User Manual: MIPS Binary Game

Introduction

Welcome to the MIPS Binary Game! This program is a learning tool and game designed to test your speed and accuracy in converting between binary and decimal numbers. It runs in the MARS (MIPS Assembler and Runtime Simulator) environment.

This manual will guide you on how to run the program and how to play the game.

System Requirements

To run the MIPS Binary Game, you will need:

- **Java Runtime Environment (JRE):** MARS is a Java application and requires Java to run.
- **MARS 4.5 (mars.jar):** The MIPS simulator.
- **All Program Files:** You must have all the following .asm files in the **same directory**:
    - main.asm
    - generateProblem.asm
    - convert.asm
    - drawBoard.asm
    - validateInput.asm
    - timer.asm
    - score.asm
    - sound.asm

How to Run the Program

Follow these steps to set up and launch the game in the MARS GUI.

Step 1: Configure MARS for a Multi-File Project

This step ensures MARS automatically finds all the necessary module files.

1. Launch MARS by running the mars.jar file.
2. In the top menu bar, go to **Settings**.
3. Click the checkbox next to **"assemble all files in directory"**. This tells MARS to load all the other .asm files that are in the same folder as main.asm.

Step 2: Enable Sound (Optional)

To hear the "success" and "fail" sounds, you must enable the sound tool.

1. In the top menu bar, go to **Tools**.
2. Click on **"Sound"**.
3. A new window will pop up. Check the box labeled **"Sound On"**.
4. You can now close this small "Sound" window.

Step 3: Open, Assemble, and Run

1. Go to **File then Open.**
2. Navigate to the directory where you saved all the .asm files.
3. Select **only main.asm** and click "Open".
4. Click the **"Assemble"** icon.
5. Check the **"MARS Messages"** tab at the bottom. It should say: Assemble: operation completed successfully.
6. Click the **"Run"** icon (the green play button). The game will now start in the "Run I/O" tab.

How to Play the Game

1. Main Menu

When the game starts, you will be shown the main menu:

=== Binary Game (MIPS) ===
1) Binary -> Decimal
2) Decimal -> Binary
Select mode (1/2):

Type 1 or 2 and press **Enter** to choose your game mode.

2. Gameplay

The game consists of 10 levels. The level number determines how many problems you must solve to advance.

- **Level 1** has 1 problem.
- **Level 2** has 2 problems.
- ...
- **Level 10** has 10 problems.

The "Line" counter shows how many problems are left in the current level.

3. Game Mode 1: Binary -> Decimal

- **What you see:** The game will display an 8-bit binary number in an ASCII art box.

```
+---+---+---+---+---+---+---+---+
| 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
+---+---+---+---+---+---+---+---+
Enter decimal:
```

- **What to do:** Type the correct decimal equivalent (a number from 0 to 255) and press **Enter**.

4. Game Mode 2: Decimal -> Binary

- **What you see:** The game will display a decimal number.

```
+---+---+---+---+---+---+---+---+
Binary:  [ _ _ _ _ _ _ _ _ ]
+---+---+---+---+---+---+---+---+
Decimal: 171
+---+---+---+---+---+---+---+---+
Enter 8-bit binary (e.g., 10101100):
```

- **What to do:** Type the 8-bit binary string that matches the decimal number and press **Enter**.
- **Input Validation:** You must enter a full 8-bit string of '0's and '1's. If you enter an invalid format (like 101 or abc), the game will prompt you to try again.

5. Scoring and Feedback

- **Standard Score:** A correct answer gives you **+10 points**.
- **Bonus Score:** If you answer correctly in **under 10 seconds**, you will get an additional **+5 bonus points**!
- **Feedback:**
    - **Correct:** You will see Correct! and hear a success sound.
    - **Fast & Correct:** You will see Correct! followed by FAST! +5 bonus!.
    - **Wrong:** You will see “Wrong.” and hear a fail sound. The game will also show you the correct answer.

6. End of Game

After you successfully complete all 10 levels, the game will display your final score.

Game complete. Score: 320
Goodbye.