Program 6: 60 points: Queues Due Tuesday, November 10th 11:59

**Objectives: The focus of this assignment is implementing the Queue data structure**

**Program Description:**

The functionality of Employees making vacation requests will be added. Requests will be granted in a first come, first serve order. A Queue will be added to the EmployeeManager to manage these requests.

A total of fourteen classes are required.

Queue – Implementation of Queue data structure of Comparables

ListNode – (From previous assignment)

LikedList – Implementation of the LinkedList data structure of Comparables

EmptyListException – (From previous assignment)

ArrayList (From previous assignment)

InvalidEmployeeNumberException (From previous assignment)

InvalidSizeException (From previous assignment)

MaximumCapacityException (From previous assignment)

Employee (From previous assignment)

HourlyEmployee (From previous assignment)

SalaryEmployee (From previous assignment)

CommissionEmployee (From previous assignment)

EmployeeManager (Altered from previous assignment)

EmployeeDriver (From previous assignment)

**UML DIAGRAM FOR AND DISCUSSION FOR Queue**

This project will add a Queue to the EmployeeManager that will be used to maintain Employee vacation requests. Requests will be granted in the order they are received. Additional options will be added to the EmployeeDriver.

|  |
| --- |
| Queue<E extends Comparable<E>> |
| * private LinkedList<E> list |
| <<constructor>> Queue()  <<constructor>> Queue(name : String)  + enqueue(item : E)  + dequeue() : E  + lengthIs() : int  + peek() : E  + toString()  + isEmpty() : Boolean  + clear() |
|  |

Notes on Queue

The composition technique of Queue is being used. That is, Queue HAS-A LinkedList, as opposed to the inheritance technique where Queue IS-A LinkedList

The implementation of the methods is as discussed and demonstrated in class.

The Queue belongs to the dataStructures package.

Changes to EmployeeManager

The EmployeeManager is adding a Queue for maintaining Employee vacation requests. Some methods are being added to provide this new feature. Since this now uses your Queue you must import it from your dataStructures package (changes in bold).

|  |
| --- |
| EmployeeManager |
| - employees : ArrayList<Employee>  - employeeMax : final int = 10  - hourlyList : LinkedList<Employee>  - salaryList : LinkedList<Employee>  - commissionList : LinkedList<Employee>  **- vacationRequests : Queue<Employee>** |
| **<<constructor>> EmployeeManager()**  + addEmployee( type : int, fn : String, ln : String, m : char, g : char, en : int, ft : boolean, amount : double) throws InvalidEmployeeNumberException  + removeEmployee( index : int)  + listAll()  + listHourly()  + listSalary()  + listCommision()  + resetWeek()  + calculatePayout() : double  + getIndex( empNum : int ) : int  + annualRaises()  + holidayBonuses() : double  + increaseHours( index : int, amount : double)  + increaseSales( index : int, amount : double)  + findAllBySubstring(find : String) : Employee[]  - RabinKarp(name : String, find : String) : int  - stringHash(s : String) : int  - charNumericValue(c : char) : int  - RabinKarpHashes(s : String, hashes : int[], pos : int, length : int) : int  - linearSearchRecursive(nameHashes : int[], findHash : int, pos : int) : int  + sort()  **+ addRequest(empNum : int) : boolean**  **+ viewNextRequest() : Employee**  **+ grantNextRequest() : Employee**  **+ outputRequests()** |

Constructor

Create the Queue object for the new Queue data member. Name the Queue “Vacation Requests” by using the appropriate constructor

public boolean addRequest(int empNum)

If an Employee with the passed Employee number exists, add them to the vacation requests queue and return true. Otherwise return false.

public Employee viewNextRequest()

Returns the next Employee that would be granted a vacation request, but does not remove it from the Queue, if there are no requests in the Queue it returns null.

public Employee grantNextRequest()

If requests are present, removes the next Employee from the Queue and returns it, if there are no requests returns null.

public void outputRequests()

If requests are present outputs all of the Employees in the Queue. If there are no requests outputs, “No vacation requests”.

EmployeeDriver

The following options must be added to the EmployeeDriver after the Sort option, moving Exit to option 13.

View Vacation Requests

Output the current vacation requests using the EmployeeManager’s outputRequests. Then specifically outputs the next Employee to receive a request if present (see below example for expected output).

Add Vacation Request

Asks user for the Employee number of the Employee to add to the request queue. If the Employee exists outputs they have been added to the queue, if not outputs there is no Employee (see below example for expected output).

Grant Vacation Request

Attempts to grant the next vacation request in the Queue. If it is successful outputs the Employee that was granted the request, otherwise outputs there were no requests (see below example for expected output).

**Other Notes:**

* Declare the new class to belong to the correct package
* Import the new class as necessary.
* **Look at the example below for expected output and format of the new EmployeeDriver options**

# **Submitting Your Program Files:**

The assignment is automatically collected from your account on the “Loki” machine on the due date. You must put your source code in the correct directory in your account in order for this to work. Your directory name includes the course, section, semester and the assignment number. This is case-sensitive; **all alphas are upper-case**. This directory must be created in your home directory.

Submission Directory:

**CSCI-1620-1-F15-A6**

**Example given the following Employees have been added**

12348

Doe, John A.

