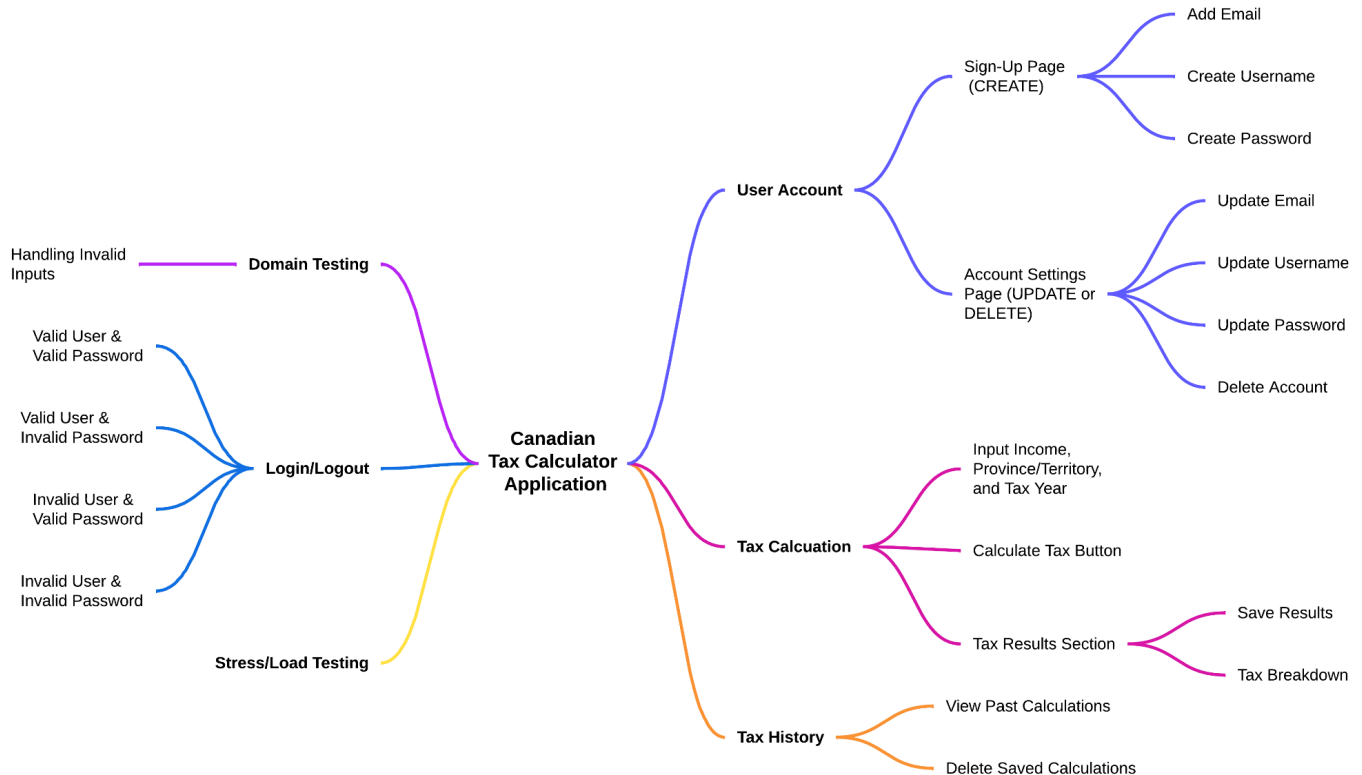


Design of Canadian Tax Calculator Application

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Mind map



Functional requirements

1. User Account Management:
 - a. Users can sign up by providing a username, email and password.
 - b. Users can log in and access their accounts.
 - c. Users can update their account details (username, email, password).
 - d. Users can delete their accounts.
 - e. Users can log out after their session.
2. Tax Calculation:
 - a. Users can input their income and select a province or territory.
 - b. The system will calculate federal and provincial taxes based on the user's input at the click of a button.
 - c. The system will display a breakdown of federal, provincial, and net tax and the total net income after tax deductions.

