# PHP
# Cookies and Sessions


Cookie

# HTTP - a 'Stateless' Environment

**stateless**

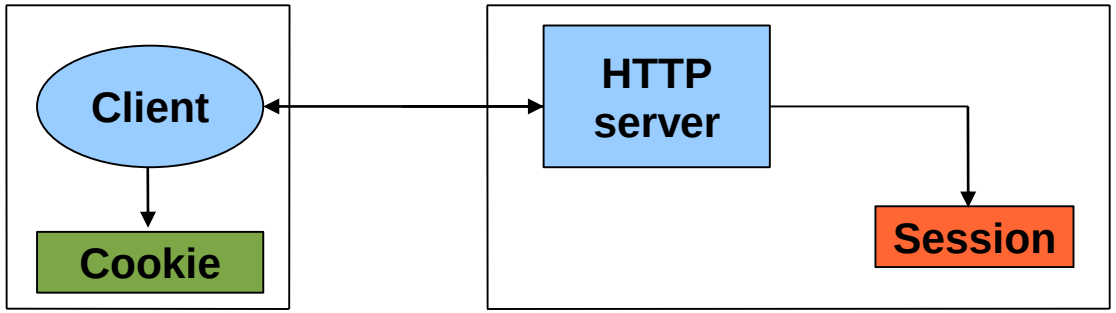
**(adj.)** Having no information about what occurred previously.

- HTTP is stateless – it does not keep track of the client between requests
  - When you browse the web, you are not always connected to the server
  - Once the  request has been processed and returned from the server, the connection is closed
  - Connection needs to be re-opened when you need new information or refresh

# Cookies and Sessions

- But sometimes we need to keep track of information, or have persistent data
  - Shopping cart
  - "Remember me" on login sites

- PHP sessions and cookies are mechanisms for introducing state into HTTP transactions.
  - Cookies – small file stored client-side
  - Sessions – relevant data stored on the server



# Is PHP Stateless?

- Variables are destroyed as soon as the page script finishes executing.
- The script can access the 'referrer', the address of the previous page, although this can't really be trusted.

```
$_SERVER['HTTP_REFERER']
```

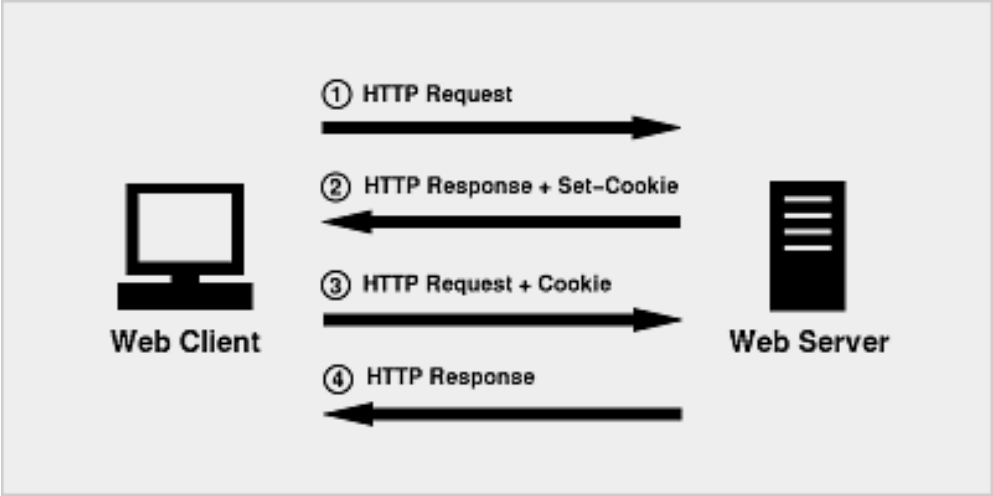
- It is possible to add data to a database/text file to add persistent data, although *this is not connected with a particular user…*

# Cookies

# What is a Cookie?

- HTTP cookies are data which a server-side script sends to a web client to keep for a period of time.
  - a small text file that is stored on a user's computer
- On every subsequent HTTP request, the web client automatically sends the cookies back to server (unless the cookie support is turned off).
- The cookies are embedded in the HTTP header (and therefore not visible to the users).

