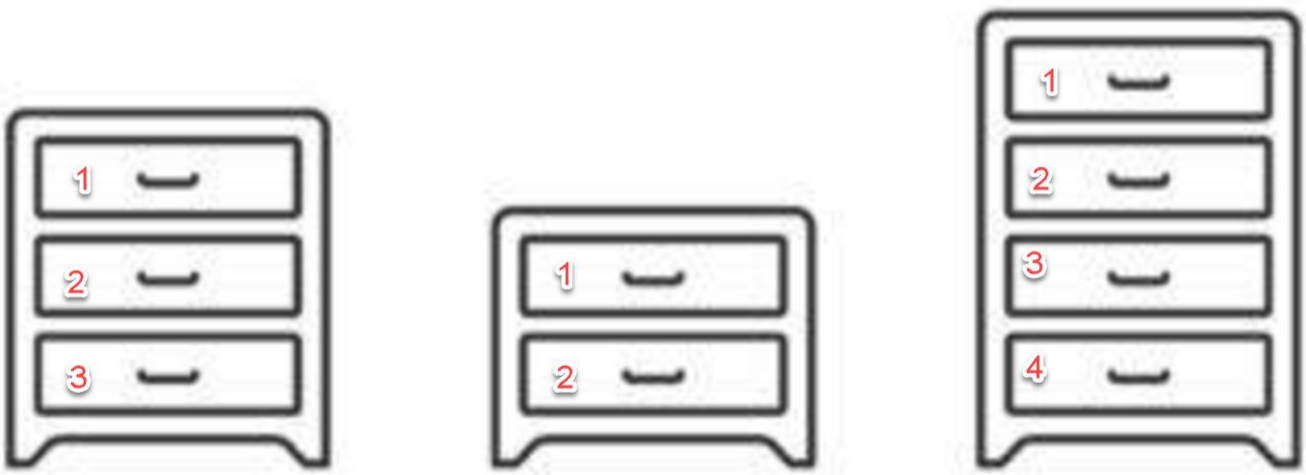
Coding Assignment 6

The program creates a dresser with drawers that are full of socks. The dresser is a 1D array where each array element is a drawer in the dresser. Each run of the program can create a dresser of a different size up to a maximum size. The drawers in the dresser are described using a structure. Each drawer is label with a number starting at 1. Each drawer has a different capacity (how many socks it can hold) – if the drawer contains wool socks, then those are bulkier socks and the drawer will not be able to hold as many as a drawerful of thin socks for example. Each drawer contains a certain number of socks and what color those socks are. Any given drawer will only contain socks of the same type/color.



The program takes the user through creating the dresser – deciding how many drawers are in the dresser and then how many socks each drawer can hold (capacity) and how many socks you want to put into each drawer and what color the socks are in each drawer. The user can then take socks out of the drawers, put more socks into the drawers and sort the drawers based on several different criteria.

Watch the video and look over the sample output before continuing.

This assignment exercises the following concepts

- Structures
- Typedefs
- Enums
- Arrays of structures
- Pointers to structures
- Passing the address of single elements of an array of structure
- Using -> notation
- Multi module programming including a makefile with 5 files compiled and linked together
- While loops with logical conditions
- Function pointers
- `qsort()`
- include guards

makefile

The `makefile` will have 5 source files – `Code6_xxxxxxxxxx.c`, `SockLib.c`, `SortLib.c`, `DrawerLib.c` and `DresserLib.c`.

SockLib.h

1. Must contain an `include` guard
2. Create a typedef structure name `SockDrawer` with the following members

   integer named `DrawerID`

   integer named `NumberOfSocks`

   character array of size 40 named `SockColor`

   integer named `MaxDrawerCapacity`
3. Create define `MAX_DRAWERS` and set it to 10
4. Must contain the prototypes for the functions in `SockLib.c`

SockLib.c

1. Contains the functions associated with socks.

   `SortMySocks()`

   `PutAwayMySocks()`

   `PutOnMySocks()`

SortLib.h

1. Must contain an `include` guard
2. Must contain the prototypes for the `qsort()` comparison functions

SortLib.c

1. You will need 4 sorting functions for `qsort()` to use.

   `DrawerIDCompare()`

   `NumberOfSocksCompare()`

   `MaxCapacityCompare()`

   `SockColorCompare()`

   They all take the same two parameters – constant `void` pointers – and they all return a value less than 0, equal to 0 or greater than 0. The `char` member of `SockDrawer` will use `strcmp()` and the `int` members will use >.