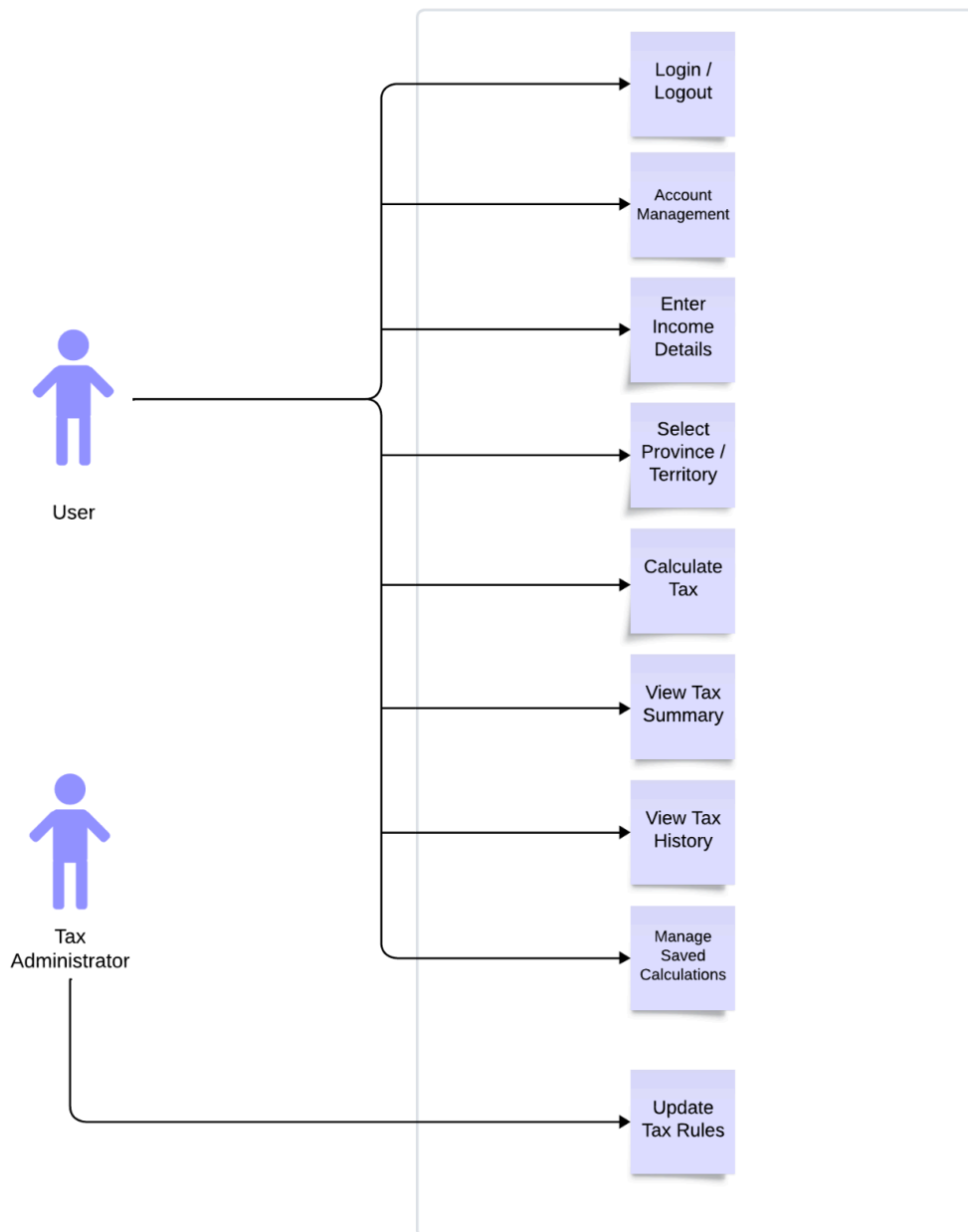
- d. Tax calculations will include basic personal amounts (BPAs) to give users as accurate a tax estimation as possible.
 - e. The system will have the option to save the results for future reference.
- 3. Tax History:
 - a. Users can view past calculations saved during their sessions.
 - b. Users can delete saved tax records.
- 4. Login/Logout:
 - a. The system will handle valid and invalid login attempts.
- 5. Input Validation:
 - a. The system will validate that the income entered is a positive number.
 - b. The system will validate that users select a valid region from a list.
 - c. The system will handle other invalid inputs (e.g. invalid characters in income).
- 6. Session Management:
 - a. The system will maintain user sessions during their login period.
 - b. Sessions will expire after a certain amount of inactivity.

