**classDiagram**

direction LR

    Application **<|--** OrangeJuiceMusicApp

    OrangeJuiceMusicApp o**--** MidiGeneratorPane

    OrangeJuiceMusicApp o**--** MidiPlayerPane

    OrangeJuiceMusicApp o**--** PianoScene

    Pane **<|--** KeyboardPane

    KeyboardPane o**--** Notes

    PianoScene o**--** PianoPane

    PianoPane o**--** KeyboardPane

    KeyboardPane o**--** PianoKey

    Polygon **<|--** PianoKey

    PianoKey **<|--** StandardKey

    PianoKey **<|--** B\_E\_Key

    PianoKey **<|--** C\_F\_Key

    PianoKey **<|--** FinalCKey

    PianoKey **<|--** SharpFlatKey

    PianoKey **<|--** FinalSharpFlatKey

    Scene **<|--** PianoScene

    BorderPane **<|--** MidiGeneratorPane

    BorderPane **<|--** MidiPlayerPane

    BorderPane **<|--** PianoPane

    BorderPane **<|--** ScaleWeightsPane

    BorderPane **<|--** TimeWeightsPane

    GridPane **<|--** NoteWeightsPane

    NoteWeightsPane **<..** DefaultNoteWeights

    VBox **<|--** RangePane

    MidiGeneratorPane o**--** TimeWeightsPane

    MidiGeneratorPane o**--** ScaleWeightsPane

    MidiGeneratorPane o**--** RangePane

    MidiGeneratorPane o**--** Song

    Song o**--** ScaleType

    Song o**--** Measure

    Measure o**--** Note

    Note **<..** NoteUtil

    Note o**--** NotePosition

    NoteUtil **\*--** NotePosition **:** Inner Class

    NoteUtil **\*--** AscendDescend **:** Inner Class

    Measure o**--** Chord

    Measure o**--** TimeSignature

    ScaleWeightsPane o**--** NoteWeightsPane

    Chord o**--** Chord7Type

    Chord o**--** ChordType

    Note o**--** NoteLengthType

    Note o**--** Notes

**<<**abstract**>>** PianoKey

**<<**javafx**>>** Application

**<<**javafx**>>** Scene

**<<**javafx**>>** GridPane

**<<**javafx**>>** BorderPane

**<<**javafx**>>** Pane

**<<**javafx**>>** Polygon

**<<**javafx**>>** VBox

**class** OrangeJuiceMusicApp **{**

**-**MidiPlayerPane midiPlayerPane

**-**MidiGeneratorPane midiGeneratorPane

**-**Receiver receiver

**-**Stage stagePiano

**-**Stage stageGenMidi

**-**Stage stagePlayMidi

**-**Scene primaryScene

**-**BorderPane startPane

**-**HBox buttonsBox

**-**ImageView logo

**-**Button btnGenMidi

**-**Button btnPlayMidi

**-**Button btnPiano

**-**Button btnExit

**+**start**(**Stage primaryStage**)**

**+**main**(**String[] args**)$**

**}**

**class** PianoScene **{**

**-**PianoPane pianoPane

**+**getPianoPane**()** PianoPane

**}**

**class** PianoPane **{**

**-**KeyboardPane piano

**-**Slider sldVolume

**-**Receiver receiver

**-**VBox buttonsPanelTop

**-**VBox buttonsPanelBottom

**-**CheckBox chkDisplayNoteNames

**-**CheckBox chkDisplayKeyMapping

**-**Button btnUpOctaveMapped

**-**Button btnUpStepMapped

**-**Button btnDownStepMapped

**-**Button btnDownOctaveMapped

**-**Button btnUpOctaveDisplay

**-**Button btnUpStepDisplay

**-**Button btnDownStepDisplay

**-**Button btnDownOctaveDisplay

**-**Button btnAddNote

**-**Button btnRemoveNote

**-**Button btnExit

**-**ComboBox**~**String**~** cboInstruments

**-**ObservableList**~**String**~** instruments$

**-**Map**~**String, Integer**~** instrumentMap$

**+**getVolumeSlider**()** Slider

**+**getKeyboardPane**()** KeyboardPane

**+**getExitButton**()** Button

**+**getButtonsPanelTop**()** VBox

**+**getButtonsPanelBottom**()** VBox

**+**getReceiver**()** Receiver

**}**

**class** KeyboardPane **{**

**-**Map**~**Integer, String**~** sharpKeyLabelMap$

**-**Map**~**Integer, String**~** regularKeyLabelMap$

**-**Map**~**Integer, KeyCode**~** sharpKeyMap$

**-**Map**~**Integer, KeyCode**~** regularKeyMap$

