

Лабораторная работа № 12

Синхронизация времени

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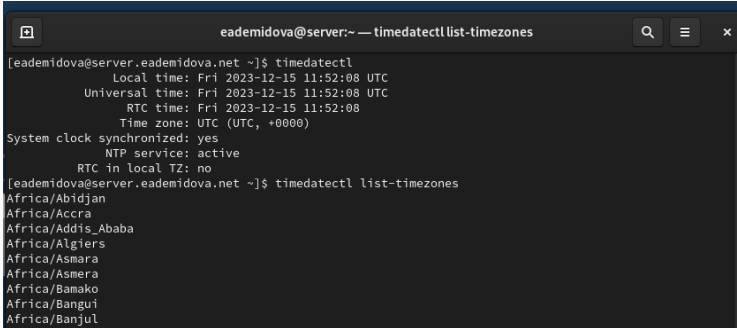
Вводная часть

Приобретение практических навыков по управлению системным временем и настройке синхронизации времени.

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

Выполнение лабораторной работы

Настройка параметров времени

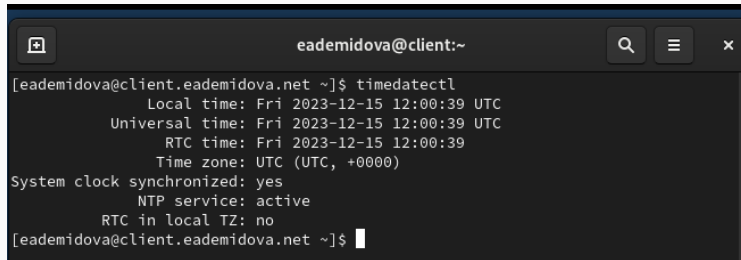
A terminal window titled "eademidova@server:~ — timedatectl list-timezones". The window shows the output of the "timedatectl" command, which displays the current system time and time zone settings. Below that, the output of "timedatectl list-timezones" is shown, listing various time zones starting with "Africa/".

```
eademidova@server:~ — timedatectl list-timezones

[eademidova@server.eademidova.net ~]$ timedatectl
          Local time: Fri 2023-12-15 11:52:08 UTC
          Universal time: Fri 2023-12-15 11:52:08 UTC
            RTC time: Fri 2023-12-15 11:52:08
            Time zone: UTC (UTC, +0000)
System clock synchronized: yes
              NTP service: active
          RTC in local TZ: no

[eademidova@server.eademidova.net ~]$ timedatectl list-timezones
Africa/Abidjan
Africa/Accra
Africa/Addis_Ababa
Africa/Algiers
Africa/Asmara
Africa/Asmera
Africa/Bamako
Africa/Bangui
Africa/Banjul
```

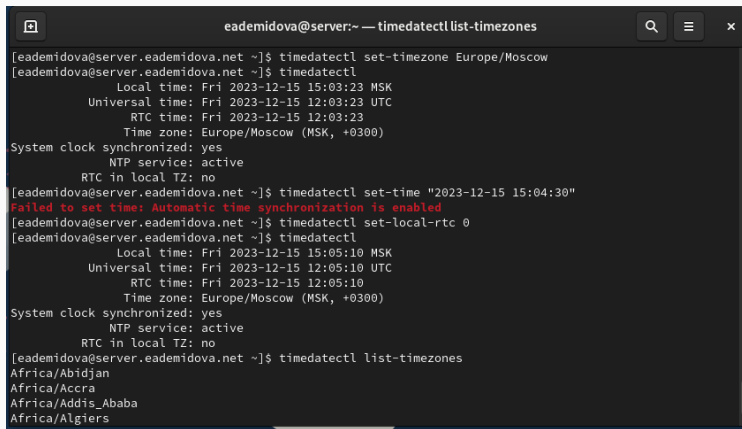
Рис. 1: Команда timedatectl на сервере



```
eademidova@client:~  
[eademidova@client.eademidova.net ~]$ timedatectl  
    Local time: Fri 2023-12-15 12:00:39 UTC  
    Universal time: Fri 2023-12-15 12:00:39 UTC  
          RTC time: Fri 2023-12-15 12:00:39  
        Time zone: UTC (UTC, +0000)  
System clock synchronized: yes  
          NTP service: active  
        RTC in local TZ: no  
[eademidova@client.eademidova.net ~]$
```

