EAST WEST UNIVERSITY

CSE479
Web Programming

Nishat Tasnim Niloy

Lecturer

Department of Computer Science and Engineering

Faculty of Science and Engineering

Topic 11

Cookies, Session and Token

The need for **persistence**

- Consider these examples
  - Counting the number of “**hits**” on a website
  - *i.e.* how many times does a client load your web page source
  - The questionnaire on computing experience

- Somehow your **.php** needs to remember previous instances of it being requested by a client

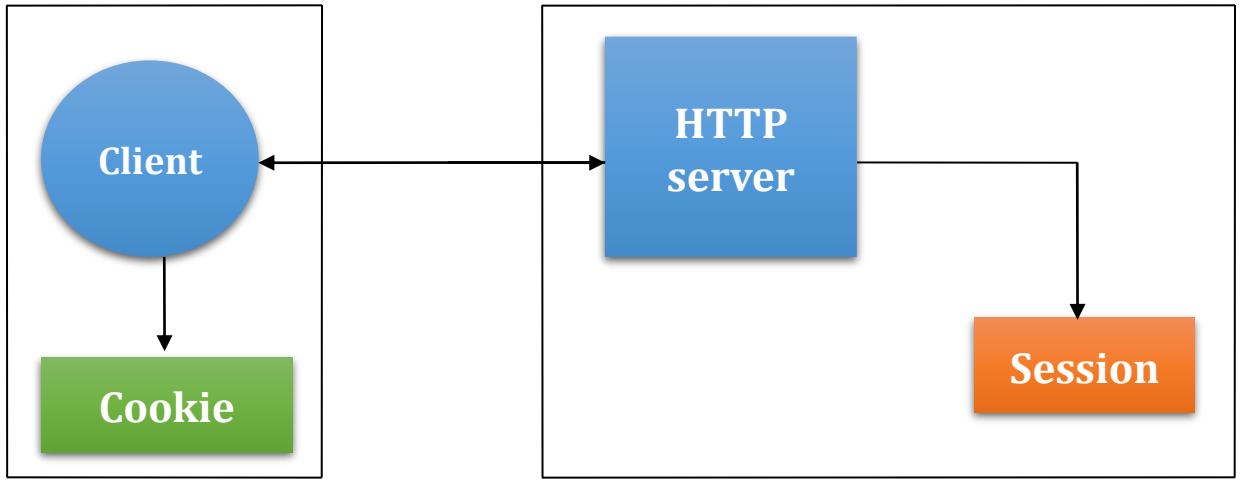
Persistence

- Persistence is the ability of data to **outlive** the execution of the program that created them.

- An obvious way of achieving persistence is to simply save the data in a file

Persistence and HTTP

- Recall http is a stateless protocol. It remembers nothing about previous transfers
- Two ways to achieve persistence:
- PHP cookies
- PHP sessions



What is a **Cookie?**

- A Cookie Resides on the User's Computer
- A cookie is often used to identify a user.
- A cookie is a small file that the server embeds on the user's computer. Each time the same computer requests a page with a browser, it will send the cookie too.
- Cookies are a mechanism for storing data in the remote browser and thus tracking or identifying return users.
- That cookie maintains information in the user's machine until the information is deleted by the user.
- A person may have a username and password to your website. That information can be saved as a cookie on the visitor's computer, so there is no need for him to log in to your website on each visit. Common uses for cookies include authentication, storage of site preferences and shopping cart items.

HTTP Cookies

- In internet programming, a cookie is a packet of information sent from the server to client, and then sent back to the server each time it is accessed by the client.
- Introduces state into HTTP (remember: **HTTP is stateless**)
- **Cookies** are **transferred** between **server** and **client** according to **http**.
- PHP supports http cookies
- Cookies can also be thought of as tickets used to identify clients and their orders

