EGE UNIVERSITY

FACULTY OF ENGINEERING

COMPUTER ENGINEERING DEPARTMENT

Database Management

2022–2023 FALL SEMESTER

PROJECT UNIVERSITY DATABASE REPORT

DELIVERY DATE

11/01/2023

PREPARED BY

05200000760 - Kaan Berk Altay

05190000107 - Züleyha Alkan

05190000073 - Sinem Akyüz

Context

1) Brief Explanation

Within the scope of our project, we have created a database model that enables the retention of data that is required to be kept for a university. It aims to keep the general information of the university, departments, faculty members, courses and the necessary information of students in a systematic way.

2) Aim of Our Design

We designed our EER diagram acoording to the given design. We aimed to keep the design consistent to data requirements with the most appropriate way. We take into consideration if our design is conceptually logical. Apart from the given requirements we researched what constraints university database should have. We avoid null values and duplicate tuples.

3) Analysis

3.a Entities

- **College:** Data belonging to universities are kept. According to the design we have made, every university must have one dean among faculty members and each university can have a number of departments or none. At least one university information must be entered into the system in order to enter data.
- **Department:** Universities consist of departments. Each department should be affiliated to one university. There are computer engineering, software engineering and artificial intelligence engineering departments in the database we have designed. Departments may offer a number of courses or not any. Each department may or may not have students.
- **Curriculum:** Departments has curriculum consisting of courses on a semester.
- **Course:** Information about the lessons is kept. Courses secs into 0 or more sections. The lessons are divided into two classes :
    - Optional: Optional course type divided into two classes: technical and non technical.
    - Mandatory.

- **Section**: Specifies that the content of a course should be opened as a course in a certain period. Sections must teached by a faculty member except research assistants. For a section to be opened, there should be at least 5 students which enrolled in that section.

- **Student:** Student is a person who enroll in a university. Database keeps track of every informations about each student. Students may or may not take sections. Each student can be or not in one department.
- **Keyword:** Keyword is a term that captures the essence of the topic of a document.
- **Research Area:** Research area accepts information management and all the issues around it as a field of research and application in all fields of science and practice, in all its applications in the public and private sectors.
- **Faculty Member:** Faculty member represents the academic person working at the university. Each faculty member have got an unique ssn number. Faculty members divided into 3 classes: university professor, research assistant and instructor.
- **Thesis:** This entity keeps information about academic articles published by faculty members. It can be either phd or master.
- **University Professor:** It is the title given to people with the highest academic rank and academic title. It is divided into 3 classes: associate professor, professor, assistant professor. University professor only can teach both grad and undergrad sections.
- **Research Assistant**: A research asistant is a researcher employed, often on a temporary contract, by a university, a reseach institude or a privately held organization, for the purpose of assisting in academic or private research.
- **Instructor:** Instructors are people who work as educators at the university. Instructors are teacher of a specialised subject. They teach undergrad sections.

3.b Relationships

- **Admins:** This relationship connects the departments to the college. Each department can connected with only one college. Collage can admins several departments.
- **Has(A):** This relationship connects the curriculums to department. Every department must have only one curriculum. Each curriculum belongs to one department. This relation has attribute called creationDate.
- **Composed Of :** This relationship is between the curriculum and the lesson. Curriculums composed of many courses. Courses can be belong to many curriculums. This relation has one attribute called matching criteria.
- **Secs :** This relationship is between course and section. Courses are organized as sections.
- **Has(B):** This relationship is between course and keyword. Each course is associated with at least 3 keywords.
- **Takes:** This relationship is between section and student. Each section is taken by at least five students. Students can take many lessons.
- **Has(C):** This relationship is between student and department. Department can have many students. Each student can enroll only one department.
- **Can Teach(A) :** This relationship is between section and university professor. Each section can be taught by only one professor. Professors can teach many sections.
- **Has(D):**This relationship is between keyword and research area. Each research are has at least 3 keyword.
- **Researches:** This relation is between faculty member and research area. Each faculty member researches for at least one research area. Many faculty member can study on one research area.
- **Employs:** This relation is between university faculty member and department. Departmens have many employes. Faculty member works for only one department.
- **Chairs:** This relation is between university professor and department. Each departmen be managed by only one university professor. This relation has one attribute called chairstartdate.
- **Dean:** This relation is between professor and college. College can be dean by only one professor. One professor can dean only one college.This relation has one attribute called DeanStartDate.

- **Published:** This relationship is between faculty member and thesis. Faculty member can published at least one thesis. Thesis are written by only one faculty member.
- **Can Teach(B):** This relationship is between Undergrad and Instructor. Each undergrad course can be taught by only one professor. An Instructor can teach many courses.

3.c Data Requirements

For each Collage, the DB keeps a record of name, phone, office, and relationship with department and professor. Collage name is primary key.Each collage admin zero or many departments. Each collage be managed by only one professor.

