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INFS 6790

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Homework 1

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Part 1

First Normal Form (1NF): A table is in 1NF if it has a unique, non-null, row-identifying key (primary key) on which all other attributes are dependent, each column/row intersection (field or cell) contains one value, ordering of the rows and/or columns is irrelevant.

Second Normal Form (2NF): A table is in 2NF if it is already in 1NF and there are no non-key attributes that are dependent on a key attribute in a composite key (partial dependencies). Therefore, if the primary key is simple, there can be no partial dependencies.

Third Normal Form (3NF): A table is in 3NF if it is already in 2NF and there are no non-key attributes that are dependent on another non-key attribute (transitive dependency).

Boyce-Codd Normal Form (BCNF): A table is in BCNF if it is already in 3NF and every value in a row that directly determines another value in that row (determinant) is a potential primary key (candidate key).

Fourth Normal Form (4NF): A table is in 4NF if it is already in 3NF and it has no keys that determine multiple values of at least two independent attributes (multi-valued dependencies).

Fifth Normal Form (5NF): A table is in 5NF if it is already in 4NF and the table can’t be broken into smaller tables and rejoined without losing or gaining any rows (lossless decomposition).

Part 2

INGREDIENT: This table is in 4/5NF because every cell will contain a single value, there are no partial dependencies, there are no transitive dependencies, the PK is simple, and there are no multivalued dependencies.

RECIPE: This table is in 4/5NF because every cell will contain a single value, there are no partial dependencies, there are no transitive dependencies, the PK is simple, and there are no multivalued dependencies.

BATCH: This table is in 0NF because a batch can (and should) have multiple ingredients. This makes the composite PK non-unique.

CUSTOMER: This table is in 4/5NF because every cell will contain a single value, there are no partial dependencies, there are no transitive dependencies, the PK is simple, and there are no multivalued dependencies.

SALESPERSON: This table is in 0NF because a salesperson can have more than one phone number.

PRODUCT: This table is in 0NF because a beer can have multiple sizes of a single package.

TRANSACTION: This table is in 4/5NF because every cell will contain a single value, there are no partial dependencies, there are no transitive dependencies, the PK is simple, and there are no multivalued dependencies.