ResearchSYNC

Submitted to:

Dr. Reza Vaezi

IS3280 – Data Management

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Our project was to devise a database solution that would allow Coles College Business Administration Program to keep track of student progress as well as research and teaching interests of faculty and doctoral students. This program allows the addition of new faculty and students using forms, as well as the addition of new research modules. This program also generates a variety of reports based on the given data. Using this program, the users within the administration will be able to facilitate faculty/student matches for academic work as well as enrich research seminars with faculty expertise. Our program was funded by our sponsors within the ISSD and Coles College.

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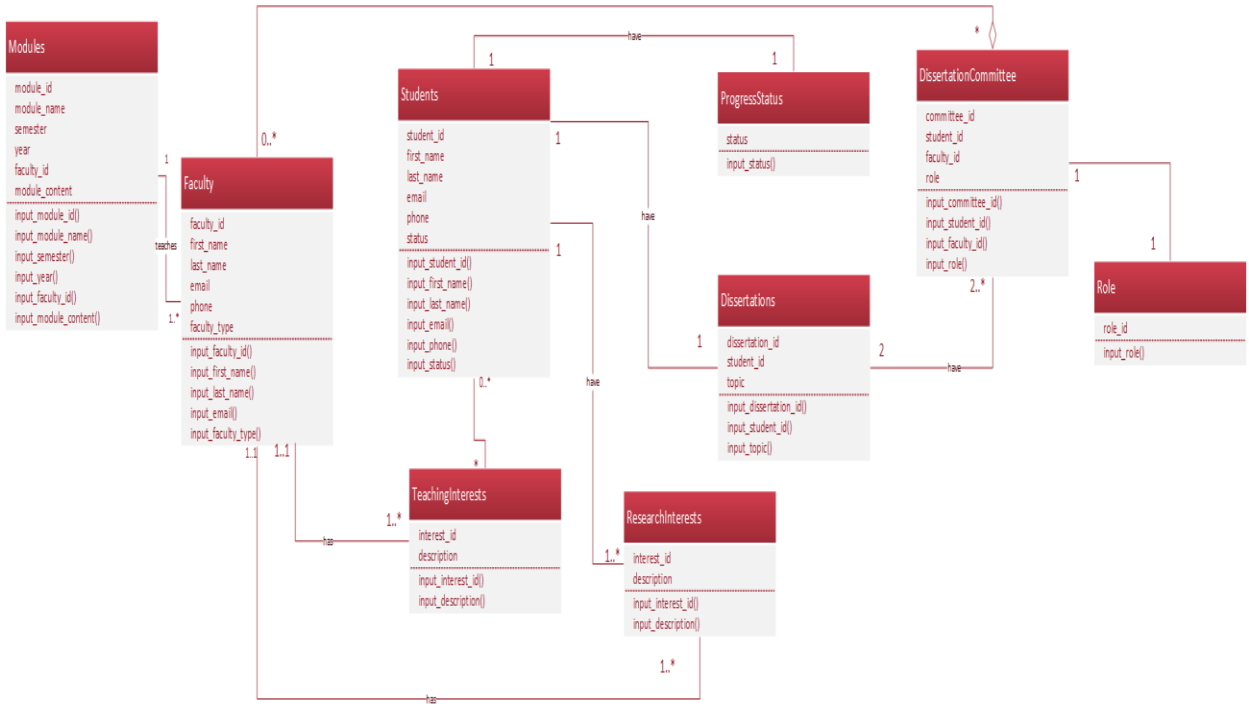
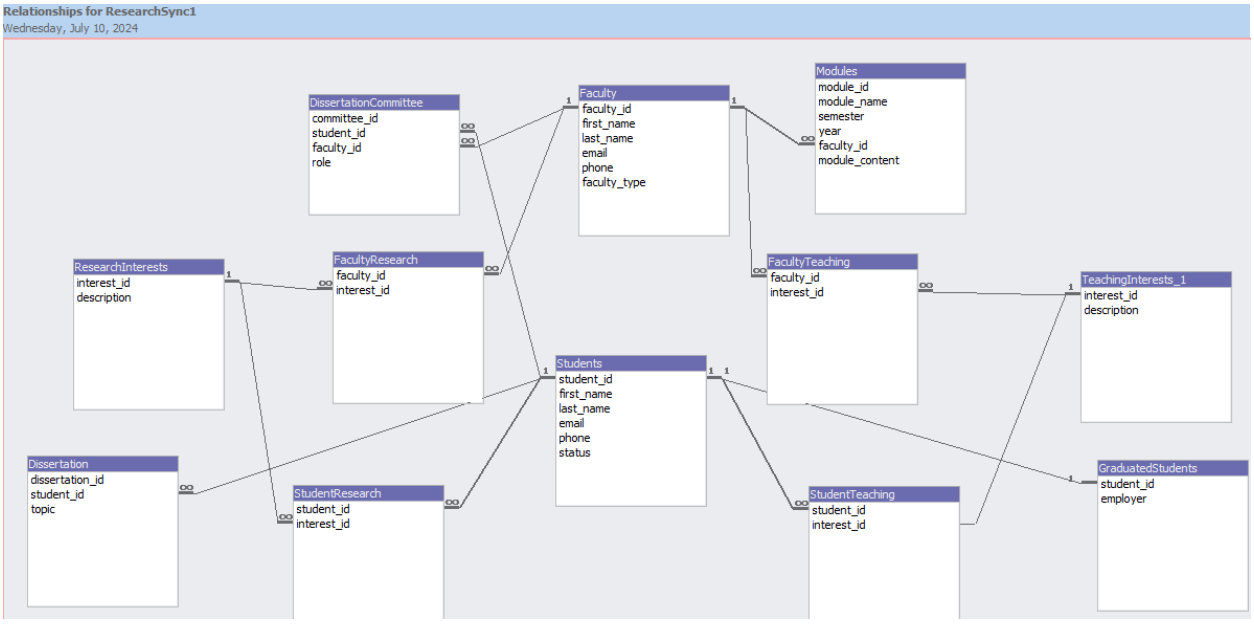
Class Diagram



