NHFSudoku

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1 Namespace Index 1

1.1 Package List 1

2 Hierarchical Index 3

2.1 Class Hierarchy 3

3 Class Index 5

3.1 Class List 5

4 File Index 7

4.1 File List 7

5 Namespace Documentation 9

5.1 Package sudoku 9

6 Class Documentation 11

6.1 sudoku.Difficulty Enum Reference 11

6.1.1 Detailed Description 11

6.1.2 Member Data Documentation 11

6.1.2.1 EASY 11

6.1.2.2 HARD 11

6.1.2.3 MEDIUM 11

6.2 sudoku.SudokuCellFilter Class Reference 12

6.2.1 Detailed Description 12

6.2.2 Member Function Documentation 12

6.2.2.1 insertString() 12

6.2.2.2 remove() 13

6.2.2.3 replace() 13

6.3 sudoku.SudokuCellFormatter Class Reference 14

6.3.1 Detailed Description 14

6.3.2 Member Function Documentation 14

6.3.2.1 formatCell() 14

6.4 sudoku.SudokuGameManager Class Reference 15

6.4.1 Detailed Description 15

6.4.2 Constructor & Destructor Documentation 15

6.4.2.1 SudokuGameManager() 15

6.4.3 Member Function Documentation 16

6.4.3.1 getElapsedTime() 16

6.4.3.2 getLeaderboardEntries() 16

6.4.3.3 isGridEmpty() 16

6.4.3.4 loadGame() 16

6.4.3.5 saveGame() 17

6.4.3.6 saveGameResult() 17

6.4.3.7 setElapsedTime() 17

6.4.4 Member Data Documentation . . . 18
6.4.4.1 elapsedTime . . . 18
6.4.4.2 grid . . . 18
6.4.4.3 leaderboard . . . 18
6.5 sudoku.SudokuGenerator Class Reference . . . 18
6.5.1 Detailed Description . . . 19
6.5.2 Member Function Documentation . . . 19
6.5.2.1 fillGrid() . . . 19
6.5.2.2 generateCompleteGrid() . . . 19
6.5.2.3 generatePuzzle() . . . 19
6.5.2.4 generateShuffledNumbers() . . . 20
6.5.2.5 isSafe() . . . 20
6.5.2.6 removeCells() . . . 21
6.5.2.7 swap() . . . 21
6.5.3 Member Data Documentation . . . 21
6.5.3.1 random . . . 21
6.5.3.2 SIZE . . . 21
6.5.3.3 SUBGRID_SIZE . . . 22
6.6 sudoku.SudokuGUI Class Reference . . . 22
6.6.1 Detailed Description . . . 23
6.6.2 Constructor & Destructor Documentation . . . 23
6.6.2.1 SudokuGUI() . . . 23
6.6.3 Member Function Documentation . . . 23
6.6.3.1 checkIfGridIsFilled() . . . 23
6.6.3.2 displayLeaderboard() . . . 23
6.6.3.3 getSaveFiles() . . . 24
6.6.3.4 handleCheck() . . . 24
6.6.3.5 handleGameEnd() . . . 24
6.6.3.6 handleLoadGame() . . . 24
6.6.3.7 handleNewGame() . . . 24
6.6.3.8 handleSaveGame() . . . 25
6.6.3.9 initializeActionPanel() . . . 25
6.6.3.10 initializeGridPanel() . . . 25
6.6.3.11 initializeMenuBar() . . . 25
6.6.3.12 initializeTimer() . . . 25
6.6.3.13 main() . . . 25
6.6.3.14 pauseTimer() . . . 26
6.6.3.15 resumeTimer() . . . 26
6.6.3.16 startNewGame() . . . 26
6.6.3.17 updateTimerLabel() . . . 26
6.6.4 Member Data Documentation . . . 26
6.6.4.1 currentDifficulty . . . 26

6.6.4.2 elapsedTime 27
6.6.4.3 gameManager 27
6.6.4.4 grid 27
6.6.4.5 isTimerRunning 27
6.6.4.6 timer 27
6.6.4.7 timerLabel 27
6.7 sudoku.SudokuLeaderboard Class Reference 27
6.7.1 Detailed Description 28
6.7.2 Constructor & Destructor Documentation 28
6.7.2.1 SudokuLeaderboard() 28
6.7.3 Member Function Documentation 28
6.7.3.1 addEntry() 28
6.7.3.2 difficultyOrder() 29
6.7.3.3 getEntries() 29
6.7.3.4 loadLeaderboard() 29
6.7.3.5 saveLeaderboard() 29
6.7.4 Member Data Documentation 30
6.7.4.1 entries 30
6.7.4.2 LEADERBOARD_FILE 30
6.8 sudoku.SudokuLeaderboardEntry Class Reference 30
6.8.1 Detailed Description 30
6.8.2 Constructor & Destructor Documentation 31
6.8.2.1 SudokuLeaderboardEntry() [1/2] 31
6.8.2.2 SudokuLeaderboardEntry() [2/2] 31
6.8.3 Member Function Documentation 31
6.8.3.1 getDifficulty() 31
6.8.3.2 getElapsedTime() 31
6.8.3.3 getPlayerName() 32
6.8.4 Member Data Documentation 32
6.8.4.1 difficulty 32
6.8.4.2 elapsedTime 32
6.8.4.3 playerName 32
6.9 sudoku.SudokuValidator Class Reference 32
6.9.1 Detailed Description 33
6.9.2 Constructor & Destructor Documentation 33
6.9.2.1 SudokuValidator() 33
6.9.3 Member Function Documentation 33
6.9.3.1 getInvalidCells() 33
6.9.3.2 isBoardEmpty() 34
6.9.3.3 isSafe() 34
6.9.3.4 isValid() 34
6.9.4 Member Data Documentation 34