How Cookies are implemented

- Cookies are sent from the server to the client via “Set-Cookie” headers

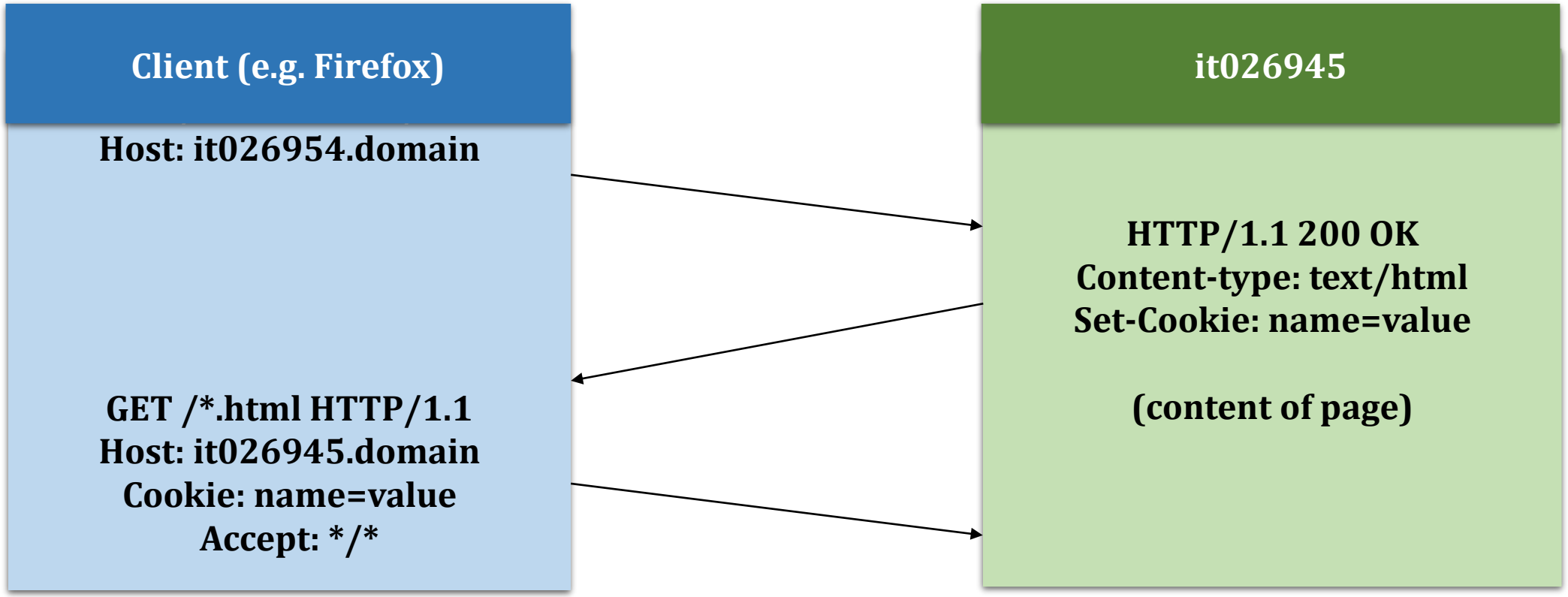
Set-Cookie: NAME=VALUE; expires=DATE; path=PATH; domain=DOMAIN_NAME; secure

- The **NAME** value is a URL-encoded name that identifies the cookie.
- The **PATH** and **DOMAIN** specify where the cookie applies

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

Parameter	Description
name	(Required). Specifies the name of the cookie
value	(Required). Specifies the value of the cookie
expire	(Optional). Specifies when the cookie expires. e.g. **time()+3600*24*30** will set the cookie to expire in **30 days**. If this parameter is not set, the cookie will expire at the end of the session (when the browser closes).
path	(Optional). Specifies the server path of the cookie. If set to "**/**", the cookie will be available within the entire domain. If set to "**/phptest/**", the cookie will only be available within the test directory and all sub-directories of **phptest**. The default value is the current directory that the cookie is being set in.
domain	(Optional). Specifies the domain name of the cookie. To make the cookie available on all subdomains of example.com then you'd set it to ".example.com". Setting it to www.example.com will make the cookie only available in the www subdomain
secure	(Optional). Specifies whether or not the cookie should only be transmitted over a secure **HTTPS** connection. **TRUE** indicates that the cookie will only be set if a secure connection exists. Default is **FALSE**.

