

CSCI235: Database Systems

Assignment 1

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Task 1

1)

- i) $B \rightarrow D$; $D \rightarrow AE$; transitive $B \rightarrow AE$
Therefore $B \rightarrow ADE$

Minimal Keys: BC

- ii) Schema does not satisfy 2NF because $B \rightarrow D$ and B is a subset of BC
Therefore schema is 1NF

- iii) $R(B, D) B \rightarrow D$,
 $R(B, C)$,
 $R(D, A, E) D \rightarrow AE$
All tables are in BCNF

2)

- i) $AB \rightarrow CD$; minimal key $E+AB \rightarrow CD$
 $DE \rightarrow AC$; minimal key $B+DE \rightarrow AC$

Minimal Keys: ABE, BDE

- ii) Schema does not satisfy 2NF because $AB \rightarrow CD$ and AB is a subset of ABE, and $DE \rightarrow AC$ and DE is a subset of BDE
Therefore schema is 1NF

- iii) $R(A, B, C, D) AB \rightarrow CD$
 $R(A, B, E)$
All schemas are in BCNF

3)

- i) $BCD \rightarrow AE$;
 $CDE \rightarrow AB$;

Minimal Keys: BCD, CDE

- ii) Schema satisfies 1NF as all columns are single value
Schema satisfies 2NF as all attributes are fully dependant on primary keys
Schema satisfies 3NF as there are no transitive functional dependencies
Schema satisfies BCNF as all minimal keys are super keys

- iii) Already in BCNF