

Exercise 1 –Installation and Configuration a CUPS Server

CUPS Server installation

Exercise 1.1: Tasks to be perform on AlmaLinux:

- Verify if the **CUPS** package is installed.

```
dnf list cups
```

```
[mperez@server1 ~]$ dnf list cups
AlmaLinux 9 - AppStream
AlmaLinux 9 - AppStream
AlmaLinux 9 - BaseOS
AlmaLinux 9 - BaseOS
AlmaLinux 9 - Extras
AlmaLinux 9 - Extras
Extra Packages for Enterprise Linux 9 - x86_64
Extra Packages for Enterprise Linux 9 - x86_64
Installed Packages
cups.x86_64
[mperez@server1 ~]$
```

File	Size	Time
cups.x86_64	2.7 kB/s 4.2 kB 00:01	
	32 MB/s 15 MB 00:00	
	16 kB/s 3.8 kB 00:00	
	41 MB/s 18 MB 00:00	
	21 kB/s 3.3 kB 00:00	
	74 kB/s 13 kB 00:00	
	66 kB/s 34 kB 00:00	
	2.5 MB/s 23 MB 00:09	@AppStream

- Verify if the **CUPS** service is started and enabled, if not start it.

```
[mperez@server1 ~]$ systemctl status cups
● cups.service - CUPS Scheduler
  Loaded: loaded (/usr/lib/systemd/system/cups.service; enabled; preset: enabled)
  Drop-In: /usr/lib/systemd/system/cups.service.d
            └─server.conf
    Active: active (running) since Fri 2025-04-04 12:27:47 EDT; 4 days ago
   TriggeredBy: ● cups.path
               ● cups.socket
     Docs: man:cupsd(8)
 Main PID: 1025 (cupsd)
    Status: "Scheduler is running..."
      Tasks: 1 (limit: 22829)
     Memory: 3.9M
        CPU: 80ms
      CGroup: /system.slice/cups.service
              └─1025 /usr/sbin/cupsd -l

Apr 08 04:56:27 server1 cupsd[1025]: REQUEST localhost - - "POST / HTTP/1.1" 200 185 Renew-Subscription successful-ok
Apr 08 05:54:47 server1 cupsd[1025]: REQUEST localhost - - "POST / HTTP/1.1" 200 185 Renew-Subscription successful-ok
Apr 08 06:53:07 server1 cupsd[1025]: REQUEST localhost - - "POST / HTTP/1.1" 200 185 Renew-Subscription successful-ok
Apr 08 07:51:27 server1 cupsd[1025]: REQUEST localhost - - "POST / HTTP/1.1" 200 185 Renew-Subscription successful-ok
Apr 08 08:49:47 server1 cupsd[1025]: REQUEST localhost - - "POST / HTTP/1.1" 200 185 Renew-Subscription successful-ok
Apr 08 09:48:07 server1 cupsd[1025]: REQUEST localhost - - "POST / HTTP/1.1" 200 185 Renew-Subscription successful-ok
Apr 08 10:46:27 server1 cupsd[1025]: REQUEST localhost - - "POST / HTTP/1.1" 200 185 Renew-Subscription successful-ok
Apr 08 11:44:47 server1 cupsd[1025]: REQUEST localhost - - "POST / HTTP/1.1" 200 185 Renew-Subscription successful-ok
Apr 08 12:43:07 server1 cupsd[1025]: REQUEST localhost - - "POST / HTTP/1.1" 200 185 Renew-Subscription successful-ok
Apr 08 13:41:27 server1 cupsd[1025]: REQUEST localhost - - "POST / HTTP/1.1" 200 185 Renew-Subscription successful-ok
[mperez@server1 ~]$
```

- Authorise in the **firewall** the port used to access the CUPS Service Admin web page.

```
[root@server1 ~]# firewall-cmd --permanent --add-port=631/tcp --zone=nm-shared
success
[root@server1 ~]# firewall-cmd --permanent --add-port=631/tcp --zone=external
success
[root@server1 ~]# firewall-cmd --reload
success
[root@server1 ~]#
```

- Check that the port is added and authorised in the firewall.

Lab 8 - Installation and Configuration of CUPS & NTP

```
[root@server1 ~]# firewall-cmd --list-ports --zone=nm-shared  
631/tcp  
[root@server1 ~]# firewall-cmd --list-ports --zone=external  
631/tcp  
[root@server1 ~]# |
```

5. List all **tcp** and **udp** ports that are listening on the server.

[netstat -tunap](#)

```
[root@server1 ~]#  
[root@server1 ~]# netstat -tunap  
Active Internet connections (servers and established)  
Proto Recv-Q Send-Q Local Address          Foreign Address        State      PID/Program name  
tcp     0      0 0.0.0.0:20048            0.0.0.0:*          LISTEN    1333/rpc.mountd  
tcp     0      0 0.0.0.0:2049             0.0.0.0:*          LISTEN    -  
tcp     0      0 0.0.0.0:22              0.0.0.0:*          LISTEN    1033/sshd: /usr/sbi  
tcp     0      0 0.0.0.0:111             0.0.0.0:*          LISTEN    1/systemd  
tcp     0      0 0.0.0.0:139             0.0.0.0:*          LISTEN    1328/smbd  
tcp     0      0 0.0.0.0:37085            0.0.0.0:*          LISTEN    -  
tcp     0      0 0.0.0.0:445             0.0.0.0:*          LISTEN    1328/smbd  
tcp     0      0 127.0.0.1:631            0.0.0.0:*          LISTEN    1025/cupsd  
tcp     0      0 0.0.0.0:39849            0.0.0.0:*          LISTEN    1302/rpc.statd  
tcp     0      356 192.168.204.128:22       192.168.204.1:63475 ESTABLISHED 13233/sshd: mperez  
tcp6    0      0 ::1:20048              ::*:*               LISTEN    1333/rpc.mountd  
tcp6    0      0 ::1:631                ::*:*               LISTEN    1025/cupsd  
tcp6    0      0 ::1:2049              ::*:*               LISTEN    -  
tcp6    0      0 ::1:22                ::*:*               LISTEN    1033/sshd: /usr/sbi  
tcp6    0      0 ::1:40991             ::*:*               LISTEN    1302/rpc.statd  
tcp6    0      0 ::1:111              ::*:*               LISTEN    1/systemd  
tcp6    0      0 ::1:139              ::*:*               LISTEN    1328/smbd  
tcp6    0      0 ::1:445              ::*:*               LISTEN    1328/smbd  
tcp6    0      0 ::1:41839             ::*:*               LISTEN    -  
tcp6    0      0 ::1:9090             ::*:*               LISTEN    1/systemd  
udp     0      0 127.0.0.1:659             0.0.0.0:*          LISTEN    1302/rpc.statd  
udp     0      0 0.0.0.0:46011            0.0.0.0:*          LISTEN    1302/rpc.statd  
udp     0      0 0.0.0.0:37878            0.0.0.0:*          LISTEN    799/avahi-daemon: r  
udp     0      0 0.0.0.0:5353             0.0.0.0:*          LISTEN    799/avahi-daemon: r  
udp     0      0 0.0.0.0:20048            0.0.0.0:*          LISTEN    1333/rpc.mountd  
udp     0      0 0.0.0.0:36791            0.0.0.0:*          LISTEN    -  
udp     0      0 192.168.204.128:68       192.168.204.254:67 ESTABLISHED 1002/NetworkManager  
udp     0      0 0.0.0.0:111             0.0.0.0:*          LISTEN    1/systemd  
udp     0      0 127.0.0.1:323             0.0.0.0:*          LISTEN    819/chrony  
udp6    0      0 ::1:5353              ::*:*               LISTEN    799/avahi-daemon: r  
udp6    0      0 ::1:20048             ::*:*               LISTEN    1333/rpc.mountd  
udp6    0      0 ::1:55337             ::*:*               LISTEN    -  
udp6    0      0 ::1:111              ::*:*               LISTEN    1/systemd  
udp6    0      0 ::1:323              ::*:*               LISTEN    819/chrony  
udp6    0      0 ::1:35210             ::*:*               LISTEN    1302/rpc.statd  
udp6    0      0 ::1:53654             ::*:*               LISTEN    799/avahi-daemon: r  
[root@server1 ~]# |
```

6. What is the **tcp port number** used by the cups service?

631

Lab 8 - Installation and Configuration of CUPS & NTP

```
[root@server1 ~]# netstat -tunap | grep cups
tcp      0      0 127.0.0.1:631          0.0.0.0:*
LISTEN      1025/cupsd
tcp6     0      0 ::1:631              :::*
LISTEN      1025/cupsd
[root@server1 ~]# netstat -tunap | grep 631
tcp      0      0 127.0.0.1:631          0.0.0.0:*
LISTEN      1025/cupsd
tcp6     0      0 ::1:631              :::*
LISTEN      1025/cupsd
[root@server1 ~]#
```

7. What is the name of the CUPS service main configuration file?

/etc/cups/cupsd.conf file is used to configure the cups server

CUPS Server Configuration

Exercise 1.2: Tasks to be perform on AlmaLinux:

1. Modify the **CUPS** service **main configuration file**, to allow the use of the CUPS server Web Admin interface, from any machine on the network.

