Advanced CGI Scripts

1. Cookies
   - personalized web browsing
   - using cookies: count number of visits
2. Password Encryption
   - secure hash algorithm
3. Login Forms
   - using cookies for login data
   - the script `cookie_login.py`
   - the script `cookie_userpass.py`

MCS 275 Lecture 35
Programming Tools and File Management
Jan Verschelde, 9 April 2010

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1 Cookies
personalized web browsing
using cookies: count number of visits

2 Password Encryption
secure hash algorithm

3 Login Forms
using cookies for login data
the script `cookie_login.py`
the script `cookie_userpass.py`

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'] = 35
>>> c['date'] = 'Fri 9 Apr 2010'
>>> print c
Set-Cookie: L=35
Set-Cookie: date="Fri 9 Apr 2010"
```

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

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Advanced CGI Scripts

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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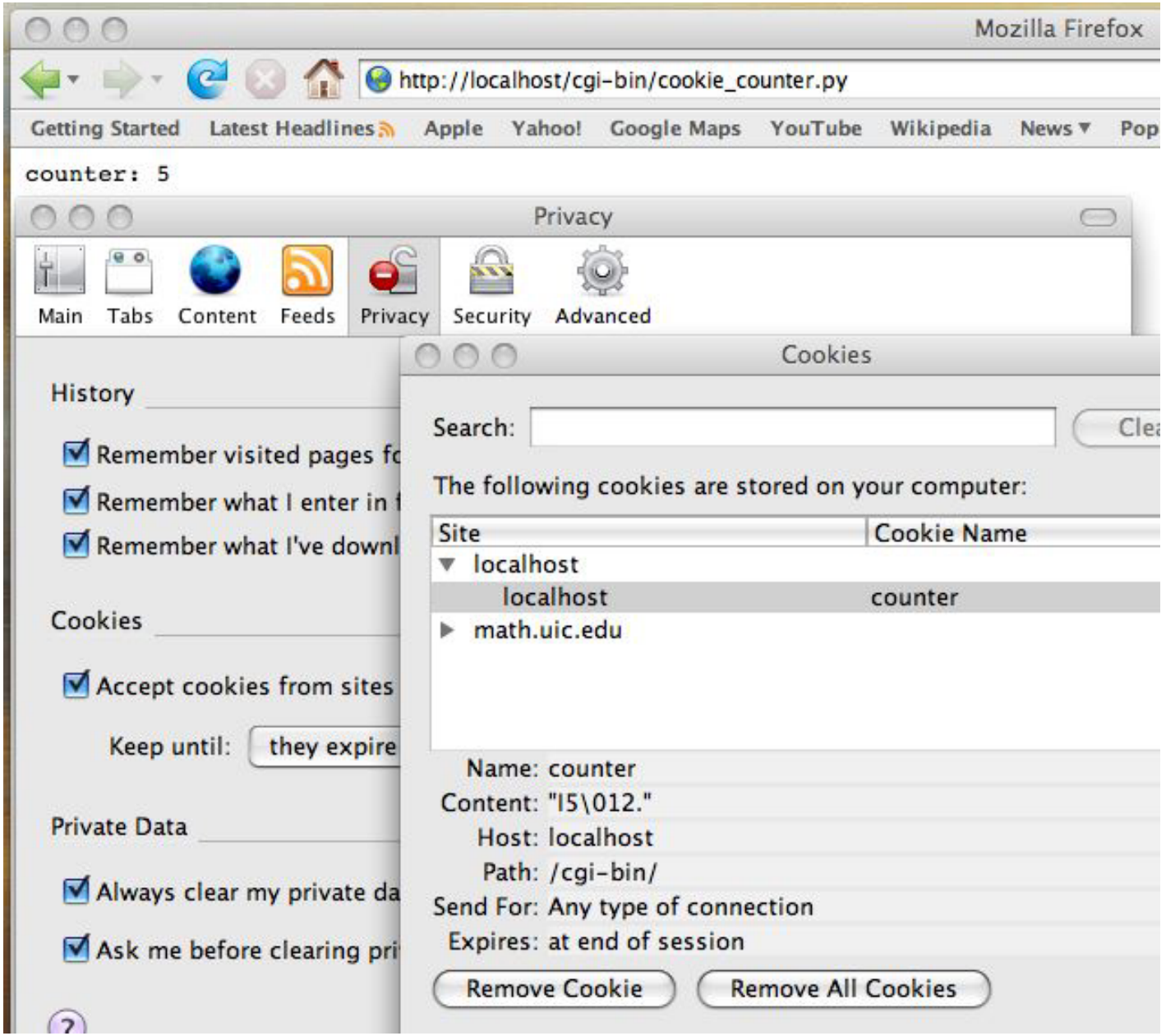
Running `cookie_counter.py`



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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    if not c.has_key('counter'):
        c['counter'] = 0
    else:
        c['counter'] = c['counter'].value + 1
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Advanced CGI Scripts

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
   $\longrightarrow$ is *trapdoor* function
2. very low collision rate
   $\longrightarrow$ 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()
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Advanced CGI Scripts

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`

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

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

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```

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):
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    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 == '':
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AskName() continued

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AskName() continued

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print """
   <input type = "submit" value = "submit">
   </form>"""
```

Advanced CGI Scripts

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"
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The Function GetCookie()

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def GetCookie(form):
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    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
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    if c.has_key('passw'):
        if form.has_key('passw'):
            p = form['passw'].value
            d = sha.new(p).hexdigest()
            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.