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Description of Lab 1

The program implements a shell program with the following commands: “cd”, “ls”, “pwd” and “exit”. The main method uses a IO file stream that continuously takes in input unless NULL or “exit” is entered. To parse the commands and any input, the functions skipChar and splitCommandLine are implemented.

The function skipChar loops through the character pointer and returns a pointer to the location of the first position which doesn’t have the “skip” character that is passed into the function. The function splitCommandLine uses skipChar and splits the full io stream buffer into individual words by placing a null character after each word. It also use strchr to find the beginning of the words and stores a pointer to the beginning of the word in a separate array. To make sure the maxArgs is not reached, a for loop is used to increment up to maxArgs and any words after that will not be stored.

A function pointer is then declared and used along with a commandStruct for each of the 4 commands that are to be implemented. The doCommand looks through the words in the args array and uses strcmp with a loop to determine which function is called. It then uses the previously mentioned function pointers to execute each specific command. If the word is not recognized, an error is returned.

The simplest of the commands is the exit command which simply calls the already defined exit function from the C libraries. The pwd is also relatively simple and uses the getcwd function that is already defined and stores it in a character pointer. The character pointer is then printed out and freed as getcwd allocates memory to get the current directory and store it in a character pointer.

The cd function first checks if two arguments or one argument was passed. If one argument was passed, it changes the current directory to the home directory. To get the home directory, it instantiates a passwd struct and then changes the directory using the chdhir command to the pw_dir element of the struct which is the home directory. If 2 arguments are passed, the directory is changed used the chdir command to the word immediately following the cd command in the args array.

The ls function first checks if there are only one or two arguments. If there are two arguments and the second argument is -a, then all files are printed out. This is done using a dirent struct and the scandir function which returns the number of number of files and also stores all the filenames within the dirent struct in the d_name element.The d_name elements are then printed out. If only ls is an argument then a filter function is passed as well to the scandir function which will filter out all hidden files. Hidden files contain a ‘.’ So the filter function will return false if a period is within the string. We called the filter function dotCheck because it checks for periods (dots). Again, it uses a print statement within a for loop to print out all the directories.

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The special features that we used from the C language are from the predefined functions of the libraries in C like getcwd, getpwuid, getuid, scandir. There are also many special parts of the C language like memory allocation used in the functions previously mentioned. Structures and function pointers were also used in this lab to implement the shell.