6.9.4.1 grid 34
6.9.4.2 invalidCells 34

7 File Documentation 35
7.1 src/main/java/sudoku/Difficulty.java File Reference 35
7.2 src/main/java/sudoku/SudokuCellFilter.java File Reference 35
7.3 src/main/java/sudoku/SudokuCellFormatter.java File Reference 35
7.4 src/main/java/sudoku/SudokuGameManager.java File Reference 36
7.5 src/main/java/sudoku/SudokuGenerator.java File Reference 36
7.6 src/main/java/sudoku/SudokuGUI.java File Reference 36
7.7 src/main/java/sudoku/SudokuLeaderboard.java File Reference 37
7.8 src/main/java/sudoku/SudokuLeaderboardEntry.java File Reference 37
7.9 src/main/java/sudoku/SudokuValidator.java File Reference 37

Index 39

Chapter 1

Namespace Index

1.1 Package List

Here are the packages with brief descriptions (if available):

sudoku 9

Chapter 2

Hierarchical Index

2.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

sudoku.Difficulty 11

DocumentFilter

  sudoku.SudokuCellFilter 12

JFrame

  sudoku.SudokuGUI 22

sudoku.SudokuCellFormatter 14

sudoku.SudokuGameManager 15

sudoku.SudokuGenerator 18

sudoku.SudokuLeaderboard 27

sudoku.SudokuLeaderboardEntry 30

sudoku.SudokuValidator 32

Chapter 3

Class Index

3.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

sudoku.Difficulty 11

sudoku.SudokuCellFilter

A custom DocumentFilter to restrict input in a Sudoku cell to digits 1-9 12

sudoku.SudokuCellFormatter

Provides utility methods for formatting Sudoku cell JTextFields 14

sudoku.SudokuGameManager

Manages the Sudoku game state, including saving, loading, and tracking progress 15

sudoku.SudokuGenerator

Generates Sudoku puzzles of varying difficulty levels 18

sudoku.SudokuGUI

Provides the graphical user interface for the Sudoku game 22

sudoku.SudokuLeaderboard

Manages the leaderboard for Sudoku game results 27

sudoku.SudokuLeaderboardEntry

Represents an entry in the Sudoku leaderboard 30

sudoku.SudokuValidator

Validates the current state of a Sudoku grid 32

Chapter 4

File Index

4.1 File List

Here is a list of all files with brief descriptions:

src/main/java/sudoku/Difficulty.java 35
src/main/java/sudoku/SudokuCellFilter.java 35
src/main/java/sudoku/SudokuCellFormatter.java 35
src/main/java/sudoku/SudokuGameManager.java 36
src/main/java/sudoku/SudokuGenerator.java 36
src/main/java/sudoku/SudokuGUI.java 36
src/main/java/sudoku/SudokuLeaderboard.java 37
src/main/java/sudoku/SudokuLeaderboardEntry.java 37
src/main/java/sudoku/SudokuValidator.java 37

Chapter 5

Namespace Documentation

5.1 Package sudoku

Classes

- enum Difficulty
- class SudokuCellFilter

  A custom DocumentFilter to restrict input in a Sudoku cell to digits 1-9.
- class SudokuCellFormatter

  Provides utility methods for formatting Sudoku cell JTextFields.
- class SudokuGameManager

  Manages the Sudoku game state, including saving, loading, and tracking progress.
- class SudokuGenerator

  Generates Sudoku puzzles of varying difficulty levels.
- class SudokuGUI

  Provides the graphical user interface for the Sudoku game.
- class SudokuLeaderboard

  Manages the leaderboard for Sudoku game results.
- class SudokuLeaderboardEntry

  Represents an entry in the Sudoku leaderboard.
- class SudokuValidator

  Validates the current state of a Sudoku grid.

Chapter 6

Class Documentation

6.1 sudoku.Difficulty Enum Reference

Public Attributes

- EASY
- MEDIUM
- HARD

6.1.1 Detailed Description

Enum representing the difficulty levels of a Sudoku game.

6.1.2 Member Data Documentation

6.1.2.1 EASY

```
sudoku.Difficulty.EASY
```

6.1.2.2 HARD

```
sudoku.Difficulty.HARD
```

6.1.2.3 MEDIUM

```
sudoku.Difficulty.MEDIUM
```

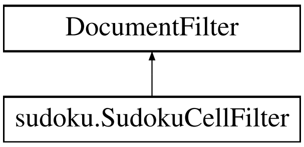
The documentation for this enum was generated from the following file:

- src/main/java/sudoku/Difficulty.java

6.2 sudoku.SudokuCellFilter Class Reference

A custom DocumentFilter to restrict input in a Sudoku cell to digits 1-9.

Inheritance diagram for sudoku.SudokuCellFilter:



Public Member Functions

- void insertString (FilterBypass fb, int offset, String string, AttributeSet attr) throws BadLocationException
- void replace (FilterBypass fb, int offset, int length, String text, AttributeSet attrs) throws BadLocationException
- void remove (FilterBypass fb, int offset, int length) throws BadLocationException

6.2.1 Detailed Description

A custom DocumentFilter to restrict input in a Sudoku cell to digits 1-9.

This filter ensures that only numeric characters in the range 1-9 can be entered into the document. It also allows clearing text completely.

6.2.2 Member Function Documentation

6.2.2.1 insertString()

```
void sudoku.SudokuCellFilter.insertString (
            FilterBypass fb,
            int offset,
            String string,
            AttributeSet attr ) throws BadLocationException
```

Inserts text into the document if it matches the allowed pattern.

Parameters

fb	The FilterBypass used to mutate the Document.
offset	The offset into the document to insert the content.
string	The string to insert.
attr	The attributes to associate with the inserted content.

Exceptions

BadLocationException	If the insert would result in invalid content.

Only digits from 1-9 or an empty string are allowed.

6.2.2.2 remove()

```
void sudoku.SudokuCellFilter.remove (
            FilterBypass fb,
            int offset,
            int length ) throws BadLocationException
```

Removes text from the document.

Parameters

fb	The FilterBypass used to mutate the Document.
offset	The offset into the document where removal begins.
length	The number of characters to remove.

Exceptions

BadLocationException	If the remove would result in invalid content.

