

**GTU Department of Computer Engineering**  
**CSE 222/505 - Spring 2021**  
**Homework 6 Report**

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## 1. USE CASE AND CLASS DIAGRAMS



## 2. PROBLEM SOLUTION APPROACH

Main problem in this project is how to create an efficient way to store the data from files without fill all the memory. I used ArrayList structure in customer search results because users will make orders based on the indexes and I think best way to deal with indexes is using an ArrayList. I used LinkedList structure to connect Category Trees each other in Product objects. I used Queue in order section to hold the orders with a first in first out method, because traders should response first order given to them in my application. I used Tree as TreeSet and hold all of the Categories in one place, when I need to access one of them it will decreases my access time and it wont spend memory like a hash table. I used hash table in Trader class to hold the products of a trader, I used it because traders access their products mostly with the id and it is important to access the product in constant time.

For sorting part I used HeapSort, Quick Sort and Merge Sort because mostly the data I get is random so these three sorts give the best performance to me in random order.

## RUNNING RESULTS AND TEST CASES

```
Login / Register Tests:
Customer ID after register: C0000003
Trader ID after register: T0000c72
Trying to create customer and trader with same name:
Customer ID after register: null
Trader ID after register: null
System didnt give them id because there is already a member with same name.
Null parameter test successful!
Trying to login with invalid password:
Should be null:
null
null
****
Prints trader and customer information:
C0000003;testcust;123456
T0000c72;testtrad;123456

Customer methods:
1) GLSEHEHZPZZA83QJ | giftsthatwow GTW-G-04 | 1200.0 -> 800.0 | Discount: %33.33333333333333
2) GLSEHEHZAZEJMRVF | giftsthatwow GTW-G-05 | 1200.0 -> 800.0 | Discount: %33.33333333333333
3) GLSEHEHZXMFJGQNG | giftsthatwow GTW-G-06 | 1200.0 -> 800.0 | Discount: %33.33333333333333
4) GLSEHEHZKEZAGK2A | giftsthatwow GTW-G-07 | 1200.0 -> 800.0 | Discount: %33.33333333333333
5) AFGEFJSDHRYRHQ25 | Nendoroid Vocaloid Miku Hatsune 20 | 8757.0 -> 7443.0 | Discount: %15.00513874614594
6) HATEHCHJZBFFAZG | Portia Hat | 799.0 -> 399.0 | Discount: %50.06257822277847
7) PRCEFR7XKXAFUXN | Prestige Nakshatra Alpha 7 L Pressure Cooker | 2495.0 -> 2047.0 | Discount: %17.955911823647295
8) MUGE8S9K9YBFCQV | Prithish Got that Shit you can't Teach Ceramic Mug | 499.0 -> 175.0 | Discount: %64.92985971943888
9) MUGESPZ6NQH7GZY | Prithish I'm A Mom. What'S Your Superpower? Multicoloured Bubbles Black Ceramic Mug | 699.0 -> 299.0 | Discount: %57.22460658082976
10) MUGEAGGKRHDTJNH | Prithish I'm A Mom. What'S Your Superpower? Red with Blue Bubbles Double Coloured Ceramic Mug | 599.0 -> 225.0 | Discount: %62.43739565943239
11) SHIE93J5D9MDDZGU | Rockmantra Beautiful Girl With Big Feather Hat Ceramic Mug | 499.0 -> 199.0 | Discount: %60.120240480961925
12) SHIE93J5D9MDDZGU | Samriddivastu asthduhatu swastik pyramid Showpiece - 10 cm | 300.0 -> 199.0 | Discount: %33.666666666666664
13) SHMECRRMZKZQEHM | Saviour HPSAVTHB Saviour Tough Hat -Blue Construction Helmet | 198.0 -> 165.0 | Discount: %16.666666666666668
14) SHMECRRMZKZQEHM | Saviour HPSAVTHG Tough Hat Green Fire Fighting Helmet | 198.0 -> 165.0 | Discount: %16.666666666666668
15) SHMECRS4DDGBWMDZ | Saviour HPSAVTHRB Tough Hat with Ratchet -Blue Fire Fighting Helmet | 198.0 -> 180.0 | Discount: %9.090909090909092
16) SHMECRVFSVSNVUC2 | Saviour HPSAVTHRW Saviour Tough Hat With Ratchet -White Fire Fighting Helmet | 216.0 -> 180.0 | Discount: %16.666666666666668
17) SHMECRNMPZGQZBNZ | Saviour HPSAVTHRY Tough Hat With Ratchet -Yellow Fire Fighting Helmet | 216.0 -> 180.0 | Discount: %16.666666666666668
18) SHIEH7JEHSAGYFKQ | "TimberTaste 12"" Chatri Ganesha Showpiece - 30 cm | 4500.0 -> 3200.0 | Discount: %28.888888888888888
```

