

Samba - SMB

yench

Network-based File Sharing

- ❑ FTP (File Transfer Protocol)
- ❑ NFS (UNIX-based)
 - mountd is responsible for mount request
 - nfsd and nfsiod
 - Based on RPC
- ❑ SMB/CIFS (Microsoft)
 - 網路芳鄰 Microsoft Windows Network
 - SMB (Server Message Block)
 - Common Internet File System
 - Share access to files, printers, ...
 - Based on NetBIOS

Service of SMB and NetBIOS

❑ NetBIOS (Network Basic Input/Output System)

- API related to the session layer
allowing applications to communicate over a local area network.
- Name Service for name registration and resolution
- Session service for connection-oriented communication
- Datagram distribution service for connectionless communication

❑ SMB (Server Message Block)

- File and printer sharing service
- Authentication

NetBIOS – Network Basic Input/Output System

❑ NetBIOS (API)

- 1983 – developed as an **API** for software communication over IBM's PC-Network LAN
 - NetBIOS relied on proprietary Sytek networking protocols
- In 1985, IBM went forward with the **token ring** network scheme
 - NetBEUI – NetBIOS Extended User Interface
 - using the **NetBIOS Frames** (NBF) protocol
- 1985 – Microsoft created a NetBIOS implementation for its MS-Net network topology
 - By NBF protocol
- Difference between local filesystem and network filesystem when accessing
- Used to share or access network-based filesystem just as BIOS does in local filesystem

❑ NetBIOS over TCP/IP

- In 1987
- NBT

Architecture of SMB and NetBIOS

OSI	SMB				TCP/IP
Application					Application
Presentation					
Session	NetBIOS	NetBEUI	NetBIOS	NetBIOS	TCP/UDP
Transport	IPX ¹		DECnet	TCP&UDP	
Network		802.2, 802.3,802.5		802.2	IP
Link		802.3,802.5	Ethernet V2	Ethernet V2	Ethernet or others
Physical					

NetBIOS name – Another name system

❑ Naming

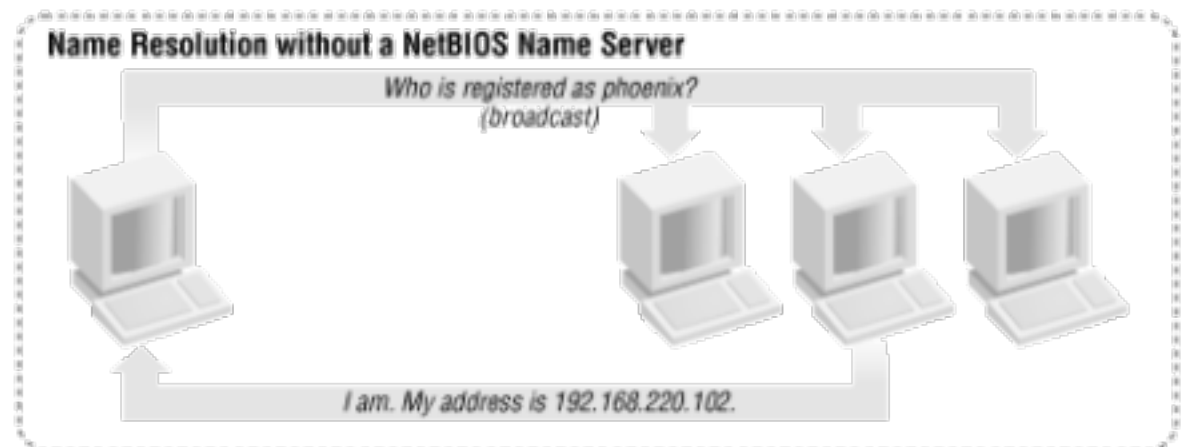
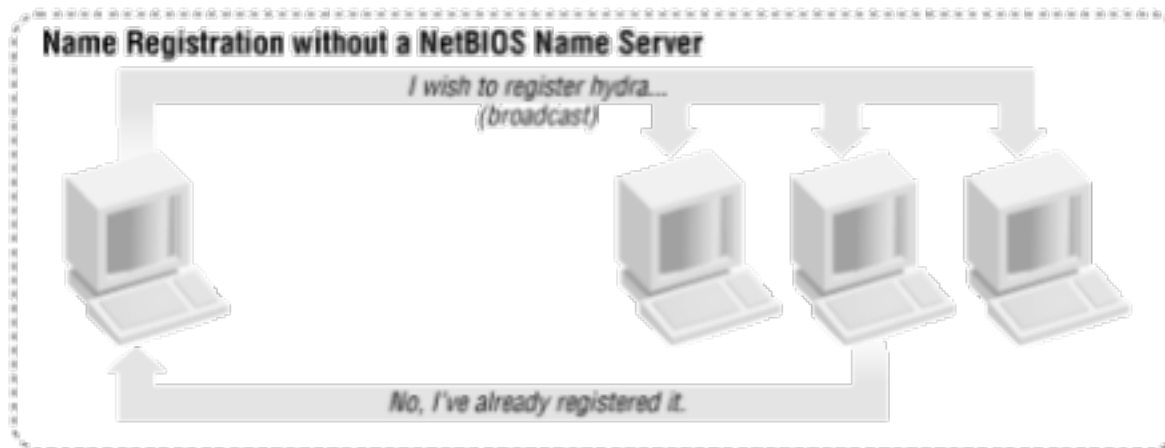
- Maximum 16 characters. 16th character is the NetBIOS Suffix.
- Alphanumeric (include “-” and “.”)
- Usually equal to computer’s host name.

