Sudoku Desktop Application

User Manual

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1.0   Introduction

Welcome. This user guide will cover how to use and get the most out of your Sudoku desktop application. In this section, you'll learn what the Sudoku desktop application is, what it does, and how to use this user guide to get the most out of your application.

The Sudoku application was developed by a team of computer science students at the University of Oregon for a core course. The application contains features that were required based on one customer's preferences.

1.1   System Overview

This Sudoku desktop application was designed to give Sudoku enthusiasts a nifty application they could play on their computers or laptops on-the-go. The application offers thousands of Sudoku puzzles in varying difficulties, giving the user higher replayability. The application allows users to start a puzzle, save it and resume it later after exiting the program. A timer is installed, giving the user the ability to time themselves, and also saves the user's best times for each difficulty. Other in-game features include a list of legal moves given for the selected tile, highlighting numbers, and getting hints and the solution. All of these features and functionalities are covered more in-depth in section 4.

One unique feature this application also offers is for the user to create their own Sudoku puzzles. They can be inspired by anything, either from imagination, a puzzle found in the newspaper, etc. Users can create new puzzles, play them, solve them, and delete them. Players can export these puzzles and send them to friends with the application to challenge them, or they can import puzzles from other users as well. This feature is covered more in-depth in section 5.

1.2   Organization of the Manual

This manual is divided into seven sections total. This first section was to provide an overview of what the Sudoku desktop application was about and what it offered. In the second section, you will learn about the system requirements needed to run the software, the access levels, and user contingencies. The third section will show you how to download, install, and run the program.

The fourth section introduces you to the bulk of the program. There, you will learn how to navigate the home menu, how to start a new puzzle, resume a saved puzzle, view your statistics, or best times, change the settings, and how to exit the application. You will also learn how to play Sudoku and how to play it on the program's interface. You will also learn how to highlight, insert, and delete numbers as well as get hints and solutions.

In the fifth section, you will learn how to create your own Sudoku puzzles. You will learn how to create a new puzzle, edit a puzzle, play and solve puzzles, and also how to

import and export puzzles. You will also learn about the file system and where the application saves all of your data.

The sixth section includes a troubleshooting guide, which you can refer to if something in the program goes wrong. There, you will find many different problem scenarios that offer a diagnosis and suggested solution for each problem. Hopefully, you will never need to refer to this section. The seventh and final section contains the credits, and download links to resources mentioned in the guide.

2.0   System Summary

In this section, you will learn what system requirements you will need to run the software, and how to meet them if you do not. You will also learn who can use the application, and who has access to your data. Finally, you will learn about some of the contingencies that can occur, and what the program's response will be to them.

2.1   System Requirements

To run the application, your computer must have Java 1.8.0 or a later version installed. If you have an older version of java, you can click here to download the most recent version. Once you've downloaded the java update package, open the folder and select the executable download file to start the download. Follow the prompted instructions given on the screen to finish downloading and installing your Java update.
If the above link doesn't work, go to www.oracle.com. From there, hover over the 'Downloads' tab, then select 'Java for Your Computer'. You will be taken to the download page where you can download the most recent version of Java. Select the package that matches with your operating system. Then follow the instructions in the above paragraph to install the update.

2.2   User Access Levels

After installing the program, anyone who has access to your desktop can use the program and manipulate your data. To prevent this, it is recommended that you change your user account settings to require administrative access to run the program or to access your desktop. Refer to your computer's manual on how to do this.

2.3   Contingencies

Unfortunately, there are cases where unexpected events can occur that cause our computer to crash or do unexpected things. Your data is not saved until you exit the application, so any unsaved data that you have before the crash happens will be lost. This only includes your saved game, best times, and any edits made on one of your puzzles after your last save.
If you delete the saved data on your computer while the program is running, it could cause certain buttons to become unresponsive or could crash the program. To prevent this, do not open and manipulate your program's save files while the program is running.

3.0   Getting Started

This section covers where and how to download the application, how to install and set up the program on your computer, and how to launch the program. By the end of this section, you should have the program functioning on your computer and will be ready to start learning how to use the program.

3.1   Downloading

Chances are, if you're reading this guide, you've already downloaded and installed the application. If so, feel free to skip to section 3.2. If not, you can download the program here. On this page, simply click the 'Sudoku.zip' link to download the program. Go to your computer's downloads folder to find the downloaded zipped archive folder.

3.2   Installing

Simply unzip the folder you downloaded, then click and drag the program to whichever directory you want. It is recommended that you place the program onto your desktop, like most other programs. However, the program should work from any directory you decide to place it in.

3.3   Starting the Application

To start the application, simply double-click the program to launch it. If your computer meets the system requirements specified earlier, the program should launch successfully, and you should see the window shown in figure 3.1. If the application did not successfully start, refer back to the system requirements (Section 2.1) or the troubleshooting section (Section 6).

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Figure 3.1 – *This window will appear if the program launched successfully. If this window appears for you on start-up, then you have successfully installed the program and are ready to start learning how to use it.*

4.0   Using the System

Now that you have the program running successfully, it's time to start learning the basics. By the end of this section, you'll know how to start a new game, play a simple game of Sudoku, load a saved game, view your best times, change your game settings, and quit the application.

4.1   The Menu System

In this section, you'll learn about the menu system and how to navigate through it. This includes starting a new game, loading a saved game, viewing your best times, accessing your saved custom puzzles, changing your settings, and quitting the program. See figure 4.1 below for a quick guide on how this section is organized.

Figure 4.1 – *The home menu of the program with a key next to each option, explained below.*

1.) *New Game* – Clicking this button will start a new game of Sudoku (section 4.1.1).
2.) *Load Game* – Clicking this button will load the previous game you started (section 4.1.2).
3.) *Statistics* – Clicking this button will display your best times, organized by puzzle difficulty (section 4.1.3).
4.) *My Puzzles* – Clicking this button takes you to your custom puzzle menu, where you can create and play user-created Sudoku puzzles. Briefly covered in section 4.1.4, but covered fully in section 5.
5.) *Settings* – Clicking this button takes you to the settings menu, where you can change the program settings (section 4.1.5).
6.) *Quit* – Clicking this button will exit the program (section 4.1.6).

4.1.1   Starting a New Game

   To start a new game, click the 'New Game' button from the home menu. You will be taken to another window where you can choose the puzzle difficulty, as shown in figure 4.2. There are five difficulties to choose from, including 'Novice', 'Easy', 'Medium', 'Hard', and 'Expert'. A novice game will give you a puzzle with 45 tiles already filled, an easy game giving you a puzzle with 40 tiles filled, medium with 35 tiles, hard with 30 tiles, and expert with 25 tiles. You can also click the 'Back' button to return the home menu.
   Once you've clicked a difficulty, a new game will start and you should see a window similar to the one shown in figure 4.3. Note that once you start a new game, your saved puzzle will be overwritten with the new puzzle and the data from the previous will be lost. If you do not want this to happen, go back to the home menu before starting a new game and click 'Load Game' to resume the saved game.

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Figure 4.2 – *This window appears when you click 'New Game'. Click on the button with the specified puzzle difficulty of your desire to start a new puzzle with that difficulty, or the back button to go back to the home menu.*

