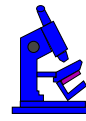


Chapter 9



Module 7



MCQ Test



- ✓ Closed book
- ✓ Closed computer
- ✓ 20 questions
- ✓ Leave if finished, but come back at 1:00 for lecture



MCQ Test



✗ Any questions?



Java



- ✓ No more lecture material, but
- ✓ I will respond to questions with material as needed
- ✓ Following few weeks will have Java/Swing centered questions, and
- ✓ Assignment 3 (announced next week) will require Java/Swing, so get some practice in...

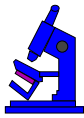


Common Gateway Interface



- ✓ CGI is a standard for helping web servers run *external* programs,
- ✓ and return *dynamic* web pages.

For example, a simple dynamic web page might return the current date and time, calculated by running the 'date' program, and formatting the results as a web page.



CGI script



CODE LISTING

mydate.cgi

```
#!/bin/sh
cat <<EOM1
Content-type: text/html

<HTML><HEAD>
<TITLE>Output of data in HTML from CGI script</TITLE>
</HEAD><BODY>
<H1>Date:</H1>
EOM1
date
cat <<EOM2
</BODY></HTML>
EOM2
```



CGI script

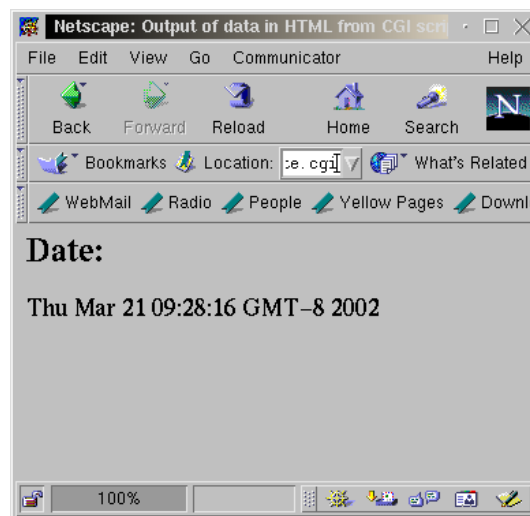


When this script is placed in the directory `public_cgi` in your home directory on one of the UNIX systems, then you may refer to

<http://www-cgi.comp.nus.edu.sg:8000/~yourid/mydate.cgi>



CGI script

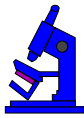




CGI script



```
Netscape: Source of: http://www-cgi.comp.nus.edu.sg:8000/~hugh/mydate.cgi
<HTML><HEAD>
<TITLE>Output of data in HTML from CGI script</TITLE>
</HEAD><BODY>
<H1>Date:</H1>
Thu Mar 21 09:28:16 GMT-8 2002
</BODY></HTML>
```



CGI scripts



- ✓ No requirement for CGI program to be a shell script.
- ✓ **Perl** is very commonly used in this role.
- ✓ It should not take too long to process.



Environment variables



CODE LISTING

env.cgi

```
#!/usr/local/bin/perl
print "Content-type: text/html\n\n";
print <<EndOfHTML;
<html><head><title>Print Environment</title></head>
<body>
EndOfHTML

foreach $key (sort(keys %ENV)) {
    print "$key = $ENV{$key}<br>\n";
}

print "</body></html>";
```



Environment variables



```
DOCUMENT_ROOT = /usr/local/apache/htdocs
GATEWAY_INTERFACE = CGI/1.1
HTTP_USER_AGENT = Mozilla/4.79 [en] (X11; U; Linux 2.2.16 i686)
...
QUERY_STRING =
...
TZ = Singapore
```



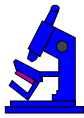
CGI forms - GET



The form contents are found inside an environment variable called `QUERY_STRING`, as a series of `name/value` pairs.

This mechanism is known as the **GET** mechanism, and a typical URL would look like this:

```
.../myform.cgi?name1=value1&name2=value2
```



POST



An alternative mechanism is the **POST** mechanism, in which the `STDIN` of the CGI program is used to process the form data.