Cookies from HTTP



Creating PHP cookies

- Cookies can be set by directly manipulating the HTTP header using the PHP header() function

```
<?php
  header("Set-Cookie: mycookie=myvalue; path=/; domain=.coggeshall.org");
?>
```

Creating cookies with setcookie()

- Name: name of the file
- Value: data stored in the file
- Expire: data string defining the life time
- Path: subset of URLs in a domain where it is valid
- Domain: domain for which the cookie is valid
- Secure: set to '1' to transmit in HTTPS

Use the PHP setcookie() function:

```
Setcookie (name,value,expire, path, domain, secure)
```

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

Reading cookies

To access a cookie received from a client, use the PHP **$_COOKIE** superglobal array

```
<?php

  foreach ($_COOKIE as $key=>$val) {
    print $key . " => " . $val . "<br/>";
  }

?>
```

Each key in the array represents a cookie - the key name is the cookie name.

Creating and using cookies example

- Cookies only become visible on the next page load

```
<?php
   setcookie("MyCookie",      $value, time()+7200);
   setcookie("AnotherCookie", $value, time()+7);
?>

<?php
   foreach ($_COOKIE as $key=>$val) {
     print $key . " => " . $val . "<br/>";
   }
?>
```

Using headers (wrong approach!)

```
<!DOCTYPE html PUBLIC "=//W3C//DTD XHMTL 1.1//EN" "http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
  <html xmlns="http://www.w3.org/1999/xhmtl" xml:lang="en">
<head><title>PHP Script using Cookies</title>
<meta http-equiv="Content-Type" content="text/html; chatset=ISO-8859-1" />
</head>
<body>
<?php
$strValue = "This is my first cookie";
setcookie ("mycookie", $strValue);
echo "Cookie set<br>";
?>
</body>
</html>
```

Gets an error!:

Warning: Cannot modify header information - headers already sent by (output started at /var/www/html/TESTandre/159339/PHP/cookie_with_headers.php:9) in /var/www/html/TESTandre/159339/PHP/cookie_with_headers.php on line 11

(adapted from Stobart & Parsons (2008))

Using headers

- **setcookie()** did not run before information was sent to the browser...

- Cookies have to be sent ***before*** the heading elements

Using headers (correct approach)

```
<?php
$strValue = "This is my first cookie";
setcookie ("mycookie", $strValue);
echo "Cookie set<br>";
?>
<!DOCTYPE html PUBLIC "=//W3C//DTD XHMTL 1.1//EN" "http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
  <html xmlns="http://www.w3.org/1999/xhmtl" xml:lang="en">
<head><title>PHP Script using Cookies</title>
<meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1" />
</head>
<body>
    <?php
        echo "<p> A cookie has been set. </p>";
    ?>
</body>
</html>
```

This is the correct approach!

