Vision

Introduction

We envisioned a top of the line dual alarm clock radio, that can tell time, play music, and wake you up. A system that is very fault tolerant.

Business opportunity

The current technology out there is exactly the same as what we have designed, but ours comes with an anti-Skynet guarantee.

Problem Statement

The old analog clocks had to been serviced often by professional clockmakers. The problem with analog is that it is inconsistent and doesn't always project the accurate time.

User-Level Goals

Owner: set alarms, set time, set time style (12-hour or 24-hour), set volume, set radio station, be able to see the time. Be able to snooze.

Summary of System Features

- Tells time
- Has two alarms
- Plays radio stations
- Can snooze

Use case #1(Changing the Time)

Use Case: Changing the Time

Scope: User-Goal Level

Primary Actor: Jim - Owner of the alarm clock

Stakeholders: Jim

Preconditions: The alarm clock must be plugged in and turned on.

Success Guarantee: The time set by Jim must be saved on the alarm clock.

Main Success Scenario: Jim approaches the alarm clock and realizes the time is incorrect. Jim changes the hours to the correct time. Jim changes the minutes to the correct time. Jim Repeats steps 2 and 3 until the time displayed on the front of the alarm clock is correct.

Extensions (Alternate flows): If at any time the alarm clock becomes unplugged the default time is 12:00. If the current minutes are 59 and another minute is added reset minutes to 00 and increment hours by 1. If the clock is set to a 12-hour clock and 1 hour is added at 12 o'clock then set the hours to 01. If the clock is set to a 24-hour clock and 1 hour is added at 23 o'clock then set the hours to 00.

Special Requirements: Clock must be visible during both day and night. Clock must be visible from 3m. In order to save time, alarm, and radio stations the clock must have a back up battery.

Technology and Data Variations List: Inputs are acquired through an assortment of buttons located all over the alarm clock. Output is through an LED display located on the front of the Alarm Clock. Antenna is able to receive radio frequencies.

Frequency of Occurrence: When the time displayed is incorrect which usually occurs due to power outage and no back-up battery is present.

Open Issues: Not able to keep track of the day Not able to keep track of daylight savings time.

Use case #2(Changing the Radio Station)

Use Case: Changing the Radio Station

Scope: User-Goal Level

Primary Actor: Jim - Owner of the alarm clock

Stakeholders: Jim, people in the vicinity of the clock radio

Preconditions: The alarm clock must be plugged in and turned on.

Success Guarantee: The radio station set by Jim must be saved on the alarm clock.

Main Success Scenario: Jim Approaches the alarm clock, Jim sets the radio to his desired radio station. The alarm clock saves the radio station set by Jim.

Extensions (Alternate flows): The pre-programed frequencies are set between 88.0 and 106.9. When scrolling through the radio stations if the user is at 106.9 and increases the frequency any more it will reset to 88.0.

Special Requirements: Clock must be visible during both day and night. Clock must be visible from 3 meters. In order to save time, alarm, and radio stations the clock must have a back up battery. The radio should not be able to produce higher then 85 Decibels.

Technology and Data Variations List: Inputs are acquired through an assortment of buttons located all over the alarm clock. Output is displayed through an LED display located on the front of the Alarm Clock. Antenna is able to receive radio frequencies.

Frequency of Occurrence: Typically when the power is lost and there is no back up battery is present.

Open Issues: Not able to keep track of the day Not able to keep track of daylight savings time.

Use case #3(Setting the Alarm)

Use Case: Set Alarm

Scope: User-Goal Level

Primary Actor: Jim – Owner of alarm clock

Stakeholders: Jim

Preconditions: The alarm clock must be plugged in and functioning properly. The alarm switch must be switched to on. There must be memory available to save the alarm time. The current time on the clock must be correct.

Main Success Scenario: Jim has a job interview at 8:00 AM tomorrow morning. Jim does not wake up early on his own, so an alarm must be set to wake him up. Jim makes sure the alarm switch is set to ON. Jim makes sure the time is correct on the LED display before setting the alarm. Jim sets the alarm time by changing the hours and minutes to his desired time, which was 6:30 AM. Jim double checks the time and the alarm switch to make sure it is set correctly.

Extensions (Alternate flows): If Jim's power goes out in his home and there is no backup battery. His alarm will not sound off at 6:30 AM. The alarm time will be deleted from memory. If Jim made a mistake by setting the alarm to PM except AM. Also, If Jim set the number of hours or minutes to the incorrect time. Resulting in him waking up too early or too late for his interview. If Jim forgot to set turn the alarm switch to on. Resulting in the alarm being set and saved, but it will not sound.

Special Requirements: Clock must be loud enough to wake owner. It must be heard from 9 feet away. Clock must be able to save alarm time. Clock must have an ON/OFF switch for alarm.

Technology and Data Variations: The clock gathers from the owner by the input of hours and minutes entered. This is possible because of the buttons located on the clock. The output would be the sound from the alarm at the desired set time.

Frequency of Occurrence: When power is lost, and there is no backup battery located in the clock. Open Issues- Current time set is incorrect, which causes the alarm to be set at the correct time according to the clock. However, alarm will not sound at the desired time. Daylight savings time can affect this.

Use case #4(Deleting the Alarm)

Use Case: Delete Alarm

Scope: User-Goal Level

Primary Actor: Jim – Owner of alarm clock

Stakeholders: Jim

Preconditions: The alarm clock must be plugged in and functioning properly. The clock must have an alarm saved in order to delete one. The alarm must be set to ON.

Main Success Scenario: Jim has 2 alarms set. One is set to wake him up in the morning and the other one is set in the evening for his workout. Since his job has extended their hours, Jim has to delete the workout alarm and set it to a different time. Jim is able to delete the previous stored alarm by changing the hours and minutes. The new alarm overwrites the old one.

Extensions (Alternate flows): If Jim's power goes out in his home and there is no backup battery. Not only will the desired alarm get deleted, but any other alarms saved will get deleted also. This is not the ideal way of deleting the alarm.

If there is no alarm set, there won't be an alarm saved in memory to delete. Special Requirements – Clock have at least one alarm set. Clock must be able to save alarm time. Clock must have an ON/OFF switch for alarm.

Technology and Data Variations: The clock gathers from the owner by the input of hours and minutes entered. This is possible because of the buttons located on the clock.

Frequency of Occurrence- When power is lost, and there is no backup battery located in the clock. Open Issues- Current time set is incorrect, which causes the alarm to be set at the correct time according to the clock. However, alarm will not sound at the desired time. Daylight savings time can affect this.

Supplementary Specification

1. Introduction

The purpose of this document is to define requirements of the dual-alarm clock radio that wasn't mentioned in the use cases. This includes the nonfunctional requirements, such as performance, design constraints, documentation, application standards, etc.

2. Functionality

2.1. Clock functions

- The clock's time should be on 12-hour or 24-hour intervals.
- It must display the correct number of hours and minutes.
- The user should be able to set the time.
- The LED display must be visible to user.

2.2. Alarm Functions

- The user must be able to set alarm.
- The alarm must have settings to save and delete alarm times.
- The alarm must have an ON/OFF switch.
- The alarm must go off at the given time set by the user.
- Sound from the alarm should be heard from at least 9 feet away.
- Only two alarms at most should be saved at a time.
- Snooze button needs to stop the sound of the alarm.
- Alarms needs to sound again after 10 minutes if switch is still set to ON.

2.3. Radio Functions

- The user must be able to change radio stations.
- The radio must have a FM/PM switch.
- The radio's antenna must receive radio waves.

3. Usability

3.1. The user will be able to see the large display of the time on the clock radio. The display should be visible 3 meters away. **3.2.** The user will be able to adjust the sound of the alarm and/or radio to their ideal volume. **3.3.** The user will be able to change the time, alarms, and radio stations. **3.4**. The user will be able to use switches that control the alarm and radio functions.

