CASE STUDY

INFO-610-C02-SU2023 - ANALYSIS & DESIGN OF DATABASE SYSTEM

CREATING A DATABASE FOR CHRIST UNIVERSITY ACTIVITIES –

ERD

RELATIONAL MODEL IN POST-GRE SQL DATABASE

GROUP MEMBERS

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30-07–2023

ENTITY RELATIONSHIP DIAGRAM AND RELATIONAL MODEL IN POST-GRE SQL DATABASE

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Introduction

Welcome to our group's comprehensive database design assignment for CHRIST UNIVERSITY! As a team comprising Graceson, Sona, and Noel, we are excited to embark on this journey of creating an efficient and robust information management system for one of the esteemed educational institutions in India.

Our primary objective is to develop an Entity Relationship Diagram (ERD) and convert it into a relational model using a post-GRE SQL database. Through meticulous planning and thoughtful consideration of CHRIST UNIVERSITY's unique needs, we aim to create a unified database that optimally captures and organizes essential data related to various aspects of university life.

At the heart of our database lies the invaluable information of the students. By employing a student ID as the unique identifier, we will meticulously store their personal details, including their names, dates of birth (DOB), genders, and home addresses. Furthermore, we will maintain a comprehensive record of their academic journey, encompassing prior degrees attained and the specialization they have chosen for the PGDM program, which attracts students from diverse backgrounds across India.

To enhance the academic experience, our database will house an extensive catalog of courses offered throughout the two-year PGDM program. Each course will be distinguished by an alphanumeric course ID and enriched with crucial data, such as its name, description, credit allocation, and whether it is categorized as a core or elective course.

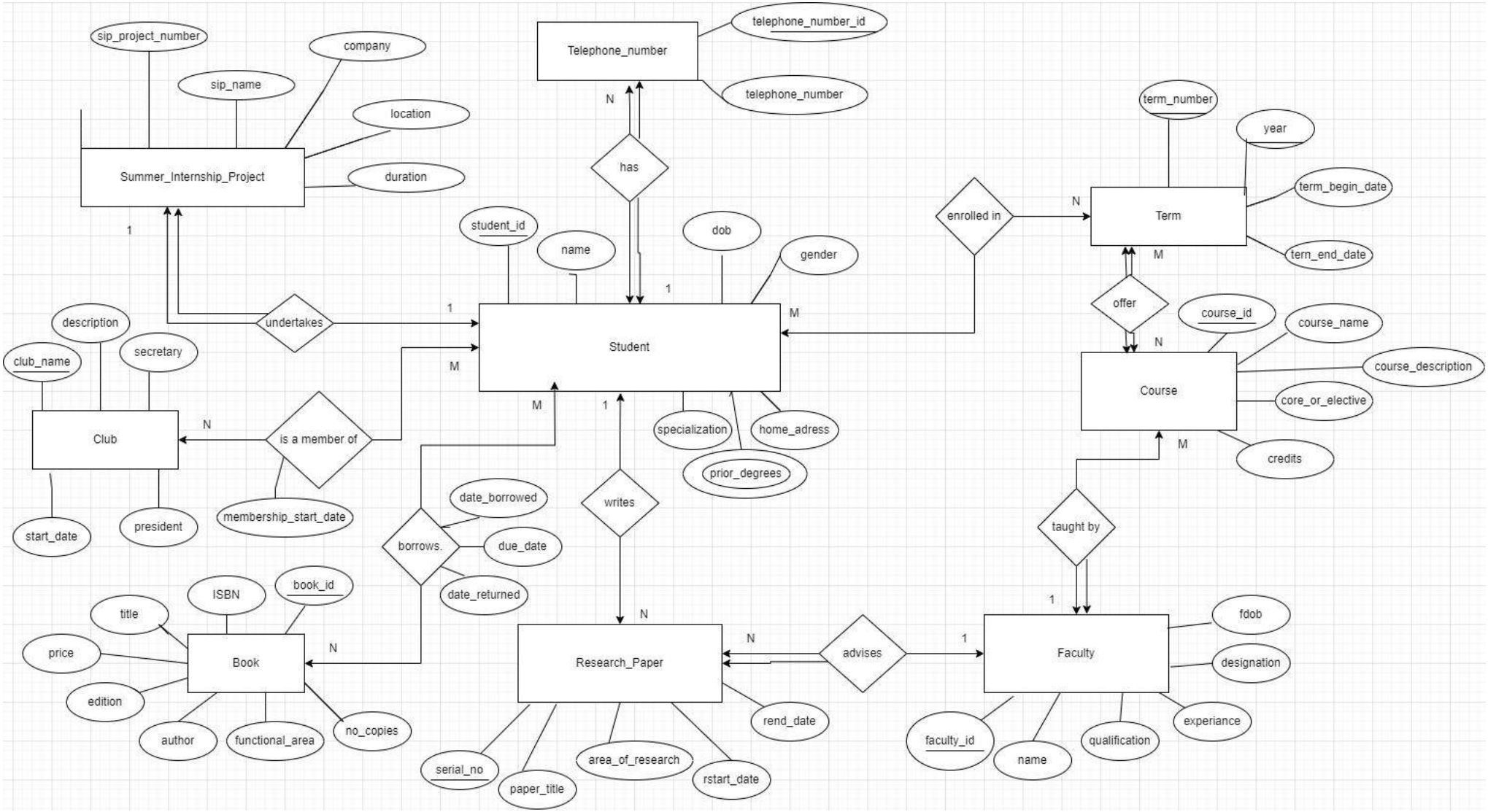
Efficiently managing student enrollment in courses is essential, and to facilitate this, we will create course_term associations. These associations will establish the links between students and the specific courses they undertake during each term, creating a holistic representation of the student's academic journey. Moreover, our design will also enable the mapping of faculty members to the course_term they teach, fostering effective communication between students and educators.

