

# **AI ASSISTED CODING**

## **LAB-11.1**

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### **Task Description #1 – Stack Implementation**

Task: Use AI to generate a Stack class with push, pop, peek, and is\_empty methods. Sample Input Code:

class Stack:

pass

Expected Output:

- A functional stack implementation with all required methods and docstrings **PROMPT:**

#Write a code to generate a stack class with push, pop, peek and isEmpty methods **CODE:**

```

• lab6.py > ...
1  #Write a code to generate a stack class with push,pop,peek and isEmpty methods
2  class Stack:
3      def __init__(self):
4          self.stack = []
5      def push(self, item):
6          self.stack.append(item)
7      def pop(self):
8          if not self.isEmpty():
9              return self.stack.pop()
10         else:
11             raise IndexError("Stack is empty")
12     def peek(self):
13         if not self.isEmpty():
14             return self.stack[-1]
15         else:
16             raise IndexError("Stack is empty")
17     def isEmpty(self):
18         return len(self.stack) == 0
19 # Example usage
20 if __name__ == "__main__":
21     stack = Stack()
22     stack.push(1)
23     stack.push(2)
24     stack.push(3)
25     print(stack.peek()) # Output: 3
26     print(stack.pop()) # Output: 3
27     print(stack.isEmpty()) # Output: False
28     print(stack.pop()) # Output: 2
29     print(stack.pop()) # Output: 1
30     print(stack.isEmpty()) # Output: True
31

```

## OUTPUT:

```

False ...
● PS C:\Users\thota\OneDrive\Desktop\AIAC> & C:/Users/thota/AppData/Local/Programs/Python/Python
/AIAC/lab6.py
3
3
False
2
1
True
○ PS C:\Users\thota\OneDrive\Desktop\AIAC> []

```

## Task Description #2 – Queue Implementation

Task: Use AI to implement a Queue using Python lists.

## Sample Input Code: class

Queue:

pass

Expected Output:

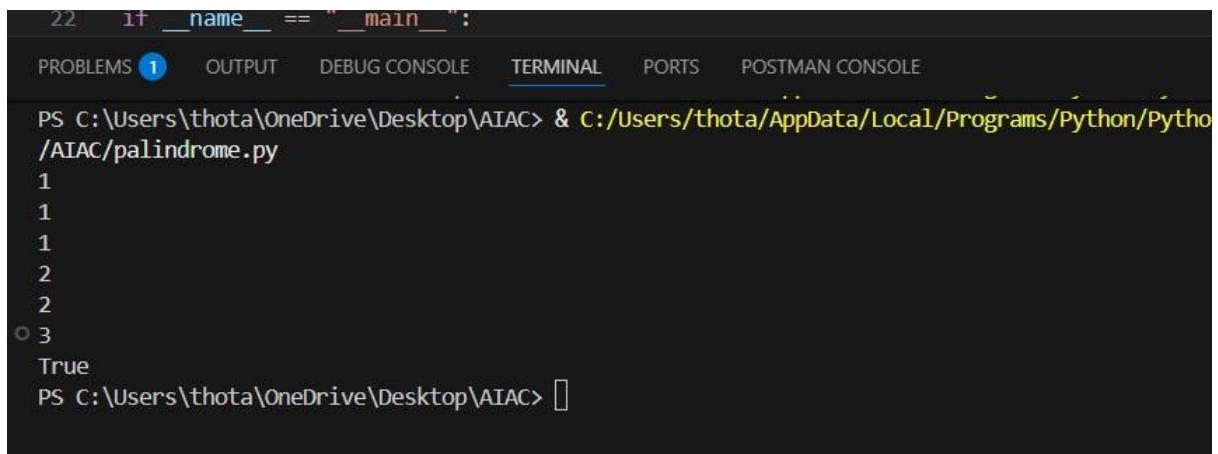
- FIFO-based queue class with enqueue, dequeue, peek, and size methods.

