UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

School of Computer Science

Course Code: CSEG1032

Course: Programming in C

Project Report

Title :

Random Number Guessing Game

Submitted by :-

Name: Ashutosh Kumar Singh

Sap Id :- 590025841

Submitted to:

Dr. Tanu Singh

Academic Year : 2025

2. Abstract :-

This project presents a simple yet interactive **Random Number Guessing Game** developed in the C programming language. The program uses standard functions such as random number generation, loops, conditional statements, and modular programming concepts. The game generates a random number within a defined range, and the user attempts to guess it. After each guess, the system provides hints such as *"Too High"* or *"Too Low"*. The program continues until the correct number is guessed.

This project demonstrates strong understanding of fundamental C programming concepts, modularity, header-file usage, and user interaction. The game is efficient, intuitive, and aligns with the guidelines of the C Major Project.

3. Problem Definition :-

The objective of this project is to design a C program that allows a user to guess a randomly generated number. The system should:

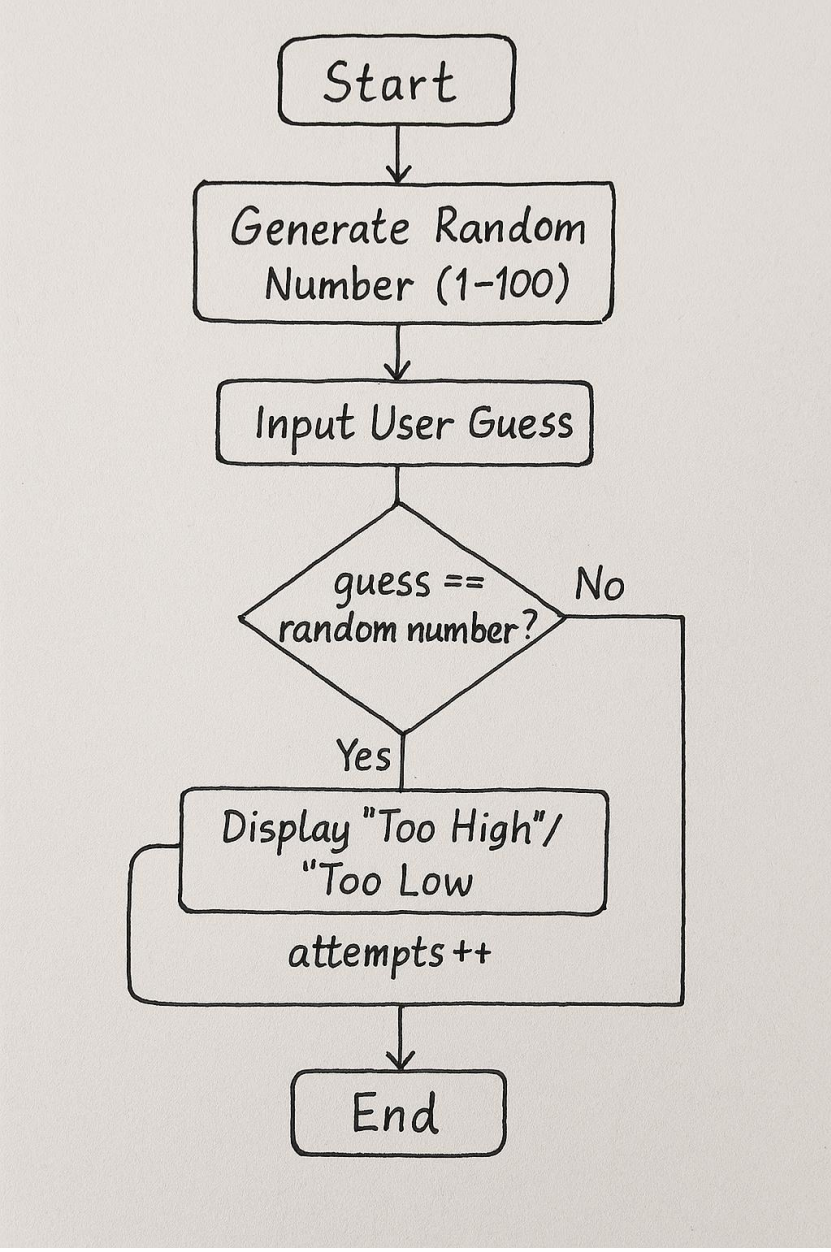
- Generate a number within a fixed range (e.g., 1 to 100).
- Accept user guesses and compare them with the generated number.
- Provide hints (*Higher/Lower*).

- Count the number of attempts.
- Terminate once the correct guess is made.
- Ensure user-friendly interaction and error-free execution.

