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# TASK 1: CGPA Calculator (C++)

## CODE:

```
#include <iostream>
#include <vector>
using namespace std;

int main() {
    int n;
    cout << "Enter number of courses: ";
    cin >> n;

    vector<float> grades(n);
    vector<int> credits(n);
    float totalPoints = 0;
    int totalCredits = 0;

    for (int i = 0; i < n; i++) {
        cout << "Enter grade points (e.g. 4.0, 3.7) for course " << i + 1 << ": ";
        cin >> grades[i];
        cout << "Enter credit hours for course " << i + 1 << ": ";
        cin >> credits[i];
```

```
        totalPoints += grades[i] * credits[i];
        totalCredits += credits[i];
    }

    float gpa = totalPoints / totalCredits;
    cout << "\nSemester GPA: " << gpa << endl;

    // Extend with multiple semesters for CGPA
    return 0;
}
```

# OUTPUT:

```cpp
#include <iostream>
#include <vector>
using namespace std;

int main() {
    int n;
    cout << "Enter number of courses: ";
    cin >> n;

    vector<float> grades(n);
    vector<int> credits(n);
    float totalPoints = 0;
    int totalCredits = 0;

    for (int i = 0; i < n; i++) {
        cout << "Enter grade points (e.g. 4.0, 3.7) for course " << i + 1 << ": ";
        cin >> grades[i];
        cout << "Enter credit hours for course " << i + 1 << ": ";
        cin >> credits[i];
        totalPoints += grades[i] * credits[i];
        totalCredits += credits[i];
    }

    float gpa = totalPoints / totalCredits;
    cout << "\nSemester GPA: " << gpa << endl;

    // Extend with multiple semesters for CGPA
    return 0;
}
```

```cpp
#include <iostream>
#include <vector>
using namespace std;

int main() {
    int n;
    cout << "Enter number of courses: ";
    cin >> n;

    vector<float> grades(n);
```

```
Enter number of courses: 8
Enter grade points (e.g. 4.0, 3.7) for course 1: 4
Enter credit hours for course 1: 3
Enter grade points (e.g. 4.0, 3.7) for course 2:
3.77
Enter credit hours for course 2: 3
Enter grade points (e.g. 4.0, 3.7) for course 3: 2.777
Enter credit hours for course 3: 3
Enter grade points (e.g. 4.0, 3.7) for course 4: 2.33
Enter credit hours for course 4: 3
Enter grade points (e.g. 4.0, 3.7) for course 5: 2
Enter credit hours for course 5: 3
Enter grade points (e.g. 4.0, 3.7) for course 6: 4
Enter credit hours for course 6: 1
Enter grade points (e.g. 4.0, 3.7) for course 7: 3.77
Enter credit hours for course 7: 1
Enter grade points (e.g. 4.0, 3.7) for course 8: 2.77
Enter credit hours for course 8: 1

Semester GPA: 3.06506
```

# TASK 2: Login and Registration System

**CODE**:

```cpp
#include <iostream>
#include <fstream>
#include <string>
using namespace std;

const string USER_FILE = "users.txt";
```

```
bool isUsernameTaken(const string& username) {
    ifstream file(USER_FILE);
    string user, pass;
    while (file >> user >> pass) {
        if (user == username) {
            return true;
        }
    }
    return false;
}

void registerUser() {
    string username, password;

    cout << "\n[Register]\nEnter username: ";
    cin.ignore(); // CLEAR input buffer before getline
    getline(cin, username);

    if (isUsernameTaken(username)) {
        cout << "Username already exists. Try a different one.\n";
        return;
    }

    cout << "Enter password: ";
    getline(cin, password);

    ofstream file(USER_FILE, ios::app);
    file << username << " " << password << endl;
    file.close();

    cout << "Registration successful!\n";
}

void loginUser() {
    string username, password, user, pass;

    cout << "\n[Login]\nEnter username: ";
    cin.ignore(); // CLEAR input buffer before getline
    getline(cin, username);

    cout << "Enter password: ";
    getline(cin, password);
```

```
    ifstream file(USER_FILE);
    bool found = false;

    while (file >> user >> pass) {
        if (user == username && pass == password) {
            found = true;
            break;
        }
    }

    if (found)
        cout << " Login successful!\n";
    else
        cout << " Invalid username or password.\n";
}

int main() {
    int choice;
    do {
        cout << "\n=== MENU ===\n";
        cout << "1. Register\n";
        cout << "2. Login\n";
        cout << "3. Exit\n";
        cout << "Enter choice: ";
        cin >> choice;

        switch (choice) {
            case 1: registerUser(); break;
            case 2: loginUser(); break;
            case 3: cout << "Exiting...\n"; break;
            default: cout << "Invalid option. Try again.\n";
        }
    } while (choice != 3);

    return 0;
}
```