4. Reliability

4.1. If the dual-alarm has no power source, a backup battery can be inserted and used up to 4 months. **4.2.** Time will maintain accuracy.

5. Performance

5.1. The time of the clock should maintain reliability. It needs to be within a 5 second interval with the operating system clock.

6. Implementation Constraints

6.1. Java classes will be used to implement design. **6.2**. Test-driven development will be used.

Glossary

dual-alarm clock radio- a clock that displays time, has two alarms, and also includes a radio.

clock- a mechanical or electrical device for measuring time, indicating hours, minutes, and sometimes seconds, typically by hands on a round dial or by displayed figures.

time- an ongoing sequence that is measured using seconds, minutes, hours, days, weeks, months and years.

radio- the transmission and reception of electromagnetic waves of radio frequency, especially those carrying sound messages.

antenna- or aerial, is an electrical device which converts electric power into radio waves.

alarm- a clock with a device that can be made to sound at the time set in advance, usually used to wake someone up.

LED display- a flat panel display, which uses an array of light-emitting diodes as pixels for a video display.

---Definitions came from Wikipedia.---

Operator Contracts

Contract 1: incrementHours
Operation: incrementHours()
Cross References: Use Case: Change Time
Preconditions: none
Post conditions:
An hour instance is created.
The attribute "hour" is increased by 1.
An association with time is created.

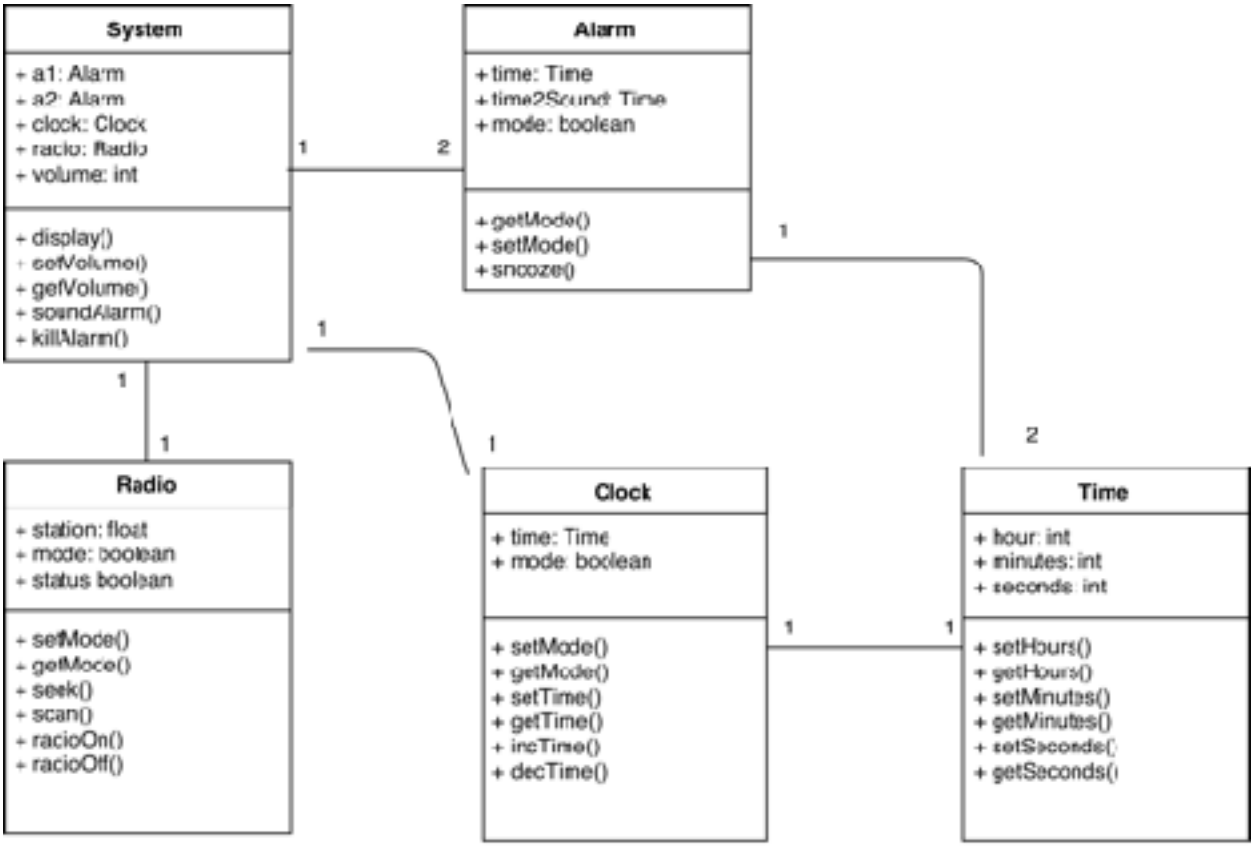
Contract 2: incrementMinutes
Operation: incrementMinutes()
Cross References: Use Case: Change Time
Preconditions: none
Post conditions:
A minute instance is created.
The attribute "minute" is increased by 1.
An association with time is created.

