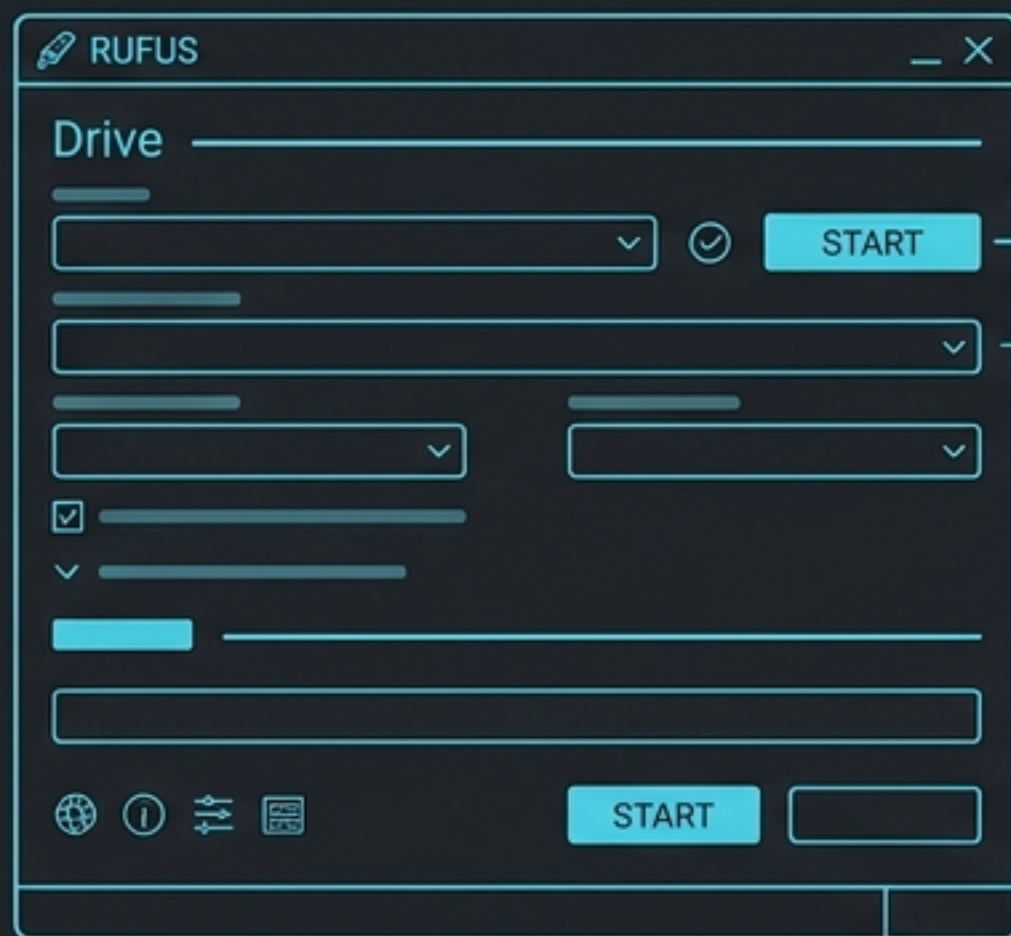


Engineering a Windows 10 Bootable Drive

Deployment methodologies utilizing Rufus GUI and DiskPart CLI.