As we recognize the significance of holistic development, our database will extend its support to the university's library management system. By maintaining a comprehensive book catalog, complete with unique book IDs, ISBN numbers, titles, prices, editions, authors, functional areas, and available copies, we will enable students to easily access and borrow valuable academic resources. Furthermore, meticulous records of book borrowings, return dates, and due dates will enhance the library's efficiency in tracking and managing its vast collection.

Celebrating students' academic achievements, our database will showcase their research paper publications. Each research paper will be identified by a serial number and will include essential attributes, such as the paper's title, area of research, and collaborative efforts with faculty members for guidance.

In the spirit of fostering a vibrant campus life, we will capture club membership details, providing insights into the numerous clubs that students can be part of. Club names, descriptions, office-bearers (secretary and president), and membership start dates will offer a comprehensive understanding of the dynamic extracurricular activities available to students.

Lastly, we recognize the significance of real-world exposure and practical learning. Therefore, our database will encompass information about students' summer internship projects. Details like project numbers, names, companies, locations, durations, and descriptions will serve as valuable resources in showcasing students' professional development.With an unwavering commitment to excellence and precision, our group endeavors to design a user-friendly and robust database system that aligns perfectly with CHRIST UNIVERSITY's vision of providing quality education and holistic support to its diverse student community. By adhering to sound database principles and incorporating the specific needs of the university, our meticulously crafted ERD and relational model will undoubtedly serve as the cornerstone for the successful implementation of this vital information management system.


sip_project_number
company
sip_name
location
Summer_Internship_Project
duration
1
undertakes
1
description
club_name
secretary
Club
start_date
president
N
is a member of
membership_start_date
M
Telephone_number
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Research_Paper
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advises
1
enrolled in
N
Term
term_number
year
term_begin_date
tern_end_date
M
offer
N
course_id
course_name
course_description
core_or_elective
Course
credits
M
taught by
1
Faculty
fdob
designation
experiance
qualification
faculty_id
name

The explanation for the ERD drawn:

1. Each Course is ALWAYS associated with 1 to M Terms via the relationship “offers.”
2. Each Term is ALWAYS associated with 1 to N Courses via the relationship “offers."
3. Each Course is SOMETIMES associated with 0 to 1 Faculty via the relationship "taught by.”
4. Each Faculty is ALWAYS associated with 0 to M Course via the link "taught by.”
5. Each Student is SOMETIMES associated with 0 to N Books via the relationship “borrows.”
6. Each Book is SOMETIMES associated with 0 to M Student via the relationship “borrows."
7. Each Student is SOMETIMES associated with 0 to M Research_Papers via the relationship “writes.”
8. Each Research_Paper is SOMETIMES associated with 0 to 1 Student via the relationship “writes."
9. Each Faculty is sometimes associated with 0 to M Research_Papers via the relationship “advice."
10. Each Research_Paper is ALWAYS associated with 0 to 1 Faculty via the relationship “advice."

