CSC261 Project Milestone 3

Project Details

Name of the project: JsTube

Team number: 17
Team name: Jays Club
Group members:

Junfei Liu (jliu137)

• Jinghan Lu (jlu54)

• Jinghao Jiang (jjiang27)

Task A¹

Relation 1. USER

User_id	<u>User_name</u>	<u>Email</u>	Password	Membership
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For relation USER

• The primary key is User id

• The rest of the candidate keys (secondary keys) are User name and Email²

The set of Functional Dependencies are

• User id → User name

• User id \rightarrow Email

• User id → Password

• User id → Membership

• User name → User id

● User name → Email

• User name → Password

• User name → Membership

● Email → User_id

 \bullet Email \rightarrow User name

• Email → Password

• Email \rightarrow Membership

¹ All functional dependencies listed in Task A are minimal functional dependencies

² By our design, each <code>email</code> address can only be used to register for one account and <code>user_name</code> cannot be the same for different users

All other attributes Password and Membership cannot functionally determine other attributes within the relation:

- Two users (different User_id, User_name, and Email) may accidentally choose
 the same Password, so Password cannot functionally determine other attributes
 within this relation.
- Membership is a boolean variable, so according to the pigeonhole principle, whenever there are more than two tuples in this table, there will be different users (with different User_id, User_name, and Email) that have the same Membership status.

For each functional dependency FD, the left hand side attribute is itself a candidate key (also a superkey), so the relation is already in **BCNF**.

Relation 2. VIDEO

Video_name³ <u>Video_id</u>	User_id	Upload_time ⁴	Membership_ requirement	<u>Link</u>
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For relation VIDEO

- The primary key is Video id
- Since Link is unique to all videos, it is a secondary key in this relation

Set of Functional Dependencies:

- Video id → Video name
- Video id → User id
- Video id \rightarrow Upload time
- Video id → Membership requirement
- Video id \rightarrow Link
- Link → Video id
- Link → Video name
- Link → User id
- Link \rightarrow Upload time
- Link → Membership requirement

All attributes other than candidate keys cannot form functional dependencies on any attributes:

- Video_name: Different users can upload videos with the same title. So it is impossible for Video_name to functionally determine other attributes.
- User_id: The same user can upload videos on the same day, so in this case, they will get the same values for Upload day, Upload month and Upload year. But

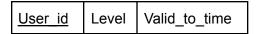
³ By our design, different video may have the same video name

⁴ We allow the same user to upload more than one video each day

- attributes Video_name, Video_id, Membership_requirement and Link are different in these tuples. So User id cannot functionally determine other attributes.
- Upload_time: Same as User_id, the same person can upload several videos on the same day. But attributes Video_name, Video_id, Membership_requirement and Link are different in these tuples.
- Membership_requirement: This is a boolean attribute. Same reason as Membership in USER relation.

For each functional dependency, the LHS are all candidate keys which are superkeys of the relation, so they are in BCNF.

Relation 3. MEMBERSHIP



For relation MEMBERSHIP

• The primary key is User id

Set of Functional Dependencies:

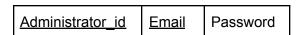
- User id → Level
- User id \rightarrow Valid to time

All attributes other than candidate keys cannot form functional dependencies on any attributes:

- Level: Same level will have many user tuples, all with different values for <code>User_id</code>, <code>Valid to time</code>. So <code>Level cannot functionally determine any attributes</code>.
- Valid_to_time: On the same date, there might be many users whose membership
 has expired. So these three attributes cannot form functional dependencies with other
 attributes.

For each functional dependency, the LHS are all candidate keys which are superkeys of the relation, so they are in BCNF.

Relation 4. ADMINISTRATOR



For relation ADMINISTRATOR

- The primary key is Administrator id
- The rest of the candidate keys (secondary keys) are Email

Set of Functional Dependencies:

• {Administrator id, Email} → Password

All other attributes Password cannot functionally determine other attributes within the relation:

• Two administrators (different Administrator_id and Email) may accidentally choose the same Password, so Password cannot functionally determine other attributes within this relation.

For each functional dependency, the LHS are all candidate keys which are superkeys of the relation, so they are in BCNF.

Relation 5. CASE

Case_id Administrator_id	Video_id	Туре	Report_user_id
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For relation CASE

• The primary key is Case_id

Set of Functional Dependencies:

- Case id \rightarrow Administrator id
- Case id → Video id
- Case id → Type
- Case id \rightarrow Report user id

All other attributes Administrator_id, Video_id, Type, Report_user_id cannot functionally determine other attributes within the relation:

- One administrator may have access to multiple cases, so Administrator_id cannot functionally determine other attributes.
- A video could be reported more than once, so there will be difference cases with the same Video_id.
- The Type of cases could be the same for different reported cases.
- A user may report many cases, so the Report_user_id cannot determine the specific case.

For each functional dependency, the LHS are all candidate keys which are superkeys of the relation, so they are in BCNF.

Relation 6. VIEW

<u>Video_id</u>	User_id	Times
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For relation VIEW

• The primary key is the combination of Video_id and User_id

The set of Functional Dependencies are

• {Video_id, User_id} → Times

All other attributes Times cannot functionally determine other attributes within the relation:

• The number of times a user has watched a video is not unique. A user could watch two different videos once each. Therefore, Times cannot functionally determine the other two attributes.

For each functional dependency, the LHS are all candidate keys which are superkeys of the relation, so they are in BCNF.