CompTIA A+

Operating System Types and Features

Introduction

Operating system types
Operating system features
A+
OS

Welcome to the **Operating System Types and Features** Practice Lab. In this module you will be provided with the instructions and devices needed to develop your hands-on skills.

Learning Outcomes

In this module, you will complete the following exercises:

- Exercise 1 - Comparison of Windows 7, 8.1 and 10
- Exercise 2 - Corporate vs. Personal Needs
- Exercise 3 - Change Desktop Styles/User Interfaces

- Exercise 4 - Comparison of 32-bit and 64-bit Operating Systems
- Exercise 5 - Workstation Operating Systems
- Exercise 6 - Comparison of Cell Phone/Tablet Operating Systems
- Exercise 7 - Know the Vendor-specific Limitations
- Exercise 8 - Compatibility Concerns between Operating Systems

After completing this lab, you will be able to:

- Know the Interface Differences
- Use Search
- Remove a System from Domain
- Use Media Center
- Configure BranchCache
- Configure Encrypting File System (EFS)
- Change Interface Settings in PLABWIN10
- Know the Key Differences between 32-bit and 64-bit Operating Systems
- Verify a 64-bit Operating System
- Select a Workstation Operating System as per the Need
- Learn about Cell Phone Operating Systems
- Know the Vendor-specific Limitations of Operating Systems
- Know about the Same Vendor Compatibility and Different Vendor Compatibility

Exam Objectives

The following exam objective is covered in this lab:

- **220-1002:** 1.2 Compare and contrast features of Microsoft Windows versions

> ***Note:*** *Our main focus is to cover the practical, hands-on aspects of the exam objectives. We recommend referring to course material or a search engine to research theoretical topics in more detail.*

Lab Duration

It will take approximately **1 hour** to complete this lab.

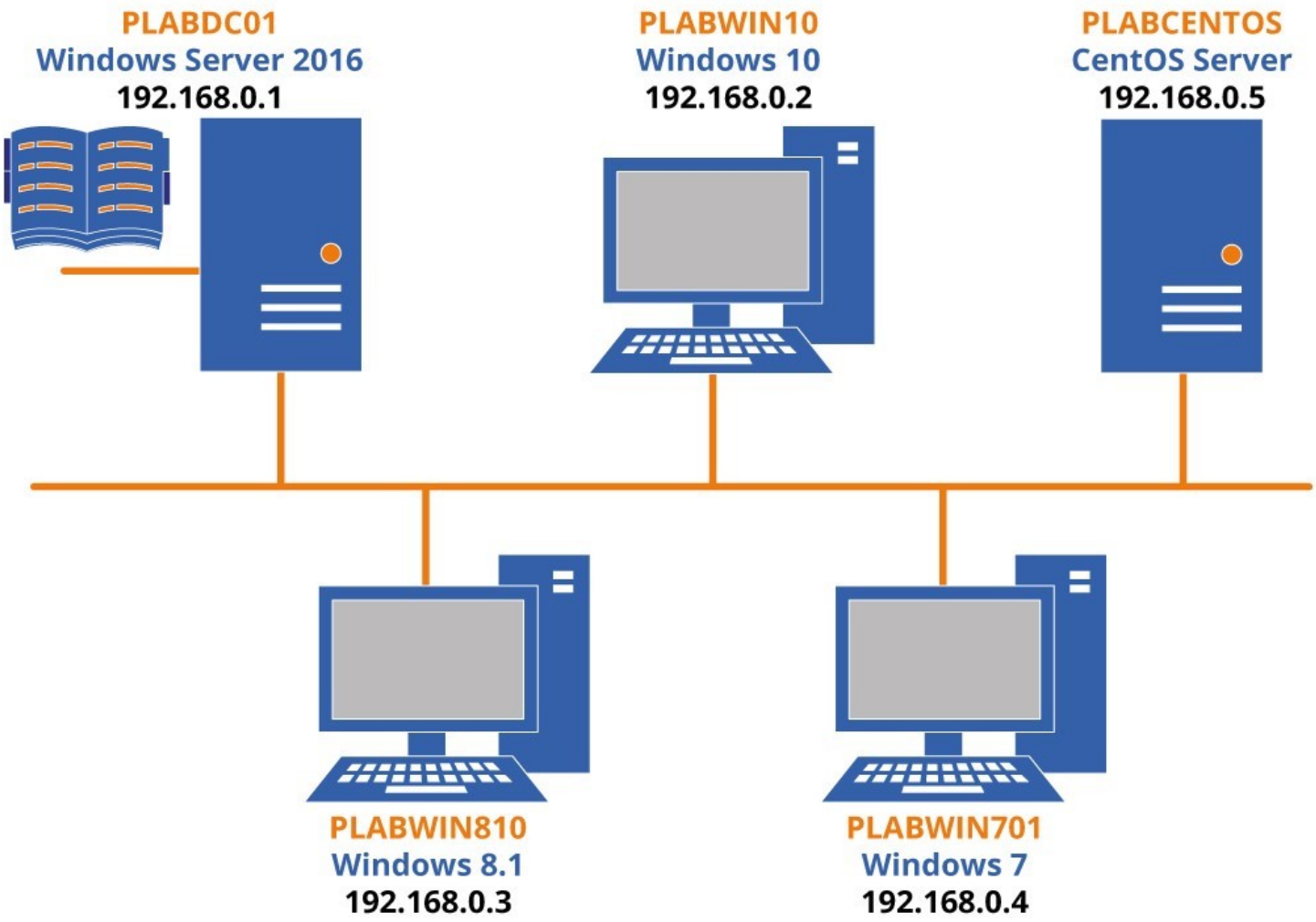
Help and Support

For more information on using Practice Labs, please see our **Help and Support** page. You can also raise a technical support ticket from this page.

Click **Next** to view the Lab topology used in this module.

Lab Topology

During your session, you will have access to the following lab configuration.



Depending on the exercises, you may or may not use all of the devices, but they are shown here in the layout to get an overall understanding of the topology of the lab.

- **PLABDC01 -** (Windows Server 2016 - Domain Controller)
- **PLABWIN10 -** (Windows 10 - Domain Member)

- **PLABCENTOS -** (CentOS Server)
- **PLABWIN810 -** (Windows 8.1 - Domain Member)
- **PLABWIN701 -** (Windows 7 - Domain Member)

Click **Next** to proceed to the first exercise.

Exercise 1 - Comparison of Windows 7, 8.1 and 10

In this exercise, you will look at three version of windows - Win 7, Win 8.1, and Win 10. Windows 7 is the oldest version among these. Windows 10 is the latest version, and Windows 8.1 was released in-between.

While Windows 7 was designed mostly for laptop and desktop users, Microsoft made big changes in the design of Windows 8 for touchscreen and tablet users. Windows 10 brought the balance in the design for the tablets and the desktop users

In Windows 10, Microsoft has introduced Cortana, which is a voice assistant that facilitates voice search. Windows 10 has a different Web browser named Microsoft Edge. In the earlier versions of Windows, Internet Explorer was the default Web browser.

Windows 10 has more enhanced security features compared to earlier versions of Windows. For example, a feature called Windows Defender Device Guard, which is useful for blocking malicious software by screening unsigned programs and apps.

Just like every product shelf-life, Windows also has an end date where Microsoft stops providing support and updates. Here are the dates for these three versions of Windows after which Microsoft will stop its extended support:

- Windows 7 Service Pack 1: January 14th, 2020
- Windows 8.1: January 10th, 2023
- Windows 10: October 14th, 2025

Windows 8 and Windows 8.1 were designed to incorporate features required for tablet operating systems. In these operating systems, a feature was introduced where a user can download an app from the cloud storage. Also, the graphical user interface was made more user-friendly. The Start menu, which was removed from Windows 8 and 8.1, was

re-introduced in Windows 10. Windows 10 also has a voice assistant feature called Cortana. In Windows 10, a feature called universal apps is introduced to make transaction across devices seamless. Windows 10 also offers a cloud storage service, which is known as Microsoft OneDrive.

In this exercise, you will learn about the interface and search differences.

Learning Outcomes

After completing this exercise, you will be able to:

- Know the Interface Differences
- Use Search

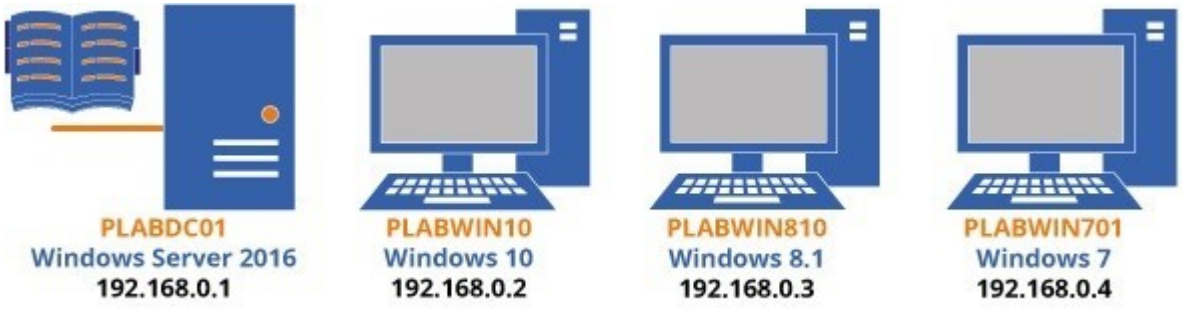
Exam Objectives

- **220-1002:** Compare and contrast common operating system types and their purposes.

Your Devices

You will be using the following devices in this lab. Please power these on now.

- **PLABDC01 -** (Windows Server 2016 - Domain Controller)
- **PLABWIN10 -** (Windows 10 - Domain Member)
- **PLABWIN810 -** (Windows 8.1 - Domain Member)
- **PLABWIN701 -** (Windows 7 - Domain Member)



Task 1 - Knowing the Interface Differences

When comparing different versions of Windows, users will need to understand that there are two types of differences: visible and hidden.

The visible differences would be something that can be seen, such as a desktop or an interface.

The hidden would be something that is not visible to the user, such as performance or a component upgrade that does not directly interact with the user. For example, Windows 10 has DirectX 12, Windows 8.1 had DirectX 11.2, and Windows 7 had DirectX 11.

In this task, you will learn the interface differences between the different versions of Windows.

Step 1

We will start with Windows 7.

Ensure all the required devices are powered on.

Connect to **PLABWIN701**.

Notice that it has a clean interface. The only icon on the desktop, with the default installation, will be **Recycle Bin**.

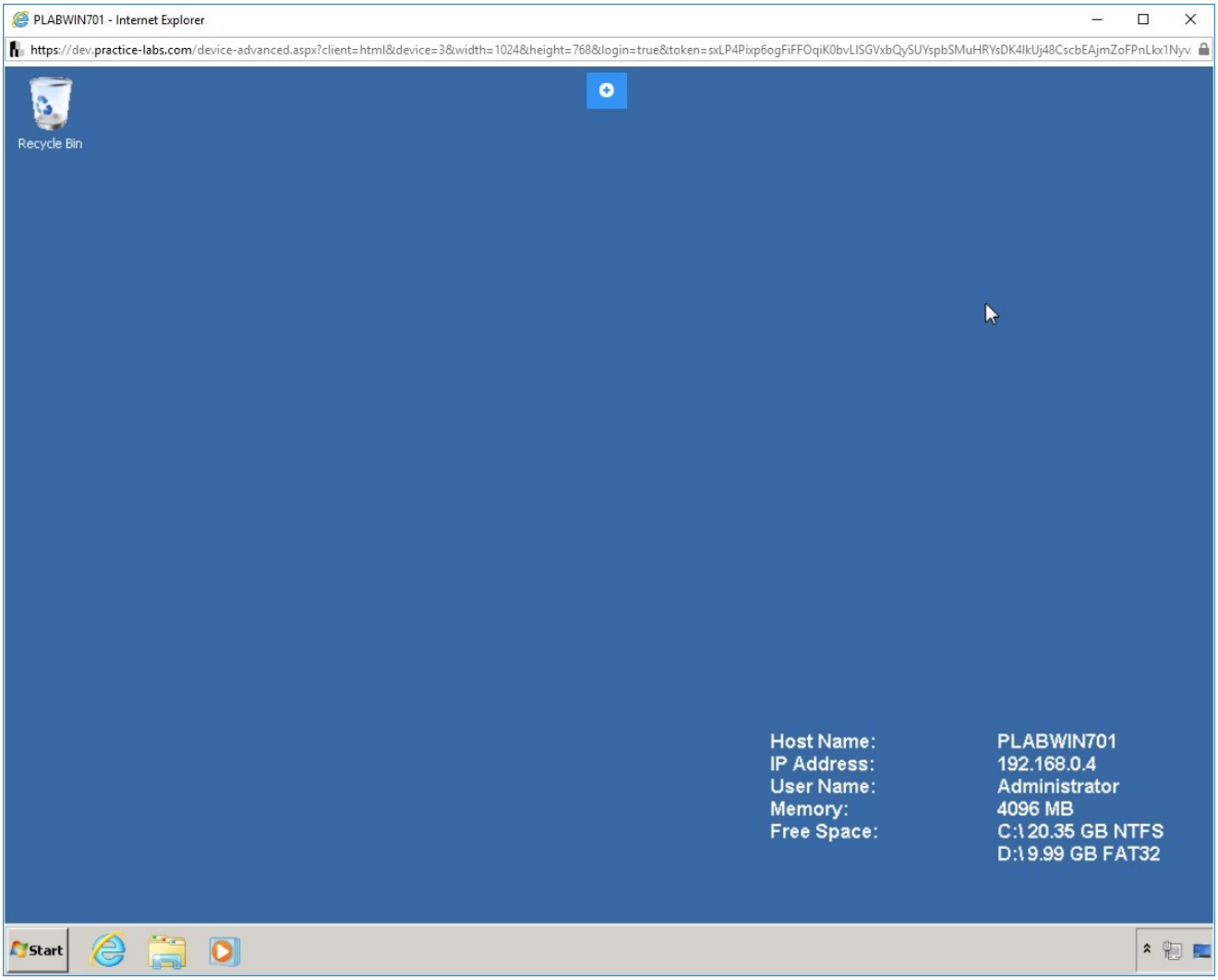


Figure 1.1 Screenshot of PLABWIN701: Screen shows where to find the search icon.

Step 2

Click **Start**. The **Start** menu is displayed. By default, a few items were already pinned on the right section of the **Start** menu.

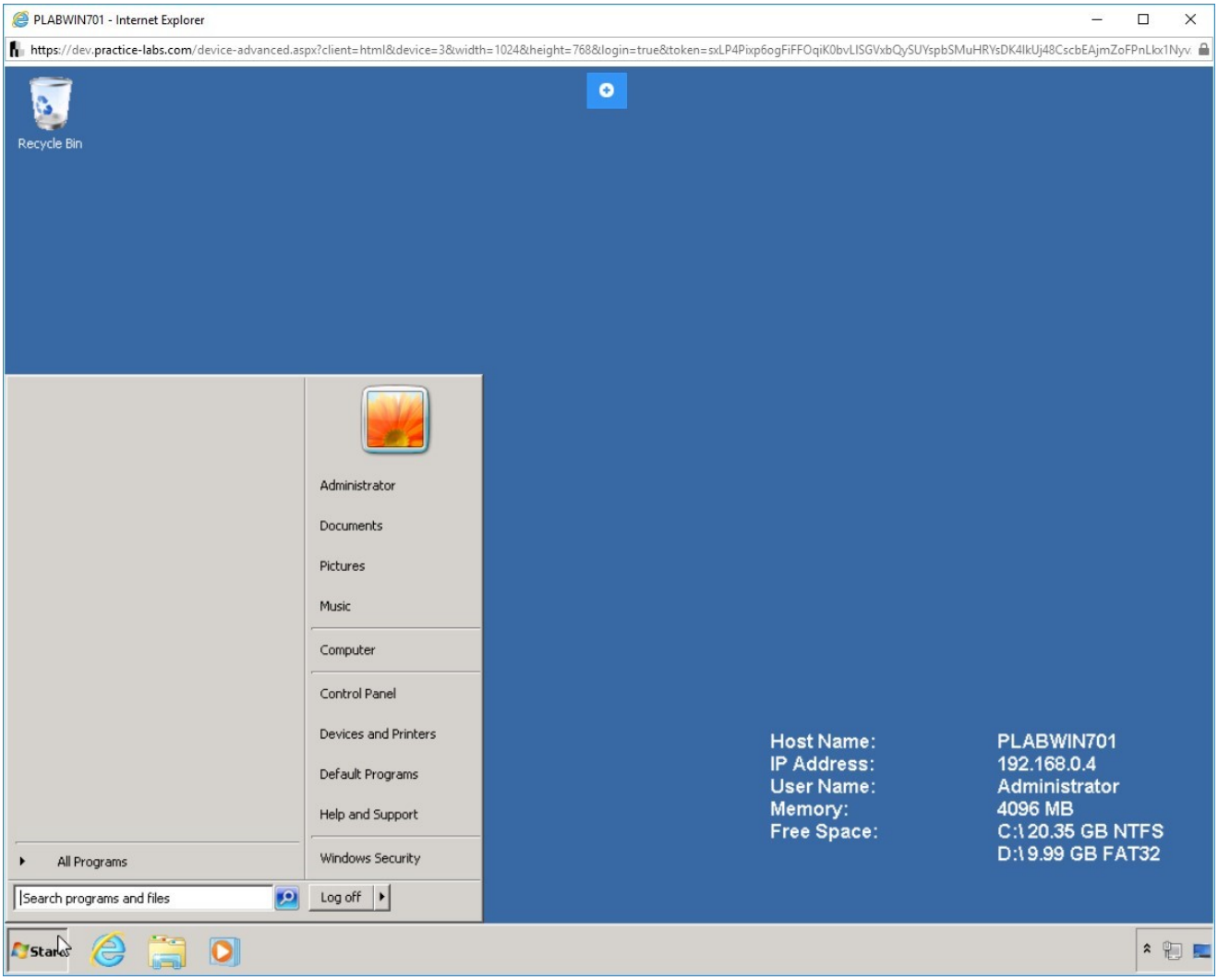


Figure 1.2 Screenshot of PLABWIN701: Displaying the Start menu with the search bar in Windows 7.

Step 3

Click **All Programs**.

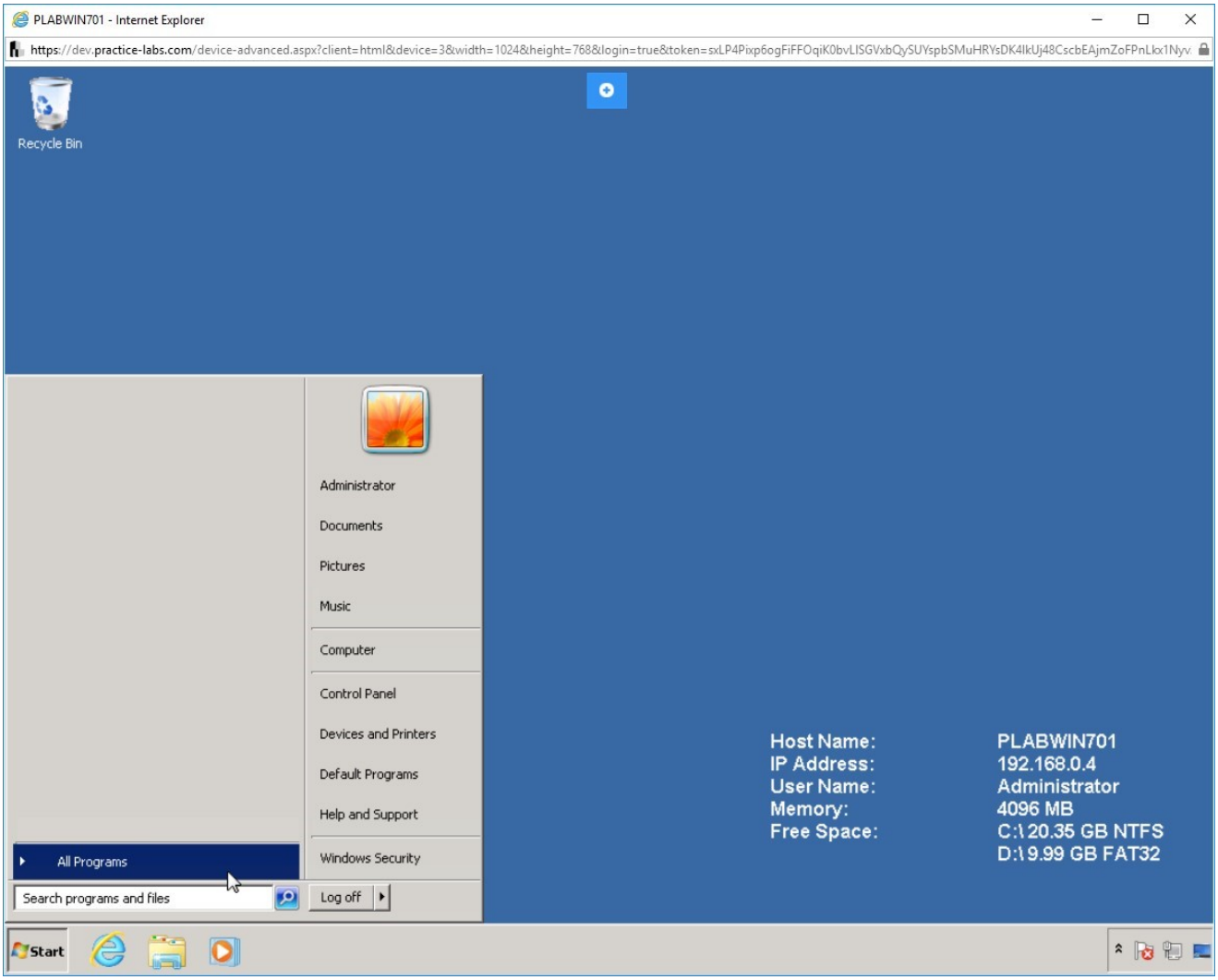


Figure 1.3 Screenshot of PLABWIN701: Clicking the All Programs option in the Start menu.

Step 4

A set of applications are neatly organized. Click **Back**.

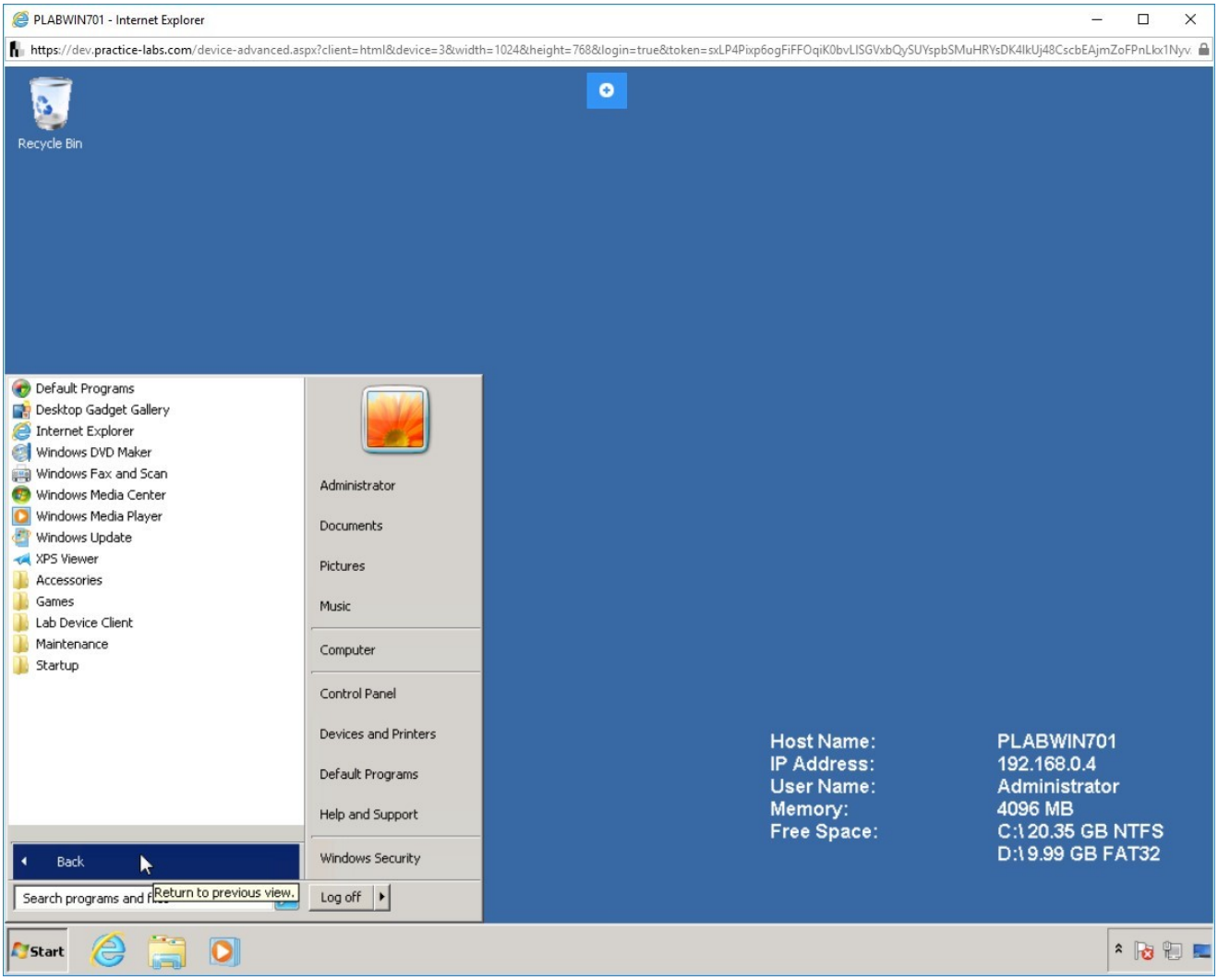


Figure 1.4 Screenshot of PLABWIN701: Clicking the Back button on the Start menu.

Step 5

Click anywhere on the desktop to close the **Start** menu. Right-click **Start**. Notice that there are only two options to choose from.

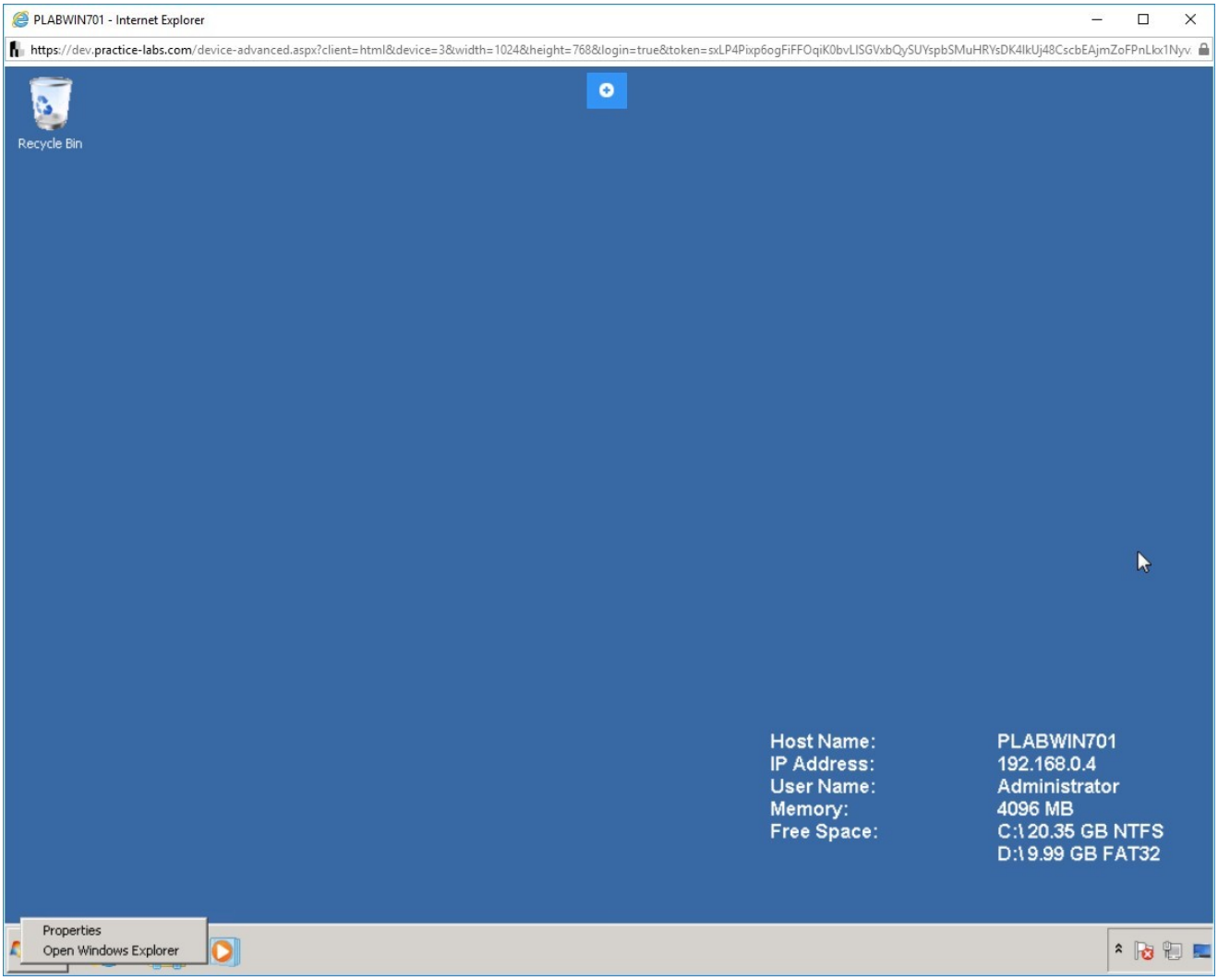


Figure 1.5 Screenshot of PLABWIN701: Right-clicking the Start menu to display its context menu.

Step 6

Now, we will look at Windows 8.1.

Connect to **PLABWIN810**.

Notice that the desktop interface is almost the same as Windows 7. However, there are two key differences:

- The Start button is no longer available. It is replaced with a Start charm.
- The look of the system tray is now different. It is now merged with the taskbar.

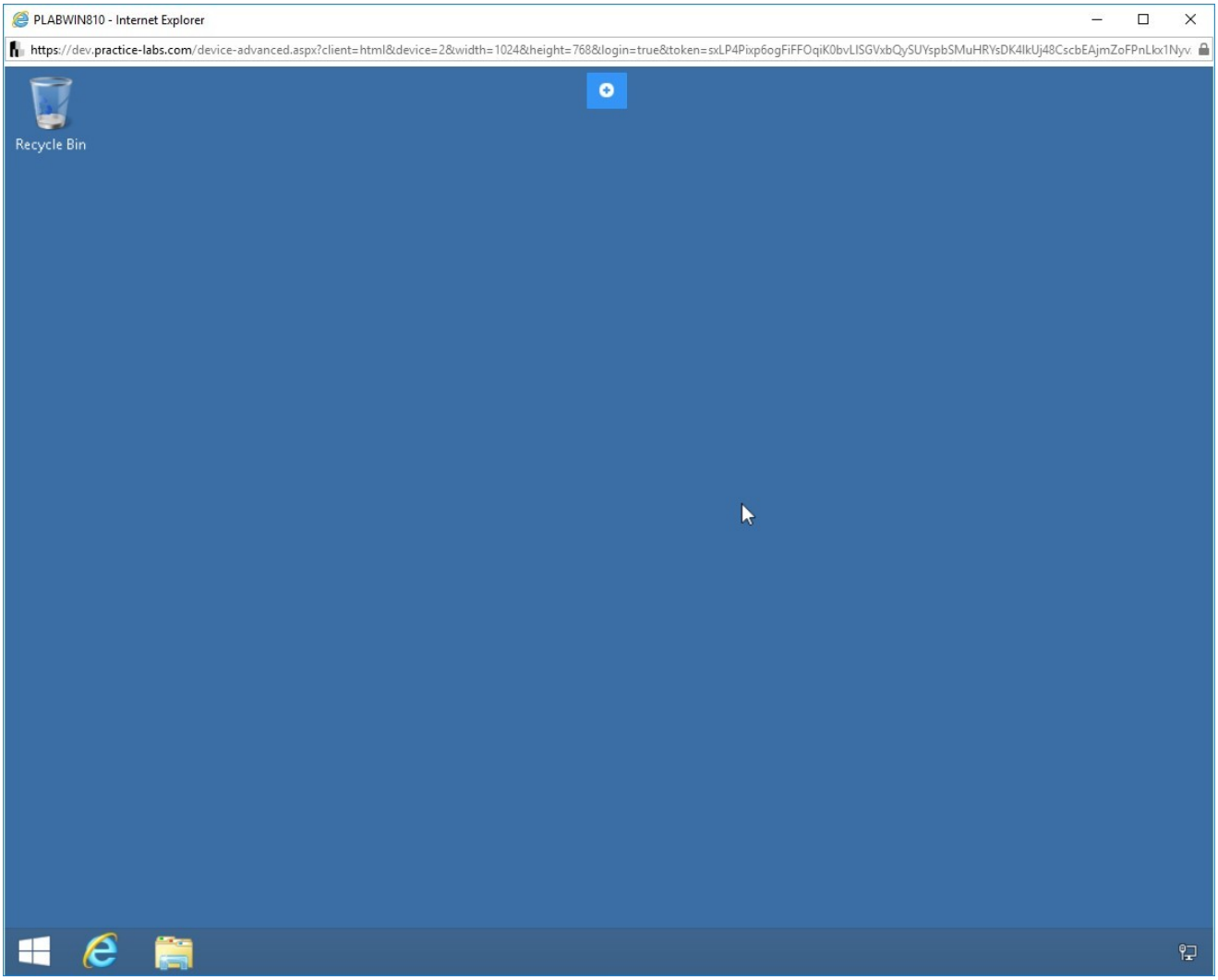


Figure 1.6 Screenshot of PLABWIN810: Showing the desktop of Windows 8.1.

Step 7

Click the **Start** charm.

Notice that there is no standard menu, but rather Metro UI is displayed.

This was a significant change in Windows 8.

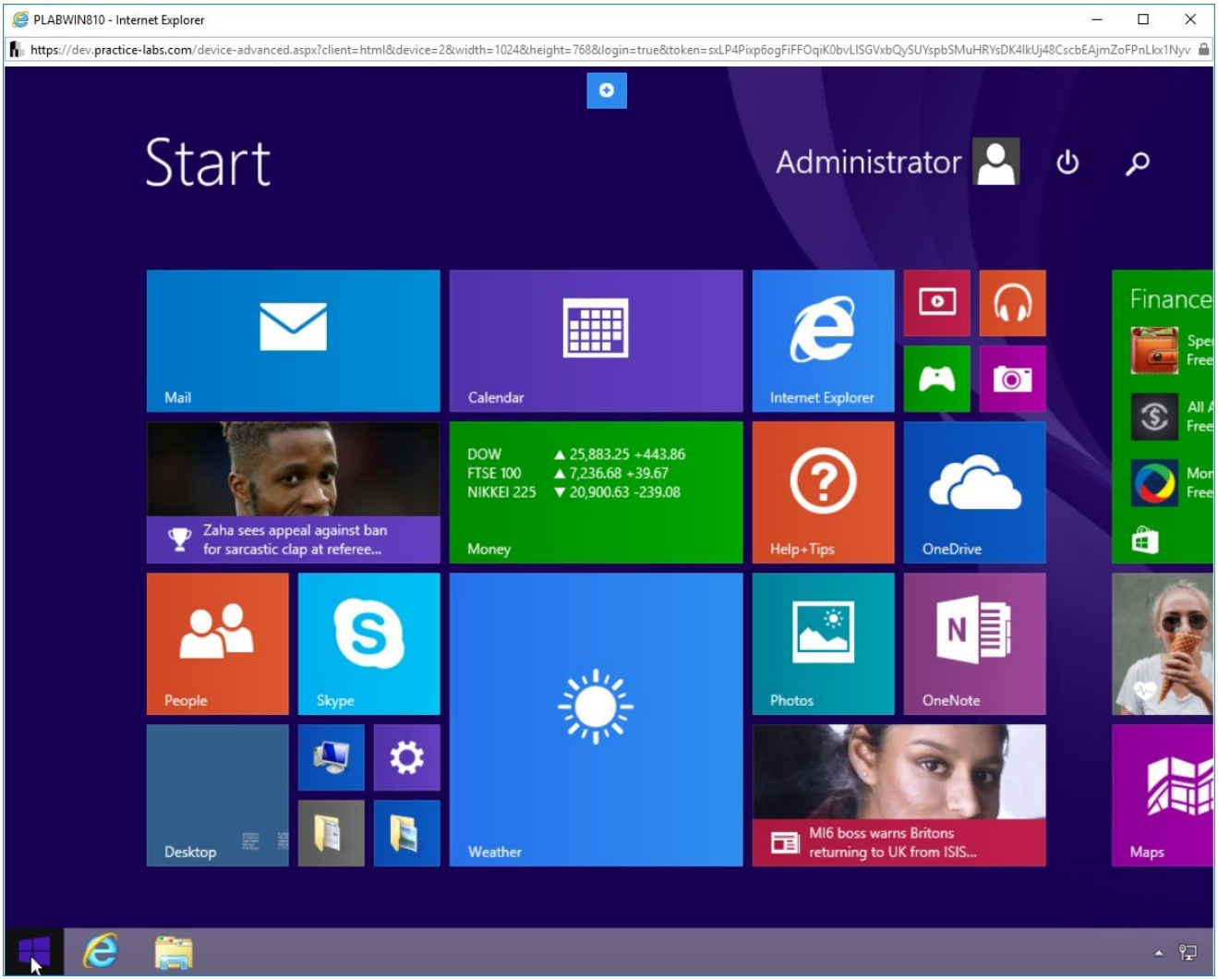


Figure 1.7 Screenshot of PLABWIN810: Showing the Start page of Windows 8.1.

