Assignment 3

Deadline:	2 June 2022, 11pm
Evaluation:	40 marks (20% of your final grade)
Late Submission:	Deduct 5 marks per day late
Individual Work	You must complete this assignment by yourself (you must NOT share your code with others or use others' code)
Purpose:	Reinforce Java OOP core concepts (abstraction, encapsulation, inheritance, and polymorphism), collections framework and generics, exception handling, input and output streams, and GUI using Swing

1. System Description (Overview of Problem)

You are asked to write a program in Java to simulate a **computer store's management system**

A computer store maintains three categories of computers: Desktop PCs, Laptops, and Tablets. Each category is further divided into different types, as listed below:

Desktop PC types: Gaming, Home & Study, Business, and Compact
Laptop types: Gaming, Home & Study, Business, and Thin & Light
Tablet types: Android, Apple, and Windows

Each computer's unique ID, brand, CPU family, and price need to be specified regardless of its category. The computer store must also record memory size (GB) and SSD capacity (GB) for Desktop PCs and Laptops as well as screen size (inches) for Laptops and Tablets.

The computer store has two types of staff: salespersons and managers. A salesperson can log into the computer store's management system to view a list of all computers and sort them. A salesperson can also search for computers by category and type before clicking on a search result to view that computer's details.

A manager can log into the computer store's management system to do everything that a salesperson can do, but a manager can also maintain records—by updating computer details or adding and deleting computers.

2. Tasks to complete:

a) Create a narrative step-by-step storyboard using screenshots of your system-generated GUIs to demonstrate required functions of the computer store's management system (please refer to a sample at the end of this document; you can use its format to present your work)

Your Java code should:

b) Import the provided test data (computers.txt) to your system using Java Input

c) Add five staff to the computer store's system—three salespersons and two managers—using usernames and passwords provided (this function should have classes designed with an appropriate inheritance hierarchy that applies core OOP concepts)

d) Realize all functions specified in the system description above (for this assignment, you are NOT required to update computers.txt file after a manager update/add/delete records, you only need to update the GUI to show the change)

3. Design and Implementation Guidelines

Note: You will receive credit for correctness, completeness, no code duplication, and clear on-screen outputs. Also, we will grade your program using the following **OOP and general software implementation guidelines**:

1) Encapsulation design and implementation—proper use of modifiers
   a. Private/Protected/Public
   b. Must make use of getters and/or setters wherever appropriate

2) Inheritance design and implementation
   a. Reasonable class hierarchies
   b. Proper data fields separation in base and derived classes
   c. Proper methods separation/overloading/overriding in base and derived classes
   d. Proper use of base and derived class constructors

3) Polymorphism and implementation
   a. Write generic code that targets the base class whenever possible
   b. Appropriate use of overriding in derived classes to realize polymorphism

4) Information store and implementation
   a. Use Hash Map and other Java collection class(es) to store information

5) Exception handling
   a. Throw an exception object when an application error occurs (e.g., when an invalid piece of data is entered)
   b. Use "try/catch/finally" or "try/catch" block to handle the exception

6) Use Java Swing to implement your GUI

4. Other Specifications

You **must** follow the next three specifications when completing this assignment:

1) Place appropriate comments in your program—e.g.:
```
/** explain what the program file is doing . . . */
// explain what a part/method of the program is doing...
```
2) **DO NOT** add any file path for 'computers.txt' (put it directly in your project folder when you test your code)
3) **DO NOT** add your own package name(s) to the beginning of your .java files (this requirement is only for marking purpose)

5. Submission Requirements:

1) **Your storyboard** as a PDF file
2) **All your .java files (source codes)**
3) Zip all your files (PDF file and .java files) together and submit as a single file to Stream

6. You MUST use the following test data in your assignment:

1) Staff details

	Usernames	*Passwords*
Staff 1 – Salesperson	p1	p1
Staff 2 – Salesperson	p2	p2
Staff 3 – Salesperson	p3	p3
Staff 4 – Manager	m1	m1
Staff 5 – Manager	m2	m2

2) Input file computers.txt to download

```
Desktop PC,Gaming,DTPCG1,GGPC,Intel Core i5,16,500,2199
Desktop PC,Gaming,DTPCG2,DELL,Intel Core i9,32,512,8449
Desktop PC,Gaming,DTPCG3,ASUS,AMD Ryzen 7,16,1000,2799
Desktop PC,Home & Study,DTPCHS1,PB,AMD Ryzen 7,16,500,1263
Desktop PC,Home & Study,DTPCHS2,PB,Intel Core i5,16,500,1598
Desktop PC,Home & Study,DTPCHS3,PB,AMD Ryzen 7,16,512,1099
Desktop PC,Business,DTPCB1,PB,Intel Core i7,16,1000,1498
Desktop PC,Business,DTPCB2,HP,Intel Core i5,8,256,1555
Desktop PC,Business,DTPCB3,LENOVO,AMD Ryzen 5,8,256,1242
Desktop PC,Business,DTPCB4,HP,Intel Core i3,8,256,1006
Desktop PC,Compact,DTPCC1,APPLE,Apple,8,256,1158
Desktop PC,Compact,DTPCC2,APPLE,Apple,8,512,1498
Desktop PC,Compact,DTPCC3,HP,Intel Core i5,8,256,1555
Desktop PC,Compact,DTPCC4,LENOVO,AMD Ryzen 5,8,256,1242
Laptop,Business,LTB1,HP,Intel Core i5,8,256,15.6,1647
Laptop,Business,LTB2,APPLE,Apple,16,512,16,4299
Laptop,Business,LTB3,LENOVO,AMD Ryzen 5,16,512,13.3,1787
Laptop,Business,LTB4,ASUS,Intel Core i7,16,512,14,1552
Laptop,Home & Study,LTHS1,APPLE,Apple,8,256,13.3,1728
Laptop,Home & Study,LTHS2,LENOVO,Intel Core i5,8,256,14,954
Laptop,Home & Study,LTHS3,MICROSOFT,Intel Core i5,8,128,12.4,1189
Laptop,Thin & Light,LTSL1,APPLE,Apple,8,256,13.3,1728
Laptop,Thin & Light,LTSL2,APPLE,Apple,8,512,13.3,2499
Laptop,Gaming,LTG1,ASUS,Intel Core i5,16,512,15.6,1840
Laptop,Gaming,LTG2,HP,AMD Ryzen 5,8,256,15.6,1307
Tablet,Android,TBAD1,LENOVO,Snapdragon,10,214
Tablet,Android,TBAD2,LENOVO,Mediatek,11,578
Tablet,Apple,TBAP1,APPLE,Apple,12.2,819
Tablet,Apple,TBAP2,APPLE,Apple,12.9,878
Tablet,Apple,TBAP3,APPLE,Apple,12.9,2499
Tablet,Windows,TBWD1,MICROSOFT,Intel Pentium,10.5,694
Tablet,Windows,TBWD2,MICROSOFT,Intel Core i5,13,1798
```