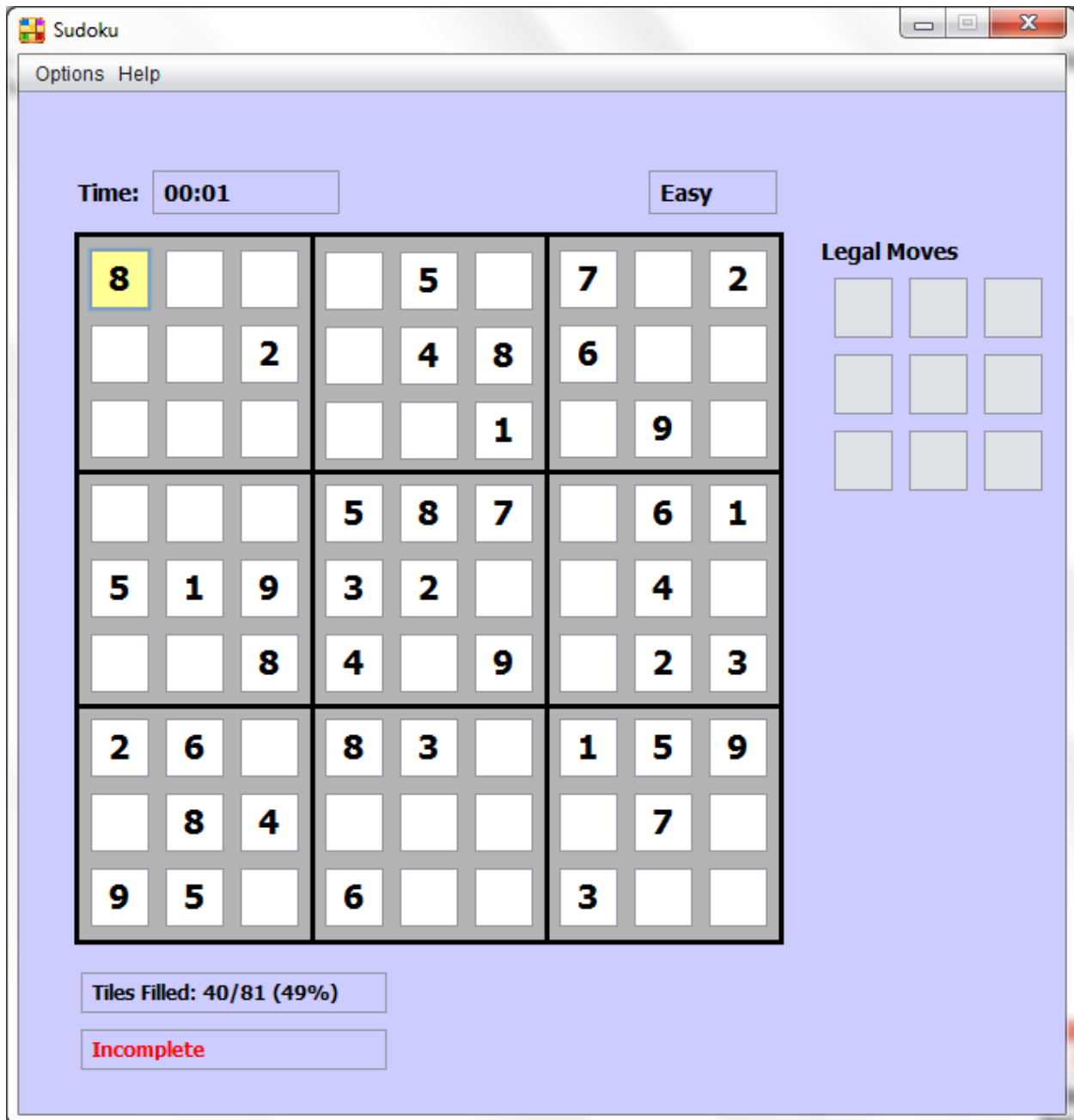*The rest of this page is intentionally left blank.*

Figure 4.3 – *A window similar to this one appears once you start a new game. This window and its components are covered later in section 4.2.*

4.1.2   Loading a Saved Game

To resume a game you started earlier, click 'Load Game' from the home menu to load your saved game. You should see a window appear similar to the one shown in figure 4.3, and it should be the puzzle you started earlier. If you have no previously saved puzzle, or the save file doesn't exist on your computer, a message will appear notifying you there is

no saved game, as shown in figure 4.4. However, once you start a new game, that puzzle will become your saved puzzle, and you can resume it later if you quit out before completion.
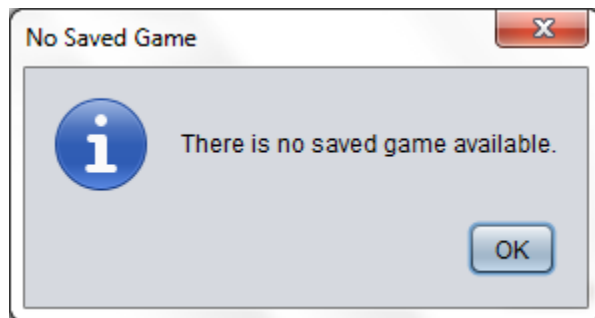

Figure 4.4 – *This window appears when you attempt to load a saved game when one doesn't exist.*

4.1.3   Viewing Your Statistics

To view your best times, click 'Statistics' from the home menu. A new window will appear similar to the one shown in figure 4.5. On your first start-up, you'll notice that the tables are empty, as it is shown in the figure. This means that you currently have no saved best times on the program. After completing a few puzzles, you'll start acquiring best times and they will appear on the table.

Your best times are organized into five tabs, one for each difficulty. Each tab keeps track of your top ten times, as well as the date and time you achieved that time. To view your best times for a difficulty, simply click on the tab at the top of the table containing the desired difficulty to switch tables. When you're done viewing your times, click 'Back' at the bottom left corner of the window to return to the home menu.

You can also reset your best times by difficulty simply by clicking 'Reset' at the bottom right corner of the window. Simply click the tab of the difficulty of the times you wish to reset to switch to that table, then click the reset button to reset your best times for the table currently on display. You will be asked to confirm the reset by clicking a yes or no button when prompted, as shown in figure 4.6. Click yes to reset your times, or no to cancel the reset. Be aware that once you reset your times, they are lost forever, so be sure you want to delete your times before confirming.

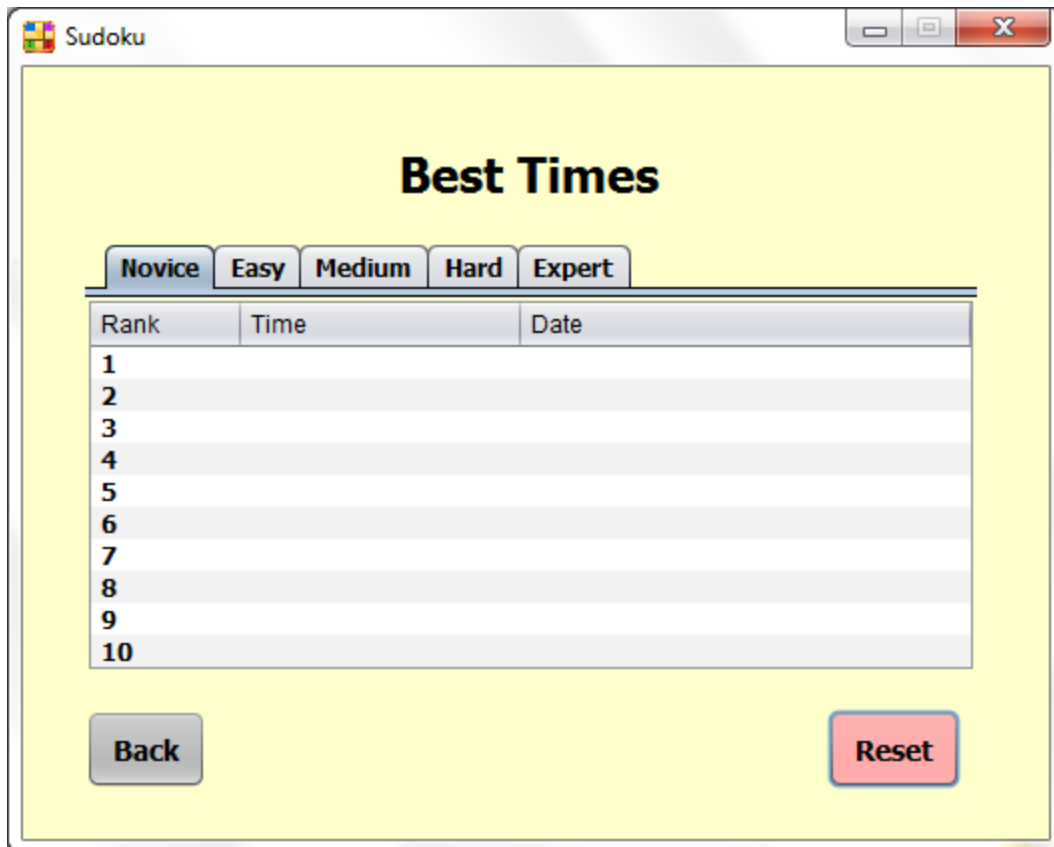*The rest of this page is intentionally left blank.*

Figure 4.5 – *This window appears when you click 'Statistics' from the home menu. Click a tab at the top to view your top ten times achieved for that difficulty along with the date and time you achieved them.*
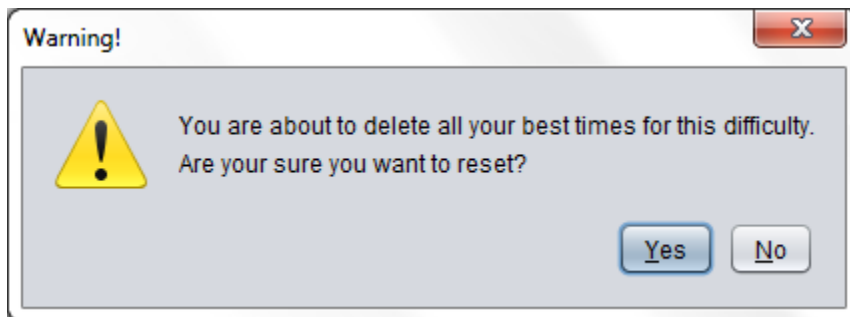

