Database Beavers, Inc.

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Link: http://flip2.engr.oregonstate.edu:4221/
Github: https://github.com/CS340-Database-Beavers/cs340-dbb-step4

Summary of Changes

Throughout the term, our database has evolved to better meet the needs of our client Beavers for Better through peer and self reviews. Below are the changes, in chronological order, that we have made to our database's design:

- Review 0 (project step 1 changes):
  - UX: Added a nav bar to the page header.
  - UX: Added a pencil icon when a user hovers over editable cells.
  - UX: Added a way to filter columns in the table.
- Review 1 (project step 2 changes):
  - Changed the table *role_types* to *roles.* Made to make att. name more concise.
  - UX & Clarity: Changed the *date* to *date_of_work* in *employee_projects* to make column purpose clearer.
  - Added *deadline* and *start_date* as fields to the *projects* table. Made this change to meet company's need to quickly assess total project time and project due date.
- Review 2 (project step 3 changes):
  - Initial database only connected to json files.
  - Added query that returns the number of active employees of each role. Added to meet company's need to see where current strength/weakness areas are.
- Review 3 (project step 4 changes):
  - Database now connected in app.js with post queries.
  - Added navigation buttons that are persistent across all pages. Change made at the suggestions of Nash Bernhart and Paul Lipp to prove UX.
  - Project requirement: changed the roles attribute in employees to be NULLable. This change also meets our company's need to not have to immediately assign new employees or interns a role.
- Review 4 (project step 5 changes):
  - UX & Clarity: Changed 'is_active' attribute of employees table to be a FK to table `statuses`, which lists statuses that an employee can be assigned.
  - Data integrity: added many checks to tables to ensure data integrity.
  - Data integrity: Added client-side data validation
  - UX & Data integrity: CREATE and EDIT calls from the UI are simplified to dropdowns of all options.
  - UX: Patched UI bug where handlebars was displaying the mariaDB column name and a blank input field in the add new employee form.
  - UX & data integrity: removed edit options where it does not make sense.
  - Data integrity: deleting an employee now changes their status to 'fired.'
- Final Changes made
  - Added two TRIGGER statements to enable limited deletion in salaries, roles, and projects. Allows deletion of erroneous values while maintaining data integrity.
  - Created SQL queries to enable faster sorting performed on the back end
  - Various UX/UI changes.

Project Outline

This project outlines the database that will be used by the company "Beavers for Better" or BB. Beavers for Better is a company of 230 employees that focuses on creating custom-made, state-of-the-art robotic solutions for their clients. Though they are exceptional at creating these solutions, they have found that their current organization methods are causing problems; namely, projects are being completed late due to misunderstandings about who is, isn't, and will be, working on a project. Additionally, as the company continues to grow, managers want a system that tracks how many hours each employee is working and what projects they are working on. Managers hope such a system can help them keep track of employees, give them insights into their workflow, and provide better estimates to clients regarding how long a project will take.

As a bonus, managers hope such a system can track each employee's current salary and their salary history. This would not only allow them to see the cost of employee salaries over a given time period, but it would also allow them to easily calculate every employee's pay at the end of the month.