1)	SHMECRMZKZKQEHM	Saviour	HPSAVTH	Saviour	Tough Hat -Blue	Construction Helmet	198.0 -> 165.0	Discount:	$\times 16.666666666666668$		
2)	SHMECRMKMDPFVNF	Saviour	HPSAVTHG	Tough Hat	Green Fire Fighting	Helmet	198.0 -> 165.0	Discount:	$\times 16.666666666666668$		
3)	SHMECRS4DDGBWMDZ	Saviour	HPSAVTHRB	Tough Hat	with Ratchet -Blue	Fire Fighting	Helmet	198.0 -> 180.0	Discount:	$\times 9.090909090909092$	
4)	SHMECRMV5VNUVCZ	Saviour	HPSAVTHRW	Saviour	Tough Hat	With Ratchet -White	Fire Fighting	Helmet	216.0 -> 180.0	Discount:	$\times 16.666666666666668$
5)	SHMECRMFPZGQZBNZ	Saviour	HPSAVTHRY	Tough Hat	With Ratchet -Yellow	Fire Fighting	Helmet	216.0 -> 180.0	Discount:	$\times 16.666666666666668$	

1)	SHMECRMZKZKQEHM	Saviour	HPSAVTH	Saviour Tough Hat -Blue Construction Helmet	198.0 -> 165.0   Discount: \$16.666666666666668
2)	SHMECRMKMDPFVNF	Saviour	HPSAVTHG	Tough Hat Green Fire Fighting Helmet	198.0 -> 165.0   Discount: \$16.666666666666668
3)	SHMECRS4DDGBWMD	Saviour	HPSAVTHRB	Tough Hat with Ratchet -Blue Fire Fighting Helmet	198.0 -> 180.0   Discount: \$9.090909090909092
4)	SHMECRMVSVNUUCZ	Saviour	HPSAVTHRW	Saviour Tough Hat With Ratchet -White Fire Fighting Helmet	216.0 -> 180.0   Discount: \$16.666666666666668
5)	SHMECRMFPZGZBZB	Saviour	HPSAVTHRY	Tough Hat With Ratchet -Yellow Fire Fighting Helmet	216.0 -> 180.0   Discount: \$16.666666666666668

1)	SHMECRMZRZKQEHM	Saviour	HPSAVTMB	Saviour Tough Hat -Blue Construction Helmet	198.0 -> 165.0   Discount:  16.666666666666668
2)	SHMECRMZKDPVNFV	Saviour	HPSAVTGH	Tough Hat Green Fire Fighting Helmet	198.0 -> 165.0   Discount:  16.666666666666668
3)	SHMECRS4DGBWMDZ	Saviour	HPSAVTHRB	Tough Hat with Ratchet -Blue Fire Fighting Helmet	198.0 -> 180.0   Discount:  9.090909090909092
4)	SHMECRVS5SVNVUC2	Saviour	HPSAVTHRW	Saviour Tough Hat With Ratchet -White Fire Fighting Helmet	216.0 -> 180.0   Discount:  16.666666666666668
5)	SHMECRMNPZGZGBWZ	Saviour	HPSAVTHRY	Tough Hat With Ratchet -Yellow Fire Fighting Helmet	216.0 -> 180.0   Discount:  16.666666666666668

1)	SHMECRNMGZGGBWZ	Saviour	HPSAVTHRH	Tough Hat With Ratchet - Yellow Fire Fighting Helmet	216.0 -> 180.0   Discount:	X16.666666666666668
2)	SHMECRVFSVJNCU2	Saviour	HPSAVTHRW	Saviour Tough Hat With Ratchet - White Fire Fighting Helmet	216.0 -> 180.0   Discount:	X16.666666666666668
3)	SHMECRS4DGBWMDZ	Saviour	HPSAVTHRB	Tough Hat with Ratchet - Blue Fire Fighting Helmet	198.0 -> 180.0   Discount:	X9.999999999999992
4)	SHMECRNMKDFVNF	Saviour	HPSAVTGH	Tough Hat Green Fire Fighting Helmet	198.0 -> 165.0   Discount:	X16.666666666666668
5)	SHMECRRMZRZKQHM	Saviour	HPSAVTHB	Saviour Tough Hat - Blue Construction Helmet	198.0 -> 165.0   Discount:	X16.666666666666668