DrawerLib.h

1. Must contain an `include` guard

2. Must contain the prototypes for functions in `DrawLib.c`

3. Create a global variable named `NumDrawers` of type `int`. This is the one time you have permission to use a global variable. This is the only global variable allowed - no others are allowed.

`DrawerLib.c`

1. Contains the functions associated with drawers.

   `GetDrawer()`

   `GetNumDrawers()`

   `CreateDrawer()`

`DresserLib.h`

1. Must contain an `include` guard

2. Must contain the prototypes for functions in `DresserLib.c`

`DresserLib.c`

1. Contains the functions associated with the dresser.

   `DisplayMyDresser()`

1. `SortMySocks()`

   Parameters array of type `SockDrawer` (the dresser)

   Return Type `void`

   Create an array of function pointers that is initialized to the names of 4 compare functions – you will be building a compare function for each type of sorting (by `DrawerID`, by `NumberOfSocks`, by `MaxCapacity`, by `SockColor`).

   Print the menu as shown the sample output

   Use a `do-while` loop to get the menu choice. The `while` condition must use the menu choice that were entered to determine whether or not the loop should continue. Do not use an arbitrary value or a break/return/exit/continue.

   If the menu choice is 0, print the message shown the sample output.

   Else call `qsort()` with the appropriate compare function based on the menu choice. Code is only allowed to have **one** call to `qsort()`.

2. `PutAwayMySocks`

   Parameters array of type `SockDrawer` (the dresser)

   Return Type `void`

   Print prompt

   Call `GetDrawer()`

   Ask how many socks are being put into the drawer

   If the socks won't fit in the drawer, then

Print how many socks fit in the drawer and how many fell on the floor

Update the number of socks in the drawer

Else

Update the number of socks in the drawer

3. `PutOnMySocks`

Parameters array of type `SockDrawer` (the dresser)

Return Type `void`

Print prompt

Call `GetDrawer()`

Ask how many socks are being taken out of the drawer

If the drawer does not have that many socks, then

Print that you don't have that many socks and how many socks you can get

Update the number of socks in the drawer

Else

Subtract the chosen number of socks from the drawer

4. `GetDrawer`

Parameters array of type `SockDrawer` (the dresser)

Return Type `int`

Use a `do-while` loop to get the drawer id and validate it. The `while` condition must use `NumDrawers` and the drawer id that was entered to determine whether or not the loop should continue. Do not use an arbitrary value or a break/return/exit/continue.

After validating the drawer id, determine which cell of the array (the dresser) contains that drawer id. Note that the index of the array will not match up to the drawer id after the array has been sorted. Use a `while` loop to search the array (dresser) to find the cell that contains the `DrawerID` that matches the input drawer id. Do not use an arbitrary value or a break/return/exit/continue to control the `while` loop.

5. `GetNumDrawers`

Parameters `void`

Return Type `void`

Use a `do-while` loop to get how many drawers are in the dresser. After validating the result using `MAX_DRAWERS`, store the value in the global variable. The `while` condition must use the number of drawers that were entered to determine whether or not the loop should continue. Do not use an arbitrary value or a break/return/exit/continue.

6. `CreateDrawer`

Parameters a pointer to an individual drawer and that drawer's number. This pointer must used throughout the function and must be used/dereferenced using -> notation and not (*). notation.

