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Introduction

Exactly what is DNS? DNS stands for Domain Name System, but why should I care. Unbeknown to most of us, we use DNS when we use the Internet, send email, or surf the World Wide Web.

As humans we like to use names over numbers. And when we want to communicate with a remote computer system, we can refer to the computer by name or by a 32 bits long number called an IP address. If we have to communicate with a large number of computers, then it could be a problem trying to remember the IP addresses of each computer. In reality when we communicate with computers, we using the IP address, even if we address the computer by name. When we use the computer name, it get converted to the IP address for that machine. DNS is how we map the computer name with the IP address for the computer.

DNS is the standard mechanism on the Internet for advertising and accessing all kinds of information about computers, not just the address for the computer. DNS is also used by virtually all internetworking software such as browsers, email, ftp, and telnet. One of the important features of DNS is that it makes computer information available all over the Internet. Storing information about a computer in a formatted file on a specific computer system will only helps the users that are on that system. With DNS a user can retrieve information remotely, from anywhere on the network.

Most important, DNS allows you to distribute the management of the systems information among many sites and organizations. Meaning that you don't have to submit the data for your computer system to some centrally located site and then periodically download copies of the "master" database to your system. All you need to do is to make sure that your section, which is called a ZONE, is up to date on your system, which is called a NAMESERVER. With DNS, your NAMESERVERS make your ZONE'S data available to all other NAME SERVERS on the network.

The purpose of this paper is to aquant the reader with what is DNS, why you would want to install it on an HP 3000 and if it's a fit for your site, how to install DNS on an HP3000. DNS is too large a topic to cover everything about DNS in a fifty minute workshop, but what we will do is give you enough information to setup your HP3000 as a DNS machine.

The DNS software referred to in this paper is BIND, the Berkeley Internet Name Domain software. This software is bundled on the HP3000 as part of the FOS (Fundamental Operating System) as of 6.0 and stored in the account BIND. We (Ronald and George)

have DNS running on an HP3000 in the HP Atlanta Education Center. We are going to share with you our experience of installing and configuring DNS. George Vish is a senior technical consultant for HPE (Hewlett-Packard Education) in Atlanta and he is the DNS champion for Atlanta. Ronald Moore is one of the few MPE instructors with HPE and has over twenty years of MPE experience and he also resides in the Atlanta. Together with Ronald's MPE experience and George's DNS experience, Ronald and George were able to setup DNS on an HP3000 957.

We will discuss the files needed to setup DNS, where the files reside, and what needs to be modified in the file. We will also show you how to start and stop DNS, and how to get NSLOOKUP working. NSLOOKUP is a DNS query tool that can be used to test DNS NAMESERVER and RESOLVER (the name used for DNS clients) configuration.

There is a file on most UNIX computer systems called HOSTS_TO_NAMED. This script will setup the files needed to configure DNS. There is a copy of this file on the HP3000, but there are bugs in the script due to some of the system variables and commands that are different on MPE and UNIX. We had to run HOSTS_TO_NAMED on one of our UNIX systems and then transfer the files to the HP3000. In this paper will start with the files that were generated on the UNIX systems and move to the HP3000. We'll tell you where to store the files and how to modify the files to work on you system.

Let's get started. The first thing that we did was to go into the POSIX shell and listed the files in the /BIND/PUB/etc. We will discuss the purpose of each file and give you information on how to modify the configuration of the files.

The **readme** file provides information on how to install and configure DNS on the HP 3000. The **named.conf** file is the NAMESERVER configuration file and instructs how DNS is to respond to queries from RESOLVERS. The **nslookup.help** file is the help screen text. The **resolv.conf** file is the RESOLVER configuration file and instructs how to query the DNS NAMESERVER.

