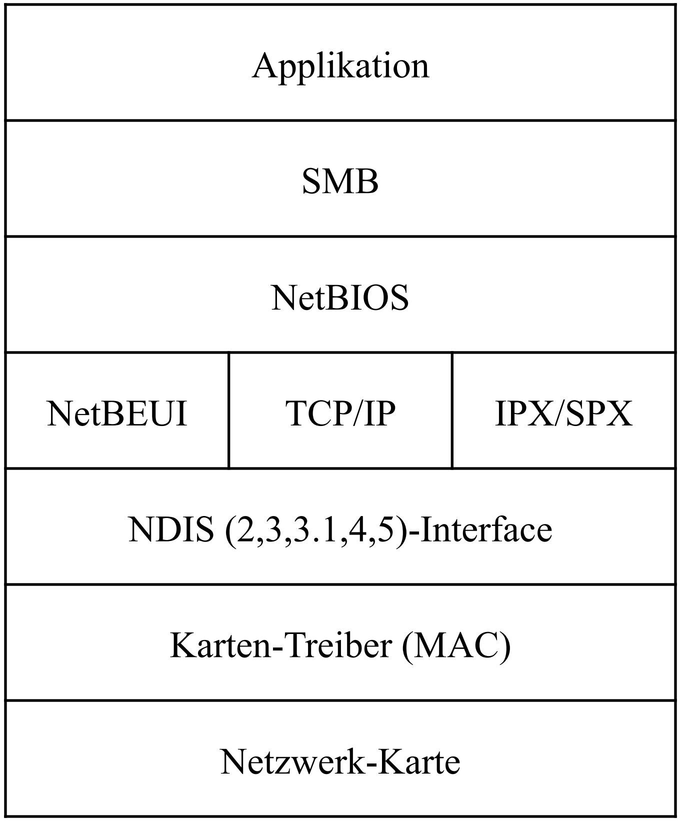
Samba

jnlin

Network-based File Sharing

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



Applikation

SMB

NetBIOS

NetBEUI | TCP/IP | IPX/SPX

NDIS (2,3,3.1,4,5)-Interface

Karten-Treiber (MAC)

Netzwerk-Karte

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
  - File and printer sharing service
  - Authentication

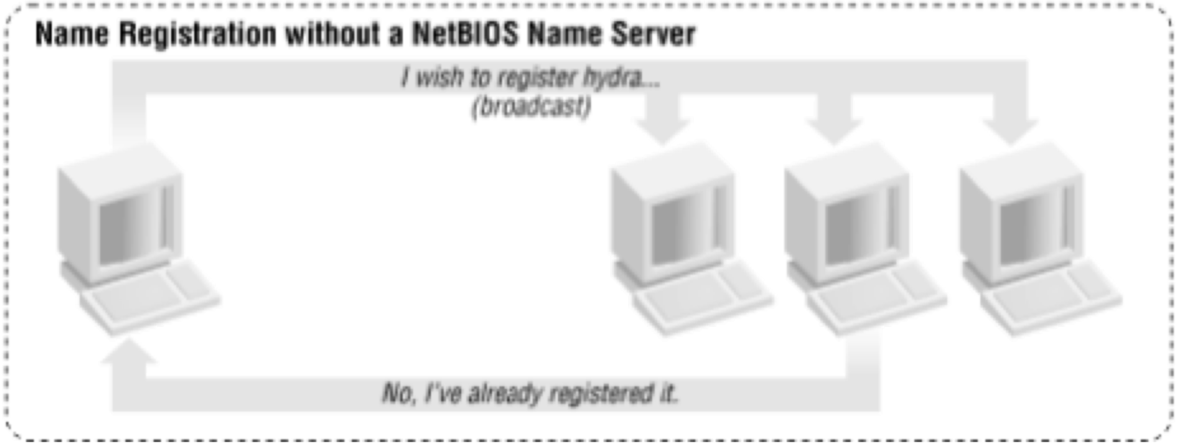
NetBIOS – Network Basic Input/Output System

