Practice Labs - Ethical Hacker v10

Cryptography

Introduction

Ethical Hacking
Cryptography
Hashes
MD5 Hash
Full Disk Encryption

Welcome to the **Cryptography** 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 - Using Cryptography Tools

After completing this lab, you will be able to:

- Prepare Files and Folders for Encryption
- Install and Use an Encryption Package
- Download and Install HashCalc
- Using the HashCalc Tool
- Install and Use the MD5 Calculator

- Perform Full Disk Encryption

Exam Objectives

The following exam objectives are covered in this lab:

- **3.1** Information Security Controls

> ***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.

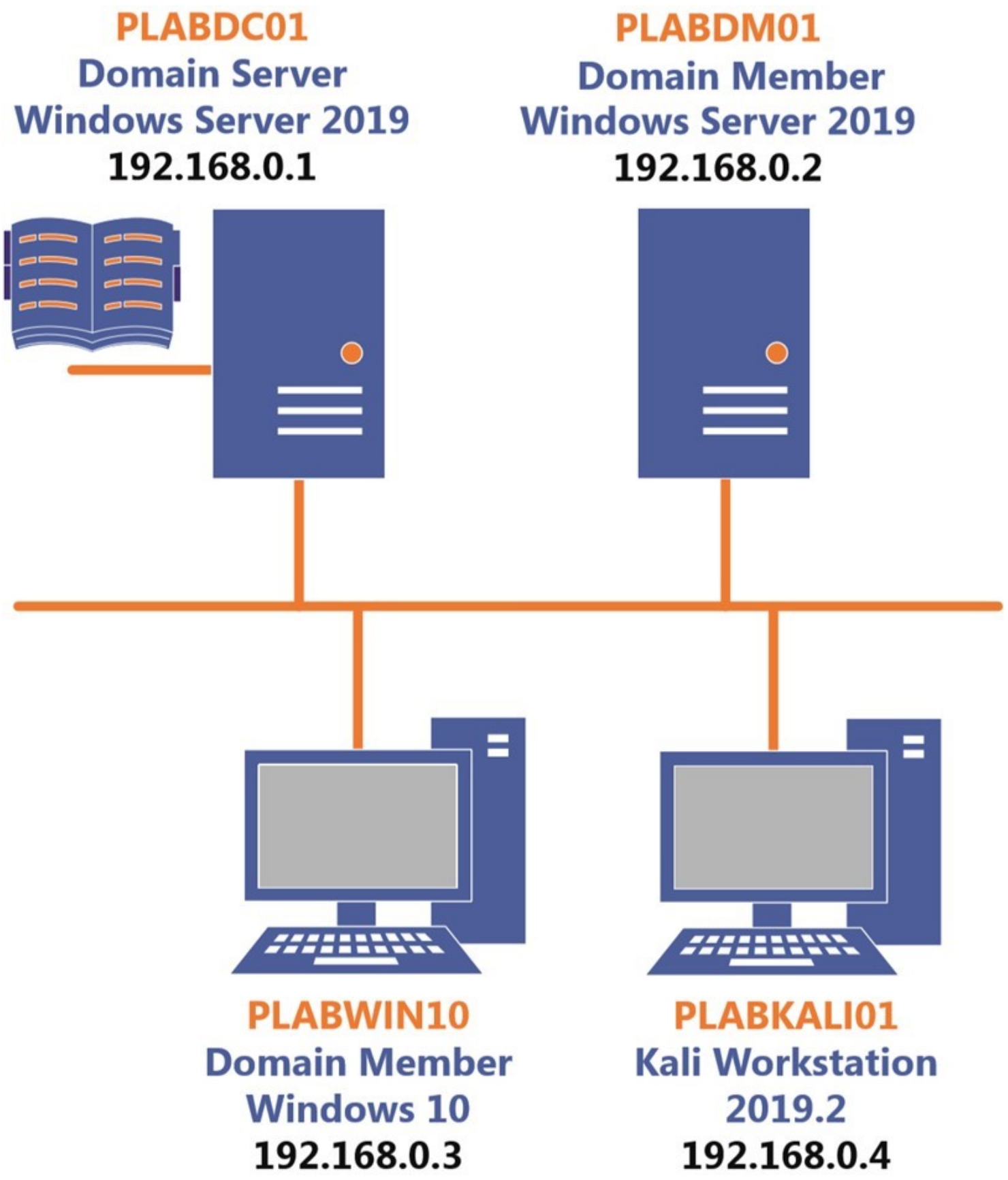
Help and Support

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 2019 - Domain Server)
- **PLABDM01 -** (Windows Server 2019 - Domain Member)
- **PLABWIN10 -** (Windows 10 - Workstation)
- **PLABKALI01 -** (Kali 2019.2 - Linux Kali Workstation)

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

Exercise 1 - Using Cryptography Tools

There are various cryptography tools available in the market. In this exercise, you will learn about different types of cryptography tools and how they can be used to encrypt and secure the information.

Learning Outcomes

After completing this exercise, you will be able to:

- Prepare Files and Folders for Encryption
- Install and Use Crypt4Free
- Download and Install HashCalc
- Use the HashCalc Tool
- Use MD5 Calculator
- Perform Full Disk Encryption

Your Devices

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

- **PLABDC01 -** (Windows Server 2019 - Domain Server)
- **PLABDM01 -** (Windows Server 2019 - Member)

Task 1 - Prepare Files and Folders for Encryption

In a real scenario, the protection of sensitive information is paramount. The best method to protect information is to use encryption, which can be applied to both files and folders.

In this task, you will learn to prepare files and folders for encryption. To do this, perform the following steps:

Step 1

Ensure you have powered on the required devices. Connect to **PLABDM01**.

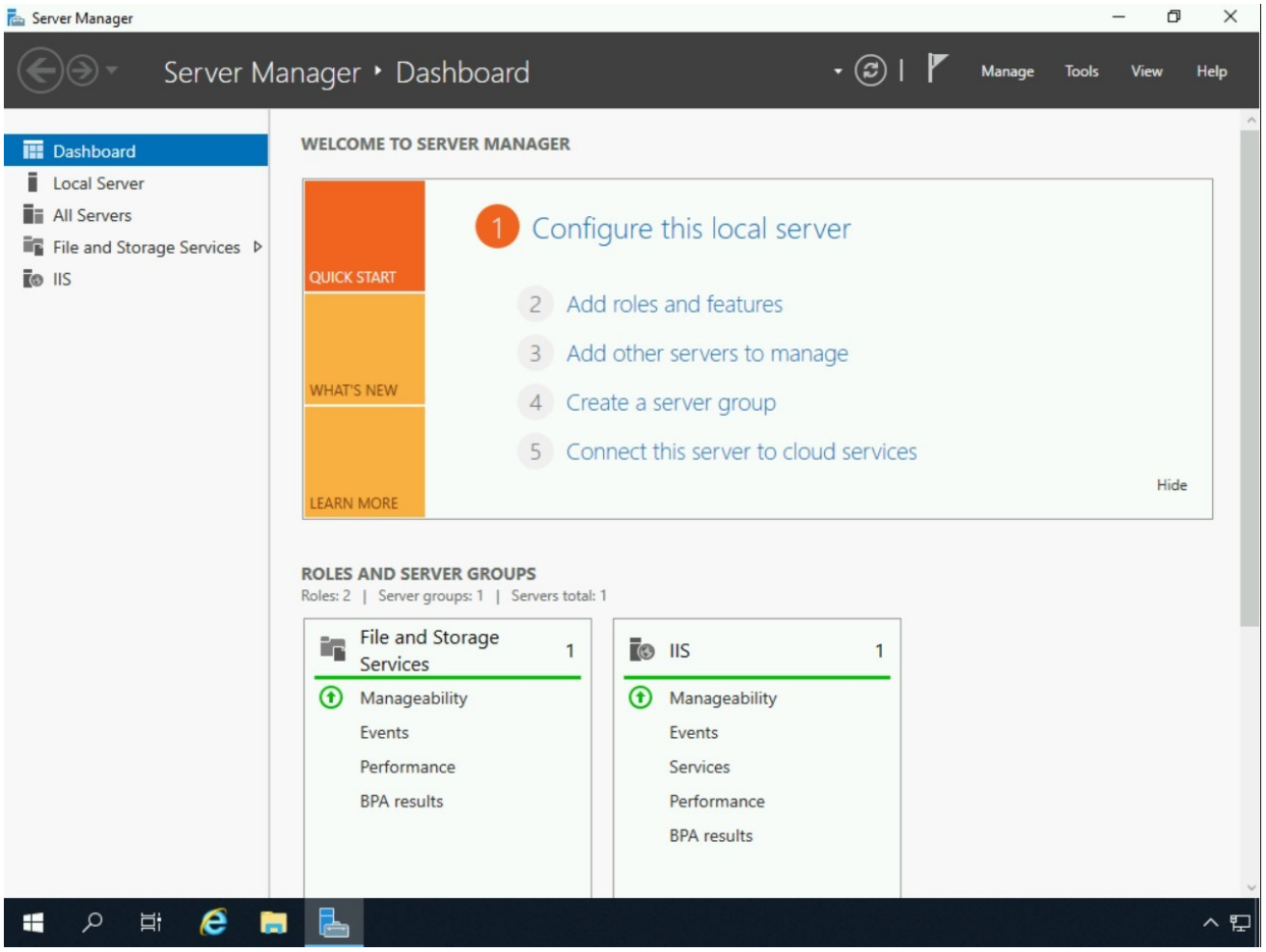


Figure 1.1 Screenshot of PLABDM01: Showing the desktop of PLABDM01.

Step 2

Close Server Manager and then, from the taskbar, click the **File Explorer** icon.

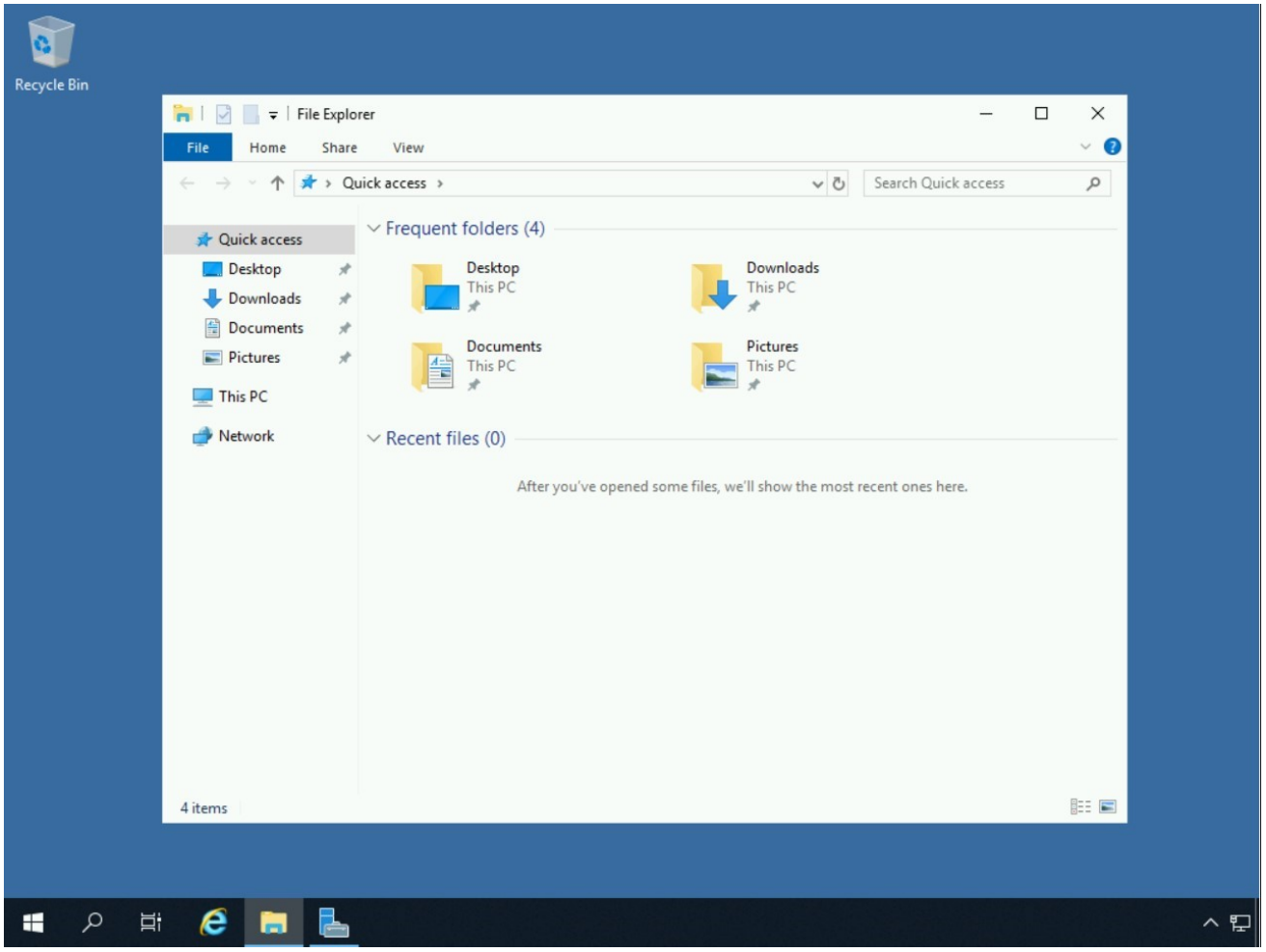


Figure 1.2 Screenshot of PLABDM01: Clicking the File Explorer icon on the taskbar.

Step 3

In the left-hand pane of **File Explorer**, expand **This PC** and then select **Local Disk (C:)**.

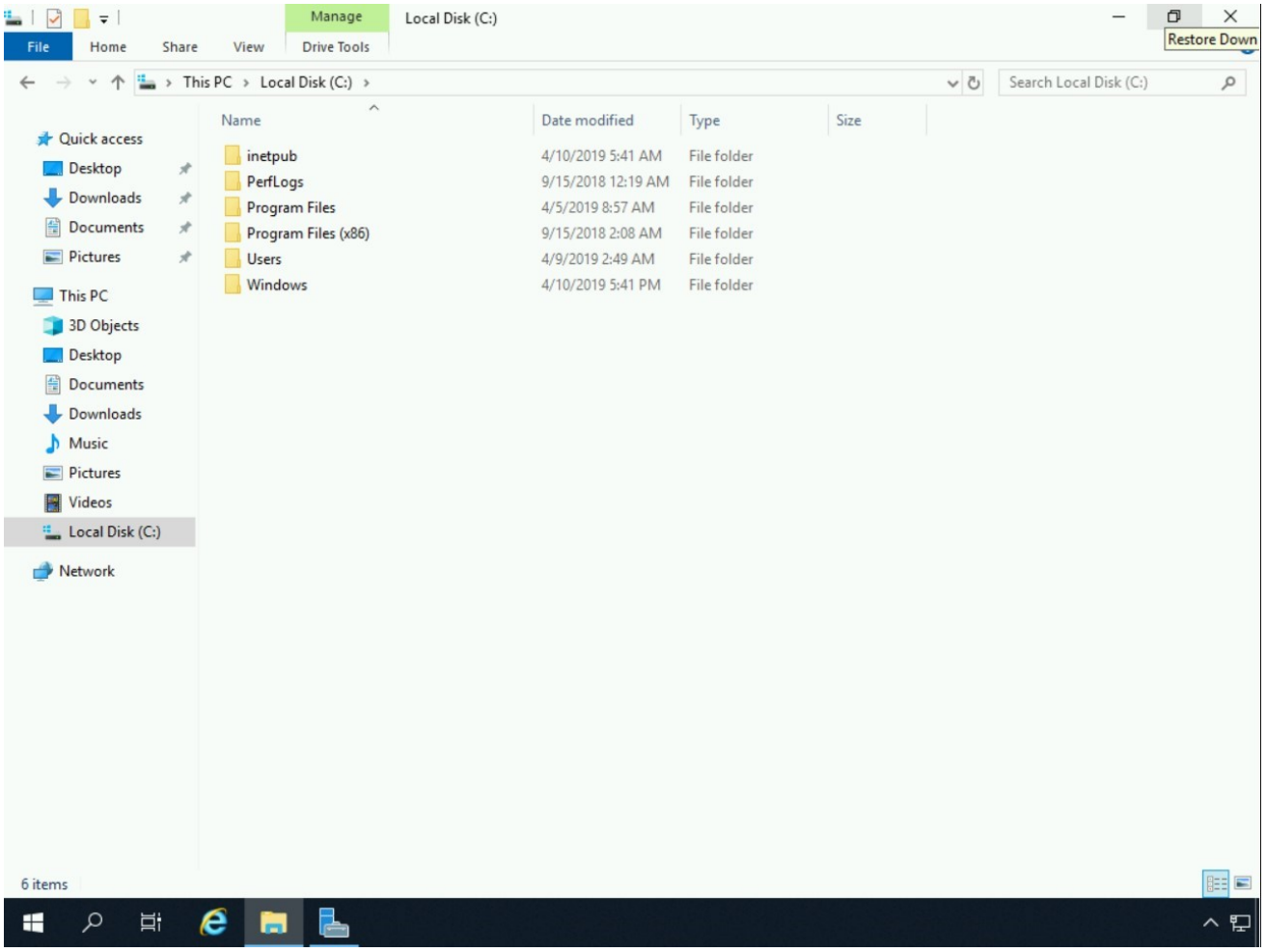


Figure 1.3 Screenshot of PLABDM01: Expanding This PC and selecting Local Disk (C:).

