

Лабораторная работа №12

Тема «Синхронизация времени»

по дисциплине «Администрирование сетевых подсистем»

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Цель работы:

Получение навыков по управлению системным временем и настройке синхронизации времени.

Задание

1. Изучить команды по настройке параметров времени.
2. Настроить сервер в качестве сервера синхронизации времени для локальной сети.
3. Написать скрипты для Vagrant, фиксирующие действия по установке и настройке NTP-сервера и клиента.

Выполнение работы

Настройка параметров времени

```
mrshcherbak@client:~  
[mrshcherbak@client.mrshcherbak.net ~]$ timedatectl  
    Local time: Thu 2023-12-07 20:51:26 UTC  
    Universal time: Thu 2023-12-07 20:51:26 UTC  
    RTC time: Thu 2023-12-07 20:51:26  
    Time zone: UTC (UTC, +0000)  
System clock synchronized: yes  
    NTP service: active  
    RTC in local TZ: no  
[mrshcherbak@client.mrshcherbak.net ~]$ timedatectl set-timezone Europe/Moscow  
[mrshcherbak@client.mrshcherbak.net ~]$ timedatectl | grep "Time zone"  
    Time zone: Europe/Moscow (MSK, +0300)  
[mrshcherbak@client.mrshcherbak.net ~]$ timedatectl | grep "NTP service"  
    NTP service: active  
[mrshcherbak@client.mrshcherbak.net ~]$
```

Просмотр параметров настройки даты и времени на клиенте

Просмотр параметров настройки даты и времени на сервере

```
[mrshcherbak@server.mrshcherbak.net ~]$ timedatectl  
    Local time: Thu 2023-12-07 20:51:37 UTC  
    Universal time: Thu 2023-12-07 20:51:37 UTC  
    RTC time: Thu 2023-12-07 20:51:38  
    Time zone: UTC (UTC, +0000)  
System clock synchronized: yes  
    NTP service: active  
    RTC in local TZ: no  
[mrshcherbak@server.mrshcherbak.net ~]$ timedatectl list-timezones  
Africa/Abidjan  
Africa/Accra  
Africa/Addis_Ababa  
Africa/Algiers  
Africa/Asmara  
Africa/Asmera  
Africa/Bamako  
Africa/Bangui  
Africa/Banjul  
Africa/Bissau  
Africa/Blantyre  
Africa/Brazzaville  
Africa/Bujumbura  
Africa/Cairo  
Africa/Casablanca  
Africa/Ceuta  
Africa/Conakry  
Africa/Dakar  
Africa/Dar_es_Salaam  
Africa/Djibouti  
Africa/Douala  
Africa/El_Aaiun  
Africa/Freetown  
lines 1-23...skipping...  
Africa/Abidjan
```

```

[mrshcherbak@client.mrshcherbak.net ~]$ date
Fri Dec  8 12:01:09 AM MSK 2023
[mrshcherbak@client.mrshcherbak.net ~]$ date +%T
00:01:15
[mrshcherbak@client.mrshcherbak.net ~]$ date +%D
12/08/23
[mrshcherbak@client.mrshcherbak.net ~]$ date -d "tomorrow"
Sat Dec  9 12:01:29 AM MSK 2023
[mrshcherbak@client.mrshcherbak.net ~]$ date -d "next Friday"
Fri Dec 15 12:00:00 AM MSK 2023
[mrshcherbak@client.mrshcherbak.net ~]$ date -d "3 year ago"
Tue Dec  8 12:01:39 AM MSK 2020
[mrshcherbak@client.mrshcherbak.net ~]$ date -d "yesterday"
Thu Dec  7 12:01:54 AM MSK 2023
[mrshcherbak@client.mrshcherbak.net ~]$ date -r /etc/hosts
Thu Dec  7 10:19:02 PM MSK 2023
[mrshcherbak@client.mrshcherbak.net ~]$ 

