FAMP

FreeBSD/Apache/MySQL/PHP

Outline

- Introduction
  - Apache
  - MySQL
  - PHP
- Installation and Administration
  - MySQL
  - Apache
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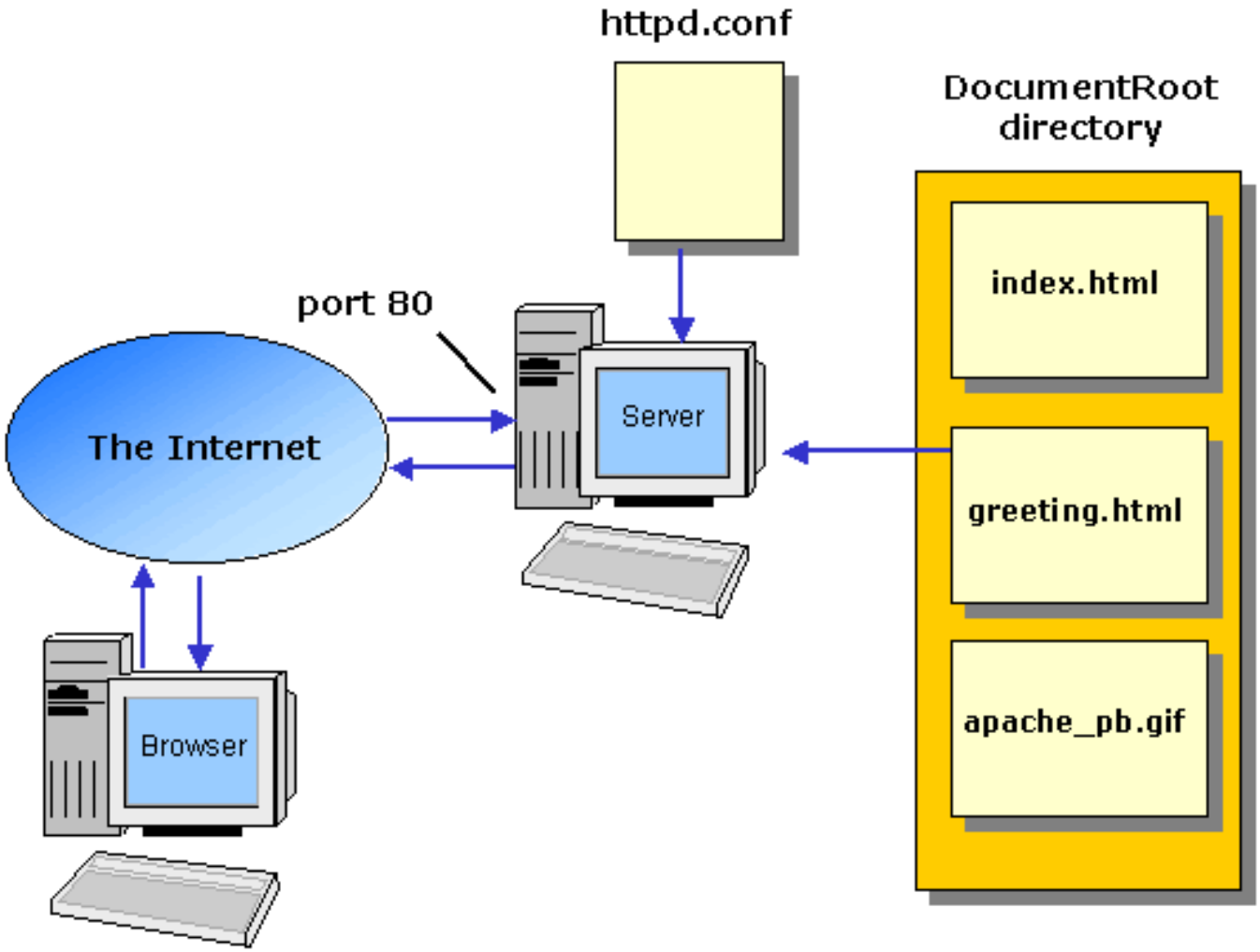
  - FastCGI