**-**int numRegularKeys

**-**int bottomNoteDisplayedOctave

**-**Notes bottomNoteDisplayed

**-**int bottomNoteMappedOctave

**-**Notes bottomNoteMapped

**-**Receiver receiver

**-**ArrayList**~**PianoKey**~** mappedKeys

**-**ArrayList**~**PianoKey**~** normalKeys

**-**ArrayList**~**Text**~** mappingLabels

**-**ArrayList**~**Text**~** keyLabels

**-**boolean displayMappingLabels

**-**boolean displayKeyLabels

**+**setDisplayKeyLabels**(**boolean display**)**

**+**setDisplayMappingLabels**(**boolean display**)**

**-**stepUpOctaveDisplayed**()**

**-**stepDownOctaveDisplayed**()**

**-**stepUpOctaveMapped**()**

**-**stepDownOctaveMapped**()**

**-**stepUpNoteDisplayed**()**

**-**stepDownNoteDisplayed

**-**stepUpNoteMapped**()**

**-**stepDownNoteMapped**()**

**-**compareNotes**(**Notes note1, int octave1, Notes note2, int octave2**)**$ int

**-**paintPiano**()**

**-**subtractNoteSteps**(**Notes note, int octave, int stepsDown**)**$ Pair**~**Notes, Integer**~**

**-**addNoteSteps**(**Notes note, int octave, int stepsUp**)**$ Pair**~**Notes, Integer**~**

**-**stopAllNotes**()**

**+**stepDownOctaveMapping**()**

**+**stepDownNoteMapping**()**

**+**stepUpNoteMapping**()**

**+**stepUpOctaveMapping**()**

**+**addNote**()**

**+**removeNote**()**

**+**stepUpOctaveDisplay**()**

**+**stepUpNoteDisplay**()**

**+**stepDownNoteDisplay**()**

**+**stepDownOctaveDisplay**()**

**+**setWidth**(**double width**)**

**+**setHeight**(**double height**)**

**+**getMappedKeys**()** ArrayList**~**PianoKey**~**

**}**

**class** PianoKey **{**

**-**KeyCode keyboardKey

**-**int octave

**-**Notes note

**-**IntegerProperty volume**$**

**-**boolean isMousePressed

**-**boolean isKeyboardPressed

**-**Receiver receiver

**+**getVolumeProperty**()**$ IntegerProperty

**+**startNote**()**

**+**stopNote**()**

**+**changeColorMouse**()\***

**+**changeColorKeyboard**()\***

**-**setMouseHandling**()**

**+**getKeyboardKey**()** KeyCode

**+**getIsMousePressed**()** boolean

**+**getIsKeyboardPressed**()** boolean

**+**setIsMousePressed**(**boolean pressed**)**

**+**setIsKeyboardPressed**(**boolean pressed**)**

**+**getNote**()** Notes

**+**getOctave**()** int

**}**

**class** StandardKey **{**

**+**changeColorMouse**()**

**+**changeColorKeyboard**()**

**}**

**class** B\_E\_Key **{**

**+**changeColorMouse**()**

**+**changeColorKeyboard**()**

**}**

**class** C\_F\_Key **{**

**+**changeColorMouse**()**

**+**changeColorKeyboard**()**

**}**

**class** FinalCKey **{**

**+**changeColorMouse**()**

**+**changeColorKeyboard**()**

**}**

**class** SharpFlatKey **{**

**+**changeColorMouse**()**

**+**changeColorKeyboard**()**

**}**

**class** FinalSharpFlatKey **{**

**+**changeColorMouse**()**

**+**changeColorKeyboard**()**

**}**

**class** MidiPlayerPane **{**

**-**Timer timer

**-**TimerTask timerTask

**-**Text txtTimer

**-**long timerTimeMilliseconds

**-**int timerMillisecondUpdate

**-**int TIMER\_MILLISECOND\_UPDATE

**-**long timerUpdateCounter

**-**boolean timerIsPaused

**-**Button btnLoadMidi

**-**Button btnPlayMidi

**-**Button btnStopMidi

**-**Button btnExit

**-**Sequencer sequencer

**-**Sequence sequence

**-**Label lblFileName

**-**ImageView logo

**+**closeTimer**()**

**+**getExitButton**()**

**+**getSequencer**()**

**-**loadMidi**()**

**-**playMidi**()**

**-**pauseMidi**()**

**-**stopMidi**()**

**}**

**class** MidiGeneratorPane **{**

**-**ObservableList**~**String**~** scalesList$

**-**ObservableList**~**String**~** noteList$

**-**ComboBox**~**String**~** cboScaleType