The above Class Diagram showcases classes, their attributes, and operations. There are association relationships between classes which are acknowledged in connecting lines. There is an aggregate relationship between faculty and the Dissertation Committee. The cardinalities of each association are also shown as per the business rules in the rubric.

Relational Model



Data Dictionary

Table	Field Name	Key	Data	Description	Constraints

			type		
Faculty	Faculty_id	primary	integer	Unique identifier for faculty	Auto-increment, Not null
Faculty	First_name		char	First name of the faculty member	Not null
Faculty	Last_name		char	Last name of the faculty member	Not null
Faculty	Email		char	Email address of the faculty member	
Faculty	Phone		char	Phone number of the faculty member	
Faculty	Faculty_type		char	Job status/role held by staff member	
Modules	Module_id	primary	integer	Unique module identifier	Auto-increment, Not null
Modules	Module_name		char	Title of module	
Modules	Semester		char	Semester in which module was taught	
Modules	Year		char	Year in which module was taught	
Modules	Faculty_id	foreign	integer	Unique identifier for faculty	References Faculty(Faculty_id)
Modules	Module_content		char	Module content that was being instructed or taught	
FacultyTeaching	Faculty_id	foreign	integer	Unique identifier for faculty	References Faculty(Faculty_id)
FacultyTeaching	Interest_id	foreign	integer	Foreign key referencing TeachingInterests (Interest_id)	
FacultyResearch	Faculty_id	foreign	integer	Foreign key referencing Faculty (faculty_id)	References Faculty(Faculty_id)
FacultyResearch	Interest_id	foreign	integer	Foreign key referencing ResearchInterests (Interest_id)	
TeachingInterests	Interest_id		integer	Unique identifier for teaching interest	
TeachingInterests	description		char	Description/name of interest	
GraduatedStudents	Student_id	foreign	integer	Foreign key referencing Students(Student_id)	References Students(Student_id)
GraduatedStudents	Employer		char	Name of employer student works for	
StudentTeaching	Student_id	foreign	integer	Foreign key referencing Students(Student_id)	References Students(Student_id)
StudentTeaching	Interest_id	foreign	integer	Foreign key referencing Students(Student_id)	
Students	Student_id	primary	integer	Unique student identifier	Auto-increment, Not null
Students	First_name		char	First name of the student	Not null
Students	Last_name		char	Last name of the student	Not null
Students	Email		char	Email address of the student	
Students	Phone		char	Phone number of the student	
Students	status		char	Student classification (I.e first-year, second-year, etc.)	