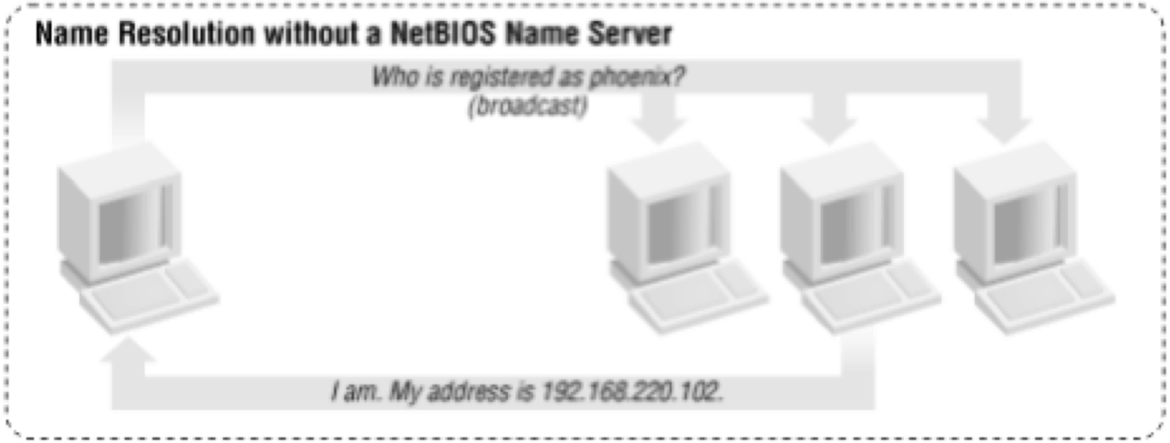
- ☐ NetBIOS (API)
  - 1983 – developed as an API for software communication over IBM's PC-Network LAN
    - ➢ NetBIOS relied on proprietary Sytek networking protocols
  - In 1985, IBM went forward with the token ring network scheme
    - ➢ NetBEUI – NetBIOS Extended User Interface
    - ➢ using the NetBIOS Frames (NBF) routing 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

NetBIOS Naming Service

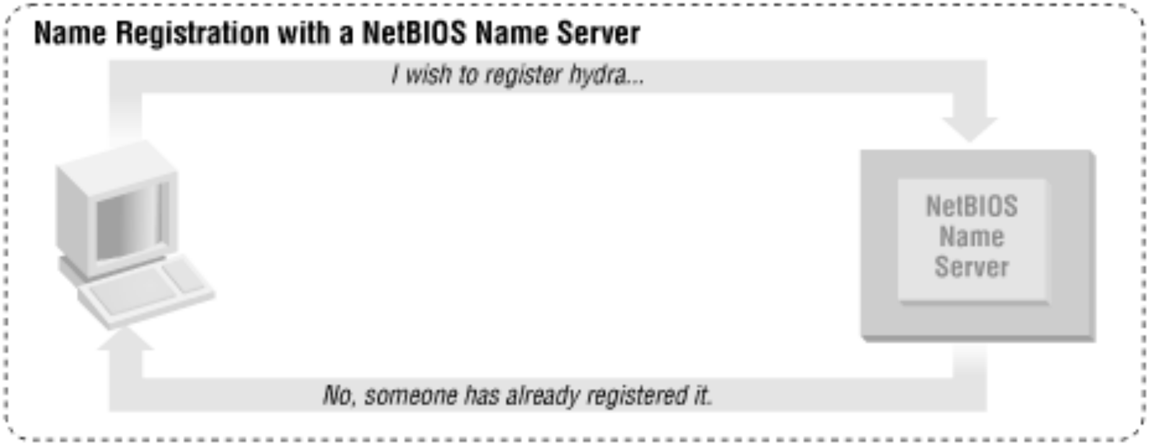
- ☐ Peer to peer (Workgroup model)


Name Registration without a NetBIOS Name Server
I wish to register hydra...
(broadcast)
No, I've already registered it.


Name Resolution without a NetBIOS Name Server
Who is registered as phoenix?
(broadcast)
I am. My address is 192.168.220.102.

