OOP Project - “Digital Piano”

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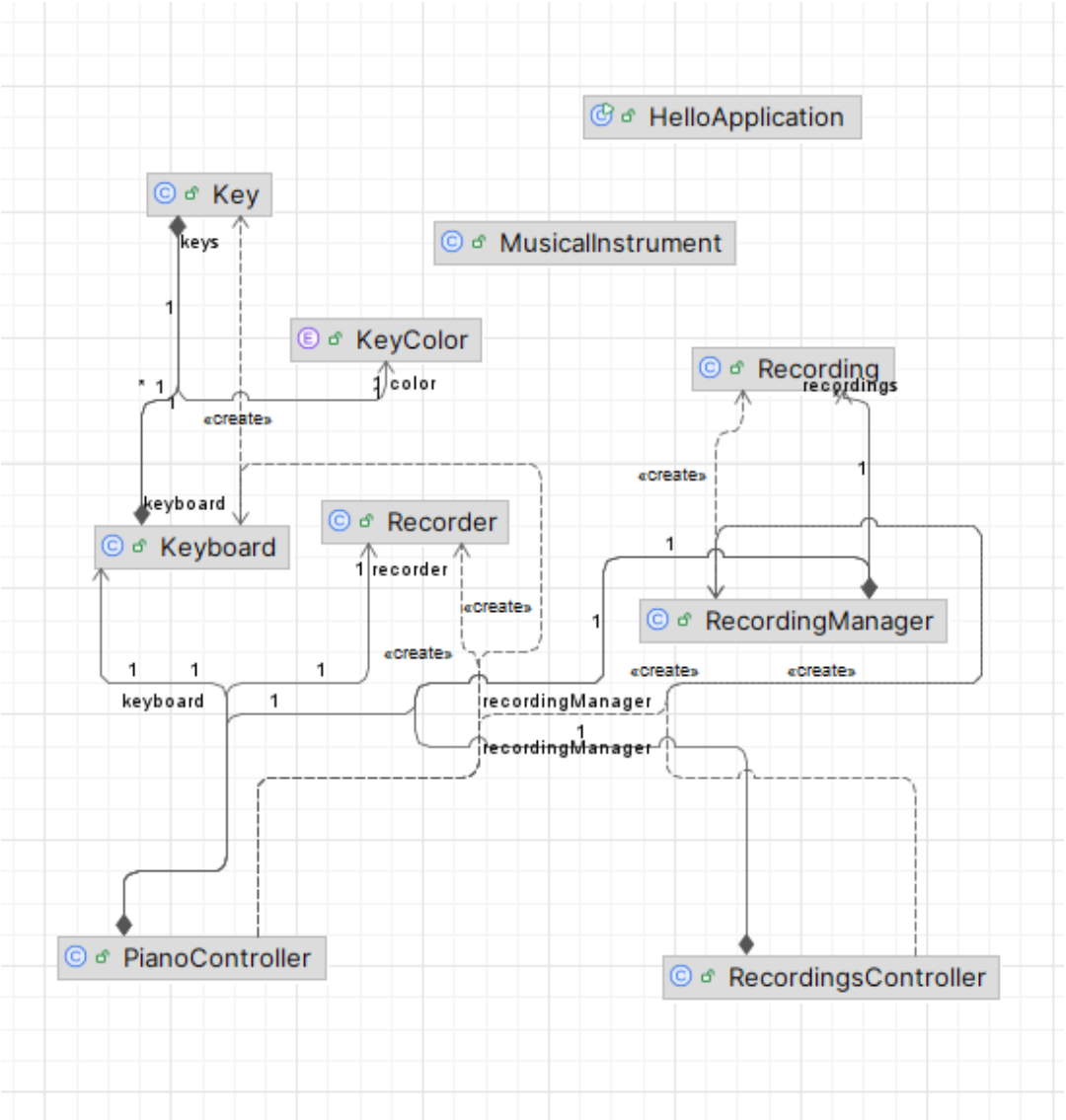
1. Project overview

I built a digital piano that can be played with mouse interactions. I used Java Sound API and MIDI Protocol to create the sound.

The application has three main functionalities:

- it has all 88 black and white keys of a acoustic piano that can be played by a mouse click; in addition, when the mouse is dragged over some keys, all of them will produce a sound
- it can change some properties of the keyboard, like the volume or the instrument being heard; moreover, there is a button that mimics the functionality of the sustain pedal
- it has the ability to record musical fragments and save the recordings into a folder; besides, the recordings can be viewed, replayed or deleted

2. Class diagram



The main classes are Key class, which represents one key of the piano, and the Keyboard, which contains 88 keys. The Key class implements the making of the sound, with its main methods: startKey, stopKey, updateKey. The main attributes of the Keyboard class are changing the volume, the instrument and the sustain pedal state.

