



Network Information Service

NIS –

The Network Information Service (1)

❑ NIS (YP – Yellow Page)

- Release by SUN in 1980s
- For master server
 - System files are kept in original locations and edited as before
 - There will be a server process takes care of availability of these files over the network
- Data files are hashed and formed a database for lookup efficiency
 - yp_mkdb
 - Makefile
- NIS domain
 - The NIS server and it's clients
- Multiple NIS server
 - One master NIS server and multiple NIS slave servers

NIS –

The Network Information Service (2)

□ /etc/netgroup

- Group users, machines, nets for easy reference in other system files
- Can be used in such as /etc/{passwd,group,exports}, /etc/exports
- [format]
 groupname list-of-members
- [member-format]
 (hostname, username, nisdomainname)
- Example of /etc/netgroup

```
adm_user      (,wutzh,) (,chiahung,) (,liuyh,)
adm_cc_cs     (cshome,,) (csduty,,) (csmailgate,,)
sun_cc_cs     (sun1,,) (sun2,,) (sun3,,)
bsd_cc_cs     (bsd1,,) (bsd2,,) (bsd3,,)
linux_cc_cs   (linux1,,) (linux2,,) (linux3,,)
all_cc_cs     adm_cc_cs sun_cc_cs bsd_cc_cs linux_cc_cs
```

NIS –

The Network Information Service (3)

- ❑ Prioritizing sources
 - System information can come from many resource
 - Local, NIS, ...
 - Specify the sources that we are going to use and the order of them
- ❑ /etc/{passwd, group}
 - +
 - Entire NIS map is included
 - +@
 - Include only certain netgroup
 - +name
 - Include only a single
- ❑ /etc/nsswitch.conf

```
...  
passwd:    compat  
group:     compat  
shadow:   files nis  
hosts:    files nis dns  
...
```

NIS –

The Network Information Service (4)

❑ Use netgroup in other system files

- Example for used in /etc/passwd

```
...  
pop:*:68:6:Post Office Owner:/nonexistent:/sbin/nologin  
www:*:80:80:World Wide Web Owner:/nonexistent:/sbin/nologin  
nobody:*:65534:65534:Unprivileged user:/nonexistent:/sbin/nologin  
+@admin-user:*:.....  
+:*:...../usr/local/bin/cs.nologin
```

- Example for used in /etc/exports

```
/raid -alldirs -maproot=root mailgate ccserv backup  
/raid -alldirs -maproot=65534 -network 140.113.209 -mask 255.255.255.0  
/home -ro -mapall=nobody -network 140.113.235.0 -mask 255.255.255.0  
/usr/src /usr/obj -maproot=0 bsd_cc_csie
```

NIS –

The Network Information Service (5)

❑ Advantages of NIS

- Not necessary for administrator to be aware of NIS internal data format
- Cross-platform

❑ Disadvantages of NIS

- If a slave NIS server is down, the slave's copy may not be updated
 - Periodically poll data (cron)
- **Not secure**
 - Any host on a network can claim to be NIS Server
 - Any one can read your NIS maps
- Consume network bandwidth

How NIS works (1)

❑ NIS directory

- /var/yp

❑ NIS Server Map directory

- In a subdirectory of the NIS directory named for the NIS domain
 - /var/yp/+cs.nis
- Example:

```
[pschiu@cshome yp]$sudo ls /var/yp/+cs.nis
amd.map          autofs.map      hosts.byaddr    netgroup        passwd.byname
auto.master     cleanpasswd    hosts.byname    netgroup.byhost passwd.byuid
auto.nfs        genhosts       mail.aliases    netgroup.byuser shadow.byname
auto_master     group.bygid    master.passwd.byname netid.byname    sudoers.pwd.byname
auto_master_wrkstation group.byname    master.passwd.byuid passwd.adjunct.byname ypservers
```

How NIS works (2)

