

CAB301 Assignment

DVD MANAGEMENT SOFTWARE

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Algorithm for Displaying the Top Ten

Pseudo Code

```
function TopTen(root)
  //Declare a new empty Binary tree.
  d <- ∅
  //iterate over the Lexographically sorted array from the current binary tree
  foreach (movie in root.ToArray())
    //if null then we initialise the new binary tree
    if(d = null)
      d.Value <- new BinaryTree(movie)
    //otherwise we add the movie to the new tree sorting by popularity
    else
      //initilise at the point in the tree we are working with
      point <- d.Value
      //initilise a temporay value to let us update the point refrence if
      //the next child is null
      temp <- null
      //Create a new tree with just the thing we want, this is the leaf
      //we will eventually add
      toAdd <- new BinaryTree(movie)
      //while we aren't at the point to add
      while(true)
        //assign the current point to temp, to save the refrence
        temp <- point
        //compare the current node with the value to add.
        //if the node is less then move the current point down the left branch
        if(point.Value.Popularity < toAdd.Value.Popularity)
          point <- point.LeftChild
          //if that branch is a dead end, don't worry,
          //just update the refrence held by temp, and then we're done.
          if(point = null)
            temp.LeftChild <- toAdd
            break
        //otherwise we travel down the right branch.
        else
          point <- point.RightChild
          //again, if that branch does not exist,
          //just assign it to our added value and exit.
          if(point = null)
            temp.RightChild <- toAdd
            break
      //finally, now that we have got a new binary tree sorted by popularity,
      //Convert it to an array for easy iteration in display,
      //and return the up to ten items.
      return d.ToArray().Range(0,10)
```

```

function BinaryTree.ToArray()
    //Create a new Array of movies.
    movies <- ∅
    //Recursive function defined so as to access the movies array
    function RecursiveInOrder(Node)
        //if null then we don't need to keep going deeper.
        if(Node = null)
            return
        //first add all the left children
        RecursiveInOrder(Node.LeftChild)
        //then add the root
        movies.Add(Node.Value)
        //then all the right children
        RecursiveInOrder(Node.RightChild)
    //Start the recursive function at the root.
    RecursiveInOrder(BinaryTree)
    //return the arrayed movies
    return movies

```

Time complexity analysis

The Algorithm will traverse the entire tree when iterating over it in the foreach loop, and again when converting the tree to an array in returning it. The binary insert performed has a Average time complexity of $\log n$, and a worst case time complexity of n . as such the average complexity will be $n \log n$, and worst be n^2 .

