Assignment 2

Course: IN3240/4240 Software Testing

Delivery format: one pdf file *

Delivery Info: Required to work in groups of 2-4

Assignment deadline: **Friday 01.05.2026** kl. **23:59**

Introduction:

A public transport company is developing a new version of an existing computer system, called *A Ticket Machine*. The new system, which will be developed in Java, will replace the old one and have the same functionality, but the old graphic user interfaces will be replaced by new and better ones with touch screens and digital card readers.
Although the system is called "A ticket machine", the system consists of three modules, one for the ticket machine where travelers can buy different kinds of tickets and travel cards, a second module for ticket control and a third module for administration purposes. However, you will only be involved in the testing of the first two modules.
You will now contribute to the planning of the various test activities related to the ticket machine and the control module, including test analysis, test design and test implementation. The specification constitutes the test basis and is the only system information you have access to.
The test basis may contain weaknesses, ambiguities or deficiencies that may require you to make your own assumptions. If so, explain these.

It is important to **read the assignment carefully and perform the tasks as described**.

*You are welcome to participate in the same group as you did in the first compulsory assignment. If you did not join a group last time and would like to join a group now, please contact one of the seminar teachers.

If you are able to form the group with all members on Devilry's group function - deliver the task as usual.

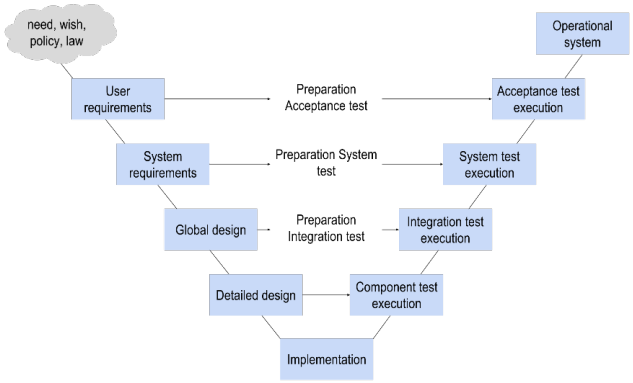
If you are not able to form the group with all the group members (because the members belong to different versions of the course) - let only one group member submit the assignment. However, all the members must write a message in the comment field in Devilry with information about the other members of the group, i.e. the names, usernames and course codes.

- Indicative length of the assignment: Approximately 2000 words, or what you need to answer the questions in the assignment.

1 System under test – A Ticket Machine



Ticket Machine



V-model

A public transport company is developing a new version of an existing computer system. The new system, which will be developed in Java, will replace the old one and have the same functionality, but the old graphic user interfaces will be replaced by new and better ones with touch screens and digital card readers.

The system consists of three modules, one for the ticket machine where travelers can buy different kinds of tickets and travel cards, a second module for ticket control and a third module for administration purposes. However, you will only be involved in the testing of the first two modules.

You will now contribute to the planning of the various test activities related to the ticket machine and the control module, including test analysis, test design and test implementation. The tasks are described in more detail in Section 5. However, you should read the system specification carefully before answering them.

The specification constitutes the test basis and is the only system information you have access to. The test basis may reveal weaknesses, ambiguities or deficiencies that may require you to make your own assumptions. If so, explain these.

2 The system specification

Development model: The V-model.

Requirements

The ticket machine module:

The traveler shall be informed about

- payment information
- ticket prices
- ticket conditions

The traveler shall be able to buy

- a rechargeable travel card
- a 7-day ticket
- a 30-day ticket

A traveler with an existing travel card shall be able to

- recharge the travel card with a self-selected amount of money.
- check the balance of the card.

The control module:

A traveler with a rechargeable travel card should be able to

- register a trip, if the trip has not already been registered within the last hour. When the trip is registered, the system shall reduce the balance of the card with the cost of a trip.
- get a ticket valid for one hour after registration. It should be possible to make multiple trips within one hour of registration.
- get information about expiration time.
- get information about the balance of the card.

All travelers shall be informed about

- whether the ticket is valid or not
- the ticket expiration date

Ticket prices and discounts

Ticket prices and discounts will be set in the administration module. However, you are **NOT** involved in testing the administration module.

