Gruppe 4 - IN3240/IN4240

Uke 16

Plan for dagen

eksamensoppgaver

Decision tables

Part 2 - Decision tables

NB! In this task, you can answer both in the word processor and possibly with sketches/drawings. In that case, use the sketch paper that has been handed out to you in the exam room. See instructions under the taskbar.

Several positions as associate professor in information technology are to be announced at a university in Norway.

In the announcement text, the following requirements for the applicant have been set:

- The applicant must have a PhD within the relevant subject area.
- The applicant must be able to document pedagogical competence at university level.
- The applicant must have language skills in Norwegian, equivalent to level B2 (the so-called Bergen test).

In order to streamline the processing of applicants, a computer program will be used to filter out the qualified applicants, as well as applicants who are qualified based on given conditions. Both those qualified and those who are conditionally qualified will then be called for an interview.

- Applicants who meet all three requirements are qualified.
- Applicants who cannot document pedagogical competence at the university level, but who meet the other two requirements, are qualified provided that they pass a course in university pedagogy within two years.
- Applicants who cannot document sufficient Norwegian skills, but who meet the other two requirements, are qualified provided that they pass the Bergen test (level B2) within two years.
- Applicants who do not fall under any of the points above are not qualified and should be rejected immediately.

In connection with the development and testing of the computer program that will process the applications automatically, you are to use decision tables to select use cases to be run during the system testing of the program.

a) Draw a decision table that shows all possible combinations of requirement fulfillment in the application. The decision table should include an action part that shows the outcome of the application, based on the points above.

b) Reduce the number of rules in the decision table as much as possible without losing information. Explain how you made the reduction.

c) Consider the following three different use cases:

- Applicant with a PhD within the relevant subject area, documented pedagogical competence, and sufficient language skills.
- Applicant with a PhD within the relevant subject area, but without documented pedagogical competence, and who also lacks sufficient Norwegian skills.
- Applicant with documented pedagogical competence, and sufficient Norwegian skills, but with a PhD outside the relevant subject area.

Do we need more use cases to achieve full decision table coverage? If yes, specify the use case(s) and the rule(s) in the decision table they represent.

d) It turns out that the number of applicants for the positions is very high. To reduce the number to be called in for an interview, the department is considering adding an additional requirement:

- Only applicants with a minimum of two years of teaching experience at the university level will be considered.

How many possible different combinations of requirements fulfillment do we get in the decision table now (*before* any rule reductions)?

e) Decision tables are considered a test design tool. However, they are suitable for more than designing use cases. Where in the software life cycle are decision tables a good tool to ensure the foundation on which the program is to be built, and what is this form of testing called?

The interaction between the user and the ticket machine module was described as follows. (For practical reasons, the interaction is somewhat simplified in relation to the compulsory assignment.)

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

a. *Buy a ticket or a travel card. The system goes to state 2.*
b. *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 two options:

a. *Travel card. The system goes to state 5.*
b. *30-days ticket. 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 returns to the start screen, 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:

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

State 7. Payment window.
The following message is displayed on the screen:
"Insert you credit card".

State transition

a) Draw a state transition diagram that cover all the states and transitions.

b) Consider following use case:

" The traveler chooses to recharge an existing travel card. The system recognizes the card, and the traveler chooses to deposit 100 NOK, and then confirms the purchase."

Write down the path through the state transition diagram representing the use case.
What is the state coverage and transition coverage for this test case?

c) Is there a path through the state transition diagram that provides 100% state coverage? If there are multiple paths of different lengths that all provide 100% state coverage, choose the shortest.

d) What is the transition coverage of your path in point c).

e) How many use cases do we need to achieve 100% transition coverage?
Write down the relevant path(s) through the state transition diagram that represents the use case(s).

f) If a use case has 100% transition coverage, is it then possible to determine what the state coverage is? Justify your answer.