

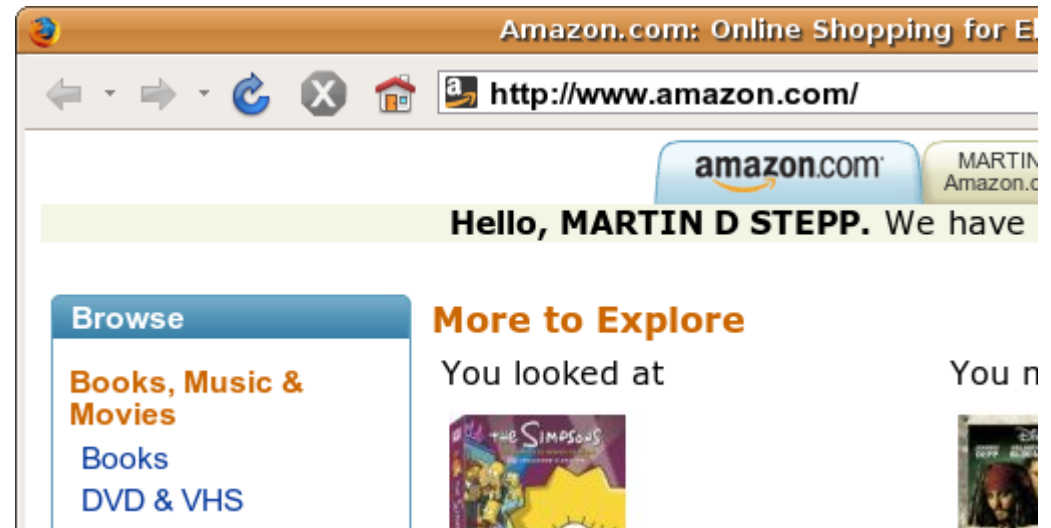
CSE 154

LECTURE 12: COOKIES

Stateful client/server interaction

Sites like amazon.com seem to "know who I am." How do they do this? How does a client uniquely identify itself to a server, and how does the server provide specific content to each client?

- HTTP is a **stateless** protocol; it simply allows a browser to request a single document from a web server
- today we'll learn about pieces of data called **cookies** used to work around this problem, which are used as the basis of higher-level **sessions** between clients and servers



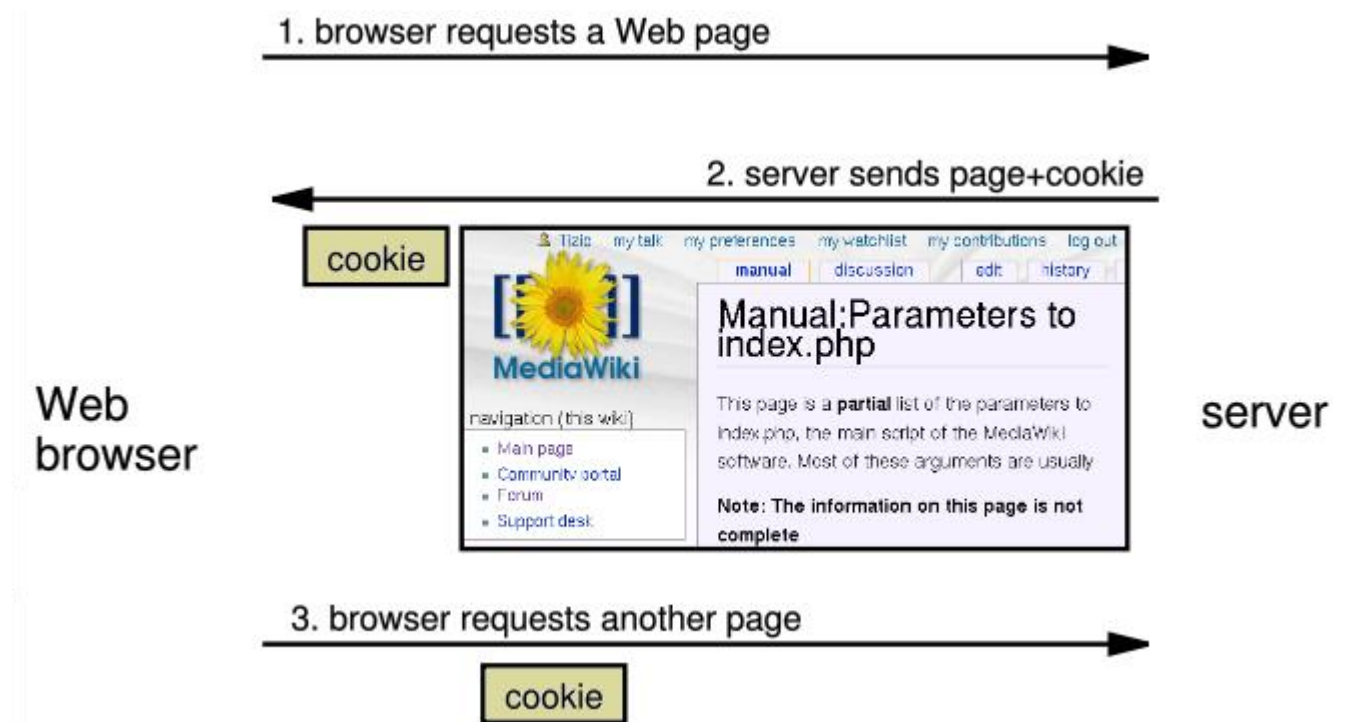
What is a cookie?