Contract 3: toggleAMPM
Operation: toggleAMPM()
Cross References: Use Cases: Change Time
Preconditions: none
Post conditions:
The attribute "AM/PM" is reversed.
An association with time is created.

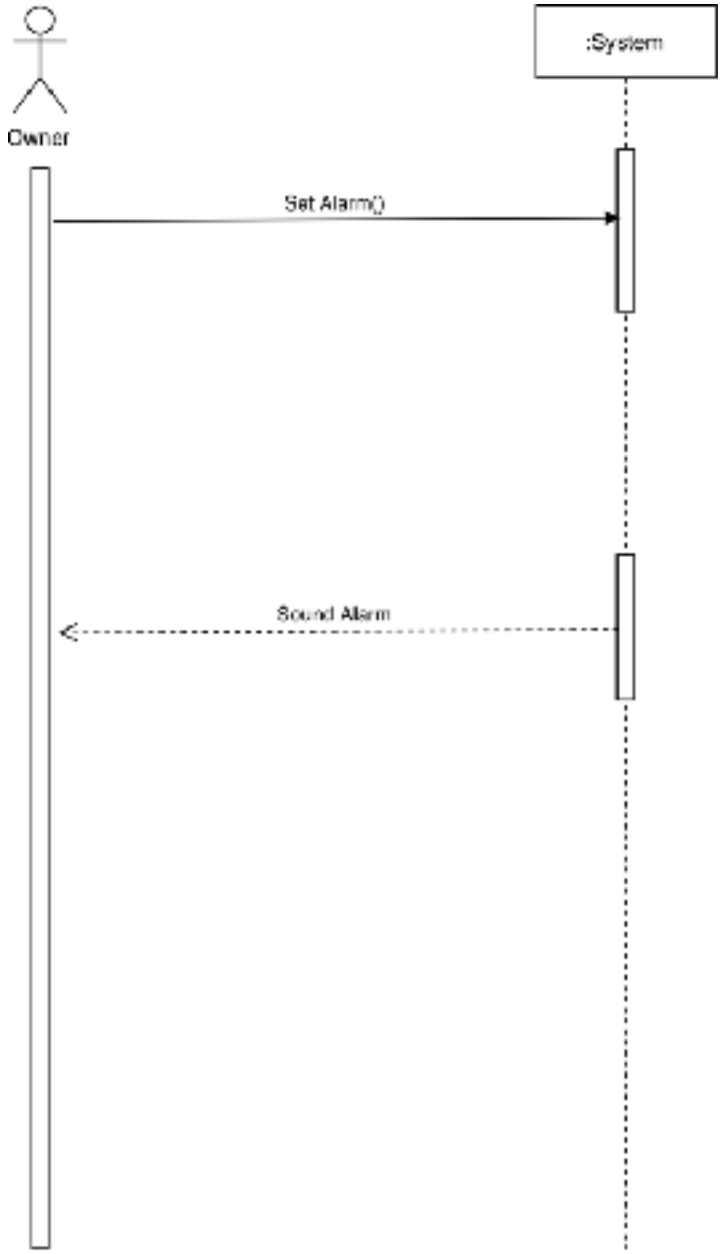
Contract 4: decrementVolume
Operation: decrementVolume()
Cross References: Use Case: Change Volume
Preconditions:
Volume level must be > 0.
Post conditions:
The attribute "volume" is decreased by 1.
An association with alarm and radio are created.

