

Project 4 Writeup CS214

David DeSimone

November 11, 2014

1 Data Structures

As we are dealing with lists of strings that are variable in size, we implement a **linked list** for string storage. To do this, we declare a type `str_arr_s`, which is a linked list for types `str_link_s`, which are a simple wrapper for a string.

To handle the indexer, we use a linked-list of terms, with each item in the linked-list itself pointing to another linked list which resolves the files that it belongs to. While insertion/retrieval is slower due to this choice, I have chosen this out of concern for memory constraints.

2 Design and Exception Handling

The search program is built into several functions. In main, we loop over input for input in the form `so |terms|` or `sa |terms|`. Once we recognize such an input, we call our `peel()` function to tokenize the input terms, and insert them into our linked list data structures. From here, we call `so()` or `sa()` on our linked list data structure to return a list of relevant files. This list is printed by our `print` function. At any time, the user can enter "q" (without quotes) to exit the program.

Exception handling includes: Non-termination on invalid/NULL user input, accomplished by various `strcmps` and NULL checks. Reporting of an invalid file format, accomplished by various logic checks in the parsing of the file.

3 Memory Space Usage

The program makes the expectation that it can load the entire file(s) into memory at run time. If n is the number of input words, and m is the number of files, our worst case memory space usage would be $O(nm)$, as each word could be contained in every file. The searcher only adds linked-lists that are bounded by this number, and thus they do not add to the asymptotic running time.

4 File Format

Files are in the format

```
< list > word  
file freq file freq file freq...  
< /list >  
...
```

5 Make File Usage

```
"make" Makes the search utility  
"make indexer" Makes the indexer utility  
"make clean" Removes files
```