Record of Desktop PC:
Category,
Type,
ID,
Brand,
CPU Family,
Memory Size (GB),
SSD Capacity (GB),
Price ($)

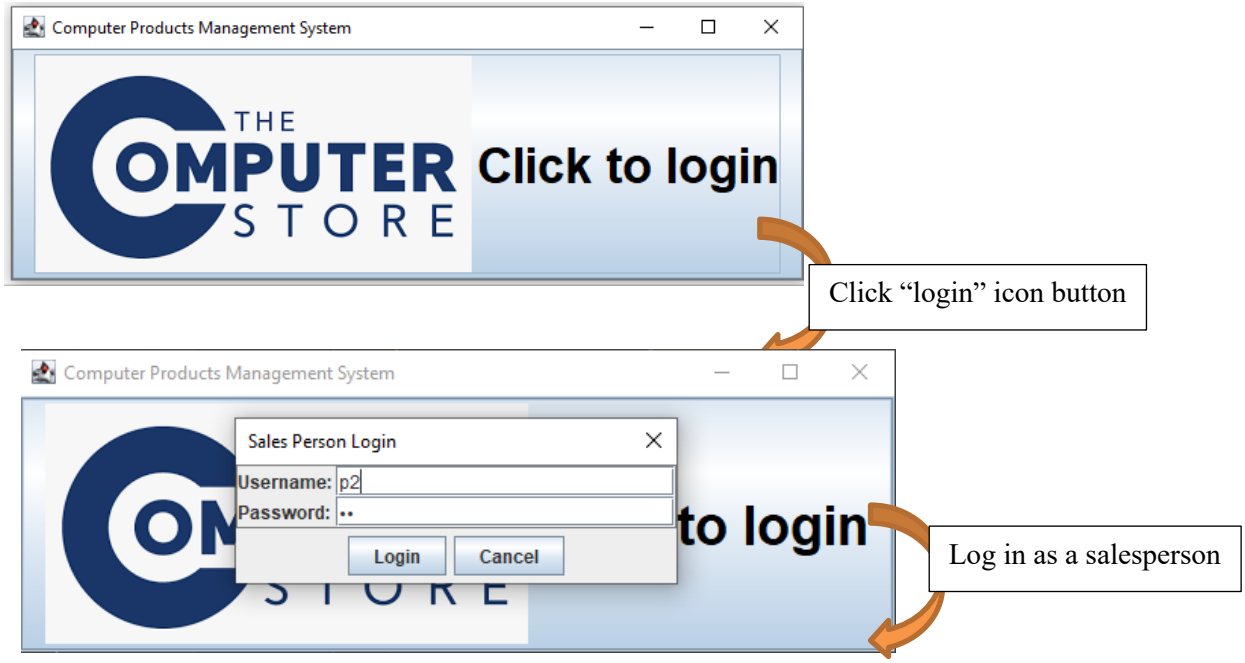
Record of Laptop:
Category,
Type,
ID,
Brand,
CPU Family,
Memory Size (GB),
SSD Capacity (GB),
Screen Size (Inches),
Price ($)

Record of Tablet:
Category,
Type,
ID,
Brand,
CPU Family,
Screen Size (Inches),
Price ($)

3) Example GUI and functions narrations:

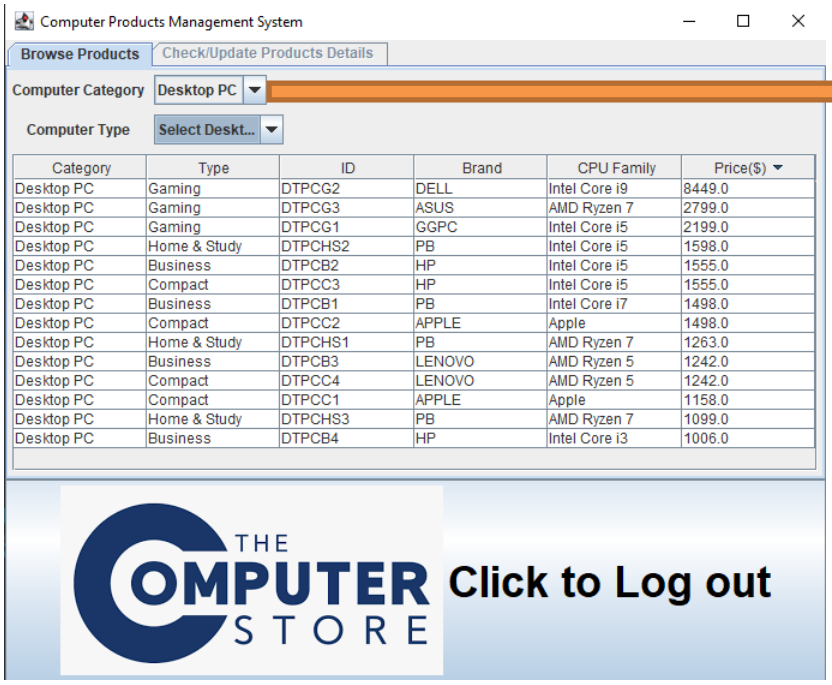
Note: this is just a sample GUI design; you are free to design your own GUI and function flow as long as they are reasonable and complete the tasks listed in item "2." above

When the program runs:



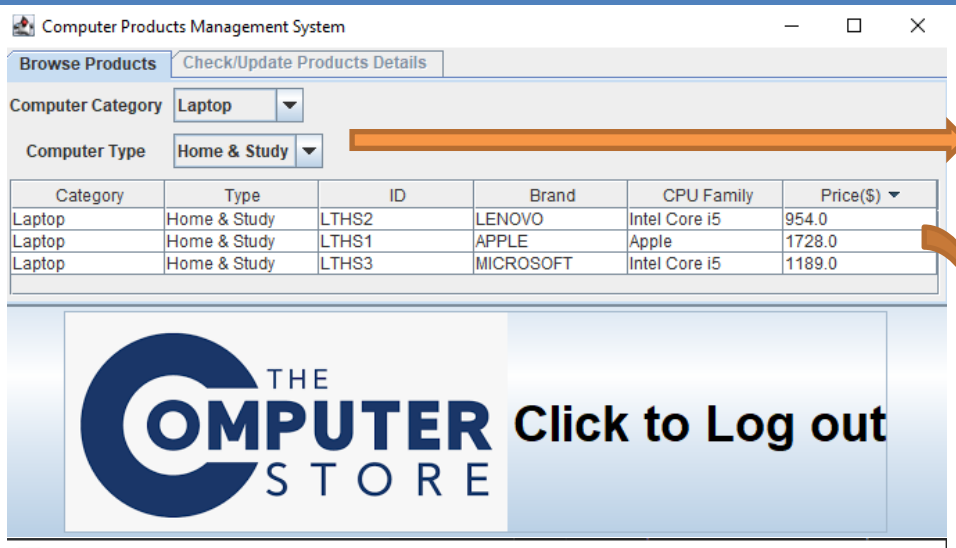
Category	Type	ID	Brand	CPU Family	Price($)
Desktop PC	Gaming	DTPCG2	DELL	Intel Core i9	8449.0
Desktop PC	Gaming	DTPCG3	ASUS	AMD Ryzen 7	2799.0
Desktop PC	Gaming	DTPCG1	GGPC	Intel Core i5	2199.0
Tablet	Apple	TBAP3	APPLE	Apple	2499.0
Tablet	Apple	TBAP1	APPLE	Apple	819.0
Tablet	Apple	TBAP2	APPLE	Apple	878.0
Laptop	Business	LTB1	HP	Intel Core i5	1647.0
Laptop	Home & Study	LTHS3	MICROSOFT	Intel Core i5	1189.0
Laptop	Business	LTB4	ASUS	Intel Core i7	1552.0
Desktop PC	Compact	DTPCC4	LENOVO	AMD Ryzen 5	1242.0
Laptop	Business	LTB3	LENOVO	AMD Ryzen 5	1787.0
Laptop	Business	LTB2	APPLE	Apple	4299.0
Desktop PC	Compact	DTPCC2	APPLE	Apple	1498.0
Desktop PC	Compact	DTPCC3	HP	Intel Core i5	1555.0
Desktop PC	Compact	DTPCC1	APPLE	Apple	1158.0
Desktop PC	Home & Study	DTPCHS3	PB	AMD Ryzen 7	1099.0
Desktop PC	Home & Study	DTPCHS2	PB	Intel Core i5	1598.0
Desktop PC	Home & Study	DTPCHS1	PB	AMD Ryzen 7	1263.0
Laptop	Thin & Light	LTSL1	APPLE	Apple	1728.0
Laptop	Thin & Light	LTSL2	APPLE	Apple	2499.0
Laptop	Home & Study	LTHS1	APPLE	Apple	1728.0
Tablet	Windows	TBWD2	MICROSOFT	Intel Core i5	1798.0
Laptop	Home & Study	LTHS2	LENOVO	Intel Core i5	954.0
Tablet	Windows	TBWD1	MICROSOFT	Intel Pentium	694.0
Laptop	Gaming	LTG2	HP	AMD Ryzen 5	1307.0
Laptop	Gaming	LTG1	ASUS	Intel Core i5	1840.0
Desktop PC	Business	DTPCB3	LENOVO	AMD Ryzen 5	1242.0
Desktop PC	Business	DTPCB4	HP	Intel Core i3	1006.0
Desktop PC	Business	DTPCB1	PB	Intel Core i7	1498.0
Desktop PC	Business	DTPCB2	HP	Intel Core i5	1555.0
Tablet	Android	TBAD1	LENOVO	Snapdragon	214.0
Tablet	Android	TBAD2	LENOVO	Mediatek	578.0