Return Type `void`

Ask for and store how many socks will fit in the drawer (the drawer's capacity)

Ask for and store how many socks you are putting in the drawer

If the number of socks being put in the drawer is greater than the drawer's capacity, then

Print how many socks fit in the drawer and how many fell on the floor

Set the number of socks in the drawer based on how many actually fit

Ask for and store the color of the socks in the drawer – sock colors are allowed to be more than one word

7. `DisplayMyDresser`

Parameters the entire dresser

Return Type `void`

Print out the dresser as shown in the sample output

`main()`

Create an `enum` named `SockAction` where the constants are named `RemoveSocks`, `AddSocks`, `DisplayDresser` and `SortSocks`. Set `RemoveSocks` to 1.

Declare an array named `Dresser` of type `SockDrawer` that has `MAX_DRAWERS` elements

Call function `GetNumDrawers()`

Call `CreateDresser` for each drawer in your `Dresser`

Use a `do-while` loop to redisplay the menu until menu option 0 is chosen. The while condition should be based on the menu choice and not an arbitrary value and should not use a break/return/exit/continue.

Display menu as seen in the sample runs

Ask for and store the menu choice

`switch` using the menu choice and the enumerations for the `case` statements

`RemoveSocks`

Call function `PutOnMySocks` and pass `Dresser`

Call function `DisplayMyDresser` and pass `Dresser`

`AddSocks`

Call function `PutAwayMySocks` and pass `Dresser`

Call function `DisplayMyDresser` and pass `Dresser`

`DisplayDresser`

Call function `DisplayMyDresser` and pass `Dresser`

`SortSocks`

Call function `SortMySocks()` and pass `Dresser`

Call function `DisplayMyDresser()` and pass `Dresser`

Verifying the number of drawers

```
How many drawers does your dresser have? (1-10) 0
Number of drawers must be between 1 and 10.
Please reenter.
How many drawers does your dresser have? (1-10) 11
Number of drawers must be between 1 and 10.
Please reenter.
How many drawers does your dresser have? (1-10) -1
Number of drawers must be between 1 and 10.
Please reenter.
How many drawers does your dresser have? (1-10) 3

How many total socks will fit in Drawer 1?
```

Putting socks in drawers

```
How many drawers does your dresser have? (1-10) 3

How many total socks will fit in Drawer 1? 10

How many socks are you putting in Drawer 1? 8

What color are the socks in Drawer 1? zebra stripes

How many total socks will fit in Drawer 2? 6

How many socks are you putting in Drawer 2? 7
6 socks fit in the drawer and 1 fell on the floor

What color are the socks in Drawer 2? mauve

How many total socks will fit in Drawer 3? 15

How many socks are you putting in Drawer 3? 15

What color are the socks in Drawer 3? blue & white
```

Exiting after creating the dresser

```
What do you need to do?

0.  Don't have socks!!
1.  Take socks out of a drawer?
2.  Put more socks in a drawer?
3.  Display dresser
4.  Sort Socks

Choice : 0
Time to do laundry
```

Taking socks out of the drawer

```
What do you need to do?
```

```
0.  Don't have socks!!
1.  Take socks out of a drawer?
2.  Put more socks in a drawer?
3.  Display dresser
4.  Sort Socks

Choice : 1


Which drawer do you want to get socks from? 4


That's not one of your drawers!!
Pick again!

3


How many socks are you getting out? 23


You don't have that many socks!!  You only get 15 socks.



My Dresser

Drawer 1
        Contents : 8 zebra stripes socks
        Capacity : 10 socks
Drawer 2
        Contents : 6 mauve socks
        Capacity : 6 socks
Drawer 3
        Contents : 0 blue & white socks
        Capacity : 15 socks
```

Put more socks in a drawer

```
What do you need to do?

0.  Don't have socks!!
1.  Take socks out of a drawer?
2.  Put more socks in a drawer?
3.  Display dresser
4.  Sort Socks

Choice : 2


Which drawer are you putting socks into? 2


How many socks are you putting away? 88
```

```
8 socks fit in the drawer and 80 fell on the floor


My Dresser

Drawer 1
        Contents : 3 purple polka dots socks
        Capacity : 21 socks
Drawer 2
        Contents : 9 Iron Man socks
        Capacity : 9 socks
```