# How do HTTP Cookies work?

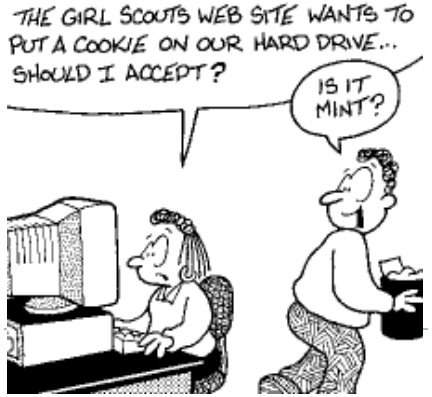



Cookies are transferred between server and client according to HTTP

1. User sends a HTTP request for page for the first time.
2. Server sends back the HTTP response (e.g. HTML webpage) to the browser AND stores some data in a cookie on the user's PC.
3. At the next page request, all cookie data associated with this domain is sent too.

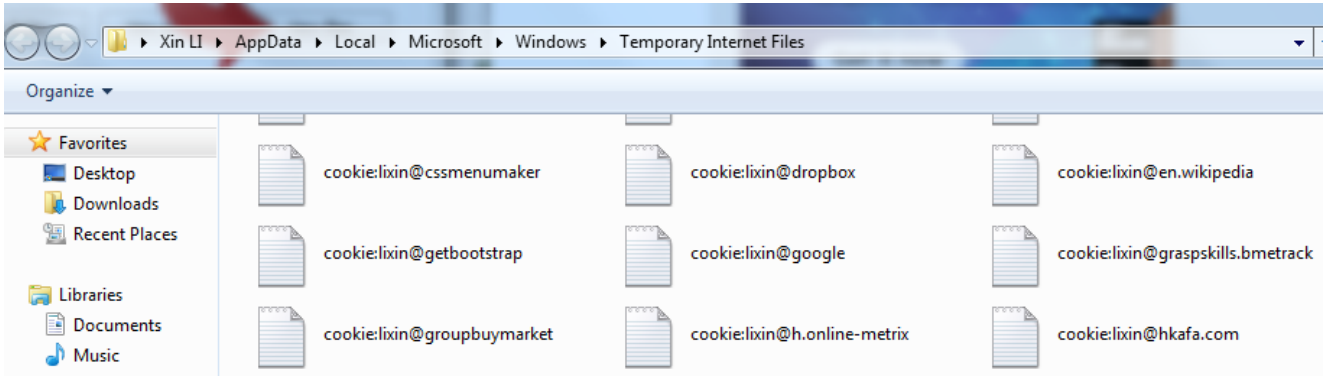
# Cookie Fact

- Cookies are sent from the server to the client via "Set-Cookie" headers
  - `Set-Cookie: NAME=VALUE; expires=DATE; path=PATH; domain=DOMAIN_NAME; secure`
- Each cookie on the user's computer is connected to a particular domain.
- Each cookie be used to store up to 4kB of data.
- A maximum number of cookies can be stored on a user's PC per domain is browser dependent
  - Usually a few tens
- Cookies can be created with JavaScript or PHP

