CSCI-5408

DATA MANAGEMENT, WAREHOUSING, & ANALYTICS

ASSIGNMENT – 1

Problem 1: Build a Conceptual Model

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GitLab Assignment Link:
https://git.cs.dal.ca/saji/csci5408_w24_b00977669_christin_saji

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Task 1: List of Entities and Attributes

Table 1 20 Entity set with their attributes and reasoning

S.No.	Entity	Attributes	Reason
1.	Student	StudentID, FirstName, LastName, DateOfBirth, Email	To uniquely identify each student, and communicate with them
2.	Faculty	FacultyID, FirstName, LastName, DepartmentID, Email, OfficeNumber	To uniquely identify faculty members, associate them with departments, and provide contact information
3.	Course	CourseID, CourseName, DepartmentID, CreditHours	To catalog courses, link them to departments, and define their weight
4.	Program	ProgramID, ProgramName, DepartmentID, DegreeLevel, TotalCreditHours	To define the various academic programs and their requirements
5.	Department	DepartmentID, DepartmentName, FacultyCount, Budget	To manage the administrative aspects of academic departments
6.	Lecture Hall	HallID, BuildingName, Capacity, EquipmentDetails	To manage the physical spaces where courses are taught and their features

7.	Enrollment	EnrollmentID, StudentID, CourseID, Semester, Grade	To record what courses students are taking and their performance
8.	Academic Advisor	AdvisorID, FirstName, LastName, Email, DepartmentID	To provide information on individuals who guide students academically
9.	Research Group	GroupID, GroupName, FocusArea, LeadFacultyID, DepartmentID	To organize research efforts and link them to academic departments
10.	Research Project	ProjectID, Title, Summary, StartDate, EndDate	To manage individual research initiatives and track their timelines
11.	Library	LibraryID, Name, Location, OpenHours, ResourceCount	To manage the operations of university libraries
12.	Book	ISBN, Title, Author, LibraryID, CheckOutStatus	To catalog library books and track their availability
13.	Club	ClubID, Name, Purpose, FacultyAdvisorID	To manage student clubs and their activities
14.	Event	EventID, Title, Description, StartTime, EndTime	To schedule and promote university events
15.	Sports Team	TeamID, Sport, CaptainStudentID, TeamRanking	To manage sports teams and their competitive standings
16.	Scholarship	ScholarshipID, Name, EligibilityCriteria, Amount, ApplicationDeadline	To manage financial aid offerings and their recipients

17.	Services	ServiceID, Name, Description, Availability, DepartmentID	To detail the services provided by the university to students and staff
18.	Job	JobID, Title, DepartmentID, Description, SalaryRange	To manage employment opportunities available within the university
19.	Alumni	AlumniID, FirstName, LastName, GraduationYear	To maintain a network of former students
20.	Dormitory	DormID, Name, Capacity, Amenities, RoomType	To manage student housing options and their features

Task 2: Initial Conceptual Model (ERD_Initial)

