READMe file

**OOP Project: Lodging Manager**

This is a project developed for a graduate-level course in Object-Oriented Programming. The goal of the project was to design and implement a Lodging Manager program using OOP concepts such as inheritance, encapsulation, and polymorphism.

**Project Overview**

The Lodging Manager is a console-based application that allows users to manage a lodging facility's bookings and reservations. The system provides functionality for adding and removing guests, managing room availability, as well as searching and sorting guest information based on different criteria.

**OOP Concepts Used**

**Inheritance:** Inheritance is used to create a hierarchy of room types. The base class 'ReservationDetail' contains common properties such as reservation number, price, and nights booked, while the derived classes HouseDetail, HotelDetail and CabinDetail add additional properties specific to each type. This allows for more efficient and organized management of room inventory in the lodging facility.

**Encapsulation:** Encapsulation is used to hide implementation details and ensure that the system is robust and maintainable. All data members are kept private, and access to them is provided through public methods. This ensures that the system is protected from unwanted modifications or misuse.

**Polymorphism:** Polymorphism is used to enable the system to work with different room types without having to know their specific implementation details. This is achieved through the use of virtual functions in the base class ReservationDetail, such as calculateBasePrice, calculateTotalPrice, and updateReservation, which are overridden in the derived classes HotelDetail, HouseDetail and CabinDetail.

**Project Structure**

The project is divided into multiple classes, each responsible for a specific aspect of the Lodging Manager program. The main classes are:

* **'Address':**
* **'CustomerAccount':**
* **'HotelDetail':**
* **'HouseDetail':**
* **'CabinDetail':**
* **'ReservationDetail':**
* **'LodgingManager':**

OOP Project Description

Requirements: You are to design and build prototype software (stand-alone application loaded on business’s local computer) to manage accounts and associated accommodation reservations. Your software will be used and called by User Interface (UI) that someone else will be implementing. You will get to design the UI screens in software design document (SDD) but you will not be implementing it for this project.

Your management’s software will load all the existing accounts and their associated reservations on startup. For this project, you should hardcode the full path for the directory where the data will be loaded from and saved to using a constant value in Manager’s class. Each account’s data should be saved in a separate directory named as the account’s number. Account’s information should be saved in one file and then each reservation that belongs to that account in separate file. The account’s file should have all the reservation numbers associated with the account but no other reservation data.

Account files name convention should be “acc-“ followed by the account number and the appropriate file extension (html, txt, or json). The reservation file name convention should be “res-“ followed by the reservation number and appropriate file extension.

For example: Given the path “accounts/” we may have a subdirectory called “A123456789” and in that subdirectory a file with accounts data: acc-A123456789.txt and two accommodation reservations: res-CAB12345678.txt and res-HOT1245678.txt

So for example, the relative path for reservation res-CAB12345678.txt file would be: “accounts/A123456789/res-CAB12345678.txt”

UI will not know the directory (and will not be able to obtain the directory from the system) nor will it interact directly with the data storage (only through your system’s methods). For the final product outside the scope of this project, server with database will be used for each account and corresponding reservations instead of the text files.

When the system starts up, UI will create an instance of your Manager class. Manager class will then load all the account and their corresponding reservations data.

An account includes the following information: unique number generated and provided by UI (A followed by 9 characters), mailing address associated with the account, list of the reservations associated with that account, email address, and phone number associated with the account.

When a new account is created, it must be provided with an account number, mailing address, phone number, and email address. New account has no reservations. Account’s number cannot be changed. Account’s mailing address, phone, and email can be changed at any time. A new account can be added to the manager but it cannot be removed. No duplicate accounts, based on account number, are allowed. New draft reservations can be added to the account at any time but they cannot be removed.

There are three types of accommodation reservations: hotel room reservation, cabin reservation, and house reservation. Each reservation includes an account number that the reservation belongs to, reservation number generated by UI (10 characters), lodging physical address, lodging mailing address, when reservation starts (Date or Calendar), number of nights, number of beds (default 2), number of bedrooms (default 1), number of bathrooms (default 1), lodging size in square feet (integer), price of the reservation, and reservation status (draft, completed, or cancelled).

You can make the reservation number value have a prefix which is unique per the type of reservation. For example, hotel starts with H, cabin with C, and house with O. This way your reservation filename, since it includes the reservation number, also tells you what type of reservation it contains.

In addition, hotel reservation has an indication of whether there is kitchenette or not; cabin reservation has indication if there is full kitchen and if cabin includes a loft; and house reservation has the number of floors.

