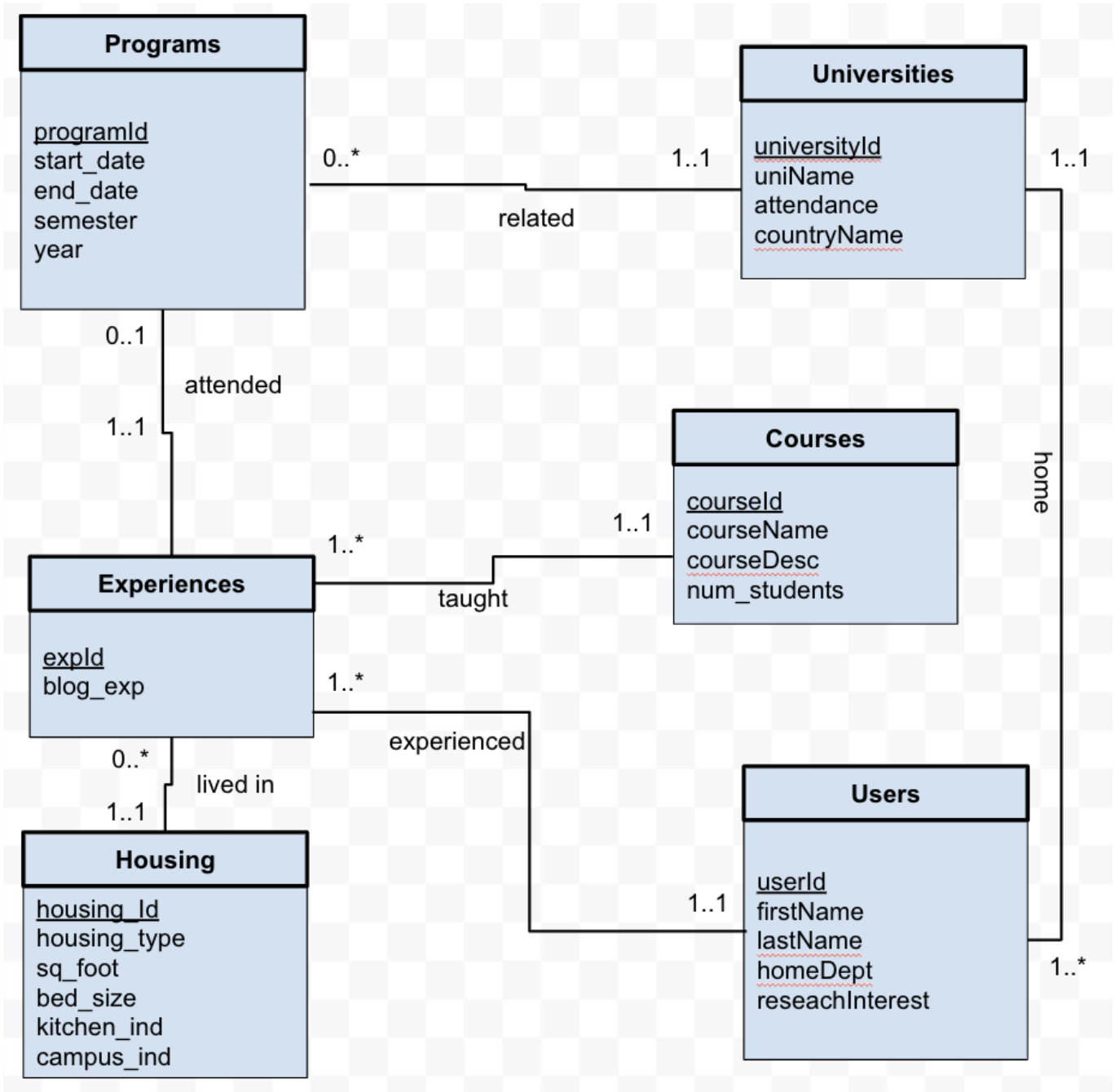
Team 034 DataBaes Project Track 1 Stage 2

UML Diagram:



BCNF Normalization:
We chose BCNF because it removes redundancy while avoiding information loss. We chose BCNF over 3NF because BCNF removed redundancy, while 3NF does not. Our process of normalization included determining the functional dependencies in our data, which are included below. After determining the functional dependencies, we applied the BCNF decomposition steps to find the normalized relations and adjusted our schema accordingly.

