# CSC 411: Secure Programming

CRN 25617 JLI Spring 2025

## Assignment 5

**Objectives:** Study and implement secure coding guidelines and conduct static code analysis and dynamic code analysis.

**Tasks:**
We spent three classes building a JavaFX FXML application that includes user registration and authentication, storing user signup information in the *users* table in a MySQL database, and securing passwords with salting and hashing. In this assignment, you will add data validation and conduct static code analysis using SpotBugs with FindSecBugs plugin and dynamic code analysis through JUnit testing.

1. Your project must have GUIs for the Home page, Sign Up page, Log In page, and a dummy Main Menu page with corresponding controller classes, and the User, DBManager, PasswordManager, and Validator classes as what we've developed in class.

When connecting to XAMPP's mysql database server, use the following setting:

Database name: csc411db
Hostname: localhost
Username: csc411user
Password: csc411pwd

Use **PBKDF2WithHmacSHA512** algorithm to generate a password hash. The salt is 32 bytes long.

2. In the **Validator** class, add methods to validate user's email, password, and confirm-password using the following simplified criteria. Regular expressions must be used in data validation. What validating user data, error messages must be displayed in a JavaFX Alert window.

Input criteria:

1) The email cannot be empty. The email address must follow the format local-part@SLD.TLD.
   - The local-part contains lowercase letters, uppercase letters, digits, and characters `#$%&*-`
   - SLD (Second-Level Domain) contains lowercase letters, uppercase letters, and digits.
   - TLD (Top-Level Domain) contains 2 to 4 letters. Examples are com, edu, co, org, info, ca, uk.
2) The password cannot be empty. The password must be at least 8 characters long and contain at least one lowercase letter, one uppercase letter, one digit, and one special character of the following `-+_!@#$%^&*`
3) The Confirm Password cannot be empty and must be identical to the Password.

If an invalid value is entered, a respective error message (not a general error message such as "Email is invalid") should be displayed to the user so they know how to correct it.

Examples of error messages: "Email cannot be empty" and "Password must contain at least one uppercase letter".

You have freedom to define the validation methods in the Validator class.

3. Conduct the static code analysis using SpotBugs and FindSecBugs plugin and fix the bugs as many as you can. Select "**Analyze Project Files Including Test Sources**" when testing with Spotbugs and FindSecBugs. For the remaining "bugs", briefly explain why you think they are acceptable or false positive. **Do not suppress any bugs**.

4. Create a Test class for the **Validator** class using JUnit framework. Write test methods to test each validation method. List your test cases in the tables below.

3.1. Test cases for testing email validation

| No. | Invalid Email | Valid Email |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| Add more rows if needed | | |

3.2 Test cases for testing password validation

| No. | Invalid Password | Valid Password |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| Add more rows if needed | | |

3.3 Test cases for testing confirm password validation

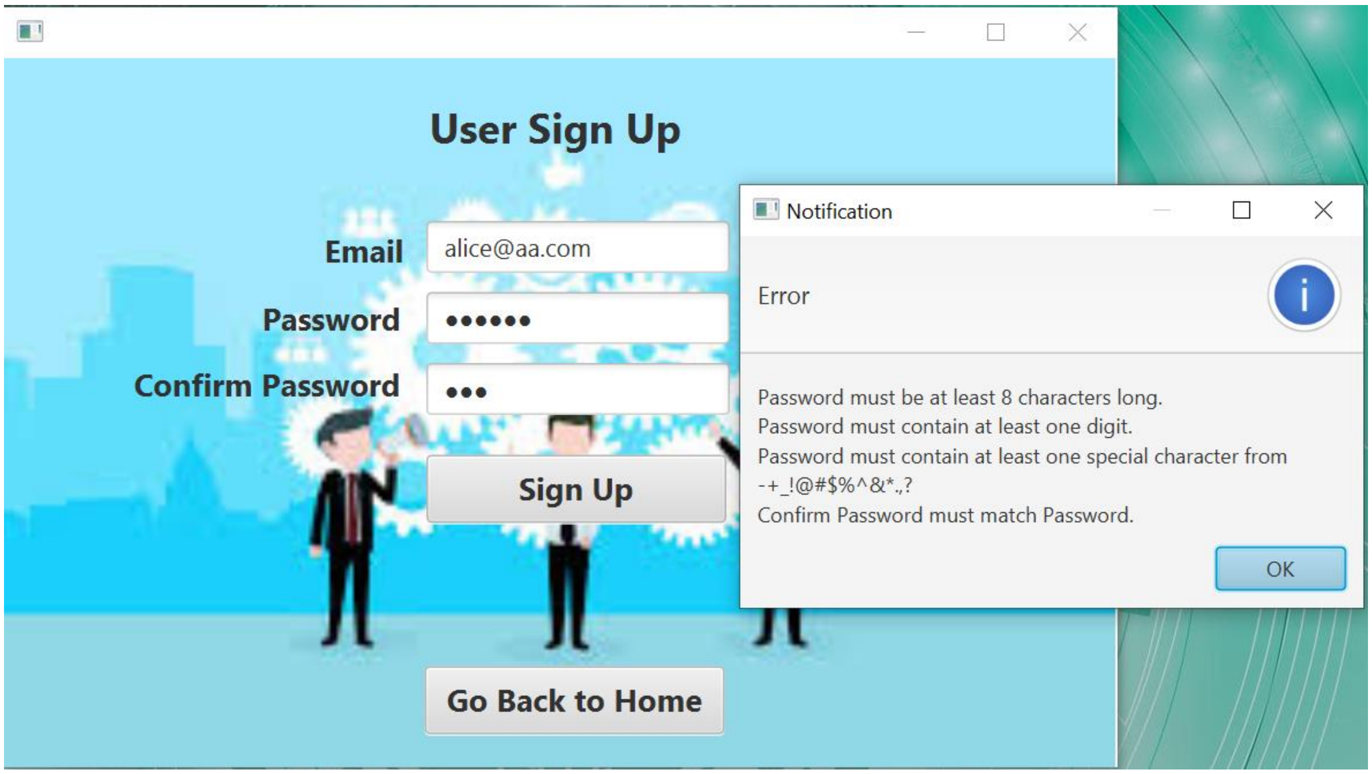
| No. | True case | False case |
|---|---|---|
| 1 | | |
| 2 | | |
| Add rows if needed | | |

5. In all GUI pages, add a label at the bottom displaying "**CSC411 Spring 2025**" followed by **Your Name**.

6. Run your application, register a few users, and manually test the signup and login processes. Take a screenshot of the records in the users table. You can view the users table in a browser by going to http://localhost/phpmyadmin/.

**Submission:**
1. Submit a zip file that contains your entire Java IntelliJ project.
2. Submit a screenshot showing the records in your users table.
3. Submit a word or pdf document reporting the results of the static code analysis and Junit testing with test cases.

**Sample Output:**



Error

Password must be at least 8 characters long.
Password must contain at least one digit.
Password must contain at least one special character from -+_!@#$%^&*.,?
Confirm Password must match Password.

: