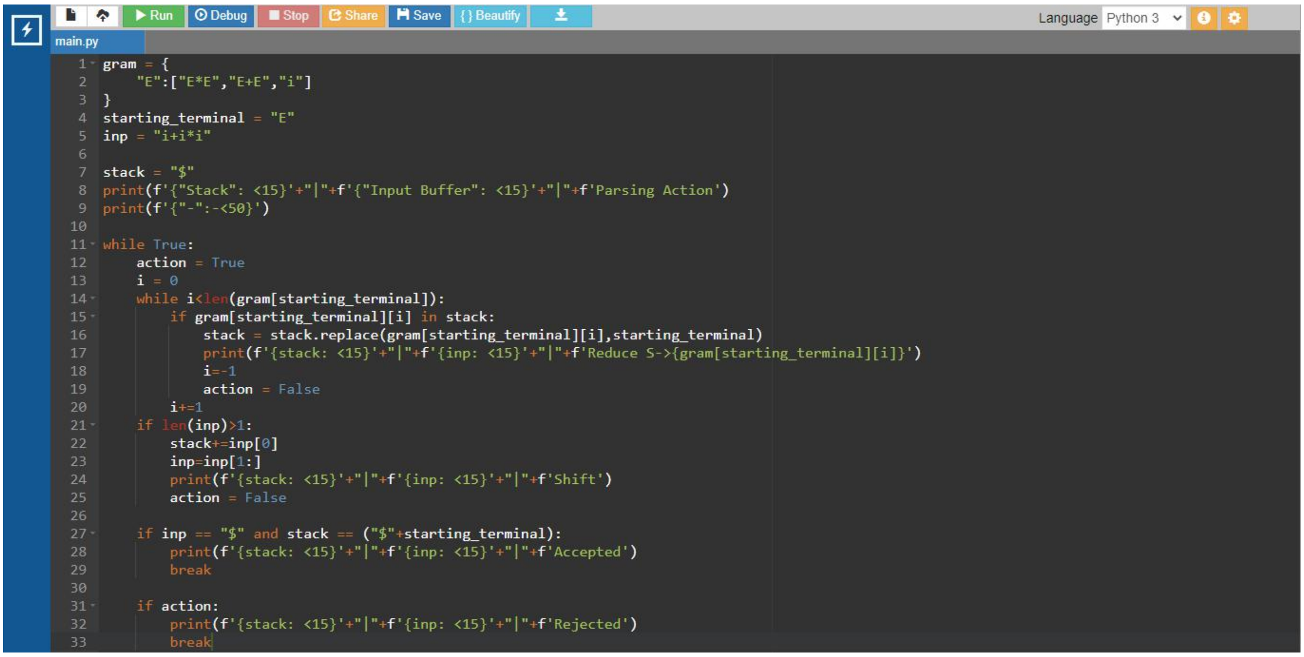
   Shift x: (x is a STATE number) Push a, then x on the top of the stack Advance ip to point to the next input symbol.

   Reduce y: (y is a PRODUCTION number) Assume that the production is of the form A→ß Pop 2 * |ß| symbols of the stack.

   At this point the top of the stack should be a state number, say s'. Push A, then goto of T[s',A] (a state number) on the top of the stack. Output the production A→ß.
5. Print if string is accepted or not.
6. Stop the program.

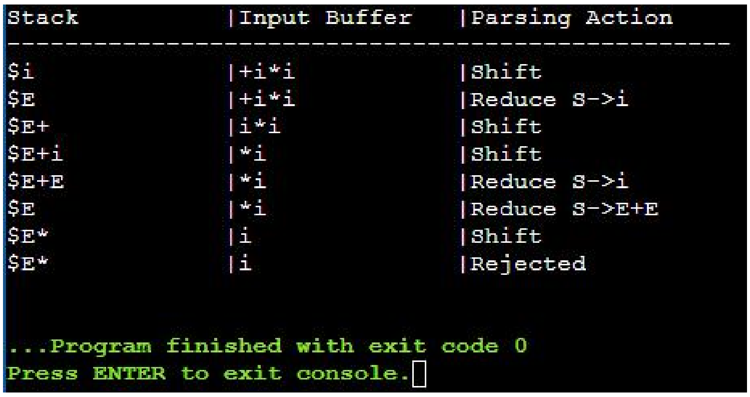
Code:

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



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

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
```

Output:



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


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

Result:

A program for Shift Reduce Parsing was run successfully.