This program reinforces various key concepts of C programming including loops, decision-making structures, random number generation, and modular design.

4. System Design :-

4.1 Flowchat



4.2 Algorithm:-

Step-1: Start

Step-2: Generate a random number between 1 and 100.

Step-3: Initialize attempt counter to 0.

Step-4: Repeat steps 5–7.

Step-5: Take input guess from user.

Step-6: If guess > number → display “Too High”.

Step-7: if guess < number → display “Too Low”.

Step-8: If guess == number → go to Step 9.

Step-9:- Display success message and attempts.

Step-10: End.

- **Key Code Snippets:**

Include/Game.h

```
#ifndef GAME_H
 #define GAME_H
#include <stdio.h>
 #include <stdlib.h>
 #include <time.h>
```

```
 #include <string.h>

typedef struct { char name[50];

int guesses; }

Player;

void play_game();

void save_score(Player p);

void load_scores(Player **players, int *count); void display_scores(const Player *players, int count);

#endif
```

- **Src/main.c:**

```
#include "game.h"


// Main entry point of the program

int main() {

   Player *players = NULL;  // Pointer to array of players

   int count = 0;


   // Load and display high scores

   load_scores(&players, &count);

   display_scores(players, count);
```

```
    free(players);  // Free dynamically allocated memory


    // Start the game
    play_game();


    return 0;
}
```

- **Src/game.c:**

```
#include "game.h"

// Function to play the guessing game void play_game() { srand(time(NULL));


 // Seed random number generator int number = rand() % 100 + 1;

// Random number between 1 and 100 int guess; int attempts = 0;

int *guesses = NULL; // Pointer to dynamic array for guess history int capacity
= 0;

printf("Welcome to Random Number Guessing Game!\n");
printf("Guess a number between 1 and 100\n");

do {
    int ret = scanf("%d", &guess);
```

```
 if (ret != 1) {
      printf("Invalid input. Please enter a number.\n");
      // Clear invalid input from stdin
      while (getchar() != '\n');
      continue;  // Do not count as attempt
   }

   attempts++;

   // Resize dynamic array if needed (using pointers and realloc)
   if (attempts > capacity) {
      capacity = attempts * 2 ? attempts * 2 : 1;  // Initial capacity if 0
      guesses = (int *)realloc(guesses, capacity * sizeof(int));
      if (guesses == NULL) {
         printf("Memory allocation failed.\n");
         exit(1);
      }
   }
   guesses[attempts - 1] = guess;

   if (guess > number) {
      printf("Too high! Try again.\n");
   } else if (guess < number) {
      printf("Too low! Try again.\n");
   } else {
      printf("Correct! You guessed in %d attempts.\n", attempts);
   }
} while (guess != number);

// Display guess history (array usage)
printf("Your guesses: ");
for (int i = 0; i < attempts; i++) {
   printf("%d ", guesses[i]);
}
```

```
printf("\n");

free(guesses);  // Free dynamic memory

// Get player name (string handling)
char name[50];
printf("Enter your name for high score: ");
scanf("%49s", name);  // Prevent buffer overflow

Player p;
strcpy(p.name, name);
p.guesses = attempts;

save_score(p);  // Save to file


}

// Function to save score to file (file I/O) void save_score(Player p) { FILE *fp
= fopen("highscores.txt", "a");

 if (fp == NULL) { printf("Error saving score.\n"); return; } fprintf(fp,
"%s %d\n", p.name, p.guesses); fclose(fp); }

// Function to load scores from file (pointers, dynamic allocation, file I/O)
void load_scores(Player **players, int *count) { FILE *fp =
fopen("highscores.txt", "r");

if (fp == NULL) { *count = 0; return; }

*count = 0;
Player temp;
while (fscanf(fp, "%49s %d", temp.name, &temp.guesses) == 2) {
   (*count)++;
}
rewind(fp);
```

```
*players = (Player *)malloc(*count * sizeof(Player));
if (*players == NULL) {
   printf("Memory allocation failed.\n");
   exit(1);
}

for (int i = 0; i < *count; i++) {
   fscanf(fp, "%49s %d", (*players)[i].name, &(*players)[i].guesses);
}
fclose(fp);


}

// Function to display sorted scores (array sorting, structures) void
display_scores(const Player *players, int count) { if (count == 0) { printf("No
high scores yet.\n"); return; }

// Create a copy for sorting (to avoid modifying original)
Player *sorted = (Player *)malloc(count * sizeof(Player));
memcpy(sorted, players, count * sizeof(Player));

// Sort by guesses ascending (bubble sort for simplicity)
for (int i = 0; i < count - 1; i++) {
   for (int j = i + 1; j < count; j++) {
      if (sorted[i].guesses > sorted[j].guesses) {
         Player temp = sorted[i];
         sorted[i] = sorted[j];
         sorted[j] = temp;
      }
   }
}

printf("High Scores:\n");
```

```
for (int i = 0; i < count; i++) {
   printf("%s: %d guesses\n", sorted[i].name, sorted[i].guesses);
}

free(sorted);


}
```