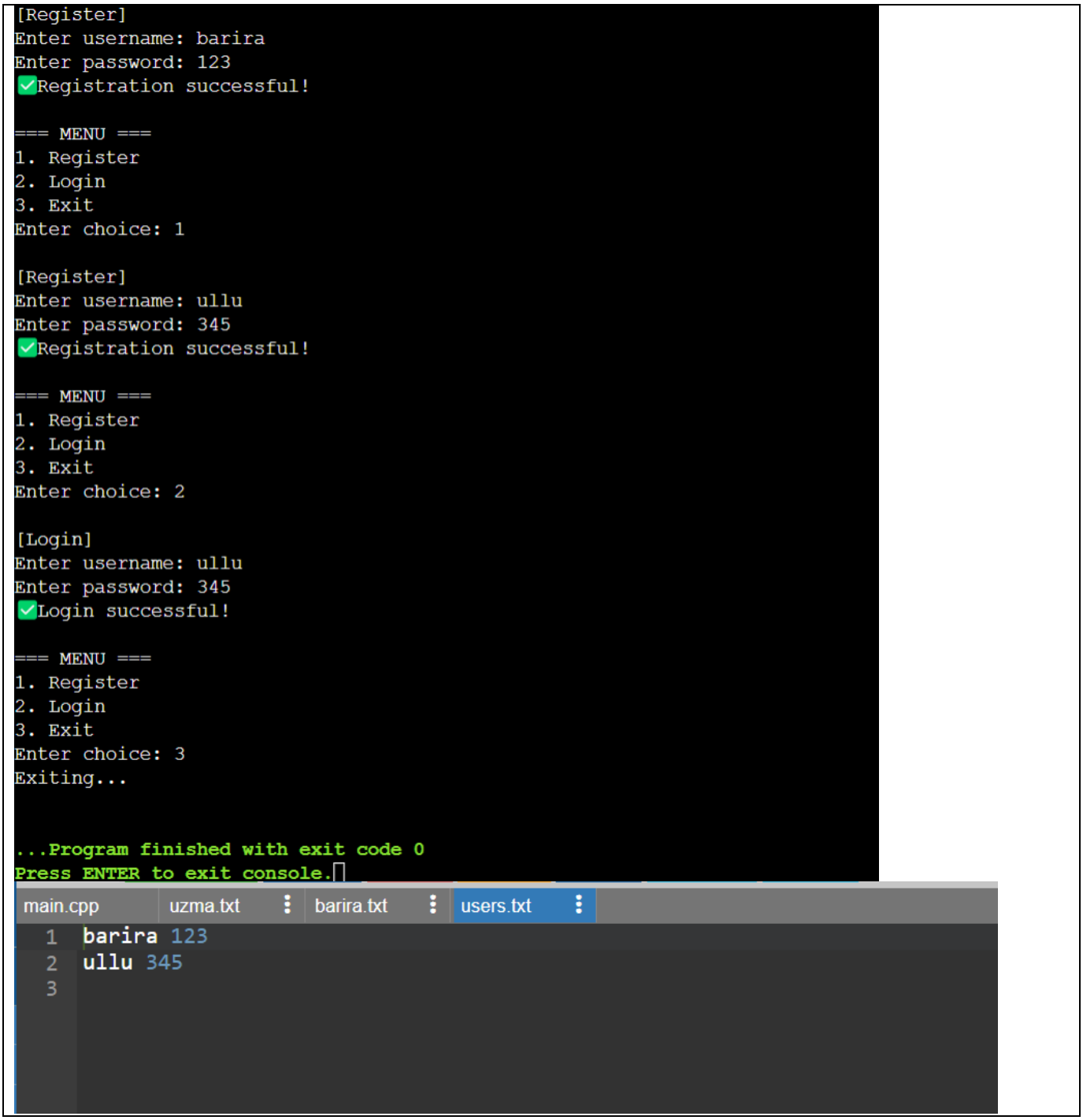
**OUTPUT:**

main.cpp | uzma.txt | banra.txt | users.txt

```cpp
#include <iostream>
#include <fstream>
#include <string>
using namespace std;

const string USER_FILE = "users.txt";

bool isUsernameTaken(const string& username) {
    ifstream file(USER_FILE);
    string user, pass;
    while (file >> user >> pass) {
        if (user == username) {
            return true;
        }
    }
    return false;
}

void registerUser() {
    string username, password;

    cout << "\n[Register]\nEnter username: ";
    cin.ignore(); // CLEAR input buffer before getline
    getline(cin, username);

    if (isUsernameTaken(username)) {
        cout << "Username already exists. Try a different one.\n";
```

input

```
. Login
. Exit
nter choice: 3
xiting...
```


[Register]
Enter username: barira
Enter password: 123
✅Registration successful!
=== MENU ===
1. Register
2. Login
3. Exit
Enter choice: 1
[Register]
Enter username: ullu
Enter password: 345
✅Registration successful!
=== MENU ===
1. Register
2. Login
3. Exit
Enter choice: 2
[Login]
Enter username: ullu
Enter password: 345
✅Login successful!
=== MENU ===
1. Register
2. Login
3. Exit