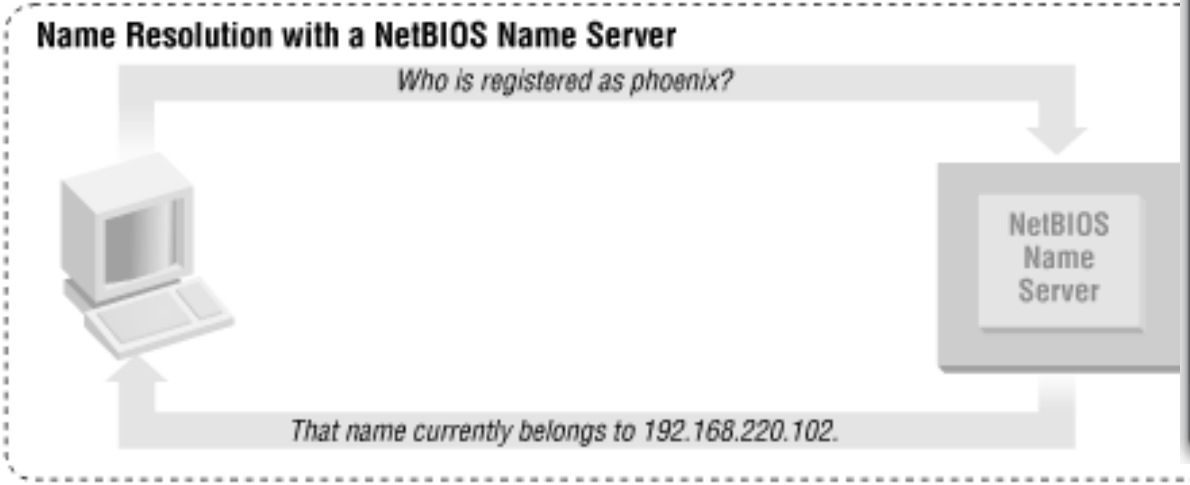
NetBIOS Naming Service

- ❑ WINS



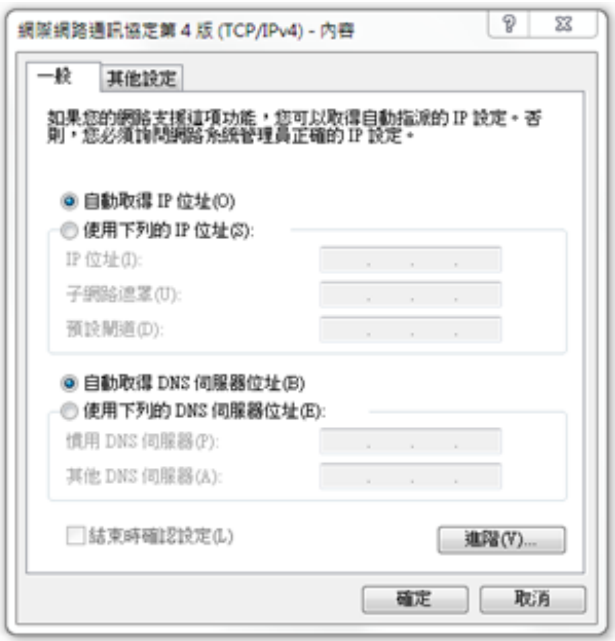
Name Registration with a NetBIOS Name Server

I wish to register hydra...
NetBIOS Name Server
No, someone has already registered it.



Name Resolution with a NetBIOS Name Server

Who is registered as phoenix?
NetBIOS Name Server
That name currently belongs to 192.168.220.102.



網際網路通訊協定第 4 版 (TCP/IPv4) - 內容

一般
其他設定

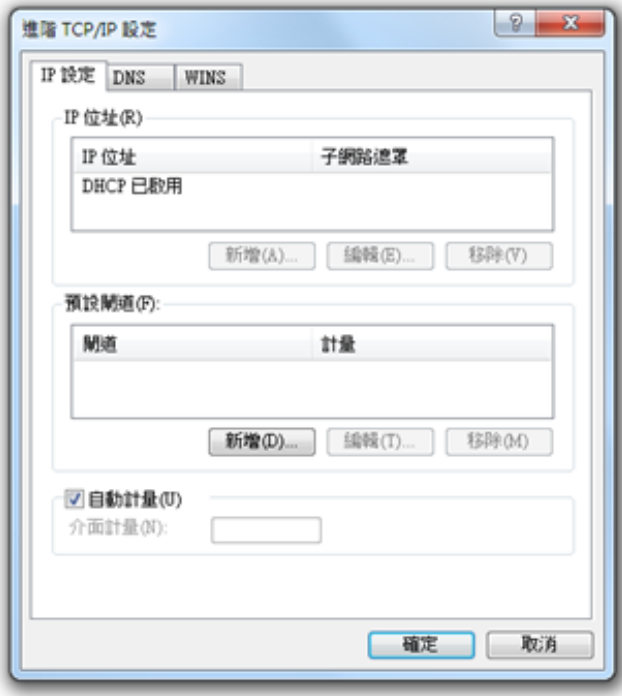
如果您的網路支援這項功能，您可以取得自動指派的 IP 設定。否則，您必須詢問網路系統管理員正確的 IP 設定。

● 自動取得 IP 位址(O)
○ 使用下列的 IP 位址(S):
IP 位址(I):
子網路遮罩(U):
預設閘道(D):

● 自動取得 DNS 伺服器位址(B)
○ 使用下列的 DNS 伺服器位址(E):
慣用 DNS 伺服器(P):
其他 DNS 伺服器(A):

☐ 結束時確認設定(L)

進階(V)...
確定
取消



進階 TCP/IP 設定

IP 設定
DNS
WINS

IP 位址(R)

IP 位址	子網路遮罩
DHCP 已啟用	

新增(A)...
編輯(E)...
移除(V)

