Лабораторная работа № 12

Синхронизация времени

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2025-11-29

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1. Информация

2. Вводная часть

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4. Выводы

Раздел 1

1. Информация

1.1 Докладчик

- Митрофанов Тимур Александрович

1.1 Докладчик

- Митрофанов Тимур Александрович
- Российский университет дружбы народов им. П. Лумумбы

Раздел 2

2. Вводная часть

2.1 Цели и задачи

Цель - получение навыков по управлению системным временем и настройке синхронизации времени.

1. Изучите команды по настройке параметров времени

2.1 Цели и задачи

Цель - получение 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

2.1 Цели и задачи

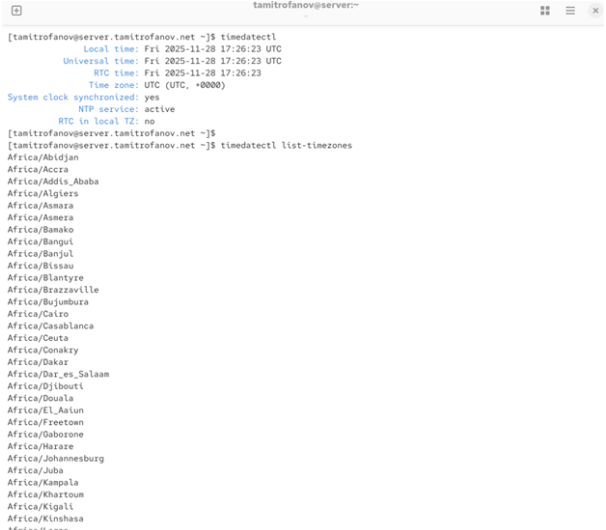
Цель - получение навыков по управлению системным временем и настройке синхронизации времени.

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

Раздел 3

3. Выполнение заданий

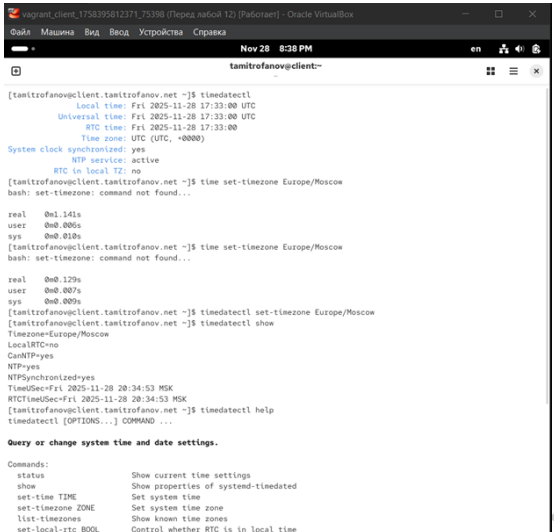
3.1 слайд 1


tamitrofanov@server:~
[tamitrofanov@server.tamitrofanov.net ~]$ timedatectl
Local time: Fri 2025-11-28 17:26:23 UTC
Universal time: Fri 2025-11-28 17:26:23 UTC
RTC time: Fri 2025-11-28 17:26:23
Time zone: UTC (UTC, +0000)
System clock synchronized: yes
NTP service: active
RTC in local TZ: no
[tamitrofanov@server.tamitrofanov.net ~]$
[tamitrofanov@server.tamitrofanov.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
Africa/Gaborone
Africa/Harare
Africa/Johannesburg
Africa/Juba
Africa/Kampala
Africa/Khartoum
Africa/Kigali
Africa/Kinshasa