Рис. 2: Команда timedatectl на клиенте

Настройка параметров времени



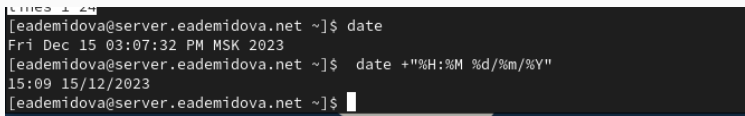
```
eademidova@server:~ — timedatectl list-timezones

[eademidova@server.eademidova.net ~]$ timedatectl set-timezone Europe/Moscow
[eademidova@server.eademidova.net ~]$ timedatectl
          Local time: Fri 2023-12-15 15:03:23 MSK
          Universal time: Fri 2023-12-15 12:03:23 UTC
             RTC time: Fri 2023-12-15 12:03:23
             Time zone: Europe/Moscow (MSK, +0300)
System clock synchronized: yes
              NTP service: active
          RTC in local TZ: no

[eademidova@server.eademidova.net ~]$ timedatectl set-time "2023-12-15 15:04:30"
Failed to set time: Automatic time synchronization is enabled
[eademidova@server.eademidova.net ~]$ timedatectl set-local-rtc 0
[eademidova@server.eademidova.net ~]$ timedatectl
          Local time: Fri 2023-12-15 15:05:10 MSK
          Universal time: Fri 2023-12-15 12:05:10 UTC
             RTC time: Fri 2023-12-15 12:05:10
             Time zone: Europe/Moscow (MSK, +0300)
System clock synchronized: yes
              NTP service: active
          RTC in local TZ: no

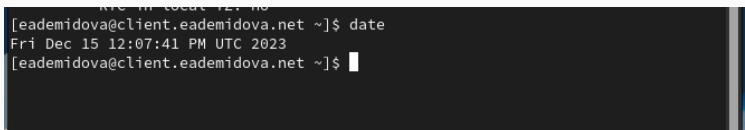
[eademidova@server.eademidova.net ~]$ timedatectl list-timezones
Africa/Abidjan
Africa/Accra
Africa/Addis_Ababa
Africa/Algiers
```

Рис. 3: Разные применения команды timedatectl

A terminal window with a dark background and light-colored text. The prompt is [eademidova@server.eademidova.net ~]. The first command is 'date', which outputs 'Fri Dec 15 03:07:32 PM MSK 2023'. The second command is 'date +"%H:%M %d/%m/%Y"', which outputs '15:09 15/12/2023'. The prompt is shown again at the end of the output.

```
[eademidova@server.eademidova.net ~]$ date
Fri Dec 15 03:07:32 PM MSK 2023
[eademidova@server.eademidova.net ~]$ date +"%H:%M %d/%m/%Y"
15:09 15/12/2023
[eademidova@server.eademidova.net ~]$
```

Рис. 4: Просмотр текущего системного времени на сервере

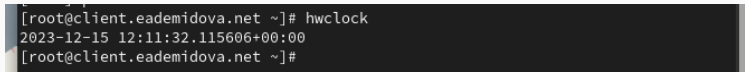
A terminal window with a dark background and light gray text. The prompt is [eademidova@client.eademidova.net ~]\$. The command 'date' has been entered and executed, resulting in the output 'Fri Dec 15 12:07:41 PM UTC 2023'. The prompt is now [eademidova@client.eademidova.net ~]\$ followed by a cursor.

```
[eademidova@client.eademidova.net ~]$ date  
Fri Dec 15 12:07:41 PM UTC 2023  
[eademidova@client.eademidova.net ~]$
```

