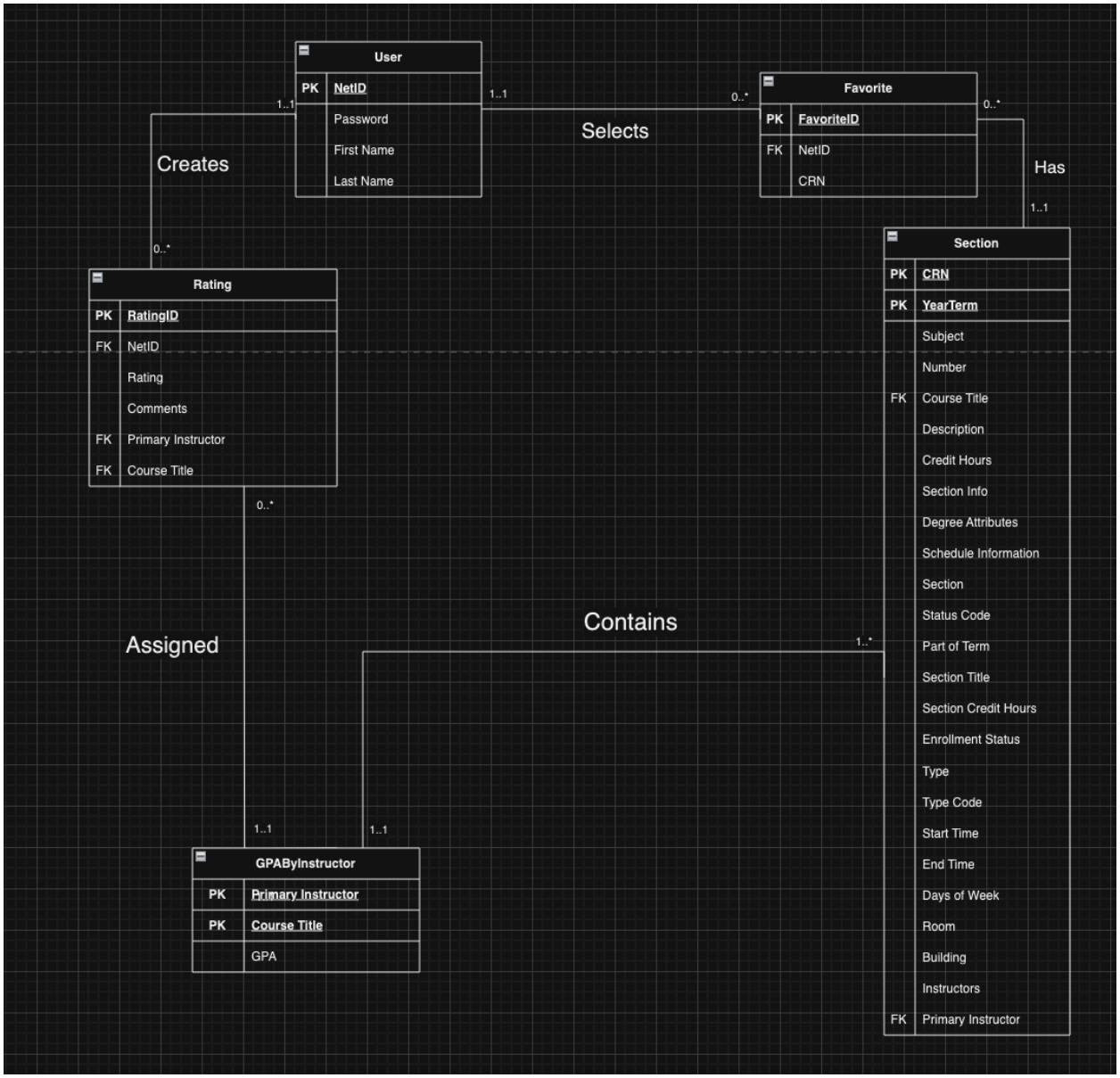
UML Diagram:


User
PK NetID
Password
First Name
Last Name
1..1
1..1
Creates
Selects
0..*
0..*
Favorite
PK FavoriteID
FK NetID
CRN
Has
1..1
0..*
Rating
PK RatingID
FK NetID
Rating
Comments
FK Primary Instructor
FK Course Title
Section
PK CRN
PK YearTerm
Subject
Number
FK Course Title
Description
Credit Hours
Section Info
Degree Attributes
Schedule Information
Section
Status Code
Part of Term
Section Title
Section Credit Hours
Enrollment Status
Type
Type Code
Start Time
End Time
Days of Week
Room
Building
Instructors
FK Primary Instructor
0..*
Assigned
Contains
1..*
1..1
1..1
GPAByInstructor
PK Primary Instructor
PK Course Title
GPA

Entity Descriptions

User: Contains user login information
Rating: Contains a rating made by a user for a specific instructor that taught a course, with comments and a rating number out of 10
Favorite: Contains a favorite made by a user for a specific section
Section: Contains information about a specific section, same as course explorer
GPAByInstructor: Contains the average GPA for a course taught by a specific instructor

Relationship Assumptions

(* = any number of)
Each User can have 0 to * Ratings, since each user can make any number of ratings
Each Rating must be made by 1 User, since a rating is made by a single user
Each User can have 0 to * Favorites, since users can favorite any number of sections
Each Favorite must belong to 1 User, since each favorite is made by a user
Each Rating should be assigned to 1 GPAByInstructor, since each rating should correspond to a unique course, instructor pair
Each GPAByInstructor can have 0 to * Ratings, since any course taught by an instructor can have any number of ratings
Each Section can have 0 to * Favorites, since a section can be favorited by any number of users
Each Favorite should correspond to 1 Section, since each favorite should correspond to only one section
Each Section should correspond to 1 GPAByInstructor, since each section can only have 1 primary instructor
Each GPAByInstructor should include 1 to * Sections, since the Instructor must have taught at least one section of that class to have a GPA

Since all of our relationships are one to many, it makes sense to separate them into separate entities because we don't know how much information needs to be stored for a one to many relationship.

BCNF

Our original diagram was already in BCNF. This is because all functional dependencies present in the relations are purely determined by the primary keys of those relations, meaning the left side is always a super key. Formally, for each relation:

User: NetID -> Password, FirstName, LastName

Rating: RatingID -> NetID, Rating, Comments, Primary Instructor, Course Title

Favorite: FavoriteID -> NetID, CRN

Section: CRN, YearTerm -> Subject, Number, Course Title, Description, Credit Hours, Section Info, Degree Attributes, Schedule Information, Section, Status Code, Part of Term, Section Title, Section Credit Hours, Enrollment Status, Type, Type Code, Start Time, End Time, Days of Week, Room, Building, Instructors, Primary Instructor

GPAByInstructor: Primary Instructor, Course Title -> GPA

Relational Schema

Entities:

- **User** (NetID VARCHAR(20) [PK], Password VARCHAR(20), FirstName VARCHAR(20), LastName VARCHAR(20))

- **Rating** (RatingID VARCHAR(20) [PK], NetID VARCHAR(20) [FK to User.NetID], Rating INT, Comments VARCHAR(350), PrimaryInstructor VARCHAR(30) [FK to GPAByInstructor.PrimaryInstructor], CourseTitle VARCHAR(20) [FK to GPAByInstructor.CourseTitle])

- **Favorite** (FavoriteID VARCHAR(20) [PK], NetID VARCHAR(20) [FK to User.NetID], CRN INT)

- **Section** (CRN INT [PK], YearTerm VARCHAR(10) [PK], Subject VARCHAR(20), Number INT, CourseTitle VARCHAR(20) [FK to GPAByInstructor.CourseTitle], Description VARCHAR(100), CreditHours INT, SectionInfo VARCHAR(200), DegreeAttributes VARCHAR(20), ScheduleInformation VARCHAR(70), Section VARCHAR(20), Status Code VARCHAR(20), PartofTerm VARCHAR(20), SectionTitle VARCHAR(20), Section CreditHours INT, EnrollmentStatus VARCHAR(20), Type VARCHAR(10), TypeCode VARCHAR(10), StartTime VARCHAR(20), EndTime VARCHAR(20), DaysofWeek VARCHAR(20), Room VARCHAR(20), Building VARCHAR(20), Instructors VARCHAR(30), PrimaryInstructor VARCHAR(30) [FK to GPAByInstructor.PrimaryInstructor])

- **GPAByInstructor** (PrimaryInstructor VARCHAR(30) [PK], CourseTitle VARCHAR(20) [PK], GPA REAL)