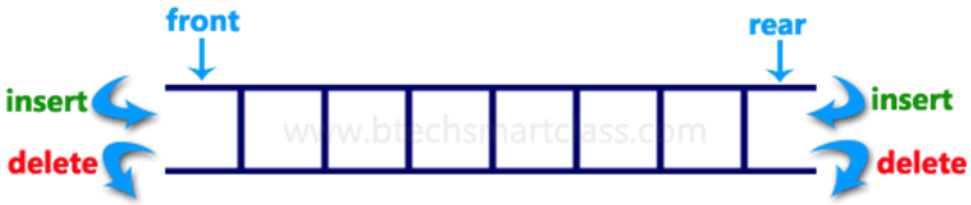
UNIT – II LINEAR DATA STRUCTURES

Lecture N0. 9

Dequeue (Double Ended Queue)

It is a linear data structure. This queue is called double ended queue. In this type of queue insertion and deletion of elements can be take place from both ends.

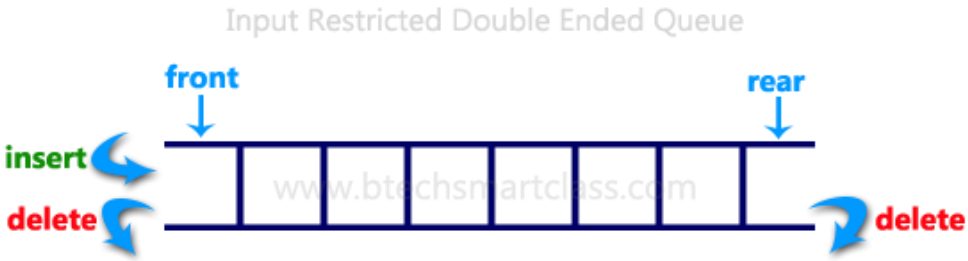


In this queue, insertion and deletion of elements from Rear and Front can take place on the principal of Right and Left pointer.

There are two types of dequeue.

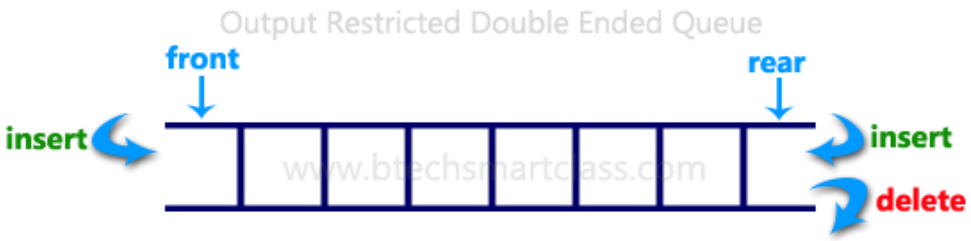
1) input restricted queue

In this type of queue, insertion can take place only from one end and deletion can take place from both ends.



2) Output restricted queue

In this type of queue, insertion can take place from both ends and deletion can take place from one end.



Principal for Insertion

When the elements are inserted from Rear/ Right then Rear pointer is incremented and when elements are inserted from Front/ Left then Front pointer decremented.

Double Ended Queue Algorithms

ALGORITHM FOR THE INSERTION OF ELEMENT TO RIGHT IN DEQUEUE

Algorithm DQInsertRight (DQ, N, item, Rear, Front)

[This algorithm is used to insert the element to the right of DQ, where

DQ = Array

N = Final Limit

Item = which is to be inserted

Front, Rear = Deletion and Insertion pointers]

Step-1 [Check for overflow]

If ((Front = 1) && (Rear = N) or (Front = Rear + 1) then

Write (“Overflow”)

Goto step-4

End if

Step-2 [Reset rear pointer]

IF (F=0 && R=0)

F=R=1

Else if (Rear = N) then

Rear = 1

Else

Rear = Rear + 1

End if

Step-4 [Insert the element]

DQ [Rear] = item

Goto step-1

Step-5 [Finished]

Exit

ALGORITHM FOR THE INSERTION OF ELEMENT TO LEFT IN DEQUEUE

Algorithm DQInsertLeft (DQ, N, item, Rear, Front)

