



Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Final Examination
Year 1, Semester 2 (2024)

IT1060– Software Process Modeling

Duration: 02 Hours

June 2024

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 is preceded by a 10-minute reading period. The supervisor will indicate when answering may commence.
- ◆ This paper contains eight 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)

“Mondy Car” is one of the popular car rental companies in Sri Lanka. Renting vehicles plays a higher role in rural areas like Dambulla, Anuradhapura, with higher demand and the development of hotels and tourism. Therefore, directors at “Mondy” have decided to implement a mobile application that serves all of Sri Lanka. analyze the partial requirements of the “Mondy.” And answer the subsequent questions given.

Any user can download the mobile application and search for vehicles available in their preferred area. Also, if they prefer, they can check the price plan for selected vehicles. Also, users can rent a car using the mobile application.

The renting process can be divided into two processes: normal renting and loyal renting. When loyal members rent a vehicle, the system will calculate loyalty points for each rental. When renting a car, if it is for an unregistered user, the system needs a loyal user’s recommendation to proceed with the rental process.

When renting, the system will check the background and ask to keep the deposit to proceed regardless of the user. When checking the background details, if the system identifies any issues, rental requests will be rejected by the system. Moreover, when checking the background, the system will request to upload the NIC image. For any foreign users who need to rent vehicles, they must upload the passport bio page instead of the NIC image. If they want to become loyal users, they need to register with the system by providing personal details and renting history of two. Any user can rent a maximum of one vehicle.

Loyal users can recommend users to the system. Also, he or she can rent multiple vehicles, which he or she can do using his or her loyalty points. Also, loyal members can claim discount suggestions that appear on the system. Furthermore, he or she can make comments, suggestions, or feedback regarding renting a car. Also, they can do everything that normal users do.

Moreover, any car owner can register his or her vehicle for rent. When registering, each owner must submit the valuation of the car and an ownership-proven document to the system. The system will validate the ownership documents with the motorcar department using a third-party system. Registering a vehicle can be divided into luxury, semi-luxury, and normal vehicle categories. As part of the registration process, the system will suggest monthly rent for the owner. If the owner accept it, owner can proceed with the account details submission and e-contract signing.

Furthermore, the operational manager can generate reports through the system. Also, he can check the feedback and suggestions of the loyal users and respond to them through email if needed. Also, he can perform all the tasks that loyalty members do.

- a) Draw a Use Case Diagram with appropriate assumptions. (37 Marks)
- b) State three non-functional requirements relevant to the given system. (1.5 Marks)
- c) State any assumptions that you made in the above scenario. (1.5 Marks)

Question 2

(20 Marks)

- a) Describe the differences between plan-based development and modern software development.

(04 Marks)

- b) "Many companies move from traditional development to modern software development to develop high quality, highest value products within the shortest period of time." Do you agree or disagree? justify your answer.

(04 Marks)

- c) "SRS is black box specification." Do you agree or disagree? Justify your answer.

(04 Marks)

- d) State maintenance types available under software maintenance and explain each using an example.

(04 Marks)

- e) State differences of the black box testing and white box testing in software testing.

(04 Marks)

Question 3

(20 Marks)

GVSS (Global Visa Support Services) is a worldwide third-party service specialist that manages non-judgmental administrative tasks for embassies of different countries to carry out their visa related tasks efficiently. Biometric Submission (BS), Medical Submission (MS) and Passport Transmission (PT) are few service types that they provide on behalf of an embassy. To avail of these services, applicants are required to make payments corresponding to the specific service requested. Below shows a UI of the software system implemented to calculate and display the payment amount based on several parameters and conditions.

The screenshot shows a mobile application interface. At the top, there is a header bar with the text "GLOBAL VISA SUPPORT SERVICES". Below the header, there are four input fields: "Passport Number" (with a placeholder "Scan QR code or enter number"), "Visa Type" (dropdown menu showing "Student Visa (SV)", "Work Visa (WV)", and "V1- Visitor Visa (V1-VV)"), "Age (Y)" (text input field), and "Service Type" (dropdown menu showing "Biometric Submission (BS)", "Medical Submission (MS)", and "Passport Transmission (PT)"). At the bottom, there is a large red button labeled "Calculate Service Charge".

Figure 1

The screenshot shows a "Medical Submission" form. It has two sections: "Medical Request Received?" (radio buttons for "No" and "Yes", with "No" selected) and "Enter Medical Request Number" (text input field containing "MED-SL-006").

Figure 2

The passport number will be obtained by scanning the passport and directly input into the application. Consequently, the validity of the passport number is not verified in this process. However, the other parameters are validated based on the following criteria.

