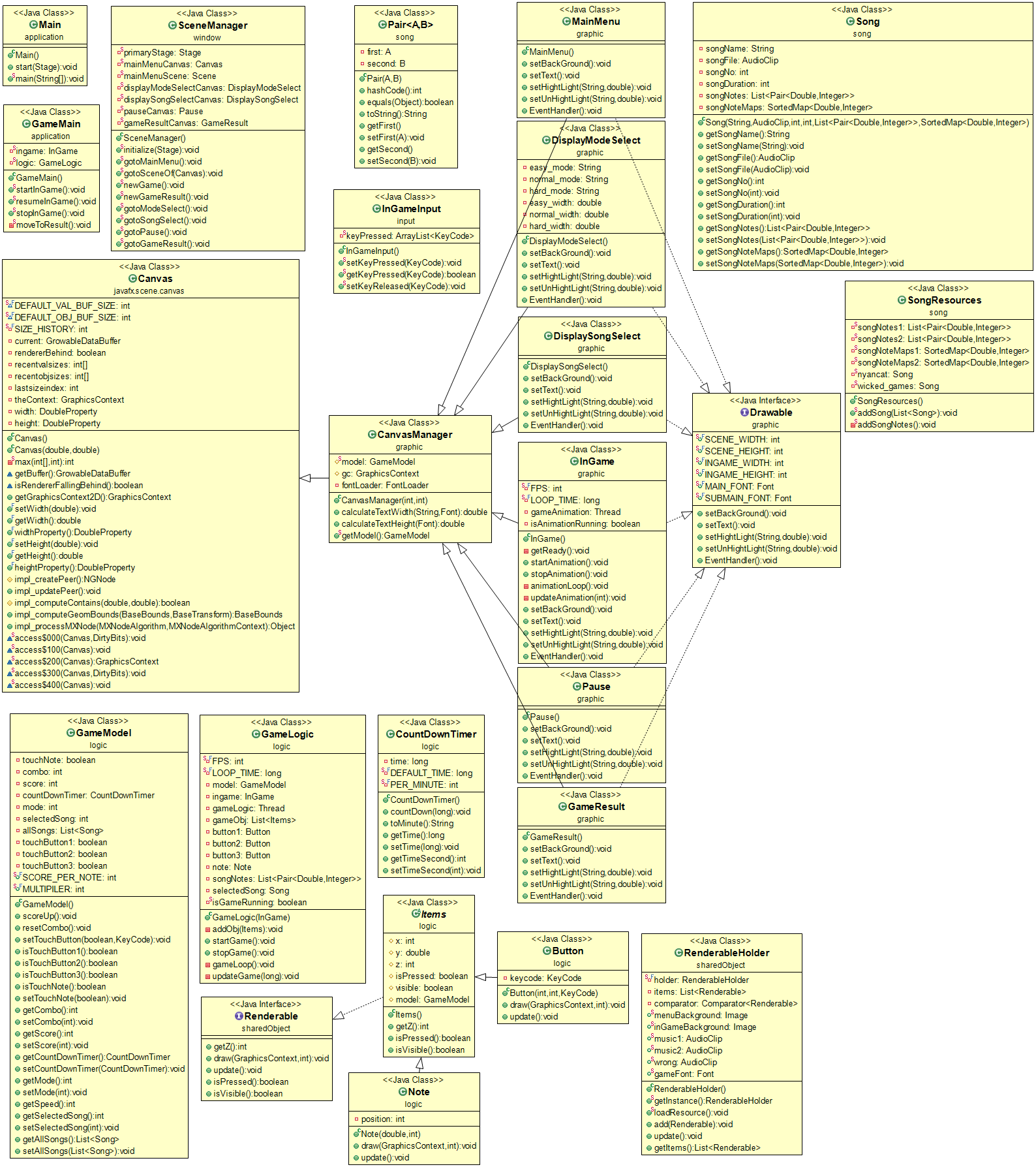
3. Implementation Detail

The diagram of the program is shown in Figure 6 below. There are 7 packages, in the total of 21 classes and 2 interfaces. The first package is application package which have 2 classes, Main and GameMain. Next package is graphic package, contains all canvases in this game and Canvas manager. It containsCanvasManager, DisplayModeSelect, DisplaySongSelect, GameResult, InGame, MainMenu, Pause and the interface, Drawable. Next package is input, contains InGameInput. Next one is logic package, contains Button, CountDownTimer, GameLogic, GameModel, Items, Note class. Next is sharedObject, which contains RenderableHolder class and Renderable interface. The song package contains Pair, Song, SongResources class. Last one is window package, contains SceneManager class. The UML diagram is shown below.



