UET 111 · CHAPTER II

Adapting to MX Linux

Linux desktop, packages, MX Tools and the terminal

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Outline

1. What is MX Linux?
2. Comparison with Other Distributions
3. The Xfce Desktop
4. Package Managers
5. Installing, Removing and Updating
6. MX Tools
7. Personalizing the System
8. The Linux Terminal

Learning Objectives

By the end of this chapter, you will be able to:

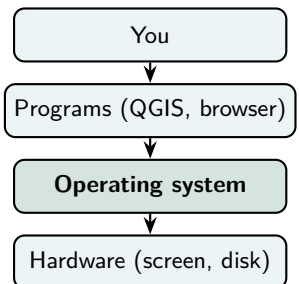
- **Describe** MX Linux and compare it with Ubuntu, Debian and Fedora;
- **Use** the Xfce desktop and its tools;
- **Install, remove and update** software;
- **Customize** themes, panels and shortcuts;
- **Type** basic terminal commands.

What is an Operating System?

Definition

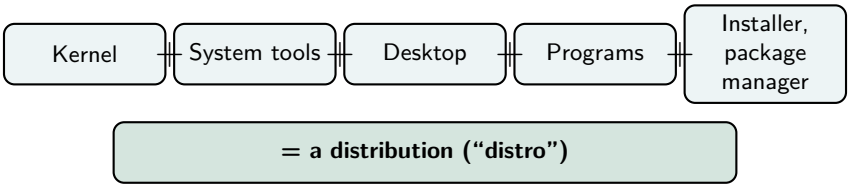
The **operating system (OS)** is the main program of a computer. It controls the machine and lets other programs run.

- Examples: Windows, macOS, Android, **Linux**;
- Like a building manager: it shares the rooms between the tenants.



What is a Linux Distribution?

- **Linux** is only the **kernel**: the core that talks to the hardware;
- A kernel alone is not usable. Someone must add the other parts.



Examples: MX Linux, Ubuntu, Debian, Fedora. Same engine, different cars.

What is a Desktop Environment?

Definition

The **desktop environment (DE)** is the part you **see and click**: windows, menus, panel, icons, file manager, settings.

- One Linux system can use **different** desktops;
- Xfce (light), GNOME (modern, simple), KDE Plasma (rich);
- Like the decoration of a house: the structure stays the same.



MX Linux: Origins and Identity

- **Born in 2014** from the **antiX** and **MEPIS** communities;
- Built on **Debian Stable**;
- Current series: **MX-25 “Infinity”**, based on Debian 13 “Trixie”;
- Editions: **Xfce** (default), KDE Plasma, Fluxbox;
- Free software, community-driven.



Definition

A **Linux distribution** = Linux kernel + programs + installer, packaged together. Same engine, different cars.

Key Features and Advantages

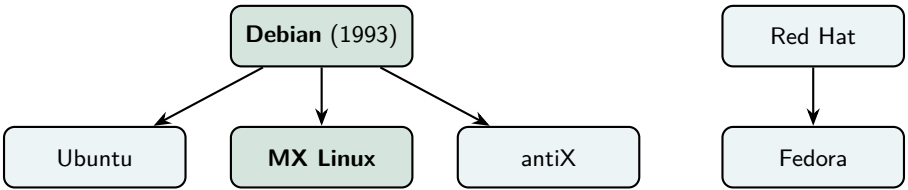
Features

- Light: runs well on older computers;
- Live USB: try it before installing;
- **MX Tools**: simple graphical utilities;
- Both systemd and SysVinit available;
- Large Debian software catalog.

Why it suits you

- Stable: few surprises during a project;
- Fast on lab and personal PCs;
- Friendly to beginners;
- Free: no license fees.

Family Tree of Distributions



Debian family: `.deb` packages and APT. Red Hat family: `.rpm` packages and DNF.

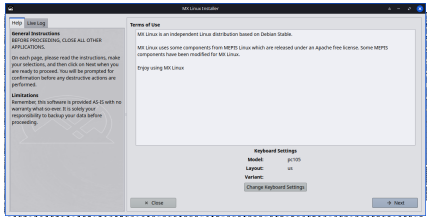
MX Linux Editions

Edition	Desktop	Good for
Xfce	Xfce 4.20	Most users: balanced and light
Xfce AHS	Xfce + newer kernel and drivers	Recent hardware
KDE Plasma	Plasma	Users who like a rich desktop
Fluxbox	Fluxbox	Very old or very small computers

AHS = Advanced Hardware Support.