Display the dresser after filling it

```
What do you need to do?

0.  Don't have socks!!
1.  Take socks out of a drawer?
2.  Put more socks in a drawer?
3.  Display dresser
4.  Sort Socks

Choice : 3


My Dresser

Drawer 1
        Contents : 22 Pusheen Socks socks
        Capacity : 34 socks
Drawer 2
        Contents : 12 Pink Mickey Mouse socks
        Capacity : 23 socks
Drawer 3
        Contents : 22 SpiderMan socks
        Capacity : 22 socks
Drawer 4
        Contents : 1 black socks
        Capacity : 32 socks
```

Sorting

```
[frenchdm@omega CA6]$ Code6_1000074079.e
How many drawers does your dresser have? (1-10) 5

How many total socks will fit in Drawer 1? 10

How many socks are you putting in Drawer 1? 8

What color are the socks in Drawer 1? zebra stripes

How many total socks will fit in Drawer 2? 6
```

```
How many socks are you putting in Drawer 2? 7
6 socks fit in the drawer and 1 fell on the floor

What color are the socks in Drawer 2? mauve

How many total socks will fit in Drawer 3? 15

How many socks are you putting in Drawer 3? 15

What color are the socks in Drawer 3? blue & white

How many total socks will fit in Drawer 4? 50

How many socks are you putting in Drawer 4? 1

What color are the socks in Drawer 4? green with shamrocks

How many total socks will fit in Drawer 5? 4

How many socks are you putting in Drawer 5? 5
4 socks fit in the drawer and 1 fell on the floor

What color are the socks in Drawer 5? apple red


What do you need to do?

0.  Don't have socks!!
1.  Take socks out of a drawer?
2.  Put more socks in a drawer?
3.  Display dresser
4.  Sort Socks

Choice : 4

Do you want to sort by?

0. Changed my mind - don't want to sort
1. Drawer ID?
2. Number of socks in drawer?
3. Max capacity of the drawers?
4. Sock color?

Choice : 0

Your sock drawer is a mess!


My Dresser

Drawer 1
        Contents : 8 zebra stripes socks
        Capacity : 10 socks
Drawer 2
```

```
        Contents : 6 mauve socks
        Capacity : 6 socks
Drawer 3
        Contents : 15 blue & white socks
        Capacity : 15 socks
Drawer 4
        Contents : 1 green with shamrocks socks
        Capacity : 50 socks
Drawer 5
        Contents : 4 apple red socks
        Capacity : 4 socks


What do you need to do?

0.  Don't have socks!!
1.  Take socks out of a drawer?
2.  Put more socks in a drawer?
3.  Display dresser
4.  Sort Socks

Choice : 4

Do you want to sort by?

0. Changed my mind - don't want to sort
1. Drawer ID?
2. Number of socks in drawer?
3. Max capacity of the drawers?
4. Sock color?

Choice : 4


My Dresser

Drawer 5
        Contents : 4 apple red socks
        Capacity : 4 socks
Drawer 3
        Contents : 15 blue & white socks
        Capacity : 15 socks
Drawer 4
        Contents : 1 green with shamrocks socks
        Capacity : 50 socks
Drawer 2
        Contents : 6 mauve socks
        Capacity : 6 socks
Drawer 1
        Contents : 8 zebra stripes socks
        Capacity : 10 socks


What do you need to do?
```

```
0.  Don't have socks!!
1.  Take socks out of a drawer?
2.  Put more socks in a drawer?
3.  Display dresser
4.  Sort Socks

Choice : 4

Do you want to sort by?

0. Changed my mind - don't want to sort
1. Drawer ID?
2. Number of socks in drawer?
3. Max capacity of the drawers?
4. Sock color?

Choice : 3


My Dresser

Drawer 5
        Contents : 4 apple red socks
        Capacity : 4 socks
Drawer 2
        Contents : 6 mauve socks
        Capacity : 6 socks
Drawer 1
        Contents : 8 zebra stripes socks
        Capacity : 10 socks
Drawer 3
        Contents : 15 blue & white socks
        Capacity : 15 socks
Drawer 4
        Contents : 1 green with shamrocks socks
        Capacity : 50 socks


What do you need to do?

0.  Don't have socks!!
1.  Take socks out of a drawer?
2.  Put more socks in a drawer?
3.  Display dresser
4.  Sort Socks

Choice : 4

Do you want to sort by?

0. Changed my mind - don't want to sort
1. Drawer ID?
2. Number of socks in drawer?
3. Max capacity of the drawers?
4. Sock color?
```

```
Choice : 2


My Dresser

Drawer 4
        Contents : 1 green with shamrocks socks
        Capacity : 50 socks
Drawer 5
        Contents : 4 apple red socks
        Capacity : 4 socks
Drawer 2
        Contents : 6 mauve socks
        Capacity : 6 socks
Drawer 1
        Contents : 8 zebra stripes socks
        Capacity : 10 socks
Drawer 3
        Contents : 15 blue & white socks
        Capacity : 15 socks


What do you need to do?

0.  Don't have socks!!
1.  Take socks out of a drawer?
2.  Put more socks in a drawer?
3.  Display dresser
4.  Sort Socks

Choice : 4

Do you want to sort by?

0. Changed my mind - don't want to sort
1. Drawer ID?
2. Number of socks in drawer?
3. Max capacity of the drawers?
4. Sock color?

Choice : 1


My Dresser

Drawer 1
        Contents : 8 zebra stripes socks
        Capacity : 10 socks
Drawer 2
        Contents : 6 mauve socks
        Capacity : 6 socks
Drawer 3
        Contents : 15 blue & white socks
        Capacity : 15 socks
```

```
Drawer 4
        Contents : 1 green with shamrocks socks
        Capacity : 50 socks
Drawer 5
        Contents : 4 apple red socks
        Capacity : 4 socks


What do you need to do?

0.  Don't have socks!!
1.  Take socks out of a drawer?
2.  Put more socks in a drawer?
3.  Display dresser
4.  Sort Socks

Choice :
```