Contract 5: incrementVolume
Operation: incrementVolume()
Cross References: Use Case: Change Volume
Preconditions:
Volume level must be < MAXIMUM VOL.
Post conditions:
The attribute "volume" is increased by 1.
An association with alarm and radio are created.

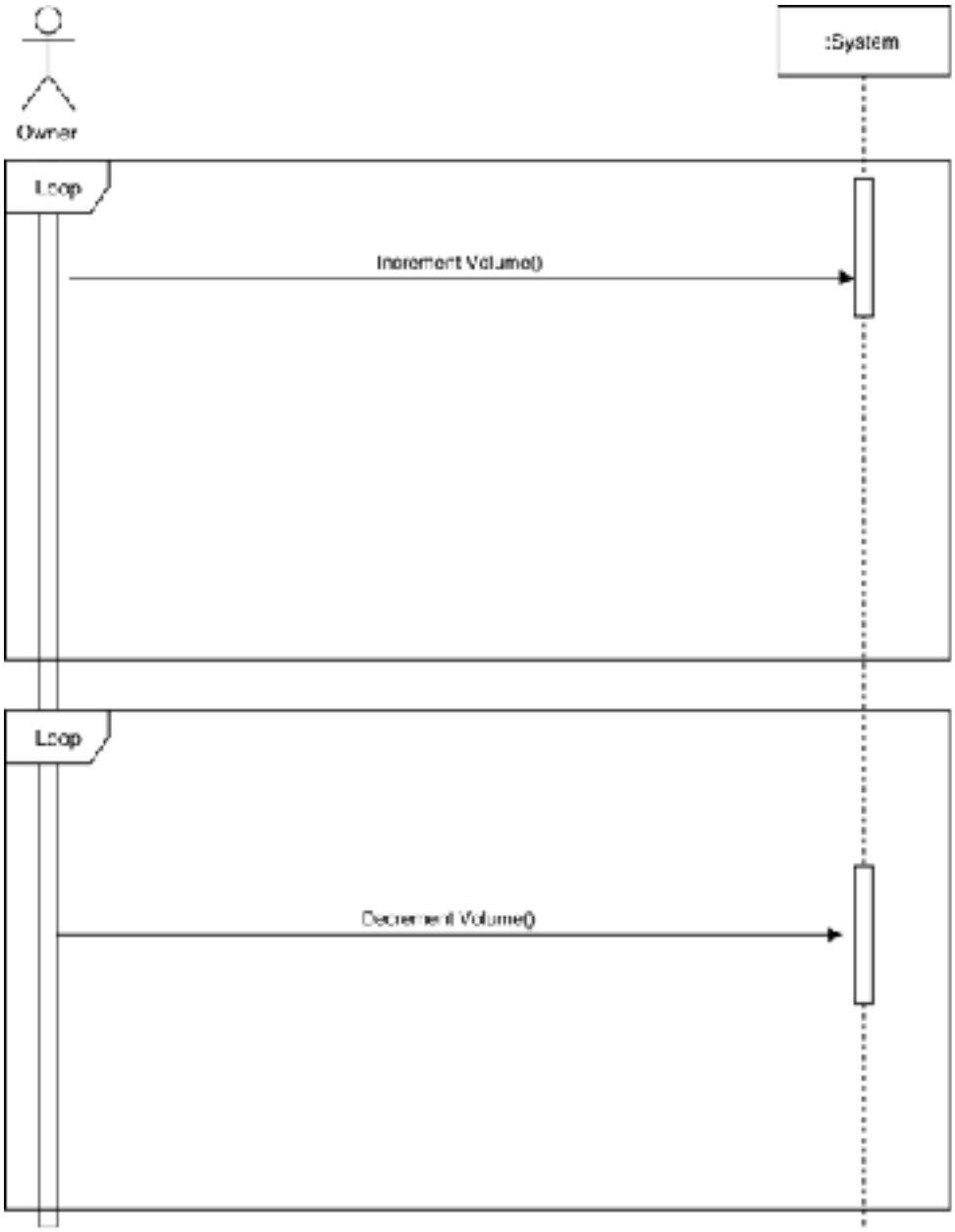