Trying and Installing MX Linux

1. Download the **ISO** file (a disc image) from the MX Linux site;
2. Write it to a USB stick (MX Live USB Maker or another tool);
3. Restart and open the **boot menu** (key depends on the computer);
4. **Try** the live system without changing anything;
5. Click **Install MX Linux** and follow the steps.



Before installing

Back up your files. Choosing the wrong disk can erase data.

MX Linux vs Ubuntu, Debian, Fedora

	MX Linux	Ubuntu	Debian	Fedora
Based on	Debian Stable	Debian	Independent	Independent
Default desktop	Xfce	GNOME	GNOME (choice at install)	GNOME
Releases	Follows Debian	Every 6 months (LTS every 2 years)	About every 2 years	About every 6 months
Packages	.deb, APT	.deb, APT, Snap	.deb, APT	.rpm, DNF
Best for	Light, stable, easy tools	Beginners, wide support	Servers, maximum stability	Latest technology

Key point

MX, Ubuntu and Debian share the same **APT** commands. Fedora uses different ones.

Choosing a Distribution: Quick Guide

If you want…	Consider
A light system for an old PC	MX Linux
The widest help online for beginners	Ubuntu
Maximum stability for a server	Debian
The newest technology	Fedora

No distribution is best for everyone. Try several in a live session.

Meet the Desktop

- **Panel**: the bar with launchers and clock;
- **Whisker Menu**: the application menu;
- **Notification area**: network, volume, updates;
- **Conky**: live system information on the desktop;
- **Workspaces**: several desktops in one.



From Windows to MX Linux

In Windows	In MX Linux (Xfce)
Start menu	Whisker Menu
File Explorer	Thunar file manager
Control Panel / Settings	Settings Manager
Notepad	Mousepad text editor
Command Prompt	Terminal
Microsoft Store	MX Package Installer

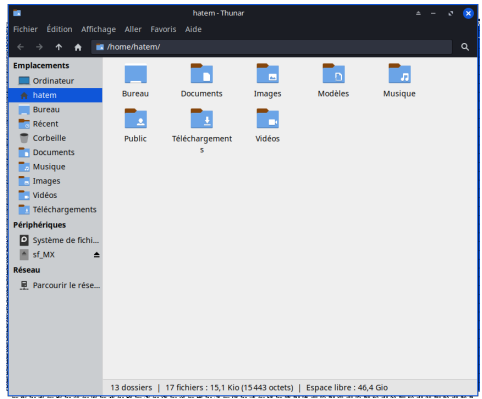
The Whisker Menu

- Click the menu icon or press the Super key;
- **Type** to search for any program;
- Browse by **category** on the right;
- Mark **Favorites** for quick access;
- Right-click an entry: add it to the panel or desktop.



Thunar: The File Manager

- **Side pane:** places and devices;
- **Address bar:** type a path with `Ctrl+L`;
- **Tabs:** `Ctrl+T` opens a new tab;
- **Hidden files:** `Ctrl+H` shows or hides them;
- Right-click a folder: Open Terminal Here.



The Settings Manager

Section	What you control
Appearance	Style, icons, fonts
Display	Resolution, multiple screens
Keyboard	Layout and shortcuts
Mouse and Touchpad	Speed, clicks, scrolling
Power Manager	Sleep and battery
Window Manager	Window borders and behaviour

Windows and Workspaces

- `Alt+Tab` switches between open windows;
- `Alt+F2` opens a box to run a program by name;
- **Workspaces** are separate desktops: use one for maps, one for reports;
- Click the workspace switcher in the panel to move between them;
- Drag a window to the screen edge to tile it (if enabled).

Try it

Open two programs, switch with `Alt+Tab`, then send one to another workspace.

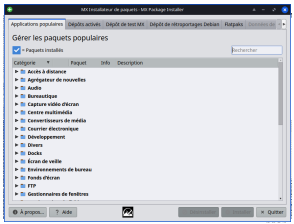
Where Do Programs Come From?

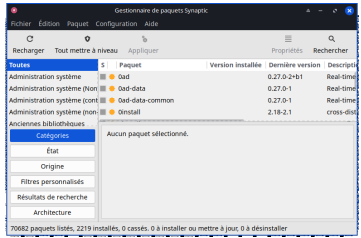


- A **package** is a program in a box (a `.deb` file);
- A **dependency** is a part the program needs; the manager installs it for you;
- Packages from official repositories are checked and signed.

