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Course : BBM203
Experiment : Assignment 3
Subject : Linked List
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Main Program : factory.java

-Program has 10 structures. These are;

Factory: This is general structure to reach all departments by using their links between them. This struct just keep a Department pointer which holds last department and total process time of all departments inside the program. By using total process time inside my factory I can calculate needed completed percentage at the report part for each car(also I am using each car's copleted department time info).

Department: Department structure has a unique name(which defines each department's sibling hierarchy) and a general name to define its general type. Also Department structure keeps needed informations(like which car it holds right now,it's total process time,top pointer to its last processed car etc.). And Department struct has two links. One of them to next sibling in the same general type and the other one to previous general department.So by using each general department I can reach one previous general department. Also by using one general department I can reach all siblings of it by using the other sibling's next pointers(links) as well.Finally I am keeping the last general Department's pointer in my Factory structure to be able to reach all departments.

ProcessedCarNode: This is one of my Nodes. This Node keeps processed car's model and unique code information as char array inside it. And also keeps another ProcessedCarNode pointer which is a link to other processed cars. I am keeping a top pointer for last ProcessedCarNode in my Department struct. So for each department I can reach by using this top pointer to processed cars dynamically.

Car: This is my Car Node to keep each car's needed information(like model,unique code,which department keeps it,is it in process right now or waiting for it's start time etc.). So in this way when I want to process a car I can find it and take its information by using it's special node. Last point is keeping all cars. When I want to put a car to departments or take it from departments I am reaching it by its pointer which is inside my general Queue(it keeps all cars which are created inside the program pointers) or my LineQueue(it keeps the waiting cars at the beginning) and when time comes I am taking them to Department struct and keep their pointer in Departments struct.

ReportNode: This node keep's each report's needed information(like type,time,car's unicode) and also a link to previous report in program. I am using a top pointer to last node in AllReports structure to reach all report nodes(reports by using their links between each node) inside the program.

AllReports: It keeps a top pointer to last report node in prog. Also has a counter that keeps # of all reports

My 4 other structure is for StringStack and Queue;

StringNode: This node includes a char array(String) as data and link to previous String Node

StringStack: String Stack keeps a pointer tol ast string node and with this pointer we can reach all string nodes by using links between them(they have previous string node pointers as links inside their struct)

NodeQue: This node keeps a Car pointer(Car struct's pointer) as data and link to next Queue Node.

Queue: This is the general Queue which keeps front and rear node's pointer(that includes Car) and a head pointer(it always points first put Car in Queue to treverse our Queue very first to last). By using this 3 pointers and their inside value(Car)'s links between them. We can reach or treverse all cars in program.

My Approach to this Assignment in My Program

I have 3 general node as Car,Department and Report and 3 general struct as Queue which keeps all Car Nodes , Factory which keeps all Department Nodes also their total process time and AllReports that keeps all reports inside my program. By using this general node I can easily reach my needed information about that specific node(for example one specific car or one specific department) and also by using this general structs(like Factory) I can easily reach my all departments,cars or reports with their links between them. So I have a pointer(connection) with my all specific items in program and I can control them(like change their place or update their info) easily. These are my struct and link approach.

I also want to explain my functional approach inside my program:
As functionality I have 4 basic function to control all my structures and give or take needed information in program part(I have also explained them inside my codes as comment lines by defining their input,return value and what they do for program).These 4 functions are;

Factory Function: This function takes all given comments in an array and manage them like direct or transmit them their proper operation. If comment says add department it adds with proper information updates inside a department node or if comment says produce it produces given car and puts it general cars queue with updates as well. So by using comments this function manages the first step of program. And reorder given reports in ascending order according to their time values. Then as last part function calls Departments Process function to be able to manage departments operations also. Furthermore function provides needed info(like All Cars with updated features inside a queue or all departments with their info inside a Factory structure or all Reports with ascending ordered array list) to Departments Process function

Departments Process: This function is base function for time control and transportation managing according to start or process time. Firstly functions checks time and all Cars Queue's front Cars if there are some cars which should be in departments line(department process) function takes them to CarLine(which is also a queue that keeps waiting cars at the beginning part of all departments). And then function starts to process all cars inside the departments from coming last department to first one and update their information(like processed time or current department).When a car finished their current department process function calls Transport Function to transport this car from transmitter department to receiver(next) department.Also function provides an updated info to Transport Function. Finally in last department function updates the car(which is inside last department) and its info as "Completed" and by using this info we can understand that this car is done and out of all processes. Also for each time step function controls given Report Array's first element and if our time and this report time are equal this function calls Report function to give that time's last moment(report will be given when that time is done).

Transport Function: This function firstly decides the transmitter department among all transmitter department siblings according to their included car's start time. Then when transmitter has chosen function takes transmitter departments car to receiver department which is next general department in hierarchy and updates all informations and features of deparments(transmitter and receiver's) and tranported car.

Report Function: When function is called firstly it checks the report time and find proper report node to give. Then when report node is founded function takes type and other needed informations from node and process them in proper ways. If type is "Car function give a report for that specified car in comment and print it on screen.If type is "Cars" function checks all Cars from general queue (by using general queue's head pointer to treverse) and gives proper report about all cars for that moment on screen. If type is "Departments" function treverse all departments (bu using top pointer of factory struct) in program and gives proper report for all those departments in our program on screen.

My program also has a lot of assistant function like Departments_Is_Empty to check all department's situation if they are empty to be able to finish our process, PrintFactory to give hiearachy of our departments and their siblings when Print Factory function comes in comments as mentioned in assignment or Stack/Queue functions to manage my queue and stack structures and so on.Lastly I wrote a lot of comment lines about my general(basic) and assistant functions inside my codes(as comment lines). I also explained my structures and their usages there. These report ais just general explanation about my program's base funtions/structures and my general approach to this assignment.