List of all computers
(No specific order required)



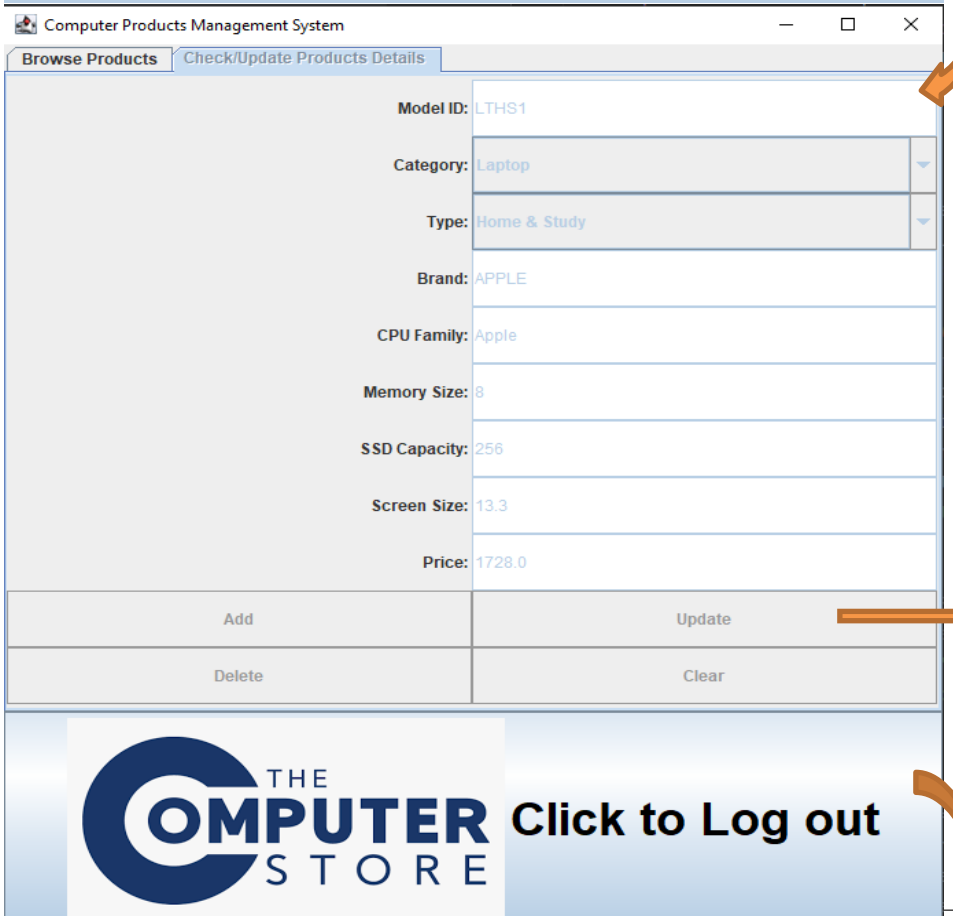
Category	Type	ID	Brand	CPU Family	Price($)
Desktop PC	Gaming	DTPCG2	DELL	Intel Core i9	8449.0
Desktop PC	Gaming	DTPCG3	ASUS	AMD Ryzen 7	2799.0
Desktop PC	Gaming	DTPCG1	GGPC	Intel Core i5	2199.0
Desktop PC	Home & Study	DTPCHS2	PB	Intel Core i5	1598.0
Desktop PC	Business	DTPCB2	HP	Intel Core i5	1555.0
Desktop PC	Compact	DTPCC3	HP	Intel Core i5	1555.0
Desktop PC	Business	DTPCB1	PB	Intel Core i7	1498.0
Desktop PC	Compact	DTPCC2	APPLE	Apple	1498.0
Desktop PC	Home & Study	DTPCHS1	PB	AMD Ryzen 7	1263.0
Desktop PC	Business	DTPCB3	LENOVO	AMD Ryzen 5	1242.0
Desktop PC	Compact	DTPCC4	LENOVO	AMD Ryzen 5	1242.0
Desktop PC	Compact	DTPCC1	APPLE	Apple	1158.0
Desktop PC	Home & Study	DTPCHS3	PB	AMD Ryzen 7	1099.0
Desktop PC	Business	DTPCB4	HP	Intel Core i3	1006.0

Can select and display computers from any Category (No specific order required)



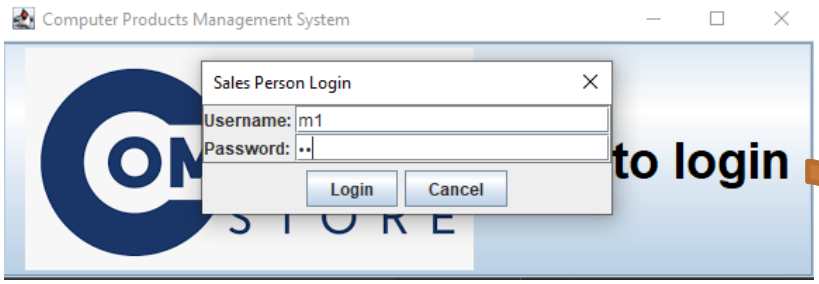
Can select and display computers from any Category and its sub type