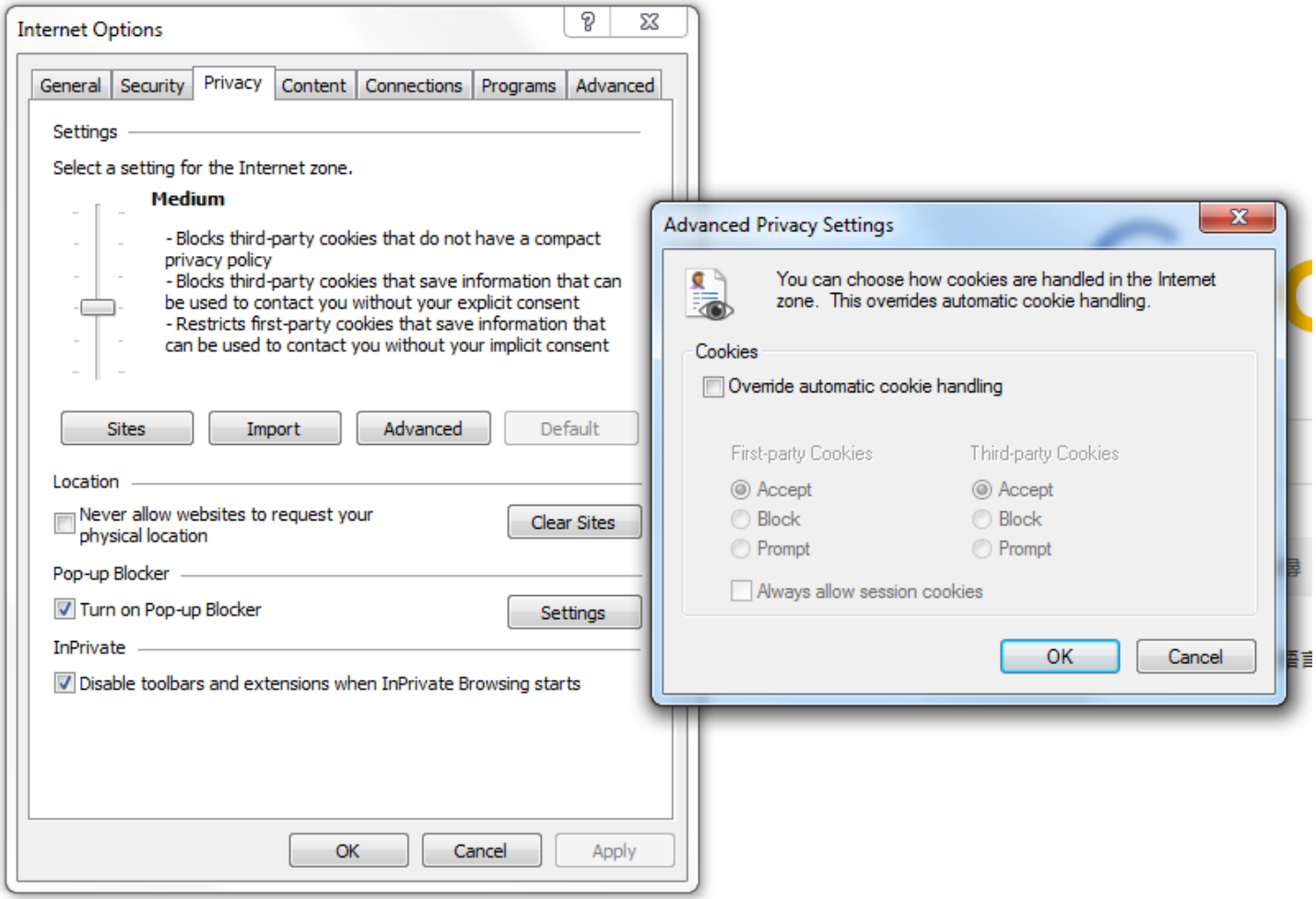


# The USER is in Control

- Cookies are stored client-side
  - Cookie is stored (or persistent) only if there is an expiry date
  - Otherwise it is deleted when leaving browser
  - They can be turned on and off at will by the user
  - Never trust them completely: they can be easily viewed, modified or created by a 3rd party
  - Exact location depends on browser, e.g. IE cookies



# Example: Default IE Cookie Setting



# Create PHP Cookies

- Directly manipulating the HTTP header using the PHP `header()` function

```
<?php
   header("Set-Cookie: mycookie=myvalue; path=/; domain=.example.com");
   # To make the cookie available on all subdomains of example.com, you'd
     set it to '.example.com'.
?>
                                                                    PHP
```

- Use the PHP `setcookie()` function
  - `setcookie (name,value,expire, path, domain, secure)`

```
<?php
  setcookie("MyCookie",       $value, time()+3600*24);
  setcookie("AnotherCookie", $value, time()+3600);
?>
                                                                    PHP
```

# The `setcookie()` Function

`setcookie(name, value, expire, path, domain)`

- Name and value correspond to `$_COOKIE[$name] = $value`
- Expiration – cookie will no longer be read after the expiration
  - Useful to use time in seconds relative to the present:
  - time() + time in seconds until expiration
- Path and domain refer to where on the site the cookie is valid
  - Usually '/' for path and the top-level domain (yoursitename.com)
- To delete a cookie, set a new cookie with same arguments but expiration in the past

# Access PHP Cookies

- The `$_COOKIE` superglobal array makes a cookie a key-value pairing
- Refer to `$_COOKIE` to retrieve a cookie
- Check with `isset($_COOKIE[$cookie_name])` before trying to use the cookie's value

- Cookies can only be set before any output is sent (e.g. echo, print) and before <html><head>.
- Cookies only become visible on the next page load