StudentResearch	Student_id	foreign	integer	Foreign key referencing Students (Student_id)	References Students(Student_id)
StudentResearch	Interest_id	foreign	integer	Foreign key referencing ResearchInterests (Interest_id)	
Dissertation	Dissertation_id	primary	integer	Unique identifier for dissertations	Auto-increment, Not null
Dissertation	Student_id	foreign	integer	Foreign key referencing Students (Student_id)	References Students(Student_id)
Dissertation	topic		char		
DissertationCommittee	Committee_id	primary	integer	Unique identifier for respective committee	
DissertationCommittee	Student_id	foreign	integer	Foreign key referencing Students (Student_id)	References Students(Student_id)
DissertationCommittee	Faculty_id	foreign	integer	Identifies which staff member is working on which dissertation	References Faculty(Faculty_id)
DissertationCommittee	role		char	Discerns committee member roles (i.e chair, second ,reader, etc.)	
ResearchInterests	Interest_id	primary	integer	Unique identifier for research interest	Auto-increment, Not null
ResearchInterests	description		char	Description of research interest	

Query Purpose

Query Question	Purpose	SQL Statement
Dissertation Committee Information Query	The Dissertation Committee query shows records of the specific student presenting their dissertation, the serving members on the chair and readers.	SELECT Students.first_name AS StudentFirstName, Students.last_name AS StudentLastName, Faculty.first_name AS FacultyFirstName, Faculty.last_name AS FacultyLastName, DissertationCommittee.role FROM Students INNER JOIN (Faculty INNER JOIN DissertationCommittee ON (Faculty.faculty_id = DissertationCommittee.faculty_id) AND (Faculty.faculty_id = DissertationCommittee.faculty_id)) ON (Students.student_id = DissertationCommittee.student_id) AND (Students.student_id = DissertationCommittee.student_id);

