Cookies

Some History

- First supported in Netscape Mosaic version 0.9beta (Oct 1994)
- Lou Montulli and John Giannandrea
  - Patent: applied in 1995, granted in 1998
- First use: visited Netscape's site already?
- Initially little user knowledge
  - Until controversy in 1996 and 1997

What’s the Need Behind Cookies?

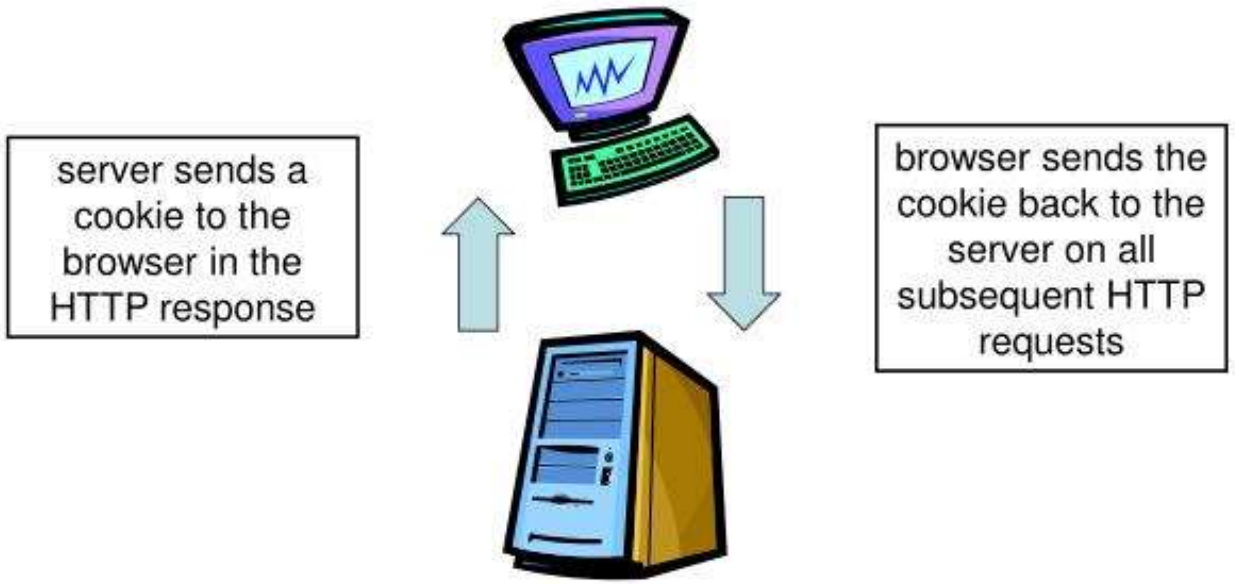
- HTTP is a *stateless* protocol
  - Client requests a page, and server sends it
  - Client later requests a 2nd page; it is sent
- But HTTP doesn’t give a way for the server to know it’s from the same user
  - Being stateless is simpler for HTTP
  - But limiting to applications

Cookies in Action

- The scenario is:
  - Browser about to send a request for a URL
  - But it first looks for cookies linked to that URL that are stored on client machine
  - If found, the cookie is sent to the server with the HTTP request for the URL
  - Server uses cookie data
    - E.g. associate this current visit with a previous visit
  - Server may then set updated cookie on client machine
    - E.g. to be sent back with the next request

