

Experiment - 6 Finding first of a grammar

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Class : TE.CO **Batch** : B3

#Source code

```
__author__ = 'Shadab Shaikh'
__title__ = 'Finding first of a set from a grammar'
__date__ = '26-02-2019'
__version__ = '1.0'

print('Author      : ' + __author__)
print('Title       : ' + __title__)
print('Date        : ' + __date__)
print('Version     : ' + __version__)

grammararr=[]           #stores the grammar maintaining the index
fst=[]                 #stores the final result of first set
inputs=""              #taking input from user
inputm=""              #continuity of production
s1=""                  #acting as a pointer to compare and find the left most
variable
first=[]
while(inputs!='no'):
    grammar = input("\nEnter the grammar left should be variable following with ->
format eg: S->a\n")
    grammar=grammar.replace(" ", "")           #replacing whitespaces with none
    if(grammar[0].islower()):
        grammar[0].upper()                     #making left most as variable
    grammararr.append(grammar)                  #storing into list
    inputs = input("\nPress no to stop writing productions or write anything to continue")
                                                #asking for the continuity of grammar

def searchprod(grammararr,s1,k,n):
    """function to search production variable if uppercase is found while parsing."""
    for i in range(len(grammararr)):
        if(grammararr[i][0]==s1):               #if leftmost variable matches with the s1 value
            if(grammararr[i][3].isupper()):
                #checking if the 3rd index element is uppercase
                s1=grammararr[i][3]              #if yes then reassigning s1
                searchprod(grammararr,s1,k,n)#recursively calling this function
            elif(grammararr[i][3:].islower()):
                #checking if the 3rd and rest index is lowercase
```

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inputm=input("\nTerminal with multiple instances found do
you want to seperate "+grammararr[i][3:]+ " terminal for
"+grammararr[k][0]+" press sep ")
    #asking if the rest of terminal are combined or seperated
if(inputm=='sep'):
    fst.append("first{ "+grammararr[k][0]+" }="
+grammararr[i][3])        #considering only the 3rd
                           #index element
else:
    fst.append("first{ "+grammararr[k][0]+" }="
+grammararr[i][3:])
        #considering all the remaining index element
else:
    if(grammararr[i][3]=='#'):
        #checking to see whether all the
        #production have became epsilon
        if(grammararr[k][3+n] is not None):
            #if index element is not none of the parsing variable
            if(grammararr[k][3+n].islower()):
                #checking if the next element is lowercase
                fst.append("first{ "+grammararr[k][0]
+" }="+grammararr[k][3+n])
                #assigning it into first of a result set
            else:
                s1=grammararr[k][3+n]
                #updating s1 value
                fst.append("first{ "+grammararr[k][0]+
" }="+grammararr[i][3])        #assigning
                #epsilon to each of the result set
        else:
            fst.append("first{ "+grammararr[k][0]+
" }="+grammararr[i][3])
            #if the next parsing index is none then assigning
            #epsilon
    else:
        fst.append("first{ "+grammararr[k][0]+"
" }="+grammararr[i][3])
        #by default making it as epsilon

```

```

def findfirst(grammararr,k):

```

```

    """function to search production variable if uppercase is found while parsing."""

```

```

    if(grammararr[k][3].isupper()):        #checking if the 3rd element of a list
                                           #index position is uppercase(variable)

```

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        s1=grammararr[k][3]                #assigning it to s1

```

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        searchprod(grammararr,s1,k,1)      #calling the searchprod function

```

```

elif(grammararr[k][3:].islower()):    #if the 3rd element and all are lowercase
    inputm=input("\nTerminal with multiple instances found do you want to
seperate "+grammararr[k][3:]+" terminal for "+grammararr[k][0]+" press
sep ")
    #asking if the rest of terminal are combined or seperated
    if(inputm=='sep'):
        fst.append("first{ "+grammararr[k][0]+"}="+grammararr[k][3])
        #considering only the 3rd index element
    else:
        fst.append("first{ "+grammararr[k][0]+"}="+grammararr[k][3:])
        #considering all the remaining index element
else:
    fst.append("first{ "+grammararr[k][0]+"}="+grammararr[k][3])
    #by default making it as 3rd element
k+=1                                #incrementing k by 1
if(k<len(grammararr)):              #until k is less than grammar list
    findfirst(grammararr,k)          #recursively calling findfirst funtion

findfirst(grammararr,0)              #calling findfirst function

fst=list(set(fst))                  #getting all the unique results
fst.sort()                          #sorting the list
print(*fst, sep = "\n")             #printing the final result

