Stage IV – Elaboration: Design
CSC315 and ENG 371/HON 270
Group 6
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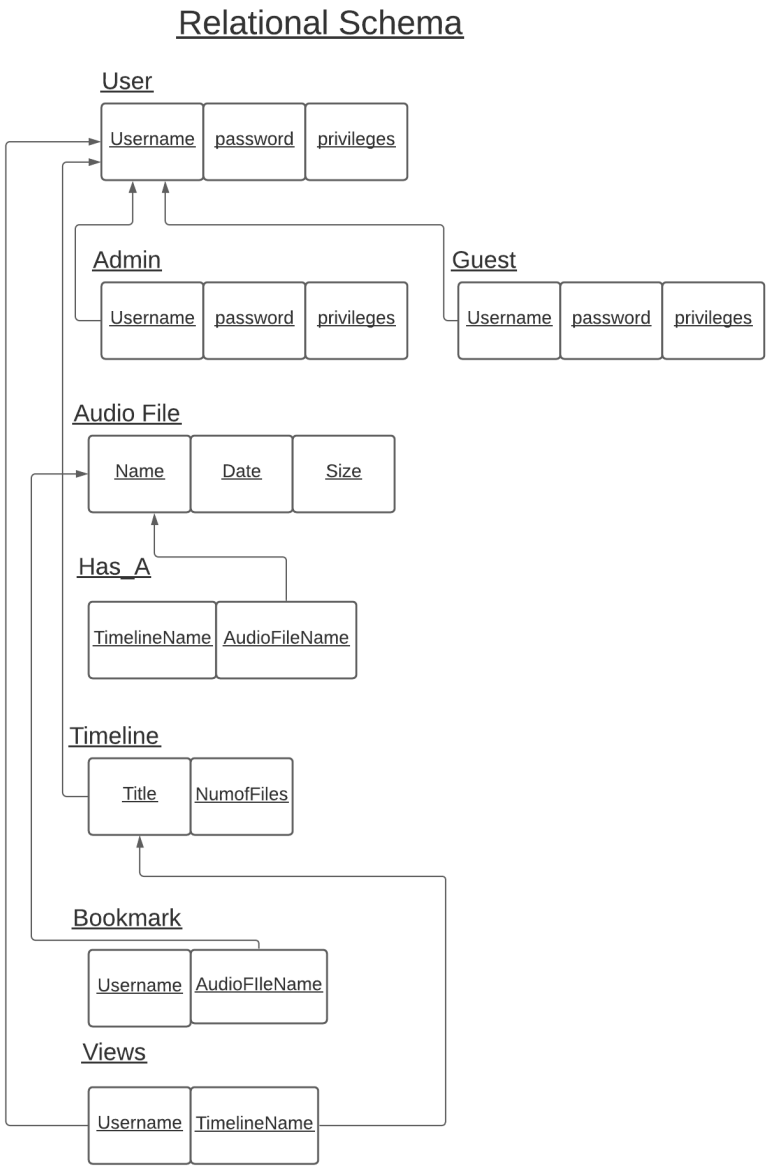
1. Review the Database Model document with stakeholders, and update the model as needed.

This is our updated relational schema, we deleted the attributes that we removed in order to normalize our tables to BCNF.



2. Demonstrate that all the relations in the relational schema are normalized to Boyce–Codd normal
form (BCNF).
• For each table, specify whether it is in BCNF or not, and explain why.
• For each table that is not in BCNF, show the complete process that normalizes it to BCNF.

User

Username	**password**	**privileges**
chrissmith42	lion3	admin
jackliddy5	windows5	admin
guest46	linux3	guest
newuser55	mac05	guest

Is it in BCNF?

- **1NF: All values are atomic, column names unique, values in each column belong to same domain**
- **2NF: No partial dependencies: Username is the only part of the candidate key**
- **3NF: No transitive dependency: there are no indirect relationships causing a functional dependency**
- **BCNF: Passes all other forms and all non prime attributes have a superkey**

Audio File

Name	**Date**	**Size**	**AudioFileID**
JHS 49	2016-10-13	37.9 MB	A1
JHS 33	2016-10-15	43.4 MB	A2
Segal, Mark Z.	1998-06-01	33.6 MB	A3
Cohen, Chester	1998-06-18	43.4 MB	A4

Is it in BCNF?

