

## **PROJECT BRIEF (WIA2005 - Algorithm Analysis and Design)**

**University/Programme/Course:** University of Malaya/Bachelor of Computer Science/Algorithm Analysis and Design  
**Year:** 2<sup>nd</sup> year / 4<sup>th</sup> semester

**Pedagogical Approach:** Project-based Learning/ Design Thinking

### **Learning Outcome:**

Experience analysing and designing algorithms for problem solving with other teammates.

- a. Utilise all of the chosen tools
- b. Apply algorithms that have been learned in this course as well as new ones to solve the given problems. Create solutions that apply the algorithm design paradigm.
- c. Integrate all of the algorithms within a computer program.
- d. Execute the computer program while explaining the relation between steps in algorithms with the behaviour/output of the computer program.
- e. Analyse the complexity of the main algorithms that solve the given problem.
- f. Function effectively as a team member.
- g. Communicate effectively through reports and presentations.

### **Objective:**

This project requires you and your teammates to analyse, design, and code a computer program using python and the chosen tools to solve the given problems.

### **Project Scope:**

To meet the project requirement, you will need to:

- ✓ Form a work team of 6 members (must be within the same tutorial session).
- ✓ Elect a team leader, write contract items and sign using the group contract template in Appendix A.
- ✓ Identify clear roles and responsibilities, distributing and coordinating various tasks appropriately, and able to operate as a high performing team. You must clearly communicate how you have worked as a team. Refer FILA form at Appendix B.
- ✓ Analyse, design, and code a computer program using python and the chosen tools to solve the given problems as the following:-

Moonbucks is a coffee chain that has stores located all over the world. The company is constantly looking at running better logistics as well as expansion to open more stores at strategic locations. You and your team have been hired to do analysis and provide insights to the management for making business decisions.

**You have been given a sample dataset that contains the location of Moonbucks stores all over the world. Please use this list to determine the country in Problem 1 and location of store in Problem 2.**

**Problem 1: Moonbucks is always looking at the possibilities of expanding their business by adding the number of stores around the world. To do this, they need to analyse local economic and social situations to ensure maximum profits.**

1. Select any five (5) countries from the list.
2. Find five (5) articles from online news websites that have published stories related to each country's local economy and social situation.
3. Do an analysis of positive, negative, and neutral words of the article to give insights of the local economic and social situation.

*Suggestion: Sometimes a webpage must be converted to the text version before it can be done. You may refer to this website to extract words from a website - <https://www.textise.net/>. You may refer to this website on how to count word frequency in a website-*

*<https://programminghistorian.org/lessons/counting-frequencies>. You can also filter stop words from the text you found. Stop words are such as conjunctions and prepositions. You may refer to this link: <https://www.ranks.nl/stopwords> . You can find the list of English positive/negative words here -*

*<http://positivewordsresearch.com/list-of-positive-words/>,*

*<http://positivewordsresearch.com/list-of-negative-words/> . Then, select or design the appropriate string-matching algorithm for the analysis.*

4. Plot line/scatter/histogram graphs related to the word count using Plotly (Word count, stop words)

*Suggestion: You may refer this link on how to install Plotly and how to use the API keys*

- <http://www.instructables.com/id/Plotly-with-Python/>
- <https://plot.ly/python/getting-started/>

5. Plot any related graphs to show useful information about the analysis.
6. Give an algorithmic conclusion regarding the sentiment of those articles

*Suggestion: If there are more positive words, conclude that the article is giving positive sentiment, if there are more negative words, conclude that the article is giving negative sentiment. You may try to conclude in different perspectives such as whether the list of positive and negative words above is accurate to be used in the context of the article you extracted the text by designing your own algorithm for making conclusions. Based on the conclusion, you may rank which country is worth having branch expansion.*

**Problem 2: Usually, Moonbucks delivers stocks from a warehouse in the region. But recently, the company decided that they want to have a local central distribution center in each country. The stocks will be delivered according to a daily schedule by truck to all the stores in the country. To ensure delivery is optimised, delivery routes will be generated for each of the delivery trucks.**

1. Determine which store to be used for the distribution center in five (5) of the countries used in Problem 1. The store selected must be in the center of at least 5 local stores.

*Suggestion: You can select (randomly) more than six (6) stores in the country and find which store can be used to be the local distribution center. Select or design an appropriate algorithm for this. You can use Python Geocoding Toolbox, gmplot and Google Distance Matrix API.*

2. All deliveries will start from and end at the distribution center. Plot line to show the shortest path for the delivery truck to make an optimal delivery. Keep track of the total distance the truck will be making for the delivery for each of the countries.

**Problem 3: The expansion of business in a country is not only determined by the local economic and social situation of the country, but the running cost for delivering logistics needs to be considered as well. And usually, a new store location will be determined by how much is spent for delivery. Based on the ranking of countries and total journey made for deliveries of each country, determine the final ranking of countries where new stores can be located.**

3. Calculate the probability of a country that has a good local economic and social situation with the lowest optimal delivery. Then, write the summary, ranking from the most recommended countries to the least recommended countries to have an expansion.

- ✓ Week 7: Only group leader has to submit the following in a .zip file through Spectrum/Teams Channel ([T1] and [T4]):
  - **Group Contract**
  - **1<sup>st</sup> FILA form (compulsory to all members to develop the program)**
- ✓ Week 7: (Compulsory) Please answer the Pre-Test. Links are provided on Spectrum. There are 3 questionnaires to answer in total.
- ✓ Week 7-12: Brainstorm, analyse, design, and code a computer program using python and the chosen tools to solve the given problems. Please use Padlet/Google Docs/or any collaborative tools to document your brainstorm activity (for identifying algorithms to use in each of the problems).
- ✓ Week 12: Each student needs to individually submit the peer evaluation form through Google Form (Link will be provided later). Your peer evaluation is confidential and will not be exposed to other team members.
- ✓ Week 13-14: Each group has to do a 20-30 minutes demo and presentation using the powerpoint slide.
- ✓ Week 14: One final submission for each group. Only group leader has to submit following in a .zip file through Spectrum:
  - **Source code: raw python files (All programming codes must use python 2 or 3)**
  - **2<sup>nd</sup> FILA form (compulsory to all members to develop the program)**
  - **Report Content:**
    1. Introduction
    2. Description
      - Elaborate how tools and algorithms resolve each of the given problems. Include reference to the Padlet/Google Docs/or any collaborative tools (in appendix or links) to support your decision.
    3. Time complexity of each of the algorithm that resolve the given problem
    4. The program code: source code and snapshots of input/output
    5. Conclusion

6. References

7. (Compulsory) Please answer the Post-Test. Links are provided on Spectrum.

### Assessment Criteria:

The assessment for this group project is divided into two categories:

- Assessment criteria for soft skill as described in Table 1
- Assessment criteria for algorithms in solving the given problems as described in Table 2

Table 1: Assessment criteria for soft skill (Individual Assessment)

		<b>Partially meets</b>	<b>Meets</b>	<b>Exceeds</b>	<b>Exemplary</b>
<b>Skill level</b>	<b>Score Description</b>	<b>1</b>	<b>2</b>	<b>3-4</b>	<b>5</b>
<b>CS1 (KIM)</b>  <b>Presentation (2%)</b>	The ability to present ideas clearly, effectively and confidently, in both oral, written forms  Oral  Parameters: <ul style="list-style-type: none"> <li>● delivery,</li> <li>● projection (pace, volume, enunciation)</li> <li>● appearance (attire and demeanor)</li> </ul>	Either one parameter is acceptable.	All parameters are acceptable.	Some parameters are exceptional.	All parameters are exceptional.
<b>TS4</b>  <b>FILA form (3%)</b>	<b>The ability to contribute towards:</b> <ul style="list-style-type: none"> <li>● planning,</li> <li>● coordination of the team's efforts</li> </ul> - Peer evaluation	Student is able to contribute towards any one task	Student is able to feasibly contribute towards both tasks.	Student is able to contribute towards both tasks well.	Student is consistently able to contribute towards both tasks excellently.

Table 2: Assessment criteria for algorithms in solving the given problems (Group Assessment)

Criteria	Scoring			
Accuracy / Content Knowledge	5	4	3	2-1
	All algorithms and the usage of tools are presented, executed without error and output appears to be accurate and exceed the expectation.	All algorithms and the usage of tools are presented, executed without error and output appears to be accurate.	Most algorithms and the usage of tools are presented, without error but output appears to be less accurate.	Some algorithms and the usage of tools are presented, executed with minor/major error, resolved with hard-codes, output appears to be accurate.
-Algorithm to resolve Problem 1 2% Brainstorming + 8% Solution				
-Algorithm to resolve Problem 2 2% Brainstorming + 8% Solution				
-Algorithm to resolve Problem 3 (1% Brainstorming + 4% Solution)				
Integration between items (5%)	5	4	3-2	1-0
	The entire system appears to be integrated	Most system appears to be integrated	Some system appears to be integrated with some hard-coding	Minor integration between items 1-10 with hard-coding

## Appendix A

Semester 2 2020/2021

### WIA2005: ALGORITHMS ANALYSIS AND DESIGN GROUP CONTRACT

A team of at most 6 students to

- Declare and identify individual strength
- Identify individual role in the team
- Agreed on meeting time, venue, communication means and approaches to arrives at any decisions
- Develop team / group social contact

Deliverable / To submit

Each member role and contract

Group Leader:

**Contract Item:** As a Team we agree to

• Participation

• Communication

• Meetings

● Conduct	
● Deadlines	
● Conflict	
<b>Clause</b> In any violation of the above, we agree	

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Please ensure that the items in the clause is effective and feasible.

No	Matric No	Name	Team Role	Signature

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(Assessor:

Date Received:

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## Appendix B

FILA FORM – University of Malaya				
FACTS	IDEAS	LEARNING ISSUES	ACTION	DATELINE
What we know about the task		What do we need to find out?		Who is going to do it?
<ul style="list-style-type: none"><li>- The phases or process to develop or model the system</li><li>- Integrate theory and practical</li></ul>	<ul style="list-style-type: none"><li>- To analyze and translated the theory into practical or real scenario</li><li>- To transfer the knowledge and suited with various of industries and provide the solution and improvement</li></ul>	<ul style="list-style-type: none"><li>- Activities and group discussion</li><li>- Find research information through internet or library</li></ul>	immediately	