NTP for Solaris

Abstract

In this paper I will explain about NTP – Network Time Protocol, I will give a short introduction and summary of NTP and demonstrate client and server NTP configurations.

Introduction

What is NTP?
NTP – Network Time Protocol, is a standard time protocol developed in the University of Delaware, NTP exists in Solaris 8-10, to enable synchronization of time clocks between 2 or more hosts. NTP in Solaris enables you to configure one Solaris machine as a NTP server and other Solaris machines to be NTP clients. Consecutively, you can configure NTP to work between Solaris and windows and Linux machines too, in a configuration of Client-Server model.

System requirements

- Any Solaris 8,9,10 sparc/x86/x64.

NTP features

- Allows configuring Solaris as a NTP server.
- Allows configuring Solaris as a NTP client.

Terms and Definitions

UTC- Universal Time Clock.
32/64 bit local clocks –
32 bit clocks will reach their limit by the year - 2038.
64 bit clocks will reach their limit after 290 million years.
Strata – A level of clock accuracy.
Stratum 1 – is an atomic clock server which is the most accurate level, Stratum 2 – less accurate, Stratum 4 – accurate level of a local clock, Stratum 5 – the least accuracy level.
Resolution/**Precision** – the smallest unit that a clock can increment (in Solaris this is 1/100 second, since NVRAM clock operate in 100 ticks/second.) where resolution is the smallest unit the clock works, precision – is the smallest unit the clock shows.
Jitter – a difference from the differences experienced when repeatedly measuring time.
Reliability – the length of time the clock can remain accurate.

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Wander – frequency variation in a clock.
Drift – the frequency offset of the local clock from the NTP preferred clock.
XType – XType represent the device type that should be putten in the ntp.conf file when configuring NTP server.

```
# XType Device    RefID        Description
# -----------------------------------------------------
#  1    local     LCL          Undisciplined Local Clock
#  2    trak      GPS          TRAK 8820 GPS Receiver
#  3    pst       WWV          PSTI/Traconex WWV/WWVH Receiver
#  4    wwvb      WWVB         Spectracom WWVB Receiver
#  5    true      TRUE         TrueTime GPS/GOES Receivers
#  6    irig      IRIG         IRIG Audio Decoder
#  7    chu       CHU          Scratchbuilt CHU Receiver
#  8    parse     ----         Generic Reference Clock Driver
#  9    mx4200    GPS          Magnavox MX4200 GPS Receiver
# 10    as2201    GPS          Austron 2201A GPS Receiver
# 11    arbiter   GPS          Arbiter 1088A/B GPS Receiver
# 12    tpro      IRIG         KSI/Odetics TPRO/S IRIG Interface
# 13    leitch    ATOM         Leitch CSD 5300 Master Clock Controller
# 15    *         *            TrueTime GPS/TM-TMD Receiver
# 17    datum     DATM         Datum Precision Time System
# 18    acts      ACTS         NIST Automated Computer Time Service
# 19    heath     WWV          Heath WWV/WWVH Receiver
# 20    nmea      GPS          Generic NMEA GPS Receiver
# 22    atom      PPS          PPS Clock Discipline
# 23    ptb       TPTB         PTB Automated Computer Time Service
# 24    usno      USNO         USNO Modem Time Service
# 25    *         *            TrueTime generic receivers
# 26    hpgps     GPS          Hewlett Packard 58503A GPS Receiver
# 27    arc       MSFa         Arcron MSF Receiver
```

When using a local clock you should replace XType with 1.
Otherwise – use this table in order to replace XType with the relevant number as indicated in this table.

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NTP concepts

NTP is constructed from 1 daemon named: **xnptd**
This daemon is responsible for the following:

1. If configured as a NTP server –
    a. advertises every 64 seconds to a multicast address 224.0.1.1 a message that it is an NTP server.
    b. sends replies for time requests with the currnet UTC time

2. If configured as a NTP client –
    a. sends requests for time, the request will include the current time of the client.
    b. Compares the round trip time of the packet (RTT) between itself and the NTP server, in order to reduce it from the offered time by the NTP server.
    c. Uses the UTC time offered by the server.