Note that hotel reservation can only be reserved for single bedroom, single bathroom, and two beds.

All reservation attributes must be given values on reservation creation except for the mailing address which may be null. If the mailing address is null, UI will know to use the physical address as mailing address.

In addition:

• count number is updated when reservation is added to a specific account, otherwise it has a -99 value • New reservation always starts in draft status and can only be cancelled if the start date is in the future; completed reservation cannot be ever cancelled • Price of the reservation is not set until the reservation is completed

Reservation price per night is calculated as follows. (1) Basic price is $120 with an additional fee of $15 if the lodging size is greater than 900 square feet. (2) Cabin has an additional fee of $20 for full kitchen and $5 for each additional bathroom (3) Hotel has an additional flat fee of $50 plus $10 for kitchenette

Note that tax is already included in the price.

The account and reservation files but must be human readable text files and you must follow separation of concerns principle for design and code reading/writing the files. You must use XML tags (you can model after Trip example) or JSON. There are code examples of both in Course Content->Code Examples.

For this project it is required that each above class (except Manager) has the toString() method (explicit or inherited from parent) that can be used to output the class’s data to the screen. Also the output of toString() is the formatted data that must be used to write to the file and then can be loaded by that class’s constructor.

After the account and reservations data is loaded on system startup (on creation of Manager’s instance), the user (using UI and appropriate authorization) will be able to:

Get the list of loaded accounts from Manager

Retrieve a loaded account object that matches a specific account number

Add new account object to the list managed by Manager (if account object already exists on add action with the same account number, it is considered an error)

Request that Manager updates specific account’s files with data stored in memory

Add draft lodging reservation to an account (if reservation object already exists with the same reservation number, it is considered an error)

Complete reservation that is associated with an account

Cancel reservation that is associated with an account

Change reservation values that can be changed (if reservation is cancelled, completed, or for past date, it is considered an error)

Request for price per night to be calculated and returned for a specific reservation

Request for total reservation price to be calculated and returned for a specific reservation

Note that UI will handle the login and authorization and access control but all are outside of the scope of the system you are designing.

Your system will need the following exceptions and validation to be added for the week 5 assignment:

When loading account and/or reservations from file if the file does not exist throw unchecked user defined exception called IllegalLoadException when violation detected. The exception will extend RuntimeException. The exception message should indicate what failed (account file versus reservation file) and the filename that could not be loaded. The message should include the account’s number that was being loaded.

On adding account or adding reservation to an account, if duplicate account/reservation exists throw unchecked user defined exception called DuplicateObjectException when violation detected. The exception will extend RuntimeException. The generated exception message should indicate the number of the account and/or reservation number and why it failed.

On cancelling or completing reservation if it cannot be finalized, throw unchecked user defined exception called IllegalOperationException when violation is detected. The exception will extend RuntimeException. The generated exception message should F

For all other issues use Java built-in exceptions such as IllegalArgumentException for invalid parameters and IllegalStateException when state of the object cannot be changed. Code that throws these exceptions must pass a meaningful message.

Note that for this project you must pass the values that are needed for the meaningful exception message to the exception’s constructor(s) and have the exception class generate a meaningful message. Each exception’s constructor should handle a specific failing scenario.

UI is outside the scope of your design but your system needs to have all the functionality that UI needs to satisfy the project requirements.

As you design the system, you need to make sure it is consistent and it only has the interfaces (constructors, attributes and methods) that are needed by the required functionality. You cannot arbitrarily add new functionality to the system.

The system you are designing will have the functionality needed to satisfy the above requirements. You will NOT be implementing the actual user interface (you will still design it though in your Software Design Document in later assignment) but you need the classes, attributes, and methods to receive and provide the information that the user interface will need. You can assume that for a complete solution there would be some other class that implements user interface (UI) with main() method and that it will call your classes/methods. Your system will not have main method except in the test class (to be implemented for the final code assignment).

When you implement the system, you must have at minimum test cases to verify the major functionality of the system as listed above and a test case for at least one error path per user defined exception. Test class is not part of the class diagram and must be submitted for final code assignment.

There should be a single test class with main and each test case scenario should be a separate method called by main method. All methods should be able to run at once or select a single method to run by commenting out calls to the other methods. Make sure you use comments to document what each test case is verifying and doing. If you hardcode your data files instead of having test cases generate them, make sure to include those files with your code submissions.

Each test case should output a brief description of what it is testing and then some output. For example, a test case testing that exception is generated would output a message that exception was caught and what the exception message was; A test case to test that data was successfully loaded from file would output what was loaded using toString() method.