Advanced CGI Scripts

Cookies

personalized web browsing

using cookies: count number of visits

Password Encryption

secure hash algorithm

Login Forms

using cookies for login data

the script `cookie_login.py`

the script `cookie_userpass.py`

MCS 275 Lecture 32
Programming Tools and File Management
Jan Verschelde, 4 April 2008

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Personalized Web Browsing

more clever cgi scripts

Storing information about a client:

1. previous selections made
   → passing data from one script to another
2. personal information
   → identification and passwords
3. information from previous visits
   → counting number of visits

Potential applications:

1. customize displayed content
2. store encrypted password for fast access
3. personalized pricing ...

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Cookies

storing information about client

Cookies are data

- stored by web server on client computer,
- managed by the browser.

Using the Cookie module:

```
>>> import Cookie
>>> c = Cookie.Cookie()
>>> c[’L’] = 32
>>> c[’date’] = ’Fri 4 Apr 2008’
>>> print c
Set-Cookie: L=32
Set-Cookie: date="Fri 4 Apr 2008"
```

Cookies are objects like dictionaries.
Reserved keys: `expires` and `path`.

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Using Cookies

Count number of times browser visited.

Write a script to

1. retrieve cookie, initialize counter to zero,
2. or increment the value of counter by one,
3. and display counter value on the page.

Script is `cookie_counter.py`.

1. in `/Library/WebServer/CGI-Executables`,
2. browser settings must accept cookies.

Note: each browser has its own cookies.

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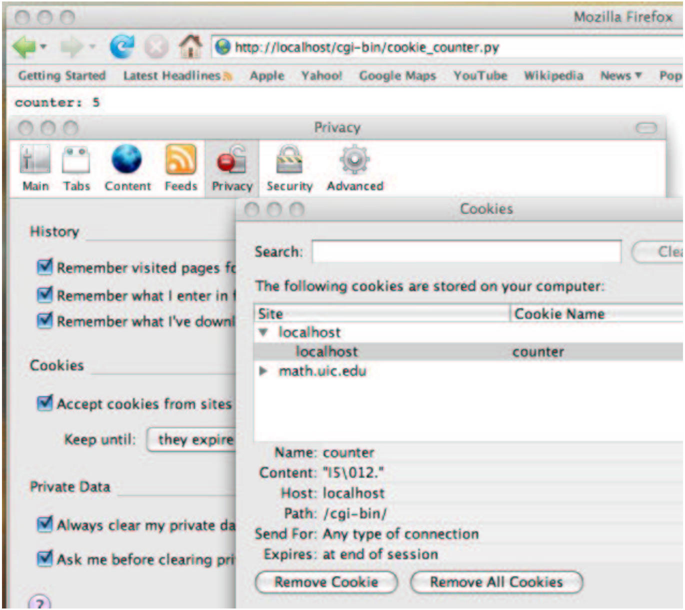
Running `cookie_counter.py`



```
counter: 5
```

The following cookies are stored on your computer:

Site	Cookie Name
▼ localhost	
localhost	counter
▶ math.uic.edu	

Name: counter
Content: "15\012."
Host: localhost
Path: /cgi-bin/
Send For: Any type of connection
Expires: at end of session

Code for main()

```
#!/Library/Frameworks/.../bin/python

import Cookie, os

def GetCookie():
   """
   Retrieves cookie, either initializes counter,
   or increments the counter by one.
   """

def main():
   """
   Retrieves a cookie and writes
   the value of counter to the page.
   """
   c = GetCookie()
   print c
   print "Content-Type: text/plain\n"
   print "counter: %d" % c['counter'].value
```

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def GetCookie():
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   else:
      c = Cookie.Cookie()
   if not c.has_key(’counter’):
      c[’counter’] = 0
   else:
      c[’counter’] = c[’counter’].value + 1
   return c
```

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Secure Hash Algorithm

for password encryption

We can use cookies for login names and passwords.

If passwords are unencrypted, then insecure.

Secure hash algorithm:

1. computationally infeasible to compute inverse
   → is *trapdoor* function
2. very low collision rate
   → very low chance that two different messages will generate the same key

Server encrypts password before sending to client.

Authentication by comparing encrypted passwords.

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Using the sha Module

```
>>> import sha
>>> m = 'this is me'
>>> h = sha.new()
>>> h
<sha1 HASH object @ 0x99ff80>
>>> h.hexdigest()
'da39a3ee5e6b4b0d3255bfef95601890afd80709'
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Login Forms

with cookies to remember data

Accessing `cookie_login.py` for the first time:

1. user submits login name and password,
2. submitted data processed by `cookie_userpass.py`,
3. cookie stores login name and encrypted password.

