

DATA STRUCTURE AND ALGORITHM



LAB REPORT

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TASK 1

QUEUE IMPLEMENTATION USING NUMPY

SOLUTION

```
print("Queue implementation using Numpy")

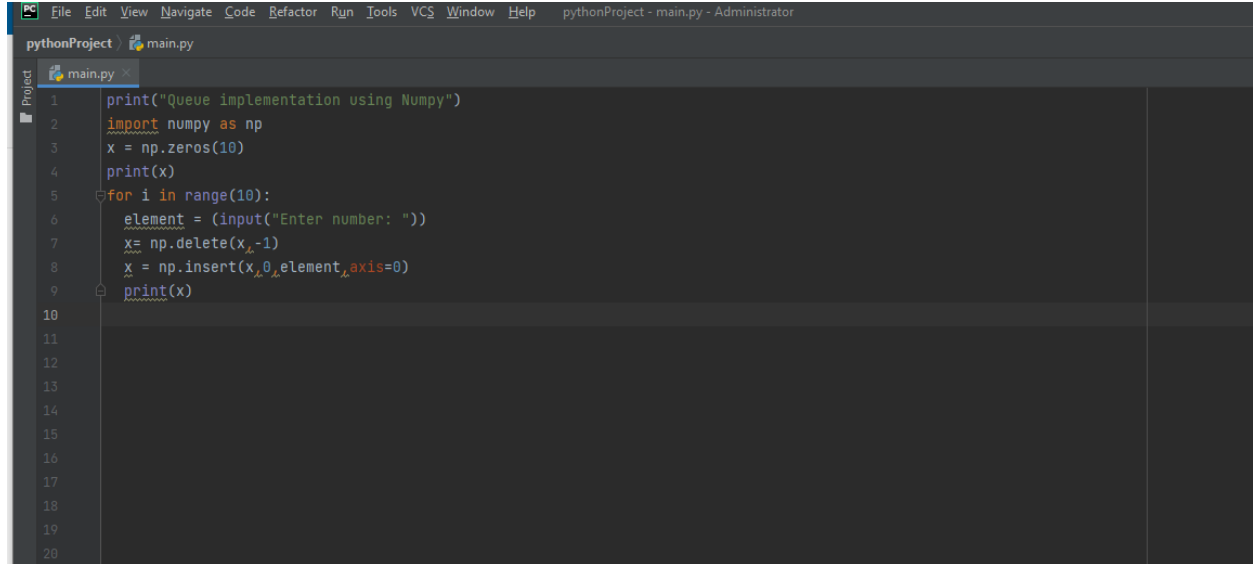
import numpy as np

x = np.zeros(5)

print(x)

for i in range(10):
    element = (input("Enter number: "))
    x= np.delete(x,-1)
    x = np.insert(x,0,element,axis=0)

print(x)
```

A screenshot of a code editor window titled 'pythonProject - main.py - Administrator'. The editor shows the same Python code as the previous block, with line numbers 1 through 20 on the left margin. The code implements a queue using NumPy arrays. The initial array 'x' is of size 5, but the loop runs 10 times, deleting the last element and inserting a new one at the beginning each time. The code is as follows:

```
1 print("Queue implementation using Numpy")
2 import numpy as np
3 x = np.zeros(10)
4 print(x)
5 for i in range(10):
6     element = (input("Enter number: "))
7     x= np.delete(x,-1)
8     x = np.insert(x,0,element,axis=0)
9     print(x)
10
11
12
13
14
15
16
17
18
19
20
```

```
Run: main
C:\Users\User\PycharmProjects\pythonProject\venv\Scripts\python.exe C:/Users/User/PycharmProjects/pythonProject/main.py
Queue implementation using Numpy
[0. 0. 0. 0. 0. 0. 0. 0. 0.]
Enter number: 1
[1. 0. 0. 0. 0. 0. 0. 0. 0.]
Enter number: 2
[2. 1. 0. 0. 0. 0. 0. 0. 0.]
Enter number: 3
[3. 2. 1. 0. 0. 0. 0. 0. 0.]
Enter number: 4
[4. 3. 2. 1. 0. 0. 0. 0. 0.]
Enter number: 5
[5. 4. 3. 2. 1. 0. 0. 0. 0.]
Enter number: 6
[6. 5. 4. 3. 2. 1. 0. 0. 0.]
Enter number: 7
[7. 6. 5. 4. 3. 2. 1. 0. 0.]
Enter number: 8
[8. 7. 6. 5. 4. 3. 2. 1. 0.]
Enter number: 9
[9. 8. 7. 6. 5. 4. 3. 2. 1.]
Enter number: 5
[5. 9. 8. 7. 6. 5. 4. 3. 2. 1.]
Process finished with exit code 0
```