❑ Suffix

- 00 : Workstation Service (workstation name/domain name)
- 1C : Domain Controllers for a domain
- 20 : File Server Service (shared disk access)

NetBIOS Naming Service

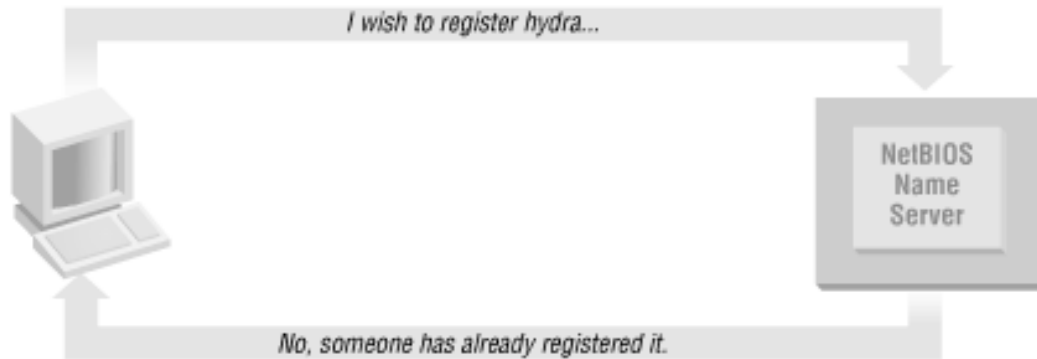
❑ Peer to peer (Workgroup model)