Three Tools, One System

Tool	Type	Best for
MX Package Installer	Graphical	Popular apps, Flatpaks, backports: easiest start
Synaptic	Graphical	Searching the full catalog, advanced control
APT	Terminal	Fast, precise, repeatable commands





Repositories in MX Linux

Source	Content
Debian repositories	The base: thousands of tested packages
MX repositories	MX Tools and MX-specific packages
MX Test repository	Newer versions, less tested
Debian Backports	Newer versions of some Debian packages
Flathub (Flatpak)	Apps packaged separately

MX Repo Manager chooses the fastest mirror for you.

Flatpak: Another Way to Install

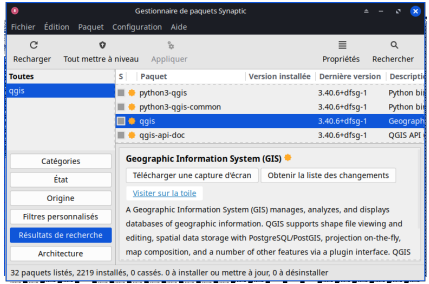
- **Flatpak** packages an app together with the parts it needs;
- Works on many distributions, with the same app everywhere;
- Apps run in a **sandbox** (isolated from the system);
- Often gives **newer** versions than the Debian repositories;
- Trade-off: bigger downloads and more disk space.

In MX

MX Package Installer has a **Flatpak** tab. Terminal: `flatpak install name`.

Synaptic: Step by Step

1. Open Synaptic and enter your password;
2. Click **Reload** to refresh the catalog;
3. Use **Search** to find a program;
4. Right-click → **Mark for Installation**;
5. Click **Apply**, then confirm the list.



Software Tasks with APT

Task	Command
Refresh the catalog	`sudo apt update`
Install newer versions	`sudo apt upgrade`
Search a program	`apt search gis`
Install a program	`sudo apt install qgis`
Remove a program	`sudo apt remove qgis`
Remove unused parts	`sudo apt autoremove`

update vs upgrade

update refreshes the list. **upgrade** installs the new versions.

About sudo

`sudo` = admin rights. Your password is not shown while you type it.

Software Tasks with the Graphical Tools

- **Install:** MX Package Installer → choose a tab → tick the program → Install;
- **Remove:** Synaptic → search → right-click → Mark for Removal → Apply;
- **Update:** click the **MX Updater** icon in the notification area;
- Update regularly: it brings security fixes.

Try it

Install **QGIS** first with the graphical tool, then remove it with APT.

Worked Example: Install QGIS

1. Terminal: `sudo apt update`;
2. Search: `apt search qgis`;
3. Install: `sudo apt install qgis`;
4. Type `y` and Enter when asked to continue;
5. Open QGIS from the Whisker Menu (Education or Science).

What happened?

APT downloaded QGIS and all its dependencies from the repository, then installed them.

Fixing Common Problems

Message or problem	Try
Package not found	`sudo apt update`, then check the spelling
Could not get lock	Another updater is running: wait, then retry
Broken packages	`sudo apt -fix-broken install`
Disk is full	MX Cleanup, then `sudo apt autoremove`

Good Update Habits

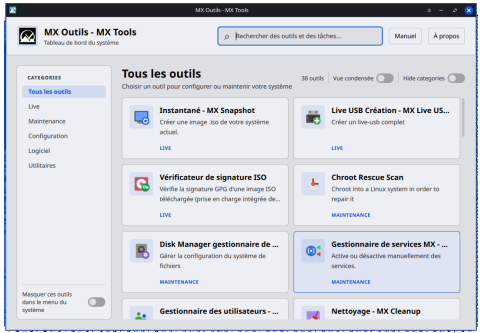
- Update **regularly**, at least every week;
- Read the list before you confirm;
- Take an **MX Snapshot** before a big upgrade;
- Use `sudo apt full-upgrade` when MX Updater suggests it;
- Restart after a kernel update.

Never

Do not turn off the computer during an update.

MX Tools: Your Control Centre

- **MX Snapshot**: copy your system;
- **MX Tweak**: adjust the desktop;
- **MX Boot Options**: control startup;
- MX Live USB Maker: create a bootable USB;
- MX Cleanup: free disk space;
- MX User: manage accounts.

