



**T.R.
GEBZE TECHNICAL UNIVERSITY
FACULTY of ENGINEERING
DEPARTMENT of COMPUTER ENGINEERING**

**OFFICE FURNITURE COMPANY
AUTOMATION SYSTEM**

**CSE 222 DATA STRUCTURES AND ALGORITHMS
HOMEWORK 1 REPORT**

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Başak KARAKAŞ

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1.DESRIPTION

This homework is designed for you

- to review OOP concepts and Java programming,
- to get used to reporting conventions that will be used in the course.

In this homework you are not allowed to use any data structure other than simple arrays. Later, we may reuse the same scenario and ask you to implement the same system using some data structures introduced during this course.

Scenario

Design and implement an automation system for a company that sells office furnitures.

An example requirement set is defined as follows: The company has 4 different branches and sells both in-store and online. The store sells office chairs (7 models and for each, 5 colors), office desks (5 models and for each, 4 colors), meeting tables (10 models and for each, 4 colors), bookcases (12 models) and office cabinets (12 models). The automation system has users such as administrators, branch employees and customers. Administrators manage the system by adding and removing branches and branch employees. They can also query whether there are any products that need to be supplied. A special customer number is defined for each customer in the system. When a person subscribes to the system, he/she uses his/her name, surname and e-mail address, and defines a password. When the registration is completed, the customer number is automatically defined in the system and the user is informed about it. When the customer logs into the system, they can search for products, see the list of products, see which store a product is in, shop online by entering address and phone information, and view their previous orders. Branch employees can inquire about the products in stock, inform the manager that the product should be purchased when any product is less than the requested amount, add / remove products, make sales, access the information of the previous orders of a customer by using the customer number and add new order to this section. Branch employees should update the customers' previous orders section during their sales from the store. If the customer is shopping for the first time, then they should create a new subscription.

You should define your own set of requirements and design and implement a system for them. Note that your system should include the features in “grading” section. Do not overextend the requirements that makes the implementation harder. Similarly, do not oversimplify the requirements; the software system should be a complete automation system and your implementation should include all required features.

Restrictions

- Use only Array
- Can be only one main class in project
- Don't use any other third part library

General Rules

- For any question firstly use course news forum in Moodle, and then the contact TA.
- You can submit assignment one day late and will be evaluated over sixty percent (%60).

Technical Rules

- You must write a driver function that demonstrates all possible actions in your homework. For example, if you are asked to implement an array list and perform an iterative search on the list then, you must at least provide the following in the driver function :
 - Create an array list and add items to the list. Append items to head, tail, and kth index of the list.
 - Perform at least two different searches by using two items in the list and print the index of the items.
 - Perform another search with an item that isn't in the array list and inform the user that the item doesn't exist in the array list.
 - Delete an existing item from the list and repeat the searches.
 - Try to delete an item that is not on the array list and throw an exception for this situation.The driver function should run when the code file is executed.
- Implement clean code standards in your code ;
 - Classes, methods and variables names must be meaningful and related with the functionality.
 - Your functions and classes must be simple, general, reusable and focus on one topic.
 - Use standard java code name conventions.

Report Rules

- Add all javadoc documentations for classes, methods, variables ...etc. All explanation must be meaningful and understandable.
- You should submit your homework code, Javadoc and report to Moodle in a "studentid_hw1.tar.gz" file.
- Use the given homework format including selected parts from the table below:
 - Detailed system requirements
 - The project use case diagrams (extra points)
 - Class diagrams
 - Other diagrams (no need for this assignment)
 - Problem solutions approach
 - Test cases
 - Running command and results

Grading

- No OOP design: -100
- No interface: -95
- No method overriding: -95
- No error handling: -50
- No inheritance: -95
- No polymorphism: -95
- No javadoc documentation: -50
- No report: -90
- Disobey restrictions: -100
- Cheating: -200
- Your solution is evaluated over 100 as your performance.

2.REPORT

I detailed here what I did in my project.