11. Each Student is SOMETIMESassociated with 0 to N Clubs via the relationship "is a member of.”

12. Each Club is SOMETIMES associated with the 0 to M Student via the relationship "is a member of.”

13. Each Student is SOMETIMES associated with 0 to 1 Summer_Internship_Project via the relationship “undertakes.”

14. Each Summer_Internship_Project is ALWAYS associated with 0 to 1 Student via the relationship “undertakes.”

15. Each Student is SOMETIMES associated with 0 to N Terms via the relationship “enrolled in.”

16. Each Term is SOMETIMES associated with 0 to M Student via the relationship “enrolled in.”

17. Each Student is ALWAYS associated with 1 to M Telephone_Number via the relationship “has.”

18. Each Telephone_Number is ALWAYS associated to 1 Student via the relationship “has."

Creating tables in database

```
-- Student
CREATE TABLE Student (
  student_id VARCHAR(10) PRIMARY KEY,
  student_name VARCHAR(100) NOT NULL,
  student_DOB DATE NOT NULL,
  Gender VARCHAR(10) NOT NULL,
  home_address VARCHAR(200) NOT NULL,
  specialization VARCHAR(100) NOT NULL
);

-- student_telephone
CREATE TABLE Student_Telephone_Number(
```

```
  telephone_id SERIAL PRIMARY KEY,
  fk_student_id VARCHAR(10) NOT NULL,
  telephone_number VARCHAR(20) NOT NULL,
  FOREIGN KEY (fk_student_id) REFERENCES student(student_id) ON DELETE CASCADE
);

-- studenstudent_priordegree
CREATE TABLE Student_PriorDegree (
  fk_student_id VARCHAR(10) NOT NULL,
  degree_name VARCHAR(100) NOT NULL,
  PRIMARY KEY (fk_student_id,degree_name),
  FOREIGN KEY (fk_student_id) REFERENCES student(student_id) ON DELETE CASCADE
);

-- term
CREATE TABLE Term(
```

```
  term_number INTEGER NOT NULL,
  term_year INTEGER NOT NULL,
  term_begin_date DATE NOT NULL,
  term_end_date DATE NOT NULL,
  PRIMARY KEY (term_number,term_year)
);

-- Faculty table
CREATE TABLE Faculty (
  faculty_id VARCHAR(8) PRIMARY KEY,
  faculty_name VARCHAR(100) NOT NULL,
  qualification VARCHAR(200) NOT NULL,
  experience INT NOT NULL,
  designation VARCHAR(100) NOT NULL,
  faculty_DOB DATE NOT NULL
);
```

```
-- course
CREATE TABLE Course (
  course_id VARCHAR(8) PRIMARY KEY,
  course_name VARCHAR(200) NOT NULL,
  course_description VARCHAR(300) NOT NULL,
  core_or_elective VARCHAR(20) NOT NULL,
  credits INT NOT NULL,
  fk_faculty_id VARCHAR(8) NOT NULL,
  FOREIGN KEY(fk_faculty_id) REFERENCES Faculty(faculty_id)
);

-- student_term
CREATE TABLE Student_Term (
  fk_student_id VARCHAR(10) NOT NULL,
  fk_term_number INTEGER NOT NULL,
```

```
  fk_term_year INTEGER NOT NULL,