QUEUE IMPLEMENTATION USING COLLECTION

SOLUTION

```
print("Queue implementation using Collections")

from collections import deque

x = deque()

print(x)

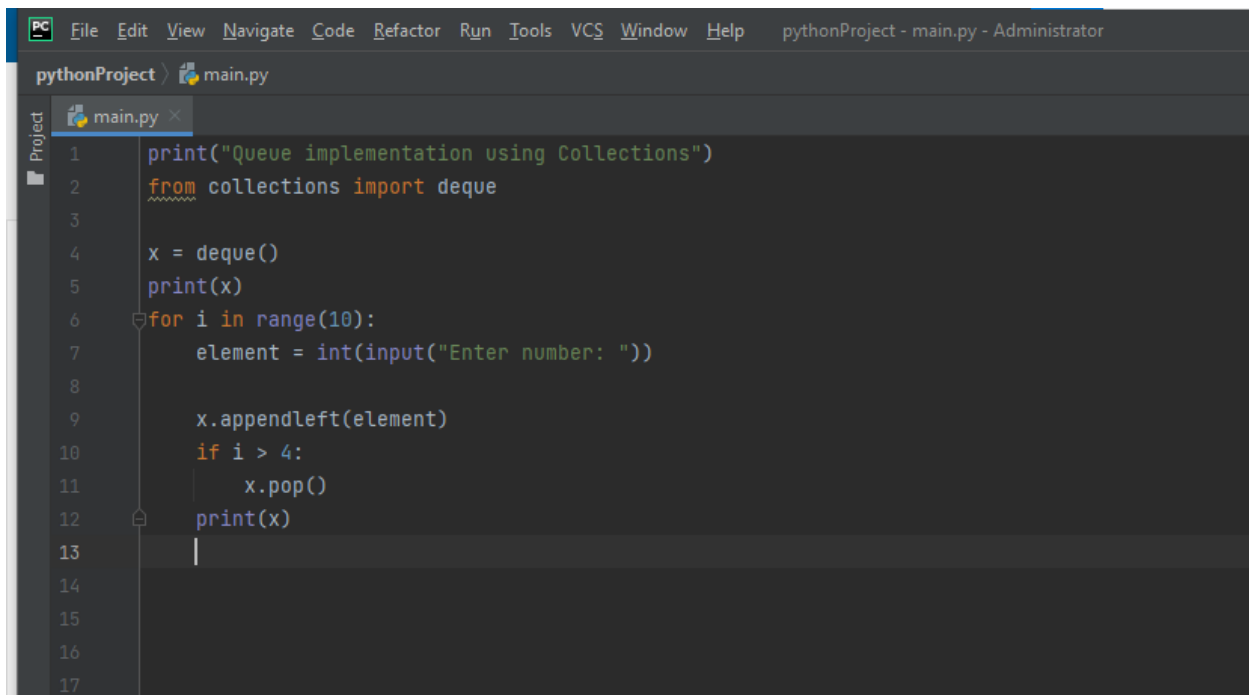
for i in range(10):
    element = int(input("Enter number: "))

    x.appendleft(element)

    if i > 4:
        x.pop()

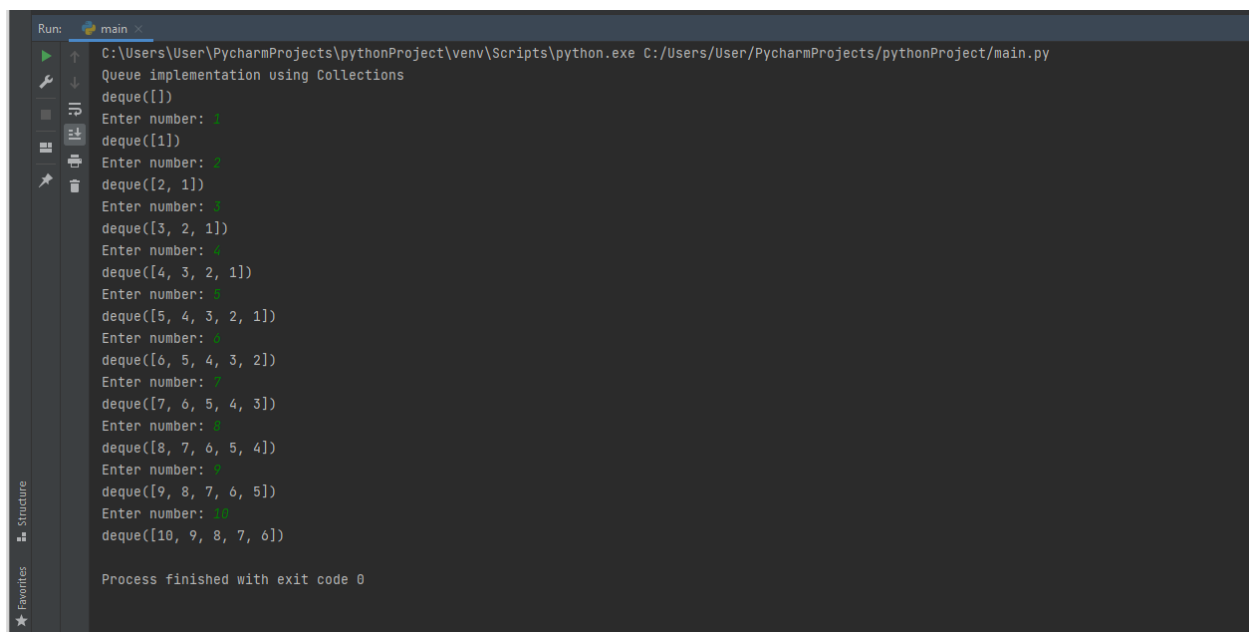
print(x)
```

