



Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Final Examination
Year 1, Semester 2 (2022)

IT1060— Software Process Modeling

Duration: 02 Hours

June 2022

Instructions to Candidates:

- ◆ This paper has four questions.
- ◆ Answer all questions in the booklet given.
- ◆ The total marks for the paper are 100.
- ◆ This paper contains seven pages, including the cover page.
- ◆ Electronic devices capable of storing and retrieving text, including calculators and mobile phones are not allowed.

Question 1 **(40 Marks)**

Flinders Learning Online, or "FLO," is an online platform created by Flinders University in South Australia. The main goal of FLO is to make the online application process at Flinders University as simple as possible. Analyze the partial case study given below and answer the subsequent questions.

Any user can access the FLO and apply to universities. He or she can also look into programs that categorize into the categories of undergraduate, postgraduate course work, and postgraduate research. He or she can choose the program in which she or he is interested while applying. If the desired program is not available, the system will propose similar programs offered by other universities. In addition, users can review the payment guide when applying to the university, which is divided into native and international categories. They might also look for scholarships based on the program and nationality as part of the application process.

Furthermore, a registered user can submit their application on their own, and the system will validate it based on the basic facts established by Flinders University. If the data is incorrect, the system will send an automated generated email requesting resubmission. However, if the deadline has passed, the application will be archived for the next intake. If the application is acceptable, it will be forwarded to the Flinders Board, which will issue a conditional offer letter depending on the University's requirements. In addition, the generated conditional letter will be directly uploaded to the FLO and accessible by the registered user.

Registered user can access final offer after one week time, when generating the final offer system will automatically redirect to the payment option. Payment can be made via credit card or can upload the telegraphic transfer receipt. When making the payment, if registered user already in student Alumni, Alumni scholarship will be considered regardless the nationality of the user.

For various reasons, a registered user can start a program online (remotely). Students must submit a photo for one card to begin the program. The system will check one card photo submission as a pre-requisite when registering online. Additionally, the system will request confirmation of the payment confirmation. After then, refund policies will no longer be considered standard operating procedure. International students must disclose their VISA status when they begin the program. Already submitted visas, already stamped visas, and stamped and inland visas are all acceptable visa statuses.

A registered agent can schedule an appointment with a campus-based visa counselor. He might also inquire about the scholarship for applicants. Then system will ask to upload the selected CV for the FLO portal. Furthermore, a registered agent has the same rights as a registered user. For purposes of integrity, the university's administrative staff handles agent registration.

Draw a Use Case Diagram with appropriate assumptions.

Question 2 **(20 Marks)**

- a) The Sri Lanka Police Department proposed "ISAKA" software system to monitor traffic offenses and unethical behavior. Your team has taken on this project to create a project plan that includes a full description of the budget, resources, constraints, schedule, and applicability of such a monitoring system.

Read the given scenario and write the answers to the questions.

The Department of Police aims to create a real-time road monitoring system that employs CCTV systems to identify traffic offenses and alert officers to the nearest police station within a short amount of time, in response to an increase in traffic violations and shady behavior.

During the initial discussion with the Ministry of Defense, the authorities requested a real-time monitoring system to help police departments 24 hours a day, seven days a week, which will significantly improve current operations.

The team has come up with a first draft that highlights two possible alternative solutions for monitoring the locations. The team suggests a high-speed fiber connection connectivity with police departments as the first solution, with CCTV footage being promptly transmitted to the nearest police station. As a result, the monitoring team will be able to see them on the system dashboard. To boost the transfer rate and enable real-time transmission, the second potential method is to use satellite transmission for data transmission. To enable secure communication, all these devices must be connected through a private VPN channel.

- I. Make a list of the three most critical non-functional requirements based on the above and briefly explain why you chose them.

(06 Marks)

- II. What is the most appropriate life cycle model for developing applications as above? Justify your reasoning.

(04 Marks)

- b) "Agile is more practical than traditional life cycle models" justify this statement based on your knowledge on traditional life cycle model.

(05 Marks)

Question 2 **(20 Marks)**

- c) "Spectrum Overseas" is a software development firm that uses an agile project management methodology. The SCRUM team was given an 8-day deadline to complete the project "Alphonic." Six software engineers and three testers make up their team. On the JIRA board, the opening day's effort was shown as 287 manhours per day. Calculate the Alphonic's burn down velocity?

(05 Marks)

Question 3**(20 Marks)**

- a) "Annoex" is a Learning Management System that incorporates smart learning options to accommodate a variety of target audiences, including toddlers, teenagers, and differently abled children of various ages. The development team has agreed to create a design model utilizing relevant tools and languages prior to implementation. Answer following questions in relation to the scenario given.
- I. What are the goals of creating a design model before implementing "Annoex", and how important it is in this type of project? (08 Marks)
- II. Briefly explain the object-oriented design approach. (05 Marks)
- III. Briefly describe the requirements imprecisions (03 Marks)
- b) "**SRS**" is known as **black box specification in the system**" Justify your answer using some examples. (04 Marks)

Question 4**(20 marks)**

"Next" is a clothing manufacturing firm with a workforce of 1000 people. On the company's 40th anniversary, the management has chosen to pay an additional incentive to employees who have worked for more than five years at the Junior Executive and Senior Executive levels. The bonus is determined by the number of years of service and the position held. It is a percentage of the employee's base salary. For the above-mentioned positions, the minimum age for recruiting is 30 years, and all employees should retire at the age of 60. Employees in the same position earn different starting salaries depending on their years of service.

You may see an approximate salary breakdown based on the employees' years of service.

Junior Executive

Service Years	Basic Salary	Bonus Rate
$5 \leq X \leq 10$	75000	30%
$10 < X \leq 25$	200000	20%
$X > 25$	350000	10%

Senior Executive

Service Years	Basic Salary	Bonus Rate
$5 \leq X \leq 10$	200000	40%
$10 < X \leq 25$	400000	30%
$X > 25$	550000	20%

To claim this bonus, employees must enter their employee ID and select the number of years of service (decimal points are not considered) and the designation from a drop-down list.

Employee ID have 4 digits (numbers) given based on the sequence of recruiting to the company.

For Example: 0001-1000

Question 4**(20 Marks)**

- a) Draw a diagram showing equivalence partitions and boundary values that ensure all input values are tested for the system. Clearly mention the values.

(10 Marks)

- b) Write 10 Samples test data to check the format and the correctness of the user entered data to the above system. Use the below format.

(10 Marks)

Employee ID	Service Years	Designation	Expected Test Results	Reason of Invalid
-------------	---------------	-------------	-----------------------	-------------------