360Snoozin
Dual-Alarm AM/FM Clock Radio

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Vision

Introduction:

We envision an alarm clock that allows the owner to set 2 separate alarms and play AM/FM radio. The time will be interchangeable between 12 hour AM/PM time and 24 hour military time. The alarms will have the option of a generic tone, or a radio station specified by the user.

Stakeholder Descriptions:

Stakeholder Summary

Possible stakeholders include any person who may be affected by a failed alarm or incorrect timekeeping of the system. For example, if a user is expecting their alarm to go off at a specified time so that they may make a meeting with an employer, the employer and any coworkers who may be impacted by the alarm improperly not going off could be considered stakeholders.

User Summary

Users should be considered the owner(s) of the alarm clock. This is the person(s) who will utilize the alarm clock to keep track of their time and set alarms.

Key High-Level Goals and Problems of the Stakeholders:

High-Level Goal	Priority	Problems and Concerns
Accurate timekeeping	High	The system should be able to keep accurate time, not being delayed by slow functionality Alarms should go off at the specified time, not being delayed by slow functionality
Quality Radio Compatibility	Medium	Software recognizes wide range of AM and FM stations Sound quality through the speaker is pleasant for the user

User-Level Goals
   ➢ Owner: Set Clock Time, Set Alarm, Play Radio, Toggle Time, Enable Alarm, Disable Alarm, Snooze Alarm

Product Overview:

Summary of Benefits

Supporting Feature	Stakeholder Benefit
The system will have accurate and easy-to-use timekeeping	Reliable time management
The system will have dual alarms, individual of one another	Accessible alarms
AM/FM Radio can be played individually, or assigned to play with an alarm	Flexible alarm tones, Entertainment
Time can be toggled between 12 hour AM/PM time and 24 hour time	Convenience of keeping time

Summary of System Features:
➢ Dual alarms with independent times and customizable tones or selectable radio station
➢ Play AM/FM radio
➢ Accurately keeps track of time in 24 hour or 12 hour format.
➢ Snooze alarm for 10 minutes

Other Requirements and Constraints:
➢ Because we are designing a virtual interface, we may be limited to the number of available buttons on the system
➢ The system will be designed in Java, as specified by Dr. Bowring

Use Case 1: Set Clock Time

Scope: Dual-Alarm AM/FM Clock Radio
Level: User-goal
Primary Actor: Owner
Stakeholders and Interests:
➤ Owner: Wishes to know the accurate time of day and adjust it if it is not accurate.
➤ Dependants: Expects the owner to have the accurate time of day
Preconditions: Owner possesses Dual-Alarm AM/FM Clock Radio
Postconditions: Clock time is set, clock immediately ticks.
Main Success Scenario:
1. Owner chooses to set time on clock.
2. The clock flashes while being set.
3. Owner chooses between 12 hour or 24 hour format.
4. Owner sets the hour and the minute and chooses between AM/PM if they are using 12 hour mode.
5. Owner then confirms that the time is correct and the display stops flashing.
6. Inputted time is saved and the seconds begin to tick on the display.
Extensions: None
Special Requirements:
➤ Clock must tick immediately upon save.
➤ Save must be nearly instant.
Technology and Data Variations List: None
Frequency of Occurrence: Could occur nearly continuously.
Open Issues:
➤ Is set based on time zone or specific hours and minutes?
➤ How will clock respond to daylight savings time?

Use Case 2: Set Alarm

Scope: Dual-Alarm AM/FM Clock Radio
Level: User-Goal
Primary Actor: Owner
Stakeholders and Interests:
- ➢ Owner: Wishes to set an alarm for accurate, specified time that is adjustable.
- ➢ Dependents: Expects owner to have accurate alarms.
- ➢ Radio Stations: Wishes to know how many listeners tune into their station.

Preconditions: Owner possesses the Dual-Alarm AM/FM Clock Radio
Postconditions: Alarm Time and Tone are saved
Main Success Scenario:
1. Owner chooses alarm to set.
2. Owner chooses time for alarm.
3. Owner chooses tone or alarm.
4. Inputted alarm time and tone are saved.

Extensions:
1. Owner's chosen time is identical to other alarm time.
   - a. Owner is notified of duplicate time.
   - b. Input time cannot be saved unless changed.

Special Requirements:
- ➢ Setting alarm must not disrupt clock ticking.
- ➢ Save must be nearly instant.

Technology and Data Variations List: None
Frequency of Occurrence: Could occur nearly continuously.
Open Issues: None

Use Case 3: Play Radio

Scope: Dual-Alarm AM/FM Clock Radio
Level: User-Goal
Primary Actor: Owner
Stakeholders and Interests:
  ➢ Owner: Wishes to listen to the radio station of their choice.
  ➢ Radio Stations: Wishes to know how many listeners tune into their station.
Preconditions: Owner possesses Dual-Alarm AM/FM Clock Radio
Postconditions: Radio broadcast is clearly played
Main Success Scenario:
  1. Owner selects the radio function.
  2. Owner scans AM/FM signals for desired station
  3. The desired station is found and begins playing
Extensions:
  1. The desired station cannot be picked up
     a. The user hears static
  2. Alarm sounds while radio is playing
     a. radio stops playing to play alarm tone
     b. if alarm tone is radio, play alternate tone
     c. resume radio after alarm ends
Special Requirements:
  ➢ Playing radio must not disrupt clock/alarm functionality
Technology and Data Variations List: None
Frequency of Occurrence: Could be continuously playing
Open Issues:
  ➢ Is default station the last used station or a saved station?
  ➢ If station not found, should there be static, a notification, or skip station while scanning?

Use Case 4: Turn Off Radio

Scope: Dual-Alarm AM/FM Clock Radio
Level: User-Goal
Primary Actor: Owner
Stakeholders and Interests:
> ➢ Owner: Wishes to turn off the radio.
> ➢ Radio Stations: Wishes to know how many listeners tune into their station.

Preconditions: Radio is playing.
Postconditions: Radio is turned off.
Main Success Scenario:
1. Owner selects the radio function.
2. Owner turns off radio

Extensions: None
Special Requirements:
> ➢ Turning off radio must not disrupt clock/alarm functionality

Technology and Data Variations List: None
Frequency of Occurrence: Once each time the radio is on.
Open Issues: None

Use Case 4: Toggle Time Format

Scope: Dual-Alarm AM/FM Clock Radio
Level: User-Goal
Primary Actor: Owner
Stakeholders and Interests:
  ➢ Owner: wishes to view time in convenient formats.
  ➢ Dependents: wish to ensure owner knows the time.
Preconditions: Clock time is set
Postconditions: Clock is in desired format (12 or 24 hour)
Main Success Scenario:
  1. Owner chooses to change time format
  2. Clock time changes from 12 to 24 hour format or vice versa
Extensions: None
Special Requirements:
  ➢ Toggling time format must not disrupt clock/alarm functionality
Technology and Data Variations List: None
Frequency of Occurrence: Possibly continuously toggled
Open Issues:
  ➢ How do existing alarms handle changing time formats?

Use Case 5: Enable Alarm

Scope: Dual-Alarm AM/FM Clock Radio
Level: User-Goal
Primary Actor: Owner
Stakeholders and Interests:
➢ Owner: Wants to be able to rely on the alarm to go off.
➢ Dependents: Relies on the owner to be able to wake up on time.
Preconditions: Clock is ticking
Postconditions: The alarm is set and goes off at the desired time.
Main Success Scenario:
1. Owner toggles either alarm 1 or alarm 2 to be set.
2. The owner presses the alarm button to confirm that they want the alarm to be activated.
3. The alarm is set and displays that it is active for the owner.
4. The alarm then goes off at the time desired by the owner.
5. The owner is awoken by the alarm.
Extensions: None
Special Requirements:
➢ Uses buttons for the interface.
➢ The alarm symbol will be visible for the user when it has been set and activated.
Technology and Data Variations List: None
Frequency of Occurrence: As many times as the owner desires to set the alarm. 0…*
Open Issues:
➢ The radio station must be tuned in correctly if it is to be played as the alarm.

