CSC2024 Database Technology Coursework 2

Relational Normalization

This piece of coursework is worth 10% of the total assessment for this module. It is based on the second part of this module. Submit a single answer document to NESS containing your answers to this coursework. NESS will be set up to accept .doc, .rtf and .pdf files.

Aims:
To assess the student's ability to normalize a relational schema, and to use normalization concepts to solve new problems not seen in class.

In each of the following, consider a relation R with the FDs indicated underneath:

1) (20%)
R(A,B,C,D,E,F,G,H)
Fd1: A → B,C,D
Fd2: A,D → E
Fd3: E,F,G → H
Fd4: F → G,H
(i) what is the PK (minimal candidate key) for R?
(ii) One of the FDs can be removed as it can derived using inference rules. Which one?

2) (20%)
R(A,B,C,D)
A → B B → C C → D D → A
(i) which are the candidate keys?
(ii) is this relation in BCNF?

3) (20%)
R(A,B,C,D)
A,B → C B,C → D C,D → A A,D → B
(i) find all candidate keys
(ii) is R in BCNF?

4) (20%)
R(A,B,C,D,E)
A,B → C D,E → C B → D
(i) what is the PK for R? (this is the candidate key with fewest attributes)
(ii) normalize R into 2NF (i.e., identify and remove all partial dependencies on the key identified in (i).)
Hint: decompose into more than two tables.

5) (20%)
R(A,B,C,D,E)
A,B → C C → D D → B D → E
(i) find the PK
(ii) identify all BCNF violations, and decompose R into BCNF (hint: compute the closure over the violating FDs and use the resulting FD to do the decomposition)