3.2 слайд 2

```
[tamitrofanov@server.tamitrofanov.net ~]$ timedatectl set-timezone Europe/Moscow
[tamitrofanov@server.tamitrofanov.net ~]$ timedatectl
               Local time: Fri 2025-11-28 20:29:16 MSK
           Universal time: Fri 2025-11-28 17:29:16 UTC
                 RTC time: Fri 2025-11-28 17:29:16
                Time zone: Europe/Moscow (MSK, +0300)
System clock synchronized: yes
              NTP service: active
          RTC in local TZ: no
[tamitrofanov@server.tamitrofanov.net ~]$ timedatectl -?
timedatectl: invalid option -- '?'
[tamitrofanov@server.tamitrofanov.net ~]$ timedatectl help
timedatectl [OPTIONS...] COMMAND ...

Query or change system time and date settings.

Commands:
  status                 Show current time settings
  show                   Show properties of systemd-timedated
  set-time TIME          Set system time
  set-timezone ZONE      Set system time zone
  list-timezones         Show known time zones
  set-local-rtc BOOL     Control whether RTC is in local time
  set-ntp BOOL           Enable or disable network time synchronization

systemd-timesyncd Commands:
  timesync-status        Show status of systemd-timesyncd
  show-timesync          Show properties of systemd-timesyncd
  ntp-servers INTERFACE SERVER…
                         Set the interface specific NTP servers
  revert INTERFACE       Revert the interface specific NTP servers

Options:
  -h --help              Show this help message
     --version           Show package version
     --no-pager          Do not pipe output into a pager
     --no-ask-password   Do not prompt for password
  -H --host=[USER@]HOST  Operate on remote host
  -M --machine=CONTAINER Operate on local container
     --adjust-system-clock Adjust system clock when changing local RTC mode
     --monitor           Monitor status of systemd-timesyncd
```

3.3 слайд 3


vagrant_client_1758395812371_75398 (Перед лабой 12) [Работает] - Oracle VirtualBox
Файл Машина Вид Ввод Устройства Справка
Nov 28 8:38 PM
en
tamitrofanov@client:~
[tamitrofanov@client.tamitrofanov.net ~]$ timedatectl
Local time: Fri 2025-11-28 17:33:00 UTC
Universal time: Fri 2025-11-28 17:33:00 UTC
RTC time: Fri 2025-11-28 17:33:00
Time zone: UTC (UTC, +0000)
System clock synchronized: yes
NTP service: active
RTC in local TZ: no
[tamitrofanov@client.tamitrofanov.net ~]$ time set-timezone Europe/Moscow
bash: set-timezone: command not found...
real 0m1.141s
user 0m0.006s
sys 0m0.010s
[tamitrofanov@client.tamitrofanov.net ~]$ time set-timezone Europe/Moscow
bash: set-timezone: command not found...
real 0m0.129s
user 0m0.007s
sys 0m0.009s
[tamitrofanov@client.tamitrofanov.net ~]$ timedatectl set-timezone Europe/Moscow
[tamitrofanov@client.tamitrofanov.net ~]$ timedatectl show
Timezone=Europe/Moscow
LocalRTC=no
CanNTP=yes
NTP=yes
NTPSynchronized=yes
TimeUSec=Fri 2025-11-28 20:34:53 MSK
RTCTimeUSec=Fri 2025-11-28 20:34:53 MSK
[tamitrofanov@client.tamitrofanov.net ~]$ timedatectl help
timedatectl [OPTIONS...] COMMAND ...
Query or change system time and date settings.
Commands:
status Show current time settings
show Show properties of systemd-timedated
set-time TIME Set system time
set-timezone ZONE Set system time zone
list-timezones Show known time zones
set-local-rtc BOOL Control whether RTC is in local time

3.4 слайд 4

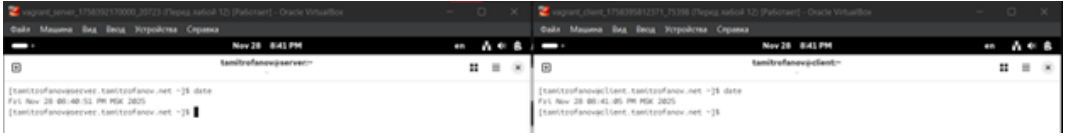


Рисунок 4: Время командой date на сервере и клиенте

3.5 слайд 5

```
[tamitrofanov@server.tamitrofanov.net ~]$ date -R
Fri, 28 Nov 2025 20:43:05 +0300
[tamitrofanov@server.tamitrofanov.net ~]$ date
Fri Nov 28 08:43:09 PM MSK 2025
[tamitrofanov@server.tamitrofanov.net ~]$ date -R
Fri, 28 Nov 2025 20:43:13 +0300
[tamitrofanov@server.tamitrofanov.net ~]$ date +"%Y-%m-%d %H:%M:%S:"
2025-11-28 20:44:00:
[tamitrofanov@server.tamitrofanov.net ~]$
```