- a) Open the CUPS main configuration file using a text editor:

sudo vim /etc/cups/cupsd.conf

```
[root@server1 etc]# vim /etc/cups/cupsd.conf
201L, 6695B written
```

- b) Locate the line: Listen localhost:631

Comment it out by adding a # at the beginning:

#Listen localhost:631

- c) Add the following line to allow access from any machine on the network:

Listen 631

- d) Under the <Location /> section, add or modify the following lines to allow access:

Include **Allow all** in the listed sections

Restrict access to the server...

<Location />

Allow all

Order allow,deny

</Location>

Restrict access to the admin pages...

<Location /admin>

Allow all

Order allow,deny

</Location>

Restrict access to configuration files...

<Location /admin/conf>

Allow all

AuthType Default

Require user @SYSTEM

Lab 8 - Installation and Configuration of CUPS & NTP

```
Order allow,deny
</Location>

# Restrict access to log files...
<Location /admin/log>
    Allow all
    AuthType Default
    Require user @SYSTEM
    Order allow,deny
</Location>

# Only listen for connections from the local machine.
#Listen localhost:631
Listen 631 *
Listen /run/cups/cups.sock

# Show shared printers on the local network.
Browsing On
BrowseLocalProtocols dnssd

# Default authentication type, when authentication is required...
DefaultAuthType Basic

# Web interface setting...
WebInterface Yes

# Timeout after cupsd exits if idle (applied only if cupsd runs on-demand - with -l)
IdleExitTimeout 0

# Restrict access to the server...
<Location />
    Allow all *
    Order allow,deny
</Location>

# Restrict access to the admin pages...
<Location /admin>
    Allow all *
    Order allow,deny
</Location>

# Restrict access to configuration files...
<Location /admin/conf>
    Allow all *
    AuthType Default
    Require user @SYSTEM
    Order allow,deny
</Location>

# Restrict access to log files...
<Location /admin/log>
    Allow all *
    AuthType Default
    Require user @SYSTEM
    Order allow,deny
</Location>

# Set the default printer/job policies...
<Policy default>
    # Job/subscription privacy...
    JobPrivateAccess default
-- INSERT --
```

- e) Save the file

Lab 8 - Installation and Configuration of CUPS & NTP

2. Restart the **CUPS** service to apply your configuration.

- Restart the CUPS service to apply the changes

```
sudo systemctl restart cups
```

```
[root@server1 etc]# systemctl restart cups
[root@server1 etc]#
```

- Verify that the service is running:

```
sudo systemctl status cups
```

```
[root@server1 etc]# systemctl restart cups
[root@server1 etc]# sudo systemctl status cups
● cups.service - CUPS Scheduler
  Loaded: loaded (/usr/lib/systemd/system/cups.service; enabled; preset: enabled)
  Drop-In: /usr/lib/systemd/system/cups.service.d
            └─server.conf
    Active: active (running) since Tue 2025-04-08 17:10:35 EDT; 3s ago
   TriggeredBy: ● cups.socket
                 ● cups.path
     Docs: man:cupsd(8)
   Main PID: 49963 (cupsd)
      Status: "Scheduler is running..."
        Tasks: 2 (limit: 22829)
     Memory: 1.7M
       CPU: 7ms
      CGroup: /system.slice/cups.service
                └─49963 /usr/sbin/cupsd -l

Apr 08 17:10:35 server1 systemd[1]: Starting CUPS Scheduler...
Apr 08 17:10:35 server1 systemd[1]: Started CUPS Scheduler.
[root@server1 etc]# |
```

Installing and Sharing a Network Printer

Exercise 1.3: Tasks to be perform on AlmaLinux:

1. Using the cups web interface, **install** and **share** the following network printer:

- Model: Brother DCP-8045D
- IP Adress: 192.168.50.100
- Name: Brother-8045D
- Description: Printer for management.
- Location: Mezzanine.

A. Verify the ip address to use

For external web browser use 192.168.204.128:631

Web from AlmaLinux (Firefox installed) 192.168.50.10:631

nmcli

Lab 8 - Installation and Configuration of CUPS & NTP

```
[root@server1 etc]# nmcli
ens160: connected to ens160
    "VMware VMXNET3"
    ethernet (vmxnet3), 00:0C:29:E7:F8:DA, hw, mtu 1500
    in4 default
    inet4 192.168.204.128/24
        route4 192.168.204.0/24 metric 100
        route4 default via 192.168.204.2 metric 100
    inet6 fe80::20c:29ff:fee7:f8da/64
        route6 fe80::/64 metric 1024

ens192: connected to LAN1
    "VMware VMXNET3"
    ethernet (vmxnet3), 00:0C:29:E7:F8:E4, hw, mtu 1500
    inet4 192.168.50.10/24
        route4 192.168.50.0/24 metric 101
        route4 default via 192.168.50.1 metric 101
    inet6 fe80::3e70:81df:4f1a:15be/64
        route6 fe80::/64 metric 1024

lo: connected (externally) to lo
    "lo"
    loopback (unknown), 00:00:00:00:00:00, sw, mtu 65536
    inet4 127.0.0.1/8
    inet6 ::1/128
        route6 ::1/128 metric 256

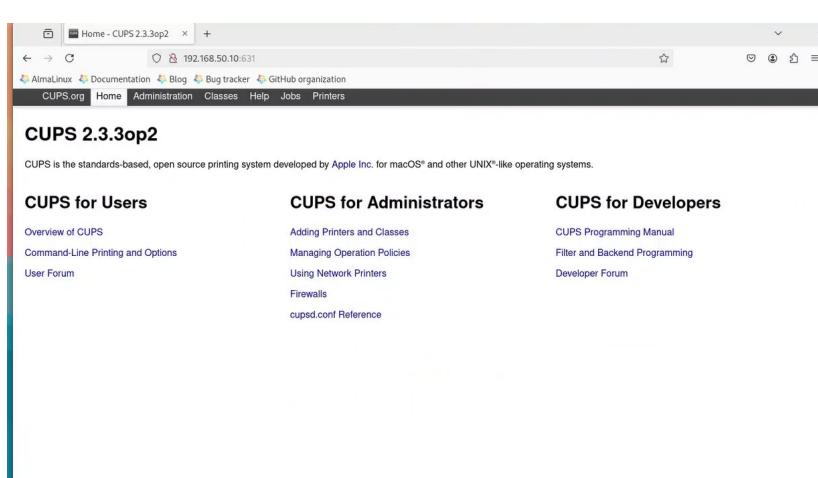
DNS configuration:
    servers: 192.168.204.2
    domains: localdomain
    interface: ens160

    servers: 8.8.8.8
    interface: ens192

Use "nmcli device show" to get complete information about known devices and
"nmcli connection show" to get an overview on active connection profiles.

Consult nmcli(1) and nmcli-examples(7) manual pages for complete usage details.
[root@server1 etc]# |
```

- Open a web browser on the AlmaLinux system.
- Navigate to:
 - 192.168.50.10:631 – from Firefox in AlmaLinux
 - 192.168.204.128:631 - from external web browser



The screenshot shows the CUPS 2.3.3op2 web interface. At the top, there's a navigation bar with links for Home, Administration, Classes, Help, Jobs, and Printers. Below the navigation bar, the title "CUPS 2.3.3op2" is displayed. A sub-header states: "CUPS is the standards-based, open source printing system developed by Apple Inc. for macOS® and other UNIX®-like operating systems." Under the main title, there are three columns of links:

CUPS for Users	CUPS for Administrators	CUPS for Developers
Overview of CUPS	Adding Printers and Classes	CUPS Programming Manual
Command-Line Printing and Options	Managing Operation Policies	Filter and Backend Programming
User Forum	Using Network Printers	Developer Forum
	Firewalls	
	cupsd.conf Reference	

B. Navigate to Add Printer

- In the CUPS web interface, click the "Administration" tab at the top.
- Under the "Printers" section, click "Add Printer".
- You may be prompted to log in. Use your AlmaLinux username and password (with sudo privileges) to authenticate.

