

Level: 2nd Year of Bachelor's Degree in Computer Science (2024/2025)

Module: Information Systems

Exercise Series No. 2

Exercise 1:

During the summer vacation, we organize each weekend as follows:

- If the weather is nice, the sea is warm, and there are no big waves, we go to the beach and swim.
 - If the weather is nice and the sea is not warm, we go to the beach and sunbathe.
 - If the weather is nice and there are big waves, we go to the beach and sunbathe.
 - When the weather is bad, we stay at home.
1. Establish the decision table for this weekend program.
 2. Compress this table.
 3. Convert this table into a decision tree.
 4. Translate this table into a pseudo algorithm.

Exercise 2:

On the occasion of El-Aid, a company has decided to help its workers according to the following rules:

- Single workers receive a subsidy of 3000 dinars.
 - Married workers receive a subsidy of 10,000 dinars.
 - Divorced workers receive a subsidy of 5000 dinars.
 - If the number of children exceeds 3, whether the worker is married or divorced, an additional subsidy of 2000 dinars is added.
1. Propose a decision table for this subsidy system.
 2. Compress this table and propose its decision tree.

Exercise 3:

A customer wishing to obtain a credit card must apply at their branch.

The credit card is not granted if the applicant is not a client of the branch.

Each day, the branch sends the credit card applications of its clients to the credit card management center.

Once the branch receives the credit card from the center, it sends a notification of availability and a notification of the annual fee deduction to the client. The client then comes to pick up the card.

Propose a Data Flow Diagram (DFD) for this procedure.

Exercise 4:

In a private school offering tutoring courses to students, the registration process takes place as follows:

- Teachers wishing to offer courses submit their application files to the administration, and the administration, after reviewing the files, gives its approval (favorable or unfavorable). The accepted teachers must then provide their work schedules, which they arrange themselves.
- The administration announces the proposed courses with their schedules to the students.
- Students submit their registration requests for the proposed courses and receive a schedule.
- Teachers receive the lists of students once the registration period has ended.

Propose a Data Flow Diagram (DFD) for this procedure.

Solutions

Exercise 1

Since the three conditions are Boolean (Yes/No) $\rightarrow$ Number of conditions = $2^3 = 8$

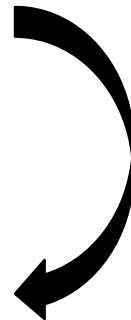
		RULES							
CONDITIONS	The weather is nice	T	T	T	T	F	F	F	F
	The sea is warm	T	T	F	F	T	T	F	F
	There are big waves	T	F	T	F	T	F	T	F
ACTIONS	We go to the beach	X	X	X	X				
	We swim		X						
	We sunbathe	X		X	X				
	We stay at home					X	X	X	X

Table Compression

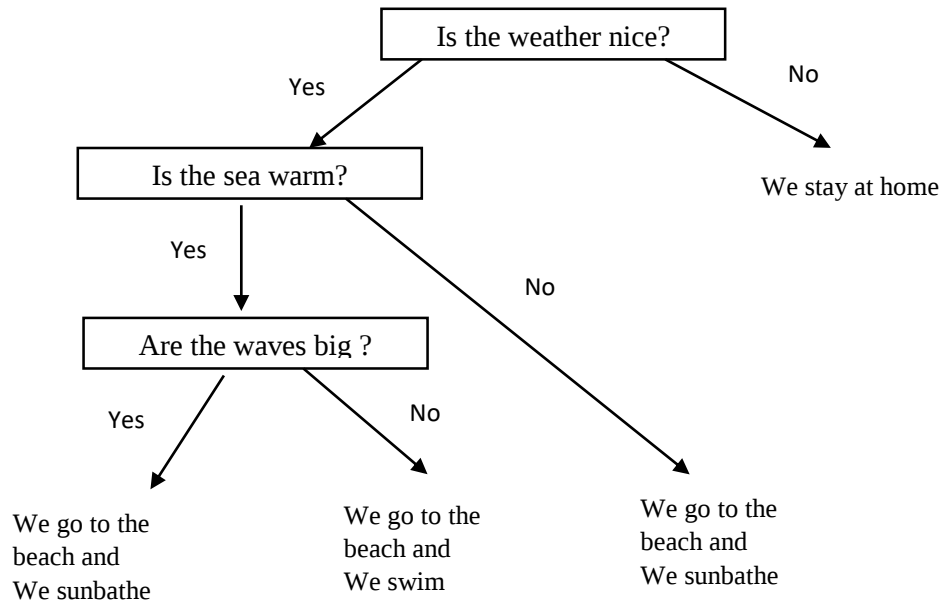
When the weather is bad, the conditions regarding the state of the sea and the waves become irrelevant.

