Molecular Biomedical Informatics

Web Programming

網際網路程式設計
CGI
Common Gateway Interface (CGI)

- Common
  - 通用

- Gateway
  - 閘道

- Interface
  - 介面
阿鬼 你还是说中文吧
It’s an interface

- It allows browsers (and thus users) to communicate with web servers
  - In brief, an interface is a bulk of rules. If you program follows these rules, you can communicate with browsers. A program that fits these rules is called a CGI program.
  - CGI is over HTTP

- A CGI program is just a program where the only thing need to know is how its IO related to browsers’ IO
HTML form

- Passing data to the server side
- `<form action="do">
   <input name="nick" type="text" /><br />
   <select name="color">
        <option value="blue">Boy</option>
        <option value="red">Girl</option>
    </select><br />
   <button>Submit</button>
</form>`

- HTML Forms and Input

- You know HTML, and thus you know the browsers' IO
CGI program

- CGI is not a language. If you follow the rules, you can use any programming language to implement a CGI program. But please don’t try any…
  - Perl is a widely used language in CGI programming. In addition to Perl, shell script, Python, Ruby, PHP, Tcl, C/C++ and Visual Basic can be used for CGI programming ⤷ by 通用網關介面 - 維基百科，自由的百科全書
CGI IO in Perl

# input
use CGI;
my $cgi = new CGI;
my $nick = $cgi->param('nick');
my $color = $cgi->param('color');

# output
print "Content-type: text/html\n\n"; # HTTP header
print "Hello World!<br />"; # any valid HTML
print "$nick likes $color!"; # any valid HTML

Easy? Let’s see other languages
CGI IO in PHP

- Hello World!<br/>

```php
<?php

# input
$nick = $_GET['nick'];
$color = $_GET['color'];

# output
echo "$nick likes $color!";

?>
```

<!-- any valid HTML -->
Hello World!<br />
<!-- any valid HTML -->
<%  
// input
String nick = request.getParameter("nick");
String color = request.getParameter("color");
// output
out.println("%s likes %s!", nick, color);
%>
CGI IO in C

- #include <stdio.h>
  #include <stdlib.h>

  int main(void)
  {
    // input
    char * query;
    char nick[256], color[256]; // dangerous
data = getenv('QUERY_STRING');
    sscanf(query, "nick=%s&color=%s", &nick, &color);
    // output
    printf("Content-type: text/html\n\n"); // HTTP header
    printf("Hello World!\n"); // any valid HTML
    printf("%s likes %s!", nick, color); # any valid HTML

    return 0;
  }

- 永遠的UNIX > CGI之C語言篇
- So just don’t use it
You may change the content types, but how?
Test (debug) CGI programs

- Pass input data via the URL
- Actually, browsers do the same thing while submitting a HTML form
Perl

- Script language
- The most advantages are string manipulation and hash
- The first line must be
  - `#!/usr/bin/perl -w`
- `use strict;`
  - be sure to include this line
  - Perl is an untyped language where variables can be used without declaration, but the harm is larger (bugs) than the convenience
- You can use any language such as PHP, but try to prevent using C/C++ for CGI programming
  - native support, string manipulation, protection…
  - Perl can call C/C++ programs
File IO in Perl

- open FH, 'res/member' or die;  # open a file
  while (<FH>) {  # each line
    chomp;  # truncate the last "\n" character
    my ( $name, $nick ) = split "\t";  # split by tab
    $nick eq $nick and $name = $name and last;  # compare
  }
  close FH;  # close the file
$_ = `~/bin/cat _hello.html`;  # use Linux command
s/{name}/$name/g;  # replace
print "Content-type: text/html\n\n$_";  # output

- The magic $_ variable
  - using it well will largely reduce the code (but less readable for rookies)
- Sometime Perl looks like English
- Call outer programs/commands
- The concept of template (模板)
Some tips

- Set CGI programs to executable
  - `$ chmod 755 do`

- You may debug as a Perl program
  - `$ ./do # remember to fix the input`

- There is a module to help output error messages to browser
  - `use CGI::Carp "fatalsToBrowser";`

- Writable file
  - `$ chmod 666 filename # make it writable to web server`
  - `open FH, ">filename" or die;`
  - `open FH, ">>>filename" or die;`
Script/interpreted languages

- **Interpreted Languages: PHP, Perl, Python, Ruby (Sheet One)**
- **Interpreted Languages: PHP, Perl, Python, Ruby (Sheet Two)**
Any Questions?
Today’s assignment
今天的任務
Make your web site memorable

- Implement at least one cross-computer (namely you cannot implement with only JavaScript) interaction with CGI

- Reference
  - Perl 學習手札
  - Perl - 維基百科，自由的百科全書

- Your web site (http://merry.ee.ncku.edu.tw/~xxx/cur/) will be checked not before 23:59 11/4 (Sun). You may send a report (such as some important modifications) to me in case I did not notice your features.
Appendix
附錄
If we have time...

- I’m sure that we won’t have spare time today :p

- We won’t have enough time to finish Perl in the whole semester so that I can only teach specific functions

- But I’m not sure what functions you need, so please think about it and feel free to discuss with me via any media