This screenshot shows a sign-in dialog box for a website at 192.168.50.10:631. The dialog box contains the following fields and buttons:

- A header message: "This site is asking you to sign in."
- A "Username" field containing "root".
- A "Password" field showing four masked characters ("****").
- Two buttons at the bottom: "Cancel" and "Sign in".

C. Specify the Printer Connection

- CUPS will display options for detected printers and manual connections.
- Since this is a network printer with a known IP address (192.168.50.100), select: "Internet Printing Protocol"

Lab 8 - Installation and Configuration of CUPS & NTP

The screenshot shows the 'Add Printer' configuration page. In the 'Other Network Printers' section, the 'Internet Printing Protocol (ipp)' option is selected. A red box highlights the 'Continue' button at the bottom of the page.

In the Connection field, enter: **ipp://192.168.50.100**

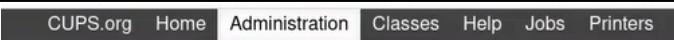
The screenshot shows the 'Add Printer' configuration page. The 'Connection' field contains 'ipp://192.168.50.100'. Below it, a list of examples includes 'http://hostname:631/ipp/' and 'ipp://hostname/ipp/'. A red box highlights the 'Continue' button at the bottom of the page.

- Click "Continue".

D. Enter Printer Details

- On the next page, fill in the printer's identifying information as specified:
 - Name: Brother-8045D
 - This is the identifier other devices will use to find the printer.
 - Description: Printer for management
 - A brief description for user reference.
 - Location: Mezzanine
 - Indicates the physical location of the printer.
- Select Sharing “Share This Printer”.
- Click "Continue".

Lab 8 - Installation and Configuration of CUPS & NTP



Add Printer

Add Printer

Name:
(May contain any printable characters except "/", "#", and space)

Description:
(Human-readable description such as "HP LaserJet with Duplexer")

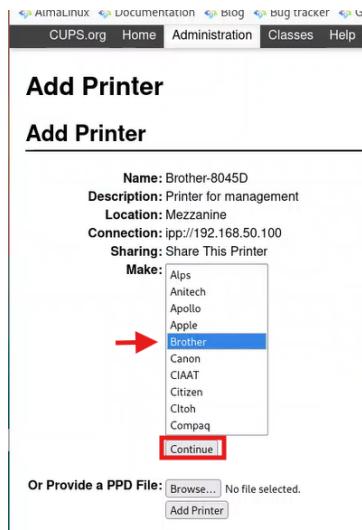
Location:
(Human-readable location such as "Lab 1")

Connection:

Sharing: Share This Printer

E. Select the Printer Model

- CUPS will prompt you to choose the printer's make and model.
- Select "Brother" from the list of manufacturers.
- Look for "Brother DCP-8045D" in the model list and select it.
 - If the exact model isn't listed, choose a similar Brother model or a generic driver (e.g., Generic PostScript Printer). However, for this task, assume the driver is available in CUPS.
- Click "Continue".



Lab 8 - Installation and Configuration of CUPS & NTP

The screenshot shows the 'Add Printer' page on the CUPS.org website. The printer details are as follows:

- Name: Brother-8045D
- Description: Printer for management
- Location: Mezzanine
- Connection: ipp://192.168.50.100
- Sharing: Share This Printer

The 'Make' field is set to 'Brother'. The 'Model' field has a dropdown menu open, showing several Brother DCP models. The option 'Brother DCP-8045D Foomatic/Postscript (en)' is highlighted with a red arrow. Below the dropdown, there is a note about providing a PPD file and a 'Browse...' button. A red box highlights the 'Add Printer' button at the bottom.

F. After “Add Printer” is selected if needed set printer options

The screenshot shows the 'Add Printer' page in the CUPS web interface. A success message 'Printer added Brother-8045D' is displayed. Below it, a note states: 'Note: Printer drivers and raw queues are deprecated and will stop working in a future version of CUPS.' A red box highlights the 'Set Printer Options' link.

Select default options

Set Printer Options

Set Default Options for Brother-8045D

[Query Printer for Default Options](#)

[General](#) [Printout Mode](#) [Banners](#) [Policies](#)

General

Print Quality: Normal
Page Size: US Letter
Media Source: Printer Default
Double-Sided Printing: Off

[Set Default Options](#)

G. Verify the Configuration

- After adding the printer, return to the "Printers" tab in the CUPS web interface.

Lab 8 - Installation and Configuration of CUPS & NTP

The screenshot shows the AlmaLinux CUPS web interface. At the top, there is a navigation bar with links for AlmaLinux, Documentation, Blog, Bug tracker, GitHub repository, CUPS.org, Home, Administration, Classes, Help, Jobs, and Printers. The 'Printers' link is highlighted with a red box. Below the navigation bar, the title 'Brother-8045D' is displayed. Underneath it, the printer details are shown: 'Brother-8045D (Idle, Accepting Jobs, Shared)'. A red box highlights the 'Shared' status. The printer properties listed are: Description: Printer for management, Location: Mezzanine, Driver: Brother DCP-8045D Foomatic/pxlmono (grayscale, 2-sided printing), Connection: ipp://192.168.50.100, and Defaults: job-sheets=none, none media=na_letter_8.5x11in sides=one-sided. Below this, a section titled 'Jobs' is shown with a search bar and buttons for 'Show Completed Jobs' and 'Show All Jobs'. A note states: 'Jobs listed in print order; held jobs appear first.'

- See "Brother-8045D" in the list.
- Click on it to view its properties and confirm that:
 - The Connection is ipp://192.168.50.100:9100.
 - The Description is "Printer for management".
 - The Location is "Mezzanine".
 - The Shared status is enabled (indicated by a checkmark or "Yes").

Exercise 1.4: Tasks to be perform on Ubuntu and Windows 11:

1.4.1 On the **Ubuntu** clients, install the shared network printer from the AlmaLinux server.

Ubuntu client

1. Verify that **CUPS** service is enabled on the **Ubuntu client**:

```
systemctl status cups
```

```
mperez@client1:~$ systemctl status cups
● cups.service - CUPS Scheduler
  Loaded: loaded (/lib/systemd/system/cups.service; enabled; vendor preset: enabled)
  Active: active (running) since Tue 2025-04-08 09:47:05 EDT; 11h ago
TriggeredBy: ● cups.path
              ● cups.socket
    Docs: man:cupsd(8)
   Main PID: 778 (cupsd)
     Status: "Scheduler is running..."
       Tasks: 3 (limit: 4549)
      Memory: 6.0M
        CPU: 74ms
      CGroup: /system.slice/cups.service
              └─ 778 /usr/sbin/cupsd -l
                  ├─2741 /usr/lib/cups/notifier/dbus dbus:// ""
                  ├─2742 /usr/lib/cups/notifier/dbus dbus:// ""

Apr 08 09:47:05 client1 systemd[1]: Starting CUPS Scheduler...
Apr 08 09:47:05 client1 systemd[1]: Started CUPS Scheduler.
mperez@client1:~$
```

2. Install the Shared Network Printer on Ubuntu

On your Ubuntu system, open the Settings application.



- Navigate to the Administration section.
- Click the Add Printer button to begin the setup process.

The screenshot shows the CUPS Administration interface. The top navigation bar has tabs for Home, Administration, Classes, Help, Jobs, and Printers. The 'Administration' tab is active. On the left, there are sections for Printers (with 'Add Printer' highlighted), Classes (with 'Add Class'), and Jobs (with 'Manage Jobs'). On the right, there's a 'Server' configuration section with 'Advanced' settings like sharing printers and remote administration, and a 'Change Settings' button.

