King Abdulaziz University Faculty of Computing and Information Technology Computer Science Department

CPCS204, Fall 2022 Program 1
Products Assignment Monitoring System
Assigned: Thursday Sep 15, 2022 Due: Thursday Sep 29, 2022

Purpose

1. Learn to implement a linked list for a real-world problem.
2. Review file I/O (input/output).

Read Carefully:

This program is worth 5% of your final grade.

WARNING: This is an individual project; you must solve it by yourself. Any form of cheating will result in receiving **zero** in the assignment.

The deadline for this project is **Thursday Sep 29, 2022** by 11:59 PM.

LATE SUBMISSION: No assignment will be accepted after the deadline

Blackboard Submission:

This project must be submitted online via Blackboard.

The source file(s) of your program should be zipped up. You must name the zip file using the following naming convention:
SectionNumber_StudentID_ProgramNumber.zip

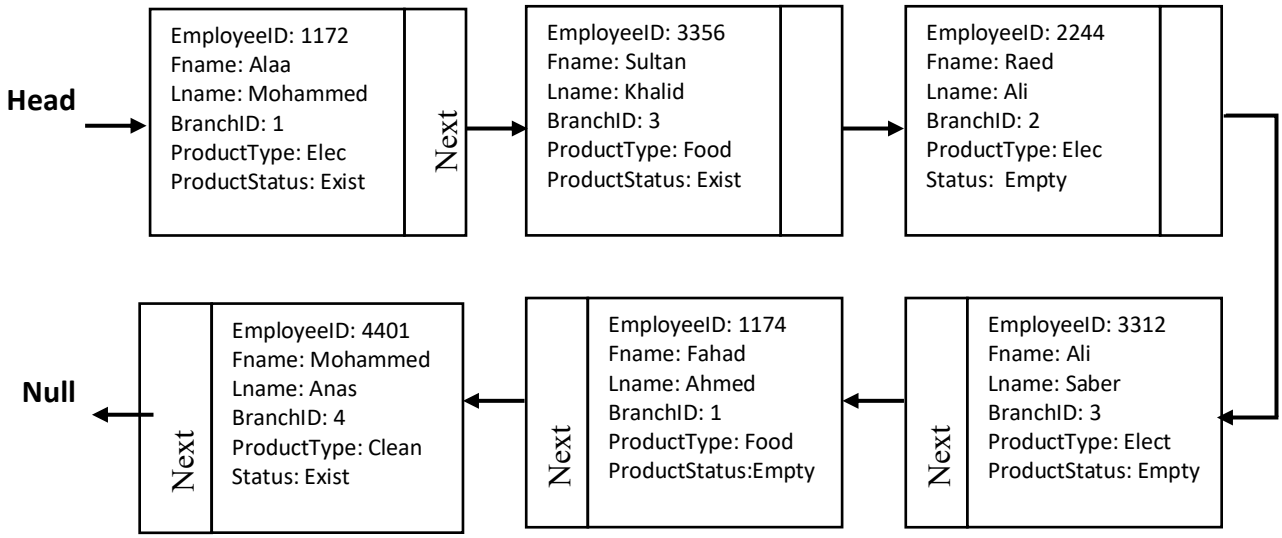
Question:	1	2	3	**Total**
Points:	20	20	60	**100**

Concept Application & Algorithmic Part

Question 1: (20 points)

1. **Concept Application**: An IT department of shopping centers has the following linked list to monitor their products availability across their branches, and it assigns employees to specific product type in specific branches. Write the steps to delete the nodes of **"Exist" product statues**. Your answer must include the followings:

    - The position of the pointer.
    - The linked list statues after every step.



Question 2: (20 points)

2. **Algorithm Write up:** In the same IT department of the shopping centers, considering the same linked list in the previous question. **Write an algorithm** that displays all information of the employees and branches which have products of **Empty** statues.

The output of the algorithm should print

```
The shopping centers branches that have empty products are:
1. BranchID: 2, EmpID: 2244, Name: Raed Ali, ProductType: Elec
2. BranchID: 1, EmpID: 1174, Name: Fahad Ahmed, ProductType: Food
3. BranchID: 3, EmpID: 3312, Name: Ali Saber, ProductType: Food
```

Algorithm

Input:
Output:
Method:

Question 3: (60 points)

Program 1: Shopping Center Employee Management System

Objective:

The goal of this program is to develop a monitoring system for employee assignment to specific product types in shopping center branches. The primary objective of this program is to implement a linked list. The secondary objective is to practice with File I/O.

Program Description:

Write a program to distribute employees across shopping centers where each employee is responsible for certain product type. You are required to write the following methods:

1. Write a function to add an employee to a specified center (**at the end of the linked list**).
2. Write a function to search for an employee based on his/her id.
3. Write a function to delete an employee from the linked list based on his/her id.
4. Write a function to swap between two employees.