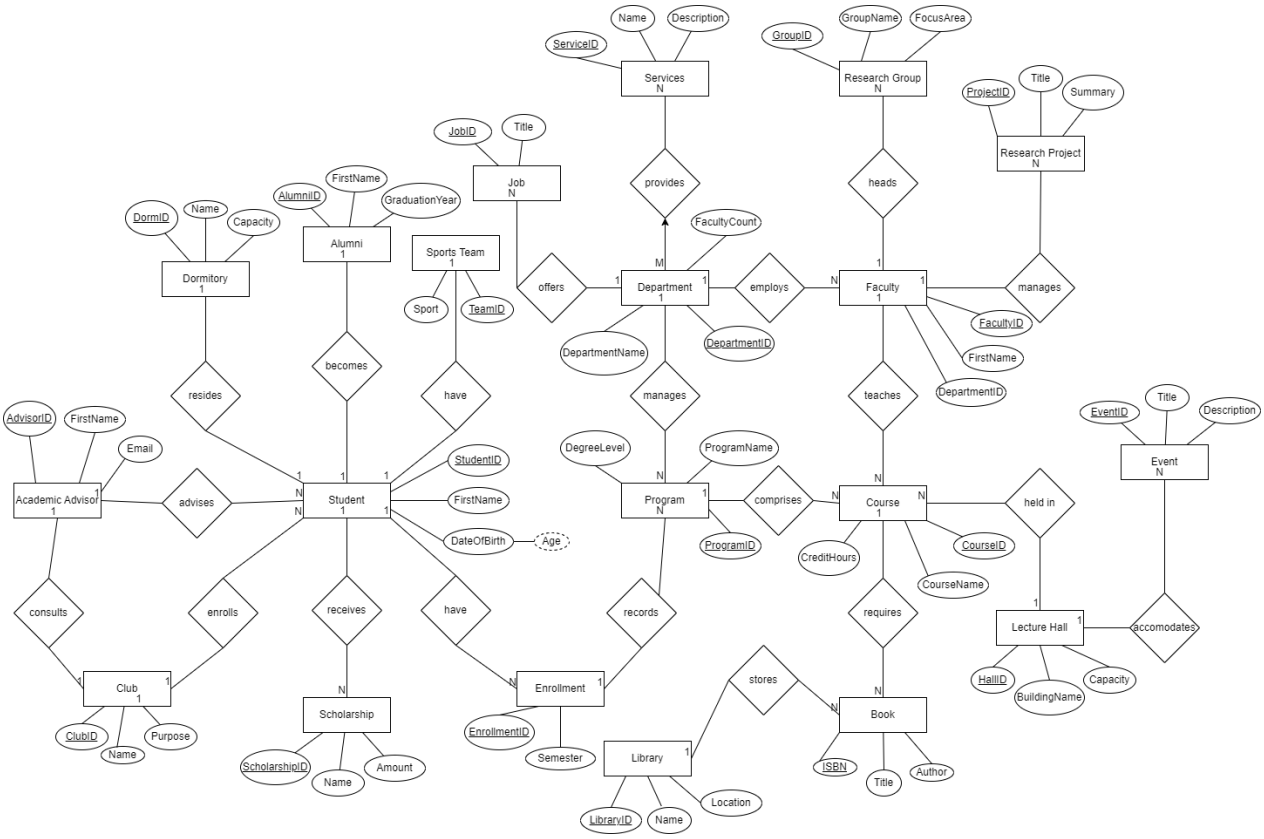

Figure 1 Initial ER Diagram for Halifax City University

Task 3: Design Issues Identification and Justification

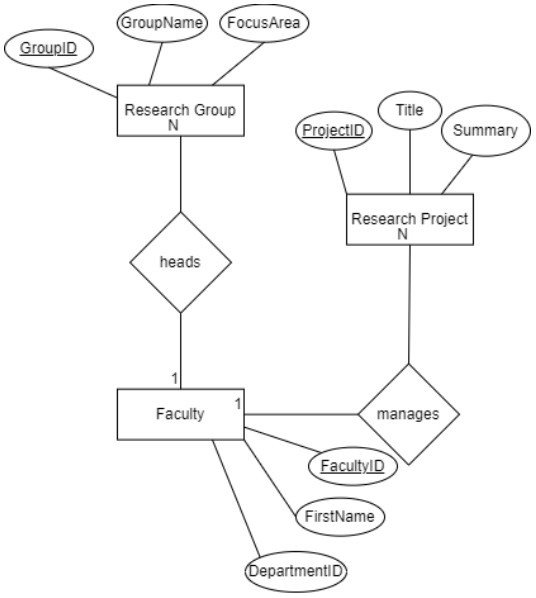

Figure 2 Chasm Trap between Research Group, Faculty and Research Project

The design issue present here is the chasm trap. Because of this, we can't determine which Research Group is working on which Research Project, and Research Groups and Research Projects can exist independently, which doesn't satisfy the requirements.

To solve this, we need to enforce a direct relationship between Research Group and Research Project.

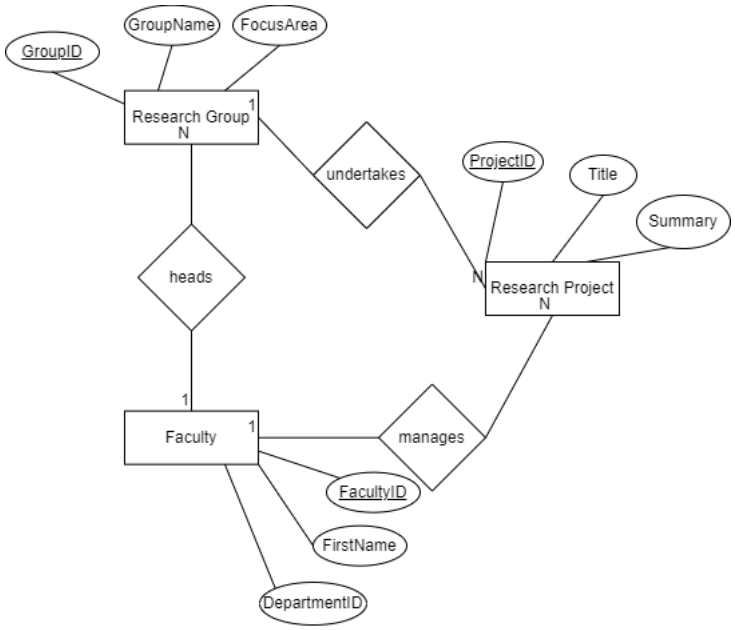

Figure 3 Solution for the Research Group, Faculty and Research Project chasm trap

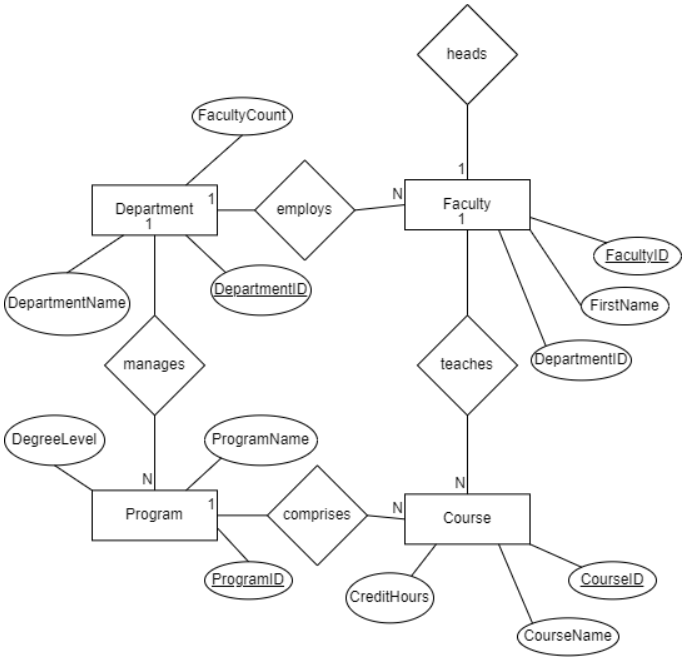

Figure 4 Chasm Trap between Department, Faculty and Course

Here, the chasm trap is present because not all faculty who head departments teach courses, and not all faculty who teach courses are part of the department.

To solve this design issue, we need to form relationships between Department and Course.