Step 4

In the right-hand pane, right-click on the white area and select **New** > **Folder**.

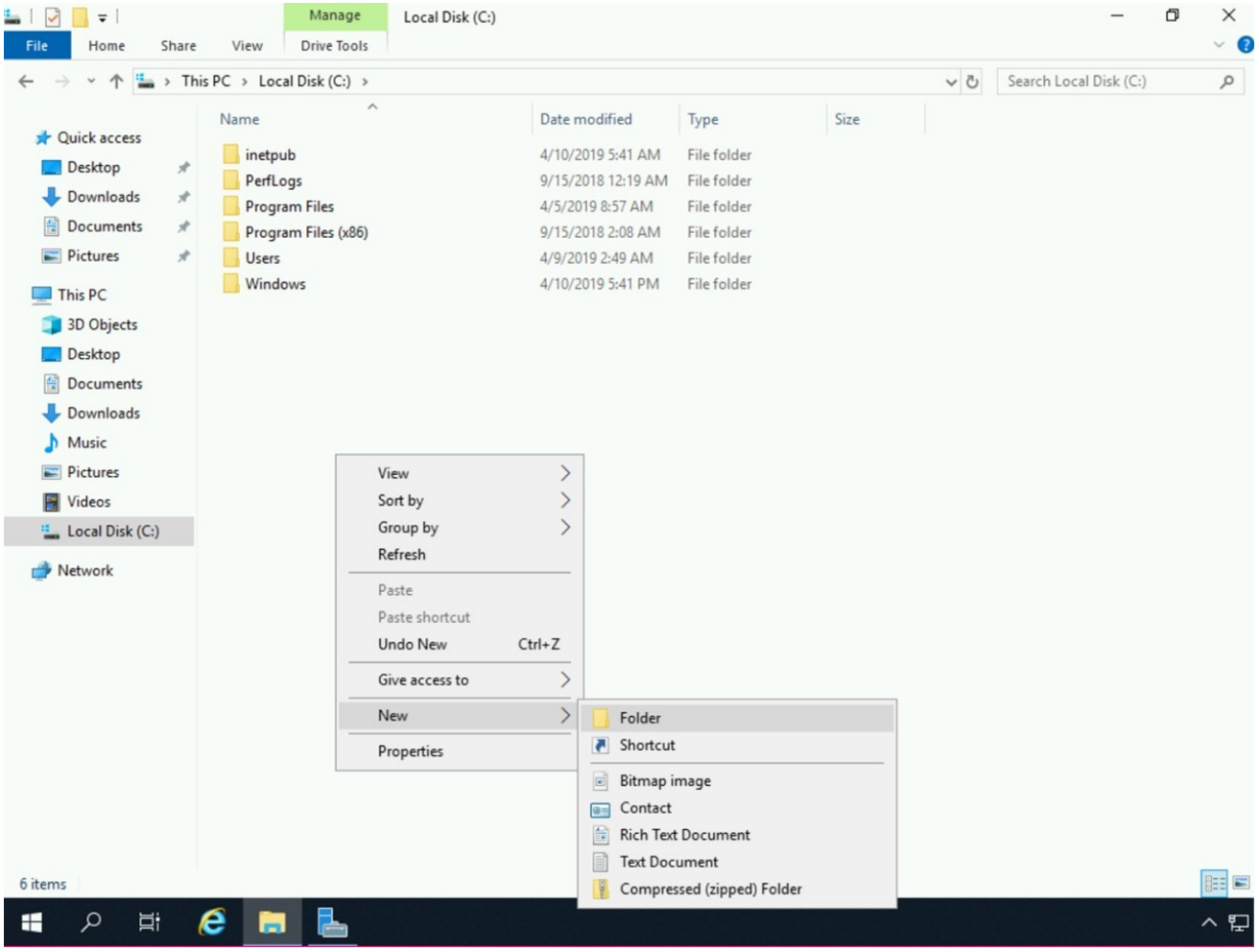


Figure 1.4 Screenshot of PLABDM01: Right-clicking in the white area, selecting New and then selecting Folder.

Step 5

In the new folder name text box, type the following:

```
labfiles
```

Press **Enter**.

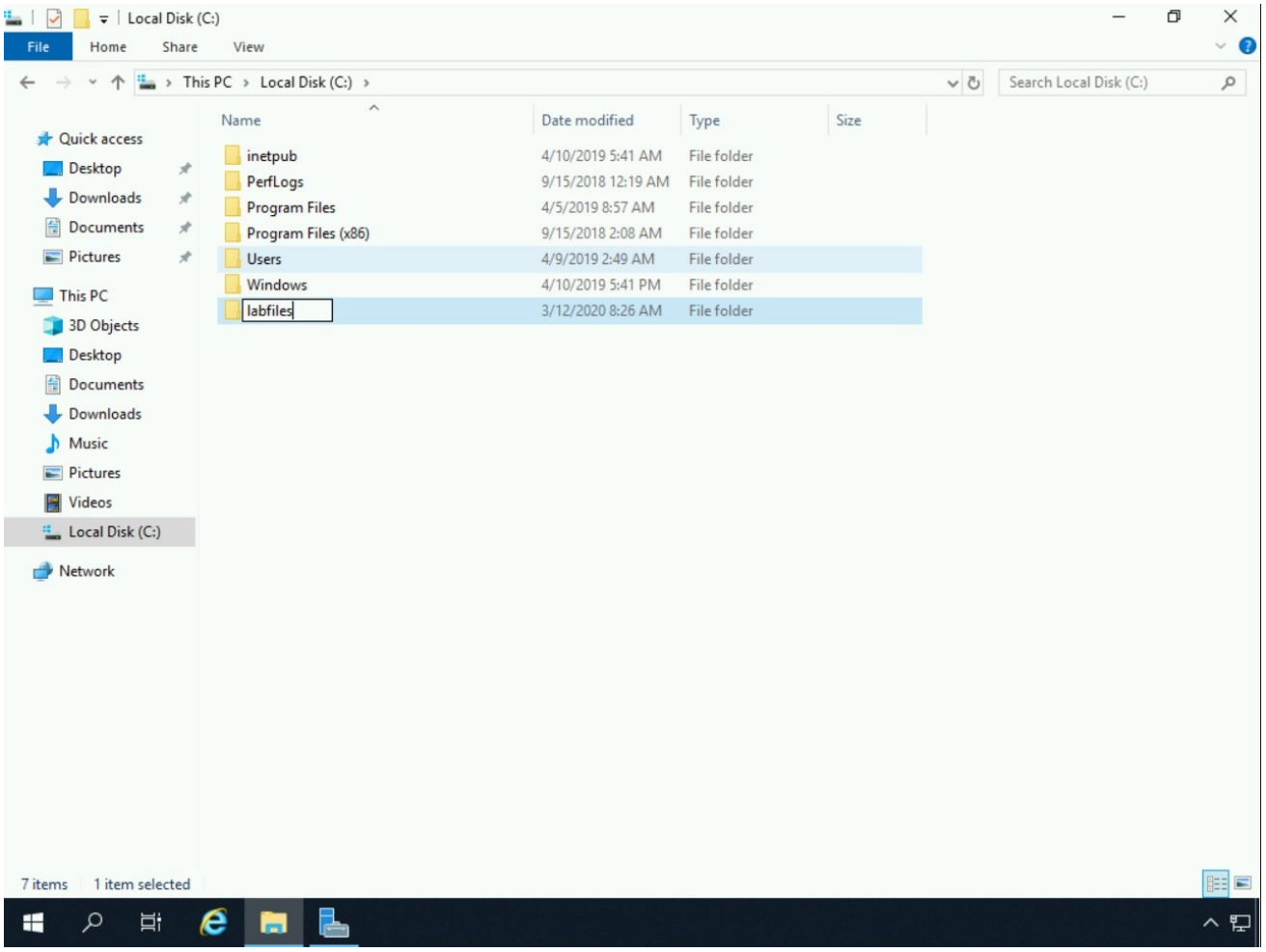


Figure 1.5 Screenshot of PLABDM01: Entering the folder name as labfiles.

Step 6

Close the **File Explorer** window.

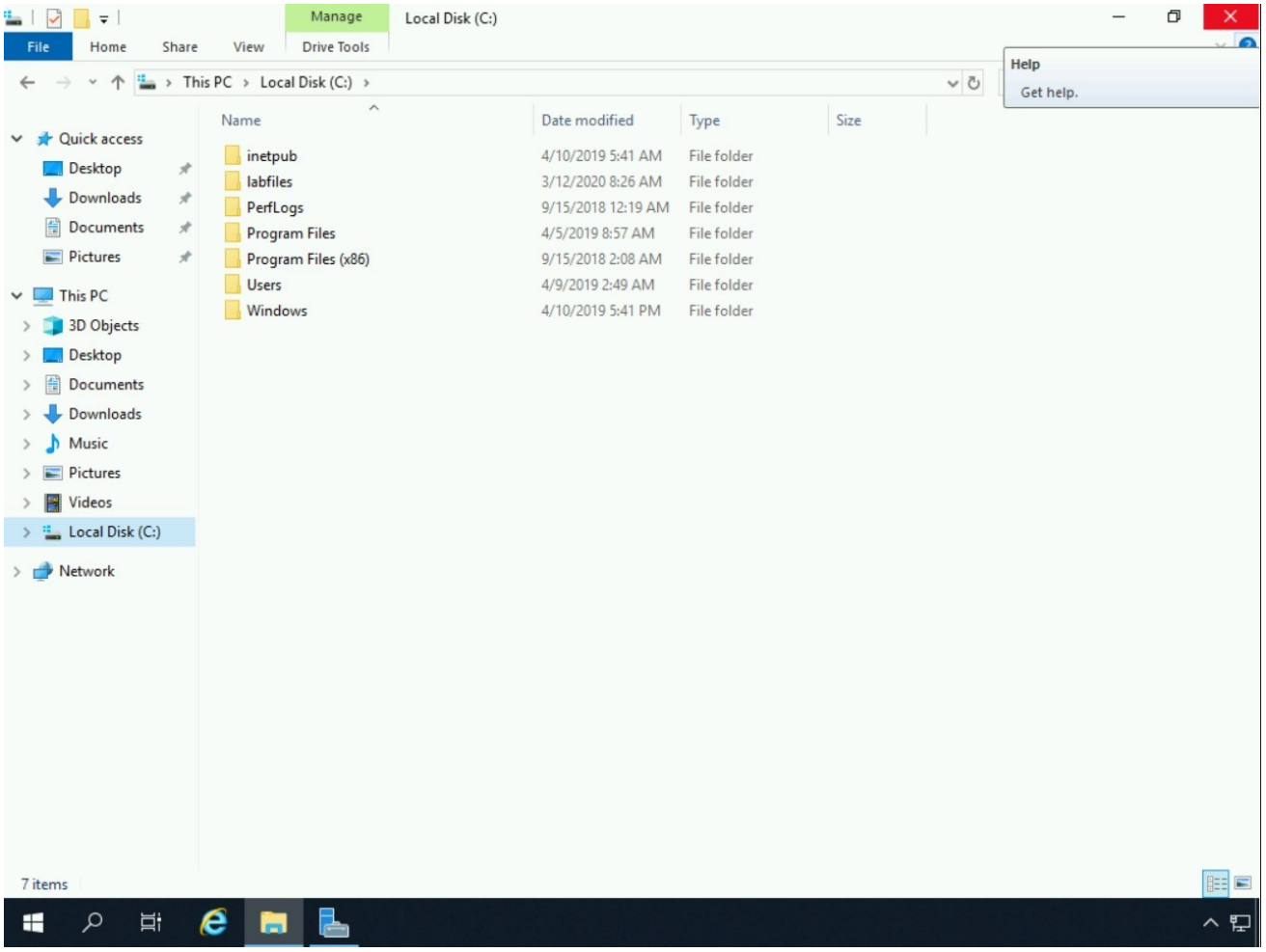


Figure 1.6 Screenshot of PLABDM01: Closing the File Explorer window.

Step 7

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

```
Internet Explorer
```

From the search results, select **Internet Explorer**.

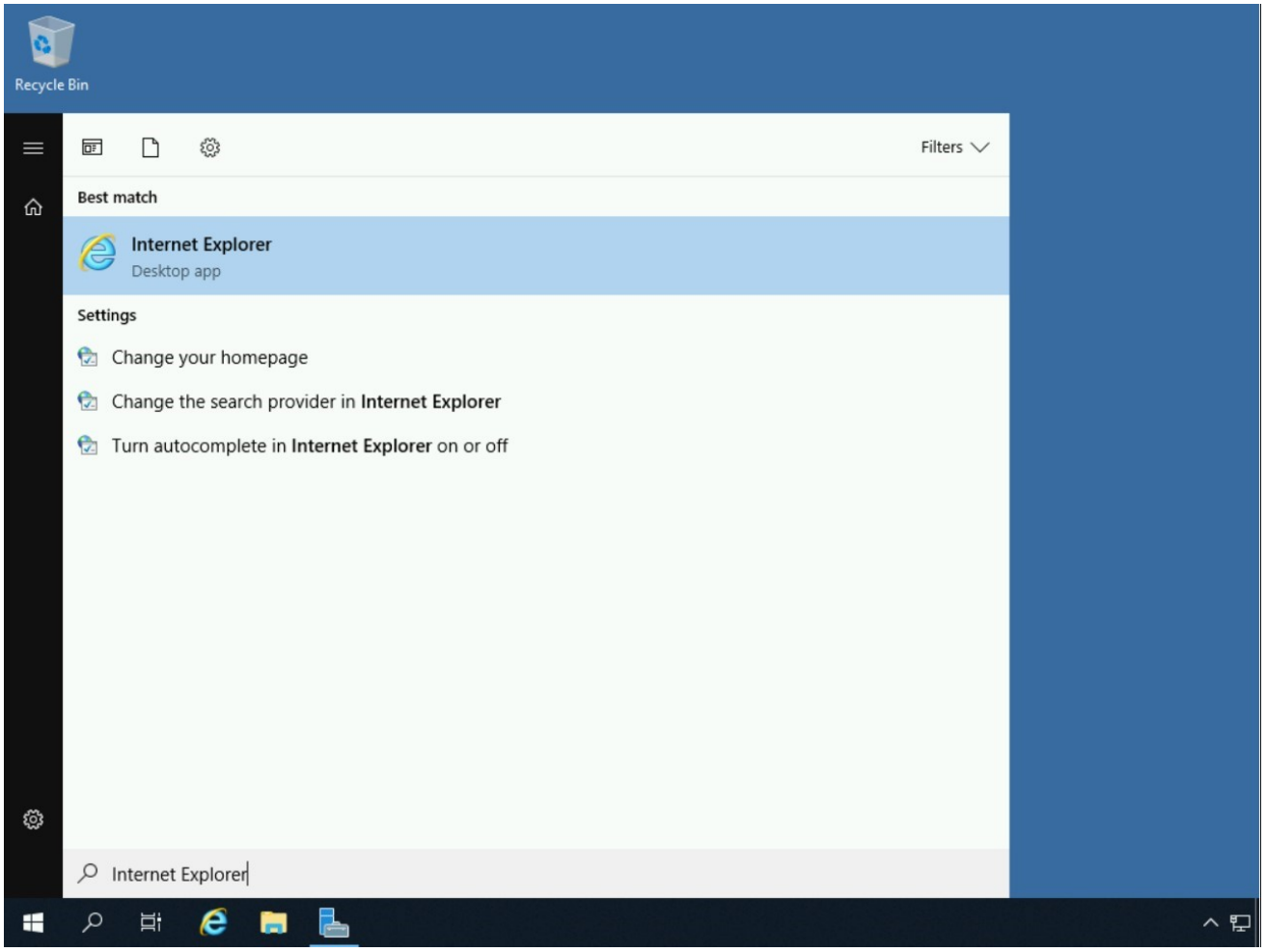


Figure 1.7 Screenshot of PLABDM01: Selecting Internet Explorer from the search results.

Step 8

The **Intranet** Website is displayed. On the **Intranet** homepage, click **Tools**.

