

CW3 Introduction

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Coursework 3 is the final coursework component of the course this semester, which accounts for **40% of your final mark**. You will form **a team of two** with your classmates and apply object-oriented principles and advanced data structures, as you have learned throughout the semester, to solve the tasks specified in this document. You will be tasked with writing a report and creating a video presentation to demonstrate your knowledge of 1. object-oriented concepts, 2. problem-solving techniques, 3. AI-assisted team cooperation, 4. equality, diversity, and inclusion principles, and 5. planning and self-learning in object-oriented programming.

You are required to submit the following files:

- Java code in a ZIP file;
- A Word report;
- An MP4 video;
- A PowerPoint (PPT) presentation used in the video.

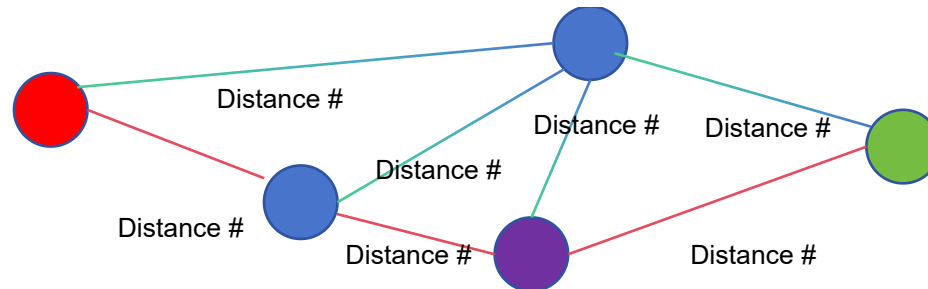
Phase	Date
Task Sheet Release	Week 9, Monday, 14th of April, 9:00 am (UTC+8).
Submission	Week 12, Sunday, 11th of May, 11:59 pm (UTC+8).
Late Submission	Week 13, Monday-Friday, 12th-16th of May. 5% lateness penalty per day, max 5 days (Monday-Friday), no submissions are accepted after 11:59 pm (UTC+8), 16th of May.

- **40%** of the final mark
- Team of **2** (Please do so ASAP)
- **4 files** need to be submitted
- From Apr.14 to May.11;
DDL - May.11, 11:59 p.m.

Task A & B - A Graph-based Route Planner

Overview

For **Tasks A and B**, you are required to design and implement an application for planning road trips in the USA. Assume the user will input a starting city/origin (e.g., New York) and an ending city/destination (e.g., Chicago). In addition, the user will input zero, one, or more places of interest (e.g., NASA Space Center, Hollywood Sign, and so on). Once implemented, your solution must find a route from the starting city to the ending city in a way that visits each of the places of interest while keeping the number of miles driven (the total distance) to a minimum.



```
Enter starting city (e.g., New York NY): New York NY
Enter destination city (e.g., Chicago IL): Chicago IL
Enter attractions (comma-separated, e.g., Hollywood Sign): Hollywood Sign
```

Result:

Start: New York NY

Destination: Chicago IL

Attractions: [Hollywood Sign]

Optimal Route: [New York NY, Philadelphia PA, Columbus OH, Los Angeles CA, Chicago IL]

Total Distance: 4460.0 miles

- Requiring to **design** (Task A) and **implement** (Task B) a graph-based route planner
- Targets:
 - Receives user inputs about **starting city**, **ending city (destination)**, with 0, 1, 2, or more **places of interest**
 - Implement graph algorithm (W10) to find the **nodes** (in order) and the **total distance** in the **shortest path**
 - Graph algorithm analysis (e.g., time efficiency)

Two datasets - one for **place of interest** (attraction.csv) and one for **cities and distances in between** (road.csv)

Task C - Sorting

In **Task C**, you will be given four datasets of different sizes and orders, which may serve as the final database for this project in the future. Your task is to evaluate and analyze the performance of the three algorithms we have learned (i.e., Insertion, Quick, and Merge) on these datasets and report your findings.

 1000places_random
 1000places_sorted
 10000places_random
 10000places_sorted

Datasets	Insertion (ns/ms)	Quick (ns/ms)	Merge (ns/ms)
1000places_sorted			
1000places_random.csv			
...			

- 4 datasets with different size (1000 v.v 10000) and order (sorted v.s. random)
- Use **insertion, quick, and merge sorting algorithms** to sort the datasets
- Based on the test results, **compare and analyze the performance** of these algorithms
- Rather isolated from Tasks A&B, you may start now ;)

Task D - Project Reflection

Task D requires you to provide a general summary of the entire project, focusing on how you utilized AI-assisted tools for project management, how you implemented the principles of equality, diversity, and inclusion during development, and what you have gained from this project as a developer.

- Basically a conclusion part for the report, but:
 - Make sure to use AI-assisted tools to **manage** your project (**not to develop**; e.g., JIRA, Trello; covered in this lecture)
 - Equality, diversity, and inclusion principles application in your project (covered in this lecture)

Task E - PPT&Video

Task E requires you to create a PPT and use it to deliver an oral report of your project in the form of a video. Both PPT and the video (.mp4) are required to be submitted.

- Submit PPT and video (.mp4), both of them
- 8 minutes MAX
- Show your faces
- No audio translation or AI voice generators/applications

General Notes

Structure

The purpose of your report is to show how you solved Tasks A, B, C, and D in a well-detailed manner. You need to organize your report in the following format.

- **Coursework submission cover page**
 - (This page is **compulsory**. You can download the template from the CPT204 LMO homepage.)
- **Chapter 1 – Program Design (Task A)**
 - (You may add sub-chapters)
- **Chapter 2 – Graph Algorithm (Task B)**
 - (You may add sub-chapters)
- **Chapter 3 – Sorting Algorithm (Task C)**
 - (You may add sub-chapters)
- **Chapter 4 – Project Reflection (Task D)**
 - (You may add sub-chapters)
- **Chapter 5 – Program Code**
 - Include all your code in Chapter 5 as text, copy and paste each source file content into the report. **The use of screenshots in Chapter 5 will result in an automatic total mark of 0 for the entire coursework task.**
- **Chapter 6 - Contribution Form**
 - Use the following table to indicate your contribution:

Student ID	Contribution (%)
 - **Note:** The total percentage is 100%. That is, if you and your teammate contribute equally to this project, both of you should fill 50% in the table.
- **Chapter 7 – Appendix**

20 pages MAX, figures, screenshots, tables, etc, also count

- Sign and include the **Coursework submission cover page** in your report (download from LMO CPT204 homepage)
- Report - 20 pages MAX
 - Only for Chapter 1-4 (Task A-D)
- Copy and paste your code in Chapter 5, do NOT use screenshots
- Contribution form - You are encouraged to contribute equally to this project
- DO NOT USE AI FOR CODE/ANSWER GENERATION
- Support:
 - 11:00 -12:00, Mon and Tue
 - Anything (but programming for you :)