**OPERATING SYSTEMS LAB**

**Experiment No. :** 1

**Date :** 25/02/2025  
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**Experiment Title :** Installation of Windows 10 Operating System using Bootable USB

1. **Aim:**

To gain practical experience in installing the Windows 10 operating system on a desktop computer using a bootable USB drive.

1. **Objectives:**

Upon successful completion of this experiment, students will be able to:

* Create a bootable USB drive containing the Windows 10 installation files using Rufus.
* Configure the computer's BIOS/UEFI settings to boot from the USB drive.
* Navigate the Windows 10 installation wizard to install the operating system on a designated partition.
* Successfully install Windows 10 operating system on a desktop computer and verify its functionality.
* Understand the basic steps involved in operating system installation and troubleshooting common issues.

1. **Materials and Software Required:**
2. **Hardware:**
   1. Desktop Computer (Target machine for Windows 10 installation)
   2. USB Drive (Minimum 8GB, preferably USB 3.0 for faster process)
   3. Internet Access (For downloading necessary software and ISO image)
3. **Software:**
   1. Windows 10 ISO Image File (Download from official Microsoft website or authorized sources)
   2. Rufus (Bootable USB creation tool - Download latest version from official Rufus website)
   3. Web Browser (For downloading Rufus and Windows 10 ISO)
4. **Theory (Brief):**

An Operating System (OS) is the core software that manages computer hardware and software resources and provides common services for computer programs. Installing an OS is a crucial step in setting up a computer. This experiment utilizes a bootable USB drive to install Windows 10.

**Booting Process:** When a computer starts, it first executes the BIOS (Basic Input/Output System) or UEFI (Unified Extensible Firmware Interface) firmware. The BIOS/UEFI initializes hardware and then looks for a bootable device. By configuring the boot order in BIOS/UEFI to prioritize the USB drive, we can force the computer to boot from the USB.

**Rufus:** Rufus is a utility that helps format and create bootable USB flash drives from ISO images. It simplifies the process of making a USB drive bootable with the Windows 10 installation files.

**Windows 10 Installation Process:** The Windows 10 installation process involves booting from the installation media (in this case, the USB drive), selecting installation language, time zone, and keyboard layout, partitioning the hard drive (if necessary), and copying the Windows files to the hard drive. After file copying, the system reboots and completes the setup process, including user account creation and device configuration.

1. **Procedure:**

**Part 1: Creating Bootable USB using Rufus**

1. **Download Required Software:**
   * Download the latest version of Rufus from the official Rufus website (e.g., rufus.ie).
   * Download the Windows 10 ISO image file from the official Microsoft website or a trusted source. Ensure you download the correct architecture (32-bit or 64-bit) and edition (Home, Pro, etc.) based on your needs and license.
2. **Connect USB Drive:** Plug the USB drive into a working computer (this computer does not need to be the target desktop). **Warning: All data on the USB drive will be erased in the following steps. Back up any important data before proceeding.**
3. **Run Rufus:** Launch the Rufus application as administrator.
4. **Configure Rufus Settings:**
   * **Device:** In the "Device" dropdown menu, select your USB drive. **Double-check that you have selected the correct USB drive to avoid data loss on other drives.**
   * **Boot selection:** Select "Disk or ISO image (Please select)".
   * **Select:** Click the "SELECT" button and browse to the location where you downloaded the Windows 10 ISO image file. Select the ISO file and click "Open".
   * **Image option:** Ensure "Standard Windows installation" is selected.
   * **Partition scheme:** Choose "MBR" for older BIOS-based systems or "GPT" for newer UEFI-based systems. If unsure, try GPT first, and if it doesn't boot, try MBR. (Generally, newer systems use GPT). *Consult your motherboard manual if needed.*
   * **Target system:** This will automatically adjust based on Partition scheme selection.
   * **Volume label:** You can change the volume label of the USB drive if desired (e.g., "Win10\_Install").
   * **File system:** Typically, Rufus will automatically select "NTFS" or "FAT32" based on the ISO and partition scheme. Leave it at the default unless you have a specific reason to change it.
   * **Cluster size:** Leave this at the default value.
   * **Show advanced format options:** (Optional) You can expand this to see advanced options but for a standard installation, the default settings are usually sufficient.
   * **Format Options:** Keep "Quick Format" and "Create a bootable disk using" checked. "Check device for bad blocks" is optional but can be skipped for this experiment.
5. **Start the Process:** Click the "START" button in Rufus.
6. **Warning Confirmation:** Rufus will display a warning message that all data on the USB drive will be destroyed. **Confirm that you have backed up any important data and click "OK" to proceed.**
7. **Wait for Completion:** Rufus will now create the bootable USB drive. This process may take a few minutes depending on the USB drive speed and ISO size. Once completed, Rufus will display "READY" in the status bar.
8. **Close Rufus:** Click "CLOSE" to exit Rufus. The bootable USB drive is now ready.