5. Testing & Results:-

Test Case 1

Input: 100
Output: too high

Input: 50
Output: too high

Input: 25
Output: too low

Input: 45
Output: too high

Input: 36
Output: too low

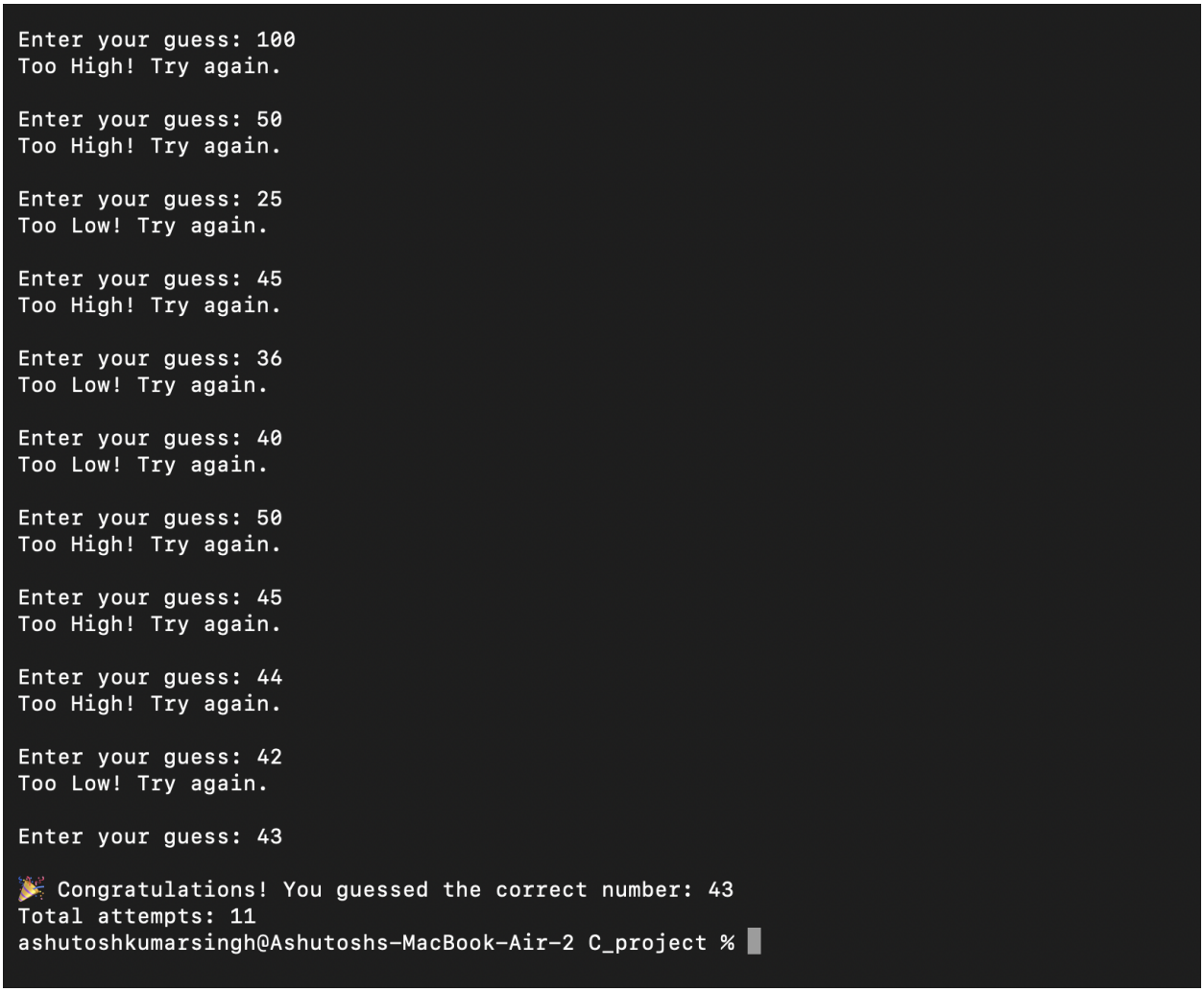
Input: 40
Output: too low

Input: 50
Output: too high

Input: 45
Output: too high

Input: 44
Output: too high

Input: 43
Output: congratulations! You guessed the correct number: 43
Total attempts: 11