Class Diagram



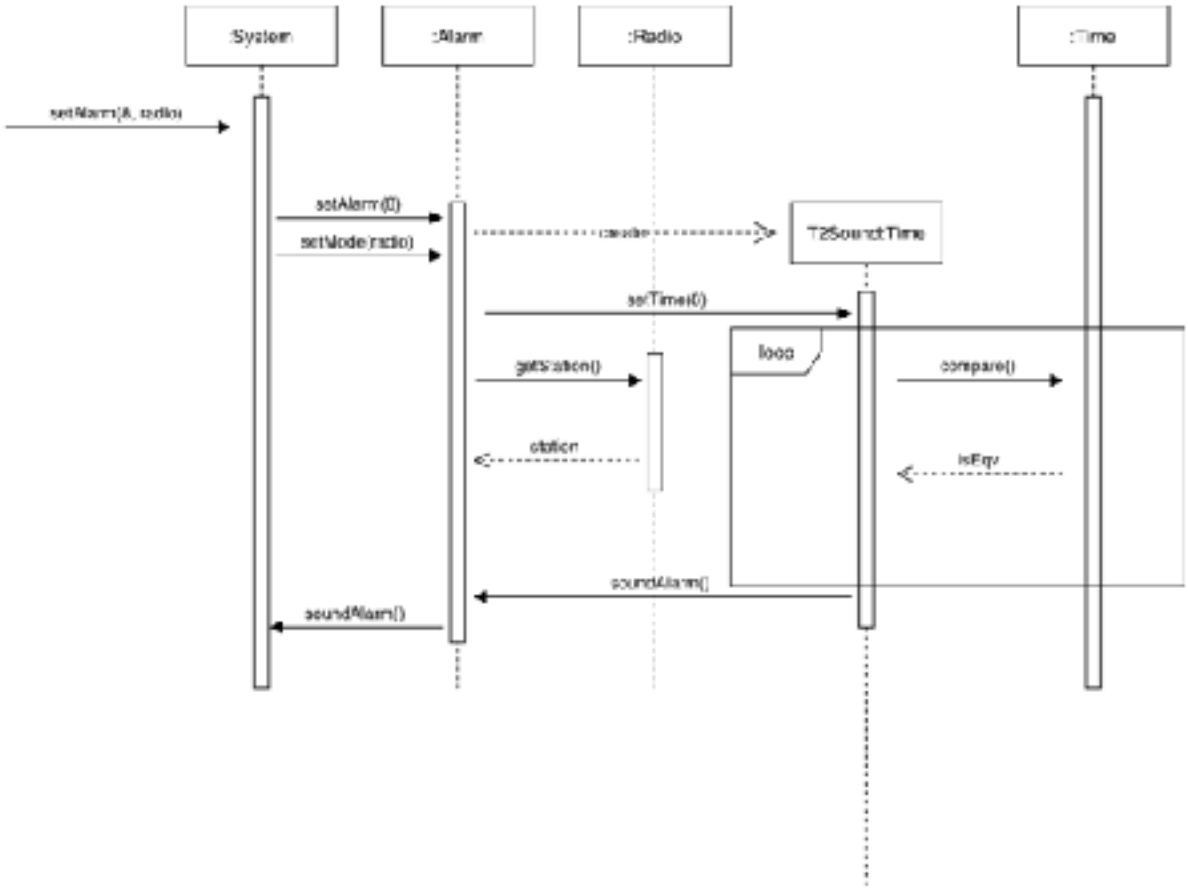
Set Alarm SSD



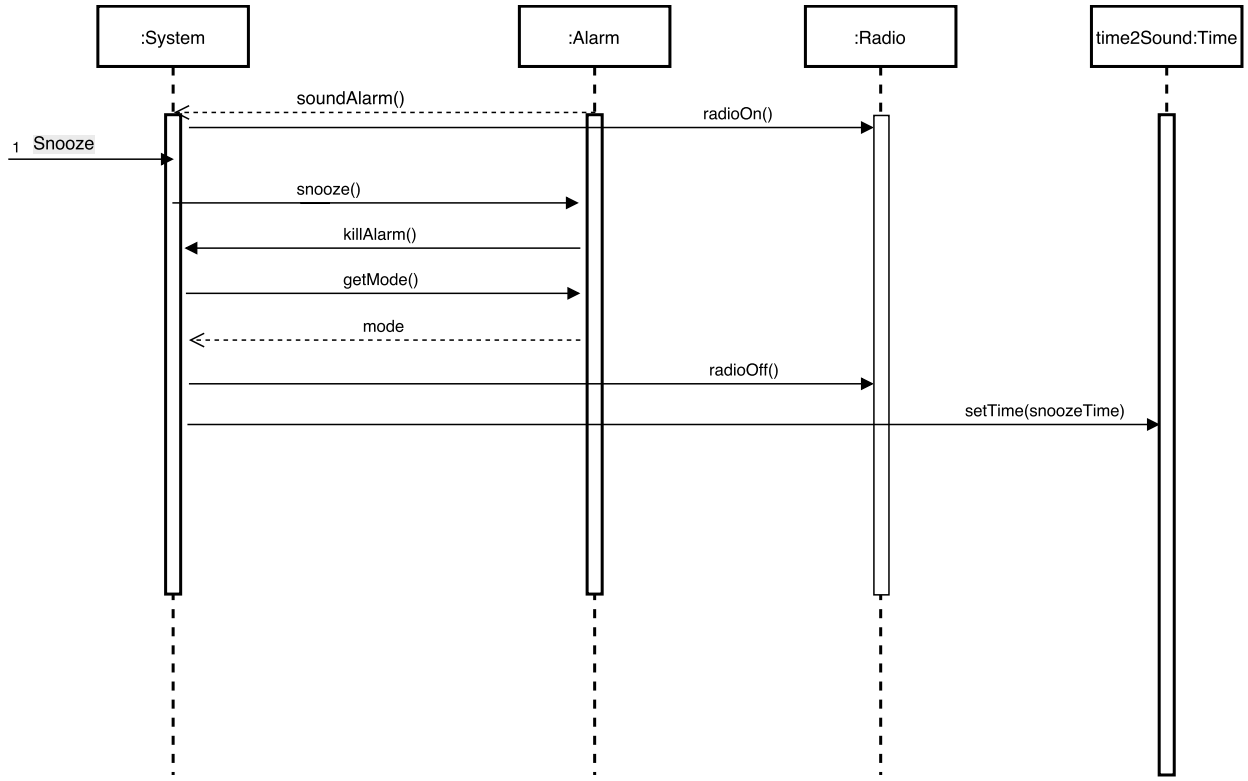