預設閘道(F):

閘道	計量

新增(D)...
編輯(T)...
移除(M)

☑ 自動計量(U)
介面計量(N):

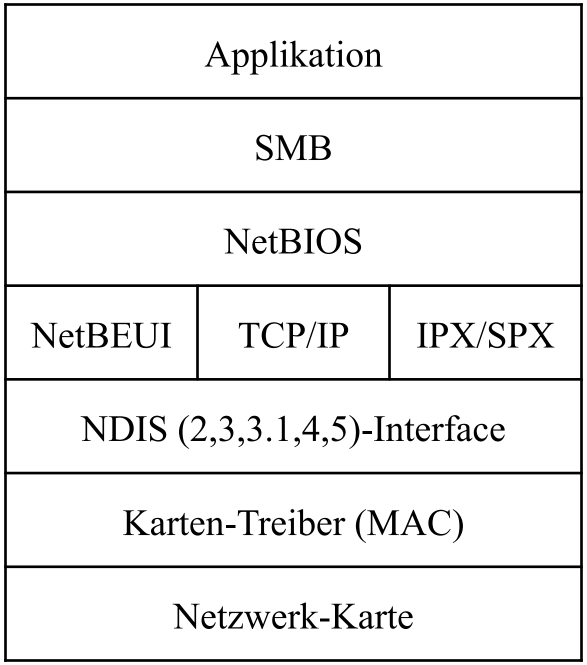
確定
取消

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/Windows Server 2012 – SMB 3.0 (Previously named 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
    - grep -i '^s.*m.*b' /usr/share/dict/words
      - Napster, Simba
- Why samba ?



Applikation

SMB

NetBIOS

NetBEUI | TCP/IP | IPX/SPX

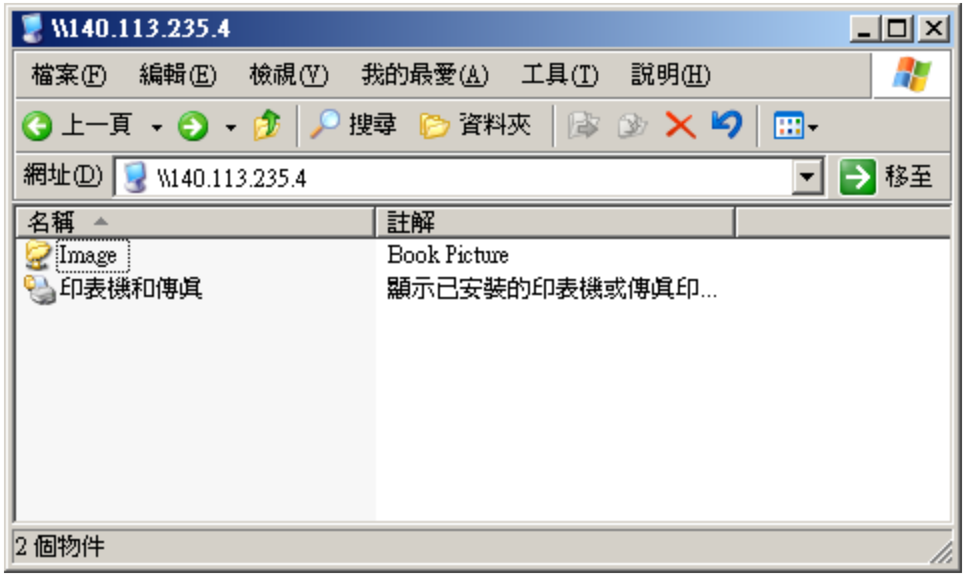
NDIS (2,3,3.1,4,5)-Interface

Karten-Treiber (MAC)

