COSC344 Assignment 1

Team: Group 1A
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1: Mini-world Description

For our project we are going to model a High School. “Dunedin Grammar”. For this school, we are going to keep track of the database’s key entities Students, Teachers, Department, Class, Admin, Report, Homework, Report, and Emergency contacts. These are going to be the foundation of how we are going to model our project. A more in-depth breakdown of these key entities is as follows:

Students: For students, we are going to store details about emergency contact which we will model as a “must-have” relationship. Alongside this, we are going to store basic contact information about each student so that we can easily record and select information about a specific student. To uniquely identify each student, we are going to assign a unique primary key “Student_ID” number. From here we will be able to identify an individual student and have access to all associated data.

Teachers: We will store the basic information about teachers along with the subjects and classes that they teach. The relationship between a teacher and a subject is 1 to N, so a teacher can teach a number of subjects. The same goes for classes that teachers are currently teaching, as each class only has one teacher but a teacher will have a number of classes.

Departments: The school has departments that have both a unique name and id. Each department will have a headteacher who is in charge of that department (for example, the Head of Department (HoD) of Science will look after Chemistry, Biology, Physics, etc), Hence, each department may contain several courses. Each department will also show the number of teachers and students. This helps the school estimate which departments require additional teachers.

Class: A department may have many courses; with each course having a unique name and id. Each course will have the year levels associated with that course, the teacher id, as well as the classrooms to go to (location).

Admin: Admins are responsible for managing the school structure. Each admin will have a name, email and unique id. Admins work to structure teachers, classes and students.

Emergency contact: Each student will have a corresponding emergency contact. The cardinality of such a relationship will be 1 to N, meaning each student will only be able to have one emergency contact, but an emergency contact may be used for several students. This will mean families with more than one student enrolled in the high school will be able to

use the same emergency contact. Each emergency contact will be uniquely identified via a partial key. The nature of a student's relationship with an emergency contact is mandatory.

Report: The report entity provides data corresponding to the performance of students in the school or miniworld. The entity additionally stores the date that the report was created so users students can track the progress of their academic studies. Each student can have numerous reports however an individual report can only be assigned to one student.

Homework: The homework entity will store details about what homework ahs been assigned to each student. It will also store given dates, due dates and grades. It will have a many to many relationship, meaning that a homework will have many students assigned to it.

2. Entities and Attributes

- Student
  - ID: Simple, Single-Valued, Unique, Integer, Not null <<PK>>
  - yearLevel: Simple, Single-Valued, Integer
  - Name: Composite(Fname, Name), SIngle-Valued, String
  - Bdate: Simple, Single-Valued Date
  - Sex char: Simple, Single-Valued, char <M || F>
  - Address: Simple, Single-Valued, String
  - PhNumber: Simple, Single-Valued, String

- Emergency Contact→ Weak Entity.
  - StudentID: Simple, SIngle-Valued, Unique,
  - Name: Composite(Fname, Name), SIngle-Valued, String
  - PhNum: Simple, Single-Valued, String, Partial Key
  - Address: Simple, Single-Valued, String
  - Relation: Simple, SIngle-Valued, String

- Teacher
  - ID Unique, Simple, Single-Valued Integer <<PK>>
  - Name Composite(FName, LName), Single-Valued, String
  - Bdate Simple, Single-Valued, date
  - Sex Simple, single-valued, char <M || F>
  - PhNum Simple, Multi-valued, String
  - Address Simple, Single-valued, String
  - Salary Simple, Single-Valued, real

- Departments
  - ID Unique, Simple, Single-Valued Integer <<PK>>
  - Name Unique, Simple, Single-Valued String <<PK>>
  - HoD - Unique, Simple, Single-valued, Integer<<FK>>
  - Number of teachers in each department, Derived Integer

