
CSI 360 - Database Systems

Review keys and normal forms:

1. SK - Super Key - combination of columns that can uniquely identify a row in the table
2. CK - Candidate Key - a Super Key that has the smallest number of columns and yet still can uniquely identify a row in the table
3. prime attribute - Any column of a table that comes from any CK
4. 1NF - no multi-valued attributes
5. 2NF - 1NF AND no partial dependencies – No non-prime can depend on just a part of a CK.
6. 3NF - 2NF AND no transitive dependencies – For every FD of the form $X \rightarrow Y$, X is a SK or Y is prime.
7. BCNF - 3NF AND LHS of FD is always a SK. – For every FD of the form $X \rightarrow Y$, X is a SK.
8. To decompose a relation, we typically choose a FD like $X \rightarrow Y$. Replace this relation with two relations: 1) includes X and every thing it reaches. 2) includes X and everything else that isn't in 1).

In each of the following scenarios complete the following tasks:

1. Identify all Super Keys
2. Identify all Candidate Keys
3. Determine if the table is in 1NF, 2NF, 3NF or BCNF. These scenarios all obey, at least, 1NF (they will not have multi-valued attributes).
4. Convert the table into an Entity-Relationship diagram based on its functional dependencies. This may require some assumptions, so list those clearly. What makes sense as an attribute? What makes sense as a relationship?
5. Describe a better configuration (if it is not in BCNF) for the tables. Repeat steps #3-5 until at least 3NF.

1. Scenario #1 - But Cars are Simple, Right?

Creator	Model Short	Model Long	Location
Toyota	Corolla	Corolla XSE	Japan
Toyota	Corolla	Corolla SE	Japan
Chevrolet	Corvette	Corvette C7	USA
Chevrolet	Cavalier	Cavalier Z24 Convertible	USA
Hyundai	Elantra	Elantra	Japan

The following relationships hold:

- Model Long \rightarrow Model Short.
- Model Long \rightarrow Creator.
- Creator \rightarrow Location

2. Scenario #2 - A Musical DB

Band Name	Song Name	Year	Album
Highly Suspect	Bloodfeather	2015	Mister Asylum
dodie	Would You Be So Kind	2017	You
EDEN	Wake Up	2015	End Credits
Eliot Sumner	I Followed You Home	2016	Information
Guns N' Roses	Live And Let Die	1991	Use Your Illusion I
Guns N' Roses	Civil War	1991	Use Your Illusion II
Paul McCartney	Live And Let Die	2016	Pure McCartney (Deluxe Edition)
Paul McCartney	Live And Let Die	1987	All The Best
The Front Bottoms	Twin Size Mattress	2013	Talon Of The Hawk

- ~~Band Name, Song Name \rightarrow Album~~ – deleted this dependency
- Band Name, Album \rightarrow Year

3. Scenario #3 - Tracking Tweets

Handle	Last Tweet Date	Last Tweet Topic	Status
FluxFrog	02/13/2019	Cute Images	1095896579473575936
realDonaldTrump	02/13/2019	Trains?	1095857587344551936
mikemearls	02/12/2019	Abuse and Playtesters	1095486649977384960

- Handle → Last Tweet Date
- Status → Last Tweet Date, Last Tweet Topic, Handle

4. Scenario #4 - Best Works By An Author

Author	Nation	Title
Shelley	England	Frankenstein
Shakespeare	England	Midsummer's Night Dream
King	USA	The Drawing of the Three
Salvatore	USA	Homeland
Heinlein	USA	Stranger in a Strange Land
Rich	USA	A Dream Of A Common Language
Adichie	Nigeria	Americanah

- Author → Nation, Title
- Title → Nation, Author

5. Scenario #5 - BCNF Fails - optional - Nation's Best Books

Author	Nation	Title	Year
Shelley	England	Frankenstein	1818
Heinlein	USA	Stranger in a Strange Land	1961
Adichie	Nigeria	Americanah	2013

- Author, Year → Title
- Title → Author