Increment and Decrement Volume SSD



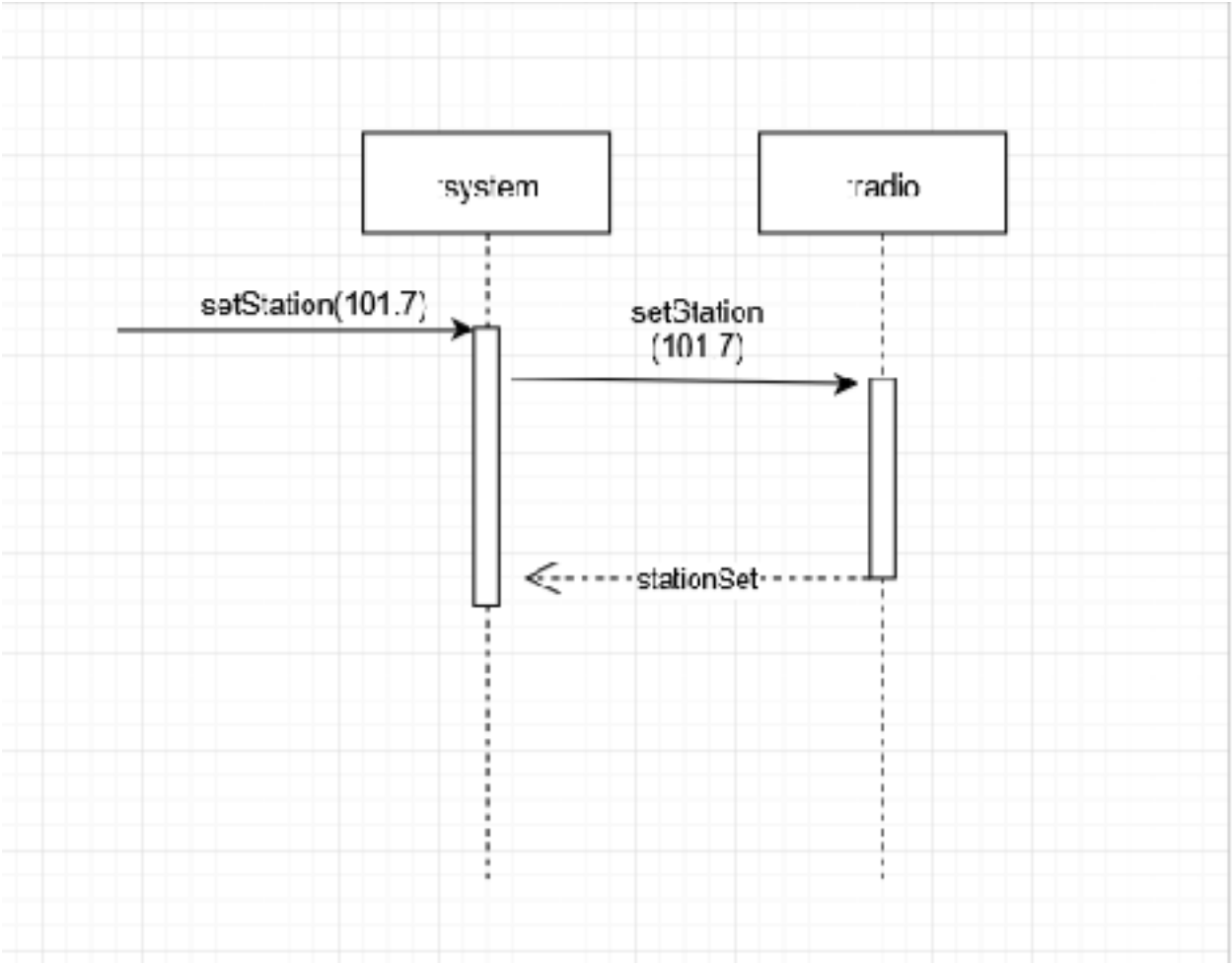
Set Radio Alarm



Snooze Radio Alarm



Set Radio SSD



Domain Model