Step 8

To find an application, you can move the cursor to the bottom left side and click the down arrow.

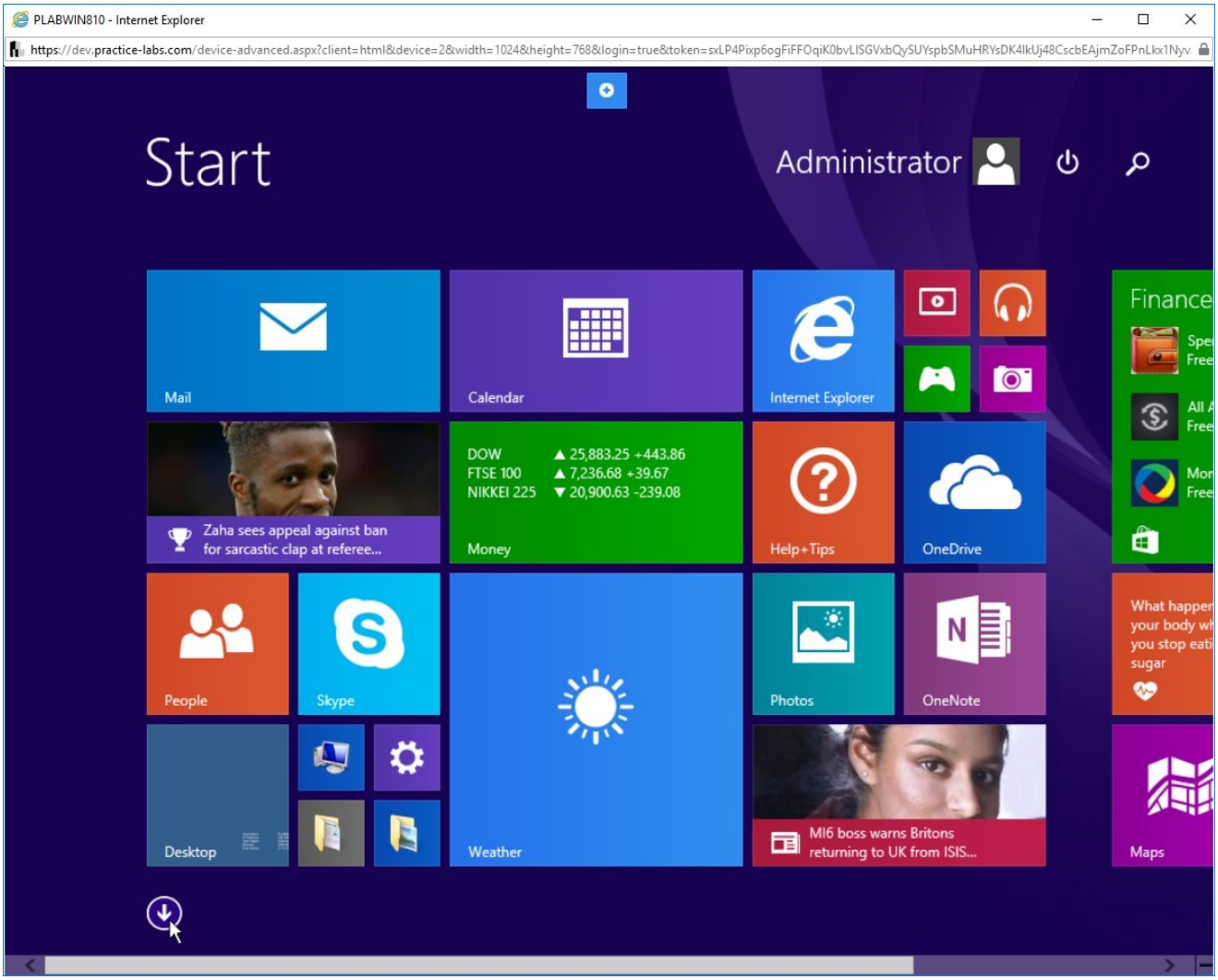


Figure 1.8 Screenshot of PLABWIN810: Clicking the down arrow to view the list of applications.

Step 9

From the **Apps** page, you could select the required application.

Click the **up** arrow.

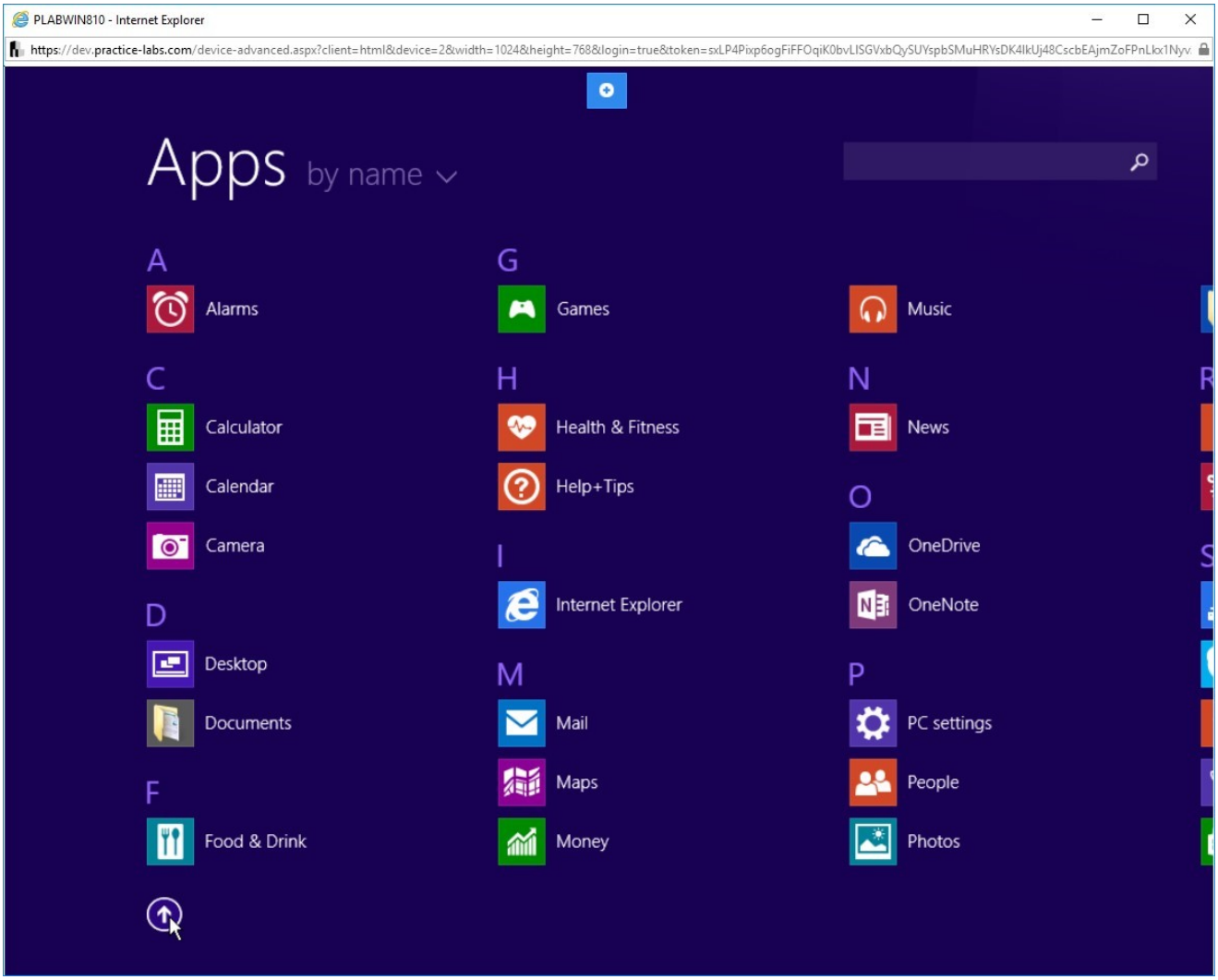


Figure 1.9 Screenshot of PLABWIN810: Showing the list of applications on the Apps page.

Step 10

Another way to find an application is to search for it specifically.

Back on the **Start** screen, you can search for an application simply by beginning to type its name. Type the following:

```
mail
```

A **Search** page is displayed and shows the results found.

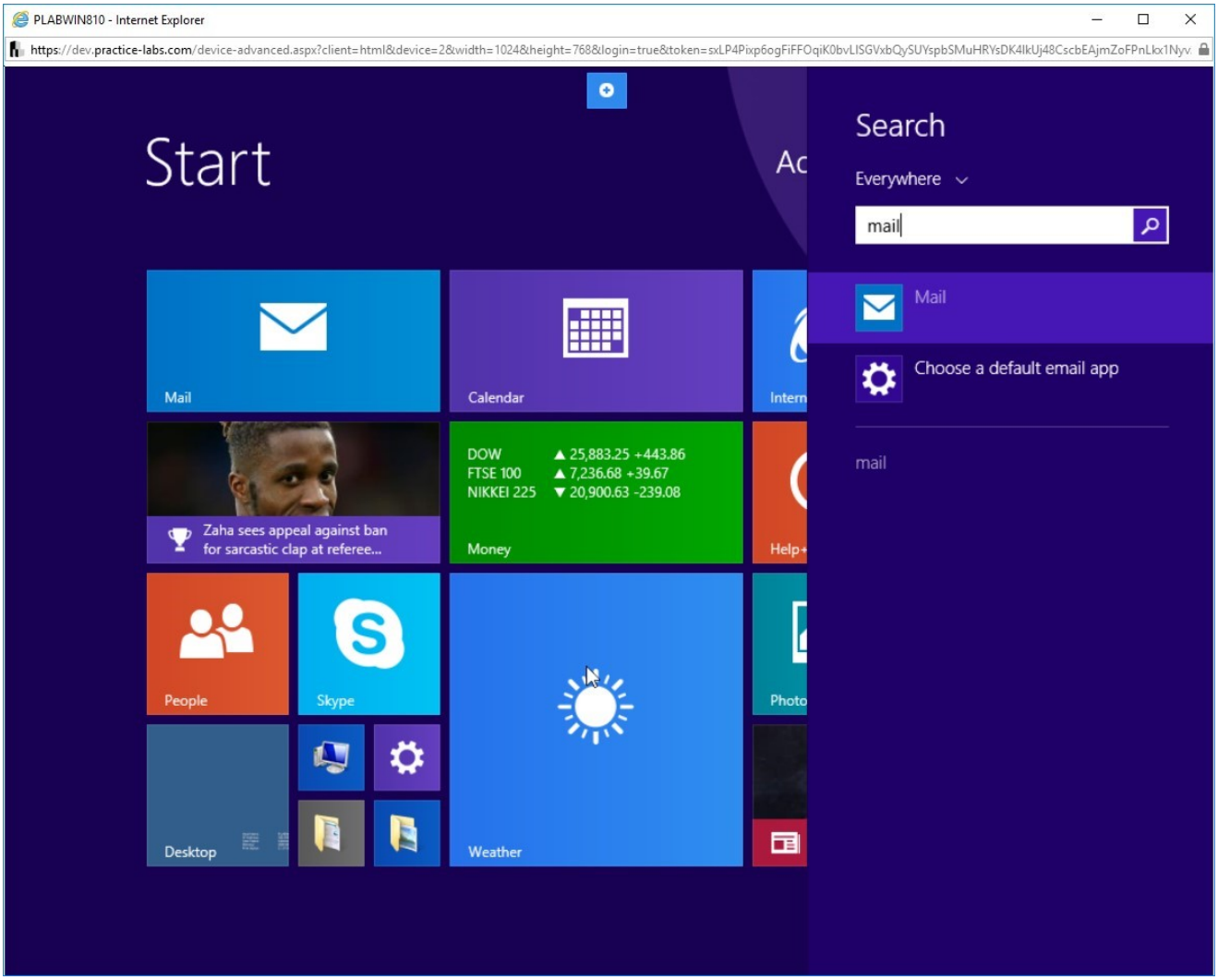


Figure 1.10 Screenshot of PLABWIN810: Performing a search on Windows 8.1.

Step 11

Now, we will cover Windows 10.

Connect to **PLABWIN10**.

Notice that the desktop is again similar to Windows 7 and 8.1. However, there is a change in the taskbar. A search is now included in the taskbar.

Just like Windows 8.1, it also includes the **Start** charm.

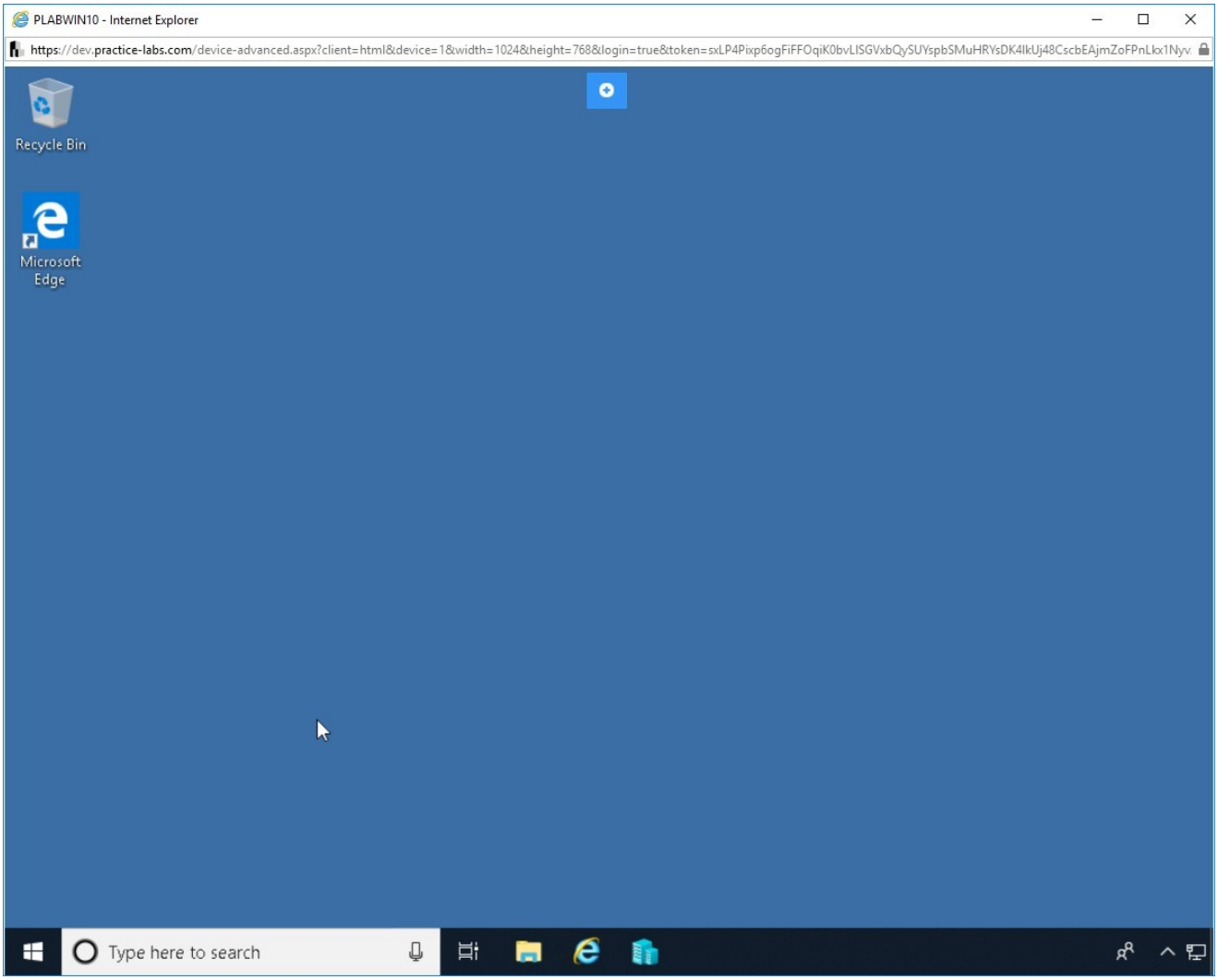


Figure 1.11 Screenshot of PLABWIN10: Showing the desktop of Windows 10.

Step 12

Click the **Start** charm.

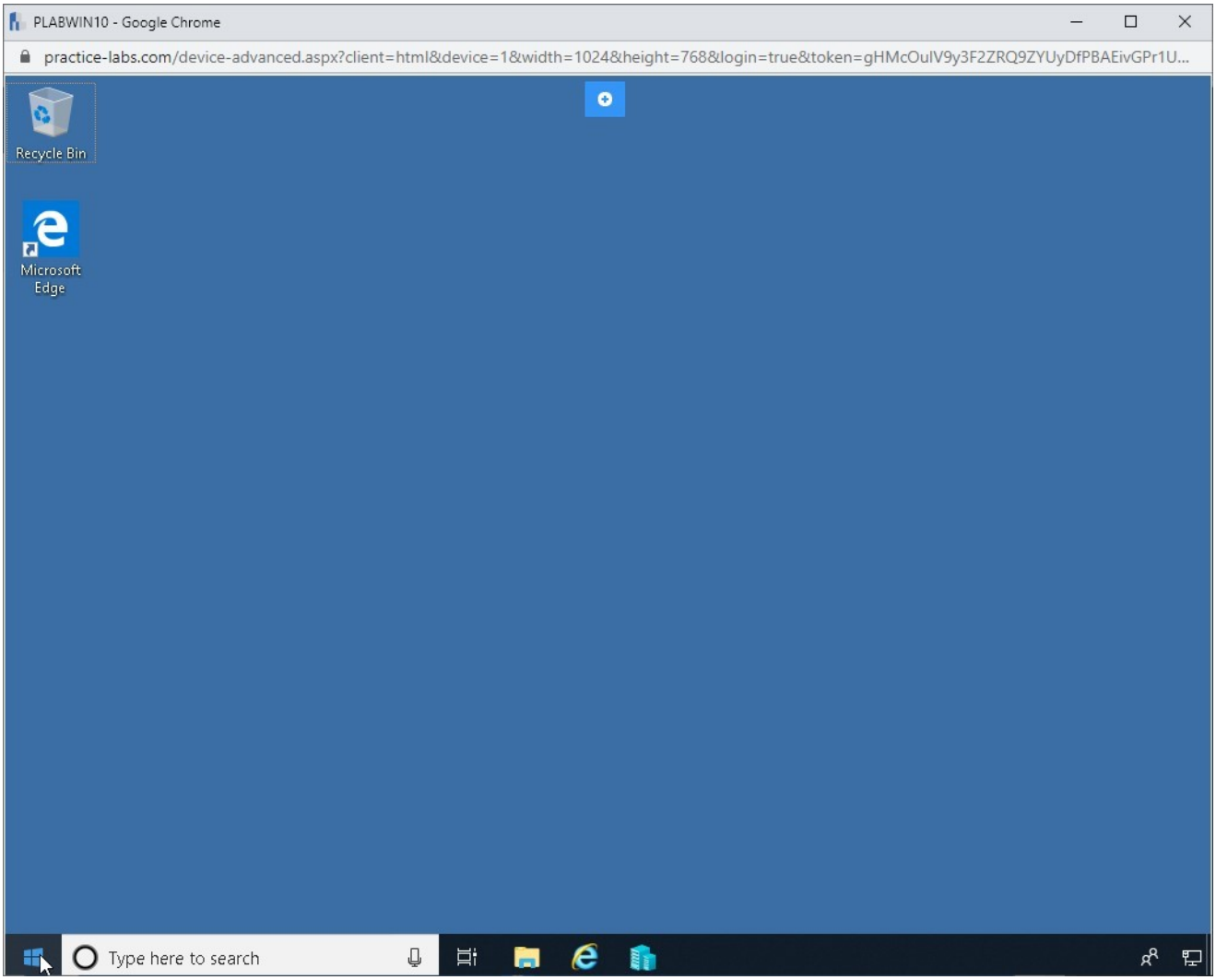


Figure 1.12 Screenshot of PLABWIN10: Clicking the Start charm on Windows 10.

Step 13

Notice that the menu is similar to the Windows 7 menu.

The bottom left of the menu adds a few new options:

- Logged in user
- Documents
- Pictures
- Settings
- Power

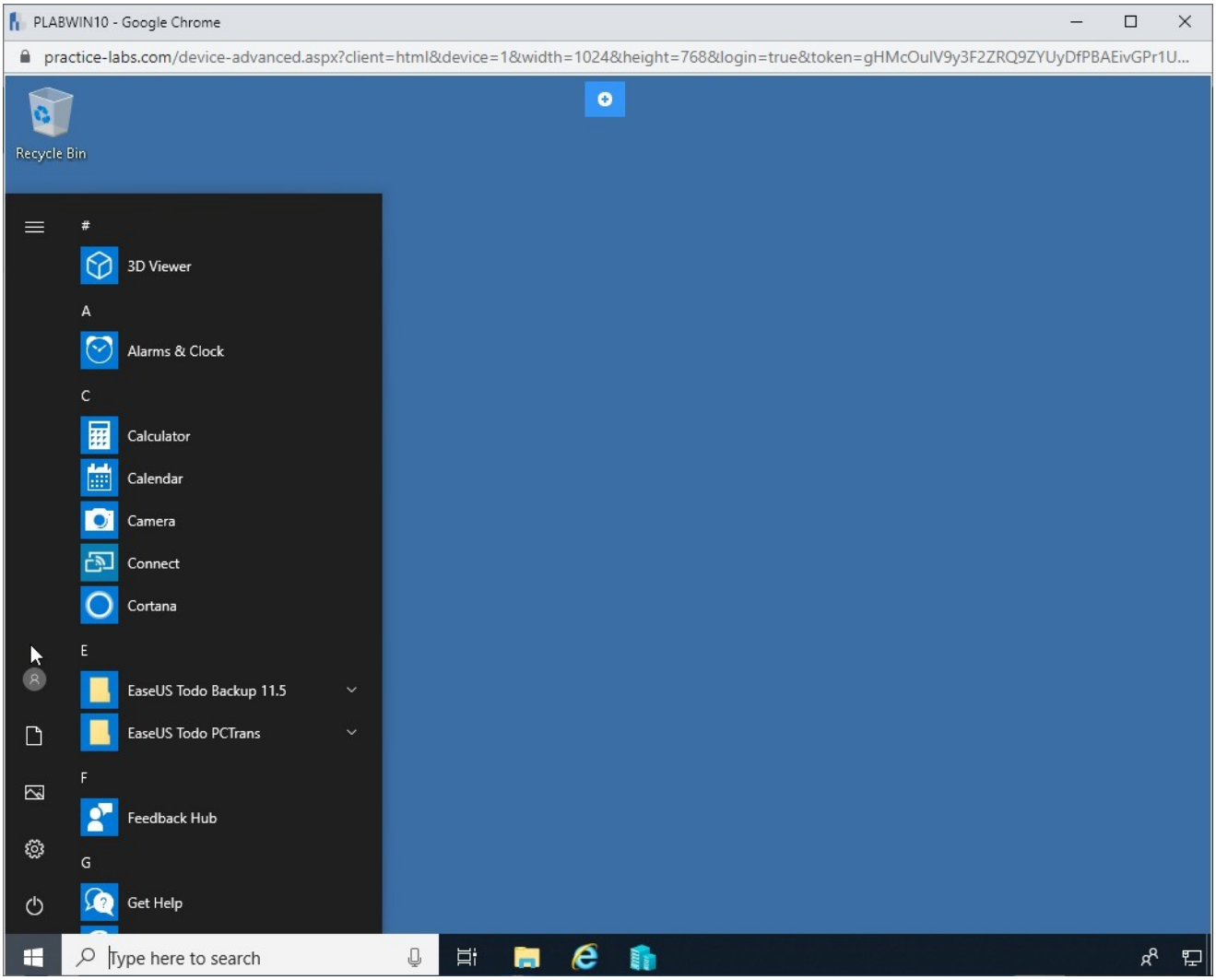


Figure 1.13 Screenshot of PLABWIN10: Showing the Start menu of Windows 10.

Task 2 - Using Search

Other than the visual differences, Windows 7, 8.1, and 10 also have differences in the way they handle search.

In this task, you will learn to use search across different versions of Windows.

Step 1

Connect to **PLABWIN701**.

Click **Start** and in the **Search programs and files** text box, type the following:

```
hosts
```

Notice that the result appear above your text. The Windows 7 search feature can search for files and folders on the local system, as well as on the network shares.

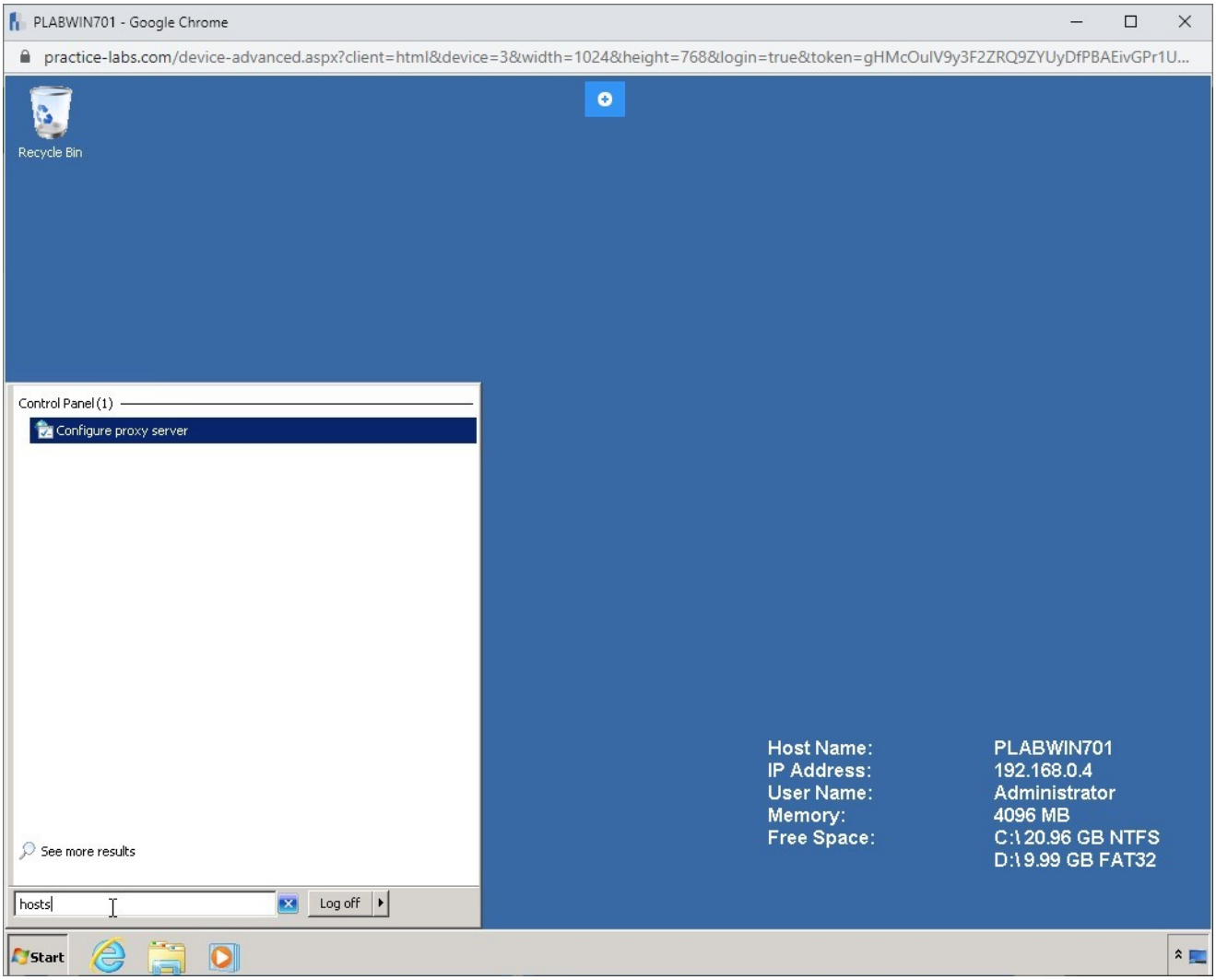


Figure 1.14 Screenshot of PLABWIN701: Performing a search on Windows 7.

Step 2

Connect to **PLABWIN810**.

The **Start** page should still be displayed from the previous task. Otherwise, click the **Start** charm.

Click the **Search** icon present at the top right-hand side of the window.

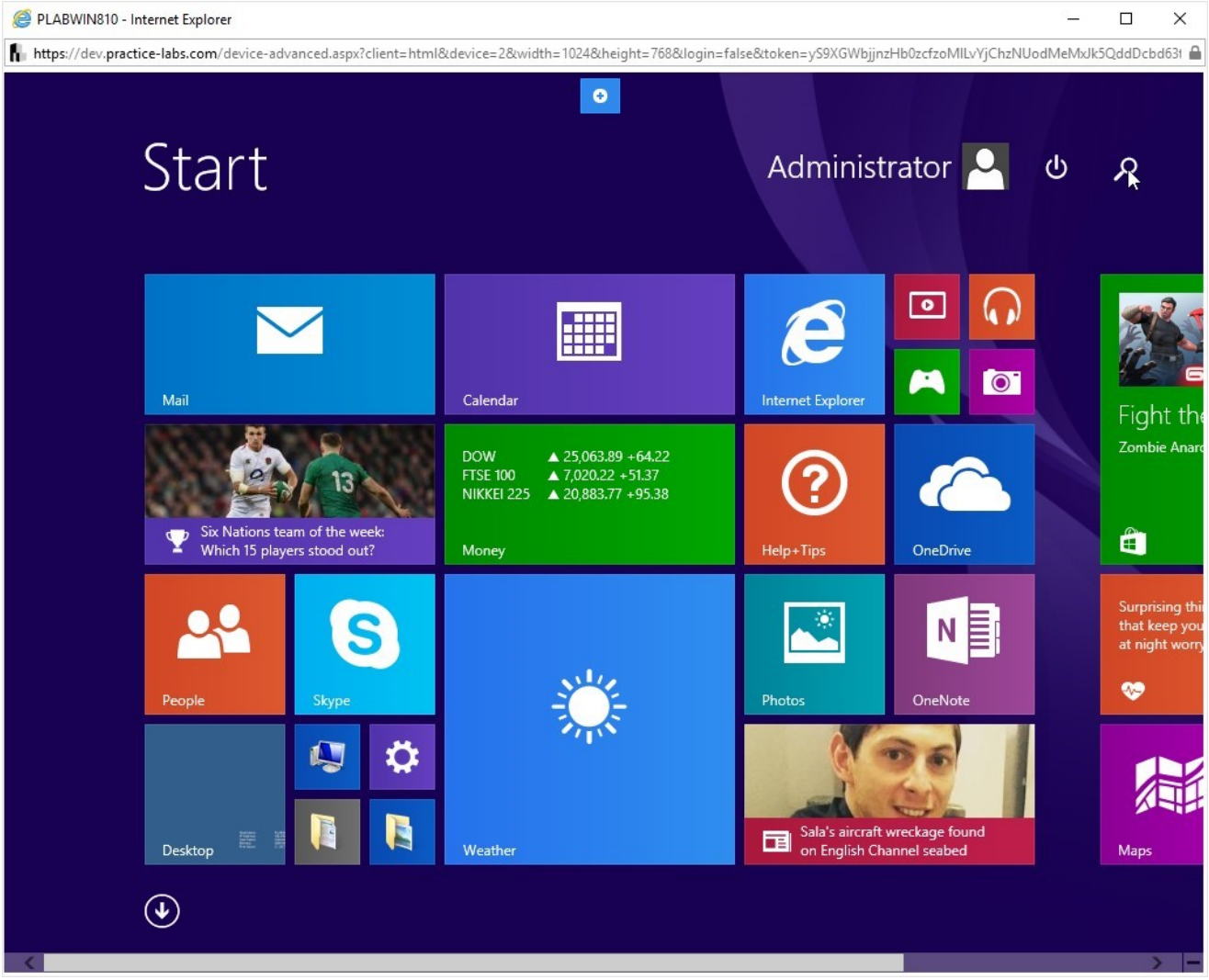


Figure 1.15 Screenshot of PLABWIN810: Clicking the Search icon on the Start page.

Step 3

Click the drop-down and observe that there are options for performing a search. Keep the default selection of **Everywhere**.

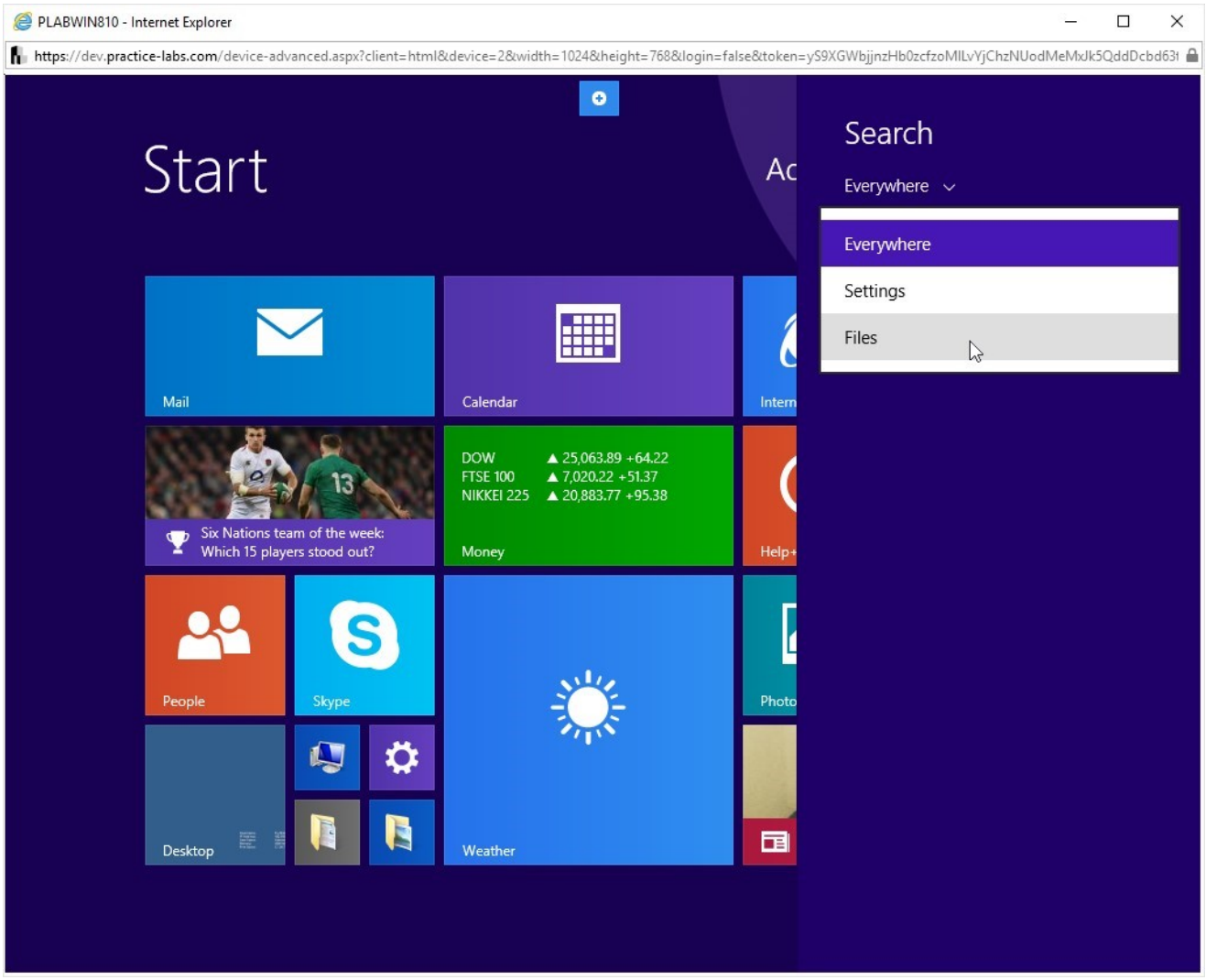


Figure 1.16 Screenshot of PLABWIN810: Selecting the search options from the drop-down.