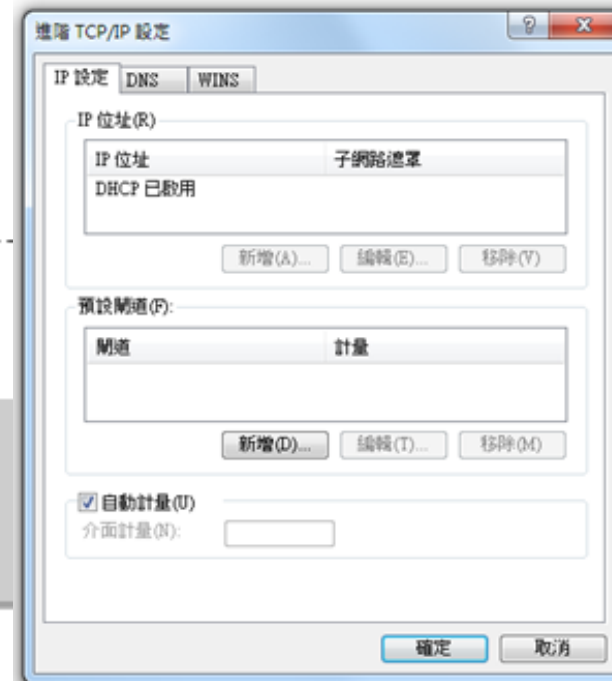
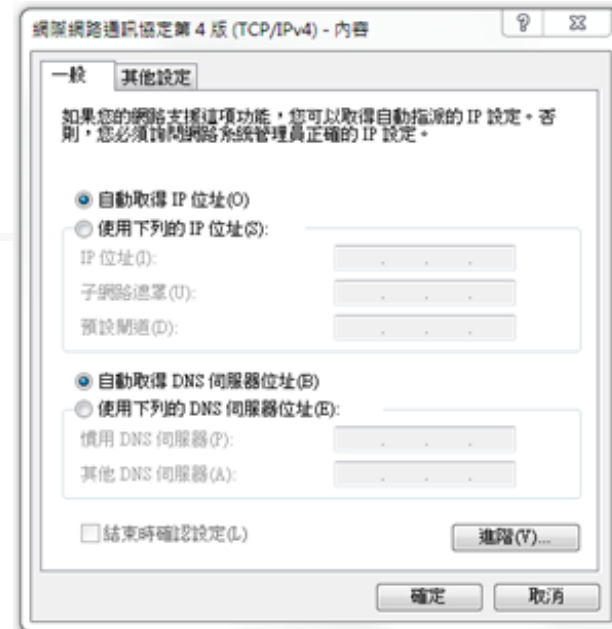
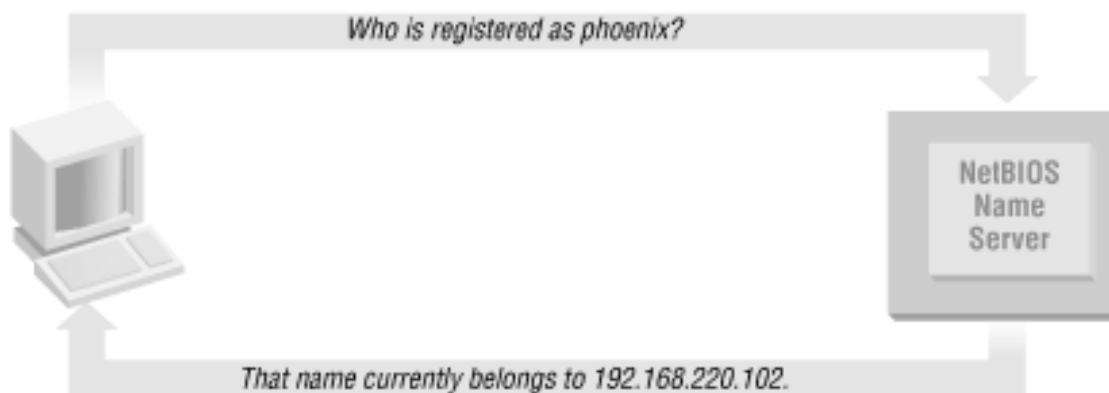
NetBIOS Naming Service

❑ WINS (NetBIOS Name Server)