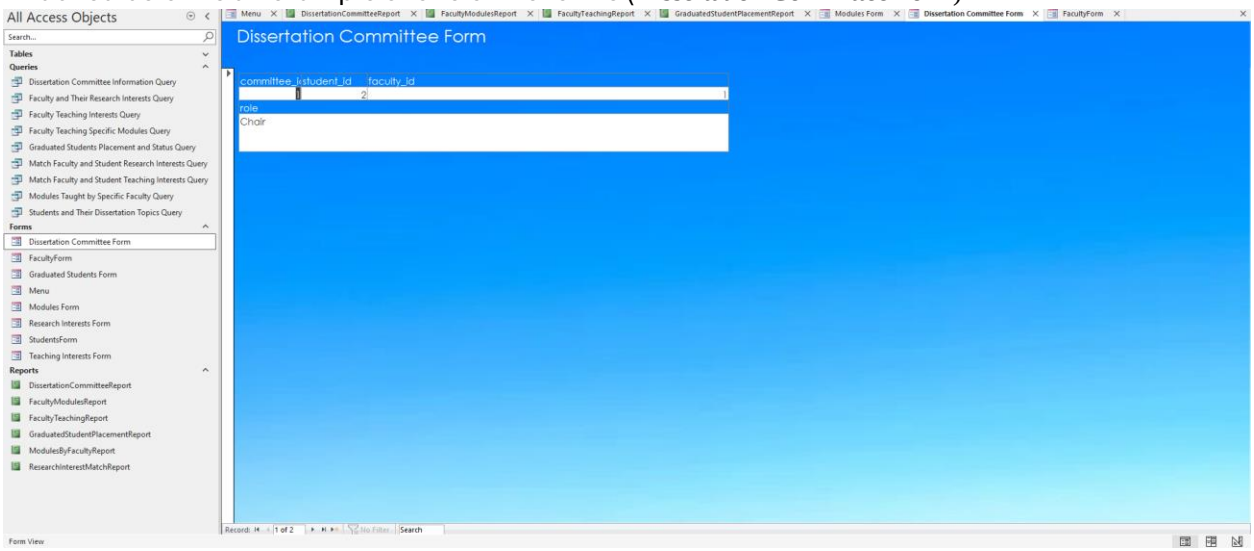
Faculty and their research interests Query	Allows faculty to enter their faculty ID and express their research interests	SELECT Faculty.first_name AS FacultyFirstName, Faculty.last_name AS FacultyLastName, ResearchInterests.description AS ResearchInterest FROM (Students INNER JOIN Dissertation ON Students.student_id = Dissertation.student_id) INNER JOIN ((ResearchInterests INNER JOIN (Faculty INNER JOIN FacultyResearch ON (Faculty.faculty_id = FacultyResearch.faculty_id) AND (Faculty.faculty_id = FacultyResearch.faculty_id)) ON (ResearchInterests.interest_id = FacultyResearch.interest_id) AND (ResearchInterests.interest_id = FacultyResearch.interest_id)) INNER JOIN StudentResearch ON ResearchInterests.interest_id = StudentResearch.interest_id) ON Students.student_id = StudentResearch.student_id;
Faculty Teaching Interests Query	Displays faculty identificiation as well as teaching interests (i.e. Database systems, Systems Engineering)	SELECT Faculty.first_name, Faculty.last_name, TeachingInterests.description FROM (Faculty INNER JOIN FacultyTeaching ON (Faculty.faculty_id = FacultyTeaching.faculty_id) AND (Faculty.faculty_id = FacultyTeaching.faculty_id)) INNER JOIN TeachingInterests ON (TeachingInterests.interest_id = FacultyTeaching.interest_id) AND (FacultyTeaching.interest_id = TeachingInterests.interest_id);
Faculty Teaching Specific Modules Query	Highlights specific modules as well as content that was taught by a faculty member. Additionally, this query refers to specific semesters and years the respective modules were taught in	SELECT Modules.module_name, Modules.semester, Modules.Year, Faculty.first_name AS FacultyFirstName, Faculty.last_name AS FacultyLastName FROM Faculty INNER JOIN Modules ON (Faculty.faculty_id = Modules.faculty_id) AND (Faculty.faculty_id = Modules.faculty_id);
Graduated students placement and status Query	Displays student information relating to graduating students and the jobs they were placed in as a result of the program	SELECT Students.first_name AS StudentFirstName, Students.last_name AS StudentLastName, Students.status, GraduatedStudents.employer FROM Students INNER JOIN GraduatedStudents ON (Students.student_id = GraduatedStudents.student_id) AND (Students.student_id = GraduatedStudents.student_id);
Match faculty and student research interests Query	Exhibits which students relate to other faculty research interests and categorizes them accordingly (I.e student A's research interest relates to that of faculty staff 1's interests)	SELECT Faculty.first_name AS FacultyFirstName, Faculty.last_name AS FacultyLastName, Students.first_name AS StudentFirstName, Students.last_name AS StudentLastName, ResearchInterests.description AS ResearchInterest FROM (((Faculty INNER JOIN FacultyResearch ON (Faculty.faculty_id = FacultyResearch.faculty_id) AND (Faculty.faculty_id = FacultyResearch.faculty_id)) INNER JOIN ResearchInterests ON (ResearchInterests.interest_id = FacultyResearch.interest_id) AND (FacultyResearch.interest_id = ResearchInterests.interest_id)) INNER JOIN StudentResearch ON (ResearchInterests.interest_id = StudentResearch.interest_id) AND (ResearchInterests.interest_id = StudentResearch.interest_id)) INNER JOIN Students ON (Students.student_id = StudentResearch.student_id) AND (StudentResearch.student_id = Students.student_id);
Modules Taught by Specific Faculty Query	Displays faculty activity. References specific semesters, years, and content that was taught in each specific module	SELECT Faculty.first_name, Faculty.last_name, Modules.module_name, Modules.semester, Modules.Year FROM Faculty INNER JOIN Modules ON (Faculty.faculty_id = Modules.faculty_id) AND (Faculty.faculty_id = Modules.faculty_id);
Students and Their Dissertation Topics Query	Highlights specific students and what topic they decided to base their dissertation on	SELECT Students.first_name AS StudentFirstName, Students.last_name AS StudentLastName, Dissertation.topic FROM Students INNER JOIN Dissertation ON (Students.student_id = Dissertation.student_id) AND (Students.student_id = Dissertation.student_id);