Enter choice: 3
Exiting...
...Program finished with exit code 0
Press ENTER to exit console.
main.cpp
uzma.txt
barira.txt
users.txt
1 barira 123
2 ullu 345
3

# TASK 3: Sudoku Solver

# CODE:

```
#include <iostream>
using namespace std;

const int N = 9;

bool isSafe(int grid[N][N], int row, int col, int num) {
   for (int x = 0; x < 9; x++)
      if (grid[row][x] == num || grid[x][col] == num)
         return false;

   int startRow = row - row % 3, startCol = col - col % 3;
   for (int i = 0; i < 3; i++)
      for (int j = 0; j < 3; j++)
         if (grid[i + startRow][j + startCol] == num)
            return false;

   return true;
}

bool solveSudoku(int grid[N][N], int row, int col) {
   if (row == N - 1 && col == N)
      return true;
   if (col == N) {
      row++;
      col = 0;
   }
   if (grid[row][col] != 0)
      return solveSudoku(grid, row, col + 1);

   for (int num = 1; num <= 9; num++) {
      if (isSafe(grid, row, col, num)) {
         grid[row][col] = num;
         if (solveSudoku(grid, row, col + 1))
            return true;
         grid[row][col] = 0;
      }
   }
   return false;
}

void printGrid(int grid[N][N]) {
   cout << "\nSolved Sudoku:\n";
```

