CS 451/551 - User Interface Design

Fall 2021

Assignment 1-a

To be submitted on or before Sep 22, 2020 (Wednesday)

Locks and Keys

UW-L has many rooms in every building. Almost all rooms have locks which can be opened by physical keys or swipe cards. The term 'key' is used in this assignment to represent a physical key or a swipe card. The distinction between the two types is made clear wherever it is necessary. Every lock can be opened by at least one key. Every key will open at least one lock. Some keys, called 'Master keys', may open more than one lock. Swipe cards cannot be used as Master keys. Hence, all Master keys are physical keys and they can open more than one lock.

In this assignment, a GUI must be developed for a software product that maintains the relationships between locks and keys. Every lock has the following information: lock identification (unique), the room number where the lock is located, and a set of keys (both physical keys and swipe cards) that can open the lock. Each key has the following information: key identification (unique), key type (physical or swipe card), and a set of locks which the key can open. The following operations must be supported:

- Add a new key and a new lock combination to the system. Both lock ID and key ID are auto generated.
- Add a new key to the system and map it to an existing lock. The key ID is auto generated.
- Add an existing key to an existing lock. Since swipe cards cannot open more than one lock, this operation is restricted to only physical keys. Moreover, the key becomes a Master key automatically because, if this operation is successful, the key will open more than one lock.
- Delete an existing key to an existing lock. This operation must ensure that there is at least one other key available to open the lock because every lock must have at least one key.
- Display information
  - of a key given its ID - should include its type (physical key or swipe card) and whether or not it is a master key.
  - of a lock given its ID - should include the room number where the lock is located.
  - of all locks for a given key ID
  - of all keys for a given lock ID

Submission

- Draw the use case diagram for the above problem. You are strongly encouraged to use a UML tool instead of a drawing tool.
- Write the use case narratives for the use case model you developed. Follow the same structure shown in your class notes.
- Draw sketch of the Graphical User Interface (GUI) derived from the use case model.

Submit only one file that includes all the diagrams and the use case narratives.
This file should be in WORD or PDF format only.