**-**ComboBox**~**String**~** cboRootNote

**-**Button btnExit

**-**Sequencer sequencer

**-**ScalesWeightsPane majorWeights

**-**ScalesWeightsPane naturalWeights

**-**ScalesWeightsPane melodicWeights

**-**ScalesWeightsPane harmonicWeights

**-**TimeWeightsPane timeWeights

**-**RangePane melodyRange

**-**RangePane bassRange

**-**TextField txtRandomSeed

**-**Button btnSave

**-**Button btnGen

**-**Button btnPlay

**-**Button btnStop

**-**HBox buttonBox

**-**HBox seedSaveBox

**-**VBox bottomPanel

**-**VBox harmonicMelodicBiasBox

**-**VBox scaleChordBiasBox

**-**VBox scaleBox

**-**Slider sldHarmonicMelodicBias

**-**Slider sldScaleChordBias

**-**CheckBox chkGenMelody

**-**CheckBox chkGenBass

**-**VBox leftOptionsBox

**-**Song currentSong

**-**Sequence currentSequence

**-**playMidi**()**

**-**pauseMidi**()**

**-**stopMidi**()**

**-**getAscendScaleWeights**(**ScaleType scale**)** ArrayList**~**ArrayList**~**Double**~~**

**-**getDescendScaleWeights**(**ScaleType scale**)** ArrayList**~**ArrayList**~**Double**~~**

**-**getSequencer**()** Sequencer

**-**getExitButton**()** Button

**}**

**class** ScaleWeightsPane **{**

**-**ObservableList**~**String**~** initNoteList$

**-**NoteWeightsPane I\_WeightsAscend

**-**NoteWeightsPane ii\_WeightsAscend

**-**NoteWeightsPane II\_WeightsAscend

**-**NoteWeightsPane iii\_WeightsAscend

**-**NoteWeightsPane III\_WeightsAscend

**-**NoteWeightsPane IV\_WeightsAscend

**-**NoteWeightsPane v\_WeightsAscend

**-**NoteWeightsPane V\_WeightsAscend

**-**NoteWeightsPane vi\_WeightsAscend

**-**NoteWeightsPane VI\_WeightsAscend

**-**NoteWeightsPane vii\_WeightsAscend

**-**NoteWeightsPane VII\_WeightsAscend

**-**NoteWeightsPane I\_WeightsDescend

**-**NoteWeightsPane ii\_WeightsDescend

**-**NoteWeightsPane II\_WeightsDescend

**-**NoteWeightsPane iii\_WeightsDescend

**-**NoteWeightsPane III\_WeightsDescend

**-**NoteWeightsPane IV\_WeightsDescend

**-**NoteWeightsPane v\_WeightsDescend

**-**NoteWeightsPane V\_WeightsDescend

**-**NoteWeightsPane vi\_WeightsDescend

**-**NoteWeightsPane VI\_WeightsDescend

**-**NoteWeightsPane vii\_WeightsDescend

**-**NoteWeightsPane VII\_WeightsDescend

**-**ArrayList**~**NoteWeightsPane**~** ascendingWeights

**-**ArrayList**~**NoteWeightsPane**~** descendingWeights

**-**ComboBox**~**String**~** cboInitialNote

**+**getAscendingWeights**()** ArrayList**~**NotesWeightsPane**~**

**+**getDescendingWeights**()** ArrayList**~**NotesWeightPane**~**

**}**

**class** NoteWeightsPane **{**

**-**Spinner**~**Double**~** I\_Weight

**-**Spinner**~**Double**~** ii\_Weight

**-**Spinner**~**Double**~** II\_Weight

**-**Spinner**~**Double**~** iii\_Weight

**-**Spinner**~**Double**~** III\_Weight

**-**Spinner**~**Double**~** IV\_Weight

**-**Spinner**~**Double**~** v\_Weight

**-**Spinner**~**Double**~** V\_Weight

**-**Spinner**~**Double**~** vi\_Weight

**-**Spinner**~**Double**~** VI\_Weight

**-**Spinner**~**Double**~** vii\_Weight

**-**Spinner**~**Double**~** VII\_Weight

**-**Spinner**~**Double**~** VIII\_Weight

**-**ArrayList**~**Spinner**~**Double**~~** spinnerWeights

**-**Label lblAscendDescend

**+**getSpinnerWeights**()** ArrayList**~**Spinner**~**Double**~~**

**}**

**class** RangePane**{**

**-**ObservableList**~**String**~** noteList$

**-**ObservableList**~**Integer**~** C\_OctaveList$

**-**ObservableList**~**Integer**~** A\_Ab\_B\_OctaveList$

**-**ObservableList**~**Integer**~** defaultOctaveList$

**-**ComboBox**~**String**~** cboBottomNote

**-**ComboBox**~**String**~** cboTopNote

**-**ComboBox**~**Integer**~** cboBottomNoteOctave