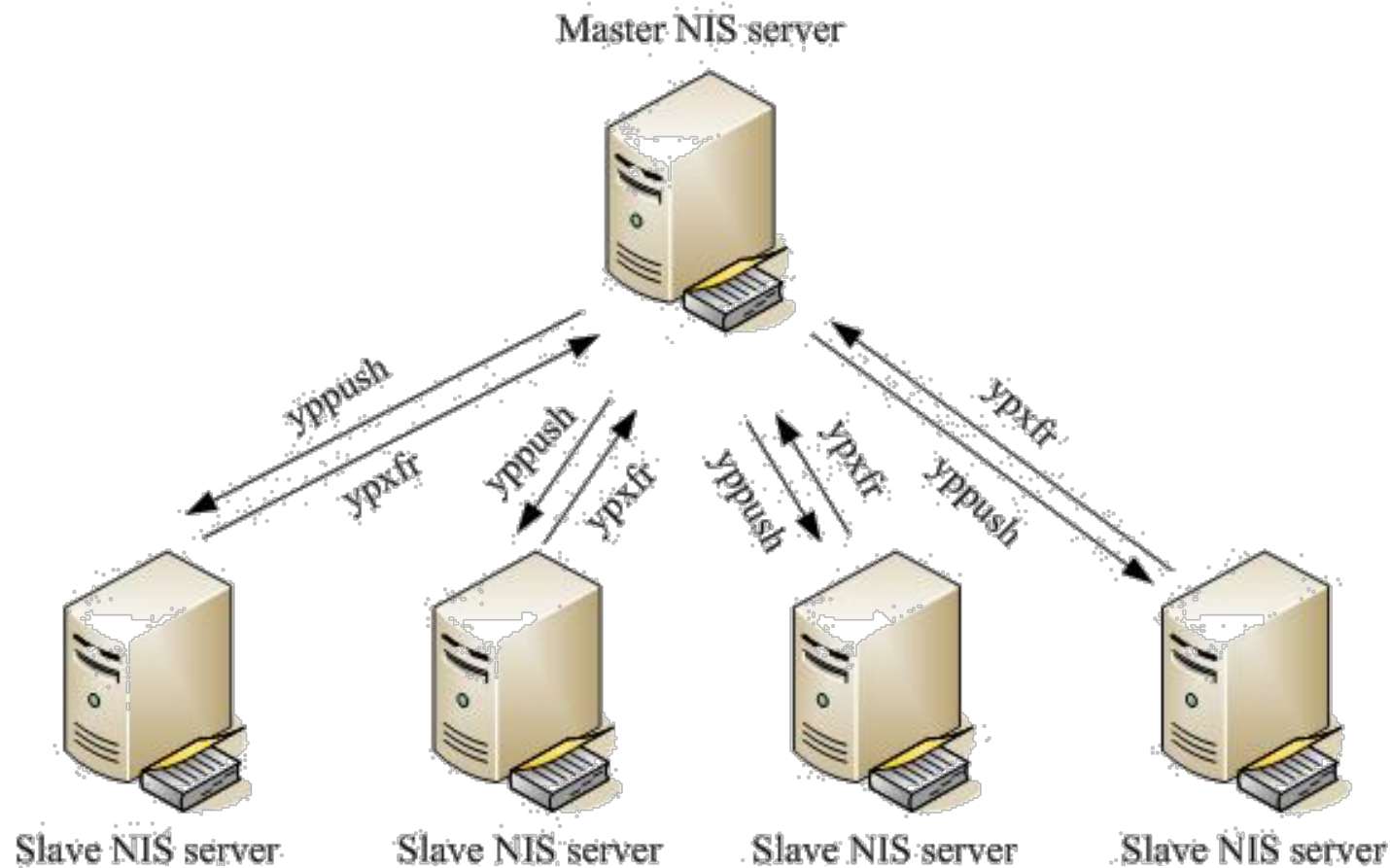
□ NIS master server → NIS slave servers

- “ypxfr” pull command
 - Every NIS slave server runs ypxfr periodically
- “yppush” push command
 - NIS master server use yppush to instruct each slave to execute ypxfr
- **ypservers** special map
 - It does not correspond to any flat file
 - A list of all NIS slave servers in that NIS domain
 - ypinit

