

# Week 1 - Overview

## Introduction

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Welcome to CS340. This course is all about relational databases. There is a major focus on relational database design. We will talk about how we structure databases so that we can add things to them, along with ways we can keep track of how those things are related to each other.



For example, we might use a database to track roads in a city (one thing) and traffic control devices (another thing). A relationship between them might tell us what sort of traffic control device is at mile 3 of 2nd St.

In addition to this sort of design, we will also get into the more technical aspects of writing queries to get the database to do what we want. Finally, we will end by integrating a database with a front end. Usually we do this by connecting a MySQL database up to a website being served with Node.js or Python.

## Key Questions

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- Generally, what are the topics covered in this class?
- What are the major assessments in this course? (eg. exams or projects)
- What are the major tools that are used in this course?
- What defines a database as separate from a collection of data on your hard drive?
- When is it appropriate to use a database?
- What are some general attributes that databases often have?

Review the **Course Learning Outcomes** (<https://oregonstate.instructure.com/courses/1727186/pages/start-here-overview>).

## This Week's Assignment

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This week you will complete a task with relatively few requirements. Basically you will set up a very simple database and add a little bit of data to it. This will prove to yourself and to the instructor that your system is set up to not get in the way of completing the future assignments in this course. And before you proceed to the next week, you would team up with a classmate for the quarter to work on the CS340 Project which is described in detail [here. \(https://oregonstate.instructure.com/courses/1727186/modules/items/18520917\)](https://oregonstate.instructure.com/courses/1727186/modules/items/18520917)

## Project

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This class's main assessment focus is on developing a fully functional application which is backed by a relational database. Users will be able to view and manipulate data within your database and those changes will persist. During the last few weeks, the course material will focus on issues related to making database-driven applications as well as other topics that relate to modern database usage.

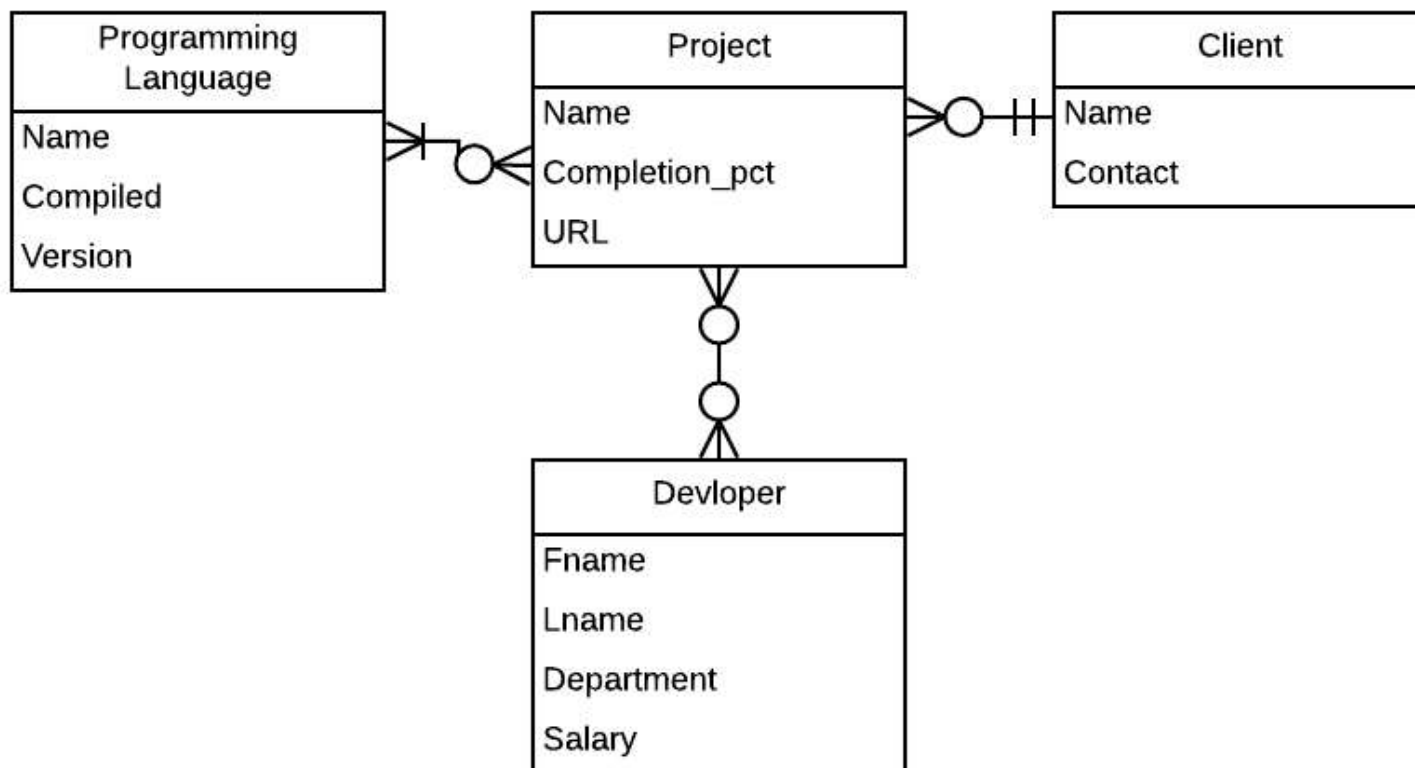
This week you will be turning in a small part (Step 0) of the project. And before you proceed to the next week, you would team up with a classmate for the quarter to work on the CS340 Project which is described in detail [here. \(https://oregonstate.instructure.com/courses/1727186/modules/items/18520917\)](https://oregonstate.instructure.com/courses/1727186/modules/items/18520917)

## Course Topics

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### Database Design

The first portion of the class will deal with database design. You will soon be making diagrams that might look a bit like this:



This will involve taking requirements from imaginary clients and turning them into diagrams that represent how a database storing their data might be organized. There are a variety of tools like [LucidChart \(https://www.lucidchart.com/\)](https://www.lucidchart.com/) or Microsoft Visio that can help you create these sorts of diagrams.

### Queries

In the next portion of the class you will start working with database queries. These will let you do things

like

- make tables that can be populated with data, or
- select a particular subset of data from one or more tables based on some set of constraints.

An example query might look like:

```
CREATE TABLE Developer
(
  DeveloperId Int NOT NULL PRIMARY KEY,
  Fname varchar(50) NOT NULL,
  Lname varchar(50) NOT NULL,
  Department varchar(100),
  Salary Int
)
```

Initially you may run these in a web GUI or at the command line, but eventually you will write queries that will be used by applications which pull data from your database. These will be written using SQL syntax but be embedded in some other code (such as JavaScript if you are working with Node.js).

## Relational Algebra

After wrapping up queries you will move on to relational algebra. This is a different way to describe queries that is purely theoretical and not tied to any particular implementation. A simple relational algebra statement might look like this:

$$R3 := (R1 \bowtie R2) \sigma_{a1 > 10}$$

If you go on to do work in database theory or developing database engines, this sort of notation can become quite important.

## Additional Resources

**VPN Access at OSU** (<https://oregonstate.teamdynamix.com/TDClient/KB/?CategoryID=6889>): This site will help you get access to the OSU VPN which will be required to connect to your engineering database.

## Review

You should now have a fairly good picture of what the general flow of the class will look like in terms of content. The early assignments will be one- or two-week assignments, whereas the project will take place over several weeks. So there is more work to do at the end of the class but there is more flexibility in how you schedule your time to get it done.