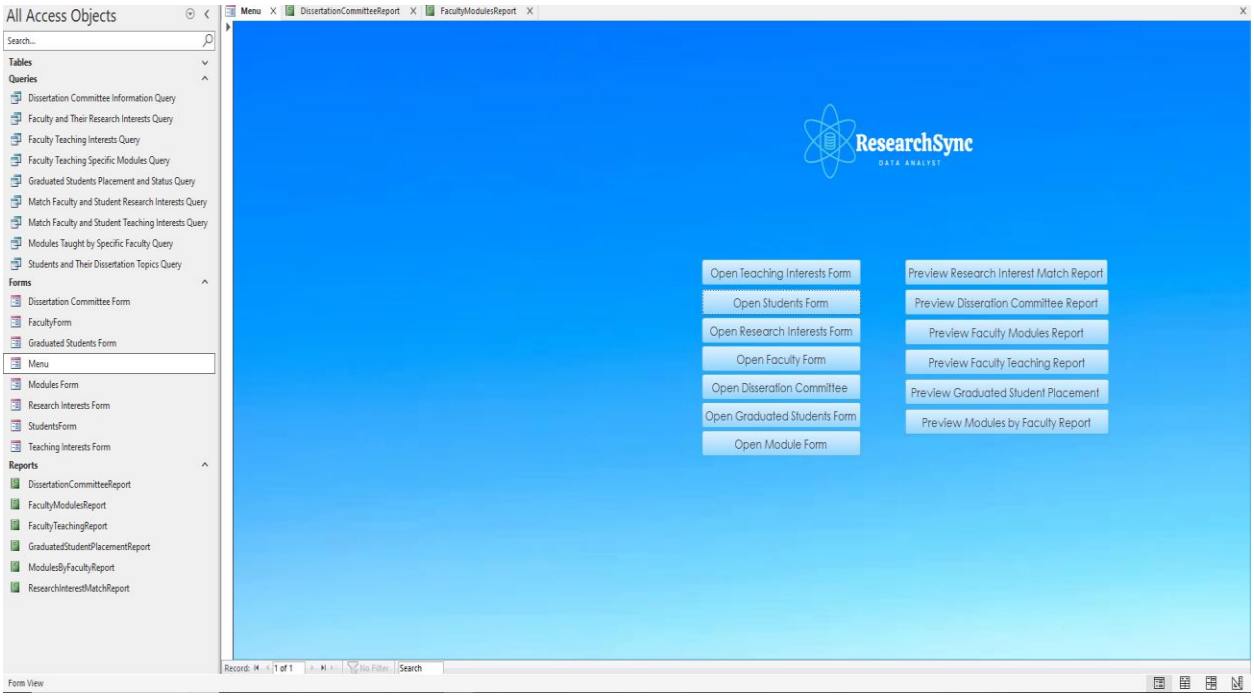
Forms and Reports

Forms	Fields	Purpose
Dissertation Committee Form	committee_id student_id faculty_id role	This table facilitates and captures information about faculty members on dissertation committees for graduate students
Faculty Form	faculty_id first_name last_name email phone faculty_type	Manages and serves as a centralized vessel for faculty details
Graduated Students Form	student_id employer	Stores information regarding successful graduates from the institution that have gone into the workforce, specifically tracking where they are employed
Menu	Open Dissertation Committee Form Open Faculty Form Open Graduated Students Form Open Modules Form	Clicking on menu items on this screen would open a form where you can view, add, edit, or delete faculty and student