# Example: Set and Access Cookie

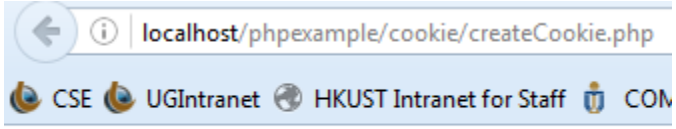
```
<?php
# createCookie.php Create and access a cookie

$cookie_name = "user";
$cookie_value = "John Doe";
setcookie($cookie_name, $cookie_value, time() + (86400 * 30), "/");
?>
<html><body>
<?php
  if(!isset($_COOKIE[$cookie_name])) {
    echo "Cookie named '" . $cookie_name . "' is not set!";}
  else {
    echo "Cookie '" . $cookie_name . "' is set!<br>";
    echo "Value is: " . $_COOKIE[$cookie_name];}
?>
</body></html>
```

PHP

Before <html><body> and output

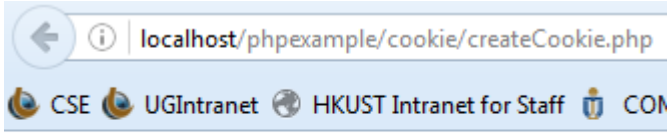
86400 = 1 day

1st run




Cookie named 'user' is not set!

2nd run



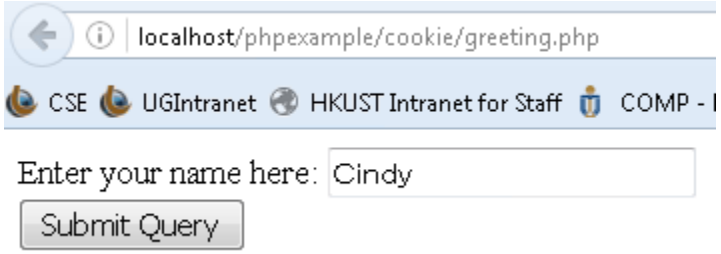

Cookie 'user' is set!
Value is: John Doe

# Example: Cookie with Multiple Items

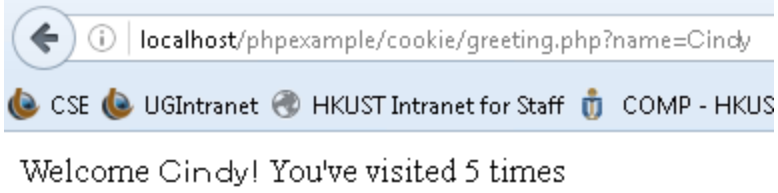
```
<?php
# multipleItemCookie.php
# set a cookie with 4 pieces of data
$strAddress = $_SERVER["REMOTE_ADDR"];
$strBrowser = $_SERVER["HTTP_USER_AGENT"];
$strServerName = $_SERVER["SERVER_NAME"];
$strInfo = "$strAddress::$strBrowser::$strServerName";
setcookie ("cookie4",$strInfo, time()+7200);
?>

<?php
# use explode() to retrieve the 4 pieces of data
$strReadCookie = $_COOKIE["cookie4"];
$arrListOfStrings = explode ("::", $strReadCookie);
echo "<p>$strInfo</p>";;
echo "<p>Your IP address is: $arrListOfStrings[1] </p>";
echo "<p>Client Browser is: $arrListOfStrings[2] </p>";
echo "<p>Server name is: $arrListOfStrings[3] </p>";
?>
                                                    PHP
```

# Wrap-up Example: `greeting.php`

- First visit: form with a text field for user's name
- Subsequent visits: Welcome message with the name
- Store the name field in a cookie:
  - Key: "name"; value: the user's name input into the form
  - Remember: when a cookie is set (the setcookie() function call is made), the cookie can only be accessed on the next request

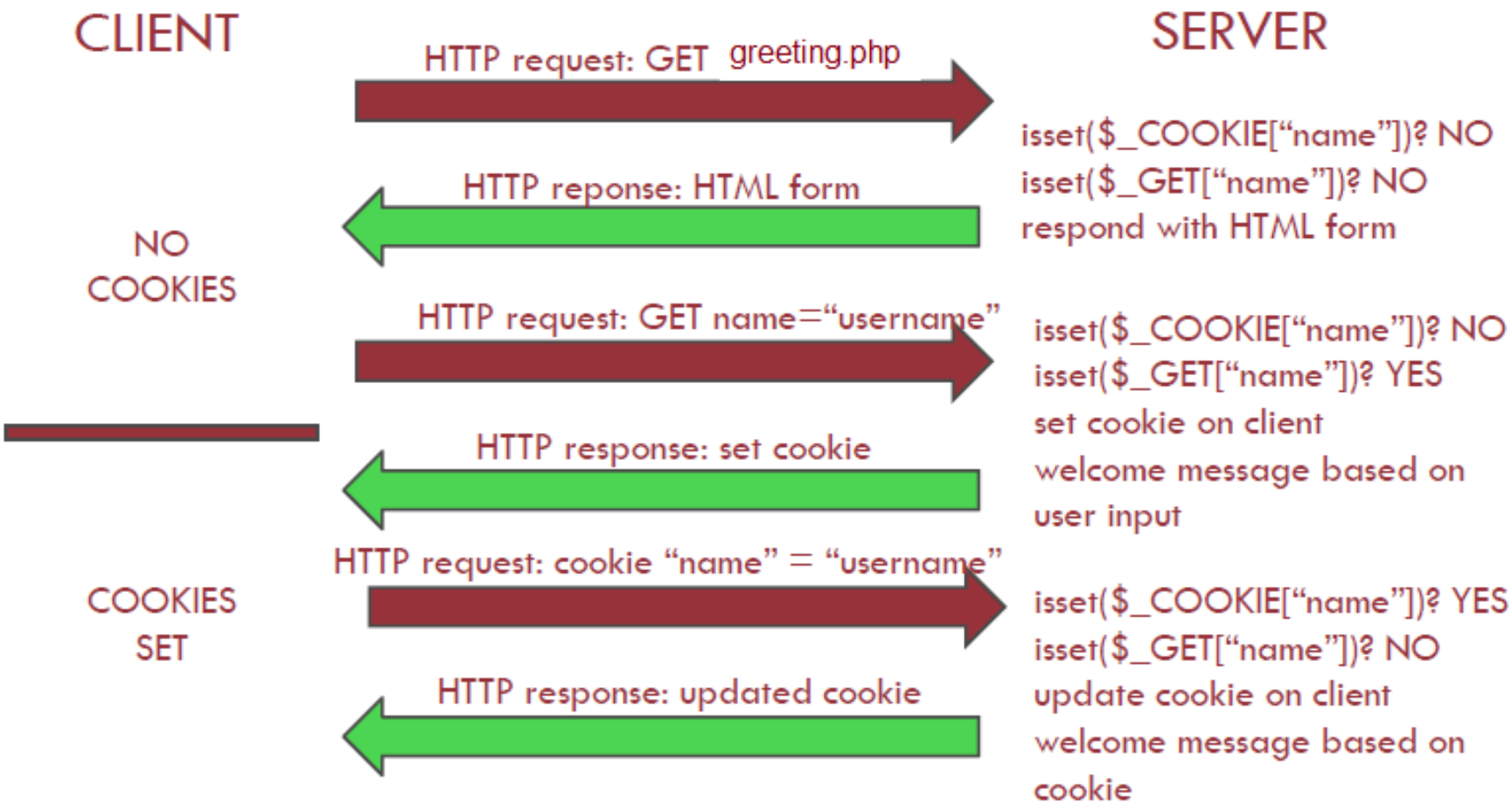



1st run




5th run

# Contents of HTTP Request and Response



# Case 1: Cookies Already Set

```
# case 1: cookies already set

if(isset($_COOKIE["name"])) {
    $cookie_exp = time()+60*60; // one hour
    $name = $_COOKIE["name"];
    setcookie("name", $name, $cookie_exp);
    if (isset($_COOKIE["visits"])) { $num_visits =
$_COOKIE["visits"]+1;
        setcookie("visits", $num_visits, $cookie_exp);
    }
    echo "Welcome $name! ";
    if (isset($_COOKIE["visits"])) {
        echo "You've visited $num_visits times"; }
}
```

PHP

# Case 2&3: First and Second Visits

```
# case 2: upon submission of form

else if (isset($_GET["name"])) {
    $name = $_GET["name"];
    setcookie("name", $name, $cookie_exp);
    setcookie("visits", 2, $cookie_exp);
    echo "Welcome $name! This is your second visit.";
}
# case 3: first visit: need to show form

else {
    # HereDoc
    # Complex data types in strings must be surrounded by {} for
them to be parsed as variables
    $form = <<< FORM
    <form action="{$_SERVER["PHP_SELF"]}" method="get">
        Enter your name here: <input type="text" name="name" />
<br /><input type="submit" />
</form>
FORM;
    echo $form;
```

