Project 5 – File Handling (CSV Files) – Earthquake App

by

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ICS 265 : C Programming

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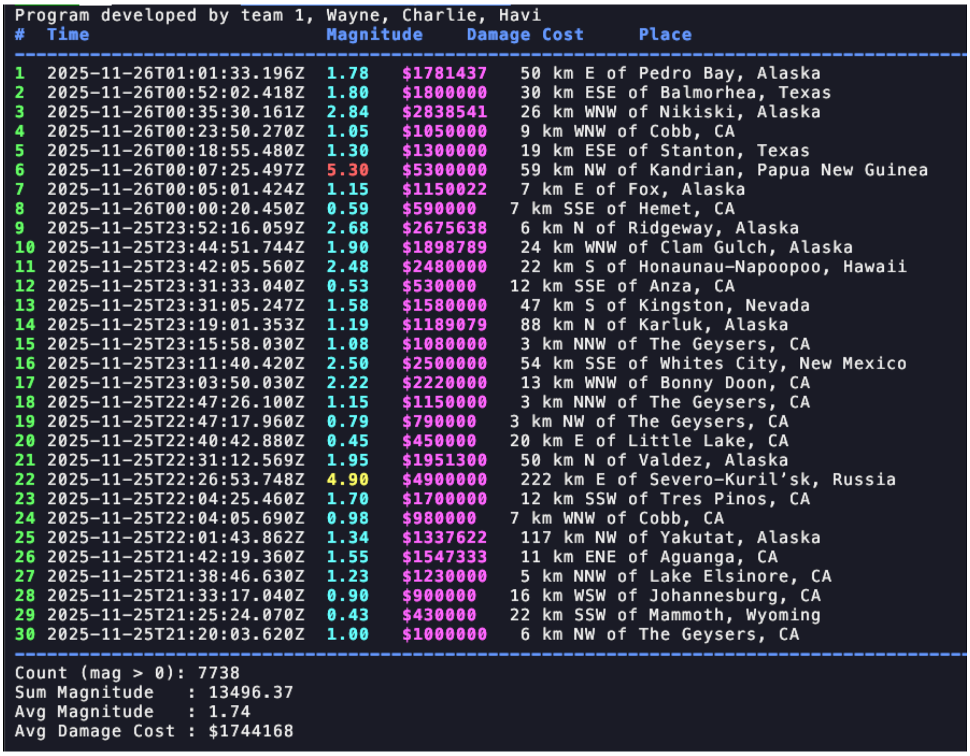
1 Introduction

This project focuses on file handling using CSV data by building a simple Earthquake Analysis App in C. The application reads the official USGS dataset containing all worldwide earthquakes from the past 30 days. The program extracts and displays key fields, including the event time, magnitude, calculated damage cost, and place.

The damage cost is computed by multiplying the earthquake's magnitude by 1,000,000. The program also calculates statistical values such as the total number of valid magnitudes, the sum of all magnitudes, the average magnitude, and the average estimated cost. These statistics are displayed at the end of the program's output.

