**Curtin College-Singapore**
ISEN1000 **Introduction to Software Engineering**
**Trimester 2, 2022**

# Exercise Submission 2

Weight: 40% of the unit

**General Information.** Include your name and student ID at the start.

**Timeframe.** You have 14 days (336 hours) to complete and submit your answers, from **09:00am on 16th Sep 2022** until **09:00am on 30th Sep 2022 (UTC+8)**. You may schedule your work however you wish within this period. **However, late submissions are strictly not allowed**.

**Submission.** Submit your answer document to the "**Exercise Submission 2" on Moodle under Exam Week**. You must verify that your submission was successful. Correctly submitting is entirely your responsibility. It is recommended to put all your files in a zip/compressed file for submission (name zip file as: **studentID_Exercise2_ISE**).

**Reference Material.** This is an OPEN BOOK and OPEN COMPUTER exercise. You may refer to any written material, including your notes, course materials, books, websites, Unit Moodle page recordings etc. However:

- You must complete this exercise entirely on your own.
- During the exercise, you may not communicate with any other student regarding the test.
- During the exercise, you may not communicate with any other person in order to seek or receivean answer to any test question.
- Your answer document will be checked by text matching software for signs of cheating,collusion and/or plagiarism.
- The exercise questions have been designed such that any two students, working independently,should not produce the same answers.

**Git Repository Requirements:** Questions 3 and 4 require you to initiate a git repository, please follow the following guidelines in this regard:

- The git repository should be name as "**studentID_Exercise2_ISE**"
- The global git repository (if online) should be private.
- The link for the global repository (if online) should also be submitted.

Hint: Initiate git repository at the start of the exercise submission and add files as you develop.

## Question 1: Planning, and Agile Software Project Management [Total Marks: 20]

Consider the following (Fig.1) 13 nodes AON and along with the Table 1 project descriptions.

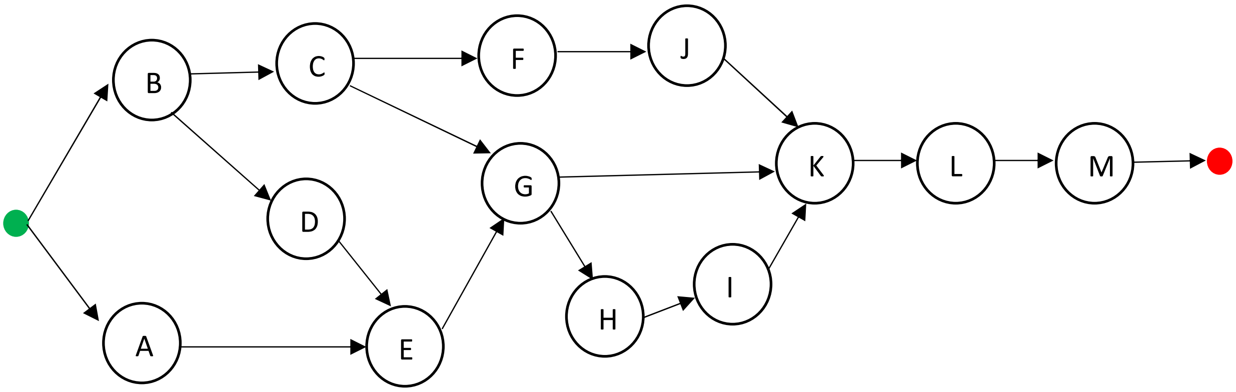


Fig. 1: 12 Nodes AON

Table 1: AON Graph Description

| Sr. | Task | Estimated Duration (weeks) | Dependencies |
|---|---|---|---|
| 1. | A | 5 | - |
| 2. | B | 3 | - |
| 3. | C | 7 | - |
| 4. | D | 15 | - |
| 5. | E | 7 | - |
| 6. | F | 3 | - |
| 7. | G | 5 | - |
| 8. | H | 6 | - |
| 9. | I | 8 | - |
| 10. | J | 9 | - |
| 11. | K | 4 | - |
| 12. | L | 2 | - |
| 13. | M | 1 | - |

A. List the missing dependencies in Table 1. **(1 mark)**

B. Estimate the Early Start (ES), Late Start (LS), Early Finish (EF) and Late Finish (LF) for each task in the AON, present your answer in a tabular form. **(2 marks)**