**PROMPT:**

#Write a code to generate a queue class with enqueue,dequeue,peek and size methods **CODE:**

```
❸ palindrome.py > ...
1  #Write a code to generate a queue class with enqueue,dequeue,peek and size methods
2  class Queue:
3      def __init__(self):
4          self.queue = []
5      def enqueue(self, item):
6          self.queue.append(item)
7      def dequeue(self):
8          if not self.isEmpty():
9              return self.queue.pop(0)
10         else:
11             raise IndexError("Queue is empty")
12     def peek(self):
13         if not self.isEmpty():
14             return self.queue[0]
15         else:
16             raise IndexError("Queue is empty")
17     def size(self):
18         return len(self.queue)
19     def isEmpty(self):
20         return len(self.queue) == 0
21 # Example usage
22 if __name__ == "__main__":
23     queue = Queue()
24     queue.enqueue(1)
25     queue.enqueue(2)
26     queue.enqueue(3)
27     print(queue.peek()) # Output: 1
28     print(queue.dequeue()) # Output: 1
29     print(queue.size()) # Output: 2
30     print(queue.dequeue()) # Output: 2
31     print(queue.dequeue()) # Output: 3
32     print(queue.isEmpty()) # Output: True
```

## OUTPUT:



```
22 if __name__ == "__main__":
PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL PORTS POSTMAN CONSOLE
PS C:\Users\thota\Desktop\AIAC> & C:/Users/thota/AppData/Local/Programs/Python/Python38/AIAC/palindrome.py
1
1
1
2
2
3
True
PS C:\Users\thota\Desktop\AIAC>
```

## Task Description #3 – Linked List

Task: Use AI to generate a Singly Linked List with insert and display methods. Sample Input Code: class Node:

```
pass class
```

```
LinkedList:
```

```
pass
```

Expected Output:

- A working linked list implementation with clear method documentation **PROMPT:**

```
#Write a code to generate a singly linkedlist with insert and display methods
```

## CODE AND OUTPUT:

```

palindrome.py > SinglyLinkedList > display
 2   class Node:
 3     def __init__(self, data):
 4       self.data = data
 5       self.next = None
 6   class SinglyLinkedList:
 7     def __init__(self):
 8       self.head = None
 9     def insert(self, data):
10       new_node = Node(data)
11       if not self.head:
12         self.head = new_node
13         return
14       last_node = self.head
15       while last_node.next:
16         last_node = last_node.next
17       last_node.next = new_node
18     def display(self):
19       current_node = self.head
20       while current_node:
21         print(current_node.data, end=' ')
22         current_node = current_node.next
23       print()
24   # Example usage
25   if __name__ == "__main__":
26     linked_list = SinglyLinkedList()
27     linked_list.insert(10)
28     linked_list.insert(20)
29     linked_list.insert(30)
30     print("Singly Linked List:")
31     linked_list.display()
32   # This program defines a Node class for the elements of the linked

```

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Singly Linked List:  
10 20 30  
PS C:\Users\thota\OneDrive\Desktop\AIAC>

## Task Description #4 – Binary Search Tree (BST)

Task: Use AI to create a BST with insert and in-order traversal methods.

**Sample Input Code:** class

**BST:**

pass

**Expected Output:**

- BST implementation with recursive insert and traversal methods.

**PROMPT:**

#Write a code to create a binary search tree and inorder traversal methods using recursive insert and traversal methods

**CODE AND OUTPUT:**

```
palindrome.py X lab6.py lab1exam.py lab4.py lab2.py 1 lab5.py
palindrome.py > BinarySearchTree > _insert_recursive
1 #Write a code to create a binary search tree and inorder traversal methods using recursive
2 class TreeNode:
3     def __init__(self, value):
4         self.value = value
5         self.left = None
6         self.right = None
7 class BinarySearchTree:
8     def __init__(self):
9         self.root = None
10    def insert(self, value):
11        if self.root is None:
12            self.root = TreeNode(value)
13        else:
14            self._insert_recursive(self.root, value)
15    def _insert_recursive(self, node, value):
16        if value < node.value:
17            if node.left is None:
18                node.left = TreeNode(value)
19            else:
20                self._insert_recursive(node.left, value)
21        else:
22            if node.right is None:
23                node.right = TreeNode(value)
24            else:
25                self._insert_recursive(node.right, value)
26    def inorder_traversal(self):
27        return self._inorder_recursive(self.root)
28    def _inorder_recursive(self, node):
29        result = []
30        if node:
31            result.extend(self._inorder_recursive(node.left))
32            result.append(node.value)
33            result.extend(self._inorder_recursive(node.right))
34        return result
35 # Example usage
36 if __name__ == "__main__":
37     bst = BinarySearchTree()
```