Functional Dependencies:
programId -> universityId, start_date, end_date, semester, year
universityId -> uniName, attendance, cityName
expId -> programId, userId, courseId, housingId, blog_exp
userId -> firstName, lastName, gender, homeUni, homeDept, researchInterest
courseId -> courseName, courseDesc, num_students
housing_Id ->housing_type, sq_foot, bed_size, kitchen_ind, campus_ind

Normalized Relations:
Programs(programId, universityId, start_date, end_date, semester, year)
Universities(universityId, uniName, attendance, cityName)
Experiences(expId, programId, userId, courseId, housingId, blog_exp)
Users(userId, firstName, lastName, gender, homeUni, homeDept, researchInterest)
Courses(courseId, courseName, courseDesc, num_students)
Housing(housing_Id, housing_type, sq_foot, bed_size, kitchen_ind, campus_ind)

Translated Relational Schema
Programs(programId:VARCHAR(8) [PK],
universityId: VARCHAR(8) [FK to Universities.universityId],
start_date: DATE,
end_date; DATE,
semester: VARCHAR(10),
year: INT)

Universities(universityId: VARCHAR(8) [PK],
uniName: VARCHAR(255),
attendance: INT,
countryName: VARCHAR(255))

Experiences(expId: VARCHAR(8) [PK],
programId: VARCHAR(8) [FK to Programs.programId],
userId: VARCHAR(8) [FK to Users.userId],
courseId: VARCHAR(16) [FK to Courses.couseId],
housingId: INT [FK to Housing.housingId],
blog_exp: TEXT)

Users(userId: VARCHAR(8) [PK],

firstName: VARCHAR(255),
lastName: VARCHAR(255),
homeUni: VARCHAR(8) [FK to Universities.universityId],
homeDept: VARCHAR(255),
researchInterest: TEXT)

Courses(courseId: VARCHAR(16) [PK],
courseName: VARCHAR(255),
courseDesc: TEXT,
Num_students: INT)

Housing(housingId: INT [PK]
housing_type: VARCHAR(255),
sq_foot: INT,
bed_size: VARCHAR(255),
kitchen_ind: BOOLEAN,
campus_ind: BOOLEAN)

Assumptions:

- Each experience id is unique to only one user. Each user can have one or more experiences.
- Each experience id is unique to a program, user, course, housing combination. So, a different user could have the same program, course, and housing combination.
- Each "user" has only one home university, however each university can have 1 to many users/teachers which belong to it as their "home" university.
- Each program is related to only one university. Each university can be a part of 0 or many programs. Universities can be added even if they are not related to a program because they might be a home university to a user.
- Each experience only has one housing type, meaning the user lives in only one housing unit while abroad. Each housing type can be lived in for many experiences.
- Each course only has one courseId so that means it is taught for at least one experience while the various experiences in a program are affiliated with exactly one specific course.

Relationships:

- Related: A relationship that ties the programs and universities entities based on if a program is affiliated with a university or vice versa. Cardinality: One-to-Many. (One university to many programs).

- Attended: Describes the relationship of how experiences attend at most one program but a program always attends exactly one experience . Cardinality: One-to-One. (One experience to at most one program).

- Taught: This relationship describes how the experiences can be taught for exactly one course but the courses can be taught at least one experience in the program. Cardinality:

One-to-Many. (One course to many experiences).

- Home: A relationship that relates how university can be a home for at least one user but a user has exactly one home university. Cardinality: One-to-Many. (One university to many users).

- Lived in: This relationship describes that experiences can live in exactly one housing and the housing can be lived in by any number of experiences. Cardinality: One-to-Many. (One housing to many experiences).

- Experienced: This relationship describes how a unique user can have at least one experience or have multiple study abroad experiences. It is impossible for an experience to exist without belonging to a user. Cardinality: One-to-Many. (One user to many experiences).