Step 4

Type the following in the search text box:

```
help
```

Notice that the results are instantly displayed.

Windows 8.1 search includes results from Bing and App store.

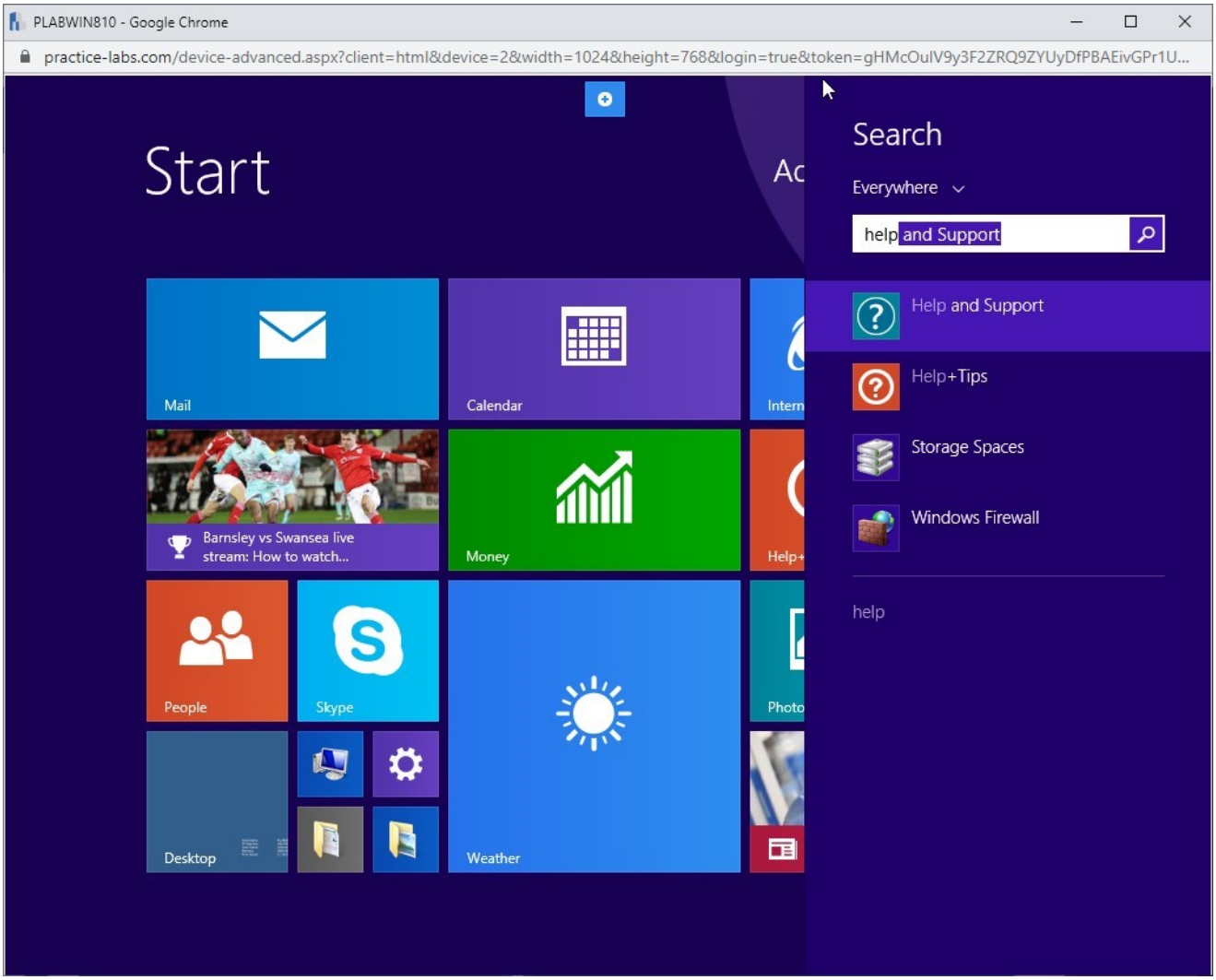


Figure 1.17 Screenshot of PLABWIN810: Performing a search in Windows 8.1.

Step 5

Connect to **PLABWIN10**.

Click inside the **Type here to search** text box on the taskbar.

This feature is called **Cortana**. Cortana is a more advanced search facility compared to previous search facilities that were available in the earlier versions of Windows.

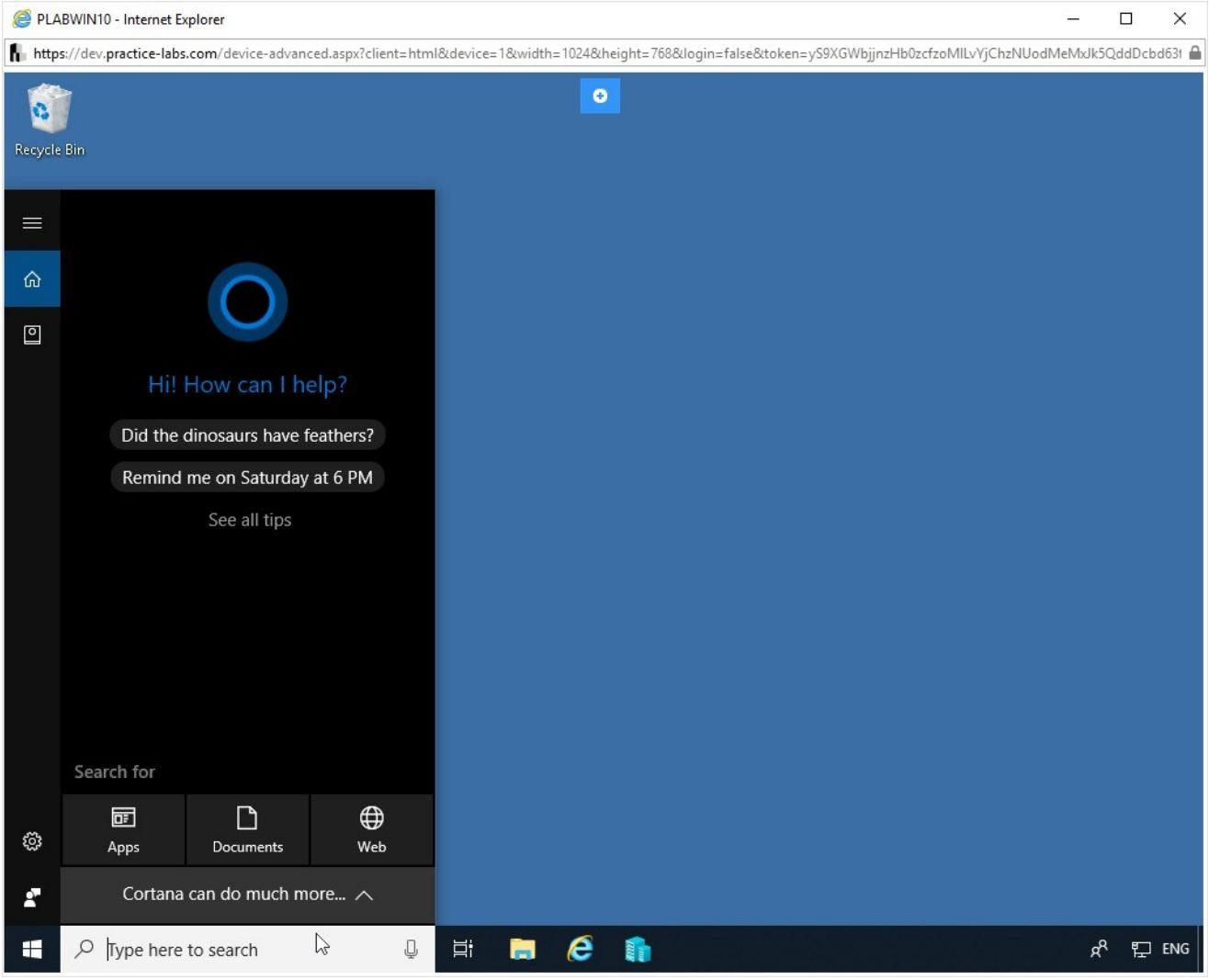


Figure1.18 Screenshot of PLABWIN10: Displaying Cortana in Windows 10.

Step 6

Type the following inside the **Type here to search** text box:

```
google
```

Then, select **Google** from the search results.

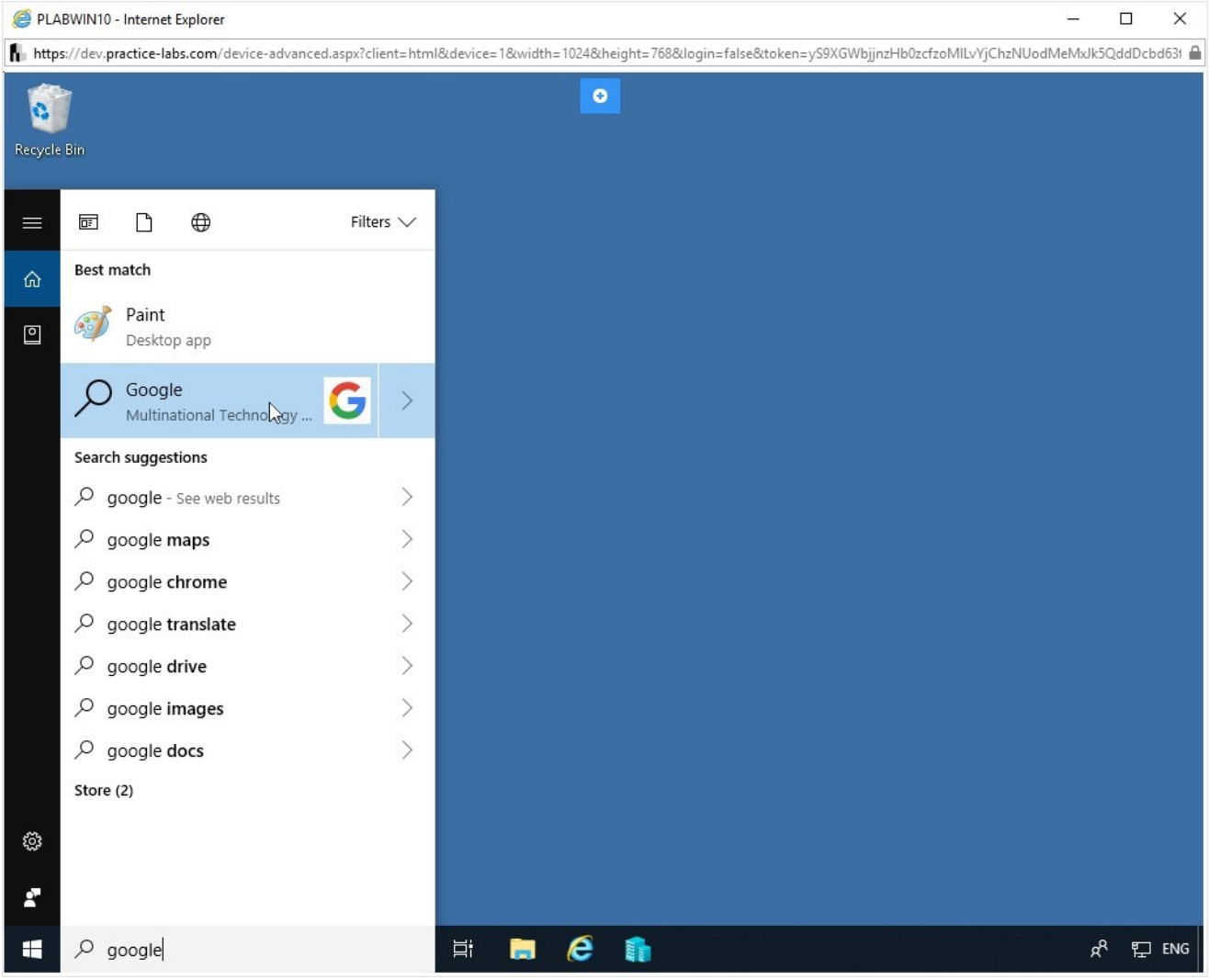


Figure 1.19 Screenshot of PLABWIN10: Searching for a keyword in Windows 10.

Step 7

The **Microsoft Edge** browser opens, and a search is performed by using the Bing search engine for the searched item, which is Google. This feature was not available in earlier versions of Windows.

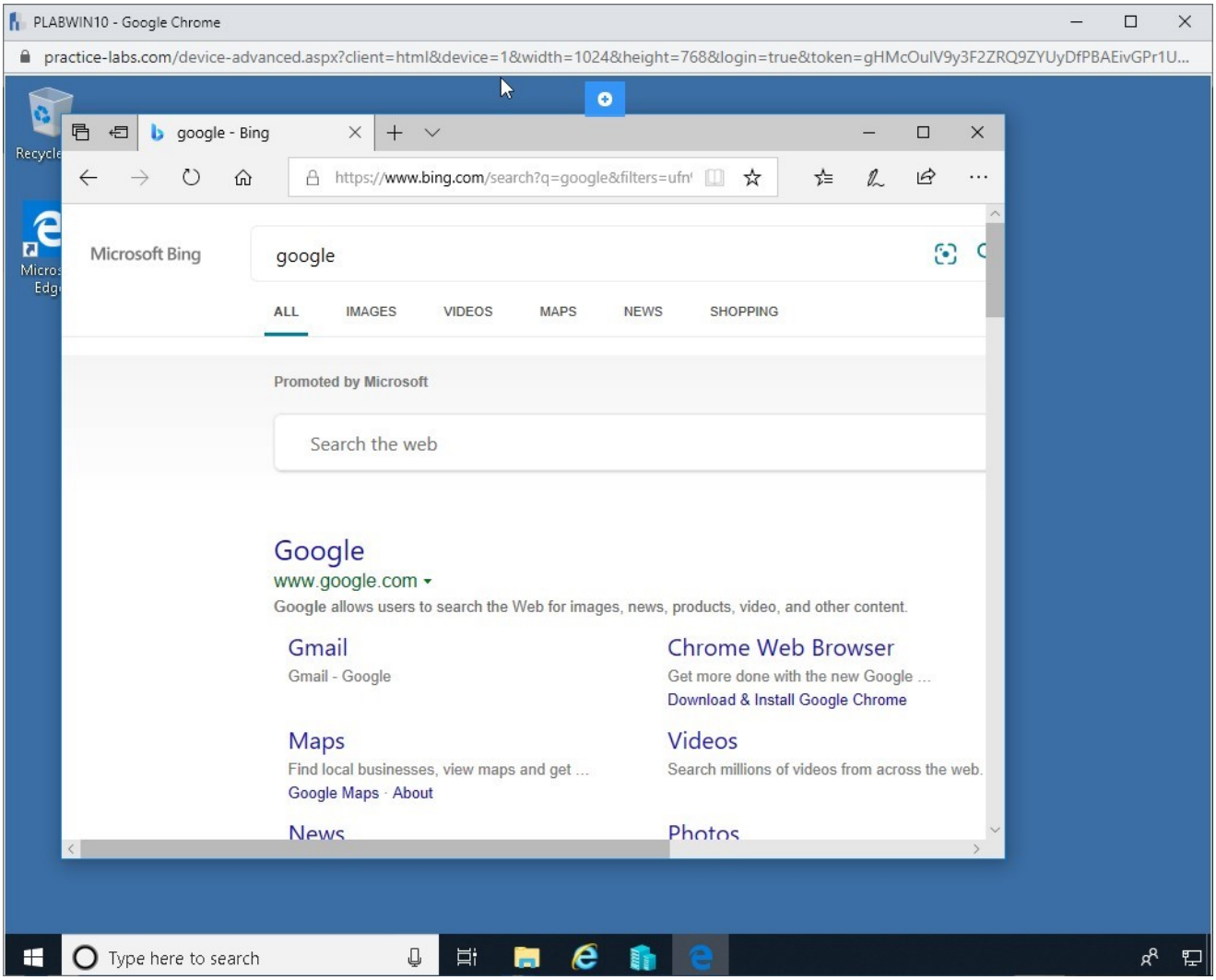


Figure1.20 Screenshot of PLABWIN10: Showing the search results in Microsoft Edge in Windows 10.

Step 8

Close the Edge window.

Leave the devices you have powered on in their current state and proceed to the next exercise.

Exercise 2 - Corporate vs. Personal Needs

Computers are being used everywhere - including at work and at home. Users can use Windows, Mac OS, or Linux in either of these environments. However, the manner in which computers are setup and configured differs in both environments.

A computer in the office environment is likely to be part of a domain and will interact with the other computers. A computer at home is likely to be part of a workgroup and is considered to be a standalone computer.

In this exercise, you will learn to add a computer to a domain.

Learning Outcomes

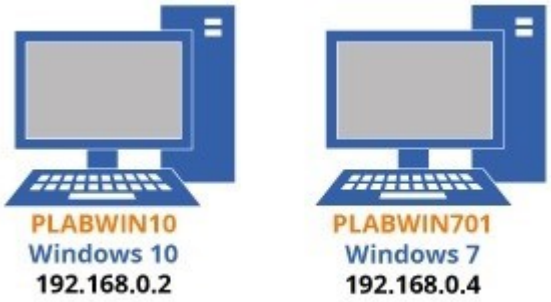
After completing this exercise, you will be able to:

- Use Media Center
- Remove a System from Domain
- Configure BranchCache
- Configure Encrypting File System (EFS)

Your Devices

You will be using the following devices in this lab. Please power these on now.

- **PLABWIN10 -** (Windows 10 - Domain Member)
- **PLABWIN701 -** (Windows 7 - Domain Member)



Task 1 - Using Media Center

Windows Media Center is a digital video recorder and a media player that is created by Microsoft. It is included in Windows 7 (except Starter and Home Basic edition) and on Windows 8.1 (as a paid add-on). However, it has been discontinued on Windows 10.

The Media Center helps users to play slideshows, videos, and music from an optical drive, hard drive, and network locations. Through Media Center, it is possible to watch and pause live TV, stream television programs, and movies through Netflix, etc.

In this task, you will learn to use Media Center.

Alert: Please be aware that with this exercise you are required to toggle off our **Connect device client option**. You will find this option in our **settings page** For further assistance we recommend you refer to our user guide below: **https://www.practice-labs.com/support/#/userguide/settings-tab**

Step 1

Connect to **PLABWIN701**.

The **Start** page should still be displayed from the previous task. Otherwise, click **Start**.

Clear any text still appearing in the **Search programs and files** text box from the previous task.

In the **Search programs and files** text box, type the following:

```
Media Center
```

Click on **Windows Media Center** from the results.

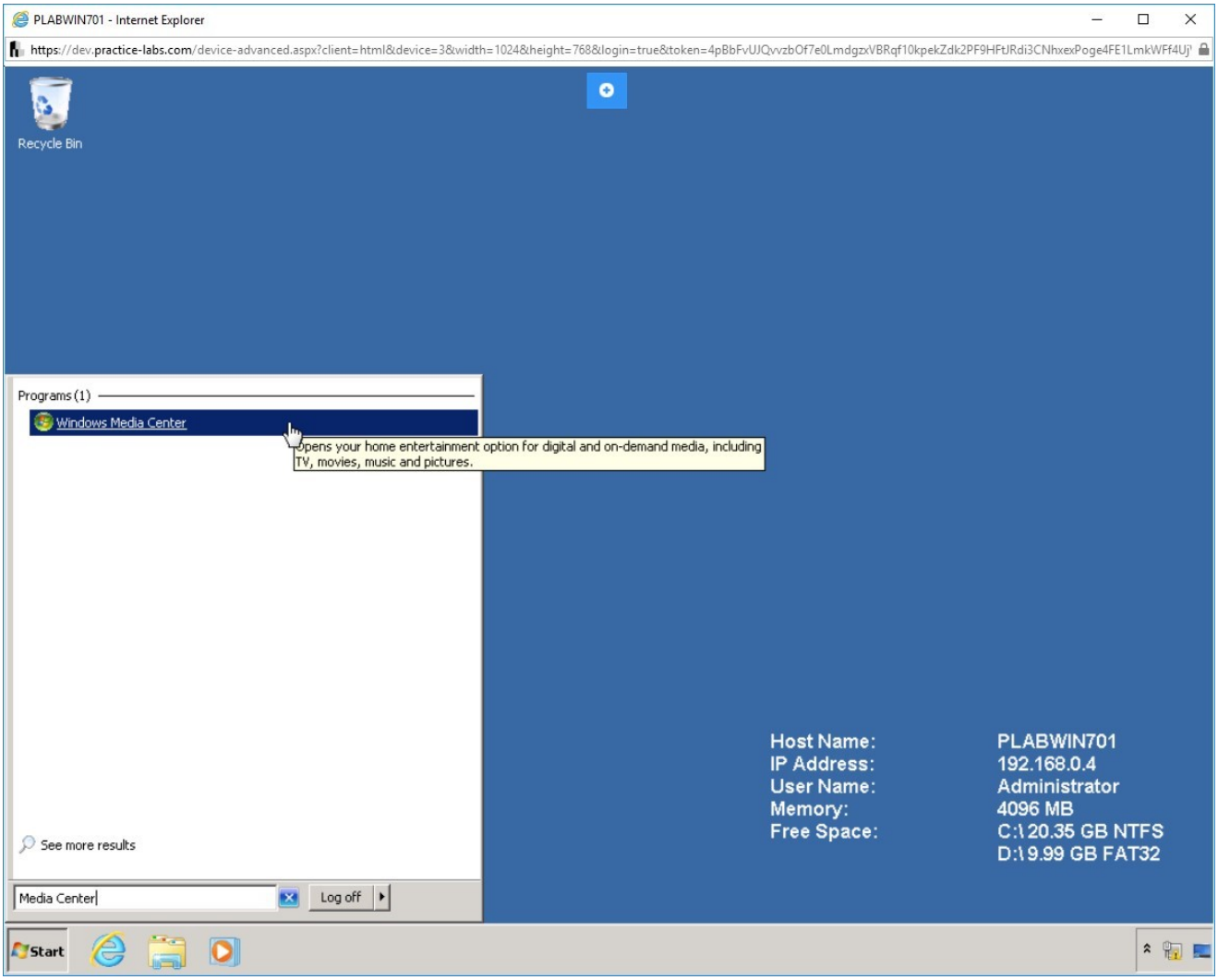


Figure 2.1 Screenshot of PLABWIN701: Selecting Windows Media Center from the search results.

Step 2

The **Windows Media Center** window is displayed.

Click **Continue**.

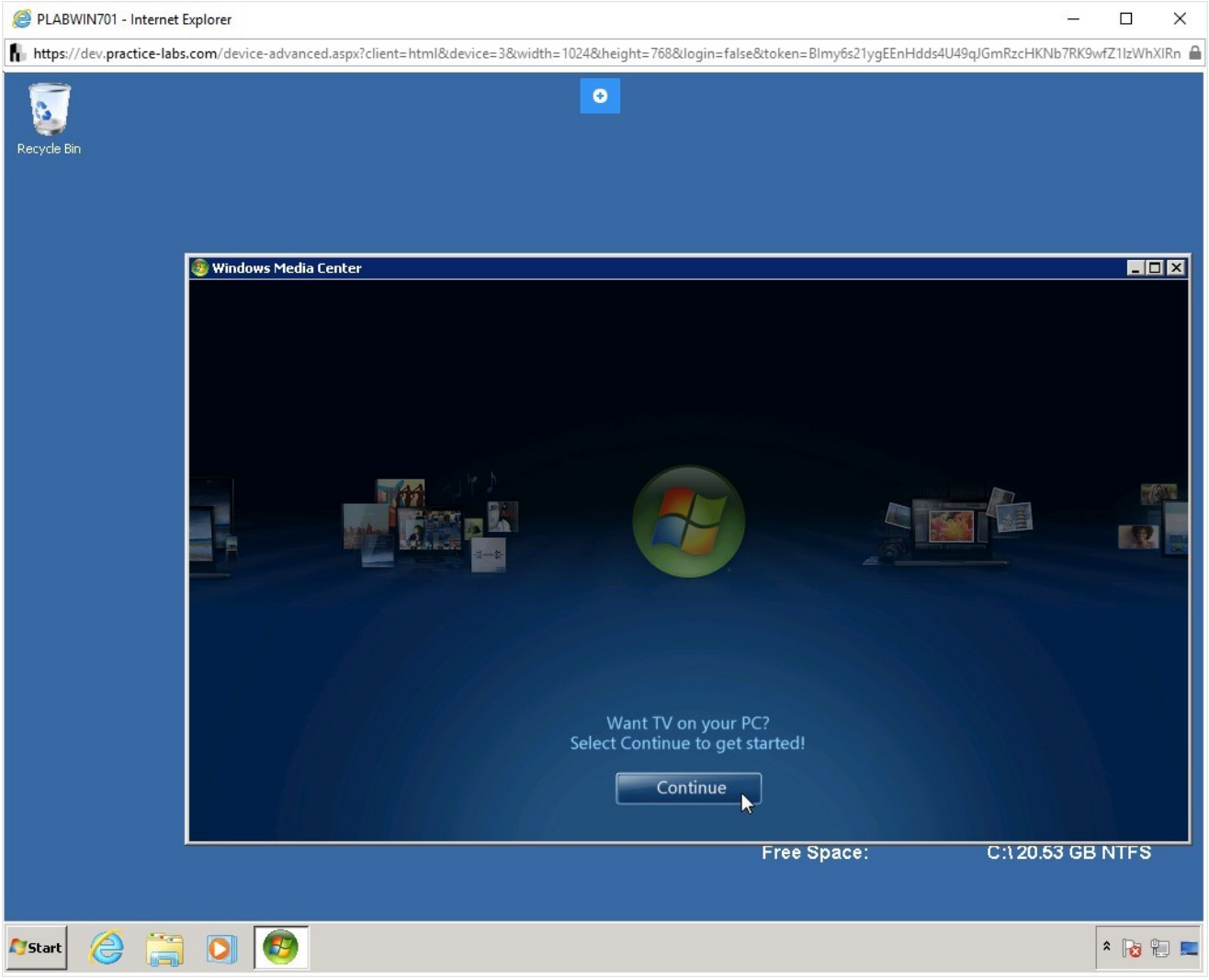


Figure 2.2 Screenshot of PLABWIN701: Showing the Windows Media Center window.

Step 3

On the **Get Started** page, click the **Express** icon.

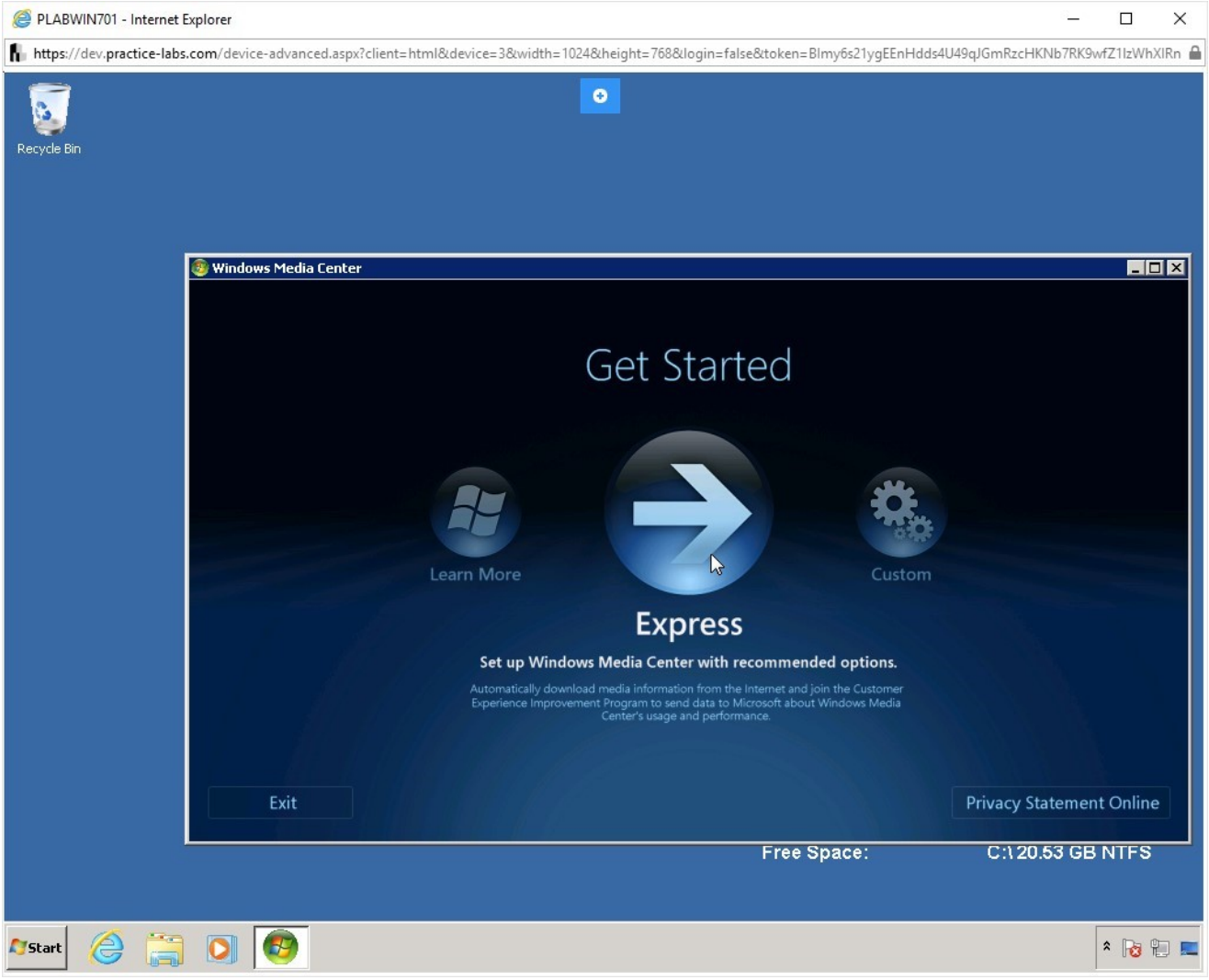


Figure 2.3 Screenshot of PLABWIN701: Showing the selection of the Express option in Windows Media Center.

Step 4

On the next page, select the **Music** option, then click the **music library** image.

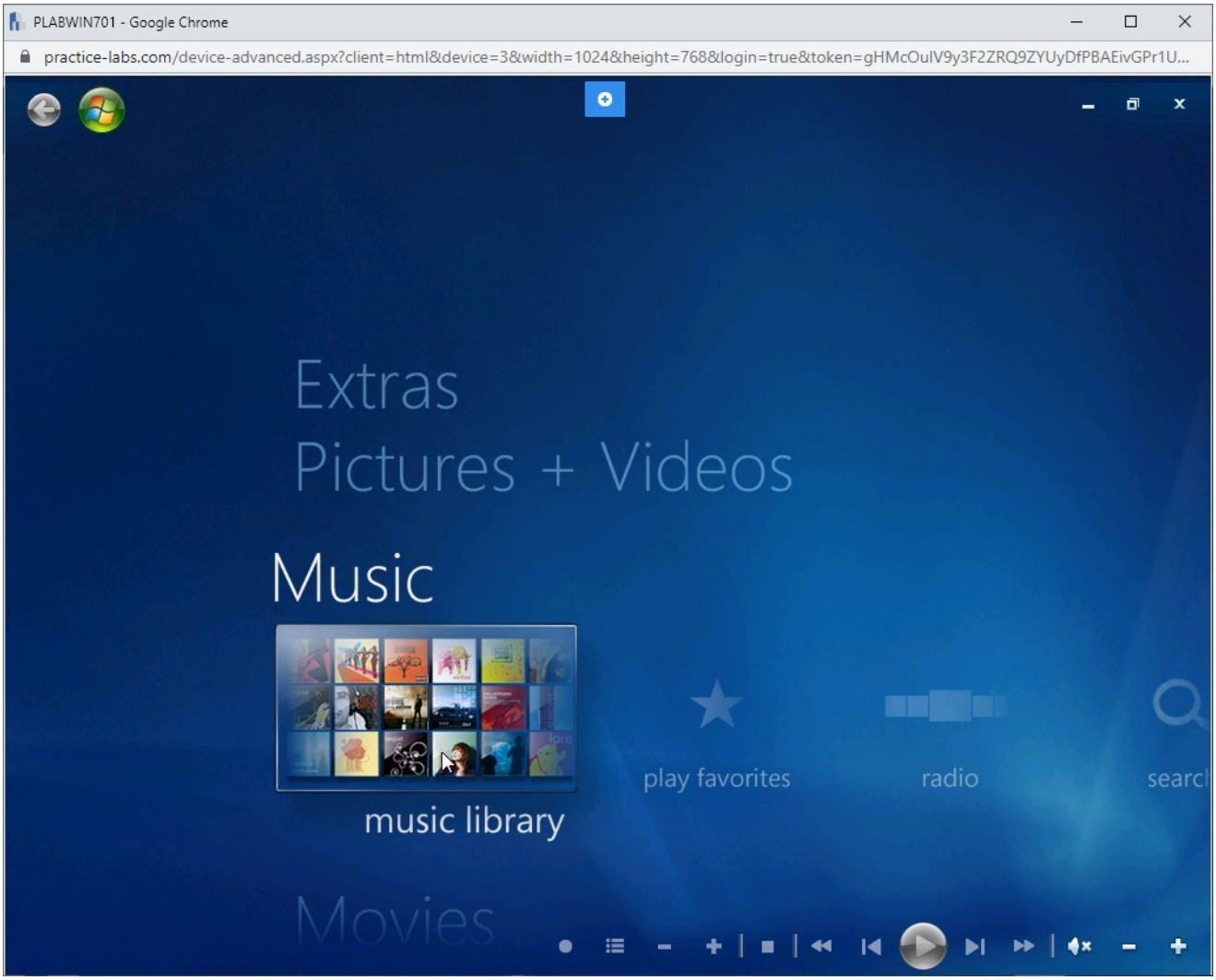


Figure 2.4 Screenshot of PLABWIN701: Showing the selection of music option in Windows Media Center.

Step 5

If the **MEDIA LIBRARIES** pop-up is displayed, click **Cancel**.

Select the first album image on the left-hand side.