The screenshot shows a code editor with a Python file named `palindrome.py` open. The code defines a `BinarySearchTree` class with an `_inorder_recursive` method. An example usage block inserts values 5 through 8 into a tree and prints the inorder traversal result. The terminal below shows the code running and outputting the expected list [2, 3, 4, 5, 6, 7, 8].

```
palindrome.py > BinarySearchTree > _inorder_recursive
7   class BinarySearchTree:
28     def _inorder_recursive(self, node):
30       if node:
31         result.extend(self._inorder_recursive(node.left))
32         result.append(node.value)
33         result.extend(self._inorder_recursive(node.right))
34       return result
35 # Example usage
36 if __name__ == "__main__":
37   bst = BinarySearchTree()
38   bst.insert(5)
39   bst.insert(3)
40   bst.insert(7)
41   bst.insert(2)
42   bst.insert(4)
43   bst.insert(6)
44   bst.insert(8)
45   print("Inorder Traversal:", bst.inorder_traversal()) # Output: [2, 3, 4, 5, 6, 7, 8]
46 # This code defines a binary search tree with methods for inserting values and performing an inorder traversal
```

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True ...

- PS C:\Users\thota\OneDrive\Desktop\AIAC & C:/Users/thota/AppData/Local/Programs/Python/Python313/python.exe c:/Users/ /AIAC/palindrome.py
- Inorder Traversal: [2, 3, 4, 5, 6, 7, 8]

PS C:\Users\thota\OneDrive\Desktop\AIAC>

## Task Description #5 – Hash Table

Task: Use AI to implement a hash table with basic insert, search, and delete methods. Sample Input

Code: class HashTable:

pass

Expected Output:

- Collision handling using chaining, with wellcommented methods.

**PROMPT:**

#Write a code to implement a hash table with basic operations like insert, delete and search methods using chaining for collision handling with well commented methods

## CODE AND OUTPUT:

```
palindrome.py > HashTable > hash_function
1  #Write a code to implement a hash table with basic operations like insert, delete and search methods using cha
2  class HashTable:
3      def __init__(self, size=10):
4          """Initialize the hash table with a specified size."""
5          self.size = size
6          self.table = [[] for _ in range(size)] # Create a list of empty lists for chaining
7
8      def hash_function(self, key):
9          """Generate a hash for the given key."""
10         return hash(key) % self.size
11
12     def insert(self, key, value):
13         """Insert a key-value pair into the hash table."""
14         index = self.hash_function(key)
15         # Check if the key already exists and update it
16         for i, (k, v) in enumerate(self.table[index]):
17             if k == key:
18                 self.table[index][i] = (key, value) # Update existing key
19             return
20
21         # If the key does not exist, add a new key-value pair
22         self.table[index].append((key, value))
23
24     def delete(self, key):
25         """Delete a key-value pair from the hash table."""
26         index = self.hash_function(key)
27         for i, (k, v) in enumerate(self.table[index]):
28             if k == key:
29                 del self.table[index][i] # Remove the key-value pair
30             return True
31
32         return False # Key not found
33
34     def search(self, key):
35         """Search for a value by its key in the hash table."""
36         index = self.hash_function(key)
37         for k, v in self.table[index]:
38             if k == key:
39                 return v # Return the value associated with the key
```

```

palindrome.py > HashTable > hash_function
  2   class HashTable:
 20     def delete(self, key):
 24       if k == key:
 25         del self.table[index][i] # Remove the key-value pair
 26         return True
 27       return False # Key not found
 28     def search(self, key):
 29       """Search for a value by its key in the hash table."""
 30       index = self.hash_function(key)
 31       for k, v in self.table[index]:
 32         if k == key:
 33           return v # Return the value associated with the key
 34       return None # Key not found
 35     # Example usage
 36     if __name__ == "__main__":
 37       hash_table = HashTable()
 38       hash_table.insert("name", "Alice")
 39       hash_table.insert("age", 30)
 40       print(hash_table.search("name")) # Output: Alice
 41       print(hash_table.search("age")) # Output: 30
 42       hash_table.delete("name")
 43       print(hash_table.search("name")) # Output: None
 44     # This program implements a hash table using chaining for collision handling. It includes methods for