Gender: M

Status: Full Time

Wage: 14.75

Hours Worked: 0.00

12345

Cavanaugh, Patrick B.

Gender: M

Status: Full Time

Wage: 10.00

Hours Worked: 0.00

12346

Bohning, Edith C.

Gender: F

Status: Part Time

Salary: 50000.00

12347

Pohnal, Rickie A.

Gender: F

Status: Full Time

Rate: 2.50

Sales: 0.00

**Example (Listing of Employees in Main Menu omitted for brevity, user input underlined, bolded comments not in actual output)**

Main Menu

1. Employee Submenu

2. Add Employee

3. Remove Employee

4. Calculate Weekly Payout

5. Calculate Bonus

6. Annual Raises

7. Reset Week

8. Find Employee

9. Sort

10. View Vacation Requests

11. Add Vacation Request

12. Grant Vacation Request

13. Quit

Enter Choice: 10 **Viewing Requests**

No vacation requests

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13. Quit

Enter Choice: 11

Enter Employee number for request: 11111 **Attempting to give non-existing Employee request**

No such Employee

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12. Grant Vacation Request

13. Quit

Enter Choice: 11

Enter Employee number for request: 12346 **Adding Employee request**

Employee 12346 added to vacation queue

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9. Sort

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12. Grant Vacation Request

13. Quit

Enter Choice: 11

Enter Employee number for request: 12345 **Adding Employee request**

Employee 12345 added to vacation queue

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8. Find Employee

9. Sort

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11. Add Vacation Request

12. Grant Vacation Request

13. Quit

Enter Choice: 11

Enter Employee number for request: 12347 **Adding Employee request**

Employee 12347 added to vacation queue

Main Menu

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8. Find Employee

9. Sort

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11. Add Vacation Request

12. Grant Vacation Request

13. Quit

Enter Choice: 10 **Viewing Requests**

12346

Bohning, Edith C.

Gender: F

Status: Part Time

Salary: 50000.00

12345

Cavanaugh, Patrick B.

Gender: M

Status: Full Time

Wage: 10.00

Hours Worked: 0.00

12347

Pohnal, Rickie A.

Gender: F

Status: Full Time

Rate: 2.50

Sales: 0.00

12346 **Next Employee that will be granted request**

Bohning, Edith C.

Gender: F

Status: Part Time

Salary: 50000.00

will receive next request

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12. Grant Vacation Request

13. Quit

Enter Choice: 12 **Granting request**

12346

Bohning, Edith C.

Gender: F

Status: Part Time

Salary: 50000.00

granted vacation request

Main Menu

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9. Sort

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11. Add Vacation Request

12. Grant Vacation Request

13. Quit

Enter Choice: 10 **View Requests**

12345

Cavanaugh, Patrick B.

Gender: M

Status: Full Time

Wage: 10.00

Hours Worked: 0.00

12347

Pohnal, Rickie A.

Gender: F

Status: Full Time

Rate: 2.50

Sales: 0.00

12345

Cavanaugh, Patrick B.

Gender: M

Status: Full Time

Wage: 10.00

Hours Worked: 0.00

will receive next request

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12. Grant Vacation Request

13. Quit

Enter Choice: 12 **Grant Request**

12345

Cavanaugh, Patrick B.

Gender: M

Status: Full Time

Wage: 10.00

Hours Worked: 0.00

granted vacation request

Main Menu

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2. Add Employee

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8. Find Employee

9. Sort

10. View Vacation Requests

11. Add Vacation Request

12. Grant Vacation Request

13. Quit

Enter Choice: 11

Enter Employee number for request: 12345 **Adding Request**

Employee 12345 added to vacation queue

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8. Find Employee

9. Sort

10. View Vacation Requests

11. Add Vacation Request

12. Grant Vacation Request

13. Quit

Enter Choice: 10 **Viewing Requests**

12347

Pohnal, Rickie A.

Gender: F

Status: Full Time

Rate: 2.50

Sales: 0.00

12345

Cavanaugh, Patrick B.

Gender: M

Status: Full Time

Wage: 10.00

Hours Worked: 0.00

12347

Pohnal, Rickie A.

Gender: F

Status: Full Time

Rate: 2.50

Sales: 0.00

will receive next request

Main Menu

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7. Reset Week

8. Find Employee

9. Sort

10. View Vacation Requests

11. Add Vacation Request

12. Grant Vacation Request

13. Quit

Enter Choice: 12 **Grant Request**

12347

Pohnal, Rickie A.

Gender: F

Status: Full Time

Rate: 2.50

Sales: 0.00

granted vacation request

Main Menu

1. Employee Submenu

2. Add Employee

3. Remove Employee

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6. Annual Raises

7. Reset Week

8. Find Employee

9. Sort

10. View Vacation Requests

11. Add Vacation Request

12. Grant Vacation Request

13. Quit

Enter Choice: 12 **Grant Request**

12345

Cavanaugh, Patrick B.

Gender: M

Status: Full Time

Wage: 10.00

Hours Worked: 0.00

granted vacation request

Main Menu

1. Employee Submenu

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11. Add Vacation Request

12. Grant Vacation Request

13. Quit

Enter Choice: 10 **Viewing requests**

No vacation requests

Main Menu

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12. Grant Vacation Request

13. Quit

Enter Choice: 13 **Exit**

Thank you for using the Employee Manager!