3. Prompted for login , use root user password or user with sudo privileges

This site is asking you to sign in.

Username
root

Password

Cancel Sign In

4. Select the Network Printer

In the Add Printer dialog, look for the Discover Network Printer section and click continue.

- See @server1 (DCP-8045D) is the Brother-8045D printer's name in AlmaLinux

On the next page, you can change the printer information, and then click Continue to add this printer.

Lab 8 - Installation and Configuration of CUPS & NTP

OpenPrinting CUPS Home Administration Classes Help Jobs Printers

Add Printer

Add Printer

Local Printers: CUPS-BRF (Virtual Braille BRF Printer)
 HP Printer (HPLIP)
 HP Fax (HPLIP)

Discovered Network Printers: Printer for management @ server1 (DCP-8045D)

Other Network Printers: LPD/LPR Host or Printer
 Internet Printing Protocol (http)
 AppSocket/HP JetDirect
 Backend Error Handler
 Internet Printing Protocol (ipp)
 Internet Printing Protocol (ipps)
 Internet Printing Protocol (https)
 Windows Printer via SAMBA

Continue

5. On the next page, you can change the printer information, and then click Continue to add this printer

OpenPrinting CUPS Home Administration Classes Help Jobs Printers

Add Printer

Add Printer

Name: DCP-8045D
(May contain any printable characters except "/", "#", and space)

Description: DCP-8045D
(Human-readable description such as "HP LaserJet with Duplexer")

Location: Mezzanine
(Human-readable location such as "Lab 1")

Connection: dnssd://Printer%20for%20management%20%40%20server1._ipp._tcp.local/cups?uuid=b8035b4c-1095-3eb1-6906-36e67dfcb08b

Sharing: Share This Printer

Continue

6. Select Model and press Add Printer

OpenPrinting CUPS Home Administration Classes Help Jobs Printers

Add Printer

Add Printer

Name: DCP-8045D
Description: DCP-8045D
Location: Mezzanine
Connection: dnssd://Printer%20for%20management%20%40%20server1._ipp._tcp.local/cups?uuid=b8035b4c-1095-3eb1-6906-36e67dfcb08b

Sharing: Do Not Share This Printer

Make: Brother **Select Another Make/Manufacturer**

Model: DCP-8045D - IPP Everywhere™
Brother DCP-8045D BR-Script3 (en)
Brother DCP-8045D Foomatic/hl7x0 (en)
Brother DCP-8045D Foomatic/hl1250 (en)
Brother DCP-8045D Foomatic/lj5gray (en)
Brother DCP-8045D Foomatic/ljet4 (en)
Brother DCP-8045D Foomatic/Postscript (en)
Brother DCP-8045D Foomatic/pxlmono (en)

Or Provide a PPD File: No file selected.
Add Printer

7. The printer is successfully installed.

Lab 8 - Installation and Configuration of CUPS & NTP

The screenshot shows a web browser window with the URL `localhost:631/admin`. The page title is "Add Printer". Below it, the heading "Add Printer DCP-8045D" is displayed. A success message states "Printer DCP-8045D has been added successfully." A note below it cautions: "Note: Printer drivers and raw queues are deprecated and will stop working in a future version of CUPS." A "Set Printer Options" button is visible at the bottom.

Press DCP-8045D to manage printer

The screenshot shows a web browser window with the URL `localhost:631/printers/DCP-8045D`. The page title is "DCP-8045D". The main heading is "DCP-8045D (Idle, Accepting Jobs, Not Shared)". Below it, there is a detailed description of the printer, including its driver, connection, and default settings. A "Jobs" section is present, with a search bar and buttons for "Show Completed Jobs" and "Show All Jobs". A note at the bottom indicates that active jobs are listed in processing order.

1.4.2 On the Windows 11 clients, install the shared network printer from the AlmaLinux server.

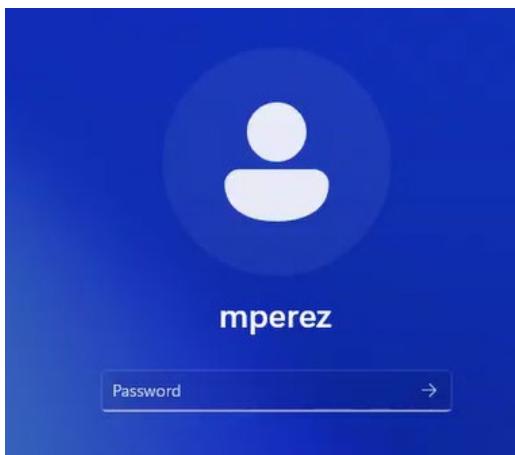
On AlmaLinux

- From the AlmaLinux server, copy the URL of the printer. Replace https with http.

The screenshot shows a web browser window with the URL `https://192.168.50.105:631/AdminInterface/Brother-8045D`. The page title is "Brother-8045D". The main heading is "Brother-8045D (Idle, Accepting Jobs)". Below it, there is a detailed description of the printer, including its driver, connection, and default settings. A "Jobs" section is present, with a search bar and buttons for "Show Completed Jobs" and "Show All Jobs". A context menu is open over the printer name, with the "Copy" option highlighted.

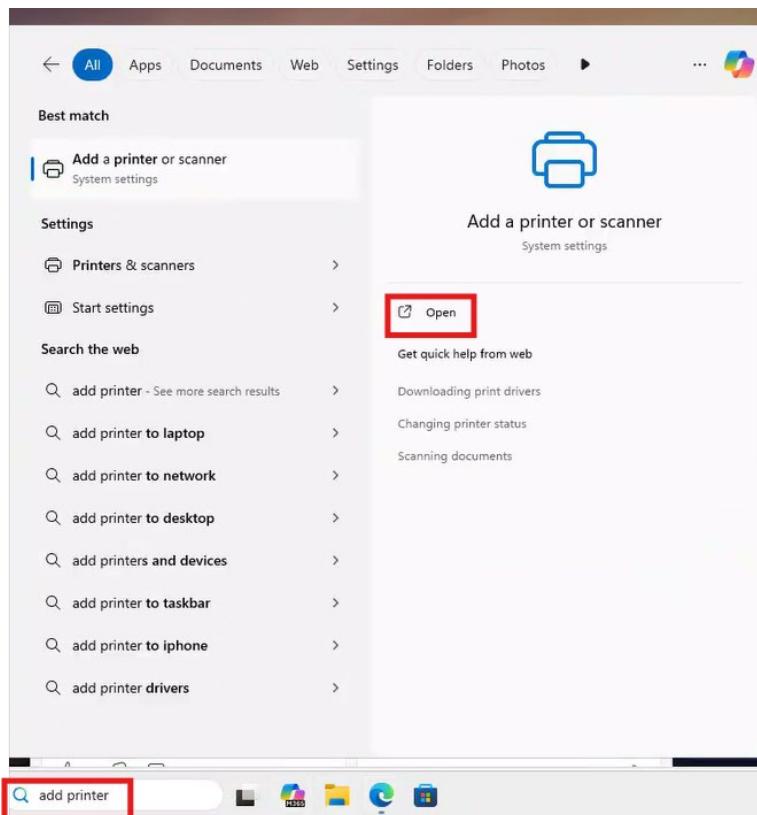
Install the Shared Network Printer on Windows 11

Step 1 Login to windows



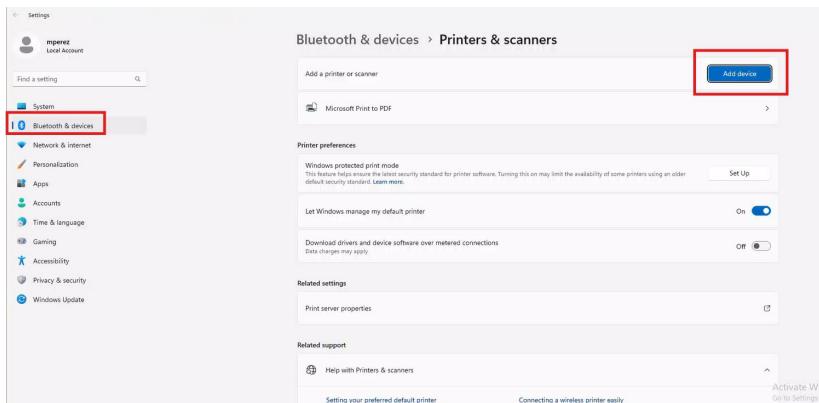
Step 2: Open Printer Settings

- Write Add printer
- Add a printer or scanner appears
- Open



Lab 8 - Installation and Configuration of CUPS & NTP

- Go to Bluetooth & devices and then click Printers & scanners.
- Click Add device to start adding the printer.