Рис. 5: Просмотр текущего системного времени на клиенте

```
[root@server.eademidova.net ~]# hwclock  
2023-12-15 15:11:08.014501+03:00  
[root@server.eademidova.net ~]#
```

Рис. 6: Просмотр аппаратного времени на сервере

A terminal window with a dark background. The prompt is [root@client.eademidova.net ~]#. The command hwclock has been entered, and the output is 2023-12-15 12:11:32.115606+00:00. The prompt is repeated below the output.

```
[root@client.eademidova.net ~]# hwclock
2023-12-15 12:11:32.115606+00:00
[root@client.eademidova.net ~]#
```

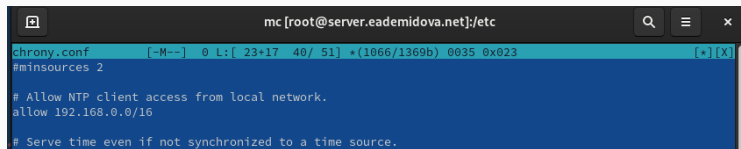
Рис. 7: Просмотр аппаратного времени на клиенте

```
[root@server.eademidova.net ~]# dnf -y install chrony
Extra Packages for Enterprise Linux 9 - x86_64          7.0 kB/s | 24 kB    00:03
Extra Packages for Enterprise Linux 9 - x86_64        534 kB/s | 20 MB    00:37
Rocky Linux 9 - BaseOS                               237 B/s | 4.1 kB    00:17
Rocky Linux 9 - BaseOS                               1.1 MB/s | 2.2 MB    00:02
Rocky Linux 9 - AppStream                             12 kB/s | 4.5 kB    00:00
Rocky Linux 9 - AppStream                            1.8 MB/s | 7.4 MB    00:04
Rocky Linux 9 - Extras                               192 B/s | 2.9 kB    00:15
Package chrony-4.3-1.el9.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[root@server.eademidova.net ~]# chronyc sources
MS Name/IP address         Stratum Poll Reach LastRx Last sample
=====
^+ 176.215.178.239          2   6   377    54  -5831us[-5831us] +/- 29ms
^~ ntp.truenetwork.ru       2   7   377   124 -3765us[-4921us] +/- 68ms
^* time.cloudflare.com      3   6   377    68 +2971us[+1781us] +/- 23ms
^+ mail.keks-books.ru       2   7   377    72 -3751us[-3751us] +/- 40ms
[root@server.eademidova.net ~]#
```

Рис. 8: Просмотр источников времени на сервере

```
[root@client.eademidova.net ~]# chronyc sources
MS Name/IP address          Stratum Poll Reach LastRx Last sample
=====
^+ 37.79.216.163             2    6   377    46  -5189us[-5032us] +/-  69ms
^+ ns2.egov66.ru             2    7   377    55  +1456us[+1612us] +/-  63ms
^* cello.corbina.net         2    6   377    57   +965us[+1122us] +/-  27ms
^+ 213.234.203.30            2    7   377    62  +4466us[+4623us] +/-  76ms
[root@client.eademidova.net ~]# cd /etc/
[root@client.eademidova.net etc]# mc
```

