Homework 4

Pseudocode

Add Record:

1 Define a record pointer called **end**.
2 Define a record pointer called **temp**.
3 Copy from the **start** variable the address it's pointing to, into variable **end**.
4 **If** the address stored in **end** is not **NULL**:
5 **While** the next field of the record being pointed to by **end** is not **NULL**:
6   Copy from the next field of the record being pointed to by **end** the address being pointed to into the variable **end**.
7 Allocate space for a new record on the heap and store its address in the **temp**.
8 Copy from the **uname** variable its value into the name field of the record pointed to by **temp**.
9 Copy from the **uyob** variable its value into the yob field of the record pointed to by **temp**.
10 Copy from the **uaddr** variable its value into the addr field of the record pointed to by **temp**.
11 Copy from the **utelno** variable its value into the telno field of the record pointed to by **temp**.
12 Copy the **NULL** pointer into the next field of the record pointed to by **temp**.
13 **If start** is pointing to **null**:
14 Copy the address stored at **temp** into **start**
15 **Else if** the next field of the record being pointed to by **start** is **NULL**:
16 Copy the address stored at **temp** into the next field of **start**.
17 **Else**:
18 Copy the address pointed to by **temp** to next field of the record being pointed to by **end**.

Delete Record:

```
 1 Define a record pointer named last.
 2 Define a record pointer named current.
 3 Define a short named match.
 4 Copy the value of 0 into match.
 5 Copy from the start variable the address being pointed to into the current
   variable.
 6 While the address stored in current is not NULL:
 7    If the name field of the record pointed to by current and uname are equal:
 8          Copy the value of 1 to match.
 9          If the address pointed to by start and the address pointed to by
             current are equal:
10                Copy from the next field of the record pointed to by current
                   into the next field of the record being pointed to by start.
11          Else:
12                Copy from the next field of the record pointed to by current the
                   address being pointed to into the next field of the record
                   pointed to by last.
13    Copy from the current variable the address being pointed to into the
       address pointed to by last.
14    Copy from the next field of the record being pointed to by current into the
       address being pointed to by current.
15    If the value of match is not 0:
16          Delete the record whose address is in last.
17          Copy the value of 0 into match.
```

Add Record Trace

Add record to empty list

Stack		Heap
utelno	808-271-9168	
uyob	1980	
uaddr	539 East 23rd St	
	Riverside, IA Earth	
uname	Jim Kirk	
start	~~null~~,1000	
end	~~?~~,null	
temp	~~?~~,1000	

```
                +----+
                |1000|
      +---------------------+
      | name:?,Jim Kirk     |
      | telno:?,808-271-9168 |
      | yob:?,1980          |
      | addr:?,539 East 23 St|
      |                     |
      | Riverside, IA Earth |
      | next:?,null         |
      +---------------------+
```

Add record to list which has three records

Stack		Heap

<table>
<tr><th colspan="2">Stack</th><th>Heap</th></tr>
<tr><td colspan="2">
utelno   555-555-5555
uyob   2222
uaddr   1701 Enterprise DR
     Edinburg, UK Earth
uname   Monty Scott
start   1000
end   ?,1000,1001,1010
temp   1011
</td></tr>
</table>

```
                        +----+
                        |1000|
             +----------------------+
             | name:Jim Kirk        |
             | telno:808-271-9168   |
             | yob,2233             |
             | addr:539 East 23 St  |
             |                      |
             | Riverside, IA Earth  |
             | next:1001            |
             +----------------------+

                        +----+
                        |1001|
             +----------------------+
             | name:Spock           |
             | telno:808-555-1701   |
             | yob:2230             |
             | addr:1331 Logic WAY  |
             |                      |
             | Shi'Kahr, Vulcan     |
             | next:1010            |
             +----------------------+

                        +----+
                        |1010|
             +----------------------+
             | name:Leonard McCoy MD|
             | telno:808-271-5555   |
             | yob:2227             |
             | addr:1 Sick Bay      |
             |                      |
             | Jackson, MS Earth    |
             | next:null,1011       |
             +----------------------+

                        +----+
                        |1011|
             +-------------------------+
             | name:?,Monty Scott      |
             | telno:?,555-555-5555    |
             | yob:?,2222              |
             | addr:?,1701 Enterprise DR|
             |                         |
             | Edinburg, UK Earth      |
             | next:?,null             |
             +-------------------------+
```

Delete Record Trace

Delete name matches the first record from list with 3 records

start	~~1000~~,1001
uname	Jim Kirk
last	~~?,1000,1001~~,1010
current	~~?,1000,1001,1010~~, null
match	~~?,0,1~~,0

```
              +----+
            --|1000|
+----------------------+
| name:Jim Kirk        |
| telno:808-271-9168   |
| yob,2233             |
| addr:539 East 23 St  |
|                      |
| Riverside, IA Earth  |
| next:1001            |
+----------------------+

          +----+
          |1001|
+----------------------+
| name:Spock           |
| telno:808-555-1701   |
| yob:2230             |
| addr:1331 Logic WAY  |
|                      |
| Shi'Kahr, Vulcan     |
| next:1010            |
+----------------------+

          +----+
          |1010|
+----------------------+
| name:Leonard McCoy MD|
| telno:808-271-5555   |
| yob:2227             |
| addr:1 Sick Bay      |
|                      |
| Jackson, MS Earth    |
| next:null            |
+----------------------+
```

Delete name matches third record from list with 4 records

Stack	
start	1000
uname	Leonard McCoy MD
last	~~?,1000,1001,1010,~~ 1011
current	~~?,1000,1001,1010,~~ ~~1011~~,null
match	~~?,0,1,~~0

Heap

```
           +----+
           |1000|
  +---------------------+
  | name:Jim Kirk       |
  | telno:808-271-9168  |
  | yob,2233            |
  | addr:539 East 23 St |
  |                     |
  | Riverside, IA Earth |
  | next:1001           |
  +---------------------+

           +----+
           |1001|
  +---------------------+
  | name:Spock          |
  | telno:808-555-1701  |
  | yob:2230            |
  | addr:1331 Logic WAY |
  |                     |
  | Shi'Kahr, Vulcan    |
  | next:1010,1011      |
  +---------------------+

           +----+
           |1010|
  +----------------------+
  | name:Leonard McCoy MD|
  | telno:808-271-5555   |
  | yob:2227             |
  | addr:1 Sick Bay      |
  |                      |
  | Jackson, MS Earth    |
  | next:1011            |
  +----------------------+

           +----+
           |1011|
  +-------------------------+
  | name:Monty Scott        |
  | telno:555-555-5555      |
  | yob:2222                |
  | addr:1701 Enterprise DR |
  |                         |
  | Edinburg, UK Earth      |
  | next:null               |
  +-------------------------+
```