Use Case 6: Disable Alarm

Scope: Dual-Alarm AM/FM Clock Radio
Level: User-Goal
Primary Actor: Owner
Stakeholders and Interests:
- ➢ Owner: Wants to be able to switch the alarm off after it has gone off .
- ➢ Dependents: Alarm may go off while the primary owner is away.

Preconditions: Clock is on and the alarm is sounding.
Postconditions: The alarm sound is off.
Main Success Scenario:
1. One of the alarms is sounding at the time set by the owner.
2. The alarm that is sounding is flashing on the display.
3. The owner is aware of the alarm going off and presses the button corresponding to the alarm that is sounding, either alarm 1 or alarm 2.
4. The alarm stops sounding.

Extensions:
- ➢ One alarm goes off and the owner presses the button to stop the other alarm. The alarm continues to sound until the correct button has been pushed.
- ➢ An alarm sounds and the owner is not present to turn it off. It sounds for 15 minutes until it automatically turns off.
- ➢ An alarm sounds and before it is shut off the other alarm goes off. The first alarm's sound turns off and only the last alarm set is sounding.

Special Requirements:
- ➢ The display must be bright and clearly visible for the owner to see which alarm is sounding.

Technology and Data Variations List: None
Frequency of Occurrence: 0 or more times a day, dependent on frequency of Set Alarm.
Open Issues: None

Use Case 7: Snooze Alarm

Scope: Dual-Alarm AM/FM Clock Radio
Level: User-Goal
Primary Actor: Owner
Stakeholders and Interests:
  ➢ Owner: Wants to delay the alarm sounding for 10 minutes after pressing the snooze button.
Preconditions: The clock is on and the alarm has been set and is sounding.
Postconditions: The alarm stops sounding and sounds again ten minutes after the button has been pushed.
Main Success Scenario:
  1. The alarm sounds at the desired time.
  2. The owner presses the snooze button and the alarm stops sounding.
  3. A snooze message is displayed on the screen showing that the snooze button has been activated.
  4. After 10 minutes passes the alarm sounds again.
Extensions:
  1. The user presses the snooze button multiple times. The alarm only waits 10 minutes after the initial press of the snooze button.
  2. Snooze button is pressed and the alarm sounds but the owner has already left. The alarm only play for 15 minutes before automatically turned off.
  3. Owner pushes the snooze button for the first alarm and within 10 minutes a second alarm sounds. The owner pushes the snooze button again. Two snoozed alarms will then go off 10 minutes after their respective alarms.
Special Requirements:
  ➢ Numbers and snooze indicator should be visible for the owner.
  ➢ Snooze button must be available for the owner.
Technology and Data Variations List: None
Frequency of Occurrence: As many times as the snooze button is pressed.
Open Issues: None.

Use Case 8: Change Radio Station

Scope: Dual-Alarm AM/FM Clock Radio
Level: User-Goal
Primary Actor: Owner
Stakeholders and Interests:
➢ Owner: Wants to be able to tune in to multiple radio stations.
Preconditions: The clock is on and the volume set high enough for the radio to be heard.
Postconditions: The radio turns on and plays the station at the set frequency.
Main Success Scenario:
1. The owner wants to listen to the radio.
2. The owner presses the AM/FM button on the radio and chooses either AM or FM for the radio tuner.
3. The radio begins tuning at the lowest broadcasting frequency for the AM or FM setting.
4. The owner may press and hold the tune +/- button and the radio will search for the next strong station.
5. The owner can also press the tune +/ - to manually adjust the frequency that the radio is playing.
6. After a few minutes the display will change back from the radio station to the time.

Extensions:
1. The owner can press a scan button that will wait 30 seconds before searching for the next strong station.
2. Owner presses scan button to stop scanning once they have found a station they would like to keep listening to.
3. Owner must have the volume set loud enough for the radio station to be heard.
4. The owner can save their favorite stations in button presets.

Special Requirements:
➢ AM/FM radio button.
➢ Frequencies searched will stay within the limits of normal radio broadcasting frequencies.
Technology and Data Variations List: None
Frequency of Occurrence: As many times as the owner desires.
Open Issues: None.

Use Case 9: Adjust Radio Volume

Scope: Dual-Alarm AM/FM Clock Radio
Level: User-Goal
Primary Actor: Owner
Stakeholders and Interests:
  ➢ Owner: Wants to be able to tune in to multiple radio stations.
Preconditions: The alarm clock is on
Postconditions: The radio volume is adjusted according to the input
Main Success Scenario:
  1. The owner adjusts volume dial
  2. Internal volume of the radio is changed according to input
Extensions:
  1. If volume is at minimum value, do not decrease it further
  2. If volume is at maximum value, do not increase it further
Special Requirements:
  ➢ AM/FM radio volume dial.
Technology and Data Variations List: None
Frequency of Occurrence: As many times as the owner desires.
Open Issues: None.

Supplementary Specifications

Introduction:

This document includes any specifications for the 360 Snoozin Dual-Alarm AM/FM Radio which were not specified in the Use Cases.

Functionality:
The clock will play two alarms
The clock will play an adjustable AM/FM radio
The clock will feature a snooze button
The clock will

Usability:

Human Factors:
The customer will be able to see the clock at night as well as during the day. An LED light would be ideal for a bright display.
The volume of the alarm and radio will be adjustable for the user of the alarm.
The time may be set to military time or 12 hour time.

Reliability:

Recoverability:
The only problem the alarm clock's reliability faces is if there is a power outage. If such an event occurs, all the settings will have to be restored by the user.

Performance:
Our goal with the performance of the dual alarm clock radio is that it will sound at the time set by the owner of the alarm every time.

Implementation Constraints:
Dr. Jim Bowring insists on a Java technologies solution as a requirement for the course.

Interfaces:

Noteworthy Hardware Interfaces:
An adjustable screen or dial that displays the AM/FM radio settings.
A dial that adjusts the volume of the radio and alarm.
A button that allows the user to toggle between AM and FM radio.
A button that allows the user to snooze the alarm

Software Interfaces:

A screen that displays the time and alarm settings.

A setting toggle that allows the clock to switch between 24 hour and 12 hour time modes.

