



FAMP

FreeBSD/Apache/MySQL/PHP

Outline

❑ Introduction

- Apache
- MySQL
- PHP

❑ Installation and Administration

- MySQL
- Apache
- PHP

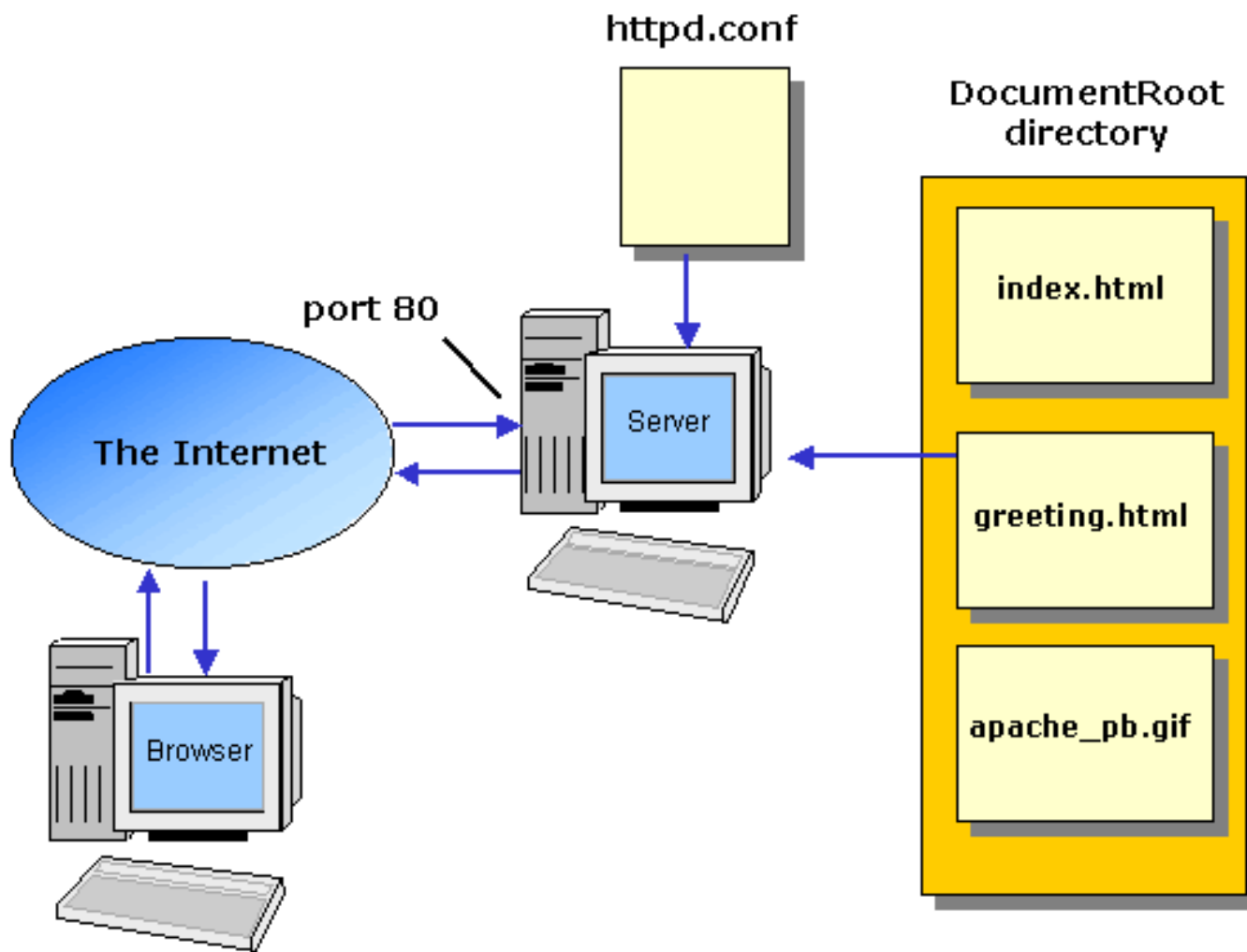
❑ Appendix

- phpMyAdmin
- lighttpd
- FastCGI

Apache

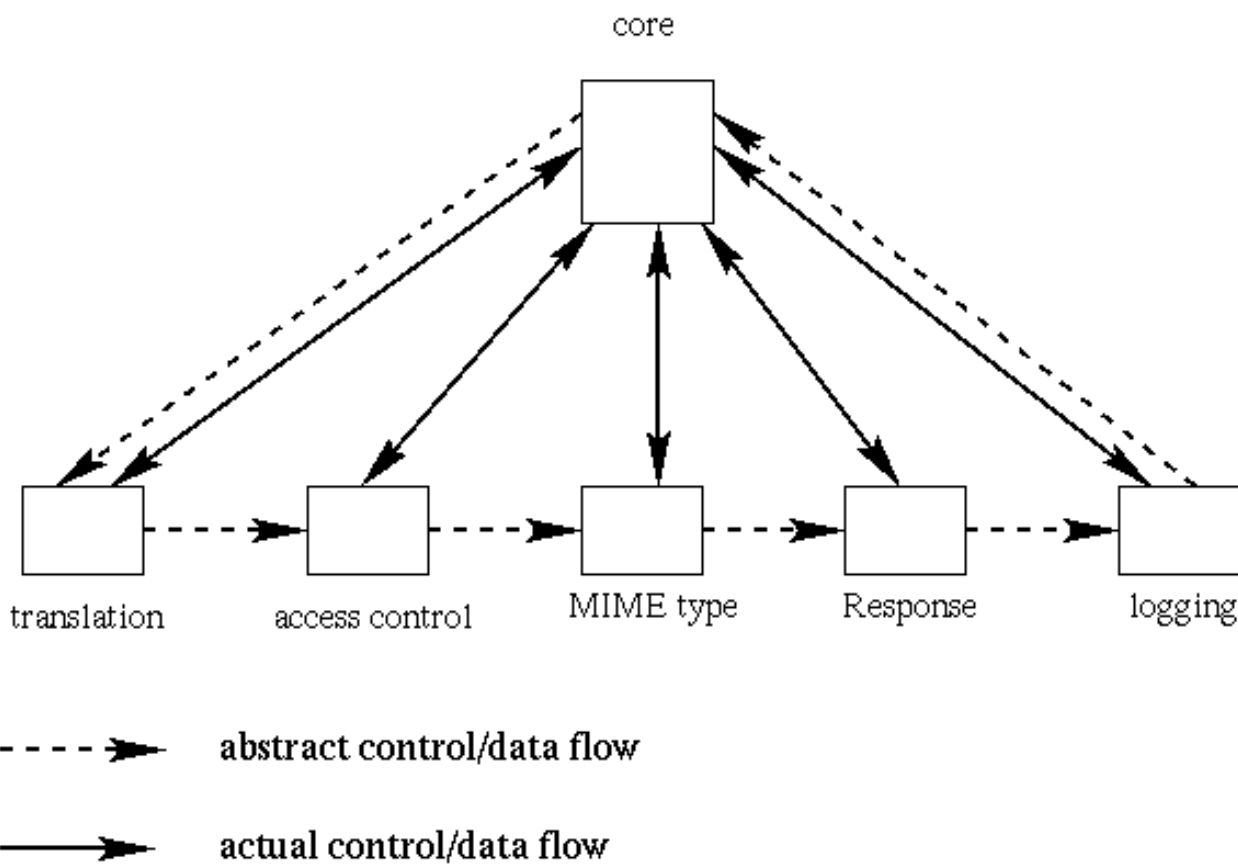
- ❑ Apache Software Foundation: <http://www.apache.org/>
- ❑ Apache HTTP Server Project: <http://httpd.apache.org/>
- ❑ Web httpd server that
 - HTTP/1.1
 - Modular design
 - Can be customised by writing modules using Apache module API
 - Freely available cross many platforms
- ❑ Two main parts
 - Core: implement basic functions and provide the interface for Apache modules
 - Modules: extend or override the function of Core
 - Example: Access control, logging, CGI, proxy, cache control, PHP...

