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Eksamen i 45160 Systemering 1 — engelsk versjon

Exam in 45160 Software Engineering 1

Friday May 28, 1992

09:00am – 01:00pm

Hjelpemidler: Ingen trykte eller skriftlige hjelpemidler tillatt.
Godkjent lommekalkulator tillatt.

Approved calculator allowed.
No printed or handwritten material allowed.

Answer briefly and concisely!

Oppgave 1, Conceptual models (15 %)

a) (10 %) What is a conceptual model, and how are they used when developing information systems?

b) (5 %) User involvement in information systems engineering is today considered very important for ensuring a satisfactory quality of the final product. Discuss how conceptual modeling languages should be designed and used to increase user participation in development projects!

Oppgave 2, Modeling (50%)

In the appendix there is a description of the banking system in **Palassbanken**. Answer the questions below with reference to this description! You can make your own assumptions where the description is not sufficiently detailed, but remember to write down the assumptions you make.

a) (20 %) Construct data flow diagrams that describe the functionality of the system!

b) (10 %) Model the static aspects of the systems by means of an Entity Relationship model!

c) (20 %) Given the following rules for deciding the loan amount that the bank should offer the customer:

If the customer is classified as bad, she is not be offered any loan. If she is classified as neutral, her total amount in loans must not excede the sum of her income and savings. A good customer can be granted a loan as long as her total loans are lower than or equal to her savings plus twice her income. If the amount requested by the customer does not lead to any violation of these rules, she is to be offered the requested loan amount. Otherwise, the bank should offer the largest amount possible without violating the rules.

Assume that the rules above constitute the process logic of one of the processes in the data flow diagrams in a), and specify this logic as a decision table, as structured English, and as a PLD diagram (PLD is one of the sublanguages of PPP)!

Make a comparison between these three techniques (decision tables, structured English, and PLD diagrams) with respect to user friendliness and expressiveness!

Oppgave 3, Petri-net (20 %)

Figur 1: Petri-net.

a) (10 %) Figure 1 shows a Petri-net. Explain what will happen if transitions t1 and t2 fire once each, one just before the other! Does it matter which transition fires first? Note that place P3 initially has one token.

b) (5 %) How can the information in a data flow diagram be translated to a Petri-net? Illustrate by means of a small example how this can be done!

c) (5 %) To what extent is it possible to translate a Petri-net to a data flow diagram? Explain the translation principles, and state any assumptions which have to be made!

Oppgave 4, Object-oriented approach (20 %)

a) (10 %) Describe shortly the most important characteristics of the object-oriented approach to information systems analysis and design!

b) (10 %) Compare the concept 'object' of the object-oriented approach with the concepts 'process' and 'entity' of structural analysis/structural design with respect to the meaning of the concepts!

Appendix — a description of Palassbanken's banking system

*A customer of this Palassbanken can have several accounts and loans registered. She is identified by an id, but the bank also keeps her name, address, and classification. The classification is the bank's judgement of the credibility of the customer, and is assigned one of the values **good**, **neutral**, or **bad**. The account has an identifying number, a balance, and an interest rate, while a loan is characterized by a loan id, interest rate, terms of payment, and balance. Associated with the loan is a payment plan that says how the loan is to be paid back in terms of smaller regular payments. Loan applications specify the requested loan amount and the customer's current salary, and there will be one application for each loan granted a customer. Transactions on the customer's account contain informations about the transaction id, the amount to be deposited or withdrawn, the date, and the transaction type (either **deposit** or **withdrawal**).*

For the customer to be given a loan, she must have an account in the bank. Another restriction is that the balance of the account must never be negative.

There are three functions in the systems:

- *The user can apply for a loan,*
- *she can open an account, and*
- *she can deposit and withdraw money.*

*Applying for a loan, the customer must first have opened an account in the bank and cannot have been classified as a **bad** customer. The requested loan amount is compared to her salary, current loan, and current bank account balances, and the bank may offer either the requested loan or a somewhat smaller loan.*

*If the customer is to open an account for the first time, she must also be registered and given an initial classification as a **neutral** customer. If she is already registered, the new account is just added to the list of bank accounts.*

The customer may deposit or withdraw money by sending a transaction to the system. If the transaction is valid, i.e. the given account exists and the given name is identical to the account's owner, the system will update the account and afterwards issue an account statement to the customer. As previously indicated, though, a withdrawal is only accepted if it does not lead to a negative balance.