

CS151, Section 06

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Group 9, Midterm 1

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Analysis of Voice Mail Box:

1) FUNCTIONAL SPECIFICATION

The Telephone Voice Mail System is a voice mail system in which callers can leave a message to a specific mailbox, while receivers of the message will be able to have their own mailbox and listen to the messages sent to them. The system has many different functional specifications for the caller and receiver.

The system should allow callers to be able to dial an extension number of a specific person that they would like to call and leave a message by inputting a number with a specific character after. Furthermore, the system should allow callers to be able to end a telephone call by entering 'H' into the input stream.

On the other end, the system will also include a menu in which user can choose to listen to their message. Furthermore, the system should have a passcode system in which the receivers of the message must enter to view their message. After each message is played, the system will allow the user to have the option to either delete the message after listening to the message or save the message. The system will also have a menu for the receiver to access which they are able to change their password and greeting. The system will also allow the user to record up to three new greetings, and the user will have the capability to switch from each greeting, or edit and change the greeting.

Furthermore, the system will also include an administration menu which can be accessed using a specific extension number. In the administration menu, the user should be able to add a

new user to the system, as well as be able to reset a specific users password.

2) USER MANUAL

This program simulates a telephone voice mail system:

- In a voice mail system, a person dials an extension number and, provided the other party does not pick up the telephone, the person is allowed to leave a message.
- The other party can later retrieve the messages, keep them, or delete them.

Some of the templates of User Options:

Admin

After the admin enters a specific extension, admin is taken to admin menu where they can either add users to the mail system and change or reset the passcode of all desired users.

Greetings

You will be instructed to record one or more greetings that callers will hear when they call your mailbox. Each user is going to have a default greeting assigned when the admin adds users to the mailbox system. So, when a caller calls the user, they listen to either the default generated greeting or the greeting assigned by the mailbox owner.

Passcode

You will always be prompted for your passcode before accessing your mailbox. The first time you access your mailbox, you will use the temporary passcode assigned by the system administrator. If needed, the user will be prompted to change your passcode to a number with 4 digits.

Creating Messages

To create a message, the user must first access your mailbox by calling the control system access number and entering your passcode. You can then make a voice message before or after listening to any unplayed messages in your mailbox.

Retrieving Message

To retrieve a message, the owner of the mailbox logs in using their unique extension number. The user of the mailbox is then taken to the mailbox menu. Here the user is prompted to dial 4# to retrieve all the messages for the user.

USE CASES

To complete the analysis phase, we will define the behaviour of voice mail system through a set of use cases.

Use Case 1: Administrator Menu Options

1. Admin enters 00#.
2. The system prompts the user:
Enter 1 to create a new user.
Enter 2 to reset a user's passcode.
Enter 3 to change a user's passcode.

Use Case 2: Creating a new user

1. Admin follows Administrator Menu Options.
2. The Admin chooses option 1.
3. The System creates a new mailbox and prompts user:
User has been created with Mailbox number X with default password.

4. The System takes the Admin back to the Admin Menu.

Use Case 3: Reset a User's passcode

1. Admin follows Administrator Menu Options.
2. The Admin chooses option 2.
3. The System prompts user:
Please enter the extension number of the user to reset the password.
4. The Admin enters the extension number.
5. The System resets the password and prompts the user: Password reset successfully.

Variation #1: Invalid extension number

1. Admin enters invalid extension number in step 4.
2. The System prompts the user: Invalid Extension Number. Try Again.
3. The System returns to step 3.

Variation #2: No Users on System

1. After step 2, no user is on the system.
2. The System prompts the user: "No User is on the system. Create a new User.

Use Case 4: Change a Users Passcode

1. Admin follows Administrator Menu Options.
2. The Admin chooses option 3.
3. The System prompts user:
Please enter the extension number of the user to change the password.
4. The Admin enters the extension number.
5. The System find the mailbox then prompts the User: Enter the new passcode you would like the user to have.
6. The Admin enters the passcode.
7. The System changes the password and prompts the user: Password reset successfully.

Variation #1: Invalid extension number

4. Admin enters invalid extension number in step 4.
5. The System prompts the user: Invalid Extension Number. Try Again.

6. The System returns to step 3.

Variation #2: No Users on System

3. After step 2, no user is on the system.
4. The System prompts the user: "No User is on the system. Create a new User."