How Apache Works – request and response

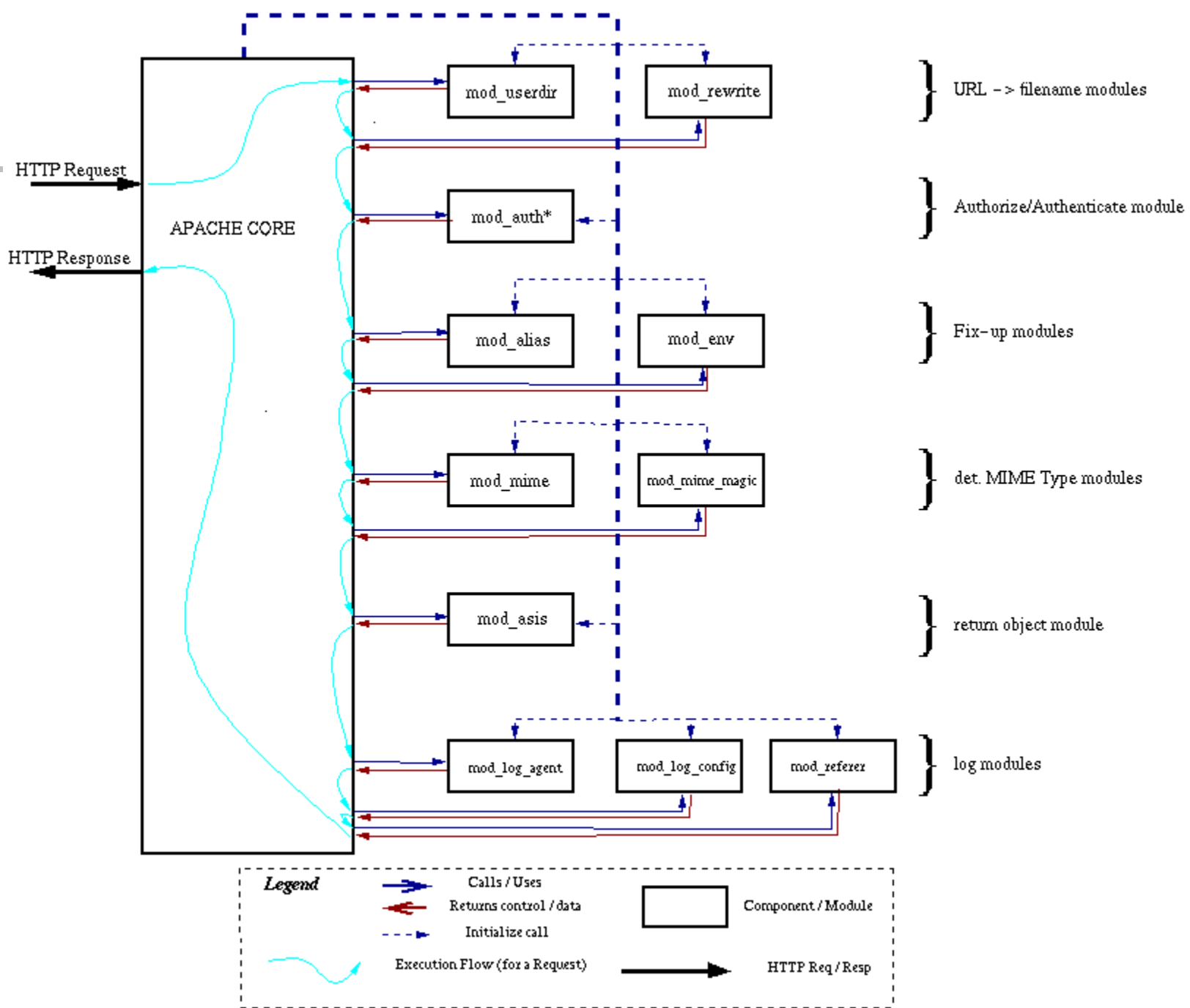


How Apache Works – Each request-response

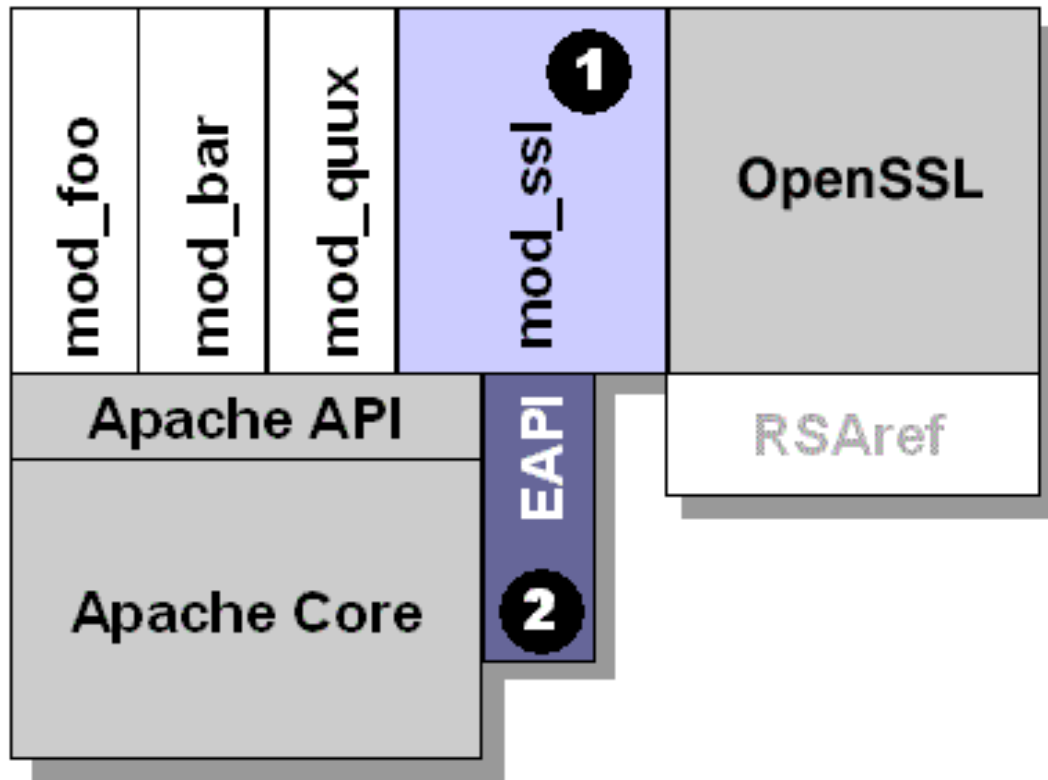
- Apache breaks client request into several steps which are implemented as modules



Apache Detail



Apache with mod_ssl



MySQL (1)

❑ SQL (Structured Query Language)

- The most popular computer language used to create, modify, retrieve and manipulate data from **relational database** management systems.
- Introduction to SQL: <http://www.1keydata.com/tw/sql/sql.html>
 - In Chinese.

❑ A **multithreaded, multi-user, SQL** Database Management System.

❑ Owned and sponsored by a Swedish company MySQL AB, acquired by Sun Microsystems 2008.