Domain Model
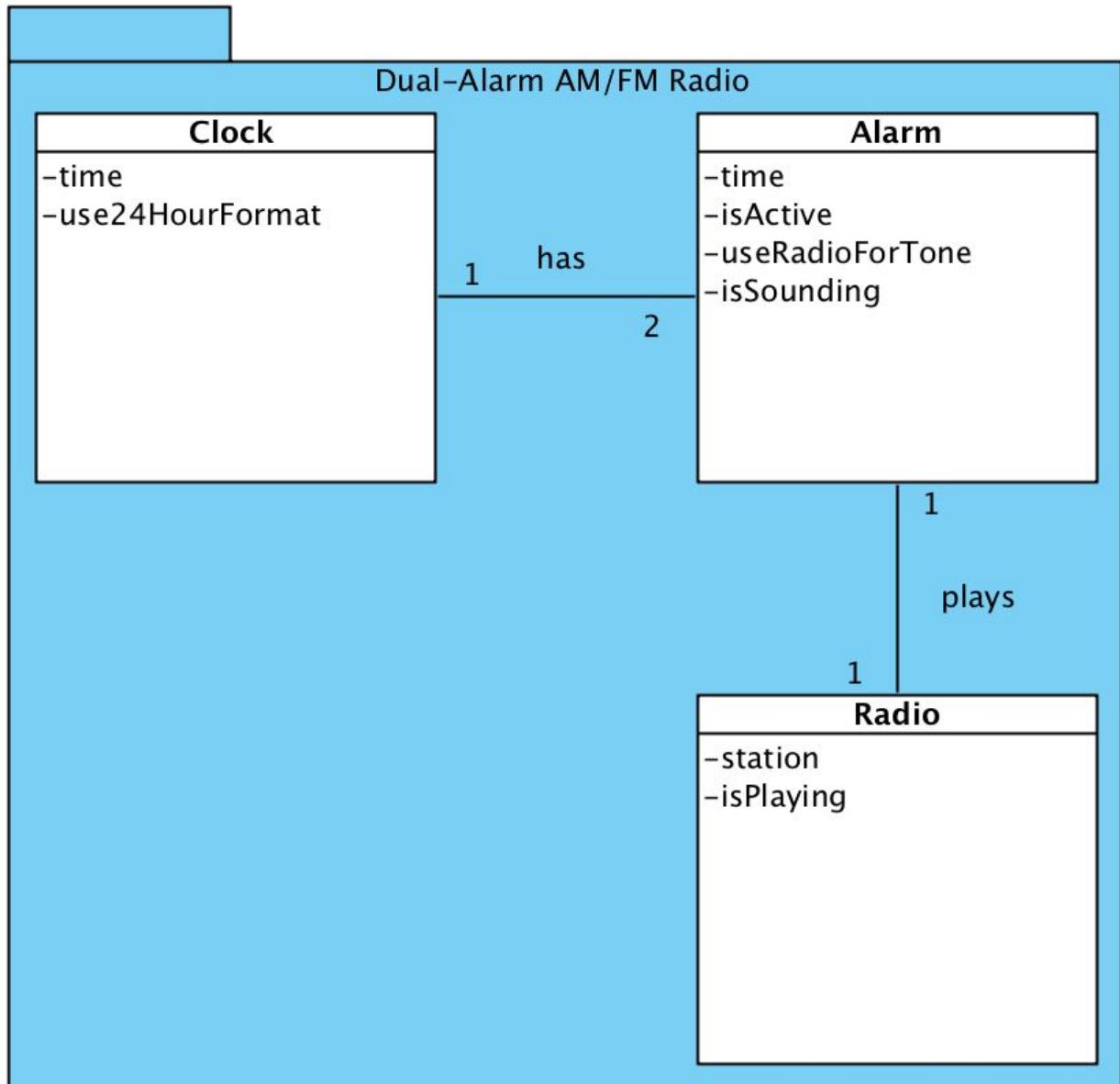
SSD 1: Set Clock Time
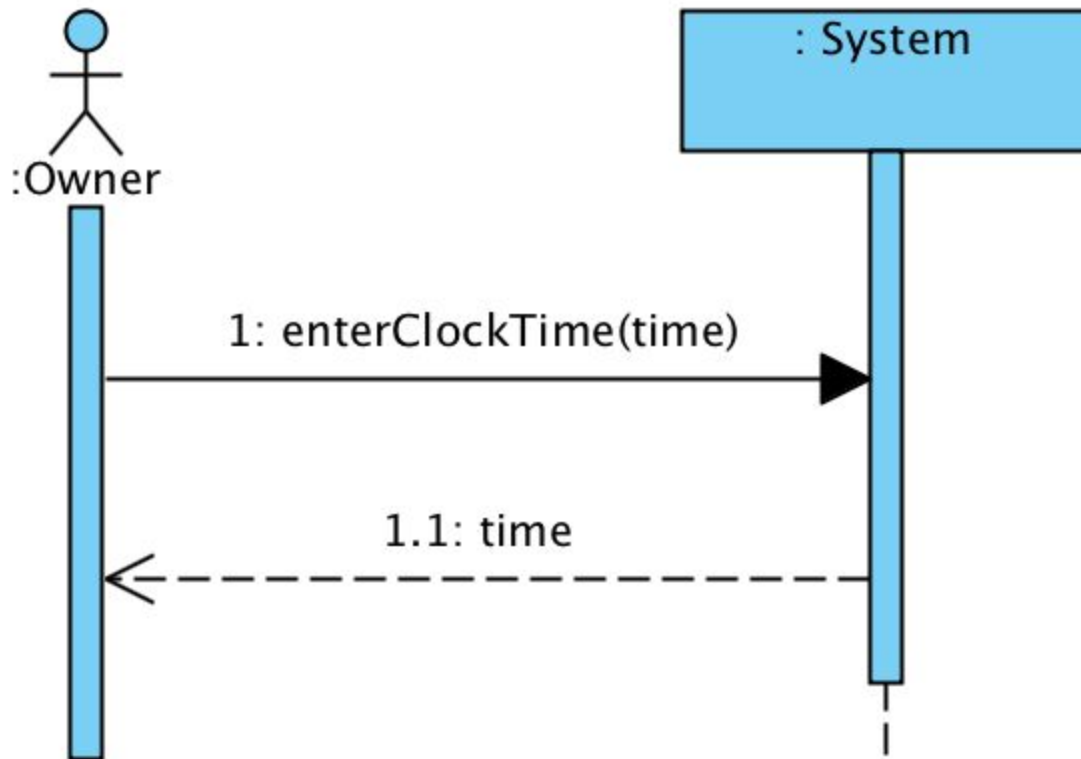
Operation Contracts: Set Clock Time

OC1: enterClockTime

Operation: enterClockTime(time)
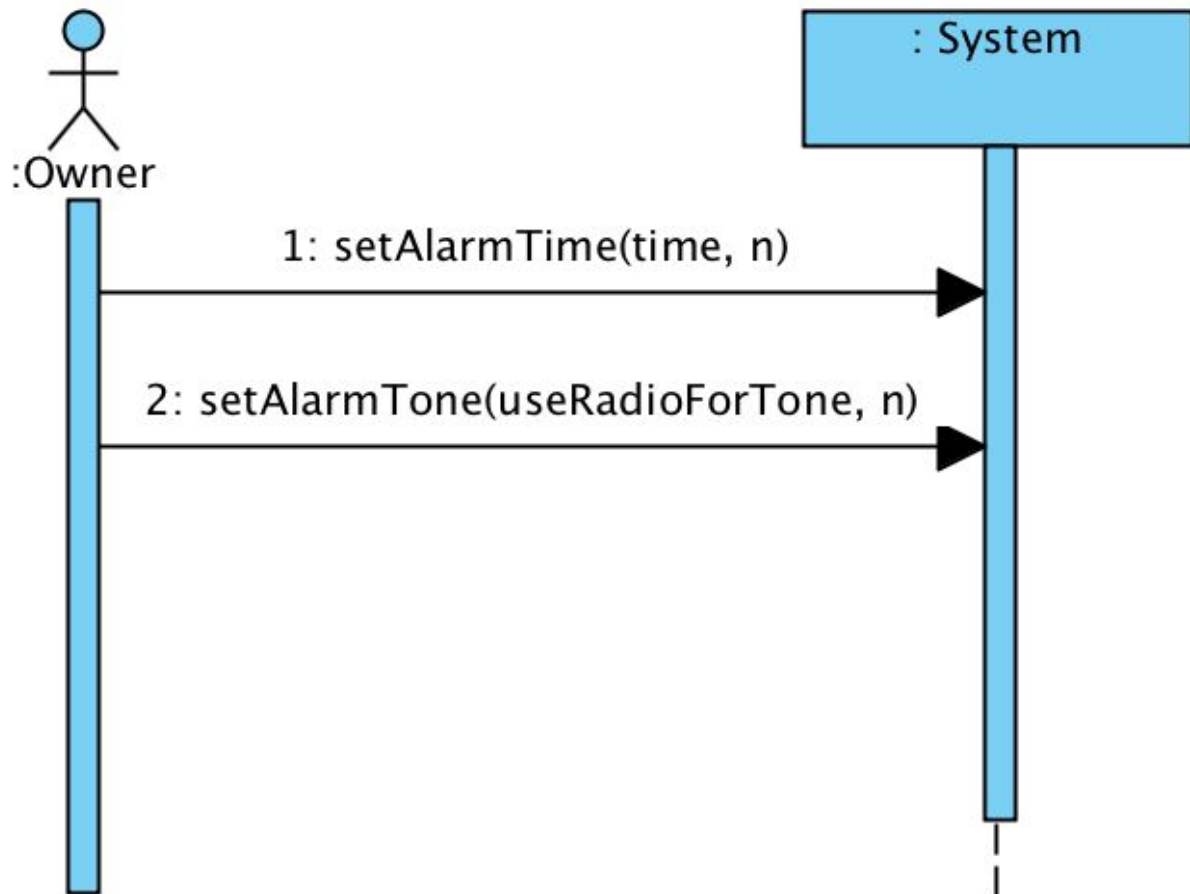**Cross References:** Use Cases: *Set Clock Time*
Preconditions:
➢ Owner possesses the dual-alarm AM/FM clock.
Postconditions:
➢ Clock's time was set to time.