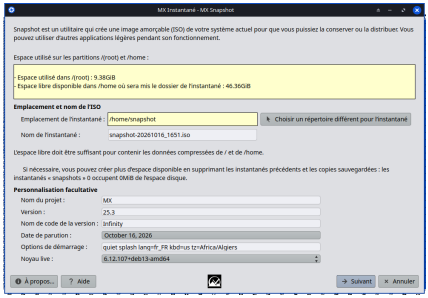


MX Snapshot: A Copy of Your System

Definition

A **snapshot** is a bootable ISO image of your installed system.

- **Backup:** save your setup before big changes;
- **Clone:** install the same setup on other computers;
- **Steps:** open MX Snapshot → choose a folder → choose whether to keep personal data → Create.



MX Tweak and MX Boot Options

MX Tweak

- Panel position and size;
- Theme and window behaviour;
- Display and mouse settings;
- Safe: changes can be reversed.

MX Boot Options

- Choose the default startup entry;
- Set the menu waiting time;
- Change the boot splash screen.

Careful

Boot settings affect startup. Change **one thing at a time**.

MX Tools: Other Useful Utilities

Tool	Use
MX Cleanup	Delete temporary files, free space
MX Conky	Choose the desktop system monitor
MX Repo Manager	Select the fastest mirrors
MX Live USB Maker	Create a bootable USB stick
MX User	Add or manage user accounts
MX Updater	Check and install updates

Wallpaper, Icons and Fonts

- **Wallpaper:** right-click the desktop → Desktop Settings;
- **Icons:** Settings Manager → Appearance → Icons;
- **Fonts:** Appearance → Fonts; larger text helps readability;
- **Conky:** choose its look in MX Conky.

Try it

Pick a dark theme and a new icon set. Take a screenshot.

Customizing the Panel

1. Right-click the panel → Panel → **Panel Preferences**;
2. Tab **Display:** orientation, size, position;
3. Tab **Items:** add a launcher, clock or workspace switcher;
4. Drag items to reorder them;
5. Click Close: changes apply at once.

Tip: add a launcher for your most used program.

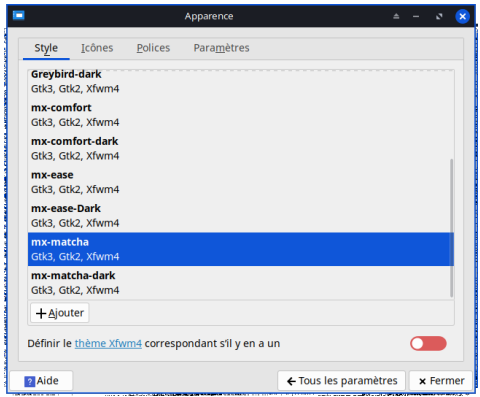
Useful Keyboard Shortcuts

Keys	Action
`Alt+Tab`	Switch window
`Alt+F2`	Run a program by name
`Ctrl+Alt+T`	Open the terminal (if set)
`Ctrl+C`, `Ctrl+V`	Copy, paste
`Ctrl+Z`	Undo

Shortcuts can differ: check Settings → Keyboard.

Themes and Appearance

- **Settings Manager** → **Appearance:** style and icons;
- **Window Manager:** window borders;
- **Desktop:** wallpaper;
- **MX Tweak:** ready-made themes.



Panels and Keyboard Shortcuts

Panels

- Right-click the panel → Panel → Panel Preferences;
- Add items: launchers, clock, workspaces;
- Change position, size, orientation.

Shortcuts

- Settings Manager → Keyboard → Application Shortcuts;
- Click Add, type the command, press the keys;
- Example: `Ctrl+Alt+T` opens the terminal.

Try it

Move the panel, then create a shortcut for the file manager.

Why Use the Terminal?

- The **terminal** lets you give instructions by typing instead of clicking;
- Faster for repeated tasks, and the same on every Linux system;
- Open it from the Whisker Menu.

Reading the prompt

`student@mx:~$` user name @ computer name : current folder (~ = your home folder)

Three useful tricks

Tab completes names · ↑ repeats earlier commands · `man ls` shows help

Navigation

`pwd`	where am I?
`ls`	list files
`ls -l`	detailed list
`cd Documents`	enter a folder
`cd ..`	go up one level
`cd ~`	go home

Folder tree

```
/
  home
    student
      Documents
      Downloads
```

An **absolute path** starts at `/`; a **relative path** starts from where you are.

