**Data Base Systems**

**COMP2222 Team Project**

**Spring/2023**

Team members

Talha Güneş / 20SOFT1019

Enes Kanbur / 20SOFT1031

Birkan Ege Çorbacıoğlu / 21SOFT1038

Muhammet Vonal / 20SOFT1026

1. **How GUI was used ?**

**Main page :**

metin, ekran görüntüsü, yazı tipi, çizgi içeren bir resim

Açıklama otomatik olarak oluşturuldu

* Navigation: GUI gives users a visual representation of the functioning of the system and let them move between screens or windows. Users can navigate between parts by clicking on buttons, choosing items from menus, or using other graphical components.
* When the user logs in to the site, he/she encounters this screen. As you can see there are four general names that you might be interested in. The user can click on the button that he/she seeks more information about it.

**Student page:**

metin, yazı tipi, web sayfası, web sitesi içeren bir resim

Açıklama otomatik olarak oluşturuldu

* When user click on the student button, more specified links will meet the user. As the name of the link suggests, user can get more detailed information about it.

**For example if you want to access to grades of students:**

ekran görüntüsü, metin içeren bir resim

Açıklama otomatik olarak oluşturuldu

* User can list exam grades by filtering certain features of exams.
* Data entry and input: GUIs include forms or input fields where users can enter data, such as text, numbers, dates, or choices from dropdown menus. A keyboard, mouse, or other input device can be used by users to interact with these input areas.

**The screen that the user will encounter:**

ekran görüntüsü, metin, yazılım içeren bir resim

Açıklama otomatik olarak oluşturuldu

* Information display: GUIs are used to provide information to users in a logical and aesthetically pleasing way. This can involve displaying information in tables, charts, graphs, or other visual formats that facilitate user comprehension and information analysis.

**Instructor page:**

metin, web sayfası, yazı tipi, web sitesi içeren bir resim

Açıklama otomatik olarak oluşturuldu

* If user click on the instructor button despite of student button, he/she will encounter with this page.

**Projects page:**

ekran görüntüsü, metin, çizgi, sayı, numara içeren bir resim

Açıklama otomatik olarak oluşturuldu

You are viewing Projects page.

**Departments page:**

çizgi, metin, ekran görüntüsü, sayı, numara içeren bir resim

Açıklama otomatik olarak oluşturuldu

You are viewing Departments page.

**2 - Is the relational schema of your database in 2NF/3NF/BCNF?**

**3 – How would you improve this database?**

Buildingandroom:

2NF: BuildingName and roomNumber make up the primary key, which is composite.Since buildingName and roomNumber are both a component of the primary key, there are no partial dependencies. It is 2NF.

3NF: There is no transition dependency. So it is 3NF.

BCNF: It is BCNF since this table satisfies the requirements for BCNF LHS is super key and it is 3NF.

Course:

2NF: It has a courseCode single-column primary key.Since every non-key attribute is dependent on the complete main key, there are no partial dependencies.It is hence in 2NF.

3NF: Department, name, and id (primary key).Because there are no transitive dependencies, the table is in 3NF. Name and department are two non-key qualities that are totally dependent on the primary key (id).

BCNF: It is BCNF since this table satisfies the requirements for BCNF ''LHS is super key and it is 3nf.

Curricula:

2NF: Because currName and Dname are both main keys and gradOrUGrad depends on only currCode, so curricula is not 2NF. If ve set primary keys in seperate table, it will suit the 2NF rule.

CurriculaCourses:

2NF: The primary key is a composite of currCode, dName, and courseCode.Since every non-key attribute is dependent on the complete main key, there are no partial dependencies.It is hence in 2NF.

3NF: There is no transition dependency so it is 3NF.

BCNF: It is BCNF since this table satisfies the requirements for BCNF LHS is super key and it is 3nf.

Department:

2NF: The "dNumber" attribute acts as the primary key in the "department" database, which is designed in this way. The table shows that the values of the "dName," "budget," "headSsn," and "buildingName" attributes are determined by the "dNumber" attribute. Additionally, the primary key is necessary for all non-key properties. This information leads to the conclusion that the "department" table complies with Second Normal Form (2NF) specifications.