ISO Source

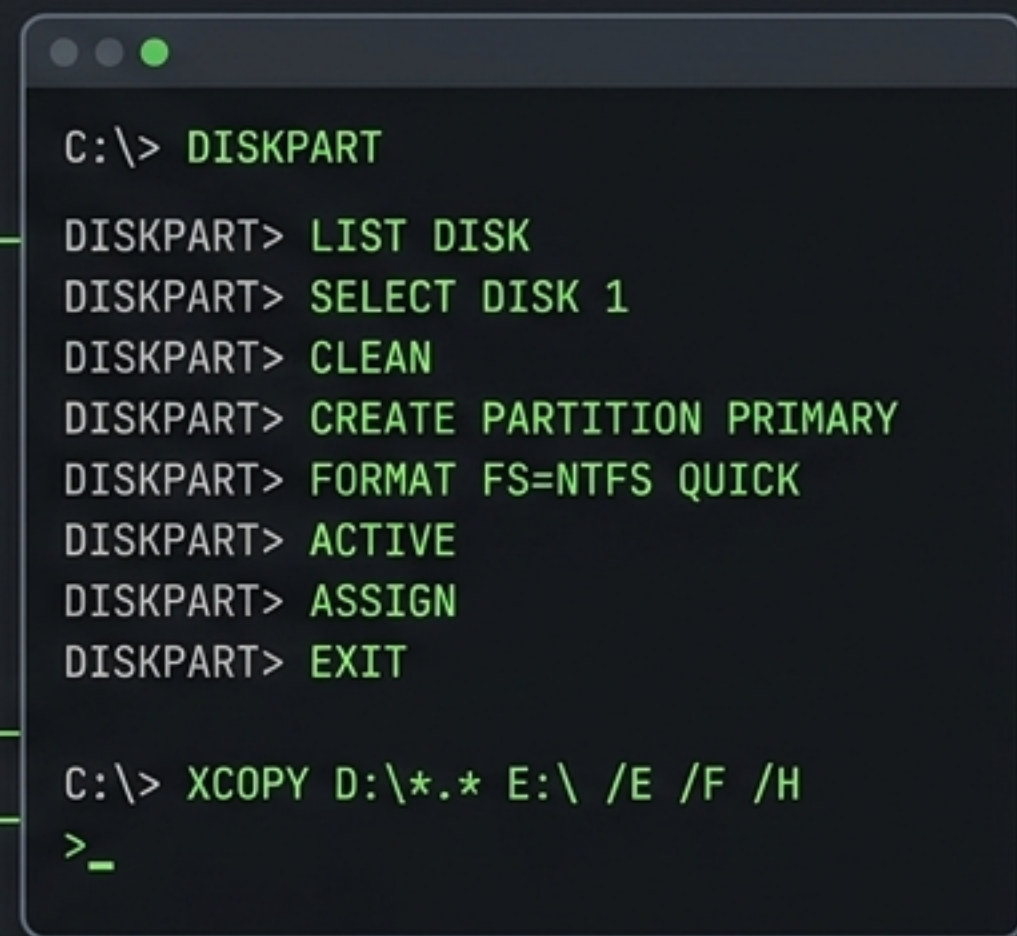
Target Drive



Disk Selection

Disk Selection

Boot Sector Creation

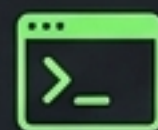


RUFUS GUI METHOD

Intuitive graphical interface for rapid ISO to USB writing and partition scheme selection.

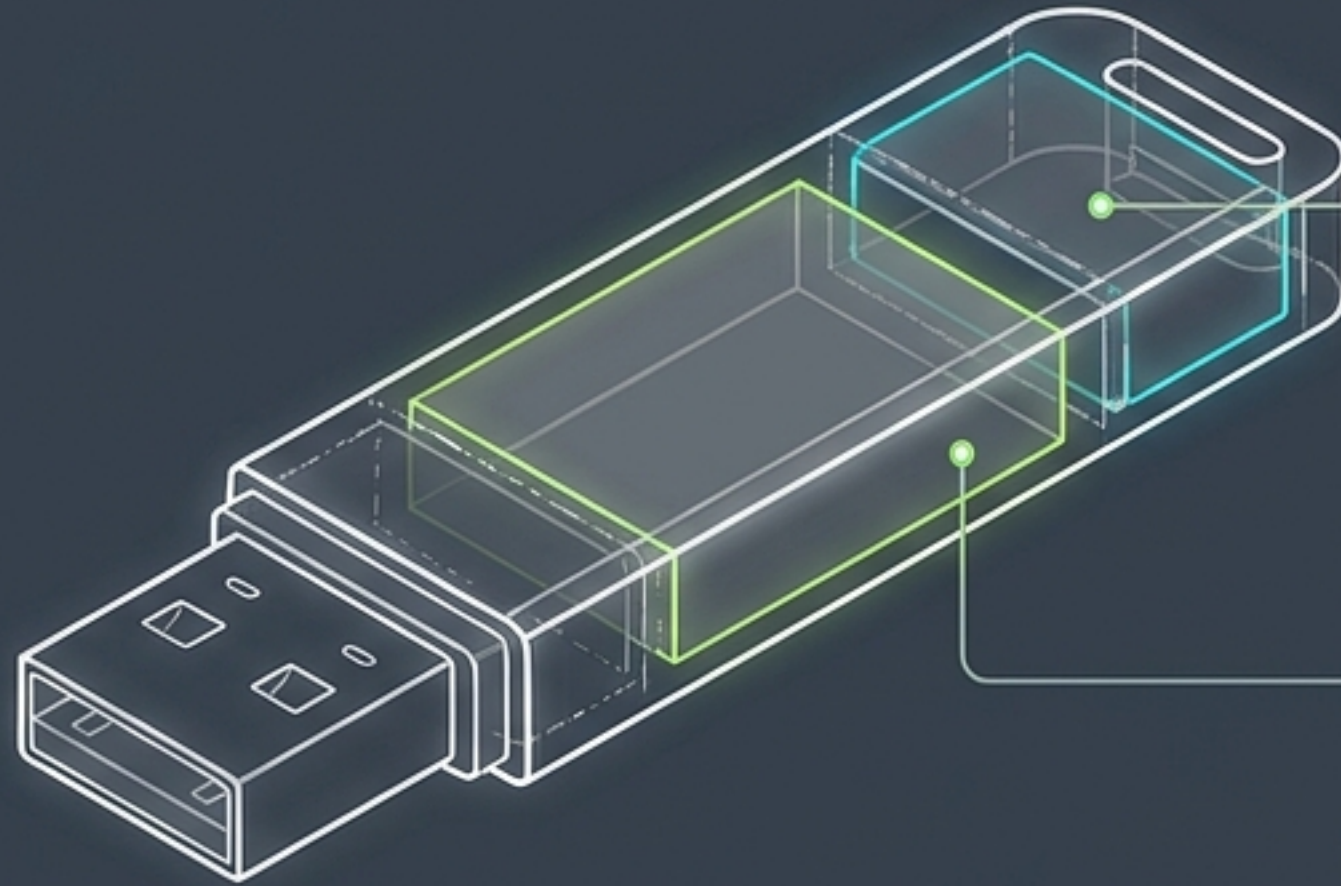


DISKPART CLI METHOD



Direct command-line execution for precise disk management, partitioning, and file transfer.