```

Просмотр параметров команды date на клиенте

```

[root@server.mrshcherbak.net server]# date -R
Fri, 08 Dec 2023 00:47:52 +0300
[root@server.mrshcherbak.net server]# date -u
Thu Dec  7 09:48:16 PM UTC 2023
[root@server.mrshcherbak.net server]# date +%a
Fri
[root@server.mrshcherbak.net server]# date +%A
Friday
[root@server.mrshcherbak.net server]# date +%d
08
[root@server.mrshcherbak.net server]# date +%D
12/08/23
[root@server.mrshcherbak.net server]# date +%H
00

```

Просмотр параметров команды date на сервере

```

[mrshcherbak@client.mrshcherbak.net ~]$ sudo -i
[root@client.mrshcherbak.net ~]# hwclock
2023-12-08 00:03:14.913504+03:00
[root@client.mrshcherbak.net ~]# 

```

```

[root@server.mrshcherbak.net ~]# hwclock
2023-12-08 00:03:25.856017+03:00
[root@server.mrshcherbak.net ~]# 

```

Управление синхронизацией времени

```
[root@server.mrshcherbak.net ~]# dnf -y install chrony
Rocky Linux 9 - BaseOS                    5.1 kB/s | 4.1 kB    00:00
Rocky Linux 9 - AppStream                  10 kB/s | 4.5 kB    00:00
Rocky Linux 9 - Extras                     6.5 kB/s | 2.9 kB    00:00
Package chrony-4.3-1.el9.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[root@server.mrshcherbak.net ~]# chronyc sources
MS Name/IP address         Stratum Poll Reach LastRx Last sample
=====
^~ 195.133.23.209           2   8   377   152   +405us[ +128us] +/-   53ms
^* ntp1.doorhan.ru          2   8   377    81   -278us[ -572us] +/-  5271us
^~ dot.kkursor.ru           2   7   377    17   -3306us[-3306us] +/-   49ms
^~ time.cloudflare.com       3   7   377    79   +675us[ +675us] +/-   12ms
[root@server.mrshcherbak.net ~]# mc
```

Установка ПО и проверка источников времени на сервере

```
[root@client.mrshcherbak.net ~]# chronyc sources
MS Name/IP address         Stratum Poll Reach LastRx Last sample
=====
^* time.cloudflare.com       3   7   373   125   -1150us[-1614us] +/-   12ms
^~ ns.iitp.ru                2   8   377    56   -1932us[-1932us] +/-   32ms
^~ atomail.ru                2   6   377    58   -1649us[-1649us] +/-   26ms
^~ ns.aksinet.net            2   8   377   190    +181us[ -264us] +/-   43ms
[root@client.mrshcherbak.net ~]# mc
```

Проверка источников времени на клиенте

```
mc [root@server.mrshcherbak.net]:/etc
chrony.conf [BM--] 0 L: [ 21+ 5 26/ 51] *(740 /1369b) 0097 0x061 [*][X]
# Increase the minimum number of selectable sources required to adjust
# the system clock.
#minsources 2

# Allow NTP client access from local network.
allow 192.168.0.0/16

# Serve time even if not synchronized to a time source.
#local stratum 10
```

Редактирование файла /etc/chrony.conf

```
[root@server.mrshcherbak.net etc]# systemctl restart chronyd
[root@server.mrshcherbak.net etc]# firewall-cmd --add-service=ntp --permanent
success
[root@server.mrshcherbak.net etc]# firewall-cmd --reload
success
[root@server.mrshcherbak.net etc]#
```

Редактирование файла /etc/chrony.conf

```
mc [root@client.mrshcherbak.net]:/etc
chrony.conf [B---] 0 L:[ 1+ 3 4/ 52] *(159 /1408b) 0115 0x073
# Use public servers from the pool.ntp.org project.
# Please consider joining the pool (https://www.pool.ntp.org/join.html).
#pool 2.rocky.pool.ntp.org iburst
server server.mrshcherbak.net iburst

# Use NTP servers from DHCP.
sourcedir /run/chrony-dhcp

# Record the rate at which the system clock gains/losses time.
```