The remaining files that start with the word "zone" are the DNS database files, where the HOSTNAME and IP ADDRESS information will be stored. The **zone.127.0.0** file maintains the loopback network information, namely that 127.0.0.1 is the IP Address for the localhost (your computer). The **zone.156.153.205** file stores all of the IP Address-to-Hostname information using PTR (pointer) resource records. The **zone.mpe** file stores all of the Hostname-to-IP Address information using A (address) resource records. The **zone.root** file acts as a seed file to cache all of the locations for the DNS NAMESERVERS.

```
shell/iX>ls -F
named.conf*        readme             zone.156.153.205*  zone.root*
named.pid          resolv.conf        zone.mpe*
nslookup.help      zone.127.0.0*      zone.net
shell/iX> pwd
/BIND/PUB/etc
```

```
shell/iX>  cat readme   <= This is the name of the file
This readme file contains information on installing DNS on the
HP3000

There are seven file that you need

named.conf
nslookup.help
resolv.conf
zone.127.0.0
zone.mpe
zone.net
zone.root


In the named.conf file there are five line that you need to make
changes on:  lines 5, 31, 33, 38, 40

On line 5 after the phrase "listen-on" enter the IP Address
for your DNS server.

On lines 31 and 33 replace the # with the network address header.
For example:  If you network is a class A with IP Address of
15.1.2.3 you would replace the # with 15

If your network is a class B with an IP Address of 156.153.1.2
you would replace the # with 156.153

If your network is a class C with an IP Address of 192.6.5.4
you would replace the # with 192.6.5

On line 38 replace the "mpe.com" with your domain name

On line 40 replace the "zone.mpe" with zone.your-domain-name

My hostname is ED957.mpe.com in the above example, your hostname
could be dupree.jsu.edu.  That would make your domain name be
jsu.edu.  You would replace "mpe" with "jsu" and "com" with "edu".
```