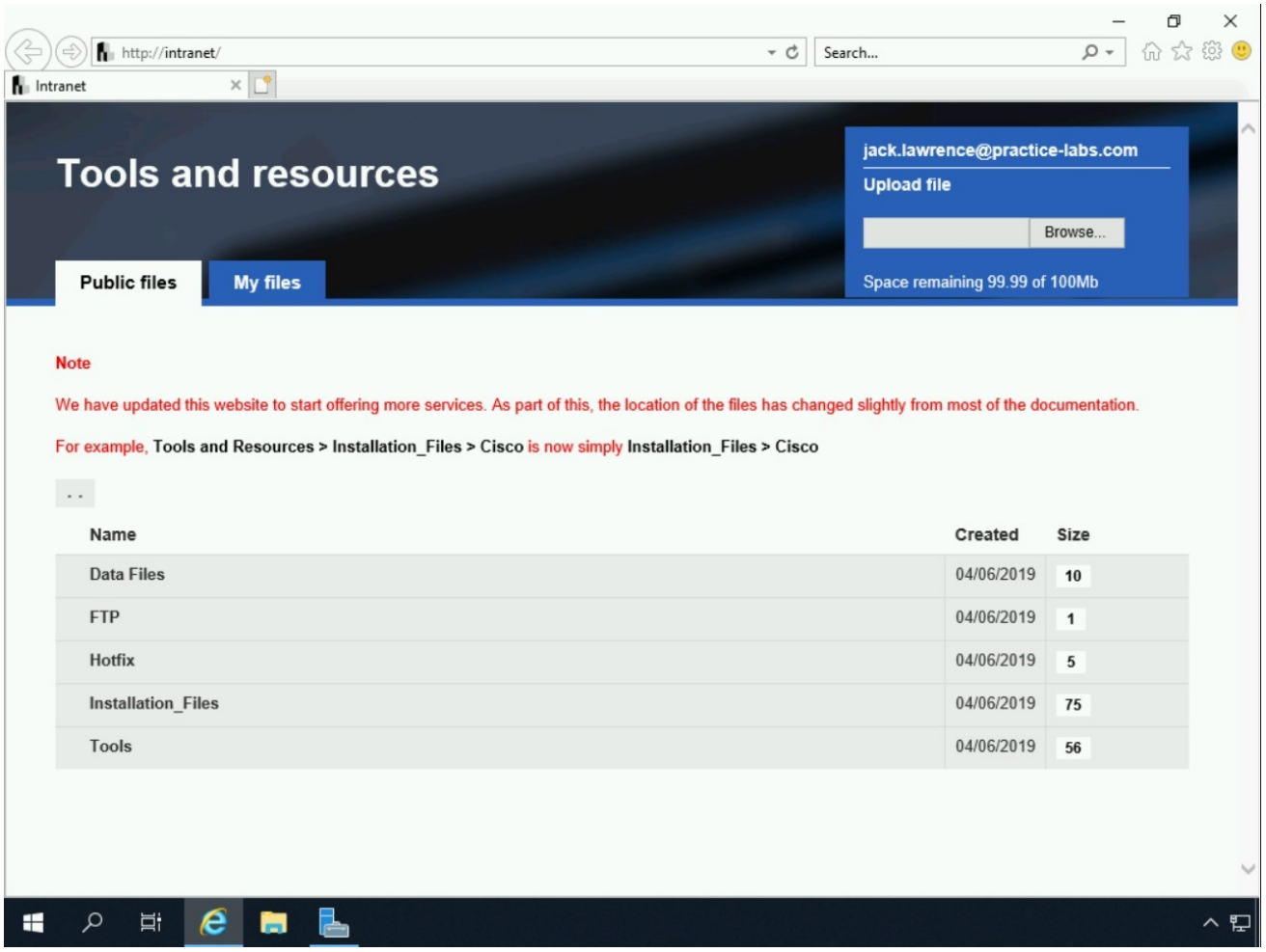


Figure 1.8 Screenshot of PLABDM01: Clicking Tools on the Intranet homepage.

Step 9

On the **Tools** Webpage, click **Hacking Tools**.

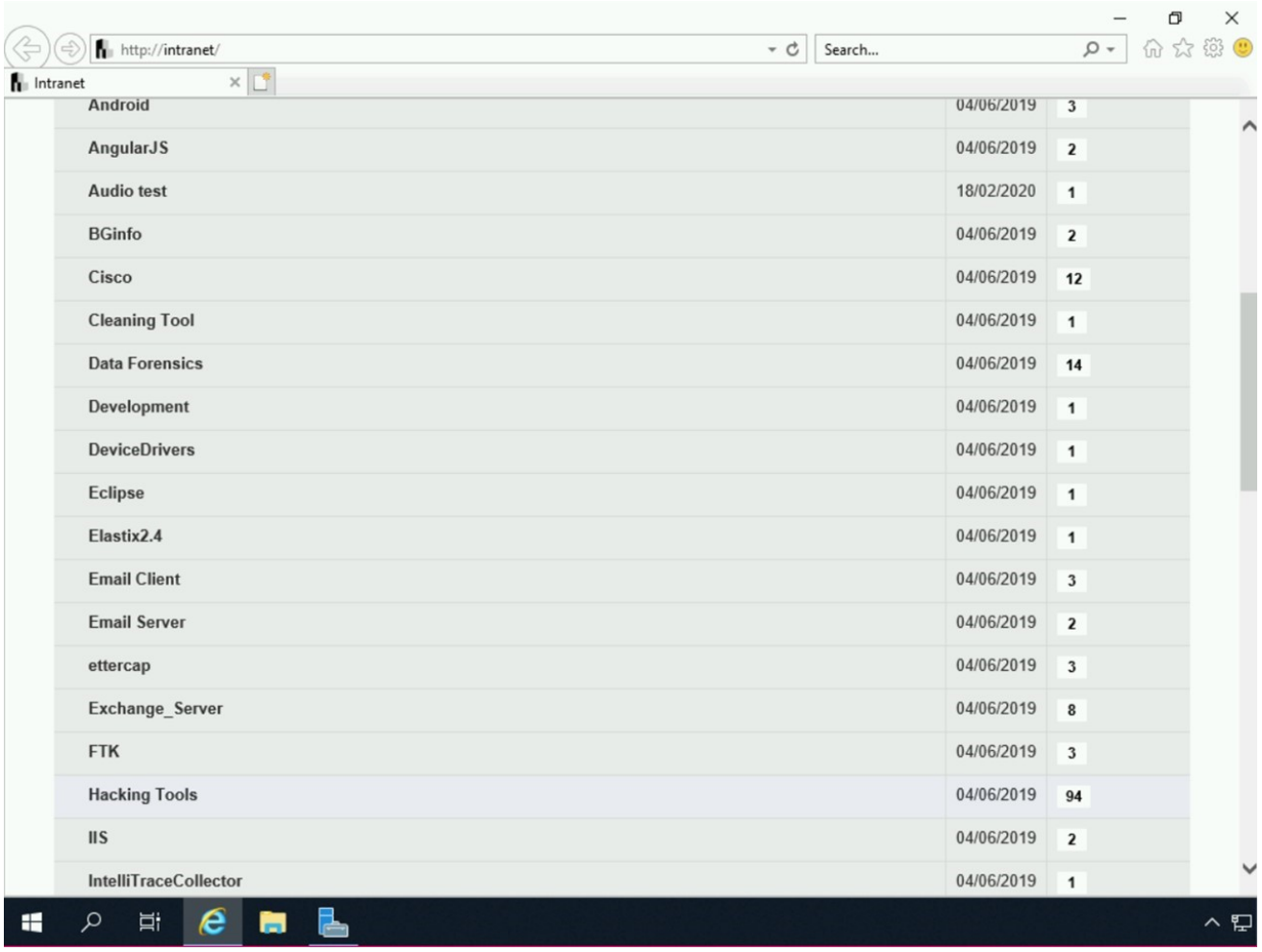


Figure 1.9 Screenshot of PLABDM01: Clicking Hacking Tools on the Intranet homepage.

Step 10

Locate the **md5calculator_setup.exe** file and click on it.

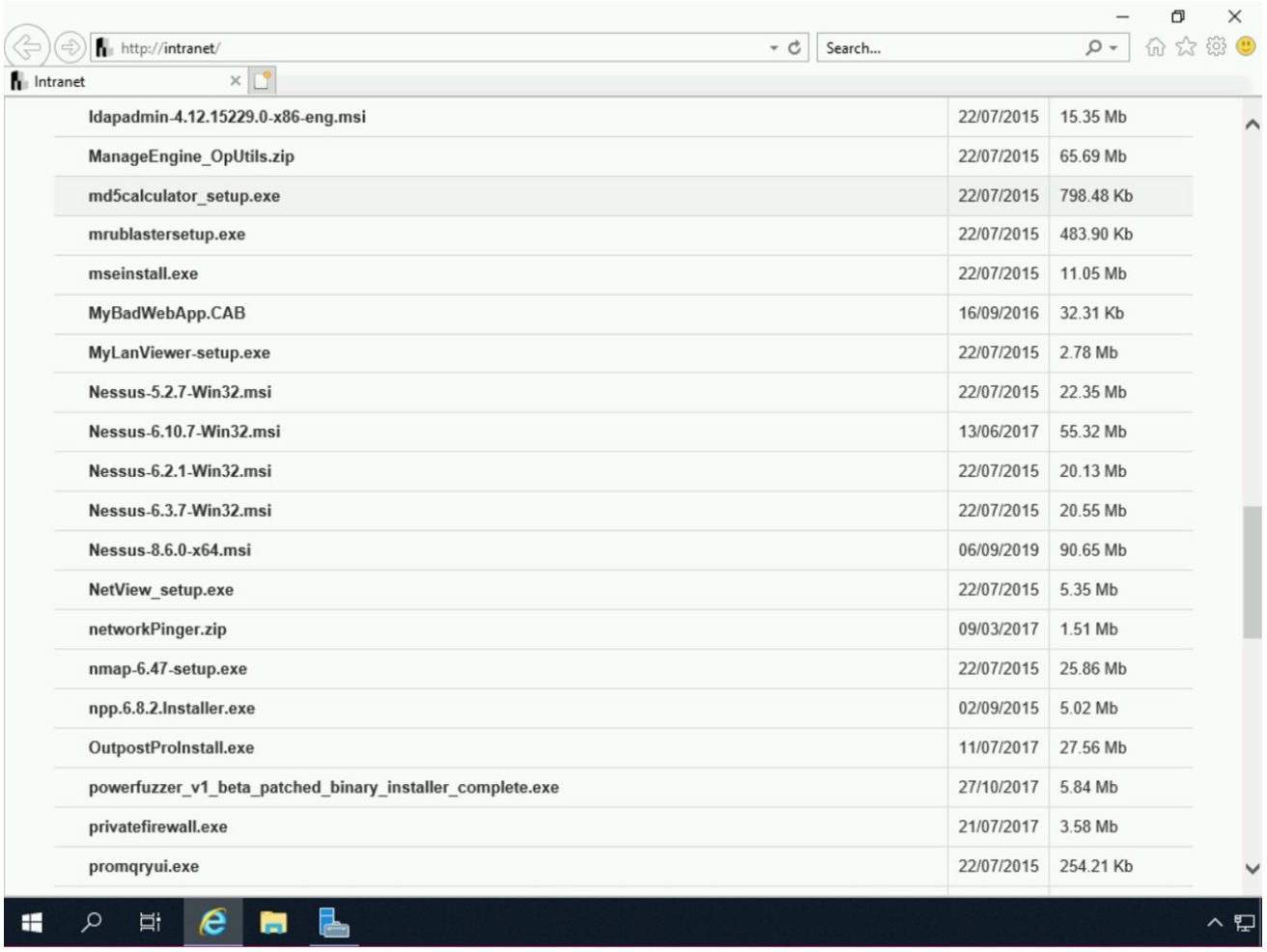


Figure 1.10 Screenshot of PLABDM01: Clicking on the md5calculator_setup.exe file.

Step 11

In the notification bar, click the down arrow and select **Save as**.

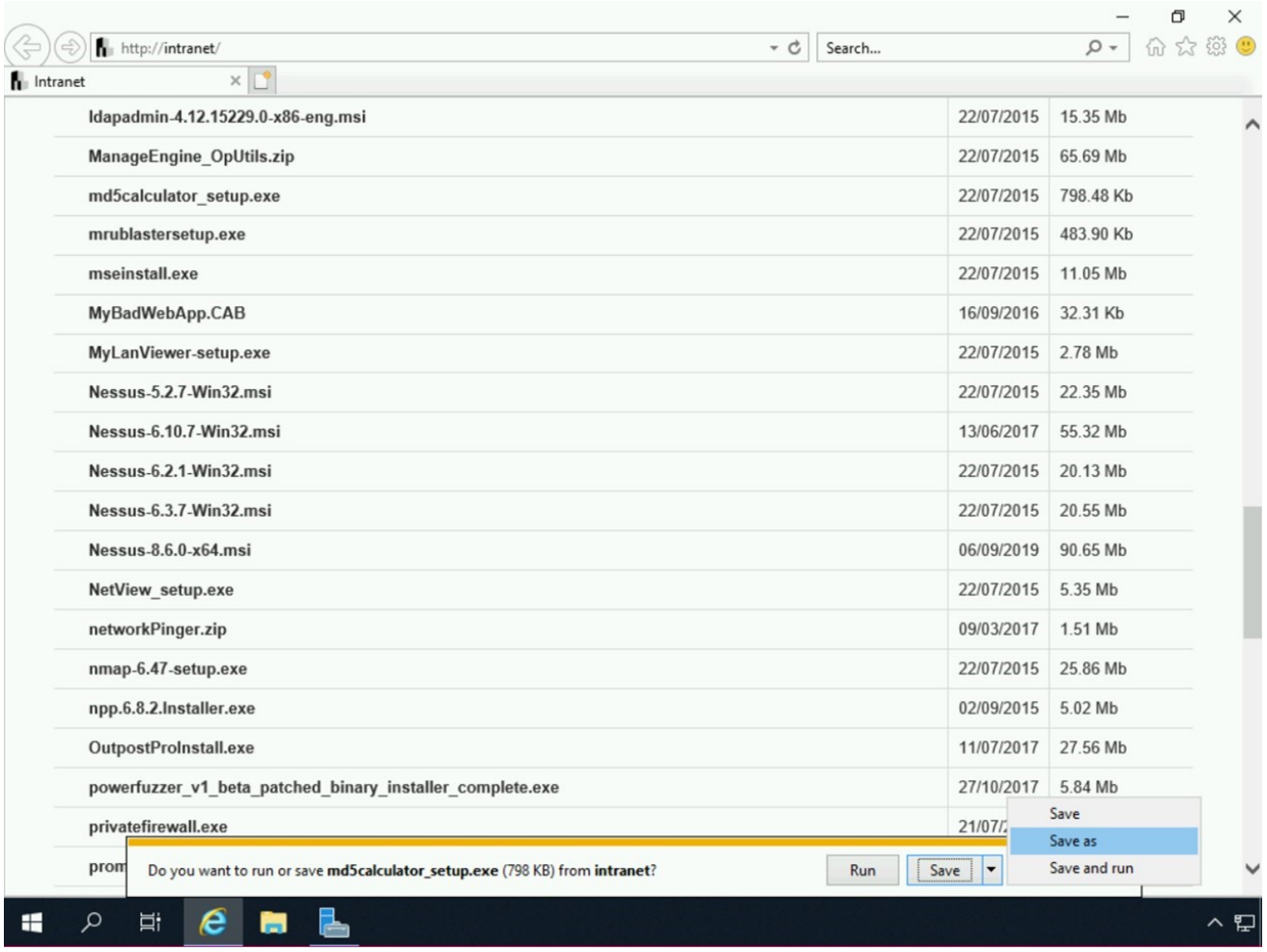


Figure 1.11 Screenshot of PLABDM01: Clicking the Save as option in the notification bar.

Step 12

In the **Save As** dialog box navigate to the **Local Disk C:\labfiles** folder and click **Save**.