  PRIMARY KEY (fk_student_id,fk_term_number,fk_term_year),
  FOREIGN KEY (fk_student_id) REFERENCES Student(student_id),
  FOREIGN KEY (fk_term_number, fk_term_year) REFERENCES Term(term_number, term_year) ON
DELETE CASCADE
);

-- term_course
CREATE TABLE Term_Course (
  fk_term_number INTEGER NOT NULL,
  fk_term_year INTEGER NOT NULL,
  fk_course_id VARCHAR(8) NOT NULL,
  PRIMARY KEY (fk_term_number, fk_term_year, fk_course_id),
  FOREIGN KEY (fk_term_number, fk_term_year) REFERENCES Term(term_number, term_year) ON
DELETE CASCADE,
  FOREIGN KEY (fk_course_id) REFERENCES Course(course_id) ON DELETE CASCADE
```

```
);

-- ResearchPaper table
CREATE TABLE Research_Paper (
  serial_no INT PRIMARY KEY,
  paper_title VARCHAR(200) NOT NULL,
  area_of_research VARCHAR(100) NOT NULL,
  start_date DATE NOT NULL,
  end_date DATE NOT NULL,
  fk_student_id VARCHAR(10) NOT NULL REFERENCES Student(student_id),
  fk_faculty_id VARCHAR(8) NOT NULL REFERENCES Faculty(faculty_id)
);

-- LibraryBook table
CREATE TABLE Library_Book (
  book_id VARCHAR(8) PRIMARY KEY,
```

```
  ISBN VARCHAR(20) NOT NULL,
  title VARCHAR(200) NOT NULL,
  price DECIMAL NOT NULL,
  edition VARCHAR(50),
  author VARCHAR(200),
  functional_area VARCHAR(100) NOT NULL,
  no_copies INTEGER NOT NULL
);

-- BorrowedBook table
CREATE TABLE Borrowed_Book (
  fk_book_id VARCHAR(8) not NULL ,
  fk_student_id VARCHAR(10) not NULL,
  PRIMARY KEY(fk_book_id,fk_student_id),
  date_borrowed DATE NOT NULL,
  duedate DATE NOT NULL,
```

```
  date_returned DATE,
  FOREIGN KEY (fk_book_id) REFERENCES Library_Book(book_id),
  FOREIGN KEY (fk_student_id) REFERENCES student(student_id)
);

-- Club table
CREATE TABLE Club (
  club_name VARCHAR(10) PRIMARY KEY,
  club_description VARCHAR(200) NOT NULL,
  club_secretary VARCHAR(100) NOT NULL,
  club_president VARCHAR(100) NOT NULL,
  club_start_date DATE not NULL
);

-- Student_Club table
CREATE TABLE Student_Club (
```

```
  fk_student_id VARCHAR(10) not NULL,
  fk_club_name VARCHAR(10) not NULL,
  membership_start_date DATE NOT NULL,
  PRIMARY KEY (fk_student_id, fk_club_name),
  FOREIGN key (fk_club_name) REFERENCES Club(club_name),
  FOREIGN KEY (fk_student_id) REFERENCES student(student_id)
);

-- SIP table
CREATE TABLE SIP (
  SIP_Project_No INT PRIMARY KEY,
  SIP_Name VARCHAR(200) NOT NULL,
  company VARCHAR(200) not NULL,
  sip_location VARCHAR(100) NOT NULL,
  Duration INT NOT NULL,
  Description VARCHAR(300) not NULL,
```

```
  fk_student_id VARCHAR(10) not NULL,
  FOREIGN KEY (fk_student_id) REFERENCES student(student_id)
);
```