Non-functional requirements

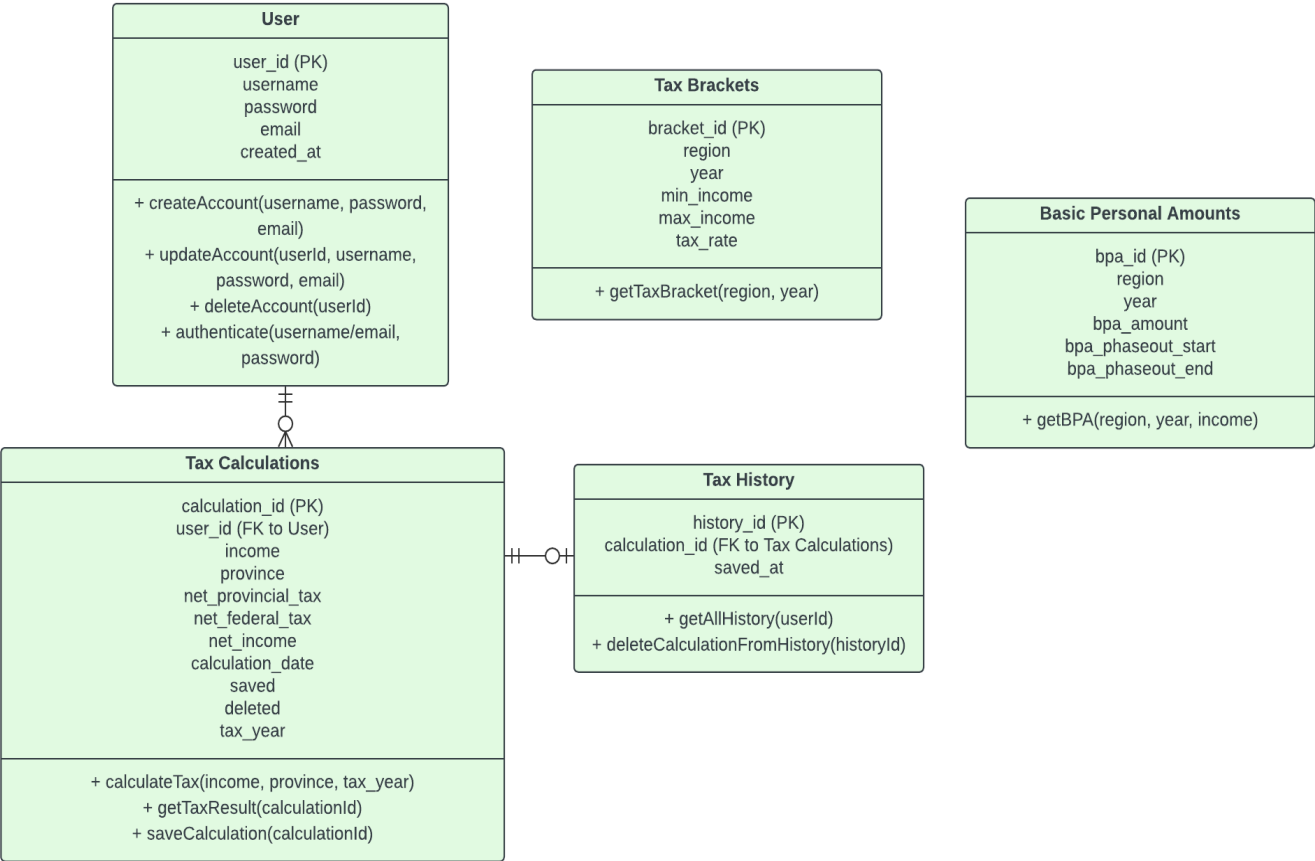
- 1. Performance:
 - a. The system should process tax calculations quickly.
 - b. The system should be able to handle many concurrent users (e.g. 100 users calculating taxes simultaneously without crashing).
 - c. The system should deliver accurate estimates of users taxes and net incomes, similar to other online tax calculators such as EY.
- 2. Security:
 - a. User passwords should be encrypted in the database.
 - b. The system should require HTTPS for secure communication between the user's browser and the server.
 - c. The system should have authentication measures in place to protect access to user accounts.
 - d. Users should only be able to access their own tax history, account settings, etc.
- 3. Usability:
 - a. The application should have an intuitive user interface, with clear instructions for tax calculation.
 - b. The application should be responsive across different devices (desktop, tablet, mobile).
- 4. Reliability:
 - c. The system should have a 99.9% uptime, especially during tax season.
 - d. The system should automatically recover from minor errors without crashing.
- 5. Scalability:

- a. The system should be designed to easily scale up to accommodate growing users, especially during high-traffic times (e.g. during tax season).
- b. The system should allow for long-term usage across different tax years.
- 6. Maintainability:
 - a. The system should allow easy updates of tax rates and BPAs year after year without affecting the overall functionality.
 - b. The code should be well-documented for future developers to understand and maintain.

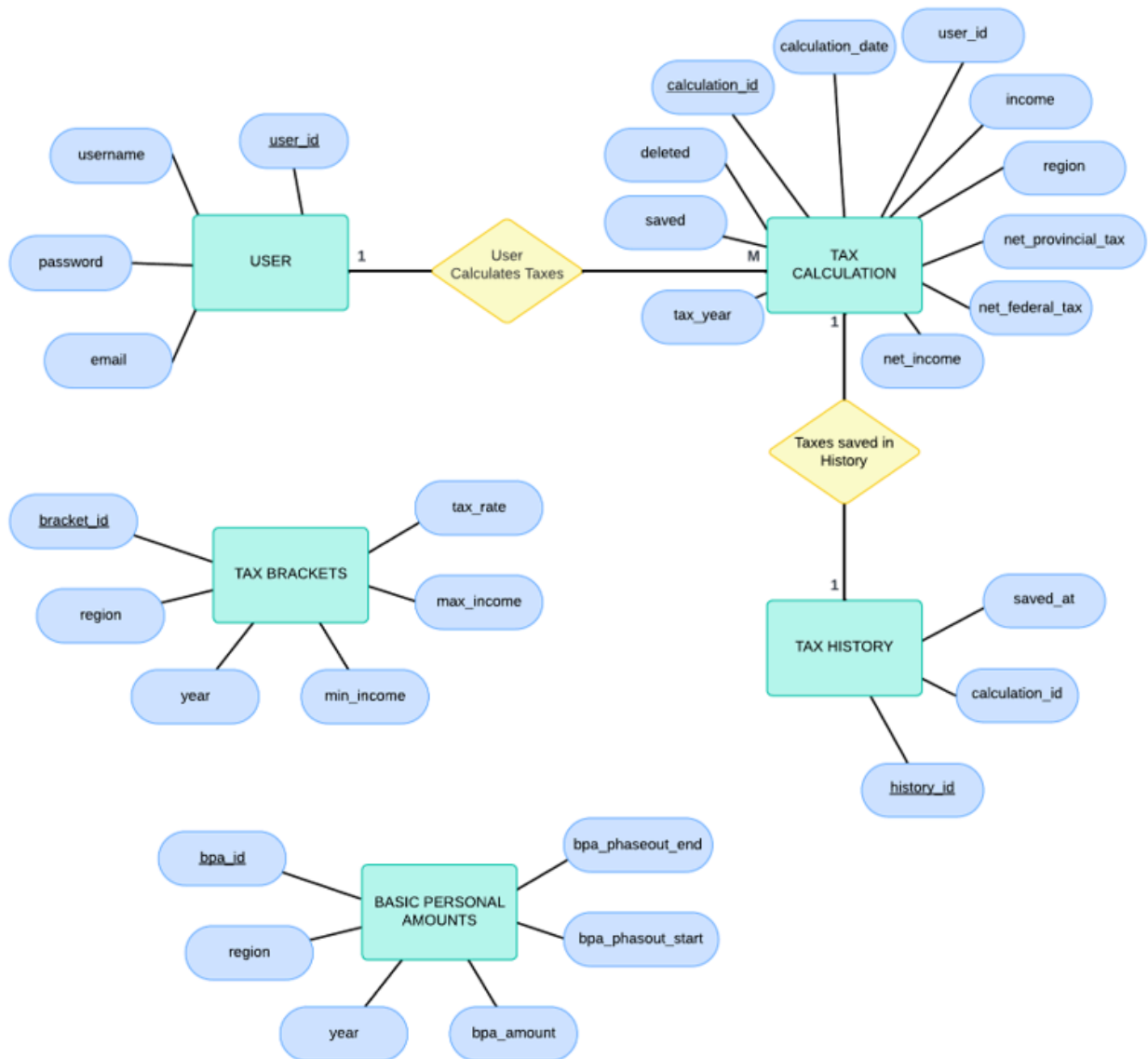
Use-Case Diagram



Class diagram



ER diagram



Screen Flow

1. Homepage

- Navigation Bar:
 - Links to Login Screen and Registration Screen
 - Links to navigate to About Us and How it Works sections
- Main Content:
 - A brief introduction to the tax calculator.
 - A get started button that directs users to sign up or log in.

Welcome to the Canadian Tax Calculator

Plug in your income and region, and we'll give you an in-depth breakdown of your provincial and federal taxes for the current year.
Get started for free.

[Get Started](#)

About Us

We're three students who noticed a lack of online tax calculators that have simple user interfaces and allow users to track and save multiple tax calculations over time. Our goal was to develop a Canadian tax calculator website where users can create an account to track their estimated tax payments year after year, and come back any time to view, update, or create new calculations.

Emily McIsaac | Anne Houghton | Marissa-Mai Phu

How It Works

Adjusting Income

Our tax calculator first adjusts your income using federal and provincial basic personal amounts for the given year.



Calculating Taxes

We use Canada's tax brackets to estimate your federal and provincial taxes, as well as your net income.

Estimates Only