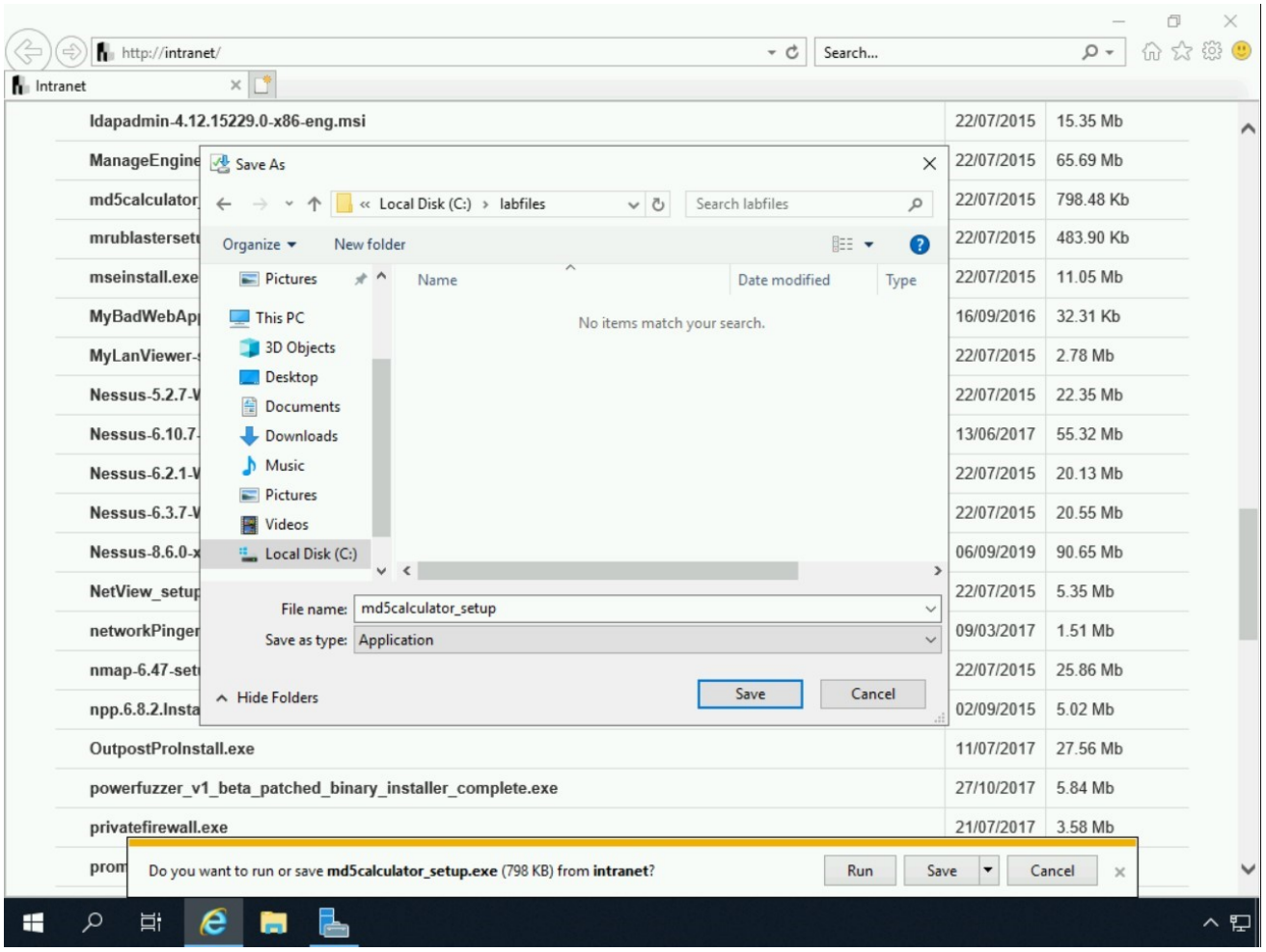


Figure 1.12 Screenshot of PLABDM01: Clicking Save on the Save As dialog box.

Step 13

Close the notification bar.

Keep the Internet Explorer window open.

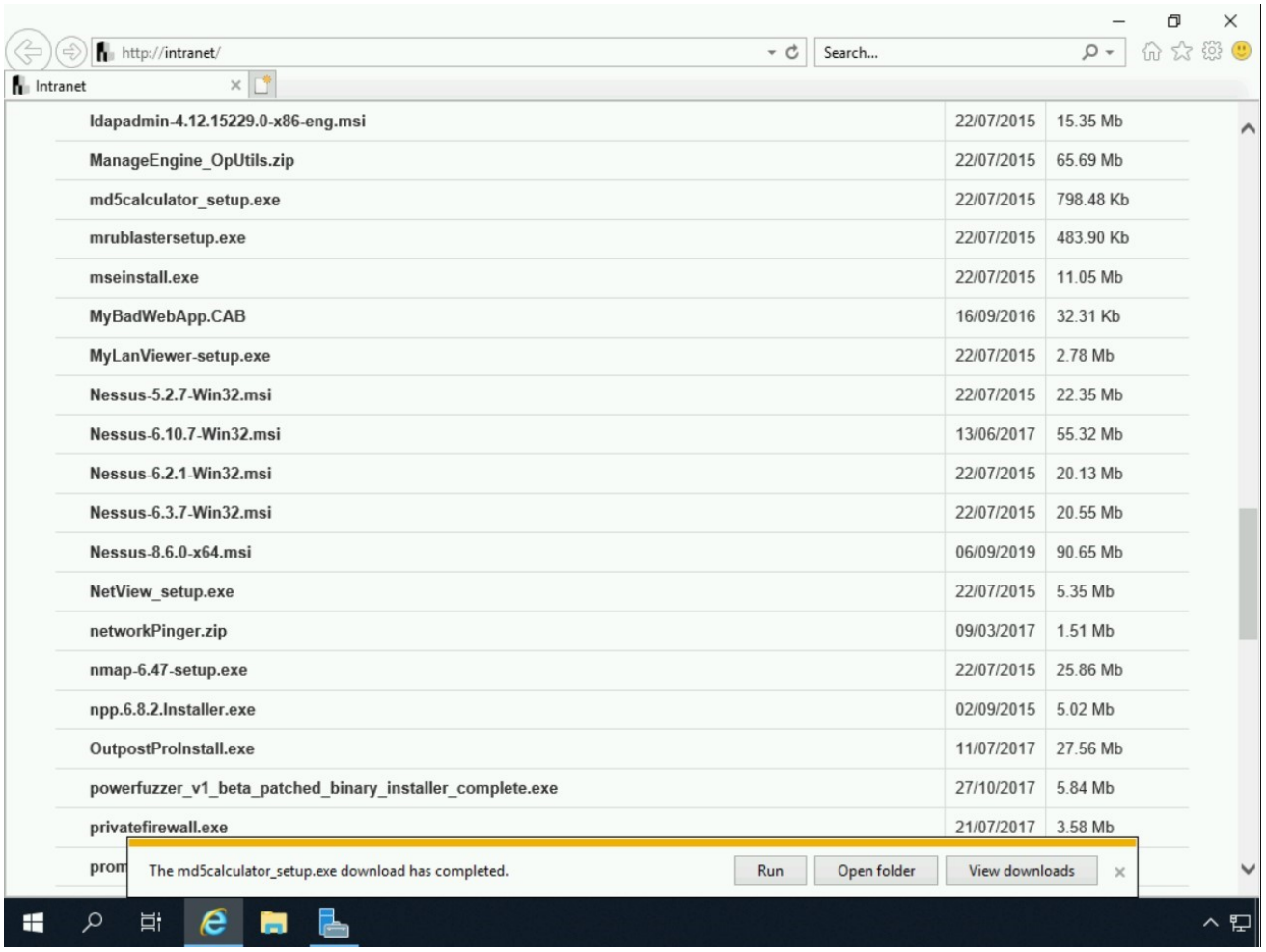


Figure 1.13 Screenshot of PLABDM01: Closing the notification bar.

Task 2 - Install and Use Crypt4Free

Using an Encryption Package, you can encrypt and decrypt files and folders. It contains several encryption algorithms that can be used to protect sensitive information.

In this lab you will be using the package Crypt4Free

To install and use Crypt4Free, perform the following steps:

Step 1

Ensure you have powered the required devices, and **Connect** to **PLABDM01**.

Internet Explorer should be open with the **Hacking Tools** page displayed.

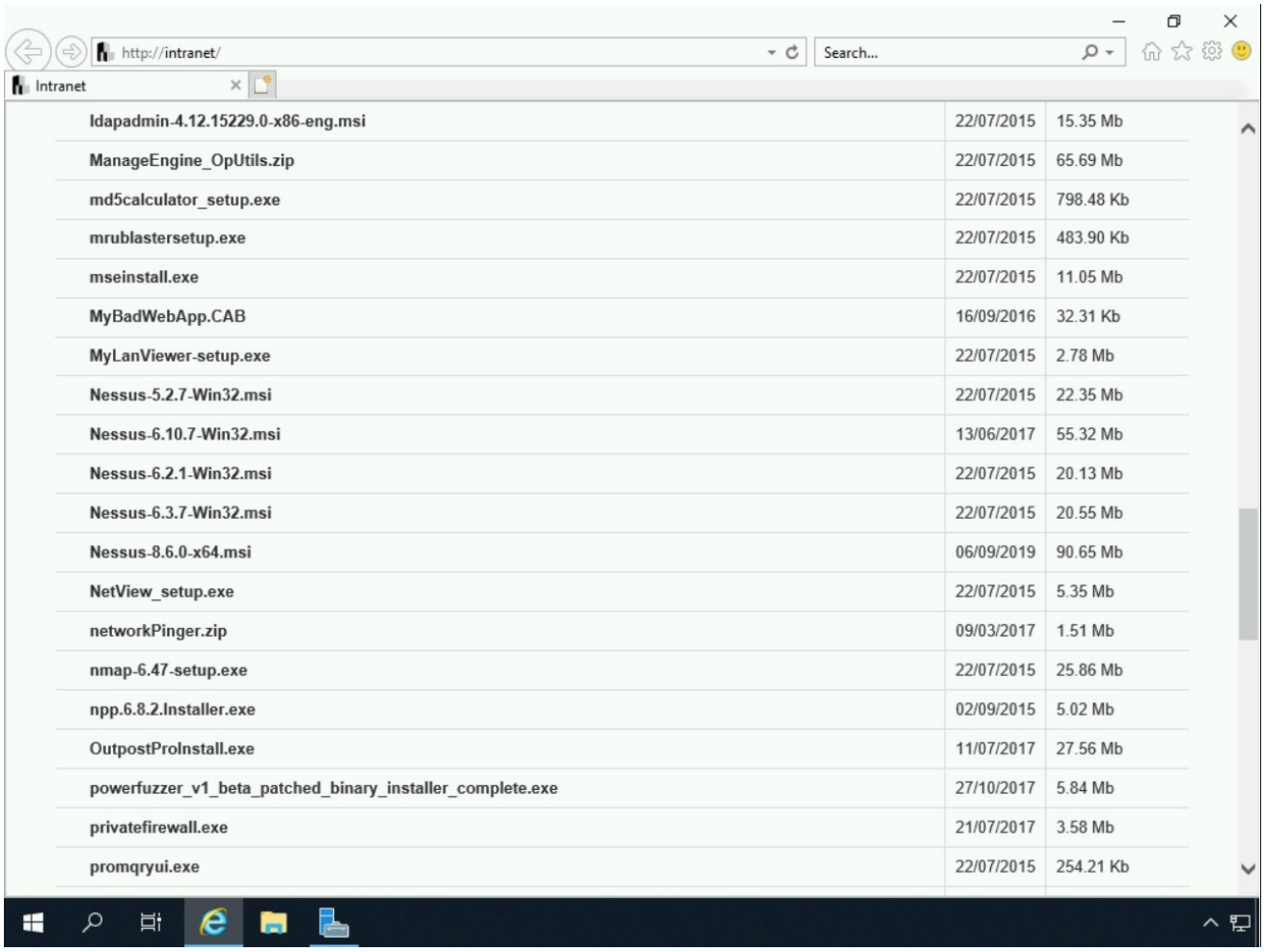


Figure 1.14 Screenshot of PLABDM01: Displaying the Hacking Tools page.

Step 2

Click the the address bar and type in

```
http://www.aeppro.com/products/free.shtml
```

Press Enter

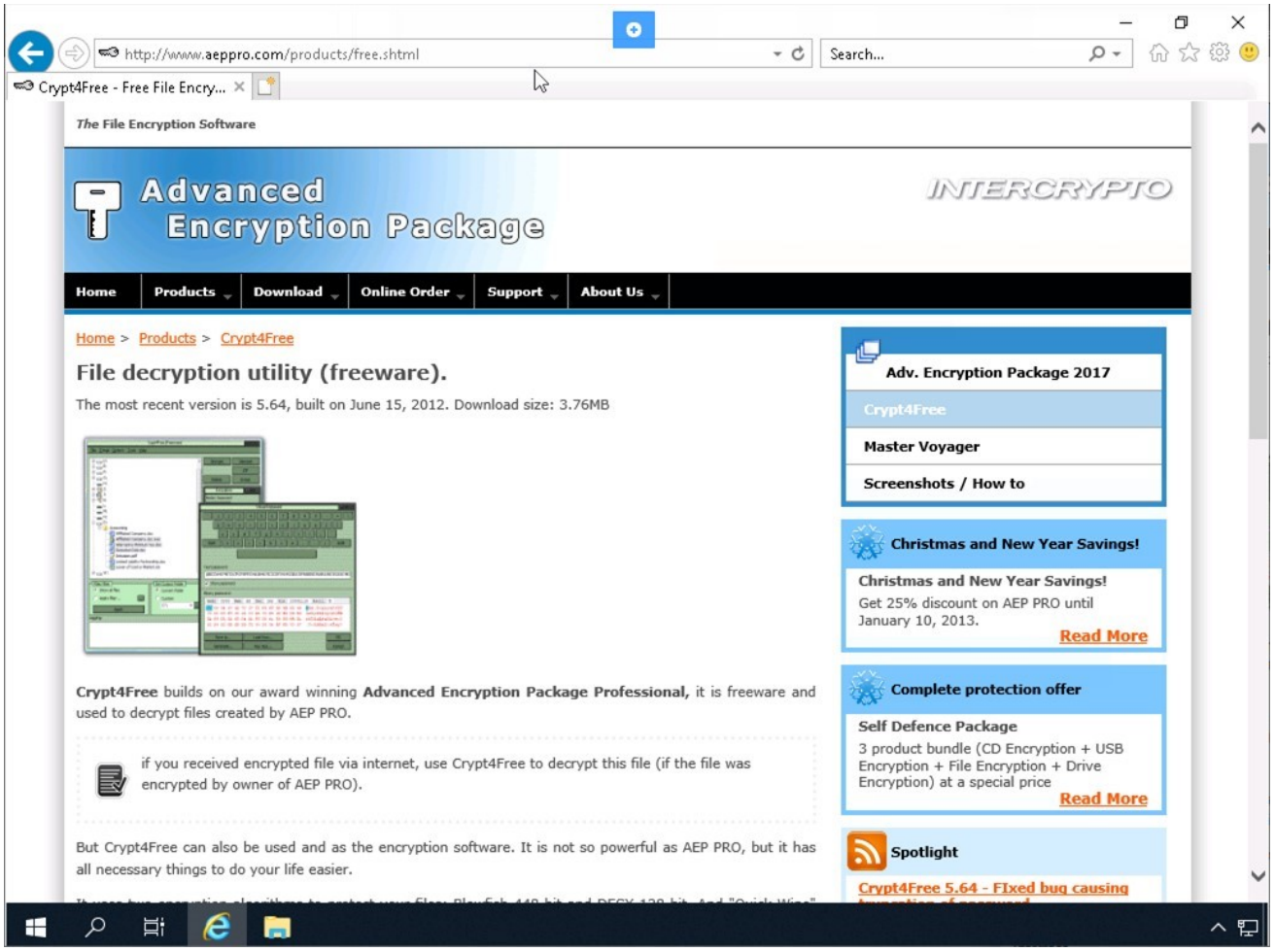


Figure 1.15 Screenshot of PLABDM01: Clicking the ape.msi file.

Step 3

Scroll down and click on **Download "Crypt4Free" (crypt4free setup.exe)**,

When the notification appears click the down arrow and select **Save as**.