Use case 5: Reach an Extension

Since there can be multiple users who might be using the voicemail, we can use extension number to categorize the users.

1. First the caller will dial the main number of the voice mail system.
2. The voice mail system will prompt the caller to enter the mailbox extension number followed by #.
3. The caller is given some time to type 4 digit extension number of the message recipient.
4. The voice mail system then speaks the following message :
 - a. You have reached mailbox XXXX. Please leave a message after the tone.

Use Case 6: Leave a message

1. The caller dials the main number of the voice mail system
2. The voice mail system speaks a prompt: Enter mailbox number followed by #
3. The user types in the extension number of the message recipient
4. The voice mail system speaks: You have reached mailbox X, please leave a message now
5. The caller speaks the message
6. The caller hangs up
7. The voice mail system places the recorded message in the recipient's mailbox

Variation #1

1. In Step 3, the user enters an invalid extension number
2. The voice mail system speaks: You have typed an invalid mailbox number

3. Continue with Step 2

Variation #2

1. After Step 4, the caller hangs up instead of speaking a message
2. The voice mail system discards the empty message

Use Case 7: Log in

1. The mailbox owner carries out Reach an Extension.
2. The mailbox owner types the passcode and the # key.
3. The voice mail system plays the mailbox menu:

Enter 1 to retrieve your messages.

Enter 2 to change your passcode.

Enter 3 to change your greeting.

Use case 8: Retrieve Messages

1. The mailbox owner carries out Log in.
2. The mailbox owner selects the desired option from the mail box menu to retrieve messages.
3. The voice mail system plays the message menu:

Enter 1 to listen to the current message.

Enter 2 to save the current message.

Enter 3 to delete the current message.

Enter 4 to select a specific message to delete.

Enter 5 to return to the mailbox menu.

4. The mailbox user selects option 1 to listen to the current message.
5. The voice mail system plays the current new message, or, if there are no new messages, the current old message. Note that the message is played, not removed from the queue.
6. The voice mail system plays the message menu.
7. The user selects option 3 to delete the current message. The message is permanently removed.
8. Continue with Step 3.

Variation #1 Saving a message.

1. Start at Step 6 from Use case 8 above.
2. The user selects option 2 save the current message. The message is removed from its queue and appended to the queue of old messages.
3. Continue with Step 3.

Variation #2 Deleting Selected Message

1. The user selects option 4 in Step 4.
2. The system prints all the messages with numbers corresponding to each message.
3. The user dials a number corresponding to the message to delete.
4. Continue with Step 3.

Use Case 9: Change the Greeting

1. The mailbox owner carries out Log in.
2. The owner chooses the option #3 of changing the greeting.
3. The system prompts the user with the following options:

Enter 1 to choose a greeting.

Enter 2 to change the current greeting.

Enter 3 to create a new greeting.

Enter 4 to return to Mailbox Menu

4. The mailbox owner presses #2 to change the greeting.
5. The system prompts the user: Please speak your greeting now
6. The mailbox owner speaks the greeting and presses #.
7. The system saves the recorded greeting in place of the current greeting.
8. The system returns to greeting menu.

Variation #1. Hang up (H) before confirmation

1. Start at Step 6 in use case 6 above.
2. The mailbox owner hangs up the telephone.
3. The system keeps the old greeting.

Use case 10: Choosing the greeting

1. The mailbox owner follows Use Case #9 to step 3.
2. The mailbox owner selects #1 to choose a greeting.
3. The system prints all greetings.
4. The user selects a greeting by inputting the number corresponding to the greeting
5. The mail system sets that as the new current greeting.

Variation #1: Only 1 greeting on the system

1. In step 3, the system only has one greeting.
2. The system prompts the user: There is only one greeting currently on the system. No change has been made.
3. The system takes the user to the greeting menu.

Use case 11: Create a new greeting

1. The mailbox owner follows Use Case #6 to step 3.

2. The mailbox owner selects #3 to create a new greeting.
3. The system prompts the user: Please speak your new greeting.
4. The user speaks the greeting and presses #.
5. The system adds the greeting and sets it as the current greeting.
6. The system brings the user back to the greeting menu.