Connecting to `cookie_login.py` a second time:

1. cookie is retrieved,
2. login name is displayed if not empty,
3. user must type no password if in cookie.

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Script cookie_login.py

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import cgi, Cookie, os

def main():
   """
   Form to process login.
   """
   c = GetCookie()
   print c
   print "Content-type: text/html\n"
   print "<html><body>\n"
   AskName(c)
   print "</body></html>\n"
```

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   else:
      c = Cookie.Cookie()
   if not c.has_key(’login’):
      c[’login’] = ’’
      c[’passw’] = ’’
   return c
```

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      c[’login’] = ’’
      c[’passw’] = ’’
   return c
```

The Function AskName( )

first part

```
def AskName(c):
   """
   Form to enter user name, using cookie c
   to show user name.
   """
   print """<form method = "post"
               action = "cookie_userpass.py">
   """
   v = c[’login’].value
   w = c[’passw’].value
```

→ values of v and w
determine what will be asked from the user.

The Function AskName()

first part

```
def AskName(c):
    """
    Form to enter user name, using cookie c
    to show user name.
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    print """<form method = "post"
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    """
    v = c[’login’].value
    w = c[’passw’].value
```

→ values of v and w
determine what will be asked from the user.

AskName() continued

```
if v == ’’:
   print """<p>
   Login Name:
   <input type = "text" name = "login"
          size = 20>"""
else:
   print """<p>
   Login Name:
   <input type = "text" name = "login"
          size = 20 value = %s>""" % v
if w == ’’:
   print """<p> Password:
   <input type = "password" name = "passw"
          size = 20>"""
print """
   <input type = "submit" value = "submit">
   </form>"""
```

AskName() continued

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if v == ’’:
   print """<p>
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else:
   print """<p>
   Login Name:
   <input type = "text" name = "login"
          size = 20 value = %s>""" % v
if w == ’’:
   print """<p> Password:
   <input type = "password" name = "passw"
          size = 20>"""
print """
   <input type = "submit" value = "submit">
   </form>"""
```

AskName() continued

```
if v == '':
   print """<p>
   Login Name:
   <input type = "text" name = "login"
          size = 20>"""
else:
   print """<p>
   Login Name:
   <input type = "text" name = "login"
          size = 20 value = %s>""" % v
if w == '':
   print """<p> Password:
   <input type = "password" name = "passw"
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AskName() continued

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print """
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Script `cookie_userpass.py`

```
#!/Library/Frameworks/../bin/python

import cgi, Cookie, os, sha

def main():
   """
   Form to process login.
   """
   form = cgi.FieldStorage()
   c = GetCookie(form)
   print c
   print "Content-type: text/html\n"
   print "<html><body>\n"
   error = ProcessName(form)
   if not error:
      ProcessPass(c)
   print "</body></html>\n"
```

Script cookie_userpass.py

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def main():
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   else:
      c = Cookie.Cookie()
   if c.has_key(’login’):
      if form.has_key(’login’):
         c[’login’] = form[’login’].value
   if c.has_key(’passw’):
      if form.has_key(’passw’):
         p = form[’passw’].value
         d = sha.new(p).hexdigest()
         c[’passw’] = d
   return c
```

The Function GetCookie()

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def GetCookie(form):
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   if os.environ.has_key('HTTP_COOKIE'):
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   else:
      c = Cookie.Cookie()
   if c.has_key('login'):
      if form.has_key('login'):
         c['login'] = form['login'].value
   if c.has_key('passw'):
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         c[’passw’] = d
   return c
```

Processing the Name

```
def ProcessName(form):
   """
   Processes name of login form.
   Returns True if error, else False.
   """
   error = False
   try:
      n = form[’login’].value
   except KeyError:
      print "please enter your name"
      error = True
   if not error:
      print ’welcome ’ + n + ’\n’
   return error
```

Processing Password

```
def ProcessPass(c):
   """
   Processes password of login form.
   """
   print "<p>your password is "
   print c['passw'].value
```

→ instead of printing the password,
compare against password on file.

Summary + Assignments

We covered more of chapter 14 in *Making Use of Python*.

Assignments:

1. Extend `cookie_counter.py` so that a different HTML page is displayed based on whether the counter is zero or not.
2. Extend `cookie_userpass.py` for it to do proper password authentication: compare the given password with the one that was earlier entered and stored on file.