Our calculator does not include any personalized tax credits. Results are not an exact calculation of payable taxes.



Preparing Your Finances

We provide approximations to help you prepare financially for tax year-end.

2. Login Screen

- Form:
 - Username/email and password input fields.
 - A submit button for logging in which takes the user to the My Account Screen
 - A link to the Registration Screen is available if the user has no account.

Tax Calculator

Register

Login

Username or Email

Enter your username or email

Password

Enter your password

☐ Show Password

☐ Remember Me

Login

Don't have an account? [Register here](#)

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3. Registration Screen

- Form:
 - Input fields for Username, Email, Password, and Confirm Password.
 - A submit button for creating an account.
 - A link to the Login Screen for existing users.

Create an Account

Username

Email address

Password

☐ Show Password

Confirm Password

Register

Already have an account? [Login here](#)

4. My Account Screen

- Main content:
 - Buttons to:
 - Calculate Taxes Screen
 - Tax History Screen
 - Update Account Info pop-up
 - Log out

My Account

Username: Sample
Email: sample@email.com

[Calculate Taxes](#)[View Tax History](#)[Edit Account Info](#)

Edit Account Information

Username

Sample

Email address

sample@email.com

Change Password

Old Password

Enter your old password

New Password

Enter your new password

Save Changes

5. Calculate Taxes Screen

- Form:
 - Income input field.
 - Dropdown menu for selecting a province/territory.
 - A calculate button to calculate taxes.
- Results Section:
 - After submission, display a breakdown of federal taxes, provincial taxes, net taxes, and net income.
 - Include an option to save the results to tax history.