[This algorithm is used to insert the element to the left of DQ, where

DQ = Array

N = Final Limit

Item = which is to be inserted

Front, Rear = Deletion and Insertion pointers]

Step-1 [Check for overflow]

IF ((Front = 1) && (Rear = N) or (Front = Rear + 1) then

Write ("Overflow")

Goto step-4

End if

Step-2 [Reset the front pointer]

IF (F=0 && R=0)

F=R=1

Else IF (F = 1) then

F = N

Else

F = F-1

End if

Step-4 [Insert the element]

DQ [F] = item

Goto step-1

Step-5 [Finished]

Exit

ALGORITHM FOR THE Deletion OF ELEMENT TO FRONT IN DEQUEUE

Algorithm DQDelFront (DQ, N, item, Rear, Front)

[This algorithm is used to delete the element to the front of DQ, where

DQ = Array

N = Final Limit

Item = which is to be inserted

Front, Rear = Deletion and Insertion pointers]

Step-1 [Check for underflow]

IF (F=0 && R=0)

Write (“Underflow”)

Goto step-4

End if

Step-2 [Check the front pointer and delete the item]

IF (F=R)

X= Dq(F)

F=R=0 goto step-1

Else IF (F=N)

X= Dq(F)

F=1 goto step-1

Else

X=Dq(F)

F= F+1 goto step-1

Step-3 [Finished]

Exit

ALGORITHM FOR THE Deletion OF ELEMENT TO Right IN DEQUEUE

Algorithm DQDelRight (DQ, N, item, Rear, Front)

[This algorithm is used to delete the element to the right of DQ, where

DQ = Array

N = Final Limit

Item = which is to be inserted

Front, Rear = Deletion and Insertion pointers]

Step-1 [Check for underflow]

IF (F=0 && R=0)

Write (“Underflow”)

Goto step-4

End if

Step-2 [Check the Rear pointer and delete the item]

IF (F=R)

X= Dq(R)

F=R=0 goto Step-1

Else IF (R=1)

X=Dq[R]

R=N, Goto Step-1

Else

X=Dq[R]

R= R-1, Goto Step-1

Step-4 [Finished]

Exit

Algorithm DQInsertRight

Step-1 [Check for overflow]
If ((Front = 1) && (Rear = N) or (Front = Rear + 1) then
Write ("Overflow")
Goto step-4
End if
Step-2 [Reset rear pointer]
IF (F=0 && R=0)
F=R=1
Else if (Rear = N) then
Rear = 1
Else
Rear = Rear + 1
End if
Step-4 [Insert the element]
DQ [Rear] = item
Goto step-1
Step-5 [Finished]
Exit

Algorithm DQInsertLeft

Step-1 [Check for overflow]
IF ((Front = 1) && (Rear = N) or (Front = Rear + 1) then
Write ("Overflow")
Goto step-4
End if
Step-2 [Reset the front pointer]
IF (F=0 && R=0)
F=R=1
Else IF (F = 1) then
F = N
Else
F = F-1
End if
Step-4 [Insert the element]
DQ [F] = item
Goto step-1
Step-5 [Finished]
Exit

Algorithm DQDelFront

Step-1 [Check for underflow]
IF (F=0 && R=0)
Write ("Underflow")
Goto step-4
End if
Step-2 [Check the front pointer and delete the item]
IF (F=R)
X= Dq(F)
F=R=0 goto step-1
Else IF (F=N)
X= Dq(F)
F=1 goto step-1
Else
X=Dq(F)
F= F+1 goto step-1
Step-3 [Finished]
Exit

Algorithm DQDelRight

Step-1 [Check for underflow]
IF (F=0 && R=0)
Write ("Underflow")
Goto step-4
End if
Step-2 [Check the Rear pointer and delete the item]
IF (F=R)
X= Dq(R)
F=R=0 goto Step-1
Else IF (R=1)
X=Dq[R]
R=N, Goto Step-1
Else
X=Dq[R]
R= R-1, Goto Step-1
Step-4 [Finished]
Exit