

Recap: FD

Consider a student_lecture relation

S_id	Address	Course	Teaching_assistant
1234	57 Hockanum Blvd	Database Systems	Minnie
2345	1400 E. Bellows	Database Systems	Humpty
3456	900 S. Detroit	Cloud Computing	Dumpty
1234	57 Hockanum Blvd	Web Programming Lang.	Mickey
5678	2131 Forest Lake Ln.	Software Analysis	Minnie

Assume that there is exactly one teaching assistant assigned to each student for every course

1. Determine all functional dependencies of the relation
2. Give an example of a super key and a candidate key

Recap: FD

Consider a student_lecture relation

S_id	Address	Course	Teaching_assistant
1234	57 Hockanum Blvd	Database Systems	Minnie
2345	1400 E. Bellows	Database Systems	Humpty
3456	900 S. Detroit	Cloud Computing	Dumpty
1234	57 Hockanum Blvd	Web Programming Lang.	Mickey
5678	2131 Forest Lake Ln.	Software Analysis	Minnie

1. Determine all functional dependencies of the relation

$S_id \rightarrow Address$

$S_id, Course \rightarrow Teaching_assistant$

?? $Address \rightarrow Course$

Possible (if no student lives in the same address), but probably unrealistic

Assume: there is exactly one teaching assistant assigned to each student for every course

Recap: FD

Consider a student_lecture relation

S_id	Address	Course	Teaching_assistant
1234	57 Hockanum Blvd	Database Systems	Minnie
2345	1400 E. Bellows	Database Systems	Humpty
3456	900 S. Detroit	Cloud Computing	Dumpty
1234	57 Hockanum Blvd	Web Programming Lang.	Mickey
5678	2131 Forest Lake Ln.	Software Analysis	Minnie

2. Give an example of a super key and a candidate key

The set of all the attributes is a trivial super key
 $(S_id, Course)$ is a candidate key

Assume: there is exactly one teaching assistant assigned to each student for every course

Recap: Attribute Closure

Given a relation R (A, B, C, D, E, F, G) with the following FDs

FDs = { $A \rightarrow BC$, $E \rightarrow CF$, $B \rightarrow E$, $CD \rightarrow EF$, $A \rightarrow G$ }

Find the closure of A (A^+)

$A \rightarrow B$ and $A \rightarrow C$ (decompose $A \rightarrow BC$)

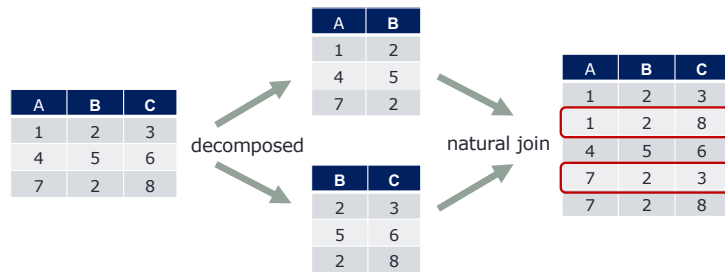
$A \rightarrow E$ (transitive $A \rightarrow B$ and $B \rightarrow E$)

$A \rightarrow CF$ (transitive $A \rightarrow E$ and $E \rightarrow CF$)

$A \rightarrow G$ (FD given)

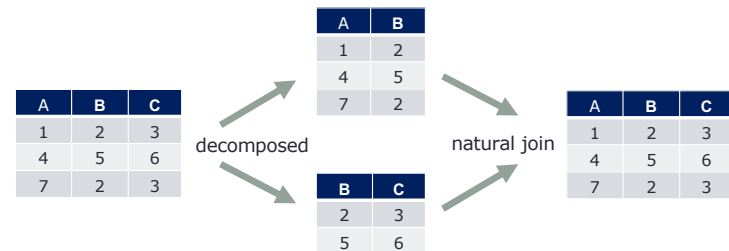
Thus, $A^+ = \{ ABCEFG \}$

Let's Try (1) Lossless Join decomposition?



No

Let's Try (2) Lossless Join decomposition?



Yes

$(AB \cap BC) \rightarrow BC$

Recap: Normal Forms

What is the main aspect of 1NF?

Atomicity

Which among 3NF and BCNF is dependency preserving?

3NF

Which among 3NF and BCNF is redundancy free?

BCNF

What is common between 3NF and BCNF?

Lossless join