Anatomy of a Deployment Drive



The Boot Sector

- **Function:** Interacts with the motherboard to allow the computer to boot without an installed OS.
- **Key Files:** `boot`, `efi`

The Payload

- **Function:** Contains the actual Windows OS installation and repair utilities.
- **Key Files:** `sources`, `setup.exe`



Install Windows



Repair Windows

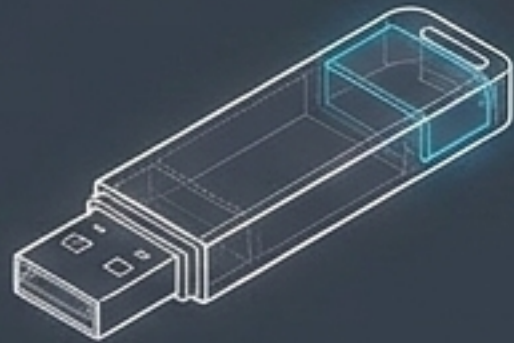


Troubleshoot System



Boot Bare-Metal Hardware

Preparation and Hardware Prerequisites



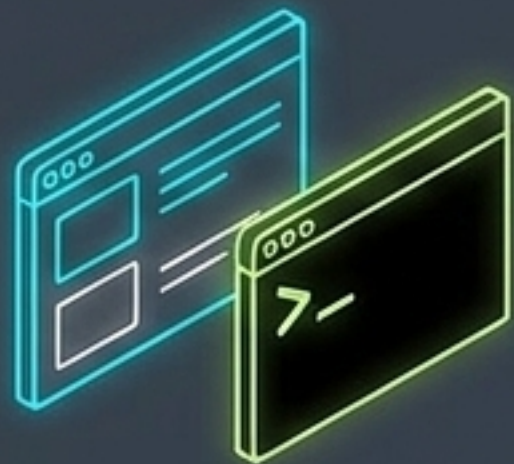
Hardware Storage

USB Flash Drive (8GB minimum capacity).



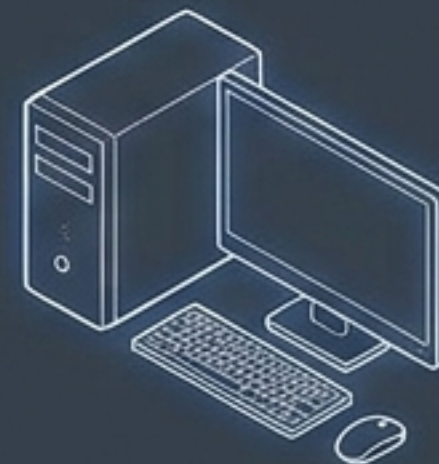
OS Payload

Windows 10 ISO image file
(Example:
`Win10_22H2_English_x64.iso`).



Deployment Tool

Rufus executable OR
Windows **Command Prompt** with Administrator Access.



System Access

Active computer with an Administrator account.



DESTRUCTIVE OPERATION. The formatting process will permanently erase all existing data on the target USB drive. Ensure backups are secured before proceeding.

Strategic Paradigm: GUI vs. CLI Selection



The Rufus Method (Path A)

Architecture:	Graphical User Interface (GUI)
Execution:	Highly automated, faster setup time
Ideal User:	Beginners, standard deployments
Pros:	Prevents formatting the wrong drive, auto-detects USBs



The CMD/DiskPart Method (Path B)

Architecture:	Command Line Interface (CLI)
Execution:	Manual partitioning, deeper technical process
Ideal User:	Advanced users, IT pros, secure environments
Pros:	Native to Windows, requires no third-party software, teaches core system architecture

Path A: Rufus Interface Architecture

Device: Ensure this matches your target 8GB+ USB. (Rufus auto-detects connected drives).

