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    COP 3223C

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    Assignment 12: DNA.c

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#include <stdio.h>

#include <string.h>

#define MAX\_LENGTH 1000

int main()

{

    char file\_name[MAX\_LENGTH]; // File name inputted by user

    char target[MAX\_LENGTH];

    char buffer[MAX\_LENGTH];

    int lines; // Number of lines in the file and to indicate which line is which

    int i; // For loop variable used

    int j; // For loop variable used

    int length; // The length of the DNA strand

    int score; // Variable for the score calculation

    int max\_score; // The highest score in the file

    int max\_score\_line; // The line in the file with the highest score

    FILE \*fp;

    // Ask user to input a file name

    printf("What file stores the DNA test cases?\n");

    scanf("%s", file\_name);

    // If file found then open the file, if not then output error message

    fp = fopen(file\_name, "r");

    if (fp == NULL)

    {

        printf("Error: could not open file %s\n", file\_name);

        return 1;

    }

    // Read the sample sequence of DNA

    fgets(target, MAX\_LENGTH, fp);

    // Get the number of candidates

    fscanf(fp, "%d\n", &lines);

    // Scores calculated for each candidate

    max\_score = -1;

    max\_score\_line = -1;

    for (i = 1; i <= lines; i++)

    {

        // Read the line

        fgets(buffer, MAX\_LENGTH, fp);

        // Check if it is a perfect match

        if (strcmp(buffer, target) == 0)

        {

            printf("Candidate %d is a perfect match.\n", i);

            fclose(fp);

            return 0;

        }

        // Calculate the line's score

        score = 0;

        // length = strlen(target) < strlen(buffer) ? strlen(target) : strlen(buffer); - equivalent to the if statement below

        if (strlen(target) < strlen(buffer))

        {

            length = strlen(target);

        }

        else

        {

            length = strlen(buffer);

        }

        for (j = 0; j < length; j++)

        {

            if (target[j] == buffer[j])

            {

                score += 3;

            }

            else if ((target[j] == 'A' && buffer[j] == 'T') || (target[j] == 'T' && buffer[j] == 'A') || (target[j] == 'G' && buffer[j] == 'C') || (target[j] == 'C' && buffer[j] == 'G'))

            {

                score += 1;

            }

        }

        // Integer Division

        score = score \* 100 / (3 \* length);

        // If Statement for comparing highest score

        if (score > max\_score)

        {

            max\_score = score;

            max\_score\_line = i;

        }

    }

    printf("Candidate %d is the best match with a score of %d\n", max\_score\_line, max\_score);

    fclose(fp);

    return 0;

}

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