**Part 2: Installing Windows 10 on the Desktop Computer**

1. **Connect Bootable USB:** Plug the bootable USB drive into the target desktop computer (the computer where you want to install Windows 10).
2. **Power On/Restart Computer and Enter BIOS/UEFI Settings:**
   * Power on or restart the desktop computer.
   * Immediately after powering on, start pressing the BIOS/UEFI setup key repeatedly. This key varies depending on the motherboard manufacturer, but common keys are: **Delete (Del), F2, F12, F1, Esc**. *Refer to your motherboard manual or the startup screen for the correct key.*
3. **Navigate to Boot Order Settings:**
   * Once in the BIOS/UEFI settings, use the arrow keys to navigate to the "Boot", "Boot Order", "Boot Priority", or similar section. The exact wording and location will vary depending on the BIOS/UEFI interface.
4. **Change Boot Order:**
   * Locate the boot order list.
   * Using the instructions provided on the BIOS/UEFI screen (usually using keys like F5, F6, +,-, or arrow keys and Enter), prioritize the USB drive in the boot order. Move the USB drive to the top of the boot list, so it is the first boot device. The USB drive might be listed under names like "Removable Devices", "USB HDD", or the specific name of your USB drive.
5. **Save and Exit BIOS/UEFI:**
   * Navigate to the "Exit" or "Save & Exit" section in the BIOS/UEFI.
   * Select "Save Changes and Exit" (or similar option) and press Enter. This will save the changes you made to the boot order and restart the computer.
6. **Boot from USB and Start Windows 10 Setup:**
   * The computer should now boot from the USB drive. You should see the Windows logo or the Windows setup screen appear.
7. **Windows 10 Setup Wizard:**
   * **Language, Time, and Keyboard:** Select your preferred language, time and currency format, and keyboard or input method. Click "Next".
   * **Install Now:** Click the "Install now" button.
   * **Setup is starting:** Wait for the setup process to initialize.
   * **Product Key:** If you have a product key, enter it. If you are reinstalling or don't have one at this stage, you can click "I don't have a product key" and activate Windows later (you will need a valid license to fully activate Windows 10).
   * **Operating System Selection (if applicable):** If the ISO contains multiple editions of Windows 10, choose the desired edition (e.g., Windows 10 Home, Windows 10 Pro). Click "Next".
   * **License Terms:** Read the Microsoft Software License Terms. Check the "I accept the license terms" box and click "Next".
   * **Installation Type:** Choose "Custom: Install Windows only (advanced)". This option allows you to partition the hard drive.
   * **Where do you want to install Windows?:** This is the drive/partition selection screen.
     + **If you have a new or empty hard drive:** You will see unallocated space. You can select the unallocated space and click "New" to create partitions. It's recommended to create at least two partitions: one for the operating system (e.g., C:) and optionally another for data (e.g., D:). Select the primary partition you created (or the unallocated space if you want to use the entire drive as one partition) and click "Next".
     + **If you are reinstalling Windows or have existing partitions:** You will see existing partitions. **Be very careful here.** If you want to install Windows on an existing partition (e.g., overwriting a previous OS), select that partition and click "Format" (optional, but recommended for a clean install) and then "Next". **Formatting will erase all data on the selected partition. Ensure you have backed up any important data.** If you want to install Windows on a different partition or create a dual-boot setup, choose accordingly and proceed with caution. *For this basic lab, installing on a clean partition is usually sufficient.*
   * **Installing Windows:** Windows will now start installing. This process involves copying files, getting files ready for installation, installing features, installing updates, and finishing up. The computer will restart several times during this process. **Do not interrupt the installation process.**
   * **Region Selection:** After the installation files are copied and the computer restarts, you will be prompted to select your region. Choose your region and click "Yes".
   * **Keyboard Layout:** Select your keyboard layout and click "Yes". You can add a second keyboard layout if needed.
   * **Network Setup:** Choose to connect to a network or skip this step for now. You can connect to a network later.
   * **Account Setup:**
     + **Personal Use or Organization:** Choose "Set up for personal use". Click "Next".
     + **Microsoft Account or Offline Account:** You can sign in with a Microsoft account or create an offline account (local account). Choose your preference and follow the prompts to create a user account (username and password).
   * **Privacy Settings:** Review and configure privacy settings to your preference. Click "Accept".
   * **Cortana (Optional):** Choose whether to use Cortana or not.
8. **Welcome to Windows 10!** Once the setup process is complete, you will be logged into your newly installed Windows 10 operating system. The desktop will appear, and you can start using Windows 10.
9. **Post-Installation Tasks (Optional but Recommended):**
   * Install device drivers (especially for graphics card, network adapter, etc.) if they are not automatically installed. You can usually download drivers from the hardware manufacturer's website.
   * Activate Windows 10 if you haven't already done so.
   * Install necessary software and applications.
   * Configure system settings to your preferences.
   * Connect to the internet and check for Windows Updates.

**6. Conclusion:**

In this experiment, we successfully installed the Windows 10 operating system on a desktop computer using a bootable USB drive created with Rufus. We learned how to create a bootable USB from a Windows 10 ISO image, configure the BIOS/UEFI settings to boot from the USB, and navigate the Windows 10 installation wizard to complete the OS installation process.

This experiment provided practical experience in operating system installation, which is a fundamental skill in computer administration and maintenance. We now understand the steps involved in installing Windows 10 and can apply this knowledge to install operating systems on other computers or troubleshoot OS installation issues. We also gained familiarity with using Rufus, a valuable tool for creating bootable USB media.