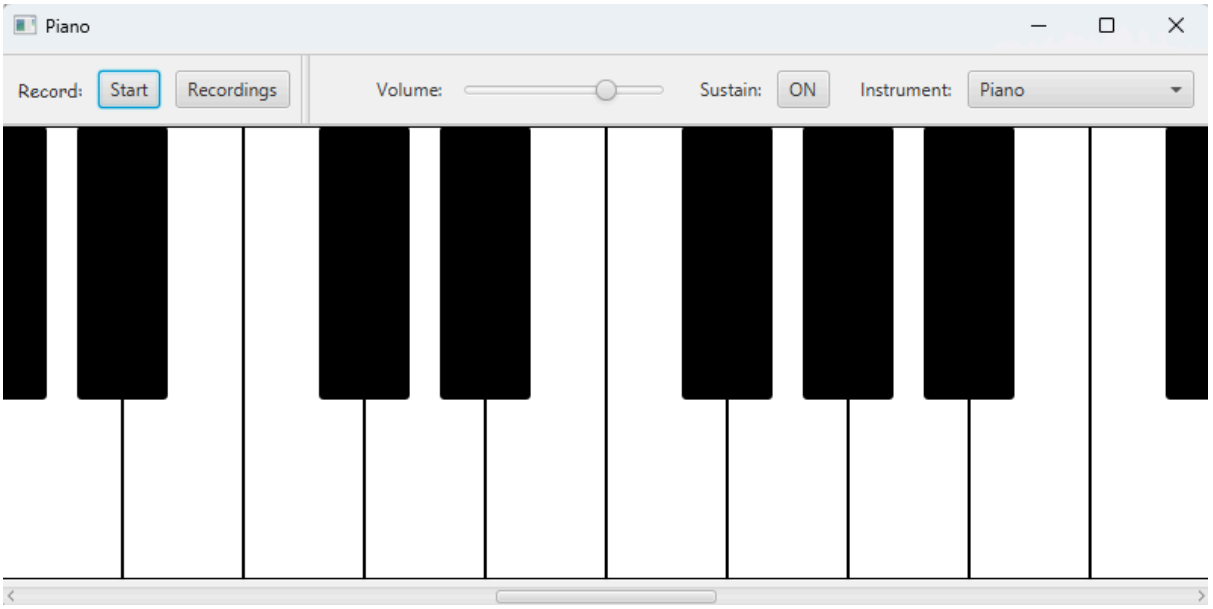
The KeyColor Enum contains 2 colors: BLACK and WHITE. MusicalInstrument class has only a static method that converts the names of the instruments into the corresponding MIDI code.

The Recorder class has all the methods necessary for creating, playing and saving a recording. RecordingManager is the class that handles all the recordings saved so far. Each instantiation of the Recording class represents a recording saved on disk. The constructor of the RecordingManager class

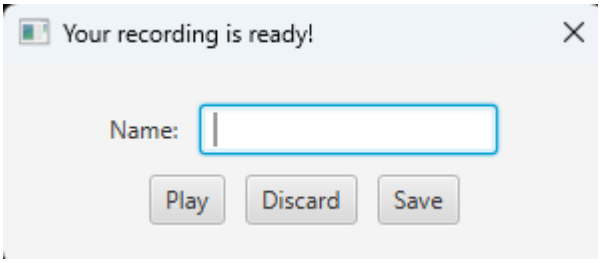
instantiates one Recording object for each recording in the “Recordings” directory.

PianoController and RecordingController are the classes that handle the user interaction with the application.

3. User guide



The application is very easy to use. The scroll bar at the bottom scrolls through all the 88 keys. When a record is stopped, a popUp alert appears that lets the user play the recording or save it with a specific name (maximum 20 chars, only alphanumeric characters, no repeating names allowed).



When the user starts recording, the sustain pedal is set to off by default but it can change its state later. However, changing instruments while recording is not allowed.

The Recordings screen shows all the recordings made in a scrolling window. The recordings can be replayed or deleted. The deletion takes place only when the Apply button is pressed! When there are no recordings, a message is shown.

4. Testing

All the main methods of Key class are tested. Mockito is used for creating mock MIDI Messages and verifying the correctness of the Key class methods. Moreover manual testing was done by several individuals.