Figure 4.6 – *This warning message appears when you click 'Reset' at the bottom right of the window. Click 'Yes' to reset your top times for the selected difficulty, or 'No' to cancel.*

4.1.4 Creating Your Own Puzzles

Your Sudoku desktop application also allows you to create, edit and play your own Sudoku puzzles. From the home menu, click 'My Puzzles', then you will be taken to another window similar to the one shown in figure 4.7. This feature is explained more in-depth in section 5. To return to the home menu, click 'Back' at the bottom left corner of the window, or click File -> Go Back.
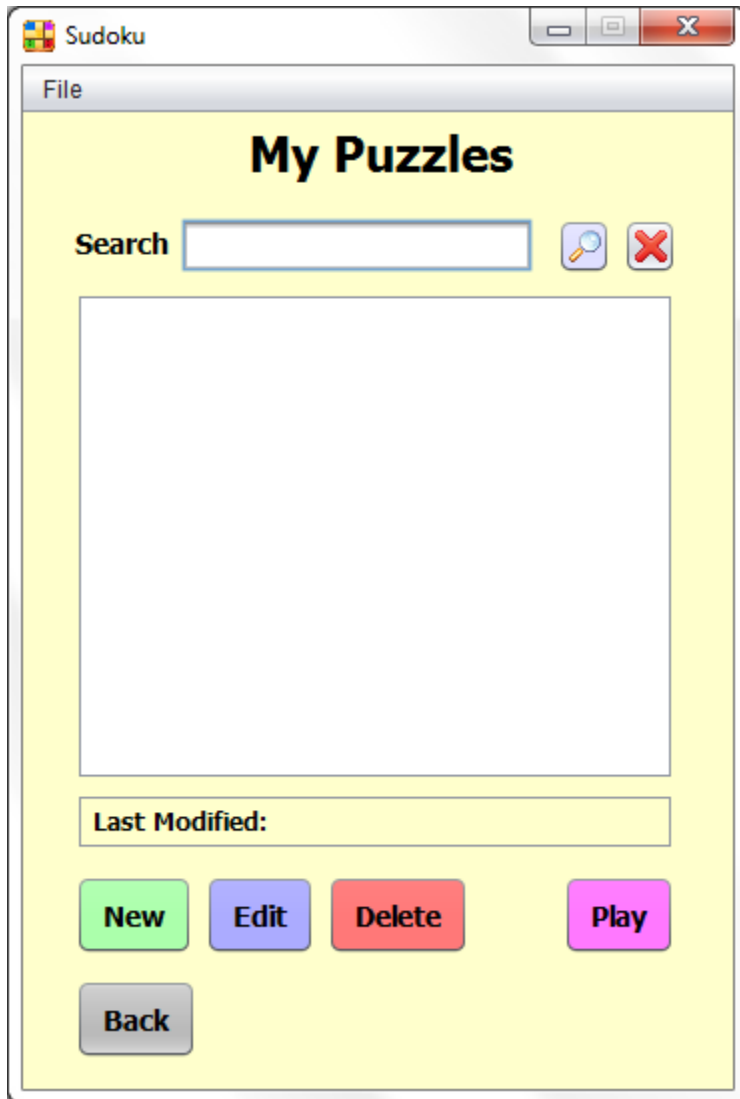

Figure 4.7 – *This is the window that appears when 'My Puzzles' is clicked from the home menu. This window and its options and features are explained more in-depth in section 5.*

4.1.5 Changing the Game Settings

To change the game settings, click 'Settings' from the home menu. A new window will appear as shown in figure 4.8. Here, you can configure your program's settings by clicking the buttons next to each option. Click the on button to enable the corresponding

game feature on the left, or off to disable it. Click 'Back' at the bottom left corner of the window to return to the home menu.
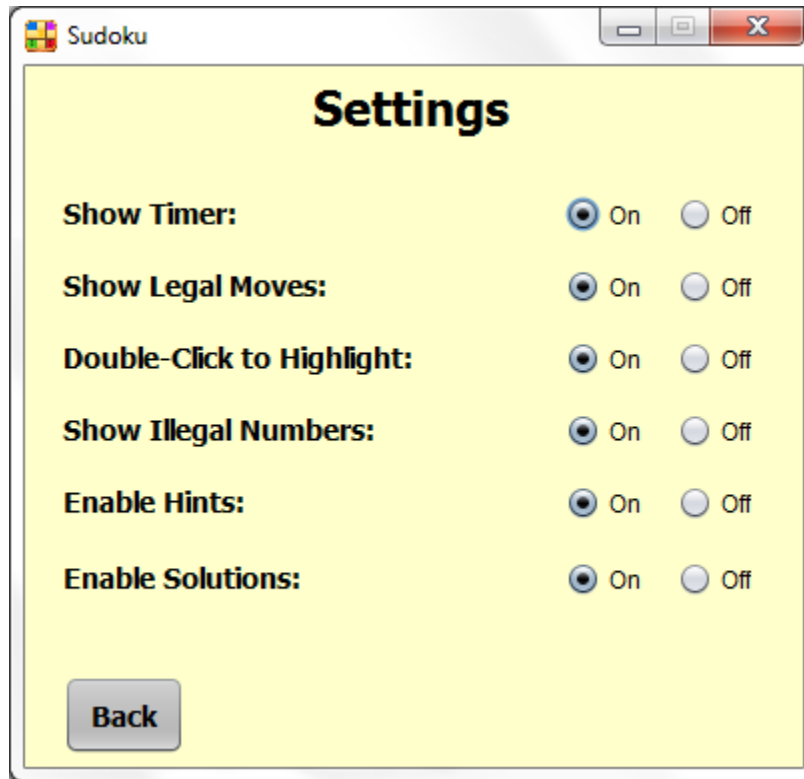
Show Timer – This feature displays the total time in-game (section 4.2.2).
Show Legal Moves – This feature will show or hide the panel of legal moves allowed in a selected tile (section 4.2.2).
Double-Click to Highlight – This feature allows players to highlight all common numbers on the board when the user double-clicks a tile with a number inside of it (section 4.2.3).
Show Illegal Numbers – This feature will highlight illegally inserted numbers in red (section 4.2.2).
Enable Hints – This feature allows users to obtain hints in-game (4.2.6).
Enable Solutions – This feature allows users to obtain the solution in-game (section 4.2.7).

4.1.6   Quitting the Game

To quit the application, click 'Quit' from the home menu. You can also quit by closing any window you are currently in by clicking the red x at the top right corner of the window. Whenever you try to quit the application, a warning message will appear asking you to confirm by clicking a yes or no button (see figure 4.9). If you want to quit, click the yes button, or no to cancel.

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Everything in the application is saved automatically when you quit, with the exception of editing a customized puzzle, as explained in section 5.1.4. Otherwise, feel free to exit the application whenever you wish to.

Figure 4.9 – *This warning message appears when you attempt to exit the application. Click 'Yes' to exit the program, or 'No' to cancel.*

4.2 Playing the Game

In this next section, you will now learn how to start and play a full game of Sudoku. You will learn how to play and the rules, how to start a new game, reset a game, and how to play on the application's interface. You will also learn how to get hints on your puzzle, get the solution, and how to quit a puzzle.

4.2.1 Rules of Sudoku

If you already know how to play Sudoku, you can skip ahead to section 4.2.2. If not, read on.

The goal of Sudoku is to fill the 9x9 board with the numbers 1 through 9 such that each row, column, and 3x3 grid that make up the whole grid all contain each of the nine digits. Each of these components must contain all nine numbers, and no duplicates are allowed in any row, column, or 3x3 grid. See figure 4.10 for a demonstration.

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Figure 4.10 – *On the left is an incomplete Sudoku puzzle. The goal is to fill the board with the numbers 1-9 such that each row (A-I), each column (1-9), and each 3x3 grid separated by the bold lines inside the grid (A1, A2, A3, B1, B2, B3, C1, C2, & C3 for example) contain the numbers 1-9 with no duplicates. On the right side is the completed version of the puzzle.*

On paper, some puzzles can be difficult to solve. With this application, you have some tools available to you to help you out, making solving them easier and faster (although if you want more of a challenge, refer to section 4.1.5 to turn off some of these features). Use the tools available and start off on the novice difficulty to learn the rules of Sudoku.