Variation #1: Max Amount of Greetings

1. In step 3, there is a max amount of greeting.
2. The System prompts: "Max amount of greeting reached."
3. The System returns the user to the Greeting Menu.

Variation #2. Hang up (H) before confirmation

4. Start at Step 4 in use case 11 above.
5. The mailbox owner hangs up the telephone.
6. The system keeps the old greeting, no new greeting is created.

Use case 12: Change the Passcode

1. The mailbox owner carries out Log in.
2. The mailbox owner selects option 2 change your passcode.
3. The mailbox owner dials the new passcode
4. The mailbox owner presses the # key.
5. The mail system sets the new passcode.

Variation #1. Hang up before confirmation

1. Start at Step 3 in use case 12 above.
2. The mailbox owner hangs up the telephone.
3. The mail system keeps the old passcode.

1) **DESIGN**

- **Identify Classes**

1. Phone
2. ControlSystem
3. MailSystem
4. Mailbox
5. Message
6. MessageQueue

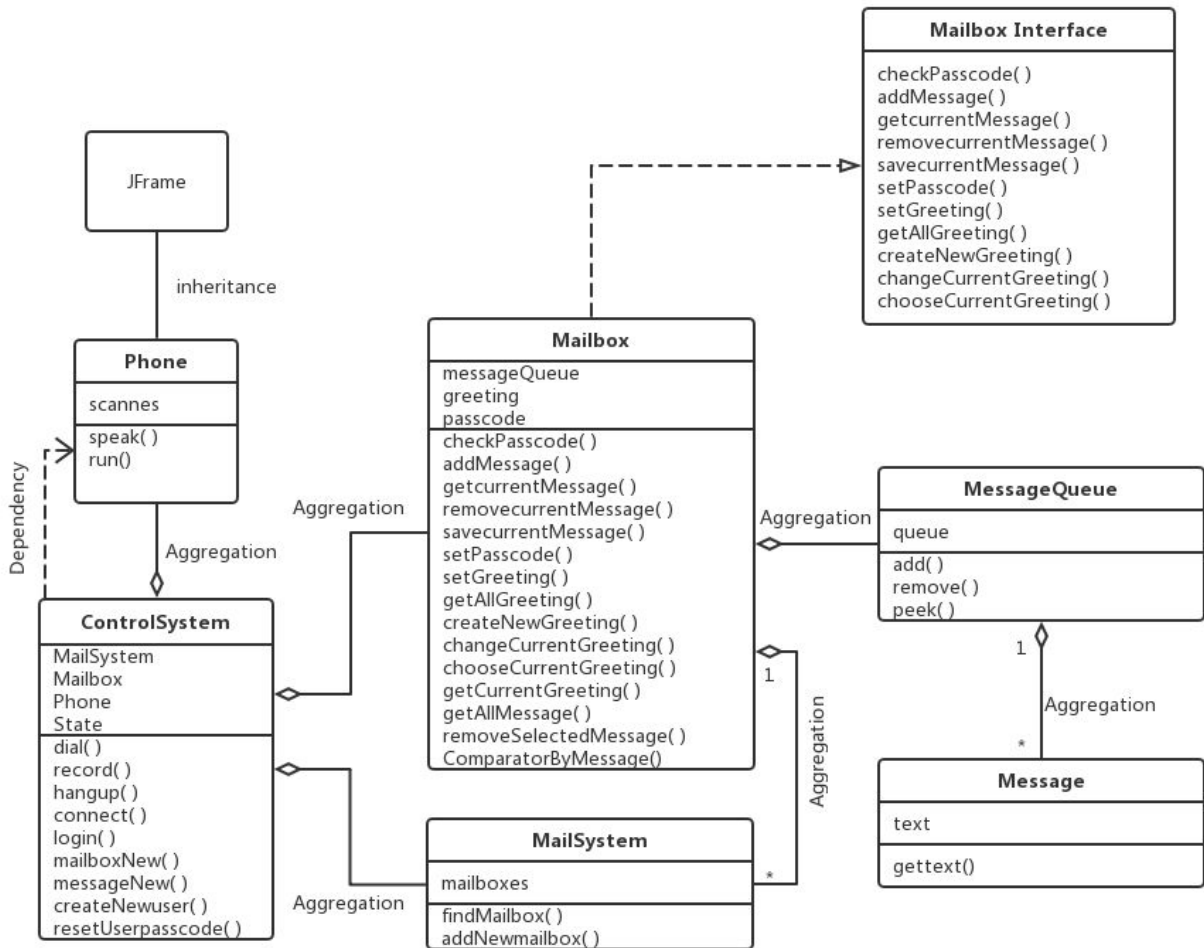
- **Class Responsibility**

1. Phone: The Phone Class will utilize user inputs and take actions specifically on these inputs on through the Control System.
