

CAB301 Algorithms and Complexity

Assignment1 I Technical report

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Section1 : Introduction

Briefly talk about the project and the software application that you have developed

The purpose of this project is developing the software application for not-for-profit tool library where tool library lends its tools free of charge to people in the community. All the tools in the tool library are obtained either from donations or purchased with funds raised by the community. some of the data structures and algorithms has been applied to store the various tools and to manage he information about the tools, as well as the members of the tool library. and manipulate data mainly tools and registering member and collection of the those given member and tools received from the local community. And efficiency of algorithms will be introduced during this presentation.

Section2 : Design and Analysis of Algorithms

design an efficient algorithm to solve the following computational problem(s) in the software application.

ALGORITHM *displayTopTHree* (string n, array a)

//Display top three most frequently borrowed tools by the members in the descending order by the number of times each tool has been borrowed.

// Display the top 3 most frequently borrowed tools **for** i <- 0 **to** index of array **do**

List<Tool> allTools = new List<Tool>();

```

for int i = 0; i < categories.Length; i++
    i<- i + 1;
    for j ← 0 to categories[i].Types.Length[i] do
        j<- j + 1;
        for k ← 0 to categories[i].Types.Length[j].Tools.Number do
            k <- k + 1;
            allTools.Add((Tool)categories[i].Types[j].Tools.tools[k]);
List<Tool> SortedList = allTools.OrderByDescending(o => o.timeBorrowed).ToList();
    print ("Top 3 most borrowed tools");
    print Console.WriteLine("=====");
    for int j = 0; j < 3
        J<- j+1
        { Console.WriteLine(j + 1 + ". " + SortedList[j].Name + ". Number of time borrowed:
" + SortedList[j].timeBorrowed); }

```

Use the pseudocode notations introduced in Lecture 1 to describe your algorithm(s) and analyse the time efficiency of your algorithm(s).

Time complexity of displayTopTHree () is $O(n)$. The for loop in displayTopTHree() function will go through

n elements so its time complexity is n .

Display top three (3) most frequently borrowed tools in the descending order by the number of times that a tool has been borrowed.

 Terminal - Assignment

```

=====Member menu=====
1. Display all the tools of a tool type
2. Borrow a tool
3. Return a tool
4. List all the tools that I am renting
5. Display top three (3) most frequently rented tools
0. Return to main menu
=====

Please Make a selection (1-6, or 0 to return to the main menu):
5
Top 3 most borrowed tools
=====
1. testingtool8888. Number of time borrowed: 3
2. borrow testing1. Number of time borrowed: 2
3. Borrowtesting1. Number of time borrowed: 1
Press enter to go back to menu

```

Section 3: Software Test Plans and Test Results

design a test plan for each of functionality testes. In each of the test plan, please include the test scenarios/cases and test data for each of the test scenarios/cases. Please also provide your test results for each of the test scenarios/cases using screenshots.

Staff login

Terminal - Assignment

```
=====main menu=====
1. Staff Login
2. Member Login
0. Exit
=====
```

Please Make a selection (1-2, or 0 to exit):

Terminal - Assignment

```
=====main menu=====
1. Staff Login
2. Member Login
0. Exit
=====
```

Please Make a selection (1-2, or 0 to exit):

1

Terminal - Assignment

Enter your ID: TLstaff

Terminal - Assignment

Enter your ID: TLstaff

Enter your Password: staff

Terminal - Assignment

```
=====Staff menu=====
1. Add a new tool
2. Add new pieces of an existing tool
3. Remove some pieces of a tool
4. Register a new member
5. Remove a member
6. Find the contact number of a member
0. Return to main menu
=====
```

Please Make a selection (1-6, or 0 to return to the main menu):

1

Invalid staff ID and Password

Terminal - Assignment

Enter your ID: jstaff

Enter your Password: cook

given ID and password is wrong check your staff ID and password

Add tool

Terminal - Assignment

Enter name for the new tool:

Gar line version1 1111

Terminal - Assignment

Enter name for the new tool:

Gar line version1 1111

Select the category

1. Gardening tools
2. Flooring tools
3. Fencing tools
4. Measuring tools
5. Cleaning tools
6. Painting tools
7. Electronic tools
8. Electricity tools
9. Automotive tools

Select the option from menu: 1

Select the tool type

=====

1. Line Trimmers
2. Lawn Mowers

Terminal - Assignment

```
3. Fencing tools
4. Measuring tools
5. Cleaning tools
6. Painting tools
7. Electronic tools
8. Electricity tools
9. Automotive tools
Select the option from menu: 1
```

Select the tool type

```
=====
1. Line Trimmers
2. Lawn Mowers
3. Hand Tools
4. Wheelbarrows
5. Garden Power Tools
Selection option from menu
1
```

Terminal - Assignment

```
7. Electronic tools
8. Electricity tools
9. Automotive tools
Select the option from menu: 1
```

Select the tool type

```
=====
1. Line Trimmers
2. Lawn Mowers
3. Hand Tools
4. Wheelbarrows
5. Garden Power Tools
Selection option from menu
1
Tool successfully added to library
```

Hit enter to continue

Add new piece of an existing tool

Terminal - Assignment

Tool Library System - Update Existing Tool Stock Level

```
=====
1. Gardening tools
2. Flooring tools
3. Fencing tools
4. Measuring tools
5. Cleaning tools
6. Painting tools
7. Electronic tools
8. Electricity tools
9. Automotive tools
```

Select a tool category: 1

Tool Type List

```
=====
1. Line Trimmers
```

Terminal - Assignment

=====Staff menu=====

```
1. Add a new tool
2. Add new pieces of an existing tool
3. Remove some pieces of a tool
4. Register a new member
5. Remove a member
6. Find the contact number of a member
0. Return to main menu
```

=====

Please Make a selection (1-6, or 0 to return to the main menu):

2

Terminal - Assignment

- 8. Electricity tools
- 9. Automotive tools

Select a tool category: 1

Tool Type List

=====

- 1. Line Trimmers
 - 2. Lawn Mowers
 - 3. Hand Tools
 - 4. Wheelbarrows
 - 5. Garden Power Tools
- Enter the tool type: 1

Tool Type List of Tools

=====

- 1. Gar lin 1111, Available: 1, Total: 1

Select a tool to update: █

Terminal - Assignment

- 1. Line Trimmers
 - 2. Lawn Mowers
 - 3. Hand Tools
 - 4. Wheelbarrows
 - 5. Garden Power Tools
- Enter the tool type: 1

Tool Type List of Tools

=====

- 1. Gar lin 1111, Available: 1, Total: 1

Select a tool to update: 1

Enter the quantity to add into the library: 2

Updated the quantity of Gar lin 1111 in the library to 3

Hit enter to continue

█

For testing reason Adding more tool in the same type with different name and quantity then test in the same section with different name of item.

Terminal - Assignment

- 2. Lawn Mowers
 - 3. Hand Tools
 - 4. Wheelbarrows
 - 5. Garden Power Tools
- Enter the tool type: 1

Tool Type List of Tools

=====

- 1. Gar lin 1111, Available: 1, Total: 3
- 2. Gar Lin Version2 23423, Available: 1, Total: 1

Select a tool to update: 2

Enter the quantity to add into the library: 2

Updated the quantity of Gar Lin Version2 23423 in the library to 3

Hit enter to continue

█

Remove piece of tools

Terminal - Assignment

```
=====Staff menu=====
1. Add a new tool
2. Add new pieces of an existing tool
3. Remove some pieces of a tool
4. Register a new member
5. Remove a member
6. Find the contact number of a member
0. Return to main menu
=====

Please Make a selection (1-6, or 0 to return to the main menu):
4
```

Select a tool category: 1

Tool Type List

=====

```
1. Line Trimmers
2. Lawn Mowers
3. Hand Tools
4. Wheelbarrows
5. Garden Power Tools
Enter the tool type: 1
```

Tool Type List of Tools

=====

```
1. remove testing1, Available: 1, Total: 1
2. removetesting2, Available: 1, Total: 1
3. removetesting3, Available: 1, Total: 1
```

Select a tool to update:

Tool Type List

=====

```
1. Line Trimmers
2. Lawn Mowers
3. Hand Tools
4. Wheelbarrows
5. Garden Power Tools
Enter the tool type: 1
```

Tool Type List of Tools

=====

```
1. remove testing1, Available: 1, Total: 1
2. removetesting2, Available: 1, Total: 1
3. removetesting3, Available: 1, Total: 1
```

Select a tool to update: 2

Enter the quantity to remove from the library: 1

4. Wheelbarrows

5. Garden Power Tools
Enter the tool type: 1

Tool Type List of Tools

=====

```
1. remove testing1, Available: 1, Total: 1
2. removetesting2, Available: 1, Total: 1
3. removetesting3, Available: 1, Total: 1
```

Select a tool to update: 2

Enter the quantity to remove from the library: 1

Updated the quantity of removetesting2 in the library to 0

Hit enter to continue

Register new member

Terminal - Assignment

```
=====Staff menu=====
1. Add a new tool
2. Add new pieces of an existing tool
3. Remove some pieces of a tool
4. Register a new member
5. Remove a member
6. Find the contact number of a member
0. Return to main menu
=====

Please Make a selection (1-6, or 0 to return to the main menu):
4
```

Terminal - Assignment

```
Enter member First name
Maolin
Enter member Last name
Tang
Enter member mobile number
0451116035
Enter member pin
1234
```

Terminal - Assignment

```
Enter member First name
Maolin
Enter member Last name
Tang
Enter member mobile number
0451116035
Enter member pin
1234
Maolin successfully added to membercollection

Hit enter to continue
```

Delete member

Terminal - Assignment

```
Enter member First name
Philip
Enter member Last name
Jung
Enter member mobile number
0451116035
```

Terminal - Assignment

```
Enter member First name
Philip
Enter member Last name
Jung
Enter member mobile number
0451116035
Enter member pin
1234
PhilipJung successfully added to membercollection

Hit enter to continue
```

Terminal - Assignment

```
=====Staff menu=====
1. Add a new tool
2. Add new pieces of an existing tool
3. Remove some pieces of a tool
4. Register a new member
5. Remove a member
6. Find the contact number of a member
0. Return to main menu
=====

Please Make a selection (1-6, or 0 to return to the main menu):
5
```

Terminal - Assignment

```
Enter member First name
Philip
Enter member Last name
Jung
Enter member mobile number
0451116035
Enter member pin
1234
```

Terminal - Assignment

```
Enter member First name
Philip
Enter member Last name
Jung
Enter member mobile number
0451116035
Enter member pin
1234
Deleting member
aMember name: Jung
parent.member name: Jung
Member to delete: Jung
Hit enter to continue
```

Terminal - Assignment

```
=====main menu=====
1. Staff Login
2. Member Login
0. Exit
=====

Please Make a selection (1-2, or 0 to exit):
2
Enter your first name: Philip

Enter your last name: Jung

Enter your contact number: 0451116035

Enter your pin: 1234

Invalid member details. Please try again
```

Find a contact number

Terminal - Assignment

```
Enter member First name
Philip
Enter member Last name
Jung
Phone number is :0451116035
```

```
Hit enter to continue
```

Terminal - Assignment

```
=====Staff menu=====
```

1. Add a new tool
2. Add new pieces of an existing tool
3. Remove some pieces of a tool
4. Register a new member
5. Remove a member
6. Find the contact number of a member
0. Return to main menu

```
=====
```

```
Please Make a selection (1-6, or 0 to return to the main menu):
```

```
6
```

Registered Member login

Terminal - Assignment

```
Enter member First name
Sangpil
Enter member Last name
Jung
Enter member mobile number
0451116035
Enter member pin
1234
Sangpil successfully added to membercollection
```

```
Hit enter to continue
```

Terminal - Assignment

```
=====main menu=====
1. Staff Login
2. Member Login
0. Exit
=====

Please Make a selection (1-2, or 0 to exit):
2
```

Terminal - Assignment

```
=====main menu=====
1. Staff Login
2. Member Login
0. Exit
=====

Please Make a selection (1-2, or 0 to exit):
2
Enter your first name: Sangpil

Enter your last name: Jung

Enter your contact number: 0451116035

Enter your pin: 1234
```