Name Registration with a NetBIOS Name Server



Name Resolution with a NetBIOS Name Server



SMB – Server Message Block

□ SMB

- Original designed by IBM with the aim of turning DOS interrupt local file access into a network filesystem
 - Run on top of netbios
 - Microsoft has made considerable modifications to the most common used version
- 1990 – Microsoft merged the SMB protocol with LAN Manager
- 1992 – Microsoft merged and add features to SMB protocol in Windows for Workgroup
- 1996 – Microsoft renames SMB as CIFS
 - Support for symbolic link, hard link, larger file sizes, ...
 - Initial attempt at supporting direct connections over TCP port 445
- 2006 – Microsoft introduced SMB2 with Windows vista
- Windows 7 – SMB 2.1
 - Performance enhancement with a new opportunistic locking
- Windows 8 – SMB 2.2
 - Enables the use of multiple physical network interfaces

UNIX-Windows communication

❑ SAMBA

- 1991 – Andrew Tridgwell developed the first version of Samba
 - Using a packet sniffer on DEC Pathworks server software
- A UNIX application that speak SMB protocol
- Can not use the Original Name: Server Message Block (SMB)
 - Samba

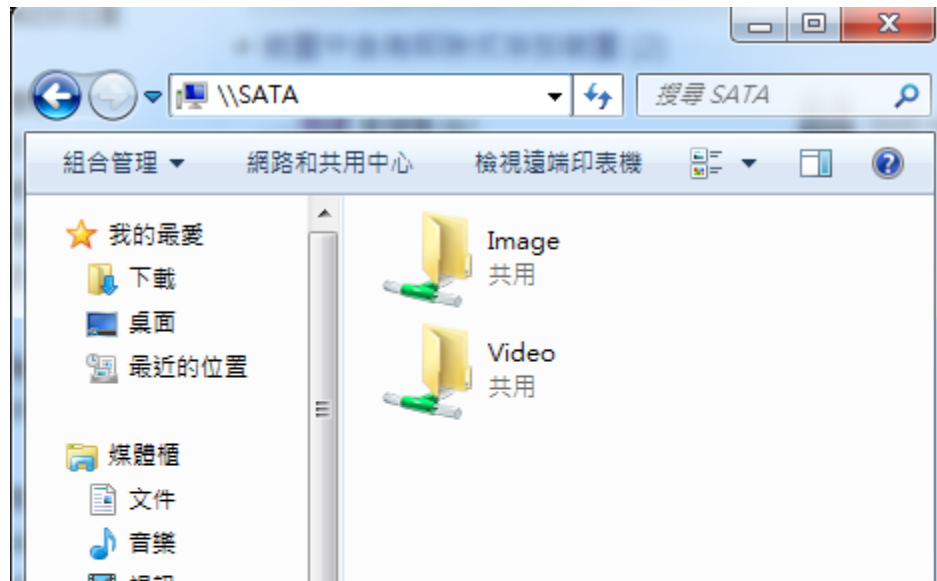
❑ Why samba ?

OSI				TCP/IP	
Application	SMB				Application
Presentation					Application
Session	NetBIOS	NetBEUI	NetBIOS	NetBIOS	
Transport	IPX ¹		DECnet	TCP&UDP	TCP/UDP
Network				IP	IP
Link	802.2, 802.3,802.5	802.2 802.3,802.5	Ethernet V2	Ethernet V2	Ethernet or others
Physical					

What SAMBA can do?

□ Sharing

- Sharing files or printers just like Microsoft does
- Authenticate user identity just like Microsoft does
- Resolve **NetBIOS** name just like Microsoft does
- Corresponding LAN Manager Server/Workstation on Windows.