2. ControlSystem: The class that connects the phone to a specific mail system based on the extension number user has input, and will allow the user to be able to access the Mail System, which will ultimately transfer them to a Mailbox in which they can either leave a message or access the Mailbox. Through the access of the Mailbox, the Control System will be able to edit the mailbox based on the user's commands. The Control System furthermore has an administrator state which allows a user who enters a specific extension number to create new users, reset their passwords or change the passwords that user want to have.
3. MailSystem: A class that connects the user to a specific Mailbox. The system will contain a data structure with a number of mailboxes depending on the number of mailboxes created. This Mailbox can be found through the Data Structure based on the access number entered.
4. Mailbox: A class which will hold all the messages of a specific user through a Message Queue.

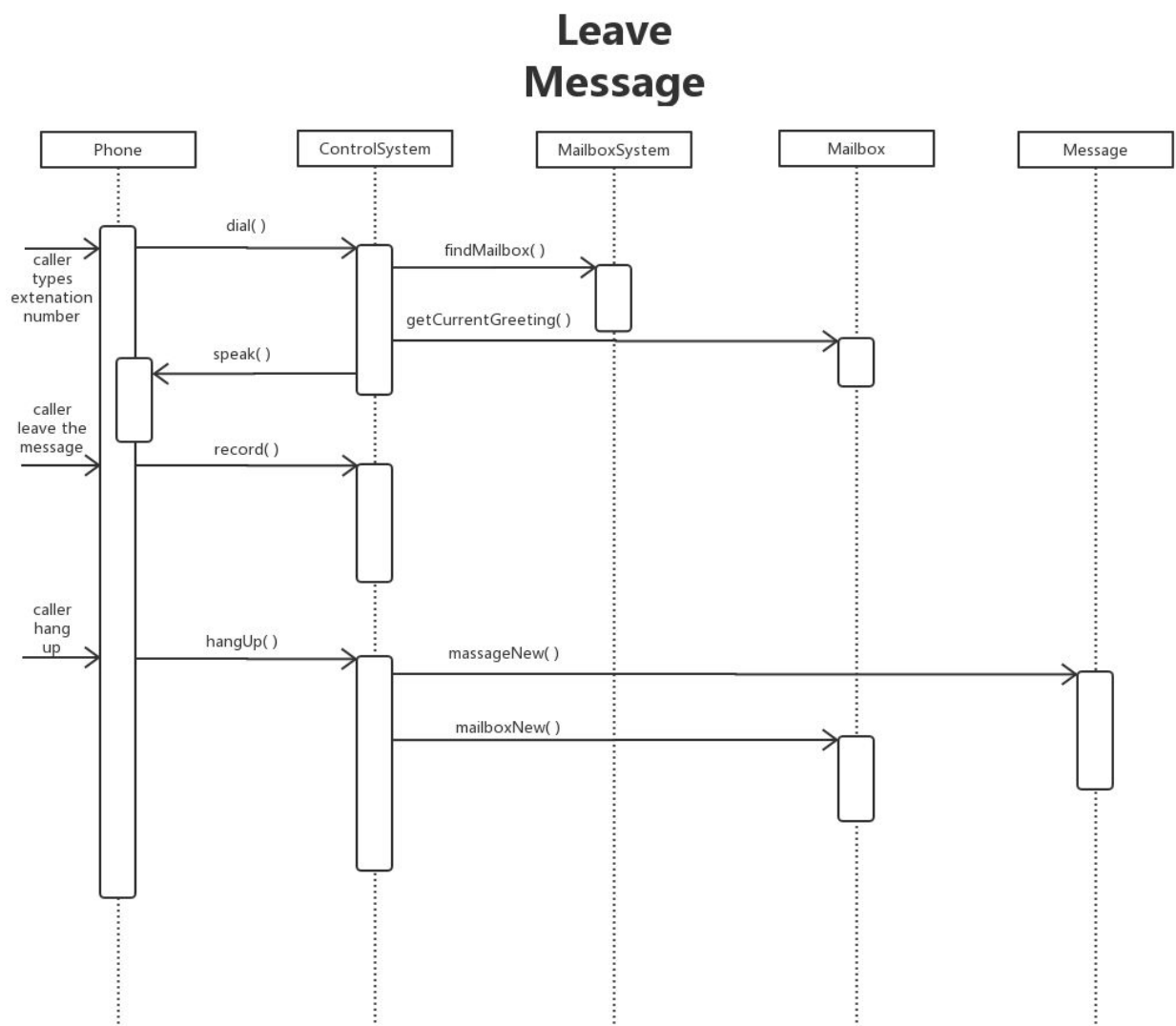
5. Message: The class will contain the message of the user in the form of a string.
New messages will be created using the class.
6. MessageQueue: A queue that will be using first in first out methods to add and delete messages.

