SKILL DEVELOPMENT AND **TRAINING PROGRAMS** ON SOFTWARE **INSTALLATION & TROUBLESHOOTING**

INNOVATIVE AND PERSONALIZED SOFTWARE SOLUTIONS

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BOOT AND INSTALLATION PROCESS

"INTRODUCTION TO BASIC COMPUTER HARDWARE: RAM, MOTHERBOARD, SSD, AND USB KEYBOARD"



















INTRODUCTION TO OS INSTALLATION

1.1 What is an Operating System (OS)?

An operating system (OS) is software that manages computer hardware and provides services for applications. Examples include Windows, Linux, and macOS.

1.2 Importance of Choosing the Right OS?

Choosing the right OS is crucial based on your needs:

For Gaming: Windows 10/11 is ideal due to software support.

- For Development: Linux provides flexibility and open-source tools.
- For Business: Windows Pro or macOS offers security and productivity.







TYPES OF OPERATING SYSTEMS



WINDOWS OS

1.Windows 10, 11 for home and office use.

2.Windows Server for business and IT infrastructure.



LINUX OS

 Popular distributions: Ubuntu, Fedora, Debian.
Mostly free and open-source, great for security and programming.

Difference Between OS Types:

Feature	Windows	Linux
Open-Source	No	Yes
Customization	Limited	High
Compatibility	High	Medium
Cost	Paid	Free (most



MACOS

1.Exclusive to Apple devices,known for stability andprofessional use.



SYSTEM REQUIREMENTS CHECK

S.I HARDWARE REQUIREIVIENTS					
OS	Minimum RAM	Storage Required	Processor Requirement		
Windows 10	2GB	20GB	1GHz, 2-core		
Ubuntu	4GB	25GB	2GHz, dual-core		
Windows 11	4GB	64GB	1GHz, TPM 2.0		
OS	Minimum RAM	Storage Required	Processor Required		

3.2 COMPATIBILITY WITH 32-BIT VS. 64-BIT

> 32-bit OS supports up to 4GB RAM.

> 64-bit OS supports more than 4GB RAM and runs modern applications better.

3.3 CHECKING TPM AND SECURE BOOT FOR WINDOWS 11

Open Run (Win + R) > Type 'tpm.msc' > Press Enter to check if TPM 2.0 is available.

Secure Boot can be enabled/disabled in BIOS settings.

SYSTEM REQUIREMENTS CHECK

Processor Type	Clock Speed (GHz)	Performance Level	Processor Type
Intel i3 (10th Gen)	2.4 - 3.6 GHz	Basic (Office Work, Browsing)	Intel i3 (10th Gen)
Intel i5 (11th Gen)	2.5 - 4.2 GHz	Moderate (Gaming, Editing)	Intel i5 (11th Gen)
Intel i7 (12th Gen)	2.8 - 4.8 GHz	High (Video Editing, Programming)	Intel i7 (12th Gen)
Intel i9 (13th Gen)	3.0 - 5.5 GHz	Extreme (Heavy Gaming, Al, 3D Rendering)	Intel i9 (13th Gen)





PREPARING FOR OS INSTALLATION 4.1 BACKING UP IMPORTANT DATA

Use external storage, cloud backup (Google Drive, OneDrive).

4.2 CHOOSING INSTALLATION TYPE

Fresh Install: Deletes everything.

Upgrade Install: Keeps files and settings.

Dual Boot: Runs two operating systems.





Dual Boot Ubuntu with Windows 10



What do you want to do?

Upgrade this PC now

Mindows 10 Setup

Microsoft Support Legal

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Ai Tweaker A		Advan	lvanced Monitor		Boot Force BIUS	Tool	Exit
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odule)							
					SanDisk (149	939MB)	
					Disabled		
					Disabled		
					Disabled		



PREPARING FOR OS INSTALLATION

4.3 CREATING BOOTABLE USB/DVD

Use Rufus, BalenaEtcher, or Windows Media Creation Tool.

4.4 CHANGING BOOT ORDER IN BIOS/UEFI

Restart PC, press F2 / DEL / ESC to enter BIOS.

Set USB as the first boot device.