2.1.System Requirements

Functional Requirements

Req Id	Functional Requirement	Done
FR01	The company has 4 different branches.	Done
FR02	The company sells both in-store and online.	Done
FR03	The store sells office chairs (7 models and for each, 5 colors), office desks (5 models and for each, 4 colors), meeting tables (10 models and for each, 4 colors), bookcases (12 models) and office cabinets (12 models).	Done
FR04	The automation system has users such as administrators, branch employees and customers.	Done
FR05	Administrators manage the system by adding and removing branches and branch employees.	Done
FR06	Administrators can query whether there are any products that need to be supplied.	Done
FR07	A special customer number is defined for each customer in the system.	Done
FR08	When a person subscribes to the system, he/she uses his/her name, surname and e-mail address, and defines a password. When the registration is completed, the customer number is automatically defined in the system and the user is informed about it.	Done
FR09	When the customer logs into the system, they can search for products.	Done
FR10	Customers see the list of products.	Done
FR11	Customers see which store a product is in.	Done
FR12	Customers shop online by entering address and phone information.	Done
FR13	Customers view their previous orders.	Done
FR14	Branch employees can inquire about the products in stock.	Done
FR15	Branch employees inform the manager that the product should be purchased when any product is less than the requested amount.	Done
FR16	Branch employees add / remove products.	Done
FR17	Branch employees make sales.	Done
FR18	Branch employees access the information of the previous orders of a customer by using the customer number and add new order to this section.	Done
FR19	Branch employees should update the customers' previous orders section during their sales from the store.	Done
FR20	If the customer is shopping for the first time, then they should create a new subscription.	Done

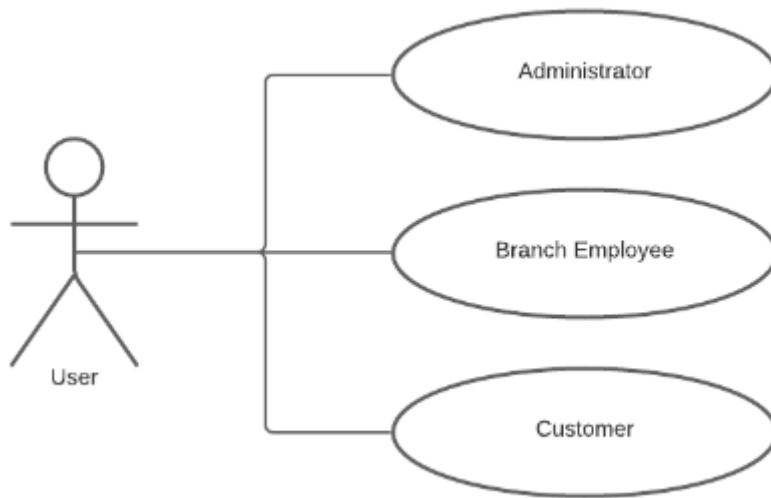
Non-functional Requirements

Req Id	Non-functional Requirement	Done
NFR01	There is one company. COM1.	Done
NFR02	Company has 4 branches. BR1, BR2, BR3, BR4.	Done
NFR03	Company has 5 product types. Office Chair, Office Desk, Meeting Table, Bookcase, Office Cabinet.	Done
NFR04	Office chair product type has 7 models. A, B, C, D, E, F, G, H.	Done
NFR05	Office chair product type has 5 colors. Black, Gray, White, Red, Green.	Done
NFR06	Office desk product type has 5 models. A, B, C, D, E.	Done
NFR07	Office desk product type has 4 colors. Black, Gray, White, Red.	Done
NFR08	Meeting table product type has 10 models. A, B, C, D, E, F, G, H, I, J.	Done
NFR09	Meeting table product type has 4 colors. Black, Gray, White, Red.	Done
NFR10	Bookcase product type has 12 models. A, B, C, D, E, F, G, H, I, J, K, L.	Done
NFR11	Bookcase product type has 1 color. No Color.	Done
NFR12	Office cabinet product type has 12 models. A, B, C, D, E, F, G, H, I, J, K, L.	Done
NFR13	Office cabinet product type has 1 color. No Color.	Done