Cookies

- Small items of data stored by a browser
    - on behalf of a server



server sends a cookie to the browser in the HTTP response

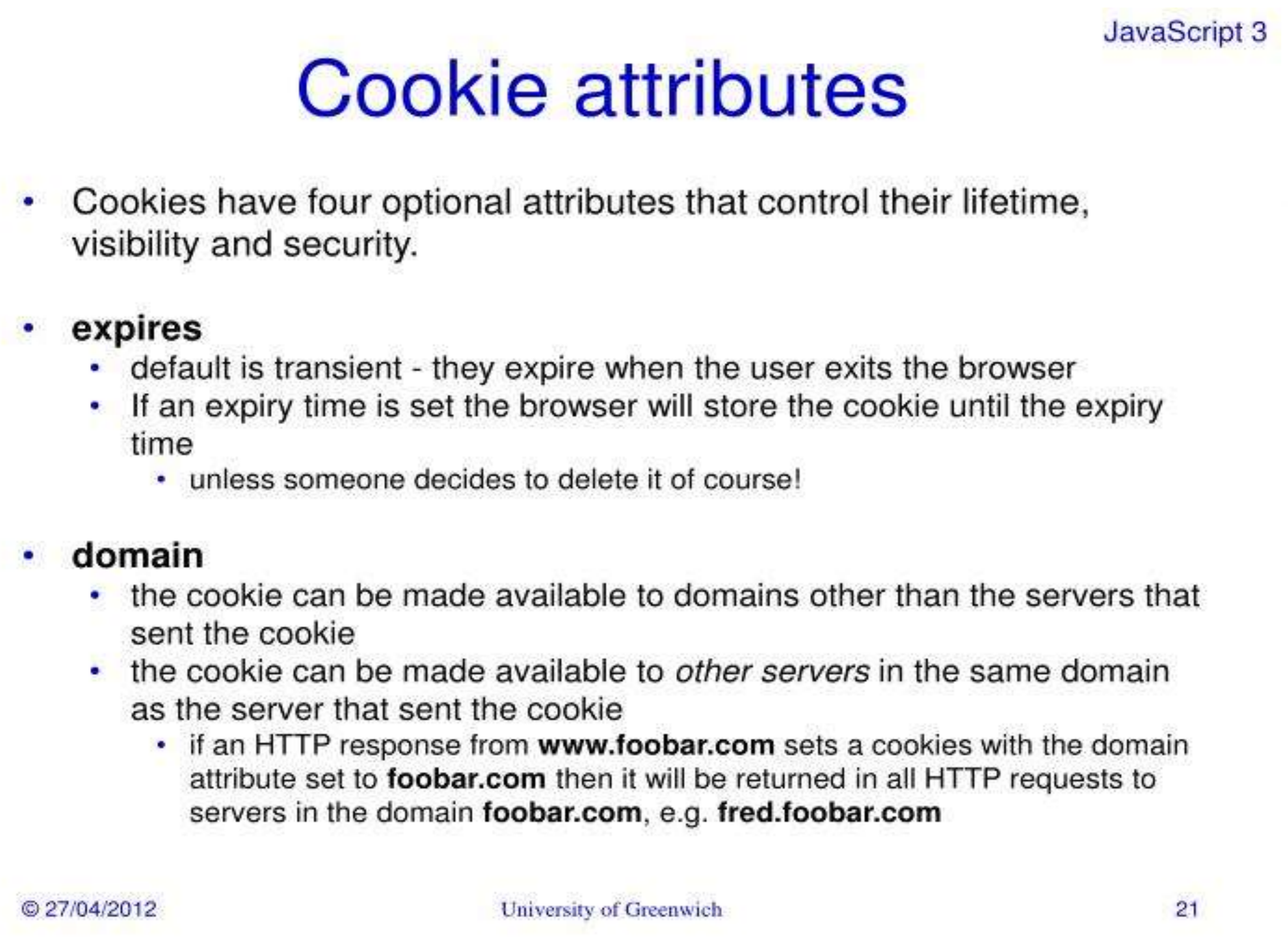
browser sends the cookie back to the server on all subsequent HTTP requests

Purposes of Cookies

- Authentication
  - User-id, password stored on client
  - Sent on next visit. No login required!
- Personalization
  - Remember user preference for fonts, colors, skin, site-options, etc.
- Shopping carts
- Tracking
  - How is our site used?
  - Multi-site tracking by companies looking for usage profiles etc.