Use or E selec	[ENTER], [TAB] SHIFT-TAB] to :t a field.
Use I confi	(*) or [-] to gure system Time
	Select Screen
11	Select Iten
+-	Change Field
Tab	Select Field
F1	General Help
F10	Save and Exit
ESC	Exit





PARTITIONING THE HARD DRIVE

When installing an operating system (OS), you need to partition the hard drive, which means dividing it into separate sections (partitions) to store different types of data. Partitioning can be Automatic (done by the OS) or Manual (you decide how to set up the partitions). Computer Management

- Automatic Partitioning
- The OS creates and manages all partitions automatically.
- Good for beginners who don't need custom setups.
- Example: If you install Windows without changing anything, it creates a C: drive and a small recovery partition.



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	Simple	Basic		Healthy (Prim	ary Partition)		98	14 1 1	
	Simple	Basic		Healthy (Prim	ary Partition)		19	More Actions	
	Simple	Basic	NTFS	Healthy (Boot	Page File, Cras	h Dump, Primary Partition)	10		
:)	Simple	Basic	NTFS	Healthy (Prim	ary Partition)		19		
	Simple	Basic	NTFS	Healthy (Prim	ary Partition)		32		
:d	Simple	Basic	NTFS	Healthy (Syste	m, Active, Prim	ary Partition)	86		
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	Healthy (S Healthy (Boot, Page File, Crash Healthy (Primary Partition)								
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P	rimary pa	rtition I	Extended p	partition 📕 Free	e space		•		
P	rimary pa	rtition	Extended p	partition 📕 Free	e space		•		



PARTITIONING THE HARD DRIVE

When installing an operating system (OS), you need to partition the hard drive, which means dividing it into separate sections (partitions) to store different types of data.

Partitioning can be Automatic (done by the OS) or Manual (you decide how to set up the partitions).

Manual Partitioning

- You control how much space each partition gets.
- Useful for dual-booting (e.g., Windows & Linux) or custom setups.
- \checkmark Example: When installing Linux, you can manually set up /, /home, /swap, and other partitions.



RECOMMENDED PARTITIONING FOR LINUX:

In Linux, manual partitioning allows better organization of files. The common partitions are:

Partition	Purpose	Recommended Size
/ (Root)	Stores the main OS files and system settings	20GB+
/home	Stores user data (documents, downloads, desktop)	50GB+
/swap	Acts as virtual memory when RAM is full	Equal to RAM size
/boot	Stores bootloader and kernel files	1GB

HY IS MANUAL PARTITIONING USEFUL?

Prevents Data Loss – If your OS crashes, ur files in /home are safe.

Better Performance – Swap helps when RAM is full.

Easier Upgrades – You can reinstall Linux thout deleting your files.

Dual Boot Support – You can keep Windows and nux on the same PC.



UNDERSTANDING PARTITIONS IN MBR AND GPT

Before understanding Primary and Logical partitions, you need to know that hard drives use partitioning schemes like:

MBR (MASTER BOOT RECORD)

- Supports only 4 primary partitions. If you need more than 4 partitions, one must be converted into an Extended Partition, inside which Logical Partitions can be created.
- Maximum disk size: 2TB
- Used in older systems.



GPT (GUID PARTITION TABLE)





MBR = 4 partitions max (with Logical Partitions workaround), GPT = No limit on partitions

Supports unlimited primary partitions.

Recommended for modern systems (Windows

Supports disks larger than 2TB.

Uses UEFI instead of the traditional BIOS.



ENTERING BIOS/UEFI AND SELECTING BOOT DEVICE

Before installing an operating system (OS), you must enter the BIOS/UEFI settings and select the correct boot device (USB, DVD, or external drive). This ensures that the system loads the OS installation files from the correct source.

What is BIOS/UEFI? BIOS (Basic Input/Output System):

- Older firmware used in older computers.
- Uses Legacy Boot Mode.
- Limited features and slower than UEFI.

UEFI (Unified Extensible Firmware Interface):

- Modern replacement for BIOS.
- Supports Secure Boot, GPT partitions, and faster booting.
- Found in most computers manufactured after 2012.