> ***Note:*** *The screen can also be re-sized for ease of use. For example, in the screenshots it has been expanded to full screen.*

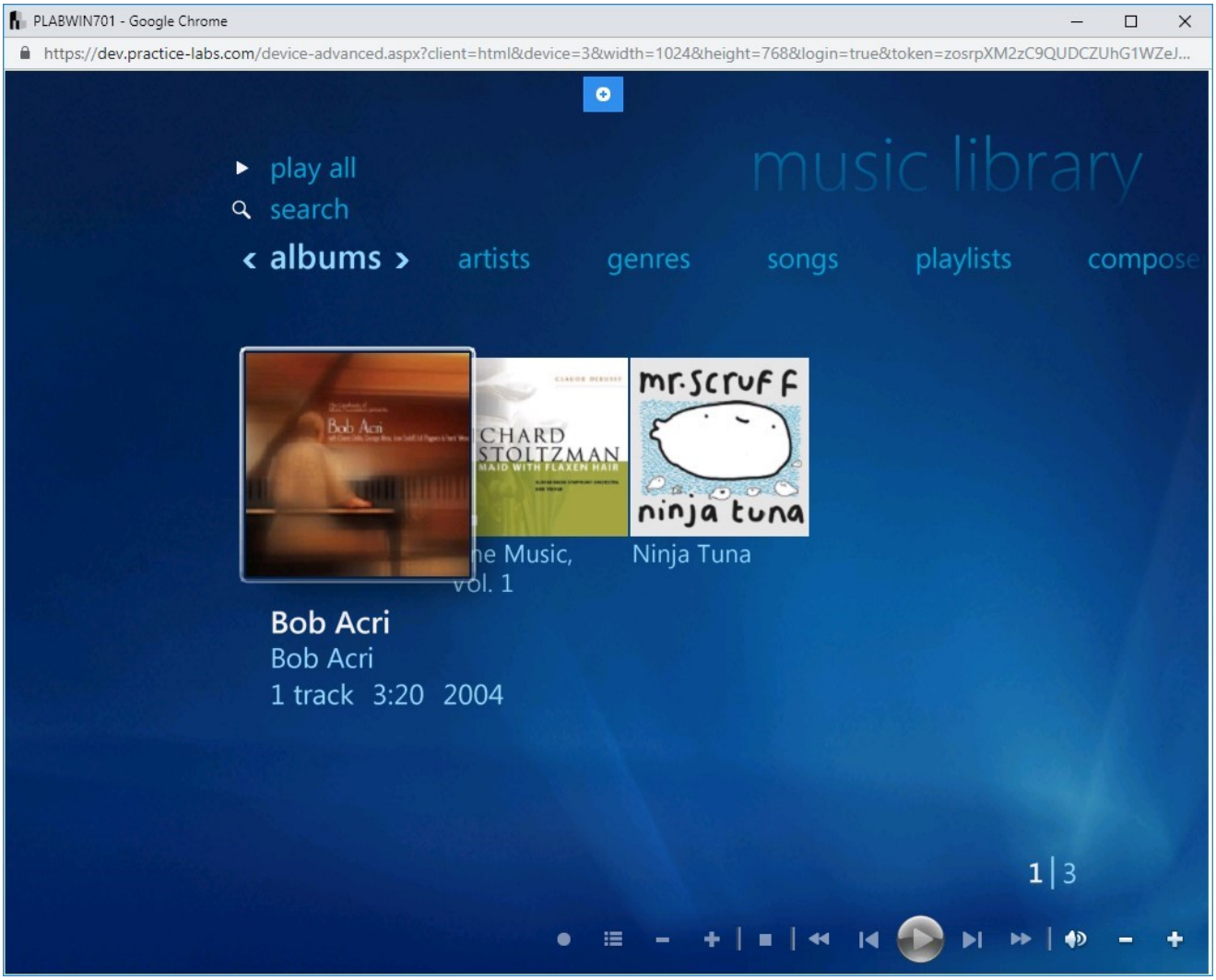


Figure 2.5 Screenshot of PLABWIN701: Showing the selection of an album in Windows Media Center.

Step 6

Select the **play album** option. This makes the album play on the audio player. This is for demonstration purposes as sound does not pass through this lab environment,

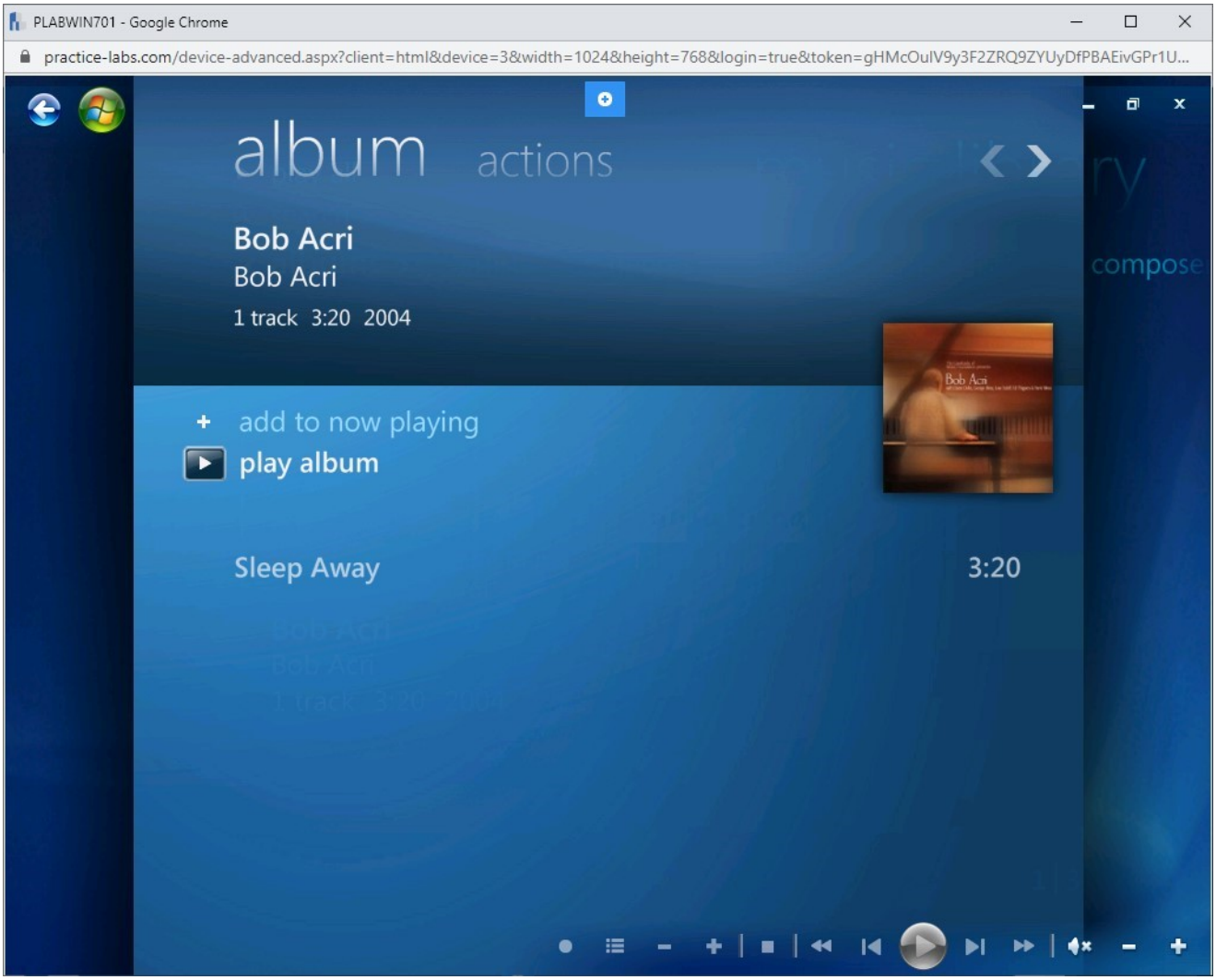


Figure 2.6 Screenshot of PLABWIN701: Playing of an album in Windows Media Center.

Step 7

Press the **Pause** button present at the bottom. This will make the current playing track stop.

> ***Note**: The settings toolbar will appear when you drag your mouse over the bottom part of the screen. It will hide after a short amount of time.*

Close **Windows Media Center**.

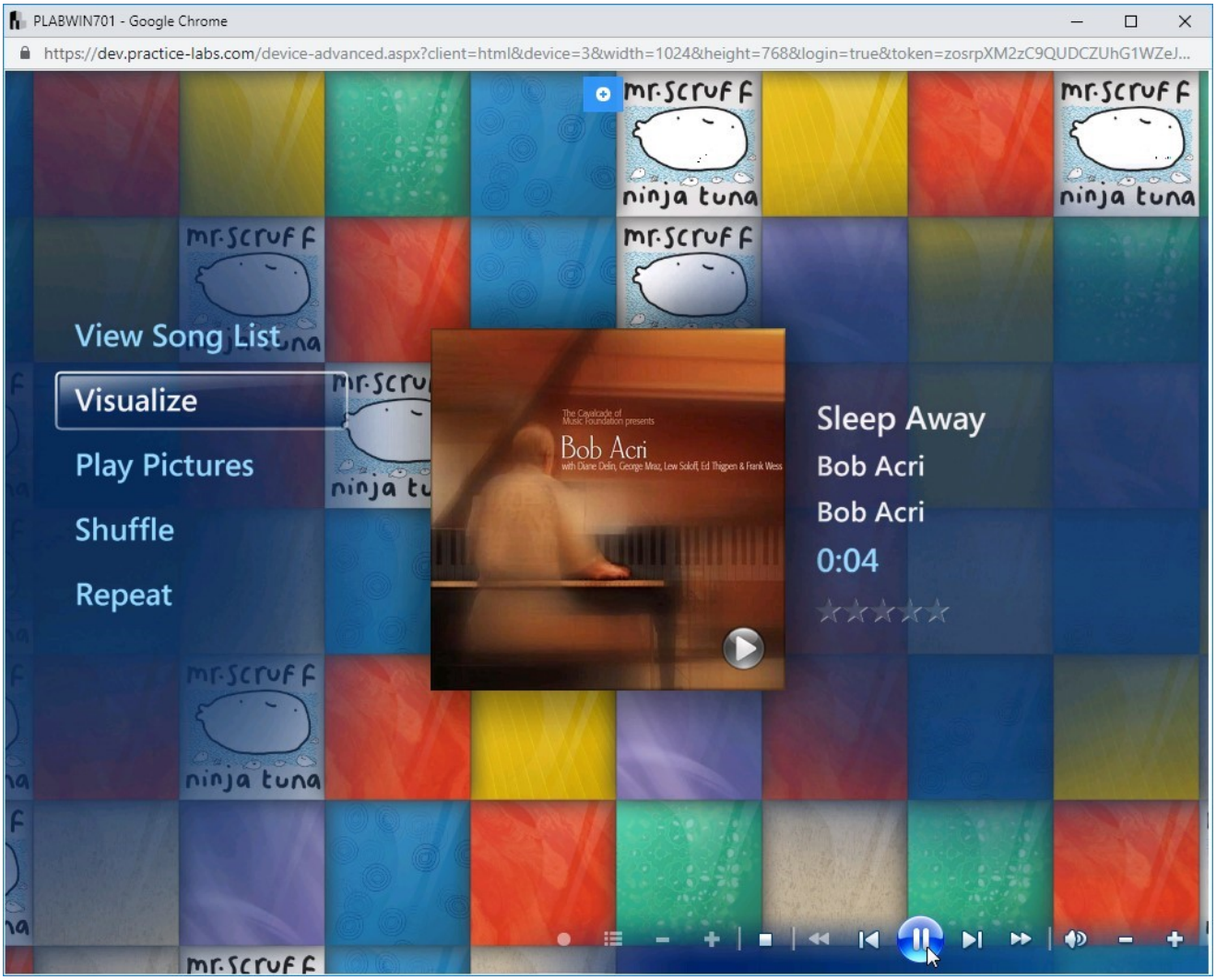


Figure 2.7 Screenshot of PLABWIN701: Showing how to pause a track in Windows Media Center.

Task 2 - Remove a System from Domain

In this task, you will remove **PLABWIN10** from the domain and add the device to a workgroup.

Step 1

Ensure you are connected to **PLABWIN10**.

Click on the **File Explorer** icon on the taskbar.

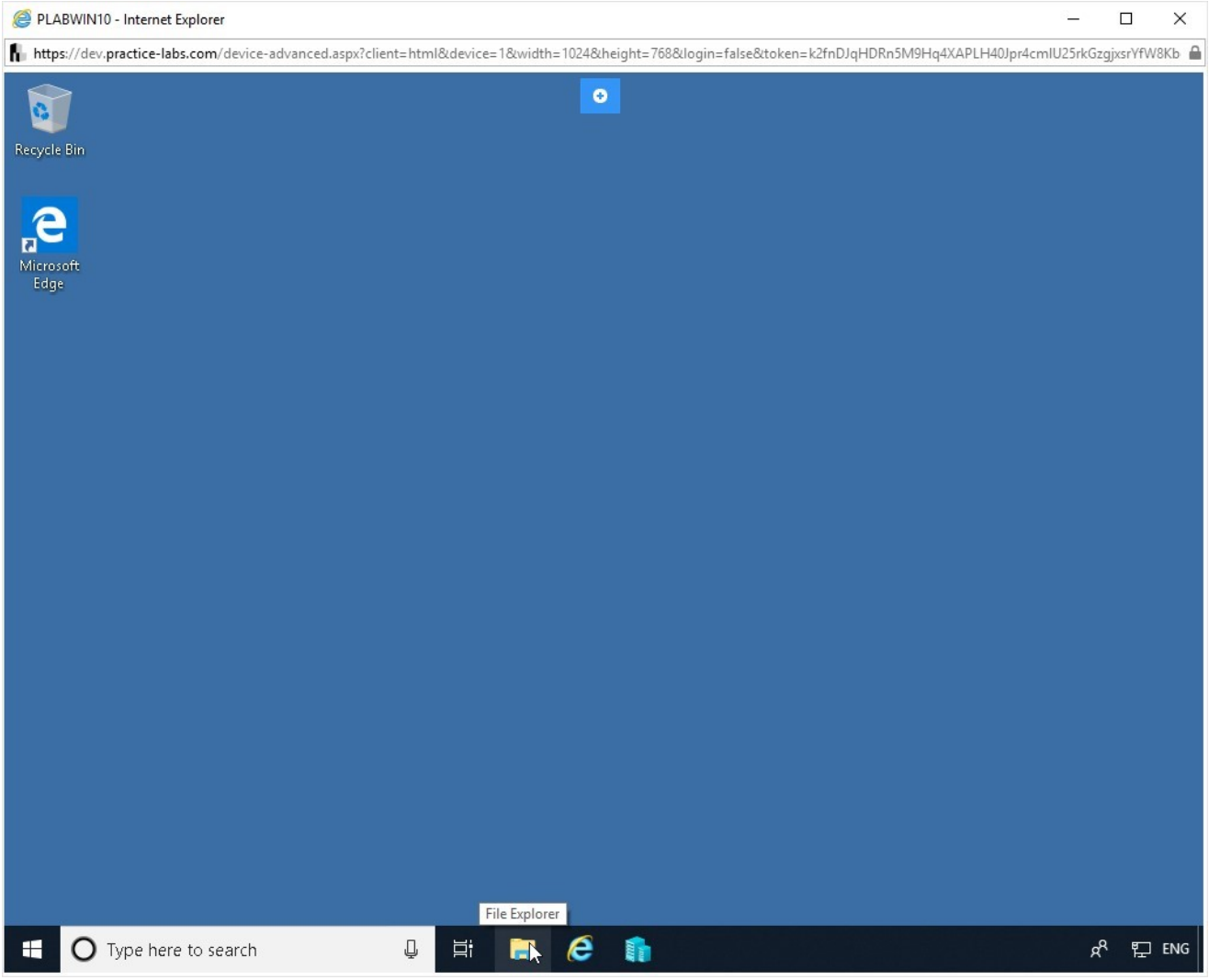


Figure 2.8 Screenshot of PLABWIN10: Clicking the File Explorer icon from the taskbar.

Step 2

You are on the **File Explorer** window.

Right-click **This PC** in the left pane and select **Properties**.

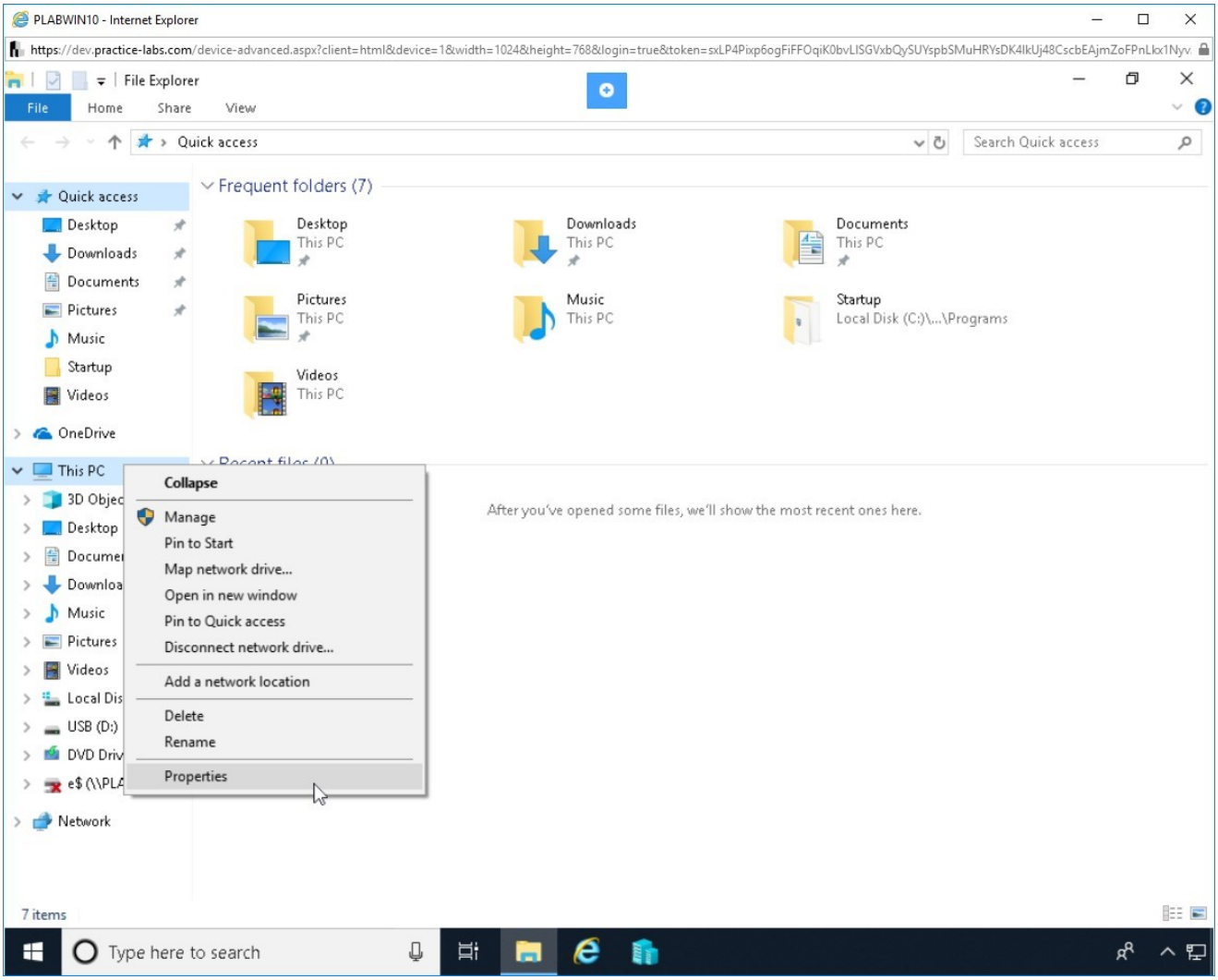


Figure 2.9 Screenshot of PLABWIN10: Selecting Properties from the context menu of This PC.

Step 3

The **View basic information about your computer** page is displayed.

Under the **Computer name, domain, and workgroup settings** section, click the blue **Change settings** link.

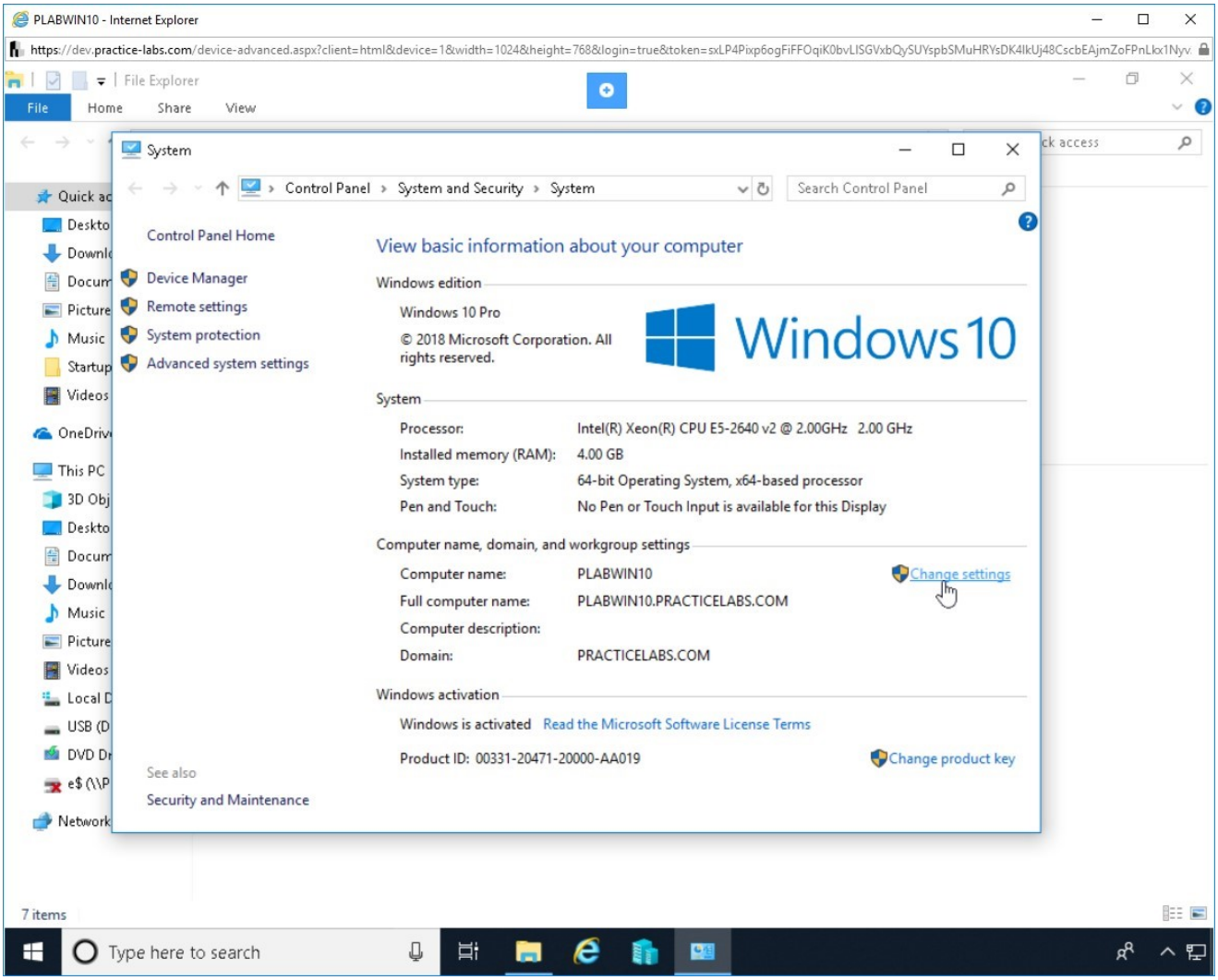


Figure 2.10 Screenshot of PLABWIN10: Clicking the Change settings link in the Computer name, domain, and workgroup settings.

Step 4

The **System Properties** dialog box is displayed.

On the **Computer Name** tab, click the **Change** button.

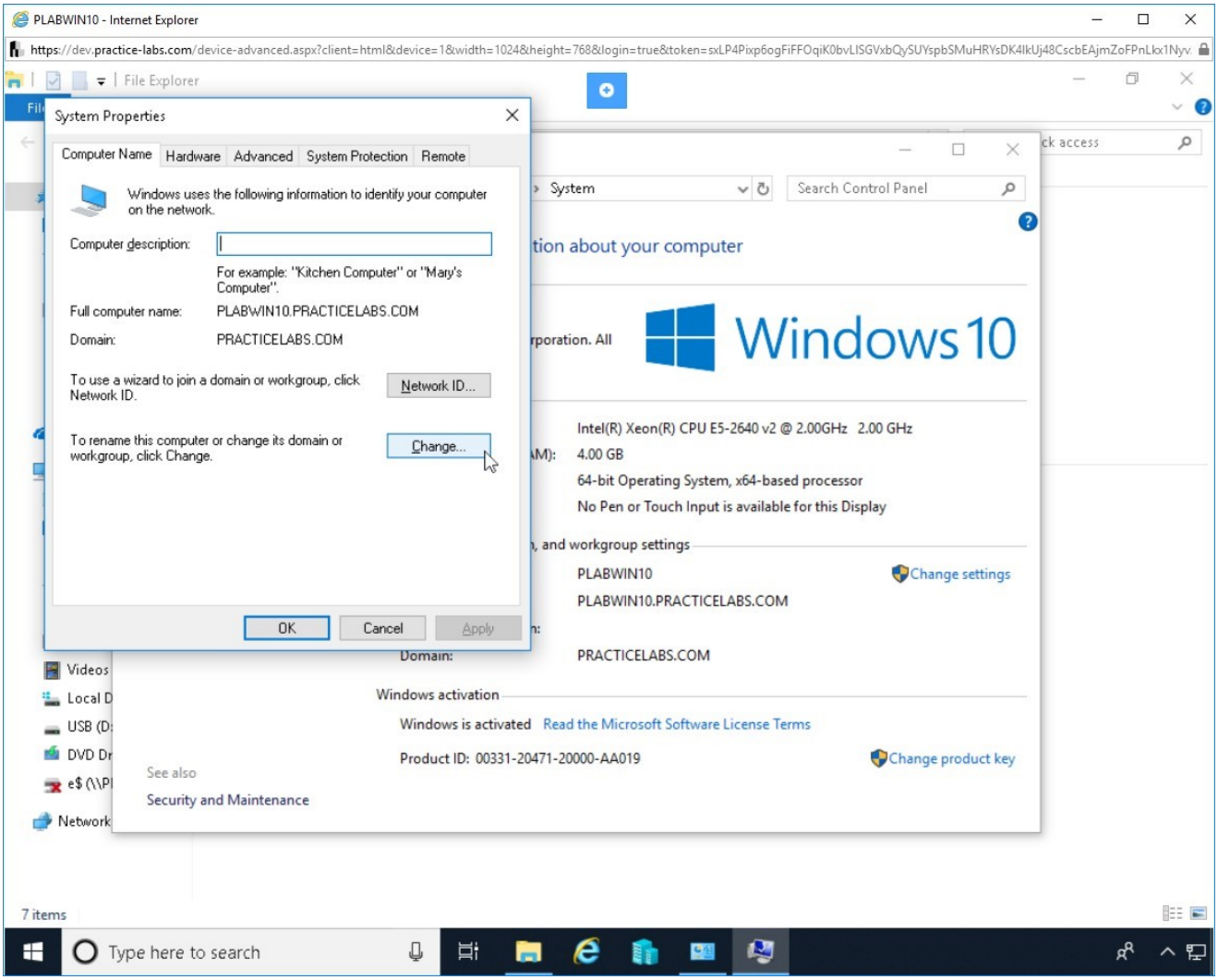


Figure 2.11 Screenshot of PLABWIN10: Clicking Change on the System Properties dialog box.

Step 5

The **Computer Name/Domain Changes** dialog box is displayed.

Under the **Member of** section, select **Workgroup.**

Type the following in the text box:

```
PLAB
```

Click **OK**.

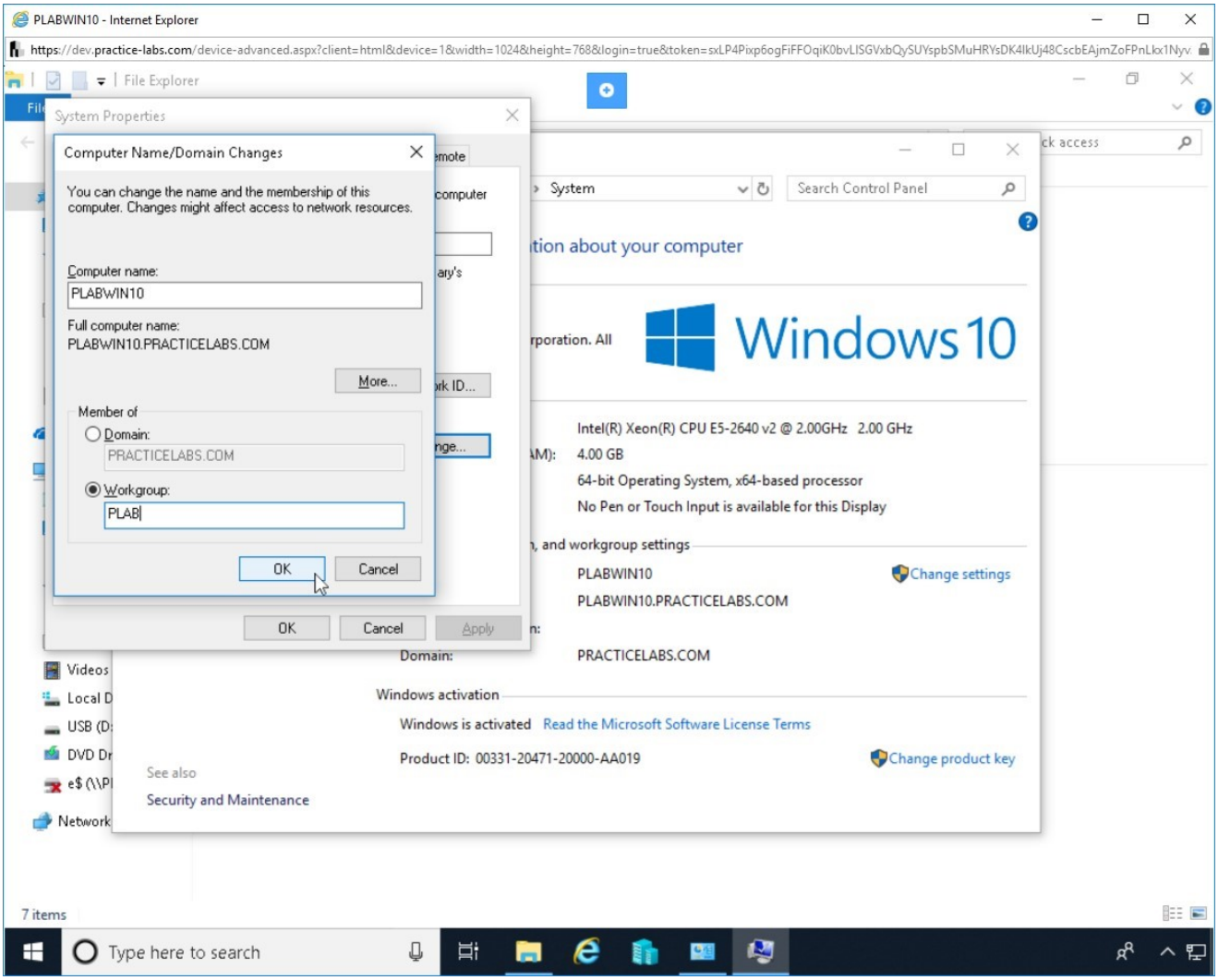


Figure 2.12 Screenshot of PLABWIN10: Adding the system to a workgroup named PLAB.

Step 6

The **Computer Name/Domain Changes** dialog box is displayed.

Click **OK**.

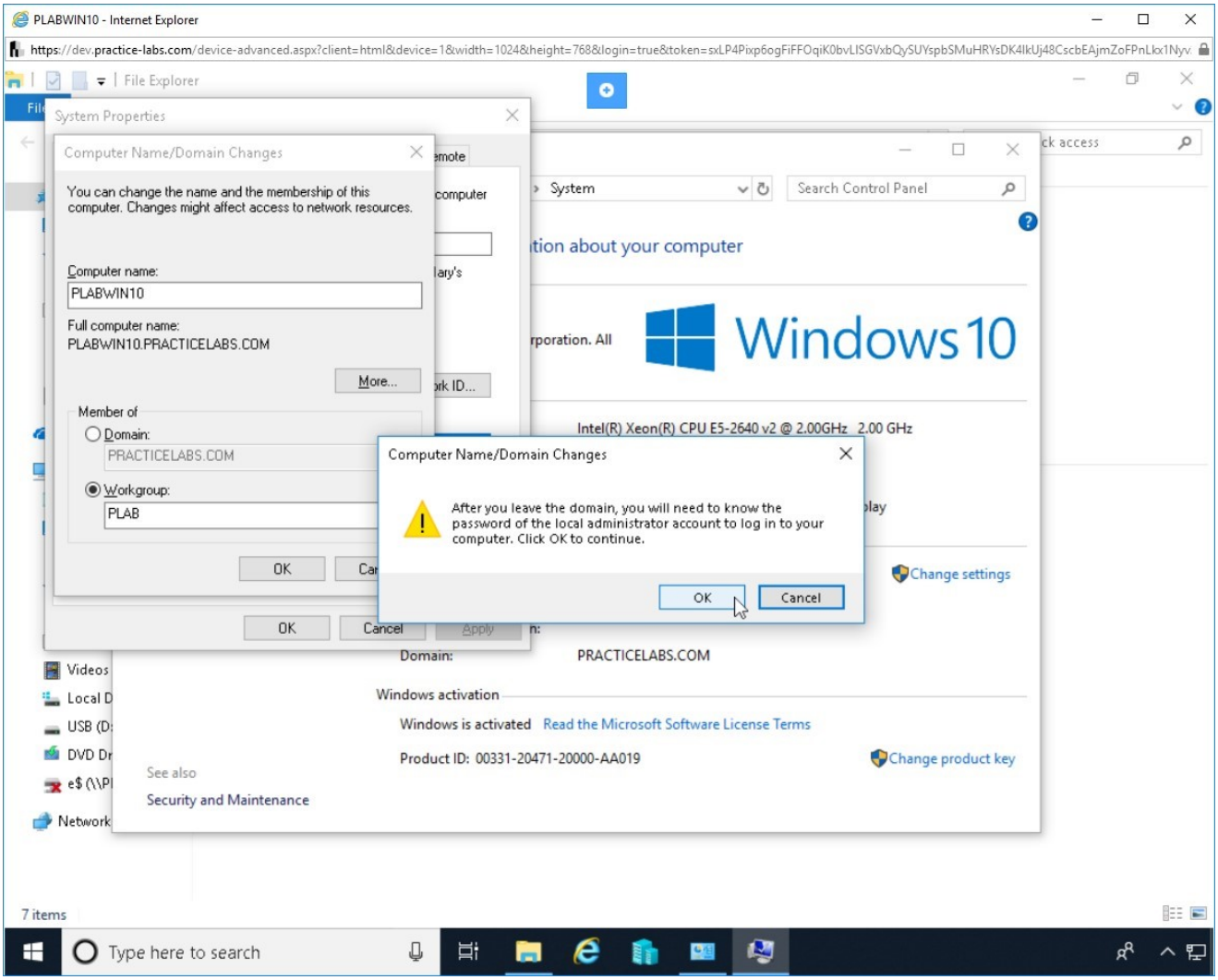


Figure 2.13 Screenshot of PLABWIN10: Showing the message displayed after adding the system in the homegroup.

Step 7

The next **Computer Name/Domain Changes** dialog box message is displayed.

Click **OK**.