Netzwerk-Karte

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

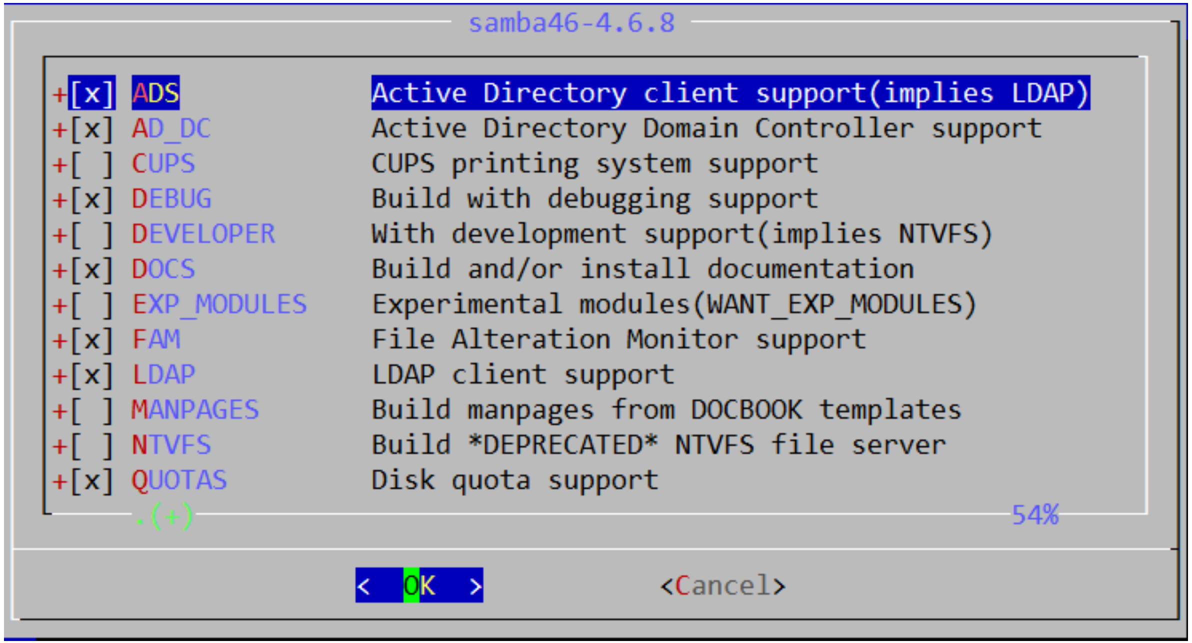

\\140.113.235.4
檔案(F) 編輯(E) 檢視(V) 我的最愛(A) 工具(T) 說明(H)
上一頁
搜尋
資料夾
網址(D)
\\140.113.235.4
移至

名稱	註解
Image	Book Picture
印表機和傳真	顯示已安裝的印表機或傳真印...

2 個物件

Install SAMBA

- ❑ Using ports
  - % cd /usr/ports/net/samba46
    - ➢ Samba 4.6.8
  - % portmaster -BD net/samba46
- ❑ Using package
  - % pkg install samba46



```
                         samba46-4.6.8
+[x] ADS          Active Directory client support(implies LDAP)
+[x] AD_DC        Active Directory Domain Controller support
+[ ] CUPS         CUPS printing system support
+[x] DEBUG        Build with debugging support
+[ ] DEVELOPER    With development support(implies NTVFS)
+[x] DOCS         Build and/or install documentation
+[ ] EXP_MODULES  Experimental modules(WANT_EXP_MODULES)
+[x] FAM          File Alteration Monitor support
+[x] LDAP         LDAP client support
+[ ] MANPAGES     Build manpages from DOCBOOK templates
+[ ] NTVFS        Build *DEPRECATED* NTVFS file server
+[x] QUOTAS       Disk quota support
     .(+)                                                    54%

              <  OK  >              <Cancel>
```

SAMBA components

- ☐ Configuration files
  - /usr/local/etc/smb.conf.sample → /usr/local/etc/smb.conf
    - chmod 644 smb.conf
  - /usr/local/etc/lmhosts
- ☐ Major execution files
  - 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
  - pdbedit (/usr/local/bin/pdbedit)
    - Manage the Samba user database
  - smbpasswd (/usr/local/bin/smbpasswd)

SAMBA password

- ❑ samba4 password file
  - Now samba stores accounts and passwords in tdb
    - ➢ Default database path: /var/db/samba4
- ❑ tdb v.s. smbpasswd

```
derek[~] -chiahung- sudo pdbedit -L -v
---------------
Unix username:        chiahung
NT username:
Account Flags:        [U          ]
User SID:             S-1-5-21-3763889141-129722405-4261865294-1000
Primary Group SID:    S-1-5-21-3763889141-129722405-4261865294-513
Full Name:            Chia-Hung Tsai
Home Directory:       \\derek\chiahung
HomeDir Drive:
Logon Script:
Profile Path:         \\derek\chiahung\profile
Domain:               DEREK
Account desc:
Workstations:
Munged dial:
Logon time:           0
Logoff time:          never
Kickoff time:         never
Password last set:    Mon, 12 Jul 2010 00:03:29 CST
Password can change:  Mon, 12 Jul 2010 00:03:29 CST
Password must change: never
Last bad password   : 0
Bad password count  : 0
Logon hours         : FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
---------------
```

```
derek[/var/db] -chiahung- sudo pdbedit -w -u chiahung
chiahung:1000:
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX:
3CDEC7966A2F9837F9F628DC13CC02AE:
[U          ]:
LCT-4C39EB51:
```

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
  - pdbedit -r -c username
    - ➢ pdbedit -r -c “[DX]” test

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 = chwong
  - 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
    - "display charset", "unix charset", "dos charset"
    - Ex:

      unix charset = CP850
      dos charset = CP850
  - hosts allow
    - Apply to all services, regardless or individual service setting;
    - Ex: hosts allow = 140.113.235. 140.113.

