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dequeue\_implementation.py

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1
2 # HSLU / ICS/AI ML : Modul ADS : Algorithmen & Datenstrukturen
3 # Path : uebung02/al/aufgabe02
4 # Version: Sun Feb 23 20:27:43 CET 2025
5
6 from uebung02.al.aufgabe02.node import Node
7 from uebung02.al.aufgabe02.dequeue_empty_exception import DequeEmptyException
8
9
10 class DequeImplementation:
11     """
12     Double linked list and DE-Queue (double ended queue: Deque)
13     """
14     def __init__(self):
15         self._header = Node()
16         self._trailer = Node()
17         self._header.set_next(self._trailer)
18         self._trailer.set_prev(self._header)
19         self._size = 0
20
21     def insert_first(self, element):
22         second = self._header.get_next()
23         first = Node(element, self._header, second)
24         second.set_prev(first)
25         self._header.set_next(first)
26         self._size += 1
27
28     def remove_last(self):
29         if self.is_empty():
30             raise DequeEmptyException("Deque is empty!")
31         last = self._trailer.get_prev()
32         e = last.get_element()
33         secondtolast = last.get_prev()
34         self._trailer.set_prev(secondtolast)
35         secondtolast.set_next(self._trailer)
36         self._size -= 1
37         return e
38
39     def remove_first(self):
40
41         # TODO: Implement here...
42         pass
43
44
45     def insert_last(self, element):
46
47         # TODO: Implement here...
48         pass
49
50
51     def first(self):
52
53         # TODO: Implement here...
54         pass
55
56
57     def last(self):
58
59         # TODO: Implement here...
60         pass
61
62
63     def size(self):
64
65         # TODO: Implement here...
66         pass
67

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68
69     def is_empty(self):
70
71         # TODO: Implement here...
72         pass
73
74
75     def __str__(self):
76         node = self._header.get_next()
77         elements = []
78         while node != self._trailer:
79             elements.append(str(node.get_element()))
80             node = node.get_next()
81         separator=", "
82         return "[" + separator.join(elements) + "]"
83
84
85 if __name__ == '__main__':
86     deque = DequeImplementation()
87     deque.insert_first(3)
88     deque.insert_first(2)
89     deque.insert_first(1)
90     print(deque)
91     deque.insert_last(4)
92     deque.insert_last(5)
93     deque.insert_last(6)
94     print(deque)
95     print("size : " + str(deque.size()))
96     print("empty : " + str(deque.is_empty()))
97     print("first : " + str(deque.first()))
98     print("last : " + str(deque.last()))
99     for i in range(3):
100         print(str(deque.remove_first()), end = " ")
101     print()
102     for i in range(3):
103         print(str(deque.remove_last()), end = " ")
104     print()
105     deque.remove_first()
106
107
108 """ Session-Log:
109
110 [1, 2, 3]
111 [1, 2, 3, 4, 5, 6]
112 size : 6
113 empty : False
114 first : 1
115 last : 6
116 1 2 3
117 6 5 4
118 Traceback (most recent call last):
119   File "/home/tletsch/HSLU/FS25/ADS_Uebungen_Python/Uebungen/uebung02/al/aufgabe02/deq
ueue_implementation.py", line 102, in <module>
120     deque.remove_first()
121   File "/home/tletsch/HSLU/FS25/ADS_Uebungen_Python/Uebungen/uebung02/al/aufgabe02/deq
ueue_implementation.py", line 41, in remove_first
122     raise DequeEmptyException("Deque is empty!")
123 uebung02.al.aufgabe02.dequeue_empty_exception.DequeEmptyException: Deque is empty!
124
125 """

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**node.py**

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```
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3 # Path : uebung02/al/aufgabe02
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5
6
7 class Node:
8
9     def __init__(self, e = None, p = None, n = None):
10         self._element = e
11         self._next = n
12         self._prev = p
13
14     def set_element(self, new_elem):
15         _element = new_elem
16
17     def set_next(self, new_next):
18         self._next = new_next
19
20     def set_prev(self, new_prev):
21         self._prev = new_prev
22
23     def get_element(self):
24         return self._element
25
26     def get_next(self):
27         return self._next
28
29     def get_prev(self):
30         return self._prev
31
32
```

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**dequeue\_empty\_exception.py**

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```
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3 # Path : uebung02/al/aufgabe02
4 # Version: Sun Feb 23 20:27:43 CET 2025
5
6 class DequeEmptyException(Exception):
7
8     def __init__(self, err):
9         super().__init__(err)
10
```