Web basics: HTTP cookies

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Web access control - 3 key aspects

- Authentication - username and passwords
- Session management - link sequences of requests of authenticated users
- Authorisation - check and enforce permissions of authenticated users

Session management

- Goal - the server should not require a user to re-authenticate at each HTTP(s) request
- Problem - HTTP is stateless
- Solution -
  - User logs in once
  - The server generated session identifier and sends it to the client (browser)
    temporary token that identifying an authenticated user
  - The client returns the session identifier in subsequent requests
  - 2 main approches: hidden fields and cookies

Hidden fields (slide from Web basics lecture)

The principle

Include an HTML form with a hidden field containing a session ID in all the HTML pages sent to the client. This hidden field will be returned back to the server in the request.

Example: the web server can send a hidden HTML form field along with a unique session ID as follows:

```
<input type="hidden" name="sessionid" value="12345">
```

When the form is submitted, the specified name and value are automatically included in the POST data.

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- Cookies can be used to hold personalized information, or to help in on-line sales/service (e.g. shopping cart), or tracking popular links.

Web security: session hijacking

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Wikipedia

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- Cross-site request forgery (CSRF) vulnerabilities

Cross-site request forgery (CSRF)

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OWASP

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Keys ingredient: requests to vulnerable server have predictable structure

CSRF: a simple example

Alice wishes to transfer $100 to Bob using the bank.com web application. This money transfer operation reduces to a request like:

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GET http://bank.com/transfer.do?acct=BOB&amount=100
HTTP/1.1
```

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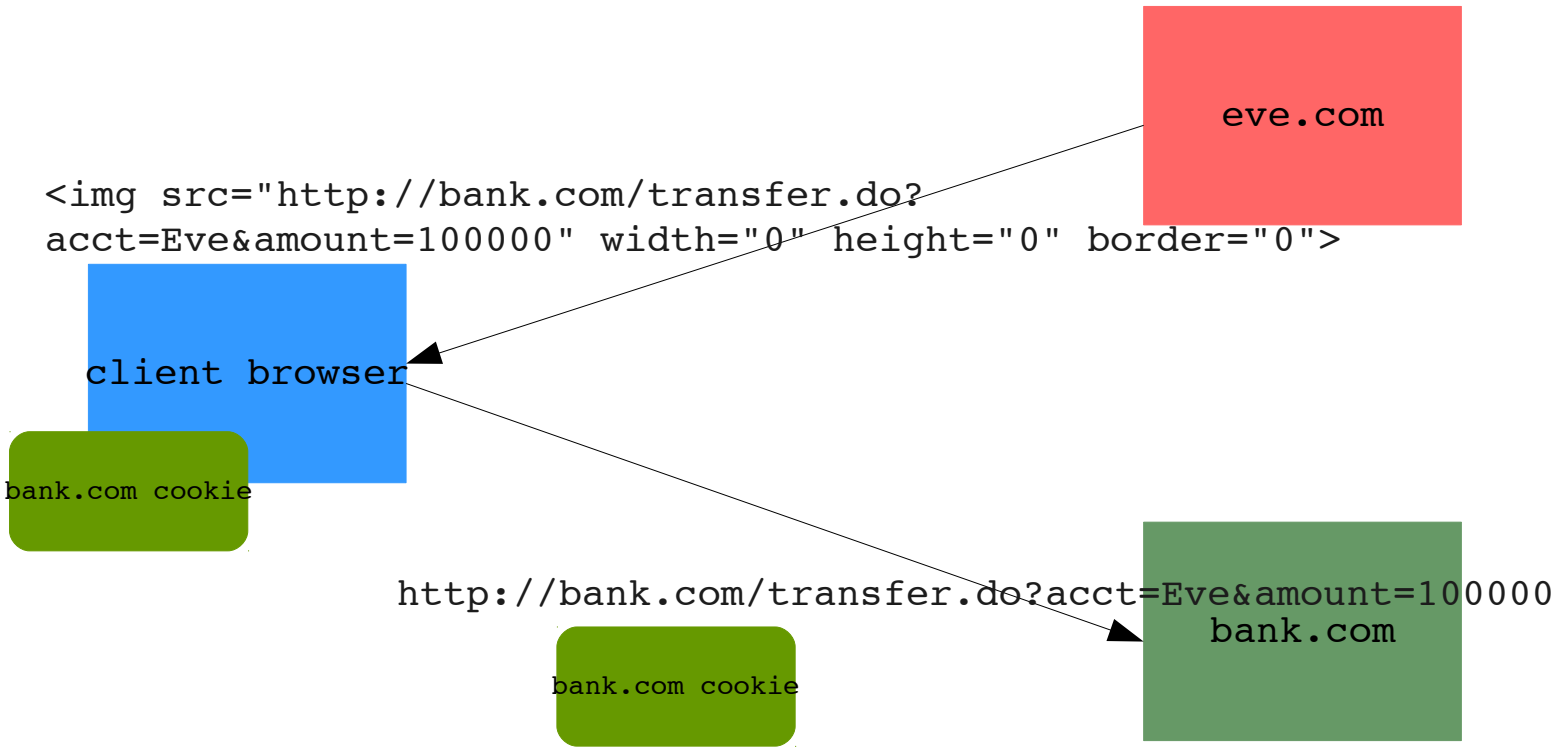
The `bank.com` server is vulnerable to CSRF: the attacker can generate a valid malicious request for Alice to execute!!
The attack comprises the following steps:

1. Eve crafts the following URL
   `http://bank.com/transfer.do?acct=Eve&amount=100000`
2. When Alice visits Eve's website she tricks Alice's browser into accessing this URL

CSRF: a simple example



CSRF defenses

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- **Set the** `SameSite` **cookie attribute** - prevents coloes from being sent in cross-site requests. But this is a very recent standard and might not be supported by all browsers.

Twitter SMS account hijacking (Nov. 2013)