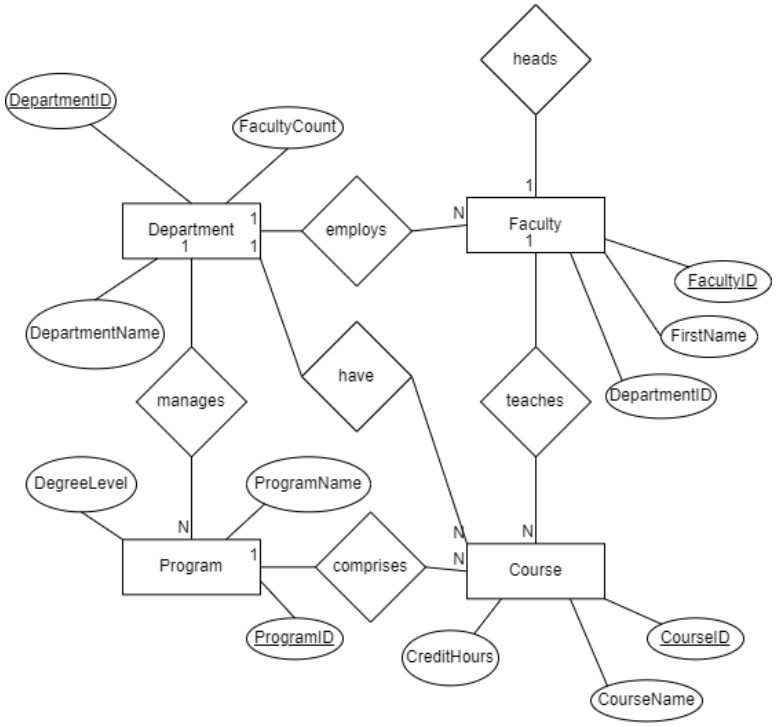

Figure 5 Solution for Department, Faculty and Course for chasm trap

Task 4: Final ERD Model (ERD_Final)

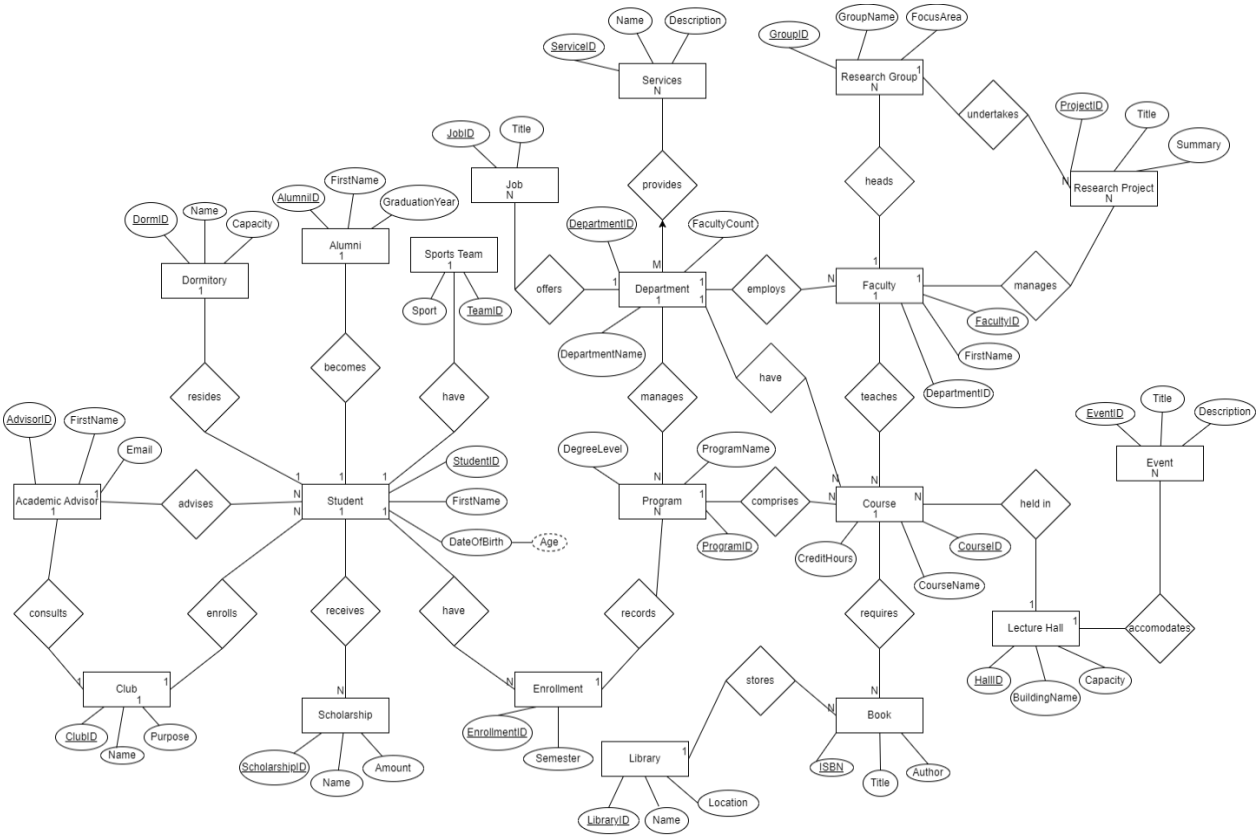

Figure 6 Final ER Diagram for Halifax City University

Task 5: Final ERRD Model (Final_ERRD)