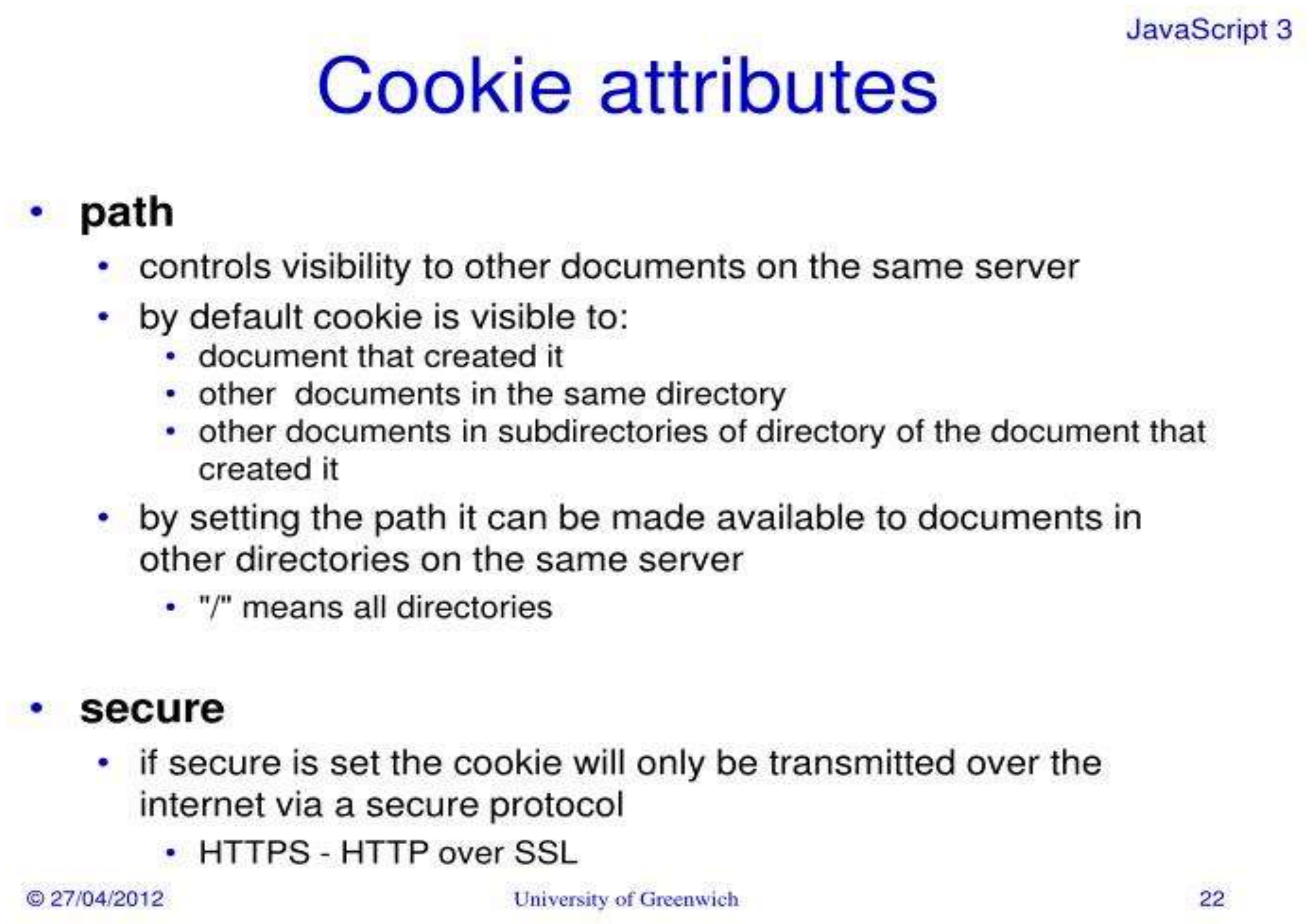
What’s in a Cookie? (besides flour)

- It’s just text data as follows:
  - NAME=VALUE
    - Name value pairs
  - expires=<date> *(optional)*
    - Without a date, deleted when browser closed
  - path=<path> *(optional)*
  - domain=<domain> *(optional)*
  - secure *(optional)*



Cookie attributes

- Cookies have four optional attributes that control their lifetime, visibility and security.
- **expires**
  - default is transient - they expire when the user exits the browser
  - If an expiry time is set the browser will store the cookie until the expiry time
    - unless someone decides to delete it of course!
- **domain**
  - the cookie can be made available to domains other than the servers that sent the cookie
  - the cookie can be made available to *other servers* in the same domain as the server that sent the cookie
    - if an HTTP response from **www.foobar.com** sets a cookies with the domain attribute set to **foobar.com** then it will be returned in all HTTP requests to servers in the domain **foobar.com**, e.g. **fred.foobar.com**



Cookie attributes

- **path**
  - controls visibility to other documents on the same server
  - by default cookie is visible to:
    - document that created it
    - other documents in the same directory
    - other documents in subdirectories of directory of the document that created it
  - by setting the path it can be made available to documents in other directories on the same server
    - "/" means all directories
- **secure**
  - if secure is set the cookie will only be transmitted over the internet via a secure protocol
    - HTTPS - HTTP over SSL