All-in-all, Beavers for Better wants a database that will track employees, the projects employees are working on and how long they are working on them, and each employee's payroll.
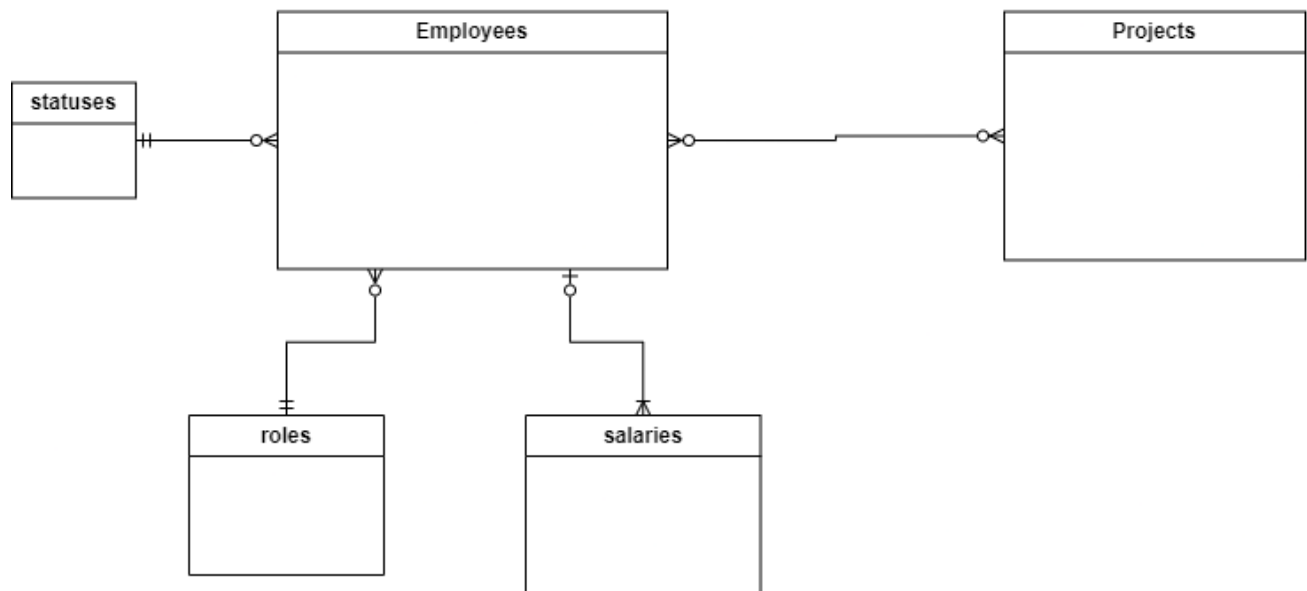
Database Outline

❖ **employees:** The records and employment data of those employed past and present
- ➢ *employee_id*: int, unsigned, PK, NN, UQ, AI
- ➢ *hire_date*: date, NN
- ➢ *employee_status*: unsigned int, NN, FK
- ➢ *name*: varchar, NN
- ➢ *role:* unsigned int, NULLable
- ➢ *address*: varchar
- ➢ *birthdate*: date, NN
- ➢ Relationships with
  - ■ **statuses**
    - ● Cardinality: 1:M with *employee_status* as a foreign key in the **statuses** table
    - ● Participation: not mandatory for statuses, mandatory for employees
  - ■ **roles**
    - ● Cardinality: 1:M implemented with *role_id* as a foreign key in **employees** table
    - ● Participation: not mandatory for **roles**, not mandatory for **employees**
  - ■ **salaries**
    - ● Cardinality: 1:1 implemented with *employee_id* as a foreign key in **salaries**
    - ● Participation: Mandatory for **salaries**, not mandatory for **employees**

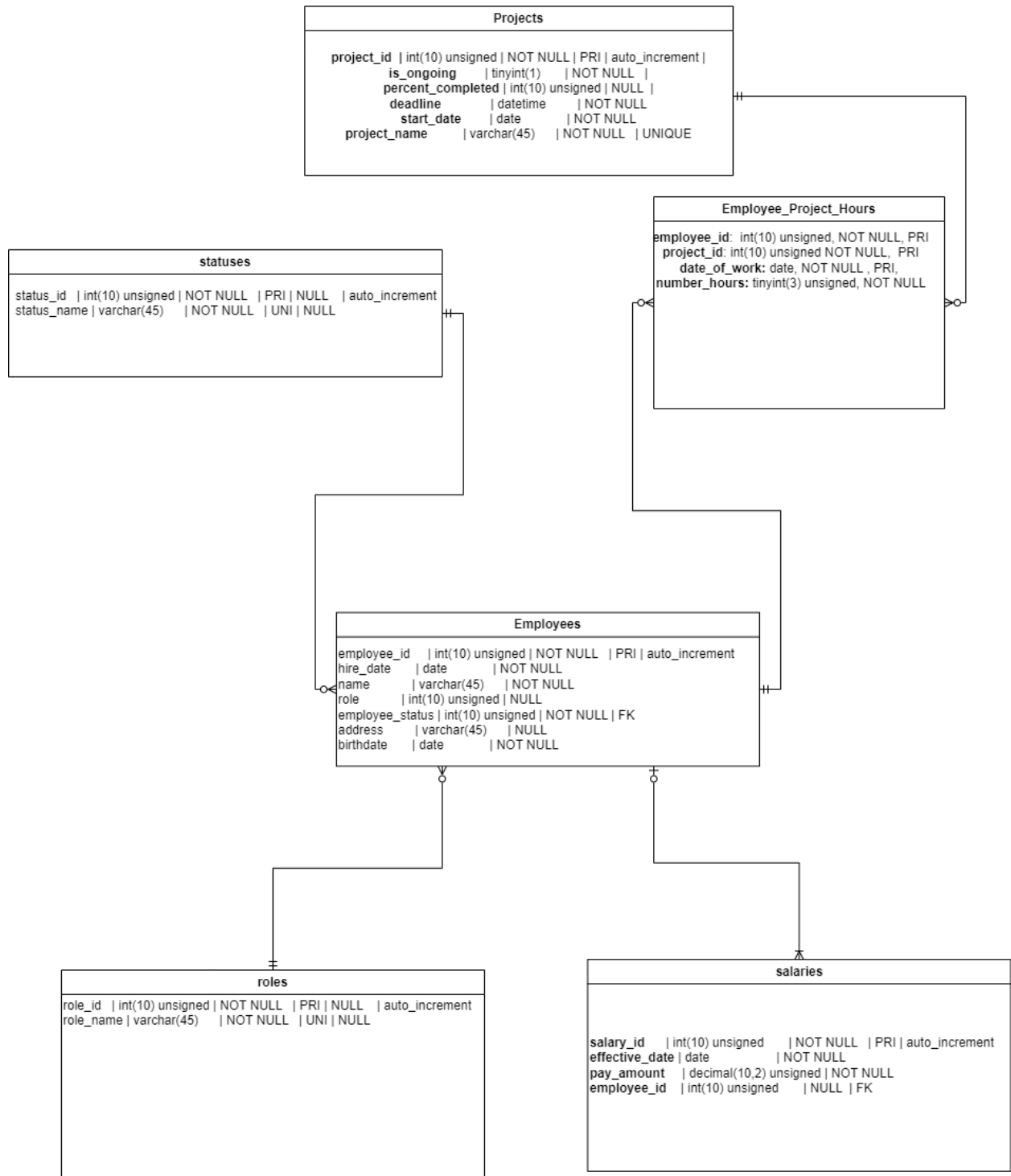- - **projects**
    - Cardinality: M:N implemented with *employee_id* and *project_id* as foreign keys of a composite entity **employees_projects**
    - Participation: Not mandatory for **employees**, not mandatory for **projects**