		BIOS SETUP UTILITY	
lain Advanc	ed Power	Boot Exit	
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	VEFI BIOS Utility – Advanced Mode		
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to	My Favorites Main Ai Tweaker Advanced Monitor Uption ким messages	Boot Tool	Exit
to	Interrupt 19 Capture	Disabled	
m Time.	Setup Mode	Advanced Mode	
	> CSM (Compatibility Support Module)		
	> Secure Boot		
	Boot Option Priorities		
reen	Boot Option #1	SanDisk (14939MB)	
eld	Boot Option #2	Disabled	-
eld	Boot Option #3	Disabled	
Exit	Boot Option #4	Disabled	
	Hard Drive BBS Priorities		

ENTERING BIOS/UEFI AND SELECTING BOOT DEVICE

Before installing an operating system (OS), you must enter the BIOS/UEFI settings and select the correct boot device (USB, DVD, or external drive). This ensures that the system loads the OS installation files from the correct source.

Steps to Enter BIOS/UEFI

- **1** Turn On or Restart the Computer If the system is already on, restart it.
- **2** Press the BIOS/UEFI Key During Startup As soon as the screen lights up, repeatedly press the BIOS key.

Common keys:

 $F2 \rightarrow Dell, Acer, ASUS, Lenovo$

F10 → HP

- $F12 \rightarrow Boot Menu$ (some brands)
- DEL (Delete) → MSI, Gigabyte, ASRock
- $ESC \rightarrow Some models$

If you miss the timing, restart and try again.

Lenovo Laptop	F12, Fn + F11	F1, F2	Please select be	oot device:
Lenovo Desktop	F12, F8	F1, F2	HDD:PO-Corsair CSSD-F120GB2	
Intel	F10		HDD:P1-SAMSUNG HD753 USB:IT117204 USB	
HP Desktop	Esc, F9	F10, Esc	IDE:0CZ-VERTEX3	
HP Laptop	Esc	F10		
Dell Desktop	F12	F2		
Dell Laptop	F12	F2	↑ and ↓ to move	selection
Asus Desktop	F8	F9	ENTER to select boot device ESC to boot using defaults	
Asus Laptop	Esc	F2 or Delet	(C)	d-1000 Award Software
Acer Desktop	Esc, F12, F9	Del, F2	Standard CMOS Features	equencu/Voltage_Control
Acer Laptop	F12	F2	Advanced BIOS Features	ad Fail-Safe Defaults
Samsung	Esc, F2	F2, F10	Advanced Chipset Features Lo Integrated Peripherials Se	ad Optimized Defaults t Supervisor Password
Sony Laptop	Esc, F11	F1, F2	► Power Management Setup Se	t User Password
Toshiba Laptop	F12	F2	PnP/PCI Configurations Sa PC Health Status Exception	ve & Exit Setup it Without Saving
Compaq Laptop	Esc, F9	F10	sc:Quit ↑↓→	+ : Select Iten
Fujitsu Laptop	F12	F2	10 : Savo & Exit Sotup	
Appl Model	Cond (Continue (D) D	Conduct Co	Time, Date, Hard Disk	Type

CHANGING BOOT ORDER TO SELECT BOOT DEVICE

- **1** Navigate to the Boot Menu
 - Use arrow keys to go to Boot, Boot Order, or Boot Configuration.
 - In UEFI, use a mouse if available.
- 2 Change Boot Priority
 - \checkmark Set the USB drive or DVD as the first boot device.
 - If installing from a network, select PXE Boot.
- **3** Disable Secure Boot (If Necessary)
 - If installing Linux or an older OS, go to Security and disable Secure Boot.
 - In UEFI, enable Legacy Boot Mode if required.
- 4 Save and Exit
 - Press F10 to save changes and exit.
 - Confirm by selecting Yes and pressing Enter.
- **5** Restart and Begin Installation
 - The system will now boot from the selected device and start the OS installation process.