UML Diagrams

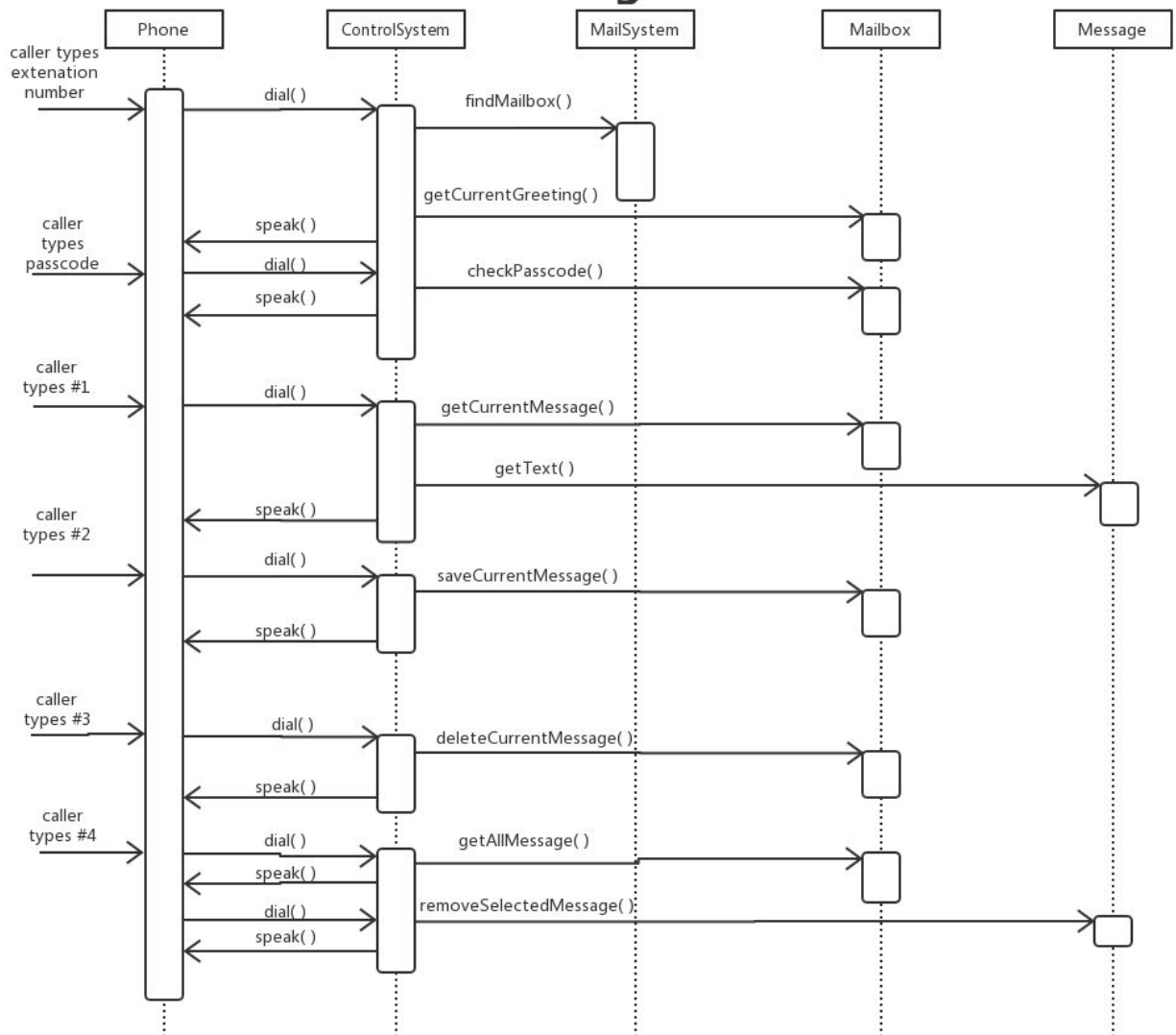
• Class Relationship and Class Diagram