- ❖ **statuses:** the various statuses that an employee can have (e.g. "active", "sick", "fired")
  - ❖ *status_id*: unsigned, int, NN, AI, PK
  - ❖ *Status_name*: varchar(45), NN, Unique
  - ❖ Relationships with
    - ➢ Employees
      - Cardinality 1:M implemented with *status_id* as FK in **employees** table.
      - Participation: Not mandatory for statuses, mandatory for employees
- ❖ **roles:** The job type employees are hired to fill
  - ➢ *role_id*: int, unsigned, PK, NN, UQ, AI
  - ➢ *role_name*: varchar, NN
  - ➢ Relationships with
    - **employees**
      - Cardinality: 1:M implemented with *role_id* as a foreign key in **employees** table
      - Participation: Not mandatory for **employees**, mandatory for **roles**
- ❖ **projects:** All projects the company has ever assigned an employee to
  - ➢ *project_id*: int, unsigned, PK, NN, UQ, AI
  - ➢ *project_name*: varchar(255), NN
  - ➢ *start_date:* date, NN
  - ➢ *deadline:* date, NN
  - ➢ *is_ongoing*: tinyint, NN
  - ➢ *perecent_completed*: int, unsigned
  - ➢ Relationships with
    - **employees**
      - Cardinality: M:N implemented with *employee_id* and *project_id* as foreign keys of a composite entity **employees_projects**
      - Participation: Mandatory for **projects**, not mandatory for **employees**

- ❖ **salaries:** All pay rates an employee has ever had
  - ➢ *salary_id*: int, PK, NN, UQ, AI
  - ➢ *effective_date*: date, NN
  - ➢ *pay_amount*: decimal(10,2), NN
  - ➢ employee_id: int, unsigned, NN
  - ➢ Relationships with
    - **employees**

- Cardinality: 1:1 implemented with *employee_id* as a foreign key in **salaries**
- Participation: Not mandatory for **employees**, mandatory for **salaries**

❖ **employees_projects:** A composite entity used to track employee and project relationships as well as employee hours spent on a project
  ➢ *employee_id*: int, PK, NN
  ➢ *project_id*: int, PK, NN
  ➢ *date_of_work*: date, PK, NN
  ➢ *number_hours*: tinyint, unsigned, NN
  ➢ Relationships with
    ■ **employees**
      - Cardinality: 1:M implemented with *employee_id* as a foreign key in composite entity **employees_projects**
      - Participation: Mandatory for **employees**, not mandatory for **employees_projects**
    ■ **projects**
      - Cardinality: 1:M implemented with *project_id* as a foreign key in composite entity **employees_projects**
      - Participation: Mandatory for **projects**, not mandatory for **employees_projects**