Okay. Let’s find the lines in the file that are **BOLD**, these are the

lines that we need to modify. The ***ITALIC BOLD*** words are to be inputted by the user.

```
shell/iX> cat named.conf      <= This is the name of the file
options {
        directory "/BIND/PUB/etc";
// The following is the IP address of the MPE/iX system that is running
NAMED.
// @@@ YOU MUST CHANGE THIS TO BE YOUR OWN IP ADDRESS!
        listen-on { 156.153.205.142; };
};

zone "." {
        type hint;
        file "zone.root";
};

//      DNS optimization tricks for "special" addresses.  You will need
to
//      edit all of these files to specify the hostname of your own
nameserver
//      and the e-mail address of the DNS maintainer.

zone "0.0.127.in-addr.arpa" {
        type master;
        file "zone.127.0.0";
};

// @@@ YOU MUST CHANGE THIS TO BE YOUR OWN IP NETWORK (IN REVERSE)!
zone "205.153.156.in-addr.arpa" {
        type master;
        file "zone.156.153.205";
};

// A master zone.  Substitute one of your own zones here.

// @@@ YOU MUST CHANGE THIS TO BE YOUR OWN DNS DOMAIN NAME!
zone "mpe.com" {
        type master;
        file "zone.mpe"
};
```

```
shell/iX> cat nslookup.help   <= This is the name of the file

$Id: nslookup.help,v 8.4 1996/10/25 18:09:41 vixie Exp $

Commands:       (identifiers are shown in uppercase, [] means optional)
NAME            - print info about the host/domain NAME using default
server
```

```
NAME1 NAME2     - as above, but use NAME2 as server
help or ?       - print info on common commands; see nslookup(1) for
details
set OPTION      - set an option
    all         - print options, current server and host
    [no]debug   - print debugging information
    [no]d2      - print exhaustive debugging information
    [no]defname - append domain name to each query
    [no]recurse - ask for recursive answer to query
    [no]vc      - always use a virtual circuit
    domain=NAME - set default domain name to NAME
    srchlist=N1[/N2/.../N6] - set domain to N1 and search list to
N1,N2, etc.
    root=NAME   - set root server to NAME
    retry=X     - set number of retries to X
    timeout=X   - set initial time-out interval to X seconds
    querytype=X - set query type, e.g.,
A,ANY,CNAME,HINFO,MX,PX,NS,PTR,SOA,TXT,W
KS,SRV,NAPTR
    port=X      - set port number to send query on
    type=X      - synonym for querytype
    class=X     - set query class to one of IN (Internet), CHAOS,
HESIOD or ANY
server NAME     - set default server to NAME, using current default
server
lserver NAME    - set default server to NAME, using initial server
finger [USER]   - finger the optional USER at the current default host
root            - set current default server to the root
ls [opt] DOMAIN [> FILE] - list addresses in DOMAIN (optional: output
to FILE)
    -a          -  list canonical names and aliases
    -h          -  list HINFO (CPU type and operating system)
    -s          -  list well-known services
    -d          -  list all records
    -t TYPE     -  list records of the given type (e.g., A,CNAME,MX,
etc.)
view FILE       - sort an 'ls' output file and view it with more
exit            - exit the program, ^D also exits
```

```
shell/iX> cat resolv.conf     <= This is the name of the file
#resolv.conf file
#Copy this file to RESLVCNF.NET.SYS if that file does not already
exist.
#
#format (without the '#', of course):
#
#domain <domain>
#search <path1> <path2> ... <pathn>
#nameserver <primary server's IP address>
#nameserver <secondary server's IP address>
```

```
#nameserver <tertiary server's IP address>
#
#Note 1: Change the domain entry on the last line of this file to your
#        actual domain.
#Note 2: The search entry is optional.  Add one if users on this system