OUTPUT



The screenshot shows a code editor window titled "pythonProject" with a file named "main.py" open. The code implements a queue using a deque from the collections module. It starts by printing "Queue implementation using Collections", then imports deque. A deque object x is created and printed. A loop runs 10 times, each time prompting the user to "Enter number:". The entered number is added to the left of the deque. If the deque's length exceeds 4, the element at the right end is removed. The deque is printed after each iteration.

```
1 print("Queue implementation using Collections")
2 from collections import deque
3
4 x = deque()
5 print(x)
6 for i in range(10):
7     element = int(input("Enter number: "))
8
9     x.appendleft(element)
10    if i > 4:
11        x.pop()
12    print(x)
13
14
15
16
17
```



The screenshot shows a terminal window titled "Run: main" displaying the output of the script. It shows the initial deque state, followed by 10 iterations of user input and deque updates. The deque grows from left to right, and elements are removed from the right when the length exceeds 4. The process finishes with exit code 0.

```
Run: main
C:\Users\User\PycharmProjects\pythonProject\venv\Scripts\python.exe C:/Users/User/PycharmProjects/pythonProject/main.py
Queue implementation using Collections
deque([])
Enter number: 1
deque([1])
Enter number: 2
deque([2, 1])
Enter number: 3
deque([3, 2, 1])
Enter number: 4
deque([4, 3, 2, 1])
Enter number: 5
deque([5, 4, 3, 2, 1])
Enter number: 6
deque([6, 5, 4, 3, 2])
Enter number: 7
deque([7, 6, 5, 4, 3])
Enter number: 8
deque([8, 7, 6, 5, 4])
Enter number: 9
deque([9, 8, 7, 6, 5])
Enter number: 10
deque([10, 9, 8, 7, 6])

Process finished with exit code 0
```