Text removal is always allowed to ensure the cell can be cleared.

6.2.2.3 replace()

```
void sudoku.SudokuCellFilter.replace (
            FilterBypass fb,
            int offset,
            int length,
            String text,
            AttributeSet attrs ) throws BadLocationException
```

Replaces text in the document with new text if it matches the allowed pattern.

Parameters

fb	The FilterBypass used to mutate the Document.
offset	The offset into the document where the replacement begins.
length	The length of the text to replace.
text	The text to replace with.
attrs	The attributes to associate with the replacement text.

Exceptions

BadLocationException	If the replace would result in invalid content.

Only digits from 1-9 or an empty string are allowed.

The documentation for this class was generated from the following file:

- src/main/java/sudoku/SudokuCellFilter.java

6.3 sudoku.SudokuCellFormatter Class Reference

Provides utility methods for formatting Sudoku cell JTextFields.

Static Public Member Functions

- static void formatCell (JTextField cell, int row, int col, boolean isEditable)

6.3.1 Detailed Description

Provides utility methods for formatting Sudoku cell JTextFields.

This class defines a static method to configure the appearance and behavior of Sudoku grid cells, including alignment, size, font, background color, and borders.

6.3.2 Member Function Documentation

6.3.2.1 formatCell()

```
static void sudoku.SudokuCellFormatter.formatCell (
              JTextField cell,
              int row,
              int col,
              boolean isEditable )  [static]
```

Formats a Sudoku grid cell with specified properties.

Parameters

cell	The JTextField representing a Sudoku cell.
row	The row index of the cell in the Sudoku grid (0-based).
col	The column index of the cell in the Sudoku grid (0-based).
isEditable	Whether the cell should be editable by the user.

This method:

- Centers text horizontally.
- Sets the cell's size to 50x50 pixels.
- Adjusts background color and font based on the `isEditable` parameter.
- Configures borders to emphasize 3x3 subgrid boundaries.

The documentation for this class was generated from the following file:

- src/main/java/sudoku/SudokuCellFormatter.java

6.4 sudoku.SudokuGameManager Class Reference

Manages the Sudoku game state, including saving, loading, and tracking progress.

Public Member Functions

- SudokuGameManager (JTextField[ ][ ] grid, int elapsedTime)
- void saveGame (String saveName, Difficulty difficulty)
- void loadGame (String saveName)
- int getElapsedTime ()
- void setElapsedTime (int elapsedTime)
- boolean isGridEmpty ()
- void saveGameResult (String playerName, Difficulty difficulty)
- List< SudokuLeaderboardEntry > getLeaderboardEntries ()

Private Attributes

- final JTextField[ ][ ] grid
- final SudokuLeaderboard leaderboard = new SudokuLeaderboard()

  < The elapsed time in seconds for the current game.
- int elapsedTime

  < The 9x9 grid representing the Sudoku board.

6.4.1 Detailed Description

Manages the Sudoku game state, including saving, loading, and tracking progress.

This class provides methods to save and load the current game state, manage the elapsed time, and interact with the leaderboard. It uses a 9x9 grid of JTextFields to represent the Sudoku board.

6.4.2 Constructor & Destructor Documentation

6.4.2.1 SudokuGameManager()

```
sudoku.SudokuGameManager.SudokuGameManager (
            JTextField grid[ ][ ],
            int elapsedTime )
```

Constructs a SudokuGameManager with a given grid and initial elapsed time.

Parameters

grid	The 9x9 grid of JTextFields representing the Sudoku board.
elapsedTime	The initial elapsed time in seconds.

6.4.3 Member Function Documentation

6.4.3.1 getElapsedTime()

```
int sudoku.SudokuGameManager.getElapsedTime ( )
```

Retrieves the elapsed time for the current game.

Returns

The elapsed time in seconds.

6.4.3.2 getLeaderboardEntries()

```
List< SudokuLeaderboardEntry > sudoku.SudokuGameManager.getLeaderboardEntries ( )
```

Retrieves the leaderboard entries.

Returns

A list of SudokuLeaderboardEntry objects representing the leaderboard entries.

6.4.3.3 isGridEmpty()

```
boolean sudoku.SudokuGameManager.isGridEmpty ( )
```

Checks if the grid is empty.

Returns

True if all cells in the grid are empty, false otherwise.

6.4.3.4 loadGame()

```
void sudoku.SudokuGameManager.loadGame (
            String saveName )
```

Loads a game state from a JSON file.

Parameters

saveName	The name of the save file (without extension).

This method restores:

- The current grid values.

- The original grid values (for setting editability).
- The elapsed time.
- The difficulty level.

Displays a success or error message based on the result of the operation.

6.4.3.5 saveGame()

```
void sudoku.SudokuGameManager.saveGame (
            String saveName,
            Difficulty difficulty )
```

Saves the current game state to a JSON file.

Parameters

saveName	The name of the save file (without extension).
difficulty	The difficulty level of the game.

This method saves:

- The current grid values.
- The original grid values.
- The elapsed time.
- The difficulty level.

If the grid is empty, the save operation is aborted with a warning message.

6.4.3.6 saveGameResult()

```
void sudoku.SudokuGameManager.saveGameResult (
            String playerName,
            Difficulty difficulty )
```

Saves the game result to the leaderboard.

Parameters

playerName	The name of the player.
difficulty	The difficulty level of the game.

6.4.3.7 setElapsedTime()

```
void sudoku.SudokuGameManager.setElapsedTime (
            int elapsedTime )
```

Sets the elapsed time for the current game.

Parameters

elapsedTime	The elapsed time in seconds.

6.4.4 Member Data Documentation

6.4.4.1 elapsedTime

```
int sudoku.SudokuGameManager.elapsedTime  [private]
```

< The 9x9 grid representing the Sudoku board.

The leaderboard manager.

6.4.4.2 grid

```
final JTextField [][] sudoku.SudokuGameManager.grid  [private]
```

6.4.4.3 leaderboard

```
final SudokuLeaderboard sudoku.SudokuGameManager.leaderboard = new SudokuLeaderboard()  [private]
```

< The elapsed time in seconds for the current game.