will
#        commonly try to connect to nodes in other domains.
#Note 3: Add one to three (typically 2 or 3) nameserver entries at the
end
#        of this file.  Make sure they are each an IP-address where a
server
#        resides.  If you have no server, do not add any nameserver
entry,
#        so the resolver will not time-out trying to connect to a
server
#        that does not exist; rather, it will immediately revert to the
#        file HOSTS.NET.SYS instead.
#
#example (replace 'hp' with your company's name):
#
#domain local-domain.hp.com
#search local-domain.hp.com other-domain.hp.com hp.com
#nameserver 192.1.1.1
#nameserver 192.1.2.1
#



# INSERT YOUR OWN DOMAIN NAME AFTER THE WORD "domain"
domain mpe.com
# INSERT YOUR OWN IP ADDRESS AFTER THE WORD "nameserver"
nameserver 156.153.205.142
# EXECUTE THE FOLLOWING COMMAND AT THE POSIX SHELL PROMPT
# cp /BIND/PUB/etc/resolv.conf /etc/resolv.conf
```

```
shell/iX> cat zone.127.0.0    <= This is the name of the file

@       IN      SOA     ed957.mpe.com. manager.ed957.mpe.com. (
                                        1       ; Serial
                                        10800   ; Refresh every 3 hours
                                        3600    ; Retry every hour
                                        604800  ; Expire after a week
                                        86400 ) ; Minimum ttl of 1 day
        IN      NS      ed957.mpe.com.

1       IN      PTR     localhost.
shell/iX>
```

```
shell/iX> cat zone.mpe  <= This is the name of the file

@       IN      SOA     ed957.mpe.com. manager.ed957.mpe.com. (
                                        1       ; Serial
                                        10800   ; Refresh every 3 hours
                                        3600    ; Retry every hour
                                        604800  ; Expire after a week
                                        86400 ) ; Minimum ttl of 1 day
        IN      NS      ed957.mpe.com.

localhost       IN      A       127.0.0.1

ed957           IN      A       156.153.205.142
ed917           IN      A       156.153.205.143


;FOR EXAMPLE, IF ronmoore.mpe.com HAD AN IP ADDRESS OF 15.1.2.3
;ronmoore       IN      A       15.1.2.3
;NOTE: THE SEMICOLONS ARE COMMENT CHARACTERS
;AND THE FINAL DOT MUST BE INCLUDED
```

```
shell/iX> cat zone.156.153.205      <= This is the name of the file
@       IN      SOA     ed957.mpe.com. manager.ed957.mpe.com. (
                                        1       ; Serial
                                        10800   ; Refresh every 3 hours
                                        3600    ; Retry every hour
                                        604800  ; Expire after a week
                                        86400 ) ; Minimum ttl of 1 day
        IN      NS      ed957.mpe.com.
142     IN              PTR       ed957.mpe.com.
143     IN              PTR       ed917.mpe.com.


;FOR EXAMPLE, IF ronmoore.mpe.com. HAD AN IP ADDRESS OF 15.1.2.3
;3.2.1  IN      PTR     ronmoore.mpe.com.
;NOTE: THE SEMICOLONS ARE COMMENT CHARACTERS
;AND THE FINAL DOT MUST BE INCLUDED


; @@@ ENTER IP ADDRESS TO HOSTNAME DNS INFORMATION (WITH NO SUBNETS)
; ----------------------------------------------------------------
; DNS database filename: zone.15   (IP Class A)
; mother.atl.hp.com ---> 15.50.157.70
; 70.157.50     IN      PTR     mother.atl.hp.com.
;
; DNS database filename: zone.156.153   (IP Class B)
; father.edunet.hp.com ---> 156.153.205.147
; 147.205       IN      PTR     father.edunet.hp.com.
;
```

```
; DNS database filename: zone.192.6.249   (IP Class C)
; ronald.moore.hp.com ---> 192.6.249.7
; 7             IN      PTR     ronald.moore.hp.com.
```