4.2.2 The Interface

Start a new game as you learned in section 4.1.1. You will see a window as shown in figure 4.11. Refer to each letter next to each component in the figure and read the associated key to learn what the component is and what it does.

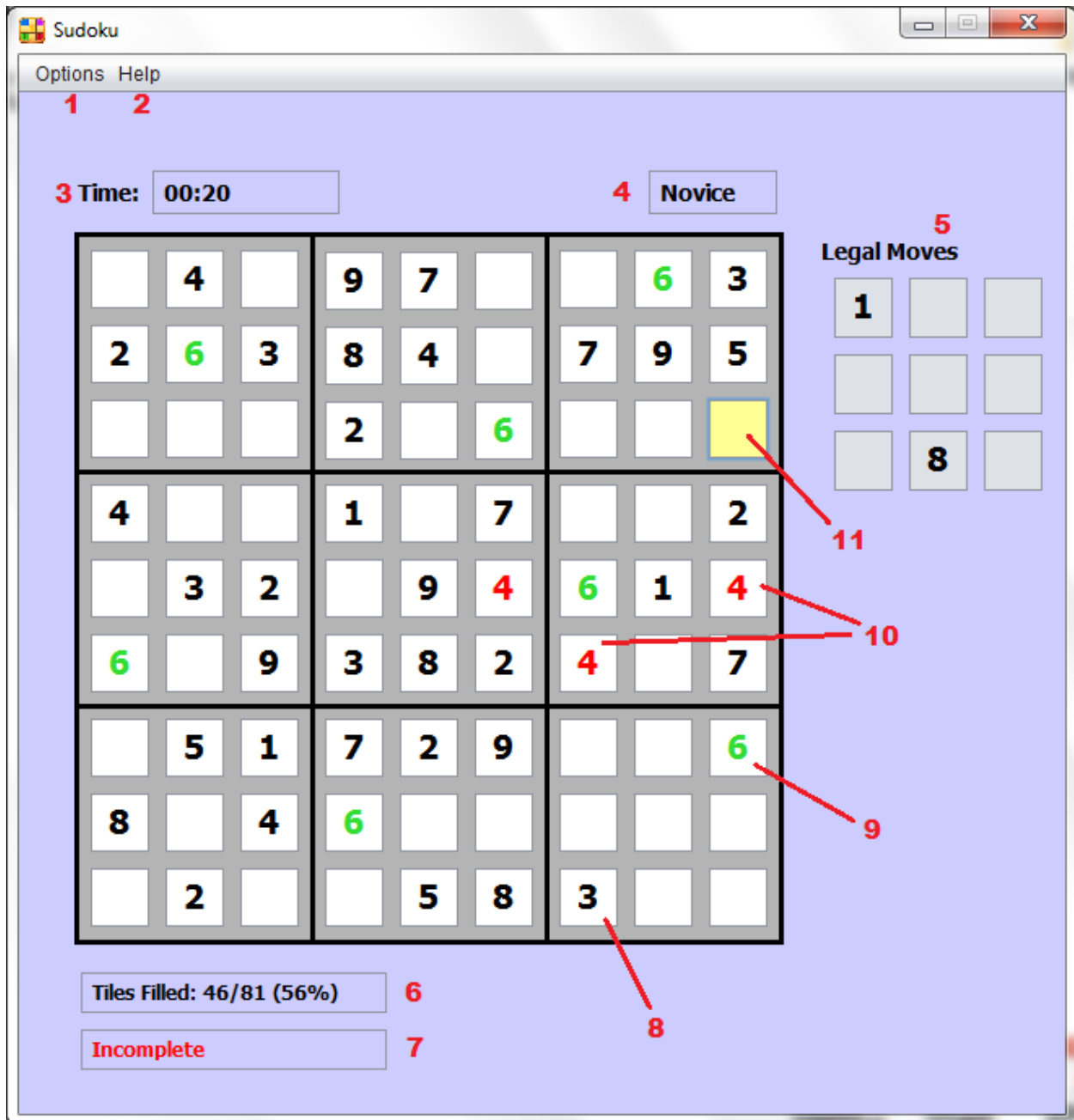*The rest of this page is intentionally left blank.*

Figure 4.11 – *The program interface during a game of Sudoku. Each component and tool are labeled with a number, and described below with section references.*

1.) *Options* – This tab located at the top of the window is where you can start a new game of Sudoku, reset the puzzle you are currently working on, or quit out of the puzzle and return to the home menu (sections 4.2.4, 4.2.5, and 4.2.8).

2.) *Help* – This tab located next to the options tab is where you can get hints for the puzzle, or request the solution of the puzzle (sections 4.2.6 and 4.2.7).

3.) *Timer* – This is the timer that keeps track of the total time you've spent working on the current puzzle. You can disable this feature in the settings menu (section 4.1.5).

4.) *Puzzle Difficulty* – The difficulty of the puzzle you are currently working on (novice, easy, medium, hard, or expert).

5.) *Legal Moves* – This component displays the numbers that can legally be inserted into the currently selected tile based on the puzzle's current state. You can disable this feature in the settings menu (section 4.1.5).

6.) *Tiles Filled* – This labels the number of tiles and percentage you've filled in the puzzle so far.

7.) *Completeness* – Labels 'Incomplete' while the puzzle is unsolved, or 'Complete!' when the puzzle has been solved.

8.) Tiles that contain black numbers have been pre-filled. They are a part of the puzzle and cannot be edited.

9.) Users can highlight numbers inside the puzzle by double-clicking a non-empty tile. In this example, the user has double-clicked a tile with a 6 inside, and all 6s in the puzzle have been highlighted as a result (section 4.2.3). You can disable this feature in the settings menu (section 4.1.5).

10.) Tiles with red numbers indicates that the number is illegally inserted and conflicts with another tile in the puzzle. In this example, the 4 inserted is illegal due to the 4 in the sub-grid and the 4 in the row. You can disable this feature in the settings menu (section 4.1.5).

11.) The tile that is colored bright orange-yellow indicates that the tile is currently selected, and the user can insert numbers into that tile. Any tile can be selected, but not all can be edited (section 4.2.3).

4.2.3 Controls

To play the puzzle, simply click a tile to select it, then press the numbers 1-9 to insert the number into that tile. Any other key you press will delete whatever number is in the tile. You can edit any tile that does not contain a black number.

To highlight all of one occurring number in the puzzle, simply double-click any tile containing your desired number. To un-highlight that number, double-click the tile again. Remember that this feature will not work if you have it disabled in the settings menu.

To access one of the options at the top of the window, simply click the tab once, then scroll to the option you want and click again.

4.2.4 Starting a New Puzzle

If you wish to start a new puzzle and leave the one you are currently working on, simply click Options -> New Game. You will be asked to confirm when the message appears (see figure 4.12). Click 'Yes' to start a new game, or 'No' to continue your current puzzle. Note that if you click yes, your current puzzle will be tossed, and your progress on that puzzle will be lost. The application only saves one puzzle at a time, so be aware of this before confirming.
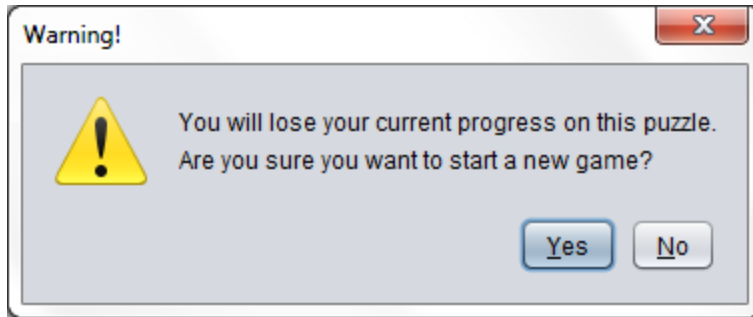
Figure 4.12 – *This window appears when you request a new game. Click yes to start the new game, or no to continue the current puzzle.*

4.2.5   Restarting the Puzzle

If you want to restart the puzzle you are currently working on, click Options -> Restart Game. You will be asked to confirm the reset when the message appears (see figure 4.13). Click 'Yes' to restart the puzzle, or 'No' to cancel the reset. Resetting the puzzle will remove all of your inserted numbers from the puzzle, so only do this if you are stuck and/or wish to start over.
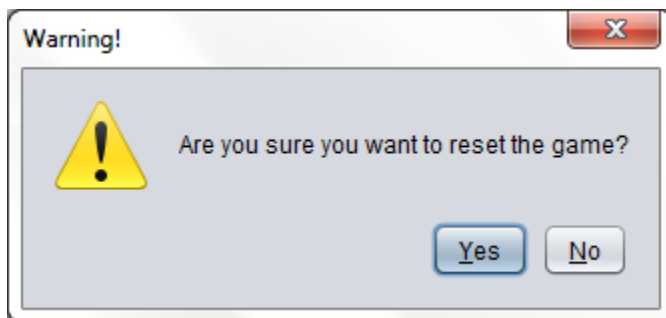

Figure 4.13 – *This window appears when you request to reset the puzzle. Click yes to reset the game, or no to continue the current puzzle.*

4.2.6   Getting Hints

If you're feeling stuck on a puzzle, you can request for a hint by clicking Help -> Get Hint. When you request for a hint, the top-most and left-most tile that is incorrectly filled and is not pre-filled will be filled with the correct value. This tile will also become un-editable so that you don't accidentally remove any hints you've gotten. However, requesting a hint will add 16 seconds to your current time if it's a novice puzzle, 17 for easy, 18 for medium, 19 for hard, and 20 for expert. So if you're going for fast times, use hints sparingly. Remember that this feature will not work if you have it disabled in the settings menu.