The documentation for this class was generated from the following file:

- src/main/java/sudoku/SudokuGameManager.java

6.5 sudoku.SudokuGenerator Class Reference

Generates Sudoku puzzles of varying difficulty levels.

Public Member Functions

- int[ ][ ] generatePuzzle (Difficulty difficulty)

Private Member Functions

- int[ ][ ] generateCompleteGrid ()
- boolean fillGrid (int[ ][ ] grid, int cellIndex)
- int[ ] generateShuffledNumbers ()
- void swap (int[ ] array, int i, int j)
- boolean isSafe (int[ ][ ] grid, int row, int col, int num)
- void removeCells (int[ ][ ] grid, int cellsToRemove)

Static Private Attributes

- static final int SIZE = 9
- static final int SUBGRID_SIZE = 3

  < The size of the Sudoku grid (9x9).
- static final Random random = new Random()

  < The size of a subgrid (3x3).

6.5.1 Detailed Description

Generates Sudoku puzzles of varying difficulty levels.

This class provides methods to generate a complete Sudoku grid, remove cells to create a puzzle based on difficulty.

6.5.2 Member Function Documentation

6.5.2.1 fillGrid()

```
boolean sudoku.SudokuGenerator.fillGrid (
            int grid[][],
            int cellIndex )  [private]
```

Fills the Sudoku grid using a backtracking algorithm.

Parameters

grid	The Sudoku grid to fill.
cellIndex	The current cell index being filled (row ∗ SIZE + col).

Returns

True if the grid is successfully filled, false otherwise.

This method recursively tries all possible numbers for each cell and backtracks if no valid number can be placed.

6.5.2.2 generateCompleteGrid()

```
int[][] sudoku.SudokuGenerator.generateCompleteGrid ( )  [private]
```

Generates a complete, valid Sudoku grid.

Returns

A 2D integer array representing a complete Sudoku grid.

This method uses a backtracking algorithm to fill the grid with numbers while adhering to Sudoku rules.

6.5.2.3 generatePuzzle()

```
int[][] sudoku.SudokuGenerator.generatePuzzle (
            Difficulty difficulty )
```

Generates a Sudoku puzzle based on the specified difficulty.

Parameters

difficulty	The difficulty level of the puzzle ("Easy", "Medium", "Hard").

Returns

A 2D integer array representing the Sudoku puzzle grid.

Exceptions

IllegalStateException	If an invalid difficulty level is provided.

The number of clues (pre-filled cells) varies by difficulty:

- Easy: 60 clues
- Medium: 30 clues
- Hard: 15 clues

6.5.2.4 generateShuffledNumbers()

```
int[] sudoku.SudokuGenerator.generateShuffledNumbers ( )  [private]
```

Generates an array of numbers 1-9 in random order.

Returns

An array of shuffled numbers from 1 to 9.

6.5.2.5 isSafe()

```
boolean sudoku.SudokuGenerator.isSafe (
            int grid[][],
            int row,
            int col,
            int num )  [private]
```

Checks if placing a number in a cell is safe according to Sudoku rules.

Parameters

grid	The Sudoku grid.
row	The row index of the cell.
col	The column index of the cell.
num	The number to place in the cell.

Returns

True if it is safe to place the number, false otherwise.

This method checks the row, column, and the 3x3 subgrid for duplicates.

6.5.2.6 removeCells()

```
void sudoku.SudokuGenerator.removeCells (
             int grid[][],
             int cellsToRemove )  [private]
```

Removes a specified number of cells from the grid to create a puzzle.

Parameters

grid	The Sudoku grid.
cellsToRemove	The number of cells to remove.

This method randomly selects cells and sets them to 0 (empty).

6.5.2.7 swap()

```
void sudoku.SudokuGenerator.swap (
             int[] array,
             int i,
             int j )  [private]
```

Swaps two elements in an array.

Parameters

array	The array in which the elements are swapped.
i	The index of the first element.
j	The index of the second element.

6.5.3 Member Data Documentation

6.5.3.1 random

```
final Random sudoku.SudokuGenerator.random = new Random()  [static], [private]
```

< The size of a subgrid (3x3).

Random number generator for shuffling and cell removal.

6.5.3.2 SIZE

```
final int sudoku.SudokuGenerator.SIZE = 9  [static], [private]
```

6.5.3.3 SUBGRID_SIZE

```
final int sudoku.SudokuGenerator.SUBGRID_SIZE = 3  [static], [private]
```

< The size of the Sudoku grid (9x9).

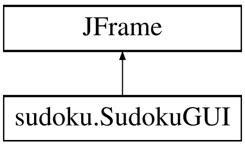
The documentation for this class was generated from the following file:

- src/main/java/sudoku/SudokuGenerator.java

6.6 sudoku.SudokuGUI Class Reference

Provides the graphical user interface for the Sudoku game.

Inheritance diagram for sudoku.SudokuGUI:



Public Member Functions

- SudokuGUI ()

Static Public Member Functions

- static void main (String[ ] args)

Private Member Functions

- void initializeMenuBar ()
- void initializeGridPanel ()
- void checkIfGridIsFilled ()
- void initializeActionPanel ()
- void initializeTimer ()
- void handleNewGame (ActionEvent e)
- void handleSaveGame (ActionEvent e)
- void handleLoadGame (ActionEvent e)
- void updateTimerLabel ()
- List< String > getSaveFiles ()
- void pauseTimer ()
- void resumeTimer ()
- void handleGameEnd ()
- void displayLeaderboard ()
- void handleCheck (ActionEvent e)
- void startNewGame (Difficulty difficulty)

Private Attributes

- final JTextField[ ][ ] grid = new JTextField[9][9]

  The 9x9 grid for the Sudoku game.
- final SudokuGameManager gameManager

  Manages game logic and persistence.
- Timer timer

  Timer to track elapsed game time.
- JLabel timerLabel

  Label to display the elapsed game time.
- int elapsedTime = 0

  Tracks elapsed game time in seconds.
- boolean isTimerRunning = false

  Indicates if the timer is running.
- Difficulty currentDifficulty

  The difficulty level of the current game.