	BIOS SETUP UTILITY	
Main Advanced Power	Boot Exit	
System Time System Date Legacy Diskette A Language • Primary IDE Master • Primary IDE Slave • Secondary IDE Slave • Third IDE Master • Fourth IDE Master • IDE Configuration • System Information	[02:52:19] [Ued 03/09/2005] [1.44M, 3.5 in.] [English] : [ST3160023A] : [ST3200822A] : [TOSHIBA DUD-ROM SD] : [INOSHIBA DUD-ROM SD] : [Maxtor 6Y160M0] : [Not Detected]	Use [ENTER], [TAB] or [SHIFT-TAB] to select a field. Use [+] or [-] to configure system Time.

COMMON ISSUES & FIXES

Issue	Cause	Solution
Cannot Enter BIOS	Wrong key pressed	Try F2, F12, DEL, or ESC immediately after power-on.
USB/DVD Not Showing in Boot Menu	Boot device not detected	Ensure USB/DVD is properly connected and formatted correctly.
Secure Boot Error	UEFI blocks non- certified OS	Disable Secure Boot in BIOS settings.
Changes Not Saved	Incorrect exit method	Use F10 \rightarrow Save & Exit instead of just exiting.



- ✓ Use the correct key (F2, F12, DEL, ESC) to enter BIOS.
- Change boot order to boot from USB/DVD.
- Disable Secure Boot if installing Linux or older OS versions.
- Save and exit to begin installation.



STEP-BY-STEP OS INSTALLATION GUIDE

Once the boot device is selected in BIOS/UEFI, the OS installation process begins. Below is a detailed step-by-step guide for installing an operating system (Windows/Linux).

Step 1: Boot from Installation Media

- Insert the bootable USB/DVD into the computer.
- **2** Restart the computer and enter BIOS/UEFI.
- 3 Select the USB/DVD as the first boot device and exit BIOS (F10 \rightarrow Save & Exit).
- 4 The system will boot into the OS installer.

K Step 2: Selecting Language, Time, and Keyboard Layout

- When the OS setup screen appears, choose:
 - Language (e.g., English, Tamil)
 - Time & currency format
 - Keyboard layout (e.g., US, UK, Tamil)
- **2** Click Next to proceed.



Windows Setup		- 63								
Language to install English (United States)		}								
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Enter your language and other preferences and click "Next" to	continue.									
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STEP-BY-STEP OS INSTALLATION GUIDE

Once the boot device is selected in BIOS/UEFI, the OS installation process begins. Below is a detailed step-by-step guide for installing an operating system (Windows/Linux).

Step 3: Choosing Installation Type

- Fresh Installation (Recommended) \rightarrow Deletes everything and installs a new OS.
- Upgrade Installation \rightarrow Retains files & apps but updates the OS.
- Dual Boot \rightarrow Installs OS alongside an existing one.

Example: If you want both Windows and Ubuntu, choose "Install Ubuntu alongside Windows".

- Step 4: Partitioning the Hard Drive
- Automatic Partitioning: The OS creates partitions automatically.
- Manual Partitioning: You create custom partitions.





Media Creation Tool

		rree space	Type	
Drive 0 Partition 1: Recovery	300.0 MB	58.0 MB	Recovery	
Drive 0 Partition 2	99.0 MB	69.0 MB	System	
Drive 0 Partition 3	128.0 MB	128.0 MB	MSR (Reserved)	
Drive 0 Partition 4	29.5 GB	11.6 GB	Primary	
<u>R</u> efresh X <u>D</u> elete	Eormat	-∦ N <u>e</u> w		
Load driver 🔐 Extend				
indows can't be installed on drive 0 p	partition 1. (Show details)			
			Next	
			<u> </u>	

STEP-BY-STEP OS INSTALLATION GUIDE

Once the boot device is selected in BIOS/UEFI, the OS installation process begins. Below is a detailed step-by-step guide for installing an operating system (Windows/Linux).

Step 5: Entering Product Key (Windows Only)

- I lf prompted, enter your Windows activation key.
- 2 If you don't have one, click "I don't have a product key" (you can activate later).

Step 6: Installing the OS

- Click Install Now and wait.
- 2 The system will copy files and install necessary components.
- 3 The installation may take 10-45 minutes depending on system speed.