Javascript and Cookies

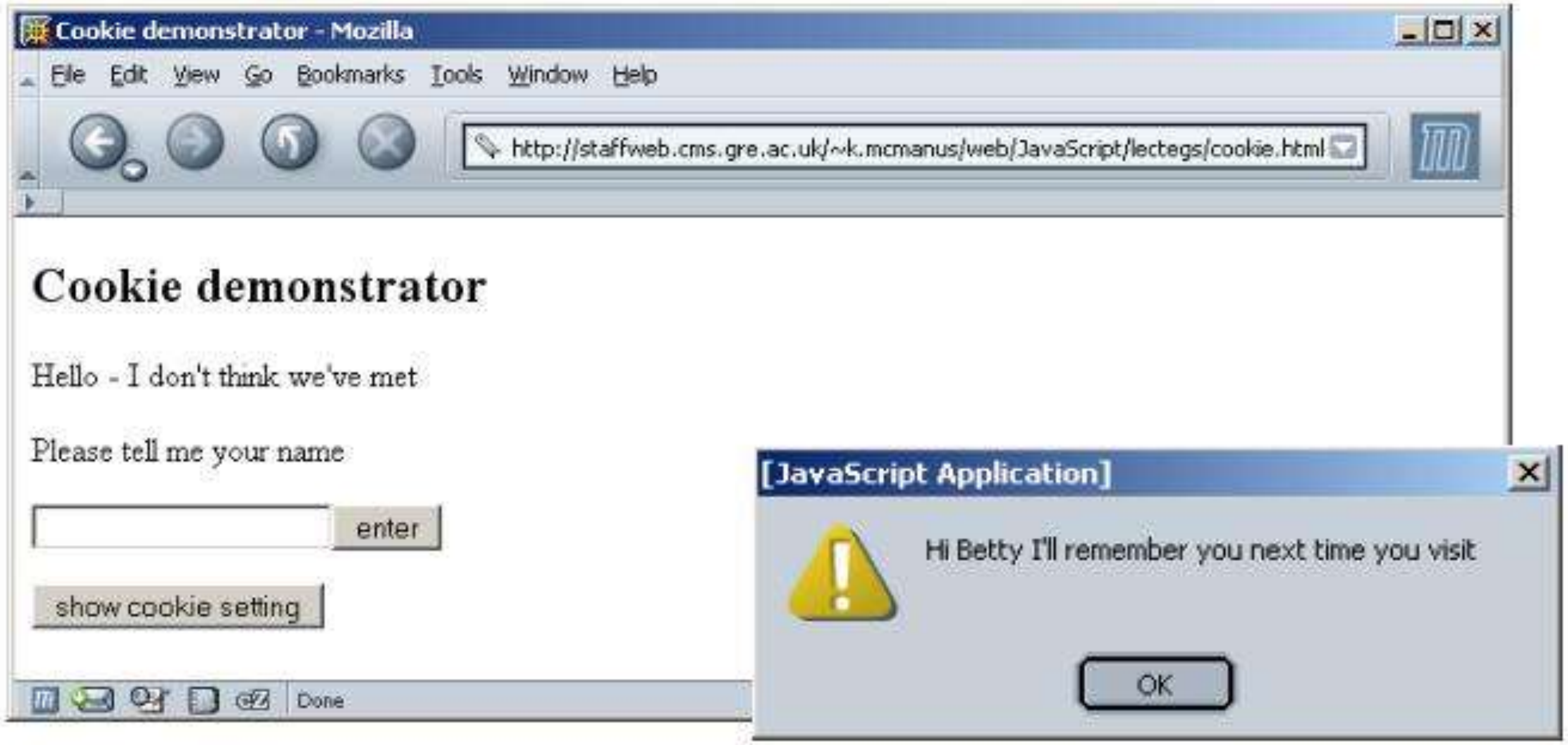
- **Setting a cookie**
  - Easy! Just give it a name and assign it's name, value and attributes to `document.cookie` e.g.

```
document.cookie =
    "uname=fred;expires=Fri, 5 Apr 2002 15:17:01"
```

- **Reading a cookie**
  - Tricky! When you read `document.cookie` you see the whole list of cookies that you are allowed access
  - You have to search through to extract the one you want - e.g. `document.cookie` may contain the string:

```
last=9827; uname=fred; pword=x59d; search=beans
```

cookie.html


Cookie demonstrator - Mozilla
File Edit View Go Bookmarks Tools Window Help
http://staffweb.cms.gre.ac.uk/~k.mcmanus/web/JavaScript/lectegs/cookie.html
enter
show cookie setting
Done
[JavaScript Application]
OK