- cookie: a small amount of information sent by a server to a browser, and then sent back by the browser on future page requests
- cookies have many uses:
 - authentication
 - user tracking
 - maintaining user preferences, shopping carts, etc.
- a cookie's data consists of a single name/value pair, sent in the header of the client's HTTP GET or POST request



How cookies are sent

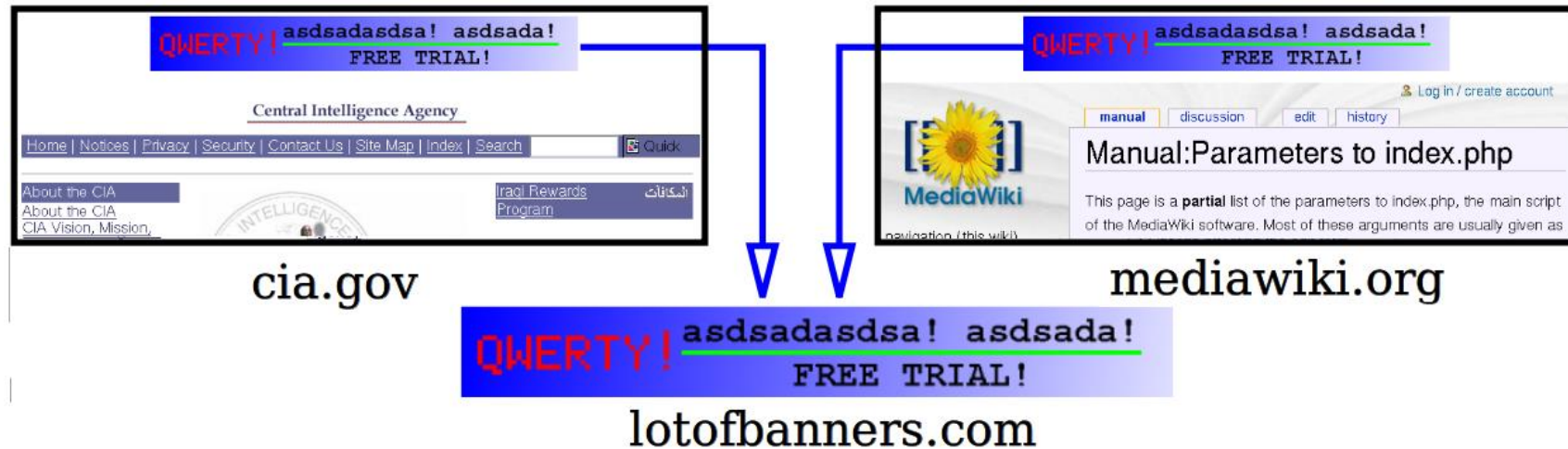
- when the browser requests a page, the server may send back a cookie(s) with it
- if your server has previously sent any cookies to the browser, the browser will send them back on subsequent requests
- alternate model: client-side JavaScript code can set/get cookies



Myths about cookies

- Myths:
 - Cookies are like worms/viruses and can erase data from the user's hard disk.
 - Cookies are a form of spyware and can steal your personal information.
 - Cookies generate popups and spam.
 - Cookies are only used for advertising.
- Facts:
 - Cookies are only data, not program code.
 - Cookies cannot erase or read information from the user's computer.
 - Cookies are usually anonymous (do not contain personal information).
 - Cookies CAN be used to track your viewing habits on a particular site.

A "tracking cookie"



- an advertising company can put a cookie on your machine when you visit one site, and see it when you visit another site that also uses that advertising company
- therefore they can tell that the same person (you) visited both sites
- can be thwarted by telling your browser not to accept "third-party cookies"

Where are the cookies on my computer?

- IE: *HomeDirectory*\Cookies
 - e.g. C:\Documents and Settings\jsmith\Cookies
 - each is stored as a .txt file similar to the site's domain name
- Chrome:
 - C:\Users*username*\AppData\Local\Google\Chrome\User Data\Default
- Firefox: *HomeDirectory*\.mozilla\firefox\???.default\cookies.txt
 - view cookies in Firefox preferences: Privacy, Show Cookies...



How long does a cookie exist?

- **session cookie** : the default type; a temporary cookie that is stored only in the browser's memory
 - when the browser is closed, temporary cookies will be erased
 - can not be used for tracking long-term information
 - safer, because no programs other than the browser can access them
- **persistent cookie** : one that is stored in a file on the browser's computer
 - can track long-term information
 - potentially less secure, because users (or programs they run) can open cookie files, see/change the cookie values, etc.

Setting a cookie in PHP

```
setcookie("name", "value");
```

PHP

```
setcookie("username", "alllllison");  
setcookie("age", 19);
```

PHP

- setcookie causes your script to send a cookie to the user's browser
- `setcookie` must be called before any output statements (HTML blocks, `print`, or `echo`)
- you can set multiple cookies (20-50) per user, each up to 3-4K bytes
- by default, the cookie expires when browser is closed (a "session cookie")

Retrieving information from a cookie

```
$variable = $_COOKIE["name"];    # retrieve value of the cookie

if (isset($_COOKIE["username"])) {
    $username = $_COOKIE["username"];
    print("Welcome back, $username.\n");
} else {
    print("Never heard of you.\n");
}

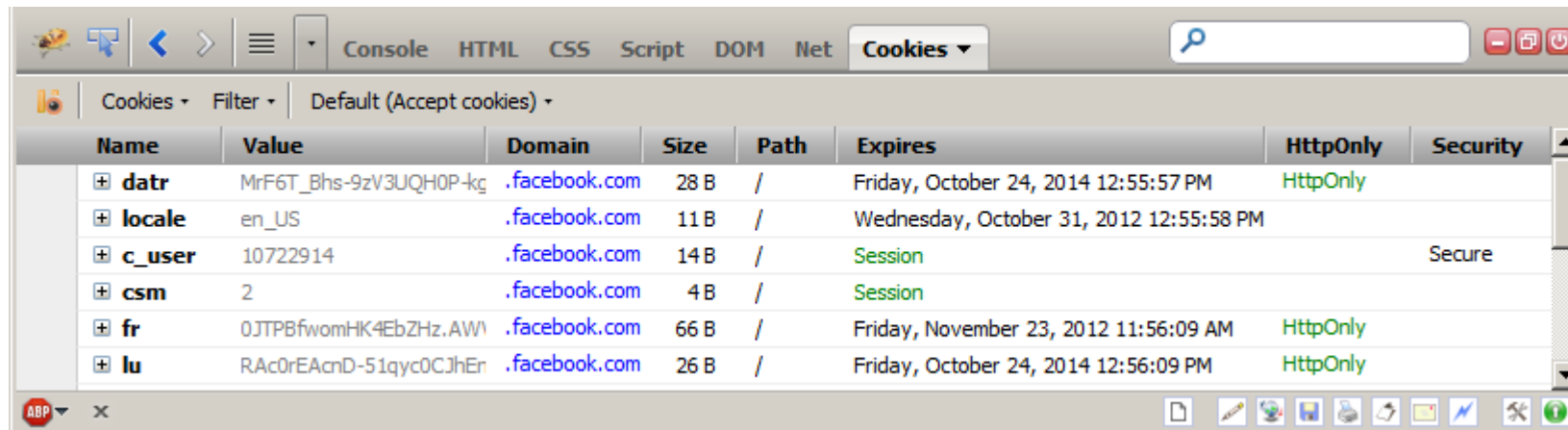
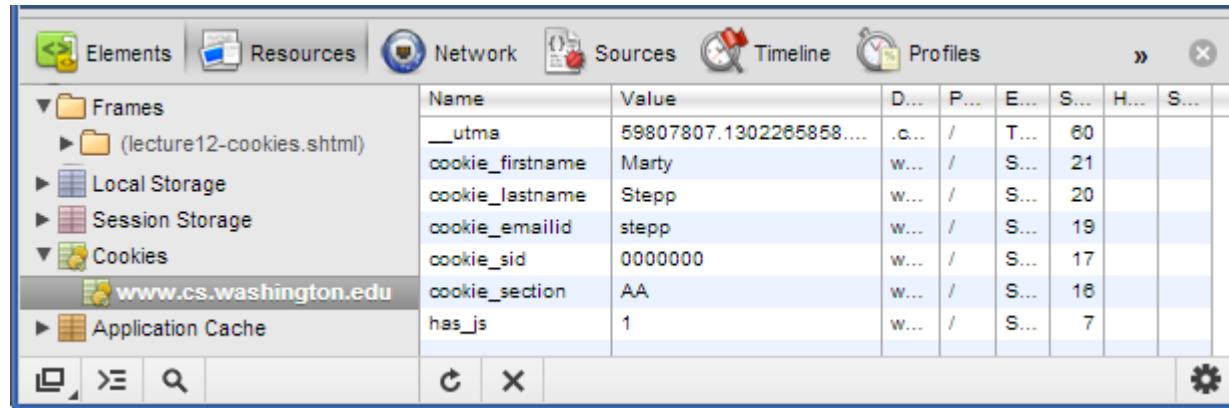
print("All cookies received:\n");
print_r($_COOKIE);
```

PHP

- any cookies sent by client are stored in `$_COOKIES` associative array
- use [isset](#) function to see whether a given cookie name exists

What cookies have been set?

- **Chrome:** F12 → Resources → Cookies; **Firefox:** F12 → Cookies



Expiration / persistent cookies

```
setcookie("name", "value", expiration);
```

PHP

```
$expireTime = time() + 60*60*24*7;    # 1 week from now  
setcookie("CouponNumber", "389752", $expireTime);  
setcookie("CouponValue", "100.00", $expireTime);
```

PHP

- to set a persistent cookie, pass a third parameter for when it should expire
- indicated as an integer representing a number of seconds, often relative to current timestamp
- if no expiration passed, cookie is a session cookie; expires when browser is closed
- time function returns the current time in seconds
 - date function can convert a time in seconds to a readable date

Deleting a cookie

```
setcookie("name", FALSE);
```

PHP

```
setcookie("CouponNumber", FALSE);
```

PHP


- setting the cookie to **FALSE** erases it
- you can also set the cookie but with an expiration that is before the present time:

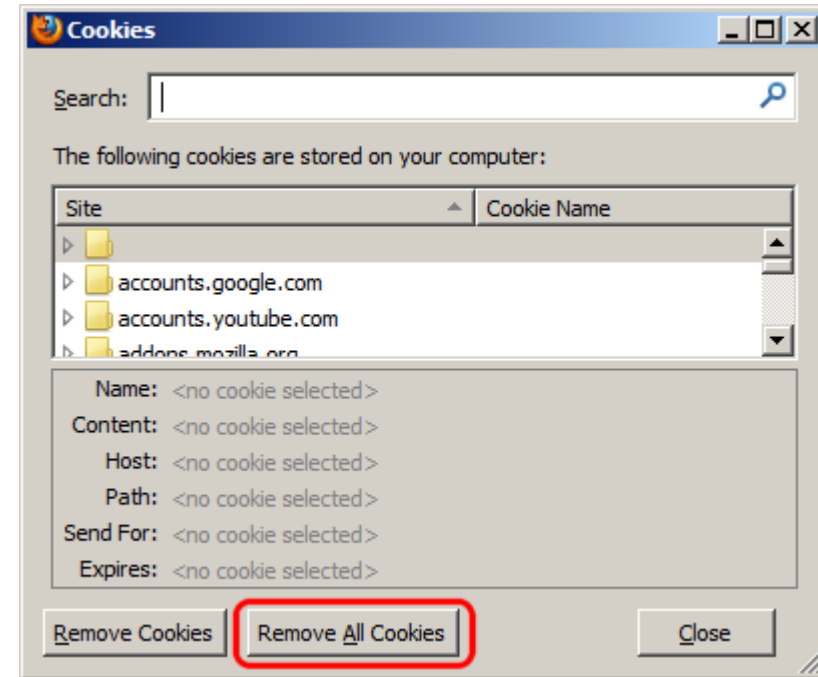
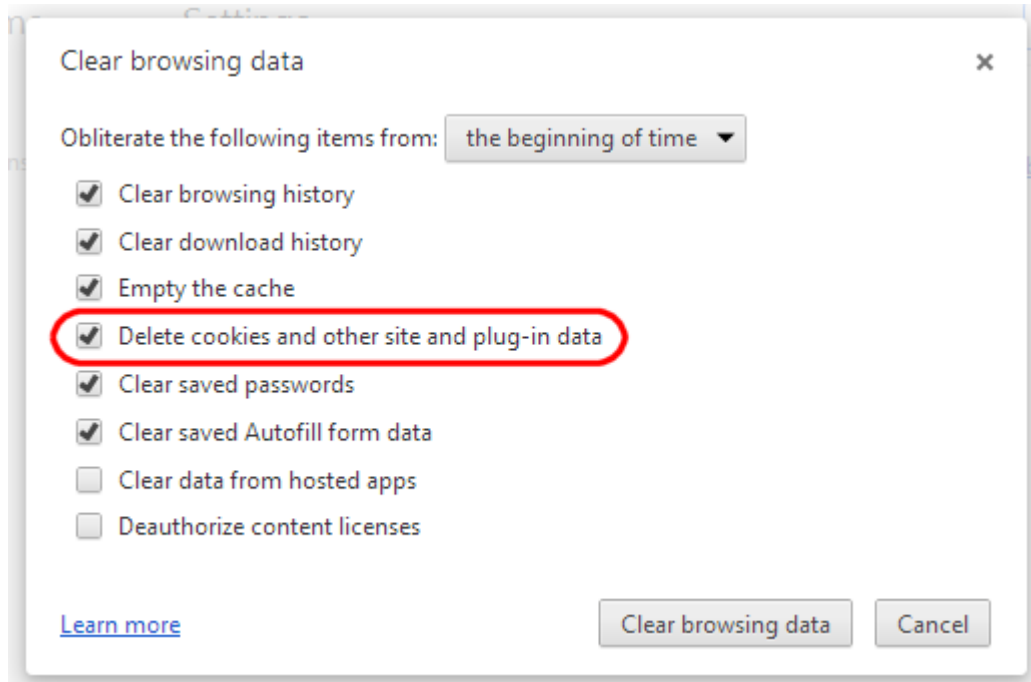
```
setcookie("count", 42, time() - 1);
```

PHP

- remember that the cookie will also be deleted automatically when it expires, or can be deleted manually by the user by clearing their browser cookies

Clearing cookies in your browser