Проверка источников времени на сервере

```
[root@server.mrshcherbak.net etc]# chronyc sources
MS Name/IP address          Stratum Poll Reach LastRx Last sample
=====
^* dynamicip-176-215-178-23> 2 6 377 33 +2491us[+2493us] +/- 51ms
^+ bitstay.ru                2 6 377 30 -8365us[-8365us] +/- 84ms
^+ dot.kkursor.ru            2 6 377 34 -9724us[-9723us] +/- 59ms
^+ broadband-77-37-138-237.> 2 6 377 36 +11ms[ +11ms] +/- 57ms
```

```
[root@server.mrshcherbak.net etc]# chronyc tracking
Reference ID      : B0D7B2EF (dynamicip-176-215-178-239.pppoe.oren.ertelecom.ru)
Stratum          : 3
Ref time (UTC)   : Thu Dec 07 21:21:49 2023
System time      : 0.000001556 seconds slow of NTP time
Last offset      : +0.002015828 seconds
RMS offset       : 0.002015828 seconds
Frequency        : 497.273 ppm slow
Residual freq    : +468.128 ppm
Skew             : 0.730 ppm
Root delay       : 0.008154252 seconds
Root dispersion  : 0.081799611 seconds
Update interval  : 1.8 seconds
Leap status      : Normal

[root@server.mrshcherbak.net etc]# chronyc tracking
Reference ID      : C0248F82 (Time100.Stupi.SE)
Stratum          : 2
Ref time (UTC)   : Thu Dec 07 21:23:59 2023
System time      : 0.000001622 seconds fast of NTP time
Last offset      : -0.003694971 seconds
RMS offset       : 0.003694971 seconds
Frequency        : 497.258 ppm slow
Residual freq    : +12.592 ppm
Skew             : 1.437 ppm
Root delay       : 0.027759047 seconds
Root dispersion  : 0.001683930 seconds
Update interval  : 2.7 seconds
Leap status      : Normal
```

Подробная информация о
синхронизации

```
[root@client.mrshcherbak.net client]# chronyc sources
MS Name/IP address      Stratum Poll Reach LastRx Last sample
=====
^* dhcp.mrshcherbak.net      3    6   377   42  +559us[+2807us] +/- 5802us

[root@client.mrshcherbak.net client]# chronyc tracking
Reference ID      : C0A80101 (www.mrshcherbak.net)
Stratum          : 4
Ref time (UTC)   : Thu Dec 07 22:23:31 2023
System time      : 0.000000654 seconds slow of NTP time
Last offset      : +0.002248202 seconds
RMS offset       : 0.000735939 seconds
Frequency        : 493.689 ppm slow
Residual freq    : +8.801 ppm
Skew             : 6.526 ppm
Root delay       : 0.006567922 seconds
Root dispersion  : 0.003991795 seconds
Update interval  : 65.1 seconds
Leap status      : Normal
[root@client.mrshcherbak.net client]#
```

