Assignment 1 Solution

Introduction to Databases, 2018 Spring

Datalab, NTHU

Problem 1

- Skip
- Please refer to the solution on the repository

Problem 2

Request: Decompose this table to match the 3rd normal form

fourm_name	popularity	post_id	title	article	reply
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	["Haha", "I don't know"]
Gossiping	100	251	Firends	I don't have a friend...	["Haha", "I can be", "QQ"]
Joke	23	41	Knock	Knock! Knock! ...	["Then?", "What's the point ?"]
Joke	23	156	Santa Claus	Hold! Hold! Hold!	["XDD"]

Functional Dependency 1

Problem 2

Request: Decompose this table to match the 3rd normal form

fourm_name	popularity	post_id	title	article	reply
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	["Haha", "I don't know"]
Gossiping	100	251	Firends	I don't have a friend...	["Haha", "I can be", "QQ"]
Joke	23	41	Knock	Knock! Knock! ...	["Then?", "What's the point ?"]
Joke	23	156	Santa Claus	Hold! Hold! Hold!	["XDD"]

Functional Dependency 2

Idea

- Requirements of the 3rd normal form
  - Must comply the 1st normal form
    - No array
  - Must comply the 2nd normal form
    - All fields must depend on primary keys
  - No non key-based FDs
    - Unless RHS of all non key-based FDs belongs to primary key

Step 1: To The 1st Normal Form

The 1st Normal Form: No array !!

fourm_name	popularity	post_id	title	article	reply
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	["Haha", "I don't know"]
Gossiping	100	251	Firends	I don't have a friend...	["Haha", "I can be", "QQ"]
Joke	23	41	Knock	Knock! Knock! ...	["Then?", "What's the point ?"]
Joke	23	156	Santa Claus	Hold! Hold! Hold!	["XDD"]

Step 1: To The 1st Normal Form

The 1st Normal Form: No array !!

fourm_name	popularity	post_id	title	article	reply_id	reply_content
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	1	Haha
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	2	I don't know
Gossiping	100	251	Firends	I don't have a friend...	1	Haha
Gossiping	100	251	Firends	I don't have a friend...	2	I can be
Gossiping	100	251	Firends	I don't have a friend...	3	QQ
Joke	23	41	Knock	Knock! Knock! ...	1	Then?
Joke	23	41	Knock	Knock! Knock! ...	2	What's the point ?
Joke	23	156	Santa Claus	Hold! Hold! Hold!	1	XDD

Note: "reply_id" is necessary to identify each content

Step 2: To The 2nd Normal Form

The 2nd Normal Form : All fields must depends on primary keys

fourm_name	popularity	post_id	title	article	reply_id	reply_content
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	1	Haha
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	2	I don't know
Gossiping	100	251	Firends	I don't have a friend…	1	Haha
Gossiping	100	251	Firends	I don't have a friend…	2	I can be
Gossiping	100	251	Firends	I don't have a friend…	3	QQ
Joke	23	41	Knock	Knock! Knock! …	1	Then?
Joke	23	41	Knock	Knock! Knock! …	2	What's the point ?
Joke	23	156	Santa Claus	Hold! Hold! Hold!	1	XDD

8

Step 2: To The 2nd Normal Form

The 2nd Normal Form : All fields must depends on primary keys

fourm_name	popularity	post_id	title	article	reply_id	reply_content
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	1	Haha
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	2	I don't know
Gossiping	100	251	Firends	I don't have a friend...	1	Haha
Gossiping	100	251	Firends	I don't have a friend...	2	I can be
Gossiping	100	251	Firends	I don't have a friend...	3	QQ
Joke	23	41	Knock	Knock! Knock! ...	1	Then?
Joke	23	41	Knock	Knock! Knock! ...	2	What's the point ?
Joke	23	156	Santa Claus	Hold! Hold! Hold!	1	XDD

Step 2: To The 2nd Normal Form

The 2nd Normal Form : All fields must depends on primary keys

A hidden dependency

fourm_name	popularity	post_id	title	article	reply_id	reply_content
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	1	Haha
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	2	I don't know
Gossiping	100	251	Firends	I don't have a friend...	1	Haha
Gossiping	100	251	Firends	I don't have a friend...	2	I can be
Gossiping	100	251	Firends	I don't have a friend...	3	QQ
Joke	23	41	Knock	Knock! Knock! ...	1	Then?
Joke	23	41	Knock	Knock! Knock! ...	2	What's the point ?
Joke	23	156	Santa Claus	Hold! Hold! Hold!	1	XDD

The Problems of This Table

- You cannot add a forum without a post and a reply
- You also cannot add a post without a reply

fourm_name	popularity	post_id	title	article	reply_id	reply_content
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	1	Haha
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	2	I don't know
Gossiping	100	251	Firends	I don't have a friend...	1	Haha
Gossiping	100	251	Firends	I don't have a friend...	2	I can be
Gossiping	100	251	Firends	I don't have a friend...	3	QQ
Joke	23	41	Knock	Knock! Knock! ...	1	Then?
Joke	23	41	Knock	Knock! Knock! ...	2	What's the point ?
Joke	23	156	Santa Claus	Hold! Hold! Hold!	1	XDD