$$C_{Best}(n) = O(n \log n) + n$$

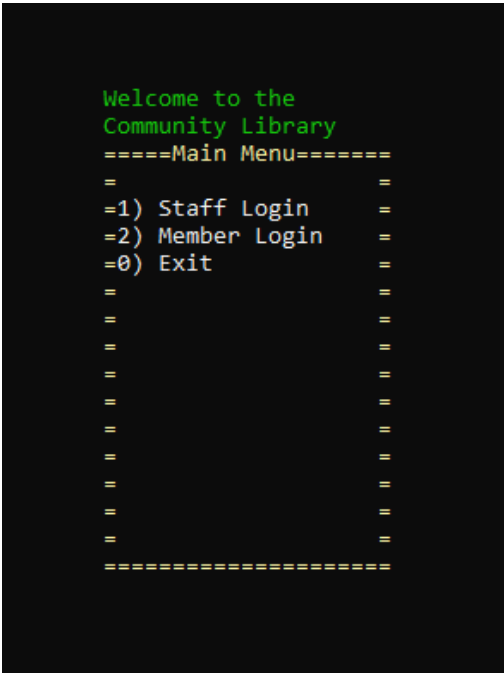
$$C_{average}(n) = O(n \log n) + n$$

$$C_{worst}(n) = O(n^2) + n$$

Functional tests

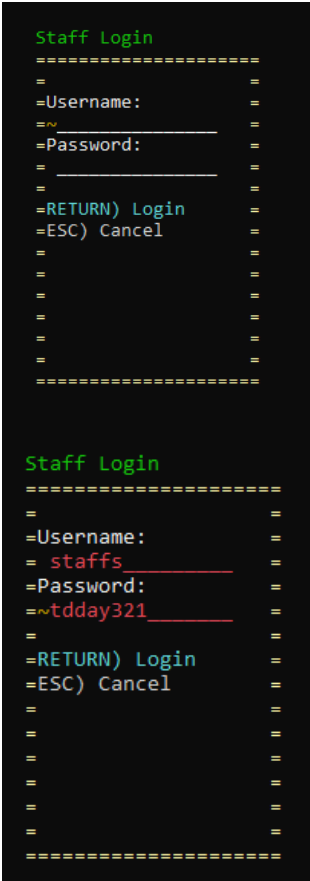
For the sake of shortening this, all menus that use the esc to exit use the same code, with just a different menu index, and they all work. As such I won't mention them. The same is true for the main, client and staff menus, as they are static accepting simple numeric input, there is quite literally a single switch stamen of logic, and they all work. As such they have been exempt from this reporting bar, the main menu, and screenshots of all pages.

Main menu



Test	Expected	Actual
'1' key presses	The staff login menu will be displayed	As expected
'2' key pressed	The Member login menu will be displayed	As expected.
'3' key or 'escape' key pressed	The app will exit	As expected.

Staff Login



Test	Expected	Actual
Use 'TAB' or the 'up arrow' or 'down arrow' pressed	The yellow ~ changes position to reflect the selected input	As expected
Enter a character into the selected input using the appropriate key	The input is reflected in the selected input box.	As expected
Username or password incorrect, pressing 'return'	Fields flash red to indicate failure	As expected
Username 'staff' and password 'today123' entered correctly, 'return' pressed	The staff menu is displayed.	As expected

Staff Menu

```
Staff Menu
=====
=
=1) Add a new movie DVD =
=2) Remove a movie DVD =
=3) Register a new Member=
=4) Find a registered   =
=  members phone number =
=0) Return              =
=
=
=
=
=
=
=
=====
```

Add DVD Menu

```
Add DVD
=====
=
=Title
=
=Starring
=
=Director
=
=Duration (hh:mm:ss)
=
=Genre
=
=Classification
=
=Quantity
=
=RETURN) Add
=ESC) Cancel
=====

Add DVD
=====
=
=Title
= (%*)#@$ (
=Starring
= Jim Bob
=Director
= Bob Jim
=Duration (hh:mm:ss)
= 24:00:05
=Genre
= Sci-Fi
=Classification
= MA15+
=Quantity
=2
=
=RETURN) Add
=ESC) Cancel
=====
```

Test	Expected	Actual
Invalid text entered into a respective field (or field empty) and 'return' is pressed	First sequentially invalid field flashes red	As expected
All fields filled with valid values and 'return' pressed (title already in database)	Staff menu is displayed, and the quantity of the DVD is incremented by one	As expected
All fields filled with valid values and 'return' pressed (title not in database)	Staff menu is displayed and the DVD is added to the database.	As expected
'TAB' or 'up arrow' or 'down arrow' are pressed	The yellow ~ changes position to reflect the selected input	As expected

Remove Movie Menu

```
Remove DVD Menu
=====
=
=DVD title
=
=
=
=
=
=RETURN) Remove
=ESC) Cancel
=
=
=
=====
```

Test	Expected	Actual
Invalid input in text entry or not registered film 'return' pressed	Text entry field flashes red and appropriate message displayed	As expected
Valid registered movie title in Text entry, 'return' pressed	Staff menu displayed	As expected

Register new member Menu

```
Add Member
=====
=
=FirstName
=
=Surname
=
=Address
=
=PhoneNumber
=
=Password
=
=
=
=RETURN) Add
=ESC) Cancel
=
=
=====

Add Member
=====
=
=FirstName
= John
=Surname
= Smith
=Address
= 24 apple lane
=PhoneNumber
= 38492756
=Password
=~1234
=
=Error, name taken
=
=
=RETURN) Add
=ESC) Cancel
=
=
=====
```

Test	Expected	Actual
Invalid text entered into a respective field (or field empty) and 'return' is pressed	First sequentially invalid field flashes red and error message displayed	As expected
All fields filled with valid values and 'return' pressed (user could not be added)	error message displayed	As expected
All fields filled with valid values and 'return' pressed (User does not exist)	Staff menu is displayed, and the User is added to the list of registered members	As expected
'TAB' or 'up arrow' or 'down arrow' are pressed	The yellow ~ changes position to reflect the selected input	As expected