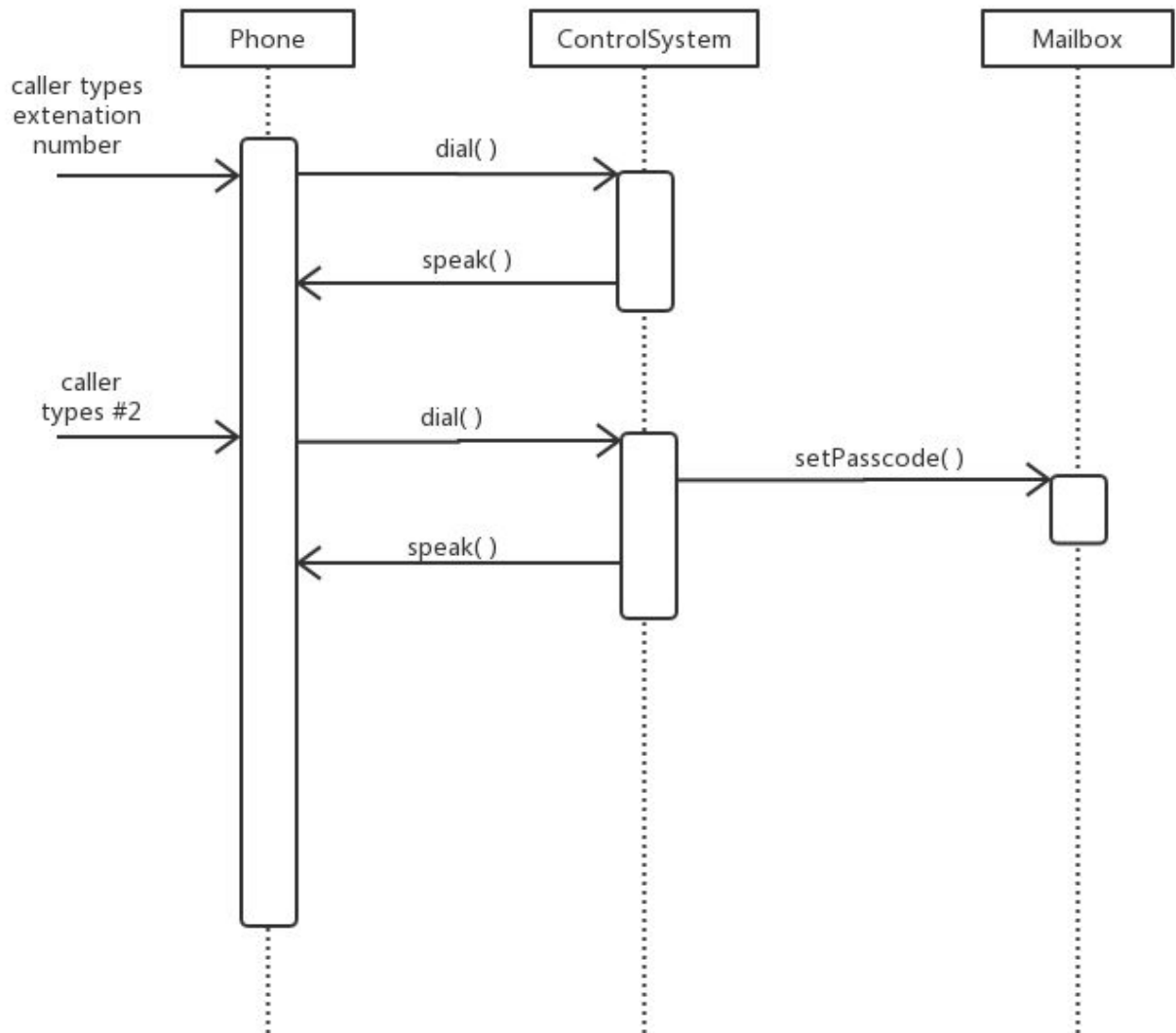
Sequence Diagram



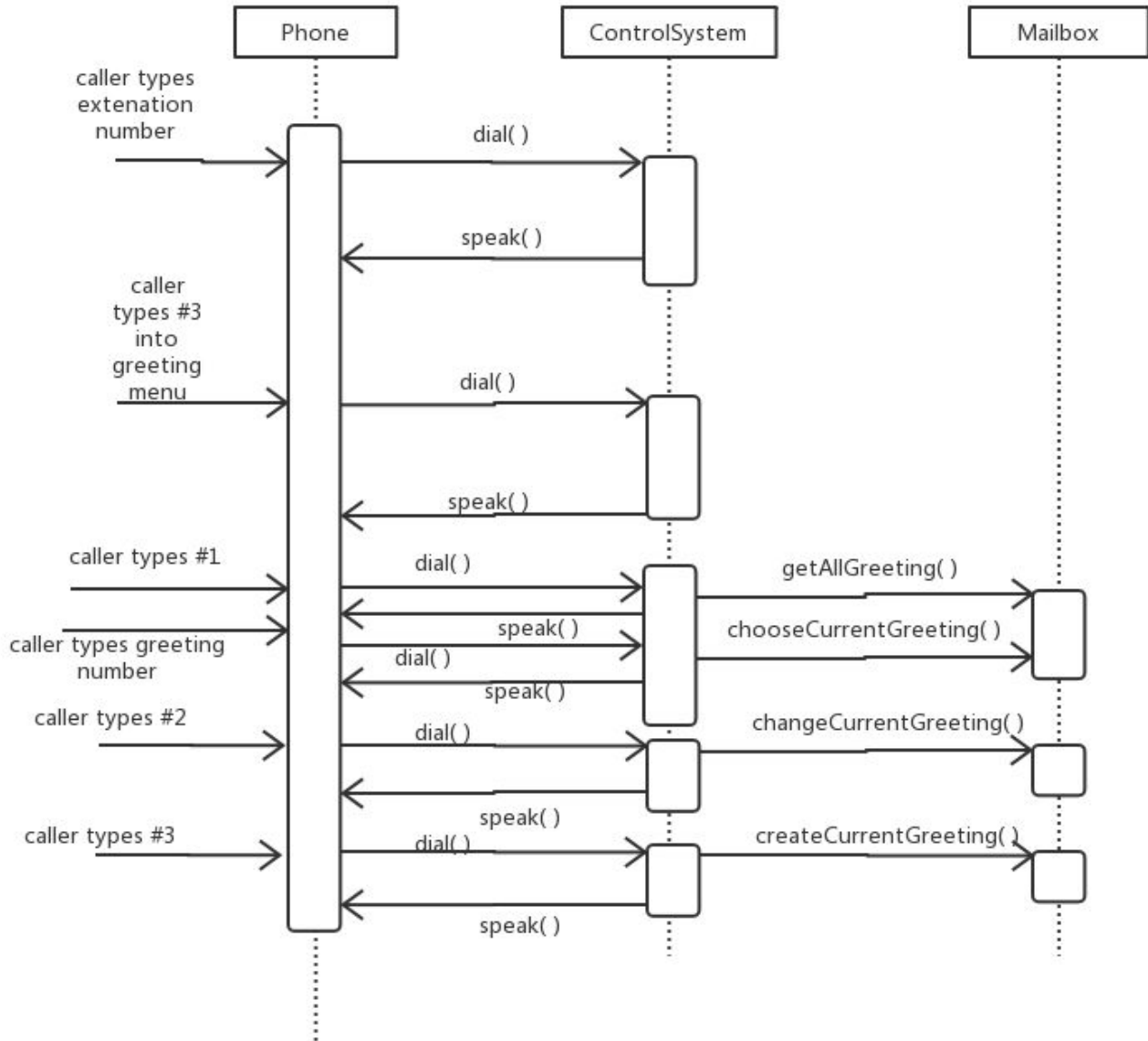