```

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PS C:\Users\thota\OneDrive\Desktop\AIAC> ^C

- PS C:\Users\thota\OneDrive\Desktop\AIAC> & c:/Users/thota/AppData/Local/Programs/Python/Python313/python.exe c:/Users/thota/OneDrive/Desktop/AIAC/palindrome.py

```

Alice
30
None

```

PS C:\Users\thota\OneDrive\Desktop\AIAC>

## Task Description #6 – Graph Representation

Task: Use AI to implement a graph using an adjacency list.

Sample Input Code: class

Graph:

pass

Expected Output:

- Graph with methods to add vertices, add edges, and display connections.

**PROMPT:**

#Write a code to implement a graph using an adjacency list and perform methods like add\_vertices,add\_edges and display connections **CODE AND OUTPUT:**

The screenshot shows a terminal window with the following content:

```
palindrome.py > ...
1  write a code to implement a graph using an adjacency list and perform methods like add_vertices
2  iss Graph:
3      def __init__(self):
4          self.adjacency_list = {}
5      def add_vertex(self, vertex):
6          if vertex not in self.adjacency_list:
7              self.adjacency_list[vertex] = []
8      def add_edge(self, vertex1, vertex2):
9          if vertex1 in self.adjacency_list and vertex2 in self.adjacency_list:
10             self.adjacency_list[vertex1].append(vertex2)
11             self.adjacency_list[vertex2].append(vertex1) # For undirected graph
12     def display_connections(self):
13         for vertex, edges in self.adjacency_list.items():
14             print(f"{vertex}: {', '.join(edges)}")
15 :example usage
16 __name__ == "__main__":
17 graph = Graph()
18 graph.add_vertex("A")
19 graph.add_vertex("B")
20 graph.add_vertex("C")
21 graph.add_edge("A", "B")
22 graph.add_edge("A", "C")
23 graph.add_edge(["B", "C"])
24 graph.display_connections()
25
```

TERMINAL

```
/AIAC/palindrome.py
● PS C:\Users\thota\OneDrive\Desktop\AIAC> & C:/Users/thota/AppData/Local/Programs/Python/Python313/python.
/AIAC/palindrome.py
A: B, C
B: A, C
C: A, B
○ PS C:\Users\thota\OneDrive\Desktop\AIAC> []
```

## Task Description #7 – Priority Queue

Task: Use AI to implement a priority queue using Python's heapq module.

Sample Input Code: class

PriorityQueue:

pass

**Expected Output:**

- Implementation with enqueue (priority), dequeue (highest priority), and display methods.

**PROMPT:**

#Write a code to implement a priority queue using python's heapq module and implement with methods for enqueue,dequeue and display methods