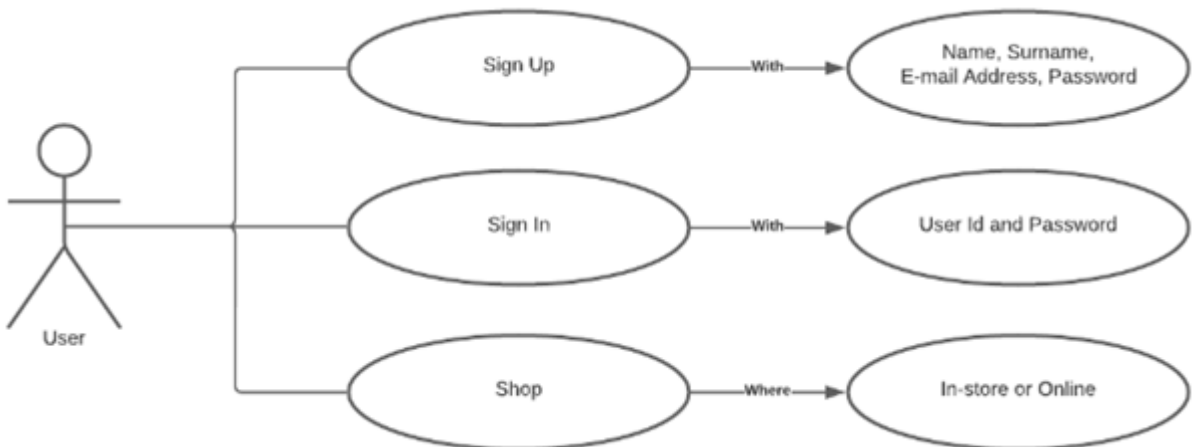
NFR14	Company has an automation system.	Done
NFR15	System has 3 type of users. Administrator, Branch Employee, Customer.	Done
NFR16	All users are customer at the same time.	Done
NFR17	User can not any operation without log in to the system.	Done
NFR18	User must register to log in to the system.	Done
NFR19	User enters its name, surname, e-mail address, and defines a password to register to the system.	Done
NFR20	System creates unique id for each user and inform user when user register to the system.	Done.
NFR21	User log in with customer number and password to the system.	Done
NFR22	User email address also must be unique.	Done
NFR23	Users see the list of products.	Done
NFR24	Users see which store a product is in.	Done.
NFR25	Users can shop in-store or online.	Done
NFR26	User must enter address and phone information to shop online.	Done.
NFR27	Users must create a new subscription to shop in-store or online.	Done
NFR28	Users view their previous orders.	Done
NFR29	Branch employee users can inquire about the products in stock.	Done
NFR30	Branch employee users inform the manager that the product should be purchased when any product is less than the requested amount.	Done
NFR31	Branch employee users add / remove products.	Done
NFR32	Branch employee users make sales.	Done
NFR33	Branch employee users access the information of the previous orders of a customer by using the customer number and add new order to this section.	Done.
NFR34	Branch employee users should update the customers' previous orders section during their sales from the store.	Done.
NFR35	Administrator users add / remove branches.	Done
NFR36	Administrator users add / remove branch employee users.	Done
NFR37	Administrators can query whether there are any products that need to be supplied.	Done