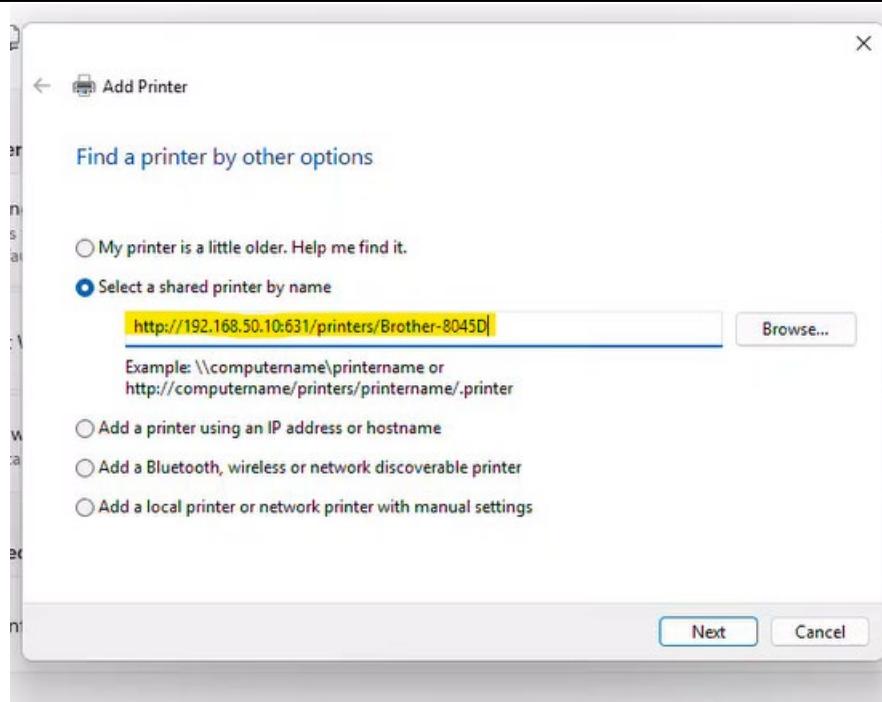
Step 2: Add a Network Printer

- Windows will search for local printers. If the network printer doesn't appear, click The printer that I want isn't listed. Add a new device manually

A screenshot of the 'Printers & scanners' page in the Windows Settings. At the top, it says 'Bluetooth & devices > Printers & scanners'. Below that is a section titled 'Add a printer or scanner' with a 'Refresh' button. Underneath, it says 'The printer that I want isn't listed' and has a blue 'Add a new device manually' button, which is highlighted with a red box. At the bottom, there's a preview of a printer named 'Microsoft Print to PDF'.

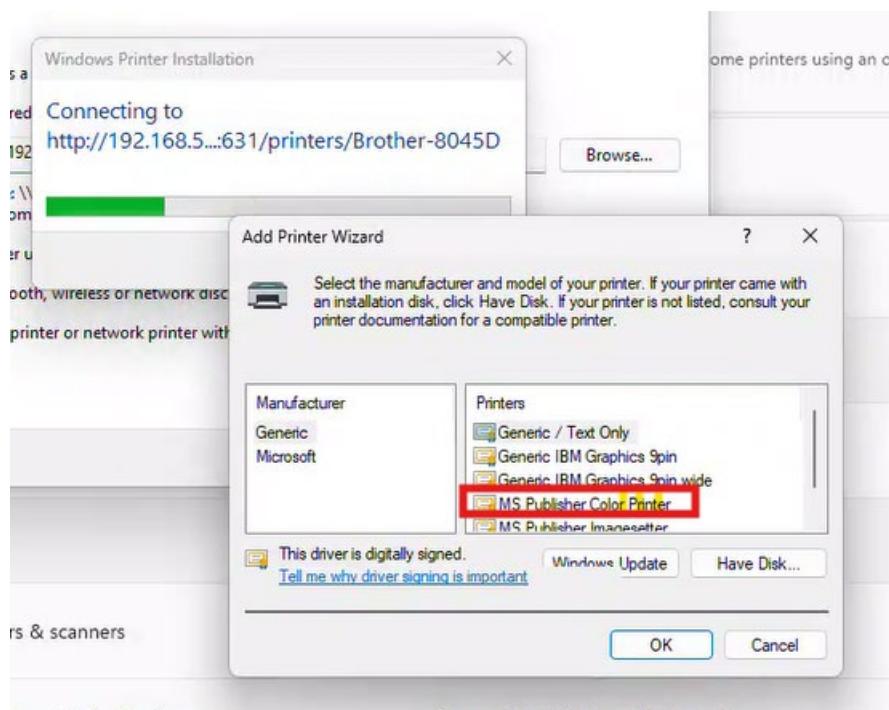
- In the new window, choose Add a printer using Select printer by name
- Paste the copied link from AlmaLinux and press Next

<http://192.168.50.10:631/printers/Brother-8045D>

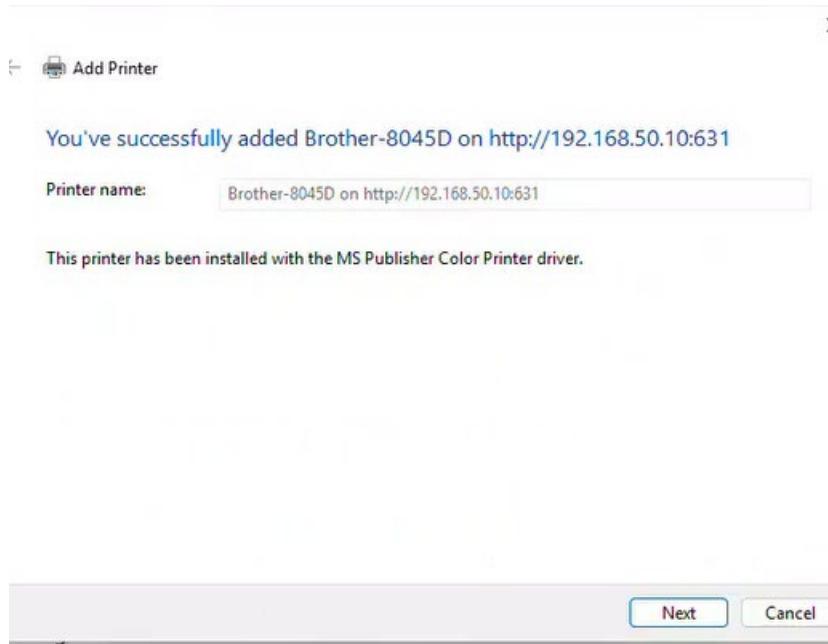


Step 3: Enter Printer Details

- Select MS Publisher Color Printer
- Click OK.