    - Number of students in each department, Derived Integer

- Class
    - ID Unique, Simple, Single-Valued, Integer <<PK>>
    - Name Unique, Simple, Single-Valued, String <<PK>>
    - Year level, Simple, Single-Valued, integer
    - Location, Simple, Multi-valued, String
    - Teacher ID, Simple, Single-valued, Integer <<FK>>
- Admin
    - ID Unique, Simple, Single-Valued, String <<PK>>
    - Name Composite(FName, LName), Single-Valued, String
    - Email, Simple, Single-Valued, String

- Report
    - Report ID Unique, Simple, Single-Valued, Integer <<PK>>
    - Student ID, Unique, Simple, Single-Valued, Integer <<FK>>
    - DateCreated, Simple, Single-Valued, date
    - Report_contents, Simple, Single-Valued, VarChar

- Homework
    - Homework ID, Unique, Simple, Single-Valued Integer<<PK>>
    - Student ID, Unique, Single Valued, Integer <<FK>>
    - DateCreated, Simple, Single-Valued, date
    - Date due, Simple, Single-Valued, date
    - Grade, Simple, Single-Valued, Double

3: Relationships

- **Belongs to**
    - 1:N relationship
    - A Teacher can only work in one department e.g. Science, Literacy, Mathematics, but a Department can have multiple teachers.
    - A teacher is going to have total participation as each teacher is required to be in a single department. Department is also going to be full participation.

- **Includes**
    - 1:N relationship between Department and Class
    - A department can have many classes(e.g. Science department can have Physics, Chemistry, etc), while a class must only belong to one department
    - Departments is partial participation; Class is total participation

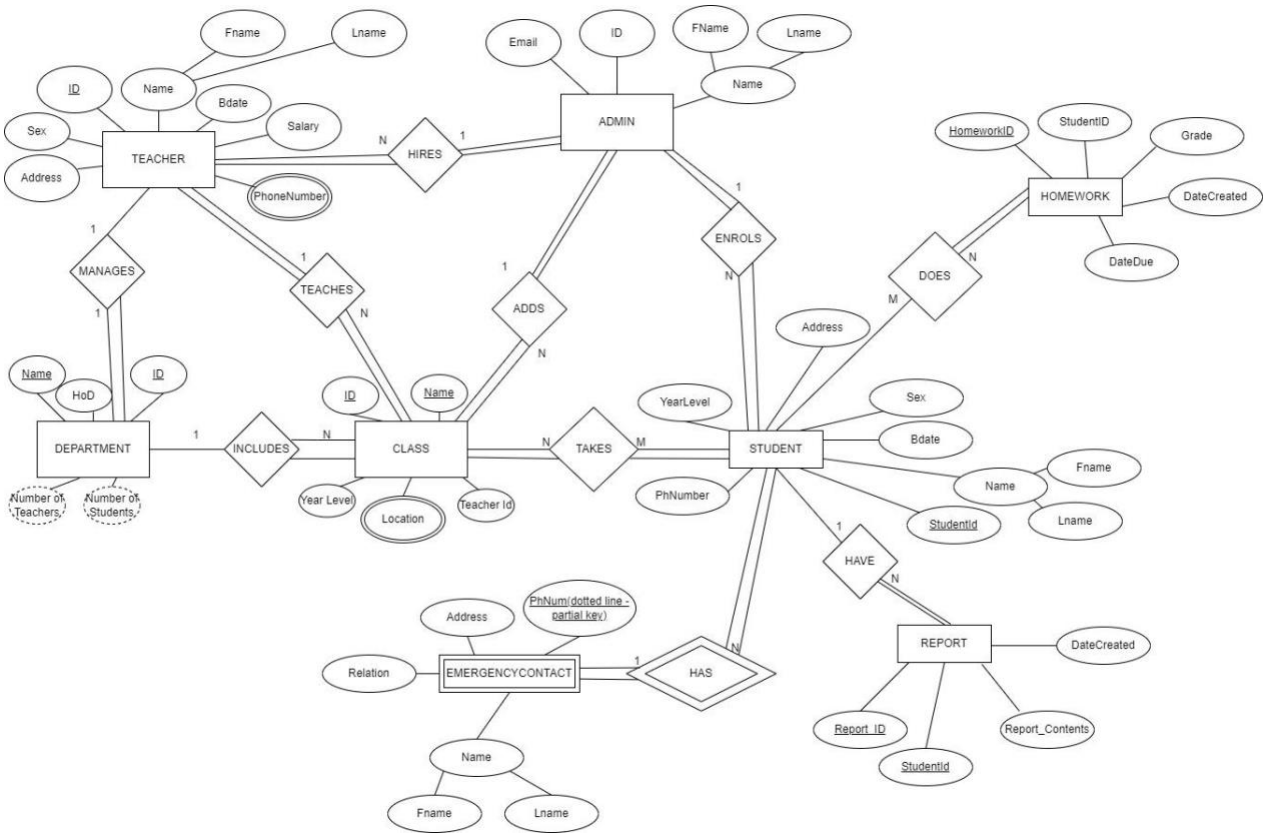
- **Teaches**
    - 1:N relationship between Teacher and Class
    - One teacher can teach many classes, but one class can only be taught by one teacher
    - Both Class and Teacher are total participation