For each Department, the DB keeps a record of name, code, office, phone, type and relationships with collage and curriculum,faculty member, student,university professor. Departmentcode is primary key. Each department depents to only one collage. Each departmen has one curriculum. This relation has one attribute about creation date. Each departmen has zero or many students. Each departmen has zero or many faculty member. Each department be directed by only one university professor. This relation has a one attribute called ChairStartDate. Each department has three sub classes called "software engineering", "computer engineering", "artifical intelligence".

For each Curriculum, the DB keeps a record of curriculum number and relationships with course and department. Curriculum number is primary key. Each curriculum depends to only one departments. Each curriculum composed of one or many course.

For each Course, the DB keeps a record of course description, level, credits,course code, course name, course type and relationships with curriculum, keyword and section.Course code is primary key.Each course compose one or several curriculum. Each course associate with zero or several sections.Each course has three or more keyword. Course has got two subclasses called "mandatory course" and "optional courses".Course type attribute determines which subclass the course belongs to.

For each section, the DB keeps a record of year,days time, section no, section ıd, section type, semester, building, room no and relationships with course, student, university professor.Section ıd is primary key. Each section associated with only one course. Each

section taken by five or more students. Each section has got two subclasses called "Grad" and "Undergrad". SecType attribute determines which subclass the section belongs to.

For each student, the DB keeps a record of Student Id, phone, major, first name,last name, middle name, DOB, address and relations with section and department.Student ıd is primary key. Each student can take zero or many sections. Each student can depend zero or one department.

For each Keyword, the DB keeps a record of Keyword ıd , word and relationships with research area and course.Keyword ıd is primary key. Each keyword belongs to zero or one resarch area. Each keyword associated with zero or many course.

For each Research area, the DB keeps a record of area ıd, area and relationships with keyword and faculty member.Area ıd is primary.Each researh area has 3 or more keyword. Each research area associated with zero or many faculty member.

For each faculty member, the DB keeps a record of addres, phone, rank, office, last name, middle name, first name, ssn and relationships with research area, thesis, department.Ssn is primary key.Each faculty member researches one or several research area.Each faculty member published one or more thesis. Each faculty member employes only one department.Each faculty member has got three subclasses called "university professor","assistant professor","instructor". Rank attribute determines which subclass the faculty member belongs to.

University professorr is subclass of faculty member. The DB keeps a record of professor type and relationship to the department. Each university professor chairs zero or one department. University professor has got three subclasses called "professor","asistant professor","associated professor".

Professor type attribute determines which subclass the university professor belongs to. Professor can dean zere or one collage.This relationship has got deanStartDate attribute.

Instructor can teach zero or several undergrad section. Each undergrad section be taught by only one ınstructor.

For each thesis, the DB keeps a record of thesis number, title, thesis type, thesis date and relationship to the faculty member. Each thesis be written by one or more faculty member.

4) Relational Mapping

4.a Mapping

1.ITERATION

1.1

COLLEGE (COLLAGENAME, CollageOffice, CollagePhone)

DEPARTMANT(DEPARTMENTCODE,DepartmentName , DepartmentOffice, DepartmentPhone)

CURRİCULUM(CURRİCULUMNO)

COURSE(COURSECODE, CourseName, Credits, Level, CourseDescription)

SECTION(SECTİONID, SectionNo, DaysTime, Semester, Building, RoomNo, Year)

STUDENT(STUDENT_ID, Address, Phone, Major, DOB, FirstName, MiddleName, LastName)

KEYWORD(KEYWORD_ID, Words)

RESEARH_AREA(AREA_ID, area)

FACULTY_MEMBER(SSN, FirstName, MiddleName, LastName, Address, Phone, Office, Rank)

THESIS(THESİSNUMBER, title, thesisDate,ThesisType)

1.2 ----------

1.3

CURRİCULUM(CURRİCULUMNO, *DepartmentCode*, creation_date)

1.4

DEPARTMANT(DEPARTMENTCODE, DepartmentName , DepartmentOffice , DepartmentPhone, *CollageName*)

SECTION(SECTİONID, SectionNo, DaysTime, Semester, Building, RoomNo, Year, *CourseCode*)

FACULTY_MEMBER(SSN,FirstName, MiddleName, LastName, Address, Phone,Office, Rank, *DepartmentCode*)

STUDENT(STUDENT_ID, Address, Phone, Major, DOB, FirstName, MiddleName, LastName, *DepartmentCode*)

1.5

TAKEN_SECTİON(STUDENT_ID, SECTİONID, Transcript)

COURSE_KEYWORD(KEYWORD_ID, COURSECODE)

COMPOSED_OF(CURRİCULUMNO, COURSECODE, Matching_Criteria)

RESEARCHES(Faculty_memberSSN, Area_ID)

RESEARH_AREA_KEYWORD(KEYWORD_ID, AREA_ID)

PUBLİSHED(SSN,THESİSNUMBER)

1.6--------

1.7--------

1.8

8A =

FACULTY_MEMBER(SSN, FirstName, MiddleName, LastName, Address, Phone, Office, Rank*,*DepartmentCode*)

UNI_PROF(SSN)

RESEARCH_ASİST(SSN)

INSTRUCTOR(SSN)

SECTION(SECTİONID, SectionNo, DaysTime, Semester, Building, RoomNo, Year, *CourseCode*,Seaction_Type*)

UNDERGRAD(SECTİONID)

GRAD(SECTİONID)

COURSE(COURSECODE, CourseName, Credits, Level, CourseDescription, Course_Type*)

MANDATORY(COURSECODE)

OPTİONAL(COURSECODE)

8C =

DEPARTMANT(DEPARTMENTCODE,DepartmentName , DepartmentOffice , DepartmentPhone, CollageName, Department_Type*)

2.ITERATION

2.1 ----

2.2 ----

2.3 =

DEPARTMANT(DEPARTMENTCODE,DepartmentName , DepartmentOffice , DepartmentPhone, CollageName, Department_Type, Chair_SSN, ChairStartDate)

2.4 =

UNDERGRAD(SECTİONID,İnstructor_SSN)

SECTION(SECTİONID, SectionNo, DaysTime, Semester, Building, RoomNo, Year, CourseCode, Seaction_Type*,ProfSSN)

2.5 ----

2.6 ----

2.7 ----

2.8 =

OPTİONAL(COURSECODE,TECHNİCAL_TYPE)

UNI_PROF(SSN,Prof_Type*)

Professor(SSN)

Associate_Prof(SSN)

Assistant_Prof(SSN)

3.ITERATION

3.1 ----

3.2 ----

3.3 =

COLLEGE (COLLAGENAME, .CollageOffice, CollagePhone, Dean_ssn,DeanStartDate)

4.b Referential Integrity Constraints

COLLAGE

CollageName	CollageOffice	CollagePhone	DeanSSN (Professor)	DeanStartDate

DEPARTMENT

Department Code	Dep Name	Dep Office	Dep Phone	Collage Name (Collage)	Dep_Type	Chair_SSN (University_prof)	Chair_Start Date

COURSE

CourseCode	CourseName	Credits	Level	CourseDesc.	CourseType

SECTION

SectionID	SecNo	Days Time	Semester	Building	Room No	Year	Course Code (Course)	Prof_SSN (University_Prof)	Section Type

FACULTY MEMBER

SSN	FirstName	MiddleName	LastName	Address	Phone	Office	DepartmentCode (Department)	Rank

STUDENT

StudentID	Address	Fistname	MiddleName	LastName	DOB	Major	Phone	DepartmentCode (Department)

CURRICULUM

CurriculumNo	DepartmentCode (Department)	CreationDate

KEYWORD

KeywordID	Word

RESEARCH AREA

Area_ID	Area

THESIS

ThesisNumber	Title	ThesisDate	ThesisType

TAKEN_SECTION

StudentId (Student)	SectionId (Section)	Transcript

COURSE_KEYWORD

KeywordID (Keyword)	CourseCode (Course)

COMPOSED_OF

CurriculumNo (Curriculum)	CourseCode (Course)	MatchingCriteria

RESEARCHES

FacultyMemberSSN (FacultyMember)	AreaId (Research_Area)

PUBLISHED

FacultyMemberSSN (FacultyMember)	ThesisNumber (Thesis)

OPTINAL_COURSE

CourseCode (Course)	Technical_Type

MANDATORY_COURSE

CourseCode (Course)

UNIVERSİTY_PROF

ProfSSN (FacultyMember)	Professor_Type

PROFESSOR

Prof_Ssn (University_Prof)

ASSOCİATE_PROF

AssociateProfSSN (University_Prof)

ASSISTANT_PROF

AssistantProfSSN (University_Prof)

RESEARCH_ASIST

ResearchAsistSSN (FacultyMember)

INSTRUCTOR

InstructorSSN (FacultyMember)

UNDERGRAD

SectionID (Section)	Instructor_SSN (Instructor)

GRAD

SectionId (Section)

5) Triggers and Assertions

We added some triggers and assertions that make sense considering the design. We have on delete, on upgrade and on delete examples for several tables:

Dean have to be professor.

Dean start date can not be beyond today.

Department type has only 3 possible values.

An optional course credit can not be bigger than 4.

For a section to be opened there should be at least 5 students that enrolled in that section.

Faculty members rank can have 5 possible values.

Section type only have 2 possible values.

Optional course only have 2 possible values.

Course type optional or mandatory.

A student can take 15 sections at max in a semester.

Chair can not be instructor or research assistant.

When a faculty member is deleted, his/her thesis should be deleted as well.

6) Check Constraints

Start dates can not be beyond today.

A grade of a student should be in between 0-100.

A credit of a course should be in between 0-8.