Step 6: Completing Installation & Restarting

- Once installation is complete, click Restart Now.
- **2** Remove the USB/DVD when prompted.
- 3 The system will reboot into the newly installed OS.

Step 7: Post-Installation Setup

- Create a User Account (set username & password).
- 2 Check for OS Activation (Windows: Settings > Activation).
- Install Drivers & Updates (Wi-Fi, graphics, audio).



4 Install Essential Software (browser, office suite, media player).



COMMON INSTALLATION ERRORS AND FIXES

C "Windows Setup Stuck at Loading"

Cause:

Insufficient system resources (Low RAM, slow HDD)

Faulty installation media

Fix:

✓ Wait for some time (can take 10-20 minutes on slow PCs)

✓ Restart the PC and try again

Replace the USB/DVD with a freshly created bootable one

Final Tips

Always use official OS installation files

Check system requirements before installation

Backup important data before formatting the hard drive

8. "GRUB Bootloader Missing (Linux Only)" **Cause:**

- GRUB bootloader not installed correctly
 - Windows overwrote Linux bootloader

Fix:

✓ Boot into Live Linux USB and run:

sudo grub-install /dev/sda sudo update-grub

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After installing an operating system, a few essential steps ensure the system runs smoothly, securely, and efficiently. Below is a step-by-step postinstallation setup guide.

1. Install System Updates

Why?

Updates include security patches, bug fixes, and performance improvements.

Windows:

Go to Settings \rightarrow Windows Update \rightarrow Check for updates

Install drivers, security updates, and feature updates

✓ Linux:

Open a terminal and run:

sudo apt update && sudo apt upgrade -y # (For Debian-based distros like Ubuntu) sudo dnf update -y # (For Fedora)

\checkmark macOS:

Go to System Settings \rightarrow Software Update

2.Install Essential Drivers

Windows:

Install Wi-Fi, graphics, chipset, and sound drivers

3. Install Essential Software

Why? A fresh OS installation comes with only basic applications.

Before you start using the system for work, ensure:

Why? Missing drivers can cause issues like no sound, no Wi-Fi, or poor display resolution.

Use Windows Update or download from the manufacturer's website (Intel, AMD, NVIDIA)

Test Everything!

Internet is working

Sound and display settings are configured correctly Software updates are installed

Backup & restore points are set

TROUBLESHOOTING COMMON ISSUES

Common Installation Errors and Fixes

1. "No Bootable Device Found"

Cause:

- Incorrect boot order in BIOS/UEFI
- Faulty or improperly created bootable USB/DVD

Fix:

✓ Enter BIOS/UEFI (Press F2, F12, ESC, DEL during startup)

✓ Set USB/DVD as the first boot device

bootable USB Recreate the using Rufus/BalenaEtcher

① 2. "Windows Cannot Be Installed on This Disk" **Cause:**

- partition format)
- Hard drive is in the wrong partition scheme

Fix:

type:

diskpart list disk select disk X (replace X with your disk number) clean convert gpt exit

For GPT to MBR: Follow the same steps but use convert mbr instead.

GPT/MBR partition issue (Windows cannot install on the current)

- ✓ Convert the partition table:
- For MBR to GPT: Open Command Prompt in setup (Shift + F10) and



Name	Total size	Free space	Туре
Drive 0 Partition 1	15.0 MB	15.0 MB	MSR (Reserve
Drive 0 Partition 2: Recovery	529.0 MB	515.0 MB	Recovery
Windows Setup			-
The partitions on the recommended order disks go to the Micro GPT.	disk selected f For additional psoft website (w	or installation information ww.microsof ation?	n are not in the about installing to GPT t.com) and search for
The partitions on the recommended order disks go to the Micro GPT. Do you want to proc	disk selected f For additional psoft website (w eed with install	or installation information ww.microsof ation?	o are not in the about installing to GPT t.com) and search for OK Cancel
The partitions on the recommended order disks go to the Micro GPT. Do you want to proceed or the Micro Here's more info about what happened	e disk selected f For additional psoft website (w eed with install	or installation information ww.microsof ation?	o are not in the about installing to GPT t.com) and search for OK Cancel



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