Apache

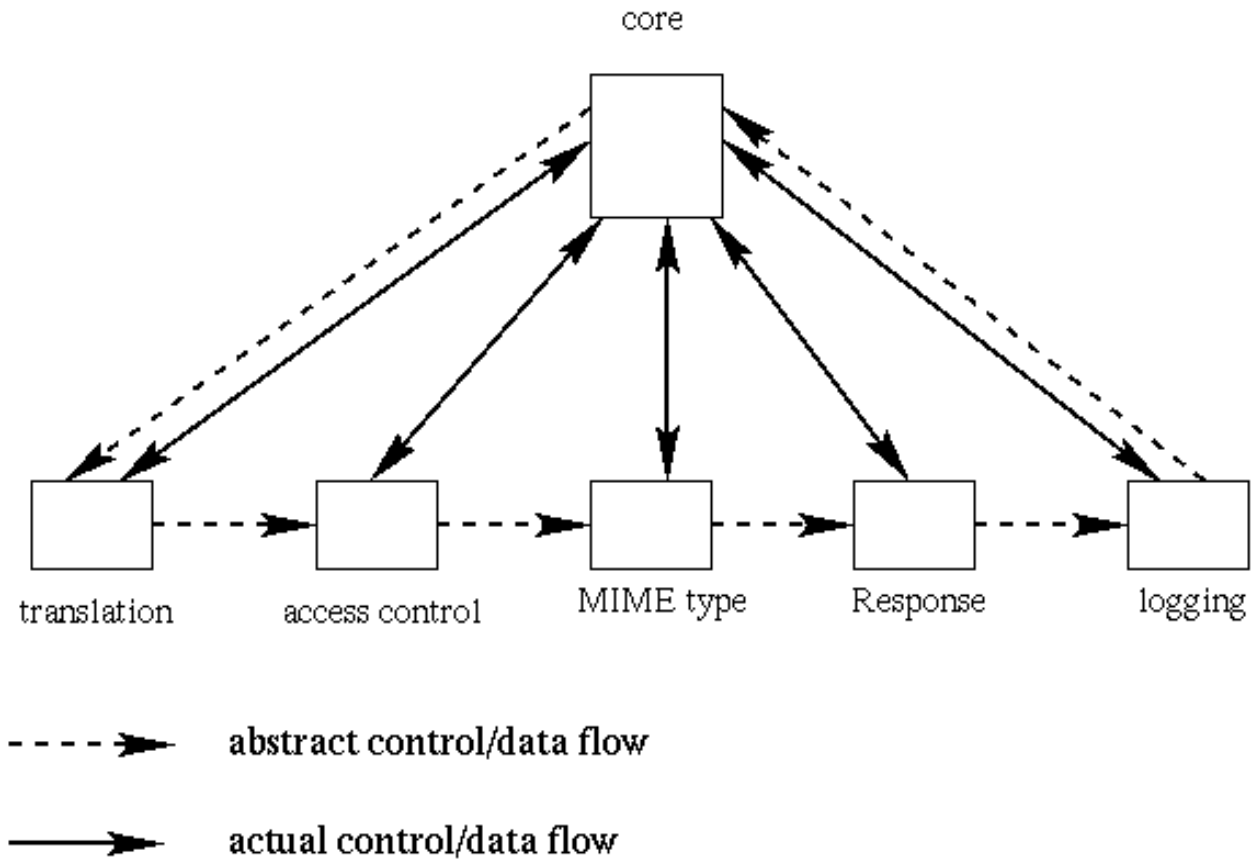
- Apache Software Foundation: http://www.apache.org/
- Apache HTTP Server Project: http://httpd.apache.org/
- Web httpd server that
  - HTTP/1.1
  - Modular design
  - Can be customised by writing modules using Apache module API
  - Freely available cross many platforms
- Two main parts
  - Core: implement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