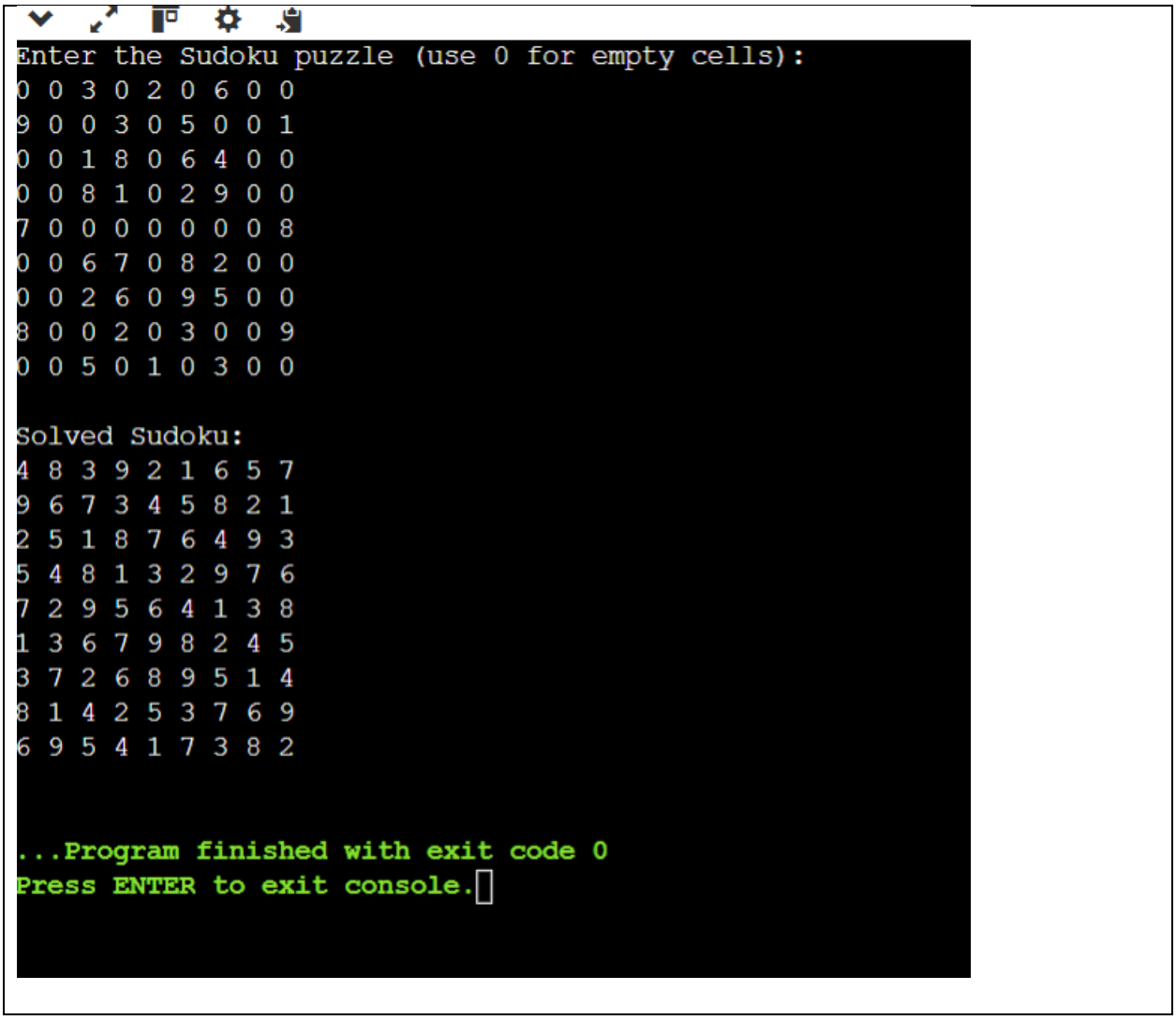
```
    for (int r = 0; r < N; r++) {
        for (int d = 0; d < N; d++) {
            cout << grid[r][d] << " ";
        }
        cout << endl;
    }
}

int main() {
    int grid[N][N];

    cout << "Enter the Sudoku puzzle (use 0 for empty cells):\n";
    for (int i = 0; i < N; i++) {
        for (int j = 0; j < N; j++) {
            cin >> grid[i][j];
            if (grid[i][j] < 0 || grid[i][j] > 9) {
                cout << "Invalid input. Please enter numbers between 0 and 9 only.\n";
                return 1;
            }
        }
    }

    if (solveSudoku(grid, 0, 0))
        printGrid(grid);
    else
        cout << "No solution exists for the given puzzle.\n";

    return 0;
}
```

**OUTPUT:**

```cpp
#include <iostream>
using namespace std;

const int N = 9;

bool isSafe(int grid[N][N], int row, int col, int num) {
    for (int x = 0; x < 9; x++)
        if (grid[row][x] == num || grid[x][col] == num)
            return false;

    int startRow = row - row % 3, startCol = col - col % 3;
    for (int i = 0; i < 3; i++)
        for (int j = 0; j < 3; j++)
            if (grid[i + startRow][j + startCol] == num)
                return false;

    return true;
}

bool solveSudoku(int grid[N][N], int row, int col) {
    if (row == N - 1 && col == N)
        return true;
    if (col == N) {
        row++;
        col = 0;
    }
    if (grid[row][col] != 0)
        return solveSudoku(grid, row, col + 1);
```