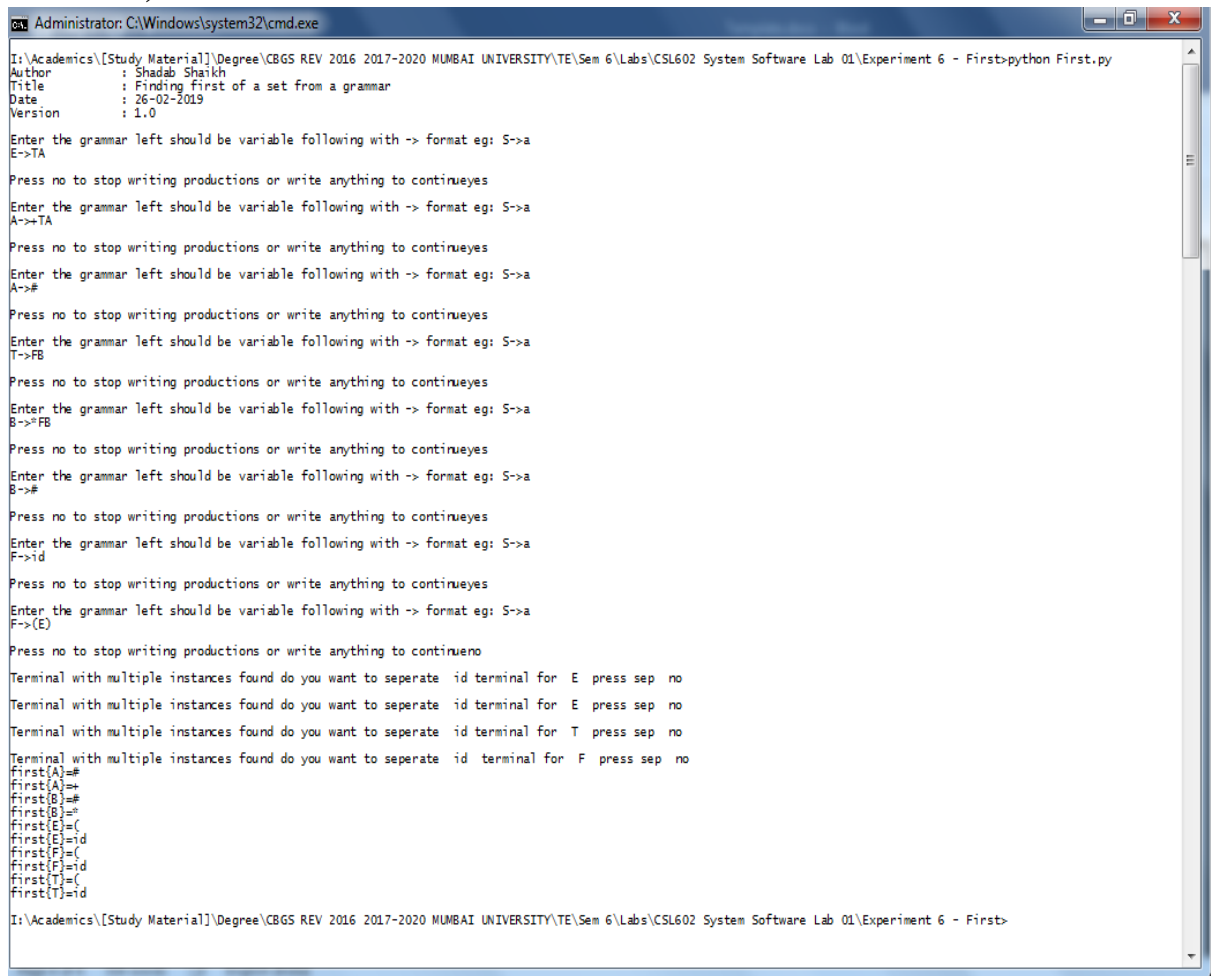
```

#Output

Sample Grammar inputs

1. E->TA
A->+TA/€
T->FB
B->*FB/€
F->id/(E) #(Case of non-splitting of terminal)
2. S->(S)/ €
3. S->aABb
A->C/€
B->d/€
4. S->ACB/CbB/Ba
A->da/BC
B->g/€
C->b/€
(Case of € replacement and splitting terminal)

1. Output for the first sample grammar (Case of non-splitting of terminal)