***Figure 6: The UML diagram of the program***

3.1 Package application

3.1.1 Class Main extends Application

3.1.1.1 Method

|  |  |
| --- | --- |
| + void start(Stage primaryStage) | The main entry for the JavaFX applications. There are the code setOnCloseRequest to completely close the application. |
| + void main(String[] args) | An entry of the application. |

3.1.2 Class GameMain

3.1.2.1 Field

|  |  |
| --- | --- |
| - InGameingame | For call the canvas and startAnimation |
| - GameLogic logic | For call startGame |

3.1.2.2 Method

|  |  |
| --- | --- |
| + void startInGame() | - Initialize the fields  - Go to the scene of ingame  - Start the logic and animation threads |
| + void resumeInGame() | Move back to ingame canvas |
| + void stopInGame() | - Stop the logic and animation threads  - Call moveToResult method |
| + void moveToResult() | - Initialize the result canvas  - Move to that canvas |

3.2 Package graphic

3.2.1 Class CanvasManager extends Canvas

3.2.1.1 Field

|  |  |
| --- | --- |
| # GameModel model | To collect the data from user and use it in the whole game |
| # GraphicContextgc | To draw of each canvas |
| # FontLoaderfontLoader | To use calculate width and height of the text |

3.2.1.2 Constructor

|  |  |
| --- | --- |
| + CanvasManager(intsceneWidth, intsceneHeight) | - Initialize canvas by setting the width and height  - Initialize fontLoader with Toolkit.getToolkit().getFontLoader();  - Initialize model when the model didn’t initial before. |

3.2.1.3 Method

|  |  |
| --- | --- |
| + double calculatedTextWidth(String text, Font font) | Calculate the string width |
| + double calculateTextHeight(Font font) | Calculate the string height |
| + GameModelgetModel() | Return model |

3.2.2 Class MainMenu extends CanvasManager implements Drawable

3.2.2.1 Constructor

|  |  |
| --- | --- |
| +MainMenu() | - Set the width and height with SCENE\_WIDTH and SCENE\_HEIGHT  - Initialize gc  - call the setBackground(), setText(), EventHandler() methods |

3.2.2.2 Method

|  |  |
| --- | --- |
| + voidsetBackground() | Set the background of canvas with menuBackgroundin RenderableHolder |
| + void setText() | Set the text of canvas  - Title  - Description  - Esc: Exit Game |
| + void setHighLight(String selected\_mode, double selected\_width) | Blank method (not use, but need to implements) |
| + void setUnHightLight(String unsel\_mode, double unsel\_width) | Blank method (not use, but need to implements) |
| + void EventHandler() | Add listener to listen when user press  - Escape: Exit Game  - Other keys: Move to next canvas |

3.2.3 Class DisplayModeSelect extends CanvasManager implements Drawable

3.2.3.1 Field

|  |  |
| --- | --- |
| - String easy\_mode | String “Easy” |
| - String normal\_mode | String “Normal” |
| - String hard\_mode | String “Hard” |
| - double easy\_width | Width position to draw easy\_mode |
| - double normal\_width | Width position to draw normal\_mode |
| - double hard\_width | Width position to draw hard\_mode |

3.2.3.2 Constructor

|  |  |
| --- | --- |
| + DisplayModeSelect() | - Set the width and height with SCENE\_WIDTH and SCENE\_HEIGHT  - Initialize gc  - call the setBackground(), setText(), EventHandler() methods |

3.2.3.3 Method

|  |  |
| --- | --- |
| + voidsetBackground() | Set the background of canvas with menuBackgroundin RenderableHolder |
| + void setText() | Set the text of canvas  - Title  - Modes  - Esc: Back |
| + void setHighLight(String selected\_mode, double selected\_width) | Set the text highlight when user chose it |
| + void setUnHightLight(String unsel\_mode, double unsel\_width) | Set the text unhighlight when user left it |
| + void EventHandler() | Add listener to listen when user press  - Escape: back to previous canvas  - Enter: choose the selected mode and move to next canvas  - Up/Down: Change the highlight position |