SSD2: Set Alarm

Operation Contracts: Set Alarm

OC1: setAlarmTime

Operation: setAlarmTime(time, n)
Cross References: Use cases: *Set Alarm*
Preconditions:
  ➢ Owner possesses the dual-alarm AM/FM clock.
  ➢ $n \in \{1,2\}$.
Postconditions:
  ➢ Alarm number n's time is set to time.
  ➢ Alarm number n's snoozeTime was set to time.

OC2: setAlarmTone

Operation: setAlarmTone(useRadioForTone, n)
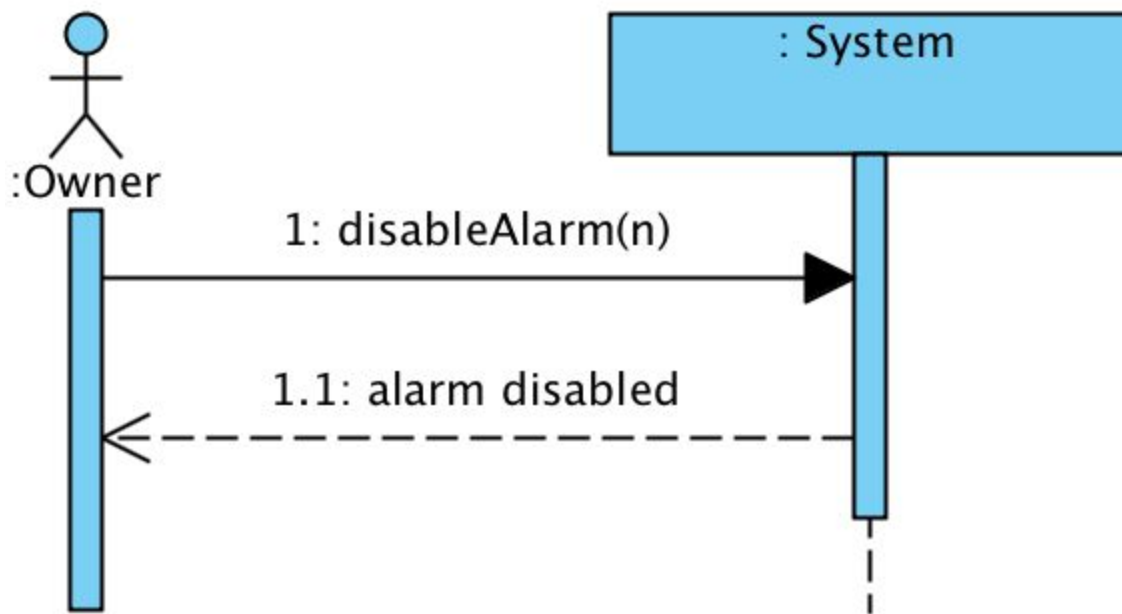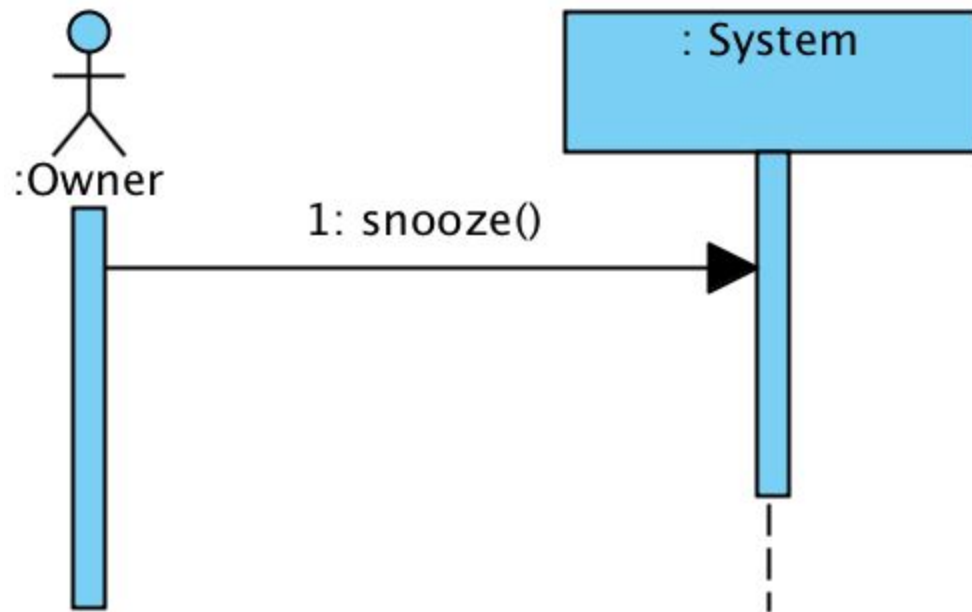**Cross References:** Use cases: *Set Alarm*
Preconditions:
  - ➢ Owner possesses the dual-alarm AM/FM clock.
  - ➢ $n \in \{1,2\}$.
Postconditions:
  - ➢ Alarm number n's tone was changed to radio if useRadioForTone.
  - ➢ Alarm number n's tone was changed to default tone if !useRadioForTone.

SSD 3: Play Radio
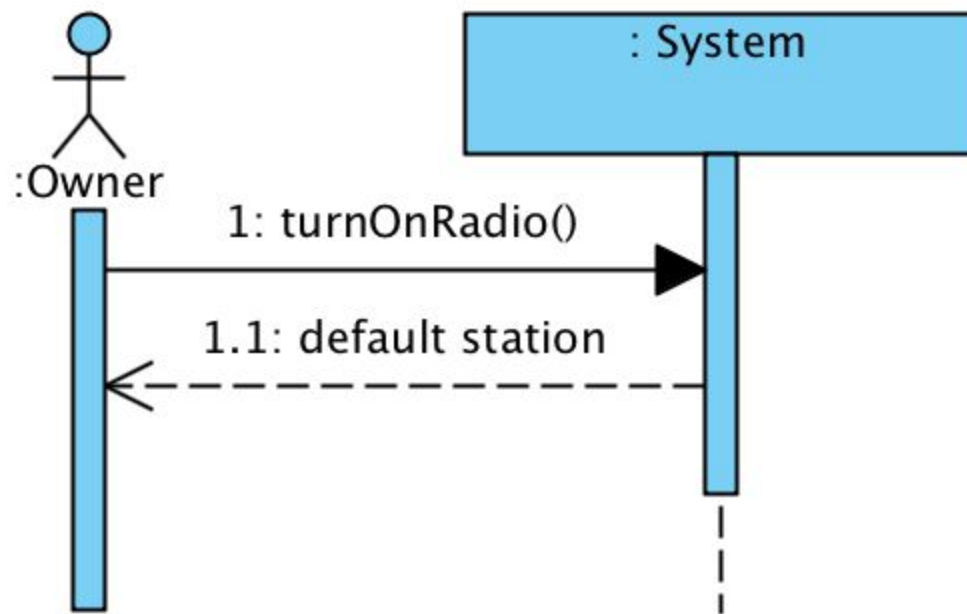
Operation Contracts: Play Radio

OC1: turnOnRadio

Operation: turnOnRadio()
Cross References: Use cases: *Play Radio*
Preconditions:
  ➢ Radio is not playing.
Postconditions:
  ➢ Radio's isPlaying was set to true.