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
    - passdb backend = tdbsam

SAMBA configuration file – Global Setting (4)

❑ Example of global setting

```
[global]
        server string = Samba Server Version %v
        unix charset = CP850
        workgroup = MYGROUP
        log file = /var/log/samba/log.%m
        max log size = 50
        usershare allow guests = Yes
        guest account = pcguest
        security = USER
        idmap config * : backend = tdb
        cups options = raw
```

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

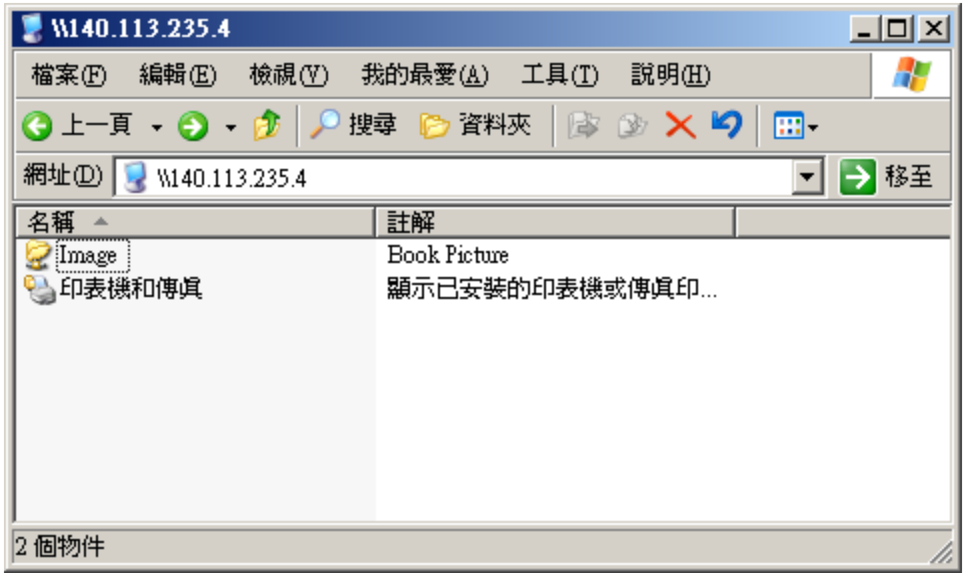
SAMBA configuration file – Home Sharing Setting (1)

- ☐ 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 = %S (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
```


\\140.113.235.4
檔案(F)
編輯(E)
檢視(V)
我的最愛(A)
工具(T)
說明(H)
上一頁
搜尋
資料夾
網址(D)
\\140.113.235.4
移至
2 個物件

名稱	註解
Image	Book Picture
印表機和傳真	顯示已安裝的印表機或傳真印...

SAMBA configuration file
Additional tuning

☐ Disable printer

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

☐ Performance tuning

- 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 {start|stop}
  - /etc/rc.conf
    - samba_enable="YES"
      - smbd_enable="YES"
      - nmbd_enable="YES"
    - winbindd_enable="YES"

smbstatus

- ☐ Report on current Samba connections

```
hscc[~] -chiahung- smbstatus

Samba version 3.0.37
PID     Username        Group       Machine
-------------------------------------------------------------
47945   hscc            hscc        hscc-d30aedc531 (140.113.240.124)
48533   Pegasus         hscc        simba-pc     (140.113.240.135)
47944   zn               hscc       bdeca39d90d4 (140.113.240.133)

Service      pid          machine                Connected at
--------------------------------------------------
zn           47944        bdeca39d90d4           Mon Oct 18 17:12:02 2010
hscc         47945        hscc-d30aedc531        Mon Oct 18 17:12:02 2010
Pegasus      48533        simba-pc               Mon Oct 18 17:58:46 2010

Locked files:
Pid        Uid      DenyMode   Access     R/W      Oplock        SharePath   Name   Time
------------------------------------------------------------------------------------------
47947      509      DENY_NONE  0x100001   RDONLY    NONE          /home/hscc   UG/Films/[USA
47946      509      DENY_NONE  0x100001   RDONLY    NONE          /home/hscc   UG/Animation
```

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)

```
hsccws5[~] -chiahung- smbclient -L hscc -U chiahung
Enter chiahung's password:
Domain=[HSCCLAB] OS=[Unix] Server=[Samba 3.0.37]