input

```
3 1 4 2 5 3 7 6 9
5 9 5 4 1 7 3 8 2
```


Enter the Sudoku puzzle (use 0 for empty cells):
0 0 3 0 2 0 6 0 0
9 0 0 3 0 5 0 0 1
0 0 1 8 0 6 4 0 0
0 0 8 1 0 2 9 0 0
7 0 0 0 0 0 0 0 8
0 0 6 7 0 8 2 0 0
0 0 2 6 0 9 5 0 0
8 0 0 2 0 3 0 0 9
0 0 5 0 1 0 3 0 0
Solved Sudoku:
4 8 3 9 2 1 6 5 7
9 6 7 3 4 5 8 2 1
2 5 1 8 7 6 4 9 3
5 4 8 1 3 2 9 7 6
7 2 9 5 6 4 1 3 8
1 3 6 7 9 8 2 4 5
3 7 2 6 8 9 5 1 4
8 1 4 2 5 3 7 6 9
6 9 5 4 1 7 3 8 2
...Program finished with exit code 0
Press ENTER to exit console.

# TASK 4: Banking System

# CODE:

```
#include <iostream>
#include <vector>
using namespace std;

class Account {
   string name;
   int accountNo;
   double balance;

public:
   Account(string n, int acc, double bal) {
      name = n;
      accountNo = acc;
      balance = bal;
   }

   void deposit(double amount) {
      balance += amount;
      cout << "Deposited: " << amount << endl;
   }

   void withdraw(double amount) {
      if (amount <= balance) {
         balance -= amount;
         cout << "Withdrawn: " << amount << endl;
      } else {
         cout << "Insufficient balance.\n";
      }
   }

   void showDetails() {
      cout << "Name: " << name << ", Acc#: " << accountNo << ", Balance: " << balance << endl;
   }
};

int main() {
   Account acc("Barira Khan", 101, 1000);

   int choice;
   double amount;
   do {
      cout << "\n1. Deposit\n2. Withdraw\n3. Show Account\n4. Exit\nChoice: ";
```

```
        cin >> choice;
        switch (choice) {
            case 1:
                cout << "Amount to deposit: ";
                cin >> amount;
                acc.deposit(amount);
                break;
            case 2:
                cout << "Amount to withdraw: ";
                cin >> amount;
                acc.withdraw(amount);
                break;
            case 3:
                acc.showDetails();
                break;
        }
    } while (choice != 4);

    return 0;
}
```

# OUTPUT:

```cpp
#include <iostream>
#include <vector>
using namespace std;

class Account {
    string name;
    int accountNo;
    double balance;

public:
    Account(string n, int acc, double bal) {
        name = n;
        accountNo = acc;
        balance = bal;
    }

    void deposit(double amount) {
        balance += amount;
        cout << "Deposited: " << amount << endl;
    }

    void withdraw(double amount) {
        if (amount <= balance) {
            balance -= amount;
            cout << "Withdrawn: " << amount << endl;
        } else {
            cout << "Insufficient balance.\n";
```

```
1. Deposit
2. Withdraw
3. Show Account
4. Exit
Choice: 1
Amount to deposit: 500
Deposited: 500

1. Deposit
2. Withdraw
3. Show Account
4. Exit
Choice: 3
Name: Barira Khan, Acc#: 101, Balance: 1500

1. Deposit
2. Withdraw
3. Show Account
4. Exit
Choice: 1
Amount to deposit: 2000
Deposited: 2000

1. Deposit
2. Withdraw
3. Show Account
4. Exit
Choice: 3
Name: Barira Khan, Acc#: 101, Balance: 3500

1. Deposit
2. Withdraw
3. Show Account
4. Exit
Choice: 2
Amount to withdraw: 5000
Insufficient balance.
```

```
Choice: 3
Name: Barira Khan, Acc#: 101, Balance: 3500

1. Deposit
2. Withdraw
3. Show Account
4. Exit
Choice: 2
Amount to withdraw: 5000
Insufficient balance.

1. Deposit
2. Withdraw
3. Show Account
4. Exit
Choice: 2
Amount to withdraw: 700
Withdrawn: 700

1. Deposit
2. Withdraw
3. Show Account
4. Exit
Choice: 3
Name: Barira Khan, Acc#: 101, Balance: 2800

1. Deposit
2. Withdraw
3. Show Account
4. Exit
Choice: 4


...Program finished with exit code 0
Press ENTER to exit console.
```