Deleting a cookie

- Set the cookie with its name only:

```
setcookie(“mycookie”);
```

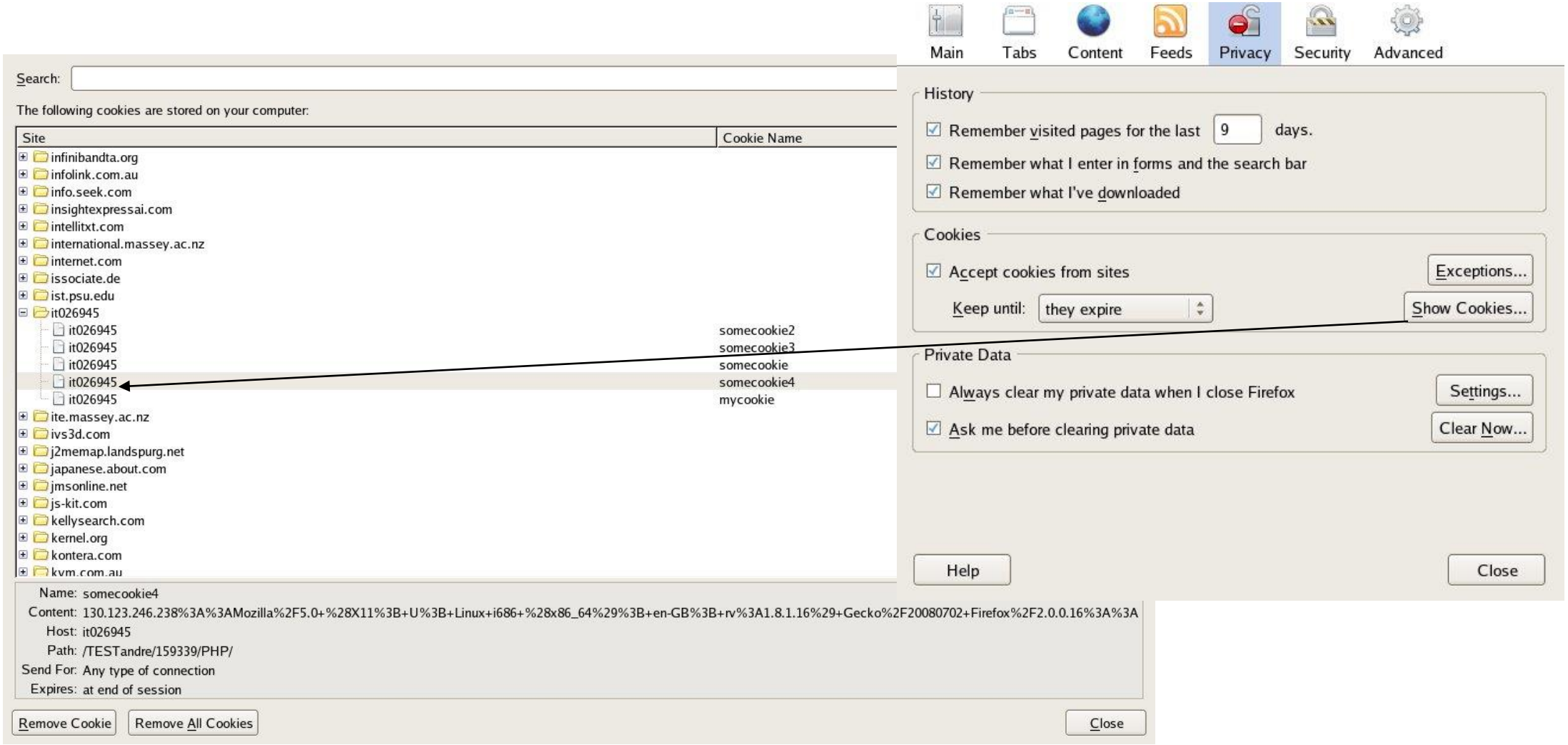
Multiple data items

- Use explode() e.g.

```
<?php
$strAddress = $_SERVER['REMOTE_ADDR'];
$strBrowser = $_SERVER['HTTP_USER_AGENT'];
$strOperatingSystem = $_ENV['OS'];
$strInfo =
    "$strAddress::$strBrowser::$strOperatingSystem";
setcookie ("somecookie4",$strInfo, time()+7200);
?>
```

```
<?php
$strReadCookie = $_COOKIE["somecookie4"];
$arrListOfStrings = explode ("::", $strReadCookie);
echo "<p>$strInfo</p>";
echo "<p>Your IP address is: $arrListOfStrings[0] </p>";
echo "<p>Client Browser is: $arrListOfStrings[1] </p>";
echo "<p>Your OS is: $arrListOfStrings[2] </p>";
?>
```

Where is the cookie stored?



Where is the cookie stored

- Depends on the browser...
- e.g., firefox/mozilla under /home/a_____
  - Look for cookies.txt in .mozilla directory
  - Usually under:
    - /home/a_____/.mozilla/firefox/asdkfljy.default
  - Cookie is stored only if there is an expiry date
  - Otherwise it is deleted when leaving browser
  - ***Persistent*** only if an *expiry date is set*

Session

- Session Information Resides on the Web Server
- In internet there is one problem: the web server does not know who you are or what you do, because the HTTP address doesn't maintain state.
- Session variables solve this problem by storing user information to be used across multiple pages (e.g. username, favorite color, etc).
- By default, session variables last until the user closes the browser.
- Session variables hold information about one single user, and are available to all pages in one application.

PHP Sessions

- You can store user information (e.g. username, items selected, etc.) in the **server side** for later use using PHP session.

- **Sessions** work by creating a unique id (UID) for each visitor and storing variables based on this **UID**.