PHP


# Sessions

$_SESSION

# Cookies vs. Sessions

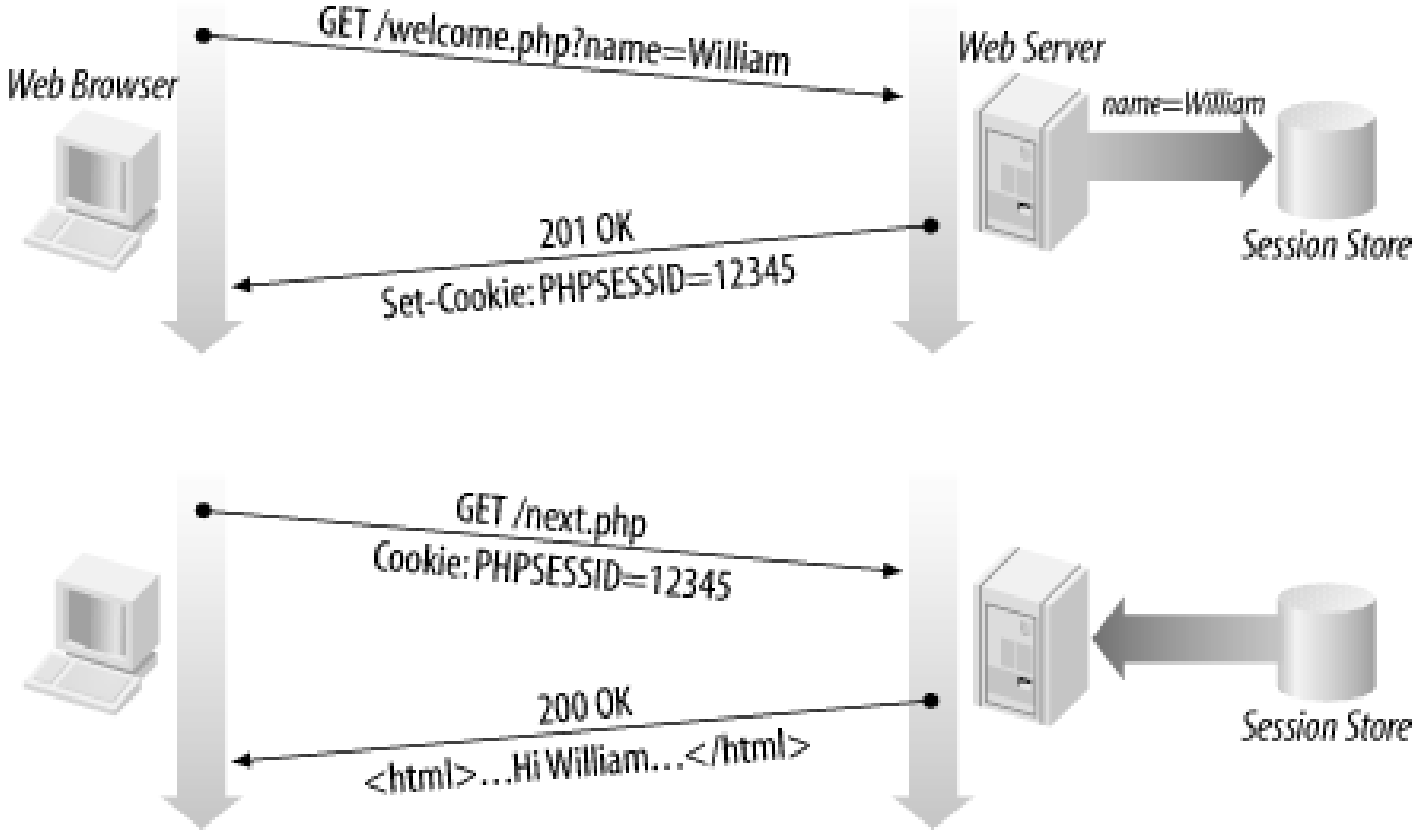
A session is a semi-permanent interactive information interchange, between two or more communicating devices

- Two main disadvantages of cookies
  - Limited in size by browser
  - Stored client-side →can be tampered with
- Sessions store user data on the server-side
  - Limited only by server space
  - Cannot be modified by users
- A potential downside to sessions is that they expire when the browser is closed

# How Session Works?

- The first time a web client visits a server, the server sends a unique "session ID" to the web client for the client to keep.
  - Session ID is typically stored in the cookies.
- The session ID is used by the server to identify the client.
- For each session ID created, the server also creates a storage space. Server-side scripts that receive the same session ID share the same storage space.
  - The storage space is typically implemented as a map-liked data structure.
  - In PHP, it is an associative array named `$_SESSION[]`.
- A session's "storage space" is only kept alive for a period of time (session period) or until it is explicitly deleted.

