Basic Math Learning Program - Compilation & Execution Guide

📁 Project Structure

```
math_learning_program/
├── main.c
├── menu.c
├── menu.h
├── user.c
├── user.h
├── topics.c
├── topics.h
├── quiz.c
├── quiz.h
├── leaderboard.c
├── leaderboard.h
├── user.csv
├── scores.csv
└── quiz.csv
```

🔧 Compilation Instructions

Option 1: Compile All Files Together (Simple)

bash

```
gcc main.c menu.c user.c topics.c quiz.c leaderboard.c -o mathprogram
```

Option 2: Compile with Object Files (Recommended for Development)

```bash
# Compile each source file to object file
gcc -c main.c -o main.o
gcc -c menu.c -o menu.o
gcc -c user.c -o user.o
gcc -c topics.c -o topics.o
gcc -c quiz.c -o quiz.o
gcc -c leaderboard.c -o leaderboard.o

# Link all object files
gcc main.o menu.o user.o topics.o quiz.o leaderboard.o -o mathprogram
```

Option 3: Using a Makefile

Create a file named `Makefile`:

```makefile
```

```
CC = gcc
CFLAGS = -Wall -Wextra -std=c99
TARGET = mathprogram
OBJS = main.o menu.o user.o topics.o quiz.o leaderboard.o

all: $(TARGET)

$(TARGET): $(OBJS)
  $(CC) $(OBJS) -o $(TARGET)

%.o: %.c
  $(CC) $(CFLAGS) -c $< -o $@

clean:
  rm -f $(OBJS) $(TARGET)

.PHONY: all clean
```

Then compile with:

```
bash

make
```

▶️ Running the Program

On Linux/Mac:

```
bash
```

```
./mathprogram
```

On Windows:

```
bash

mathprogram.exe
```

Or simply:

```
bash

mathprogram
```

📝 Initial Setup

Before running for the first time, create the CSV files:

1. Create `user.csv` (can be empty initially)

```
csv

alice,pass123
bob,securepass
```

2. Create `scores.csv` (can be empty initially)

```
csv
```

```
alice,Arithmetic,5,1
bob,Algebra,4,1
```

3. Create `quiz.csv` (REQUIRED - must have questions)

```csv
Arithmetic,What is 15 + 27?,42
Arithmetic,What is 56 - 23?,33
Arithmetic,What is 8 × 7?,56
Arithmetic,What is 72 ÷ 9?,8
Arithmetic,What is 100 - 45?,55
Algebra,If x + 7 = 15 what is x?,8
Algebra,If 2x = 18 what is x?,9
Algebra,If x - 5 = 10 what is x?,15
Algebra,If 3x + 2 = 14 what is x?,4
Algebra,If x + 4 = 5 what is x?,20
Number Theory,Is 17 a prime number? (yes/no),yes
Number Theory,What is the GCD of 12 and 18?,6
Number Theory,Is 15 divisible by 3? (yes/no),yes
Number Theory,Is 21 a prime number? (yes/no),no
Number Theory,What is the GCD of 8 and 12?,4
```

Note: The CSV files can be empty (except `quiz.csv`), but they must exist in the same directory as the executable.

🎮 How to Use the Program

1. **First Time Users:**
    - Select "Register" from the authentication menu

- Enter a username and password
- Login with your credentials

2. **Main Features:**
   - **Start Learning:** Choose a topic (Arithmetic, Algebra, or Number Theory)
   - Read the lesson content
   - Take the quiz (5 questions)
   - View your score
   - **View Leaderboard:** See top 10 users ranked by total score
   - **Logout:** Return to login screen
3. **Quiz System:**
   - Each topic has 5 questions
   - Scores are saved automatically
   - You can retake quizzes to improve your score
   - Attempts are tracked

🐛 Troubleshooting

Compilation Errors:

Error: "No such file or directory"

- Make sure all `.c` and `.h` files are in the same directory
- Check that filenames match exactly (case-sensitive on Linux/Mac)

Error: "undefined reference to..."

- Make sure you're compiling all `.c` files together
- Check that all functions are properly defined in their respective files

Runtime Errors:

"Could not open file"

- Ensure all three CSV files exist in the same directory as the executable
- Check file permissions (must be readable and writable)

Program crashes on login/quiz

- Verify `quiz.csv` has the correct format: `topic,question,answer`
- Check that there are no empty lines in the middle of CSV files

📊 CSV File Formats

user.csv

```
username,password
```

scores.csv

```
username,topic,score,attempts
```

quiz.csv

```
topic,question,answer
```

⚙️ Compiler Requirements

- **GCC:** Version 4.8 or higher
- **Standard:** C99 or higher
- **Platform:** Linux, macOS, Windows (with MinGW/Cygwin)

🎯 Testing the Program

1. Compile the program
2. Create the three CSV files (or use the provided examples)
3. Run the program
4. Register a new user
5. Login
6. Complete a quiz in each topic
7. Check the leaderboard

Enjoy learning math! 🎓📐