2.2.Use Case Diagrams

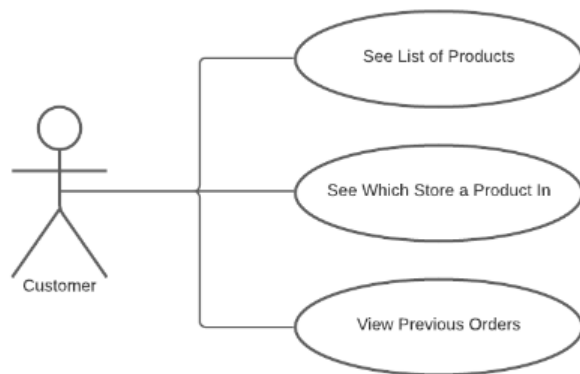
User Can Be



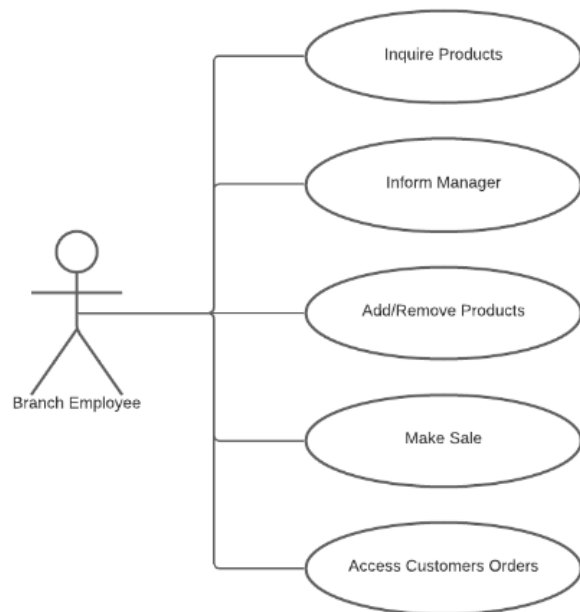
User Can Do



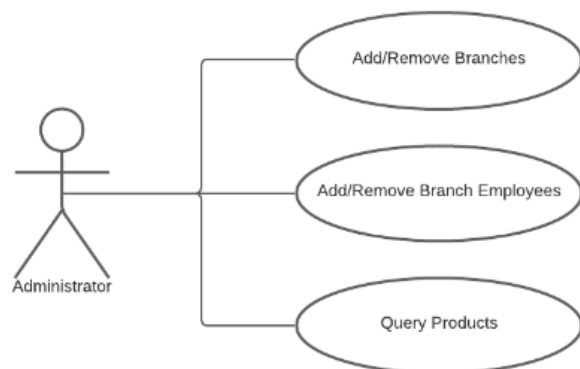
Customer Can Do



Branch Employee Can Do



Administrator Can Do

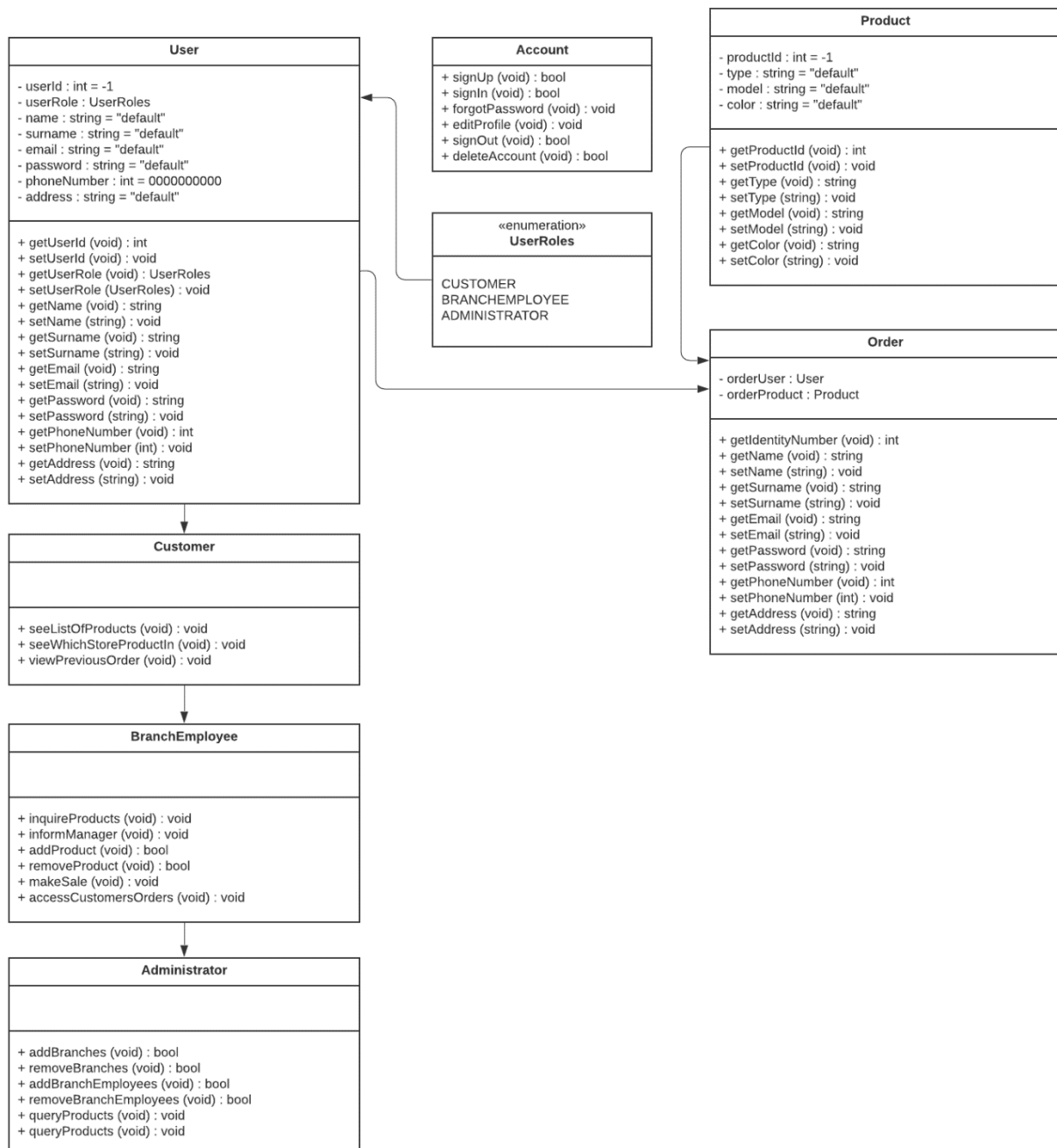


2.3.Class Diagrams

Company Automation System

My first design was as below.

Please look “ClassDiagram.pdf” file int my homework report directory for the last version of my homework’s UML class diagram.



2.4.Other Diagrams

I did not draw any other diagram.

2.5.Problem Solutions Approach

Note : I googled the way you said in the report to problem solving approach, but I could not find any useful article, what I found was either paid or long. After all I found a useful post from medium. I prepared this part according to this post. I hope I got it right.

- **Clearly understanding and/or defining the problem :**

I understood and defined the problem clearly.

- We should design and implement an automation system for a office furniture company.
- We have customer, sales, product, order, branch and user modules.
- All user a customer, that have different roles and authorities.
- Administrator user role has all permissions, branch employee user role has permissions about sale, and customer user role has permissions about order.
- Company has online and in-store sales, customers register to the system, products can be added, orders can be created.

- **Breaking down large problems into smaller problems :**

I broke down large problem automation system into smaller problems like menu, user module, product and order modules.

- We have a large problem, automation system.
- We have smaller problems now, menu, user model, product and order.
- Menu is for interactive usage.
- Products have category, model, color and amount.
- Orders have user, and operation informations.
- User can be administrator, a branch employee, or only a customer.

- **Solving the problem at an abstract level first :**