6.6.1 Detailed Description

Provides the graphical user interface for the Sudoku game.

This class handles the layout, event handling, and interaction logic for a Sudoku game. It supports creating new games, saving/loading games, checking the grid, displaying a leaderboard, and managing a timer.

6.6.2 Constructor & Destructor Documentation

6.6.2.1 SudokuGUI()

```
sudoku.SudokuGUI.SudokuGUI ( )
```

Constructs a new SudokuGUI and initializes its components.

The constructor sets up the main window, menu bar, grid panel, action panel, and timer, and makes the GUI visible.

6.6.3 Member Function Documentation

6.6.3.1 checkIfGridIsFilled()

```
void sudoku.SudokuGUI.checkIfGridIsFilled ( ) [private]
```

Checks if the grid is fully filled and validates it if true.

6.6.3.2 displayLeaderboard()

```
void sudoku.SudokuGUI.displayLeaderboard ( ) [private]
```

Displays the leaderboard in a dialog.

Retrieves entries from the leaderboard and shows them in a formatted string.

6.6.3.3 getSaveFiles()

```
List< String > sudoku.SudokuGUI.getSaveFiles ( )  [private]
```

Retrieves the list of saved game files.

Returns

A list of save file names (without extensions).

6.6.3.4 handleCheck()

```
void sudoku.SudokuGUI.handleCheck (
            ActionEvent e )  [private]
```

Handles the validation of the Sudoku grid.

Parameters

e	The ActionEvent triggered by the "Check" button or grid filling.

Validates the grid using the SudokuValidator class and displays the result in a dialog. Highlights invalid cells in red if there are errors.

6.6.3.5 handleGameEnd()

```
void sudoku.SudokuGUI.handleGameEnd ( )  [private]
```

Handles the end of the game.

Prompts the user for their name, saves the game result to the leaderboard, and restarts the application.

6.6.3.6 handleLoadGame()

```
void sudoku.SudokuGUI.handleLoadGame (
            ActionEvent e )  [private]
```

Handles loading a saved game state.

Parameters

e	The ActionEvent triggered by the "Load" menu item.

6.6.3.7 handleNewGame()

```
void sudoku.SudokuGUI.handleNewGame (
            ActionEvent e )  [private]
```

Handles the creation of a new Sudoku game based on the selected difficulty.

Parameters

e	The ActionEvent triggered by the "New Game" menu item.

6.6.3.8 handleSaveGame()

```
void sudoku.SudokuGUI.handleSaveGame (
             ActionEvent e )  [private]
```

Handles saving the current game state.

Parameters

e	The ActionEvent triggered by the "Save" menu item.

6.6.3.9 initializeActionPanel()

```
void sudoku.SudokuGUI.initializeActionPanel ( )  [private]
```

Initializes the action panel containing buttons for checking the grid.

6.6.3.10 initializeGridPanel()

```
void sudoku.SudokuGUI.initializeGridPanel ( )  [private]
```

Initializes the grid panel containing the 9x9 Sudoku cells.

Each cell is formatted and configured to accept only valid input through a document filter. A document listener is added to each cell to detect when the grid is filled.

6.6.3.11 initializeMenuBar()

```
void sudoku.SudokuGUI.initializeMenuBar ( )  [private]
```

Initializes the menu bar with options for a new game, saving, loading, and viewing the leaderboard.

6.6.3.12 initializeTimer()

```
void sudoku.SudokuGUI.initializeTimer ( )  [private]
```

Initializes the timer and its associated label.

The timer updates the elapsed time every second while running.

6.6.3.13 main()

```
static void sudoku.SudokuGUI.main (
             String[] args )  [static]
```

The entry point for the application. Creates and displays the Sudoku GUI.

Parameters

args	Command-line arguments (not used).

6.6.3.14 pauseTimer()

```
void sudoku.SudokuGUI.pauseTimer ( )  [private]
```

Pauses the game timer.

Stops the timer and sets the running state to false.

6.6.3.15 resumeTimer()

```
void sudoku.SudokuGUI.resumeTimer ( )  [private]
```

Resumes the game timer.

Restarts the timer and sets the running state to true.

6.6.3.16 startNewGame()

```
void sudoku.SudokuGUI.startNewGame (
             Difficulty difficulty )  [private]
```

Starts a new Sudoku game with the specified difficulty.

Parameters

difficulty	The difficulty level ("Easy", "Medium", "Hard").

6.6.3.17 updateTimerLabel()

```
void sudoku.SudokuGUI.updateTimerLabel ( )  [private]
```

Updates the timer label with the current elapsed time.

6.6.4 Member Data Documentation

6.6.4.1 currentDifficulty

```
Difficulty sudoku.SudokuGUI.currentDifficulty  [private]
```

The difficulty level of the current game.

6.6.4.2 elapsedTime

```
int sudoku.SudokuGUI.elapsedTime = 0  [private]
```

Tracks elapsed game time in seconds.

6.6.4.3 gameManager

```
final SudokuGameManager sudoku.SudokuGUI.gameManager  [private]
```

Manages game logic and persistence.

6.6.4.4 grid

```
final JTextField [][] sudoku.SudokuGUI.grid = new JTextField[9][9]  [private]
```

The 9x9 grid for the Sudoku game.

6.6.4.5 isTimerRunning

```
boolean sudoku.SudokuGUI.isTimerRunning = false  [private]
```

Indicates if the timer is running.

6.6.4.6 timer

```
Timer sudoku.SudokuGUI.timer  [private]
```

Timer to track elapsed game time.

6.6.4.7 timerLabel

```
JLabel sudoku.SudokuGUI.timerLabel  [private]
```

Label to display the elapsed game time.

The documentation for this class was generated from the following file:

- src/main/java/sudoku/SudokuGUI.java

6.7 sudoku.SudokuLeaderboard Class Reference

Manages the leaderboard for Sudoku game results.