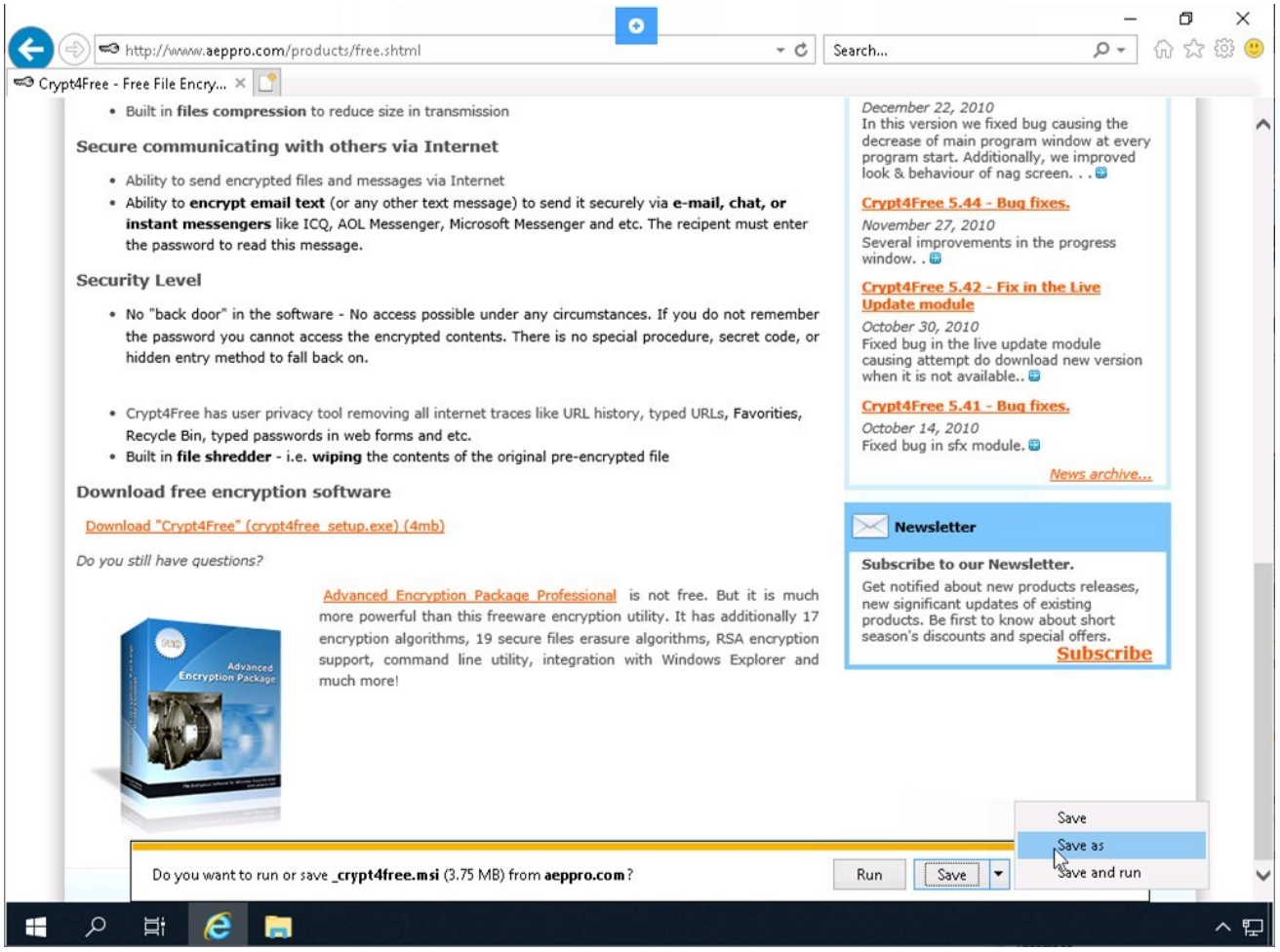


Figure 1.16 Screenshot of PLABDM01: Clicking the Save as option in the notification bar.

Step 4

In the **Save As** dialog box navigate to the **Local Disk C:\labfiles** folder and click **Save**.

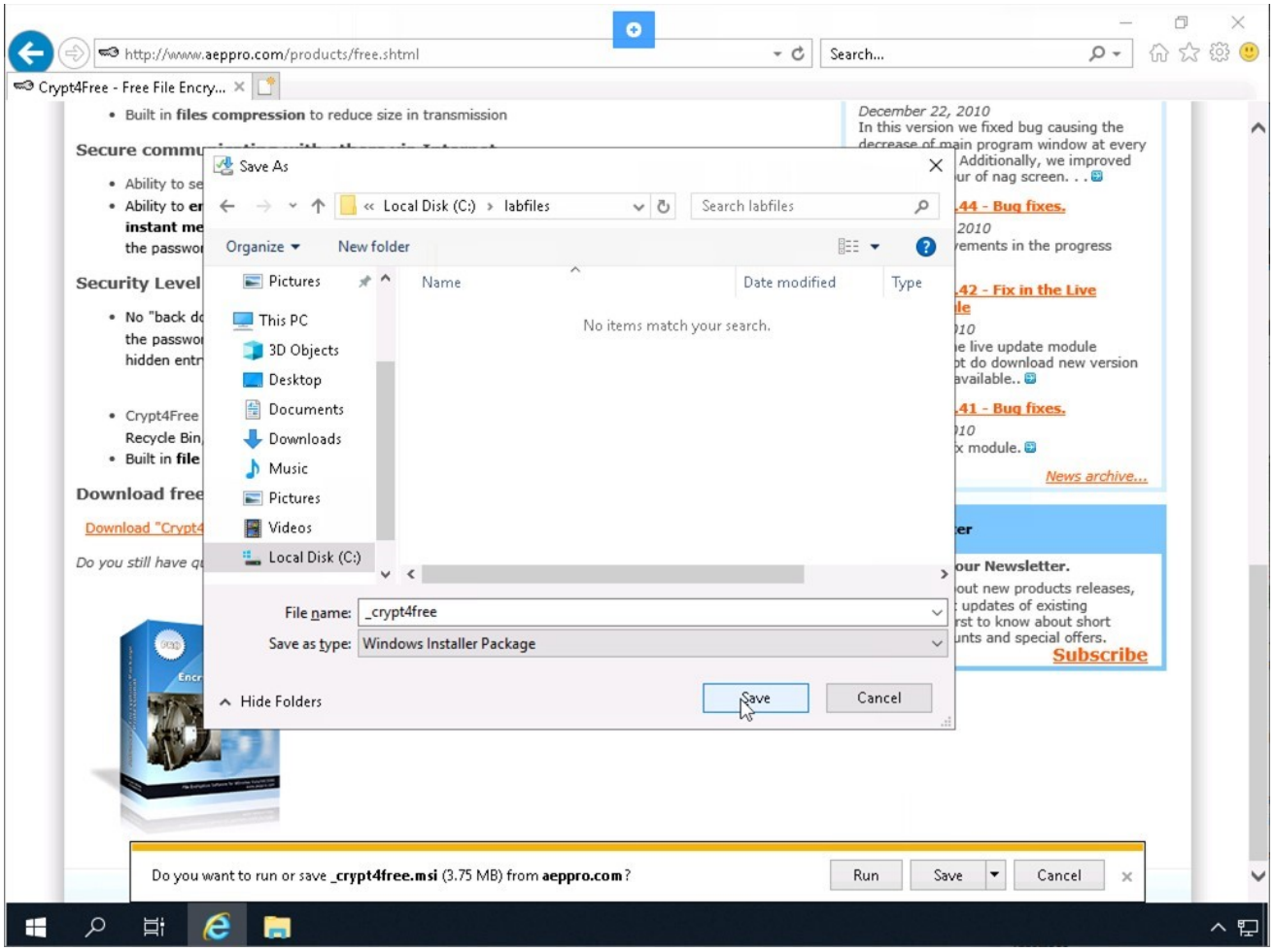


Figure 1.17 Screenshot of PLABDM01: Clicking Save on the Save As dialog box.

Step 5

In the notification bar, click **Run**.

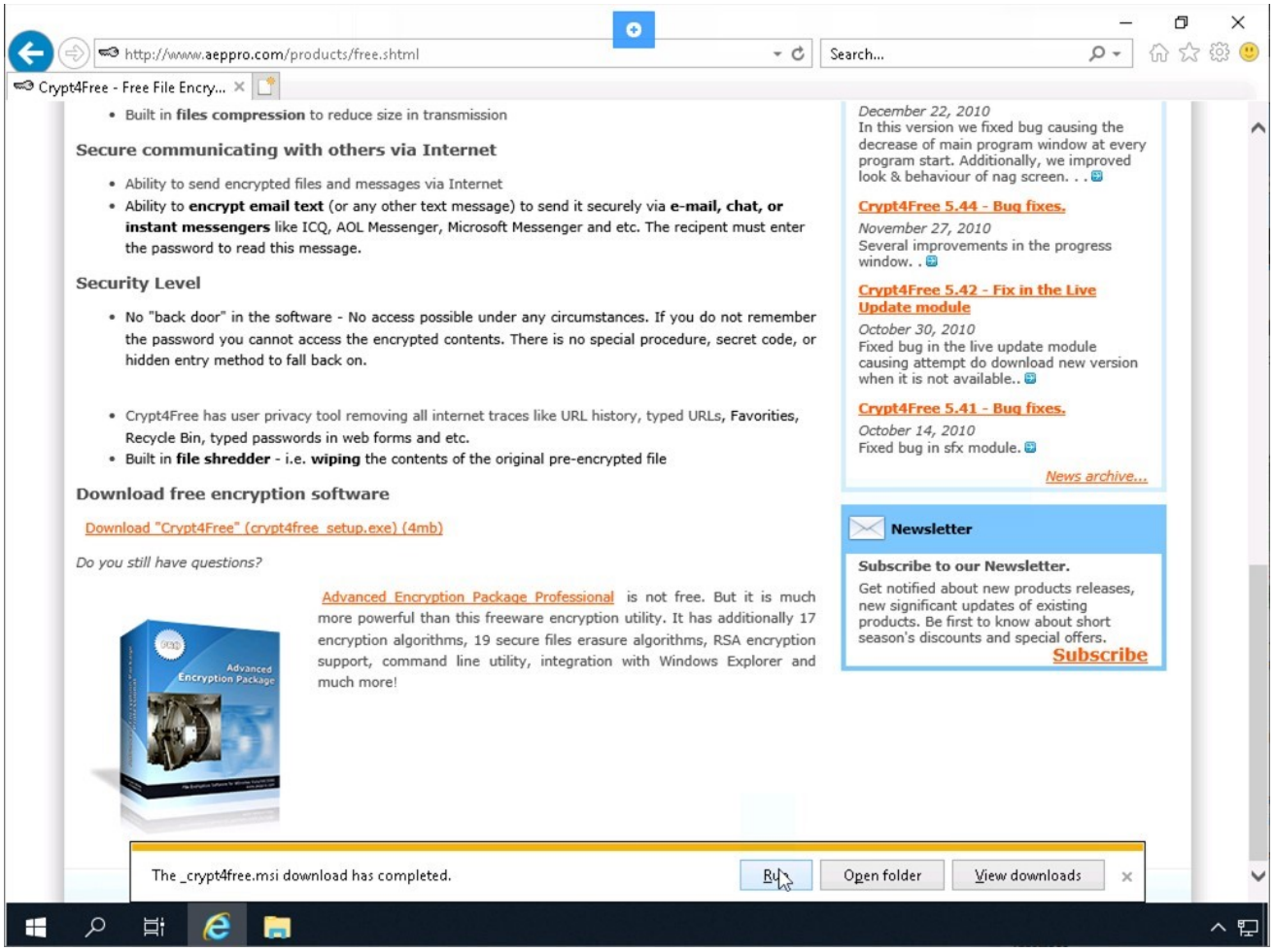


Figure 1.18 Screenshot of PLABDM01: Clicking Run on the notification bar.

Step 6

In the **Crypt4Free Setup** dialog box, select **I accept the terms in the License Agreement** and click **Install**.

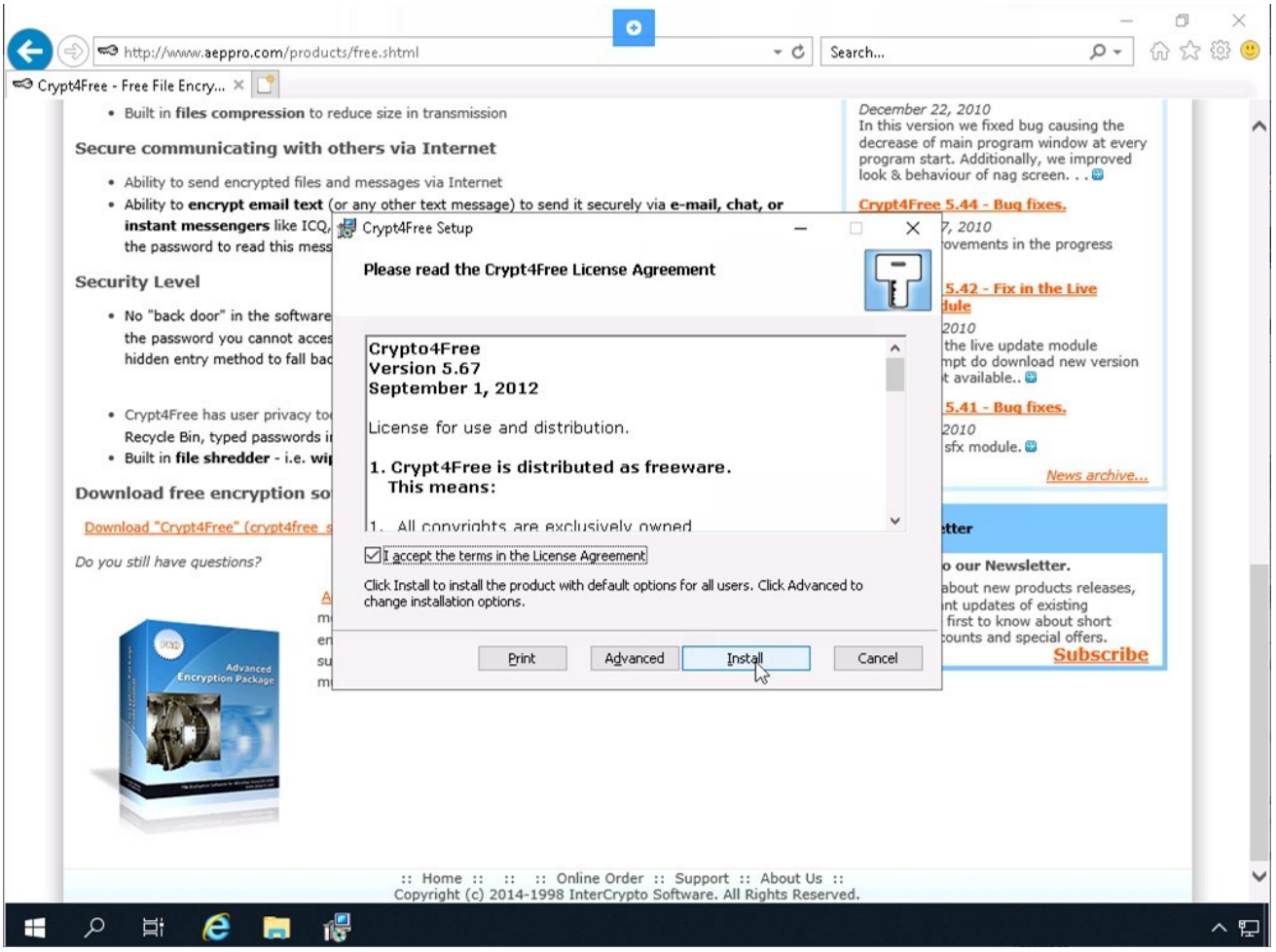


Figure 1.19 Screenshot of PLABDM01: Clicking Install on the Please read the Advanced Encryption Package 2017 License Agreement page.

Step 7

The installation process starts.

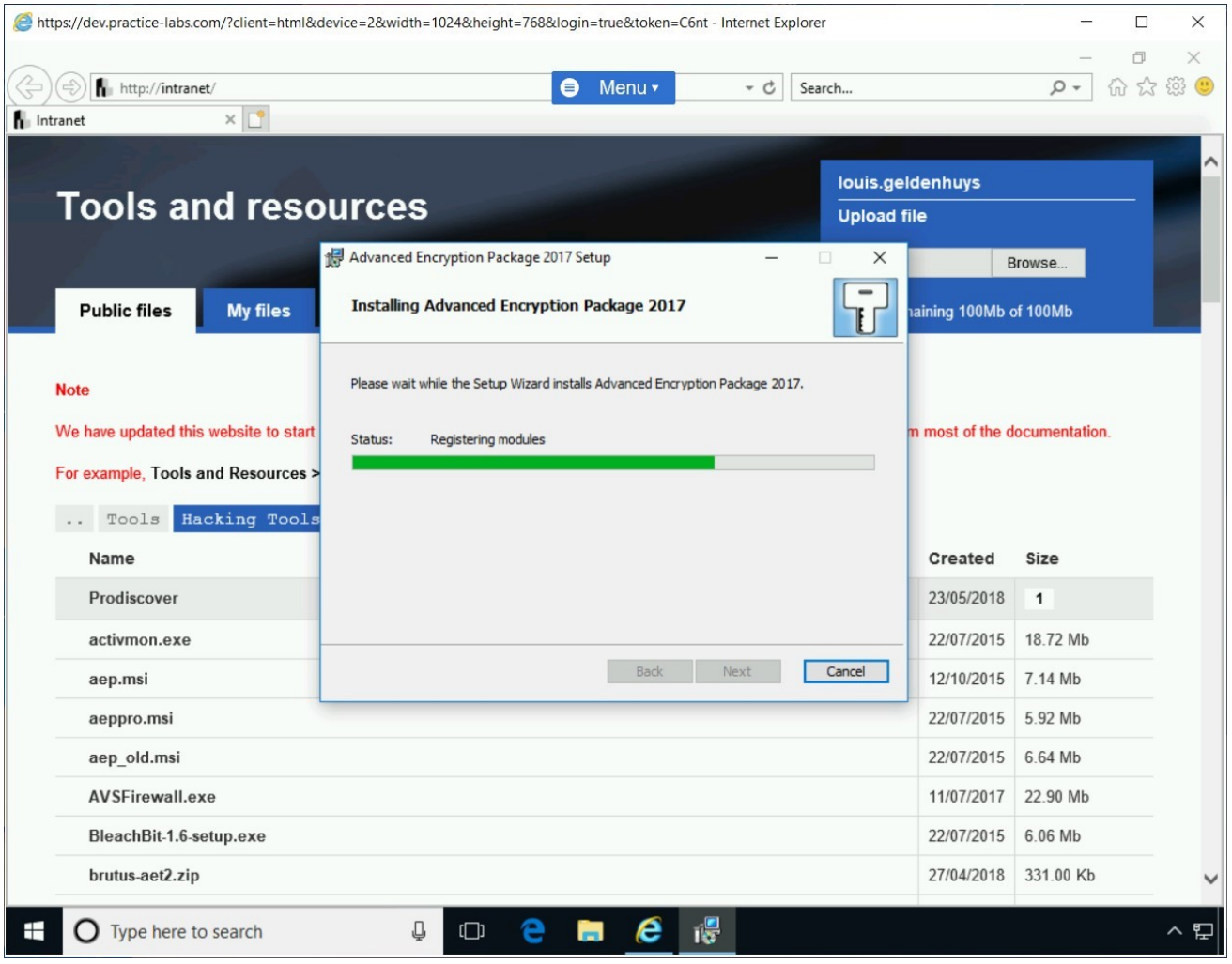


Figure 1.20 Screenshot of PLABDM01: Showing the installation process of Advanced Encryption Package 2017.