	Open Research Interest Form Open Stduents Form Open Teaching Interests Form Preview DissertationCommittee Report Preview FacultyModulesReport Preview Faculty Teaching Report Preview GraduatedStudentPlacement Report Preview ModulesByFaculty Report ResearchInterestMatch Report	records. Users can easily access the data or forms as needed without directly interacting with queries.
Modules Form	module_id module_name semester year faculty_id module_content	This form allows for the input and tracking of modules across different semesters. Also allows for assigning faculty members to modules and a summary of each module's content.
Research Interests Form	interest_id description	Includes input options for students to put their research interests, helps facilitate similar interests between committee members and students
Students Form	student_id first_name last_name email phone status	This form allows faculty to enter general student information
Teaching Interests Form	interest_id description	Includes input options for faculty to put their teaching interests, helps facilitate similar interests between committee members and students

Attached below is an example of one of the forms (Dissertation Committee Form)

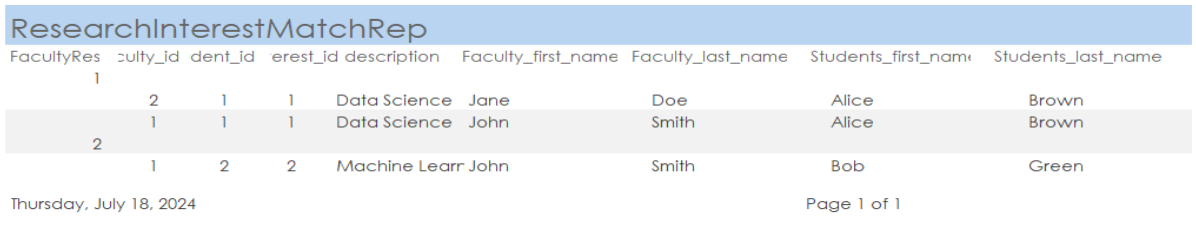




Attached above is the ResearchSYNC Interactive Menu

Reports	Purpose
DissertationCommittee Report	This report grouped faculty members with students and highlights faculty roles within the committee and assigns a committee ID to each student and faculty pair.
FacultyModulesReport	This report shows the reports of previous modules taught by faculty members, including names and module content.
Faculty Teaching Report	Reports faculty members general information as well as modules taught by them
GraduatedStudentPlacement Report	Report displays institution graduates and their employers
ModulesByFaculty Report	This report shows the reports of previous modules taught by faculty members, including names and module content.
ResearchInterestMatch Report	This report shows information regarding interests expressed by students and teachers regarding teaching and research topics. This allows for easier matchmaking for research interest matches between faculty and committee members and their students.

Attached below is an example of one of the reports, the ResearchInterestMatch Report.


ResearchInterestMatchRep

FacultyRes	culty_id	dent_id	erest_id	description	Faculty_first_name	Faculty_last_name	Students_first_nam	Students_last_name
1								
	2	1	1	Data Science	Jane	Doe	Alice	Brown
	1	1	1	Data Science	John	Smith	Alice	Brown
2								
	1	2	2	Machine Learr	John	Smith	Bob	Green

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DeFrancesco Reflection

This project really opened my eyes to what database technology can do today. Dealing with the management of faculty, modules, students, and research interests, the design of a comprehensive database was required. Quite a challenging project but with several important lessons regarding how to approach database design and implementation in a systematic way. One of the primary issues was data consistency over several related tables

Some of the challenges that came within the "Faculty" table were the relations to "Modules", "FacultyTeaching," "FacultyResearch," and "DissertationCommittee," all requiring a consistent "faculty_id." This is done using auto-incrementing primary keys and foreign key constraints. An example of how my group overcame a challenge was when it was realized that, while implementing the "GraduatedStudents" table, there was a need to refer back to the "Students" table for storing employment details of students now graduated. This added foreign key constraints but also gave checks on the entries of the student ID into the table "GraduatedStudents" that ensured only valid student IDs were entered. This indeed preserved integrity and resulted in reliable information for queries about the placement and status of graduated students.

My partner and I were assigned for the development of the menu, forms, and reports on Microsoft Access. We made sure that every detail related to our database was being developed meticulously. In conclusion, our project development was a task which had careful planning, strong design principles, and effective teamwork. We got through problems from data integrity to writing complex queries, adhering to structured approaches.