I solved the problem at an abstract level first.

- I thought a lot about the problem.
- I scribbled something about this subject in the ledger.
- Something started to take shape in my head.
- I used my knowledge of data structures, and it is.

- **Using notes and pseudo-code :**

I noted what I thought, and wrote permanently pseudo-codes mixed with java codes.

- If i understand or find something new, I noted.
- I wrote pseudo-codes mixed with java codes, not clear.

- **Running code early and often :**

I wrote real codes and run them often.

- I turned my pseudo-codes into real java codes.
- I coded them in ide and run them often.

2.6.Test Cases

Testing Requirements

Test Id	Req Id	Test Case	Pre-Condition/ Posts	Pass/Fail
T1	NFR27 NFR26	Sign Up	<ul style="list-style-type: none">• User must enter name, surname, email, password, address and phone number.• User email must be unique.• User id automatically assigned to the user after sign up.	Pass
T2	NFR21	Sign In	<ul style="list-style-type: none">• User must enter email and password.	Pass
T3	NFR27	List Customers		Pass
T4	NFR27	Add Customer	<ul style="list-style-type: none">• User must enter name, surname, email, password, address and phone number.• User email must be unique.• User id automatically assigned to the user after adding customer.	Pass
T5	NFR27	Remove Customer	<ul style="list-style-type: none">• User must enter user id to remove a customer.• User account is deleted, but orders remain after removing customer.	Pass
T6	NFR36	List Branch Employees		Pass
T7	NFR36	Add Branch Employee	<ul style="list-style-type: none">• User must enter user informations.• User also enters branch name to add branch employee.• User id automatically assigned to the user after adding branch employee.	Pass
T8	NFR36	Remove Branch Employee	<ul style="list-style-type: none">• User must enter user id to remove a branch employee.• User account is deleted, but orders remain after removing branch employee.	Pass

