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.
Job trends

Social Web Design & Research
Job trends

- c, java, javascript, c++, perl
- perl, php, jquery, python, ruby, objective-c
CGI IO in Perl

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

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

- Easy? Let’s see other languages
HTTP header

- **Chapter 10. HTTP Headers**
- **好文: HTTP 流程 與 HTTP Header 入門**
- **HTTP Header 入門详解**

- You can use this to change the way that browsers parse your response, to return binary files (for download) and to specify the filename
Hello World! <!-- any valid HTML --> 

```php
<?php
# input
$nick = $_GET['nick'];
$color = $_GET['color'];
# output
echo "$nick likes $color!";
?>
```
CGI IO in Ruby

# input
require 'cgi'
cgi = CGI.new
nick = cgi['nick']
color = cgi['color']

# output
puts "Content-type: text/html";
puts # HTTP header
puts "Hello World!<br />"; # any valid HTML
puts "#{nick} likes #{color}!"; # any valid HTML
Hello World!<br />

```java
// 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\n"); // HTTP header
    printf("Hello World!<br />"); // 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
How to change the content type in a server-side scripting language such as PHP?
Test (debug) CGI programs

- Pass input data via the URL
- Actually, browsers do the same thing while submitting a HTML form
Any Questions?
Ajax

Asynchronous JavaScript XML

非同步的JavaScript與XML技術
Ajax

- Ajax is a combination of multiple existing technologies
  - use HTML+CSS for expression
  - use JavaScript to operate DOM objects for dynamic effects
  - use XML for data exchange
  - use XMLHttpRequest for asynchronous connection with web server
  - use JavaScript to bind them all
- Ajax does not refer to a single technology but to organically using a series of related technologies
A traditional web app

Tell users to fill HTML forms and to request the server for each form. The server receives and processes the requested form and responds with the result page.
Innovation from existing technologies

- The above process wastes much bandwidth, since usually the result page is very similar to the request page. Namely, most HTML code are the same in the two pages.
  - in short, only very tiny part need to update

- We have such technologies for a long time. For example, we have already used JavaScript to update partial page (such as a marquee) or used XML to transfer data (but not web page)
  - actually, if someone thought to use JavaScript to update web page according to the transferred data, he got Ajax ← the importance of idea
Ajax

Update a little

只改一點點
Killer applications

- Traditional web mails
  - http://mail.ncku.edu.tw/

- Modern web mails
  - http://gmail.com/
  - Ajax requires JavaScript, thus some kind web sites would provide a non-Ajax version that does not depend on JavaScript
  - 浅谈Gmail邮箱发展历史
  - 回顾Gmail历史——猛击网页邮箱的G点！

- BTW, Ajax is regarded invented in 1998 by the Outlook Web Access team of Microsoft ← the importance of idea
  - AJAX - 维基百科
Other Google applications

- Google
- Google Calendar
- Google Docs
- Google Maps

The so-called rich interface application (RIA). Since each time only a tiny part is updated, the content could be very complicated. The entire page wouldn’t be reloaded.

- some are too rich to provide a non-Ajax version
Common Ajax-dependent components

- Auto complete (自動完成)
  - Ajax Autocomplete for jQuery
  - FCBKcomplete
  - ajax autocomplete - Google 搜尋

- Tooltip (工具提示)
  - 40+ Tooltips Scripts With AJAX, JavaScript & CSS
  - tooltip - Google 搜尋

- Upload (上傳)
  - http://valums.com/ajax-upload/
  - upload - Google 搜尋

- Human is slow. Leak a partial content for the users to read (or let them to input something) first. The response time of human is very enough for machines to do the actual work. Don’t waste such time.
A simple Ajax example

- Design logic
  - users fill a HTML form and submit it
  - after submitting, the client does not wait the response of the server and the control returns to the users immediately ← this behavior is the so-called asynchronous (非同步)
  - change the content to ‘loading’, which makes the users comfortable
  - after receiving the server response, display the results
Notes in HTML

- The design of HTML form should follow the conventions of the non-Ajax version, in case that you need a non-Ajax one
- Usually you need to set the id attribute of the DOM objects to update for manipulating them easily
Notes in JavaScript

- An event to activate the Ajax
- Get the input data
- Invoke the Ajax
  - set the data (some transformation may be needed)
  - the CGI URL
  - http://api.jquery.com/category/ajax/
- After Ajax, you got two asynchronous program flows
  - after submitting, display messages to make users comfortable
  - after server response, display the results
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, or even better, Ajax

- Reference
  - Ajax – jQuery API
  - Ajaxload - Ajax loading gif generator
  - Preloaders.net - AJAX loading GIF and APNG spinners, bars and 3D animations generator
  - 5 Ways to Make Ajax Calls with jQuery

- Your web site (http://merry.ee.ncku.edu.tw/~xxx/cur/) will be checked not before 23:59 4/9 (Tue). 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
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 (無型態) 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;

- Perl 學習手札
- Perl - 維基百科，自由的百科全書
Script/interpreted languages

- **Interpreted Languages: PHP, Perl, Python, Ruby (Sheet One)**
- **Interpreted Languages: PHP, Perl, Python, Ruby (Sheet Two)**