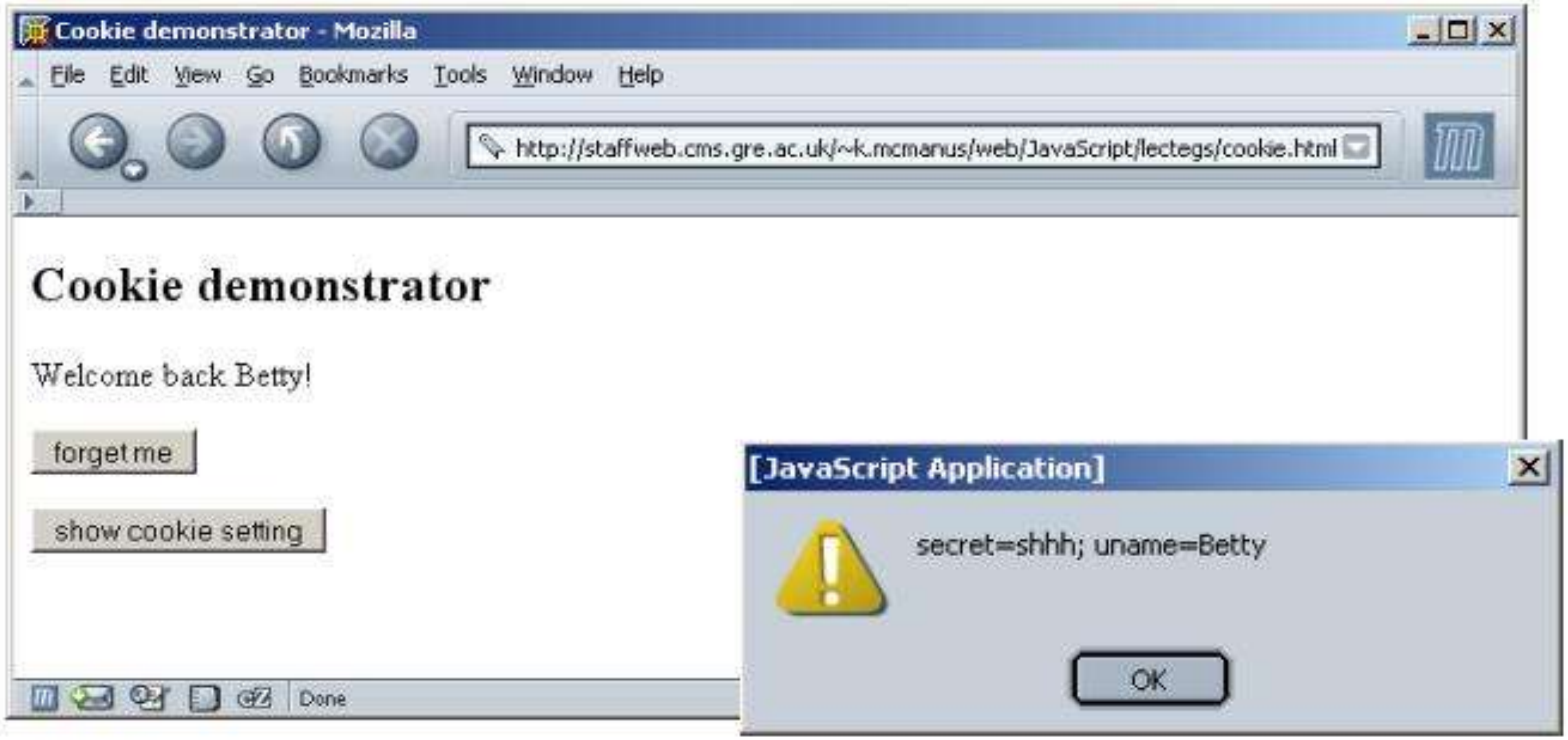
Cookie demonstrator

Hello - I don't think we've met

Please tell me your name

Hi Betty I'll remember you next time you visit

cookie.html


Cookie demonstrator - Mozilla
File Edit View Go Bookmarks Tools Window Help
http://staffweb.cms.gre.ac.uk/~k.mcmanus/web/JavaScript/lectegs/cookie.html
forget me
show cookie setting
[JavaScript Application]
OK
Done