**-**ComboBox**~**Integer**~** cboTopNoteOctave

**+**getTopNote**()** Notes

**+**getBottomNote**()** Notes

**+**getTopNoteOctave**()** int

**+**getBottomNoteOctave**()** int

**}**

**class** TimeWeightsPane **{**

**-**ObservableList**~**String**~** timeSignatureTopList$

**-**ComboBox**~**String**~** cboTimeSignatureTop

**-**HBox timeSignatureBox

**-**HBox tempoBox

**-**VBox restBox

**-**HBox measuresBox

**-**VBox topBox

**-**VBox centerBox

**-**GridPane spinnersPane

**-**Spinner**~**Integer**~** spnNumMeasures

**-**Spinner**~**Double**~** spnTempo

**-**Slider sldRest

**-**Spinner**~**Double**~** wholeWeight

**-**Spinner**~**Double**~** dotHalfWeight

**-**Spinner**~**Double**~** halfWeight

**-**Spinner**~**Double**~** dotQuarterWeight

**-**Spinner**~**Double**~** quarterWeight

**-**Spinner**~**Double**~** dotEighthWeight

**-**Spinner**~**Double**~** eighthWeight

**-**Spinner**~**Double**~** sixteenthWeight

**-**ArrayList**~**Spinner**~**Double**~~** spinnerWeights

**+**getRhythmWeights**()** ArrayList**~**Double**~**

**+**getTempo**()** double

**+**getNumMeasures**()** int

**+**getRestBias**()** double

**+**getTimeSignature TimeSignature

**}**

**class** Song **{**

**-**RESOLUTION$

**-**double BPM

**-**int numMeasures

**-**int melodyRangeMinValue

**-**int melodyRangeMaxValue

**-**int bassRangeMinValue

**-**int bassRangeMaxValue

**-**ArrayList**~**ArrayList**~**ArrayList**~**Double**~~~** ascendingNoteWeights

**-**ArrayList**~**ArrayList**~**ArrayList**~**Double**~~~** descendingNoteWeights

**-**ArrayList**~**Double**~** rhythmWeights

**-**ScaleType scale

**-**Random rand

**-**LinkedList**~**Measure**~** melodyMeasures

**-**LinkedList**~**Measure bassMeasures

**-**Notes scaleRootNote

**-**TimeSignature timeSig

**-**boolean hasMelodyPart

**-**boolean hasBassPart

**-**double restBias

**-**double chordBias

**-**double harmonicMelodicBias

**+**generateSong**()**

**+**convertToSequence**()** Sequence

**+**setRandomSeed**(**long randomSeed**)**

**}**

**class** ScaleType **{**

**<<**Enumeration**>>**

        MAJOR

        NATURAL\_MINOR

        MELODIC\_MINOR

        HARMONIC\_MINOR

**}**

**class** ChordType **{**

**<<**Enumeration**>>**

        MAJOR

        MINOR

        DIMINISHED

        AUGMENTED

**}**

**class** Chord7Type **{**

**<<**Enumeration**>>**

        M7

        m7

        dim7

        NONE

**}**

**class** Chord **{**

**-**NotePosition rootNote

**-**Chord7Type seventhType

**-**ChordType chordType

**-**double[] defaultChordWeights

**-**initializeChordWeights**()**

**+**getRootNote**()** NotePosition

**+**getRandomChord**(**ScaleType scale, Random rand**)** Chord

**+**getNextNoteChordWeights**(**NotePosition prevNote**)** double[]

**}**

**class** TimeSignature **{**

**-**int topNumber

**-**int bottomNumber

**+**getTopNumber**()** int

**+**getBottomNumber**()** int

**+**getTimeSignatureMidiMessage**()** MetaMessage

**}**

**class** Measure **{**

**-**int RESOLUTION**$**

**-**TimeSignature timeSig

**-**Chord chord

**-**ArrayList**~**Note**~** notes

**-**getNonRestNote**(**int index**)** Note

**+**getLastNonRestNote**()** Note

**+**getNoteList**()** ArrayList**~**Note**~**

**+**getChord**()** Chord

**-**fillMeasure**(**Note prevNote, int minValue, int maxValue, double restBias, double chordBias, double harmonicMelodicBias, ArrayList**~**ArrayList**~**ArrayList**~**Double**~~~** ascendingWeights, ArrayList**~**ArrayList**~**ArrayList**~**Double**~~~** descendingWeights, ArrayList**~**Double**~** rhythmWeights, Random rand**)**