- The **UID** is either stored in a **cookie** or is **propagated in the URL**.

When should you use sessions?

- Need for data to store on the server
- Unique session information for each user
- Transient data, only relevant for short time
- Data does not contain secret information
- Similar to Cookies, but it is stored on the server
- More secure, once established, no data is sent back and forth between the machines
- Works even if cookies are disabled
- Example: we want to count the number of “**hits**” on our web page.

Before you can store user information in your PHP session, you must first start up the session.

session_start() function must appear BEFORE the **<html>** tag.

```
<?php session_start(); ?>

<html>
<body>

</body>
</html>
```

PHP Sessions

- Starting a PHP session:

```
<?php
    session_start();
?>
```

- This tells PHP that a session is requested.
- A **session ID** is then **allocated** at the server end.

- **session ID** looks like:

sess_f12347812374681237 68asjkhfa7891234g

Session variables

- $_SESSION
- e.g., $_SESSION[“intVar”] = 10;

- Testing if a session variable has been set:

```
session_start();
if(!$_SESSION['intVar']) {...} //intVar is set or not
```

Registering session variables

- Instead of setting superglobals, one can register one's own session variables

```
<?php
    $barney = "A big purple dinosaur.";
    $myvar_name = "barney";
    session_register($myvar_name);
?>
```

- $barney can now be accessed "globally" from session to session
- This only works if the **register_globals** directive is enabled in **php.ini** - nowadays this is turned off by default

Use of session_register() is deprecated!

Make your own session variables

- With **session_start()** a default session variable is created - the name extracted from the page name
- To create your own session variable just add a new key to the **$_SESSION superglobal**

$_SESSION['dug'] = "a talking dog.";

Use of $_SESSION is preferred, as of PHP 4.1.0.

Session Example 1

```
<?php
        session_start();
        if (!isset($_SESSION["intVar"]) ){
            $_SESSION["intVar"] = 1;
        } else {
            $_SESSION["intVar"]++;
        }
        echo "<p>In this session you have accessed this page " .    $_SESSION["intVar"] .
        "times.</p>";
?>
```

Session Example 2

```php
<?php session_start();?>
<?php
$thisPage = $_SERVER['PHP_SELF'];

$pageNameArray = explode('/', $thisPage);
$pageName = $pageNameArray[count($pageNameArray) - 1];
print "The name of this page is: $pageName<br/>";

$nameItems = explode('.', $pageName);
$sessionName = $nameItems[0];
print "The session name is $sessionName<br/>";

if (!isset($_SESSION[$sessionName])) {
      $_SESSION[$sessionName] = 0;
      print "This is the first time you have visited this page<br/>";
}
else {
      $_SESSION[$sessionName]++;
}
print "<h1>You have visited this page " . $_SESSION[$sessionName] .
    " times</h1>";
?>
```

Ending sessions

unset($_SESSION['name'])

- Remove a session variable

session_destroy()

- Destroys all data registered to a session
- does not unset session global variables and cookies associated with the session
- Not normally done - leave to timeout

Destroying a session completely

```php
<?php
// Initialize the session.
// If you are using session_name("something"), don't forget it now!
session_start();

// Unset all of the session variables.
$_SESSION = array();

// If it's desired to kill the session, also delete the session cookie.
// Note: This will destroy the session, and not just the session data!
if (ini_get("session.use_cookies")) { // Returns the value of the configuration option
    $params = session_get_cookie_params();
    setcookie(session_name(), '', time() - 42000,
        $params["path"], $params["domain"],
        $params["secure"], $params["httponly"]
    );
}

// Finally, destroy the session.
session_destroy();
?>
```

returns the name of the current session

http://nz2.php.net/manual/en/function.session-destroy.php

Session Example 3

```php
<?php
session_start();
if(!isset($_SESSION['strColourBg']))   $_SESSION['strColourBg'] = "red";
else echo "Currently Bg set to " . $_SESSION['strColourBg'] . "<br>";
if(!isset($_SESSION['strColourFg'])) $_SESSION['strColourFg'] = "yellow";
else echo "Currently Fg set to " . $_SESSION['strColourFg'];
if(isset($_POST["submit"]) ) {
  $strColourBg = $_POST["strNewBg"];
  $strColourFg = $_POST["strNewFg"];
  $_SESSION['strColourBg'] = $strColourBg;
  $_SESSION['strColourFg'] = $strColourFg;
  echo "<br>New Settings";
}
else {
  $strColourBg = $_SESSION['strColourBg'];
  $strColourFg = $_SESSION['strColourFg'];
  echo "<br>Keep old settings";
}
?>
```

Session Example 3 (cont.)