Calculate Taxes

Enter Your Income

Select Your Province/Territory

Prince Edward Island

Select Tax Year

2024

Calculate Taxes

Tax Results

Federal Tax: \$14497.98

Provincial Tax: \$11724.37

Total Net Income After Tax: \$73777.66

Save to Tax History

View Tax History

6. Tax History Screen

- List View:
 - A table or list displaying previous tax calculations (including income, province, date, and saved results).
 - Options to update or delete each entry.
 - A button or link to calculate new taxes.

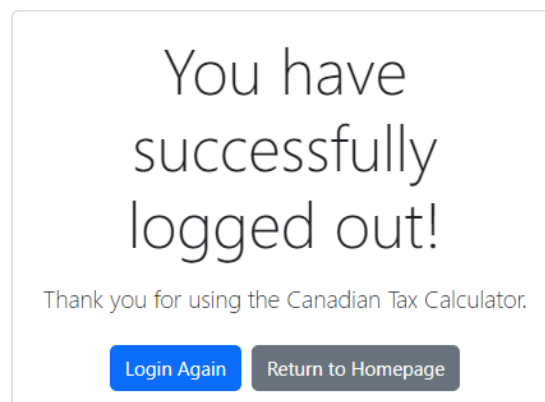
Tax History

Date Calculated	Tax Year	Income	Province	Federal Tax	Provincial Tax	Net Income	Actions
9/21/2024	2024	\$477518.00	nova scotia	\$133576.03	\$91889.77	\$252052.20	Delete
9/21/2024	2024	\$75555.00	northwest territories	\$12514.53	\$5282.04	\$57758.43	Delete
9/21/2024	2024	\$576765.00	yukon	\$166327.54	\$69139.98	\$341297.49	Delete
9/22/2024	2024	\$666666.00	new brunswick	\$195994.87	\$114251.38	\$356419.76	Delete

[Calculate More Taxes](#)

7. Logout Confirmation Screen

- A simple screen or modal confirming that the user has successfully logged out.
- A button to return to the homepage or log in again.



Screen Flow Example:

- Homepage -> Login/Register -> My Account

- From My Account: -> Calculate Taxes -> View Tax History -> Delete Tax History
- Also from My Account: -> Update Account Info -> Delete Account
- Log out from any screen.

Database Setup

-- 1. Users table and indexes

```
CREATE TABLE users (
    user_id SERIAL PRIMARY KEY,
    username VARCHAR(50) NOT NULL UNIQUE,
    email VARCHAR(100) NOT NULL UNIQUE,
    password_hash VARCHAR(255) NOT NULL,
    created_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP
    CHECK (LENGTH(password_hash) >= 8)
);
```

```
CREATE INDEX idx_users_email ON users (email);
```

```
CREATE INDEX idx_users_username ON users (username);
```

-- 2. Tax Brackets Table

```
CREATE TABLE tax_brackets (
    bracket_id SERIAL PRIMARY KEY,
    region VARCHAR(50) NOT NULL,
    year INT NOT NULL,
    min_income DECIMAL(15, 2) NOT NULL,
    max_income DECIMAL(15, 2) NOT NULL,
    tax_rate DECIMAL(5, 4) NOT NULL
    CHECK (min_income < max_income),
    CHECK (tax_rate > 0 AND tax_rate <= 1)
);
```

-- 3. Tax Calculations table and indexes

```
CREATE TABLE tax_calculations (
    calculation_id SERIAL PRIMARY KEY,
    user_id INT REFERENCES users(user_id) ON DELETE CASCADE,
    income DECIMAL(15, 2) NOT NULL CHECK (income > 0),
    region VARCHAR(50) NOT NULL,
    federal_tax DECIMAL(15, 2) NOT NULL,
    provincial_tax DECIMAL(15, 2) NOT NULL,
    net_income DECIMAL(15, 2) NOT NULL,
    calculation_date TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
    saved BOOLEAN DEFAULT FALSE,
    deleted BOOLEAN DEFAULT FALSE -- Soft delete flag,
    tax_year integer NOT NULL DEFAULT EXTRACT(YEAR FROM CURRENT_DATE);
);
```

```
CREATE INDEX idx_tax_calculations_user_id ON tax_calculations (user_id);
```

