Practice Assignment: Example 1
Depth First Iterative Deepening (DFID-C)

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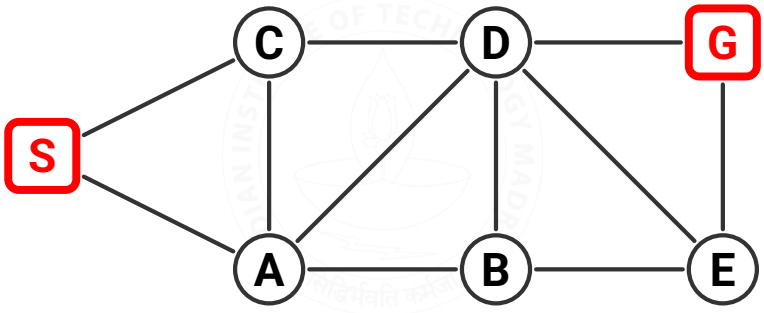
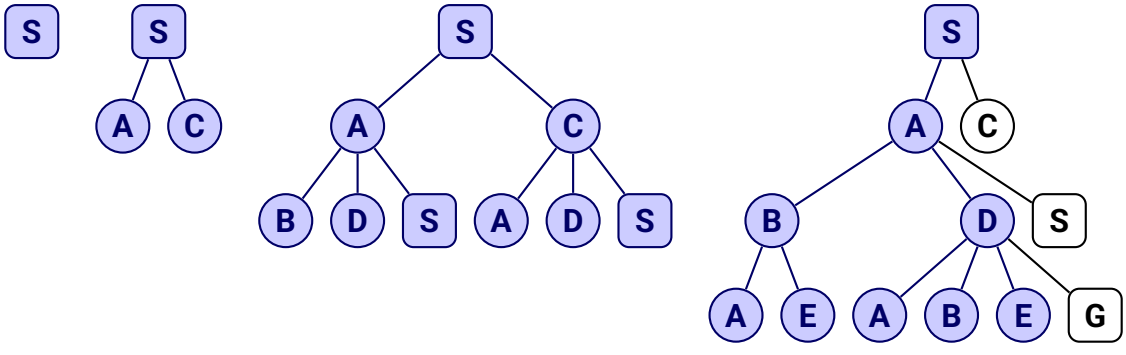
State Space



MoveGen returns nodes in ALPHABETICAL order.

```
S -> A,C
A -> B,C,D,S
B -> A,D,E
C -> A,D,S
D -> A,B,C,E,G
E -> B,D,G
G -> D,E
```

DFID-C Search Trees (d=0,1,2,3)