How NIS works (3)

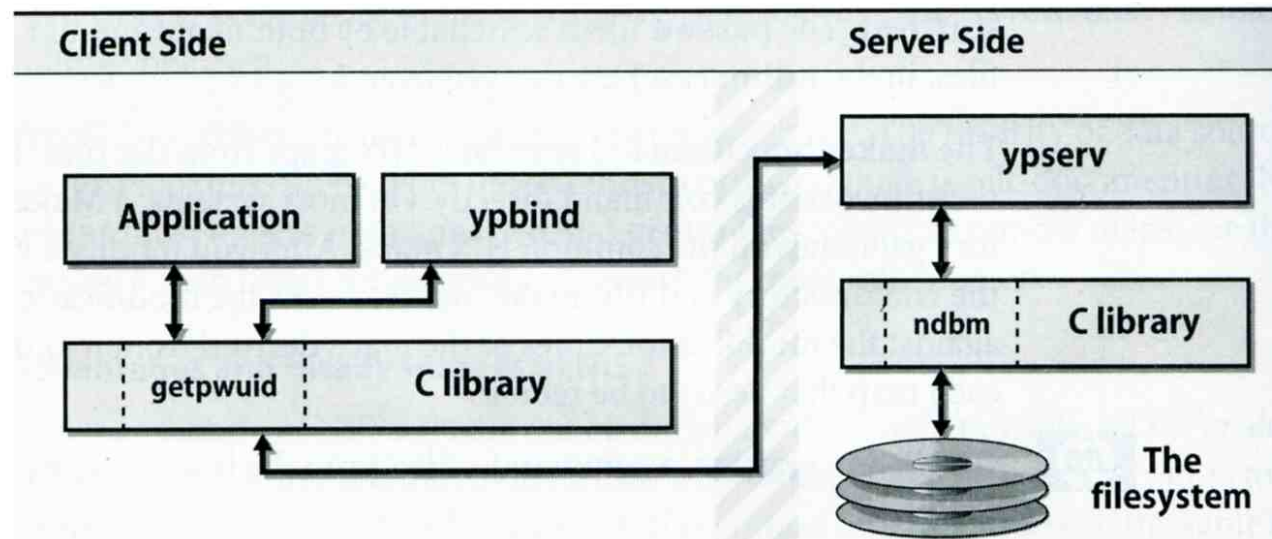
❑ Example of cs

```
[pschiu@cshome yp]$sudo cat ypservers
cshome.cs.nctu.edu.tw cshome.cs.nctu.edu.tw
csmailgate.cs.nctu.edu.tw csmailgate.cs.nctu.edu.tw
```



How NIS works (4)

- ❑ After all maps are ready
 - Request and response
 - ypserv daemons
 - Run on NIS servers
 - Waiting for NIS requests and answering them by looking up information in maps
 - ypbind daemons
 - Run on every machine in NIS domain
 - Locate a ypserv and return the identity to the C library, which then contact the server directly



How NIS works (5)

□ NIS commands and daemons

Program	Description
domainname	Set or print name of current NIS domain
makedbm yp_mkdb (FreeBSD)	Build hashed map
ypinit	Configure a host as master or slave
ypset	Let ybind to bind a particular NIS server
ypwhich	Find out which yp server is using
ypcat	Print the value contained in an NIS map
yppasswd	Change password on the NIS server
ypchfn	Change GECOS information on NIS server
ypchsh	Change login shell on NIS server
yppasswdd	Server daemon for yppasswd,ypchsh,ypchfn

Configuring NIS Servers

- ❑ Steps
 - Sequence: Master Server → Slave Servers → each client
- ❑ Master Server
 - Set nis domain name
 - Use ypinit to construct a list of slave servers
 - Run ypserv and rpc.yppasswdd daemons
- ❑ Slave Servers
 - Set nis domain name
 - Use ypinit to set master NIS server
 - Get NIS maps
- ❑ NIS client
 - Set nis domain name
 - Modify /etc/passwd, /etc/group
 - Run ybind daemons