-- 4. Tax History table and indexes

```
CREATE TABLE tax_history (
```

```

        history_id SERIAL PRIMARY KEY,
        calculation_id INT REFERENCES tax_calculations(calculation_id) ON DELETE
CASCADE,
        saved_at TIMESTAMP DEFAULT CURRENT_TIMESTAMP
);

```

```

CREATE INDEX idx_tax_history_calculation_id ON tax_history (calculation_id);

```

```

-- 6. Insert Data for 2024 Federal and Provincial Tax Brackets

```

```

INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES

```

```

('federal', 2024, 0.00, 55867.00, 0.15),
('federal', 2024, 55867.01, 111733.00, 0.205),
('federal', 2024, 111733.01, 173205.00, 0.26),
('federal', 2024, 173205.01, 246752.00, 0.29),
('federal', 2024, 246752.01, 999999999.99, 0.33);

```

```

-- Newfoundland and Labrador

```

```

INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES

```

```

('newfoundland and labrador', 2024, 0.00, 43198.00, 0.087),
('newfoundland and labrador', 2024, 43198.01, 86395.00, 0.145),
('newfoundland and labrador', 2024, 86395.01, 154244.00, 0.158),
('newfoundland and labrador', 2024, 154244.01, 215943.00, 0.178),
('newfoundland and labrador', 2024, 215943.01, 275870.00, 0.198),
('newfoundland and labrador', 2024, 275870.01, 551739.00, 0.208),
('newfoundland and labrador', 2024, 551739.01, 1103478.00, 0.213),
('newfoundland and labrador', 2024, 1103478.01, 999999999.99, 0.218);

```

```

-- Prince Edward Island

```

```

INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES

```

```

('prince edward island', 2024, 0.00, 32656.00, 0.0965),
('prince edward island', 2024, 32656.01, 64313.00, 0.1363),
('prince edward island', 2024, 64313.01, 105000.00, 0.1665),
('prince edward island', 2024, 105000.01, 140000.00, 0.18),
('prince edward island', 2024, 140000.01, 999999999.99, 0.1875);

```

```

-- Nova Scotia

```

```

INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES

```

```

('nova scotia', 2024, 0.00, 29590.00, 0.0879),
('nova scotia', 2024, 29590.01, 59180.00, 0.1495),
('nova scotia', 2024, 59180.01, 93000.00, 0.1667),
('nova scotia', 2024, 93000.01, 150000.00, 0.175),
('nova scotia', 2024, 150000.01, 999999999.99, 0.21);

```

```

-- New Brunswick

```

```

INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES
('new brunswick', 2024, 0.00, 49958.00, 0.094),
('new brunswick', 2024, 49958.01, 99916.00, 0.14),
('new brunswick', 2024, 99916.01, 185064.00, 0.16),
('new brunswick', 2024, 185064.01, 999999999.99, 0.19);

-- Quebec
INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES
('quebec', 2024, 0.00, 51780.00, 0.14),
('quebec', 2024, 51780.01, 103545.00, 0.19),
('quebec', 2024, 103545.01, 126000.00, 0.24),
('quebec', 2024, 126000.01, 999999999.99, 0.2575);

-- Ontario
INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES
('ontario', 2024, 0.00, 51446.00, 0.0505),
('ontario', 2024, 51446.01, 102894.00, 0.0915),
('ontario', 2024, 102894.01, 150000.00, 0.1116),
('ontario', 2024, 150000.01, 220000.00, 0.1216),
('ontario', 2024, 220000.01, 999999999.99, 0.1316);

-- Manitoba
INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES
('manitoba', 2024, 0.00, 47000.00, 0.108),
('manitoba', 2024, 47000.01, 100000.00, 0.1275),
('manitoba', 2024, 100000.01, 999999999.99, 0.174);

-- Saskatchewan
INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES
('saskatchewan', 2024, 0.00, 52057.00, 0.105),
('saskatchewan', 2024, 52057.01, 148734.00, 0.125),
('saskatchewan', 2024, 148734.01, 999999999.99, 0.145);

-- Alberta
INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES
('alberta', 2024, 0.00, 148269.00, 0.10),
('alberta', 2024, 148269.01, 177922.00, 0.12),
('alberta', 2024, 177922.01, 237230.00, 0.13),
('alberta', 2024, 237230.01, 355845.00, 0.14),
('alberta', 2024, 355845.01, 999999999.99, 0.15);

-- British Columbia

