

# AI ASSISTED CODING

## LAB-11.1

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**Batch-  
11**

### **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:**

```

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
20  # Example usage
21  if __name__ == "__main__":
22      stack = Stack()
23      stack.push(1)
24      stack.push(2)
25      stack.push(3)
26      print(stack.peek()) # Output: 3
27      print(stack.pop())  # Output: 3
28      print(stack.isEmpty()) # Output: False
29      print(stack.pop())  # Output: 2
30      print(stack.pop())  # Output: 1
31      print(stack.isEmpty()) # Output: True

```

## OUTPUT:

```
False ...  
PS C:\Users\thota\OneDrive\Desktop\AIAC> & C:/Users/thota/AppData/Local/Programs/Python/Python38-64/Python.exe -c "import sys; sys.path.append('C:\\Users\\thota\\OneDrive\\Desktop\\AIAC'); import lab6; print(lab6.get_max_value())"  
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:**



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()

```



```
palindrome.py > BinarySearchTree > _insert_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 tra
47
```

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True ...

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

○ 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     def hash_function(self, key):
8         """Generate a hash for the given key."""
9         return hash(key) % self.size
10    def insert(self, key, value):
11        """Insert a key-value pair into the hash table."""
12        index = self.hash_function(key)
13        # Check if the key already exists and update it
14        for i, (k, v) in enumerate(self.table[index]):
15            if k == key:
16                self.table[index][i] = (key, value) # Update existing key
17                return
18        # If the key does not exist, add a new key-value pair
19        self.table[index].append((key, value))
20    def delete(self, key):
21        """Delete a key-value pair from the hash table."""
22        index = self.hash_function(key)
23        for i, (k, v) in enumerate(self.table[index]):
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
```

```
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:/User
/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:

```
palindrome.py > ...
1  Write a code to implement a graph using an adjacency list and perform methods like add_vertices
2  class 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
```

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/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:

```
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> █