Web Programming
with Python and JavaScript
Scalability and Security
Scalability
Servers

- Cloud
- On Premise
Benchmarking
Vertical Scaling
Server
Horizontal Scaling
Server
Load Balancing Methods

- Random Choice
- Round Robin
- Fewest Connections
- ...
Session-Aware Load Balancing

- Sticky Sessions
- Sessions in Database
- Client-Side Sessions
- ...
Autoscaling
Load Balancer

- Server
- Server
- Server
- Server
Scaling Databases
Database Partitioning
<table>
<thead>
<tr>
<th>id</th>
<th>origin</th>
<th>origin_code</th>
<th>destination</th>
<th>destination_code</th>
<th>duration</th>
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<tbody>
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<td>New York</td>
<td>JFK</td>
<td>London</td>
<td>LHR</td>
<td>415</td>
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<td>Shanghai</td>
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<td>CDG</td>
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<td>IST</td>
<td>Tokyo</td>
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<td>LIM</td>
<td>New York</td>
<td>JFK</td>
<td>455</td>
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### airports

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<td>New York</td>
</tr>
<tr>
<td>2</td>
<td>PVG</td>
<td>Shanghai</td>
</tr>
<tr>
<td>3</td>
<td>IST</td>
<td>Istanbul</td>
</tr>
<tr>
<td>4</td>
<td>LHR</td>
<td>London</td>
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<tr>
<td>5</td>
<td>SVO</td>
<td>Moscow</td>
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<tr>
<td>6</td>
<td>LIM</td>
<td>Lima</td>
</tr>
<tr>
<td>7</td>
<td>CDG</td>
<td>Paris</td>
</tr>
<tr>
<td>8</td>
<td>NRT</td>
<td>Tokyo</td>
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## flights

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<td>6</td>
<td>6</td>
<td>1</td>
<td>455</td>
</tr>
</tbody>
</table>
Database Replication
Database Replication

- Single-Primary Replication
- Multi-Primary Replication
Single-Primary Replication

Database

write

Database

update

Database

update

Database

read

read

read
Multi-Primary Replication

Database

write  read

Database  Database  Database

write  read  write  read  write  read

update  update  update
Caching
Client-Side Caching
Cache-Control: max-age=86400
Cache-Control: max-age=86400
ETag: "7477656E74796569676874"
Server-Side Caching
Django Cache Framework

- Per-View Caching
- Template Fragment Caching
- Low-Level Cache API
Security
Topics

- HTML and CSS
- Git
- Python
- Django
- SQL
- JavaScript
- User Interfaces
- Testing and CI/CD
Open-Source Software
first credentials exposed
HTML
Django
HTTP and HTTPS
Secret-Key Cryptography
Public-Key Cryptography
SQL
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<td>hello</td>
</tr>
<tr>
<td>2</td>
<td>ron</td>
<td>password</td>
</tr>
<tr>
<td>3</td>
<td>hermione</td>
<td>12345</td>
</tr>
<tr>
<td>4</td>
<td>ginny</td>
<td>abcdef</td>
</tr>
<tr>
<td>5</td>
<td>luna</td>
<td>qwerty</td>
</tr>
<tr>
<td>id</td>
<td>username</td>
<td>password</td>
</tr>
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<td>2</td>
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<td>3</td>
<td>hermione</td>
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<tr>
<td>4</td>
<td>ginny</td>
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</tr>
<tr>
<td>5</td>
<td>luna</td>
<td>a4048eaaee50680532845b2025996b44a9</td>
</tr>
</tbody>
</table>
Forgot Your Password?

Email Address

Reset Password
Forgot Your Password?

Password reset email sent.

Email Address

Reset Password
Forgot Your Password?

Error: There is no user with that email address.

Email Address

Reset Password
SQL Injection
Username:

Password:
SELECT * FROM users
WHERE username = username AND password = password;
Username: harry
Password: 12345
SELECT * FROM users
WHERE username = username AND password = password;
SELECT * FROM users
WHERE username = "harry" AND password = "12345";
Username: hacker

Password:
SELECT * FROM users
WHERE username = username AND password = password;
SELECT * FROM users
WHERE username = "hacker--" AND password = "";
SELECT * FROM users
WHERE username = "hacker"--" AND password = "";
APIs
API Keys

- Rate Limiting
- Route Authentication
Cross-Site Scripting
Cross-Site Request Forgery
<a href="http://yourbank.com/transfer?to=brian&amt=2800">
  Click Here!
</a>
<body>
    <img src="http://yourbank.com/transfer?to=brian&amt=2800">
</body>
<form action="https://yourbank.com/transfer" method="post">
  <input type="hidden" name="to" value="brian">
  <input type="hidden" name="amt" value="2800">
  <input type="submit" value="Click Here!">
</form>
<form action="https://yourbank.com/transfer" method="post">
    <input type="hidden" name="to" value="brian">
    <input type="hidden" name="amt" value="2800">
    <input type="submit" value="Click Here!">
</form>
<form action="/transfer" method="post">
    {% csrf_token %}
    <input name="to" value="brian">
    <input name="amt" value="2800">
    <input type="submit" value="Transfer">
</form>
Web Programming
What’s next?
Other Web Frameworks

• Server-Side
  • Express.js
  • Ruby on Rails
  • ...
• Client-Side
  • AngularJS
  • React
  • Vue.js
  • ...
Deploying Websites

- Amazon Web Services
- GitHub Pages
- Google Cloud
- Heroku
- Microsoft Azure
- ...

Web Programming
HTML and CSS
Git
Python
Django
SQL, Models, and Migrations
JavaScript
User Interfaces
Testing and CI/CD
Scalability and Security

Load Balancer

Server

Server

Server
Web Programming
with Python and JavaScript