

САНКТ-ПЕТЕРБУРГСКИЙ ПОЛИТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ
ПЕТРА ВЕЛИКОГО

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Дисциплина «Администрирование компьютерных сетей»

ОТЧЁТ
по лабораторной работе № 3
на тему
«Администрирование сетевых сервисов»

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Очистка виртуальной памяти.....	Ошибка! Закладка не определена.
Слабое шифрование	Ошибка! Закладка не определена.
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Цели работы

- Изучение технологий сетевых сервисов;
- Реализация технологий сетевых сервисов в виртуальной сети.

Ход работы

В ходе 1 лабораторной работы была создана сеть виртуальных машин в системе VMware Workstation Pro, которая имеет следующие параметры:

Основные системы ОС в системе:

- NetBSD
- FreeBSD
- Linux Ubuntu
- Windows 7
- Windows XP

Схема ККС:

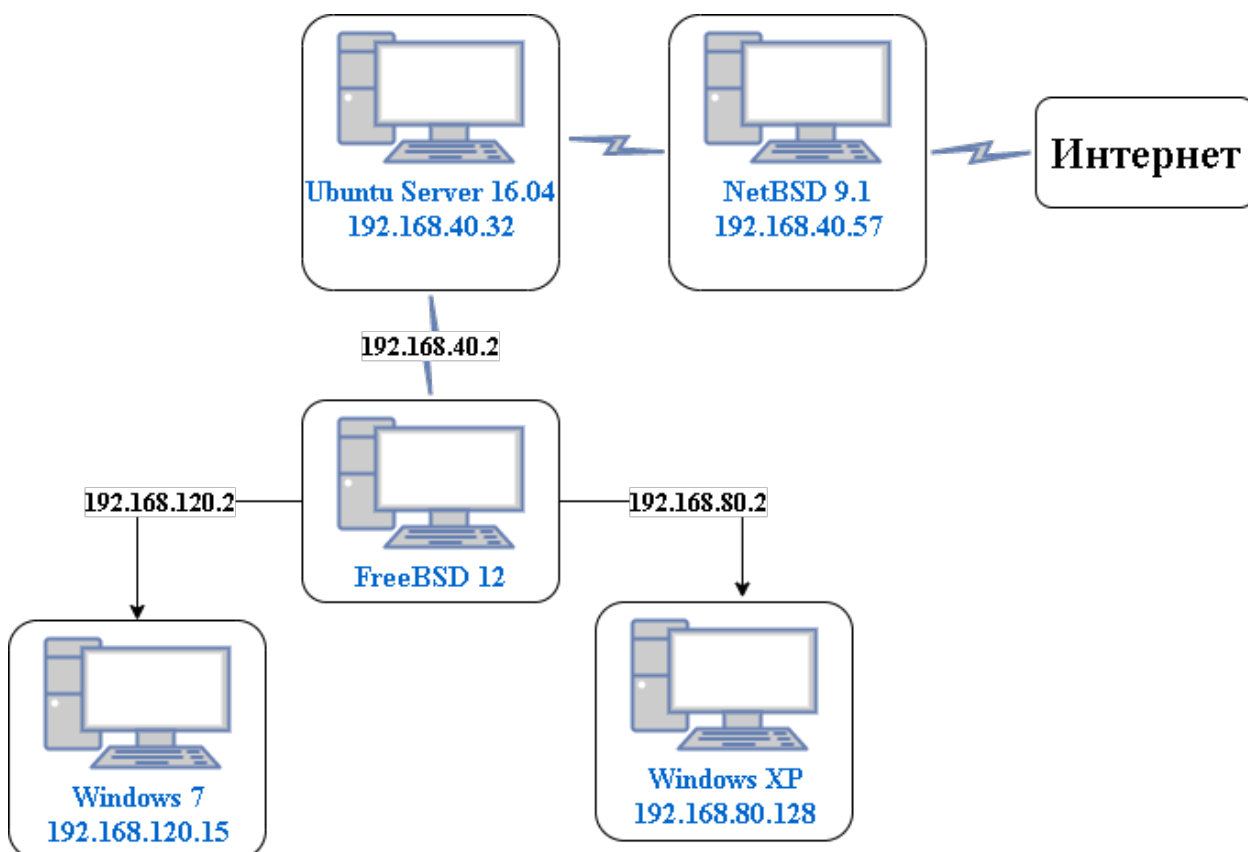


Рисунок 1 - схема ККС

Создание DHCP-серверов
FreeBSD

Был создан и запущен DHCP-сервер в системе FreeBSD

```
root@:~ # pkg search "isc-dhcp.*-server"
The package management tool is not yet installed on your system.
Do you want to fetch and install it now? [y/N]: y
Bootstrapping pkg from pkg+http://pkg.FreeBSD.org/FreeBSD:12:amd64/quarterly, please wait...
Verifying signature with trusted certificate pkg.freebsd.org.2013102301... done
Installing pkg-1.16.3...
Extracting pkg-1.16.3: 100%
pkg: Repository FreeBSD missing. 'pkg update' required
isc-dhcp44-server-4.4.2_1      ISC Dynamic Host Configuration Protocol server
```

Рисунок 2 - установка сервера

```
root@:~ # cat /etc/rc.conf
hostname=""
dhcpd_enable="YES"
dhcpd_flags="-q"
dhcpd_ifaces="em2"
dhcpd_conf="/usr/local/etc/dhcpd.conf"
ifconfig_em0="inet 192.168.40.2 netmask 255.255.255.0"
ifconfig_em1="inet 192.168.80.2 netmask 255.255.255.0"
ifconfig_em2="inet 192.168.120.2 netmask 255.255.255.0"
ifconfig_em3="DHCP"
sshd_enable="YES"
gateway_enable="YES"
defaultrouter="192.168.40.57"
# Set dumpdev to "AUTO" to enable crash dumps, "NO" to disable
dumpdev="AUTO"
```

Рисунок 3 - редактирование файла /etc/rc.conf

```
# Sample configuration file for ISC dhcpd
# option definitions common to all supported networks...
option domain-name "example.org";
option domain-name-servers ns1.example.org, ns2.example.org;

default-lease-time 600;
max-lease-time 3600;

subnet 192.168.80.0 netmask 255.255.255.0 {
    interface em2;
    range 192.168.80.127 192.168.80.224;
    option domain-name-servers 192.168.32.2;
    option domain-name "example.com";
    option routers 192.168.80.2;
    option broadcast-address 192.168.80.255;
}
# Use this to enable / disable dynamic dns updates globally.
#ddns-update-style none;

# If this DHCP server is the official DHCP server for the local
# network, the authoritative directive should be uncommented.
#authoritative;

/usr/local/etc/dhcpd.conf: 109 lines, 3503 characters.
root@:~ # vi /usr/local/etc/dhcpd.conf
```

Рисунок 4 - результат редактирования конфигурационного файла DHCP

```
Edit /etc/motd to change this login announcement.
root@:~ # /usr/local/etc/rc.d/isc-dhcpd restart
Stopping dhcpd.
Starting dhcpd.
```

Рисунок 5 – запуск

Создание DHCP-сервера Linux Ubuntu

Был создан схожий с сервером в системе FreeBSD на Linux Ubuntu

```
user@user-virtual-machine:~$ sudo apt-get install isc-dhcp-server
[sudo] password for user:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libirs-export141 libiscfg-export140
Suggested packages:
  isc-dhcp-server-ldap policycoreutils
The following NEW packages will be installed:
  isc-dhcp-server libirs-export141 libiscfg-export140
0 upgraded, 3 newly installed, 0 to remove and 179 not upgraded.
Need to get 470 kB of archives.
After this operation, 1,587 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libiscfg-export140 amd64 1:9.10.3.dfsg.P4-8ubuntu1.19 [38.6 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libirs-export141 amd64 1:9.10.3.dfsg.P4-8ubuntu1.19 [17.5 kB]
Get:3 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 isc-dhcp-server amd64 4.3.3-5ubuntu12.10 [414 kB]
Fetched 470 kB in 1s (326 kB/s)
Preconfiguring packages ...
Selecting previously unselected package libiscfg-export140.
(Reading database ... 177106 files and directories currently installed.)
Preparing to unpack .../libiscfg-export140_1%3a9.10.3.dfsg.P4-8ubuntu1.19_amd64.deb ...
Unpacking libiscfg-export140 (1:9.10.3.dfsg.P4-8ubuntu1.19) ...
Selecting previously unselected package libirs-export141.
Preparing to unpack .../libirs-export141_1%3a9.10.3.dfsg.P4-8ubuntu1.19_amd64.deb ...
Unpacking libirs-export141 (1:9.10.3.dfsg.P4-8ubuntu1.19) ...
Selecting previously unselected package isc-dhcp-server.
Preparing to unpack .../isc-dhcp-server_4.3.3-5ubuntu12.10_amd64.deb ...
Unpacking isc-dhcp-server (4.3.3-5ubuntu12.10) ...
Processing triggers for libc-bin (2.23-0ubuntu11.2) ...
Processing triggers for ureadahead (0.100.0-19.1) ...
Processing triggers for systemd (229-4ubuntu21.28) ...
Processing triggers for man-db (2.7.5-1) ...
Setting up libiscfg-export140 (1:9.10.3.dfsg.P4-8ubuntu1.19) ...
Setting up libirs-export141 (1:9.10.3.dfsg.P4-8ubuntu1.19) ...
Setting up isc-dhcp-server (4.3.3-5ubuntu12.10) ...
Generating /etc/default/isc-dhcp-server...
Processing triggers for libc-bin (2.23-0ubuntu11.2) ...
Processing triggers for ureadahead (0.100.0-19.1) ...
Processing triggers for systemd (229-4ubuntu21.28) ...
user@user-virtual-machine:~$
```

Рисунок 6 - установка сервера

```
user@user-virtual-machine:~$ sudo vi /etc/dhcp/dhcpd.conf
user@user-virtual-machine:~$ cat /etc/dhcp/dhcpd.conf
#
# Sample configuration file for ISC dhcpd for Debian
#
# Attention: If /etc/ltsp/dhcpd.conf exists, that will be used as
# configuration file instead of this file.
#
#
# The ddns-updates-style parameter controls whether or not the server will
# attempt to do a DNS update when a lease is confirmed. We default to the
# behavior of the version 2 packages ('none', since DHCP v2 didn't
# have support for DDNS.)
ddns-update-style none;

# option definitions common to all supported networks...
option domain-name "example.org";
option domain-name-servers ns1.example.org, ns2.example.org;

default-lease-time 600;
max-lease-time 7200;

subnet 192.168.120.0 netmask 255.255.255.0{
range 192.168.120.100 192.168.120.200;
option domain-name-servers 192.168.32.2;
option domain-name "example.com";
option routers 192.168.120.2;
option broadcast-address 192.168.120.255;
}

# If this DHCP server is the official DHCP server for the local
# network, the authoritative directive should be uncommented.
#authoritative;

# Use this to send dhcp log messages to a different log file (you also
# have to hack syslog.conf to complete the redirection).
```

Рисунок 7 - редактирование конф. файла /etc/rc.conf

```
user@user-virtual-machine:~$ sudo systemctl start isc-dhcp-server
user@user-virtual-machine:~$ sudo systemctl enable isc-dhcp-server
Synchronizing state of isc-dhcp-server.service with SysV init with /lib/systemd/systemd-sysv-install...
Executing /lib/systemd/systemd-sysv-install enable isc-dhcp-server
user@user-virtual-machine:~$
```

Рисунок 8 - запуск

Создание TFTP-сервера на Ubuntu

```
user@user-virtual-machine:~$ sudo apt install tftpd-hpa
Reading package lists... Done
Building dependency tree
Reading state information... Done
Suggested packages:
  pxelinux
The following NEW packages will be installed:
  tftpd-hpa
0 upgraded, 1 newly installed, 0 to remove and 179 not upgraded.
Need to get 39.1 kB of archives.
After this operation, 115 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 tftpd-hpa amd64 5.2+20150808-1ubuntu1.16.04.1 [39.1 kB]
Fetched 39.1 kB in 0s (72.9 kB/s)
Preconfiguring packages ...
Selecting previously unselected package tftpd-hpa.
(Reading database ... 177141 files and directories currently installed.)
Preparing to unpack .../tftpd-hpa_5.2+20150808-1ubuntu1.16.04.1_amd64.deb ...
Unpacking tftpd-hpa (5.2+20150808-1ubuntu1.16.04.1) ...
Processing triggers for ureadahead (0.100.0-19.1) ...
Processing triggers for systemd (229-4ubuntu21.28) ...
Processing triggers for man-db (2.7.5-1) ...
Setting up tftpd-hpa (5.2+20150808-1ubuntu1.16.04.1) ...
Processing triggers for ureadahead (0.100.0-19.1) ...
Processing triggers for systemd (229-4ubuntu21.28) ...
user@user-virtual-machine:~$
```

Рисунок 9 – загрузка tftpd сервера

```
user@user-virtual-machine:~$ sudo vi /etc/rc.conf
user@user-virtual-machine:~$ cat /etc/rc.conf
tftpd_enable="YES"
tftpd_flags="-p -s /usr/tftpboot -B 1024 -ipv4"
user@user-virtual-machine:~$
```

Рисунок 10 – конфигурационный файл /etc/rc.conf

```
user@user-virtual-machine:~$ sudo apt install -y syslinux pxelinux
Reading package lists... Done
Building dependency tree
Reading state information... Done
syslinux is already the newest version (3:6.03+dfsg-11ubuntu1).
The following NEW packages will be installed:
  pxelinux
0 upgraded, 1 newly installed, 0 to remove and 179 not upgraded.
Need to get 183 kB of archives.
After this operation, 307 kB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu xenial/main amd64 pxelinux all 3:6.03+dfsg-11ubuntu1 [183 kB]
Fetched 183 kB in 0s (218 kB/s)
Selecting previously unselected package pxelinux.
(Reading database ... 177154 files and directories currently installed.)
Preparing to unpack .../pxelinux_3%3a6.03+dfsg-11ubuntu1_all.deb ...
Unpacking pxelinux (3:6.03+dfsg-11ubuntu1) ...
Setting up pxelinux (3:6.03+dfsg-11ubuntu1) ...
Floppy Disk user@user-virtual-machine:~$
```

Рисунок 11 - установка sysLinux

Создание DNS-сервера

Создали, настроили и проверили DNS-сервер

```
user@user-virtual-machine: ~  
user@user-virtual-machine:~$ sudo apt install bind9  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following additional packages will be installed:  
  bind9-host bind9utils dnsutils libbind9-140 libdns162 libirs141 libisc160 libisccc140 libiscfg140  
  liblwres141  
Suggested packages:  
  bind9-doc rblcheck  
The following NEW packages will be installed:  
  bind9 bind9utils libirs141  
The following packages will be upgraded:  
  bind9-host dnsutils libbind9-140 libdns162 libisc160 libisccc140 libiscfg140 liblwres141  
8 upgraded, 3 newly installed, 0 to remove and 171 not upgraded.  
Need to get 1,920 kB of archives.  
After this operation, 2,936 kB of additional disk space will be used.  
Do you want to continue? [Y/n] y  
Get:1 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 bind9-host amd64 1:9.10.3.dfsg.P4-8ubuntu1.19 [38.3 kB]  
Get:2 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 dnsutils amd64 1:9.10.3.dfsg.P4-8ubuntu1.19 [88.9 kB]  
Get:3 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libisc160 amd64 1:9.10.3.dfsg.P4-8ubuntu1.19 [215 kB]  
Get:4 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libdns162 amd64 1:9.10.3.dfsg.P4-8ubuntu1.19 [872 kB]  
Get:5 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libisccc140 amd64 1:9.10.3.dfsg.P4-8ubuntu1.19 [16.3 kB]  
Get:6 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libiscfg140 amd64 1:9.10.3.dfsg.P4-8ubuntu1.19 [40.5 kB]  
Get:7 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 liblwres141 amd64 1:9.10.3.dfsg.P4-8ubuntu1.19 [33.9 kB]  
Get:8 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libbind9-140 amd64 1:9.10.3.dfsg.P4-8ubuntu1.19 [23.6 kB]  
Get:9 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 libirs141 amd64 1:9.10.3.dfsg.P4-8ubuntu1.19 [17.9 kB]  
Get:10 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 bind9utils amd64 1:9.10.3.dfsg.P4-8ubuntu1.19 [200 kB]
```

Рисунок 12 - загрузка bind9

```
user@user-virtual-machine:~$ sudo vi /etc/bind/named.conf.options  
user@user-virtual-machine:~$ cat /etc/bind/named.conf.options  
options {  
    directory "/var/cache/bind";  
  
    // If there is a firewall between you and nameservers you want  
    // to talk to, you may need to fix the firewall to allow multiple  
    // ports to talk.  See http://www.kb.cert.org/vuls/id/800113  
  
    // If your ISP provided one or more IP addresses for stable  
    // nameservers, you probably want to use them as forwarders.  
    // Uncomment the following block, and insert the addresses replacing  
    // the all-0's placeholder.  
  
    forwarders {  
        8.8.8.8;  
    };  
  
    //=====  
    // If BIND logs error messages about the root key being expired,  
    // you will need to update your keys.  See https://www.isc.org/bind-keys  
    //=====  
    dnssec-validation auto;  
  
    auth-nxdomain no;      # conform to RFC1035  
    listen-on-v6 { any; };  
};  
user@user-virtual-machine:~$
```

Рисунок 13 - изменение конфигурационный файл


```
user@user-virtual-machine:~$ nslookup mail.ru
Server:          127.0.1.1
Address:         127.0.1.1#53

Non-authoritative answer:
Name:   mail.ru
Address: 217.69.139.200
Name:   mail.ru
Address: 217.69.139.202
Name:   mail.ru
Address: 94.100.180.200
Name:   mail.ru
Address: 94.100.180.201

user@user-virtual-machine:~$
```

Рисунок 14 - результат запроса

```
user@user-virtual-machine: /etc/bind
user@user-virtual-machine:~$ cd /etc/bind
user@user-virtual-machine:/etc/bind$ sudo vi named.conf.local
[sudo] password for user:
user@user-virtual-machine:/etc/bind$ cat named.conf.local
//
// Do any local configuration here
//

// Consider adding the 1918 zones here, if they are not used in your
// organization
//include "/etc/bind/zones.rfc1918";
zone "example.com"{
type master;
file "/etc/bind/db.example.com";
};

zone "0.0.127.in-addr.arpa"{
type master;
file "/etc/bind/db.127";
};
user@user-virtual-machine:/etc/bind$
```

Рисунок 15 - добавление зон

```
user@user-virtual-machine:/etc/bind$ cat db.127
;
; BIND reverse data file for local loopback interface
;
$TTL      604800
@         IN      SOA      localhost. root.localhost. (
                        1          ; Serial
                        604800     ; Refresh
                        86400      ; Retry
                        2419200    ; Expire
                        604800 )   ; Negative Cache TTL
;
@         IN      NS       localhost.
1.0.0     IN      PTR      localhost.
user@user-virtual-machine:/etc/bind$
```

Рисунок 16 - просмотр файла зоны

```
;
; BIND reverse data file for local loopback interface
;
$TTL      604800
@         IN      SOA      localhost. root.localhost. (
                        1          ; Serial
                        604800     ; Refresh
                        86400      ; Retry
                        2419200    ; Expire
                        604800 )   ; Negative Cache TTL
;
@         IN      NS       localhost.
@         IN      A        127.0.0.1
@         IN      AAAA     ::1
```

Рисунок 17 - редактирование файла зоны

Вывод

В ходе лабораторной работы были созданы:

- DHCP-серверы в системах Ubuntu и FreeBSD;
- TFTP-сервер в системе Ubuntu;
- DNS-сервер в системе Ubuntu.