Find Member Phone Number Menu

```
Lookup Member Phone Number
=====
=
=Username / firstname
=surname
=~_____
=
=
=
=
=
=RETURN) Search
=ESC) Return
=
=
=
=====
```

<pre>Lookup Member Phone Number ===== = =Username / firstname =surname =~John Smith_____ = =Ph: 040220912 = = = =RETURN) Search =ESC) Return = = = =====</pre>	<pre>Lookup Member Phone Number ===== = =Username / firstname =surname =~John Hammond_____ = =Failed to find a match = = = =RETURN) Search =ESC) Return = = = =====</pre>
--	---

Test	Expected	Actual
Invalid input in text entry or unregistered username 'return' pressed	Appropriate error message displayed	As expected
Valid registered Username / full name in Text entry, 'return' pressed	User phone number displayed.	As expected

Member login Menu

<pre>Client Login ===== = =Username: =~_____ =Password: =_____ = =RETURN) Login =ESC) Cancel = = = = =====</pre>	<pre>Client Login ===== = =Username: =~JohnSmith_____ =Password: =_____ = =RETURN) Login =ESC) Cancel = = = = =====</pre>
--	---

Test	Expected	Actual
Use 'TAB' or the 'up arrow' or 'down arrow' pressed	The yellow ~ changes position to reflect the selected input	As expected
Enter a character into the selected input using the appropriate key	The input is reflected in the selected input box.	As expected
Username or password incorrect, pressing 'return'	Fields flash red to indicate failure	As expected
Valid username and password entered correctly, 'return' pressed	The Client menu is displayed	As expected

Client Menu

```
Client Menu
=====
=
=1) Display All DVDs
=2) Borrow DVD
=3) Return DVD
=4) Show Loaned
=5) Display top 10
=0) Return
=
=
=
=
=
=
=
=====
```