1)	SHMECRVFSV5NVCU2	Saviour	HPSAVTRW	Saviour Tough Hat With Ratchet -White Fire Fighting Helmet	216.0 -> 180.0	Discount: X16.666666666666668
2)	SHMECRMZGQZBHZ	Saviour	HPSAVTHRY	Tough Hat With Ratchet -Yellow Fire Fighting Helmet	216.0 -> 180.0	Discount: X16.666666666666668
3)	SHMECRMNRNMPFVNF	Saviour	HPSAVTHRG	Tough Hat Green Fire Fighting Helmet	198.0 -> 165.0	Discount: X16.666666666666668
4)	SHMECRMZRMZQJEMH	Saviour	HPSAVTHB	Saviour Tough Hat -Blue Construction Helmet	198.0 -> 165.0	Discount: X16.666666666666668
5)	SHMECR4ADGBWQDZ	Saviour	HPSAVTHRB	Tough Hat With Ratchet -Blue Fire Fighting Helmet	198.0 -> 180.0	Discount: X9.090909090909092

1)	SHMECRMZMKZQEHM	Saviour	HPSAVTHB	Saviour Tough Hat -Blue Construction Helmet	198.0 -> 165.0	Discount: £16.666666666666668
2)	SHMECRMNMKPPVNFH	Saviour	HPSAVTHG	Tough Hat Green Fire Fighting Helmet	198.0 -> 165.0	Discount: £16.666666666666668
3)	SHMECRSDDGBNMDZ	Saviour	HPSAVTHRB	Tough Hat with Ratchet -Blue Fire Fighting Helmet	198.0 -> 180.0	Discount: £9.090909090909092
4)	SHMECRMNPZGQZBHZ	Saviour	HPSAVTHRY	Tough Hat With Ratchet -Yellow Fire Fighting Helmet	216.0 -> 180.0	Discount: £16.666666666666668
5)	SHMECRMFSVSNVNZH	Saviour	HPSAVTHRW	Saviour Tough Hat With Ratchet -White Fire Fighting Helmet	216.0 -> 180.0	Discount: £16.666666666666668

1)	SHMECRRMKDPFVNF	Saviour	HPSAVTH	Tough Hat Green Fire Fighting Helmet	198.0 -> 165.0	Discount:	X16.666666666666668
2)	SHMECRMZKZQEHM	Saviour	HPSAVTH	Saviour Tough Hat -Blue Construction Helmet	198.0 -> 165.0	Discount:	X16.666666666666668
3)	SHMECRMMPGQZBWZ	Saviour	HPSAVTHRY	Tough Hat With Ratchet -Yellow Fire Fighting Helmet	216.0 -> 180.0	Discount:	X16.666666666666668
4)	SHMECRVFSVIVUC2	Saviour	HPSAVTHRW	Saviour Tough Hat With Ratchet -White Fire Fighting Helmet	216.0 -> 180.0	Discount:	X9.090909090909092
5)	SHMECRS4DGGWMDZ	Saviour	HPSAVTHRB	Tough Hat with Ratchet -Blue Fire Fighting Helmet	198.0 -> 180.0	Discount:	X9.090909090909092

1)	SHMECRM23QXEHM	Saviour	HPSAVTHV	Saviour Tough Hat -Blue Construction Helmet   198.0 -> 165.0   Discount: £16.666666666666668
2)	SHMECRMADGBWMDZ	Saviour	HPSAVTHRB	Tough Hat With Ratchet -Blue Fire Fighting Helmet   198.0 -> 180.0   Discount: £9.090909090909092
3)	SHMECRMVSVSNUC2	Saviour	HPSAVTHRW	Saviour Tough Hat With Ratchet -White Fire Fighting Helmet   216.0 -> 180.0   Discount: £16.666666666666668
4)	SHMECRMNPZGZOBWF	Saviour	HPSAVTHRY	Tough Hat With Ratchet -Yellow Fire Fighting Helmet   216.0 -> 180.0   Discount: £16.666666666666668
5)	SHMECRMRRQBPVNF	Saviour	HPSAVTHG	Tough Hat Green Fire Fighting Helmet   198.0 -> 165.0   Discount: £16.666666666666668

Searching the product with customer:

1)	P0000004	DriverTest	100.0 -> 20.0	Discount: %80.0
2)	P0000005	DriverTest	100.0 -> 20.0	Discount: %80.0
3)	P0000006	DriverTest	100.0 -> 20.0	Discount: %80.0
4)	P0000007	DriverTest	100.0 -> 20.0	Discount: %80.0
5)	P0000009	DriverTest	100.0 -> 20.0	Discount: %80.0

Ordering the product with customer:

Checking order with trader:

Customer ID: C0000002

Trader Name: testtrad

Product Name: DriverTest

Accepting order: :

Removing product:

1)	P0000009	DriverTest	100.0 -> 20.0	Discount: %80.0
2)	P0000004	DriverTest	100.0 -> 20.0	Discount: %80.0
3)	P0000005	DriverTest	100.0 -> 20.0	Discount: %80.0
4)	P0000006	DriverTest	100.0 -> 20.0	Discount: %80.0
5)	P0000007	DriverTest	100.0 -> 20.0	Discount: %80.0