Public Member Functions

- SudokuLeaderboard ()
- void addEntry (String playerName, Difficulty difficulty, int elapsedTime)
- List< SudokuLeaderboardEntry > getEntries ()

Private Member Functions

- void loadLeaderboard ()
- void saveLeaderboard ()
- int difficultyOrder (Difficulty difficulty)

Private Attributes

- List< SudokuLeaderboardEntry > entries

  The list of leaderboard entries.

Static Private Attributes

- static final String LEADERBOARD_FILE = "leaderboard.json"

  The file where leaderboard data is stored.

6.7.1 Detailed Description

Manages the leaderboard for Sudoku game results.

This class handles adding entries to the leaderboard, loading leaderboard data from a file, saving leaderboard data to a file, and retrieving sorted entries.

6.7.2 Constructor & Destructor Documentation

6.7.2.1 SudokuLeaderboard()

```
sudoku.SudokuLeaderboard.SudokuLeaderboard ( )
```

Constructs a SudokuLeaderboard and loads entries from the leaderboard file.

6.7.3 Member Function Documentation

6.7.3.1 addEntry()

```
void sudoku.SudokuLeaderboard.addEntry (
             String playerName,
             Difficulty difficulty,
             int elapsedTime )
```

Adds a new entry to the leaderboard.

Parameters

playerName	The name of the player.
difficulty	The difficulty level of the completed game.
elapsedTime	The time taken to complete the game in seconds.

The entries are sorted by difficulty (Hard, Medium, Easy) and then by elapsed time. The updated leaderboard is saved to the file.

6.7.3.2 difficultyOrder()

```
int sudoku.SudokuLeaderboard.difficultyOrder (
            Difficulty difficulty )  [private]
```

Determines the sorting order for difficulties.

Parameters

difficulty	The difficulty level to evaluate.

Returns

An integer representing the order: Hard (0), Medium (1), Easy (2).

6.7.3.3 getEntries()

```
List< SudokuLeaderboardEntry > sudoku.SudokuLeaderboard.getEntries ( )
```

Retrieves the leaderboard entries.

Returns

A list of SudokuLeaderboardEntry objects sorted by difficulty and elapsed time.

6.7.3.4 loadLeaderboard()

```
void sudoku.SudokuLeaderboard.loadLeaderboard ( )  [private]
```

Loads leaderboard entries from the file.

This method reads the JSON file specified by `LEADERBOARD_FILE` and populates the `entries` list. If the file does not exist or cannot be read, the list remains empty.

6.7.3.5 saveLeaderboard()

```
void sudoku.SudokuLeaderboard.saveLeaderboard ( )  [private]
```

Saves the leaderboard entries to the file.

This method writes the `entries` list to the JSON file specified by `LEADERBOARD_FILE`.

6.7.4 Member Data Documentation

6.7.4.1 entries

```
List<SudokuLeaderboardEntry> sudoku.SudokuLeaderboard.entries  [private]
```

The list of leaderboard entries.

6.7.4.2 LEADERBOARD_FILE

```
final String sudoku.SudokuLeaderboard.LEADERBOARD_FILE = "leaderboard.json"  [static], [private]
```

The file where leaderboard data is stored.

The documentation for this class was generated from the following file:

- src/main/java/sudoku/SudokuLeaderboard.java

6.8 sudoku.SudokuLeaderboardEntry Class Reference

Represents an entry in the Sudoku leaderboard.

Public Member Functions

- SudokuLeaderboardEntry ()
- SudokuLeaderboardEntry (String playerName, Difficulty difficulty, int elapsedTime)
- String getPlayerName ()
- Difficulty getDifficulty ()
- int getElapsedTime ()

Private Attributes

- String playerName

  The name of the player.
- Difficulty difficulty

  The difficulty level of the game.
- int elapsedTime

  The time taken to complete the game in seconds.

6.8.1 Detailed Description

Represents an entry in the Sudoku leaderboard.

This class stores the player's name, the difficulty level of the game, and the time taken to complete the game.

6.8.2 Constructor & Destructor Documentation

6.8.2.1 SudokuLeaderboardEntry() [1/2]

```
sudoku.SudokuLeaderboardEntry.SudokuLeaderboardEntry ( )
```

Default constructor for SudokuLeaderboardEntry.

6.8.2.2 SudokuLeaderboardEntry() [2/2]

```
sudoku.SudokuLeaderboardEntry.SudokuLeaderboardEntry (
             String playerName,
             Difficulty difficulty,
             int elapsedTime )
```

Constructs a SudokuLeaderboardEntry with the specified player name, difficulty, and elapsed time.

Parameters

playerName	The name of the player.
difficulty	The difficulty level of the game.
elapsedTime	The time taken to complete the game in seconds.

6.8.3 Member Function Documentation

6.8.3.1 getDifficulty()

```
Difficulty sudoku.SudokuLeaderboardEntry.getDifficulty ( )
```

Gets the difficulty level of the game.

Returns

The difficulty level.

6.8.3.2 getElapsedTime()

```
int sudoku.SudokuLeaderboardEntry.getElapsedTime ( )
```

Gets the time taken to complete the game.

Returns

The elapsed time in seconds.

6.8.3.3 getPlayerName()

```
String sudoku.SudokuLeaderboardEntry.getPlayerName ( )
```

Gets the player's name.

Returns

The name of the player.

6.8.4 Member Data Documentation

6.8.4.1 difficulty

```
Difficulty sudoku.SudokuLeaderboardEntry.difficulty [private]
```

The difficulty level of the game.

6.8.4.2 elapsedTime

```
int sudoku.SudokuLeaderboardEntry.elapsedTime [private]
```

The time taken to complete the game in seconds.

6.8.4.3 playerName

```
String sudoku.SudokuLeaderboardEntry.playerName [private]
```

The name of the player.

The documentation for this class was generated from the following file:

- src/main/java/sudoku/SudokuLeaderboardEntry.java

6.9 sudoku.SudokuValidator Class Reference

Validates the current state of a Sudoku grid.