- **Takes**
    - M:N relationship between Student and Class
    - Each student can take many classes, e.g. a student may take English, Mathematics, and Computer Science. A Class may also have many students taking it.
    - Both Student and Class have total participation.
- **Has**
    - 1:N relationship between student and emergency contact
    - An emergency contact may have many students (e.g. if siblings are enrolled in the school), while a student can only have one emergency contact.
    - Both have total participation.
- **Adds**
    - 1:N relationship between admin and class
    - An admin can add one or more classes, while a class can be added by only one admin.
    - Both have total participation.
- **Enrols**
    - 1:N relationship between admin and student
    - An admin can enrol one or more students while a student can only be enrolled by one admin
    - Both have total participation
- **Hires**
    - 1:N relationship between admin and teachers
    - An admin can hire one or more teachers, while a teacher can only be hired by one admin
    - Both have total participation.
- **Manages**
    - 1:1 relationship between teacher and department
    - A teacher can manage a department, while a department must be managed by a teacher.
    - Teacher is partial participation, while Department is total participation

- **Have**
    - 1:N Relationship
    - Each student can have numerous reports however an individual report can only be assigned to one student.
    - Report has partial participation while Students have total participation
      Each report will be identified via a unique number, and the attribute student ID will link the report with a student-- meaning the Student ID will be the foreign key.

- **Does**
    - M:N Relationship
    - Homework can be assigned to numerous students and each student can have several homework assignments. For this reason this entity will have a many to many relationship.
    - Homework has total participation however student will have partial participation

4: ER-diagram



5: Teamwork Summary

Through utilising Microsoft teams our group was able to effectively allocate tasks and discuss specifications of our mini-world for its foreseeable implementation.

We started off by spending time debating a mini-world that was relatable and appropriate. After some time we reached a consensus and chose to model “Dunedin Grammar”-- a local high school.

After this consensus was reached we began to design the mini-world. Our team collectively agreed to design two entities and relationships each-- the contribution of each team member in this respect can be seen through the commenting throughout this document. The creation of entities and relationships was done independently, and submitted to a shared google document. Once this was done we came together to discuss each entity and relationship, ensuring that the mini-worlds specifications were met.

Because our team worked in this manner the contribution of each member in the group was equal. Furthermore, the drawing of the ERD diagram was completed on teams via

app.diagrams.net which integrated nicely into google drive-- allowing all parties of our group to see changes made to the diagram and draw individual entities.
In a broad sense, our team collaborated well. We faced several drawbacks, such as Ben catching COVID, however due to the utilisation of effective communication channels progress continued.