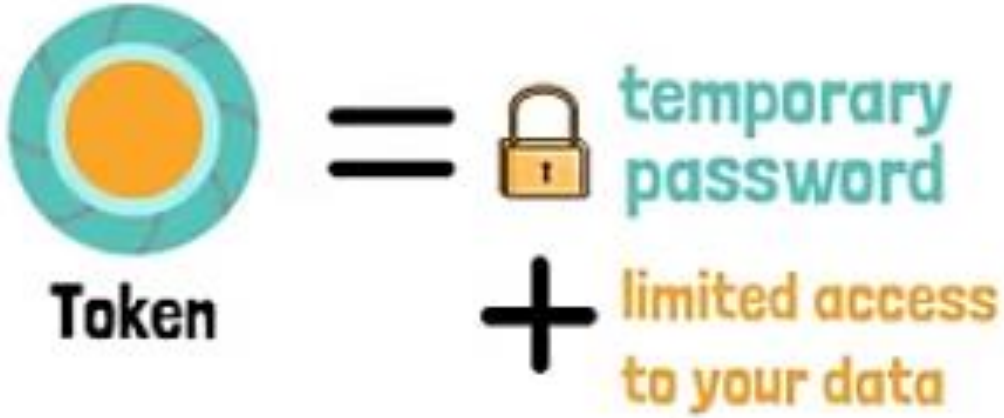
```
<head> <style type="text/css">
body {background-color: <?php echo $strColourBg ?>}
p {color: <?php echo $strColourFg?>}
h2 {color: <?php echo $strColourFg?>}
</style></head>

<body>
<h2>h2 colour</h2>
<form action = '<?php echo $SERVER["PHP_SELF"] ?>' method='post'>
<label for="strNewBg"> Background colour: </label>
<select name='strNewBg' id='strNewBg'>
 <option>red</option> ...  <option>grey</option>
</select>
<label for="strNewFg"> Text colour: </label>
<select name='strNewFg' id='strNewFg'>
 <option>yellow</option> ... <option>grey</option>
</select>
<input type='submit' name='submit'/>
</form></body>
```

(adapted from Stobart & Parsons, 2008)

