Enamadi Sanath Yashwin Assignment - 01
18CS01057 03.03.2021

q1.cpp: lossless join property

R (Ssn, Ename, Pnumber, Pname, Plocation, Hours)
F = {Ssn → Ename, Pnumber → {Pname, Plocation}, {Ssn, Pnumber} → Hours}
R1 (Ssn, Ename)
R2 (Pnumber, Pname, Plocation)
R3 (Ssn, Pnumber, Hours)
In the code, mappings af attributes are as follows:
Ssn - 0, Ename - 1, Pnumber - 2, Pname - 3, Plocation - 4, Hours - 5

Description:

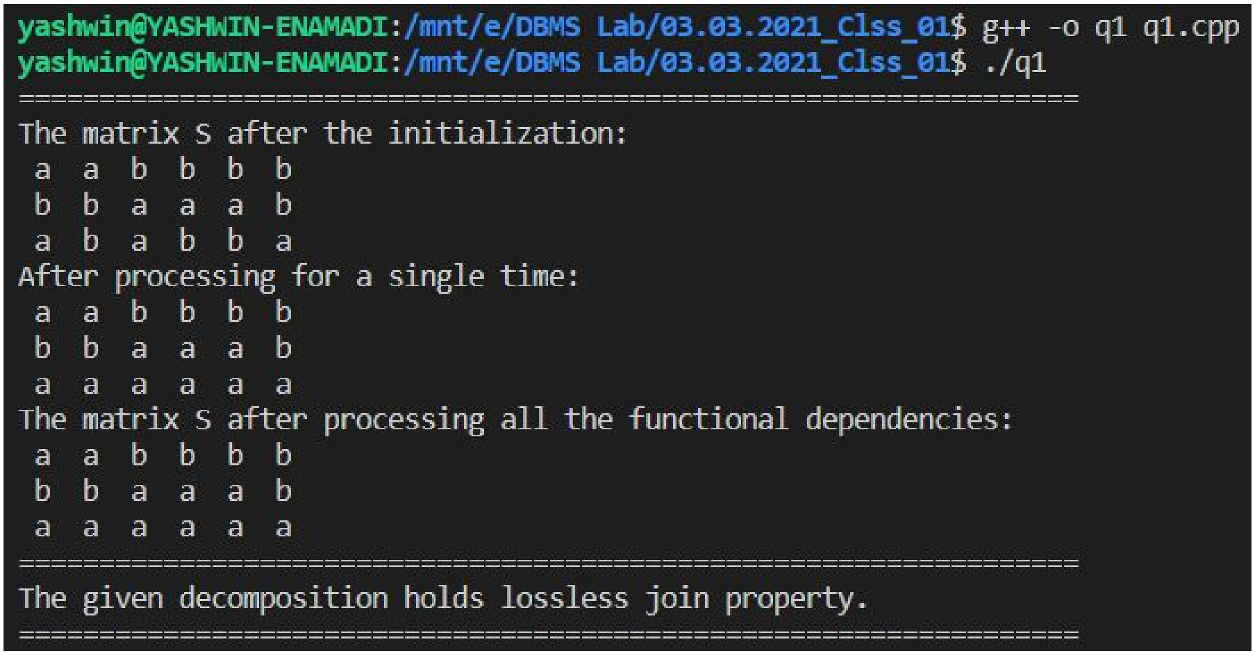
Class Relation:

Data Members:

- numAttrs (int): number of attributes in the relation
- F (vector of functional dependencies): set of functional dependencies for the relation
- Decomposition (vector of vectors of attributes): represents the decomposition state of the relation

Methods:

- checkForAs: checks if a complete row contains a’s
- processAllFDs: loops through all functional dependencies until the matrix S doesn’t change
- displayS: depicts the matrix S
- fillUpRelation: takes input related to relation
- fillUpDecomposition: takes input related to the decomposition
- validateLJProp: checks if the given decomposition holds lossless join using the above functions



```
yashwin@YASHWIN-ENAMADI:/mnt/e/DBMS Lab/03.03.2021_Clss_01$ g++ -o q1 q1.cpp
yashwin@YASHWIN-ENAMADI:/mnt/e/DBMS Lab/03.03.2021_Clss_01$ ./q1
==================================================================
The matrix S after the initialization:
 a  a  b  b  b  b
 b  b  a  a  a  b
 a  b  a  b  b  a
After processing for a single time:
 a  a  b  b  b  b
 b  b  a  a  a  b
 a  a  a  a  a  a
The matrix S after processing all the functional dependencies:
 a  a  b  b  b  b
 b  b  a  a  a  b
 a  a  a  a  a  a
==================================================================
The given decomposition holds lossless join property.
==================================================================
```

q2.cpp: 3nf synthesis with dp

R (Ssn, Ename, Pnumber, Pname, Plocation, Hours)