Проверка источников времени на
клиенте и подробная информация о
синхронизации

Подробная информация о синхронизации

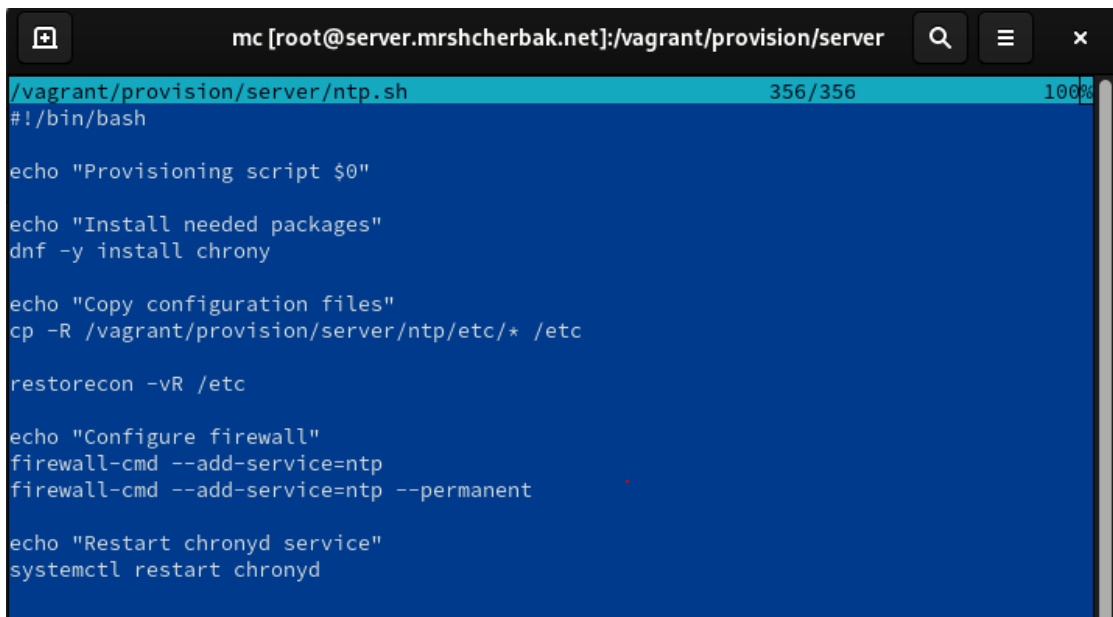
```
[root@client.mrshcherbak.net client]# chronyc tracking
Reference ID      : C0A80101 (mail.mrshcherbak.net)
Stratum          : 4
Ref time (UTC)   : Thu Dec 07 22:24:36 2023
System time      : 0.000001253 seconds fast of NTP time
Last offset      : -0.001128380 seconds
RMS offset       : 0.000784073 seconds
Frequency        : 493.131 ppm slow
Residual freq    : +2.420 ppm
Skew             : 10.873 ppm
Root delay       : 0.006567922 seconds
Root dispersion  : 0.005350320 seconds
Update interval  : 64.7 seconds
Leap status      : Normal

[root@client.mrshcherbak.net client]# chronyc tracking
Reference ID      : C0A80101 (www.mrshcherbak.net)
Stratum          : 4
Ref time (UTC)   : Thu Dec 07 22:24:36 2023
System time      : 0.000001253 seconds fast of NTP time
Last offset      : -0.001128380 seconds
RMS offset       : 0.000784073 seconds
Frequency        : 493.131 ppm slow
Residual freq    : +2.420 ppm
Skew             : 10.873 ppm
Root delay       : 0.006567922 seconds
Root dispersion  : 0.005383510 seconds
Update interval  : 64.7 seconds
Leap status      : Normal

[root@client.mrshcherbak.net client]# chronyc tracking
Reference ID      : C0A80101 (server.mrshcherbak.net)
Stratum          : 4
Ref time (UTC)   : Thu Dec 07 22:24:36 2023
System time      : 0.000001253 seconds fast of NTP time
Last offset      : -0.001128380 seconds
RMS offset       : 0.000784073 seconds
Frequency        : 493.131 ppm slow
Residual freq    : +2.420 ppm
Skew             : 10.873 ppm
Root delay       : 0.006567922 seconds
Root dispersion  : 0.005405623 seconds
Update interval  : 64.7 seconds
Leap status      : Normal
```

Внесение изменений в настройки внутреннего окружения виртуальных машин

```
[root@server.mrshcherbak.net etc]# cd /vagrant/provision/server
[root@server.mrshcherbak.net server]# mkdir -p /vagrant/provision/server/ntp/etc
[root@server.mrshcherbak.net server]# cp -R /etc/chrony.conf /vagrant/provision/server/ntp/etc/
[root@server.mrshcherbak.net server]# cd /vagrant/provision/server
[root@server.mrshcherbak.net server]# touch ntp.sh
[root@server.mrshcherbak.net server]# chmod +x ntp.sh
[root@server.mrshcherbak.net server]# mc
```