T9	NFR35	List Branches		Pass
T10	NFR35	Add Branch	<ul style="list-style-type: none"> • User must enter branch name and branch address. • Branch id automatically assigned to the branch after adding branch. 	Pass
T11	NFR35	Remove Branch	<ul style="list-style-type: none"> • User must enter branch id to remove a branch. 	Pass
T12	NFR23	List All Products		Pass
T13	NFR29	List Products out of Stock	<ul style="list-style-type: none"> • Products are called “out of stock” when remain only “requested amount”. • Requested amount can be changed from source code, its’ value is 3 as default. 	Pass
T14	NFR31	Add Product	<ul style="list-style-type: none"> • User must enter product category, model and color. • Category must be unique. • Product id assigned to the product automatically. 	Pass
T15	NFR31	Remove Product	<ul style="list-style-type: none"> • User must enter product id to remove a product. 	Pass

T16	NFR25 NFR31	Increase Product Amount	<ul style="list-style-type: none"> • User must enter category, model and color to increase amount of already existing product. • If product does not exist, user must add this product before try to increase amount. 	Pass
T17	NFR32 NFR31	Decrease Product Amount	<ul style="list-style-type: none"> • User must enter category, model and color to decrease amount of already existing product. • If product does not exist, user must add this product before try to decrease amount. • If product amount is 0, user can not decrease amount of this product, it remains as 0 amount. 	Pass
T18	NFR32	Make Sale	<ul style="list-style-type: none"> • Making sale works similar with decreasing amount of any product, after sale, product amount decreased. • After sale, order is created automatically, also order id assigned to the this order automatically by the system. • User must enter a user and a product to create an order. 	Pass
T19	NFR25	Shop Online	<ul style="list-style-type: none"> • Shopping online realizes on the “Online Branch”. All store orders realizes online on the web. • User must enter own user id and product id to shop online. • After shop, product amount is decreased by 1. 	Pass
T20	NFR28 NFR33	View Previous Orders	<ul style="list-style-type: none"> • Any user can view its’ previous orders by entering its’ user id. • Also, branch employees can view all previous orders. 	Pass
T21	NFR30	Inform Manager	<ul style="list-style-type: none"> • Branch employees can inform the managers about the products out of stock. • Product ids goes to administrators’ notifications. 	Pass
T22	NFR37	View Notifications	<ul style="list-style-type: none"> • Administrators can be view notifications from branch employees about the products out of stock. 	Pass

2.7. Running Commands and Results

Compile and Run Commands, Testing Steps

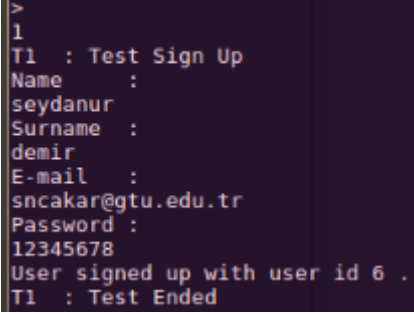

Usage of my automation system program :

1. Compile program with “**javac *.java**” command
2. Run program with “**java Main**” command
3. And follow the menu,
 - You can use automation system with an interactive **menu**, just choose **1**
 - You can test important methods with **test** menu, just choose **2**
 - You can drive to **driver** menu to test the system automatically, just choose **3**