Install SAMBA

Using ports

- `% cd /usr/ports/net/samba4 && make install clean`

Using package

- `% pkg install samba4`

SAMBA components

❑ Configuration files

- /usr/local/etc/smb4.conf
 - chmod 644 smb4.conf
- /usr/local/etc/lmhosts

❑ Related Services

- `smbd` (/usr/local/sbin/smbd)
 - Management of sharing directories, files and printers
- `nmbd` (/usr/local/sbin/nmbd)
 - Resolve NetBIOS name and manage workgroup
- `winbindd` (/usr/local/sbin/winbindd)
 - WINS services
- `samba_server` (/usr/local/etc/rc.d/samba_server)
 - Samba's daemon to control above services

SAMBA password

❑ samba4 password file

- Now samba stores accounts and passwords in tdb
 - Default path: /var/db/samba4/

❑ tdb v.s. smbpasswd

- `cat /var/db/samba4/private/smbpasswd`

```
mango:1001:XXXX:752BE9458:[U]:LCT-5618D1D6:  
admin:1002:XXXX:752BE9458:[U]:LCT-5618DC91:  
test1:1003:XXXX:752BE9458:[U]:LCT-5618DD3C:
```

<https://www.samba.org/samba/docs/man/manpages/smbpasswd.5.html>

SAMBA password

❑ smbpasswd command

- -a
 - Add new user
- -d
 - Let some account in smbpasswd file can not login (to disable)
- -e
 - Let some disable account resume (to enable)

❑ pdbedit command

- `pdbedit -a username`
 - Add new user
- `pdbedit -x username`
 - delete user
- `pdbedit -L -v`
 - List user

```
Unix username:      test1
NT username:
Account Flags:      [U                ]
User SID:           S-1-5-21-1704006466-352808661
Primary Group SID: S-1-5-21-1704006466-352808661
Full Name:          Samba Test 1
Home Directory:     \\sata\test1
HomeDir Drive:
Logon Script:
Profile Path:       \\sata\test1\profile
Domain:             SATA
Account desc:
Workstations:
Munged dial:
```

SAMBA configuration file

□ smb.conf

- Sections
 - Each section in the smb.conf file represents either a share or a meta-service
 - Global section is special
 - Global setting
 - Meta-service
 - Printer Sharing Setting
 - Home Sharing Setting

```
# comments
[global]
para1 = value1
...

[printers]
para2 = value2
...

[homes]
para3 = value3
...

[share-dir]
para4 = value4
...
```


SAMBA configuration file – Global Setting (1)

❑ Global Configuration

- workgroup
 - Group name to join
 - Ex: workgroup = SANA
- server string
 - Description of this host
 - Ex: server string = Samba Server of SA Course
- netbios name
 - NetBIOS name of this host
 - Ex: netbios name = sabsd
- Charset Settings
 - "unix charset", "dos charset"
 - Ex:
 unix charset = UTF8
 - hosts allow (Access Control List)
 - Apply to all services, regardless or individual service setting;
 - Ex: hosts allow = 140.113.69. 140.113.64.

SAMBA configuration file – Global Setting (2)

- guest ok (or public = yes)
 - If this is yes, no password is required
 - Ex: guest ok = no
- guest account
 - If guest can use this samba service, any guest request will map to this guest account
 - Ex: guest account = ftp
 - Add this account into your /etc/passwd
 - Otherwise, the user nobody is used
- log file
 - Full path of log file
 - Ex: log file = /var/log/samba/log.%m
- max log size (KB)
 - Ex: max log size = 500

SAMBA configuration file – Global Setting (3)

- security = [share/user/server/domain]
 - share: no need of id and password to login
 - user: default option, login with id and password
 - domain: check id and password by domain controller
 - ads: check id and password by AD server
 - server: check id and password by another server
 - It is highly recommended not to use this feature
 - Ex:
 - security = user
 - passwd backend = tdbsam

SAMBA configuration file – Global Setting (4)

❑ Example of global setting

```
[global]
workgroup           = SANA
server string       = sata server
netbios name        = sata
unix charset        = UTF8
dos charset          = ISO8859-15
printcap name       = /dev/null
load printers       = no
log file            = /var/log/samba4/log.%m
max log size        = 500
security            = user
passdb backend      = tdbsam # smbpasswd, ldapsam
```

Samba parameters

- ❑ Default parameters in samba
 - %m
 - Client NetBIOS name
 - %M
 - Client Hostname
 - %I
 - Client IP
 - %L
 - Samba server NetBIOS name
 - %h
 - Samba server Hostname
 - %H
 - User home directory
 - %U
 - Login name
 - %T
 - Current Date time