4.2.7   Getting Solutions

If you give up on a puzzle, and wish to see the solution, you can request it by clicking Help -> Get Solution. You will be asked to confirm the request when the message appears (see figure 4.14). Click 'Yes' to get the solution, or 'No' to continue the puzzle. Note that

your time will not be added to your best times if you request the solution. Also remember that this feature won't work if disabled in the settings menu.
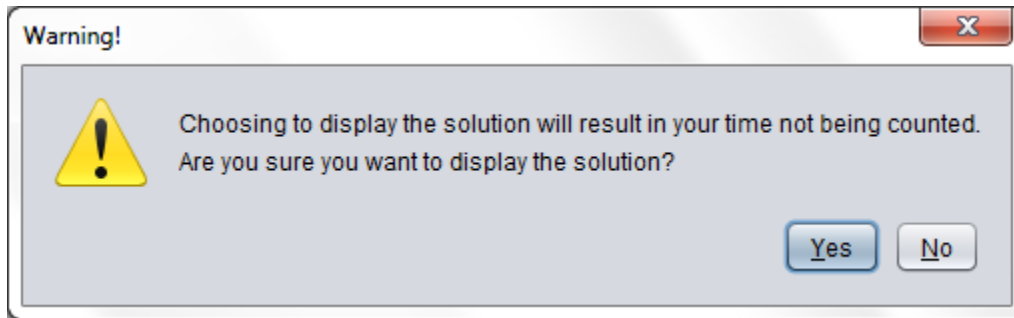

Figure 4.14 – *This window appears when you request the puzzle's solution. Click yes to get and display the solution, or no to continue the puzzle.*

4.2.8 Quitting the Puzzle

      To quit the puzzle and return to the home menu, click Options -> Quit. You will be asked to confirm when the message appears (see figure 4.9). Click 'Yes' to return to the home menu, or 'No' to continue the puzzle. Note that once you quit out, the game will be saved and you can resume your game later by clicking 'Load Game' from the home menu. This is also true if you exit the application by closing the window.

5.0   Advanced Topics & Features

In the previous section, you learned how to play games of Sudoku and how to navigate the main menu system. In this section, you will learn how to create your own puzzles and how the program manages files on your computer. This section will wrap up all you need to know to get the most out of your application.

5.1   My Puzzles

Now, you will learn how to create your own Sudoku puzzle with the puzzle editor feature offered. Here, you will learn how to create new puzzles, edit, and play them. You will also learn how to manage your puzzle files by importing, exporting, searching, and deleting them.

5.1.1   The Menu System

You were briefly introduced to the custom puzzles menu back in section 4.1.4. Here, you will learn more about the menu and how to navigate it. Refer to figure 5.1 below and read the associated key to learn what each component is and what it does, including labels and buttons, and a reference section for each part.

1.) *File* - This tab located at the top of the window is where you can create a new puzzle, open a puzzle, delete a puzzle, or play a puzzle. Also offers options for importing and exporting puzzles, and also an option to return to the home menu. Keyboard shortcuts are also available and labeled next to each option.

2.) *Search Bar* – Here, you can enter the name of a puzzle in your list to search for (section 5.1.5).

3.) *Search Button* – Click this button to search for a puzzle (section 5.1.5).

4.) *Undo Button* – Click this button to undo your search (section 5.1.5).

5.) *Puzzle List* – This is where all of your custom puzzles are listed.

6.) *Last Modified* – This displays the last time and date the selected puzzle was opened and modified (section 5.1.4).

7.) *New* – Clicking this button creates a new puzzle (section 5.1.2).

8.) *Edit* – Clicking this button opens the selected puzzle for editing (section 5.1.4).

9.) *Delete* – Clicking this button deletes the selected puzzle from your computer (section 5.1.6).

10.) *Play* – Clicking this button opens the selected puzzle for playing (section 5.1.9).

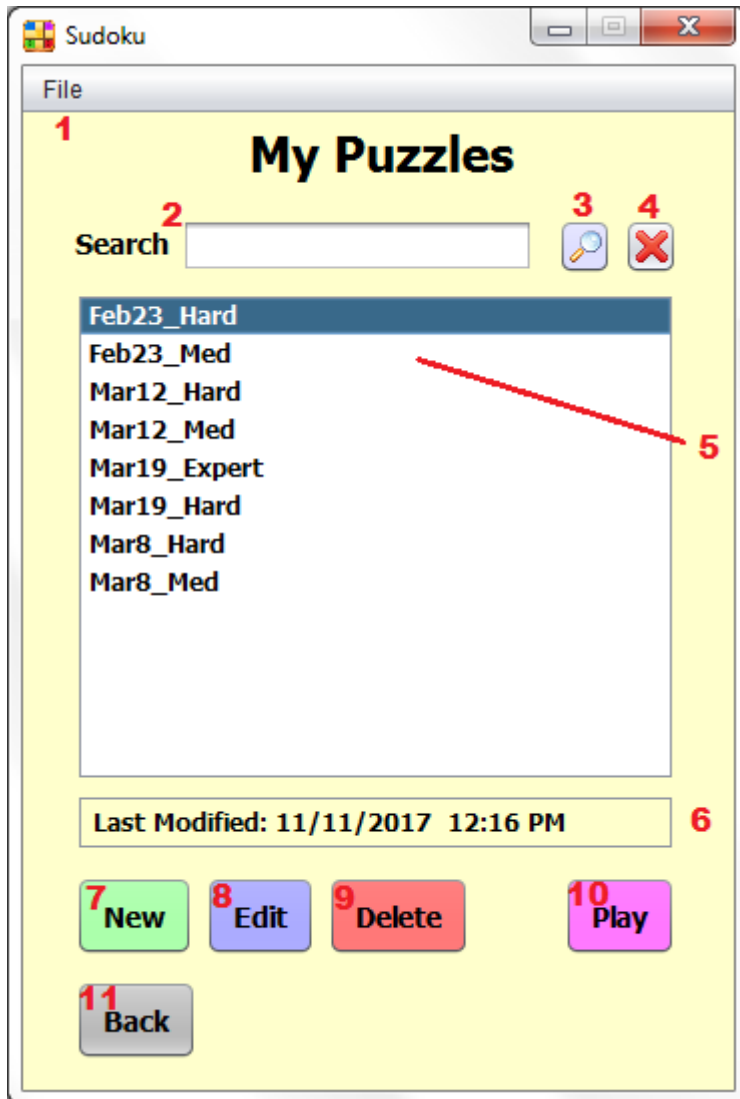11.) *Back* – Clicking this button returns the user to the home menu.

Figure 5.1 – *The program interface of the puzzles menu. Each component and tool are labeled with a number, and described below with section references.*

5.1.2 Creating a New Puzzle

To create a new puzzle, click 'New' at the bottom of the window, or click File -> New, or press Ctrl+N. A window will appear asking you for the name of your new puzzle. You may name your puzzle whatever you wish as long as it meets the following constraints:

1.) Puzzle names must only contain letters, numbers, white space, hyphens, underscores, or backslashes.

2.) Puzzle names must begin and end with a letter or number.

3.) Puzzle names must be at least 2 characters long.

4.) Puzzle names cannot be the same name as another puzzle, with no case-sensitivity. For example, a new puzzle cannot be named 'Sample' if 'Sample' or 'sample' already exist.

If you entered a name that does not meet these requirements, one of the two error messages shown below will appear telling you why your name was not accepted. The error message shown in figure 5.2 tells you your name violates rules 1, 2, and/or 3. The error message shown in figure 5.3 tells you your name violates rule 4. Click the new button again to try a different name.