Рис. 9: Просмотр источников времени на клиенте



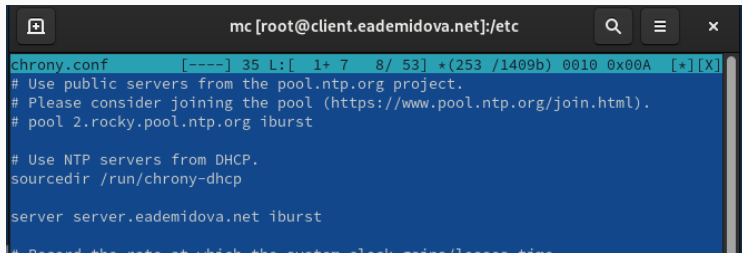
The image shows a terminal window with a dark background. The title bar at the top reads 'mc [root@server.eademidova.net]:/etc'. The terminal content shows the configuration file 'chrony.conf' being edited. The visible lines are: '#minsources 2', '# Allow NTP client access from local network.', 'allow 192.168.0.0/16', and '# Serve time even if not synchronized to a time source.' The line 'allow 192.168.0.0/16' is highlighted in blue. The terminal window has standard icons for search, menu, and close on the right side of the title bar.

```
mc [root@server.eademidova.net]:/etc
chrony.conf [-M--] 0 L:[ 23+17 40/ 51] *(1066/1369b) 0035 0x023 [*] [X]
#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.
```

Рис. 10: Разрешение NTP работать из локальной сети



```
mc [root@client.eademidova.net]:/etc
chrony.conf [----] 35 L:[ 1+ 7 8/ 53] *(253 /1409b) 0010 0x00A [*][X]
# 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

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

server server.eademidova.net iburst

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

Рис. 11: Настройка сервера в качестве сервера синхронизации времени


```
[root@server.eademidova.net etc]# chronyc sources
MS Name/IP address             Stratum Poll Reach LastRx Last sample
=====
^+ dynamicip-176-215-178-23>    2   6   377   21  +4447us[+4447us] +/-  32ms
^- 213.171.14.58                2   6   377   21  +357us[ +357us] +/-  59ms
^* 89.221.207.113               2   6   377   85  -2591us[-2559us] +/-  20ms
^+ rnis-app2.rnis66.ru          2   6   377   30  +789us[ +789us] +/-  35ms

[root@server.eademidova.net etc]# chronyc tracking
Reference ID    : 59DDCF71 (89.221.207.113)
Stratum        : 3
Ref time (UTC) : Fri Dec 15 12:36:23 2023
System time    : 0.000436605 seconds fast of NTP time
Last offset    : +0.000032592 seconds
RMS offset     : 0.024411930 seconds
Frequency      : 10.751 ppm fast
Residual freq  : -0.029 ppm
Skew           : 6.614 ppm
Root delay     : 0.037751257 seconds
Root dispersion: 0.001927930 seconds
Update interval: 64.4 seconds
Leap status    : Normal

[root@server.eademidova.net etc]# cd /vagrant/provision/server
```

Рис. 12: Просмотр источников времени на сервере

```
[root@client.eademidova.net etc]# chronyc sources
MS Name/IP address         Stratum Poll Reach LastRx Last sample
=====
^? mail.eademidova.net      3      6      1      2    +37us[ +37us] +/-  21ms

[root@client.eademidova.net etc]# chronyc tracking
Reference ID      : C0A80101 (dhcp.eademidova.net)
Stratum          : 4
Ref time (UTC)   : Fri Dec 15 12:37:39 2023
System time      : 0.000000096 seconds slow of NTP time
Last offset      : +0.000082352 seconds
RMS offset       : 0.000082352 seconds
Frequency        : 9.379 ppm fast
Residual freq    : +0.306 ppm
Skew             : 7.981 ppm
Root delay       : 0.038036201 seconds
Root dispersion  : 0.002194976 seconds
Update interval  : 2.0 seconds
Leap status      : Normal