Simply Follow This Screenshot

```
cse241@cse241-VirtualBox:~$ cd Documents/CSE222/HW1/
cse241@cse241-VirtualBox:~/Documents/CSE222/HW1$ javac *.java
cse241@cse241-VirtualBox:~/Documents/CSE222/HW1$ java Main
----- START -----
Start of Menu
Welcome to Office Furniture Company Automation System
What Do You Want to Do?
[1] Menu
[2] Test
[3] Driver
[E] Exit
> 2
Which Operation Do You Want to Test?
[1] T1 : Test Sign Up
[2] T2 : Test Sign In
[3] T3 : Test List Customers
[4] T4 : Test Add Customer
[5] T5 : Test Remove Customer
[6] T6 : Test List Branch Employees
[7] T7 : Test Add Branch Employee
[8] T8 : Test Remove Branch Employee
[9] T9 : Test List Branches
[10] T10 : Test Add Branch
[11] T11 : Test Remove Branch
[12] T12 : Test List All Products
[13] T13 : Test List Products out of Stock
[14] T14 : Test Add Product
[15] T15 : Test Remove Product
[16] T16 : Test Increase Product Amount
[17] T17 : Test Decrease Product Amount
[18] T18 : Test Make Sale
[19] T19 : Test Shop Online
[20] T20 : Test View Previous Orders
[21] T21 : Test Inform Manager
[22] T22 : Test View Notifications
[E] Exit
>
```

Commands and Results with Screenshots

Test Id	Command	Result
T1	M > 2 > 1	 <pre>> 1 T1 : Test Sign Up Name : seydanur Surname : demir E-mail : sncakar@gtu.edu.tr Password : 12345678 User signed up with user id 6 . T1 : Test Ended</pre>
T2	M > 2 > 2	 <pre>> 2 T2 : Test Sign In E-mail : seyda@seyda.com Password : 123456 User signed in. T2 : Test Ended</pre>

T3	M > 2 > 3	<pre> > 3 T3 : Test List Customers List of Customers User Id : 4 Role : 3 Branch : Online Name : Name3 Surname : Surname3 Email : c1 Password : *** Address : Gebze/KOCAELI Phonenumber : 500 - T3 : Test Ended </pre>
T4	M > 2 > 4	<pre> > 4 T4 : Test Add Customer Name : jane Surname : doe E-mail : blabla@bla.com Password : 123456 Address : World Phonenumber : 0000000000 User added with user id 6 . T4 : Test Ended </pre>
T5	M > 2 > 5	<pre> > 5 T5 : Test Remove Customer Which Customer Do You Want to Remove? 2 User 2 removed. T5 : Test Ended </pre>

T6	M > 2 > 6	<pre> > 6 T6 : Test List Branch Employees List of Branch Employees User Id : 2 Role : 2 Branch : Online Name : Name1 Surname : Surname1 Email : be1 Password : *** Address : Gebze/KOCAELI Phonenumber : 500 - User Id : 3 Role : 2 Branch : Online Name : Name2 Surname : Surname2 Email : be3 Password : *** Address : Gebze/KOCAELI Phonenumber : 500 - T6 : Test Ended </pre>
T7	M > 2 > 7	<pre> > 7 T7 : Test Add Branch Employee Branch Name : Online Name : john Surname : doe E-mail : blob@blob.com Password : 123456 Address : World Phonenumber : 0000000000 User added with user id 6 . T7 : Test Ended </pre>
T8	M > 2 > 8	<pre> > 8 T8 : Test Remove Branch Employee Which Branch Employee Do You Want to Remove? 3 User 3 removed. T8 : Test Ended </pre>

T9	M > 2 > 9	<pre> T9 : Test List Branches List of Branches Branch Id : 0 Name : Online Address : WEB - Branch Id : 1 Name : Baglarbasi Address : Darica/KOCAELI - Branch Id : 2 Name : Nenehatun Address : Darica/KOCAELI - Branch Id : 3 Name : Emek Address : Darica/KOCAELI - T9 : Test Ended </pre>
T10	M > 2 > 10	<pre> T10 : Test Add Branch Name : Gebze Address : Gebze/KOCAELI Branch added with branch id 4 . T10 : Test Ended </pre>
T11	M > 2 > 11	<pre> T11 : Test Remove Branch Which Branch Do You Want to Remove? 3 Branch 3 removed. T11 : Test Ended </pre>