SSD 4: Turn Off Radio
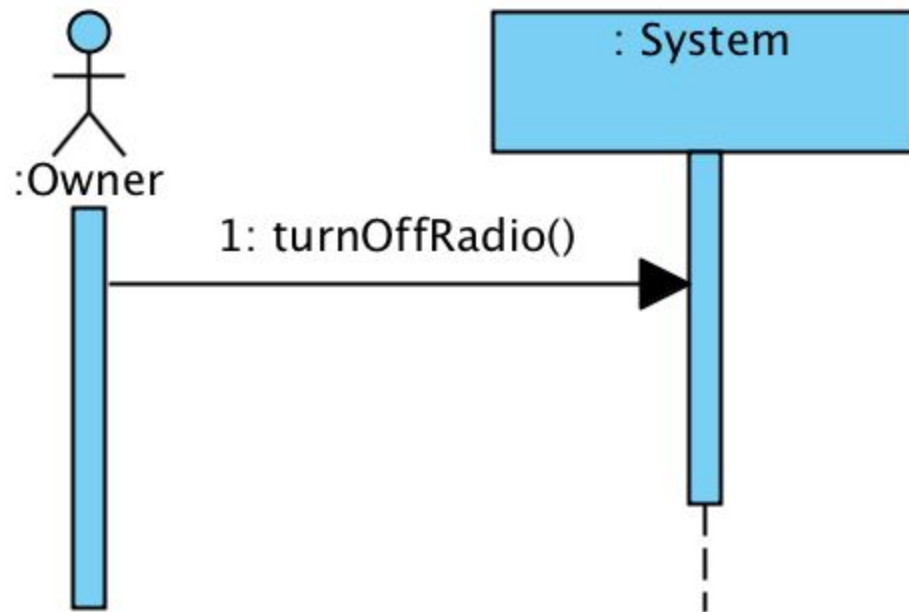
Operation Contracts: Turn Off Radio

OC3: turnOffRadio

Operation: turnOffRadio()
Cross References: Use cases: *Play Radio*
Preconditions:
➢ Radio is playing.
Postconditions:
➢ Radio's isPlaying was set to false.

SSD 5: Toggle Time Format
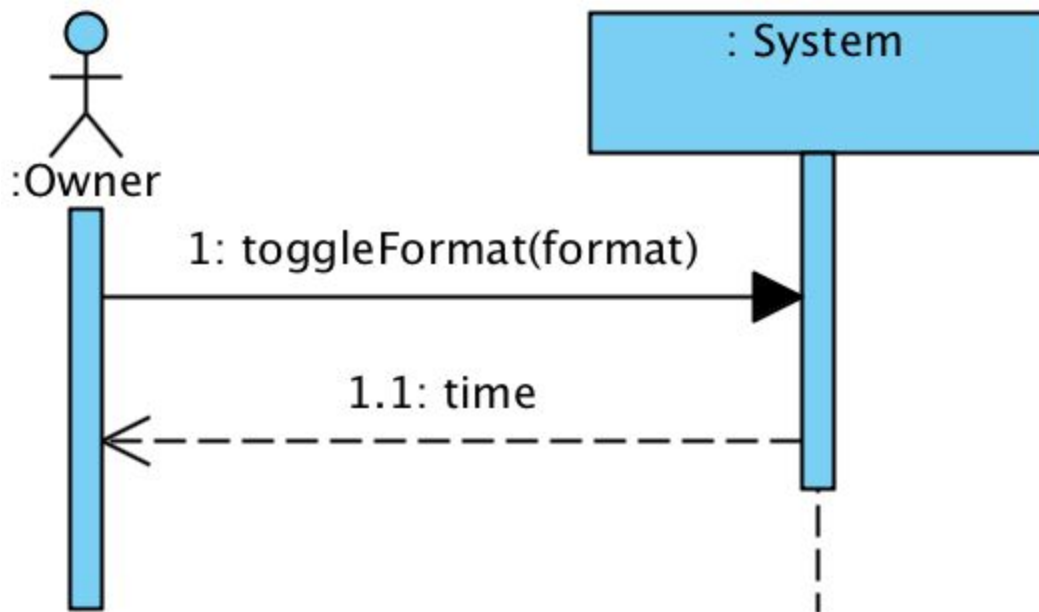
Operation Contracts: Toggle Time Format

OC1: toggleFormat

Operation: toggleFormat()
Cross References: Use cases: *Toggle Time Format*
Preconditions:
  ➢ Owner possesses the dual-alarm AM/FM clock.
Postconditions:
  ➢ Clock's use24HourFormat was toggled to the opposite of previous state.

SSD 6: Enable Alarm
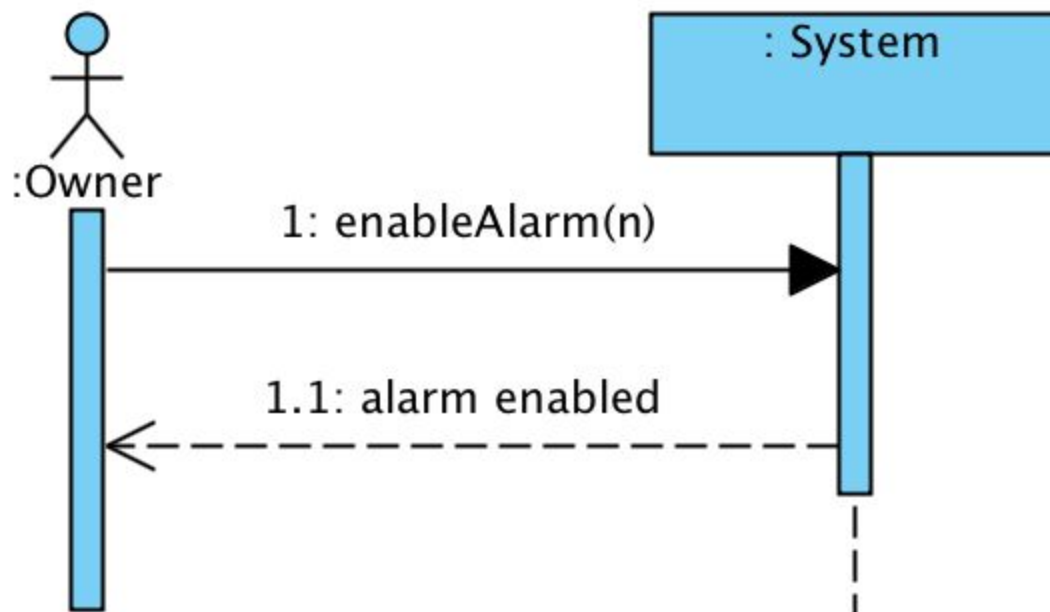
Operation Contracts: Enable Alarm

OC1: enableAlarm

Operation: enableAlarm(n)
Cross References: Use cases: *Enable Alarm*
Preconditions:
  ➢ Owner possesses the dual-alarm AM/FM clock.
  ➢ $n \in \{1,2\}$.
Postconditions:
  ➢ Alarm number n's isActive was set to true.

SSD 7: Disable Alarm

Operation Contracts: Disable Alarm

OC1: disableAlarm

Operation: disableAlarm(n)
Cross References: Use Cases: *Disable Alarm*
Preconditions:
  ➢ Owner possesses the dual-alarm AM/FM clock.
  ➢ $n \in \{1,2\}$.
Postconditions:
  ➢ Alarm number n's isActive was set to false.
  ➢ Alarm number n's isSounding was set to false.
  ➢ Alarm number n's snoozeTime was set to time attribute.

SSD 8: Snooze Alarm

Operation Contracts: Snooze Alarm

OC1: snoozeAlarm

Operation: snooze()
Cross References: Use Cases: *Snooze Alarm*
Preconditions:
  ➢ Owner possesses the dual-alarm AM/FM clock.
Postconditions:
  ➢ snoozeTime was incremented by 10 minutes for any alarm where isSounding is true.
  ➢ isSounding was set to false for any alarm where isSounding is true.

