Linux Class 3
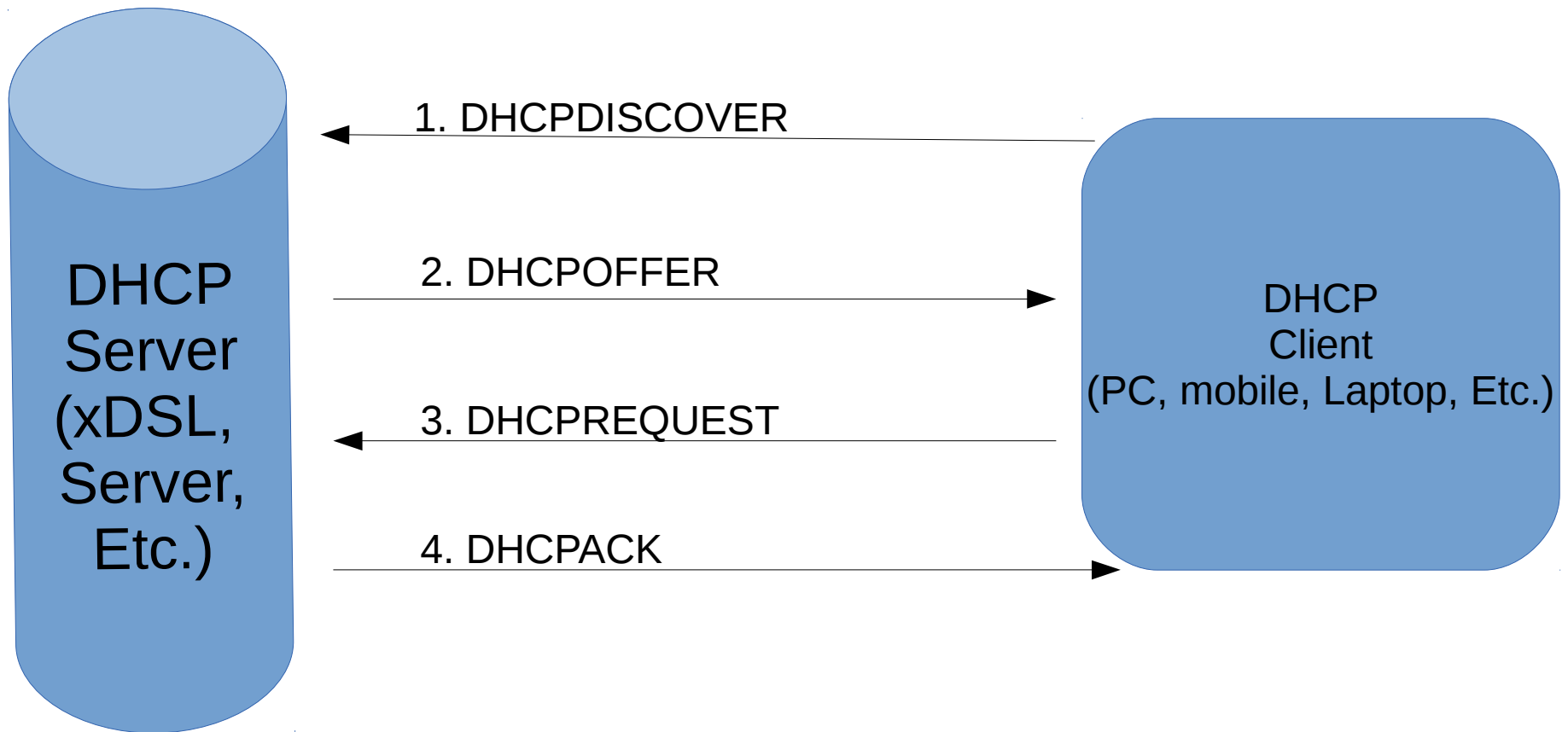
DHCP server basic principles; installation and configuration

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Basics of the DHCP Protocol

DHCP Server (xDSL, Server, Etc.)

DHCP Client (PC, mobile, Laptop, Etc.)

1. DHCPDISCOVER

2. DHCPOFFER

3. DHCPREQUEST

4. DHCPACK

1. DHCPDISCOVER *(taken from wikipedi)*

It is a DHCP message that marks the beginning of a DHCP interaction between client and server. This message is sent by a client (host or device connected to a network) that is connected to a local subnet. It's a broadcast message that uses 255.255.255.255 as destination IP address while the source IP address is 0.0.0.0

2. DHCPOFFER

It is DHCP message that is sent in response to DHCPDISCOVER by a DHCP server to DHCP client. This message contains the network configuration settings for the client that sent the DHCPDISCOVER message.