Рисунок 5: эксперементы с командой date

3.6 слайд 6

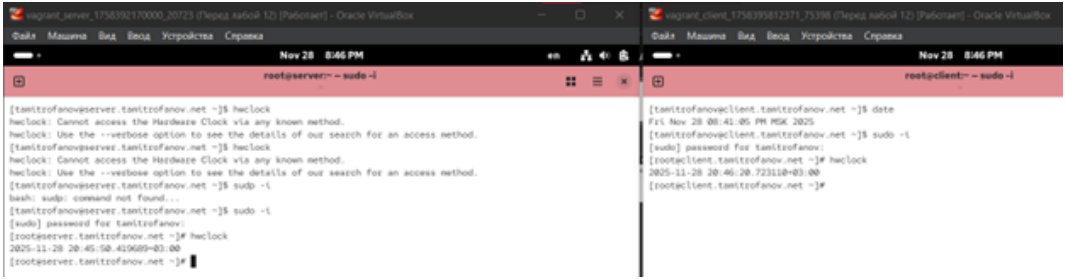
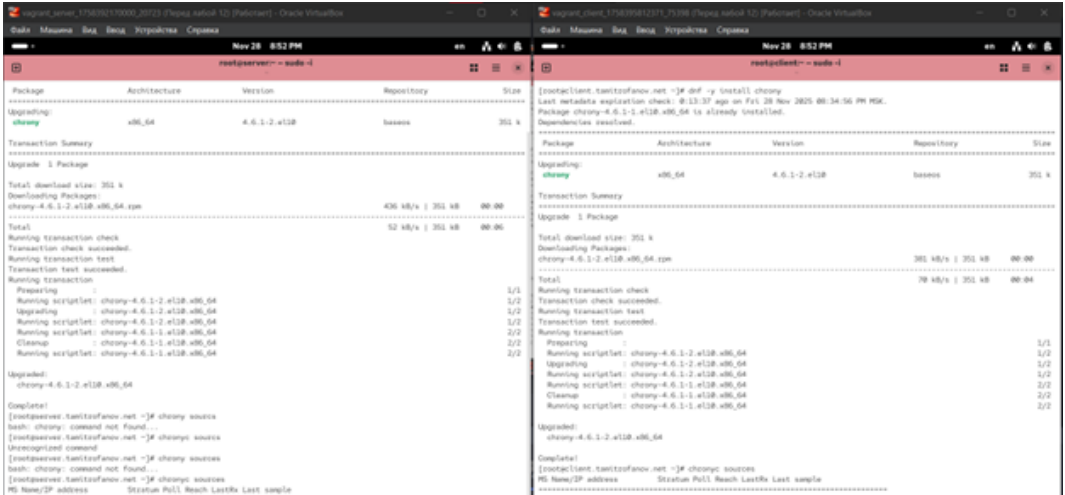