Can click any selected computer to check its details



Note that all editing functions are disabled for a salesperson

Click to log out pre-login screen is displayed



This time, log in as a manager (note that both "Browse" and "Check/Update" tabs are enabled this time)

Computer Products Management System

Browse Products | Check/Update Products Details

Computer Category: All

Computer Type:

Category	Type	ID	Brand	CPU Family	Price($)
Laptop	Home & Study	LTHS2	LENOVO	Intel Core i5	954.0
Tablet	Apple	TBAP2	APPLE	Apple	878.0
Desktop PC	Gaming	DTPCG2	DELL	Intel Core i9	8449.0
Tablet	Apple	TBAP1	APPLE	Apple	819.0
Tablet	Windows	TBWD1	MICROSOFT	Intel Pentium	694.0
Tablet	Android	TBAD2	LENOVO	Mediatek	578.0
Laptop	Business	LTB2	APPLE	Apple	4299.0
Desktop PC	Gaming	DTPCG3	ASUS	AMD Ryzen 7	2799.0
Tablet	Apple	TBAP3	APPLE	Apple	2499.0
Laptop	Thin & Light	LTSL2	APPLE	Apple	2499.0
Desktop PC	Gaming	DTPCG1	GGPC	Intel Core i5	2199.0
Tablet	Android	TBAD1	LENOVO	Snapdragon	214.0
Laptop	Gaming	LTG1	ASUS	Intel Core i5	1840.0
Tablet	Windows	TBWD2	MICROSOFT	Intel Core i5	1798.0
Laptop	Business	LTB3	LENOVO	AMD Ryzen 5	1787.0
Laptop	Home & Study	LTHS1	APPLE	Apple	1728.0
Laptop	Thin & Light	LTSL1	APPLE	Apple	1728.0
Laptop	Business	LTB1	HP	Intel Core i5	1647.0
Desktop PC	Home & Study	DTPCHS2	PB	Intel Core i5	1598.0
Desktop PC	Business	DTPCB2	HP	Intel Core i5	1555.0
Desktop PC	Compact	DTPCC3	HP	Intel Core i5	1555.0
Laptop	Business	LTB4	ASUS	Intel Core i7	1552.0
Desktop PC	Business	DTPCB1	PB	Intel Core i7	1498.0
Desktop PC	Compact	DTPCC2	APPLE	Apple	1498.0
Laptop	Gaming	LTG2	HP	AMD Ryzen 5	1307.0
Desktop PC	Home & Study	DTPCHS1	PB	AMD Ryzen 7	1263.0
Desktop PC	Business	DTPCB3	LENOVO	AMD Ryzen 5	1242.0
Desktop PC	Compact	DTPCC4	LENOVO	AMD Ryzen 5	1242.0
Laptop	Home & Study	LTHS3	MICROSOFT	Intel Core i5	1189.0
Desktop PC	Compact	DTPCC1	APPLE	Apple	1158.0
Desktop PC	Home & Study	DTPCHS3	PB	AMD Ryzen 7	1099.0
Desktop PC	Business	DTPCB4	HP	Intel Core i3	1006.0