Step 3: To The 3rd Normal Form

The 3rd Normal Form : No non key-based dependency
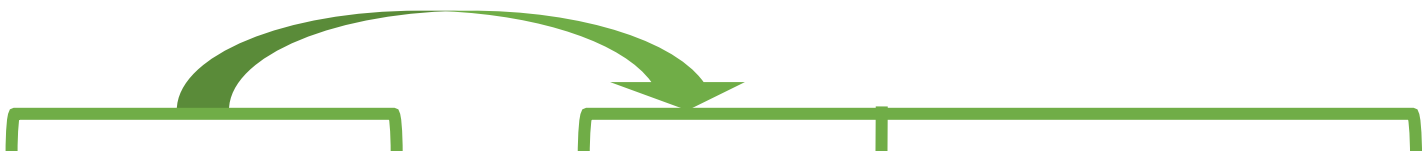
This dependency says the primary key must be "fourm_name"

fourm_name	popularity	post_id	title	article	reply_id	reply_content
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	1	Haha
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	2	I don't know
Gossiping	100	251	Firends	I don't have a friend…	1	Haha
Gossiping	100	251	Firends	I don't have a friend…	2	I can be
Gossiping	100	251	Firends	I don't have a friend…	3	QQ
Joke	23	41	Knock	Knock! Knock! …	1	Then?
Joke	23	41	Knock	Knock! Knock! …	2	What's the point ?
Joke	23	156	Santa Claus	Hold! Hold! Hold!	1	XDD

Step 3: To The 3rd Normal Form

This dependency says
the primary key must be {"fourm_name", "post_id"}

fourm_name	popularity	post_id	title	article	reply_id	reply_content
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	1	Haha
Gossiping	100	132	Girlfriend	How can I get girlfriend ?	2	I don't know
Gossiping	100	251	Firends	I don't have a friend...	1	Haha
Gossiping	100	251	Firends	I don't have a friend...	2	I can be
Gossiping	100	251	Firends	I don't have a friend...	3	QQ
Joke	23	41	Knock	Knock! Knock! ...	1	Then?
Joke	23	41	Knock	Knock! Knock! ...	2	What's the point ?
Joke	23	156	Santa Claus	Hold! Hold! Hold!	1	XDD

Step 3: To The 3rd Normal Form

Solution: Decompose it ! Done ?

fourm_name	post_id	title	article	reply_id	reply_content
Gossiping	132	Girlfriend	How can I get girlfriend ?	1	Haha
Gossiping	132	Girlfriend	How can I get girlfriend ?	2	I don't know
Gossiping	251	Firends	I don't have a friend...	1	Haha
Gossiping	251	Firends	I don't have a friend...	2	I can be
Joke	251	Firends	I don't have a friend...	3	QQ
Joke	41	Knock	Knock! Knock! ...	1	Then?
Joke	41	Knock	Knock! Knock! ...	2	What's the point ?
Joke	156	Santa Claus	Hold! Hold! Hold!	1	XDD

fourm_name	popularity
Gossiping	100
Joke	23

Step 3: To The 3ʳᵈ Normal Form

the primary key must be {"fourm_name", "post_id", "reply_id"}

The hidden dependency

fourm_name	post_id	title	article	reply_id	reply_content
Gossiping	132	Girlfriend	How can I get girlfriend ?	1	Haha
Gossiping	132	Girlfriend	How can I get girlfriend ?	2	I don't know
Gossiping	251	Firends	I don't have a friend…	1	Haha
Gossiping	251	Firends	I don't have a friend…	2	I can be
Gossiping	251	Firends	I don't have a friend…	3	QQ
Joke	41	Knock	Knock! Knock! …	1	Then?
		Knock	Knock! Knock! …	2	What's the point ?
	5	Santa Claus	Hold! Hold! Hold!	1	XDD

fourm_name	popularity
Gossiping	100
Joke	23

15

Step 3: To The 3rd Normal Form

Solution: Decompose it again !

fourm_name	post_id	title	article
Gossiping	132	Girlfriend	How can I get girlfriend ?
Gossiping	251	Firends	
Joke	41	Knock	
Joke	156	Santa Claus	

fourm_name	popularity
Gossiping	100
Joke	23

fourm_name	post_id	reply_id	reply_content
Gossiping	132	1	Haha
Gossiping	132	2	I don't know
Gossiping	251	1	Haha
Gossiping	251	2	I can be
Gossiping	251	3	QQ
Joke	41	1	Then?
Joke	41	2	What's the point ?
Joke	156	1	XDD

The Final Result

fourm_name	post_id	title	article
Gossiping	132	Girlfriend	How can I get girlfriend ?
Gossiping	251	Firends	I don't have a friend...
Joke	41	Knock	Knock! Knock!
Joke	156	Santa Claus	

fourm_name	popularity
Gossiping	100
Joke	23

fourm_name	post_id	reply_id	reply_content
Gossiping	132	1	Haha
Gossiping	132	2	I don't know
Gossiping	251	1	Haha
Gossiping	251	2	I can be
Gossiping	251	3	QQ
Joke	41	1	Then?
Joke	41	2	What's the point ?
Joke	156	1	XDD