Configuring NIS Servers – FreeBSD (1)

❑ Edit /etc/rc.conf

- If your host does not want to be a NIS client, remove nis_client related entries
- It is a good idea to force NIS master server to ypbind itself
 - % man ypbind

```
...
# NIS
nisdomainname="sabsd.nis"
nis_server_enable="YES"
nis_server_flags=""
nis_client_enable="YES"
nis_client_flags="-s -m -S sabsd.nis,sabsd"
nis_yppasswdd_enable="YES"
nis_yppasswdd_flags=""
...
```

Configuring NIS Servers – FreeBSD (2)

- ❑ Initializing the NIS Maps
 - NIS maps are generated from configuration files in /etc with exceptions : /etc/master.passwd, /etc/netgroup, /etc/passwd
 - % cp /etc/master.passwd /var/yp/master.passwd
 - % cp /etc/netgroup /var/yp/netgroup
 - Edit /var/yp/master.passwd , removing all system accounts
 - % cd /var/yp
 - % ypinit -m sabsd.nis
 - % reboot
- ❑ Rebuild yp maps whenever the configuration files are changed
- ❑ Example
 - When you change /var/yp/master.passwd
 - % cd /var/yp
 - % make

Configuring NIS Servers – FreeBSD (3)

□ Makefile of NIS

```
...
YPSRCDIR = /etc
YPDIR = /var/yp
YPMAPDIR = $(YPDIR)/$(DOMAIN)
ETHERS = $(YPSRCDIR)/ethers # ethernet addresses (for rarpd)
BOOTPARAMS = $(YPSRCDIR)/bootparams # for booting Sun boxes (bootparamd)
HOSTS = $(YPSRCDIR)/hosts
NETWORKS = $(YPSRCDIR)/networks
PROTOCOLS = $(YPSRCDIR)/protocols
RPC = $(YPSRCDIR)/rpc
SERVICES = $(YPSRCDIR)/services
SHELLS = $(YPSRCDIR)/shells
GROUP = $(YPSRCDIR)/group
ALIASES = $(YPSRCDIR)/mail/aliases
NETGROUP = $(YPDIR)/netgroup
PASSWD = $(YPDIR)/passwd
MASTER = $(YPDIR)/master.passwd
YPSERVERS = $(YPDIR)/ypservers # List of all NIS servers for a domain
PUBLICKEY = $(YPSRCDIR)/publickey
NETID = $(YPSRCDIR)/netid
AMDHOST = $(YPSRCDIR)/amd.map
...
```

Configuring NIS Servers – FreeBSD (4)

```
[pschiu@bsd1 /]$ps -auxwww | grep yp
root          589   0.0  0.0  16468  3848  -  Is   29Oct16   0:05.79  /usr/sbin/
ypbind -s -m -S +cs.nis,cshome,csmailgate,csduty
pschiu       25145  0.0  0.0  18840  2608  34  S+   6:24PM   0:00.00  grep yp
[pschiu@bsd1 /]$ypwhich
csduty.cs.nctu.edu.tw
[pschiu@bsd1 /]$ypcat -x
Use "passwd" for "passwd.byname"
Use "master.passwd" for "master.passwd.byname"
Use "shadow" for "shadow.byname"
Use "group" for "group.byname"
Use "networks" for "networks.byaddr"
Use "hosts" for "hosts.byaddr"
Use "protocols" for "protocols.bynumber"
Use "services" for "services.byname"
Use "aliases" for "mail.aliases"
Use "ethers" for "ethers.byname"
```


Configuring NIS Servers – FreeBSD (5)

❑ NIS client configuration

- Edit /etc/rc.conf

```
...  
# NIS  
nisdomainname="sabsd.nis"  
nis_client_enable="YES"  
nis_client_flags="-s"  
...
```

- Edit /etc/master.passwd (using vipw) and /etc/group

```
...  
nobody:*:65534:65534::0:0:Unprivileged user:/nonexistent:/usr/sbin/nologin  
+:*:.....
```

```
nobody:*:65534:  
+:*:
```

- reboot

Q & A