If you entered a valid name, then your new puzzle will be created, and you will be taken to the editing window. You can click 'Quit' on the right side to return to the puzzles menu.
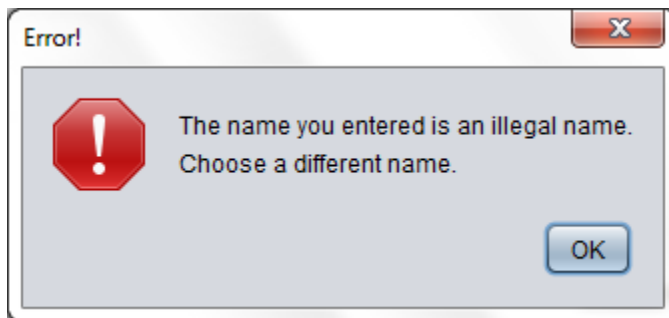

Figure 5.2 – *This error message appears if your new puzzle file name violates restrictions 1, 2, and/or 3.*
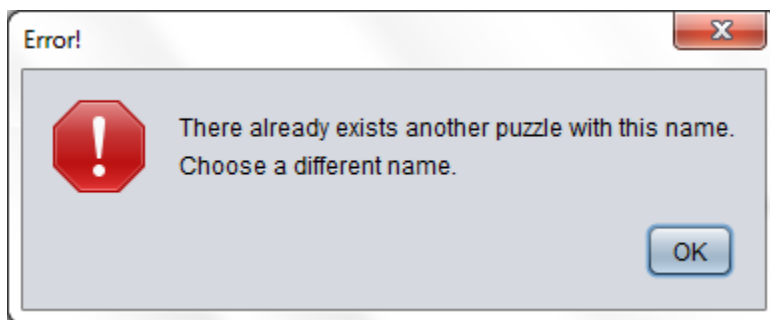

Figure 5.3 – *This error message appears if your new puzzle file name violates restriction 4.*

5.1.3 Opening a Puzzle

To open a puzzle for editing, click on the name of the puzzle to open, then click 'Edit' at the bottom of the window, or click File -> Edit, or press Ctrl+O. The selected puzzle will be loaded and you should see your puzzle loaded into the window, similar to the one shown in figure 5.8.

5.1.4 Searching For a Puzzle

To search for a puzzle in your list, enter the name of the puzzle, or part of the name, then click the search button. Any puzzle names containing the given phrase will remain in the list, while the rest will be hidden. Searching is also not case-sensitive. For example, if you have two puzzles named 'Sample1' and 'Sample2', and you search 'sample', those two puzzles are considered matches. They will also be considered matches if you search for 'sample', 'SAM', 's', etc. On the contrary, searching for 'x' or 'example' are not considered matches. To undo the search and get all of your puzzles back in the menu, click the undo button to the right of the search button.

5.1.5 Deleting a Puzzle

To delete a puzzle, click the puzzle in the list you wish to delete, then click 'Delete' at the bottom of the window, or click File -> Delete, or press Ctrl+D. You will be asked to confirm the deletion when the message appears (see figure 5.4). Click 'Yes' to delete the puzzle, or 'No' to cancel the deletion. Once you delete a puzzle, it will be gone for sure, so make sure that you are deleting the right file before confirmation. It is a good idea to back up your puzzles in case this mistake happens.
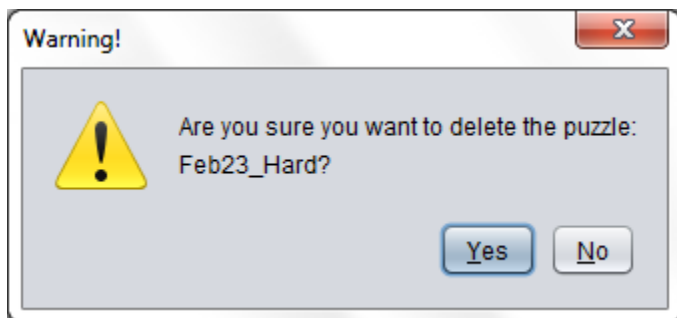

Figure 5.4 – *This warning message appears when you attempt to delete a puzzle. Click yes to confirm the deletion, or no to cancel it.*

5.1.6 Importing a Puzzle

To import a puzzle file means to take a puzzle file saved somewhere other than the folder your program saves everything in, and to copy that file into the program's save folder. Importing allows you to load other user's custom puzzles from a different system onto your program.

To import a puzzle, click File -> New, or press Ctrl+I. A window will appear similar to the one shown in figure 5.5. Navigate to the directory where the puzzle file is located, then double-click it, or click it once and click the open button. The imported file will be loaded into your saved folder and will appear in the list. Close the window, or click cancel to cancel the import. Note that you can only import files with the .dat extension. Any other files you attempt to import will result in an error message displaying as shown in figure 5.6.
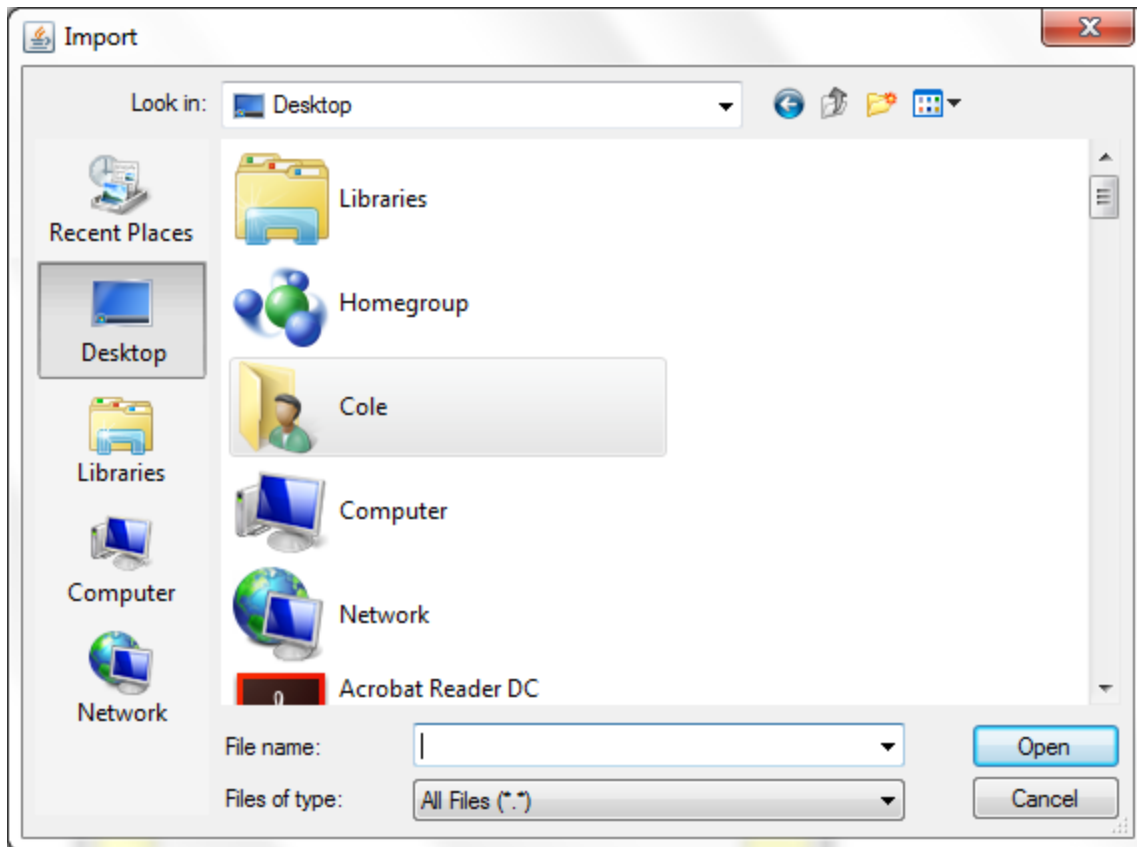
Figure 5.5 – *This window appears when you choose to import a file. Browse to the directory, then select the file to import.*
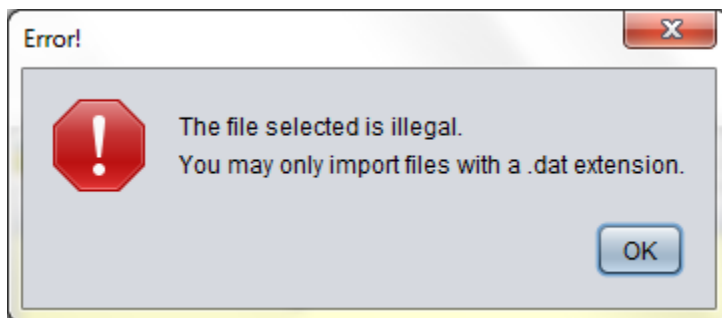

Figure 5.6 – *This error message appears when you attempt to import an illegal file.*

5.1.7   Exporting a Puzzle

To export a puzzle means to copy the puzzle from your program onto your computer in a different directory. Export puzzles if you wish to back it up, or send one off to a friend. To export a puzzle, click the puzzle you want to export, then click File -> Export, or press Ctrl+E. A new window will appear similar to the one shown in figure 5.5. Just like importing, navigate to the desired directory through this window.