3NF: The "department" table is verified to be in Second Normal Form (2NF) because it complies with 2NF's specifications and has no transitive relationships. It follows that the table also satisfies the requirements of the Third Normal Form (3NF).

BCNF: The Third Normal Form (3NF) of the "department" table is confirmed because all non-key attributes are dependent on the "dName" attribute. This suggests that the table also satisfies the BCNF (Boyce-Codd Normal Form) requirements.

Emails:

2NF: It has a primary key with a single column (dName).Since every non-key attribute is dependent on the complete main key, there are no partial dependencies.It is hence in 2NF.

3NF: It is in 2NF, and there is no transition dependency.It is so in 3nf.

BCNF: It is BCNF since this table satisfies the requirements for BCNF ''LHS is super key and it is 3nf.

Enrollment:

2NF: Because sssn, semester, courseCode, yearr, sectorId, and issn are all primary keys, enrollment is not 2NF. ISN has no bearing on grade. Aside from hourr, dayy, buildingName, and roomNumber, not all main keys are required. We can fix that by seperating ssn and issn primary keys and set them as seperate tables. Grade attribute should be dependent to ssn primary key. Location, number and time features of clasrrom should be dependent to issn.

Examsofsection

2NF: The main key is a composite key made up of the following: examname, issn, courseCode, yearr, semester, and sectionId.Since every non-key attribute is dependent on the complete main key, there are no partial dependencies.It is hence in 2NF.

3NF: It is in 2NF, and there is no transition dependency.Thus, it is in 3nf.

BCNF: It is in bcnf because this table satisfies the requirement for bcnf that "LHS is super key, and it is 3nf."

Gradesperquestion:

2NF: The primary key is composite and includes the following information: qno, examname, issn, courseCode, yearr, semester, sectionId, and sssn.Since every non-key attribute is dependent on the complete main key, there are no partial dependencies.It is hence in 2NF.

3NF: It is in 2NF, and there is no transition dependency.Thus, it is in 3nf.

BCNF: This table satisfies the requirement for bcnf ''LHS is super key and it is 3nf, so it is BCNF.

Gradstudent:

2NF: It has a main key with a single column (ssn).Since every non-key attribute is dependent on the complete main key, there are no partial dependencies.It is hence in 2NF.

3NF: It is in 2NF, and there is no transition dependency.Thus, it is in 3nf.

BCNF: All of the non-key attributes are reliant on the "sssn" attribute because it is in 3nf.It is hence in bcnf.This table satisfies the requirement for bcnf LHS is super key, and it is 3nf."

Instructor:

2NF: The "ssn" attribute serves as the primary key for the "Instructor" database. The "ssn" property, according to the table, defines the values for "iName," "rankk," "baseSalary," "extraSalary," and "dName." Additionally, the primary key is necessary for all non-key properties.Therefore, 2NF

3NF: There is no transition dependency because it is in 2nf.It is so in 3nf.

Due to the fact that all non-key attributes are dependent on the "ssn" attribute, third normal form (3NF) is proven for the "Instructor" table. The table so also satisfies the requirements for the Boyce-Codd Normal Form (BCNF). This table satisfies the BCNF requirement that the table be in 3NF and that the left-hand side of functional dependencies be a super key.

Prevdegree:

2NF: College, degree, yearr, and Gradssn make up the composite primary key.Since every non-key attribute is dependent on the complete main key, there are no partial dependencies.It is hence in 2NF.

3NF: It is in 2NF, and there is no transition dependency.Thus, it is in 3nf.

BCNF: : It is in bcnf because this table satisfies the requirement for bcnf that "LHS is super key, and it is 3nf." because all of the characteristics are already keys: BuildClass.

Project:

2NF: The non-key attributes in this instance are controllingDName, subject, budget, startDate, and endDate.

a) Since they are not dependent on any subset of the primary key (leadSsn, pName), the subject, budget, startDate, and enddate are all completely dependent on it.

b) The controllingDName property does not rely on the whole main key. Only the pName attribute is necessary.