Public Member Functions

- SudokuValidator (JTextField[ ][ ] grid)
- boolean isValid ()
- List< Point > getInvalidCells ()

Private Member Functions

- boolean isSafe (int row, int col, int num)
- boolean isBoardEmpty ()

Private Attributes

- final JTextField[ ][ ] grid

  The Sudoku grid to validate.
- final List< Point > invalidCells

  List of invalid cell coordinates.

6.9.1 Detailed Description

Validates the current state of a Sudoku grid.

This class checks if the current state of the Sudoku grid is valid and keeps track of invalid cells.

6.9.2 Constructor & Destructor Documentation

6.9.2.1 SudokuValidator()

```
sudoku.SudokuValidator.SudokuValidator (
            JTextField grid[ ][ ] )
```

Constructs a SudokuValidator with the specified grid.

Parameters

grid	The Sudoku grid to validate.

6.9.3 Member Function Documentation

6.9.3.1 getInvalidCells()

```
List< Point > sudoku.SudokuValidator.getInvalidCells ( )
```

Returns the list of invalid cells.

Returns

The list of invalid cell coordinates.

6.9.3.2 isBoardEmpty()

```
boolean sudoku.SudokuValidator.isBoardEmpty ( )  [private]
```

Checks if the board is completely empty.

Returns

true if the board is completely empty, false otherwise.

6.9.3.3 isSafe()

```
boolean sudoku.SudokuValidator.isSafe (
              int row,
              int col,
              int num )  [private]
```

Checks if a number is valid at a given position.

Parameters

row	The row index.
col	The column index.
num	The number to check.

Returns

true if the number is valid, false otherwise.

6.9.3.4 isValid()

```
boolean sudoku.SudokuValidator.isValid ( )
```

Checks if the current state is valid and saves the invalid cells.

Returns

true if all entered numbers are valid, false otherwise.

6.9.4 Member Data Documentation

6.9.4.1 grid

```
final JTextField [ ][ ] sudoku.SudokuValidator.grid  [private]
```

The Sudoku grid to validate.

6.9.4.2 invalidCells

```
final List<Point> sudoku.SudokuValidator.invalidCells  [private]
```

List of invalid cell coordinates.

The documentation for this class was generated from the following file:

- src/main/java/sudoku/SudokuValidator.java

Chapter 7

File Documentation

7.1 src/main/java/sudoku/Difficulty.java File Reference

Classes

- enum sudoku.Difficulty

Packages

- package sudoku

7.2 src/main/java/sudoku/SudokuCellFilter.java File Reference

```
import javax.swing.text.AttributeSet;
```

Classes

- class sudoku.SudokuCellFilter

  A custom DocumentFilter to restrict input in a Sudoku cell to digits 1-9.

Packages

- package sudoku

7.3 src/main/java/sudoku/SudokuCellFormatter.java File Reference

```
import javax.swing;
```

Classes

- class sudoku.SudokuCellFormatter

  Provides utility methods for formatting Sudoku cell JTextFields.

Packages

- package sudoku

7.4 src/main/java/sudoku/SudokuGameManager.java File Reference

```
import com.fasterxml.jackson.databind.ObjectMapper;
```

Classes

- class sudoku.SudokuGameManager

  Manages the Sudoku game state, including saving, loading, and tracking progress.

Packages

- package sudoku

7.5 src/main/java/sudoku/SudokuGenerator.java File Reference

```
import java.util.Random;
```

Classes

- class sudoku.SudokuGenerator

  Generates Sudoku puzzles of varying difficulty levels.

Packages

- package sudoku

7.6 src/main/java/sudoku/SudokuGUI.java File Reference

```
import javax.swing;
```

Classes

- class sudoku.SudokuGUI

  Provides the graphical user interface for the Sudoku game.

Packages

- package sudoku

7.7 src/main/java/sudoku/SudokuLeaderboard.java File Reference

```
import com.fasterxml.jackson.databind.DeserializationFeature;
```

Classes

- class sudoku.SudokuLeaderboard

  Manages the leaderboard for Sudoku game results.

Packages

- package sudoku

7.8 src/main/java/sudoku/SudokuLeaderboardEntry.java File Reference

Classes

- class sudoku.SudokuLeaderboardEntry

  Represents an entry in the Sudoku leaderboard.

Packages

- package sudoku

7.9 src/main/java/sudoku/SudokuValidator.java File Reference

```
import javax.swing;
```

Classes

- class sudoku.SudokuValidator

  Validates the current state of a Sudoku grid.

Packages

- package sudoku

Index

addEntry
  sudoku.SudokuLeaderboard, 28

checkIfGridIsFilled
  sudoku.SudokuGUI, 23
currentDifficulty
  sudoku.SudokuGUI, 26

difficulty
  sudoku.SudokuLeaderboardEntry, 32
difficultyOrder
  sudoku.SudokuLeaderboard, 29
displayLeaderboard
  sudoku.SudokuGUI, 23

EASY
  sudoku.Difficulty, 11
elapsedTime
  sudoku.SudokuGameManager, 18
  sudoku.SudokuGUI, 26
  sudoku.SudokuLeaderboardEntry, 32
entries
  sudoku.SudokuLeaderboard, 30

fillGrid
  sudoku.SudokuGenerator, 19
formatCell
  sudoku.SudokuCellFormatter, 14

gameManager
  sudoku.SudokuGUI, 27
generateCompleteGrid
  sudoku.SudokuGenerator, 19
generatePuzzle
  sudoku.SudokuGenerator, 19
generateShuffledNumbers
  sudoku.SudokuGenerator, 20
getDifficulty
  sudoku.SudokuLeaderboardEntry, 31
getElapsedTime
  sudoku.SudokuGameManager, 16
  sudoku.SudokuLeaderboardEntry, 31
getEntries
  sudoku.SudokuLeaderboard, 29
getInvalidCells
  sudoku.SudokuValidator, 33
getLeaderboardEntries
  sudoku.SudokuGameManager, 16
getPlayerName
  sudoku.SudokuLeaderboardEntry, 31
getSaveFiles
  sudoku.SudokuGUI, 23
grid
  sudoku.SudokuGameManager, 18
  sudoku.SudokuGUI, 27
  sudoku.SudokuValidator, 34