How Apache Works – request and response

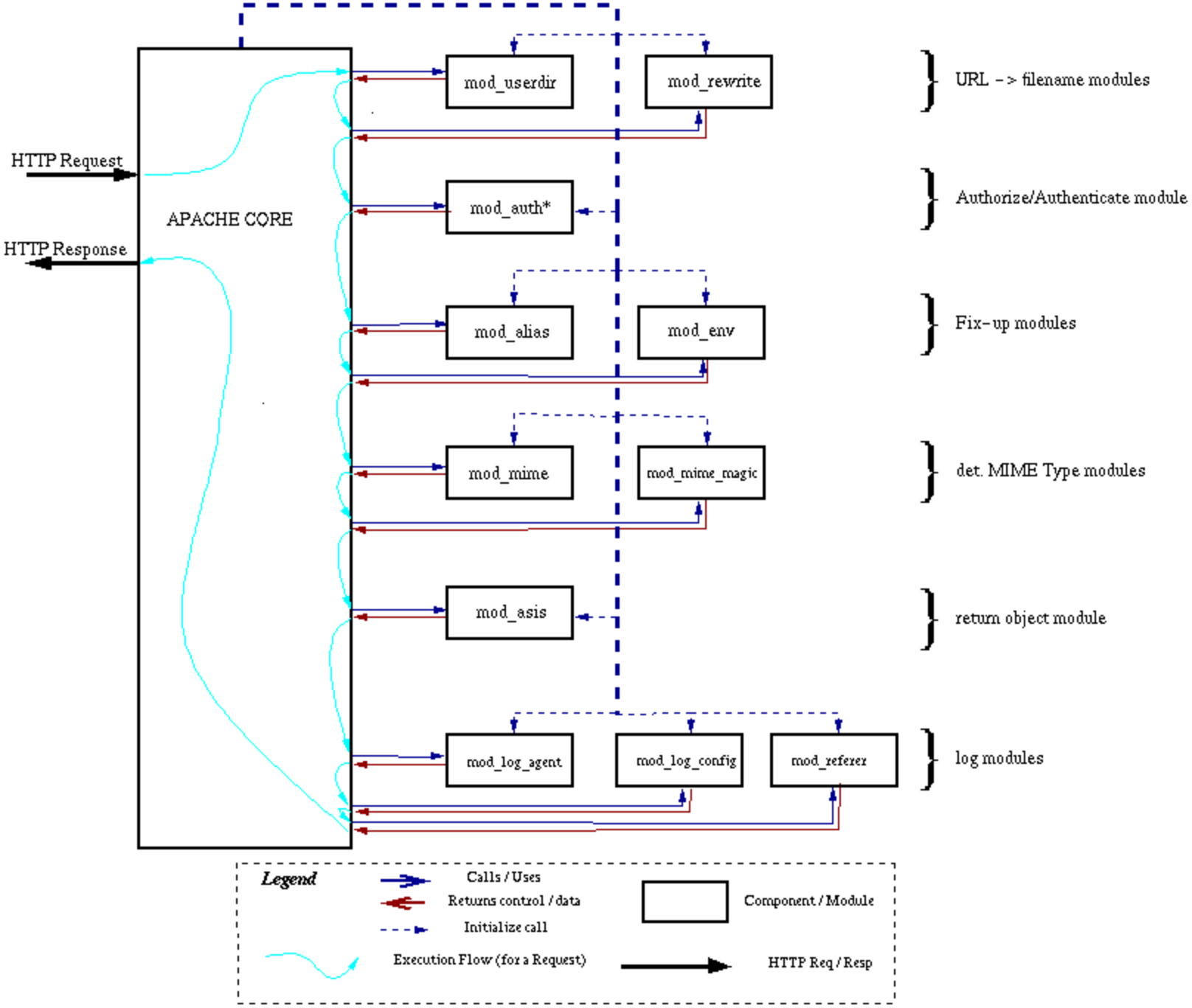


How Apache Works – Each request-response

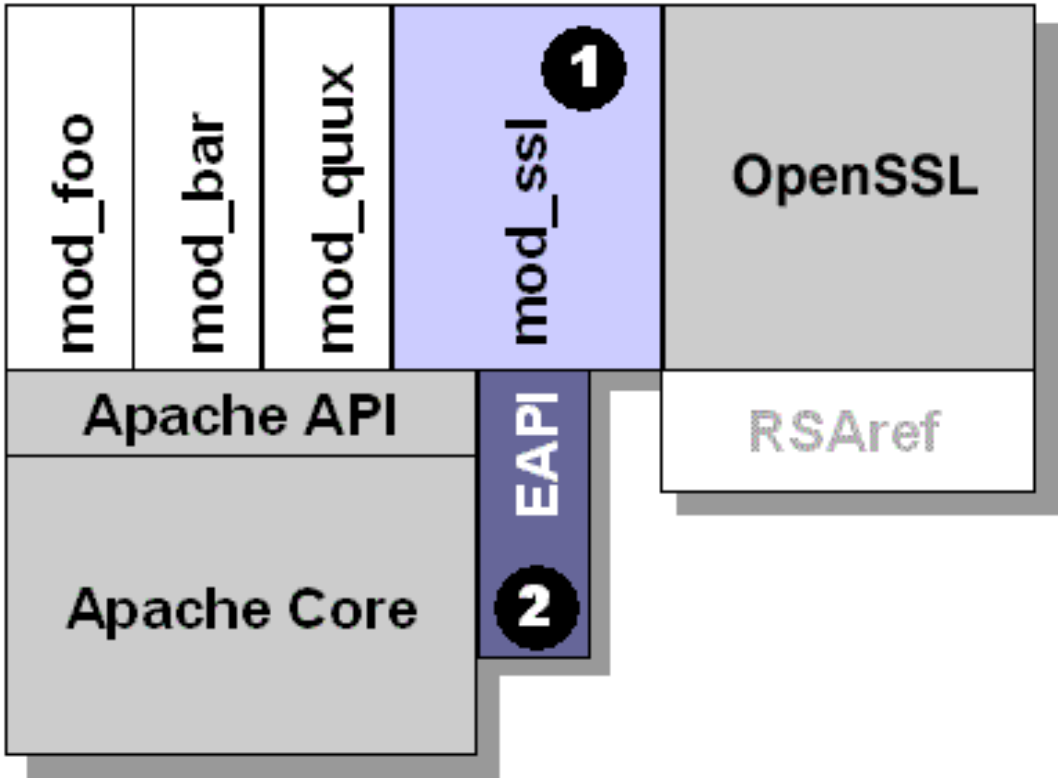
- Apache breaks client request into several steps which are implemented as modules



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/mysql51-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).
#
```

Administrating 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/apache24/
  - # 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 apache24_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/apache24
  - apache24_http_accept_enable

Apache configuration – Configuration files

- Location
  - The default location of apache (in ports) is /usr/local/etc/apache24
  - 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/apache24/extra/httpd-*.conf
  - Include etc/apache24/Includes/*.conf

Apache configuration – Directory Configuration (1)

- Configuration parameters
  - Options
    - All
    - ExecCGI
    - FollowSymLinks
    - Indexs
    - MultiViews
    - SymLinksIfOwnerMatch
  - http://httpd.apache.org/docs/2.4/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/2.4/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/apache24/cgi-bin/"
</IfModule>
```

- mime_module

```
DefaultType text/plain
<IfModule mime_module>
   TypesConfig etc/apache24/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/apache24/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/apache24/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/apache24/extra/ httpd-vhosts.conf
  - Name-based
    - NameVirtualHost
    - <VirtualHost>
  - IP-based
    - <VirtualHost>
  - ServerName
  - DocumentRoot