Due to the controllingDName attribute's partial dependency on the main key, the table does not meet 2NF.

3NF: The table must be in 2NF and contain no transitive dependencies in order to meet 3NF. To put it another way, no non-key attribute ought to be dependent on another non-key attribute.

In this instance, the controllingDName property of the table is somewhat dependent on the non-key attribute pName. The characteristics can be divided into two tables in order to eliminate this transitive dependency and obtain 3NF:

Project details are listed in Table 1 (leadSsn, pName, subject, budget, startDate, enddate).

Department (pName, controllingDName) in Table 2.

The transitive dependency is eliminated by making a new table for the controllingDName attribute, and the table now satisfies 3NF.

BCNF: Boyce-Codd Normal Form (BCNF): This more stringent normalization technique demands the absence of any non-trivial dependencies in cases where the determinant is not a candidate key.

Due to the controllingDName attribute's partial dependency on the non-key property pName, the table in this instance does not meet BCNF. In order to obtain BCNF, we must divide the table into two tables as previously indicated.

Project\_has\_grad\_student:

2NF:Since it depends solely on the primary key (leadSsn, pName, and GradSsn), the workingHour attribute is completely dependent on the key. The table therefore meets 2NF.

3NF: The table must be in 2NF and free of transitive dependencies in order to meet 3NF. To put it another way, no non-key attribute ought to be dependent on another non-key attribute.

Since the table in this instance doesn't contain any transitive dependencies or non-key characteristics, it immediately meets 3NF.

BCNF: The table has no non-trivial dependencies, and the primary key includes all of the properties. The table thus meets BCNF requirements.

Project\_has\_instructor:

2NF: Since it depends solely on the primary key (leadSsn, pName, and issn), the workinghour characteristic is completely dependent on the key. The table therefore meets 2NF.

3NF: The table automatically fulfills 3NF since it lacks transitive dependencies and non-key attributes.

BCNF: The table has no non-trivial dependencies, and the primary key includes all of the properties. The table thus meets BCNF requirements.

Questionofexam:

2NF: Since it doesn't depend on any subset of the primary key, the qpoints property is totally dependent on all of them (qno, examname, issn, courseCode, yearr, semester, and sectionId). The table therefore meets 2NF.

3NF: The table automatically fulfills 3NF since it lacks transitive dependencies and non-key attributes.

BCNF: The table has no non-trivial dependencies, and the primary key includes all of the properties. The table thus meets BCNF requirements.

Sectionn:

2NF: Since the quota attribute doesn't depend on any subset of the primary key (issn, courseCode, yearr, semester, or sectionId), it is completely dependent on all of them. The table therefore meets 2NF.

3NF: The table automatically fulfills 3NF since it lacks transitive dependencies and non-key attributes.

BCNF: The table has no non-trivial dependencies, and the primary key includes all of the properties. The table thus meets BCNF requirements.

Student:

2NF: It has a main key with a single column (sssn).Since every non-key attribute is dependent on the complete main key, there are no partial dependencies.It is hence in 2NF.

3NF: Name, major, and id (primary key).Because there are no transitive dependencies, the table is in 3NF. Name and major are two non-key qualities that are entirely dependent on the primary key (id).

BCNF: This table satisfies the requirement for bcnf 'LHS is super key and it is 3nf, so it is BCNF.

Studenttakingexam:

2NF: It has an examname, issn, courseCode, year, semester, sectionId, and sssn composite primary key.Since every non-key attribute is dependent on the complete main key, there are no partial dependencies.It is hence in 2NF.

3NF: No transition dependency so it is 3NF.

BCNF: Every attribute in a table depends on the key.

Timeslot:

2NF: It has a main key with a single column (timeslotid).Since every non-key attribute is dependent on the complete main key, there are no partial dependencies.It is hence in 2NF.

3NF:No transition dependency.

BCNF: Every attribute in a table depends on the key.

Weeklyschedule:

2NF: A composite primary key (timeslotid, day) is present.Since timeslotid and day are both a component of the primary key, there are no partial dependencies.It is hence in 2NF.

3NF:No transition dependency.

BCNF: Every attribute in a table depends on the key.