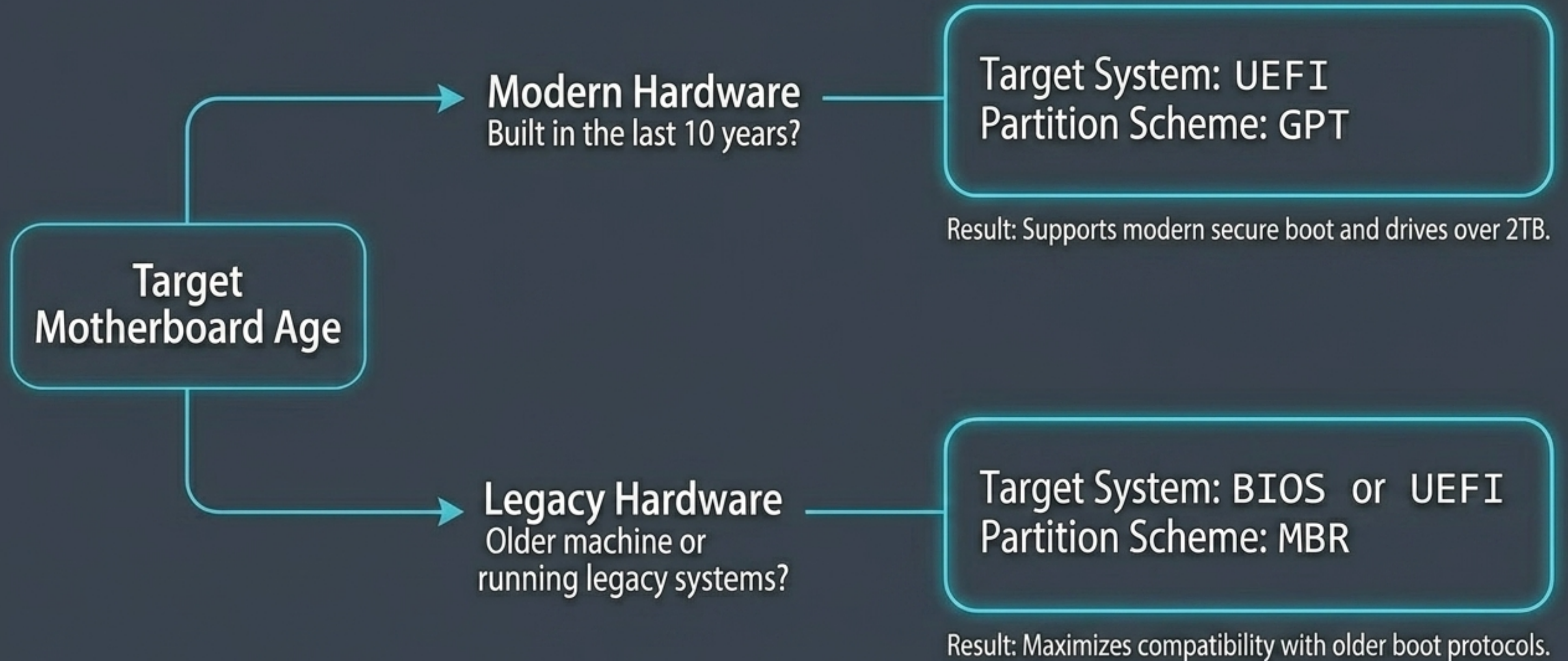
Partition Scheme: The critical configuration step (See next slide for logic).



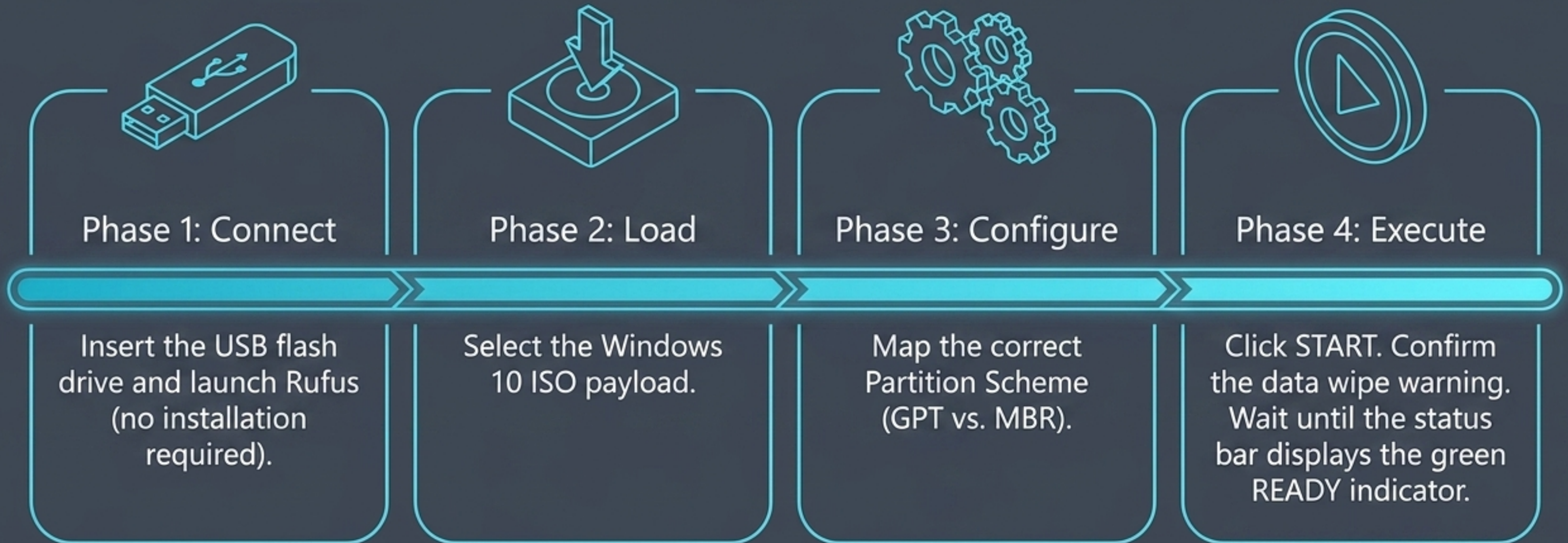
Boot Selection: Set to Disk or ISO Image. Click the SELECT button to browse for the 'Win10_22H2_English_x64.iso' file.

