

Lab2 Report

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Lab Name: Address Book

Lab Task

Your job is to write a program to search on the provided linked list. The user will enter a name on the console, and your program is expected to print the corresponding full names, together with the room numbers, based on the information stored in the linked list.

Algorithm

In my opinion, we don't need a very complex algorithm, all we need to do is to traverse the list and compare the content of each node with the input. The point is to write the strcmp function and traverse the given list.

In order to compare two strings, we need to know how to define two strings are equal. In this Lab, I define two strings are equal if and only if they have the same strength and in the same location exists same character. With this definition, we can write the strcmp function as follows:

Strcmp:

```
;initialize R5
AND R5, R5, #0
ADD R5, R5, #1
;push R0
ADD R6, R6, #-1
STR R0, R6, #0
;push R1
ADD R6, R6, #-1
STR R1, R6, #0
;push R3
ADD R6, R6, #-1
STR R3, R6, #0
;push R4
ADD R6, R6, #-1
STR R4, R6, #0
```

```
LDR R0, R0, #0
BRz ProgramExit
```

CmpLoop:

```
;compare every character
LDR R3, R0, #0
LDR R4, R1, #0
ADD R3, R3, #0
BRz Ending
```

```
ADD R4, R4, #0
BRz Ending
ADD R0, R0, #1
ADD R1, R1, #1
NOT R4, R4
ADD R4, R4, #1
ADD R3, R3, R4
BRz CmpLoop
```

```
Ending:
ADD R3, R3, R4
BRnp NotEqual
BRz ReturnMain
```

```
NotEqual:
AND R5, R5, #0
BRnzp ReturnMain
```

```
ReturnMain:
;pop R4
LDR R4, R6, #0
ADD R6, R6, #1
;pop R3
LDR R3, R6, #0
ADD R6, R6, #1
;pop R1
LDR R1, R6, #0
ADD R6, R6, #1
;pop R0
LDR R0, R6, #0
ADD R6, R6, #1
RET
```

Another important part is to traverse the linked list. To be honest, I use the same way to traverse the list in C programming.

```
;pop R0
ADD R6, R6, #1
LDR R0, R6, #-1
BRz ProgramExit
;move to next node
LDR R0, R0, #0
BRz ProgramExit
```

BRnp SearchingLoop

Improvement according to the TA's question

There are a lot of redundant instructions. Redundant instructions will waste calculation power and time. I know it's not a good habit to write a number of redundant instructions. I will try my best to optimization my program.