- **Chrome:** Wrench  → History → Clear all browsing data...
- **Firefox:** Firefox menu → Options → Privacy → Show Cookies... → Remove (All) Cookies



Cookie scope and attributes

```
setcookie("name", "value", expire, "path", "domain", secure, httponly);
```

- a given cookie is associated only with one particular **domain** (e.g. `www.example.com`)
- you can also specify a **path** URL to indicate that the cookie should only be sent on certain subsets of pages within that site (e.g. `/users/accounts/` will bind to `www.example.com/users/accounts`)
- a cookie can be specified as **Secure** to indicate that it should only be sent when using HTTPS secure requests
- a cookie can be specified as **HTTP Only** to indicate that it should be sent by HTTP/HTTPS requests only (not JavaScript, Ajax, etc.; seen later); this is to help avoid JavaScript security attacks

Common cookie bugs

When you call `setcookie`, the cookie will be available in `$_COOKIE` on the *next* page load, but not the current one. If you need the value during the current page request, also store it in a variable:

```
setcookie("name", "joe");  
print $_COOKIE["name"];      # undefined      PHP
```

```
$name = "joe";  
setcookie("name", $name);  
print $name;                 # joe        PHP
```

- `setcookie` must be called before your code prints any output or HTML content:

```
<!DOCTYPE html><html>  
<?php  
setcookie("name", "joe");    # should precede HTML content!
```