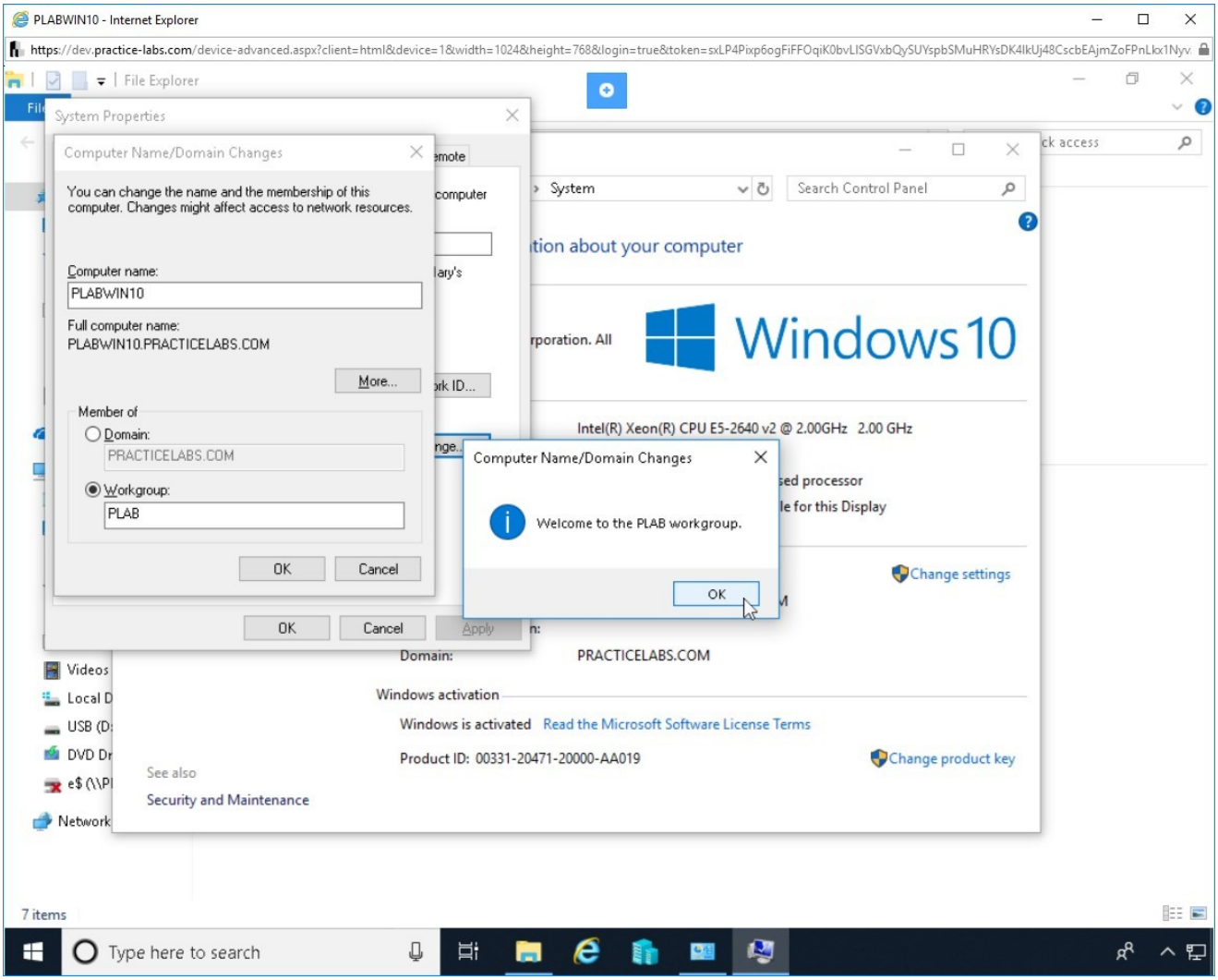


Figure 2.14 Screenshot of PLABWIN10: Showing the welcome message after adding the system in the workgroup.

Step 8

The next **Computer Name/Domain Changes** dialog box is then displayed.

Click **OK**.

> ***Note:*** *You would need to restart your computer for the changes to take effect. Without restarting, the computer will still be part of the domain.*

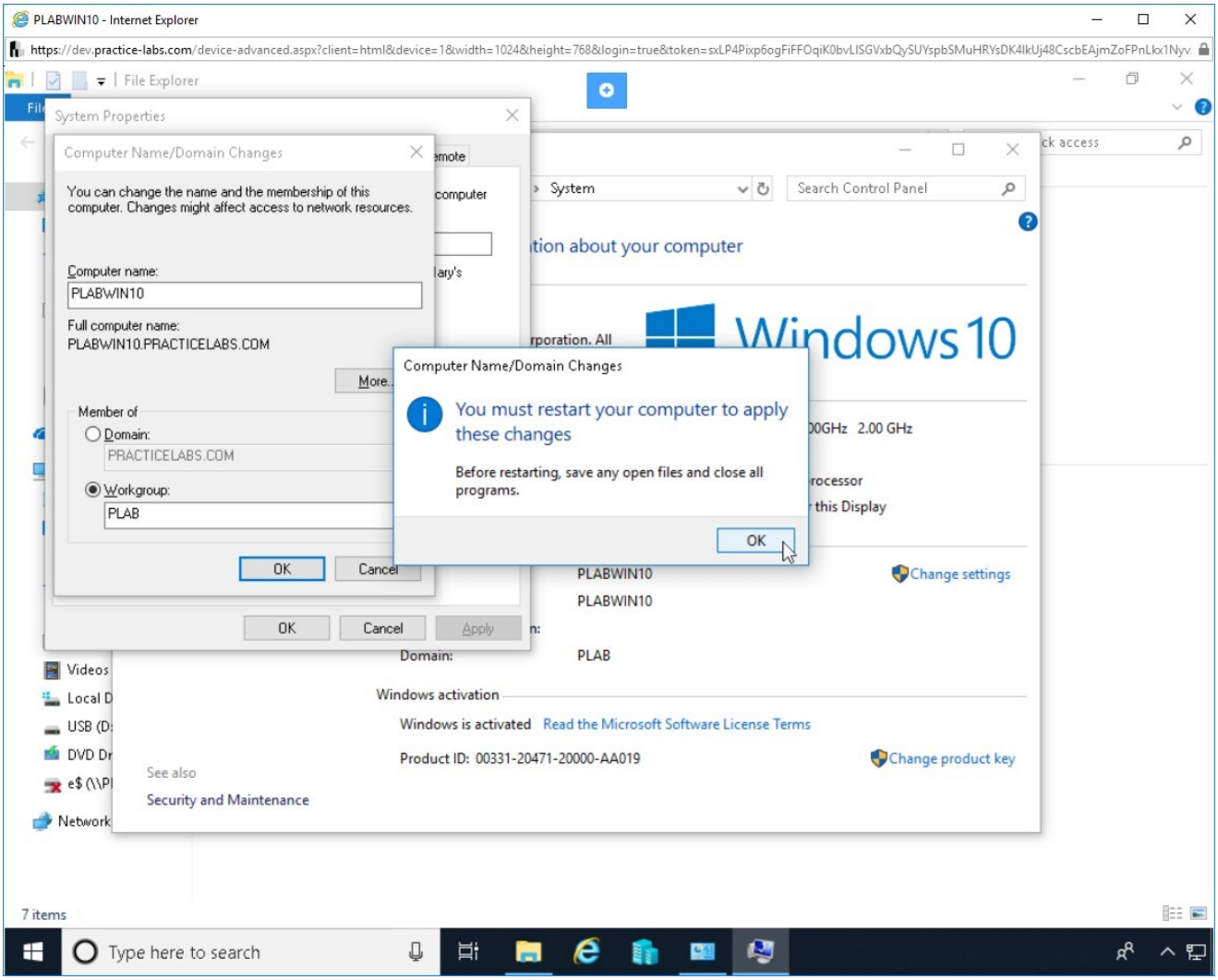


Figure 2.15 Screenshot of PLABWIN10: Showing the message to restart the system.

Step 9

Back on the **System Properties** dialog box, click **Close**.

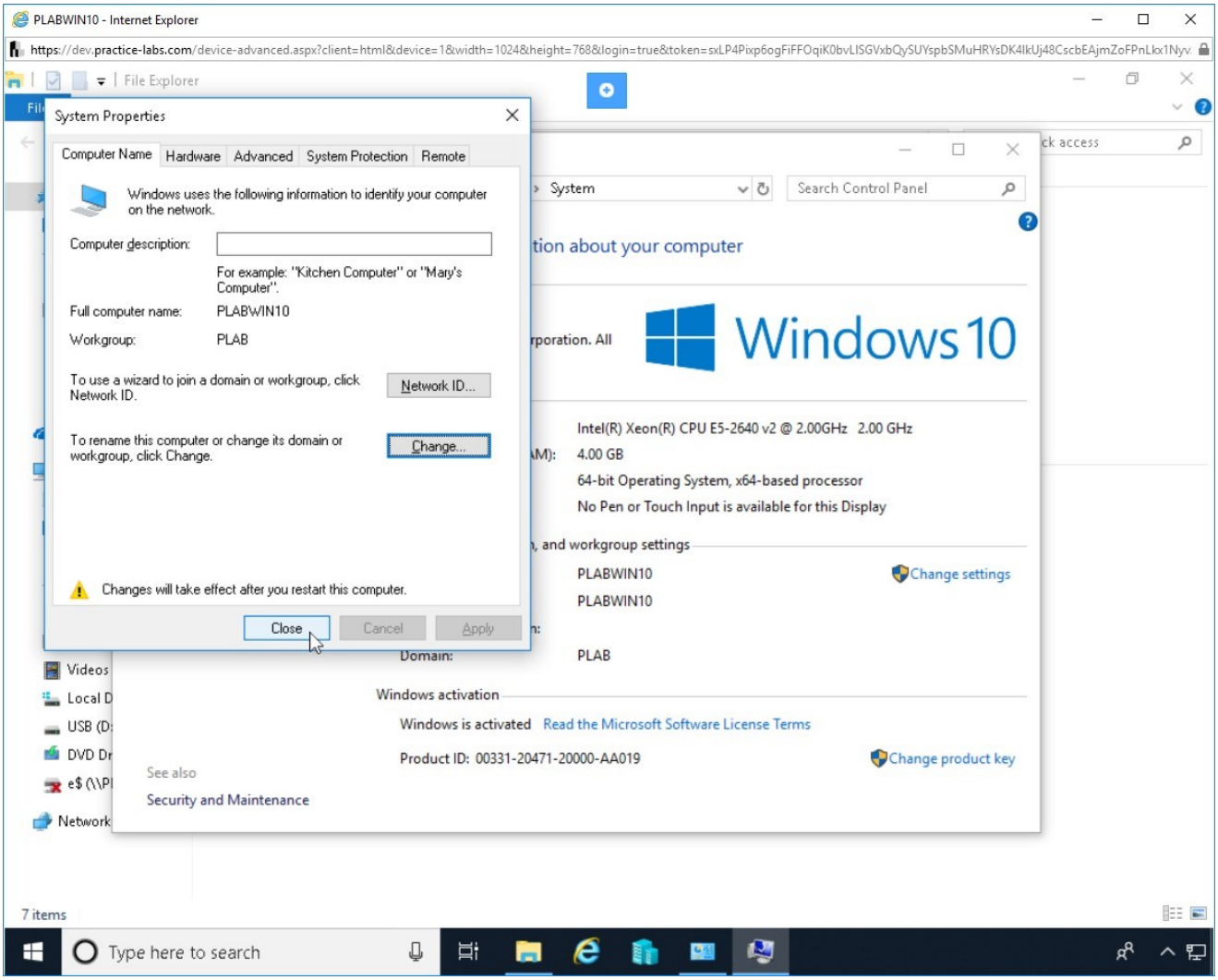


Figure 2.16 Screenshot of PLABWIN10: Closing the System Properties dialog box.

Step 10

The **Microsoft Windows** dialog box is displayed.

Click **Restart Later** to delay the restart until required.

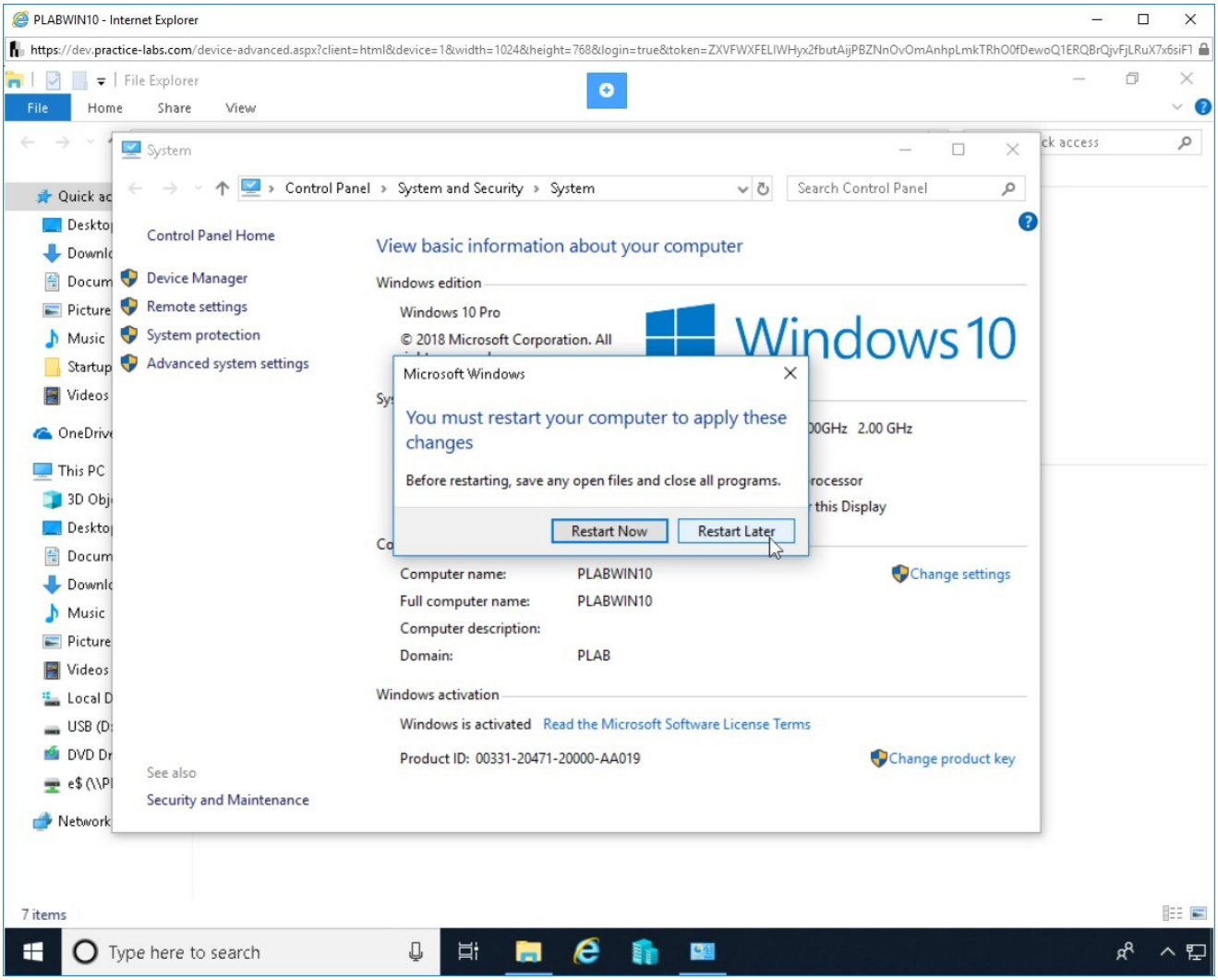


Figure 2.17 Screenshot of PLABWIN10: Clicking on the Restart Later button in the Microsoft Windows dialog box.

Step 11

Under the **Computer name, domain, and workgroup settings** section, notice that the domain name is now changed to **PLAB**, which is actually a workgroup.

> **Alert:** Do not restart PLABWIN10 at this moment.

Close all open windows.

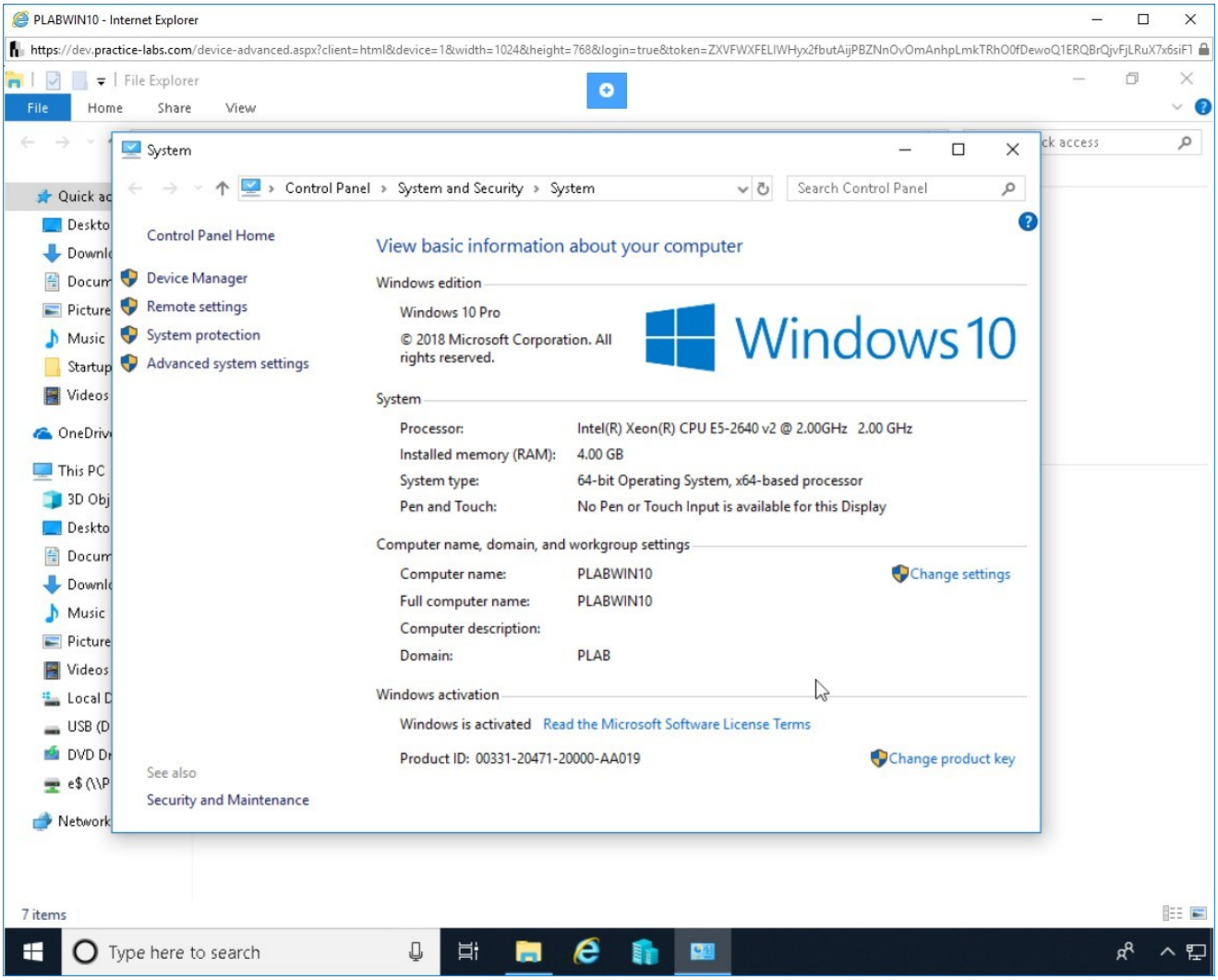


Figure 2.18 Screenshot of PLABWIN10: Showing the system details on the View basic information about your computer page

Task 3 - Configuring BranchCache

The BranchCache feature is used in a network environment where you have branch offices. BranchCache allows files present on the server to be stored at the client end, thereby reducing the network traffic.

BranchCache is configured at the client end. BranchCache can be configured on the individual client computers or the local server at the client side. BranchCache configured on the client computers is known as distributed BranchCache.

If BranchCache is configured on the local server, it is known as hosted BranchCache.

In this task, you will learn to configure a BranchCache in the distributed cache mode.

Step 1

Connect to **PLABWIN10**.

Click inside the **Type here to search** text box on the taskbar.

Type the following:

```
Edit group policy
```

Select **Edit group policy** from the search results.

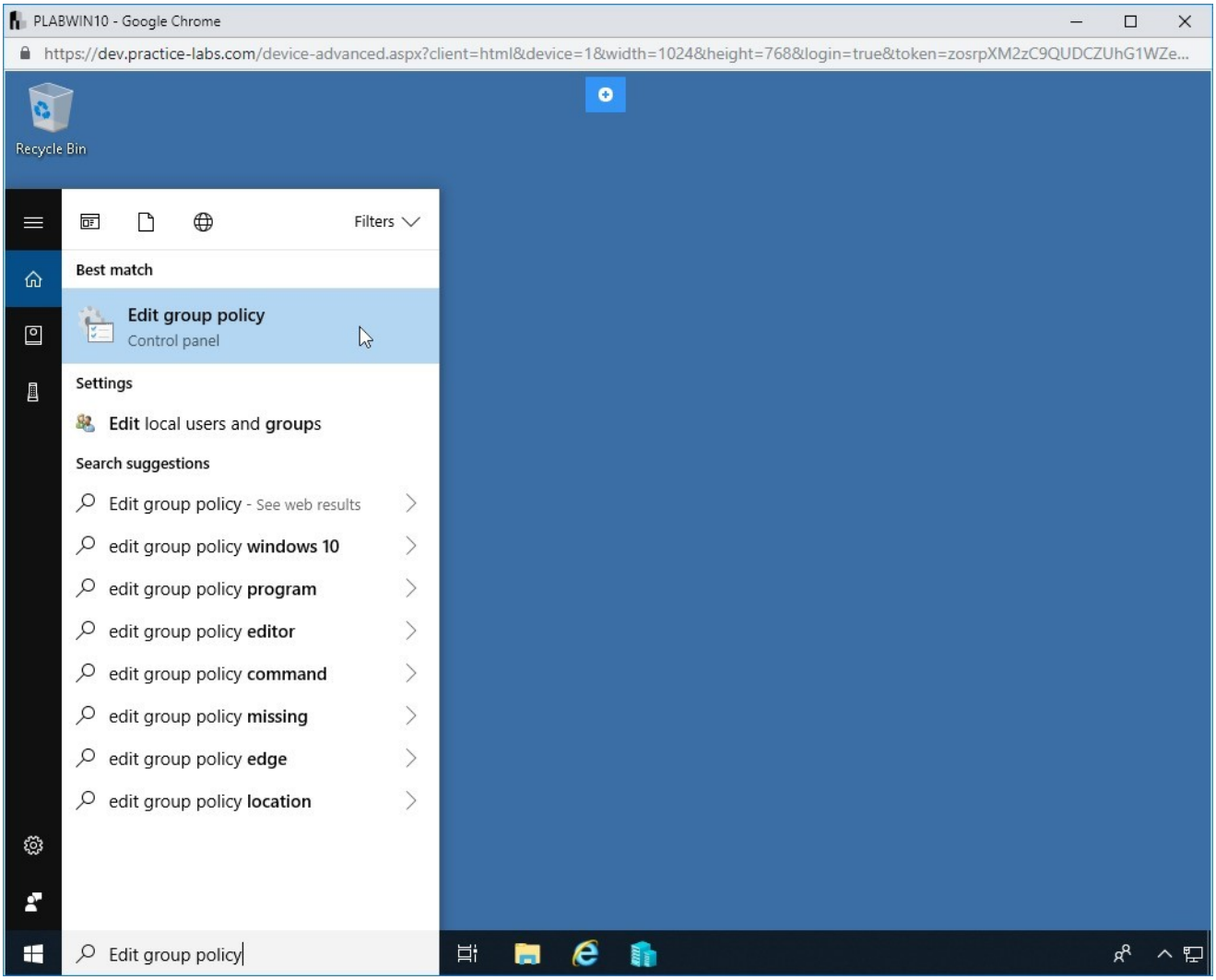


Figure 2.19 Screenshot of PLABWIN10: Selecting Edit group policy from the search results.

Step 2

Maximize the window.

In the left pane, navigate to **Computer Configuration** and expand **Administrative Templates**, expand **Network**, and then select **BranchCache**.

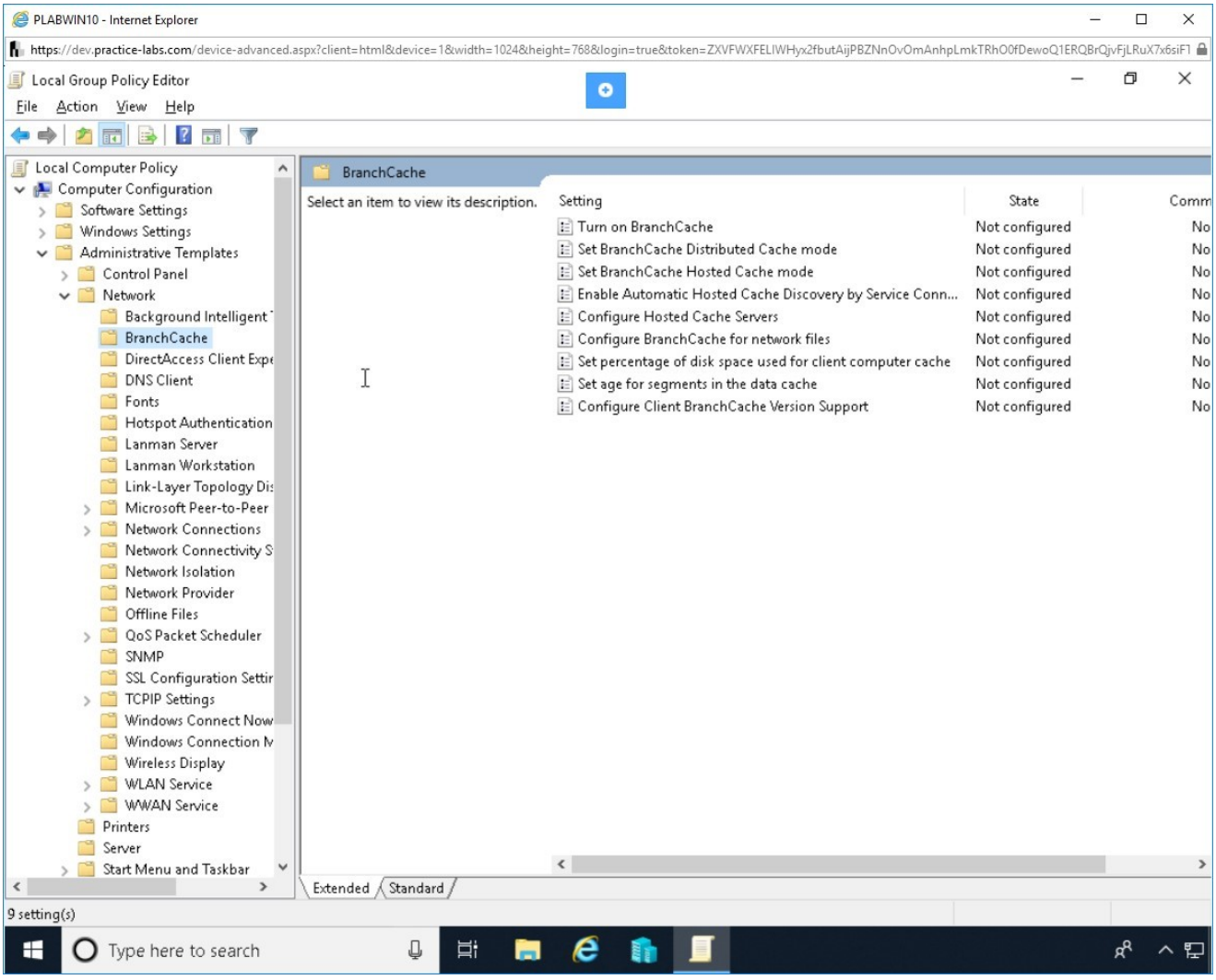


Figure 2.20 Screenshot of PLABWIN10: Showing the Local Group Policy Editor window.

Step 3

In the right pane, double-click the **Turn on BranchCache** policy.

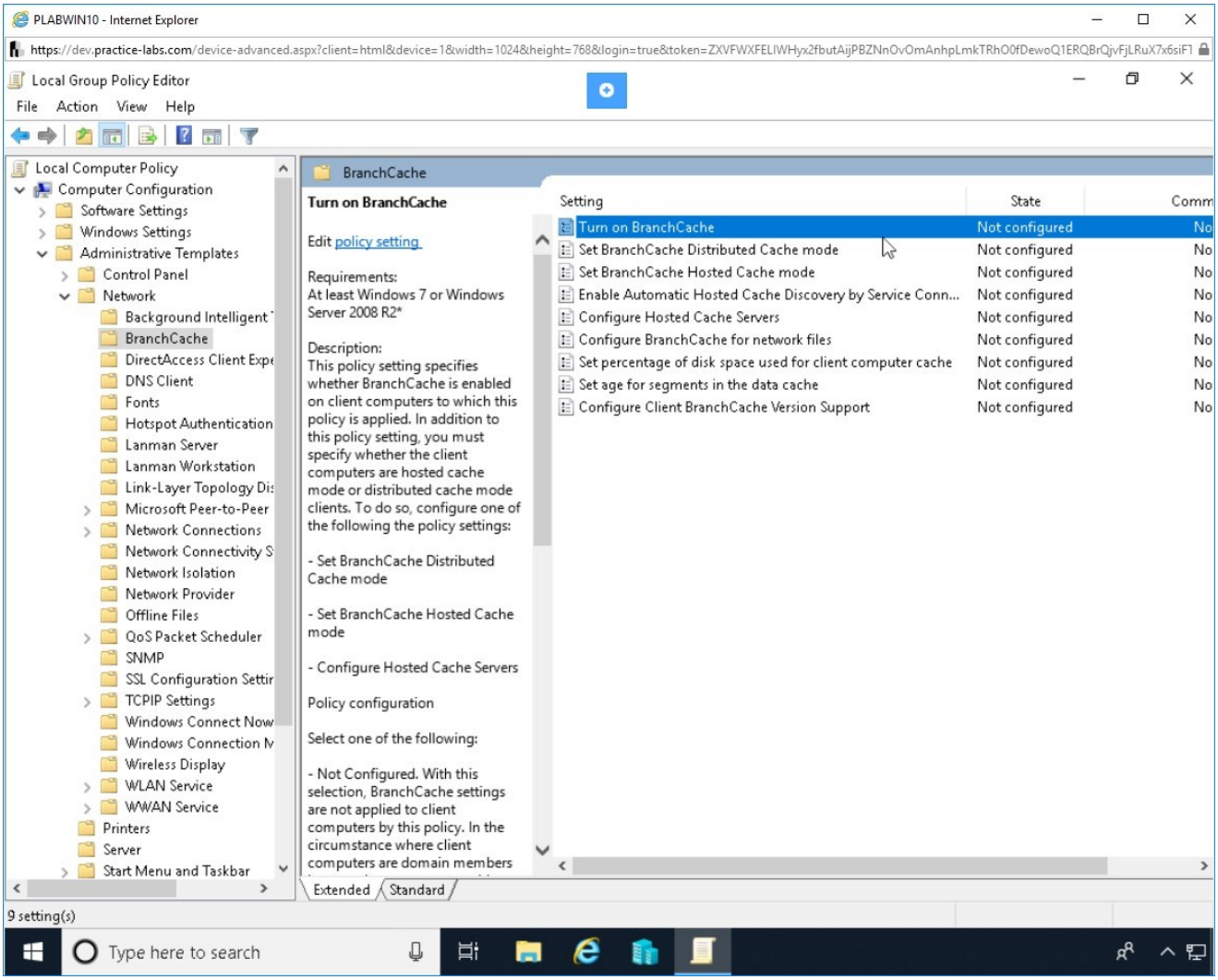


Figure 2.21 Screenshot of PLABWIN10: Opening a policy in the Local Group Policy Editor.

Step 4

The **Turn on BranchCache** dialog box is displayed.

Select **Enabled** and click the **Next Setting** button.

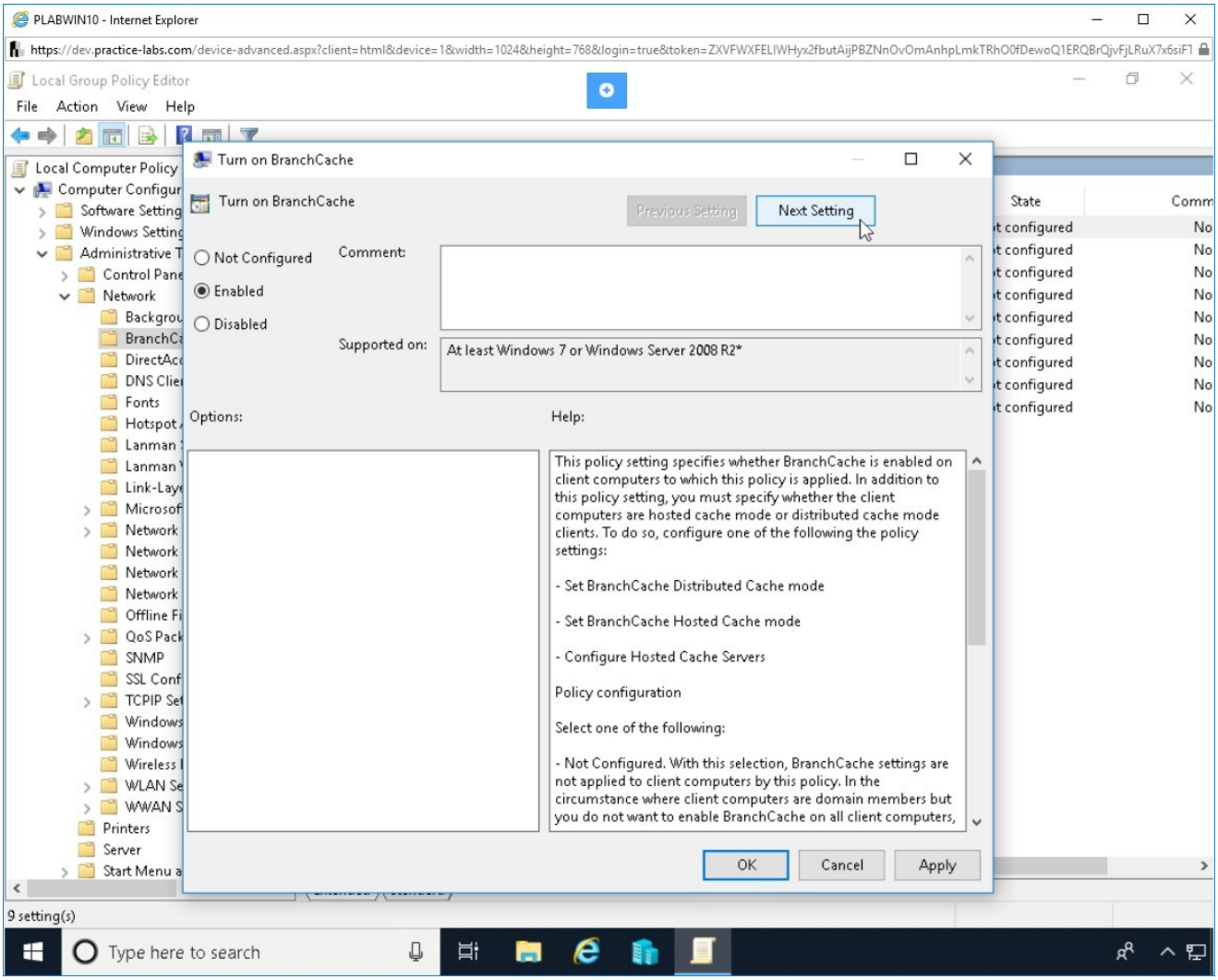


Figure 2.22 Screenshot of PLABWIN10: Enabling a policy in the Local Group Policy Editor.

Step 5

For the **Set BranchCache Distributed Cache mode** policy, select **Enabled** and click **Next Setting**.