**}**

**class** Note **{**

**-**int OFFSET**$**

**-**Notes standardNoteName

**-**int noteValue

**-**NotePosition notePosition

**-**int noteLengthValue

**-**NoteLengthType noteLengthType

**-**boolean isRest

**+**getIsRest**()** boolean

**+**getOffset**()**$ int

**+**getNoteValue**()** int

**+**getNoteLengthValue**()** int

**+**getNotePosition**()** NotePosition

**+**getNoteLengthType**()** NoteLengthType

**+**getNextNoteLengthType**(**int remainingTicks, ArrayList**~**Double**~** rhythmWeights, Random rand**)**$ NoteLengthType

**+**getNextNoteValue**(**Note prevNote, int minValue, int maxValue, double chordBias, double harmonicMelodicBias, Chord chord, ArrayList**~**ArrayList**~**ArrayList**~**Double**~~~** ascendingWeights, ArrayList**~**ArrayList**~**ArrayList**~**Double**~~~** descendingWeights, Random rand**)**$ int

**}**

**class** NoteLengthType **{**

**<<**Enumeration**>>**

        SIXTEENTH

        EIGHTH

        DOTTED\_EIGHTH

        QUARTER

        DOTTED\_QUARTER

        HALF

        DOTTED\_HALF

        WHOLE

**}**

**class** DefaultNoteWeights **{**

**<<**Utility**>>**

**+**getDefaultNoteWeight**(**ScaleType scale, NotePosition initNote, NotePosition newNote, AscendDescend direction**)**$ double

**}**

**class** NoteUtil **{**

**<<**Utility**>>**

**+**enum NotePosition**$**

**+**enum AscendDecend**$**

**-**Map**~**NotePosition, Integer**~** notesAscendValueMap$

**+**getNotesAscendValueMap**()**$ Map**~**NotePosition, Integer**~**

**-**Map**~**NotePosition, Integer**~** notesDescendValueMap$

**+**getNotesDescendValueMap**()**$ Map**~**NotePosition, Integer**~**

**-**Map**~**Notes, Integer**~** noteMap$

**+**getNoteMap**()**$ Map**~**Notes, Integer**~**

**-**Map**~**Notes, Integer**~** scaleOffsetMap$

**+**getScaleOffsetMap**()**$ Map**~**Notes, Integer**~**

**-**Map**~**NoteLengthType, Integer**~** noteTickLength64ResolutionMap$

**+**getNoteTickLength64ResolutionMap**()**$ Map**~**NoteLengthType, Integer**~**

**-**Map**~**NotePosition, Notes**~** notesStandardPositionToNameMap$

**+**getNotesStandardPositionToNameMap**()**$ Map**~**NotePosition, Notes**~**

**-**Map**~**Notes, NotePosition**~** notesNameToStandardPositionMap$

**+**getNotesNameToStandardPositionMap**()**$ Map**~**Notes, NotePosition**~**

**+**getNoteValue**(**Notes note, int octave**)**$ int

**+**calcNoteName**(**int noteValue**)**$ Notes

**+**getAscendDescend**(**int previousNoteValue, int minValue, int maxValue, Random rand**)**$ AscendDescend

**+**normalizeWeights**(**double[] weights, int weightsSize**)$**

**+**getWeightedRandom**(**double[] weights, int weightsSize, Random rand**)$**

**}**

**class** Notes **{**

**<<**Enumeration**>>**

        A

        Bb

        B

        C

        Db

        D

        Eb

        E

        F

        Gb

        G

        Ab

**}**

**class** NotePosition **{**

**<<**Enumeration**>>**

        I

        ii

        II

        iii

        III

        IV

        v

        V

        vi

        VI

        vii

        VII

        VIII

**}**

**class** AscendDescend **{**

**<<**Enumeration**>>**

        ASCEND

        DESCEND

**}**