Once you are at your desired directory, you can name the puzzle in the file name text field. The name is pre-filled as the same as you named it in the program, but you may name it differently here if you wish. If you do choose to rename the file, note that the same restriction apply as mentioned in section 5.1.2. Violating one of these restrictions will cancel the export. Once you've found the directory, and named the file as you wish, click the save button to export the file to that directory. You can also click the cancel button or close the window to cancel the export.

5.1.8 Playing a Puzzle

To play one of your customized puzzles, click the puzzle you wish to play, then click 'Play' at the bottom of the window, or click File -> Play, or press Ctrl+P. The program will load your customized puzzle and briefly attempt to solve it. If the puzzle can't be solved, then a message will appear telling you that your puzzle is unsolvable and cannot be played (see figure 5.7). If your puzzle is solvable, then your puzzle will be loaded and you will be able to play the puzzle as normal. Your custom puzzles are saved in their own files, so you can quit out and resume them later without losing any other saved data. Also, once you quit out, or complete the puzzle, you will be taken back to the puzzles menu instead of the home menu.
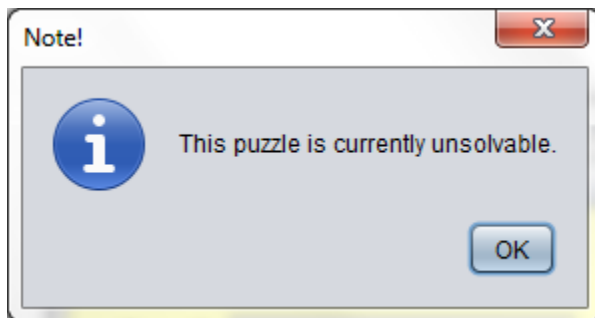

Figure 5.7 – *This message appears when you attempt to play a custom puzzle that is unsolvable.*

5.2   Creating Puzzles

In this section, you will learn how to use the puzzle editor to edit your own customized puzzles.

5.2.1 The Interface

Start off by creating a new puzzle, or opening an existing one for editing. You should see a new window appear shown in figure 5.8. This is the puzzle editor interface, and it is similar to the interface described in section 4.2.2. Only the new components are labeled and explained below.
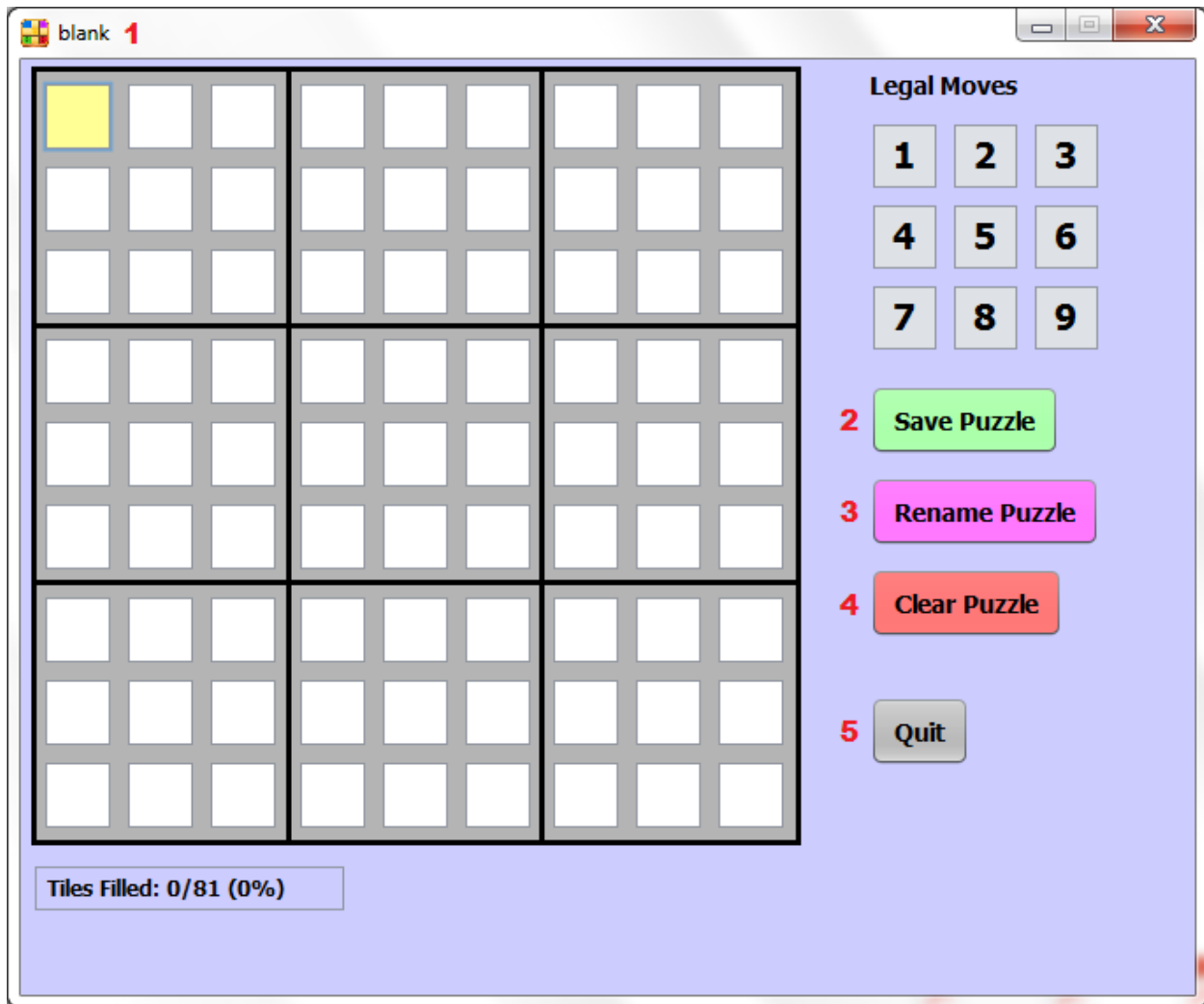
Figure 5.8 – *The puzzle editor interface. Each new component and tool are labeled with a number, and described below with section references.*

1.) *Puzzle Title* – The title of the window is the name of your puzzle. Also shows an asterisk (*) when unsaved changes to the puzzle are made (section 5.2.3).
2.) *Save Puzzle* – This button saves your puzzle in its current state (section 5.2.3).
3.) *Rename Puzzle* – This button prompts the user to rename the puzzle (section 5.2.4).
4.) *Clear Puzzle* – This button clears out the puzzle by erasing the values in all tiles (section 5.2.5).
5.) *Quit* – This button closes the puzzle editor and returns to the puzzles menu.

5.2.2 Editing a Puzzle

Once you have the editor open, you may edit the puzzle as you like. The controls are the same as they are while playing. Also, all features are enabled regardless whether or not you have them disabled in the settings menu. This means you can highlight numbers, see

the legal numbers allowed in a highlighted tile, and illegally inserted numbers are highlighted red. From here, edit the puzzle however you wish.

5.2.3   Saving a Puzzle

To save your puzzle, click 'Save Puzzle' on the right side of the window. Your puzzle will then be saved in its current state. To see if you have unsaved changes, look at the puzzle title at the top left corner of the window. If there is an asterisk (*) to the right of the name, this means that you have unsaved changes to your puzzle. It appears when you edit a tile, or clear the puzzle. Once you save, however, it will disappear, meaning you can close the puzzle with no loss of data or changes.

5.2.4   Renaming a Puzzle

To rename your puzzle, click 'Rename Puzzle' on the right side of the window. A window will appear prompting you for the new name of your puzzle. Enter the name you wish to rename your puzzle as. The same rules apply when renaming your puzzle as explained in section 5.1.2. If your new name violates any of these rules, one of two error messages will appear as shown in figure 5.2 and figure 5.3, and your puzzle will not be renamed. However, if your new name is valid, then your puzzle will be renamed and the new name will replace the old one at the top of the window. Your puzzle will also be saved into a new file and the old one will be deleted.