Step 8

After the installation process is completed, On the **Completed the Advanced Crypt4Free** page, click **Finish**.

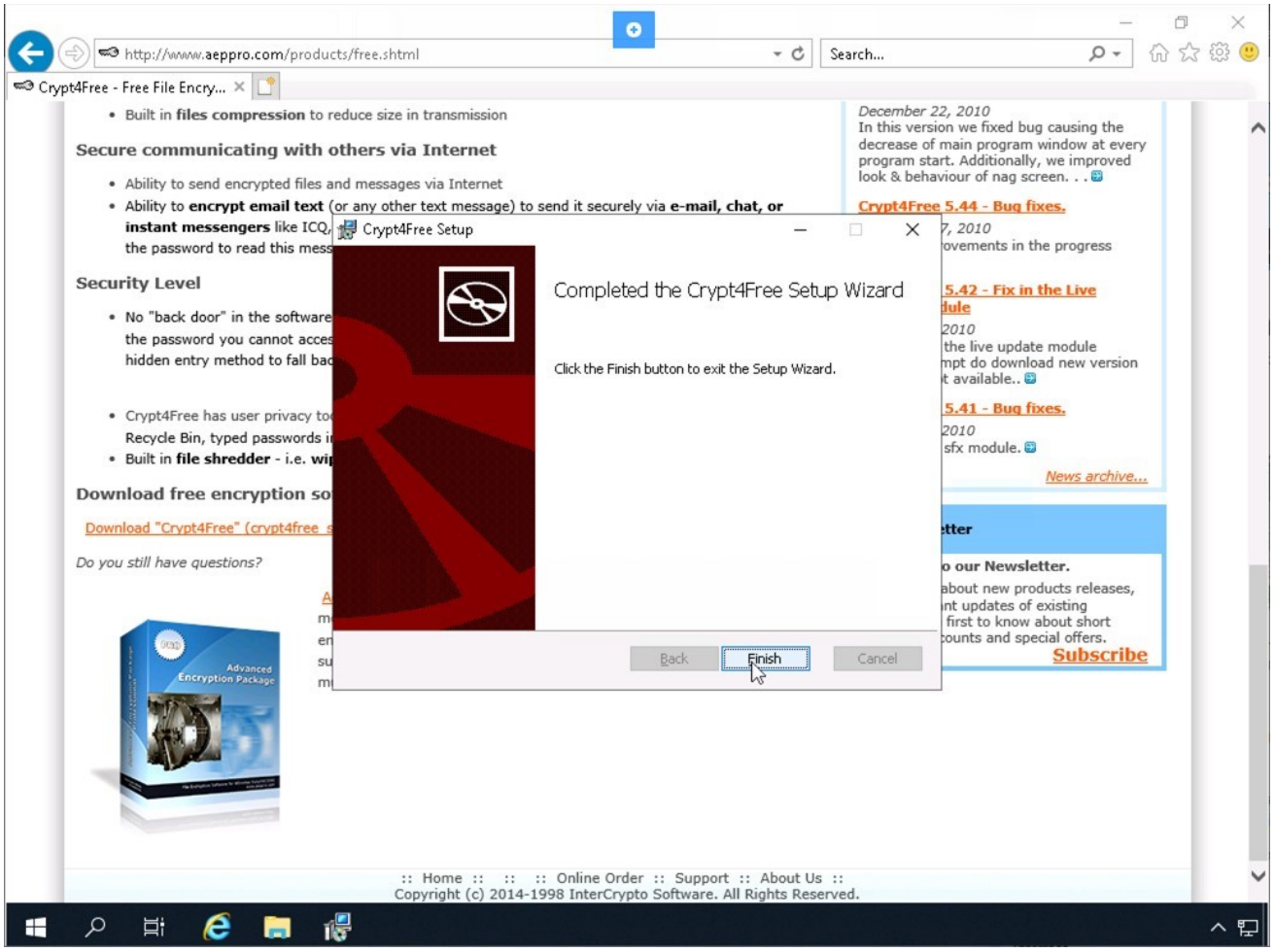


Figure 1.21 Screenshot of PLABDM01: Clicking Finish on the Completed the Advanced Encryption Package 2017 Setup Wizard page.

Step 9

Minimize the **Internet Explorer** window. Click the Windows charm, expand **Crypt4Free** and then select **Crypt4Free**.

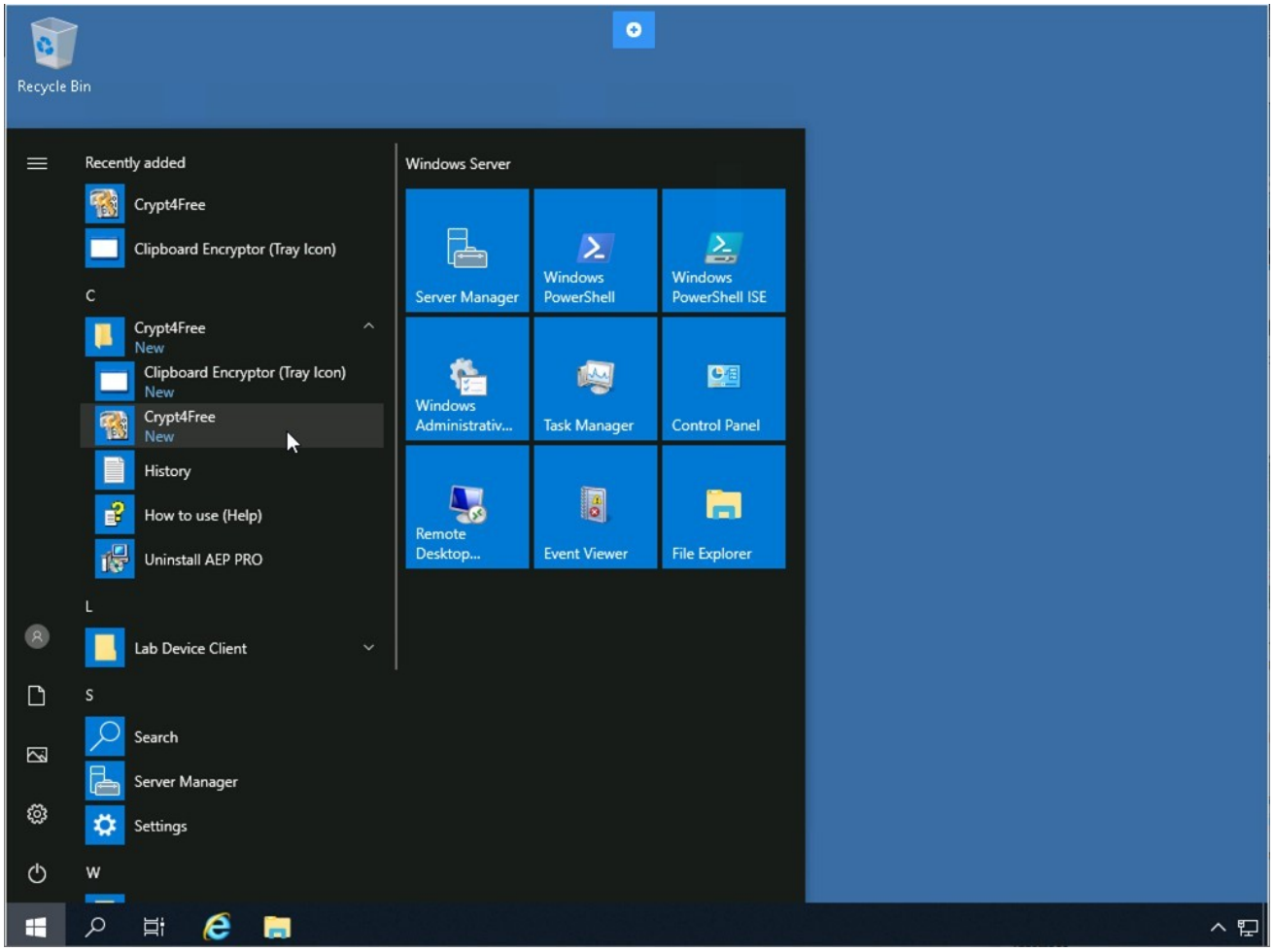


Figure 1.22 Screenshot of PLABDM01: Selecting Advanced Encryption Package 2017 menu option.

Step 10

The **Crypt4Free** application is displayed.

From the left-hand pane, expand the **C:** drive, select **labfiles**, and click **Encrypt**.

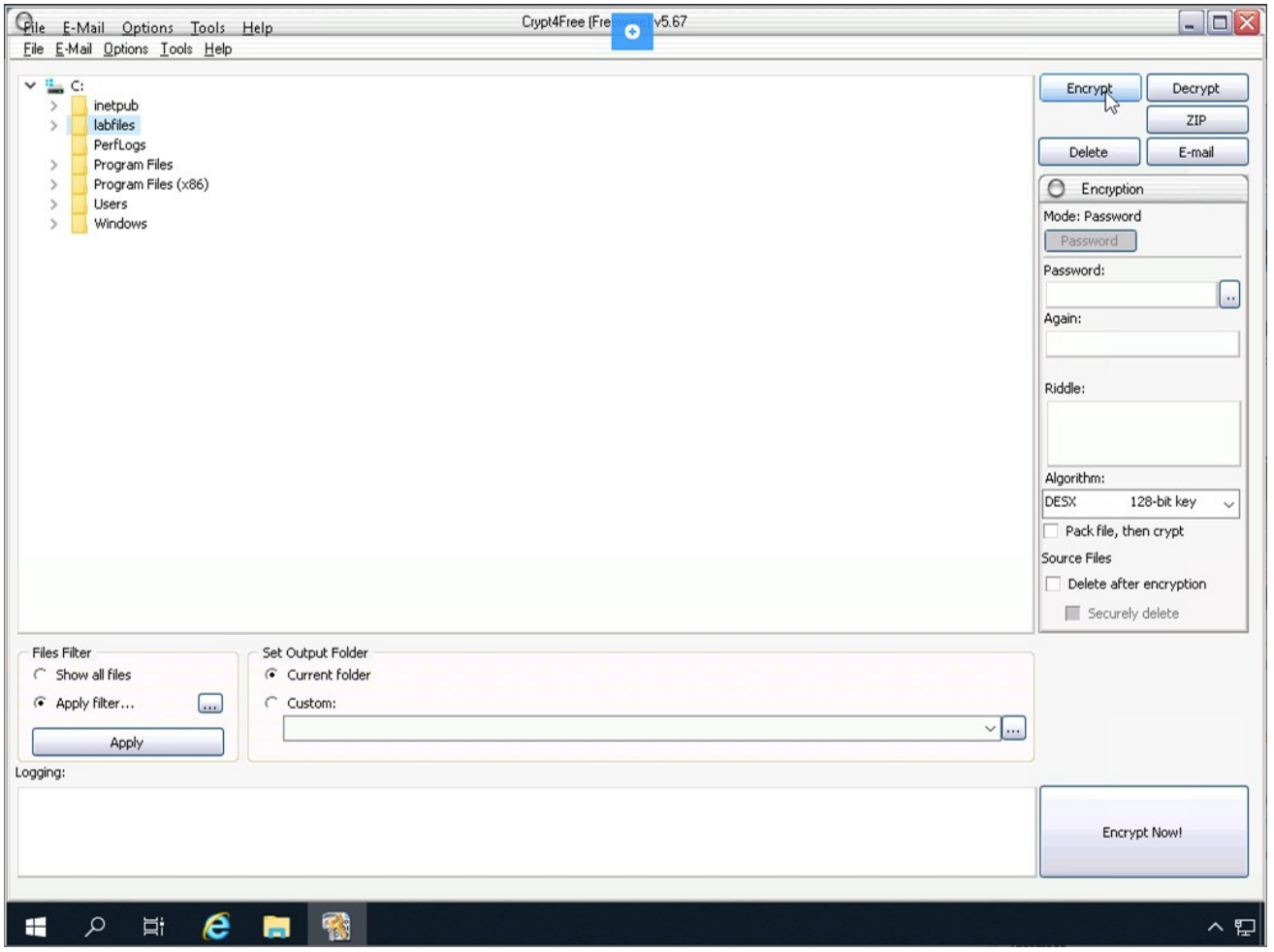


Figure 1.23 Screenshot of PLABDM01: Expanding C drive and clicking Encrypt.

Step 11

The cursor appears in the **Password** textbox. Type the following password:

```
Passw0rd
```

In the **Again** textbox, type the following password:

```
Passw0rd
```

Click **Encrypt Now!**

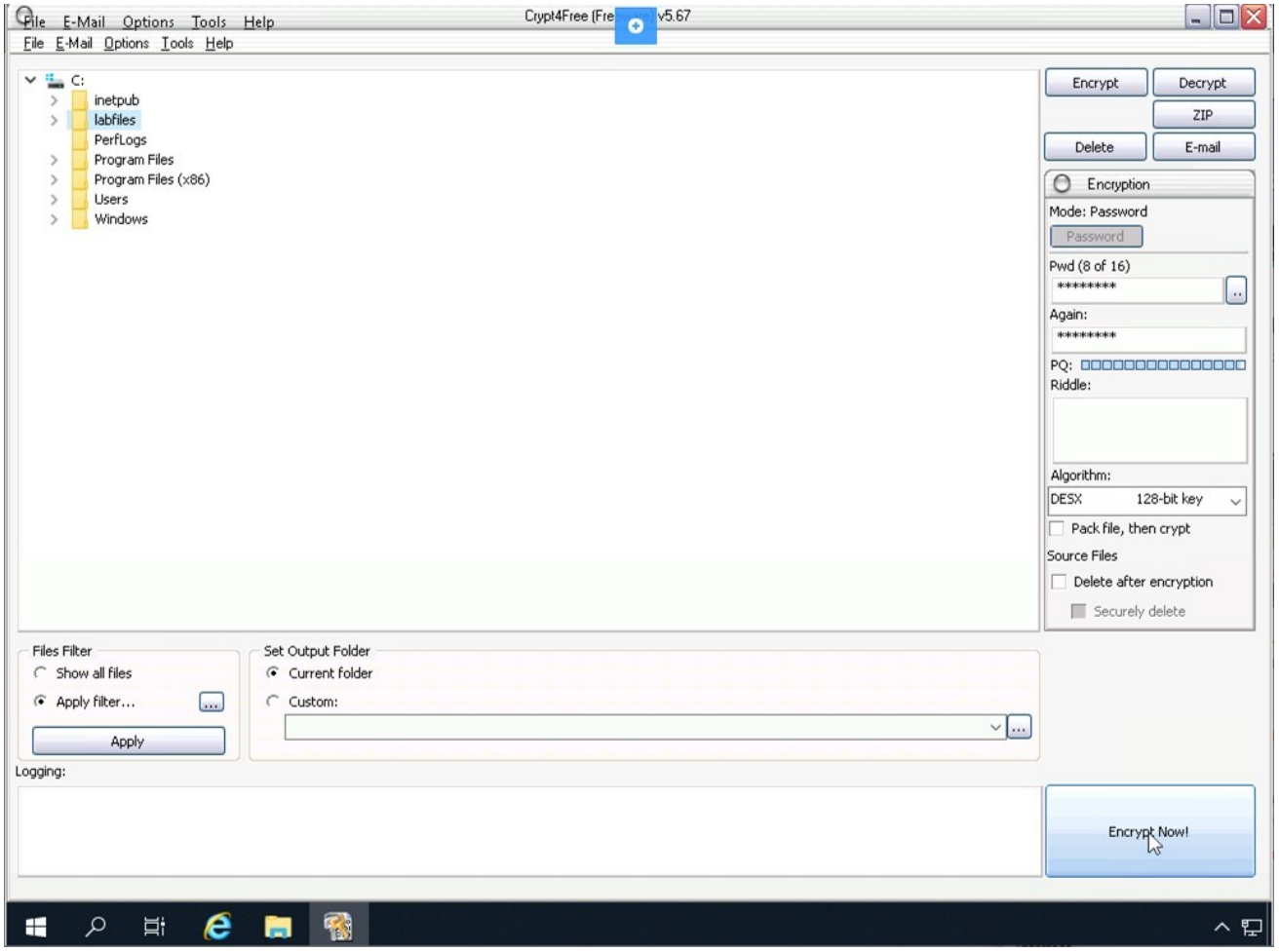


Figure 1.24 Screenshot of PLABDM01: Entering and confirming the password and then clicking Encrypt Now!.