handleCheck
  sudoku.SudokuGUI, 24
handleGameEnd
  sudoku.SudokuGUI, 24
handleLoadGame
  sudoku.SudokuGUI, 24
handleNewGame
  sudoku.SudokuGUI, 24
handleSaveGame
  sudoku.SudokuGUI, 25
HARD
  sudoku.Difficulty, 11

initializeActionPanel
  sudoku.SudokuGUI, 25
initializeGridPanel
  sudoku.SudokuGUI, 25
initializeMenuBar
  sudoku.SudokuGUI, 25
initializeTimer
  sudoku.SudokuGUI, 25
insertString
  sudoku.SudokuCellFilter, 12
invalidCells
  sudoku.SudokuValidator, 34
isBoardEmpty
  sudoku.SudokuValidator, 33
isGridEmpty
  sudoku.SudokuGameManager, 16
isSafe
  sudoku.SudokuGenerator, 20
  sudoku.SudokuValidator, 34
isTimerRunning
  sudoku.SudokuGUI, 27
isValid
  sudoku.SudokuValidator, 34

leaderboard
  sudoku.SudokuGameManager, 18
LEADERBOARD_FILE
  sudoku.SudokuLeaderboard, 30
loadGame
  sudoku.SudokuGameManager, 16
loadLeaderboard

sudoku.SudokuLeaderboard, 29

main
sudoku.SudokuGUI, 25
MEDIUM
sudoku.Difficulty, 11

pauseTimer
sudoku.SudokuGUI, 26
playerName
sudoku.SudokuLeaderboardEntry, 32

random
sudoku.SudokuGenerator, 21
remove
sudoku.SudokuCellFilter, 13
removeCells
sudoku.SudokuGenerator, 21
replace
sudoku.SudokuCellFilter, 13
resumeTimer
sudoku.SudokuGUI, 26

saveGame
sudoku.SudokuGameManager, 17
saveGameResult
sudoku.SudokuGameManager, 17
saveLeaderboard
sudoku.SudokuLeaderboard, 29
setElapsedTime
sudoku.SudokuGameManager, 17
SIZE
sudoku.SudokuGenerator, 21
src/main/java/sudoku/Difficulty.java, 35
src/main/java/sudoku/SudokuCellFilter.java, 35
src/main/java/sudoku/SudokuCellFormatter.java, 35
src/main/java/sudoku/SudokuGameManager.java, 36
src/main/java/sudoku/SudokuGenerator.java, 36
src/main/java/sudoku/SudokuGUI.java, 36
src/main/java/sudoku/SudokuLeaderboard.java, 37
src/main/java/sudoku/SudokuLeaderboardEntry.java, 37
src/main/java/sudoku/SudokuValidator.java, 37
startNewGame
sudoku.SudokuGUI, 26
SUBGRID_SIZE
sudoku.SudokuGenerator, 21
sudoku, 9
sudoku.Difficulty, 11
EASY, 11
HARD, 11
MEDIUM, 11
sudoku.SudokuCellFilter, 12
insertString, 12
remove, 13
replace, 13
sudoku.SudokuCellFormatter, 14
formatCell, 14
sudoku.SudokuGameManager, 15
elapsedTime, 18
getElapsedTime, 16
getLeaderboardEntries, 16
grid, 18
isGridEmpty, 16
leaderboard, 18
loadGame, 16
saveGame, 17
saveGameResult, 17
setElapsedTime, 17
SudokuGameManager, 15
sudoku.SudokuGenerator, 18
fillGrid, 19
generateCompleteGrid, 19
generatePuzzle, 19
generateShuffledNumbers, 20
isSafe, 20
random, 21
removeCells, 21
SIZE, 21
SUBGRID_SIZE, 21
swap, 21
sudoku.SudokuGUI, 22
checkIfGridIsFilled, 23
currentDifficulty, 26
displayLeaderboard, 23
elapsedTime, 26
gameManager, 27
getSaveFiles, 23
grid, 27
handleCheck, 24
handleGameEnd, 24
handleLoadGame, 24
handleNewGame, 24
handleSaveGame, 25
initializeActionPanel, 25
initializeGridPanel, 25
initializeMenuBar, 25
initializeTimer, 25
isTimerRunning, 27
main, 25
pauseTimer, 26
resumeTimer, 26
startNewGame, 26
SudokuGUI, 23
timer, 27
timerLabel, 27
updateTimerLabel, 26
sudoku.SudokuLeaderboard, 27
addEntry, 28
difficultyOrder, 29
entries, 30
getEntries, 29
LEADERBOARD_FILE, 30
loadLeaderboard, 29
saveLeaderboard, 29
SudokuLeaderboard, 28
sudoku.SudokuLeaderboardEntry, 30
difficulty, 32

elapsedTime, 32
getDifficulty, 31
getElapsedTime, 31
getPlayerName, 31
playerName, 32
SudokuLeaderboardEntry, 31
sudoku.SudokuValidator, 32
getInvalidCells, 33
grid, 34
invalidCells, 34
isBoardEmpty, 33
isSafe, 34
isValid, 34
SudokuValidator, 33
SudokuGameManager
sudoku.SudokuGameManager, 15
SudokuGUI
sudoku.SudokuGUI, 23
SudokuLeaderboard
sudoku.SudokuLeaderboard, 28
SudokuLeaderboardEntry
sudoku.SudokuLeaderboardEntry, 31
SudokuValidator
sudoku.SudokuValidator, 33
swap
sudoku.SudokuGenerator, 21

timer
sudoku.SudokuGUI, 27
timerLabel
sudoku.SudokuGUI, 27

updateTimerLabel
sudoku.SudokuGUI, 26