

Task 6

Question 1

Highest Normal Form

Second Normal Form (2NF)

Justification:

1. Derivations of Minimal Keys:

snumber \rightarrow sname

snumber \rightarrow city

snumber \rightarrow postcode

city \rightarrow postcode

postcode \rightarrow city

snumber \rightarrow sname, city, postcode

(Augmentation and Transitivity)

Therefore Minimal Keys: snumber

2. Testing of validity of all Normal Forms

First Normal Form (1NF):

Yes - All occurrences of rows in the table contain the same number of fields and include the atomic values only, (there is no repeating fields and groups)

Second Normal Form (2NF):

Yes - Every nonprime attribute in this schema is fully functionally dependent on primary key snumber

Third Normal Form (3NF):

No - Non prime attributes city and postcode are transitively dependent on the primary key snumber

Question 2

Highest Normal Form

Third Normal Form (3NF)

Justification:

1. Derivations of Minimal Keys:

employee \rightarrow branch

customer, branch \rightarrow employee

Employee, customer \rightarrow branch

Key 1 = employee

Key 2 = branch

Therefore Minimal Keys: (customer, branch) and (employee, customer)

2. Testing of validity of all Normal Forms

First Normal Form (1NF):

Yes - All occurrences of rows in the table contain the same number of fields and include the atomic values only, (there is no repeating fields and groups)

Second Normal Form (2NF):

Yes - Every nonprime attribute in this schema is fully functionally dependent on primary keys (customer, branch)

Third Normal Form (3NF):

Yes - It is in 2NF and no nonprime attribute is transitively dependent on the primary keys (customer, branch)

BCNF

No - The primary keys (customer, branch) are not super keys to all attributes

Question 3

Highest Normal Form

Second Normal Form (2NF)

Justification:

1. Derivations of Minimal Keys:

pnumber \rightarrow address

pnumber \rightarrow rent

pnumber \rightarrow onumber

onumber \rightarrow oname

pnumber \rightarrow oname

(Transitivity)

pnumber \rightarrow address, rent, onumber, oname

(Augmentation and Transitivity)

Therefore Minimal Keys: pnumber

2. Testing of validity of all Normal Forms

First Normal Form (1NF):

Yes - All occurrences of rows in the table contain the same number of fields and include the atomic values only, (there is no repeating fields and groups)

Second Normal Form (2NF):

Yes - Every nonprime attribute in this schema is fully functionally dependent on primary key pnumber

Third Normal Form (3NF):

No - Non prime attributes pnumber and oname are transitively dependent on the primary key pnumber

Question 4

Highest Normal Form

Second Normal Form (2NF)

Justification:

1. Derivations of Minimal Keys:

lecturer \rightarrow school

school \rightarrow bldg#

bldg# \rightarrow campus

lecturer \rightarrow school \rightarrow bldg# \rightarrow campus

(Transitivity)

Therefore Minimal Keys: lecturer

2. Testing of validity of all Normal Forms

First Normal Form (1NF):

Yes - All occurrences of rows in the table contain the same number of fields and include the atomic values only, (there is no repeating fields and groups)

Second Normal Form (2NF):

Yes - Every nonprime attribute in this schema is fully functionally dependent on primary key lecturer

Third Normal Form (3NF):

No - Non prime attributes school, bldg# and campus are transitively dependent on the primary key lecturer

Question 5

Highest Normal Form

Second Normal Form (2NF)

Justification:

2. Derivations of Minimal Keys:

$T \rightarrow N$

$T \rightarrow E$

$O \rightarrow C$

$O \rightarrow T$

$T \rightarrow N, E$

$O \rightarrow C, T$

(Augmentation and Transitivity)

$O \rightarrow T \rightarrow N, E$

$O \rightarrow C, T$

(Augmentation and Transitivity)

Therefore Minimal Keys: O

3. Testing of validity of all Normal Forms

First Normal Form (1NF):

Yes - All occurrences of rows in the table contain the same number of fields and include the atomic values only, (there is no repeating fields and groups)

Second Normal Form (2NF):

Yes - Every nonprime attribute in this schema is fully functionally dependent on primary key O

Third Normal Form (3NF):

No - Non prime attributes N and E are transitively dependent on the primary key O