

Worksheet 8: Normalization

Submission Instructions: Submit a text file or a pdf file with your answers. Name your file as last- nameFirstnameW4.fileExtension (e.g., chaturvediRituW48.txt). Hand-written answers will not be accepted.

Question 1: Match the following. Statements on the left-hand side may match more than one statements on the right-hand side. (Hint: Nov 1st Monday's lecture has the solutions).

1	Anomaly		a	A is the dependent, B is the determinant
2	Functional Dependency		b	A is the determinant, B is the dependant
3	$A \rightarrow B$		c	is one that is part of any primary key
4	Prime attribute		d	does not have any repeating groups such as composite or multi-valued attributes
5	Non-loss decomposition $\{R_1, R_2, \dots R_n\}$ of a relation R		e	is an inconsistent, incompatible or contradictory state of the database
6	Full FD		f	is a many-to-one relationship between attribute set A and attribute set B
7	Transitive		g	if 2 tuples in a relational instance agree on their X-value, then they must agree on their Y-value.
8	Relation in 2NF		h	each value of A has associated with it exactly one value of B
9	Relation in 3NF		i	does not have any tranistive dependencies
10	Relation in 1NF		j	is a FD of an attribute S on attribute R such that S does not depend on any proper subset of R
			k	does not have any non-full dependencies
			l	if there exists a FD of $X \rightarrow Y$ and $Y \rightarrow Z$, then it implies that $X \rightarrow Z$ also exists
			m	natural join of $R_1, R_2, \dots R_n$ produces exactly the relation R
			n	Rissanen's rules

Question 2: A relation called Emp must store the following attributes for every employee in this company: (Name, Address, Phone numbers, BeersLiked). Each employee has an address, may have 1 or more phone numbers and may like 1 or more beer.

- a. Create an instance for Emp using the following information:

Name: Harry
 Address: 50 Stone Wall
 Phone numbers: {519 999 8888, 647 999 2233}
 BeersLiked: {Brahma, Heineken, Coors Light}

Name: Ansh
Address: 3550 Mississauga Road
Phone numbers: {647 000 1111, 416 321 4133}
BeersLiked: {Brahma}

- b. What is the result of:
 SELECT COUNT(*)
 FROM Emp;
- c. find all multivalued and functional dependencies of Emp, if any. Assume that the key is (name, PhoneNumbers, BeersLiked).
- d. Decompose Emp to smaller relations such that there are no more MVDs in any of the smaller relations and all smaller relations are now in 3NF and 4NF. Prove that the decomposition is non-loss.

Question 3: CAR_SALE(Car#, Date_sold, Salesman#, Commision%, Discount_amt)

Assume that a car may be sold by multiple salesmen and hence {CAR#, SALESMAN#} is the primary key. Additional dependencies are:

Date_sold ->Discount_amt

and

Salesman# ->commission%

Based on the given primary key, is this relation in BCNF? Why or why not? How would you successively normalize it completely?