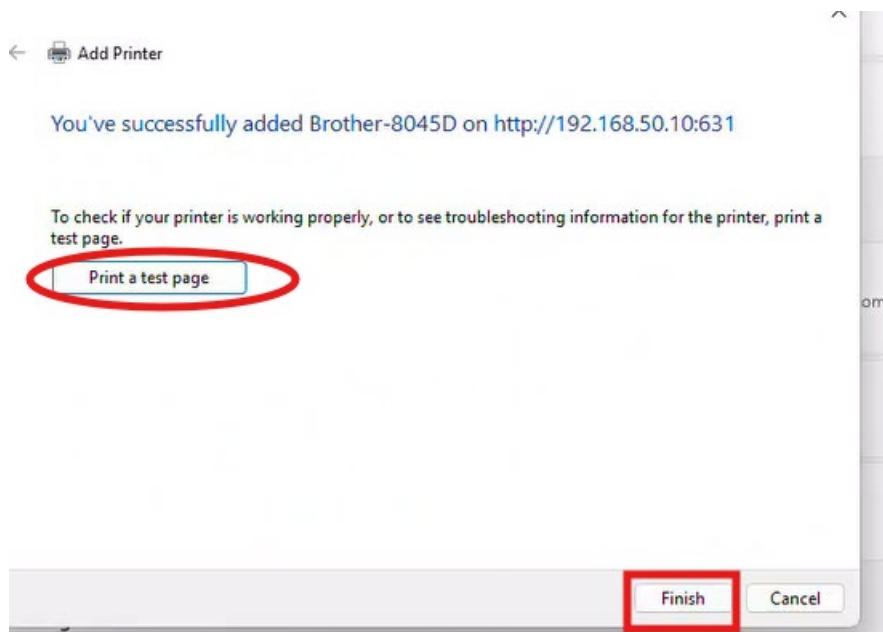


Step 4: Printer has been installed successfully, click Next



Step 6: Test the Printer

- On the final screen, opt to print a test page to confirm the setup.
- Click Finish to complete the installation.
- Ensure the test page prints successfully if available



See now printer appears on the list

Bluetooth & devices > Printers & scanners

Add a printer or scanner

Add device

Brother-8045D on http://192.168.50.10:631

Microsoft Print to PDF

... > Printers & scanners > Brother-8045D on http://192.168.50.10:631



Brother-8045D on http://192.168.50.10:631

Printer status: Idle

Remove

Brother-8045D on http://192.168.50.10:631 settings

Open print queue



Print test page



Printer properties



Printing preferences

Orientation, page order, pages per sheet, borders, paper source



Additional printer settings

Rename your printer, pause printing



Hardware properties



More devices and printers settings



More information

Activate W
Go to Settings

Exercise 2 – Installing and Configuring a NTP Server

NTP Server Installation

Exercise 2.1: Tasks to be perform on AlmaLinux:

1. Verify that the **chrony** application is installed correctly.

dnf list chrony

```
[root@server1 etc]# dnf list chrony
Last metadata expiration check: 1:06:01 ago on Tue 08 Apr 2025 09:02:49 PM.
Installed Packages
chrony.x86_64
```

2. Verify that the **chronyd** service is started and enabled, if not start it.

systemctl status chronyd

```
[root@server1 etc]# systemctl status chronyd.service
● chronyd.service - NTP client/server
   Loaded: loaded (/usr/lib/systemd/system/chronyd.service; enabled; preset: enabled)
     Active: active (running) since Fri 2025-04-04 12:27:47 EDT; 4 days ago
       Docs: man:chronyd(8)
              man:chrony.conf(5)
     Main PID: 819 (chronyd)
        Tasks: 1 (limit: 22829)
      Memory: 4.1M
         CPU: 2.509s
        CGROUP: /system.slice/chronyd.service
                 └─819 /usr/sbin/chronyd -F 2

Apr 04 12:27:47 server1 systemd[1]: Starting NTP client/server...
Apr 04 12:27:47 server1 chronyd[819]: chronyd version 4.5 starting (+CMDMON +NTP +REFCLOCK +RTC +PRIVDROP +SCFILTER +SIGND +ASYNCDNS +NTS +SEHASH +IPV6 +DEBUG)
Apr 04 12:27:47 server1 chronyd[819]: Loaded 9 symmetric keys
Apr 04 12:27:47 server1 chronyd[819]: Using right/UTC timezone to obtain leap second data
Apr 04 12:27:47 server1 chronyd[819]: Frequency -10.121 +/- 0.016 ppm read from /var/lib/chrony/drift
Apr 04 12:27:47 server1 chronyd[819]: Loaded seccomp filter (level 2)
Apr 04 12:27:47 server1 systemd[1]: Started NTP client/server.
Apr 04 12:27:53 server1 chronyd[819]: Selected source 173.206.46.40 (2.almalinux.pool.ntp.org)
Apr 04 12:27:53 server1 chronyd[819]: System clock TAI offset set to 37 seconds
Apr 04 12:27:55 server1 chronyd[819]: Selected source 206.108.0.132 (2.almalinux.pool.ntp.org)
[root@server1 etc] |
```

3. What is the name of the main configuration file of the **chronyd** service?

The chronyd daemon configuration is listed in the configuration file:[**/etc/chrony.conf**](#)

cat /etc/chrony.conf

Lab 8 - Installation and Configuration of CUPS & NTP

```
[root@server1 etc]# cat /etc/chrony.conf
# Use public servers from the pool.ntp.org project.
# Please consider joining the pool (https://www.pool.ntp.org/join.html).
pool 2.almalinux.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.
#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

# Get TAI-UTC offset and leap seconds from the system tz database.
leapsectz right/UTC

# Specify directory for log files.
logdir /var/log/chrony

# Select which information is logged.
#log measurements statistics tracking
[root@server1 etc]# |
```

4. Run a command to list the source of the NTP time.

chronyc sources - displays a table of configured NTP servers, including their IP addresses, reachability, and synchronization status.

chronyc sources

```
[root@server1 etc]#
[root@server1 etc]# chronyc sources
MS Name/IP address          Stratum Poll Reach LastRx Last sample
=====
^- ip253.ip-142-4-192.net    2     8   377    175    +745us[ +745us] +/-   68ms
^- s173-183-146-26.ab.hisia.> 2    10   377    956   -1623us[-2148us] +/-   29ms
^+ dsl-173-206-46-40.tor.pr>  1     9   377    159    +305us[ +305us] +/- 8412us
^* ntp2.torix.ca            1     8   377    230    -276us[ -744us] +/- 5703us
[root@server1 etc]# |
```

5. View the **exact time** of your server.

To display the exact time on your server, use the command:

timedatectl

```
[root@server1 etc]# timedatectl
          Local time: Tue 2025-04-08 22:18:04 EDT
          Universal time: Wed 2025-04-09 02:18:04 UTC
                  RTC time: Wed 2025-04-09 02:18:03
                  Time zone: America/Toronto (EDT, -0400)
 System clock synchronized: yes
        NTP service: active
      RTC in local TZ: no
[root@server1 etc]# |
```

6. Stop the **chronyd** service and verify that the NTP service is inactive.

systemctl stop chronyd.service

timedatectl

```
[root@server1 etc]# systemctl stop chronyd.service
[root@server1 etc]# timedatectl
          Local time: Tue 2025-04-08 22:23:59 EDT
          Universal time: Wed 2025-04-09 02:23:59 UTC
                  RTC time: Wed 2025-04-09 02:23:59
                  Time zone: America/Toronto (EDT, -0400)
 System clock synchronized: yes
      NTP service: inactive
      RTC in local TZ: no
[root@server1 etc]# |
```

7. Set up your server time **manually**.

systemctl stop chronyd.service

timedatectl

```
[root@server1 etc]# timedatectl set-time 22:27
[root@server1 etc]# timedatectl
          Local time: Tue 2025-04-08 22:27:04 EDT
          Universal time: Wed 2025-04-09 02:27:04 UTC
                  RTC time: Wed 2025-04-09 02:27:04
                  Time zone: America/Toronto (EDT, -0400)
 System clock synchronized: no
      NTP service: inactive
      RTC in local TZ: no
[root@server1 etc]# |
```

NTP Server ConfigurationExercise 2.2: Tasks to be perform on AlmaLinux:

1. Modify the **chronyd** service configuration file, to allow your internal subnet **192.168.50.0/24** to use this server as an NTP server.

vi /etc/chrony.conf

```
# Use public servers from the pool.ntp.org project.
# Please consider joining the pool (https://www.pool.ntp.org/join.html).
pool 2.almalinux.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.
#allow 192.168.0.0/16
allow 192.168.50.0/24 ←

# Serve time even if not synchronized to a time source.
#local stratum 10
local stratum 2 ←

# 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 --
```