# Example




Crucially, sessions are easy to implement as PHP does all the work!

# When should you use sessions?

- Need for data to stored on the server
- Unique session information for each user
- Transient data, only relevant for short time
- More secure, once established, no data is sent back and forth between the machines
- Works even if cookies are disabled

# PHP Session Start/Resume

- You must start up the session before using it
- Call `session_start()` at top of every page before <html> tag

```
<?php
    session_start();
?>
    <html>
    <body>
    </body>
    </html>
```
PHP

- This tells PHP that a session is requested.

# PHP Session Start/Resume (cont.)

- PHP looks for a valid session ID in the `$_COOKIE` or `$_GET` superglobals

- If found
  - Initializes the data
- If not found
  - Create new session ID at the server end
  - Session ID looks 26fe536a534d3c7cde4297abb45e275a to make it unique

# PHP Session Access

- Access data using the $_SESSION superglobal, just like $_COOKIE, $_GET, or $_POST

```
<?php
#visitCountSession.php
session_start();
if (isset($_SESSION["count"])) {
    $_SESSION["count"] += 1;
    echo "You have visited here {$_SESSION["count"]} times";
}
else {
    $_SESSION["count"] = 1;
    echo "You have visited once";
}
?>                                                    PHP
```

# PHP Session Propagation

- Sessions need to pass the session id between pages as a user browses to track the session.
- It can do this in two ways:
  - Cookie propagation
  - URL propagation

- The default setup of a PHP server is to use both methods.
  - it checks whether the user has cookies enabled.
  - If cookies are on, PHP uses cookie propagation. If cookies are off it uses URL propagation.

# Cookie Propagation

- A cookie is stored on the users PC containing the session id.
- It is read in whenever `session_start();` is called to initialize the session.
- Default behaviour is a cookie that expires when the browser is closed. Cookie properties can be modified with `session_set_cookie_params` if required.

# URL Propagation

- The session id is propagated in the URL
- e.g.

```
...some_folder/index.php?sid=26fe536a534d3c7cde4297abb45e275a
```

- PHP provides a global constant to append the session id to any internal links, `SID`.
- e.g.

```
<a href="nextpage.php?<?=SID?>">Next page</a>
```

# Session Expiry

- By default, PHP sessions expire:
  - after a certain length of inactivity (default 1440s), the PHP garbage collection processes deletes session variables.
  - Important as most sessions will not be explicitly destroyed.
  - if propagated by cookies, default is to set a cookie that is destroyed when the browser is closed.
  - If URL propagated, session id is lost as soon as navigate away from the site.

# `unset()` and `session_destroy()`

- Remove an individual element of the $_SESSION superglobal
  - `unset($_SESSION['key_name'])`
  - The session still exists and can be modified

- Destroy the entire session, remove all data
  - `session_destroy()`
  - Destroys all data registered to a session
  - Does not unset session global variables and cookies associated with the session
  - Need to call `session_start()` to start a new session
  - Not normally done - leave to timeout

# Example: Destroying a Session

```
<?php
#destroy session
  session_start();
?>
<html>
<body>
<?php
// remove all session variables
  session_unset();

// destroy the session
  session_destroy();
?>

</body>
</html>
```
PHP

- A more complete example at
  - http://php.net/manual/en/function.session-destroy.php

# Wrap-up Example: User Login

- loginForm.php
  - Create a form to input user name and password
- login.php
  - Validate user name and password
- content.php
  - If logged in, show content page
- Logout.html
  - Webpage for logout
- Logout.php
  - Delete session

# Recap: a Comparison

| | COOKIES | SESSIONS |
|---|---|---|
| Where is data stored | Locally on client | Remotely on server |
| Expiration? | Variable – determined when cookie is set | Session is destroyed when the browser is closed |
| Size limit? | Depends on browser | Depends only on server (practically no size limit) |
| Accessing information | $_COOKIE | $_SESSION |
| General use? | Remember small things about user, such as login name. Remember things after re-opening browser | Remember varying amount of data about the user in one browsing "session" |