A manager can use all the search functions that a salesperson can

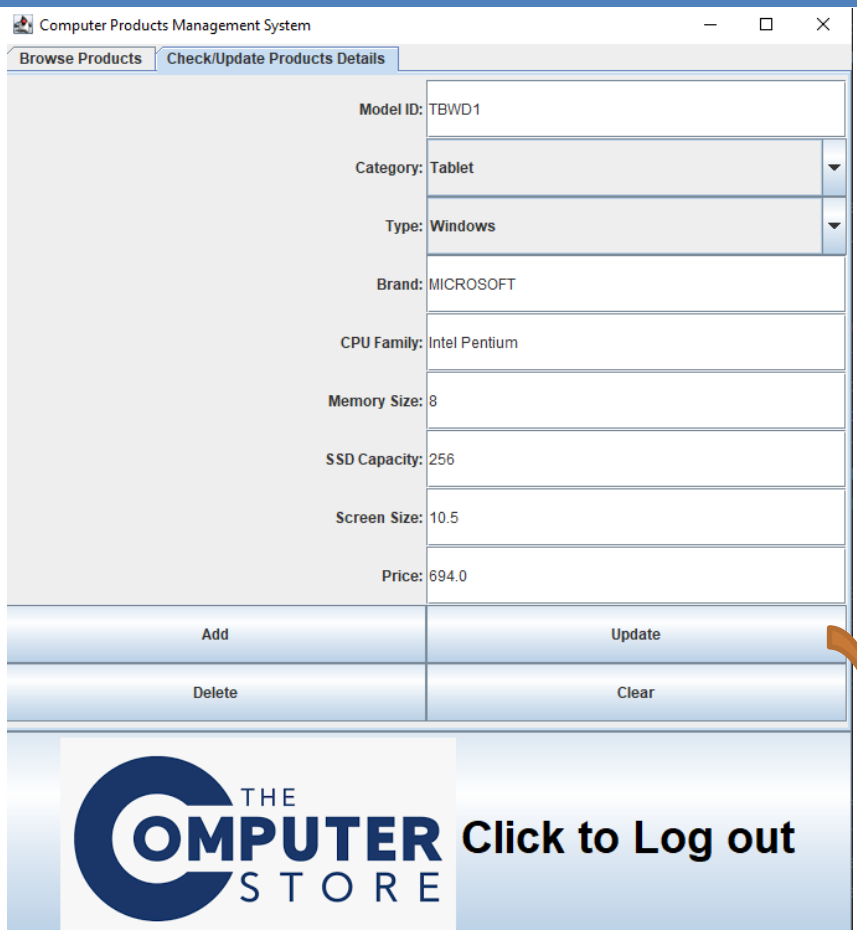
Computer Products Management System

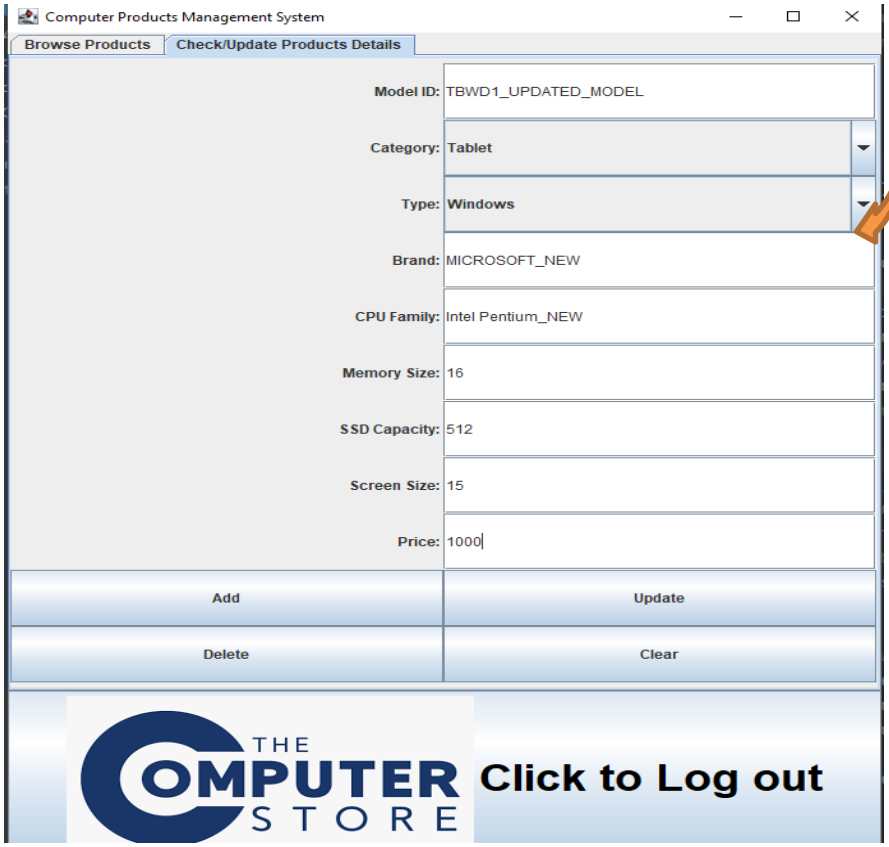
Browse Products | Check/Update Products Details

Computer Category: Tablet

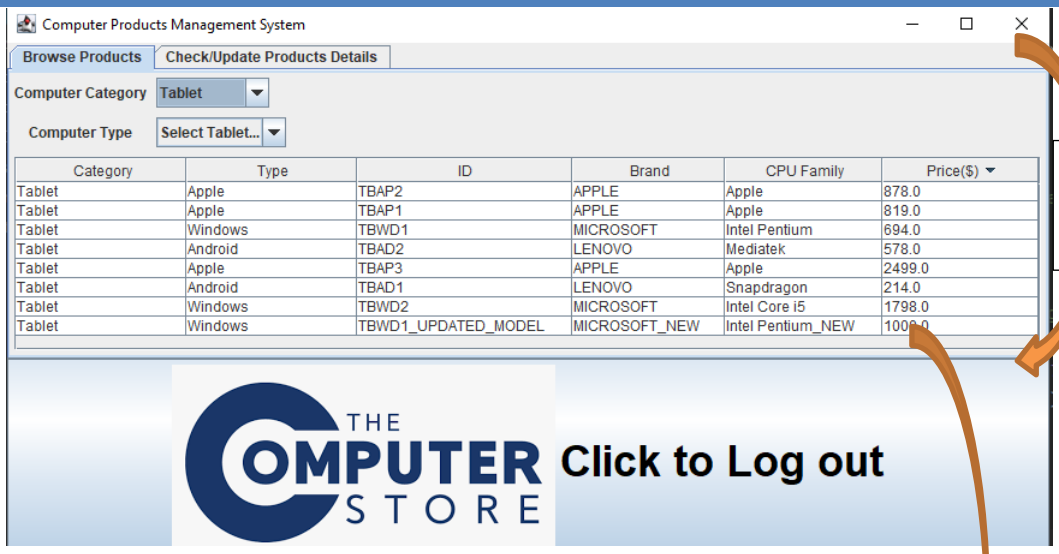
Computer Type: Select Tablet...