Lab 8 - Installation and Configuration of CUPS & NTP

2. Restart the **chronyd** service to apply your configuration.

sudo systemctl restart chronyd.service

```
[root@server1 etc]# systemctl restart chronyd
[root@server1 etc]# |
```

sudo systemctl status chronyd.service

```
[root@server1 etc]# systemctl status chronyd
● chronyd.service - NTP client/server
   Loaded: loaded (/usr/lib/systemd/system/chronyd.service; enabled; preset: enabled)
   Active: active (running) since Tue 2025-04-08 22:35:47 EDT; 23s ago
     Docs: man:chronyd(8)
           man:chrony.conf(5)
     Process: 54080 ExecStart=/usr/sbin/chronyd $OPTIONS (code=exited, status=0/SUCCESS)
    Main PID: 54083 (chronyd)
      Tasks: 1 (limit: 22829)
        Memory: 1.1M
          CPU: 26ms
        CGroup: /system.slice/chronyd.service
                 └─54083 /usr/sbin/chronyd -F 2

Apr 08 22:35:47 server1 chronyd[54083]: chronyd version 4.5 starting (+CMDMON +NTP +REFCLOCK +RTC +PRIVDROP +SCFILTER +SIGND +ASYNCDNS +NTS +SECHASH +IPV6 +S
Apr 08 22:35:47 server1 chronyd[54083]: Loaded 0 symmetric keys
Apr 08 22:35:47 server1 chronyd[54083]: Using right/UTC timezone to obtain leap second data
Apr 08 22:35:47 server1 chronyd[54083]: Frequency -13.328 +/- 0.737 ppm read from /var/lib/chrony/drift
Apr 08 22:35:47 server1 chronyd[54083]: Loaded seccomp filter (level 2)
Apr 08 22:35:47 server1 systemd[1]: Started NTP client/server.
Apr 08 22:35:52 server1 chronyd[54083]: Selected source 173.206.46.40 (2.almalinux.pool.ntp.org)
Apr 08 22:35:52 server1 chronyd[54083]: System clock wrong by -21.443199 seconds
Apr 08 22:35:51 server1 chronyd[54083]: System clock was stepped by -21.443199 seconds
Apr 08 22:35:51 server1 chronyd[54083]: System clock TAI offset set to 37 seconds
[lines 1-23/23 (END)]
```

3. Configure the **firewall** to authorise the usage of the **NTP** service.

sudo firewall-cmd --permanent --add-service=ntp --zone=nm-shared

```
[root@server1 etc]# sudo firewall-cmd --permanent --add-service=ntp --zone=nm-shared
success
[root@server1 etc]# |
```

sudo firewall-cmd --reload

```
[root@server1 etc]# sudo firewall-cmd --reload
success
[root@server1 etc]# |
```

4. Verify that the **NTP** service is added and authorised in the firewall.

sudo firewall-cmd --list-services --zone=nm-shared

```
[root@server1 etc]# sudo firewall-cmd --list-services --zone=nm-shared
dhcpc dns mountd nfs ntp rpc-bind samba ssh
[root@server1 etc]# |
```

Lab 8 - Installation and Configuration of CUPS & NTP

5. List the **chrony** service **udp** port that is listening on the server.

netstat -tunap | grep chronyd

```
[root@server1 etc]# netstat -tunap | grep chronyd
udp        0      0 0.0.0.0:123          0.0.0.0:*
udp        0      0 127.0.0.1:323        0.0.0.0:*
udp6       0      0 ::1:323            :::*
[root@server1 etc]# |
```

6. What is the **udp port number** used by the **chrony** service?

The NTP protocol by default uses UDP port **123**

Client Configuration

Exercise 2.3: Tasks to be perform on Ubuntu:

1. Go to the **Ubuntu** client and install the **chrony** package.

sudo apt install chrony -y

```
[mperez@client1:~$ sudo apt install chrony
[sudo] password for mperez:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Suggested packages:
  dnsutils
The following packages will be REMOVED:
  systemd-timesyncd
The following NEW packages will be installed:
  chrony
0 upgraded, 1 newly installed, 1 to remove and 27 not upgraded.
Need to get 290 kB of archives.
After this operation, 360 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://ca.archive.ubuntu.com/ubuntu jammy/main amd64 chrony amd64 4.2-2ubuntu2 [290 kB]
Fetched 290 kB in 0s (1,035 kB/s)
(Reading database ... 204700 files and directories currently installed.)
Removing systemd-timesyncd (249.11-0ubuntu3.12) ...
Selecting previously unselected package chrony.
(Reading database ... 204686 files and directories currently installed.)
Preparing to unpack .../chrony_4.2-2ubuntu2_amd64.deb ...
Unpacking chrony (4.2-2ubuntu2) ...
Setting up chrony (4.2-2ubuntu2) ...

Creating config file /etc/chrony/chrony.conf with new version

Creating config file /etc/chrony/chrony.keys with new version
dpkg-statoverride: warning: --update given but /var/log/chrony does not exist
Created symlink /etc/systemd/system/chrony.service → /lib/systemd/system/chrony.service.
Created symlink /etc/systemd/system/multi-user.target.wants/chrony.service → /lib/systemd/system/chrony.service.
Processing triggers for dbus (1.12.20-2ubuntu4.1) ...
Processing triggers for man-db (2.10.2-1) ...
mperez@client1:~$
```

2. Verify that the **chrony** service is started and enabled.

```
[mperez@client1:~$ systemctl status chrony
● chrony.service - chrony, an NTP client/server
   Loaded: loaded (/lib/systemd/system/chrony.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2025-04-08 22:51:15 EDT; 3min 53s ago
     Docs: man:chronyd(8)
           man:chronyc(1)
           man:chrony.conf(5)
   Main PID: 4759 (chrony)
      Tasks: 2 (limit: 4549)
        Memory: 1.9M
         CPU: 38ms
        CGroup: /system.slice/chrony.service
                 └─4759 /usr/sbin/chronyd -F 1
                 ├─4760 /usr/sbin/chronyd -F 1

Apr 08 22:51:15 client1 systemd[1]: Starting chrony, an NTP client/server...
Apr 08 22:51:15 client1 chrony[4759]: chrony version 4.2 starting (+CMDMON +NTP +REFCLOCK +RTC +PRIVDROP +SCFILTER +SIGND +ASYNCDNS +NTS +)
Apr 08 22:51:15 client1 chrony[4759]: Initial frequency -13.104 ppm
Apr 08 22:51:15 client1 chrony[4759]: Using right/UTC timezone to obtain leap second data
Apr 08 22:51:15 client1 chrony[4759]: Loaded seccomp filter (level 1)
Apr 08 22:51:15 client1 systemd[1]: Started chrony, an NTP client/server.
Apr 08 22:51:22 client1 chrony[4759]: Selected source 185.125.190.58 (ntp.ubuntu.com)
Apr 08 22:51:22 client1 chrony[4759]: System clock TAI offset set to 37 seconds
lines 1-22/22 (END)
^C
mperez@client1:~$
```

3. View the **exact time** of your server.

```
mperez@client1:~$ timedatectl
    Local time: Tue 2025-04-08 23:00:02 EDT
    Universal time: Wed 2025-04-09 03:00:02 UTC
        RTC time: Wed 2025-04-09 03:00:02
      Time zone: America/Toronto (EDT, -0400)
System clock synchronized: yes
          NTP service: active
    RTC in local TZ: no
mperez@client1:~$
```

4. Run a command to list the **source** of the NTP time.

[chronyc sources](#)

```
mperez@client1:~$ chronyc sources
MS Name/IP address          Stratum Poll Reach LastRx Last sample
=====
^+ prod-ntp-5.ntp4.ps5.cano>   2   6   377    80    -256us[ -20us] +/-  39ms
^+ prod-ntp-3.ntp1.ps5.cano>   2   6   377    15    +4187us[+4325us] +/-  43ms
^* alphyn.canonical.com       2   6   377    15    +2512us[+2650us] +/-  34ms
^+ prod-ntp-4.ntp4.ps5.cano>   2   6   377    15    -272us[ -134us] +/-  39ms
^+ s216-232-132-95.bc.hisia.> 2   6   377    16    +298us[ +436us] +/-  89ms
^+ ip253.ip-142-4-192.net     2   6   377    19    +308us[ +446us] +/-  82ms
^+ ntp.lilynx.ca              3   6   377    19    -1060us[ -922us] +/-  72ms
^- s216-232-132-102.bc.hisia> 1   6   377    18    -1031us[ -893us] +/-  235ms
mperez@client1:~$
```