3.2.4 Class DisplaySongSelect extends CanvasManager implements Drawable

3.2.4.1 Constructor

|  |  |
| --- | --- |
| + DisplaySongSelect() | - Set the width and height with SCENE\_WIDTH and SCENE\_HEIGHT  - Initialize gc  - call the setBackground(), setText(), EventHandler() methods |

3.2.4.2 Method

|  |  |
| --- | --- |
| + voidsetBackground() | Set the background of canvas with menuBackgroundin RenderableHolder |
| + void setText() | Set the text of canvas  - Title  - Songs  - Esc: Back |
| + void setHighLight(String selected\_mode, double selected\_width) | Set the text highlight when user chose it |
| + void setUnHightLight(String unsel\_mode, double unsel\_width) | Set the text unhighlight when user left it |
| + void EventHandler() | Add listener to listen when user press  - Escape: back to previous canvas  - Enter: choose the selected song and move to next canvas  - Up/Down: Change the highlight position |

3.2.5 Class InGame extends CanvasManager implements Drawable

3.2.5.1 Field

|  |  |
| --- | --- |
| - int FPS | 60 Frames per second |
| - long LOOP\_TIME | Time between each update of a game animation |
| - Thread gameAnimation | Thread of animation |
| - Boolean isAnimationRunning | Variable that control the thread loop to start or not |

3.2.5.2 Constructor

|  |  |
| --- | --- |
| + InGame() | - Set the width and height with INGAME\_WIDTH and INGAME\_HEIGHT  - Initialize gc  - call the EventHandler() methods |

3.2.5.3 Method

|  |  |
| --- | --- |
| - void getReady() | Show the screen that count down before the game start |
| + void startAnimation() | - Initialize gameAnimation  - Set isAnimationRunning = true  - Start the animation thread |
| + void stopAnimation() | Set isAnimationRunning = false |
| - void animationLoop() | Loop the animation  - Call getReady()  - Start the song  - Loop while isAnimationRunning is true, call the updateAnimation |
| - void updateAnimation(int count) | - Set background  - Render the items from RenderableHolder  - Set text |
| + void setBackground() | Set the background of canvas with inGameBackgroundin RenderableHolder |
| + void setText() | - Add score and combo text at the top left  - Add song name and time at the top right |
| + void setHighLight(String selected\_mode, double selected\_width) | Blank method (not use, but need to implements) |
| + void setUnHightLight(String unsel\_mode, double unsel\_width) | Blank method (not use, but need to implements) |
| + void EventHandler() | Add listener to listen when user press  - Escape: go to the pause canvas  - A, S, D: always return only 1 tick if the user hold the button or not |

3.2.6 Class Pause extends CanvasManager implements Drawable

3.2.6.1 Constructor

|  |  |
| --- | --- |
| + Pause() | - Set the width and height with SCENE\_WIDTH and SCENE\_HEIGHT  - Initialize gc  - call the setBackground(), setText(), EventHandler() methods |

3.2.6.2 Method

|  |  |
| --- | --- |
| + voidsetBackground() | Set the background of canvas with black color |
| + void setText() | Set the text of canvas  - Title  - Esc: Continue |
| + void setHighLight(String selected\_mode, double selected\_width) | Blank method (not use, but need to implements) |
| + void setUnHightLight(String unsel\_mode, double unsel\_width) | Blank method (not use, but need to implements) |
| + void EventHandler() | Add listener to listen when user press  - Escape: resume InGame |

3.2.7 Class GameResult extends CanvasManager implements Drawable

3.2.7.1 Constructor

|  |  |
| --- | --- |
| + GameResult() | - Set the width and height with SCENE\_WIDTH and SCENE\_HEIGHT  - Initialize gc  - call the setBackground(), setText(), EventHandler() methods |