Logged in

Terminal - Assignment

```
=====Member menu=====
1. Display all the tools of a tool type
2. Borrow a tool
3. Return a tool
4. List all the tools that I am renting
5. Display top three (3) most frequently rented tools
0. Return to main menu
=====

Please Make a selection (1-6, or 0 to return to the main menu):
```

Display all the tools of a tool type

Terminal - Assignment

```
=====Member menu=====
1. Display all the tools of a tool type
2. Borrow a tool
3. Return a tool
4. List all the tools that I am renting
5. Display top three (3) most frequently rented tools
0. Return to main menu
=====

Please Make a selection (1-6, or 0 to return to the main menu):
1
```

9. Automotive tools
Select the option from menu: 4

```
Select the tool type
=====
1. Distance Tools
2. Lawn Mowers
3. Measuring Jugs
4. Temperature & Humidity Tools
5. Levelling Tools
Selection option from menu
4
1. Mea Temp 3432, Available: 1, Total: 1
2. mea temp temp11111, Available: 1, Total: 4
3. brandnew mea 111111, Available: 1, Total: 6
4. MMMTEAD 23f33, Available: 1, Total: 1

Select a tool item you want to borrow:
```

Borrow tool

```
=====Member menu=====
1. Display all the tools of a tool type
2. Borrow a tool
3. Return a tool
4. List all the tools that I am renting
5. Display top three (3) most frequently rented tools
0. Return to main menu
=====

Please Make a selection (1-6, or 0 to return to the main menu):
2
```

```
8. Electricity tools
9. Automotive tools
Select the option from menu: 4
```

```
Select the tool type
```

```
=====
1. Distance Tools
2. Lawn Mowers
3. Measuring Jugs
4. Temperature & Humidity Tools
5. Levelling Tools
Selection option from menu
```

```
4
```

```
1. Mea Temp 3432, Available: 1, Total: 1
```

```
Select a tool item you want to borrow: 1
```

```
Enter the quantity to borrow from the library: 1
```

```
Select the tool type
```

```
=====
1. Distance Tools
2. Lawn Mowers
3. Measuring Jugs
4. Temperature & Humidity Tools
5. Levelling Tools
Selection option from menu
```

```
4
```

```
1. Mea Temp 3432, Available: 1, Total: 1
```

```
Select a tool item you want to borrow: 1
```

```
Enter the quantity to borrow from the library: 1
```

```
Updated the quantity of Mea Temp 3432 in the library to 0
```

```
Hit enter to continue
```

Return tools

Terminal - Assignment

```
2. Air Compressors
3. Battery Chargers
4. Socket Tools
5. Braking
6. Drivetrain
```

```
Selection option from menu
```

```
1
```

```
1. Borrowtesting1, Available: 1, Total: 1
```

```
2. borrowtesting2, Available: 1, Total: 1
```

```
3. borrowtesting3, Available: 1, Total: 4
```

```
Select a tool item you want to borrow: 1
```

```
Enter the quantity to borrow from the library: 1
```

```
Updated the quantity of Borrowtesting1 in the library to 0
```

```
Hit enter to continue
```

Top 3 most borrowed tools

Terminal - Assignment

```
=====Member menu=====
1. Display all the tools of a tool type
2. Borrow a tool
3. Return a tool
4. List all the tools that I am renting
5. Display top three (3) most frequently rented tools
0. Return to main menu
=====

Please Make a selection (1-6, or 0 to return to the main menu):
5
```

Terminal - Assignment

```
=====Member menu=====
1. Display all the tools of a tool type
2. Borrow a tool
3. Return a tool
4. List all the tools that I am renting
5. Display top three (3) most frequently rented tools
0. Return to main menu
=====

Please Make a selection (1-6, or 0 to return to the main menu):
5
Top 3 most borrowed tools
=====
1. testingtool8888. Number of time borrowed: 3
2. borrow testing1. Number of time borrowed: 2
3. Borrowtesting1. Number of time borrowed: 1
Press enter to go back to menu
```