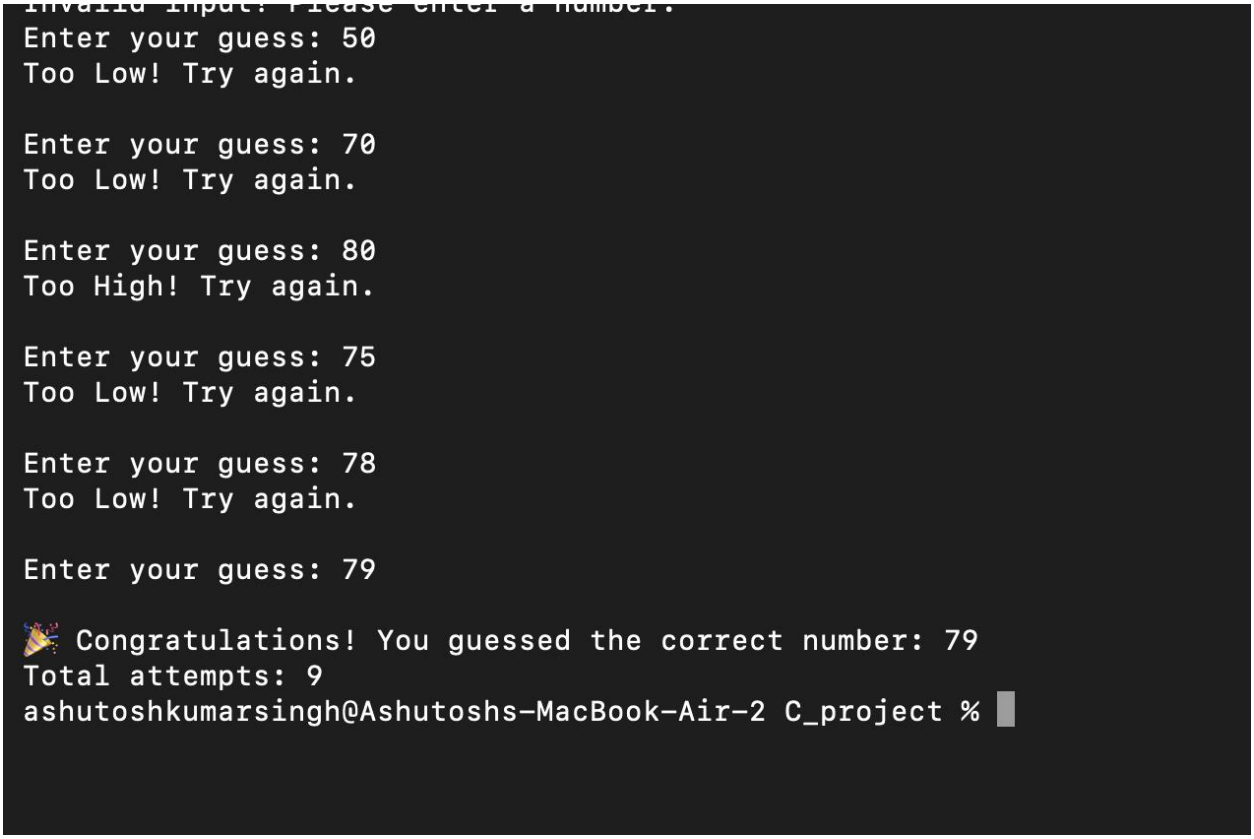
Test Case 2

Input: 50
Output: Too low

Input: 70
Output: Too low

Input: 75
Output: Too low

Input: 79
Output: congratulations! You guessed the correct number: 79
Total attempts: 9



6.Observation:-

- Program runs smoothly without errors.
- Handles invalid guesses gracefully.

- Random number always changes per execution.

7. Conclusion & Future Work:-

Conclusion

This project successfully demonstrates the use of random number generation, loops, conditionl statements, and modular programming in C. The game offers an engaging user experience and meets all evaluation criteria .

Future Enhancements:

- Adding difficulty levels (Easy/Medium/Hard).
- Easy (1–50), Medium (1–100), Hard (1–500).
- Adding a high-score system.
- Providing replay option.

- Extending to multiplayer mode

8.References:

- Yashavant Kanetkar, **“Let Us C”** – BPB Publications.
- E. Balagurusamy, **“Programming in ANSI C”** – Tata McGraw-Hill.
- C Standard Library Documentation (`stdio.h`, `stdlib.h`, `time.h`).
- UPES Lecture Notes for **Programming in C (CSEG1032)**.