3.2.7.2 Method

|  |  |
| --- | --- |
| + voidsetBackground() | Set the background of canvas with menuBackgroundin RenderableHolder |
| + void setText() | Set the text of canvas  - User’s score  - Esc: Exit  - if the user reach all combos, show OK alert with the text |
| + void setHighLight(String selected\_mode, double selected\_width) | Blank method (not use, but need to implements) |
| + void setUnHightLight(String unsel\_mode, double unsel\_width) | Blank method (not use, but need to implements) |
| + void EventHandler() | Add listener to listen when user press  - Enter/Escape: Exit the game |

3.2.8 Interface Drawable

3.2.8.1Field

|  |  |
| --- | --- |
| + int SCENE\_WIDTH | 800px |
| + int SCENE\_HEIGHT | 600px |
| + intINGAME\_WIDTH | 480px |
| + intINGAME\_HEIGHT | 800px |
| + Font MAIN\_FONT | Monospace with size 50 |
| + Font SUBMAIN\_FONT | Monospace with size 25 |

3.2.8.2 Method

|  |  |
| --- | --- |
| + void setBackGround() |  |
| + void setText() |  |
| + void setHightLight(String selected\_mode, double selected\_width) |  |
| + void setUnHightLight(String unsel\_mode, double unsel\_width) |  |
| + void EventHandler() |  |

3.3 Package input

3.3.1 Class InGameInput

3.3.1.1 Field

|  |  |
| --- | --- |
| - ArrayList<KeyCode>keyPressed | Initialize ArrayList |

3.3.1.2 Method

|  |  |
| --- | --- |
| - void setKeyPressed(KeyCodekeyCode) | - If the keyPressed don’t have that keyCode, insert the keycode into the list |
| - booleangetKeyPressed(KeyCodekeyCode) | - return true if there is already have the keyCode in the list, otherwise return false |
| - void setKeyReleased(KeyCodekeyCode) | - remove the keycode when release |

3.4 Package logic

3.4.1 Class Button extends Items

3.4.1.1 Field

|  |  |
| --- | --- |
| - KeyCode keycode | The keycode from user |

3.4.1.2 Constructor

|  |  |
| --- | --- |
| + Button(int x, int y, KeyCode keycode) | - Set the parameter x, y, keycode to the field  - Set z value to 50 (under the Note) |

3.4.1.3 Method

|  |  |
| --- | --- |
| + void draw(GraphicsContextgc, int count) | Draw the button  - if isPressed true, draw white stroke and red square  - if false, draw white stroke and orange square |
| + void update() | - ifgetKeyPressed() from InGameInput is true, set isPressed true, setTouchButton in model true with the keycode field, otherwise set all above to false  - add local variable selectedSong and time\_now, call from model  - iftime\_now is in a map of songnotescheck if the button user pressed is A,S, or D match with the note position, set the touchnote in model true and the score is up. Otherwise, set touchnote false. |

3.4.2 Class CountDownTimer

3.4.2.1 Field

|  |  |
| --- | --- |
| - long time | Time now |
| - long DEFAULT\_TIME | 65 x 10^9 L |
| - int PER\_MINUTE | 60 seconds |

3.4.2.2 Constructor

|  |  |
| --- | --- |
| + CountDownTimer | Set the initial time to default time |

3.4.2.3 Method

|  |  |
| --- | --- |
| + void countdown(long elapsedTime) | Minus time with elapsedTime |
| + String toMinute() | Return String of time in format XX:XX |
| + long getTime() | Return time |
| + void setTime(long time) | Set the time with given parameter |
| + intgetTimeSecond() | Return time in second |
| + void setTimeSecond() | Set the time in long with the input in second |

3.4.3 Class GameLogic

3.4.3.1 Field

|  |  |
| --- | --- |
| - int FPS | 60 Frames per second |
| - long LOOP\_TIME | Time between each update of a game animation |
| - GameModel model | A model to call the function |
| - InGameingame | An ingame field to call the function |
| - Thread gameLogic | A thread needs to run together with gameAnimation thread in InGame |
| - List<Items>gameObj | List that contains all buttons and notes |
| - Button button1 | Left button |
| - Button button2 | Center button |
| - Button button3 | Right button |
| - Note note | Field of note |
| - List<Pair<Double, Integer>>songNotes |  |
|  |  |
|  |  |