DFID-C Solution

The solution provided below is based on the DFID-C algorithm published in the Week 2 Notes.

```
OPEN and CLOSED carry triples: (NODE,PARENT,DEPTH)

***[DEPTH BOUND = 0]***

OPEN       (S,null,0):[]
CLOSED     []

1.
NODE       S
close      (S,null,0)

OPEN       []
CLOSED     (S,null,0):[]


***[DEPTH BOUND = 1]***

OPEN       (S,null,0):[]
CLOSED     []

1.
NODE       S
close      (S,null,0)
moveGen    A:C:[]
newNodes   A:C:[]
newPairs   (A,S,1):(C,S,1):[]

OPEN       (A,S,1):(C,S,1):[]
CLOSED     (S,null,0):[]

2.
NODE       A
close      (A,S,1)

OPEN       (C,S,1):[]
CLOSED     (A,S,1):(S,null,0):[]

3.
NODE       C
close      (C,S,1)

OPEN       []
CLOSED     (C,S,1):(A,S,1):(S,null,0):[]


***[DEPTH BOUND = 2]***

OPEN       (S,null,0):[]
CLOSED     []

1.
NODE       S
close      (S,null,0)
moveGen    A:C:[]
newNodes   A:C:[]
newPairs   (A,S,1):(C,S,1):[]

OPEN       (A,S,1):(C,S,1):[]
CLOSED     (S,null,0):[]

2.
NODE       A
close      (A,S,1)
moveGen    B:C:D:S:[]
newNodes   B:D:S:[]
newPairs   (B,A,2):(D,A,2):(S,A,2):[]

OPEN       (B,A,2):(D,A,2):(S,A,2):(C,S,1):[]
CLOSED     (A,S,1):(S,null,0):[]

3.
NODE       B
close      (B,A,2)

OPEN       (D,A,2):(S,A,2):(C,S,1):[]
CLOSED     (B,A,2):(A,S,1):(S,null,0):[]

4.
NODE       D
close      (D,A,2)

OPEN       (S,A,2):(C,S,1):[]
CLOSED     (D,A,2):(B,A,2):(A,S,1):(S,null,0):[]

5.
NODE       S
close      (S,A,2)

OPEN       (C,S,1):[]
CLOSED     (S,A,2):(D,A,2):(B,A,2):(A,S,1):(S,null,0):[]

6.
NODE       C
close      (C,S,1)
moveGen    A:D:S:[]
newNodes   A:D:S:[]
newPairs   (A,C,2):(D,C,2):(S,C,2):[]

OPEN       (A,C,2):(D,C,2):(S,C,2):[]
CLOSED     (C,S,1):(S,A,2):(D,A,2):(B,A,2):(A,S,1):
           (S,null,0):[]

7.
NODE       A
close      (A,C,2)

OPEN       (D,C,2):(S,C,2):[]
CLOSED     (A,C,2):(C,S,1):(S,A,2):(D,A,2):(B,A,2):
           (A,S,1):(S,null,0):[]

8.
NODE       D
close      (D,C,2)

OPEN       (S,C,2):[]
CLOSED     (D,C,2):(A,C,2):(C,S,1):(S,A,2):(D,A,2):
           (B,A,2):(A,S,1):(S,null,0):[]

9.
NODE       S
close      (S,C,2)

OPEN       []
CLOSED     (S,C,2):(D,C,2):(A,C,2):(C,S,1):(S,A,2):
           (D,A,2):(B,A,2):(A,S,1):(S,null,0):[]


***[DEPTH BOUND = 3]***

OPEN       (S,null,0):[]
CLOSED     []

1.
NODE       S
close      (S,null,0)
moveGen    A:C:[]
newNodes   A:C:[]
newPairs   (A,S,1):(C,S,1):[]

OPEN       (A,S,1):(C,S,1):[]
CLOSED     (S,null,0):[]

2.
NODE       A
close      (A,S,1)
moveGen    B:C:D:S:[]
newNodes   B:D:S:[]
newPairs   (B,A,2):(D,A,2):(S,A,2):[]

OPEN       (B,A,2):(D,A,2):(S,A,2):(C,S,1):[]
CLOSED     (A,S,1):(S,null,0):[]

3.
NODE       B
close      (B,A,2)
moveGen    A:D:E:[]
newNodes   A:E:[]
newPairs   (A,B,3):(E,B,3):[]

OPEN       (A,B,3):(E,B,3):(D,A,2):(S,A,2):(C,S,1):[]
CLOSED     (B,A,2):(A,S,1):(S,null,0):[]

4.
NODE       A
close      (A,B,3)

OPEN       (E,B,3):(D,A,2):(S,A,2):(C,S,1):[]
CLOSED     (A,B,3):(B,A,2):(A,S,1):(S,null,0):[]

5.
NODE       E
close      (E,B,3)

OPEN       (D,A,2):(S,A,2):(C,S,1):[]
CLOSED     (E,B,3):(A,B,3):(B,A,2):(A,S,1):(S,null,0):[]

6.
NODE       D
close      (D,A,2)
moveGen    A:B:C:E:G:[]
newNodes   A:B:E:G:[]
newPairs   (A,D,3):(B,D,3):(E,D,3):(G,D,3):[]

OPEN       (A,D,3):(B,D,3):(E,D,3):(G,D,3):(S,A,2):
           (C,S,1):[]
CLOSED     (D,A,2):(E,B,3):(A,B,3):(B,A,2):(A,S,1):
           (S,null,0):[]

7.
NODE       A
close      (A,D,3)

OPEN       (B,D,3):(E,D,3):(G,D,3):(S,A,2):(C,S,1):[]
CLOSED     (A,D,3):(D,A,2):(E,B,3):(A,B,3):(B,A,2):
           (A,S,1):(S,null,0):[]

8.
NODE       B
close      (B,D,3)

OPEN       (E,D,3):(G,D,3):(S,A,2):(C,S,1):[]
CLOSED     (B,D,3):(A,D,3):(D,A,2):(E,B,3):(A,B,3):
           (B,A,2):(A,S,1):(S,null,0):[]

9.
NODE       E
close      (E,D,3)

OPEN       (G,D,3):(S,A,2):(C,S,1):[]
CLOSED     (E,D,3):(B,D,3):(A,D,3):(D,A,2):(E,B,3):
           (A,B,3):(B,A,2):(A,S,1):(S,null,0):[]

10.
NODE       G
GOAL       G

OPEN       (G,D,3):(S,A,2):(C,S,1):[]
CLOSED     (E,D,3):(B,D,3):(A,D,3):(D,A,2):(E,B,3):
           (A,B,3):(B,A,2):(A,S,1):(S,null,0):[]


PATH       S:A:D:G:[]
```