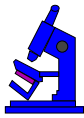


CGI form

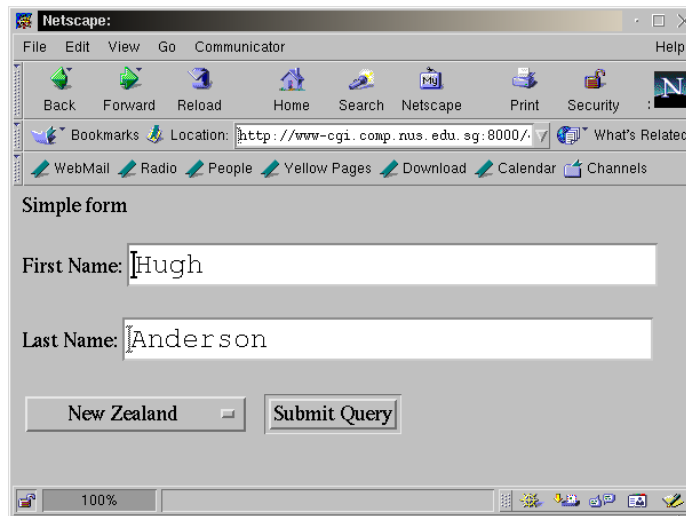


```
CODE LISTING                                form.html

<html><head>Simple form</head>
<body>
<form action="env.cgi" method="GET">
  First Name: <input type="text" name="First" size=30><p>
  Last Name: <input type="text" name="Last" size=30><p>
  <select name="Home">
    <option>Singapore      <option>Malaysia
    <option>Indonesia      <option>New Zealand
    <option>The rest of the world!
  </select>
  <input type="submit">
</form>
</body></html>
```



CGI form





CGI form

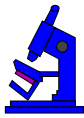


When the form is submitted, the `QUERY_STRING` looks like this:

```
QUERY_STRING = First=Hugh&Last=Anderson&Home=New+Zealand
```

Within a CGI program, this series of name-value pairs may be used to return a dynamic web page based on this form data.

`Perl` is a particularly useful language to use in this context - the `QUERY_STRING` can be `split` quickly into its component parts.



Security



- ✓ There are security issues with unrestricted CGI programs - since they run powerful programs (like `perl` and `csh`) with arbitrary parameters, they may be a source of (hacker) intrusion.
- ✓ It is for this reason that CGI usage is restricted here at NUS.



PHP



- ✓ PHP is a server-side scripting language.
- ✓ It looks very like standard HTML scripts, but the server automatically interprets the PHP.
- ✓ There are no enhancements needed for browsers.



PHP



- ✓ The two tags `<?php` and `?>` start and end a PHP script, and identify a PHP code segment.
- ✓ The PHP code itself is a reasonably powerful programming language similar to Java, C and Perl, with functions, variables and so on.

PHP stands for PHP - Hypertext Preprocessor, a recursive acronym.



PHP



- ✓ Particularly useful to access databases.
- ✓ It is common to pair up PHP with MySQL, but PHP is not limited to one database type.
- ✓ For example if you wish to use PHP to access a Microsoft SQL server, you can install the ODBC support in the server machine, and access the server directly.



PHP code



```
<?php
...
mysql_pconnect("host","user","password")
  or die("Unable to connect to SQL server");
mysql_select_db("dbname")
  or die("Unable to select database");
$numguests = mysql_query("SELECT COUNT(*) FROM guests")
  or die("Select Failed!");
...
?>
```



PHP security



- ✓ PHP suffers less from the security issue than perl or csh CGI scripts do.