Step 12

The encryption process now starts.

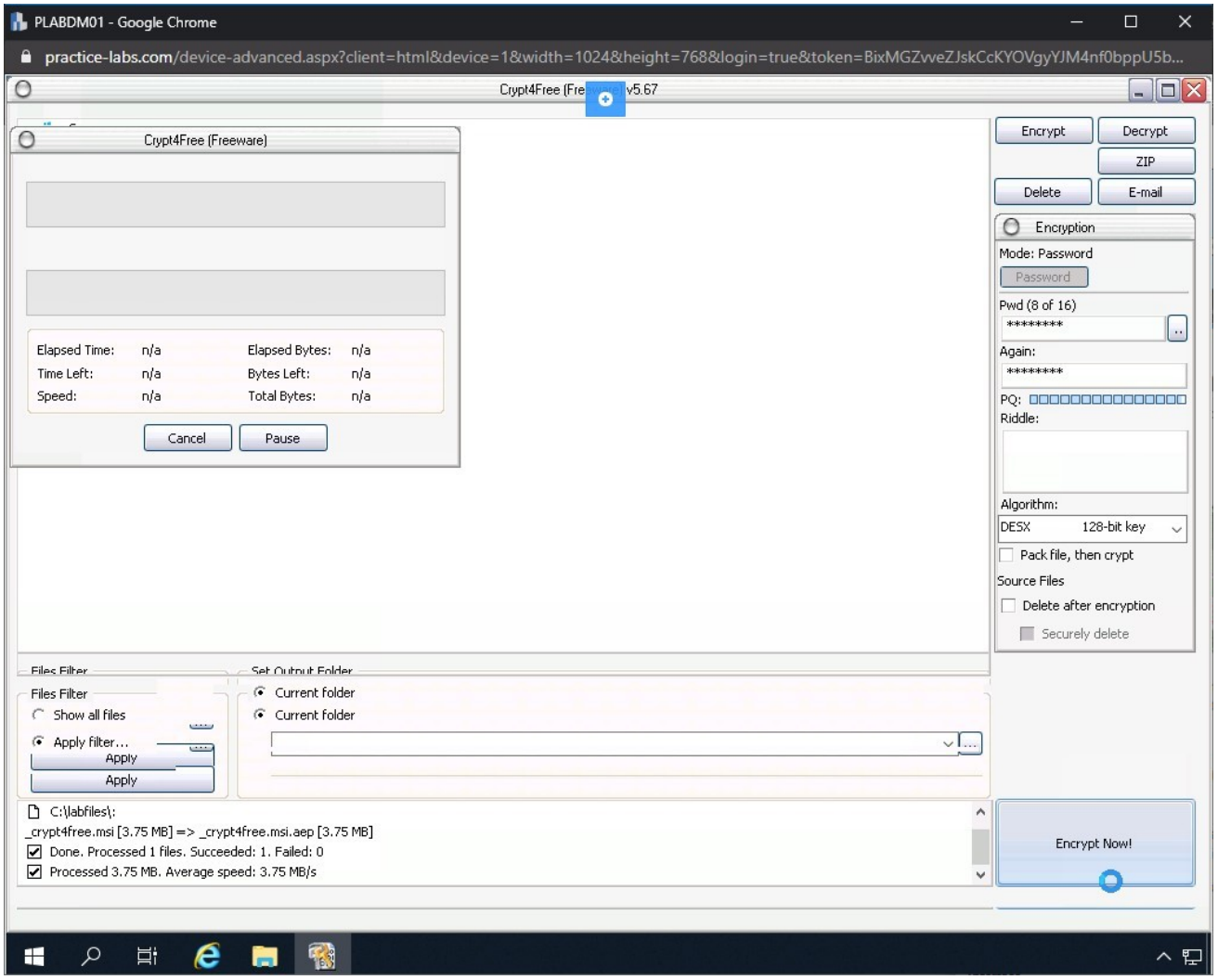


Figure 1.25 Screenshot of PLABDM01: Showing the encryption process.

Step 13

The files are now encrypted. The bottom section of the left pane, **Logging**, displays the log for the encryption process.

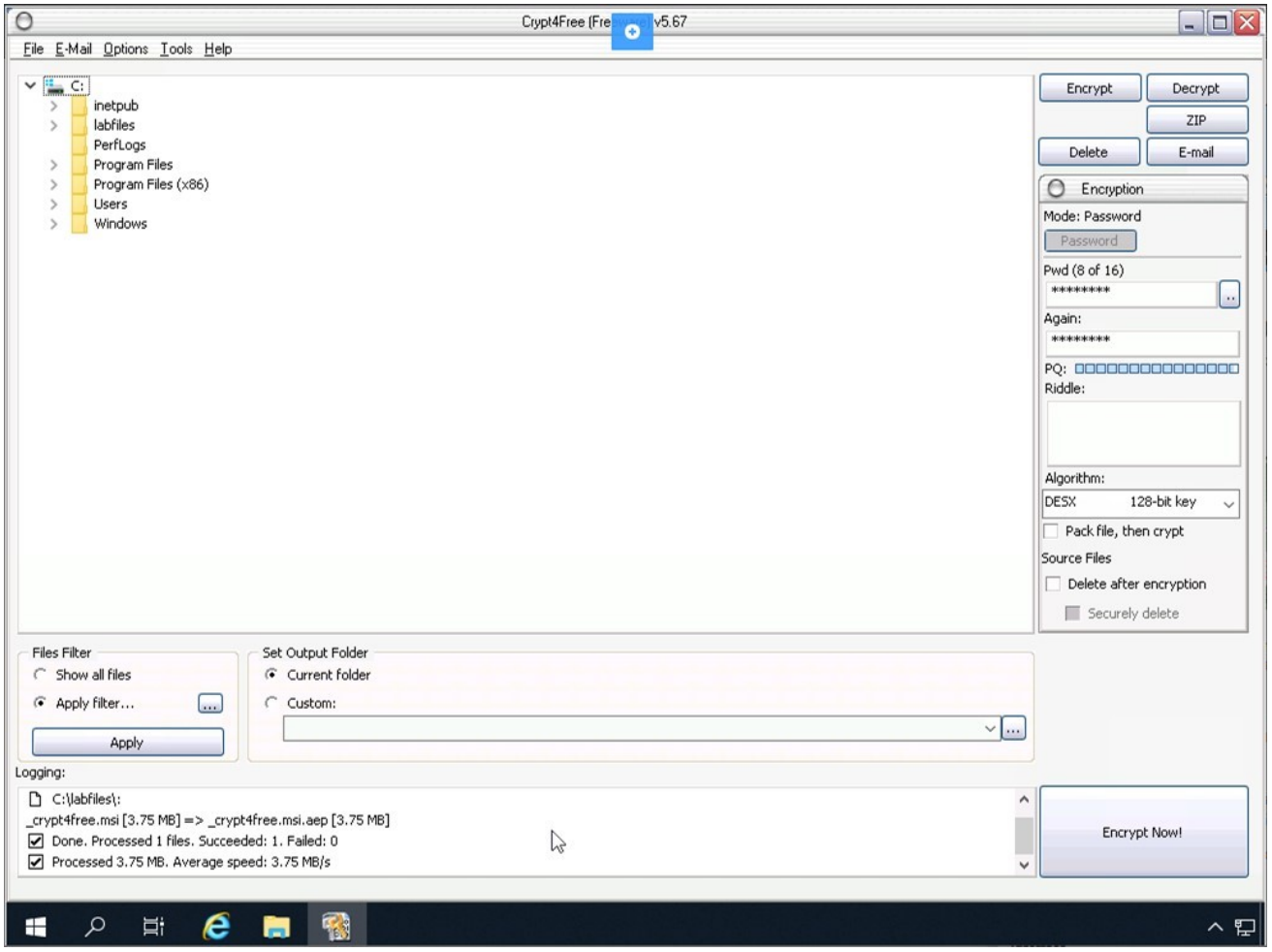


Figure 1.26 Screenshot of PLABDM01: Showing the encryption events in the Logging section.

Step 14

Open **File Explorer** and navigate to the **C:\labfiles** folder. Note that for each file, a new file with the key icon has been created. This is the encrypted file.

Double-click **md5calculator_setup.exe**.

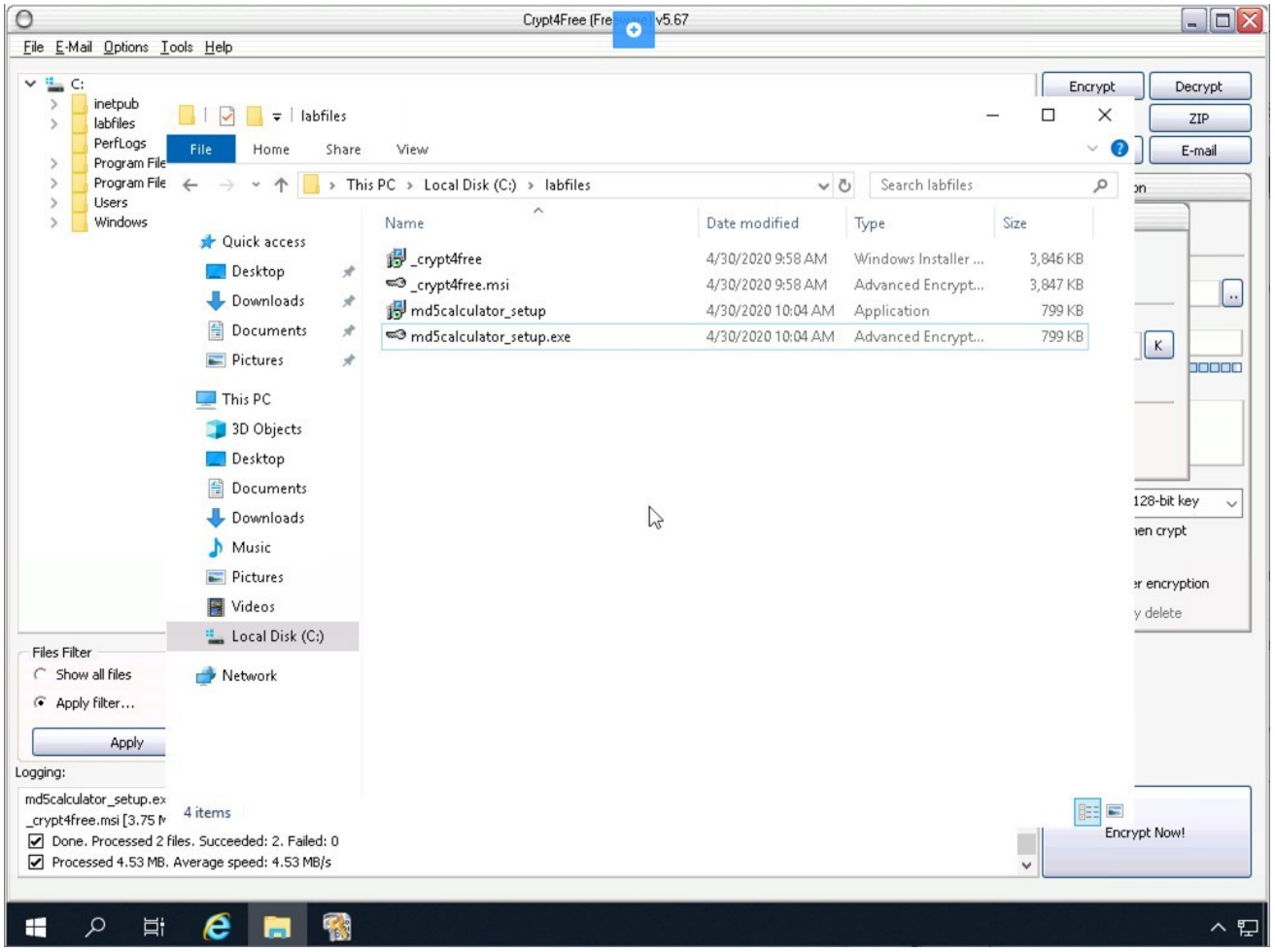


Figure 1.27 Screenshot of PLABDM01: Showing the c:\labfiles folder with the encrypted files and double-clicking the md5calculator_setup.exe.

Step 15

The **Enter Password** dialog box is displayed.

Enter the following password in the **Password** textbox:

```
Passw0rd
```

Click **Decrypt**.

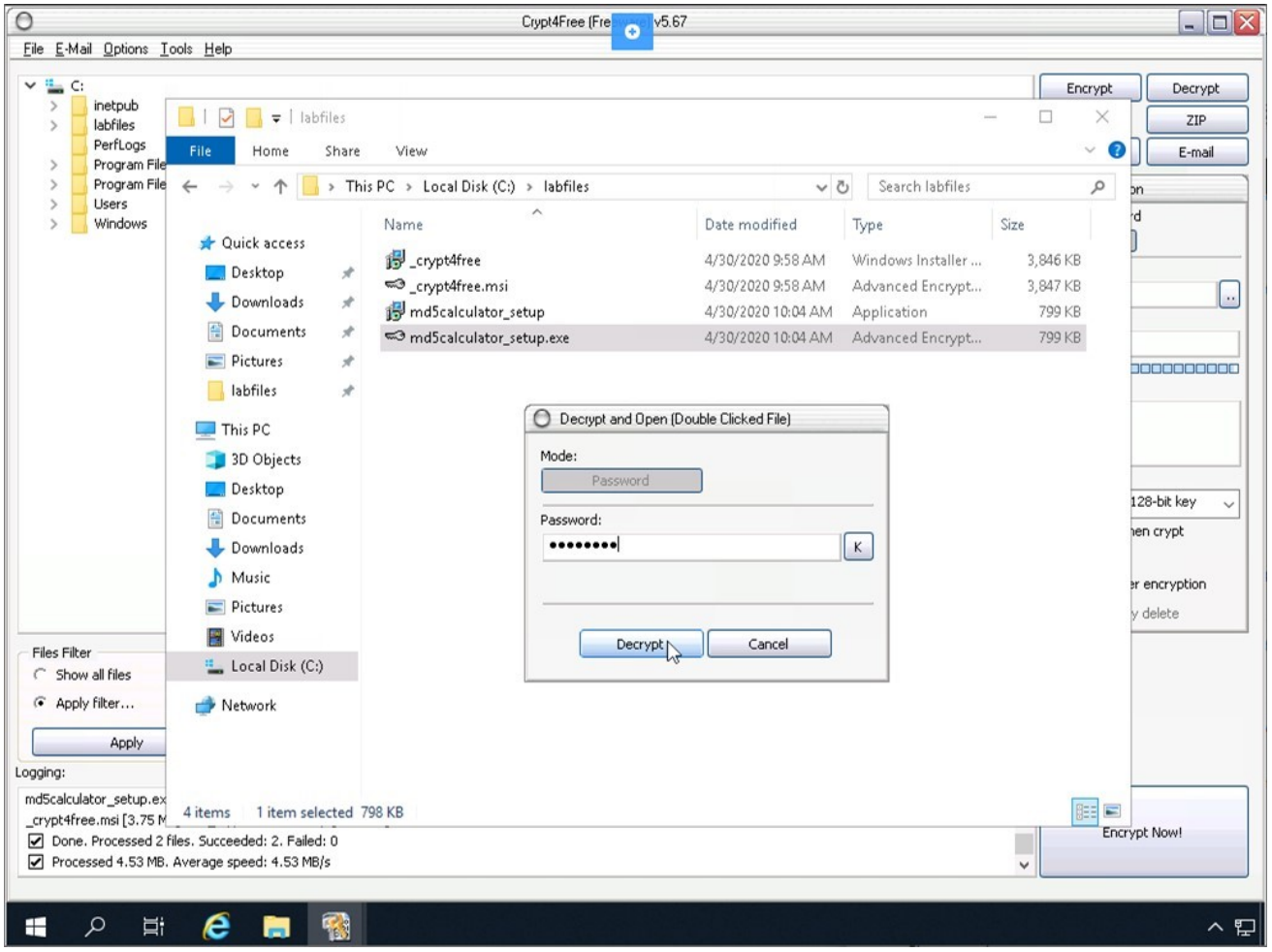


Figure 1.28 Screenshot of PLABDM01: Entering the password in the Enter Password dialog box and clicking Proceed.