- **1NF: All values are atomic, column names unique, values in each column belong to same domain**
- **2NF: There is a partial dependency since Date and Size can be derived by just AudioFileID and it does not need to refer to both Name and AudioFileID.**

Normalizing to BCNF

Name	Date	Size
JHS 49	2016-10-13	37.9 MB
JHS 33	2016-10-15	43.4 MB
Segal, Mark Z.	1998-06-01	33.6 MB
Cohen, Chester	1998-06-18	43.4 MB

- **3NF: No transitive dependency: there are no indirect relationships causing a functional dependency**
- **BCNF: Passes all other forms and all non prime attributes have a superkey**

Timeline

Title	NumOfFiles	TimelineID
Oral History of Trenton	75	T1
Jewish History	65	T2

Is it in BCNF?

- **1NF: All values are atomic, column names unique, values in each column belong to same domain**
- **2NF: Partial dependencies: There is a partial dependency since NumOfFiles can be derived by just TimelineID it does not need to refer to both Title and TimelineID.**
- **This table is not in the BCNF because it has partial dependencies.**

Normalizing to BCNF

Title	NumOfFiles
Oral History of Trenton	75
Jewish History	65

- **We decided to normalize the table to BCNF by removing the TimelineID column since it is unnecessary to have if we do not allow duplicates for the Title attribute.**
- **3NF: No transitive dependency: there are less than three columns so it is not possible to have transitive dependencies.**
- **BCNF: Passes all other forms and all non prime attributes have a superkey**

Has_A

TimelineName	AudioFileName
T1	{A1,A2,A3,A5,A7}
T2	{A5,A7,A9,A11,A14}

Is it in BCNF?

- **1NF: All values are atomic, column names unique, values in each column belong to same domain**
- **2NF: No partial dependencies: TimelineID is the only part of the candidate key**
- **3NF: No transitive dependency: there are less than three columns**
- **BCNF: Passes all other forms and all non prime attributes have a superkey**

Bookmark

Username	TimelineID	TimelineTitle
chrissmith42	T1	Oral History of Trenton
jackliddy5	T2	Jewish History
guest46	T2	Jewish History
newuser55	T1	Oral History of Trenton

Is it in BCNF?

- **1NF: All values are atomic, column names unique, values in each column belong to same domain**
- **2NF: Partial dependencies: There is a partial dependency since TimelineTitle can be derived by just using TimelineName**
- **This table is not in the BCNF because it has partial dependencies.**

Normalizing to BCNF

Username	AudioFileName
chrissmith42	{A1,A2,A3,A5,A7}
jackliddy5	{A5,A7,A9,A11,A14}
guest46	{A5,A7,A9,A11,A14}

newuser55	{A1,A2,A3,A5,A7}

- **We decided to normalize the table to BCNF by removing the TimelineID and TimelineTitle columns since we decided to bookmark audio files instead. Users will only bookmark audio files, not timelines in this new approach.**
- **3NF: No transitive dependency: there are less than three columns so it is not possible to have transitive dependencies.**
- **BCNF: Passes all other forms and all non prime attributes have a superkey**

Views

Username	**TimelineName**
chrissmith42	Oral History of Trenton
jackliddy5	Jewish History
guest46	Jewish History
newuser55	Oral History of Trenton

Is it in BCNF?

- **1NF: All values are atomic, column names unique, values in each column belong to same domain**
- **2NF: No partial dependencies**
- **3NF: No transitive dependency: there are less than three columns**
- **BCNF: Passes all other forms and all non prime attributes have a superkey**

3. Define the different views (virtual tables) required. For each view list the data and transaction requirements. Give a few examples of queries, in English, to illustrate.

Order audio files chronologically in the Audio File table

chronological_view

Name	**Date**	**Size**
Segal, Mark Z.	1998-06-01	33.6 MB
Cohen, CHester	1998-06-18	43.4 MB

JHS 49	2016-10-13	37.9 MB
JHS 33	2016-10-15	43.4 MB

Select all usernames that are admins in the User table

admin_view

Username	**password**	**privileges**
chrissmith42	lion3	admin
jackliddy5	windows5	admin

Select all usernames that are guests in the User table

guest_view

Username	**password**	**privileges**
guest46	linux3	guest
newuser55	mac05	guest

Display all bookmarks for a specific username(ex: chrissmith42)

User_bookmarks_view

Username	**TimelineName**
chrissmith42	Oral History of Trenton

4. Design a complete set of SQL queries to satisfy the transaction requirements identified in the previous stages, using the relational schema and views defined in tasks 2 and 3 above.

chronological_view

```
CREATE VIEW chronological_view AS
SELECT * FROM Audio File
ORDER BY Date
```

admin_view

```
CREATE VIEW admin_view AS
SELECT * FROM User
WHERE privileges=admin
```

guest_view

```
CREATE VIEW guest_view AS
SELECT * FROM User
WHERE privileges=guest
```

User_bookmarks_view

```
CREATE VIEW User_bookmarks_view AS
SELECT * FROM Bookmark
WHERE Username=chrissmith42
```