3. DHCPREQUEST

This DHCP message is sent in response to DHCPOFFER indicating that the client has accepted the network configuration sent in DHCPOFFER message from the server.

4. DHCPACK

This message is sent by the DHCP server in response to DHCPREQUEST recieved from the client. This message marks the end of the process that started with DHCPDISCOVER. The DHCPACK message is nothing but an acknowledgement by the DHCP server that authorizes the DHCP client to start using the network configuration it received from the DHCP server earlier.
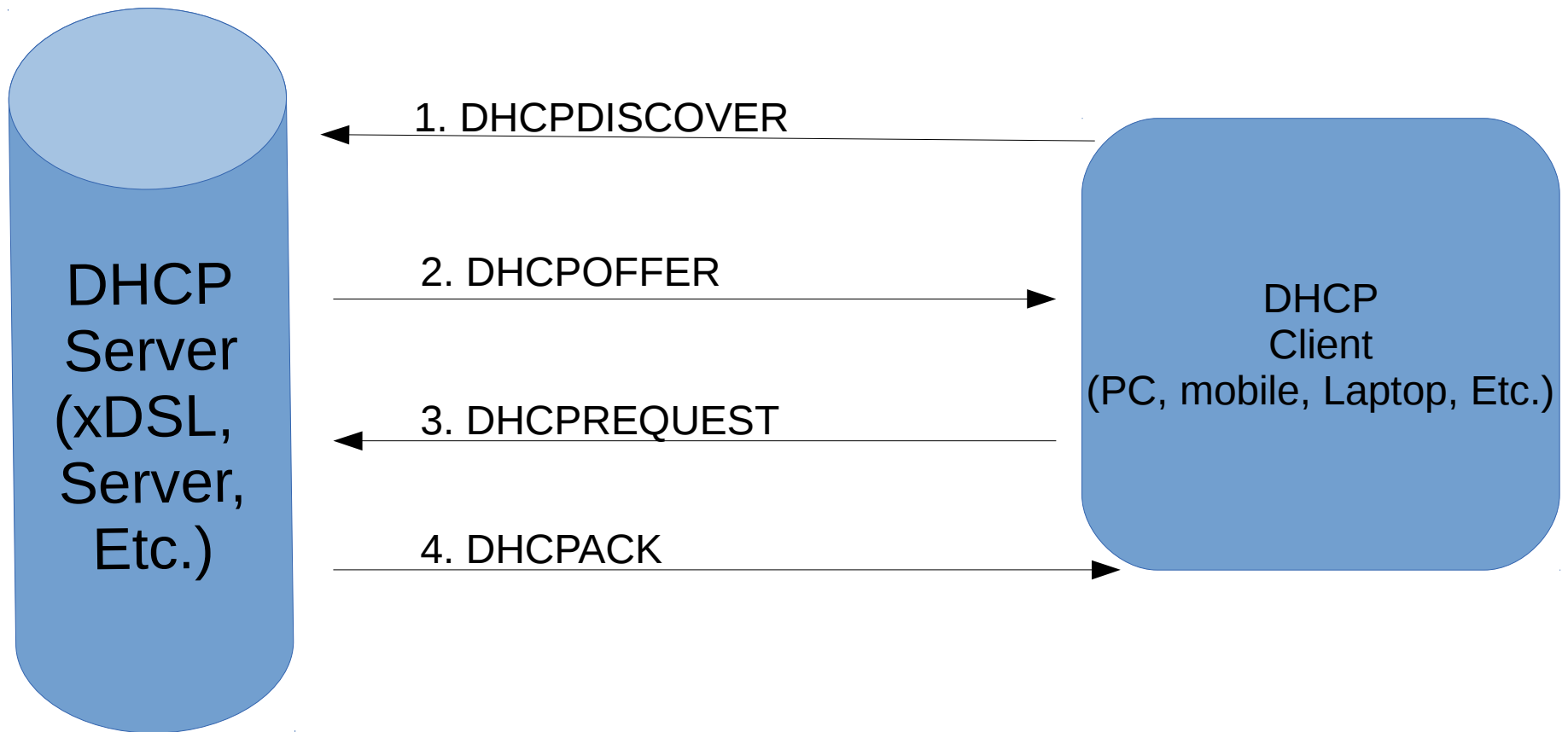
ISC's DHCP server software

ISC's DHCP (isc-dhcp-server in Debian) software is the most widely used open source DHCP implementation on the Internet. The same software can be used for LAN too. It is a carrier and enterprise grade solution for any host configuration needs.

Precautions before start.

- After installing the necessary packages isolate the server fragment of network fron the rest of the computers. If you have an error in your configuration you can prevent computers from connecting.

