

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:**

```

• 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:

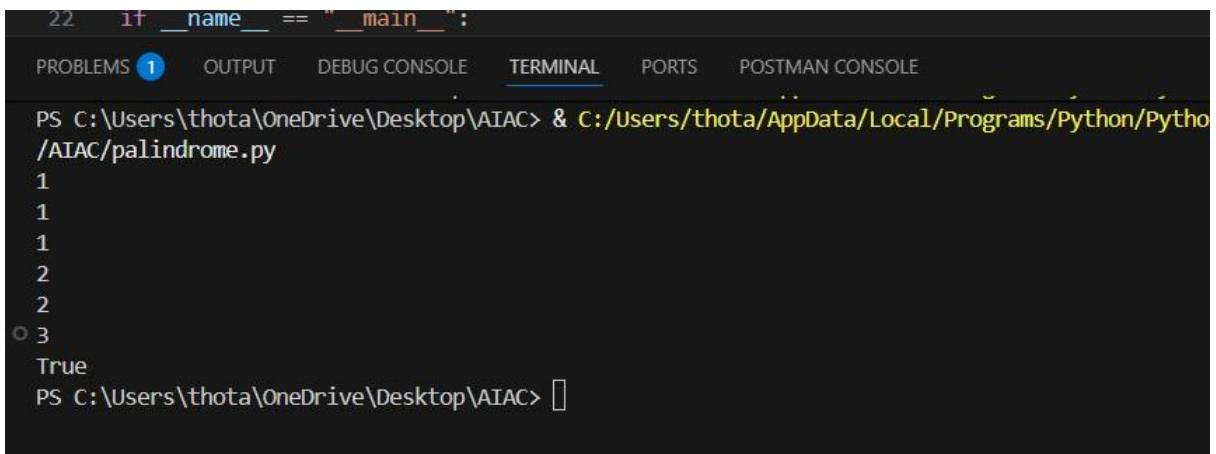
- FIFO-based queue class with enqueue, dequeue, peek, and size methods.

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:



A screenshot of a terminal window from a code editor. The terminal tab is selected at the top. The command PS C:\Users\thota\OneDrive\Desktop\AIAC> & C:/Users/thota/AppData/Local/Programs/Python/Python38/AIAC/palindrome.py is run. The output shows the execution of the code, which prints the number 3 and returns True. The terminal prompt PS C:\Users\thota\OneDrive\Desktop\AIAC> is visible at the bottom.

```
22 if __name__ == "__main__":
PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL PORTS POSTMAN CONSOLE
PS C:\Users\thota\OneDrive\Desktop\AIAC> & C:/Users/thota/AppData/Local/Programs/Python/Python38/AIAC/palindrome.py
1
1
1
2
2
3
True
PS C:\Users\thota\OneDrive\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 dark theme. The file being edited is `palindrome.py`. The code defines a `BinarySearchTree` class with an `_inorder_recursive` method. It also includes an example usage block where a bst object is created and populated with values 5, 3, 7, 2, 4, 6, and 8, then an inorder traversal is printed. The terminal tab at the bottom shows the output of running the script, which is the 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
```

PROBLEMS 1 OUTPUT DEBUG CONSOLE TERMINAL PORTS POSTMAN CONSOLE

/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> □
```