2 Screenshots



```
Program developed by team 1, Wayne, Charlie, Havi
#  Time                        Magnitude    Damage Cost     Place
-------------------------------------------------------------------------------------------
1  2025-11-26T01:01:33.196Z  1.78   $1781437   50 km E of Pedro Bay, Alaska
2  2025-11-26T00:52:02.418Z  1.80   $1800000   30 km ESE of Balmorhea, Texas
3  2025-11-26T00:35:30.161Z  2.84   $2838541   26 km WNW of Nikiski, Alaska
4  2025-11-26T00:23:50.270Z  1.05   $1050000   9 km WNW of Cobb, CA
5  2025-11-26T00:18:55.480Z  1.30   $1300000   19 km ESE of Stanton, Texas
6  2025-11-26T00:07:25.497Z  5.30   $5300000   59 km NW of Kandrian, Papua New Guinea
7  2025-11-26T00:05:01.424Z  1.15   $1150022   7 km E of Fox, Alaska
8  2025-11-26T00:00:20.450Z  0.59   $590000   7 km SSE of Hemet, CA
9  2025-11-25T23:52:16.059Z  2.68   $2675638   6 km N of Ridgeway, Alaska
10 2025-11-25T23:44:51.744Z  1.90   $1898789   24 km WNW of Clam Gulch, Alaska
11 2025-11-25T23:42:05.560Z  2.48   $2480000   22 km S of Honaunau-Napoopoo, Hawaii
12 2025-11-25T23:31:33.040Z  0.53   $530000   12 km SSE of Anza, CA
13 2025-11-25T23:31:05.247Z  1.58   $1580000   47 km S of Kingston, Nevada
14 2025-11-25T23:19:01.353Z  1.19   $1189079   88 km N of Karluk, Alaska
15 2025-11-25T23:15:58.030Z  1.08   $1080000   3 km NNW of The Geysers, CA
16 2025-11-25T23:11:40.420Z  2.50   $2500000   54 km SSE of Whites City, New Mexico
17 2025-11-25T23:03:50.030Z  2.22   $2220000   13 km WNW of Bonny Doon, CA
18 2025-11-25T22:47:26.100Z  1.15   $1150000   3 km NNW of The Geysers, CA
19 2025-11-25T22:47:17.960Z  0.79   $790000   3 km NW of The Geysers, CA
20 2025-11-25T22:40:42.880Z  0.45   $450000   20 km E of Little Lake, CA
21 2025-11-25T22:31:12.569Z  1.95   $1951300   50 km N of Valdez, Alaska
22 2025-11-25T22:26:53.748Z  4.90   $4900000   222 km E of Severo-Kuril'sk, Russia
23 2025-11-25T22:04:25.460Z  1.70   $1700000   12 km SSW of Tres Pinos, CA
24 2025-11-25T22:04:05.690Z  0.98   $980000   7 km WNW of Cobb, CA
25 2025-11-25T22:01:43.862Z  1.34   $1337622   117 km NW of Yakutat, Alaska
26 2025-11-25T21:42:19.360Z  1.55   $1547333   11 km ENE of Aguanga, CA
27 2025-11-25T21:38:46.630Z  1.23   $1230000   5 km NNW of Lake Elsinore, CA
28 2025-11-25T21:33:17.040Z  0.90   $900000   16 km WSW of Johannesburg, CA
29 2025-11-25T21:25:24.070Z  0.43   $430000   22 km SSW of Mammoth, Wyoming
30 2025-11-25T21:20:03.620Z  1.00   $1000000   6 km NW of The Geysers, CA
-------------------------------------------------------------------------------------------
Count (mag > 0): 7738
Sum Magnitude    : 13496.37
Avg Magnitude    : 1.74
Avg Damage Cost : $1744168
```

Figure 1: Here the code in execution

3 General Comments

```c
// Simple CSV parser that respects quotes
char *col(char *dest, const char *src, int colWanted) {
    int col = 0, i = 0, j = 0, inside = 0;

    while (src[i]) {
        char c = src[i];
        if (c == ’"’) {
            inside = !inside;
            i++;
            continue;
        }
        if (c == ’,’ && !inside) {
            if (col == colWanted) {
                dest[j] = 0;
                return dest;
            }
            col++;
            j = 0;
            i++;
            continue;
        }
        if (col == colWanted) dest[j++] = c;
        i++;
    }
    dest[j] = 0;
    return dest;
}
```

1: CSV Parsing Function

```c
// Open CSV file
FILE *f = fopen(CSV_FILE, "r");
if (!f) {
    perror("fopen");
    return 1;
}

char line[LINE];
// Skip header line
if (!fgets(line, LINE, f)) {
    fclose(f);
    printf("Empty CSV.\n");
    return 1;
}

char c_time[256], c_mag[32], c_place[512];
long   count_total   = 0;
double sumMag_total  = 0.0;
double sumCost_total = 0.0;
```

```c
// Read each line of CSV
while (fgets(line, LINE, f)) {
    col(c_time,  line, 0);   // Extract time column
    col(c_mag,   line, 4);   // Extract magnitude column
    col(c_place, line, 13);  // Extract place column

    double m = atof(c_mag);
    if (m <= 0) continue;

    double cost = calc_cost(m);

    // Accumulate statistics
    count_total++;
    sumMag_total  += m;
    sumCost_total += cost;

    // Display earthquake data
    printf("%-25s ", c_time);
    print_mag_color(m);
    printf("   $%.0f   %s\n", cost, c_place);
}

fclose(f);
```

2: CSV File Reading and Data Extraction

The code, binaries and documentation can be found on:
`https://github.com/CharlesTrombley/group-project/tree/main`

The video can be found:
`https://youtube.com(comingsoon)`