A screenshot of a terminal window titled 'mc [root@server.mrshcherbak.net]:/vagrant/provision/server'. The terminal shows the content of the file '/vagrant/provision/server/ntp.sh'. The file content includes a shebang line, an echo statement for provisioning script identification, an echo for installing packages, a dnf command to install chrony, an echo for copying configuration files, a cp command to copy /etc/chrony.conf to the ntp/etc directory, a restorecon command, an echo for configuring the firewall, two firewall-cmd commands to add the ntp service permanently, an echo for restarting the chronyd service, and a systemctl restart command.

```
mc [root@server.mrshcherbak.net]:/vagrant/provision/server
/vagrant/provision/server/ntp.sh 356/356 100%
#!/bin/bash

echo "Provisioning script $0"

echo "Install needed packages"
dnf -y install chrony

echo "Copy configuration files"
cp -R /vagrant/provision/server/ntp/etc/* /etc

restorecon -vR /etc

echo "Configure firewall"
firewall-cmd --add-service=ntp
firewall-cmd --add-service=ntp --permanent

echo "Restart chronyd service"
systemctl restart chronyd
```

Содержимое файла ntp.sh на сервере

```
[root@client.mrshcherbak.net etc]# cd /vagrant/provision/client
[root@client.mrshcherbak.net client]# mkdir -p /vagrant/provision/client/ntp/etc
[root@client.mrshcherbak.net client]# cp -R /etc/chrony.conf /vagrant/provision/client/ntp/etc/
[root@client.mrshcherbak.net client]# cd /vagrant/provision/client
[root@client.mrshcherbak.net client]# touch ntp.sh
[root@client.mrshcherbak.net client]# chmod +x ntp.sh
[root@client.mrshcherbak.net client]# mc
```

```
mc [root@client.mrshcherbak.net]:/vagrant/provision/client
/vagrant/provision/client/ntp.sh 201/201
#!/bin/bash

echo "Provisioning script $0"

echo "Copy configuration files"
cp -R /vagrant/provision/client/ntp/etc/* /etc

restorecon -vR /etc

echo "Restart chronyd service"
systemctl restart chronyd
```

Содержимое файла ntp.sh на клиенте

```
*C:\Work\mrshcherbak\vagrant\Vagrantfile - Notepad++
Файл  Правка  Поиск  Вид  Кодировки  Синтаксисы  Опции  Инструменты  Макросы  За
Vagrantfile
67
68     server.vm.provision "server mail",
69                         type: "shell",
70                         preserve_order: true,
71                         path: "provision/server/mail.sh"
72
73     server.vm.provision "server ssh",
74                         type: "shell",
75                         preserve_order: true,
76                         path: "provision/server/ssh.sh"
77
78     server.vm.provision "server ntp",
79                         type: "shell",
80                         preserve_order: true,
81                         path: "provision/server/ntp.sh"
82
83
84     server.vm.provider :virtualbox do |v|
85         v.linked_clone = true
86         # Customize the amount of memory on the VM
87         v.memory = 1024
88         v.cpus = 1
89         v.name = "server"
```

Редактирование файла Vagrantfile

```
118         preserve_order: true,
119         path: "provision/client/01-dummy.sh"
120
121     client.vm.provision "client routing",
122         type: "shell",
123         preserve_order: true,
124         run: "always",
125         path: "provision/client/01-routing.sh"
126
127     client.vm.provision "client mail",
128         type: "shell",
129         preserve_order: true,
130         path: "provision/client/mail.sh"
131
132     client.vm.provision "client ntp",
133         type: "shell",
134         preserve_order: true,
135         path: "provision/client/ntp.sh"
136
137
138     client.vm.provider :virtualbox do |v|
139         v.linked_clone = true
140         # Customize the amount of memory on the VM
141         v.memory = 1024
142         v.cpus = 1
```

Вывод: таким образом, в ходе выполнения л/р №12 я получила навыки по управлению системным временем и настройке синхронизации времени.