Display all DVDs Menu

```
Registered DVDs
=====DVDS=====
=
= Title          Staring      Director      Duration (hh:mm:ss) Genre      Classification      =
= Jonny Bravo vol 1      Johnny Bravo Alfred Hitchcock 10:30:45 Action PG 99 =
= Jonny Bravo vol 100     Johnny Bravo Alfred Hitchcock 66:12:55 Sci-Fi G 461 =
= Jonny Bravo vol 103     Johnny Bravo Alfred Hitchcock 34:24:32 Animated M15+ 366 =
= Jonny Bravo vol 119     Johnny Bravo Alfred Hitchcock 63:10:24 Animated M15+ 816 =
= Jonny Bravo vol 121     Johnny Bravo Alfred Hitchcock 42:18:17 Action G 220 =
= Jonny Bravo vol 122     Johnny Bravo Alfred Hitchcock 27:4:20 Drama M15+ 407 =
= Jonny Bravo vol 132     Johnny Bravo Alfred Hitchcock 53:32:41 Animated PG 686 =
= Jonny Bravo vol 138     Johnny Bravo Alfred Hitchcock 16:21:36 Family PG 442 =
= Jonny Bravo vol 144     Johnny Bravo Alfred Hitchcock 73:19:11 Thriller G 272 =
= Jonny Bravo vol 15      Johnny Bravo Alfred Hitchcock 13:27:38 Adventure M15+ 692 =
= Jonny Bravo vol 153     Johnny Bravo Alfred Hitchcock 81:23:23 Action M15+ 698 =
= Jonny Bravo vol 159     Johnny Bravo Alfred Hitchcock 9:24:16 Adventure G 181 =
= Jonny Bravo vol 171     Johnny Bravo Alfred Hitchcock 58:13:45 Comedy M15+ 185 =
= Jonny Bravo vol 183     Johnny Bravo Alfred Hitchcock 35:14:1 Comedy G 272 =
= Jonny Bravo vol 186     Johnny Bravo Alfred Hitchcock 29:8:0 Comedy G 784 =
= Jonny Bravo vol 19      Johnny Bravo Alfred Hitchcock 75:7:22 Adventure PG 380 =
= Jonny Bravo vol 2       Johnny Bravo Alfred Hitchcock 10:50:19 Action PG 23 =
= Jonny Bravo vol 201     Johnny Bravo Alfred Hitchcock 34:26:33 Animated M15+ 868 =
= Jonny Bravo vol 23      Johnny Bravo Alfred Hitchcock 62:32:11 Family M15+ 348 =
= Jonny Bravo vol 236     Johnny Bravo Alfred Hitchcock 38:50:43 Comedy PG 23 =
= Jonny Bravo vol 239     Johnny Bravo Alfred Hitchcock 36:16:47 Thriller M15+ 606 =
= Jonny Bravo vol 26      Johnny Bravo Alfred Hitchcock 12:51:4 Sci-Fi PG 419 =
= Jonny Bravo vol 29      Johnny Bravo Alfred Hitchcock 98:26:5 Thriller G 60 =
= Jonny Bravo vol 3       Johnny Bravo Alfred Hitchcock 10:18:25 Action PG 9 =
= Jonny Bravo vol 324     Johnny Bravo Alfred Hitchcock 92:2:36 Sci-Fi PG 300 =
= Jonny Bravo vol 325     Johnny Bravo Alfred Hitchcock 61:6:38 Adventure M15+ 109 =
= Jonny Bravo vol 339     Johnny Bravo Alfred Hitchcock 52:55:12 Animated PG 61 =
= Jonny Bravo vol 343     Johnny Bravo Alfred Hitchcock 39:39:54 Sci-Fi PG 535 =
= Jonny Bravo vol 349     Johnny Bravo Alfred Hitchcock 47:44:8 Animated PG 326 =
= Jonny Bravo vol 364     Johnny Bravo Alfred Hitchcock 11:2:49 Family PG 897 =
= Jonny Bravo vol 378     Johnny Bravo Alfred Hitchcock 33:28:30 Drama PG 665 =
= Jonny Bravo vol 4       Johnny Bravo Alfred Hitchcock 10:23:43 Action PG 1 =
= Jonny Bravo vol 413     Johnny Bravo Alfred Hitchcock 34:53:11 Comedy G 128 =
= Jonny Bravo vol 444     Johnny Bravo Alfred Hitchcock 57:19:26 Sci-Fi G 236 =
= Jonny Bravo vol 445     Johnny Bravo Alfred Hitchcock 73:57:41 Drama G 769 =
= Jonny Bravo vol 456     Johnny Bravo Alfred Hitchcock 40:23:20 Adventure G 374 =
= Jonny Bravo vol 457     Johnny Bravo Alfred Hitchcock 14:12:31 Family G 141 =
= Jonny Bravo vol 464     Johnny Bravo Alfred Hitchcock 42:12:43 Animated M15+ 446 =
= Jonny Bravo vol 477     Johnny Bravo Alfred Hitchcock 65:48:38 Thriller G 729 =
= Jonny Bravo vol 479     Johnny Bravo Alfred Hitchcock 22:11:0 Drama M15+ 394 =
= Jonny Bravo vol 489     Johnny Bravo Alfred Hitchcock 10:26:14 Animated PG 696 =
= Jonny Bravo vol 490     Johnny Bravo Alfred Hitchcock 90:2:47 Drama G 415 =
= Jonny Bravo vol 492     Johnny Bravo Alfred Hitchcock 65:20:6 Action G 843 =
= Jonny Bravo vol 50      Johnny Bravo Alfred Hitchcock 85:48:40 Action PG 726 =
=
=ESC) Return ->) Next
=
=====
```

Title	Staring	Director	Duration (hh:mm:ss)	Genre	Classification	
Jonny Bravo vol 951	Johnny Bravo	Alfred Hitchcock	54:50:34	Action	PG	803
Jonny Bravo vol 955	Johnny Bravo	Alfred Hitchcock	80:7:18	Action	M15+	417
Jonny Bravo vol 965	Johnny Bravo	Alfred Hitchcock	72:56:17	Comedy	PG	179
Jonny Bravo vol 974	Johnny Bravo	Alfred Hitchcock	56:57:26	Sci-Fi	G	265
Jonny Bravo vol 976	Johnny Bravo	Alfred Hitchcock	7:2:47	Adventure	G	76
Jonny Bravo vol 989	Johnny Bravo	Alfred Hitchcock	76:19:0	Drama	M15+	352
Jonny Bravo vol 992	Johnny Bravo	Alfred Hitchcock	10:17:13	Comedy	PG	354
Jonny Bravo vol 997	Johnny Bravo	Alfred Hitchcock	34:21:54	Sci-Fi	PG	184
Jonny Bravo: The Movie	Johnny Bravo	John Smith	90:3:1	Action	MA15+	999
The Muppets Take Manhattan	Kirmet	Steven Speilberg	99:0:32	Family	G	236