```
Administrator: C:\Windows\system32\cmd.exe
I:\Academics\[Study Material]\Degree\CBGS REV 2016 2017-2020 MUMBAI UNIVERSITY\TE\Sem 6\Labs\CSL602 System Software Lab 01\Experiment 6 - First>python First.py
Author      : Shadab Shaikh
Title       : Finding first of a set from a grammar
Date        : 26-02-2019
Version     : 1.0

Enter the grammar left should be variable following with -> format eg: S->a
E->TA

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
A->#TA

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
A->#

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
T->#FB

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
B->#FB

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
B->#

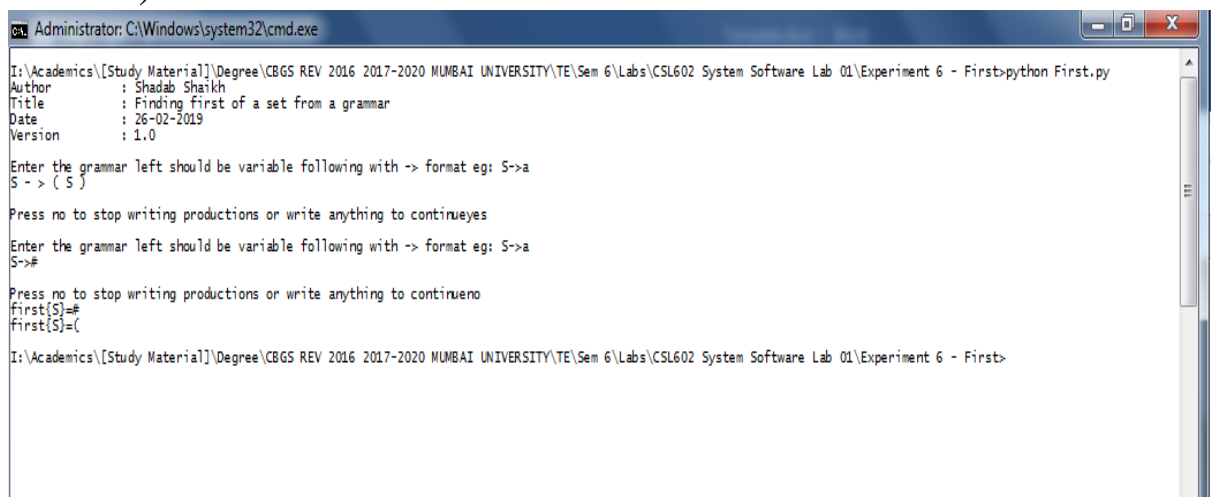
Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
F->#id

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
F->#(E)

Press no to stop writing productions or write anything to continueyes
Terminal with multiple instances found do you want to separate id terminal for E press sep no
Terminal with multiple instances found do you want to separate id terminal for E press sep no
Terminal with multiple instances found do you want to separate id terminal for T press sep no
Terminal with multiple instances found do you want to separate id terminal for F press sep no
First(A)=#
First(A)=#
First(B)=#
First(B)=#
First(E)=(
First(E)=id
First(F)=(
First(F)=id
First(T)=(
First(T)=id

I:\Academics\[Study Material]\Degree\CBGS REV 2016 2017-2020 MUMBAI UNIVERSITY\TE\Sem 6\Labs\CSL602 System Software Lab 01\Experiment 6 - First>
```

2. Output for the second sample grammar (automatic whitespace removal)



```
Administrator: C:\Windows\system32\cmd.exe
I:\Academics\[Study Material]\Degree\CBGS REV 2016 2017-2020 MUMBAI UNIVERSITY\TE\Sem 6\Labs\CSL602 System Software Lab 01\Experiment 6 - First>python First.py
Author      : Shadab Shaikh
Title       : Finding first of a set from a grammar
Date        : 26-02-2019
Version     : 1.0

