Objectives

* Understanding the Priority Queue ADT
* Inheriting classes

Due Date

This assignment is due on Tuesday, April 16 by 11:00 pm.

**Remarks:**

* This homework is to be individual work.

Value

This assignment is worth 20 points.

Activities

You have been hired by a restaurant to create a program that manages reservations. The program should use a priority queue to keep track of customers in order of their reservation *time*. Each customer has a unique name. The customer also has reservation time, represented as a string in the format of HH:MM. For example, 09:25 has a higher priority than 10:30. The time is from 00:00 until 23:59. So 16:30 is 4:30pm. The program should have a menu-based interface (provided) that allows the user to choose from the six options listed below:

1. Add a customer to the waitlist: This option allows the user to add a customer to the waiting list. The user should enter the customer’s name as a string (assume that all names are unique) and the priority of the (provided) class type time of the reservation in the form of HH:MM. When adding a customer, the program should validate the input to ensure that the time is in the correct format (HH:MM).
2. Seat the next customer: This option allows the user to seat a customer. The program should extract the customer with the highest priority (i.e., the earliest reservation time) from the priority queue.
3. Peek at the next customer: This option allows the user to peek and see the first customer on the waitlist (i.e., the customer with the highest priority the earliest reservation time). The program should handle cases where there are no customers in the queue when trying to seat or peek at the first customer.
4. Change Reservation Time: This option allows the user to change the reservation time for a specific customer. The user should enter the customer’s name and the new priority (reservation time). The program should update the priority queue based on the new priority.
5. Print the reservation list: print the reservation list in order of priority (i.e., earliest reservation time to latest).
6. The program should be menu-driven, and the user should be prompted to enter their choice of action after each operation is completed. The user should also be able to exit the program at any time. This option is already given in the starter code.

Submitting

You should submit the following files:

1. waitlist.py: This file should contain the implementation of the WaitList class with the five methods: add\_customer(), seat\_customer(), change\_reservation\_time(), peek\_first\_customer(), and print\_reservation\_list(). In addition to other methods that you may need. See the #TODO annotation in the code provided.
2. menu.py: This file should contain the implementation of the menu-based interface, with the five previous options and sixth option to exit the program when the user chooses to quit. See the #TODO annotation in the code provided.
3. test\_waitlist.py: This file should contain the unit tests for the WaitList class.

Requirements

1. You should implement the menu-based interface to allow the user to choose from the six options.
2. You should implement the first five options as separate methods in a WaitList class.
3. The program should handle cases where multiple customers have the same reservation time by using their names as a tiebreaker. In other words, if two customers have the same reservation time, the one whose name comes first alphabetically should have a higher priority in the queue. This code is already implemented in the starter code in Time and Entry classes waitlist.py.
4. You should implement unittests to ensure that the program works as expected.
5. You should provide a separate menu file that contains the menu options for the user to choose from.

Examples

An example of how the program should work starts on the following page.

Welcome to the Restaurant Reservation System!

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Please select an option:

1

. Add a customer to the waitlist

2

. Seat the next customer

3

. Change the time of a customer's reservation

4

. Peek at the next customer

5

. Print the reservation list

6

. Quit

Enter your choice (1-5): 1

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Enter the customer's name: Ana

Enter the time of the reservation (HH:MM): 12:30

Ana has been added to the waitlist at 12:30

Enter your choice (1-5): 1

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Enter the customer's name: Mike

Enter the time of the reservation (HH:MM): 18:45

Mike has been added to the waitlist at 18:45

Enter your choice (1-5): 1

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Enter the customer's name: James

Enter the time of the reservation (HH:MM): 02:00

James has been added to the waitlist at 02:00

Enter your choice (1-5): 4

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The next customer on the waitlist is: James, reservation time: 02:00

Enter your choice (1-5): 5

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The next customer on the waitlist is: James, time: 02:00

The next customer on the waitlist is: Ana, time: 12:30

The next customer on the waitlist is: Mike, time: 18:45

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Enter your choice (1-5): 2

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Seated customer: James, reservation time: 02:00

Enter your choice (1-5): 2

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Seated customer: Ana, reservation time: 12:30

Enter your choice (1-5): 3

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Enter the customer's name: Mike

Enter the new time of the reservation (HH:MM): 10:23

Mike's reservation time has been changed to 10:23

Enter your choice (1-5): 6

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Thank you for using the Restaurant Reservation System!