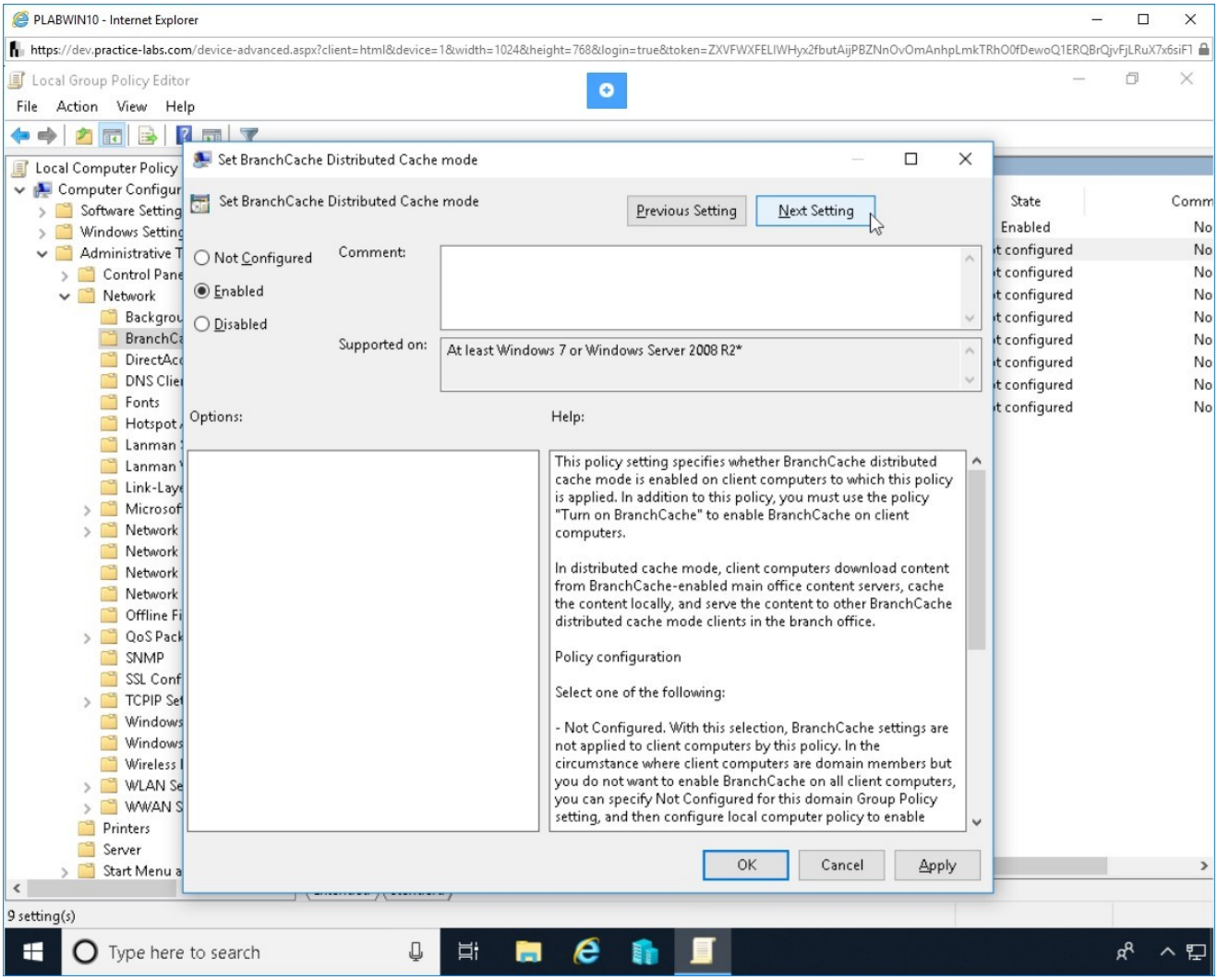


Figure 2.23 Screenshot of PLABWIN10: Enabling a policy in the Local Group Policy Editor.

Step 6

For the **Set BranchCache Hosted Cached Mode** policy, select **Disabled** and click **Next Setting**.

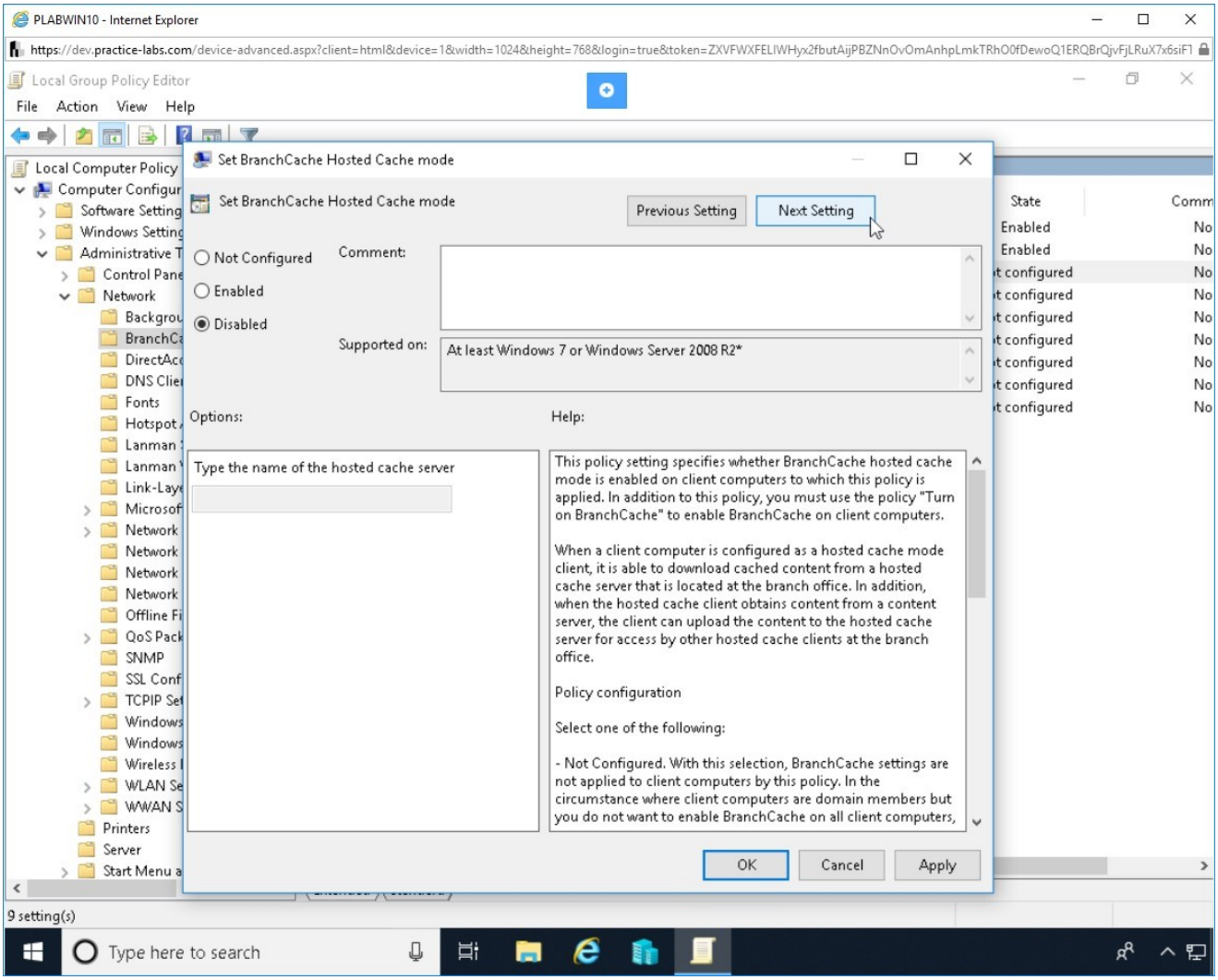


Figure 2.24 Screenshot of PLABWIN10: Disabling a policy in the Local Group Policy Editor.

Step 7

For the **Enable Automatic Hosted Cache Discovery by Service Connection Point** policy, select **Disabled** and click **Next Setting**.

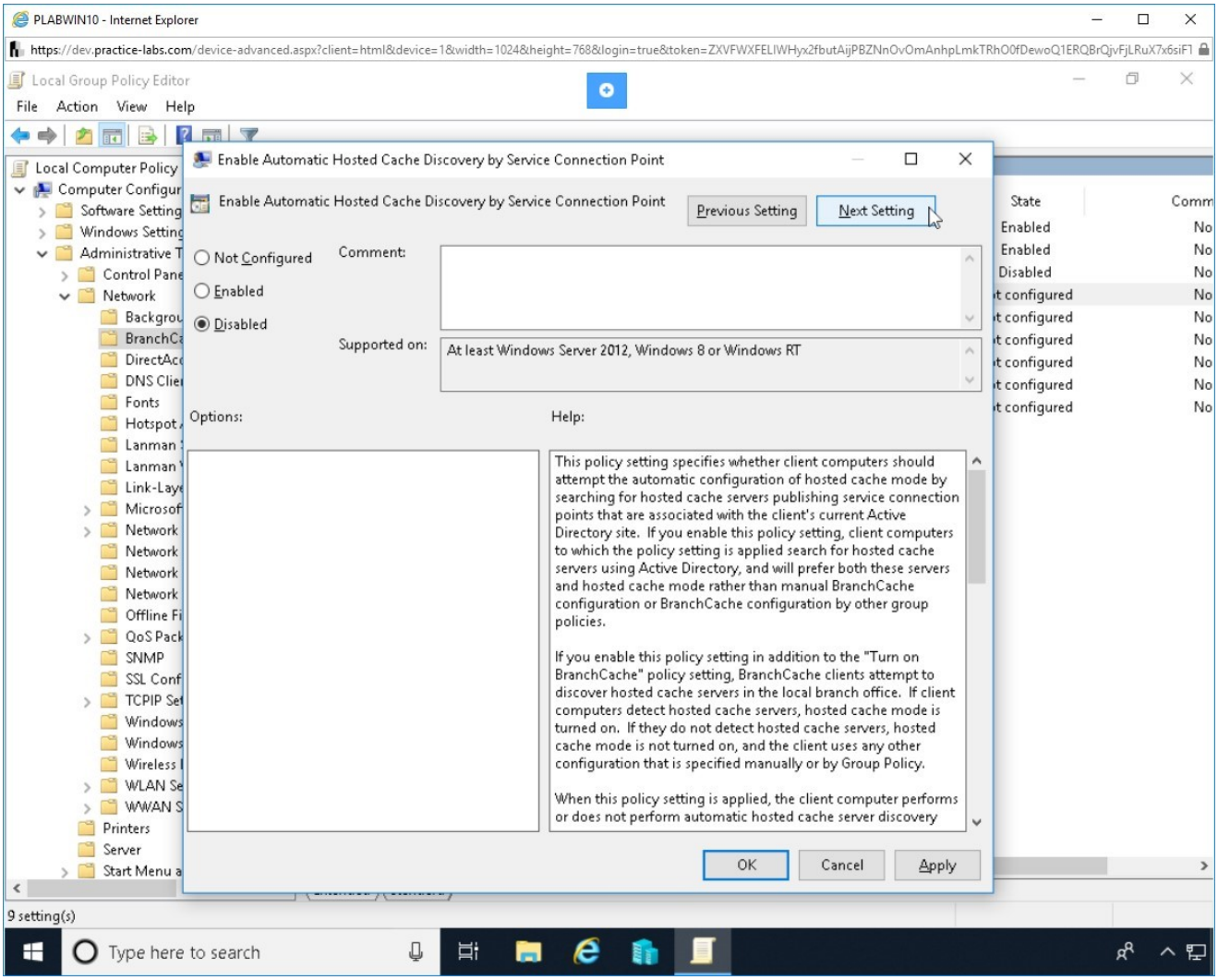


Figure 2.25 Screenshot of PLABWIN10: Disabling a policy in the Local Group Policy Editor.

Step 8

For the **Configure Hosted Cache Servers** policy, select **Disabled** and click **Next Setting**.

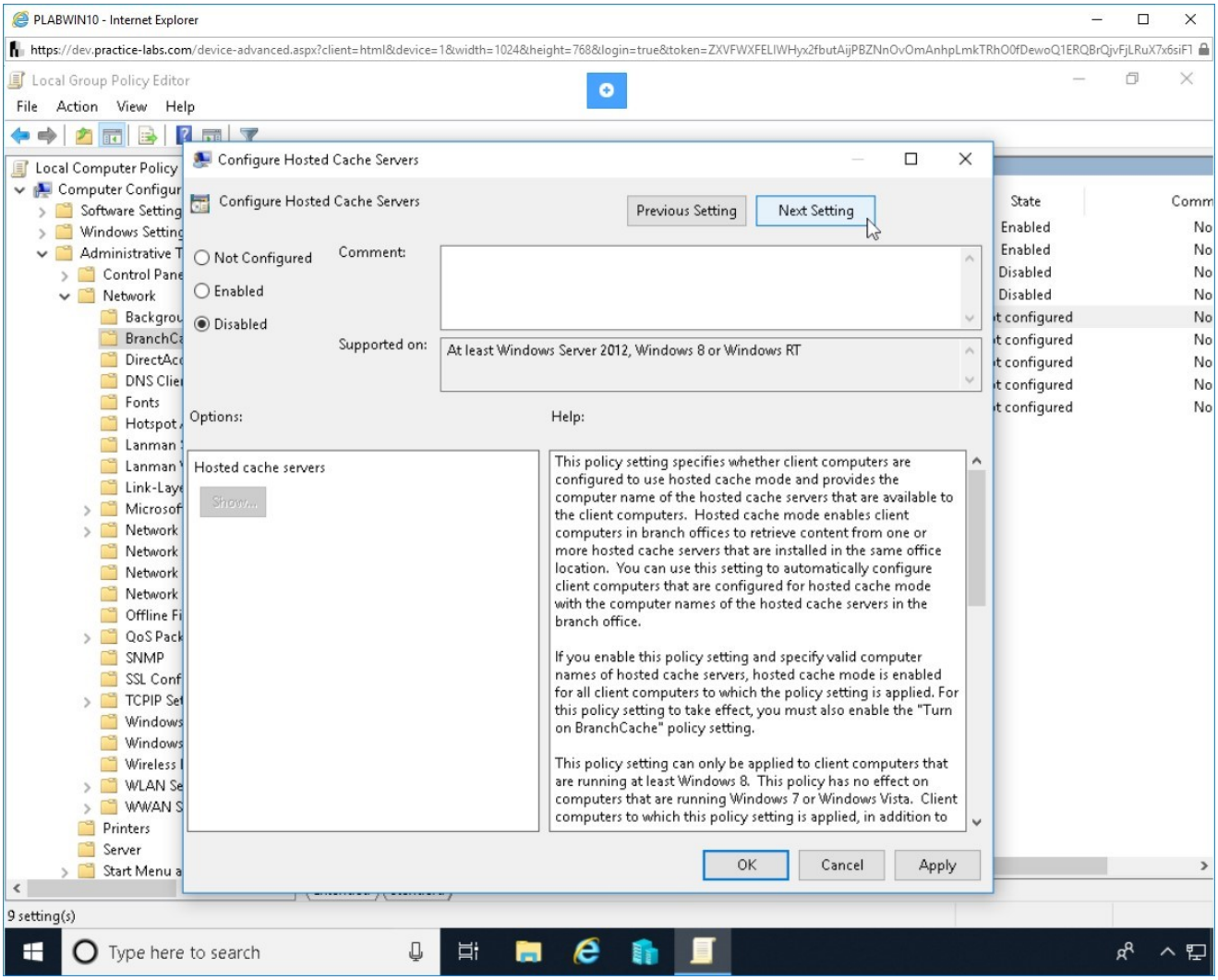


Figure 2.26 Screenshot of PLABWIN10: Disabling a policy in the Local Group Policy Editor.

Step 9

For the **Configure BranchCache for network files** policy, is displayed select **Enabled**.

Observe that default time in milliseconds is mentioned as 80.

Click **Next Setting**.

Click **Next Setting**.

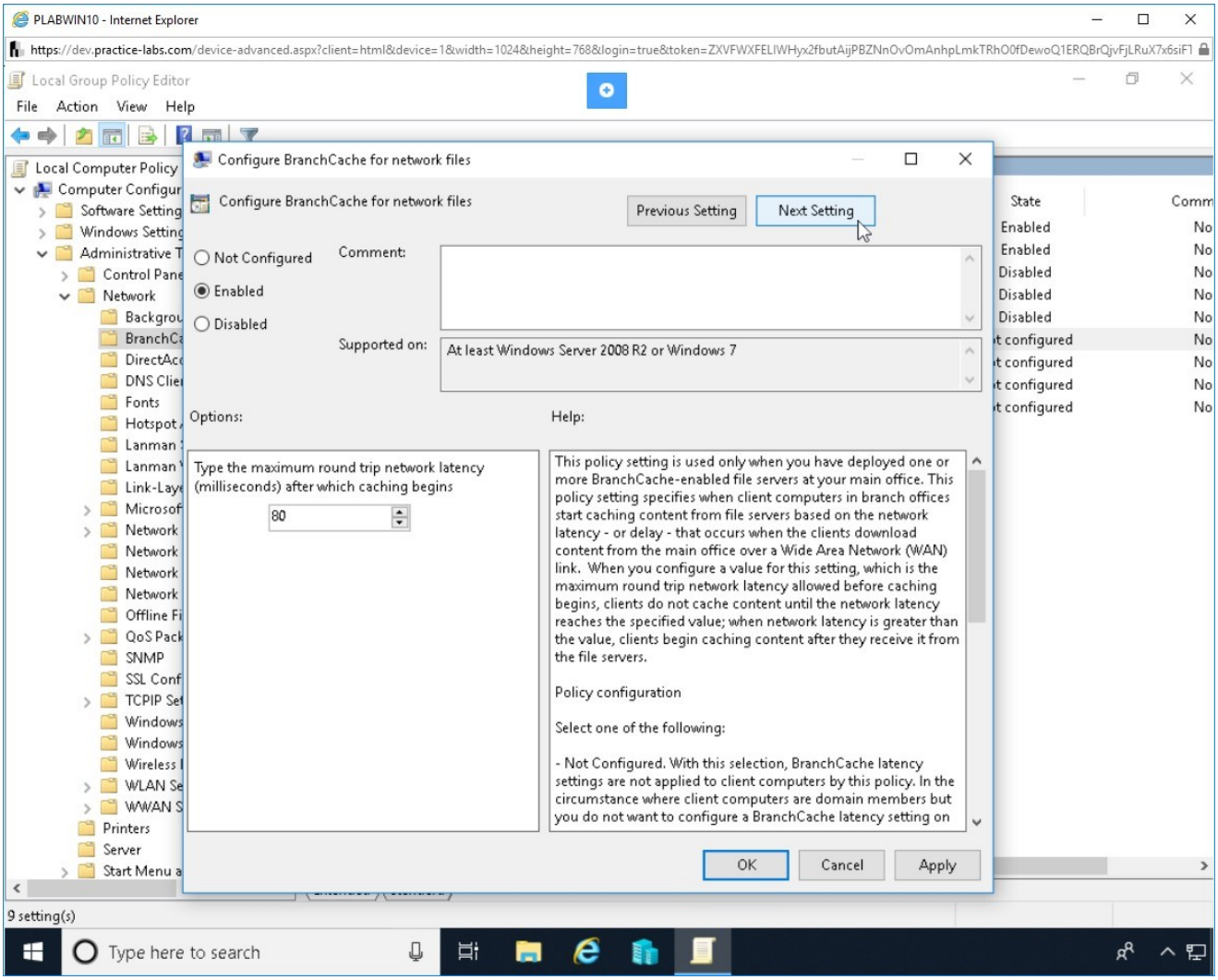


Figure 2.27 Screenshot of PLABWIN10: Enabling a policy in the Local Group Policy Editor.

Step 10

For the **Set the percentage of disk space used for client computer cache** policy, select **Enabled**. Observe that the default disk space size is set to 5 percent.

Then, click **Next Setting**.

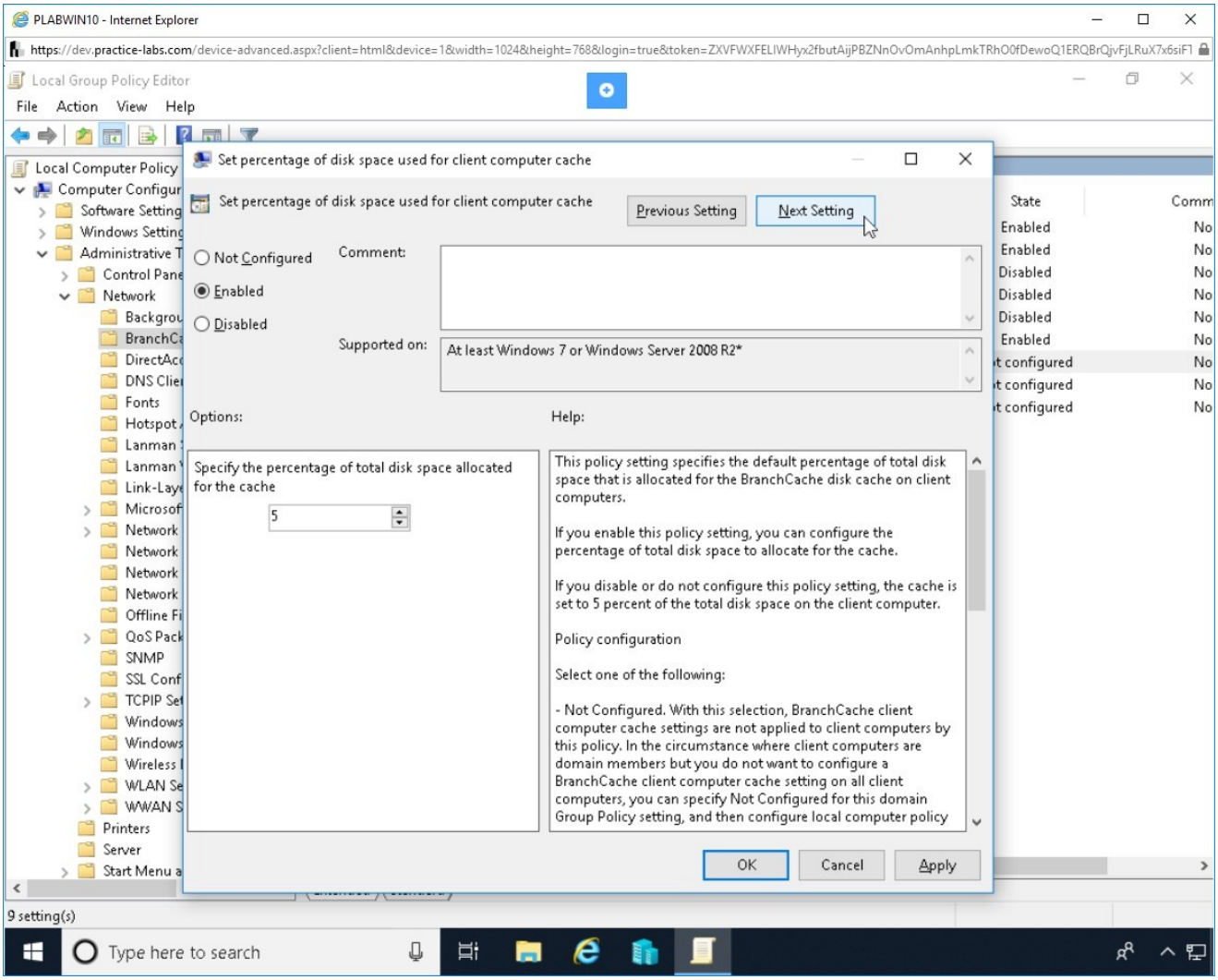


Figure 2.28 Screenshot of PLABWIN10: Enabling a policy in the Local Group Policy Editor.

Step 11

For the **Set age for segments in the data cache** policy, select **Enabled**.

Then, click **Next Setting**.

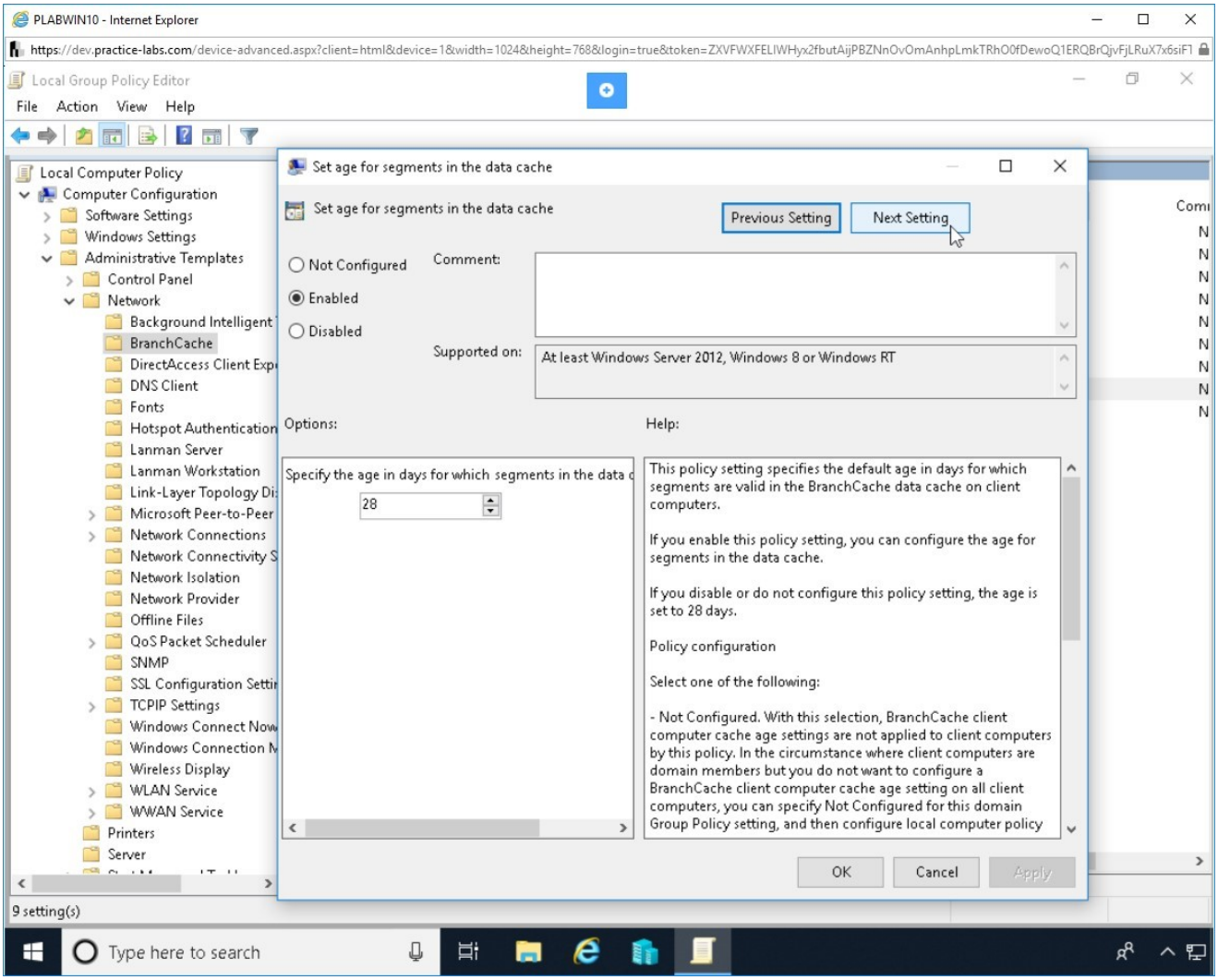


Figure 2.29 Screenshot of PLABWIN10: Enabling a policy in the Local Group Policy Editor.

Step 12

For the **Configure Client BranchCache Version Support** policy, select **Enabled**.

Below the **Select from the following versions** box, click on "**Windows Vista with BITS 4.0**..." select **Windows 8** from the drop-down list.

Then, click **OK**.

BranchCache setup is completed.

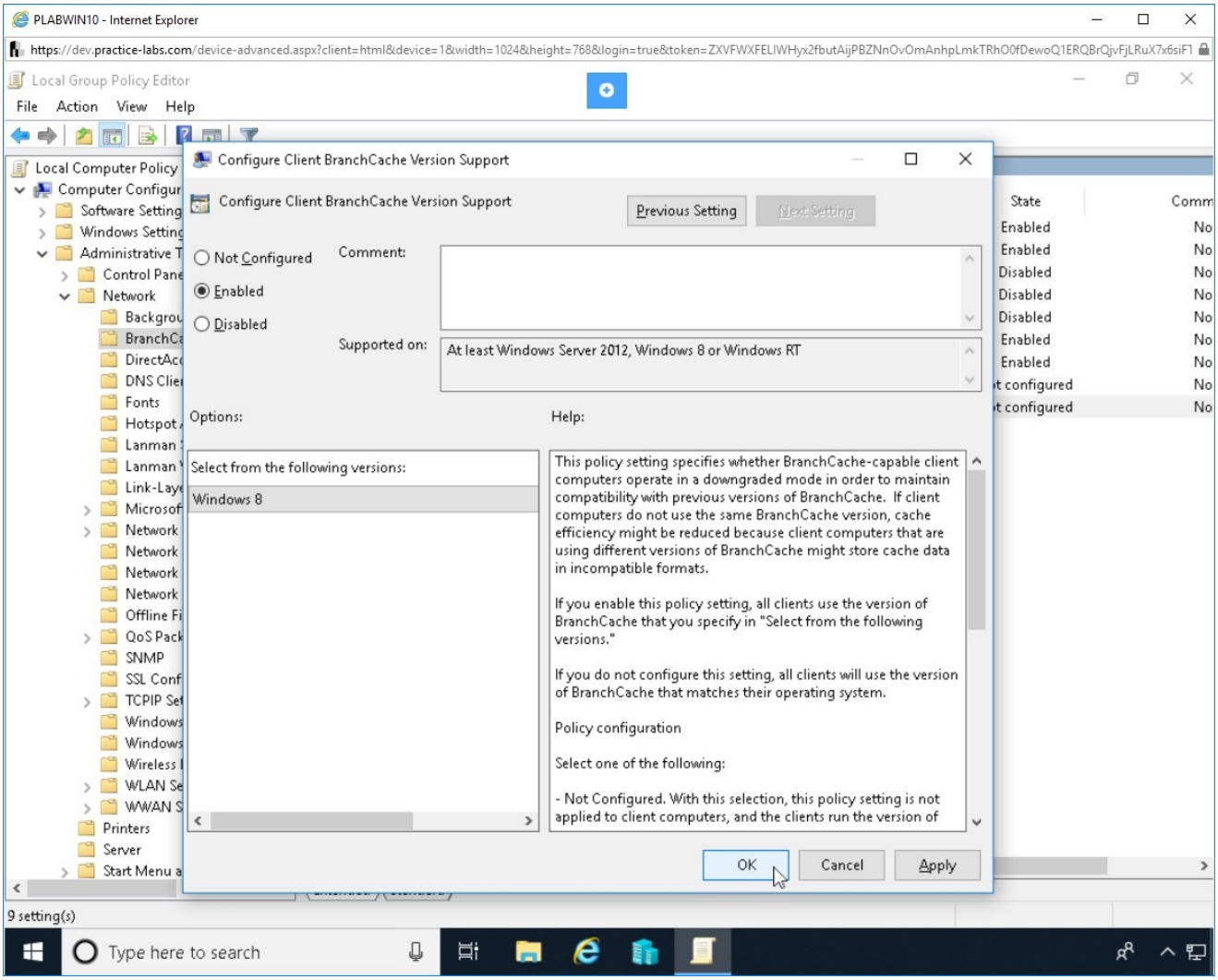


Figure 2.30 Screenshot of PLABWIN10: Enabling a policy in the Local Group Policy Editor.

Step 13

You are back on the **Local Group Policy Editor** window.

Close all open windows.

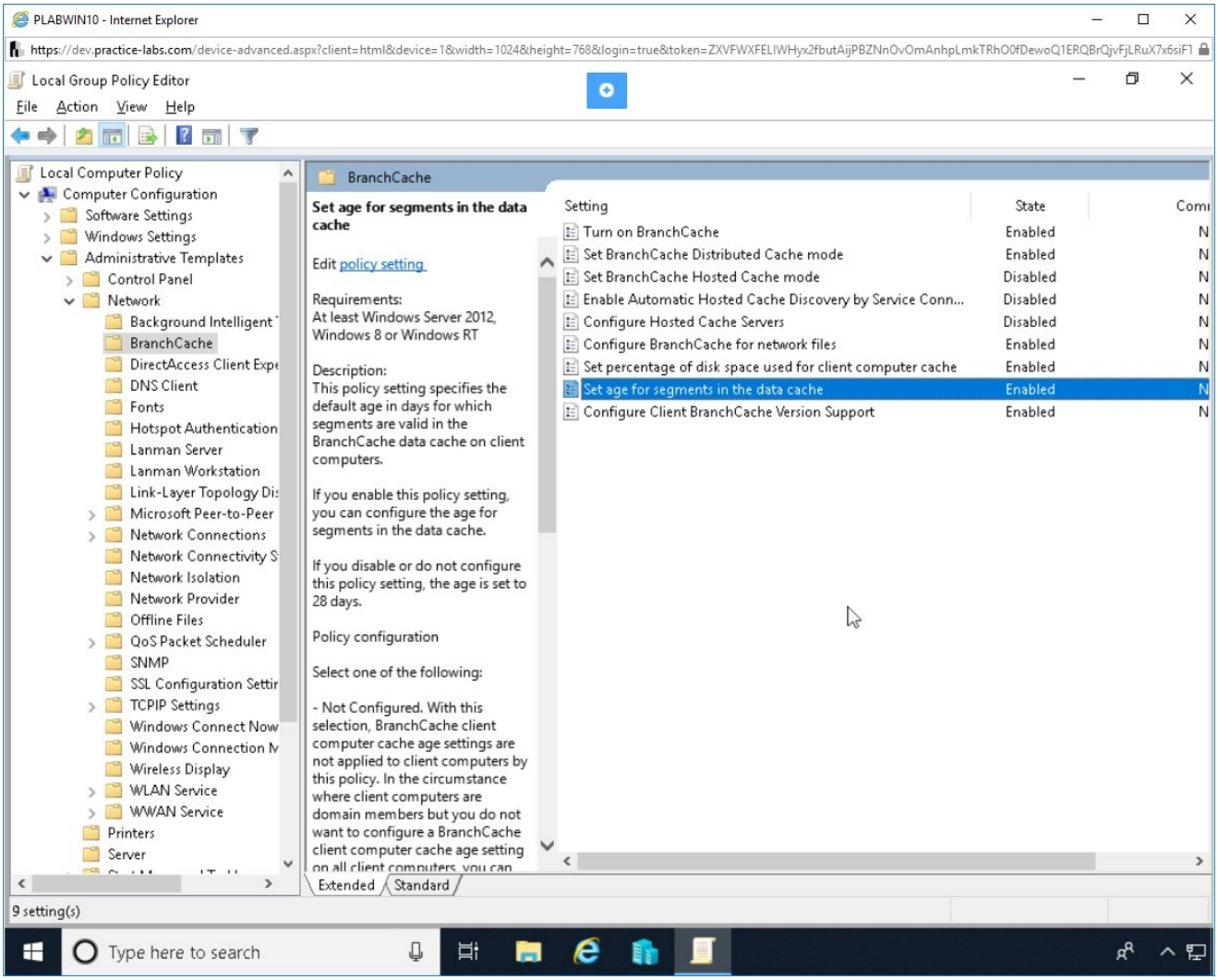


Figure 2.31 Screenshot of PLABWIN10: Showing the Enabled and Disabled policies.

Task 4 - Configuring the Encrypting File System (EFS)

EFS stands for Encrypting File System. EFS secures file data by encrypting, which ensures that the confidentiality of the information stored inside the files is maintained even if someone gets hold of the files.

Encryption is the process of converting information/data in the codified format to ensure its integrity. EFS is present in most of the recent versions of the Windows operating system. When a file is encrypted using EFS, its information and data inside the file gets encrypted.

In this task, you will configure EFS.

Step 1

Connect to **PLABWIN10**.

Right-click on the desktop and select **New** and then select **Folder** from the context menu.

