CSE220: Data Structures (Lab)

Fall 2024

Lab Quiz - 04

Duration: 30 Minutes

| Name: | ID: | Section: |
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You are asked to implement a HashTable class that stores key-value pairs, where the key is a string (representing a student ID) and the value is an integer (representing the student’s grade).

The class should include a hash\_function that calculates the hash index by summing the ASCII values of the **first two characters** of the key. If the key is only one character, the ASCII value of 'Z' (90) should be added as the second character.

The insert() method should add a new key-value pair or update the value if the key already exists. Use **forward chaining** to handle collisions.

You are **not allowed** to use any built-in functions except len(). Assume the display() method is already implemented to show the hash table.

**Python**

| Sample Input | Sample Output | Explanation |
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| # Sample Input  ht = HashTable(7)  ht.insert("S1", 85)  ht.insert("A", 90)  ht.insert("S2", 78)  print("\nHash table after insertions:")  ht.display()  ht.insert("S1", 88) # Updating S1 grade  print("\nHash table after update:")  ht.display() | Hash table after insertions:  Index 0: S2 (78) -> None  Index 1: A (90) -> None  Index 2: None  Index 3: None  Index 4: None  Index 5: None  Index 6: S1 (85) -> None  Hash table after update:  Index 0: S2 (78) -> None  Index 1: A (90) -> None  Index 2: None  Index 3: None  Index 4: None  Index 5: None  Index 6: S1 (88) -> None | **For S1**: 'S' = 83, '1' = 49. Total = 83 + 49 = 132. Index = 132 % 7 = 6.  **For A**: 'A' = 65, 'Z' = 90. Total = 65 + 90 = 155. Index = 155 % 7 = 1.  **For S2**: 'S' = 83, '2' = 50. Total = 83 + 50 = 133. Index = 133 % 7 = 0. |

**JAVA**

| Sample Input | Sample Output | Explanation |
| --- | --- | --- |
| // Sample Input  HashTable ht = new HashTable(7);  ht.insert("S1", 85);  ht.insert("A", 90);  ht.insert("S2", 78);  System.out.println("\nHash table after insertions:");  ht.display();  ht.insert("S1", 88);// Updating S1 grade  System.out.println("\nHash table after update:");  ht.display(); | Hash table after insertions:  Index 0: S2 (78) -> null  Index 1: A (90) -> null  Index 2: null  Index 3: null  Index 4: null  Index 5: null  Index 6: S1 (85) -> null  Hash table after update:  Index 0: S2 (78) -> null  Index 1: A (90) -> null  Index 2: null  Index 3: null  Index 4: null  Index 5: null  Index 6: S1 (88) -> null | **For S1**: 'S' = 83, '1' = 49. Total = 83 + 49 = 132. Index = 132 % 7 = 6.  **For A**: 'A' = 65, 'Z' = 90. Total = 65 + 90 = 155. Index = 155 % 7 = 1.  **For S2**: 'S' = 83, '2' = 50. Total = 83 + 50 = 133. Index = 133 % 7 = 0. |