Insert values Into tables

```
-- Student
INSERT INTO Student (student_id, student_name, student_DOB, Gender, home_address, specialization)
VALUES
  ('S001', 'John Doe', '1995-05-15', 'Male', '123 Main St, City', 'Marketing'),
  ('S002', 'Jane Smith', '1994-09-30', 'Female', '456 Elm St, Town', 'Finance'),
  ('S003', 'Alice Johnson', '1996-07-20', 'Female', '789 Oak St, Village', 'Human Resources'),
  ('S004', 'Michael Lee', '1997-11-05', 'Male', '321 Pine St, Town', 'Operations Management'),
```

```
  ('S005', 'Emily Chen', '1995-03-12', 'Female', '111 Maple St, City', 'Finance')



-- Student_Telephone_Number
INSERT INTO Student_Telephone_Number (fk_student_id, telephone_number)
VALUES
  ('S001', '123-456-7890'),
  ('S001', '987-654-3210'),
  ('S002', '555-555-5555'),
  ('S003', '111-222-3333'),
  ('S003', '444-555-6666'),
  ('S004', '777-888-9999')

-- Student_PriorDegree
INSERT INTO Student_PriorDegree (fk_student_id, degree_name)
VALUES
```

```
  ('S001', 'Bachelor of Science'),
  ('S001', 'Bachelor of Arts'),
  ('S002', 'Bachelor of Commerce'),
  ('S003', 'Bachelor of Science'),
  ('S003', 'Bachelor of Business Administration'),
  ('S004', 'Bachelor of Engineering'),
  ('S005', 'Bachelor of Commerce')

-- Term
INSERT INTO Term (term_number, term_year, term_begin_date, term_end_date)
VALUES
  (1, 2023, '2023-01-10', '2023-03-15'),
  (2, 2023, '2023-04-05', '2023-06-10'),
  (3, 2023, '2023-07-01', '2023-09-15'),
  (1, 2024, '2024-01-10', '2024-03-15')
```

```
-- Faculty
INSERT INTO Faculty (faculty_id, faculty_name, qualification, experience, designation, faculty_DOB)
VALUES
 ('F001', 'Professor Smith', 'Ph.D. in Economics', 15, 'Professor', '1970-08-25'),
 ('F002', 'Dr. Johnson', 'Ph.D. in Marketing', 10, 'Associate Professor', '1980-05-10'),
 ('F003', 'Dr. Elizabeth Williams', 'Ph.D. in Human Resources', 12, 'Associate Professor', '1982-04-18'),
 ('F004', 'Professor James Anderson', 'Ph.D. in Operations Management', 20, 'Professor', '1975-11-30')

-- Course
INSERT INTO Course (course_id, course_name, course_description, core_or_elective, credits, fk_faculty_id)
VALUES
 ('C001', 'Economics 101', 'Introduction to Microeconomics', 'Core', 3, 'F001'),
```

```
  ('C002', 'Marketing 201', 'Marketing Strategies', 'Core', 4, 'F002'),
  ('C003', 'Human Resource Management', 'People Management in Organizations', 'Core', 4, 'F003'),
  ('C004', 'Operations Planning', 'Supply Chain and Operations Strategy', 'Core', 3, 'F004'),
  ('C005', 'Financial Management', 'Corporate Finance and Investment Decisions', 'Core', 4, 'F001')


-- Student_Term
INSERT INTO Student_Term (fk_student_id, fk_term_number, fk_term_year)
VALUES
  ('S001', 1, 2023),
  ('S001', 2, 2023),
  ('S002', 1, 2023),
  ('S003', 2, 2023),
  ('S004', 3, 2023),
  ('S005', 1, 2024)
```

```
-- Term_Course
INSERT INTO Term_Course (fk_term_number, fk_term_year, fk_course_id)
VALUES
  (1, 2023, 'C001'),
  (2, 2023, 'C001'),
  (1, 2023, 'C002'),
  (3, 2023, 'C003'),
  (3, 2023, 'C004'),
  (1, 2024, 'C003')

-- Research_Paper
INSERT INTO Research_Paper (serial_no, paper_title, area_of_research, start_date, end_date,
fk_student_id, fk_faculty_id)
VALUES
  (1, 'Consumer Behavior Study', 'Marketing', '2023-02-15', '2023-04-20', 'S002', 'F002'),
```

(2, 'Supply Chain Optimization', 'Operations Management', '2023-06-10', '2023-08-20', 'S004', 'F004'),

(3, 'Financial Analysis', 'Finance', '2024-02-05', '2024-04-15', 'S005', 'F001')

-- Library_Book

INSERT INTO Library_Book (book_id, ISBN, title, price, edition, author, functional_area, no_copies)

VALUES

('B001', '978-0-12-345678-9', 'Introduction to Finance', 45.99, '2nd Edition', 'John Smith', 'Finance', 5),

('B002', '978-0-987654-3', 'Organizational Behavior', 30.99, '4th Edition', 'Andrew Davis', 'Human Resources', 3),