```

```

INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES
('british columbia', 2024, 0.00, 47937.00, 0.0506),
('british columbia', 2024, 47937.01, 95875.00, 0.077),
('british columbia', 2024, 95875.01, 110076.00, 0.105),
('british columbia', 2024, 110076.01, 133664.00, 0.1229),
('british columbia', 2024, 133664.01, 181232.00, 0.147),
('british columbia', 2024, 181232.01, 252752.00, 0.168),
('british columbia', 2024, 252752.01, 999999999.99, 0.205);

```

-- Yukon

```

INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES
('yukon', 2024, 0.00, 55867.00, 0.064),
('yukon', 2024, 55867.01, 111733.00, 0.09),
('yukon', 2024, 111733.01, 173205.00, 0.109),
('yukon', 2024, 173205.01, 500000.00, 0.128),
('yukon', 2024, 500000.01, 999999999.99, 0.15);

```

-- Northwest Territories

```

INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES
('northwest territories', 2024, 0.00, 50597.00, 0.059),
('northwest territories', 2024, 50597.01, 101198.00, 0.086),
('northwest territories', 2024, 101198.01, 164525.00, 0.122),
('northwest territories', 2024, 164525.01, 999999999.99, 0.1405);

```

-- Nunavut

```

INSERT INTO tax_brackets (region, year, min_income, max_income, tax_rate)
VALUES
('nunavut', 2024, 0.00, 53268.00, 0.04),
('nunavut', 2024, 53268.01, 106537.00, 0.07),
('nunavut', 2024, 106537.01, 173205.00, 0.09),
('nunavut', 2024, 173205.01, 999999999.99, 0.115);

```

-- 7. BPA Table and Inserted Data

```

CREATE TABLE basic_personal_amounts (
    bpa_id SERIAL PRIMARY KEY,
    region VARCHAR(255),
    year INT,
    bpa_amount DECIMAL(10, 2),
    bpa_phaseout_start DECIMAL(10, 2),
    bpa_phaseout_end DECIMAL(10, 2)
);

```

-- Federal BPA

```

INSERT INTO basic_personal_amounts (region, year, bpa_amount,
bpa_phaseout_start, bpa_phaseout_end)
VALUES ('federal', 2024, 15000, 150000, 221708);

```

```
-- Ontario BPA
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('ontario', 2024, 11865);

-- British Columbia BPA
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('british columbia', 2024, 11981);

-- Alberta BPA
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('alberta', 2024, 21003);

-- Quebec BPA (Note: Quebec BPA is handled separately)
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('quebec', 2024, 18056);

-- Manitoba BPA
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('manitoba', 2024, 10855);

-- Saskatchewan BPA
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('saskatchewan', 2024, 16065);

-- Nova Scotia BPA
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('nova scotia', 2024, 8481);

-- New Brunswick BPA
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('new brunswick', 2024, 12458);

-- Newfoundland and Labrador BPA
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('newfoundland and labrador', 2024, 10382);

-- Prince Edward Island BPA
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('prince edward island', 2024, 12000);

-- Yukon BPA
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('yukon', 2024, 15200);

-- Northwest Territories BPA
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('northwest territories', 2024, 15980);
```



```
-- Nunavut BPA
INSERT INTO basic_personal_amounts (region, year, bpa_amount)
VALUES ('nunavut', 2024, 16672);
```