        Sharename       Type      Comment
        ---------       ----      -------
        IPC$            IPC       IPC Service (HSCC SAMBA)
        chiahung        Disk      Home Directories
Domain=[HSCCLAB] OS=[Unix] Server=[Samba 3.0.37]

        Server          Comment
        ---------       -------
        HSCC            HSCC SAMBA

        Workgroup       Master
        ---------       -------
        EC219           EC219
        HSCCLAB         HSCC
        LAB635          JJSU-LABPC
        LAB636          2AMW1GP6PMLTL77
```

Tool: smbtree

- ❑ 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$             IPC Service
(sata server)
                        \\SATA\Video            ftp directory
                        \\SATA\Image            test directory
```

Tool: mount_smbfs

- ❑ 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

Tool: testparm

- ❑ check an smb.conf configuration file for internal correctness
- ❑ Usage
  - `testparm /usr/local/etc/smb4.conf`

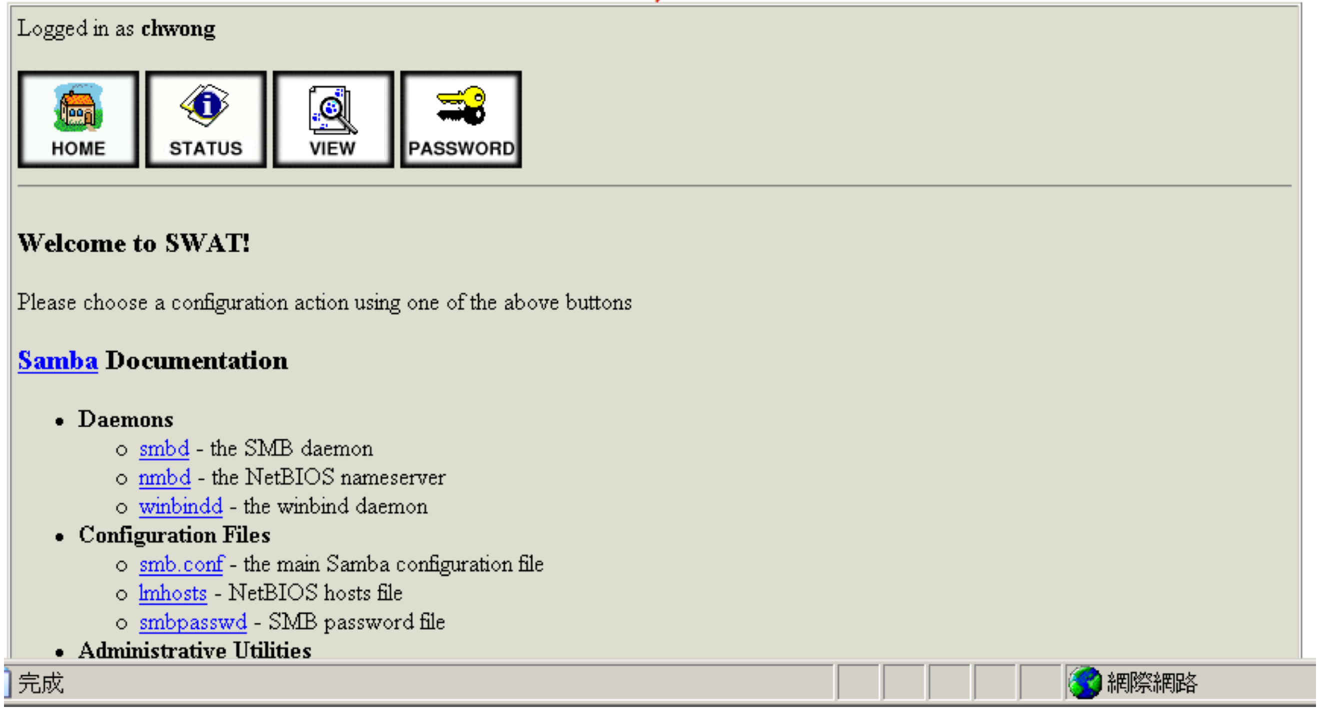
  -
    ```
    Load smb config files from /usr/local/etc/smb4.conf
    Processing section "[homes]”
    Processing section "[printers]”