Category	Type	ID	Brand	CPU Family	Price($)
Tablet	Apple	TBAP2	APPLE	Apple	878.0
Tablet	Apple	TBAP1	APPLE	Apple	819.0
Tablet	Windows	TBWD1	MICROSOFT	Intel Pentium	694.0
Tablet	Android	TBAD2	LENOVO	Mediatek	578.0
Tablet	Apple	TBAP3	APPLE	Apple	2499.0
Tablet	Android	TBAD1	LENOVO	Snapdragon	214.0
Tablet	Windows	TBWD2	MICROSOFT	Intel Core i5	1798.0

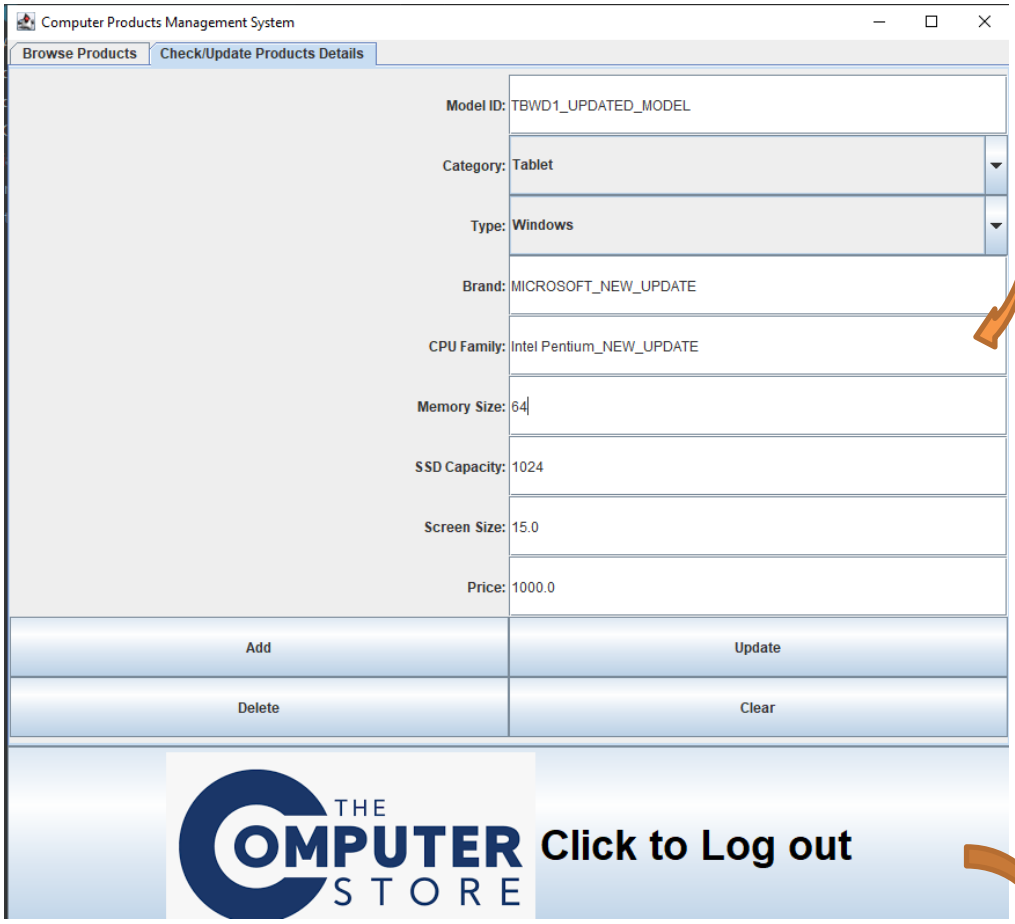




A manager can click "Add" to add a new computer ('Model ID' is unique, so a new computer can't use an existing 'Model ID')

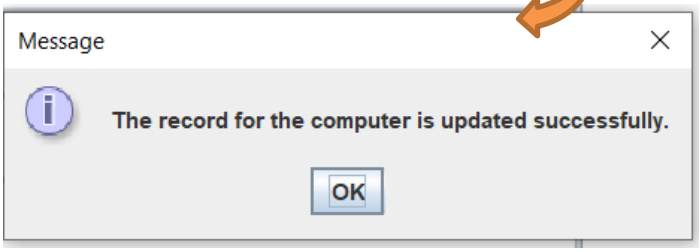


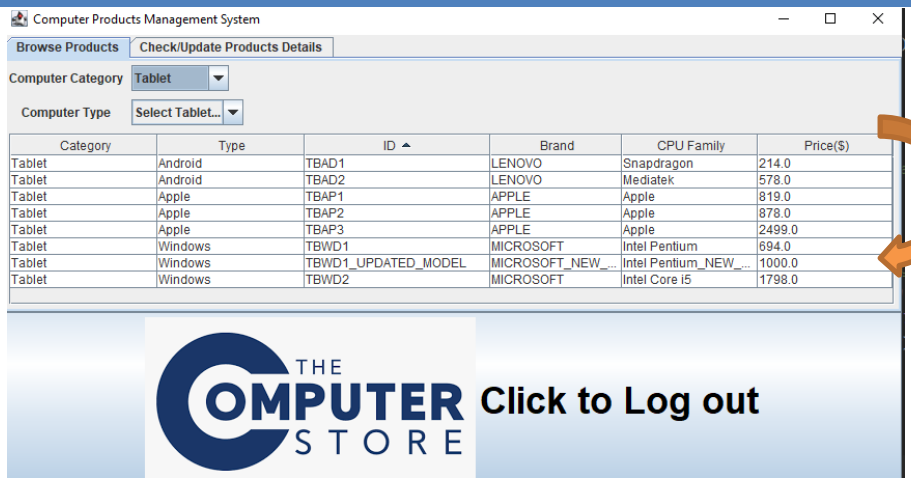
New computer's details reflected in list