```
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>
```

- Ref: http://httpd.apache.org/docs/2.4/vhosts/

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)

Installing PHP (1)

- Steps
  - # cd /usr/ports/lang/php5
  - # make config
    - Remenber 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/apache24/
  - 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/apache24 start
- Test PHP
  - % Edit /home/wwwadm/data/index.php

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

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 recommanded).

Installing phpMyAdmin (1)

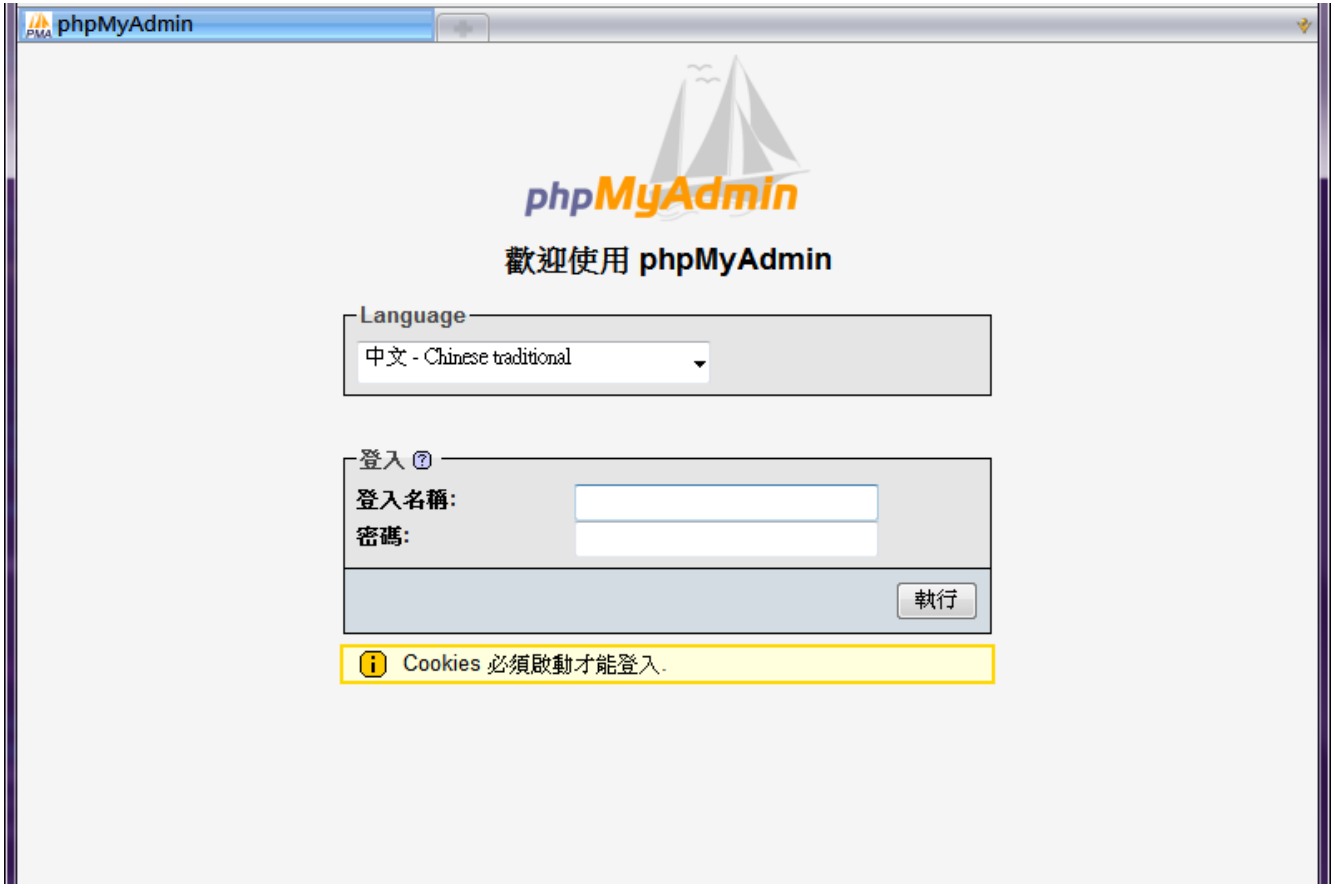
- databases/phpmyadmin
  - # make install clean
- Installed…

```
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)



Administrating MySQL – Using phpMyAdmin (3)

Administrating MySQL – Using phpMyAdmin (4)

- Create another user with limited privilege

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/