Eduardo Reflection

During the project, a lot was learned about developing and managing database technology as applied to education administration. One of the most important difficulties I had was ensuring that the database structure supported, in the best way, the numerous intricate relationships between several entities, like faculty, students, research interests, teaching interests, and modules. Designing and implementing a database that could manage these complex

relationships required an understanding of principles of database normalization and relationship management.

One of the critical aspects of this project was to create several reports, which would summarize and properly present the data. I learned to use Microsoft Access Report Wizard to develop reports such as the Faculty Teaching Interest Report, the Faculty and Student Research Interest Match Report, and the Graduated Student Placement and Status Report. This demanded appropriate selection of tables and fields, grouping and sorting, to make the report usable. This whole process stressed the importance of knowing the users' information needs and ensuring the database outputs meet those requirements.

On top of that, I faced problems with data integrity and verification. Ensuring accuracy and consistency in data input was critical to maintaining the reliability of reports and queries from the database. This involved setting referential integrity constraints and testing the database with sample data for any anomalies. Through this, I further realized the importance of data validation and form functionalities, which are key in database management.

Another valuable aspect of learning was creating data entry and viewing forms. There were well-designed and user-friendly forms for entities like Faculty, Students, Research Interests, and Teaching Interests, which needed to be intuitive to make the process of data entry and retrieval easy. The task required a delicate balance between functionality and ease: the user should interact with the database optimally without overwhelming complexity.

In conclusion, the project has given me practical work experience in database design, implementation, and management. This helped me learn more about database technology by facing and overcoming challenges, from complex relationships and maintaining data integrity to

effective reports and user-friendly forms. These experiences have prepared me with the skills and knowledge needed for future database projects.

Feven's Reflection

During this project, I've faced various challenges and opportunities in using database technology effectively. One significant hurdle was creating a database structure that could handle complicated relationships between different parts while keeping data secure and performance smooth. For example, figuring out how to create an easily understandable software solution to achieve our goal of tracking user's progress and involvement throughout different programs.

I gained valuable experience using Microsoft Access for the first time during this project, significantly expanding my knowledge in database management tools. Combining what I learned from the textbook and its assignments, it gave me a solid foundation in Microsoft Access. I

acquired many skills such as how to create relationships, designing tables, creating queries and generating reports.

In this project, I contributed to creating the data dictionary which was quite arduous due to the number of elements that needed to be identified and defined. We needed to ensure that the information was correct since we were providing data about our program's structure, contents and relationships. Creating the query purpose also proved to be slightly challenging because some queries were quite complex which demanded a deep understanding of how the data was structured.

In conclusion, I thoroughly enjoyed diving into data management during this project, particularly through hands-on experience with Microsoft Access. It was rewarding to learn how to design and manage databases, create queries, and ensure data integrity using such a versatile tool. Working with my team was a great experience too, we collaborated well, tackled challenges together, and improved our database structure and query efficiency. This experience not only deepened my understanding of databases but also highlighted the critical role of teamwork in successfully achieving our project goal.

Warner Reflection

Reflecting on my role in our group project, I am proud of the contributions I made to the documentation of our database solution for ReasearchSYNC. As the team member responsible for creating most of the documentation at large, I assisted in our display of creating crucial structures and functionalities of our database system.

Initially, I developed the class diagram, which served as the blueprint illustrating the relationships and entities within our database. This diagram was instrumental in visualizing how tables within our database system related to each other and provided a clear roadmap for the creation and organization of the relationship table.

Additionally, I crafted the data dictionary, detailing every data type and any constraints they may contain extensively. This document ensured consistency and transparency in our database design, as well as made it easier for developers to understand and implement how tables worked within our program.

Lastly, I created the forms and reports section as well. This is a summary of what each form consisted of and how it interacted with the rest of the database. I also assisted on the work of the query purpose. This provided query explanations and descriptions, and displayed what queries can be used for each task. This document also helps developers and users clearly see how we focused on maximum optimality while using our database and its interface.

The experience gained from this project cannot be overstated. I designed reports that generated valuable insights for academic events and research seminars. Additionally, I developed skills in areas crucial to future career paths. This project is a testament of a team that focused on communication and execution, and I am glad to have worked with the team that I did.