❑ Official Site: <http://www.mysql.com>

❑ Documentation: <http://dev.mysql.com/doc>

MySQL (2)

❑ Features:

- Writing in C/C++, tested by many compilers, **portable to many platforms**.
 - AIX, FreeBSD, HP-UX, Linux, Mac OS, Solaris, Windows, ...etc.
- Providing APIs for C/C++, Java, Perl, PHP, Python, Ruby, Tcl, ...etc.
- **Multi-threaded** kernel, supporting systems with multiple CPUs.
- Optimized algorithm for **SQL** Query.
- Multi-Language (coding) Supports.
- Lots of connecting method: TCP/IP, ODBC, JDBC, Unix domain socket.
- **Free Software** (GNU General Public License version 2)
- Popular for web applications

PHP

❑ PHP: Hypertext Preprocessor

- A widely-used Open Source general-purpose scripting language.
- Originally designed to create dynamic web pages, PHP's principal focus is server-side scripting.
- PHP scripts can be embedded into HTML.
- The LAMP architecture has become popular in the Web industry as a way of deploying inexpensive, reliable, scalable, secure web applications.

❑ Official Site: <http://php.net/>

Installation and Administration

MySQL

Apache

PHP

phpMyAdmin

Installing MySQL (1)

□ Steps

- # cd/usr/ports/databases/mysql55-server/
- # make OPTIONS install clean

You may use the following build options:

WITH_CHARSET=charset Define the primary built-in charset (latin1).
WITH_XCHARSET=list Define other built-in charsets (may be 'all').
WITH_COLLATION=collate Define default collation (latin1_swedish_ci).
WITH_OPENSSL=yes Enable secure connections
(define **WITHOUT_YASSL** for backward compatibility).
WITH_LINUXTHREADS=yes Use the linuxthreads pthread library.
WITH_PROC_SCOPE_PTH=yes Use process scope threads
(try it if you use libpthread).
WITH_FAST_MUTEXES=yes Replace mutexes with spinlocks.
BUILD_OPTIMIZED=yes Enable compiler optimizations
(use it if you need speed).
BUILD_STATIC=yes Build a static version of mysqld.
(use it if you need even more speed).
WITH_NDB=yes Enable support for NDB Cluster.

Installing MySQL (2)

❑ OPTIONS:

- WITH_CHARSET=utf8
- WITH_XCHARSET=ascii,big5,... (all)

❑ Installed...

====> SECURITY REPORT:

This port has installed the following files which may act as **network servers** and may therefore pose a **remote security risk** to the system.
`/usr/local/libexec/mysqld`

This port has installed the following **startup scripts** which may cause these network services to be started at boot time.
`/usr/local/etc/rc.d/mysql-server`

Installing MySQL (3)

❑ Startup script...

```
#  
# Add the following line to /etc/rc.conf to enable mysql:  
# mysql_enable (bool): Set to "NO" by default.  
#                               Set it to "YES" to enable MySQL.  
# mysql_limits (bool): Set to "NO" by default.  
#                               Set it to yes to run `limits -e -U mysql`  
#                               just before mysql starts.  
# mysql_dbdir (str):  Default to "/var/db/mysql"  
#                               Base database directory.  
# mysql_args (str):  Custom additional arguments to be passed  
#                               to mysqld_safe (default empty).  
#
```

Adminstrating MySQL (1)

❑ Configuration file

- Copy config file
 - # cd /usr/local/share/mysql
 - # cp my-huge.cnf /usr/local/etc/my.cnf
- Edit /usr/local/etc/my.cnf

❑ Start mysql daemon

- Using startup script
 - # /usr/local/etc/rc.d/mysql-server start

Administrating MySQL (2)

❑ Test

- % `mysql -u root -p`
 - The initial password for root is empty

```
nasa [/usr/local/etc] -randy- mysql -u root -p
```

```
Enter password:
```

```
Welcome to the MySQL monitor. Commands end with ; or \g.
```

```
Your MySQL connection id is 1
```

```
Server version: 5.1.41-log FreeBSD port: mysql-server-5.1.41
```

```
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
```

```
mysql> show databases;
```

```
+-----+  
| Database |  
+-----+  
| information_schema |  
| mysql |  
| test |  
+-----+
```

```
3 rows in set (0.06 sec)
```


Administrating MySQL (3)

❑ Securing initial accounts

- Two initial accounts
 - root
 - anonymous

```
mysql> SELECT Host, User From mysql.user;
+-----+-----+
| Host                | User |
+-----+-----+
| 127.0.0.1           | root |
| nasa.cs.nctu.edu.tw |      |
| nasa.cs.nctu.edu.tw | root |
| localhost           |      |
| localhost           | root |
+-----+-----+
```

```
mysql> UPDATE mysql.user SET Password = PASSWORD('test123') WHERE User = 'root';
Query OK, 3 rows affected (0.08 sec)
Rows matched: 3  Changed: 3  Warnings: 0
```

```
mysql> FLUSH PRIVILEGES;          # Reload the grant tables
Query OK, 0 rows affected (0.00 sec)
```

```
mysql> SET PASSWORD FOR 'root'@'localhost' = PASSWORD('ttt123');
Query OK, 0 rows affected (0.02 sec)
```

Installing Apache (1)

❑ Steps

- `# cd /usr/ports/www/apache22/`
- `# make install clean`

❑ Options

- A lot of options for modules
- `WITH_SSL` (default)
- `WITH_MPM=worker`
- `WITH_THREADS=yes`
- `WITH_SUEXEC=yes`

Installing Apache (2)

❑ Installed...