Managing Files and Folders

Command	Action
`mkdir maps`	create a folder
`touch notes.txt`	create an empty file
`cp notes.txt copy.txt`	copy a file
`mv copy.txt maps/`	move or rename
`rm copy.txt`	delete a file
`rm -r maps`	delete a folder and its content

Careful

`rm` is permanent: there is no recycle bin.

Editing Text Files

- `nano notes.txt` opens a simple editor in the terminal;
- `cat notes.txt` shows a file; `less notes.txt` reads it page by page;
- Prefer a window? Use **Mousepad** from the menu.

Keys in nano	**Action**
`Ctrl+O`, then Enter	save
`Ctrl+X`	exit
`Ctrl+K`	cut the line
`Ctrl+W`	search

Anatomy of a Command

```
ls -l Documents
```

`ls`	the **command**: what to do
`-l`	the **option**: how to do it
`Documents`	the **argument**: what to act on

Remember

Linux is **case-sensitive**: `Documents` and `documents` are different.

Getting Help

- `man ls`: the manual page (press `q` to quit);
- `ls -help`: a short summary;
- `apropos copy`: find commands about a word;
- Search the web with the exact error message.

Try it

Run `man cp`. Find the option that copies folders.

Wildcards and Tab Completion

Pattern	Meaning
`*`	any characters
`?`	exactly one character
`*.txt`	all files ending in .txt
`map?.png`	map1.png, mapA.png...

Press **Tab** to finish a name. Press Tab twice to see choices.

Looking Inside Files

Command	Shows
`cat file`	the whole file
`less file`	page by page (`q` to quit)
`head file`	the first 10 lines
`tail file`	the last 10 lines
`wc -l file`	the number of lines

Reading `ls -l`

```
-rw-r-r- 1 student student 120 Oct 13 notes.txt
```

- First letter: `-` file, `d` folder;
- Then three groups: **owner**, **group**, **others**;
- `r` read, `w` write, `x` run;
- Then owner, group, size in bytes, date, name.

Here the owner can read and write; everyone else can only read.

Searching: find and grep

Command	Meaning
`find . -name "*.txt"`	find files by name
`grep city notes.txt`	lines containing “city”
`grep -i city notes.txt`	ignore upper and lower case
`grep -r city .`	search all files in the folder

Redirection and Pipes

`ls > list.txt`	save the output in a file
`echo hello » list.txt`	add a line at the end
`ls | less`	send the output to another command
`history | grep apt`	find earlier commands

Careful

> replaces the file. » adds to it.

Staying Safe in the Terminal

- Read a command **before** pressing Enter;
- Never paste a command you do not understand;
- Use `sudo` only when needed;
- Check your folder with `pwd` before using `rm`;
- Use `ls` first to preview what a pattern matches.

Never

`rm -r` on a wrong folder deletes everything inside it, without a recycle bin.

Practice

1. Open the terminal. Run `pwd`, then `ls`.
2. Create a folder `lab` and enter it.
3. Create `notes.txt` with nano. Write your name. Save.
4. Copy it to `backup.txt`, then rename `backup.txt`.
5. Run `sudo apt update`. Search for `qgis`.
6. Change your wallpaper and add a shortcut.

Mini Lab: Organize a Project Folder

1. Create `project` with sub-folders `data`, `maps`, `reports`;
2. In `data`, create `sites.txt` and write three place names;
3. Copy it into `reports` as `sites_copy.txt`;
4. Show the first two lines of `sites.txt`;
5. Find all `.txt` files inside `project`;
6. Delete the copy, then list `reports`.

Quick Quiz

1. Which family uses APT: Debian or Fedora?
2. What does `apt update` do?
3. Which MX Tool makes a bootable copy of your system?
4. What does `cd ..` do?
5. Why is `rm` dangerous?
6. What is a Flatpak sandbox?

Summary

- **MX Linux** = Debian Stable + Xfce + MX Tools: stable, light, friendly;
- Ubuntu, Debian and MX share **APT**; Fedora uses DNF;
- Install software with **MX Package Installer**, **Synaptic** or **APT**;
- **MX Tools** help you back up (Snapshot), tune (Tweak) and start (Boot Options);
- Themes, panels and shortcuts make the desktop yours;
- The **terminal** needs only a few commands to start: `pwd`, `ls`, `cd`, `mkdir`, `cp`, `mv`, `rm`, `nano`.

Next: using FOSS tools for urban analysis.