START: Initiates the destructive formatting and copying process.

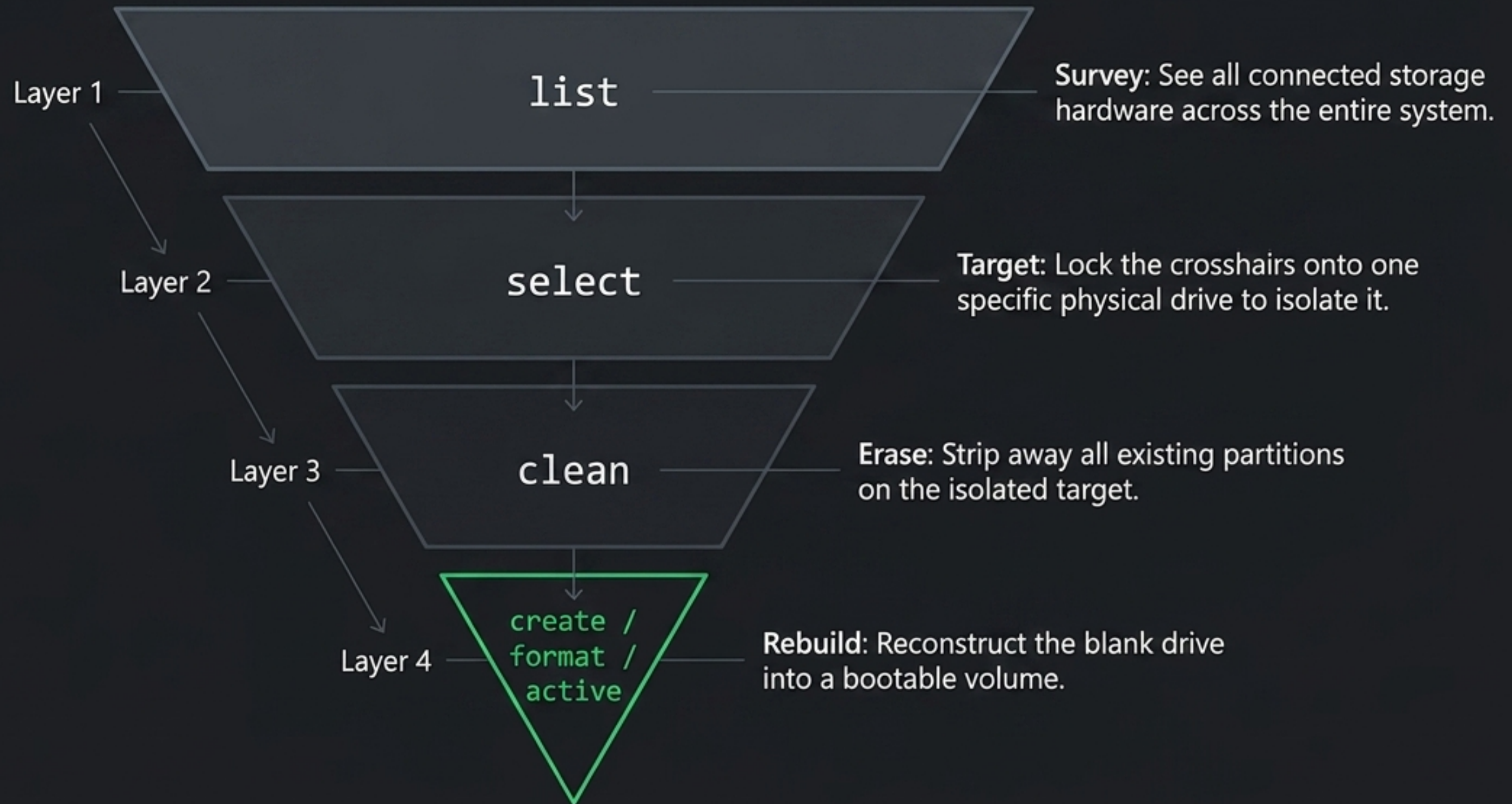
Technical Deep Dive: Partition Schemes



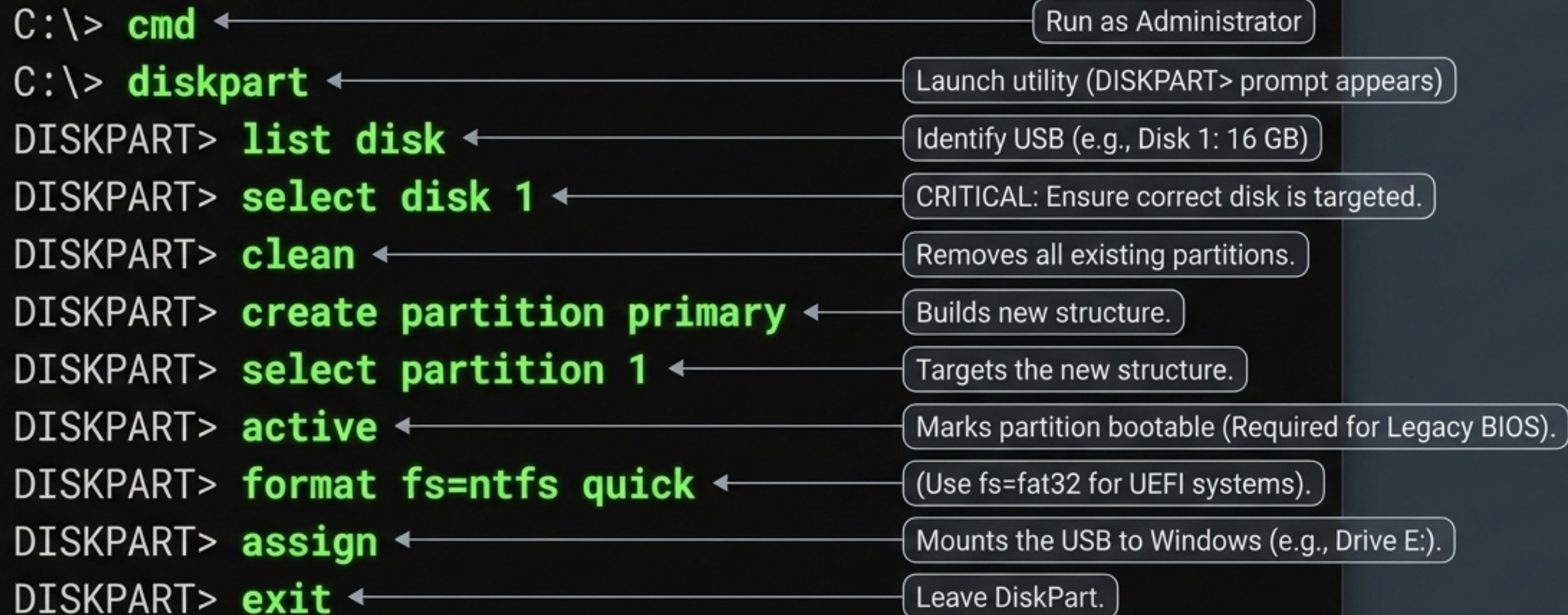
Path A: The Rufus Execution Timeline



Path B: The DiskPart The DiskPart Funnel Logic



Path B: Terminal Execution Commands



A terminal window with a dark background and light green text. The window has a title bar with standard Windows window controls (minimize, maximize, close) and a tab bar with a single tab. The terminal shows a sequence of commands for formatting a USB drive. Each command is followed by an arrow pointing to a text box explaining the command's purpose. The commands are: `cmd`, `diskpart`, `list disk`, `select disk 1`, `clean`, `create partition primary`, `select partition 1`, `active`, `format fs=ntfs quick`, `assign`, and `exit`.

```
C:\> cmd
C:\> diskpart
DISKPART> list disk
DISKPART> select disk 1
DISKPART> clean
DISKPART> create partition primary
DISKPART> select partition 1
DISKPART> active
DISKPART> format fs=ntfs quick
DISKPART> assign
DISKPART> exit
```

Run as Administrator

Launch utility (DISKPART> prompt appears)

Identify USB (e.g., Disk 1: 16 GB)

CRITICAL: Ensure correct disk is targeted.

Removes all existing partitions.

Builds new structure.

Targets the new structure.

Marks partition bootable (Required for Legacy BIOS).

(Use fs=fat32 for UEFI systems).

Mounts the USB to Windows (e.g., Drive E:).

Leave DiskPart.

Path B: Data Cloning via XCOPY



Step 1: Mount the Payload.

Right-click the Windows 10 ISO and select Mount. Windows assigns a virtual drive letter.

Syntax Breakdown Matrix

```
xcopy D:\*.* E:\ /E /F /H
```

D:*.*

- **Source:** Copy every file and extension from the mounted ISO.

/E

- Copies all directories (including empty ones).

E:\

- **Destination:** The newly formatted USB drive.

