1.Derive UC-1 (Unlock) and UC-4 (RetireUser)

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| Initiator | Initiator’s Goal | Participants | Use Case Name |
| Tenant | When the user's phone Bluetooth is turned on, the door will open as soon as the user approaches the location of the lock. | Lock,Household Devices,Phone Bluetooth | Unlock (UC-1) |
| Tenant | Lock the door. | Lock,Household Devices, | Lock (UC-2) |
| Landlord | Create a new user account and allow access to home. | Tenant, Database | AddUser (UC-3) |
| Landlord | When the user no longer rents the house, the landlord confirms that the door lock cannot be opened by the Bluetooth of the user's mobile phone. | Tenant, Database | RetireUser (UC-4) |
| Tenant | Review the history of home accesses. | Database | ViewHistory (UC-5) |
| Tenant | Configure the operational preferences for household  devices. | Database | SetDevicePrefs (UC-6) |
| Visitor | Visit a resident’s home. | Lock, Database | VisitHome (UC-7) |

2.Give the use case schemas of UC-1 and UC-4

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| Use Case UC-1 | Unlock |
| Related Requirem’ts: | 1. Keep door locked and auto-lock 2. Lock is opened when Bluetooth is near the door 3. Allow the Bluetooth connection to fail, but prevent the stranger's Bluetooth from unlocking 4. Allows the use of a physical key to unlock the door if the Bluetooth connection fails 5. Maintain a history log |
| InitiatingActor: | Any of: Tenant, Landlord |
| Actor’s Goal: | Mobile phone Bluetooth unlock, unlocked after entering the room does not need a physical key to open the door. |
| Participating Actors: | Lock,Household Devices,Phone Bluetooth |
| Preconditions: | 1. The set of valid keys stored in the system database is non-empty.  2.The system displays the menu of available functions; at the door keypad the menu choices are “Lock” ，“Unlock”and Bluetooth setting |
| Postconditions: | The automatic lock timer starts timing from the Bluetooth connection |
| Flow of Events for Main Success Scenario:  1. When the tenant or landlord arrives around the house, Bluetooth will be turned on, and the door lock will automatically detect Bluetooth connection  2. Bluetooth connection is successful, signals to LockDevice to disarm the lock, and (c) signals to LightSwitch to turn the light on  3. When the user or tenant enters the house, the room lights up¬ 4. System signals to the Timer to start the auto-lock timer countdown  4．System signals to the Timer to start the auto-lock timer countdown  5. Tenant/Landlord opens the door, enters the home [and shuts the door and locks] | |

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| Use Case UC-4 | RemoveUser |
| Related Requirem’ts: | 1. Adding/removing users at runtime |
| InitiatingActor: | Landlord |
| Actor’s Goal: | To register new or remove departed residents at runtime. |
| Participating Actors: | Tenant, Database |
| Preconditions: | 1. The database already has Bluetooth information for previous users  2. The Bluetooth setting interface of the door lock can be modified to add and delete Bluetooth |
| Postconditions: | The deleted data no longer exists in the database |
| Flow of Events for Main Success Scenario:  1. Landlord selects the menu item “ManageUsers”  2. Landlord identification: Include Login (UC-8)  3. System (a) displays the options of activities available to the Landlord (including “Add  User” and “Remove User”), and (b) prompts the Landlord to make selection  4. Landlord selects the activity, such as “Remove User,” and delete the old data  5. The system will delete the original bluetooth information, and the bluetooth will not be connected automatically in the future  Flow of Events for Extensions (Alternate Scenarios):  4a. Selected activity entails adding new users: Include AddUser (UC-3)  4b. Selected activity entails removing users: Include RemoveUser (UC-4) | |

3.Give the acceptance tests for UC-1 and UC-4

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| Test-case Identifier: | TC-1 |
| Use Case Tested: | UC-1 |
| Pass/fail Criteria: | If the number of attempts is less than the maximum number of attempts, the user's Bluetooth information is in the database. |
| Input Data: | Bluetooth connection signal, Bluetooth matching identifier |
| Test Procedure: | Expected Result: |
| Step 1. Send the message using an unpaired Bluetooth device  Step 12. Send the message using an paired Bluetooth device | The door locked and the red light flashed  No information was added to the database  The door locks and a green light flashes, the room lights up, and a new message is added to the database |

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| Test-case Identifier: | TC-4 |
| Use Case Tested: | UC-4 |
| Pass/fail Criteria: | The user who has deleted the information connects the door lock again by Bluetooth, and the door does not open, it is deemed to be successful |
| Input Data: | Bluetooth connection signal, Bluetooth matching identifier |
| Test Procedure: | Expected Result: |
| Step 1. Connect the door lock using a Bluetooth that has deleted the data  Step 12. Send the message using an paired Bluetooth device | The door locked and the red light flashed  No information was added to the database  The door locks and a green light flashes, the room lights up, and a new message is added to the database |