**CODE AND OUTPUT:**

```
palindrome.py X lab6.py lab1exam.py lab4.py lab2.py 1 lab5.py
palindrome.py > PriorityQueue > is_empty
1 #Write a code to implement a priority queue using python's heapq module and implement
2 import heapq
3 class PriorityQueue:
4     def __init__(self):
5         self.elements = []
6     def enqueue(self, item, priority):
7         heapq.heappush(self.elements, (priority, item))
8     def dequeue(self):
9         if not self.is_empty():
10            return heapq.heappop(self.elements)[1]
11        else:
12            raise IndexError("Priority Queue is empty")
13    def display(self):
14        print("Priority Queue:")
15        for priority, item in sorted(self.elements):
16            print(f"Item: {item}, Priority: {priority}")
17    def is_empty(self):
18        return len(self.elements) == 0
19 # Example usage
20 if __name__ == "__main__":
21    pq = PriorityQueue()
22    pq.enqueue("Task 1", priority=3)
23    pq.enqueue("Task 2", priority=1)
24    pq.enqueue("Task 3", priority=2)
25    pq.display()
```

```
palindrome.py X lab6.py lab1exam.py lab4.py lab2.py 1 lab5.py
palindrome.py > PriorityQueue > is_empty
1 #Write a code to implement a priority queue using python's heapq module and implement
2 import heapq
3 class PriorityQueue:
4     def __init__(self):
5         self.elements = []
6     def enqueue(self, item, priority):
7         heapq.heappush(self.elements, (priority, item))
8     def dequeue(self):
9         if not self.is_empty():
10            return heapq.heappop(self.elements)[1]
11        else:
12            raise IndexError("Priority Queue is empty")
13    def display(self):
14        print("Priority Queue:")
15        for priority, item in sorted(self.elements):
16            print(f"Item: {item}, Priority: {priority}")
17    def is_empty(self):
18        return len(self.elements) == 0
19 # Example usage
20 if __name__ == "__main__":
21    pq = PriorityQueue()
22    pq.enqueue("Task 1", priority=3)
23    pq.enqueue("Task 2", priority=1)
24    pq.enqueue("Task 3", priority=2)
25    pq.display()
```

## Task Description #8 – Deque

Task: Use AI to implement a double-ended queue using collections.deque. Sample Input Code: class DequeDS:  
pass

Expected Output:

- Insert and remove from both ends with docstrings.

### PROMPT:

#Write a code to implement a double ended queue using collections.dequeue using insert and remove from both ends with docstring **CODE AND**

### OUTPUT:

```
❶ palindrome.py > ↵ DoubleEndedQueue > ↵ is_empty
1  #Write a code to implement a double ended queue using collections.dequeue using insert and remove from both ends with docstr
2  from collections import deque
3  class DoubleEndedQueue:
4      def __init__(self):
5          """Initialize an empty double-ended queue."""
6          self.deque = deque()
7      def insert_front(self, item):
8          """Insert an item at the front of the deque."""
9          self.deque.appendleft(item)
10     def insert_rear(self, item):
11         """Insert an item at the rear of the deque."""
12         self.deque.append(item)
13     def remove_front(self):
14         """Remove and return an item from the front of the deque. Raises IndexError if the deque is empty."""
15         if not self.is_empty():
16             return self.deque.popleft()
17         else:
18             raise IndexError("Deque is empty")
19     def remove_rear(self):
20         """Remove and return an item from the rear of the deque. Raises IndexError if the deque is empty."""
21         if not self.is_empty():
22             return self.deque.pop()
23         else:
24             raise IndexError("Deque is empty")
25     def is_empty(self):
26         """Check if the deque is empty."""
27         return len(self.deque) == 0
28 # Example usage
29 if name == " main ":
```

```
3   class DoubleEndedQueue:
19     def remove_rear(self):
22       return self.deque.pop()
23     else:
24       raise IndexError("Deque is empty")
25     def is_empty(self):
26       """Check if the deque is empty."""
27       return len(self.deque) == 0
28   # Example usage
29   if __name__ == "__main__":
30     deq = DoubleEndedQueue()
31     deq.insert_rear(1)
32     deq.insert_rear(2)
33     deq.insert_front(0)
34     print(deq.deque)  # Output: deque([0, 1, 2])
35     print(deq.remove_front())  # Output: 0
36     print(deq.remove_rear())  # Output: 2
37     print(deq.is_empty())  # Output: False
38     print(deq.remove_front())  # Output: 1
39     print(deq.is_empty())  # Output: True
40   # This code implements a double-ended queue (deque) using the collections.d
41
```

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/AIAC/palindrome.py

1

True

- PS C:\Users\thota\OneDrive\Desktop\AIAC> ^C
  - PS C:\Users\thota\OneDrive\Desktop\AIAC> & C:/Users/thota/AppData/Local/Programs/Python/AIAC/palindrome.py
- ```
deque([0, 1, 2])
0
2
False
1
True
○ PS C:\Users\thota\OneDrive\Desktop\AIAC> □
```