To run apache www server from startup, add **apache22_enable="YES"** in your `/etc/rc.conf`. Extra options can be found in startup script.

Your **hostname** must be resolvable using at least 1 mechanism in `/etc/nsswitch` typically DNS or `/etc/hosts` or apache might have issues starting depending on the modules you are using.

====> SECURITY REPORT:

This port has installed the following binaries which execute with increased privileges.

`/usr/local/sbin/suexec`

❑ Startup script

- `/usr/local/etc/rc.d/apache22`
- `apache22_http_accept_enable`

Apache configuration – Configuration files

❑ Location

- The default location of apache (in ports) is /usr/local/etc/apache22
- Major configuration file: httpd.conf
 - Other configuration files could be included. (setting in httpd.conf)
 - extra/httpd-*.conf, Includes/*.conf

❑ Two types

- Global settings
 - Server configurations
 - Options of modules
- Directory Configuration
 - Local setting for certain directory

Apache configuration – Global Settings (httpd.conf)

❑ Server configuration

- Listen 80
- ServerAdmin liuyh@cs.nctu.edu.tw
- ServerName nasa.cs.nctu.edu.tw
- DocumentRoot "/home/wwwadm/data"
 - Remember create DocumentRoot directory if you modify it

❑ Options of modules

❑ Include supplemental configuration files

- Include etc/apache22/extra/httpd-*.conf
- Include etc/apache22/Includes/*.conf

Apache configuration – Directory Configuration (1)

□ Configuration parameters

- Options
 - All
 - ExecCGI
 - FollowSymLinks
 - Indexs
 - MultiViews
 - SymLinksIfOwnerMatch
- <http://httpd.apache.org/docs/2.2/mod/core.html#options>

```
<Directory "/home/wwwadm/data">  
  Options Indexes FollowSymLinks MultiViews  
  AllowOverride None  
  Order allow,deny  
  Allow from all  
</Directory>
```

Apache configuration – Directory Configuration (2)

❑ Configuration parameters

- AllowOverride
 - All (Read .htaccess)
 - None (ignoring .htaccess)
- Order
 - Solve collision of deny and allow rules
- Deny/Allow
 - IP/DN (control access to this directory)

```
<Directory "/home/wwwadm/data">  
  Options Indexes FollowSymLinks MultiViews  
  AllowOverride None  
  Order allow,deny  
  Allow from all  
</Directory>
```

Apache configuration – Options of Modules

❑ dir_module

```
<IfModule dir_module>  
  DirectoryIndex index.html  
</IfModule>
```

❑ alias_module (http://httpd.apache.org/docs/2.2/mod/mod_alias.html)

```
<IfModule alias_module>  
  Redirect /foo http://www.example.com/bar  
  Alias /webpath /full/filesystem/path  
  ScriptAlias /cgi-bin/ "/usr/local/www/apache22/cgi-bin/"  
</IfModule>
```

❑ mime_module

```
DefaultType text/plain  
<IfModule mime_module>  
  TypesConfig etc/apache22/mime.types  
  AddType application/x-compress .Z  
  AddHandler cgi-script .cgi  
</IfModule>
```


Supplemental configuration – httpd-mpm.conf (Multi-Processing Module)

- ❑ Server-pool management (MPM specific)
 - Include etc/apache22/extra/httpd-mpm.conf
- ❑ WITH_MPM
 - prefork: non-threaded, pre-forking
 - worker: hybrid multi-process multi-threaded

```
<IfModule mpm_worker_module>  
  StartServers      2  
  MaxClients       150  
  MinSpareThreads  25  
  MaxSpareThreads  75  
  ThreadsPerChild  25  
  MaxRequestsPerChild  0  
</IfModule>
```

Supplemental configuration – httpd-userdir.conf

❑ User home directories

- Include etc/apache22/extra/httpd-userdir.conf

```
UserDir public_html
UserDir disabled root toor daemon operator bin tty kmem games news man
sshd bind proxy _pflogd _dhcp uucp pop www nobody mailnull smmsp

<Directory "/home/*/public_html">
  AllowOverride FileInfo AuthConfig Limit Indexes
  Options MultiViews Indexes SymLinksIfOwnerMatch IncludesNoExec
  <Limit GET POST OPTIONS>
    Order allow,deny
    Allow from all
  </Limit>
  <LimitExcept GET POST OPTIONS>
    Order deny,allow
    Deny from all
  </LimitExcept>
</Directory>
```

- Methods: <http://www.w3.org/Protocols/rfc2616/rfc2616-sec9.html>

Supplemental configuration – httpd-vhosts.conf

❑ Virtual hosts

- Include etc/apache22/extra/httpd-vhosts.conf
- Name-based
 - NameVirtualHost
 - <VirtualHost>
- IP-based
 - <VirtualHost>
- ServerName
- DocumentRoot
- Ref: <http://httpd.apache.org/docs/2.2/vhosts/>

```
Listen 80
Listen 8080

NameVirtualHost 172.20.30.40:80
NameVirtualHost 172.20.30.40:8080
<VirtualHost 172.20.30.40:80>
  ServerName www.example.com
  DocumentRoot /www/domain-80
</VirtualHost>
<VirtualHost 172.20.30.40:8080>
  ServerName www.example.com
  DocumentRoot /www/domain-8080
</VirtualHost>
<VirtualHost 172.20.30.40:80>
  ServerName www.example.org
  DocumentRoot /www/otherdomain-80
</VirtualHost>
<VirtualHost 172.20.30.40:8080>
  ServerName www.example.org
  DocumentRoot /www/otherdomain-8080
</VirtualHost>
```

Supplemental configuration – More...