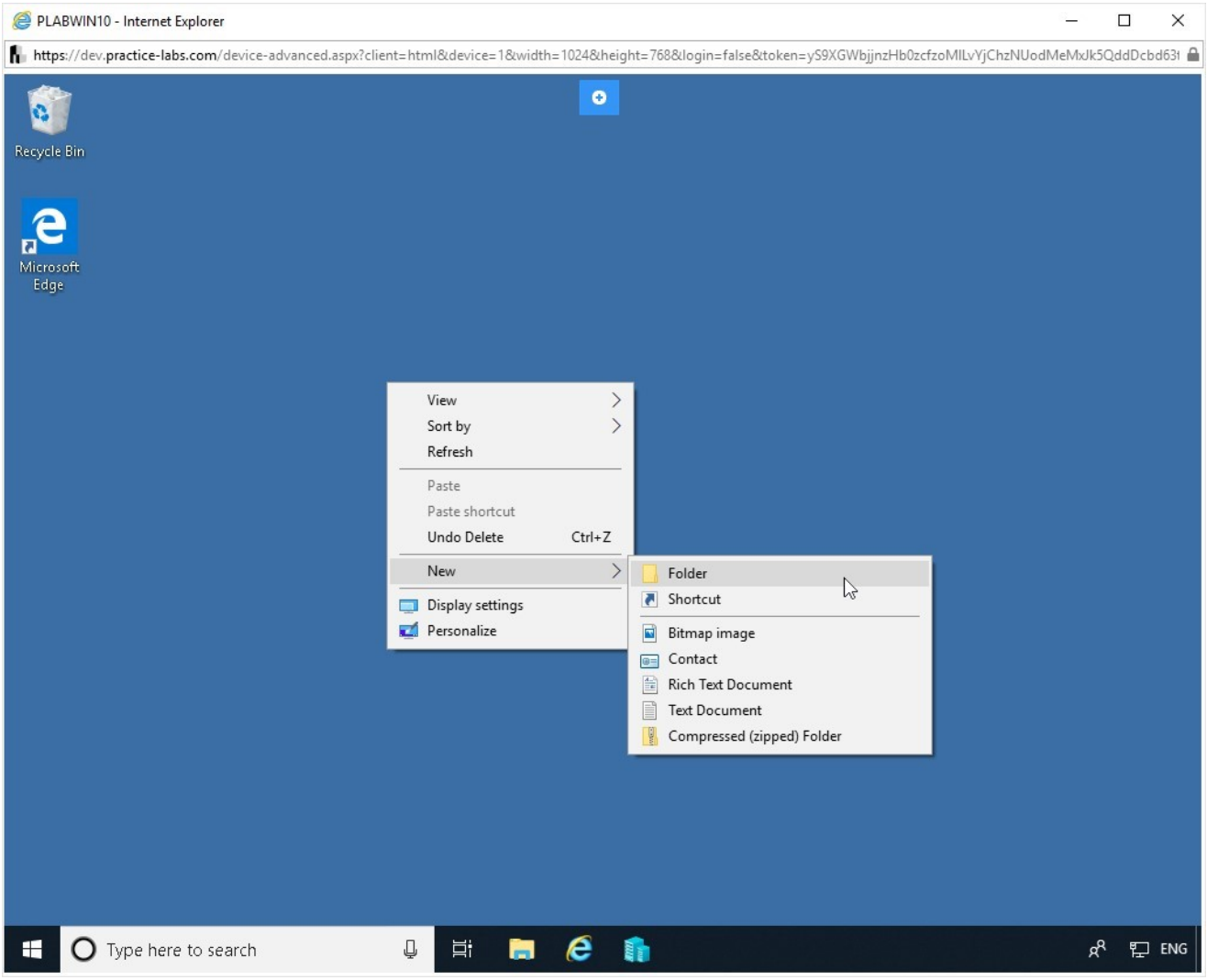


Figure 2.32 Screenshot of PLABWIN10: Right-clicking on the desktop and selecting New > Folder option from the context menu.

Step 2

Right-click the **New Folder** and select **Properties**.

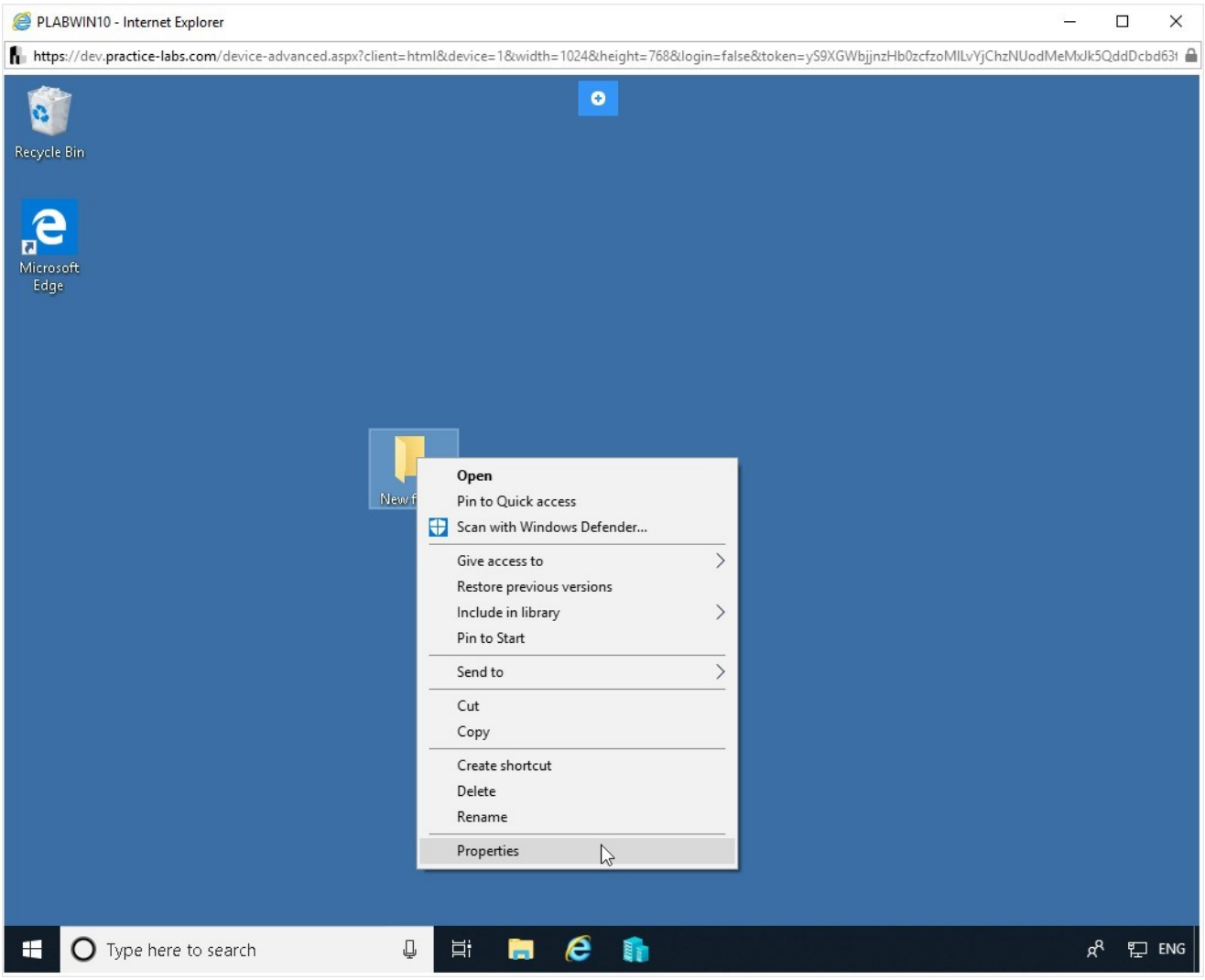


Figure 2.33 Screenshot of PLABWIN10: Right-clicking the folder and selecting Properties from its context menu.

Step 3

The **New Folder Properties** dialog box is displayed.

Click **Advanced** found on the **General** tab.

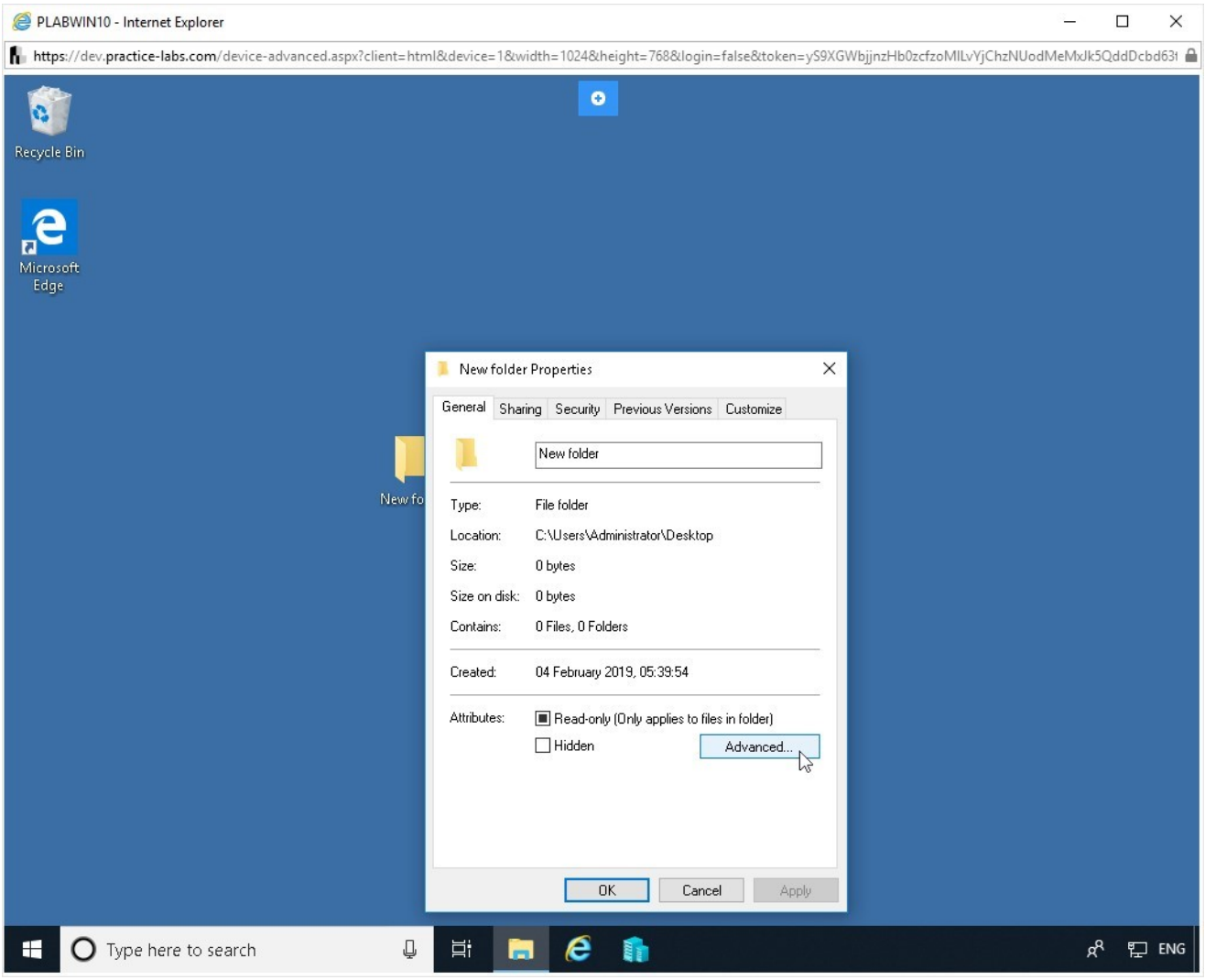


Figure 2.34 Screenshot of PLABWIN10: Clicking the Advanced button on the General tab.

Step 4

Tick the **Encrypt contents to secure data label** checkbox.

Click **OK**.

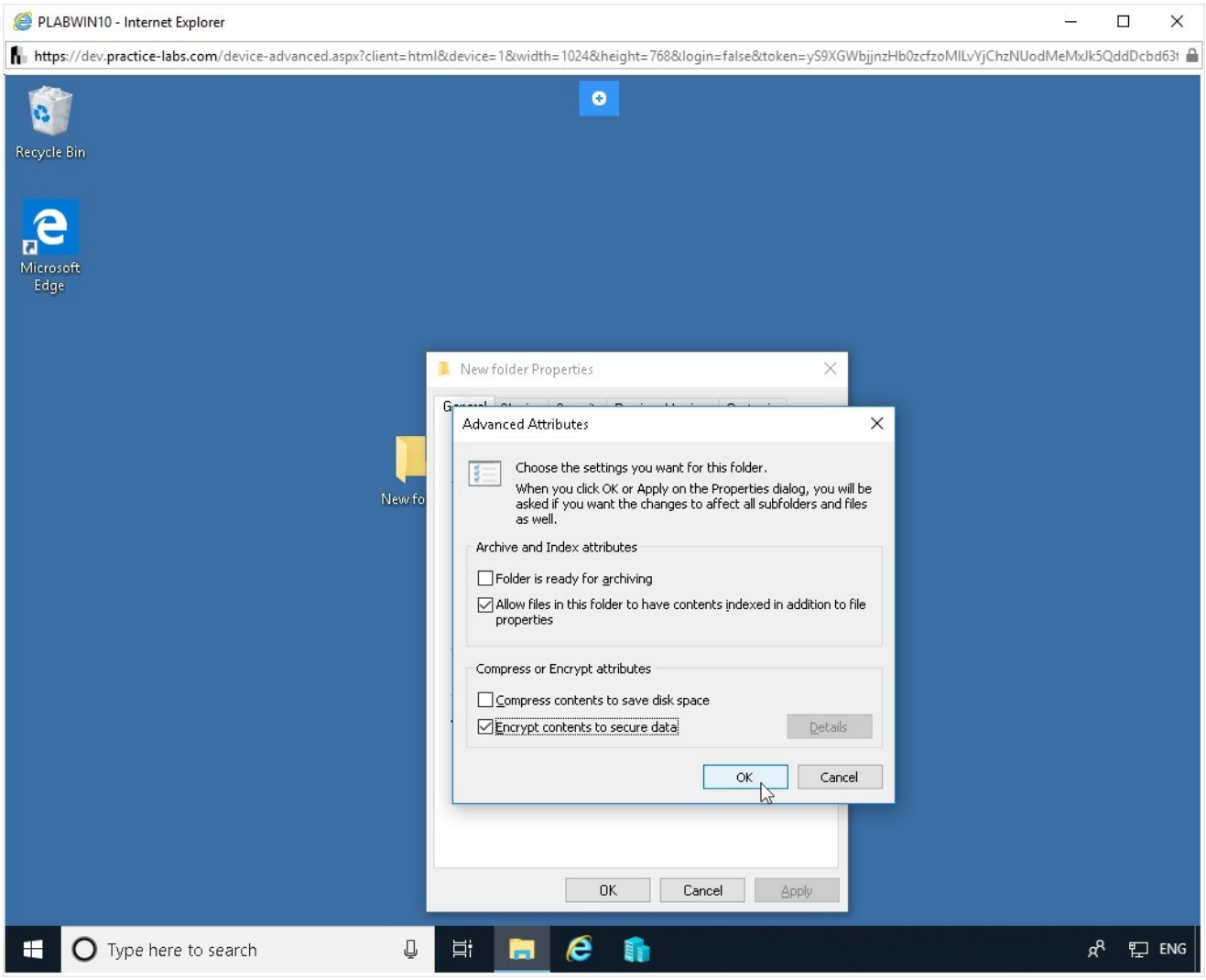


Figure 2.35 Screenshot of PLABWIN10: Enabling encryption on the Advanced Attributes dialog box.

Step 5

You are back on the **New Folder Properties** dialog box.

Click **OK**.

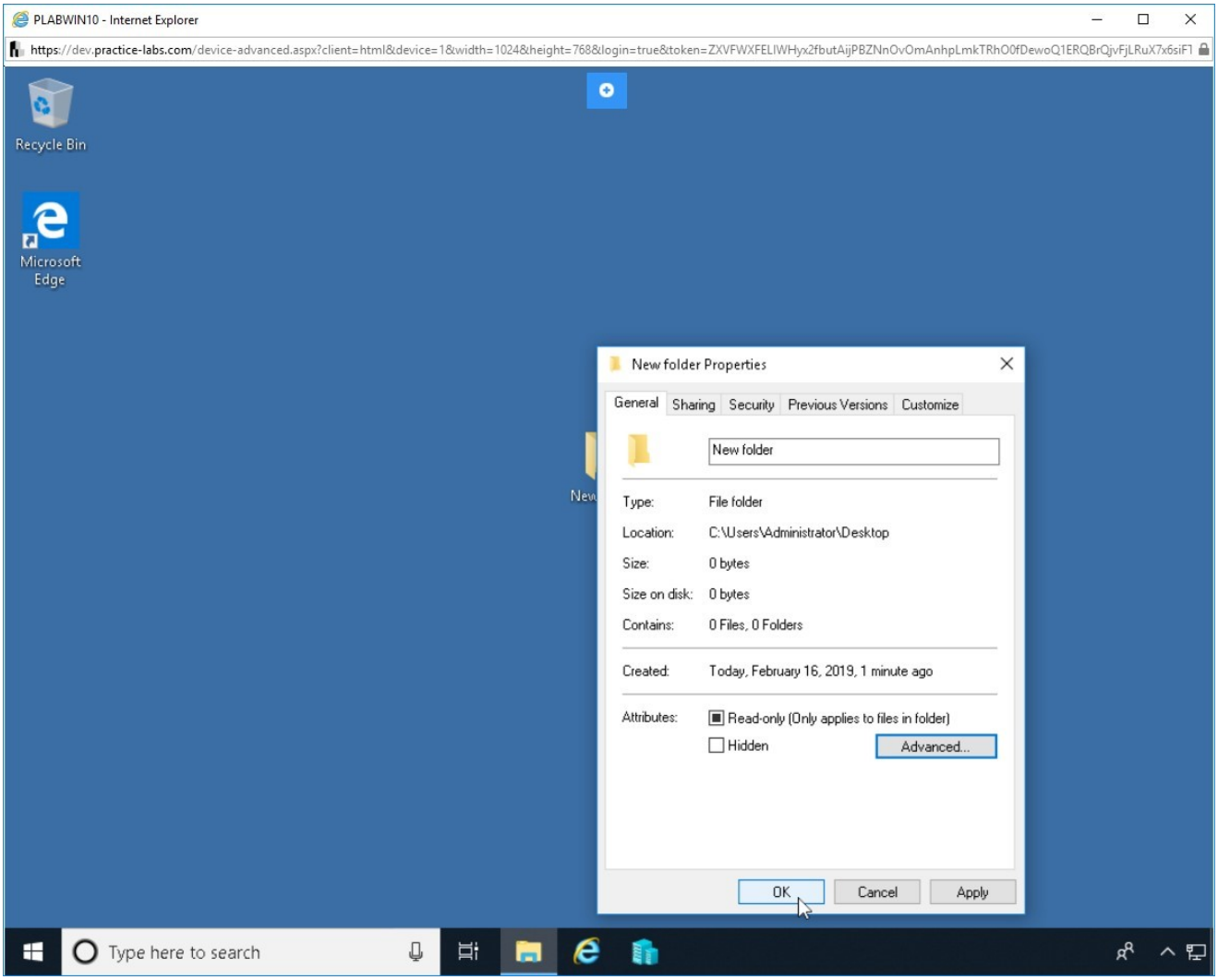


Figure 2.36 Screenshot of PLABWIN10: Clicking OK on the folder properties dialog box.

Click **OK**.

> ***Note**: You do not require this folder in this lab. Delete the folder by pressing the **Shift + Delete keys.** When prompted to confirm, click **Yes**.*

Leave the devices you have powered on in their current state and proceed to the next exercise.

Exercise 3 - Change Desktop Styles/User Interfaces

Different operating systems provide different kinds of displays and user interfaces. These user interfaces can be customized.

Unlike Linux, which is open source, Windows does not offer a great deal of customization. You can make cosmetic changes, but they are limited to color, wallpaper, etc. Linux, on the other hand, you can make plenty of changes, including the look, feel, and functionality.

For example, Windows 7 was similar to Vista, but there were several new improvements, such as performance. Bugs and user interface-related issues present in Windows Vista were fixed in Windows 7.

In this exercise, you will learn to change desktop styles and user interfaces.

Learning Outcomes

After completing this exercise, you will be able to:

- Change Interface Settings in PLABWIN10

Your Devices

You will be using the following devices in this lab. Please power-on the device now.

- **PLABWIN10 -** (Windows 10 - Domain Member)

Task 1 - Change Interface Settings in PLABWIN10

In this task, you will change the interface settings.

Step 1

Connect to **PLABWIN10**.

In the **Type here to search text** box, type the following command:

```
Settings
```

Select **Settings** from the search results.

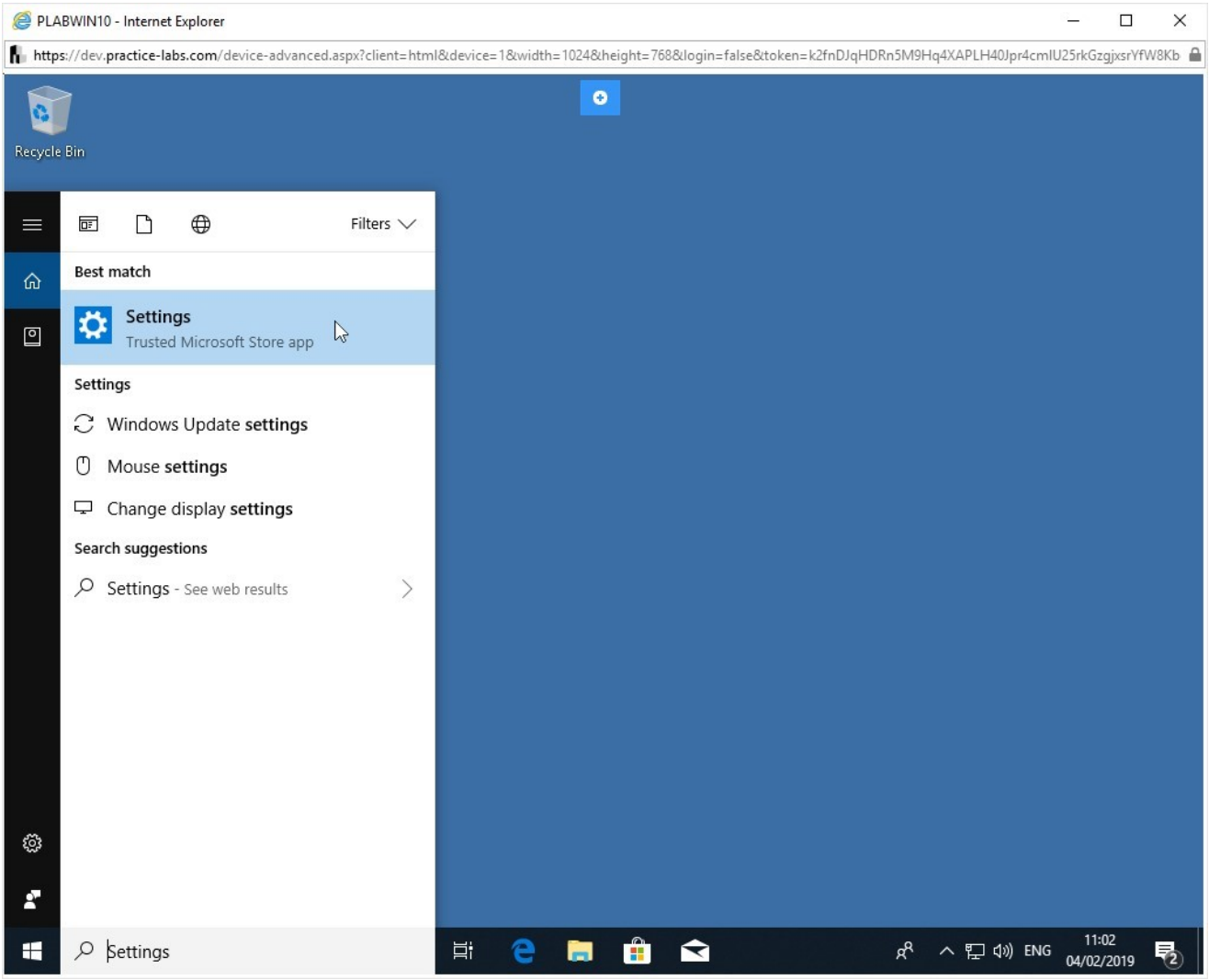


Figure 3.1 Screenshot of PLABWIN10: Selecting Settings from the search results.

Step 2

The **Windows Settings** window is displayed.

Click **Personalization**.

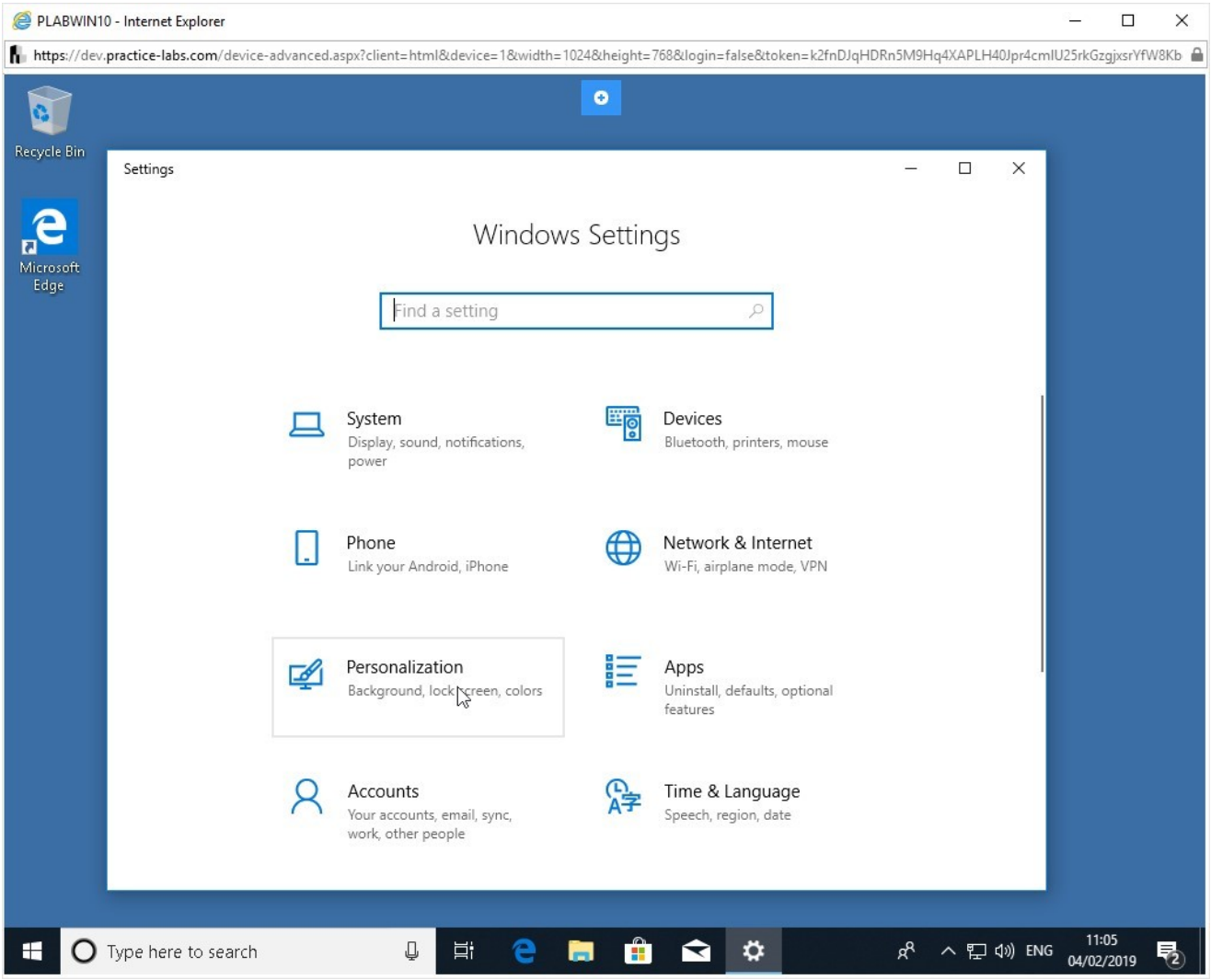


Figure 3.2 Screenshot of PLABWIN10: Clicking Personalization in the Windows Settings window.

Step 3

From the left pane, click **Colors**.

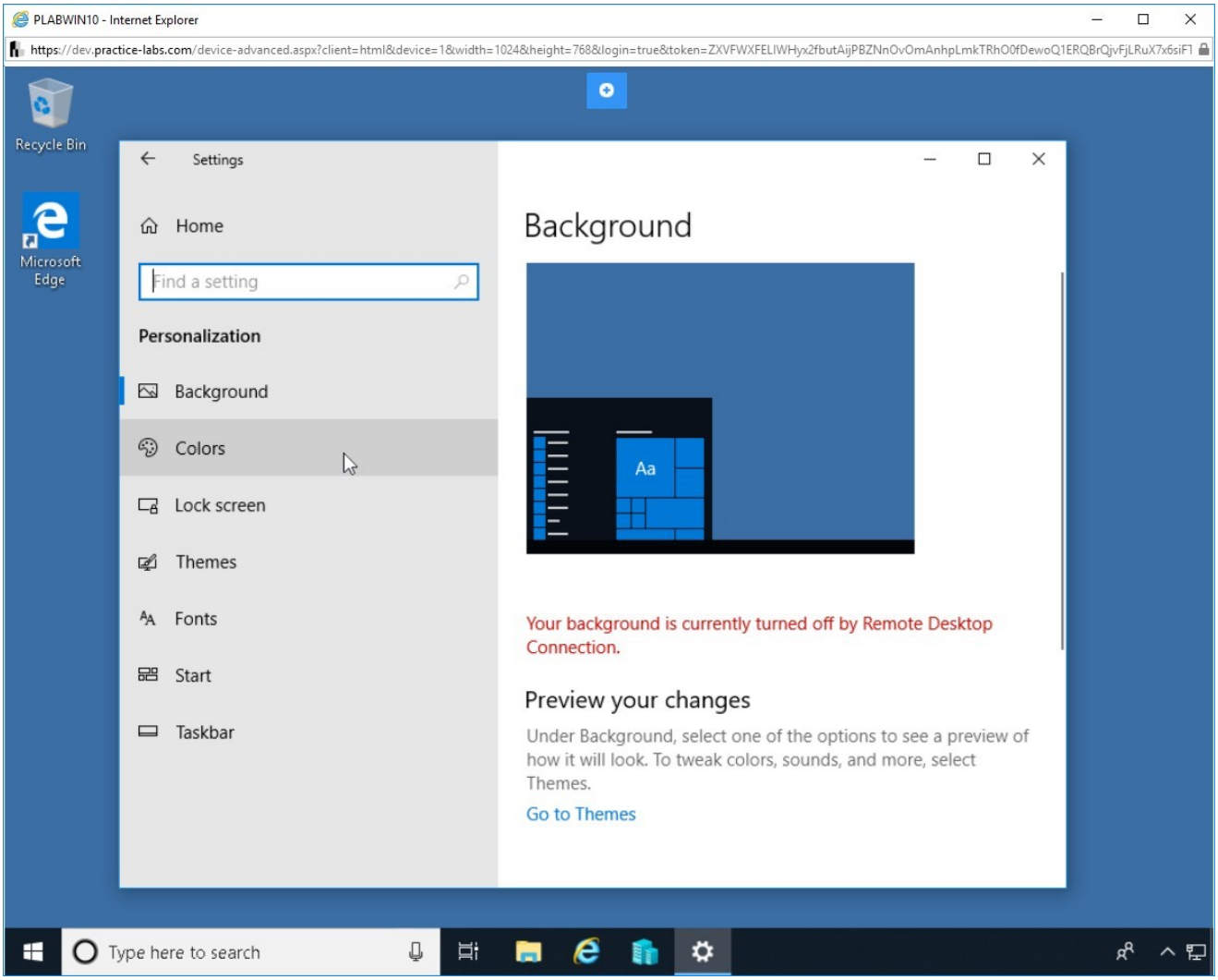


Figure 3.3 Screenshot of PLABWIN10: Clicking Colors in the left pane.

Step 4

Click the first color in the **Recent Colors** section.

Notice that the top picture menu now displays a preview of the selected color.

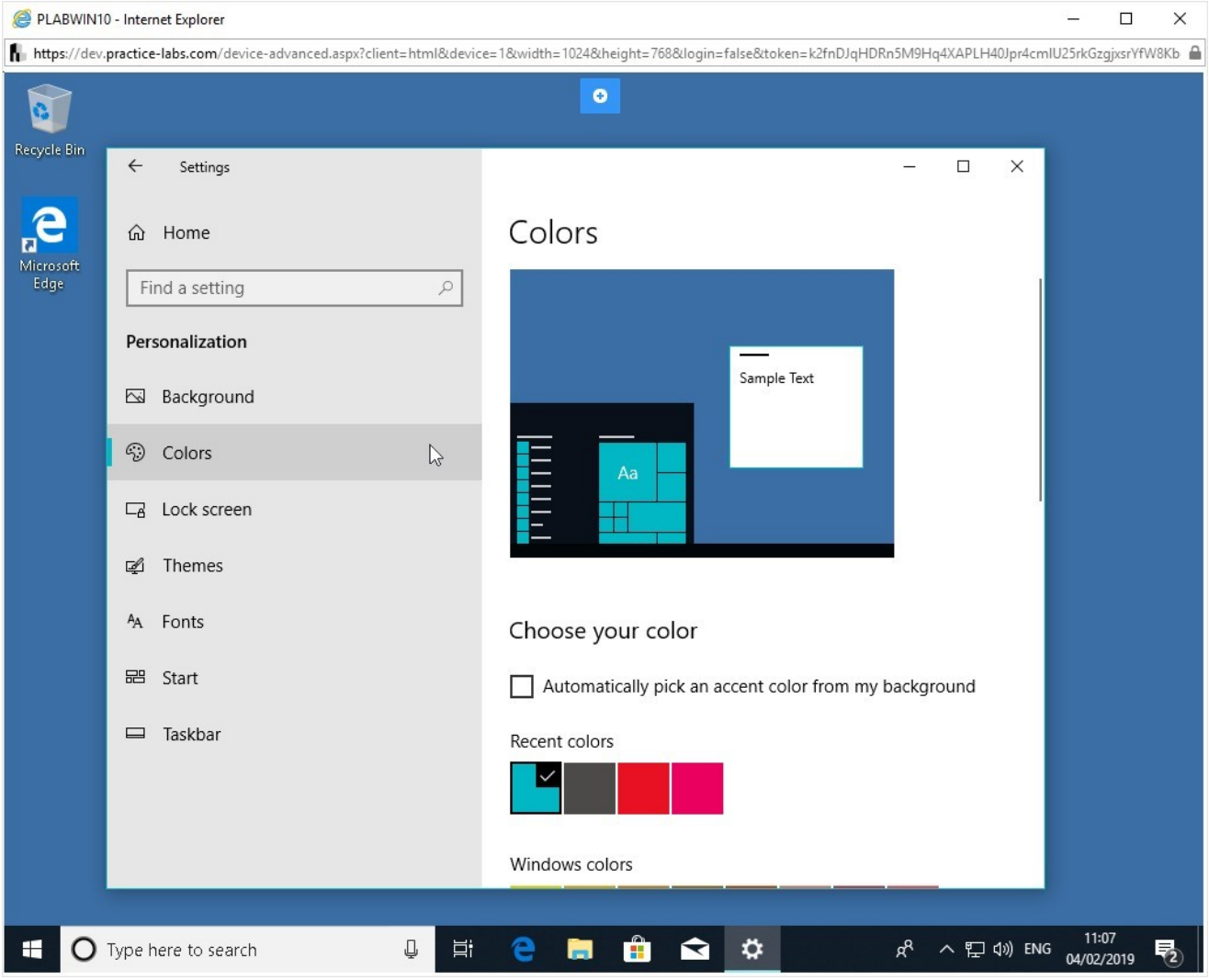


Figure 3.4 Screenshot of PLABWIN10: Selecting a color in the right pane.

Step 5

In the left pane, click **Lock screen**.

Select the **Picture** option from the **Background** drop-down.

The image above the background title shows how the lock screen would look like if the selected picture were set as a lock screen.