C. Find out the task(s) which have slack time, and clearly mention the slack time of each identified task in tabular format. **(2 marks)**

D. Show your complete working (make a PERT chart) on estimation of overall optimistic project duration, along with critical path estimation. **(2 marks)**

E. You project is in at week 9 and you are using Scrum based project management, there is a sprint in 2 weeks, where client wants to add three activities (say N, O, P, in WBS) as backlog, what necessary action would you consider in this case, and describe the responsibilities of each team to deal with the situation **(4 marks)**

F. You take has completed activity “H” by week 20 and all dependencies of “H”. However, all other activities are not complete. Estimate actual performance on the Burn-up Chart and describe the overall project progress in text. **(4 marks)**

G. Show a Kanban Board when both

1. “G” and “H” are under review and “I” and “J” are done/completed with all dependencies. **(3 marks)**
2. When activity “K” and “L” are under review. **(2 marks)**

## Question 2 is on Next Page

## Question 2: Functional and Non-functional requirements [Total Marks: 20]

Consider the following applications need to be automated with the help of a software:

1. Online Food delivery application.
2. Mobile group chatting.
3. Online application for room booking.

Select any two of the above applications and

A. Identify at least three stakeholders and three actors for each application (human/non-human). **(3 marks)**

B. Write one user story for each identified actor for (particular application). The user stories should be significantly different from each other. **(3 marks)**

C. Pick any two user stories from part B and give a full use case description for the selected user stories (considering them as functional requirements). The use cases must include 2 extensions for each use case. **(6 marks)**

D. Identify which one would be the best reliability metric (MTTF, MTBF, ROCOF, POFOD or Availability) for each identified user story in part B. Justify your answer by providing the reasons. **(4 marks)**

E. Identify 3 usability requirement for 3 user stories (select any 3, from part B) **(4 marks)**

## Question 3 is on Next Page

## Question 3: Unit Testing [Total Marks: 25]

*Following considerations should be made while answering this question

- Name the file (python file) appropriately e.g., “MyCalculator.py” (for a calculator software)
- Name the functions appropriately e.g., “MySum” (for sum operation)
- All code should be executable on college provided VMWare based Linux environment.
- **This question uses the git repository follow the guidelines.**

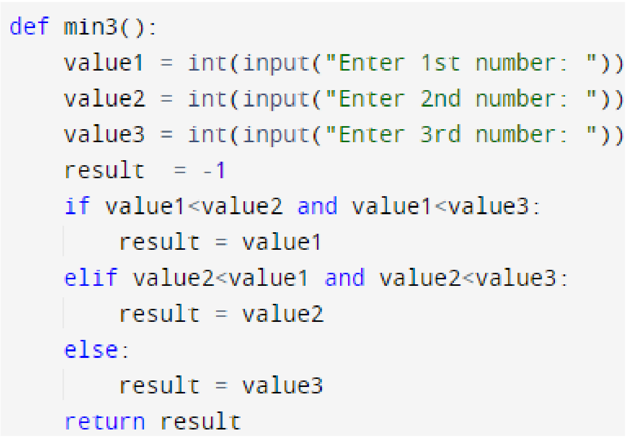
A. Design a black box test (making table for all test cases) for the Equivalence Partitioning testing and write equivalent Python based test code. **(7 marks) [submit the test code as python files]-Production code provided (see codes folder Q3PartA.py).**

A function takes four integer inputs (num1, num2, num3, num4), and returns the sum of squares of four numbers if the numbers meet the basic requirement and 0 otherwise. The basic requirement is, if num1 is equal to num2 or num3 is equal to num4, the result is sum of squares of all numbers.

B. Design a test for the following for the Boundary Values Analysis (BVA) testing and write equivalent Python based test code. **(5 marks) submit test code as python files] - Production code provided (see codes folder Q3PartB.py)**

A function estimates the fight length (in Kms) of an airplane based on the amount fuel (input F). If the amount of fuel is less than 25 output is -100, if the fuel amount is less than 50 the output is 500, if fuel is less than 70 output is 650, if fuel amount is less than 80 output is 750, if the fuel amount is less than 95 output is 850, if the fuel amount is less than 115 output is 1000, if the fuel amount is up to 125 output is 1200, if the fuel amount is greater than 125 output is -100.