NTP configuration files

/etc/inet/ntp.client – a template NTP client file.
/etc/inet/ntp.server – a template NTP server file.
/etc/inet/ntp.conf – the main NTP configuration file. This file can be a copy of the ntp.client or ntp.server files. This file is a prequisisit for starting the xntpd daemon.
/var/ntp/ntp.drift – a file which contains the drift from a local NTP server.

NTP daemon and relevant commands

Solaris 8,9:
/etc/init.d/xntpd or **/etc/rc2.d/S74xntpd** – starter scripts to start or stop NTP at boot time or manual operation.
Solaris 10:
FMRI - svc:/network/ntp:default
svcadm enable ntp
svcadm disable ntp

snoop | grep –i ntp - enables to sniffer ntp messages vie the network.

Alternatively there is also the **/usr/ucb/rdate** command for synchronization between old clients and a server that doesn't support the NTP protocol.

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NTP Server configuration

Step 1: Create /etc/inet/ntp.conf – the main NTP configuration file.
Copy /etc/inet/ntp.server to be /etc/inet/ntp.conf by typing:

```
cp /etc/inet/ntp.server /etc/inet/ntp.conf
```

Step 2: Edit and change /etc/inet/ntp.conf to meet your needs
Change the following lines in order to enable the NTP service:

```
server 127.127.XType.0 prefer
fudge 127.127.XType.0 stratum 0
```

to be:

```
server 127.127.1.0 prefer
# fudge 127.127.XType.0 stratum 0
```

Step 3: Create an empty /var/ntp/ntp.drift file
Use the command:

```
touch /var/ntp/ntp.drift
```

verify that this file is created using

```
ls –al /var/ntp/ntp.drift
```

Step 4: Start the NTP daemon
Use the command:

```
/etc/init.d/xntpd start
```

On Solaris 10 use:

```
svcadm enable ntp
```

Step 5: Verify that NTP is running
Use the ps or pgrep commands:

```
ps -ef|grep  xntp
```

or

```
pgrep -lf xntp
```

You should expect the following output:

```
1565 /usr/lib/inet/xntpd
```

Step 6: verify that NTP multicast messages are advertised:

```
snoop|grep –i ntp
```

Step 7: Determine ntp peers –
You can use the following ntpq utility:

```
ntpq
ntpq> peers
```

Expected output should be:

```
remote refid st t when poll reach delay offset disp
=======================================================
*LOCAL(0) LOCAL(0) 3 l 36 64 377 0.00 0.000 10.06
224.0.1.1 0.0.0.0 16 - - 64 0 0.00 0.000 16000.0
ntpq>
```

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```
ntpq> exit
```

NTP client configuration

Step 1: Create /etc/inet/ntp.conf – the main NTP configuration file.
Copy /etc/inet/ntp.client to be /etc/inet/ntp.conf by typing:

```
cp /etc/inet/ntp.client /etc/inet/ntp.conf
```

Step 2: Edit and change /etc/inet/ntp.conf to meet your needs
Change the following lines in order to enable the NTP service:

```
multicastclient 224.0.1.1
```

to be:

```
server <IP-Address-of-NTP-server>
```

Step 3: Start the NTP daemon
Use the command:

```
/etc/init.d/xntpd start
```

On Solaris 10 use:

```
svcadm enable ntp
```

Step 4: Verify that NTP is running
Use the ps or pgrep commands:

```
ps -ef|grep  xntp
```

or

```
pgrep -lf xntp
```

You should expect the following output:

```
1689 /sbin/sh /etc/init.d/xntpd start
1690 /usr/sbin/ntpdate -s -w -m 224.0.1.1
```

Step 5: verify that NTP multicast messages are advertised:

```
snoop|grep –i ntp
```

Step 6: Determine ntp peers –
You can use the following ntpq utility:

```
ntpq
ntpq> peers
```

Expected output should be:

```
ntpq> peers
remote refid st t when poll reach delay offset disp
=========================================================
*10.0.0.5 LCL. 1 u 57  128  377   0.76 -0.075  0.05
ntpq>
ntpq> exit
```

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