[root@client.eademidova.net etc]# mc

[root@client.eademidova.net etc]#
```

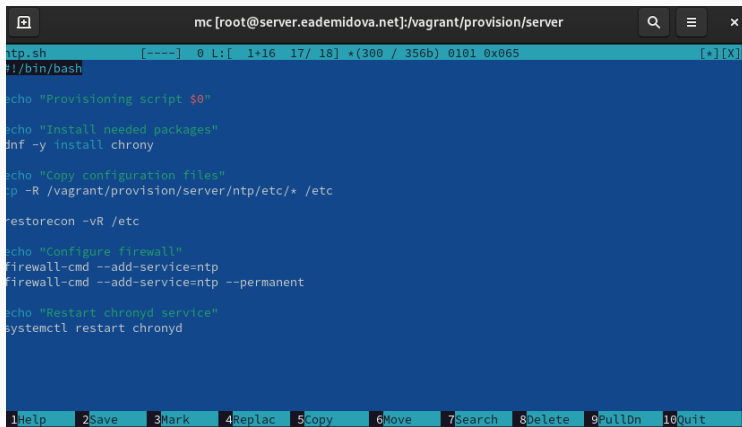
Рис. 13: Просмотр источников времени на клиенте

Внесение изменений в настройки внутреннего окружения виртуальной машины

```
leap status      : Normal
[root@server.eademidova.net etc]# cd /vagrant/provision/server
[root@server.eademidova.net server]# mkdir -p /vagrant/provision/server/ntp/etc
[root@server.eademidova.net server]# cp -R /etc/chrony.conf /vagrant/provision/server/ntp/etc/
[root@server.eademidova.net server]# cd /vagrant/provision/server
[root@server.eademidova.net server]# touch ntp.sh
[root@server.eademidova.net server]# chmod +x ntp.sh
[root@server.eademidova.net server]#
```

Рис. 14: Создание окружения для внесения изменений в настройки окружающей среды

Внесение изменений в настройки внутреннего окружения виртуальной машины



The screenshot shows a terminal window titled "mc [root@server.eademidova.net]:/vagrant/provision/server". The terminal displays the execution of a script named "ntp.sh". The script performs several tasks: it echoes the script name, installs the chrony package using dnf, copies configuration files from the vagrant directory to /etc, restores the chrony service, configures the firewall to allow NTP traffic, and restarts the chronyd service. The terminal output is as follows:

```
mc [root@server.eademidova.net]:/vagrant/provision/server
ntp.sh [----] 0 L:[ 1+16 17/ 18] *(300 / 356b) 0101 0x065 [*] [X]
#!/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

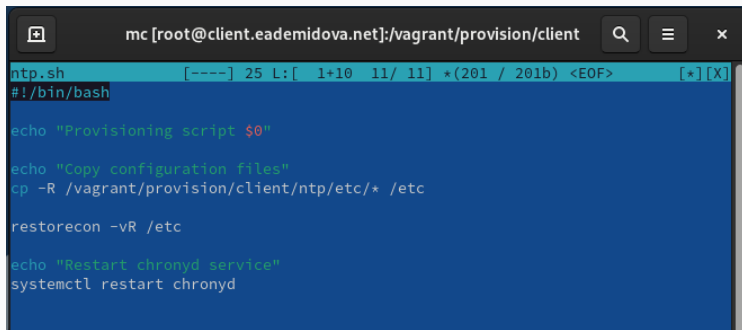
echo "Configure firewall"
firewall-cmd --add-service=ntp
firewall-cmd --add-service=ntp --permanent

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

At the bottom of the terminal window, there is a navigation bar with the following options: 1Help, 2Save, 3Mark, 4Replac, 5Copy, 6Move, 7Search, 8Delete, 9PullDn, 10Quit.

Рис. 15: Скрипта файла /vagrant/provision/server/ntp.sh

Внесение изменений в настройки внутреннего окружения виртуальной машины



```
mc [root@client.eademidova.net]:/vagrant/provision/client
ntp.sh [-----] 25 L:[ 1+10 11/ 11] *(201 / 201b) <EOF> [*][X]
#!/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
```

Рис. 16: Скрипта файла /vagrant/provision/client/ntp.sh

```
server.vm.provision "server ntp",  
type: "shell",  
preserve_order: true,  
path: "provision/server/ntp.sh"
```

```
client.vm.provision "client ntp",  
type: "shell",  
preserve_order: true,  
path: "provision/client/ntp.sh"
```

Заключение

В результате выполнения данной работы были приобретены практические навыки по управлению системным временем и настройке синхронизации времени.