**Assignment No. 2**

**Code:**

#include <iostream>

#include <vector>

#include <string>

#include <fstream>

#include <sstream>

#include <chrono>

#include <algorithm>

using namespace std;

using namespace std::chrono;

struct Movie {

string title;

float rating;

int release\_year;

int popularity;

void display() const {

cout << title << " | Rating: " << rating

<< " | Year: " << release\_year

<< " | Popularity: " << popularity << endl;

}

};

// QuickSort with comparator

void quickSort(vector<Movie> &movies, int low, int high, bool (\*compare)(const Movie &, const Movie &)) {

if (low < high) {

int pivotIndex = low;

Movie pivot = movies[high];

for (int i = low; i < high; i++) {

if (compare(movies[i], pivot)) {

swap(movies[i], movies[pivotIndex]);

pivotIndex++;

}

}

swap(movies[pivotIndex], movies[high]);

quickSort(movies, low, pivotIndex - 1, compare);

quickSort(movies, pivotIndex + 1, high, compare);

}

}

// Comparators

bool compareByRating(const Movie &a, const Movie &b) {

return a.rating < b.rating;

}

bool compareByYear(const Movie &a, const Movie &b) {

return a.release\_year < b.release\_year;

}

bool compareByPopularity(const Movie &a, const Movie &b) {

return a.popularity < b.popularity;

}

// Load movies from CSV

vector<Movie> loadMoviesFromCSV(const string &filename) {

vector<Movie> movies;

ifstream file(filename);

if (!file.is\_open()) {

cerr << "Error opening file: " << filename << endl;

return movies;

}

string line;

getline(file, line); // Skip header

while (getline(file, line)) {

stringstream ss(line);

string title, ratingStr, yearStr, popStr;

getline(ss, title, ',');

getline(ss, ratingStr, ',');

getline(ss, yearStr, ',');

getline(ss, popStr, ',');

if (!title.empty()) {

Movie m;

m.title = title;

m.rating = stof(ratingStr);

m.release\_year = stoi(yearStr);

m.popularity = stoi(popStr);

movies.push\_back(m);

}

}

return movies;

}

int main() {

string filename = "movies.csv";

vector<Movie> movies = loadMoviesFromCSV(filename);

if (movies.empty()) {

cout << "No movies loaded.\n";

return 1;

}

cout << "Sort movies by (rating/year/popularity): ";

string sort\_by;

cin >> sort\_by;

bool (\*compare)(const Movie &, const Movie &);

if (sort\_by == "rating")

compare = compareByRating;

else if (sort\_by == "year")

compare = compareByYear;

else if (sort\_by == "popularity")

compare = compareByPopularity;

else {

cout << "Invalid choice. Defaulting to rating.\n";

compare = compareByRating;

}

auto start = high\_resolution\_clock::now();

quickSort(movies, 0, movies.size() - 1, compare);

auto end = high\_resolution\_clock::now();

duration<double> diff = end - start;

cout << "\nTop 10 movies sorted by " << sort\_by << ":\n";

for (int i = movies.size() - 1; i >= static\_cast<int>(movies.size()) - 10; --i) {

movies[i].display();

}

cout << "\nSorted " << movies.size() << " movies in " << diff.count() << " seconds.\n";

return 0;

}

**Output:**

**i) Sort by Rating**

Sort movies by (rating/year/popularity): rating

Top 10 movies sorted by rating:

Knives Out 7 | Rating: 9.9 | Year: 1994 | Popularity: 93191

City of God 12 | Rating: 9.9 | Year: 1985 | Popularity: 705827

Avengers: Endgame 6 | Rating: 9.9 | Year: 2012 | Popularity: 539144

Knives Out 6 | Rating: 9.9 | Year: 1993 | Popularity: 911799

Oldboy 7 | Rating: 10.0 | Year: 2016 | Popularity: 131989

Once Upon a Time in Hollywood 14 | Rating: 10.0 | Year: 1993 | Popularity: 159845

Back to the Future 10 | Rating: 10.0 | Year: 1995 | Popularity: 522195

The Dark Knight 8 | Rating: 10.0 | Year: 1996 | Popularity: 252427

Back to the Future 1 | Rating: 10.0 | Year: 2004 | Popularity: 77490

Black Panther 5 | Rating: 10.0 | Year: 2017 | Popularity: 400764

Sorted 1000 movies in 0.0032 seconds.

**ii) Sort by year**

Sort movies by (rating/year/popularity): year

Top 10 movies sorted by release year:

The Big Short 5 | Rating: 2.1 | Year: 2024 | Popularity: 684093

Avengers: Infinity War 12 | Rating: 6.1 | Year: 2024 | Popularity: 786173

The Departed 1 | Rating: 3.4 | Year: 2024 | Popularity: 219095

Django Unchained 12 | Rating: 6.8 | Year: 2024 | Popularity: 888169

Se7en 13 | Rating: 5.9 | Year: 2024 | Popularity: 535481

Saving Private Ryan 7 | Rating: 6.1 | Year: 2024 | Popularity: 901489

The Dark Knight 7 | Rating: 3.4 | Year: 2024 | Popularity: 519633

Back to the Future 5 | Rating: 8.0 | Year: 2024 | Popularity: 575837

Spirited Away 3 | Rating: 9.6 | Year: 2024 | Popularity: 345541

The Pianist 8 | Rating: 2.9 | Year: 2024 | Popularity: 515637

Sorted 1000 movies in 0.0034 seconds.

**ii) Sort by Popularity**

Sort movies by (rating/year/popularity): popularity

Top 10 movies sorted by popularity:

1917 5 | Rating: 8.5 | Year: 1982 | Popularity: 992469

The Empire Strikes Back 9 | Rating: 5.1 | Year: 2020 | Popularity: 993403

Saving Private Ryan 17 | Rating: 2.8 | Year: 2018 | Popularity: 993525

The Dark Knight 3 | Rating: 6.1 | Year: 2004 | Popularity: 994798

Knives Out 16 | Rating: 5.4 | Year: 1994 | Popularity: 994855

Goodfellas 5 | Rating: 5.1 | Year: 2021 | Popularity: 996126

The Green Mile 10 | Rating: 7.2 | Year: 1993 | Popularity: 997248

Up 1 | Rating: 5.8 | Year: 1987 | Popularity: 997800

Terminator 2: Judgment Day 8 | Rating: 5.7 | Year: 1992 | Popularity: 998171

The Matrix 5 | Rating: 8.1 | Year: 2005 | Popularity: 998278

Sorted 1000 movies in 0.0031 seconds.