Taking socks out of a drawer AFTER sorting

```
[frenchdm@omega CA6]$ Code6_1000074079.e
How many drawers does your dresser have? (1-10) 3

How many total socks will fit in Drawer 1? 10

How many socks are you putting in Drawer 1? 8

What color are the socks in Drawer 1? zebra stripes

How many total socks will fit in Drawer 2? 6

How many socks are you putting in Drawer 2? 7
6 socks fit in the drawer and 1 fell on the floor

What color are the socks in Drawer 2? mauve

How many total socks will fit in Drawer 3? 15

How many socks are you putting in Drawer 3? 15

What color are the socks in Drawer 3? blue & white


What do you need to do?

0.  Don't have socks!!
1.  Take socks out of a drawer?
2.  Put more socks in a drawer?
3.  Display dresser
4.  Sort Socks

Choice : 4

Do you want to sort by?
```

```
0. Changed my mind - don't want to sort
1. Drawer ID?
2. Number of socks in drawer?
3. Max capacity of the drawers?
4. Sock color?

Choice : 4


My Dresser

Drawer 3
        Contents : 15 blue & white socks
        Capacity : 15 socks
Drawer 2
        Contents : 6 mauve socks
        Capacity : 6 socks
Drawer 1
        Contents : 8 zebra stripes socks
        Capacity : 10 socks


What do you need to do?

0.  Don't have socks!!
1.  Take socks out of a drawer?
2.  Put more socks in a drawer?
3.  Display dresser
4.  Sort Socks

Choice : 1


Which drawer do you want to get socks from? 1


How many socks are you getting out? 4


My Dresser

Drawer 3
        Contents : 15 blue & white socks
        Capacity : 15 socks
Drawer 2
        Contents : 6 mauve socks
        Capacity : 6 socks
Drawer 1
        Contents : 4 zebra stripes socks
        Capacity : 10 socks
```