5.2.5   Clearing a Puzzle

To clear your puzzle, click 'Clear Puzzle' on the right side of the window. A message will appear prompting you to confirm the clear (see figure 5.9). Click 'Yes' to completely clear your puzzle and erase all values in all tiles, or 'No' to cancel. Once you click yes, your puzzle will be cleared, so make sure you want to clear before confirming. If you clear your puzzle by accident, you can close the puzzle without saving, then re-open the puzzle in the editor.
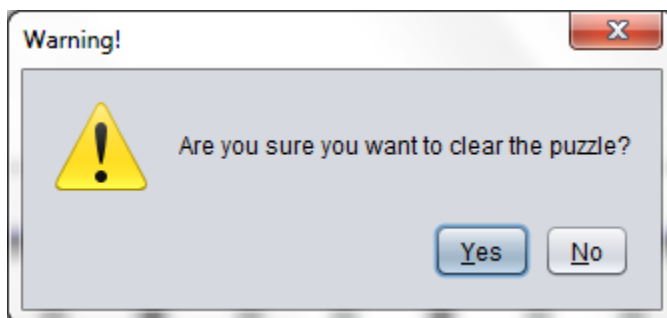

Figure 5.9 – *This window appears when you attempt to clear the puzzle. Click yes to clear the puzzle, or no to cancel.*

5.2.6 Closing a Puzzle

To close the puzzle editor frame, click 'Quit' on the right side of the window. If you have any unsaved changes, a warning message will appear asking you to confirm or cancel. Otherwise, if you don't have any unsaved changes, the editor will close and you will return to the puzzles menu with no warning message.

Check the top left corner of the window next to the puzzle name. If there is an asterisk next to the name, then you have unsaved changes and will be asked to confirm before closing. If there is no asterisk, then you have no unsaved changes and the editor will close automatically. To ensure no loss of data or changes, it's a good idea to save before closing out of the editor.
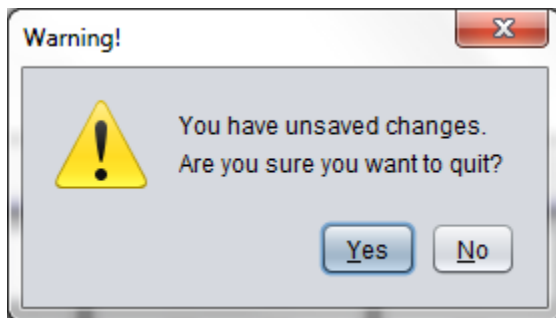

Figure 5.10 – *This warning appears when you attempt to close the editor with unsaved changes. Click yes to close without saving, or no to cancel.*

5.3   The File System

In this final section, you'll learn where on your computer to find the program's save files, and how the program stores the saved data.

5.3.1 Where Files Are Saved

The program saves your general data inside your home directory inside a folder called Sudoku. This directory where this data is stored will vary by operating system. Inside this directory, you may find the following files:

• settings.txt – Saves the user's program settings.
• saved.dat – Saves the user's currently played puzzle.
• novice.dat – Saves the user's top times scored in novice mode.
• easy.dat – Saves the user's top times scored in easy mode.
• medium.dat – Saves the user's top times scored in medium mode.
• hard.dat – Saves the user's top times scored in hard mode.
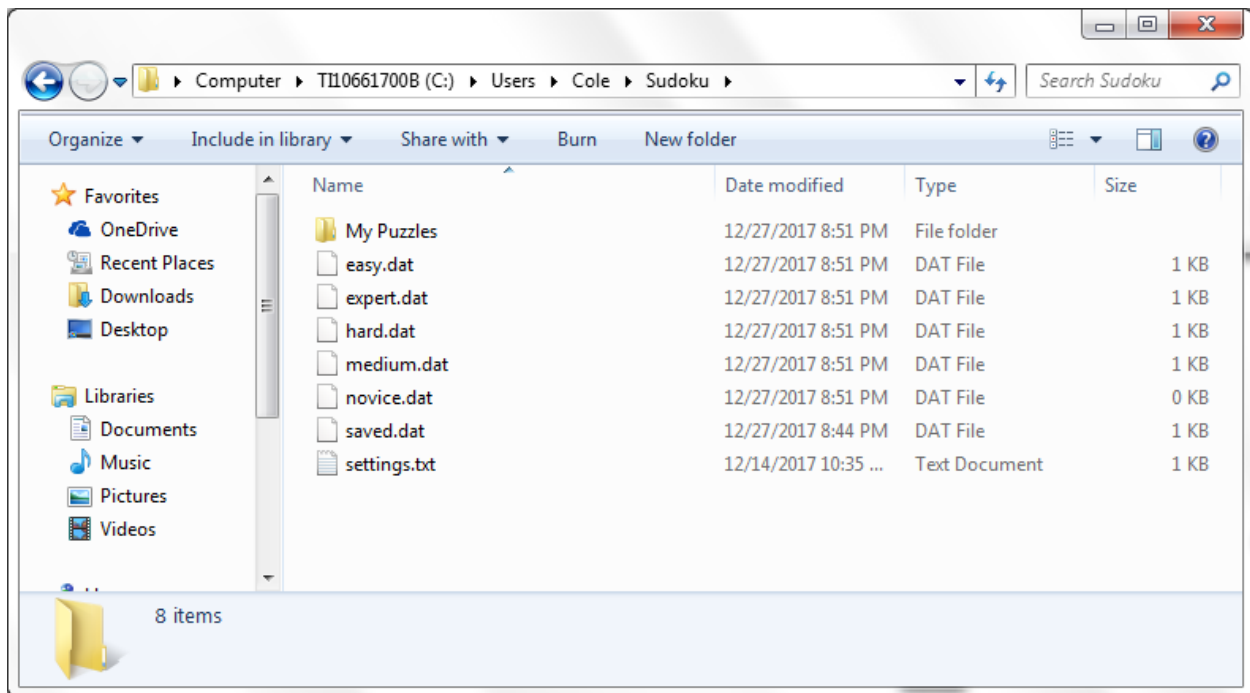• expert.dat – Saves the user's top times scored in expert mode.

Figure 5.11 – *The directory where the program saves the data at (on Windows 7).*

5.3.2   How Files Are Saved

Puzzles are saved inside .dat files, and contains two states. The first state is the initial state of the puzzle, which is used for starting and resetting the game. The second state is the current state of the puzzle, which contains the data that allows users to resume their game. The time is also stored inside the file and the puzzle difficulty.

The program's settings are saved inside a text file named settings.txt. This file gets loaded whenever the program is first launched, and the program settings are saved to this file whenever the user exits the settings menu. If this file is deleted or removed, a new one will be created, and all features will be switched on by default.

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6.0   Troubleshooting

This section covers a variety of potential problems that may occur while using the program. Here, we try to cover as many of these problems as possible, and offer the best diagnosis and solution for each problem.

Problem	Diagnosis	Solution
The program won't start.	Your computer doesn't have Java 8 or a later version installed.	Download Java 8 or a later version (see section 2.1).
I started a game earlier, but it won't load when I click 'Load Game'.	There is no saved.dat file in your Sudoku directory.	Start a new game, or move the saved.dat file back into the Sudoku directory.
My customized puzzles won't show up in my custom puzzles list.	Your custom puzzle files are not located in your 'My Puzzles' folder.	Move your puzzles back into the 'My Puzzles' folder.
My custom puzzle(s) fail to open, or play.	You recently moved the custom puzzle file out of your 'My Puzzles' directory.	Move the puzzle file back into your 'My Puzzles' folder.
A puzzle file fails to import.	Either you are selecting a file without the .dat extension (1), or the contents of the file cannot be read properly (2).	(1) Make sure to select a file with the .dat extension. (2) Make sure you are selecting a custom puzzle file and not a different file with the .dat extension.
My custom puzzle fails to save.	You haven't saved the puzzle before closing the editor.	Make sure to save your puzzle before closing the editor.

If you experience any other issues, or none of the above solutions worked for you, you can post them on the repository's issues forum. We will check and investigate the bug(s) and/or error(s) as soon as possible. Link to the repository is in the credits section.

7.0   Credits

The Sudoku desktop application was developed by team IDK. The members are:

Name	Role(s)
Lucas Chavarria	• Requirements Analyst • Developer • Documentation • Configuration Control
Ron Guo	• Project Manager • UI Designer • Developer
Cole Vikupitz	• Developer • Documentation • Quality Control
James Xu	• Architecture • Developer • Tester & Integrator

Oracle Home Page:

https://www.oracle.com/index.html

Java Download Link:

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GitHub Repository Link:

https://github.com/cvikupitz/sudoku

Application Download Link:

https://github.com/cvikupitz/sudoku/releases