Cookie demonstrator

Welcome back Betty!

```
secret=shhh; uname=Betty
```

cookie.html

function to store the cookie

get the name from the form

calculate an expiry date 6 months from now

convert the expiry date to the correct string format

```
function storeName(theForm){
    var theName = theForm.username.value;
    var expire = new Date();
    expire.setMonth(expire.getMonth() + 6)
    var expireGMT = expire.toGMTString();
    document.cookie = "uname=" + theName + "; expires=" +
                                          expireGMT;

    alert("Hi " + theName +
                 " I'll remember you next time you visit");
    document.cookie = "secret=shhh";
}
```

set the cookie

report back to the user

set a secret cookie

cookie.html

function to delete the cookie

set an expiry date
1 day in the past

convert the expiry
date to the correct
string format

```
function deleteName() {
    var expire = new Date();
    expire.setDate(expire.getDate() - 1)
    var expireGMT=expire.toGMTString();
    document.cookie = "uname=; expires=" + expireGMT;
}
```

no need to give the
cookie a value

cookie.html

```
<script type="text/javascript"><!--
var allCookies = document.cookie;
var start = allCookies.indexOf("uname=");
if (start != -1) {
  start += 6;
  var end = allCookies.indexOf(";", start);
  if (end == -1)
  end = allCookies.length;
  var theName = allCookies.substring(start, end);
  document.write("<p>Welcome back " + theName + "!</p>");
  document.write("<p>");
  document.write("<input type='button' value='forget me'
                     onclick='deleteName()'/>");
  document.write("</p>");
} else {
  document.write("<p>Hello - I don't think we've met</p>");
  document.write("<p>Please tell me your name</p>");
  document.write("<p><form action=\"dummy\">");
  document.write("<input type='text' name='username'/>");
  document.write("<input type='button' value='enter'
                  onclick='storeName(this.form)'/>");
  document.write("</form></p>");
}
// -->
</script><p>
<input type="button" value="show cookie setting"
onclick="alert(document.cookie)"/>
</p></body>
```

if the uname cookie exists

find the value of uname in the cookie

welcome the user back

create a button to delete the cookie

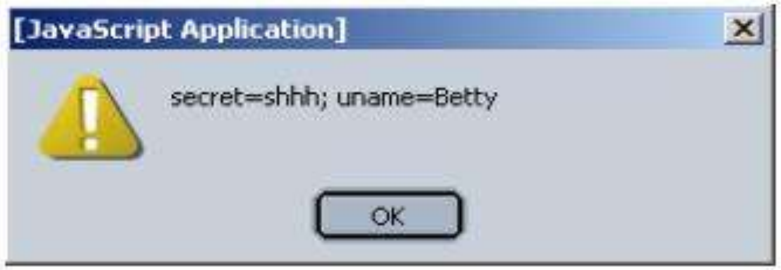
otherwise prompt the user for their name

create a button to store the cookie

Reading a Cookie

- **document.cookie** contains a list of all cookies that your document is allowed to see

```
<input type="button" value="show cookie setting"
     onclick="alert(document.cookie)"/>
```



```
secret=shhh; uname=Betty
```

- You have to write code to search through the **document.cookie** string and find the cookie that you want

Reading a Cookie

- The string method **`indexOf(foo)`** returns the index of "foo" in the string or -1 if "foo" is not found
- The string method **`substring()`** returns the string between two indices

start gets the value 3

```
var mytext = "snakevinyl";
var start = mytext.indexOf("kev");
var end = start + 5;
var name = mytext.substring(start,end);
```

calculate the index of the last character

name gets the value 'kevin'

Reading a Cookie

- You don't know where in the `document.cookie` string your cookie is.
- Use `indexOf()` to search for the name of your cookie and store the index number of the first character
  - if `indexOf()` returns -1 if the cookie doesn't exist
- Add the length of the cookie name (plus one for the "=" character) to the index number so that it points to the first character of the cookie value
- Use `indexOf()` again to search from that position onwards for the next ";" character and store that value
- Use the string method `substring()` to extract the string between the two index values

Reference

- https://javascript.info/cookie
- https://developer.mozilla.org/en-US/docs/Web/API/Document/cookie
- https://www.w3schools.com/js/js_cookies.asp

More Reading

- Wikipedia has a nice article
  - Note issues on laws governing cookies!
  - Why? The White House, the NSA and the CIA have used cookies to track users
- Various websites
- Check your browser for what it does and what it can tell you