- ❑ Multi-language error messages
 - `httpd-multilang-errordoc.conf`
- ❑ Fancy directory listings
 - `httpd-autoindex.conf`
- ❑ Language settings
 - `httpd-languages.conf`
- ❑ Real-time info on requests and configuration
 - `httpd-info.conf`
- ❑ Local access to the Apache HTTP Server Manual
 - `httpd-manual.conf`
- ❑ Various default settings
 - `httpd-default.conf`

Other configuration for Apache – log

- ❑ Rotate your log using newsyslog
- ❑ In httpd config
 - ErrorLog "/var/log/httpd-error.log"
 - TransferLog "/var/log/httpd-access.log"

```
/var/log/httpd-access.log    640 5 * @T00 Z    /var/run/httpd.pid
/var/log/httpd-error.log    640 5 * @T00 Z    /var/run/httpd.pid
```

- ❑ In startup script
 - `_pidprefix="/var/run/httpd"`
 - `pidfile="$_pidprefix.pid"`

.htaccess (1)

❑ .htaccess

- Allow admin or users to control access to certain directory

❑ Usage

- Modify httpd.conf
- Create .htaccess file
- Generate password database
- Test

.htaccess (2)

❑ Example

- Modify httpd.conf
- Create .htaccess file
- Generate password file

```
<Directory "/home/wwwadm/data/test1">  
Options None  
AllowOverride All  
Order allow,deny  
Allow from all  
</Directory>
```

```
liuyh@nasa /home/wwwadm/data/test1> cat .htaccess  
AuthName "SA-test1"  
AuthType "Basic"  
AuthUserFile "/home/wwwadm/data/test1/.htpasswd"  
Require valid-user  
Options Indexes
```

```
liuyh@nasa /home/wwwadm/data/test1> htpasswd -c ./htpasswd SA-user1  
New password:  
Re-type new password:  
Adding password for user SA-user1
```

.htaccess (3)

❑ You can use these tools to generate .htaccess

- <http://www.linuxkungfu.org/tools/htaccesser/index.php>
- <http://www.htaccesseditor.com/>



Installing PHP (1)

□ Steps

- # cd /usr/ports/lang/php5
- # make config
 - Remember to choose Apache module
- # make install clean (in 2009 SA course)

```
# make install clean
==> php5-5.2.11_1 has known vulnerabilities:
=> php -- multiple vulnerabilities.
    Reference: <http://portaudit.FreeBSD.org/39a25a63-eb5c-11de-b650-00215c6a37bb.html>
=> Please update your ports tree and try again.
*** Error code 1
```

```
Stop in /usr/ports/lang/php5.
*** Error code 1
```

```
Stop in /usr/ports/lang/php5.
```

- <http://www.freshports.org/lang/php5>

Installing PHP (2)

❑ Installed...

Make sure index.php is part of your DirectoryIndex.

You should add the following to your Apache configuration file:

```
AddType application/x-httpd-php .php
AddType application/x-httpd-php-source .phps
```

- For use of Apache, you should restart apache to load php5_module

❑ Install php5-extensions

- # cd /usr/ports/lang/php5-extensions
- # make install clean
 - Choose what you need
 - Remember to choose mysql module
- Or installing from /usr/ports/*/php5-
 - databases/php5-mysql

Test PHP in apache (1)

❑ Edit httpd.conf

- % mkdir -p /home/wwwadm/data
- % cd /usr/local/etc/apache22/
- Edit httpd.conf

```
<IfModule mime_module>
...
AddType application/x-httpd-php .php .phtml .php5
AddType application/x-httpd-php-source .phps
...
</IfModule>
```

```
<IfModule dir_module>
  DirectoryIndex index.php index.html
</IfModule>
```

Test PHP in apache (2)

❑ Start apache

- `/usr/local/etc/rc.d/apache22 start`

❑ Test PHP

- % Edit `/home/wwwadm/data/index.php`

```
<?
phpinfo();
?>
```



PHP Version 5.2.11	
System	FreeBSD evilbig5.math.nctu.edu.tw 8.0-STABLE FreeBSD 8.0-STABLE #3: Fri Dec 4 04:28:07 CST 2009 root@evilbig5.math.nctu.edu.tw:/usr/obj/usr/src/sys/EVILBIG5 i386
Build Date	Dec 22 2009 13:05:05
Configure Command	'./configure' '--with-layout=GNU' '--with-config-file-scan-dir=/usr/local/etc/php' '--disable-all' '--enable-libxml' '--with-libxml-dir=/usr/local' '--enable-reflection' '--program-prefix=' '--enable-fastcgi' '--with-apxs2=/usr/local/sbin/apxs' '--with-regex=php' '--with-zend-vm=CALL' '--disable-ipv6' '--prefix=/usr/local' '--mandir=/usr/local/man' '--infodir=/usr/local/info' '--build=i386-portbld-freebsd8.0'
Server API	Apache 2.0 Handler
Virtual Directory Support	enabled
Configuration File (php.ini) Path	/usr/local/etc
Loaded	(none)