('B003', '978-0-654321-0', 'Operations Management: Concepts and Applications', 52.99, '5th Edition', 'Lisa Adams', 'Operations Management', 5)

-- Borrowed_Book

```
INSERT INTO Borrowed_Book (fk_book_id, fk_student_id, date_borrowed, duedate, date_returned)
VALUES
  ('B001', 'S001', '2023-03-01', '2023-03-15', NULL),
  ('B002', 'S003', '2023-03-15', '2023-03-30', NULL),
  ('B002', 'S004', '2023-07-05', '2023-07-20', NULL),
  ('B003', 'S005', '2024-02-20', '2024-03-05', NULL)

-- Club
INSERT INTO Club (club_name, club_description, club_secretary, club_president, club_start_date)
VALUES
  ('ChessClub', 'Chess enthusiasts club', 'John Doe', 'Jane Smith', '2023-01-15'),
  ('DebateClub', 'Debating society for students', 'Alice Johnson', 'Michael Lee', '2023-02-10'),
  ('SportsClub', 'Sports enthusiasts club', 'Emily Chen', 'John Doe', '2023-01-20')


-- Student_Club
```

```
INSERT INTO Student_Club (fk_student_id, fk_club_name, membership_start_date)
VALUES
  ('S001', 'ChessClub', '2023-01-15'),
  ('S003', 'DebateClub', '2023-02-10'),
  ('S004', 'SportsClub', '2023-01-20'),
  ('S005', 'SportsClub', '2023-01-20')

-- SIP
INSERT INTO SIP (SIP_Project_No, SIP_Name, company, sip_location, Duration, Description,
fk_student_id)
VALUES
  (1, 'Market Research Project', 'ABC Corporation', 'City', 8, 'Research on consumer behavior',
'S002'),
  (2, 'Supply Chain Optimization at XYZ Corp', 'XYZ Corporation', 'City', 6, 'Optimizing supply chain
processes', 'S004'),
  (3, 'Financial Analysis at ABC Bank', 'ABC Bank', 'Town', 10, 'Analyzing financial statements', 'S005')
```

Conclusion

In conclusion, our group case study has successfully culminated in the design of a robust and comprehensive database for CHRIST UNIVERSITY. Throughout the assignment, Graceson, Sona, and Noel collaborated to create an efficient information management system that caters to the diverse needs of the university's student community.

By meticulously crafting the Entity Relationship Diagram (ERD) and converting it into a relational model using a post-GRE SQL database, we have established a solid foundation for the implementation of this essential tool. The database is tailored to effectively store and organize critical information about students, faculty, courses, library resources, research papers, clubs, and summer internship projects.

Through our design, we have addressed the specific requirements of CHRIST UNIVERSITY's academic environment. The student-centric approach ensures seamless access to personal details,

academic records, and club memberships, supporting a holistic understanding of each student's journey within the university.

Our database also strengthens the university's academic operations, facilitating efficient course management and faculty allocation. By linking faculty members to the courses they teach and students to the courses they take, the database fosters a collaborative learning environment.

Library management has been enhanced with a comprehensive book catalog and a sophisticated tracking system for book borrowings and returns. This feature empowers students with easy access to valuable academic resources and optimizes the library's resource allocation.

Furthermore, the database highlights students' academic accomplishments through research paper publications. The inclusion of research paper details emphasizes the university's commitment to nurturing scholarly contributions and academic excellence.

Additionally, the database captures valuable insights into students' professional development through their summer internship projects. By documenting project details, companies, and durations, the university can better support students' real-world exposure and professional growth.

Overall, our group case study's conclusion is marked by the successful creation of a user-friendly, efficient, and well-structured database for CHRIST UNIVERSITY. We are confident that this information management system will greatly contribute to streamlining administrative processes, improving data accessibility, and supporting the university's mission to provide quality education to its diverse student body.

As we conclude this case study, we recognize the significance of a collaborative approach and the integration of cutting-edge technology to achieve organizational goals. We express our gratitude for the opportunity to work on this assignment and are hopeful that our efforts will have a positive impact on the university's academic landscape.