Test	Expected	Actual
Page loaded	Registered movies all displayed in alphabetical order.	As expected, though only the first 44 films are displayed on a given page, arrow based navigation is required to see all of them.
Left arrow key pressed	If there is a page prior to the current page, that page will be displayed.	As expected
Right Arrow Key Pressed	If there is a page proceeding the current page, it will be displayed.	As expected.

Borrow DVD Menu

```
Borrow DVD
=====
=
=DVD title
=^_____
=
=
=
=
=RETURN) Borrow
=ESC) Return
=
=
=
=====
```

```
Borrow DVD
=====
=DVD title
=^uppets Take Manhattan
=Borrow Limit reached
=
=
=RETURN) Borrow
=ESC) Return
=
=
=
=====

Borrow DVD
=====
=DVD title
=^uppets Take Manhattan
=
=You've already borrowed
=that film
=
=RETURN) Borrow
=ESC) Return
=
=
=
=====
```

Test	Expected	Actual
Invalid input in text entry or unable to borrow 'return' pressed	Appropriate error message displayed	As expected
Valid registered movie title in Text entry, 'return' pressed	Client Menu displayed, fill added to member borrow tree, and stocked quantity decreased	As expected

Return DVD Menu

```
Return DVD
=====
=DVD title
=^_____
=
=
=RETURN) Return
=ESC) Back
=
=
=
=====

Return DVD
=====
=DVD title
=^Jonny Bravo vol 10____
=Unable to find film
=
=RETURN) Return
=ESC) Back
=
=
=
=====
```

Test	Expected	Actual
Invalid input in text entry or Film Not borrowed 'return' pressed	Appropriate error message displayed	As expected
Valid Borrowed movie title in Text entry, 'return' pressed	Client Menu displayed and movie returned	As expected

Show Loaned Menu

[illegible]

Test	Expected	Actual
Page loaded	Borrowed movies all displayed in alphabetical order.	As expected.

Top Ten Menu

```

=====DVDSE=====
=
= Title                               Staring      Director      Duration (hh:mm:ss) Genre    Classification Quantity Popularity =
= Jonny Bravo vol 6212                Johnny Bravo  Alfred Hitchcock 11:24:8       Drama   G              717          9         =
= Jonny Bravo vol 8556                Johnny Bravo  Alfred Hitchcock 85:5:35       Animated PG           325          8         =
= Jonny Bravo vol 1309               Johnny Bravo  Alfred Hitchcock 76:43:8       Thriller PG           102          7         =
= Jonny Bravo vol 2238               Johnny Bravo  Alfred Hitchcock 77:20:13      Action   G              887          7         =
= Jonny Bravo vol 240                 Johnny Bravo  Alfred Hitchcock 71:44:26      Animated PG           536          7         =
= Jonny Bravo vol 2565               Johnny Bravo  Alfred Hitchcock 74:9:50        Thriller G             351          7         =
= Jonny Bravo vol 2996               Johnny Bravo  Alfred Hitchcock 91:54:11      Animated PG           575          7         =
= Jonny Bravo vol 4797               Johnny Bravo  Alfred Hitchcock 43:4:14        Animated G             437          7         =
= Jonny Bravo vol 7208               Johnny Bravo  Alfred Hitchcock 57:30:4        AdventurePG            398          7         =
= Jonny Bravo vol 1606               Johnny Bravo  Alfred Hitchcock 78:18:52      AdventureM15+         774          6         =
=
=
=
=
=
=
=
=
=
=
=
=
=
=
=
=
=
=
=
=
=ESC) Return
=
=
=====

```

Test	Expected	Actual
Page loaded	The ten most borrowed films are displayed in alphabetical order.	As expected.

Appendix

How to navigate tutorial



Navigation
Tutorial.mp4