Computer Science 250

Project 1: Detecting Palindromic Files

**Due:** Monday, Sep. 10, at the beginning of class.

**Reminders:**

* You are not allowed to work with, consult, or seek help from anyone except the tutor or instructor as you write your program.
* You should use "ice" to develop your program, along with the emacs editor and gcc compiler. Neither the tutor nor I will give any assistance unless you are using the Linux platform with those development tools.

A palindrome is a sequence of characters that reads the same forwards and backwards. The following phrases are all palindromic:

* live evil
* avid diva
* able was i ere i saw elba

For this project you are going to write a C program to determine if the entire contents of a text file is a single palindrome. If the contents of the file are palindromic, your program must print out the message

<filename> is a palindromic file.

and then terminate by calling exit(0). (Replace <filename> with the name of the file.) If the file is not palindromic, you program must print the error message

<filename> is not a palindromic file. It differs at characters <left position> and <right position>.

and then terminate by calling exit (-1). Replace <left position> and <right position> with the positions within the file where the first difference occurs.

The name of the text file will be given on the command line, as demonstrated in class. Your program should copy the char array stored in argv[1] into another char array using the strcpy() function. Assume that the file name has at most 1024 chars in it.

You will need to use several C library functions to write your program. Here are the prototypes of functions that you will need to use, along with their location, and a description of how they work.

| Function Prototype | Library | Description |
| --- | --- | --- |
| char [] strcpy (char destination[], char source[]); | string.h | Copy the char array source to the char array destination. Returns the copied array (which you should ignore). |
| FILE \* fopen (char filename [], char mode []); | stdio.h | Open the file named filename located in the same directory as this program, and return a text stream associated with the file, or the symbolic constant NULL if the file cannot be opened for any reason. The file is opened for the access method specified by mode. You should use the literal string "r" (open for reading only) as the second parameter. |
| int fseek (FILE \*stream, long offset, int whence); | stdio.h | Move the pointer of the previously opened file attached to stream to the location specified by offset. Use the symbolic constant SEEK\_SET as the third parameter. |
| char fgetc (FILE \*f); | stdio.h | Read the next char from the stream f and return it, advancing the pointer by 1. |
| void exit (int status); | stdlib.h | Terminate the program immediately, sending the value of status back to the shell. |

You will need to be able to determine the size of the file in your program. Include the following function in your source file, after your main function.

int fsize (char filename[])

{

struct stat st; /\* struct stat is defined in sys/stat.h, so

you will need to include this header file \*/

if (stat(filename, &st)) {

return -1;

}

return st.st\_size;

}

You will also have to add the following prototype to your source file. Put it after all pre-processor directives that you use, but before the declaration of main():

int fsize (char filename []);

Use good programming practices (meaningful identifier names, proper indentation, constants, comments, etc.) when writing your code. Points will be deducted for poorly written code, even if it works properly.

**What to turn in:** When you are ready to turn your program in, print out a hard copy of the source file to submit. Then, email me a copy of the source file as an email attachment. Make sure the subject of your email is "CS 250 – Project 1 - <your last name, your first name>". Both the hard copy and email must be received by the due date to be considered an on-time submission.