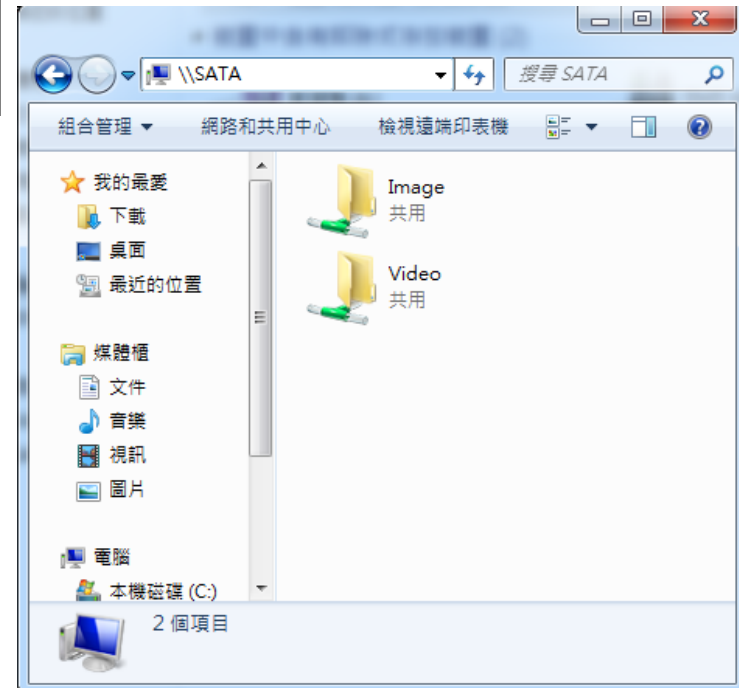
SAMBA configuration file – Home Sharing Setting (1)

- ❑ Home sharing setting
 - comment
 - Description of this directory
 - path
 - Sharing directory path
 - browseable
 - Display sharing name or not
 - read only , writeable
 - admin users = \$username
 - **valid users = \$username** (write list)
 - Only users on this can write content if read only
 - create mode / create mask
 - Default permission when file is created
 - directory mode / directory mask
 - Default permission when directory is created
 - guest ok (or public = yes)

SAMBA configuration file – Sharing Setting (2)

❑ Example of image sharing

```
[Image]
comment      = Book Picture
path         = /home/image
read only    = no
public       = yes
writable     = yes
create mode  = 0664
directory mode = 0775
```



SAMBA configuration file

Additional tuning

❑ Disable printer

- load printers = no
- printing = bsd
- printcap name = /dev/null
- disable spoolss = yes

❑ Others

- max protocol = SMB2
- socket options = TCP_NODELAY
- socket options = TCP_NODELAY SO_RCVBUF=8192 SO_SNDBUF=8192
- read size
- read prediction
- ...

Starting SAMBA

❑ Script

- /usr/local/etc/rc.d/samba_server {start|stop}
- /etc/rc.conf
 - samba_server_enable="YES"
 - smbd_enable="YES"
 - nmbd_enable="YES"
 - winbindd_enable="YES"

smbstatus

❑ Report on current Samba connections

Samba version 4.0.26

PID	Username	Group	Machine
916	admin	admin	192.168.64.152 (ipv4:192.168.64.152:49215)
1287	nobody	nobody	mangocold (ipv4:192.168.64.152:49217)
1286	nobody	nobody	192.168.64.152 (ipv4:192.168.64.152:49216)

Service	pid	machine	Connected at
Image	916	192.168.64.152	Thu Oct 15 11:31:16 2015
Video	916	192.168.64.152	Thu Oct 15 11:31:16 2015
IPC\$	916	192.168.64.152	Thu Oct 15 10:07:27 2015
IPC\$	1287	mangocold	Thu Oct 15 11:31:14 2015
IPC\$	1286	192.168.64.152	Thu Oct 15 11:31:13 2015

