

Questions on Super Keys and Candidate Keys

Questions on Super Keys and Candidate Keys using Closure

Identify Super Keys and Candidate keys :

Question 1 :

Let R(ABCDE) is a relational schema, where

$(AB)^+ = ABCDE$

$(A)^+ = ABCDE$

Is AB: Candidate Key or Not??

Solution :

AB : Not a Candidate Key, AB is only : Super Key

Question 2 :

Let R(ABCDE) is a relational Schema having FDs

$\{AB \twoheadrightarrow C, C \twoheadrightarrow D, B \twoheadrightarrow E\}$

Find out the Candidate Key ?

Solution :

$(AB)^+ : \{ABCDE\}$? super key

$(A)^+ : \{A\}$ ×

$(B)^+ : \{EB\}$ ×

? AB : minimal superkey ? Candidate Key. No subset of its attributes is a key.

Question 3 :

Let R(ABCDE) is a relational schema having FDs

$\{AB \twoheadrightarrow C, C \twoheadrightarrow D, B \twoheadrightarrow EA\}$

Find Out the Candidate Key ?

Solution :

$(AB)^+ : \{ABCDE\}$? Superkey

$(A)^+ : \{A\}$

$(B)^+ : \{EABCD\}$? Superkey

? B is Candidate Key.

Question 4 :

Let R(ABCDE) is a relational schema having FDs

$\{A \twoheadrightarrow B, B \twoheadrightarrow C, C \twoheadrightarrow D\}$

Find out the Candidate Key ?

Solution :

$(AE)^+ : \{ABCDE\}$? SuperKey

$(A)^+ : \{ABCD\}$

$(E)^+ : \{E\}$

AE : Candidate Key. No subset of its attributes is a key.

Question 5 :

Let R(ABCDEF) is a relational schema having FDs

$\{A \twoheadrightarrow BCDEF, BC \twoheadrightarrow ADEF, B \twoheadrightarrow C, D \twoheadrightarrow E\}$

Find out the Candidate Key ?

Solution:

$(A)^+ : ABCDEF$? (SuperKey)

$(BC)^+ : \{BCADEF\}$? (SuperKey)

$(B)^+ : \{BCADEF\}$

$(C)^+ : \{C\}$

$\{A, B\}$? Candidate Key. No subset of its attributes is a key.

Question 6:

Given the following set F of functional dependencies for relation schema $R = \{A, B, C, D, E\}$.

$\{A \rightarrow BC, CD \rightarrow E, B \rightarrow D, E \rightarrow A\}$

List the candidate keys for R.

Solution :

(A)+: ABCDE ? (SuperKey)

(E)+: EABCD ? (SuperKey)

(CD)+: CDEAB ? (SuperKey)

(CB)+: CBDEA ? (SuperKey)

Any combination of attributes that includes those is a superkey.

From above , the minimal super keys are ? A, E, CD and BC.

Hence, the candidate keys are A, E, CD, BC.

Question 7:

Consider a relation $R(A,B,C,D,E)$ with the following dependencies:

$\{AB \rightarrow C, CD \rightarrow E, DE \rightarrow B\}$

Is AB a candidate key of this relation? If not, is ABD? Explain your answer.

No. The closure of AB does not give you all of the attributes of the relation.

For ABD,

$(ABD)^+ = ABDCE$? Super Key

$(A) = \{A\}$

$(B) = \{B\}$

$(D) = \{D\}$

? ABD is a candidate key. No subset of its attributes is a key.

Question 8 :

Consider a relation with schema $R(A,B,C,D)$ and FDs $\{AB \rightarrow C, C \rightarrow D, D \rightarrow A\}$. What are all candidate keys of R?

$(AB)^+ : ABCD$? (SuperKey)

$(A)^+ : A$? (Not able to determine all the attributes)

$(B)^+ : B$? (not able to determine all the attributes)

$(DB)^+ : ABCD$? (SuperKey)

$(CB)^+ : ABCD$? (SuperKey)

$(D)^+ : DA$? (Not able to determine all the attributes)

$(C)^+ : CDA$? (Not able to determine all the attributes)

? By calculating an attribute closure we can see the candidate keys are: AB, BC, and BD.