Рисунок 6: Просмотр аппаратного времени через hwclock

3.7 слайд 7


vagrant_server_1758392170000_20723 [Перед кабой 12] [Работает] - Oracle VirtualBox
Файл Машина Вид Ввод Устройства Справка
Nov 28 8:52 PM
root@server:~ - sudo -i
Package Architecture Version Repository Size
Upgrading:
chrony x86_64 4.6.1-2.el10 baseos 351 k
Transaction Summary
Upgrade 1 Package
Total download size: 351 k
Downloading Packages:
chrony-4.6.1-2.el10.x86_64.rpm 436 kB/s | 351 kB 00:00
Total 52 kB/s | 351 kB 00:06
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
Preparing : 1/1
Running scriptlet: chrony-4.6.1-2.el10.x86_64 1/2
Upgrading : chrony-4.6.1-2.el10.x86_64 1/2
Running scriptlet: chrony-4.6.1-2.el10.x86_64 1/2
Running scriptlet: chrony-4.6.1-1.el10.x86_64 2/2
Cleanup : chrony-4.6.1-1.el10.x86_64 2/2
Running scriptlet: chrony-4.6.1-1.el10.x86_64 2/2
Upgraded:
chrony-4.6.1-2.el10.x86_64
Complete!
[root@server.tamitsofanov.net ~]# chrony source
bash: chrony: command not found...
[root@server.tamitsofanov.net ~]# chronyc source
Unrecognized command
[root@server.tamitsofanov.net ~]# chrony sources
bash: chrony: command not found...
[root@server.tamitsofanov.net ~]# chronyc sources
MS Name/IP address Stratum Poll Reach LastRx Last sample
vagrant_client_1758395812371_75398 [Перед кабой 12] [Работает] - Oracle VirtualBox
Файл Машина Вид Ввод Устройства Справка
Nov 28 8:52 PM
root@client:~ - sudo -i
[root@client.tamitsofanov.net ~]# dnf -y install chrony
Last metadata expiration check: 0:13:37 ago on Fri 28 Nov 2025 08:34:56 PM MSK.
Package chrony-4.6.1-1.el10.x86_64 is already installed.
Dependencies resolved.
Package Architecture Version Repository Size
Upgrading:
chrony x86_64 4.6.1-2.el10 baseos 351 k
Transaction Summary
Upgrade 1 Package
Total download size: 351 k
Downloading Packages:
chrony-4.6.1-2.el10.x86_64.rpm 301 kB/s | 351 kB 00:00
Total 70 kB/s | 351 kB 00:04
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
Preparing : 1/1
Running scriptlet: chrony-4.6.1-2.el10.x86_64 1/2
Upgrading : chrony-4.6.1-2.el10.x86_64 1/2
Running scriptlet: chrony-4.6.1-2.el10.x86_64 1/2
Running scriptlet: chrony-4.6.1-1.el10.x86_64 2/2
Cleanup : chrony-4.6.1-1.el10.x86_64 2/2
Running scriptlet: chrony-4.6.1-1.el10.x86_64 2/2
Upgraded:
chrony-4.6.1-2.el10.x86_64
Complete!
[root@client.tamitsofanov.net ~]# chronyc sources
MS Name/IP address Stratum Poll Reach LastRx Last sample

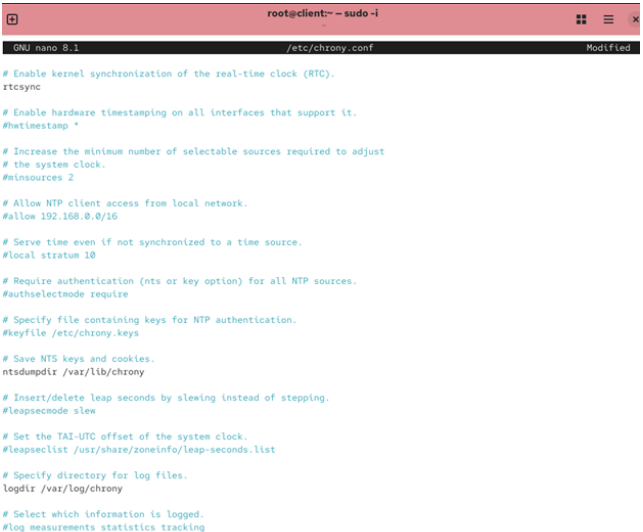
3.8 слайд 8


root@server:~ – sudo -i
GNU nano 8.1
/etc/chrony.conf
Modified
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
Record the rate at which the system clock gains/losses time.
driftfile /var/lib/chrony/drift
Allow the system clock to be stepped in the first three updates
if its offset is larger than 1 second.
makestep 1.0 3
Enable kernel synchronization of the real-time clock (RTC).
rtcsync
Enable hardware timestamping on all interfaces that support it.
#hwtimestamp *
Increase the minimum number of selectable sources required to adjust
the system clock.
#minsources 2
Allow NTP client access from local network.