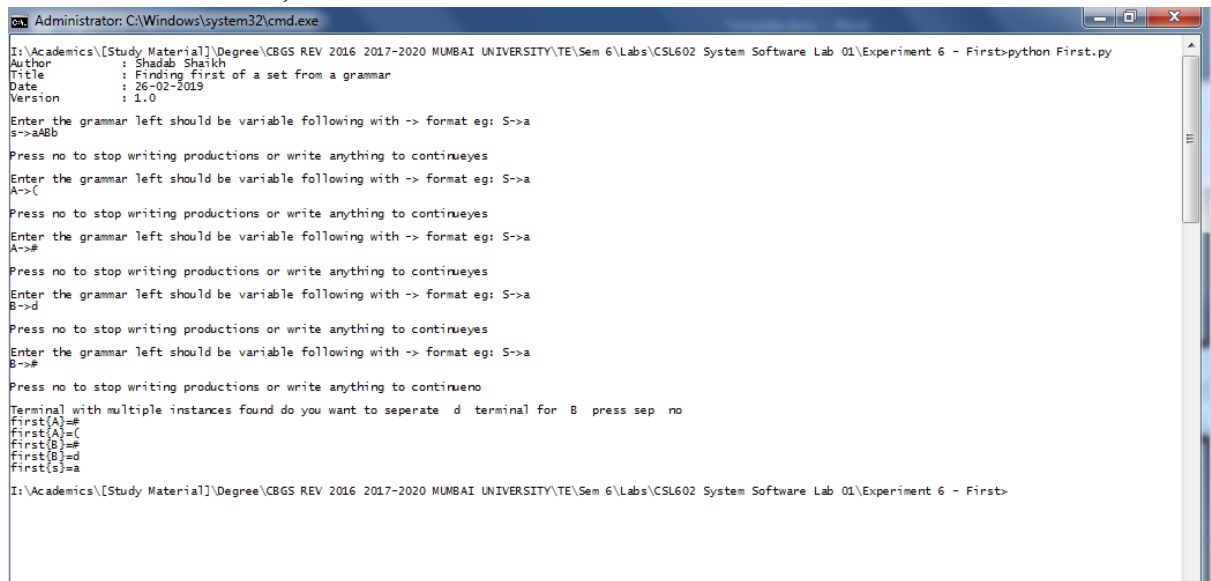
Enter the grammar left should be variable following with -> format eg: S->a
S - > ( S )

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
S->#

Press no to stop writing productions or write anything to continueyes
First(S)=#
First(S)=(