Retrieve/Save/Delete Message



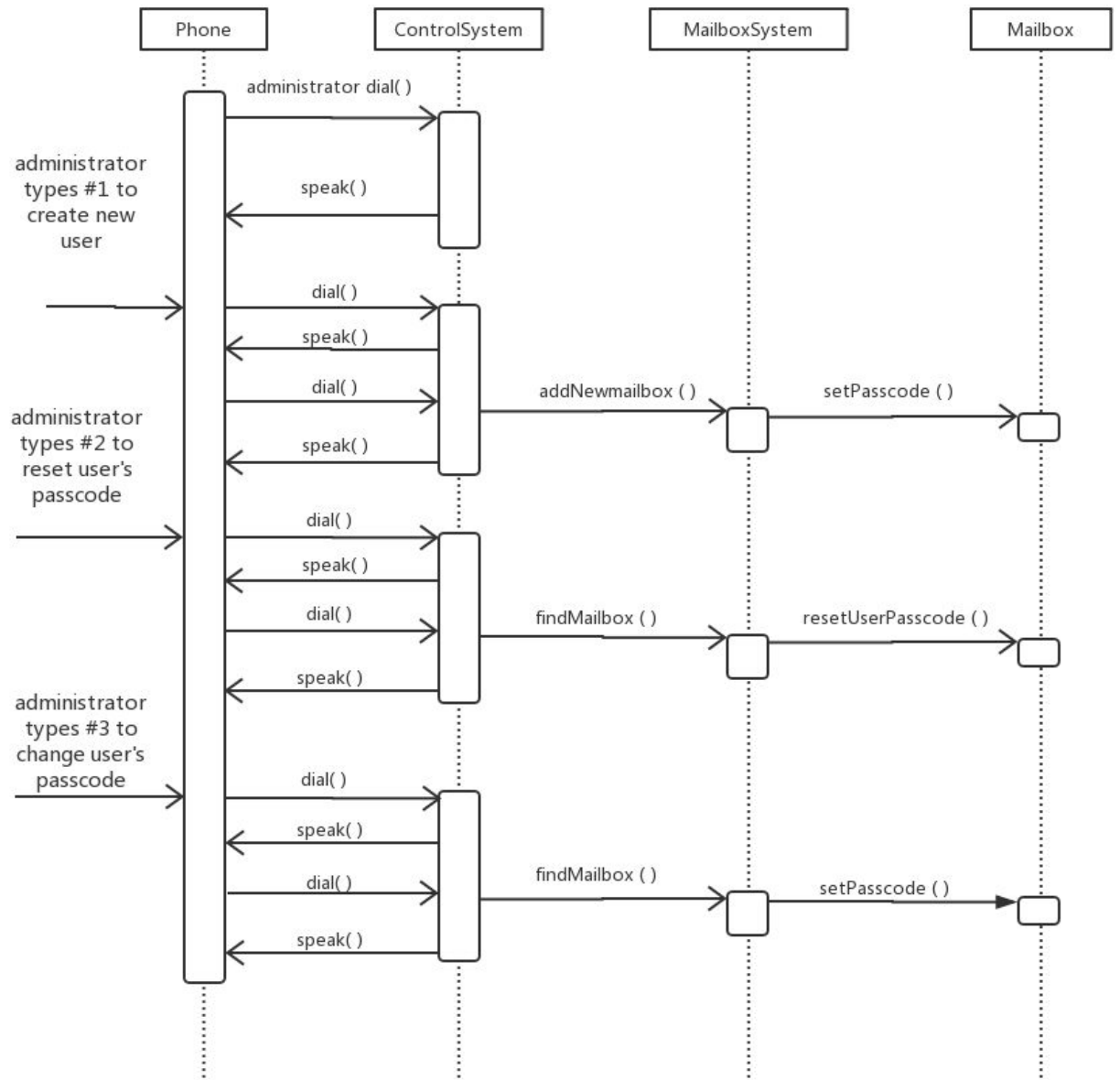
Change Passcode



Change Greeting



Create New User/Reset or Change User's Passcode



State Diagram