3.9 слайд 9

Рисунок 9: перезагрузка служб и безопасности

3.10 слайд 10


root@client:~ – sudo -i
GNU nano 8.1
/etc/chrony.conf
Modified
Enable kernel synchronization of the real-time clock (RTC).
rtcsync
Enable hardware timestamping on all interfaces that support it.
#hwtimestamp *
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
Require authentication (nts or key option) for all NTP sources.
#authselectmode require
Specify file containing keys for NTP authentication.
#keyfile /etc/chrony.keys
Save NTS keys and cookies.
ntsdumpdir /var/lib/chrony
Insert/delete leap seconds by slewing instead of stepping.
#leapsecmode slew
Set the TAI-UTC offset of the system clock.
#leapseclist /usr/share/zoneinfo/leap-seconds.list
Specify directory for log files.
logdir /var/log/chrony
Select which information is logged.
#log measurements statistics tracking

3.11 слайд 11

```
[root@client.tamitrofanov.net ~]# systemctl restart chronyd
[root@client.tamitrofanov.net ~]#
```

Рисунок 11: Перезагрузка службы

3.12 слайд 12

```
[root@server.tamitrofanov.net ~]# chronyc sources
MS Name/IP address         Stratum Poll Reach LastRx Last sample
===============================================================================
^- vpn-rf.ubnt                   3   6   377    53  +8831us[+9042us] +/-   72ms
^* ntp1.mail.ru                  2   6   377    52   +258us[ +470us] +/- 4217us
^- 90.188.6.85                   3   6   333    52  -5124us[-5124us] +/-  101ms
^- vigil.intelfx.name            2   6   377    54  +5829us[+6040us] +/-   36ms
[root@server.tamitrofanov.net ~]#
[root@server.tamitrofanov.net ~]#
[root@server.tamitrofanov.net ~]# chronyc reacking
Unrecognized command
[root@server.tamitrofanov.net ~]# chronyc tracking
Reference ID    : 5E64B485 (ntp1.mail.ru)
Stratum         : 3
Ref time (UTC)  : Fri Nov 28 18:01:00 2025
System time     : 0.000067075 seconds fast of NTP time
Last offset     : -0.000064430 seconds
RMS offset      : 0.000891226 seconds
Frequency       : 6.276 ppm slow
Residual freq   : -0.022 ppm
Skew            : 7.708 ppm
Root delay      : 0.008308926 seconds
Root dispersion : 0.000996939 seconds
Update interval : 65.0 seconds
Leap status     : Normal
[root@server.tamitrofanov.net ~]# chronyc tracking
Reference ID    : 5E64B485 (ntp1.mail.ru)
Stratum         : 3
Ref time (UTC)  : Fri Nov 28 18:01:00 2025
System time     : 0.000064688 seconds fast of NTP time
Last offset     : -0.000064430 seconds
RMS offset      : 0.000891226 seconds
Frequency       : 6.276 ppm slow
Residual freq   : -0.022 ppm
Skew            : 7.708 ppm
```