At a time, an applicant can request only one service type and the services can be avail in the given sequence (First BS, secondly MS, lastly PT) and this sequence will not be checked in this testing scenario.

An applicant for a V1 - Visitor visa must be within the age limit of 0 – 5 years old while an applicant for Student Visa could be within the age limit of 6 years to 50 years old. Work visa applicants must meet a minimum and maximum age requirement of 20 years and 70 years respectively. Age parameter will accept only integer values.

Applicants of age less than 8 years are exempt from Biometrics submission regardless of the visa type. Also, since they are not required to do a full medical examination, they will be charged only Rs. 3000/= for medical submission. All the other applicants who are above 7 years old must submit Biometrics and full Medical sequentially. Applicants who have paid the biometric submission fee will be exempt from the passport transmission fee, as it is already included in the biometrics fee. Applicants who are exempt from biometric submission will be required to pay the full passport transmission fee upon availing of this service.

Those who request medical submission service will be required to enter the Medical Request Number as shown in Figure 2, only if they have received the medical request from the embassy. Otherwise, they can simply select the option “No”. Medical request number format should be as follows:

MED-SL-<Three-digit number>

E.g. MED-SL-006

After obtaining the values for all the relevant parameters the system will calculate the payment amount based on the requested service type. Fee structure for each Service type is shown below.

Service Type	Fee
Biometric Submission	Rs. 8000/=
Medical Submission (full)	Rs. 10000/=
Medical Submission (age less than 8)	Rs. 3000/=
Passport Transmission	Rs. 5000/=

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

(10 Marks)

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

Test Case ID	Input/s	Expected Test Results	Reason of Invalid

(10 Marks)

Question 4

(20 Marks)

The following question is based on the modern development approaches. Read the given questions and write down the answers for Part A and Part B.

Part A

"Spotify" is a well-known software development firm that provides various services to the entire world while adhering to modern software development practices. The brilliant group "Verox" on "Spotify" creates programs that help those suffering from dementia. Thus, to launch their marketing campaign, "Verox" needs to finish the 2169 workload in one sprint, and they have only one month.

- I. Calculate the ideal burn-down velocity for the given sprint.

(04 Marks)

- II. Briefly explain what "Verox" must do in Sprint planning.

(06 Marks)

- III. The sample of actual remaining man hours at the end of each day in the first week is given below. Analyse the actual burndown velocity and comment on the following:

Day	1	2	3	4	5	6	7
Remaining work - man hours	2160	2100	2000	1950	1850	1790	1700

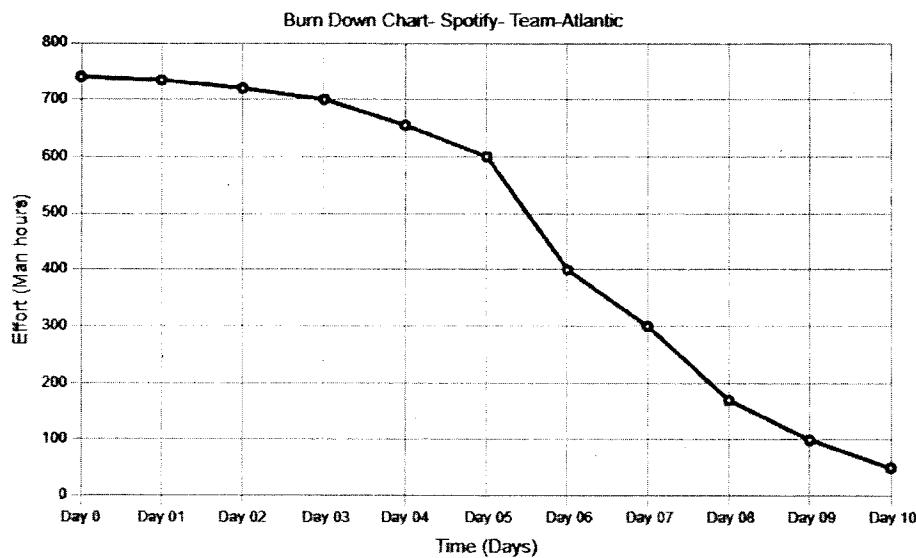
Most performed day

Least performed day

(04 Marks)

Part B

"Atlantic, "another team that performs every year with their high-quality products, faces difficulty in developing an ADHD intervention system in recent development. Analyze the burn-down chart given below and answer subsequent questions.



- I. Calculate Ideal burn-down velocity?
(02 Marks)
- II. Maximum actual velocity and performance was/were reported on ----- Day/s.
(02Marks)
- III. Minimum actual velocity and performance was/were reported on -----Day/s.
(02Marks)

~~~End of the Paper~~~