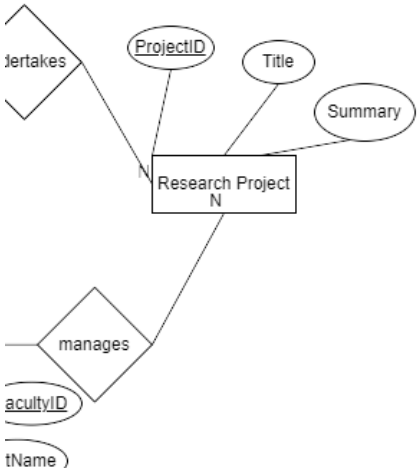

Figure 7 Research Project entity to be extended

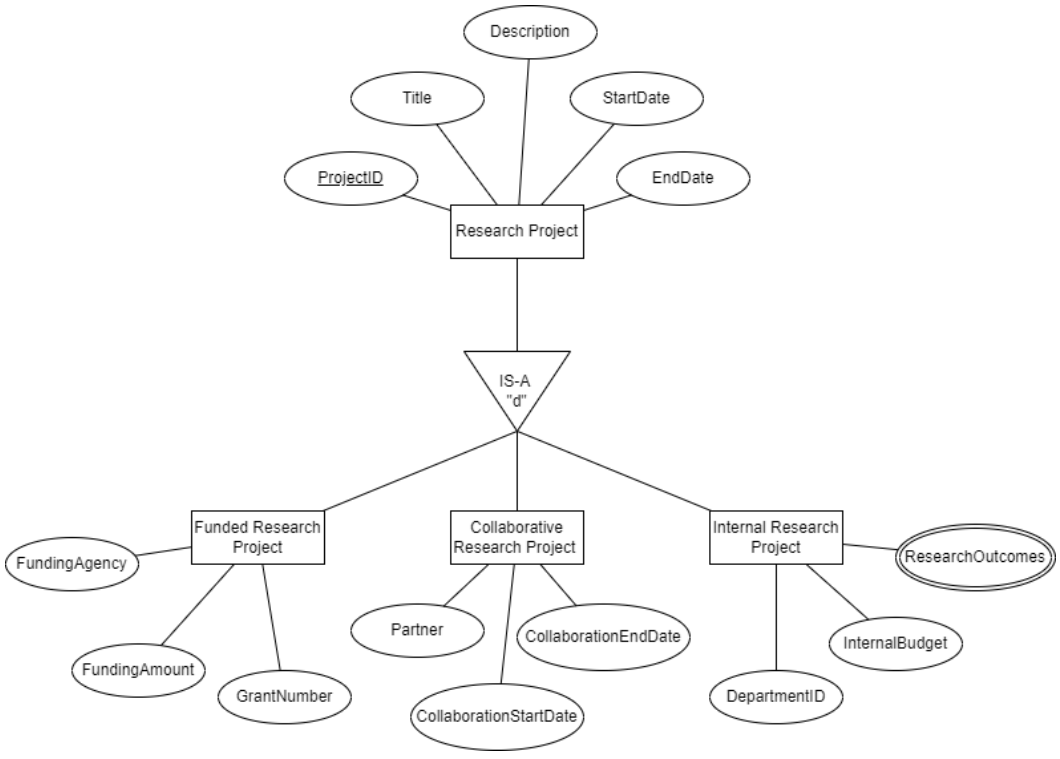

Figure 8 Enhanced ER Diagram for Research Project

Research Project (superclass) can be split into Funded Research Project, Collaborative Research Project, and Internal Research Project (subclasses). Each subclasses inherit the attributes from the Research Project, and they have their own attributes. They represent disjoint constraint because instance of the superclass can be a member of only one of the subclasses at a time.