ERD

statuses

Employees

Projects

roles

salaries

Schema

Projects

```
project_id   | int(10) unsigned | NOT NULL | PRI | auto_increment |
is_ongoing       | tinyint(1)    | NOT NULL |
percent_completed | int(10) unsigned | NULL |
deadline         | datetime      | NOT NULL
start_date       | date          | NOT NULL
project_name     | varchar(45)   | NOT NULL | UNIQUE
```

Employee_Project_Hours

```
employee_id:  int(10) unsigned, NOT NULL, PRI
project_id: int(10) unsigned NOT NULL,  PRI
date_of_work: date, NOT NULL , PRI,
number_hours: tinyint(3) unsigned, NOT NULL
```

statuses

```
status_id   | int(10) unsigned | NOT NULL | PRI | NULL | auto_increment
status_name | varchar(45)      | NOT NULL | UNI | NULL
```

Employees

```
employee_id    | int(10) unsigned | NOT NULL | PRI | auto_increment
hire_date      | date             | NOT NULL
name           | varchar(45)      | NOT NULL
role           | int(10) unsigned | NULL
employee_status | int(10) unsigned | NOT NULL | FK
address        | varchar(45)      | NULL
birthdate      | date             | NOT NULL
```

roles

```
role_id   | int(10) unsigned | NOT NULL | PRI | NULL   | auto_increment
role_name | varchar(45)      | NOT NULL | UNI | NULL
```

salaries

```
salary_id    | int(10) unsigned        | NOT NULL | PRI | auto_increment
effective_date | date                  | NOT NULL
pay_amount   | decimal(10,2) unsigned   | NOT NULL
employee_id  | int(10) unsigned         | NULL | FK
```

Screen Captures

Employees table of our Database
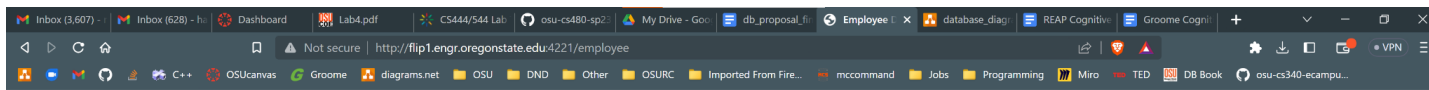
UPDATE functionality on employees page

Employee Database

View Employees   Add New Project   Manage Employee Projects   Manage Employee Salaries   Manage Employee Roles

ID	Hire Date	Name	Role ID	Role Name	Status	Status Name	Address	Birth Date	Remove
1	2020-12-31	Benny Beaverton	CEO of Beavers for	CEO of Beavers for Better	1	Active	5551 NW Harrison Blvd	1990-10-06	🗑
2	2020-12-31	Blaid Beaverton		Senior Mechanical Engineer	1	Active	5551 NW Harrison Blvd	1992-11-04	🗑
3	2021-03-01	Oregon Duck		Electric Engineer	4	Fired	2555 SE Portland Ave	1990-10-06	🗑
4	2023-01-31	Roger Smith		Senior Software Engineer	1	Active	8750 Rocky Way	1995-05-05	🗑
5	2023-01-31	Tweedle Dee	7	Software Engineer	1	Active	1458 Wonderland Way	1895-05-05	🗑
6	2023-01-31	Tweedle Dum	7	Software Engineer	1	Active	1458 Wonderland Way	1895-05-05	🗑
7	2023-01-31	Knives Chau	7	Software Engineer	1	Active	555 Westward Way	2000-10-10	🗑
8	2023-01-31	Scott Pilgrim	5	Electric Engineer	1	Active	8705 Scotty Blvd	1999-10-12	🗑
9	2023-01-31	Luke Skywalker	5	Electric Engineer	1	Active	0000 Milky Way	2000-12-12	🗑

Dropdown options:
AI Systems Specialist
CEO of Beavers for Better
Electric Engineer
Head of Communications
Kinesthetics Specialist
Mechanical Engineer
Senior Electric Engineer
Senior Mechanical Engineer
Senior Software Engineer
Software Engineer
Technical Writer

UPDATE functionality on Employees page (marking an employee as inactive)

DELETE functionality on employee_projects page (deleting a workday entry)