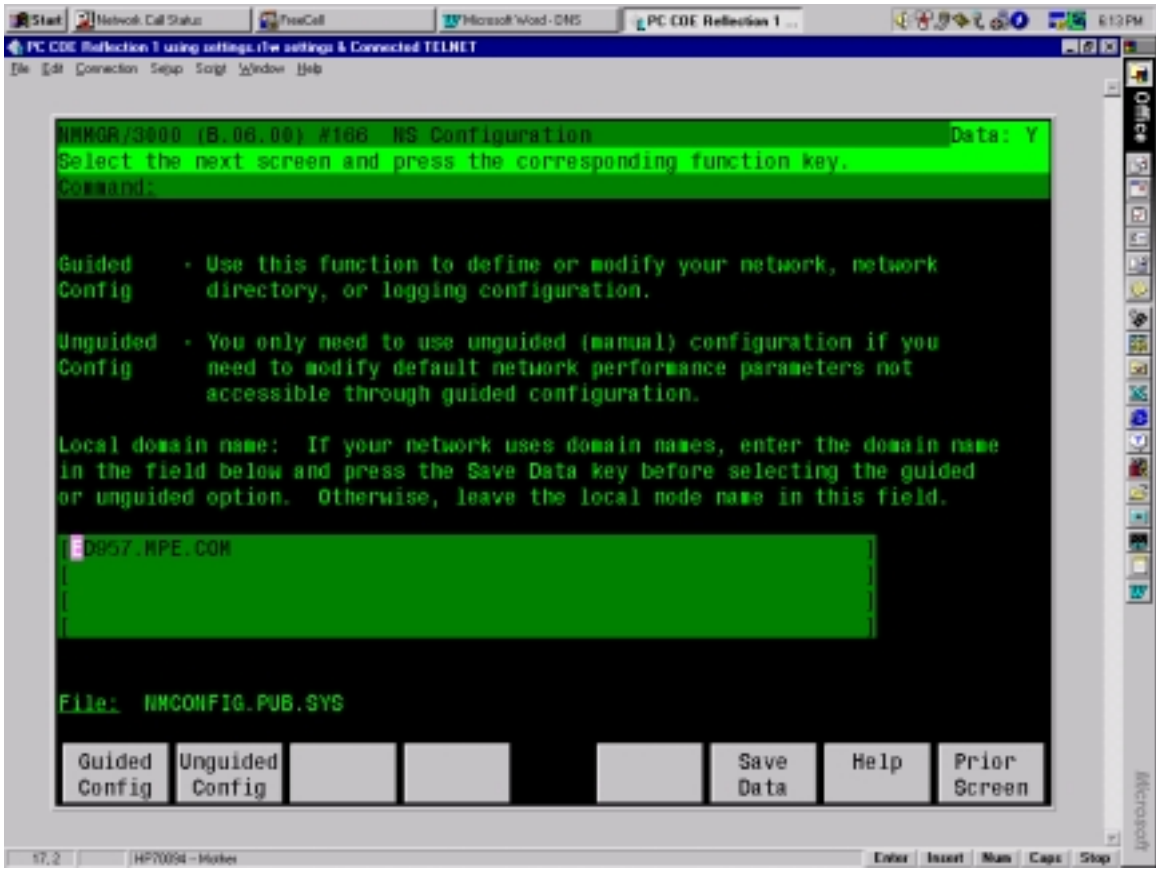
```
shell/iX> cat zone.root <= This is the name of the file

;       This file holds the information on root name servers needed to
;       initialize cache of Internet domain name servers
;       (e.g. reference this file in the "cache  .  <file>"
;       configuration file of BIND domain name servers).
;
;       This file is made available by InterNIC registration services
;       under anonymous FTP as
;           file                /domain/named.root
;           on server           FTP.RS.INTERNIC.NET
;       -OR- under Gopher at    RS.INTERNIC.NET
;           under menu          InterNIC Registration Services (NSI)
;              submenu          InterNIC Registration Archives
;           file                named.root
;
;       last update:    Aug 22, 1997
;       related version of root zone:   1997082200
;
;
; formerly NS.INTERNIC.NET
;
.                       3600000  IN  NS    A.ROOT-SERVERS.NET.
A.ROOT-SERVERS.NET.     3600000      A     198.41.0.4
;
; formerly NS1.ISI.EDU
;
.                       3600000      NS    B.ROOT-SERVERS.NET.
B.ROOT-SERVERS.NET.     3600000      A     128.9.0.107
;
; formerly C.PSI.NET
;
.                       3600000      NS    C.ROOT-SERVERS.NET.
C.ROOT-SERVERS.NET.     3600000      A     192.33.4.12
;
; formerly TERP.UMD.EDU
;
.                       3600000      NS    D.ROOT-SERVERS.NET.
D.ROOT-SERVERS.NET.     3600000      A     128.8.10.90
;
; formerly NS.NASA.GOV
;
.                       3600000      NS    E.ROOT-SERVERS.NET.
E.ROOT-SERVERS.NET.     3600000      A     192.203.230.10
;
; formerly NS.ISC.ORG
```

```
;
.                       3600000      NS    F.ROOT-SERVERS.NET.
F.ROOT-SERVERS.NET.     3600000      A     192.5.5.241
;
; formerly NS.NIC.DDN.MIL
;
.                       3600000      NS    G.ROOT-SERVERS.NET.
G.ROOT-SERVERS.NET.     3600000      A     192.112.36.4
;
; formerly AOS.ARL.ARMY.MIL
;
.                       3600000      NS    H.ROOT-SERVERS.NET.
H.ROOT-SERVERS.NET.     3600000      A     128.63.2.53
;
; formerly NIC.NORDU.NET
;
.                       3600000      NS    I.ROOT-SERVERS.NET.
I.ROOT-SERVERS.NET.     3600000      A     192.36.148.17
;
; temporarily housed at NSI (InterNIC)
;
.                       3600000      NS    J.ROOT-SERVERS.NET.
J.ROOT-SERVERS.NET.     3600000      A     198.41.0.10
;
; housed in LINX, operated by RIPE NCC
;
.                       3600000      NS    K.ROOT-SERVERS.NET.
K.ROOT-SERVERS.NET.     3600000      A     193.0.14.129
;
; temporarily housed at ISI (IANA)
;
.                       3600000      NS    L.ROOT-SERVERS.NET.
L.ROOT-SERVERS.NET.     3600000      A     198.32.64.12
;
; housed in Japan, operated by WIDE
;
.                       3600000      NS    M.ROOT-SERVERS.NET.
M.ROOT-SERVERS.NET.     3600000      A     202.12.27.33
; End of File
```