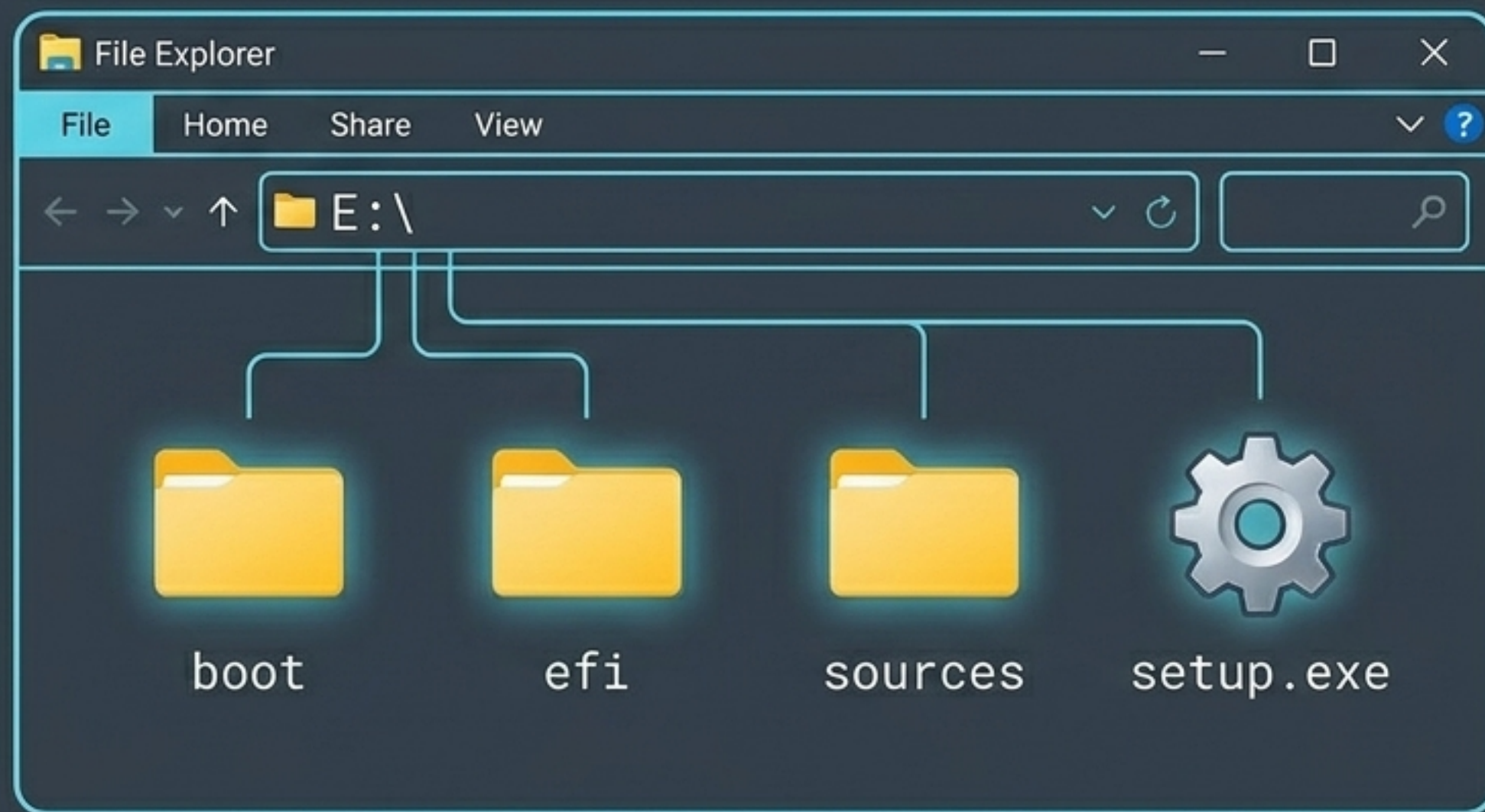
/F

- Displays full source and destination paths while copying.

/H

- Copies hidden and system files critical for booting.

Convergence: Structural Verification



The Big Four Verification Checklist:

If the deployment was successful, the root directory of the USB must contain these specific items. Their presence confirms the Windows installer payload has been properly staged and the boot sectors are completely intact.

Deployment: Hardware Boot Sequence

Step 1: Intercept POST



F12, Esc, F9

Insert the USB drive and restart the PC. Repeatedly press the manufacturer's Boot Menu key during startup (Common keys: F12, Esc, F9).

Step 2: Reroute Logic



When the BIOS/UEFI Boot Menu appears, select the connected **USB Flash Drive** instead of the internal hard drive.

Step 3: Successful Handshake



The system reads the boot sector.
Success Indicator: The **blue Windows Setup - Install Now** screen launches successfully.

Diagnostic Matrix and Troubleshooting

Symptom

Root Cause

Solution

USB not detected.

Connection error.

Reinsert or try a different direct motherboard port.

Wrong disk wiped.

Targeting error.

Always verify capacity carefully via the `list disk` command.

Boot failed.

Incorrect boot order.

Check the machine's BIOS/UEFI boot order settings.

ISO won't mount.

File corrupted.

Re-download the entire ISO file directly from Microsoft.

