

Comp2400/Comp6240

Relational Databases

Assignment 2

Due 5pm Friday 24 October 2008

Write your work in a plain text file called `ass2.txt`, which you will submit electronically.

Question 1 Candidate Keys and Highest Normal Forms

[5 marks]

Below are 5 relations, each with a set of functional dependencies. For each relation state

1. the candidate key(s) of the relation
 2. its highest normal form (1NF, 2NF, 3NF, or BCNF) and, if it is not BCNF, why it is not in the next highest normal form (since no primary keys are specified, we are using the versions of these normal forms that refer to *all* candidate keys)
- (a). $R1(a, b, c, d, e)$, $\{a \rightarrow b, b \rightarrow c, c \rightarrow d, d \rightarrow e\}$
- (b). $R2(a, b, c, d, e)$, $\{a \rightarrow b, bc \rightarrow d, bc \rightarrow e\}$
- (c). $R3(a, b, c, d, e)$, $\{\}$
- (d). $R4(a, b, c, d, e)$, $\{bc \rightarrow d, bc \rightarrow e\}$
- (e). $R5(a, b, c, d, e)$, $\{c \rightarrow a, c \rightarrow b, c \rightarrow d, c \rightarrow e\}$

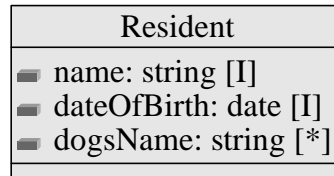


Figure 1: A UML Class with a multiple valued attribute

Question 2 Validity of Functional Dependency Inference Rule

[3 marks]

Elmasri and Navathe state that “ $X \rightarrow A$ and $Y \rightarrow B$ does *not* imply that $XY \rightarrow AB$ ” [EN07, §10.2.2]. Is this correct? Rigorously justify your answer.

Question 3 UML Translation

[2 marks]

UML allows attributes to have multiplicities just like association ends. By default, attributes have multiplicity 0..1, but the attribute *dogsName* in the class in Figure 1 has multiplicity * specified.

Using the procedure to normalise set-valued attributes shown in Lecture 22, find a faithful translation of this class into a database schema.

References

[EN07] Ramez Elmasri and Shamkant B. Navathe. *Fundamentals of Database Systems*. Addison-Wesley, 5th edition, 2007.