**B.** Consider the following python code to read a python code to find the smallest of 3 numbers, develop a test design for white box testing. **(7 marks) [Production code is provided with question (see codes folder Q3PartC.py), submit both test code and edited code (if any)]**



```
def min3():
    value1 = int(input("Enter 1st number: "))
    value2 = int(input("Enter 2nd number: "))
    value3 = int(input("Enter 3rd number: "))
    result  = -1
    if value1<value2 and value1<value3:
        result = value1
    elif value2<value1 and value2<value3:
        result = value2
    else:
        result = value3
    return result
```

D. Implement your test design in parts A, B and C using python (unittest) modules, run show the screenshots in the report and submit the implemented python codes. **(6 marks) [ Hint: Convert the codes in class-based implementation.]**

***The online uploaded codes should be a private repository.**

## Question 4 is on Next Page

## Question 4: Modularity [Total Marks: 20]

*Consider the provided code file (**Q4.py**) with the exercise document and perform the following on the provided code. **This question uses the git repository follow the guidelines.**

A. Identify the modularity issues in all functions, list (make a table, see example below) the function name, identified issue, category of issue, comments on how it is an issue, proposed solution. **(5 marks)**

Table 2: Example details expected

| Sr. | Function name | Identified issue | Category of issue | Comments | Proposed Solution |
|---|---|---|---|---|---|
| 1. | Func_1 | Global variables used | Coupling issue | The global variables increase the dependency of Func1 and Func3 | Remove global variables by parameters |

A. Demonstrate how the flag(s) used in the code provided are affecting the modularity, what specific kind issues are introduced using flag(s) in the code. **(5 marks)**

B. Refactor the code provided by remove the modularity issues identified in part A. change all functions and function calls in main function and other functions in the code. **(7 marks)**

C. Use version control to put all files initial and refactored file, making sure to meet the basic functions after refactoring (code running after refactoring) **(3 marks) [provide the git repository and online git link (if uploaded to global repository i.e., online)]**

***The online uploaded codes should be a private repository.**

### Question 5 is on Next Page

## Question 5: Ethics and Professionalism [Total Marks: 15]

For each of the following sets of software systems:

- Pick one of the systems listed.
- Pick one general area of software engineering from among the following: planning, functional requirements, non-functional requirements, project management, and testing.

  (Your choice here should be different for parts A, B and C)
- Describe a specific way in which a lack of professional conduct in this area, for this system, could lead to a harmful outcome.

Note: marks for this question will depend on the specificity (degree of detail) and plausibility of your answers. You will not receive marks for rewriting examples already given in the unit material.

A. Pick one from the following: **(5 marks)**

   a. Online student record management software

   b. Online booking software for park rides

   c. An online software for tracking cars (for security)

B. Pick one from the following: **(5 marks)**

   a. An online file sharing server

   b. Online video calling software

   c. Rideshare booking app

C. Pick one form the following: **(5 marks)**

   a. COVID immunization record management software

   b. Restaurant food booking app

   c. Online learning management software (e.g., Moodle).

## Submission Guide on Next page

## Submission Guide

Consider following for submission for this assessment

1. Main word/Pdf document consisting of answers for all questions (i.e., report)
2. Submit all figures, image, screenshots, graphs, and charts
3. Submit all production and test cases, also git repository (both local, global (if any, as link of repo))

## Use of Git VCS

Make one folder for complete assessment, put everything in that folder and initiate a git repository in the same folder. Add (stage) all files (specifically codes), make commits when required (specifically for code). Zip/compress the main folder including all files and git repository and submit the zip/compressed file on Moodle page.

## Academic Integrity

Please see the Coding and Academic Integrity Guidelines on unit Moodle page.

In summary, this is an assessable task. If you use someone else's work or assistance to help complete part of the assignment, where it's intended that you complete it yourself, you will have compromised the assessment. You will not receive marks for any parts of your submission that are not your own original work. Further, if you do not reference any external sources that you use, you are committing plagiarism and/or collusion, and penalties for academic misconduct may apply.

Curtin college also provides general advice on academic integrity at https://www.curtincollege.edu.au/content/dam/navitas/upa/curtin/pdfs/academic-integrity-policy.pdf

The unit coordinator may require you to provide an oral justification of, or to answer questions about, any piece of written work submitted in this unit. Your response(s) may be referred to as evidence in an academic misconduct inquiry.