SSD 9: Change Radio Station
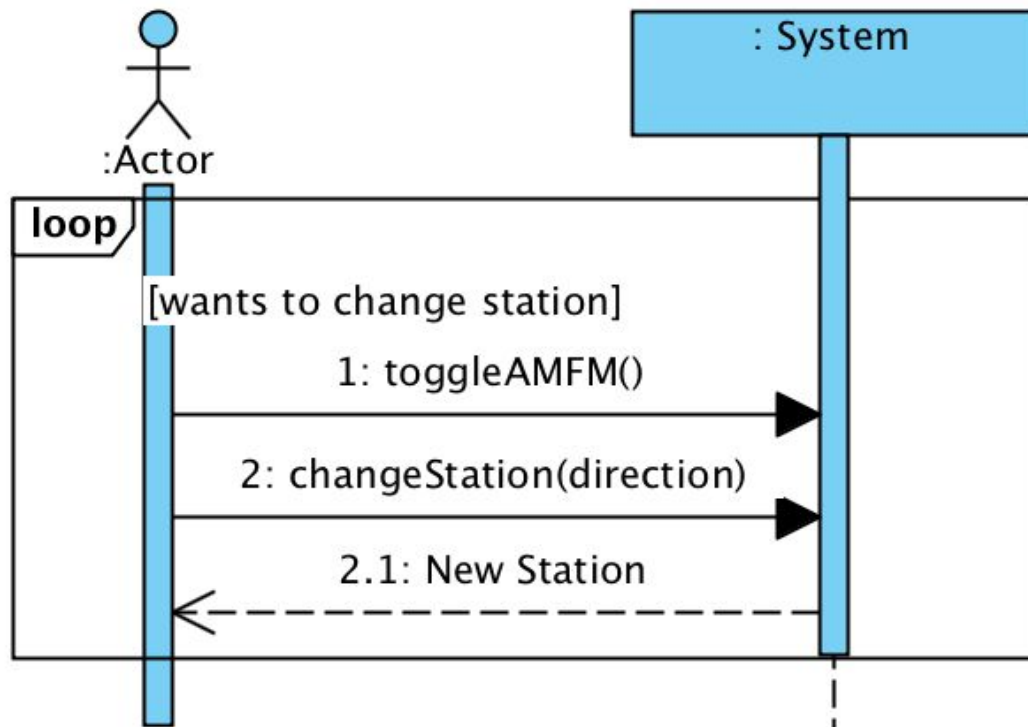
Operation Contracts: Change Radio Station

OC1: toggleAMFM

Operation: toggleAMFM()
Cross References: Use cases: *Play Radio*
Preconditions:
> ➢ Radio is playing.
Postconditions:
> ➢ Radio's useFM value was toggled to the opposite of previous state.

OC2: changeStation

Operation: changeStation(direction)
Cross References: Use cases: *Play Radio*
Preconditions:
> ➢ Radio is playing.
Postconditions:
> ➢ Radio's station was incremented/decremented to next station.

SSD 10: Adjust Radio Volume
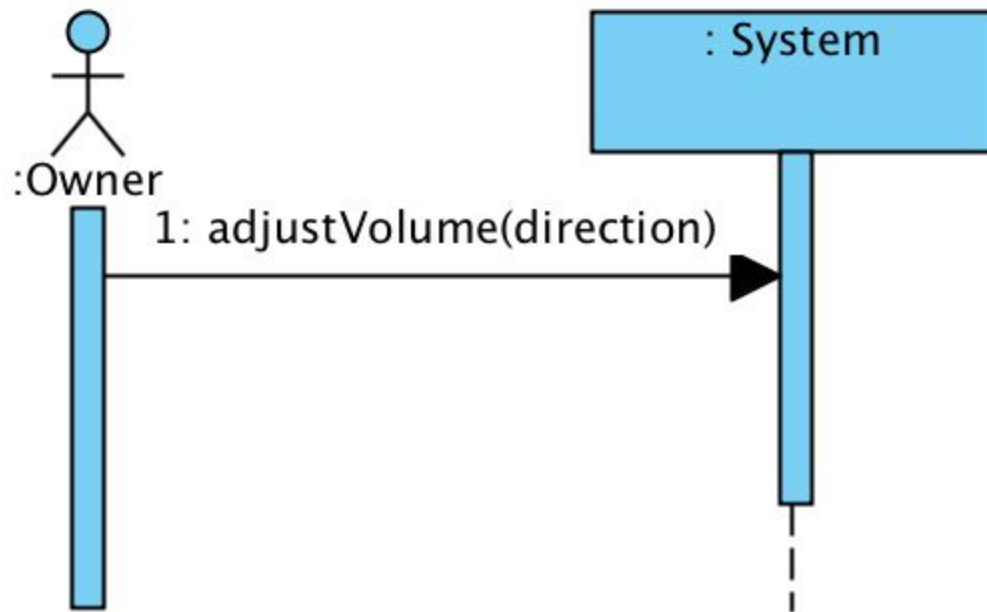
Operation Contracts: Adjust Radio Volume