3.13 слайд 13

root@client:~ — sudo -i

```
[root@client.tamitrofanov.net ~]# chronyc sources
MS Name/IP address         Stratum Poll Reach LastRx Last sample
===============================================================================
^+ 83.167.27.4                   1   6   177    34   +268us[ +268us] +/-   15ms
^+ time.cloudflare.com           3   6   177    36  -3612us[-3622us] +/-   11ms
^+ lemonbro.ru                   1   6   177    42  +2924us[+2915us] +/-   13ms
^+ spb-ntp02c.ntppool.yande>     2   6   177    45   +238us[ +228us] +/-   12ms
^* www.tamitrofanov.net          3   6   177    49   -280us[ -289us] +/- 5974us
[root@client.tamitrofanov.net ~]#
[root@client.tamitrofanov.net ~]#
[root@client.tamitrofanov.net ~]# chronyc tracking
Reference ID    : C0A80101 (ns.tamitrofanov.net)
Stratum         : 4
Ref time (UTC)  : Fri Nov 28 18:03:50 2025
System time     : 0.000018641 seconds slow of NTP time
Last offset     : +0.000237760 seconds
RMS offset      : 0.000517579 seconds
Frequency       : 3.824 ppm slow
Residual freq   : +0.519 ppm
Skew            : 4.312 ppm
Root delay      : 0.008618812 seconds
Root dispersion : 0.001834268 seconds
Update interval : 64.4 seconds
```

3.14 слайд 14

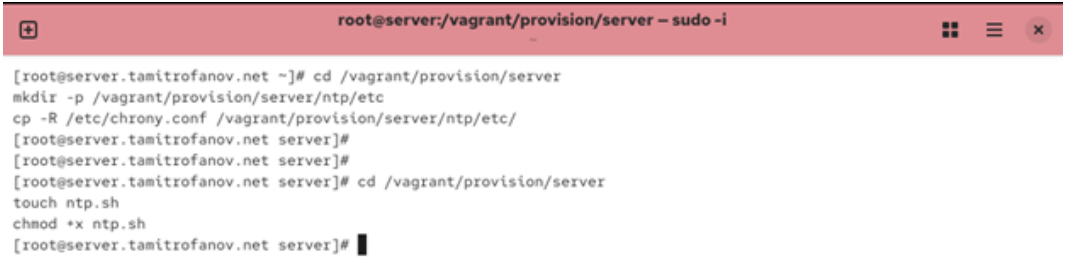


Рисунок 14: копирование конфигурации и задание её на сервере

3.15 слайд 15

Рисунок 15: внесение скрипта на сервер

3.16 слайд 16

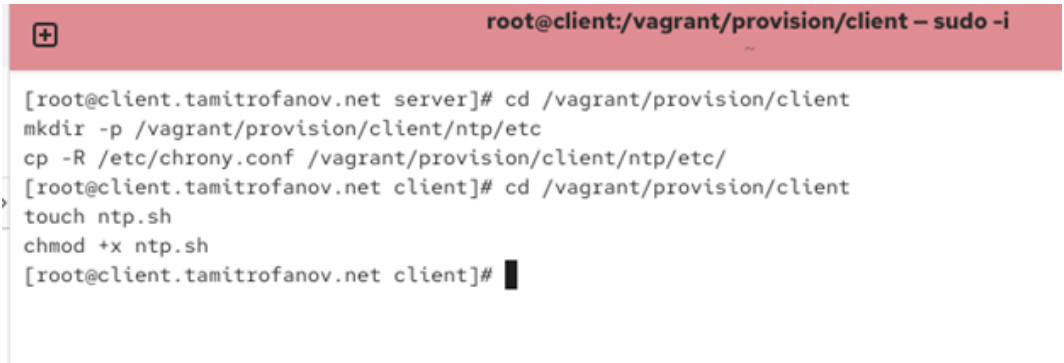


Рисунок 16: копирование конфигурации и задание её на клиенте

3.17 слайд 17

root@client:/vagrant/provision/client — sudo -i

GNU nano 8.1 ntp.sh

```
#!/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
```

Рисунок 17: внесение скрипта на клиент

3.18 слайд 18

```
117     server.vm.provision "server ntp",
118       type: "shell",
119       preserve_order: true,
120       path: "provision/server/ntp.sh"
121
```

Рисунок 18: настройка бутконфига для сервера

3.19 слайд 19

```
160
161     client.vm.provision "client ntp",
162       type: "shell",
163       preserve_order: true,
164       path: "provision/client/ntp.sh"
165
```

Рисунок 19: настройка бутконфига для сервера

Раздел 4

4. Выводы

4.1 слайд 1

Сегодня я получил навыки по управлению системным временем и настройке синхронизации времени.