The program deals with three files. Two input files and one output file. Information on the same line is separated by spaces. The description of these files as follow:

- The first input file (**intialInformation.txt**) contains the important information for the system which includes information about the employees, the centers, and the products. The information in this file is arranged as follow:
    - The first line contains **number of employees**, **number of centers** and **number of products**.
    - The second line contains **the centers names**.
    - The third line contains **the product names**.
    - The following lines (from line 4 to 18) contain the employee information, that are, **employee id**, **first name**, and **last name**.
    - The lines from 19 to 21 contain the information of the center including **center id** and **center name**.

- The commands for the system are found in the second file called **commands.txt**. The commands in this file as follow:
    - **STARTUP**: This command will use the first input file (intialInformation.txt) to initialize the system by creating 3 linked lists equal to the number of centers specified in the file. Every linked list holds the employees' information of one center. Each created linked list will have 5 employees in order as they appear in the file. Then it assigns products sequentially as they appear in the file **commands.txt**. For example, Basma Sami is in the first node of Aljamaa center and assigned to electronic products, Sara Omar is in the second node of Aljamaa center and assigned to cleaning products, etc.

- **DISPLAY_ALL_CENTERS:** This command will display all employees in all centers as it is shown in the **ouput.txt** file.
- **DISPLAY_PRODUCTS_FOR_EMPLOYEE:** This command requires one input which determines the employee id. It will display the center and the product of this employee. If no employee is found, the system shows "No employee of this number is found".
- **NUM_OF_EMPLOYEES:** This command requires one input which determines the center name. It will display the number of employees in the specified center.
- **DISPLAY_BASED_ON_PRODUCT**: This command requires one input that determines the product name. It will display all employees in all centers assigned to the specified product.
- **CHANGE_TO_NULL_PRODUCT**: This command requires one value that determines the employee ID. It will change the assigned product of the specified employee to Null.
- **SWAP_BETWEEN_EMPLOYEES**: This command requires two inputs which determine two employees IDs. It will only swap the first name, last name, and employee ID.
- **QUIT**: This command will stop the program.

- The output of the program should be written to the file name output.txt, which content should be similar to the contents of the file provided to you.

Implementation
For this program, you will create the following classes:

• Employee.java: This class will be used to create objects of type employee. Each employee object will store the employee id, employee first name, employee last name, center number, age, phone number and product.

• Center.java: All the methods will be implemented in this class.

• MainProgram.java: This is the class that will contain the main.

Sample Input & Output File
We have provided you a sample for two input files and one output file.

WARNING
Your program MUST adhere to the EXACT format shown in the sample output file (spacing capitalization, use of dollar signs, periods, punctuation, etc). The graders will use large input files, resulting in large output files. As such, the graders will use text comparison programs to compare your output to the correct output. If, for example, you have two spaces between in the output when there should be only one space, this will show up as an error even though you may have the program correct. You will get points off if this is the case, which is why this is being

explained in detail. The minimum deduction will be 10% of the grade, as the graders will be forced to go to the text editing of your program in order to give you an accurate grade. Again, your output MUST ADHERE EXACTLY to the sample output

Grading Details

Your program will be graded upon the following criteria:

1) Adhering to the implementation specifications listed on this write-up.
2) Your algorithmic design.
3) Correctness.
4) **Use of the three classes, as specified. If your program is missing these elements, you will lose marks.**
5) The frequency and utility of the comments in the code, as well as the use of white space for easy readability. (If your code is poorly commented and spaced and works perfectly, you could earn as low as 80-85% on it.)
6) Compatibility to the **newest version** of NetBeans. (If your program does not compile in NetBeans, you will get a large deduction from your grade.)
7) Your program should include a header comment with the following information: your name, **email**, account number, section number, assignment title, and date.
8) Your output MUST adhere to the EXACT output format shown in the sample output file.

Deliverables

You should submit a zip file with four files inside:

1. *ConceptPart.doc (Containing concept and algorithm parts)*
2. *Employee.java*
3. *Center.java*
4. *MainProgram.java*

***These three files should all be INSIDE the same package called **EmployeeAssignment**. If they are not in this specific package, you will lose points.

NOTE: your name, ID, section number AND EMAIL should be included as comments in all files!

UML Diagrams:

For this program, you will create **three** Classes (UML diagram shown below):

Employee

Data Members
`private int EmpID;`
`private String Fname;`
`private String lName;`
`private String product;`
`private String phone;`
`private int age;`
`private int center;`
`private Employee next;`

Operations/Methods `Employee () //` one or more Constructors And any other methods you need.

Center

Data Members
`private String centerName;`
`private int centerID;`
`private Employee head;`

Operations/Methods
`Center()`
`addEmployee()`
`searchEmployeeByID()`
`swapEmployees()`
`deleteEmployeeByID()`
 	
ALL necessary methods for linked-list operations

Data Members `As needed`
Operations/Methods `public static void main()` ALL necessary methods for all operations