5. Configure **chronyd** to use the **AlamLinux** server as the NTP server.

- a) Verify current configuration

Cat

Lab 8 - Installation and Configuration of CUPS & NTP

```
mperez@client1:~$ cat /etc/chrony/chrony.conf
# Welcome to the chrony configuration file. See chrony.conf(5) for more
# information about usable directives.

# Include configuration files found in /etc/chrony/conf.d.
confdir /etc/chrony/conf.d

# This will use (up to):
# - 4 sources from ntp.ubuntu.com which some are ipv6 enabled
# - 2 sources from 2.ubuntu.pool.ntp.org which is ipv6 enabled as well
# - 1 source from [01].ubuntu.pool.ntp.org each (ipv4 only atm)
# This means by default, up to 6 dual-stack and up to 2 additional IPv4-only
# sources will be used.
# At the same time it retains some protection against one of the entries being
# down (compare to just using one of the lines). See (LP: #1754358) for the
# discussion.
#
# About using servers from the NTP Pool Project in general see (LP: #104525).
# Approved by Ubuntu Technical Board on 2011-02-08.
# See http://www.pool.ntp.org/join.html for more information.
pool ntp.ubuntu.com          iburst maxsources 4
pool 0.ubuntu.pool.ntp.org    iburst maxsources 1
pool 1.ubuntu.pool.ntp.org    iburst maxsources 1
pool 2.ubuntu.pool.ntp.org    iburst maxsources 2

# Use time sources from DHCP.
sourcedir /run/chrony-dhcp

# Use NTP sources found in /etc/chrony/sources.d.
sourcedir /etc/chrony/sources.d

# This directive specify the location of the file containing ID/key pairs for
# NTP authentication.
keyfile /etc/chrony/chrony.keys

# This directive specify the file into which chronyd will store the rate
# information.
driftfile /var/lib/chrony/chrony.drift

# Save NTS keys and cookies.
ntsdumpdir /var/lib/chrony
```

```
# This directive specify the file into which chronyd will store the rate
# information.
driftfile /var/lib/chrony/chrony.drift

# Save NTS keys and cookies.
ntsdumpdir /var/lib/chrony

# Uncomment the following line to turn logging on.
#log tracking measurements statistics

# Log files location.
logdir /var/log/chrony

# Stop bad estimates upsetting machine clock.
maxupdateskew 100.0

# This directive enables kernel synchronisation (every 11 minutes) of the
# real-time clock. Note that it can't be used along with the 'rtcfile' directive.
rtcsync

# Step the system clock instead of slewing it if the adjustment is larger than
# one second, but only in the first three clock updates.
makestep 1 3

# Get TAI-UTC offset and leap seconds from the system tz database.
# This directive must be commented out when using time sources serving
# leap-smeared time.
leapsectz right/UTC
mperez@client1:~$
```

To direct invite to this VM click inside or press Ctrl+G

- b) Edit file

`sudo vim /etc/chrony/chrony.conf`

```
mperez@client1:~$ sudo vim /etc/chrony/chrony.conf
[sudo] password for mperez:
mperez@client1:~$
```

Comment the pool configuration

Specify

`server <AlmaLinux_IP> iburst`

```
# Include configuration files found in /etc/chrony/conf.d.
confdir /etc/chrony/conf.d

# This will use (up to):
# - 4 sources from ntp.ubuntu.com which some are ipv6 enabled
# - 2 sources from 2.ubuntu.pool.ntp.org which is ipv6 enabled as well
# - 1 source from [01].ubuntu.pool.ntp.org each (ipv4 only atm)
# This means by default, up to 6 dual-stack and up to 2 additional IPv4-only
# sources will be used.
# At the same time it retains some protection against one of the entries being
# down (compare to just using one of the lines). See (LP: #1754358) for the
# discussion.
#
# About using servers from the NTP Pool Project in general see (LP: #104525).
# Approved by Ubuntu Technical Board on 2011-02-08.
# See http://www.pool.ntp.org/join.html for more information.
#pool ntp.ubuntu.com          iburst maxsources 4
#pool 0.ubuntu.pool.ntp.org    iburst maxsources 1
#pool 1.ubuntu.pool.ntp.org    iburst maxsources 1
#pool 2.ubuntu.pool.ntp.org    iburst maxsources 2
server 192.168.50.10 iburst

# Use time sources from DHCP.
sourcedir /run/chrony-dhcp

# Use NTP sources found in /etc/chrony/sources.d.
```

- c) Save the file

6. Restart the **chronyd** service to apply your configuration.

`sudo systemctl restart chronyd`

```
mperez@client1:~$ sudo systemctl restart chronyd
mperez@client1:~$
```

Lab 8 - Installation and Configuration of CUPS & NTP

```
mperez@client1:~$ sudo systemctl status chrony
● chrony.service - chrony, an NTP client/server
   Loaded: loaded (/lib/systemd/system/chrony.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2025-04-08 23:14:13 EDT; 24s ago
     Docs: man:chrony(8)
           man:chronyc(1)
           man:chrony.conf(5)
  Process: 12856 ExecStart=/usr/lib/systemd/scripts/chronyd-starter.sh $DAEMON_OPTS (code=exited, status=0/SUCCESS)
 Main PID: 12867 (chronyd)
    Tasks: 2 (limit: 4549)
   Memory: 1.8M
      CPU: 25ms
     CGroup: /system.slice/chrony.service
             └─12867 /usr/sbin/chronyd -F 1
                ├─12868 /usr/sbin/chronyd -F 1

Apr 08 23:14:13 client1 systemd[1]: Starting chrony, an NTP client/server...
Apr 08 23:14:13 client1 chronyd[12867]: chronyd version 4.2 starting (+CMDMON +NTP +REFCLOCK +RTC +PRIVDROP +SCFILTER +SIGND +ASYNCDNS +NTS+)
Apr 08 23:14:13 client1 chronyd[12867]: Frequency -13.250 +/- 0.060 ppm read from /var/lib/chrony/chrony.drift
Apr 08 23:14:13 client1 chronyd[12867]: Using right/UTC timezone to obtain leap second data
Apr 08 23:14:13 client1 chronyd[12867]: Loaded seccomp filter (level 1)
Apr 08 23:14:13 client1 systemd[1]: Started chrony, an NTP client/server.
Apr 08 23:14:18 client1 chronyd[12867]: Selected source 192.168.50.10
Apr 08 23:14:18 client1 chronyd[12867]: System clock TAI offset set to 37 seconds
Lines 1-23/23 (END)
mperez@client1:~$
```

7. Wait a few minutes, then check if the **source** of the **NTP** time is the **AlamLinux** server.

chronyc sources

```
mperez@client1:~$ 
mperez@client1:~$ chronyc sources
MS Name/IP address          Stratum Poll Reach LastRx Last sample
=====
^* _gateway                  2       6    37      52  +128ns[ +86us] +/- 8360us
mperez@client1:~$ chronyc sources
MS Name/IP address          Stratum Poll Reach LastRx Last sample
=====
^* _gateway                  2       6   377      29  -125us[ -110us] +/- 8501us
mperez@client1:~$
```

To direct input to this VM, click inside or press Ctrl+G.

The output of the `chronyc sources` command on your Ubuntu client reveals the current NTP source being used:

- **NTP Source:** `_gateway` (likely the default gateway of the client).
- **Details:**
 - **Stratum:** 2 (indicating the proximity to a primary time source).
 - **Poll Interval:** 6 seconds.
 - **Reach:** 377 (connectivity status—fully reachable).

Note change in the **Reach** column changed from 37 to 377

Reach column represents an octal (base-8) value that indicates the status of communication between the client and the NTP source over the last eight polling cycles. The number reflects how many recent attempts to contact the server were successful.

- Reach 37 in octal means "0011111" in binary, which translates to a mix of successful and unsuccessful communication attempts with the server during the last eight polls.
 - A maximum value of 377 (octal) means "1111111" in binary, indicating that all eight recent communication attempts were successful.
- **LastRx:** 29 seconds (time since the last sample was received).
 - **Last Sample:** `-125us [-110us] +/- 8501us` (indicates synchronization adjustments).

8. Go back to the **AlmaLinux** server, and check if the server has NTP clients.

chronyc clients

Lab 8 - Installation and Configuration of CUPS & NTP

```
[root@server1 etc]# chronyc clients
Hostname          NTP   Drop Int IntL Last      Cmd   Drop Int  Last
=====
192.168.50.20        6     0    5   -   62      0     0   -   -
[root@server1 etc]# |
```