For test purposes you can use the following ticket prices:

Ticket prices

	Single trip*	**7-day ticket**	**30-day ticket**
Adults	42 NOK	352 NOK	897 NOK
Children	16 NOK	177 NOK	314 NOK
Students	30 NOK	177 NOK	537 NOK

* The price for a single trip using a travel card.

The discounts only apply to travelers with a travel card. For test purposes you can use the following discounts:

Discounts

	Adults	**Children**	**Students**
Monday–Friday	0%	0%	0%
Saturday and Sunday	30%	100%	50%

3 User interaction – The ticket machine

The ticket machine module will be described as the interaction between the user and the system:

State 1: Start window The traveler can choose one of two options:

- Buy a ticket or a travel card, specifying child, adult or student. The system goes to state 2.
- Recharge an existing travel card. The system goes to state 3.

State 2: Window for choosing the type of ticket or travel card The traveler can choose one of three options:

- Travel card. The system goes to state 5.
- 7-days card. The system goes to state 6.
- 30-days card. The system goes to state 6.

State 3: Window for reading a travel card The traveler holds the travel card in front of the card reader so that the card is read. If the system is recognizing the card, the system goes to state 5. If the system does not recognize it or the card, for any reason, is not valid, the system goes to state 4.

State 4: Window for displaying an error message The system displays the error message "Unknown card" on the screen.

After a few seconds, the system goes back to the start window, state 1.

State 5: Window for making deposits to the travel card The traveler enters the amount he/she wants to deposit to the card.

The system goes to state 6.

State 6: Confirmation window Information about what is purchased and what is payable is displayed on the screen. The traveler can choose one of two options:

- The traveler confirms the purchase, by pressing the confirm button. The system goes then to state 7.
- Cancel: The traveler cancels the transaction by pushing the cancel button. The system goes the back to the start screen, state 1.

State 7: Payment window The following message is displayed on the screen:

"Insert you credit card".

Although not mentioned in the description above, all windows will have a cancel button.

4 User interaction – The control module

The control module will be described as the interaction between the user and the system. Travelers with a 7-day or 30-day ticket do not need to register the trip. However, the control module can be used to display expiration time.

State 1: Window for reading a ticket or a travel card The traveler holds the ticket or the travel card in front of the card reader so that it is read.

If the system is recognizing the ticket or the travel card, the system goes to state 2. If the system, for any reason, does not recognize the ticket or the travel card, the system goes to state 5.

State 2: The system checks the expiration time For 7-day or 30-day tickets: If the time is before the expiration date, the system goes to state 4. If not, the system goes to state 5.

For travel cards: If it is less than one hour since the last registration, the system goes to state 4.

If there is one hour or more than one hour since the last registration, the system goes to state 3.

State 3: The system checks the balance of the travel card If the balance is above or equal the cost of the trip, the balance will be reduced by the cost for the trip. The system then goes to state 4.

If the balance is below the cost of the trip, the system goes to state 5.

State 4: Information window The system will show information about expiration time for both tickets and travel cards.

For traveling cards, the cost of the trip and the balance of the card will also be displayed.

After a few seconds, the system goes back to state 1.

State 5: Error message window The system displays an error message on the screen with the following message: "The card or ticket is not valid. You must pay before entering".

After a few seconds, the system goes back to state 1.

5 Specification of tasks

Task 1

The developing model for the Ticket Machine is the V-model. Describe how the system under test can be tested at the different test levels in the V-model and how the test activities are related to the ISTQB's seven test principles. Be as concrete as possible.

Task 2

Analyze the test basis and identify as many test conditions as possible, at least 10. The test conditions should be placed in a priority list according to their severity, in descending order.

Which test strategy and/or test approach did you use to identify the test conditions? Explain your choice of severity of each test condition. (It is possible to use more than one strategy or approach).

Task 3

Use Blackbox test design techniques to design the test cases.

For each test case:

- Explain how you have used the technique to derive and design the testcase.
- Ensure traceability to the correct requirement in the requirements specification.

You don't need to design/implement all possible test cases, only the most important ones. Nevertheless, you should try to use as many different test techniques as possible, preferably at least one test case pr. type of technique.

Task 4

To what extent will it be possible to measure test coverage based on the test cases you described in assignment 3? Which categories of test items did you use in the calculation of the test coverage?