T12	M > 2 > 12	<pre> > 12 T12 : Test List All Products List of Products Product Id : 0 Amount : 0 Category : Office Chair Model : A Model Color : Black - Product Id : 1 Amount : 0 Category : Office Chair Model : B Model Color : Gray - Product Id : 2 Amount : 0 Category : Office Chair Model : C Model Color : White - </pre>
T13	M > 2 > 13	<pre> > 13 T13 : Test List Products out of Stock List of Products out of Stock (Requested Amount 3) Product Id : 0 Amount : 0 Category : Office Chair Model : A Model Color : Black - Product Id : 1 Amount : 0 Category : Office Chair Model : B Model Color : Gray - </pre>
T14	M > 2 > 14	<pre> > 14 T14 : Test Add Product Category : Office Chair Model : Z Model Color : Blue Product added with product id 46 . T14 : Test Ended </pre>
T15	M > 2 > 15	<pre> > 15 T15 : Test Remove Product Which Product Do You Want to Remove? 45 Product 45 removed. T15 : Test Ended </pre>

T16	M > 2 > 16	<pre> > 16 T16 : Test Increase Product Amount Category : Office Chair Model : A Model Color : Black Product amount increased to 1 . T16 : Test Ended </pre>
T17	M > 2 > 17	<pre> > 17 T17 : Test Decrease Product Amount Category : Office Chair Model : A Model Color : Black Product amount decreased to 11 . T17 : Test Ended </pre>
T18	M > 2 > 18	<pre> > 18 T18 : Test Make Sale Which Customer Do You Want to Make Sale to? 5 Which Product Do You Want to Sell? 0 Product amount decreased to 11 . You sold this product. T18 : Test Ended </pre>
T19	M > 2 > 19	<pre> > 19 T19 : Test Shop Online What is Your Customer Id? 4 Which Product Do You Want to Shop? 0 Product amount decreased to 11 . You bought this product. T19 : Test Ended </pre>

T20	M > 2 > 20	<pre> > 20 T20 : Test View Previous Orders What is Your Customer Id? 4 Order Id :0 User : User Id : 4 Role : 3 Branch : Online Name : Name3 Surname : Surname3 Email : c1 Password : *** Address : Gebze/KOCAELI Phonenumber : 500 Product : Product Id : 0 Amount : 12 Category : Office Chair Model : A Model Color : Black - Order Id :1 User : User Id : 4 Role : 3 Branch : Online Name : Name3 Surname : Surname3 Email : c1 Password : *** Address : Gebze/KOCAELI Phonenumber : 500 Product : Product Id : 1 Amount : 0 Category : Office Chair Model : B Model Color : Gray - T20 : Test Ended </pre>
T21	M > 2 > 21	<pre> > 21 T21 : Test Inform Manager Administrators are informed about products out of stock. T21 : Test Ended </pre>
T22	M > 2 > 22	<pre> > 22 T22 : Test View Notifications List of Products out of Stock (Requested Amount 3) Please update stocks. T22 : Test Ended </pre>

Exit from the Program, Ending Test

You can step the upper level menu choosing “E”,
you can exit from the program clicking “E” until the end of the all menus.

Simply Follow This Screenshot

```
Which Operation Do You Want to Test?
[1] T1 : Test Sign Up
[2] T2 : Test Sign In
[3] T3 : Test List Customers
[4] T4 : Test Add Customer
[5] T5 : Test Remove Customer
[6] T6 : Test List Branch Employees
[7] T7 : Test Add Branch Employee
[8] T8 : Test Remove Branch Employee
[9] T9 : Test List Branches
[10] T10 : Test Add Branch
[11] T11 : Test Remove Branch
[12] T12 : Test List All Products
[13] T13 : Test List Products out of Stock
[14] T14 : Test Add Product
[15] T15 : Test Remove Product
[16] T16 : Test Increase Product Amount
[17] T17 : Test Decrease Product Amount
[18] T18 : Test Make Sale
[19] T19 : Test Shop Online
[20] T20 : Test View Previous Orders
[21] T21 : Test Inform Manager
[22] T22 : Test View Notifications
[E] Exit
>
e
What Do You Want to Do?
[1] Menu
[2] Test
[3] Driver
[E] Exit
>
e
System is Closing
End of Menu
----- END
cse241@cse241-VirtualBox:~/Documents/CSE222/HW1$
```

END OF THE REPORT

LAST UPDATE

Mar 13, 2021 Saturday 10:30 PM

STUDENT

**Şeyda Nur DEMİR
12 10 44 042**

LECTURER

Prof. Dr. Fatih Erdoğan SEVİLGİN

TEACHING ASSISTANT

Başak KARAKAŞ

KOCAELİ, 2021