SESSION-7

DATA NORMALIZATION

(G3_23BAI70156_Gaurav Monga)

1. Relation R(ABCD) having dependencies as following:
   - AB->C
   - C->D
   - D->A

   Identify the list of candidate keys in this table and find the prime and non - prime attributes

SOL :

As there is no B being derived on the right hand side, therefore the candidate keys will definitely contain B.

The closure properties of a few keys are:

- AB -> ABCD [AB -> AB, AB -> C, C -> D]
- BC -> BCDA [BC -> BC, C -> D, D-> A]
- BD -> BDAC [BD -> BD, D -> A, AB -> C]

As the **closure of these keys results in the entire table**, therefore they are all **Candidate Keys**(AB, BC, BD)**.**

The **prime attributes** for this table are **:**

- A
- B
- C
- D

As **all the attributes** are prime, therefore the table is in **3NF**.

2. Relation R(ABCDE) having dependencies as following:
    - A -> D
    - B -> A
    - BC -> D
    - AC -> BE

    Identify the list of candidate keys in this table and find the prime and non - prime attributes

SOL :

As there is no C being derived on the right hand side, therefore the candidate keys will definitely contain C.
The closure properties of a few keys are:

- AC -> ACBED [AC -> AC, AC -> BE, A -> D]
- BC -> BCDAE [BC -> BC, BC -> D, B-> A, AC -> BE]

As the **closure of these keys results in the entire table**, therefore they are all **Candidate Keys**(AC, BC)**.**

The **prime attributes** for this table are **:**

- A
- B
- C

As **a prime attribute is deriving a non-prime attribute**(A -> D), therefore the table is in **1NF**.

3. Relation R(ABCDE) having dependencies as following:
    - B -> A
    - A -> C
    - BC -> D
    - AC -> BE

    Identify the list of candidate keys in this table and find the prime and non - prime attributes

SOL :

The closure properties of a few keys are:

- A -> ACBED [A -> A, A -> C, AC -> BE, BC -> D]
- B -> BACDE [B -> B, BC-> A, A -> C, AC -> BE, BC -> D]

As the **closure of these keys results in the entire table**, therefore they are all **Candidate Keys**(A, B)**.**

The **prime attributes** for this table are **:**

- A
- B

As **all relations of the form a -> b have a as a super key or candidate key**, therefore the table is in **BCNF**.

4. Relation R(ABCDEF) having dependencies as following:
   - A -> BCD
   - BC -> DE
   - B -> D
   - D -> A

   Identify the list of candidate keys in this table and find the prime and non - prime attributes

SOL :

As there is no F being derived on the right hand side, therefore the candidate keys will definitely contain F.

The closure properties of a few keys are:

- AF -> AFBCDE [AF -> AF, A -> BCD, BD -> E]
- BF -> BFDACE [BF -> BF, B -> D, D -> A, A -> C, BC -> E]
- DF -> DFABCDE [DF -> DF, D -> A, A -> BC, BC -> E]

As the **closure of these keys results in the entire table**, therefore they are all **Candidate Keys**(AF, BF, DF)**.**

The **prime attributes** for this table are **:**

- A
- B
- D
- F

As **a prime attribute is deriving a non-prime attribute**(A -> D), therefore the table is in **1NF**.

5. Relation R(ABCDE) having dependencies as following:
   - CE -> D
   - D -> B
   - C -> A

   Identify the list of candidate keys in this table and find the prime and non - prime attributes

SOL :

As there is no CE being derived on the right hand side, therefore the candidate keys will definitely contain CE.
The closure properties of a few keys are:

- CE -> CEADB [CE -> CE, CE -> D, C -> A, D -> B]

As the **closure of these keys results in the entire table**, therefore they are all **Candidate Keys**(CE)**.**

The **prime attributes** for this table are **:**

- C
- E

As **a prime attribute is deriving a non-prime attribute**(CE -> D), therefore the table is in **1NF**.

6. Relation R(ABCDEF) having dependencies as following:
    - AB -> C
    - DC -> AE
    - E -> F

    Identify the list of candidate keys in this table and find the prime and non - prime attributes

SOL :

As there is no BD being derived on the right hand side, therefore the candidate keys will definitely contain BD.
The closure properties of a few keys are:

- ABD -> ABDCEF [ABD -> ABD, AB -> C, DC -> E, E -> F]
- BCD -> BCDAEF [BCD -> BCD, DC -> AE, E -> F]

As the **closure of these keys results in the entire table**, therefore they are all **Candidate Keys**(ABD, BCD)**.**

The **prime attributes** for this table are **:**

- A
- B
- C
- D

As **a non-prime attribute is deriving a non-prime attribute**(E -> F), therefore the table is in **1NF**.