		RULES				
CONDITIONS	The weather is nice	T	T	T	T	F
	The sea is warm	T	T	F	F	=
	There are big waves	T	F	T	F	=
ACTIONS	We go to the beach	X	X	X	X	
	We swim		X			
	We sunbathe	X		X	X	
	We stay at home					X

		RULES			
CONDITIONS	The weather is nice	T	T	T	F
	The sea is warm	T	T	F	=
	There are big waves	T	F	=	=
ACTIONS	We go to the beach	X	X	X	
	We swim		X		
	We sunbathe	X		X	
	We stay at home				X



Decision tree



Pseudo code

```
If (the weather is nice) Then
  If (the sea is warm) Then
    If (there are big waves) Then
      We go to the beach
      We sunbathe
    Else
      We go to the beach
      We swim
    End if
  Else
    We go to the beach
    We sunbathe
  End if
Else
  We stay at home
End if
```

Exercise 2

The number of rules = 3 (single, married, divorced) x 2 (number of children > 3: Yes/No)
The number of rules = 6

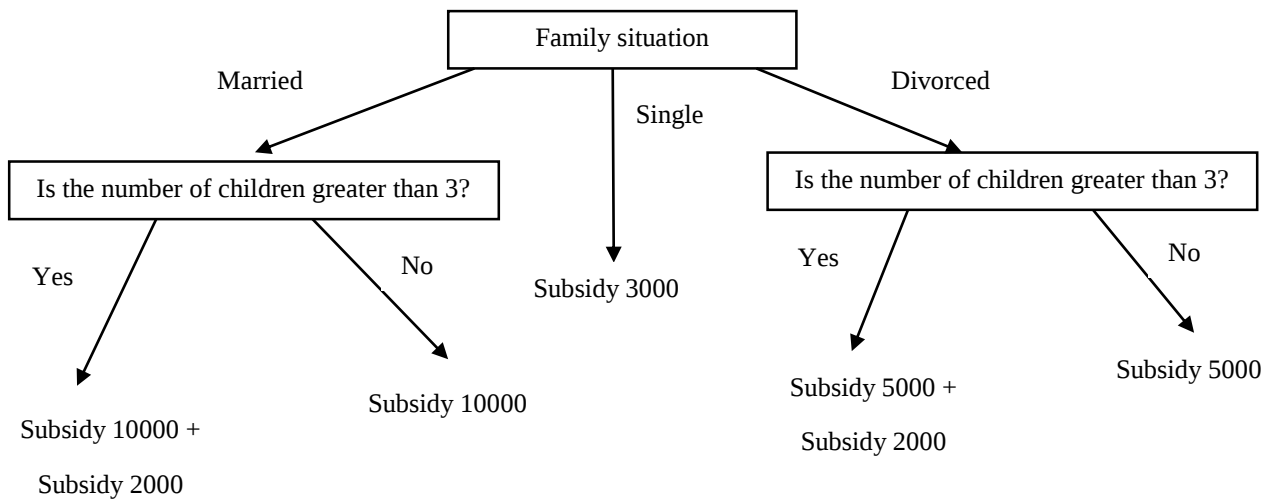
		RULES					
CONDITIONS	Family Situation	Single	Married	Divorced	Single	Married	Divorced
	Number of children>3	T	F	T	F	T	F
ACTIONS	Subsidy 3000	X			X		
	Subsidy 10000		X			X	
	Subsidy 5000			X			X
	Subsidy 2000			X		X	

Table Compression

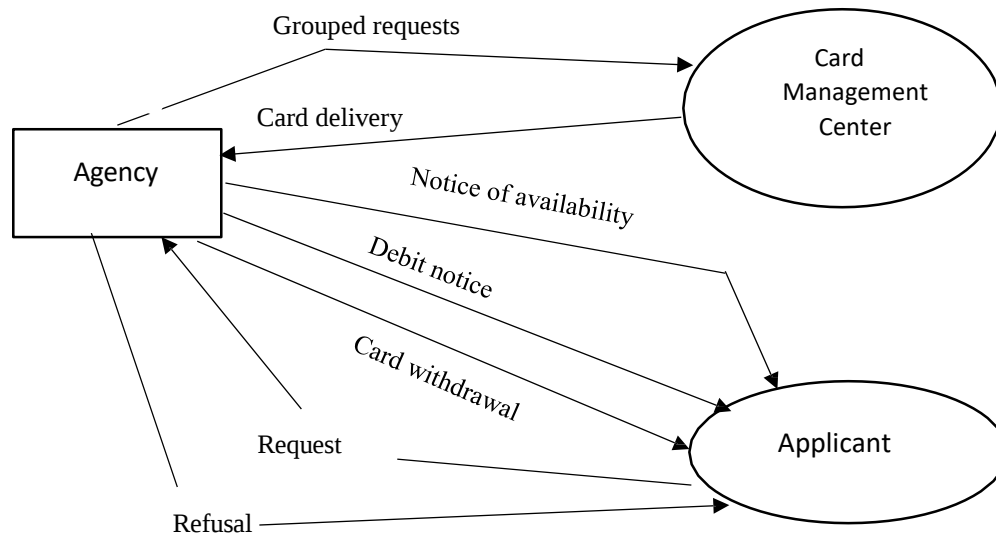
The rule (Number of children) has no impact for the single category.

		RULES				
CONDITIONS	Family Situation	Single	Married	Divorced	Married	Divorced
	Number of children>3	=	F	T	T	F
ACTIONS	Subsidy 3000	X				
	Subsidy 10000		X		X	
	Subsidy 5000			X		X
	Subsidy 2000			X	X	

Decision tree



Exercise 3:



Exercise 4:

