

Lab - 10

ACT : Advanced Compiler Techniques

AIM : Find Basic blocks from given 3-address code

Name : Ambalia Harshit

Roll no : MT001

Date : 03 Nov 2023

Question 01 : Find Basic blocks from given 3-address code

Input : Valid 3 address code

Output : Leaders

- **Code :**

```
import re

def find_leaders(address_code):
    pattern = r'goto\s*\s*(\s*(\d+)\s*\s*)'
    leaders = [1]
    for i, stt in enumerate(address_code):
        if "goto" in stt:
            leaders.append(i+2)
            match = re.search(pattern, stt)
            extracted_text = match.group(1) if match else None
            extracted_text = extracted_text.replace('(', '').replace(')', '')
            leaders.append(int(extracted_text))

    leaders = sorted(set(leaders))
    return leaders
```

```

def main():
    address_code = []
    while(True):
        stmtnt = input("Enter 3-address code (enter 'end' or 'END' for end
of input) : ")
        if (stmtnt=='end' or stmtnt=='END'):
            break
        else:
            address_code.append(stmtnt)
            # address_code = ['i=m-1', 'j=n', 't1=4*n', 'v=a[t1]', 'i=i+1',
't2=4*i', 't3=a[t2]', 'if t3<v goto (5)',
            #             'j=j-1', 't4=4*j', 't5=a[t4]', 'if t5>v goto (9)', 'if
i>=j goto (23)', 't6=4*i',
            #             'x=a[t6]', 't7=4*i', 't8=4*j', 't9=a[t8]', 'a[t7]=t9',
't10=4*j', 'a[10]=x', 'goto (5)',
            #             't11=4*i', 'x=a[t11]', 't12=4*i', 't13=4*n',
't14=a[t13]', 'a[t12]=t14', 't15=4*n', 'a[t15]=x']

    leaders = find_leaders(address_code)
    for i, led in enumerate(leaders):
        print(i, leaders[i+1])
        print("Leader-" + str(i+1) + " (line no." + str(led) + ")" + " : "
+ address_code[led-1])

if __name__=="__main__":
    main()

```

Example 01 :

```
● hr@Edith:~/Documents/Semester_9/Lab_ACT$ python3 -u "/home/hr/Documents/Semester_9/Lab_ACT/basic_blocks_m3.py"
Enter 3-address code (enter 'end' or 'END' for end of input) : a=b+c
Enter 3-address code (enter 'end' or 'END' for end of input) : d=a-e
Enter 3-address code (enter 'end' or 'END' for end of input) : if d>0 goto(6)
Enter 3-address code (enter 'end' or 'END' for end of input) : x=y*z
Enter 3-address code (enter 'end' or 'END' for end of input) : goto(7)
Enter 3-address code (enter 'end' or 'END' for end of input) : p=q+r
Enter 3-address code (enter 'end' or 'END' for end of input) : print x
Enter 3-address code (enter 'end' or 'END' for end of input) : end
Leader-1 (line no.1) : a=b+c
Leader-2 (line no.4) : x=y*z
Leader-3 (line no.6) : p=q+r
Leader-4 (line no.7) : print x
● hr@Edith:~/Documents/Semester_9/Lab_ACT$ python3 -u "/home/hr/Documents/Semester_9/Lab_ACT/basic_blocks_m3.py"
```

Example 02 :

```
_basic_blocks_m3.py"
Enter 3-address code (enter 'end' or 'END' for end of input) : i=m-1
Enter 3-address code (enter 'end' or 'END' for end of input) : j=n
Enter 3-address code (enter 'end' or 'END' for end of input) : t1=4*n
Enter 3-address code (enter 'end' or 'END' for end of input) : v=a[t1]
Enter 3-address code (enter 'end' or 'END' for end of input) : i=i+1
Enter 3-address code (enter 'end' or 'END' for end of input) : t2=4*i
Enter 3-address code (enter 'end' or 'END' for end of input) : t3=a[t2]
Enter 3-address code (enter 'end' or 'END' for end of input) : if t3<v goto (5)
Enter 3-address code (enter 'end' or 'END' for end of input) : j=j-1
Enter 3-address code (enter 'end' or 'END' for end of input) : t4=4*j
Enter 3-address code (enter 'end' or 'END' for end of input) : t5=a[t4]
Enter 3-address code (enter 'end' or 'END' for end of input) : if t5>v goto (9)
Enter 3-address code (enter 'end' or 'END' for end of input) : if i>=j goto (23)
Enter 3-address code (enter 'end' or 'END' for end of input) : t6=4*i
Enter 3-address code (enter 'end' or 'END' for end of input) : x=a[t6]
Enter 3-address code (enter 'end' or 'END' for end of input) : t7=4*i
Enter 3-address code (enter 'end' or 'END' for end of input) : t8=4*j
Enter 3-address code (enter 'end' or 'END' for end of input) : t9=a[t8]
Enter 3-address code (enter 'end' or 'END' for end of input) : a[t7]=t9
Enter 3-address code (enter 'end' or 'END' for end of input) : t10=4*j
Enter 3-address code (enter 'end' or 'END' for end of input) : a[10]=x
Enter 3-address code (enter 'end' or 'END' for end of input) : goto (5)
Enter 3-address code (enter 'end' or 'END' for end of input) : t11=4*i
Enter 3-address code (enter 'end' or 'END' for end of input) : x=a[t11]
Enter 3-address code (enter 'end' or 'END' for end of input) : t12=4*i
Enter 3-address code (enter 'end' or 'END' for end of input) : t13=4*n
Enter 3-address code (enter 'end' or 'END' for end of input) : t14=a[t13]
Enter 3-address code (enter 'end' or 'END' for end of input) : a[t12]=t14
Enter 3-address code (enter 'end' or 'END' for end of input) : t15=4*n
Enter 3-address code (enter 'end' or 'END' for end of input) : a[t15]=x
Enter 3-address code (enter 'end' or 'END' for end of input) : END
Leader-1 (line no.1) : i=m-1
Leader-2 (line no.5) : i=i+1
Leader-3 (line no.9) : j=j-1
Leader-4 (line no.13) : if i>=j goto (23)
Leader-5 (line no.14) : t6=4*i
Leader-6 (line no.23) : t11=4*i
```