Locked files:

Pid	Uid	DenyMode	Access	R/W	Oplock	SharePath	Name	Time
916	1002	DENY_NONE	0x100080	RDONLY	NONE	/tmp	.	Thu Oct 15 11:31:26 2015
916	1002	DENY_NONE	0x100081	RDONLY	NONE	/tmp	.	Thu Oct 15 11:31:26 2015

Tool: smbclient (1)

- ❑ A client program that can talk to an SMB server
- ❑ Usage:
 - -L [hostname]
 - List sharable resource
 - -U [username]
 - Login with username
- ❑ `smbclient -L host_IP -U user_ID`

Tool: smbclient (2)

```
mango@mango:~ $ smbclient -L SATA -U mango
Enter mango's password:
Domain=[SANA] OS=[Unix] Server=[Samba 4.0.26]
```

Sharename	Type	Comment
-----	----	-----
Image	Disk	test directory
Video	Disk	ftp directory
IPC\$	IPC	IPC Service (sata server)

```
Domain=[SANA] OS=[Unix] Server=[Samba 4.0.26]
```

Server	Comment
-----	-----
SATA	sata server

Workgroup	Master
-----	-----
SANA	SATA
WORKGORUP	MANGOCOLD

Tool: smbtree (3)

❑ A smb browser program in text mode

❑ Usage:

- **-b** Query network nodes by sending requests as broadcasts instead of querying the local master browser.
- **-D** Only print a list of all the domains known on broadcast or by the master browser
- **-S** Only print a list of all the domains and servers responding on broadcast or known by the master browser.

❑ `smbtree -b`

```
mango@mango:~ $ smbtree
WORKGORUP
    \\MANGOCOLD
SANA
    \\SATA
        (sata server)
            \\SATA\IPC$          sata server
                                IPC Service
            \\SATA\Video       ftp directory
            \\SATA\Image       test directory
```

Tool: mount_smbfs (4)

- ❑ Mount a shared resource from an SMB file server
- ❑ Usage:
 - -I
 - Do not use NetBIOS name resolver and connect directly to host, which can be either a valid DNS name or an IP address.
 - -N
 - Do not ask for a password.
- ❑ `mount_smbfs (-I IP or host name) -N '//NetBIOS name/dir' mount_point`

SWAT (1)

Edit /etc/inetd.conf

- Unmark

```
swat stream tcp nowait/400 root /usr/local/sbin/swat swat
```

Restart inetd

Browse http://samba_ip:901/




Logged in as chwing

Welcome to SWAT!