Appendix

phpMyAdmin

lighttpd

FastCGI

phpMyAdmin

- ❑ phpMyAdmin can manage a whole MySQL server as well as a single database over the World Wide Web.
- ❑ Official Site: <http://www.phpmyadmin.net/>
- ❑ Documentation: <http://www.phpmyadmin.net/documentation/>
- ❑ Features
 - Browser-based, Supporting PHP5.3+, MySQL 5.0+, Open Source
- ❑ There are four authentication modes offered:
 - http
 - cookie
 - signon
 - config(the less secure one, not recommended).

Installing phpMyAdmin (1)

❑ databases/phpmyadmin

- # make install clean

❑ Installed...

phpMyAdmin-3.2.4 has been installed into:
/usr/local/www/phpMyAdmin

Please edit **config.inc.php** to suit your needs.

To make phpMyAdmin available through your web site, I suggest that you add something like the following to httpd.conf:

```
Alias /phpmyadmin/ "/usr/local/www/phpMyAdmin/"
```

```
<Directory "/usr/local/www/phpMyAdmin/">
```

```
Options none  
AllowOverride Limit
```

```
Order Deny,Allow  
Deny from all  
Allow from 127.0.0.1 .example.com
```

```
</Directory>
```

Installing phpMyAdmin (2)

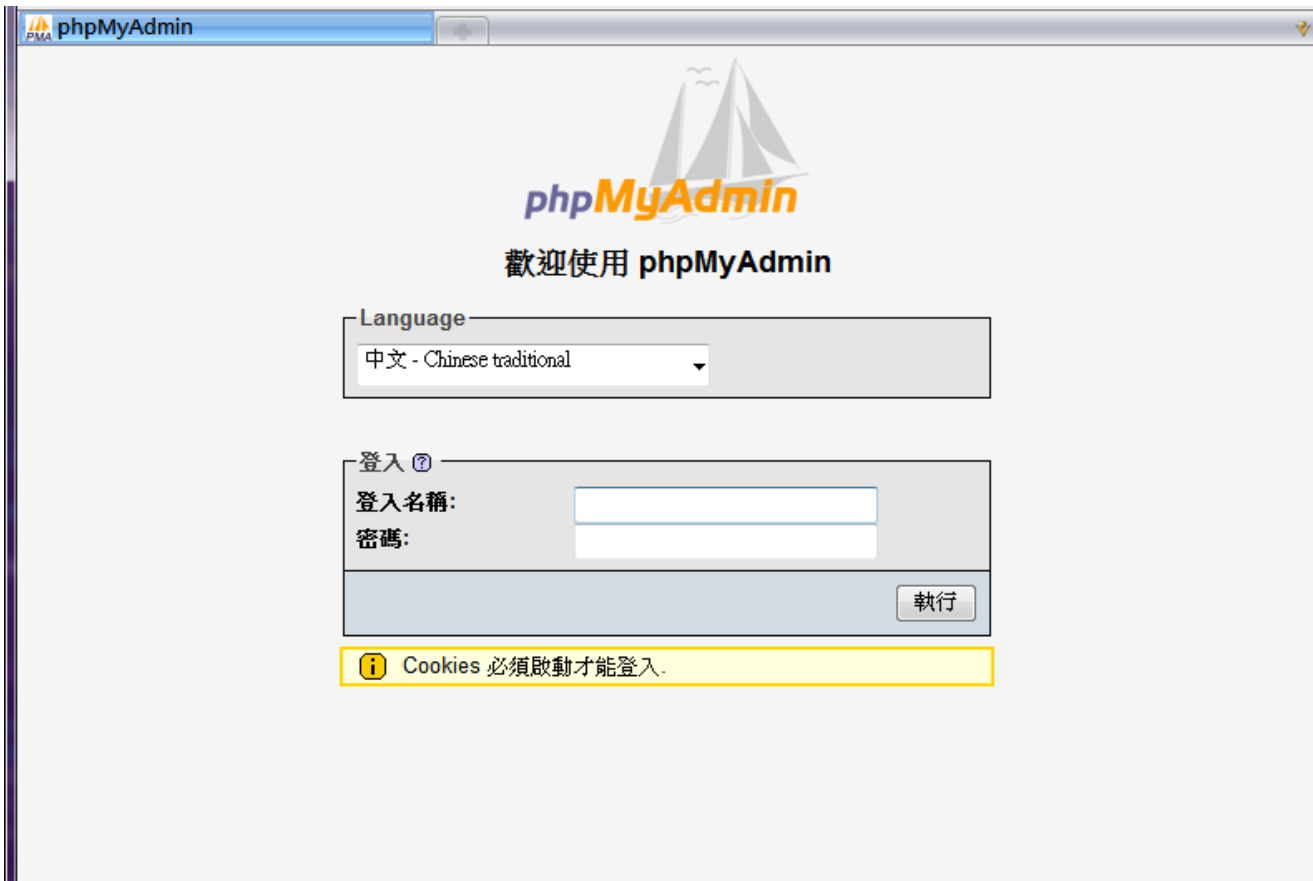
❑ config.inc.php

- Override libraries/config.default.php

❑ config.sample.inc.php

- `$cfg['blowfish_secret']`

Administrating MySQL – Using phpMyAdmin (2)