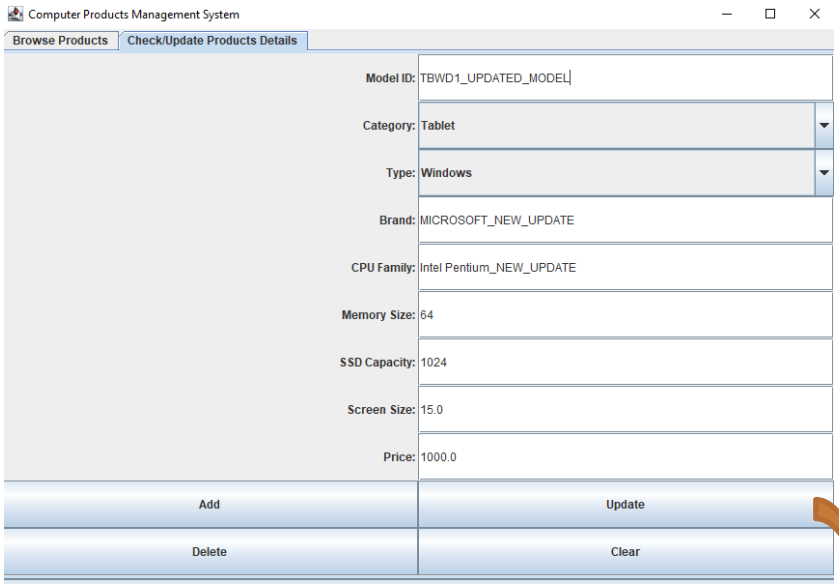
A manager can click 'Update' to update a computer's details; any data can be modified except 'Model ID'

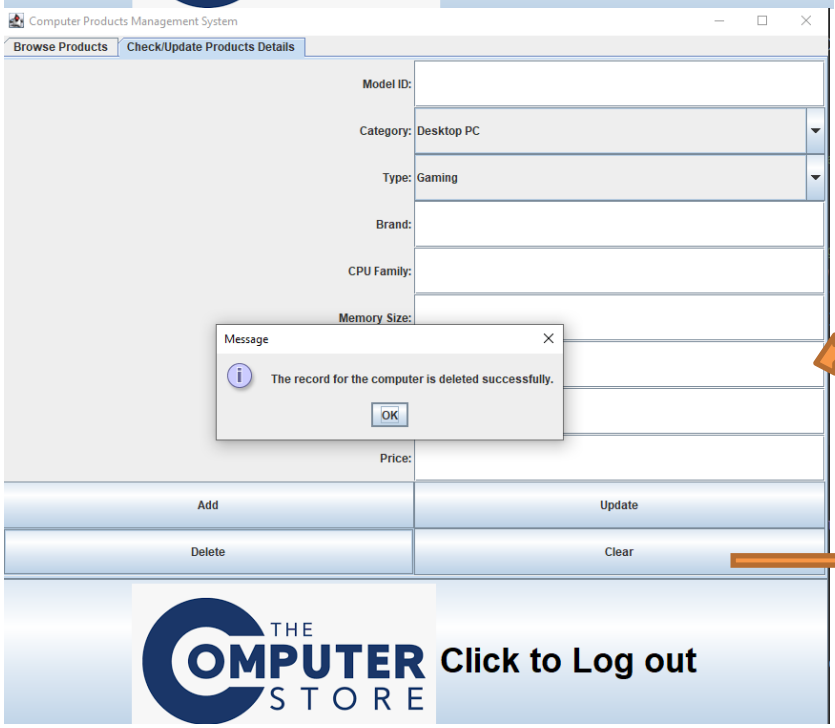
Pop-up window to confirm success of update





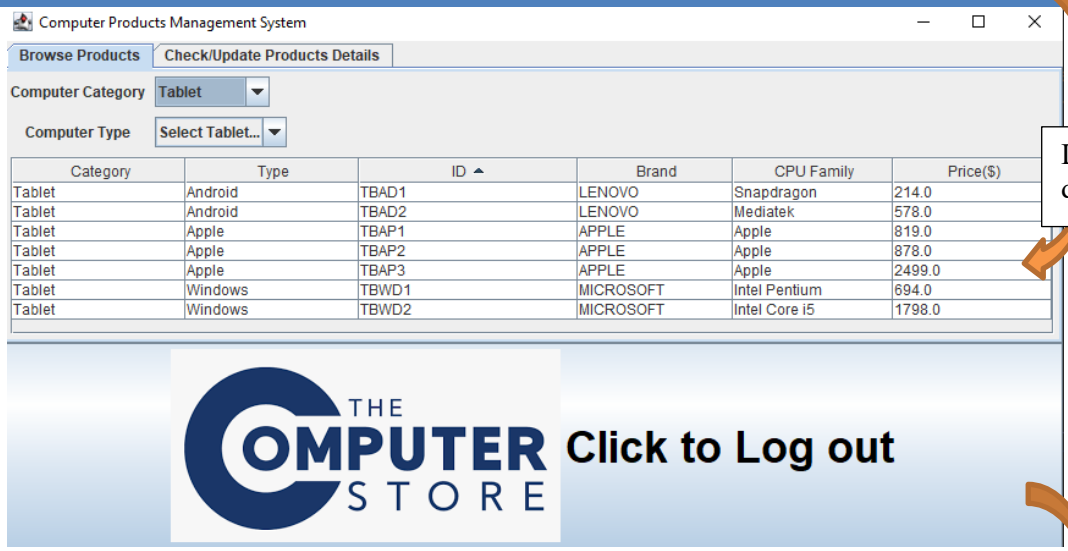
Update reflected in this list





A manager can click ‘Delete’ to delete a computer from the system

Clicking ‘Clear’ will clear all text fields’ values on this tab too (but does not actually change or delete a computer’s data)



List also reflects deletions

Click “Log out” to go back to pre-login screen