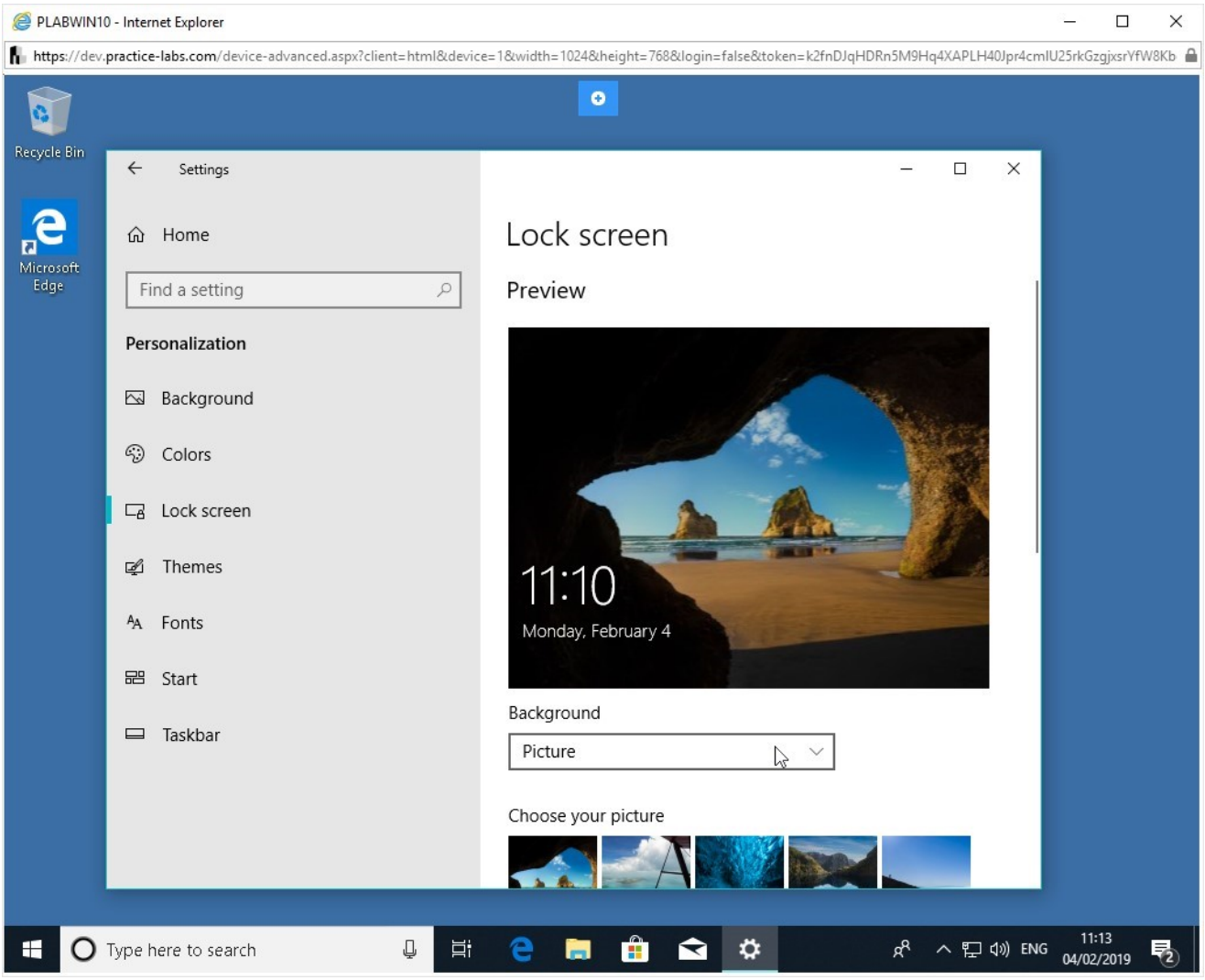


Figure 3.5 Screenshot of PLABWIN10: Showing the Lock Screen settings.

Step 6

In the left pane, click **Taskbar**.

Notice various properties for the taskbar are available.

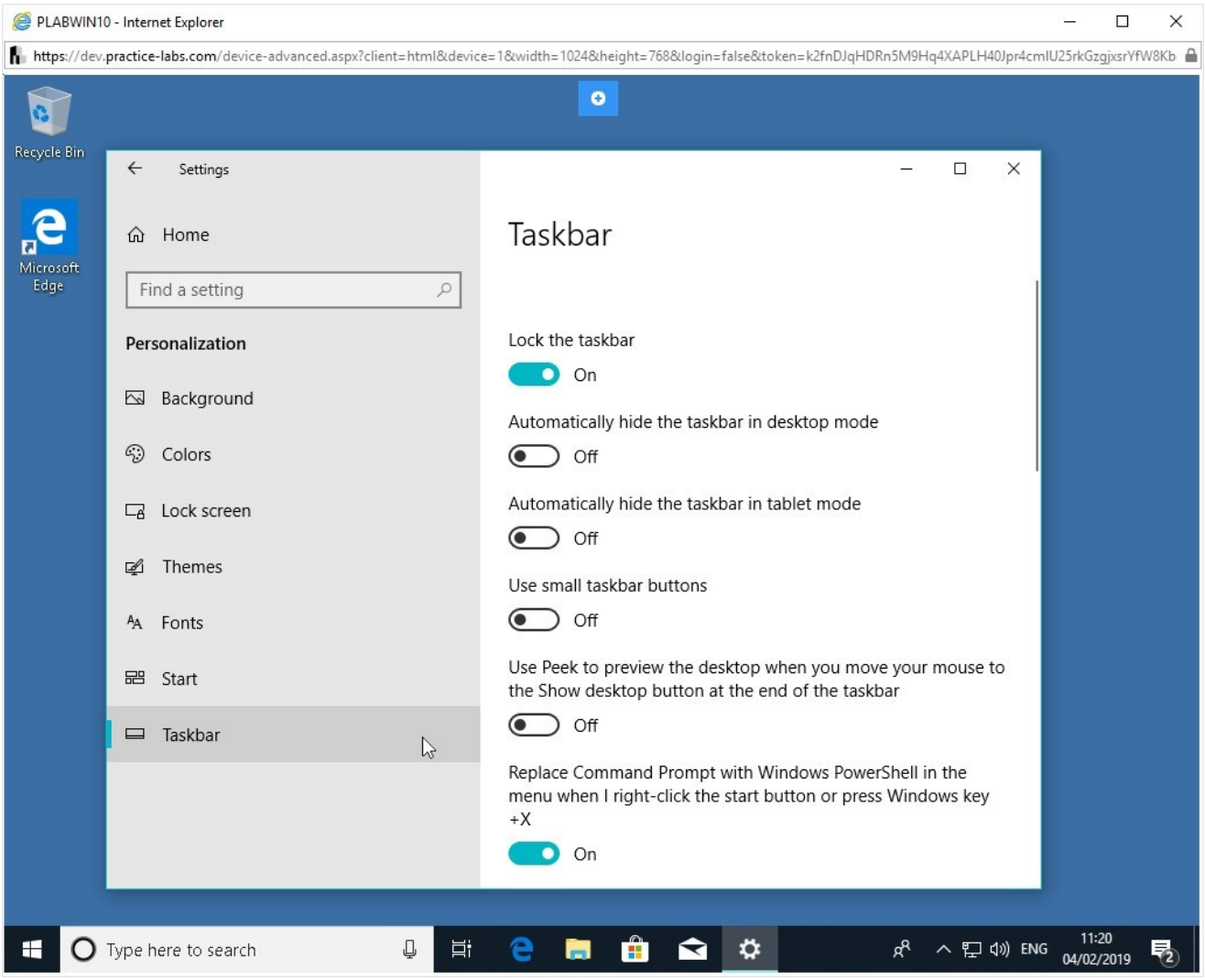


Figure 3.6 Screenshot of PLABWIN10: Configuring the Taskbar page.

Step 7

Observe then **close** the window.

Exercise 4 - Comparison of 32-bit and 64-bit Operating Systems

32-bit operating systems were used until approximately 2009, and since then, 64-bit operating systems have been widely used in personal computers.

The 64-bit operating systems became more popular because of their ability to handle a higher amount of memory. Applications are becoming bigger and are requiring more

memory.

The 32-bit operating systems cannot handle the memory requirements of these applications. Therefore, the usage of 64-bit operating systems increased.

In this exercise, you will learn to learn about the differences between a 32-bit and 64-bit operating system.

Learning Outcomes

After completing this exercise, you will be able to:

- Know the Key Differences between 32-bit and 64-bit Operating Systems
- Verify a 64-bit Operating System

Your Devices

You will be using the following device in this lab. Please power this on now.

- **PLABWIN10 -** (Windows 10 - Domain Member)

Know the Key Differences between 32-bit and 64-bit Operating Systems

The main difference between 32-bit and 64-bit operating systems is support for a specific type of processor. A 32-bit operating system will work with the 32-bit processor. It can also work with the 64-bit processor, but the RAM limitations will still be 4 GB. A 64-bit operating system will work only with the 64-bit processor.

RAM Limitations

When it comes to accessing RAM (random-access memory), the number of bits in the operating system (OS) plays a crucial part. Essentially, the higher the number of bits, the larger the amount of RAM that can be handled effectively.

Also, having a higher number of bits in the OS means that a higher quantity of locations can be accessible at one time. For example, with a 32-bit operating system, it is possible to access 2^32 bytes of byte-addressable memory at a time, which is 4GB of memory.

In comparison, a 64-bit operating system can access 2^64 bytes of byte-addressable memory at a time, which is 16 exabytes of memory. So, if a machine has up to 4GB of RAM, a 32-bit OS is sufficient. However, if a machine has more than 4GB of RAM, a 64-bit OS is a better choice to utilize the memory fully. A 32-bit OS will not be able to utilize the machine's more than 4 GB of RAM, and therefore, it will limit the machine's performance.

Software compatibility

A 32-bit operating system can run only the programs that are written with the 32-bit instruction set. A 32-bit program that can run on a 32-bit OS will also run on the 64-bit OS. However, some exceptions include a few software programs which are designed specifically for 32-bit operating systems.

On the other hand, a program made for a 64-bit OS will not function smoothly on a 32-bit OS. Another reason for a lack of compatibility is that some of the applications instruction set could be larger than 32-bit in size. This would mean that those instructions cannot be executed at all.

Key Architectural Differences

Virtual Memory:

- 64-bit: 16 terabytes
- 32-bit: 4 GB

Paging File:

- 64-bit: 512 terabytes
- 32-bit: 16 terabytes

Paged Pool:

- 64-bit: 128 GB
- 32-bit: 470 MB

Non-paged Pool:

- 64-bit: 128 GB
- 32-bit: 256 MB

System Cache:

- 64-bit: 1 terabyte
- 32-bit: 1 GB

Task 1 - Verify a 64-bit Operating System

Each operating system has to be either a 32-bit or 64-bit operating system. Nowadays, most operating systems are 64-bit.

In this task, you will learn to verify a 64-bit operating system.

Step 1

Ensure you are connected to **PLABWIN10**.

Click the **File Explorer** icon on the taskbar.

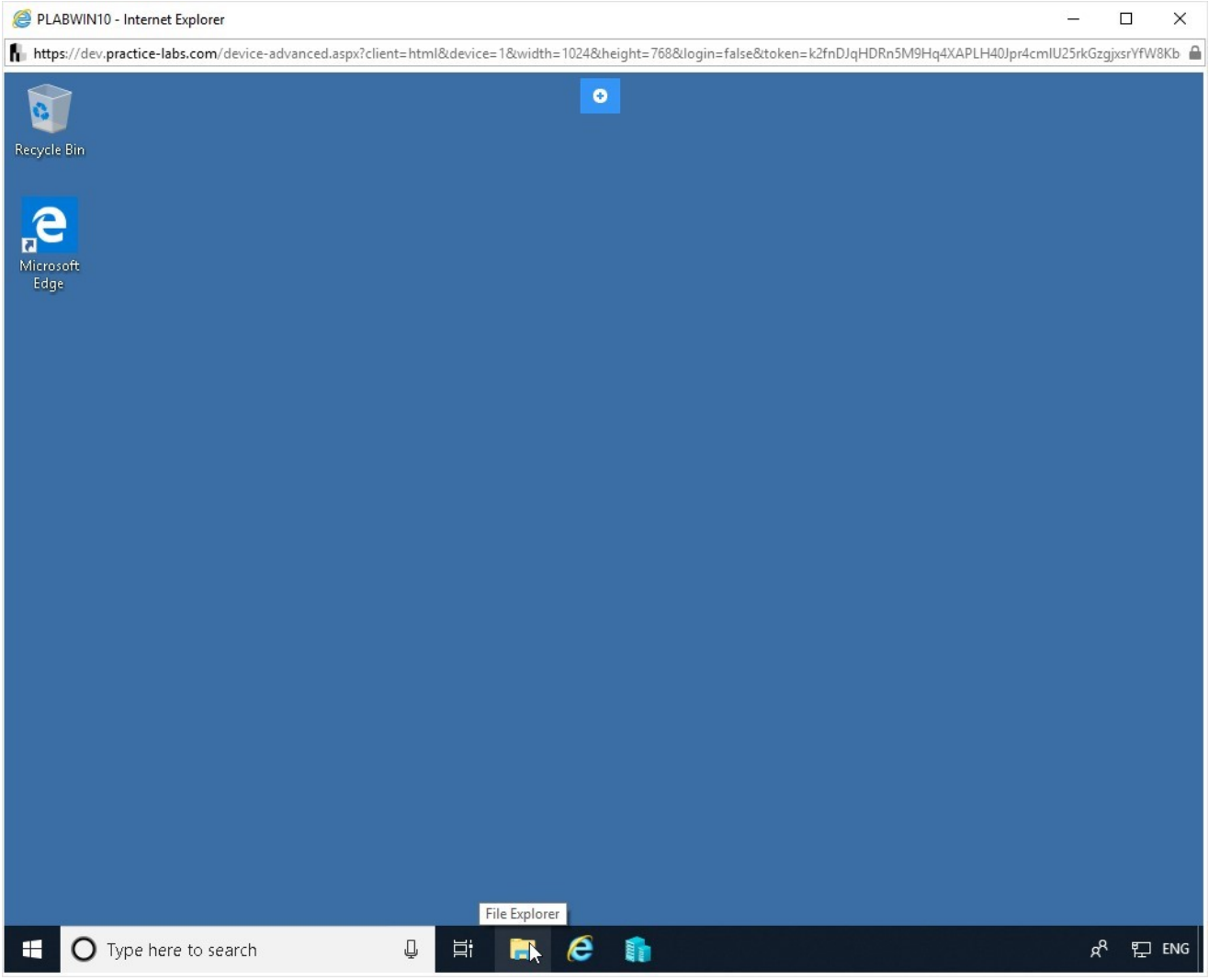


Figure 4.1 Screenshot of PLABWIN10: Clicking the File Explorer from the taskbar.

Step 2

You are back on the **File Explorer** window.

Right-click **This PC** in the left pane and select **Properties**.

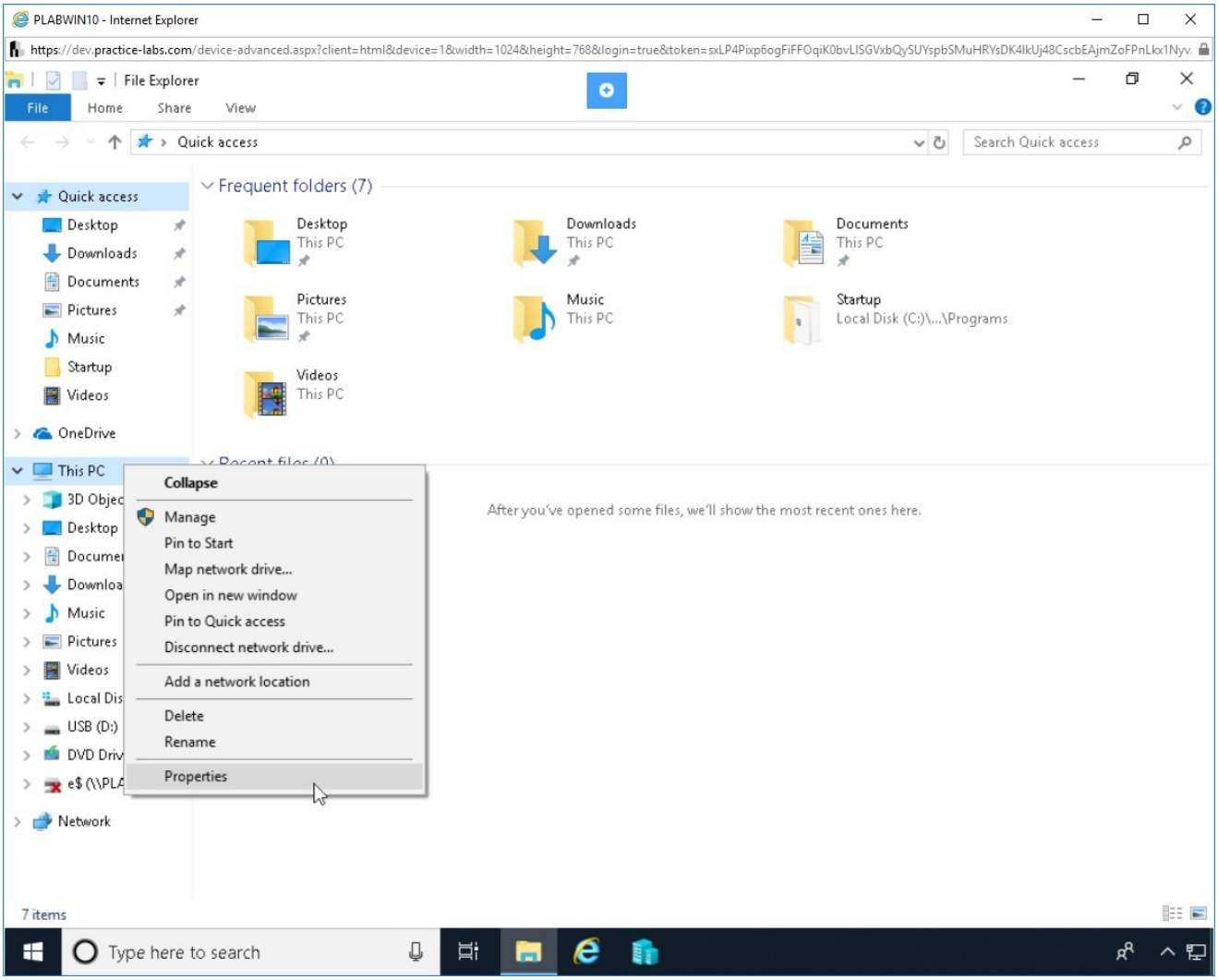


Figure 4.2 Screenshot of PLABWIN10: Right-click This PC and select Properties from the context menu.

Step 3

The **View basic information about your computer** page is displayed.

In the **System** section in the right pane, notice that **System type** mentions **64-bit**.

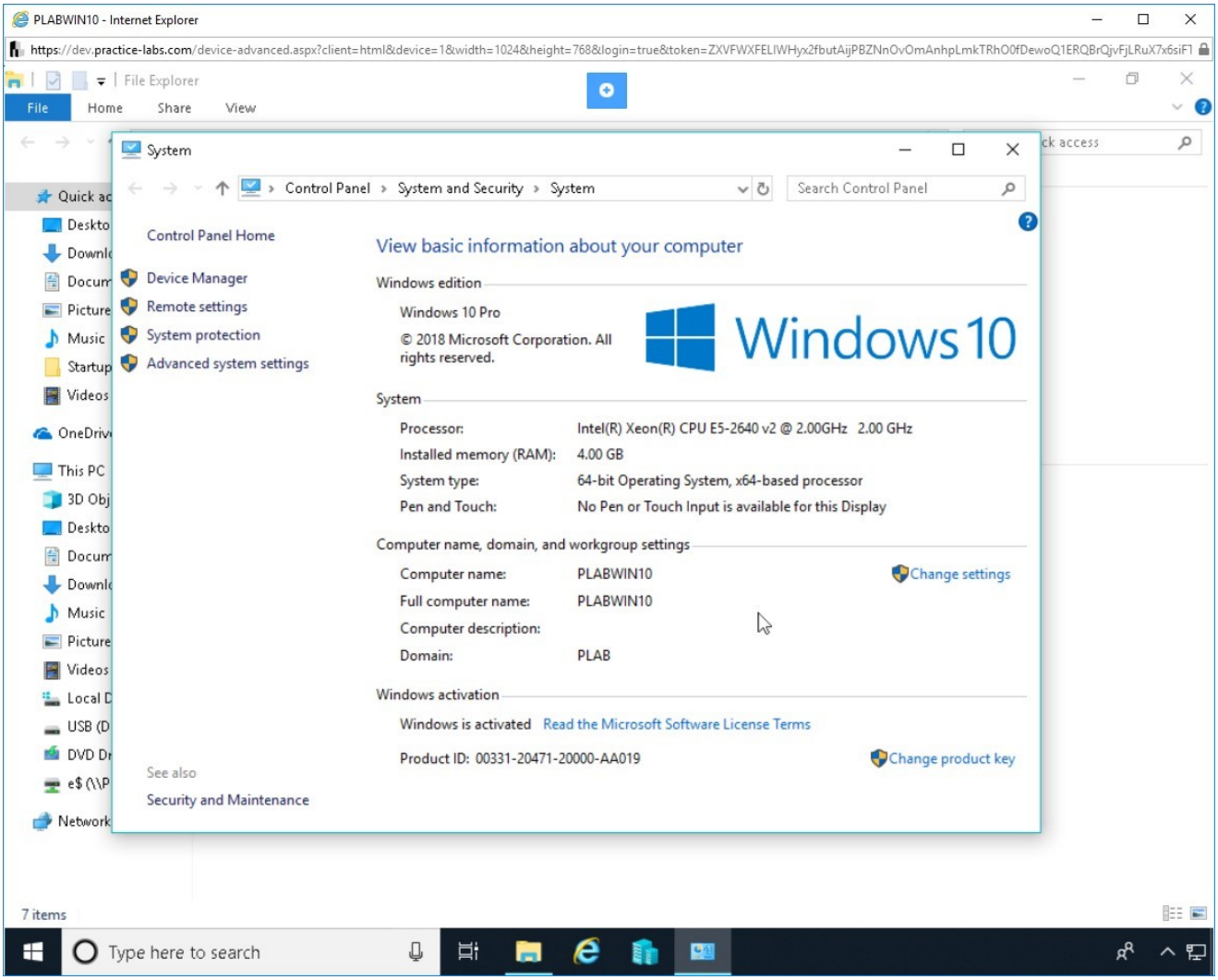


Figure 4.3 Screenshot of PLABWIN10: Showing the system properties page.

Step 4

Close all open windows.

Exercise 5 - Workstation Operating Systems

Workstation operating systems are generally referred to as ‘client’ operating systems. A client operating system is installed on the desktops, laptops, tablets, and also mobile devices.

A client operating system is designed to serve a single user at a time. Even though multiple user accounts can exist on the system, only one user can log on at any given

point of time.

A client operating system is not designed to perform any server role, such as a Web server, DNS server, or E-mail server.

A client operating system is designed to run on specific hardware, which can be 32-bit or 64-bit. A client operating system, such as Linux, is open-source and is free to download. Whereas, Windows is commercial and you have to purchase a license.

In this exercise, you will be comparing a few of these operating systems based on their vendors.

Learning Outcomes

After completing this exercise, you will have further knowledge of:

- Selecting a Workstation Operating System as per the need

Your Devices

This exercise contains supporting materials for A+ Core 2.

Selecting a Workstation Operating System as per the Need

Not necessarily every client operating system will fit into your requirement. Here are some of the options you may have to choose from:

Microsoft Windows

Microsoft Windows is the most commonly used operating system. Over the years, Microsoft has released various versions, and each version incorporated a few sets of features.

Let's look at some of the pros and cons of Microsoft Windows OS.

Pros -

- There are a large number of applications available.
- Since it is widely used by millions of users, finding help to resolve an issue can be fairly easy.
- It is easy for a novice user to navigate.
- It offers a set of utilities that can be used for system optimization.
- The most recent version of Windows offers backward compatibility with the old versions.
- It can run on a variety of hardware.

Cons -

- There is a moderate risk of viruses.
- Each version of Windows needs to be licensed.
- It can be prone to crash due to various reasons, such as virus attacks.

Apple Mac OS

Mac OS only runs on an Apple Mac system. Even though the userbase for Mac OS is lower than Windows, it is known for its great visuals.

Let's look at some of the pros and cons of Mac OS.

Pros -

- It is mostly used for creative work, such as graphic designing.
- It is based on Unix, which means that it inherits the security architecture of Linux.
- It is praised for its excellent and intuitive user interface.
- It is less vulnerable to attack because fewer viruses for it exist.
- It is known for its stability and high-level of performance.
- It runs on the x86 architecture.

Cons -

- There are fewer applications available in comparison to Windows.

- A newer version is not backward compatible with the older hardware due to the internal structure and its embedded code.
- It is more expensive than Windows.
- It can only run on Apple hardware.

Linux

Linux OS runs on almost anything. Most servers in the world are running Linux. Versions are available for many different processors. Different versions are available that are optimized for smaller memory and slower processors; they adapt to the machine they are installed on. Faster processors and more memory give you faster action.

Pros -

- There are many different available types - you can handpick what you want or need.
- There are only a handful of viruses written for Linux, and therefore, it is considered to be a secure client operating system.
- It can run on slower processors with less amount of memory.
- It is known to be lightweight.
- It is highly customizable - the code is open-source and therefore, can be tweaked and re-used as a different product.
- Most versions of Linux are free.

Cons -

- More complex than Windows and Mac OS and therefore, requires more expertise.
- It may be harder for a beginner-level/new user to operate.
- Troubleshooting help can be difficult to find.

Exercise 6 - Comparison of Cell Phone/Tablet Operating Systems

Much like operating systems, there are many different cell phones and tablets manufactured by different vendors. Each vendor utilizes its own choice of operating system (OS).

These operating systems can differ greatly from one another based on their features. For example, Android is used on a large number of mobile phones and tablets because it is open-source.

In this exercise, you will be comparing a few of these operating systems based on their features.

Learning Outcomes

After completing this exercise, you will have further knowledge of:

- Cell Phone Operating Systems

Your Devices

This exercise contains supporting materials for A+ Core 2.

Learn about Cell Phone Operating Systems

Microsoft Windows

As the name suggests, Microsoft Windows OS is manufactured by Microsoft.

This OS is not open source (like Android). This means that only the manufacturer can make changes in the OS; this feature is blocked for third-party developers.

Microsoft Windows OS is not as widely used as the Android OS or iOS on phones and tablets. As a result, the range of applications (apps) available on the Windows platform is limited in comparison to Android OS or iOS.

Also, whenever a new version of the Windows OS is released, it is released as a complete package, not just a framework that customization can be added to.

Android

Android is an open-source operating system developed by Google. It is also the most widely used mobile operating system in terms of the number of users.

As Android is an open-source OS, it is highly customizable. This means that you can have a basic Android framework (known as stock Android), then heavily customize it to your needs. For example, you can include your own services, like an extra layer of user interface running on top of the basic framework.

However, a downside of open-source operating systems is that they can be comparatively less secure than commercial systems. Whenever a new version of Android is released, it is the basic stock version, which is then added to by third-party developers.

Another positive aspect of this OS is that because Android has a high number of users, there are a large number of apps available. This also means that there are many more functionalities for users.

iOS

iOS is an operating system manufactured by Apple. The Mac OS is known for high performance and stability because of the optimization of its hardware. Unlike Android, iOS is not free to use.

Also, unlike Android, iOS is not an open-source OS. It is not open for customization by any developers besides Apple themselves. Since it can't be manipulated by other developers, it is known to be secure.

Whenever a new version of iOS is released, it is a complete operating system. It is not released as a framework due to the limitations on third-party developers, meaning no customization is available.

Chrome OS

Chrome is an operating system developed by Google. It is essentially a combination of the Linux kernel with Chrome OS running on top of it to facilitate access to the web.

This is another OS that is not open source, meaning it is also closed off to third-party customization.

Chrome OS has a select collection of local apps, such as media players. Besides these applications, there is no resident app on the Chrome OS as the aim was to make it as light as possible. Due to this, without internet access, this OS has limited functionalities. The applications and user data both reside on the Cloud.

The fact that the Chrome internet browser is then running on this custom-made software means that its efficiency is enhanced in comparison to a regular internet browser.

Exercise 7 - Know the Vendor-specific Limitations

Every operating system has a few limitations. Some are specific to the vendor of that particular OS.

These limitations could be related to the incorporation of a particular version of the OS into new devices, or it may be related to the support provided by the vendor for that particular OS.

In this exercise, you will learn about these limitations.

Learning Outcomes

After completing this exercise you will have further knowledge of:

- Vendor-specific Limitations of Operating Systems

Your Devices

This exercise contains supporting materials for A+ Core 2.

Vendor-specific Limitations of Operating Systems

End of Life

The lifespan of an operating system depends solely on its vendor. There is a date where selling the operating system ends, and then there is a deadline for stopping the support for it. When a vendor decides to stop the support to a particular operating system and asks the user to update and replace it with another OS, the lifespan of the previous OS has ended.

The vendor would have stopped incorporating that previous operating system into newly manufactured devices long before its termination of service (end of life). The laptops and desktops etc. are sold with the newer version of the operating system.

Update Limitations

When the end of lifespan is approaching, the vendor decreases the number of updates on the older operating system. The idea is to divert the users to the newer version.

When a new version of an operating system is released, it overlaps with the previous version. There are continuous efforts from the vendor to upgrade to the newer version.

Users typically do not jump to the newer version immediately. In most cases, the migration to the newer version is slow. When the migration is done from one version of the OS to another, it is called an operating system upgrade.

Depending upon the level of updates need to be rolled out, the vendor can either send a major update, such as a service pack or send out individual updates if the level of change is minor.

For example, if the desktop interface is being overhauled, the vendor may release a major update. If it is only a bug to be fixed or a security loophole to be covered up, then the vendor may release a specific update.

Exercise 8 - Compatibility Concerns between Operating Systems

Applications usually have compatibility issues with the newer version of an operating system. For example, if you have an application for Windows 7 and need to run it on Windows 10, you are likely to face compatibility issues.

In this exercise, you will know how to solve the compatibility issues in Windows 10.

Learning Outcomes

After completing this exercise, you will have further knowledge of:

- The Same Vendor Compatibility and Different Vendor Compatibility

Your Devices

This exercise contains supporting materials for A+ Core 2.

Knowing about the Same Vendor Compatibility and Different Vendor Compatibility

An application is designed and written with a target operating system and its version in mind. For example, vendors wouldn't write a Windows 7 applications; they would focus

on Windows 10. There are architectural differences between Windows 7 and Windows 10, and therefore, the application must be designed and written for Windows 10.

There is a possibility that some older applications may run without any issue on Windows 10. However, the application vendor will generally ask you to upgrade the application to the later version.

Each version of Windows offers a method to work with the applications that were designed for the older version. You can configure compatibility so that application can work as if it was working in the older version. You can configure this in the application's properties.

If this still does not work, you can run the Compatibility troubleshooter to solve this problem.

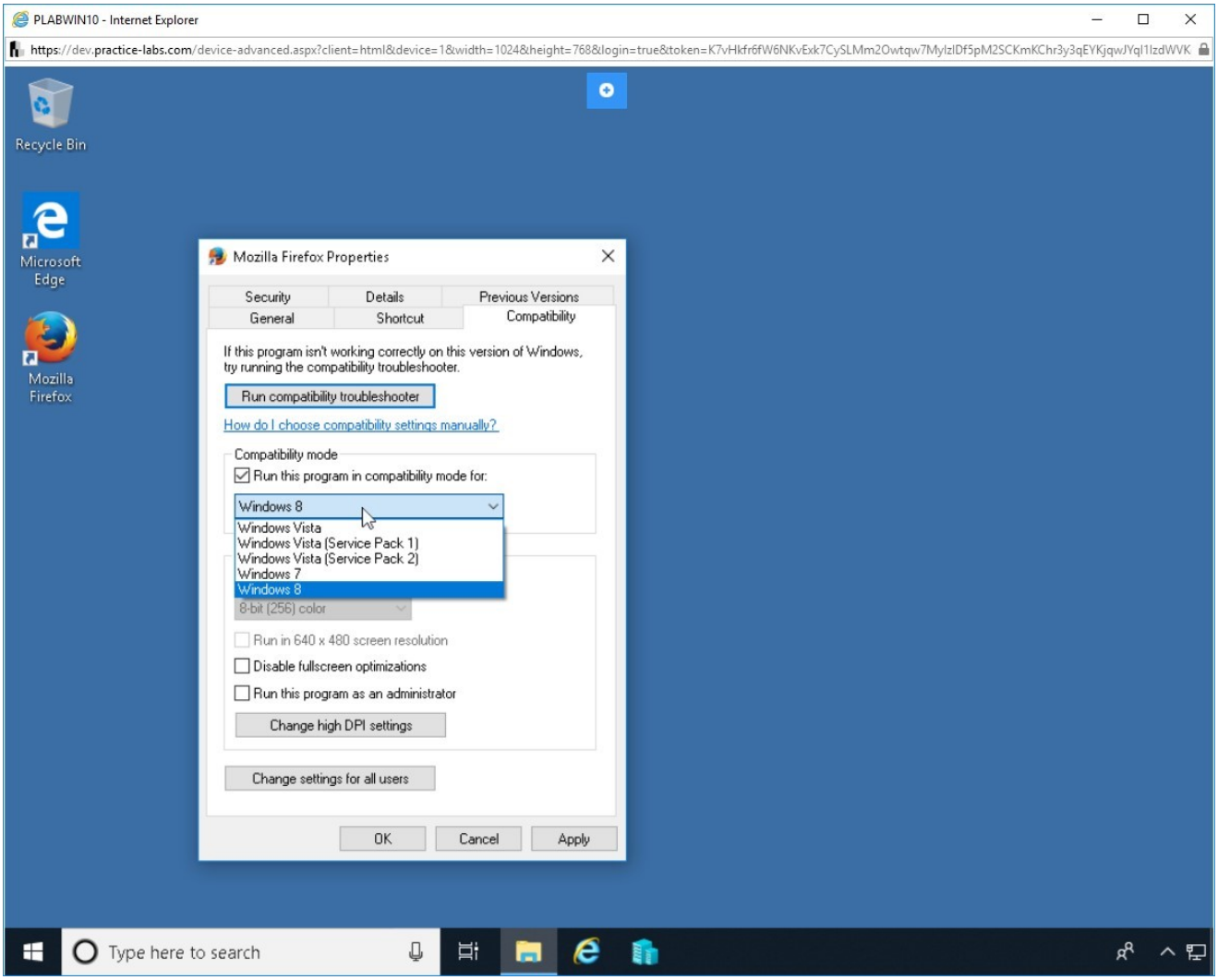


Figure 8.1 Screenshot of PLABWIN10: Showing the compatibility settings for the Mozilla Firefox.

An application designed for a specific operating system will not run on another operating system from a different vendor. For example, applications running on an Android OS do not run on iOS unless specifically developed to do so.

Review

Well done, you have completed the **Operating System Types and Features** Practice Lab.

Summary

You completed the following exercises:

- Exercise 1 - Comparison of Windows 7, 8.1 and 10
- Exercise 2 - Corporate vs. Personal Needs
- Exercise 3 - Change Desktop Styles/User Interfaces
- Exercise 4 - Comparison of 32-bit and 64-bit Operating Systems
- Exercise 5 - Workstation Operating Systems
- Exercise 6 - Comparison of Cell Phone/Tablet Operating Systems
- Exercise 7 - Know the Vendor-specific Limitations
- Exercise 8 - Compatibility Concerns between Operating Systems

You should now be able to:

- Know the Interface Differences
- Use Search
- Remove a System from Domain
- Use Media Center
- Configure BranchCache
- Configure Encrypting File System (EFS)
- Change Interface Settings in PLABWIN10
- Know the Key Differences between 32-bit and 64-bit Operating Systems
- Verify a 64-bit Operating System
- Select a Workstation Operating System as per the Need
- Learn about Cell Phone Operating Systems
- Know the Vendor-specific Limitations of Operating Systems

- Know about the Same Vendor Compatibility and Different Vendor Compatibility

Feedback

Shutdown all virtual machines used in this lab. Alternatively, you can log out of the lab platform.