Practical Application Lab

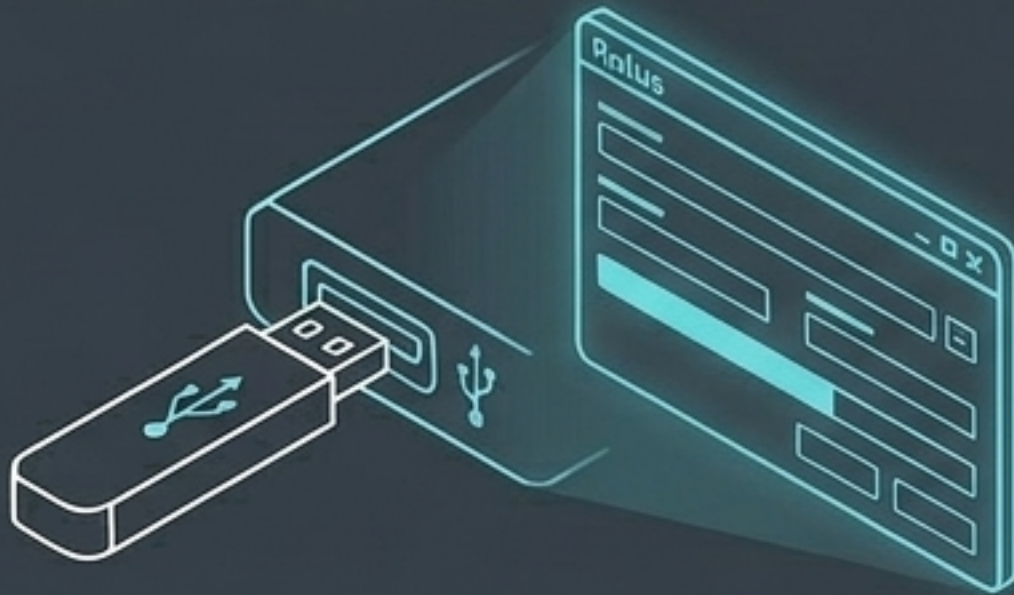


The Objective

Create a functional, bootable Windows 10 installer twice to establish operational redundancy.

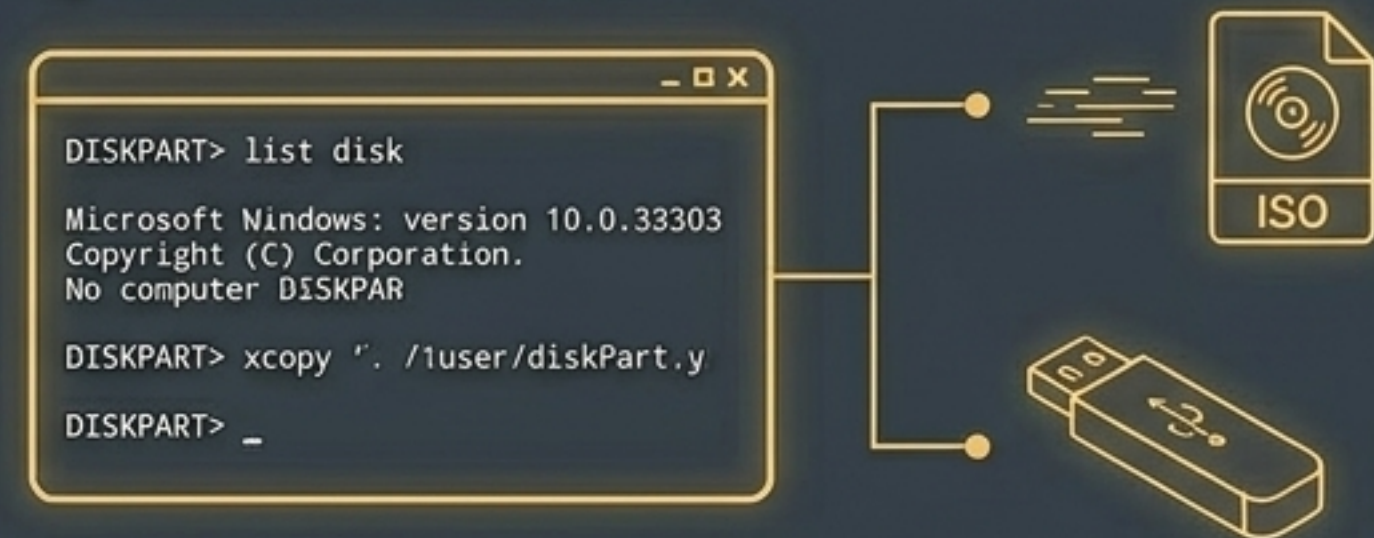
Phase 1 Execution (Efficiency)

Execute the creation using the Rufus GUI. Grasp the rapid, automated workflow.



Phase 2 Execution (Mechanics)

Format the USB, execute DiskPart syntax, and clone the ISO using CMD. Grasp the underlying system architecture.



Success Criteria

Successfully interrupt the boot sequence and reach the Windows Setup screen using both individually prepared drives.

Core Competency Validation

Min recommended USB size?

8GB.

**DiskPart command to view
all connected drives?**

list disk

**Command to strip all
partitions from a drive?**

clean

**Purpose of the active
command?**

Marks a partition as bootable specifically
for Legacy BIOS environments.