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```

3. Output for the third sample grammar (automatic uppercase for the left-most element)



```
Administrator: C:\Windows\system32\cmd.exe
I:\Academics\Study Material\Degree\CBGS REV 2016 2017-2020 MUMBAI UNIVERSITY\TE\Sem 6\Labs\CSL602 System Software Lab 01\Experiment 6 - First-python First.py
Author      : Shadab Shaikh
Title       : Finding first of a set from a grammar
Date        : 26-02-2019
Version     : 1.0

Enter the grammar left should be variable following with -> format eg: S->a
S->aABb

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
A->(

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
A->#

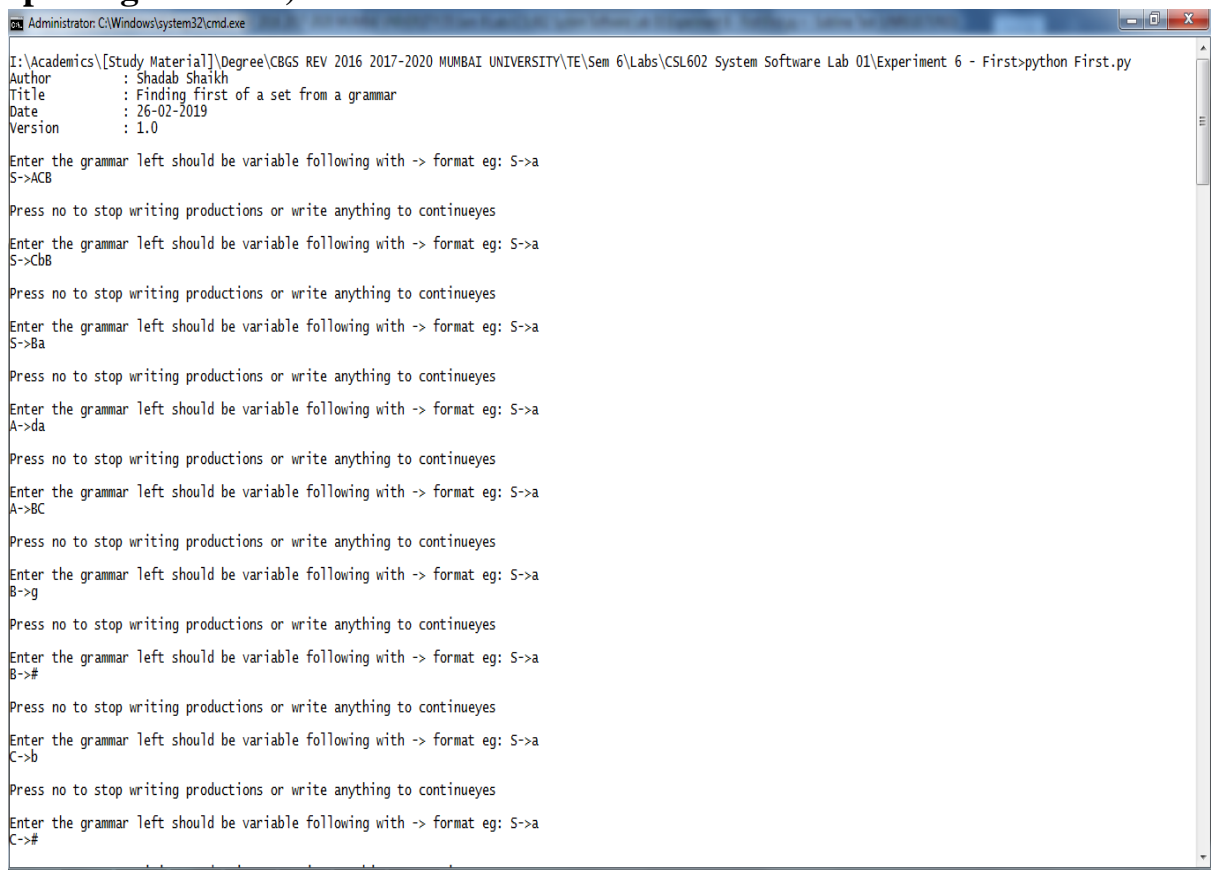
Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
B->d

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
B->#

Press no to stop writing productions or write anything to continueyes
Terminal with multiple instances found do you want to separate d terminal for B press sep no
First{A}=#
First{A}= (
First{B}=#
First{B}=d
First{s}=a

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```

4. Output for the fourth sample grammar (Case of € replacement and splitting terminal)



```
Administrator: C:\Windows\system32\cmd.exe
I:\Academics\Study Material\Degree\CBGS REV 2016 2017-2020 MUMBAI UNIVERSITY\TE\Sem 6\Labs\CSL602 System Software Lab 01\Experiment 6 - First-python First.py
Author      : Shadab Shaikh
Title       : Finding first of a set from a grammar
Date        : 26-02-2019
Version     : 1.0

Enter the grammar left should be variable following with -> format eg: S->a
S->ACB

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
S->CbB

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
S->Ba

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
A->da

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
A->BC

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
B->g

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
B->#

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
C->b

Press no to stop writing productions or write anything to continueyes
Enter the grammar left should be variable following with -> format eg: S->a
C->#
```

Terminal with multiple instances found do you want to seperate da terminal for S press sep sep
Terminal with multiple instances found do you want to seperate g terminal for S press sep no
Terminal with multiple instances found do you want to seperate b terminal for S press sep no
Terminal with multiple instances found do you want to seperate g terminal for S press sep no
Terminal with multiple instances found do you want to seperate b terminal for S press sep no
Terminal with multiple instances found do you want to seperate b terminal for S press sep no
Terminal with multiple instances found do you want to seperate g terminal for S press sep no
Terminal with multiple instances found do you want to seperate da terminal for A press sep sep
Terminal with multiple instances found do you want to seperate g terminal for A press sep no
Terminal with multiple instances found do you want to seperate b terminal for A press sep no
Terminal with multiple instances found do you want to seperate g terminal for B press sep no
Terminal with multiple instances found do you want to seperate b terminal for C press sep no
first{A}=#
first{A}=b
first{A}=d
first{A}=g
first{B}=#
first{B}=g
first{C}=#
first{C}=b
first{S}=#
first{S}=a
first{S}=b
first{S}=d
first{S}=g

I:\Academics\Study Material\Degree\CBGS REV 2016 2017-2020 MUMBAI UNIVERSITY\TE\Sem 6\Labs\CSL602 System Software Lab 01\Experiment 6 - First>