Java



```

CODE LISTING                               Lissajous1.java
/* @(#)Lissajous.java
 * Original version was written in 0.4 95/04/09
 * By Hugh Anderson for HotJava browser.
 * Updated by L. Gladney to Java 1.0 JDK on 4/13/97.
 * Patrick Chan (chan@scndprsn.Eng.Sun.COM) has suggested that it
 * would be nice if every point had a different display, so mouse
 * X motion now controls the ratio of frequencies, and mouse Y motion
 * controls the amplitude. */
import java.applet.Applet;
import java.awt.*;

public class Lissajous extends Applet implements Runnable {
    Thread animate=null;
    double pi=3.14159265359;
    int fx=50;
    int fy=100;
    int diffx=0;
    int amp=50, phase=0;
    int delay = 50;
    // amplitude, phase
    // speed set by length
    // of sleep between refreshes
    // resize to fixed width,height

    public void init() {
        resize(200, 200);
    }

    public void paint(Graphics g) {
        int X,Y,YY=0,lastx=0,lasty=0,temp=0,rev=0;
        g.drawRect(0, 0, size().width - 1, size().height - 1); // outline
        if ( fy < fx ) {
            temp = fx;
            fx = fy;
            fy = temp;
            rev = 1;
        }
        for (int x = 0 ; x <= 360 ; x += 4) { // loop
            X = (int) ( amp*Math.sin( x*2.0*pi/360.0 )); // x pos
            YY = (int) ( (x*fy/fx)+phase);
            Y = (int) ( amp*Math.sin( YY*2.0*pi/360.0 ));
            if (x==0) { lastx=X; lasty=Y; }
            if (rev==1) { g.drawLine(lastx+100,lasty+100,X+100,Y+100); }
            else { g.drawLine(lastx+100,lasty+100,X+100,Y+100); }
            lastx=X;
            lasty=Y;
        }
        if ( rev==1 ) {
            temp=fx;
            fx = fy;
            fy = temp;
        }
        phase = yy;
        // fix an error ... phase shouldn't increase forever.... */
        if ( phase >= 360 ) { phase = 360; }
        g.drawString( fx + " " + fy,10,20);
    }
}

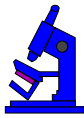
```



Java



```
CODE LISTING                                Lissajous2.java
public void run() {
    while (true) {
        repaint();
        try { Thread.currentThread().sleep(delay); // delay
        } catch (Exception e) { };
    }
}
public void start() {
    if (animate == null) {
        animate = new Thread(this);
        animate.start();
    }
}
public void stop() {
    if (animate != null) {
        animate.stop();
        animate = null;
    }
}
public boolean mouseDown(Event e, int x, int y) {
    Graphics gc;
    gc = getGraphics();
    diffx = fx-x;
    System.out.println("Got a mouse event at " + x + ", " + y);
    return true;
}
public boolean mouseDrag(Event e, int x, int y) {
    fx = x+diffx;
    if ( fx <= 0 ) { fx = 1; };
    amp = y;
    return true;
}
public String getAppletInfo() {
    return "Lissajous by Hugh Anderson/Larry Gladney ";
}
public String[][] getParameterInfo() {
    String [][] info = {
        {"delay", "int", " ", "delay, default=50"}
    };
    return info;
}
}
```



Java



This code may be found at

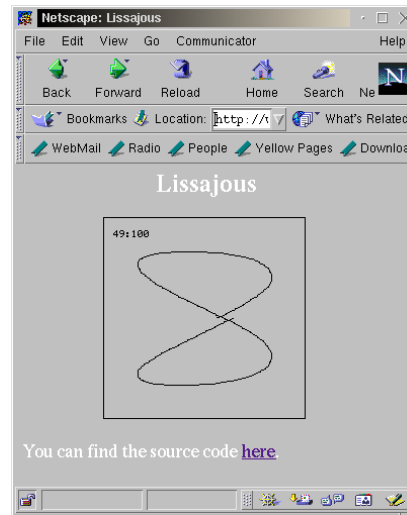
<http://olddept.physics.upenn.edu/courses/gladney/minicourse/lectures/lecture2.html>

or locally at

<http://www.comp.nus.edu.sg/~hugh/Lissajous/Lissajous.html>



Java



Summary of topics



In this module, we introduced the following topics:

- Web-based application architectures
- CGI, PHP and Java