

DataBases

TUTORIAL 7 : Normalization and Decomposition

Exercise 1

Let the relationship **StudentCourse** (**Reg_number**, **age**, **NCourse**, **day**) checking the FDs {Reg_number→age, NCourse → day}

- 1- What is the primary key of this relationship
- 2- What is the greatest normal form of this relationship?
- 3- Decompose the StudentCourse relationship into 3FN relationships.
- 4- Does this decomposition preserve DFs?

Exercise 2

The new tribunal of Zeralda wants to have a database to manage, effectively before the hearings, the large flow of court cases to be judged. A court case is registered with the court through the following initial information: A unique number (numC), a registration date (data), a type of case (typeC). The type of case can be a crime villainous, a crime passionate, fraud financial, a crime economic etc. A case can concern several people.

A person is characterized by a unique number (numP), a last name (LastNameP), a first name (FirstNameP), a date of birth (dateP), an address (adrP), a telephone number (telP).

Each person involved in a given case has the quality either of "victim", "accused", or "witness". The facts suffered or reproached or recited are thus recorded. A fact of a person vis-a-vis a case is characterized by a date (dateF), a time (timeF), a duration (durF), a description (desF).

Each "accused" person in a case is defended by a lawyer according to a position (innocent or guilty). The data concerning a lawyer are: a unique number (numL), surname (SurnameL), first name (FirstNameL), address (adrL), telephone (telL).

For a given case, a lawyer can call one or more witnesses.

Each case is followed by a jury. Each jury, identified by a code (codeJ), is made up of several judges, one of whom is president and the other members. A judge is characterized by a unique number (numJ), a surname (SurnameJ), a first name (FirstNameJ), an address (adrJ), a telephone number (telJ).

A jury can hear more than one case at a time.

For each case, a jury conducts one or more hearings on different dates during which the victims, defendants or witnesses give their statements. The jury proclaims (announces) a decision at the end of each hearing.

- a) Give the set of functional dependencies.
- b) Determine a 3 FN relational schema for this database by applying the synthesis algorithm

Exercise 3

The purpose of the police ticket processing system is to record traffic violations and notify the commission of the offenses for the study of the files in order to establish verdicts. The database of this system, therefore, involves information on motorists, tickets, police officers, commissions....

The properties related to the motorist include the driver's license number which is unique (Num-licence), the name (Name_D), the address (Address_D), the date of birth (DateB_D), the license renewal date (Date_renewal).

The properties related to tickets are the number of the offense (Num_O) which is unique in the commission, the place (Place-O), the date of the offense (Date-O), the time of the offense (Time-O), reason for charge (reason), date of hearing (Date-H), the amount of the fine (Amount) and the date of payment of the fine (Date-P).

A ticket is issued by a police officer, who forwards it to the commission in order to make a decision (a verdict).

For simplicity, we consider that a police officer is described by a name that is unique (Name_P) and that a commission is described by a name that is also unique (Name_C).

A motorist can commit several offenses and therefore have several fines. But a violation concerns only one motorist and is provided by a single police officer.

The police issue numerous tickets. Each violation is studied by a single commission.

At the end of the date of the hearing (Date-H), the commission of offenses sits and issues a verdict (return of license, license suspension, etc.).

We also want to keep, for monitoring and control reasons, the history of the verdicts issued by the various commissions against a motorist.

1. Determine all the functional dependencies described in the statement.
2. Elaborate a relational schema in 3FN, by applying the synthesis algorithm.