



TU856/8 Assignment 2024/25

Introduction

A car parts firm takes orders from customers and ships them via a logistics company to its customers. During the day, customer orders are divided between 4 teams who work to pick the stock and package them. Each of the 4 teams stores its finished packages in an appropriate bin in the warehouse. A part has a name, a weight, a price and a target car engine.

As delivery is charged by weight, the company can deliver more of its parts by fitting more in a delivery van. An automated picker is used to prepare orders for delivery by picking them from the appropriate bin.

Working in the company's IT department, you have been tasked with producing the delivery docket for each van. Products are packed in the vans in weight order - the lightest first and the heaviest last.

You have access to the company's order management system and can therefore identify the following data :-

- a. Line Code – Numeric
- b. Batch code - Numeric
- c. Batch date & time – numbered for day of month, hour of day, minute of hour.
- d. Product Id - numeric
- e. Product name – text
- f. Target engine code - text
- g. Bin# - numeric

Design Requirements

Task 1:-

- There are 4 files of production data – one for each time.
- The order management system is very old and keeps its production data in separate files in batch time order. You will need to pre-process this data so that each item is sorted by weight.
- There are huge amounts of data stored, the running time of this algorithm should be $O(N\log(N))$ or better.

Task 2

- You will need to produce a single dispatch list from the 4 files. Each file will need to be merged to create a single list.
- There are huge amounts of data stored, the running time of this algorithm should be $O(N)$ or better.

Task 3

- Provide a user interface to search for the earliest occurrence of a product with a particular weight.
- There are huge amounts of data stored, the running time of this algorithm should be $O(\log(N))$ or better.

Task 4

- Provide a report which summarises the number of products included in the delivery for all vans.
- There are huge amounts of data stored, the running time of this algorithm should be $O(N)$ or better.

Your documentation should show how each algorithm meets the running time requirement.

Deliverables

1. Design a data structure for the project,
2. Create test data for each line. e.g. >10 issues/products per line.
3. Test your project – outline how you will ensure that your implementation meets the design requirement.
4. Produce a flowchart for Task 2
5. Produce pseudocode for Tasks 1-4
6. Produce working C code for tasks 1-4
7. Create a project report outlining the brief, your design for each task, your test plan for each task and the pseudocode and code.
 - a. The report should be submitted in MS Word .docx format OR Adobe PDF format .pdf. Reports not meeting these requirements will not be marked.
 - b. Ensure code is readable in doc – properly tabbed etc.
 - c. Submit by 5pm 4th April 2025. Late submission -10% per day.

Projects will be demo'ed in the lab. The sequence of the demo should be:-

1. Display test data from each line
2. Display data from each line meeting requirements of Task1
3. Display data from all lines meeting requirements of Task2
4. Prompt for search and display result meeting requirements of Task3
5. Display summary data meeting requirements of Task4

Note: Unanswered or incorrect responses to questions on the design or implementation will result in an NG. Plagiarism will result in an NG for all concerned. Your submission will be examined by Turn-it-in to detect plagiarism and or llm input. Marks are allocated equally to all sections, including the demo.