F = {Ssn → Ename, Pnumber → {Pname, Plocation}, {Ssn, Pnumber} → Hours}

In the code, mappings af attributes are as follows:

Ssn - 0, Ename - 1, Pnumber - 2, Pname - 3, Plocation - 4, Hours - 5

Description:

Class Relation:

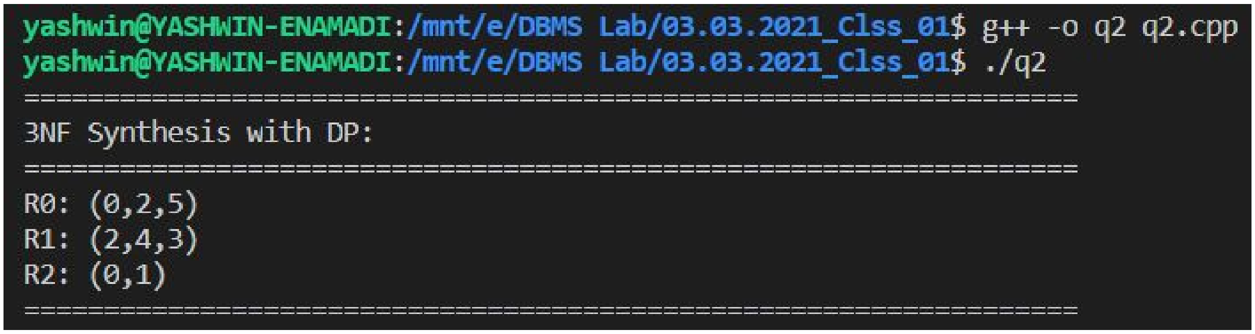
Data Members:

- numAttrs (int): number of attributes in the relation
- pk (vector of attributes): represents the primary key of the relation
- F (vector of functional dependencies): set of functional dependencies
- Decomposition (vector of vectors of attributes): represents the decomposition state of the relation

Methods:

- isSuperKey: checks if the given set of attributes form the super key of the relation

- primaryKey: finds the primary key of the relation
- minCoverFD: finds the minimum cover of the given set of functional dependencies
- checkCover: checks if F1 covers F2
- checkEqui: checks if F1 and F2 are equivalent, where F1, F2 are two sets of functional dependencies
- fillUpRelation: takes input related to relation
- displayDecomposition: displays the decomposition of the relational schema
- syn3NFwithDP: the function that generates the decomposition



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yashwin@YASHWIN-ENAMADI:/mnt/e/DBMS Lab/03.03.2021_Clss_01$ g++ -o q2 q2.cpp
yashwin@YASHWIN-ENAMADI:/mnt/e/DBMS Lab/03.03.2021_Clss_01$ ./q2
====================================================================
3NF Synthesis with DP:
====================================================================
R0: (0,2,5)
R1: (2,4,3)
R2: (0,1)
====================================================================
```

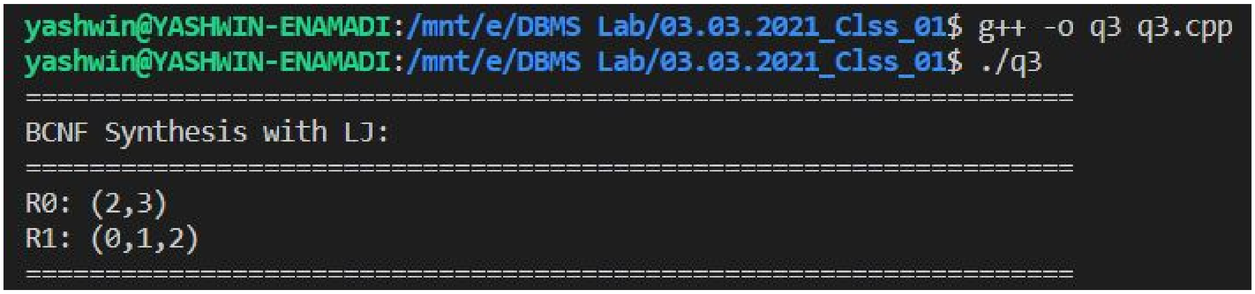
q3.cpp: bcnf synthesis with lj

R (Ssn, Ename, Pnumber, Pname)

F = {Ssn → Ename, Pnumber → Pname}

In the code, mappings af attributes are as follows:

Ssn - 0, Ename - 1, Pnumber - 2, Pname - 3



```
yashwin@YASHWIN-ENAMADI:/mnt/e/DBMS Lab/03.03.2021_Clss_01$ g++ -o q3 q3.cpp
yashwin@YASHWIN-ENAMADI:/mnt/e/DBMS Lab/03.03.2021_Clss_01$ ./q3
====================================================================
BCNF Synthesis with LJ:
====================================================================
R0: (2,3)
R1: (0,1,2)
====================================================================
```