- Once you are sure that the configuration is working join the DHCP server to the network and monitor the behavior of the computers.

- Backup your working configuration file.

•Installation

As usual, installation is very simple with apt. As root simply run

- # `apt-get install isc-dhcp-server`

or

- # `aptitude install isc-dhcp-server`

Sample Output

Reading package lists... Done

Building dependency tree

Reading state information... Done

Suggested packages:

  isc-dhcp-server-ldap

The following NEW packages will be installed:

  isc-dhcp-server

0 upgraded, 1 newly installed, 0 to remove and 11 not upgraded.

Need to get 0 B/411 kB of archives.

After this operation, 938 kB of additional disk space will be used.

Preconfiguring packages ...

Selecting previously deselected package isc-dhcp-server.

(Reading database ... 281728 files and directories currently installed.)

Unpacking isc-dhcp-server (from .../isc-dhcp-server_4.1.1-P1-15+squeeze8_amd64.deb) ...

Processing triggers for man-db ...

Setting up isc-dhcp-server (4.1.1-P1-15+squeeze8) ...

Generating /etc/default/isc-dhcp-server...

Starting ISC DHCP server: dhcpdcheck syslog for diagnostics. ... failed!

 failed!

invoke-rc.d: initscript isc-dhcp-server, action "start" failed.

How to configure?

Files to edit:

- `/etc/default/isc-dhcp-server`

and

- `/etc/dhcp/dhcpd.conf`

Configuration 1

First you should edit or create the file /etc/default/isc-dhcp-server with root permissions, either by running dpkg-reconfigure isc-dhcp-server or enter something like this into the file /etc/default/isc-dhcp-server:

```
INTERFACES="eth0"
```

Homework A: research about the command dkpg.

File   Edit   View   Search   Terminal   Help

```
  GNU nano 2.2.6              File: /etc/default/isc-dhcp-server              Modified

# Defaults for isc-dhcp-server initscript
# sourced by /etc/init.d/isc-dhcp-server
# installed at /etc/default/isc-dhcp-server by the maintainer scripts

#
# This is a POSIX shell fragment
#

# Path to dhcpd's config file (default: /etc/dhcp/dhcpd.conf).
#DHCPD_CONF=/etc/dhcp/dhcpd.conf

# Path to dhcpd's PID file (default: /var/run/dhcpd.pid).
#DHCPD_PID=/var/run/dhcpd.pid

# Additional options to start dhcpd with.
#       Don't use options -cf or -pf here; use DHCPD_CONF/ DHCPD_PID instead
#OPTIONS=""

# On what interfaces should the DHCP server (dhcpd) serve DHCP requests?
#       Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACES="eth0"
```

```
^G Get Help       ^O WriteOut       ^R Read File      ^Y Prev Page      ^K Cut Text       ^C Cur Pos
^X Exit           ^J Justify        ^W Where Is       ^V Next Page      ^U UnCut Text     ^T To Spell
```

Basic configuration 2

For a basic configuration, you have to add/edit the following lines in /etc/dhcp/dhcpd.conf. I would leave all other lines as they are.

```
option domain-name "spices.org";
```

To specify the domain to use by the DHCP server.

DNS servers.

```
option domain-name-servers
213.191.92.86, 213.191.74.18;
```

This entry provides the IP-addresses of two domain name servers (DNS), but one would be sufficient, too. You have to list here the DNS that work for your internet provider, the addresses given here will most likely not work for you.

Define the subnet

```
subnet 192.168.1.0 netmask
255.255.255.0 {

   range 192.168.1.1 192.168.1.10;

   option routers pepper.spices.org;

}
```

This entry defines the LAN and the router of the LAN. The IP-addresses 192.168.1.1 to 192.168.1.255 are typical for an intranet. Here only the range 192.168.1.1 to 192.168.1.10 are permitted. pepper.spices.org is in this case the server connected to the internet that serves as a router or gateway.

Restart the service

- /etc/init.d/isc-dhcp-server restart

Or

- service isc-dhcp-server restart

Checking that the service Works

- Now we have to check if other computers get the IP address. And we need to be able to troubleshoot it; for that the command tail is very usefull.

- `tail -f /var/log/syslog`

Or

- `tail -n100 /var/log/syslog`

- This comand shows the end of a file, and syslog is the file that stores the system event logs. The command cat could be usefull for it.

- `cat /var/log/syslog`

Other useful commands

Homework B:

How does the following command Works: `dhclient`

In class we have seen a really simple configuration, but isc-dhcp-server is able to handle much more complex ones for different user requirements. Please bring different examples of configurations to the next class and explain a possible use case for that configuration.

Thank you!