The screenshot shows the phpMyAdmin login interface. At the top, there is a browser window title bar with the phpMyAdmin logo and the text "phpMyAdmin". Below the title bar, the phpMyAdmin logo is displayed, followed by the text "歡迎使用 phpMyAdmin".

The interface includes a "Language" dropdown menu with "中文 - Chinese traditional" selected. Below this is a "登入" (Login) section with two input fields: "登入名稱:" (Username) and "密碼:" (Password). A "執行" (Execute) button is located to the right of the password field.

A yellow warning box at the bottom contains the text: "Cookies 必須啟動才能登入." (Cookies must be enabled to log in).

Administrating MySQL – Using phpMyAdmin (3)

The screenshot displays the phpMyAdmin interface in a browser window. The address bar shows the URL: `evilbig5.math.nctu.edu.tw / localhos...`. The interface is in Chinese and shows the following sections:

- Navigation:** Home, Exit, SQL, Help, and Database icons.
- Database List:**
 - information_schema (28)
 - mysql (23)
 - testBelow the list is the text "請選擇資料庫".
- Server Information:** 伺服器: localhost. A menu bar includes: 資料庫, SQL, 狀態, 資訊, 文字編碼, 引擎, 權限, 二進制記錄, 處理, 輸出, 載入.
- Actions:** 更改密碼, 登出系統.
- MySQL localhost:** 建立新資料庫 (with a search icon), 校對 (dropdown), 建立 (button), MySQL 連線校對: utf8_general_ci (dropdown).
- Interface:** Language (dropdown: 中文 - Chinese traditional), 款式: Original (dropdown), Custom color (with a "重置" button), Font size: 82% (dropdown).
- MySQL Details:** 伺服器: Localhost via UNIX socket, 伺服器版本: 5.1.41-log, 通訊協定版本: 10, 使用者: root@localhost, MySQL 文字編碼: UTF-8 Unicode (utf8).
- Web server:** Apache/2.2.14 (FreeBSD) mod_ssl/2.2.14 OpenSSL/0.9.8k DAV/2 PHP/5.2.11 with Suhosin-Patch, MySQL 客戶端版本: 5.1.41, PHP extension: mysql.
- phpMyAdmin:** 版本資訊: 3.2.4, 說明文件, Wiki.

Adminstrating MySQL – Using phpMyAdmin (4)

- ❑ Create another user with limited privilege

evilbig5.math.nctu.edu.tw / localhos...

phpMyAdmin

- information_schema (28)
- mysql (23)
- test

請選擇資料庫

伺服器: localhost

資料庫 SQL 狀態 資訊 文字編碼 引擎 權限

二進制記錄 處理 輸出 載入

新增使用者

登入資訊

使用者名稱: 文字輸入: []

主機: 任何主機 [] 1

密碼: 文字輸入: []

確認密碼: []

產生密碼: [產生]

Database for user

None

Create database with same name and grant all privileges

Grant all privileges on wildcard name (username_%)

整體權限 (全選 / 全部取消)

注意: MySQL 權限名稱會以英語顯示

資料	結構	系統管理
<input type="checkbox"/> SELECT	<input type="checkbox"/> CREATE	<input type="checkbox"/> GRANT
<input type="checkbox"/> INSERT	<input type="checkbox"/> ALTER	<input type="checkbox"/> SUPER

Installing lighttpd

- ❑ www/lighttpd
 - Official: <http://www.lighttpd.net/>
- ❑ Configuration files
 - /usr/local/etc/lighttpd/{lighttpd,modules}.conf
 - /usr/local/etc/lighttpd/{vhosts,conf}.d/
- ❑ Startup script
 - /usr/local/etc/rc.d/lighttpd
- ❑ Documentation:
 - /usr/ports/www/lighttpd/work/lighttpd-1.4.28/doc/*.txt
 - alias, cgi, dirlisting, fastcgi, ssl, userdir
 - Virtual hosts: evhost, mysqlvhost, simple-vhost

FastCGI

- ❑ FastCGI is actually CGI with only a few extensions.
 - FastCGI is language-independent.
 - FastCGI run applications in processes isolated from the core Web server, which provides greater security than APIs.
 - FastCGI developers are committed to propagating FastCGI as an open standard. (C/C++, Java, Perl, Tcl)
 - FastCGI is not tied to the internal architecture of any Web server and is therefore stable even when server technology changes.

- ❑ Benefits:
 - Distributed computing
 - Multiple and extensible roles

- ❑ Official site: <http://www.fastcgi.com/drupal/>