    Processing section "[public]”
    Loaded services file OK.
    Server role: ROLE_STANDALONE

    Press enter to see a dump of your service definitions
    ```

SWAT (1)

- ☐ Edit /etc/inetd.conf
  - Unmark

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

- ☐ Restart inetd
- ☐ Browse http://sabsd.cs.nctu.edu.tw:901/



Logged in as **chwong**

Welcome to SWAT!

Please choose a configuration action using one of the above buttons

Samba Documentation

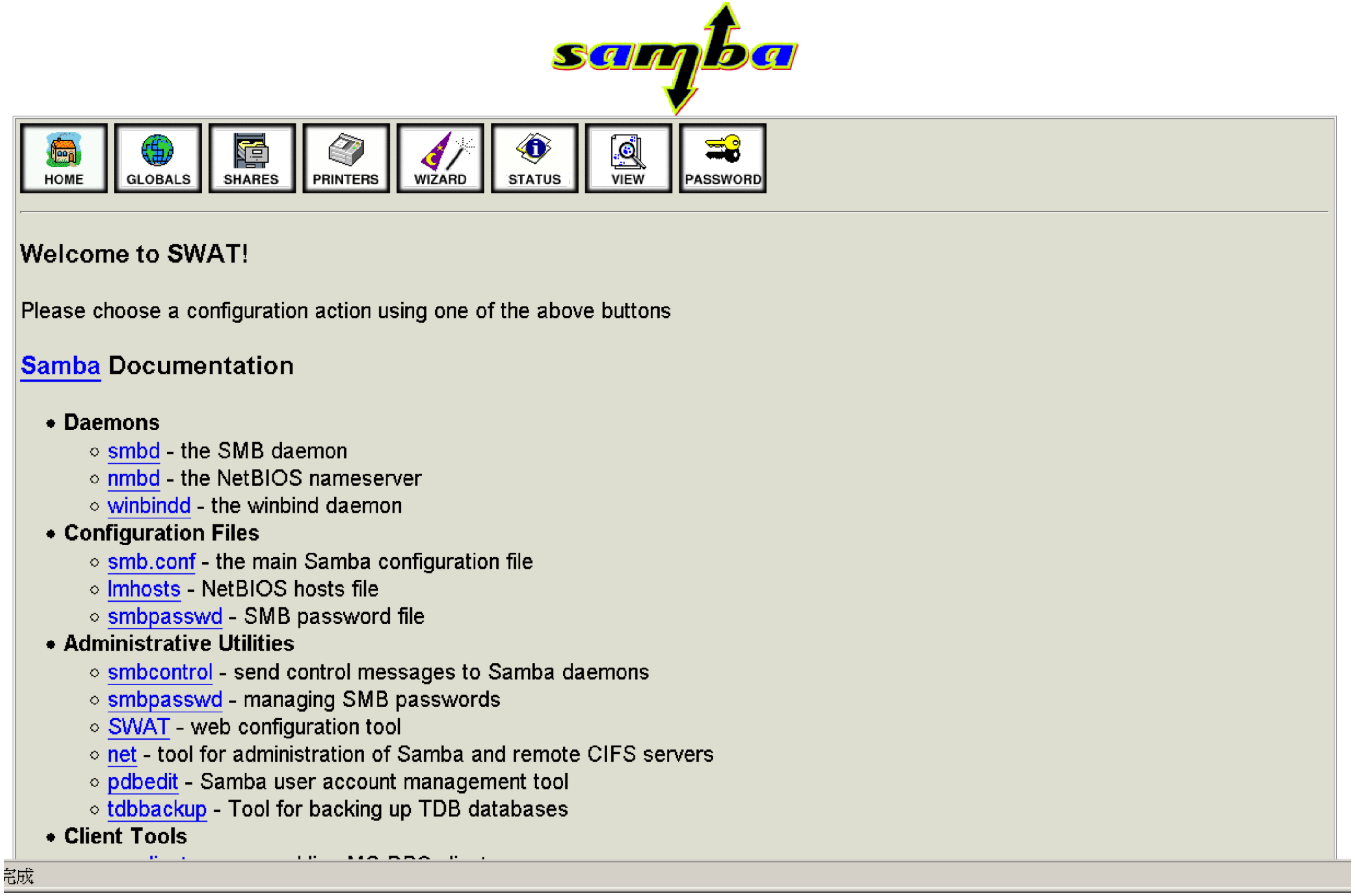
- **Daemons**
  - smbd - the SMB daemon
  - nmbd - the NetBIOS nameserver
  - winbindd - the winbind daemon
- **Configuration Files**
  - smb.conf - the main Samba configuration file
  - lmhosts - NetBIOS hosts file
  - smbpasswd - SMB password file
- **Administrative Utilities**

完成

網際網路

SWAT (2)

- ❑ Root access



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**
  - smbcontrol - send control messages to Samba daemons
  - smbpasswd - managing SMB passwords
  - SWAT - web configuration tool
  - net - tool for administration of Samba and remote CIFS servers
  - pdbedit - Samba user account management tool
  - tdbbackup - Tool for backing up TDB databases
- **Client Tools**