1. The "security mindset"

- security mindset
- some basic web attacks
- breaking and securing an example page
CSE <= 190M

- until now, we have assumed:
  - valid user input
  - non-malicious users
  - nothing will ever go wrong
- this is unrealistic!

The real world

- in order to write secure code, we must assume:
  - invalid input
  - evil users
  - everybody is out to get you
- trust nothing
2. Some basic web attacks

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**HTML injection**

*a flaw where a user is able to inject arbitrary HTML content into your page*

- why is this bad? it allows others to:
  - disrupt the flow/layout of your site
  - put words into your mouth
  - (possibly) run JavaScript on your users' computers
- kinds of injected content:
  - annoying: `results.php?name=<blink>lololol</blink>`
  - malicious and harmful: `onlinebanking.php?text=`
  ```
  <script>transferMoneyTo("Evil Kevin", 1000, "USD");
  </script>
  ```
  - injecting JavaScript content is called **cross-site scripting** or XSS
- example: magic 8-ball
Securing against HTML injection

- one idea: disallow harmful characters
  - HTML injection is impossible without `< >`
  - can strip those characters from incoming input
  - or, just reject the entire request if they are present
- better idea: allow them, but escape them
  - `< >` → `&lt;` and `&gt;`
  - PHP's `htmlspecialchars` function escapes HTML characters:
    ```php
    <?=
    htmlspecialchars($username) ?>
    ```

SQL injection

* a flaw where the user is able to inject arbitrary SQL commands into your query

- `$query = "SELECT name, ssn, dob FROM users
  WHERE username = '$username' AND password = '$password'";`
  - Password: 'OR'='1'
- `$query = "SELECT name, ssn, dob FROM users
  WHERE username = '$username' AND password = '' OR
  '1'='1'";`
  - What will the above query return? Why is this bad?
- example: simpsons grade lookup
Securing against SQL injection

- similar to securing against HTML injection, escape the string before you include it in your query
- use the PHP `mysql_real_escape_string` function

```php
$username = mysql_real_escape_string($_REQUEST["username"]);
$password = mysql_real_escape_string($_REQUEST["password"]);
$query = "SELECT name, ssn, dob FROM users
WHERE username = "\$username\" AND password = "\$password\";"
```

3. Breaking and securing an example page

- PHP/SQL review
- some basic web attacks
- breaking and securing an example page