OC1: adjustVolume

Operation: adjustVolume(direction)
Cross References: Use Cases: *Adjust Radio Volume*
Preconditions:
> ➢ Owner possesses the dual-alarm AM/FM clock.
Postconditions:
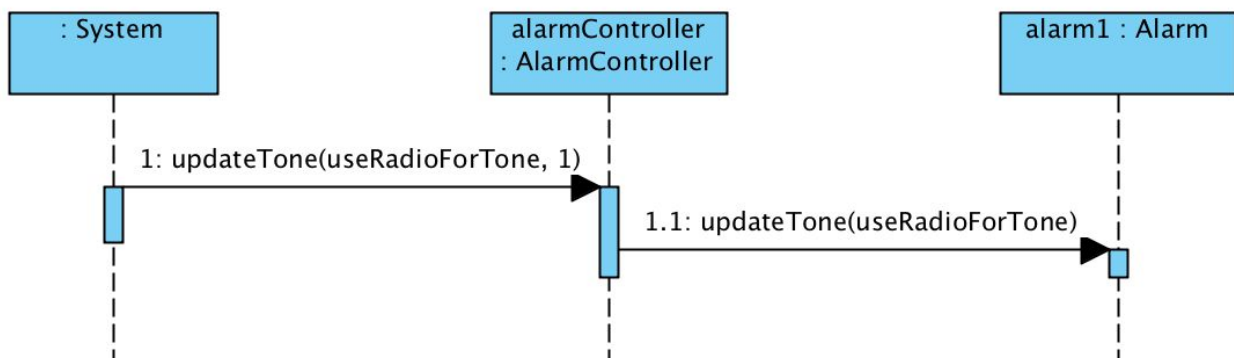> ➢ Radio's volume was incremented up or down by one based on direction.
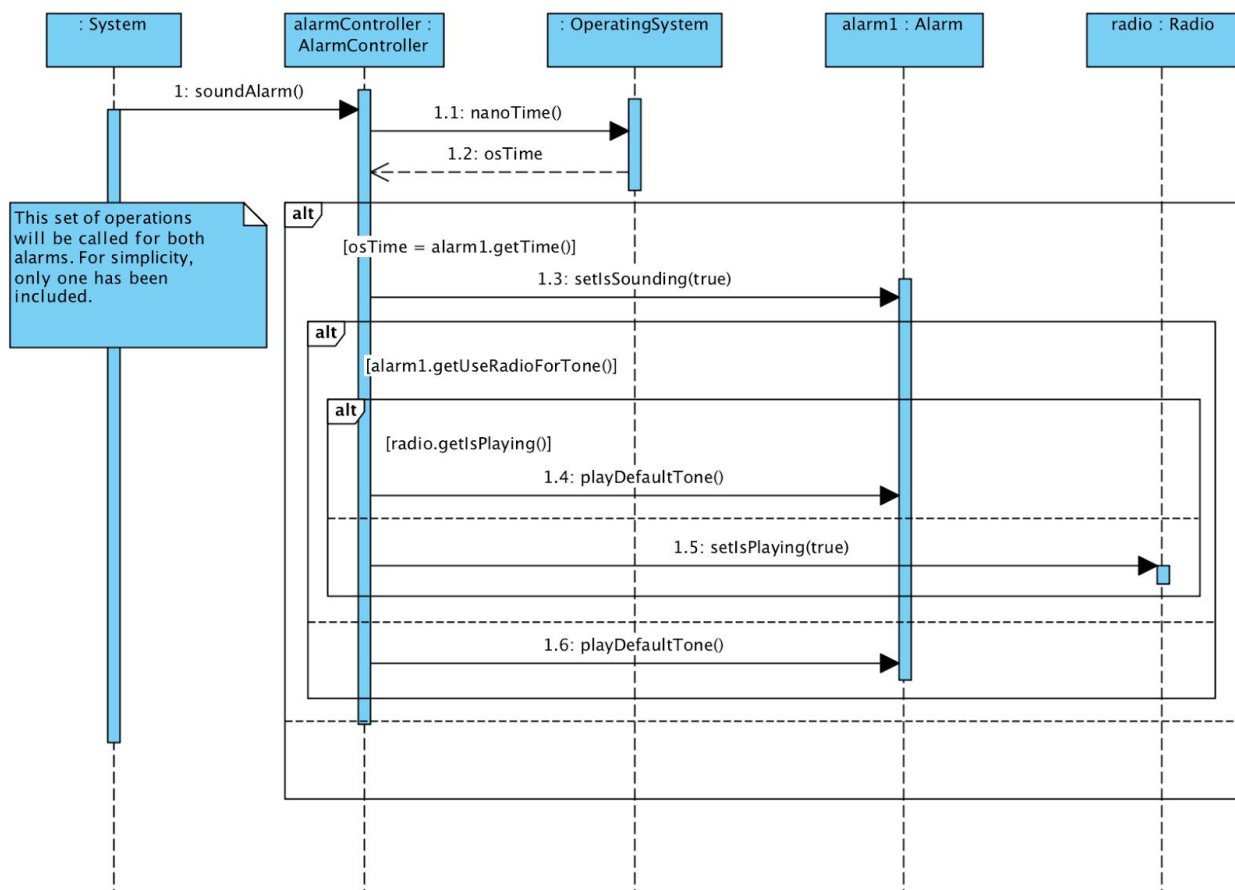
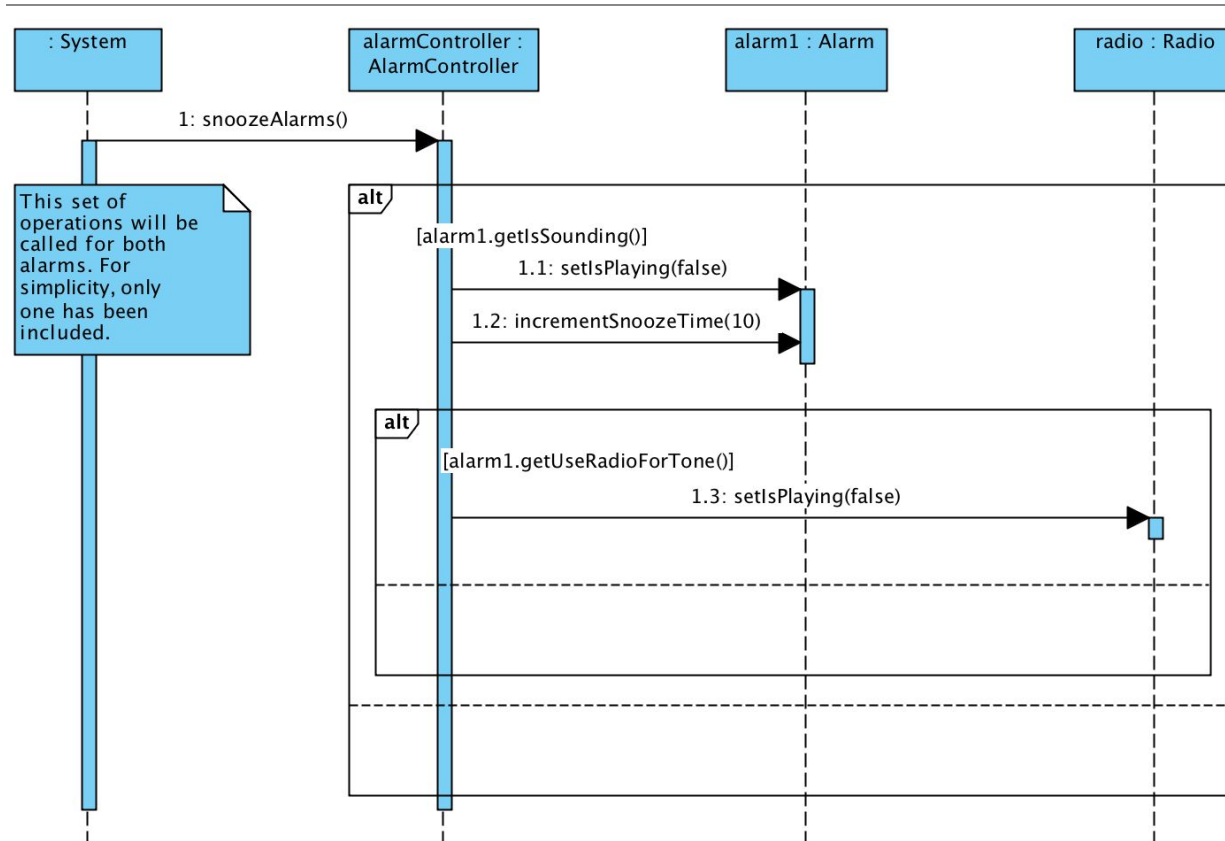# Sequence Diagram 1: Set Clock Time
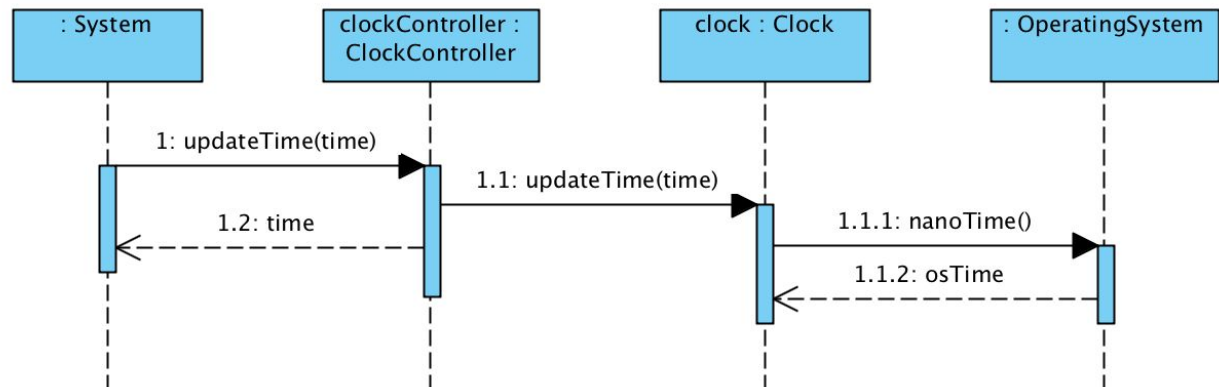
Sequence Diagram 2: Set Alarm Time
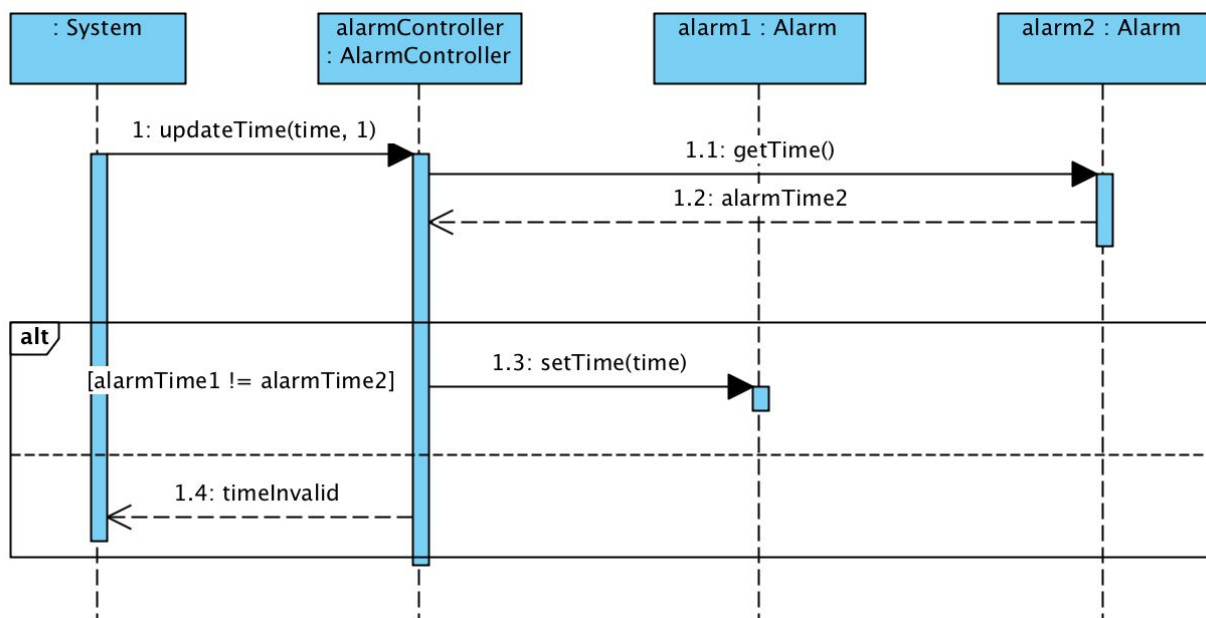
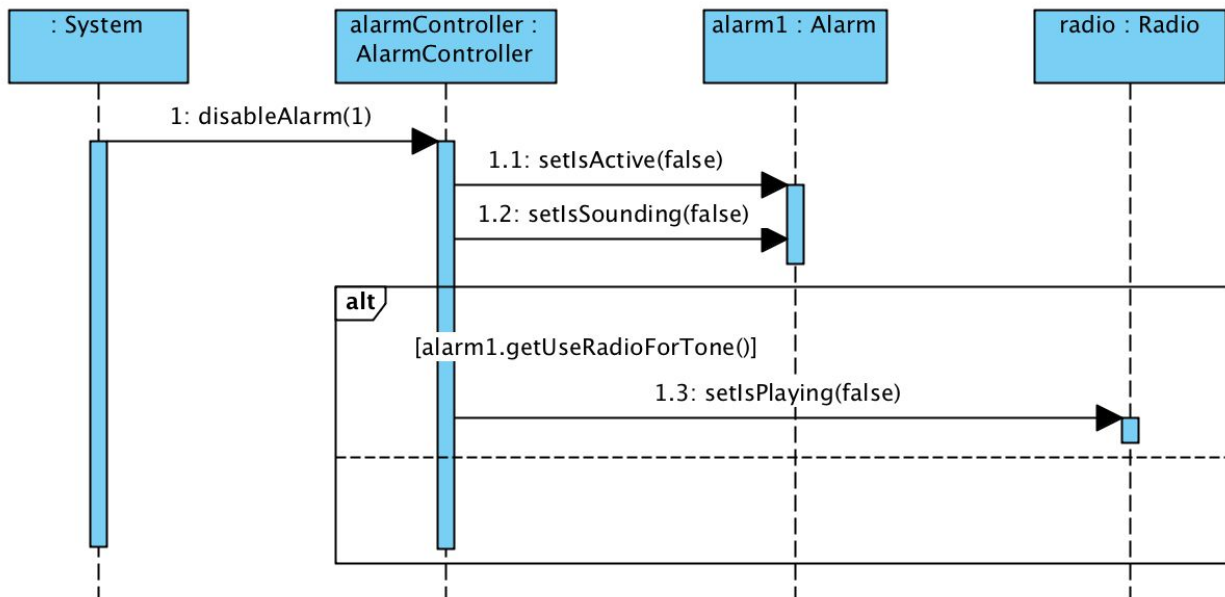# Sequence Diagram 3: Set Alarm Tone

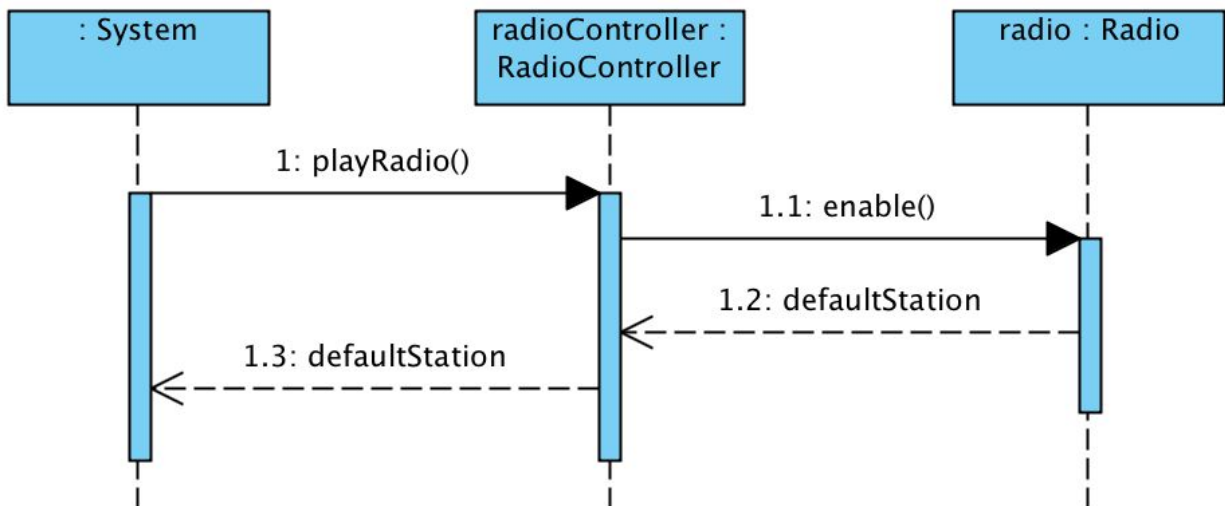

Sequence Diagram 4: Sound Alarm

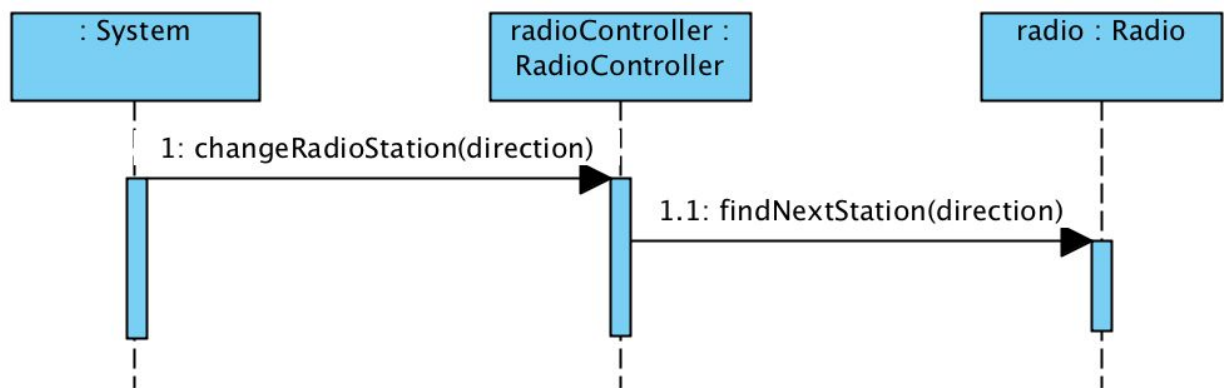# Sequence Diagram 5: Snooze Alarm

Sequence Diagram 6: Disable Alarm

Sequence Diagram 7: Play Radio

Sequence Diagram 8: Change Radio Station

Glossary

➢ Owner: The owner of the Dual-Alarm AM/FM Clock Radio system.

➢ Dependents People who are dependant on the owner to know the correct time, or expect the owner to do something at a certain time such as an employer, coworker, family member, etc.

➢ Radio Station Radio stations broadcasting AM/FM stations available to the Dual-Alarm AM/FM Clock Radio system.

➢ Tick/Ticking A clock is "ticking" if it is properly keeping track of time.

➢ Sound/Sounding An alarm is "sounding" if it is enabled and the clock time has reached the alarm time, playing the alarm's tone.