DNS Client Configuration

To use the domain name services, you must assign a friendly name to your computer. This is done we you “Configure DNS Node Name” using NMMGR.

To get to this screen you type NMMGR at the colon prompt, then press “F!” (Open Config) -> “F2” (NS). You will be on screen #166. This is where you enter the Node Name of your computer, using the full Node Name and Domain Name, for example: ED957.MPE.COM. Be sure to press the “F6” to save the data.



After configuring the full Node Name into NMMGR, you will need to copy the sample configuration file as follows:

:COPY RSLVSAMP.NET.SYS,RESLVCNF.NET.SYS

Now you must create a link to link the RESLVCNF.NET.SYS file to the one in the POSIX file space.

:NEWLINK /etc/resolv.conf,RESLVCNF.NET.SYS
Next you want to add the Domain entry and NAMESERVER entries into the file RESLVCONF.NET.SYS, here is a copy of that file.

```
:PRINT RESLVCNF.NET.SYS
#resolv.conf file
#Copy this file to RESLVCNF.NET.SYS if that file does not already
exist.
#
#format (without the '#', of course):
#
#domain <domain>
#search <path1> <path2> ... <pathn>
#nameserver <primary server's IP address>
#nameserver <secondary server's IP address>
#nameserver <tertiary server's IP address>
#
#Note 1: Change the domain entry on the last line of this file to your
#        actual domain.
#Note 2: The search entry is optional.  Add one if users on this system
will
#        commonly try to connect to nodes in other domains.
#Note 3: Add one to three (typically 2 or 3) nameserver entries at the
end
#        of this file.  Make sure they are each an IP-address where a
server
#        resides.  If you have no server, do not add any nameserver
entry,
#        so the resolver will not time-out trying to connect to a
server
#        that does not exist; rather, it will immediately revert to the
#        file HOSTS.NET.SYS instead.
#
#example (replace 'hp' with your company's name):
#
#
#domain local-domain.hp.com
#search local-domain.hp.com other-domain.hp.com hp.com
#nameserver 192.1.1.1
#nameserver 192.1.2.1
#
domain mpe.com
nameserver 156.153.205.142
```

Note the last two lines in the above file, this is where we define the DOMAIN and identify the DNS server by giving the IP Address of the DNS server. The first Name Server entry in the RESLVCNF file is always used first. The second Name Server entry is a backup entry that is only used if the first specified name server is not available.

If a primary Name Server and one or more secondary Name Servers are configured, you can balance the load between the servers by specifying different Name Servers as the first entry in the RESLVCNF file on different client machines.

Configuring NSLOOKUP

DNS BIND/iX on MPE/iX 6.0 is an implementation of BIND version 8.1.1, which has introduced many new features such as NSLOOKUP – query Internet name servers interactively for example:

```
:NSLOOKUP ED957
Server:  ed957.mpe.com
Address:  156.153.205.142
```

To configure NSLOOKUP, you need to create a command file that looks like this:

```
:help nslookup
USER DEFINED COMMAND FILE:  NSLOOKUP.PUB.SYS

parm p1=""
/BIND/PUB/bin/nslookup !p1
:
```

I store my command file in PUB.SYS so that it is accessible to everyone. All you need to do is key in the two bold line above and save the file as NSLOOKUP.

Starting and Stopping DNS

Once you have finished configuring the files in the /BIND/PUB/etc directory on you DNS Server, now you are ready to start the listener for DNS (in the UNIX world they refer to the term **demon** not **listener**)

The JNAMED.PUB.BIND job launches the NAMED program with the –f option to indicate which file is the configuration file. Below is a copy of the job to start the listener on the DNS Server:

```
:print jnamed.pub.bind
!job jnamed,mgr.bind;outclass=,2
!run named;info="-f /BIND/PUB/etc/named.conf"
!eoj
:
```

To start the DNS listener type in the following:

:STREAM JNAMED.PUB.BIND

To stop the DNS listener type in the following:

:ABORTJOB JNAMED,MGR.BIND

Note: If you would like to disable DNS and revert back to using PROBE to resolve name to IP Address resolution, you can rename the RESLVCNF file, for example:

:RENAME RESLVCNF.NET.SYS,RESLVOFF.NET.SYS

Then to turn DNS back on you would type the following:

:RENAME RESLVOFF.NET.SYS,RESLVCNF.NET.SYS

Conclusion

We have shown you how to configure your HP e3000 as a DNS Server and how to the HP e3000 as a DNS Client. It would be nice if the script (command file) **hosts2named** actually worked on the HP e3000, but at this time is doesn't. We are working on correcting this problem.

To help those of you that would like to get DNS Server running on your HP e3000, we are willing to allow you to copy the configuration file from our laptop PC while at HP World or you can email Ronald D. Moore at ronald_d_moore@hp.com and we will send you a zipped file with the correct configuration file for configuring the DNS Server.

Welcome to the E-World.

Ronald Dupree Moore
George Vish II