Please choose a configuration action using one of the above buttons

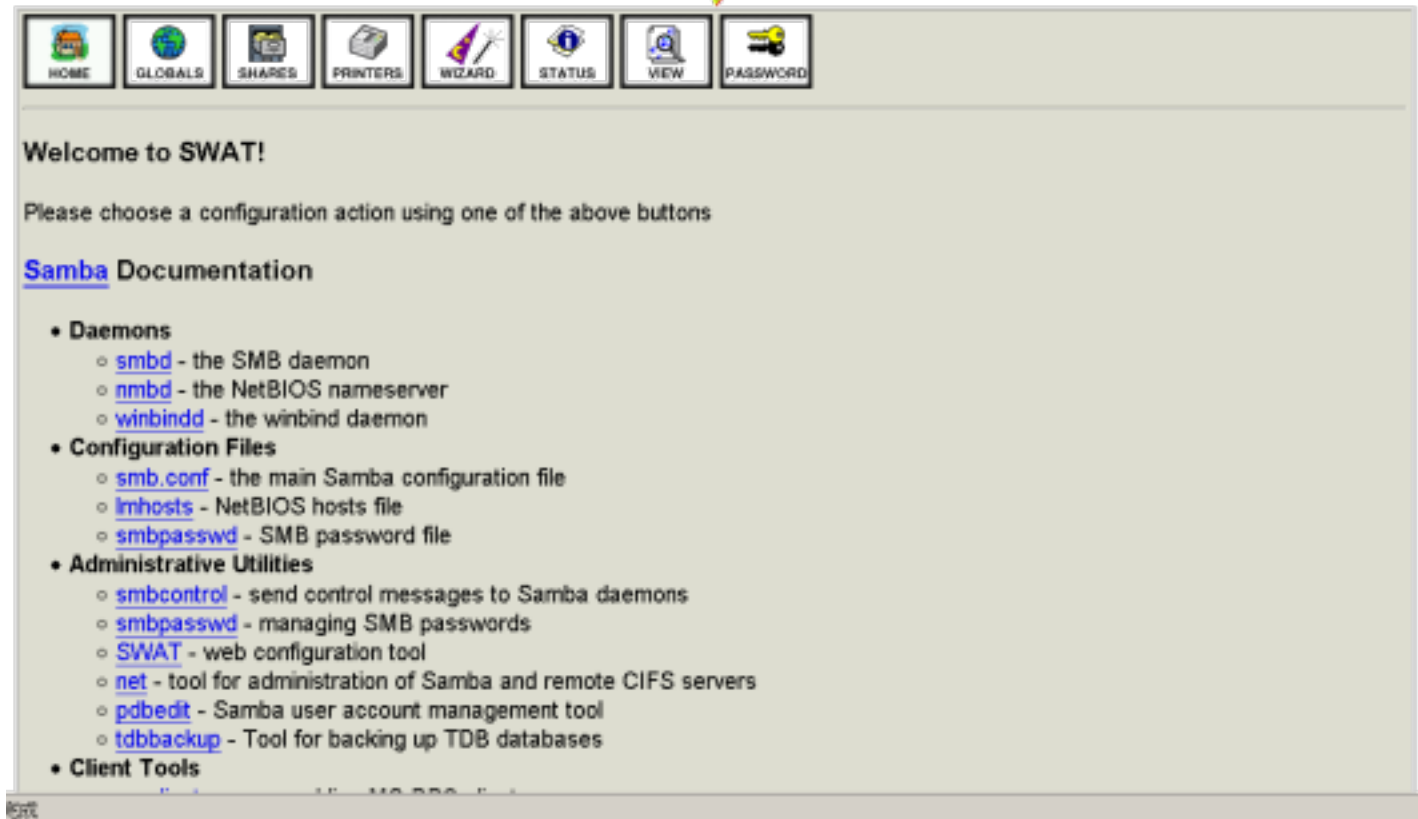
Samba Documentation

- **Daemons**
 - [smbd](#) - the SMB daemon
 - [nmbd](#) - the NetBIOS nameserver
 - [winbindd](#) - the winbind daemon
- **Configuration Files**
 - [smb.conf](#) - the main Samba configuration file
 - [lmhosts](#) - NetBIOS hosts file
 - [smbpasswd](#) - SMB password file
- **Administrative Utilities**

完成  網際網路

SWAT (2)

❑ Root access



The screenshot shows the SWAT web interface. At the top, there is a navigation bar with icons for HOME, GLOBALS, SHARES, PRINTERS, WIZARD, STATUS, VIEW, and PASSWORD. Below the navigation bar, the text reads "Welcome to SWAT!" followed by "Please choose a configuration action using one of the above buttons". A link for "Samba Documentation" is provided. The documentation is organized into sections: "Daemons" (listing [smbd](#), [nmbd](#), and [winbindd](#)), "Configuration Files" (listing [smb.conf](#), [lmhosts](#), and [smbpasswd](#)), "Administrative Utilities" (listing [smbcontrol](#), [smbpasswd](#), [SWAT](#), [net](#), [pdbedit](#), and [tdbbackup](#)), and "Client Tools".