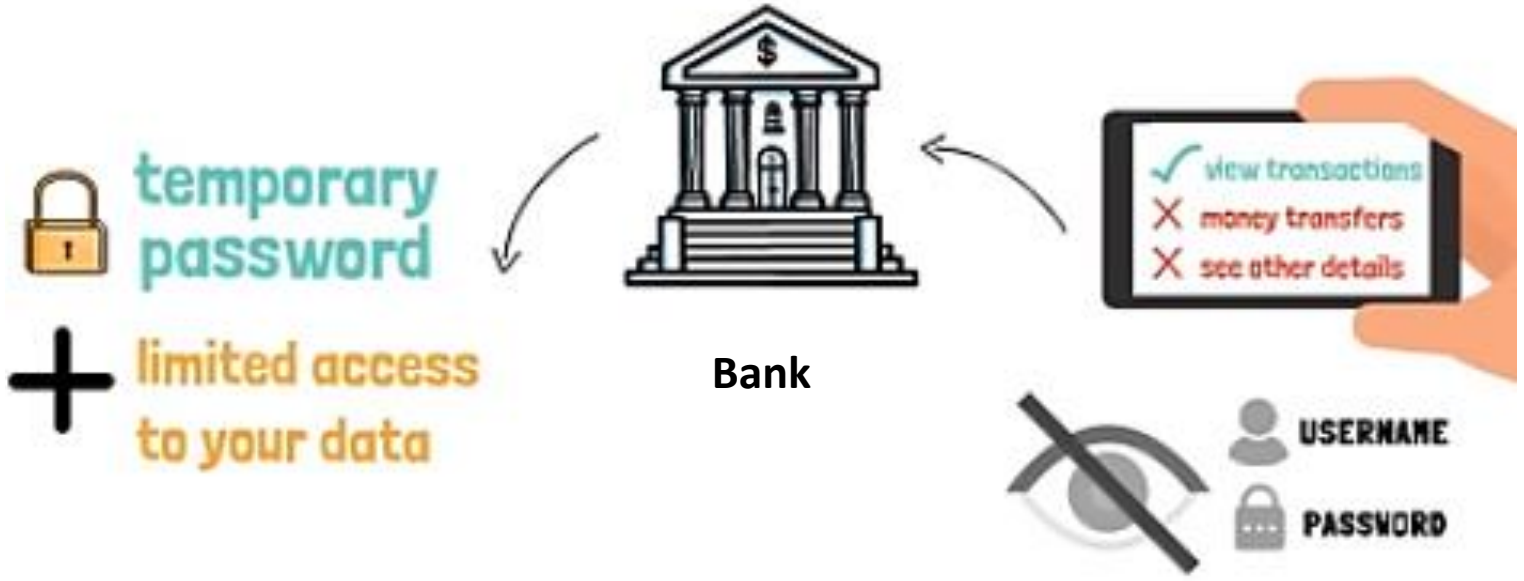
Token

- A token is a type of information that can be stored in a cookie. While a cookie can carry various types of data, a token is specifically used to identify a user session



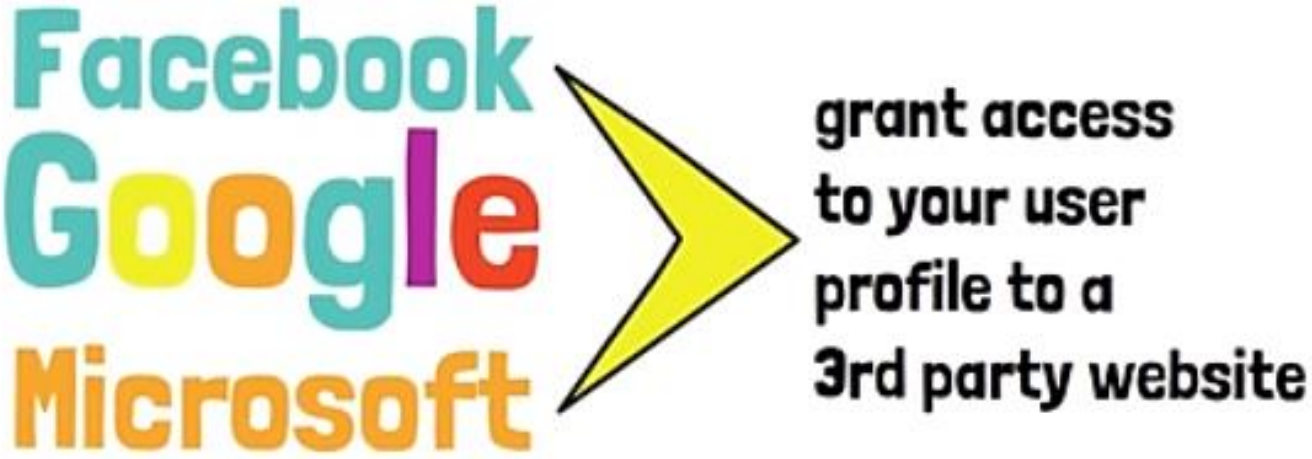
When we need token?

- Let's now assume that you want to install an app on your phone, which can help you with your finances and keep track of your spendings.
- What you don't want to do is to give your username and password to this app, which was not created by your bank. This is when access tokens are being used to grant access to your data.



Token in Third Party Apps

- When we do not trust the third party, we let a trusted app to verify us:



Token vs cookies and session

Token

- Between client and some multiple parties who do not trust each other
- Needs specific standard for interoperability
- Very limited lifetime
- Grants very limited access to the functionalities

Cookies and Session

- Between client and server
- Does not need any standard
- Longer lifetime (up to several days)
- Provides full access to all the functionalities

Summary

- PHP sessions and cookies are **mechanisms for introducing state** into HTTP transactions.