Step 16

The **Setup - MD5 Calculator** wizard is displayed. Click **Cancel**.

> **Note:** If a notification appears stating the file already exists, click on **Yes**

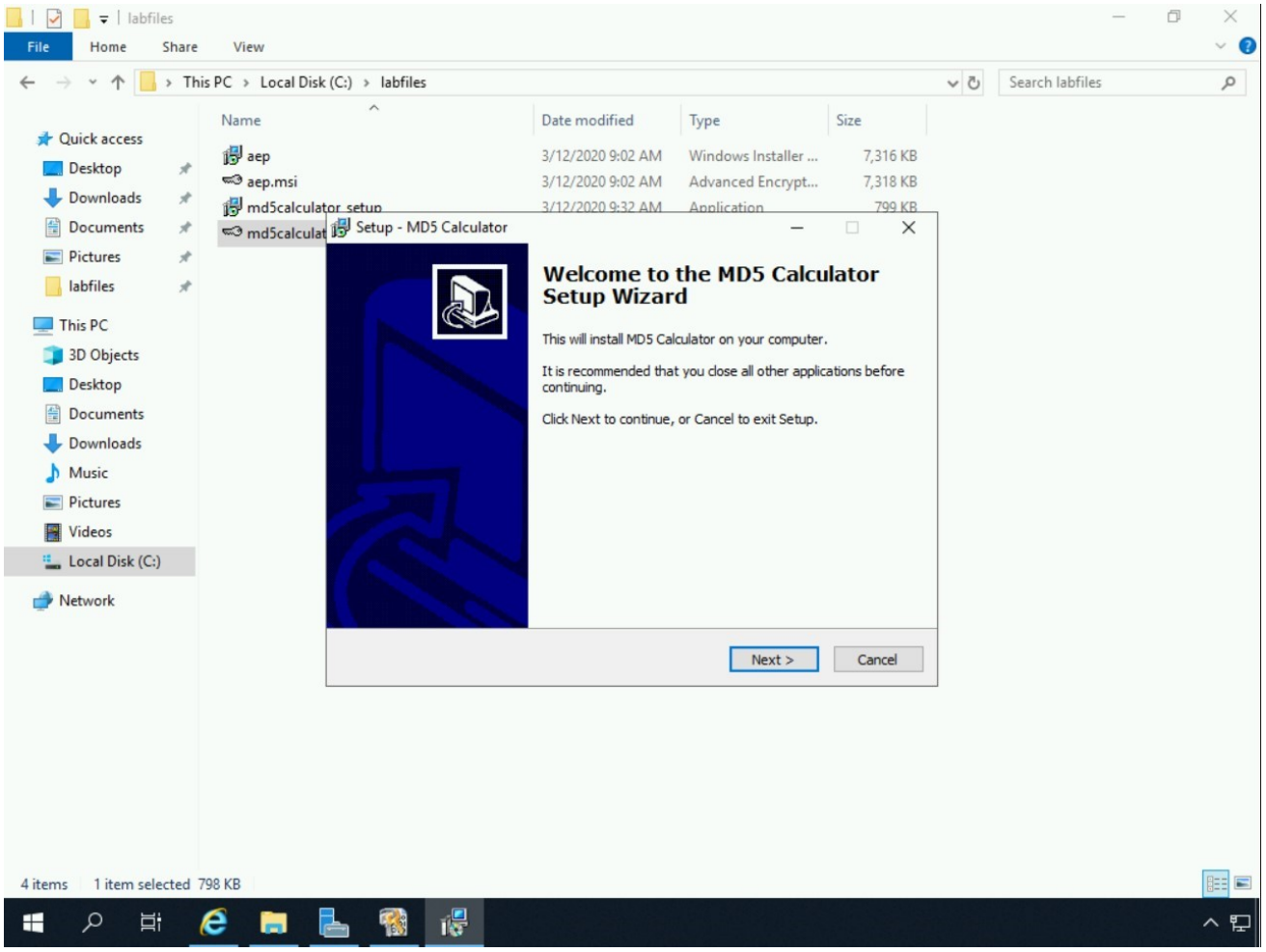


Figure 1.29 Screenshot of PLABDM01: Clicking Cancel on the Welcome to the MD5 Calculator Setup Wizard page of the Setup - MD5 Calculator wizard.

Step 17

The **Exit Setup** dialog box is displayed. Click **Yes**.

Close the **File Explorer** window.

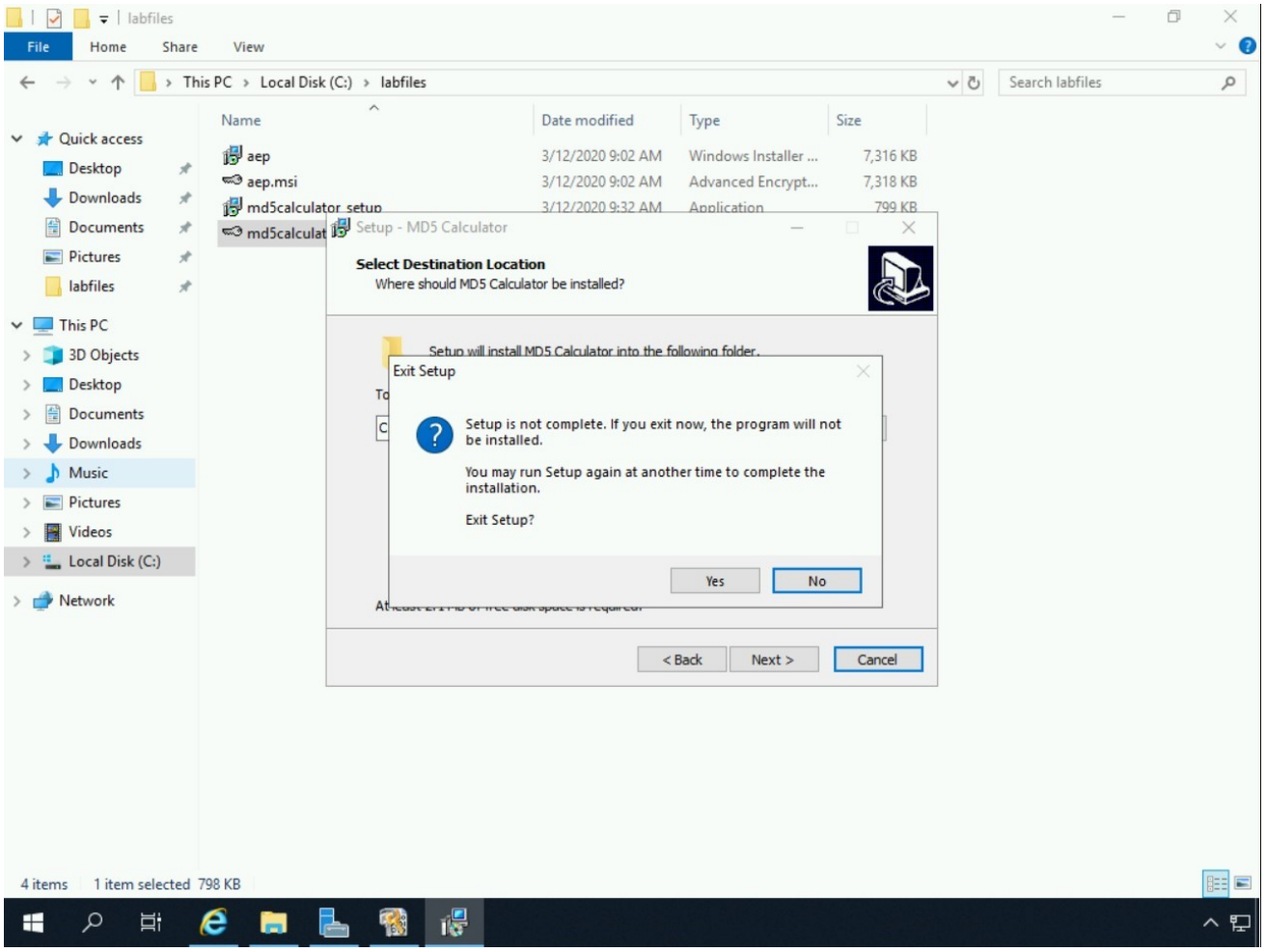


Figure 1.30 Screenshot of PLABDM01: Clicking No on the Exit Setup dialog box.

Step 18

You are back on the **Crypt4Free** window. Expand **labfiles**.

Select **md5calculator_setup.exe.aep** and click **Decrypt**.

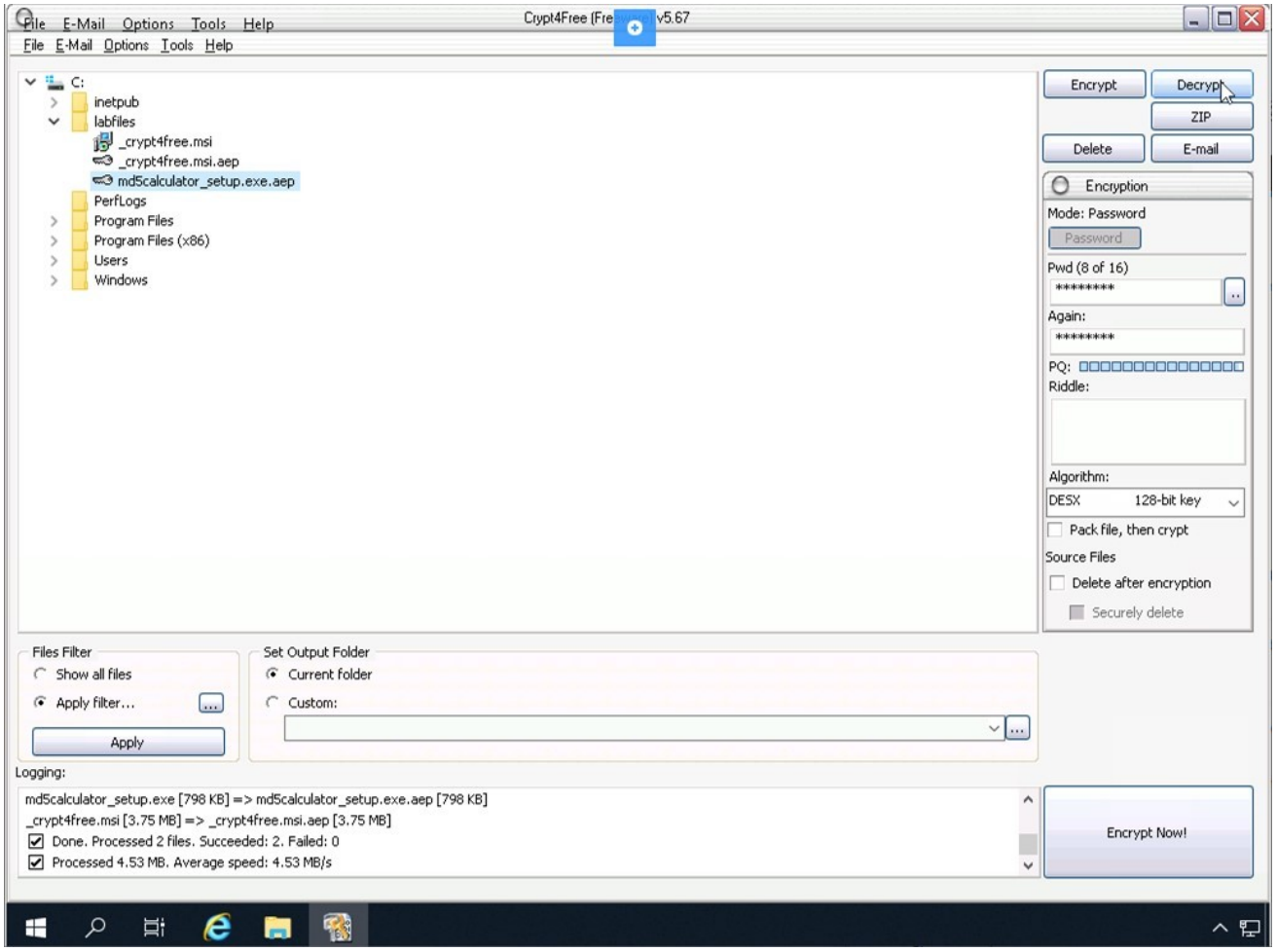


Figure 1.31 Screenshot of PLABDM01: Selecting md5alculator_setup.exe and clicking Decrypt.

Step 19

The cursor is moved into the **Password** textbox.

Enter the following password in the **Password** textbox:

```
Passw0rd
```

Click **Decrypt Now**!.

The decryption process will now start.

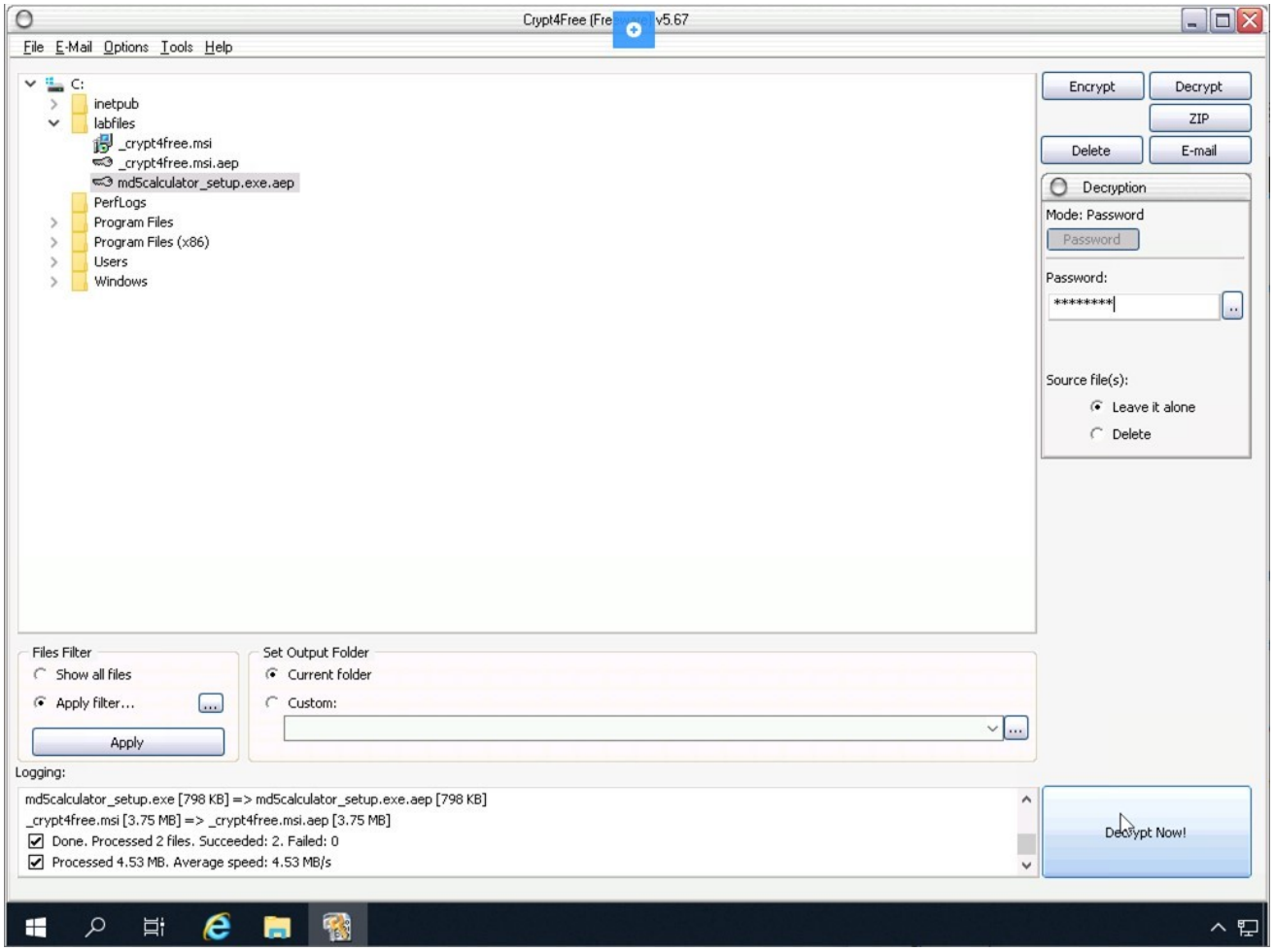


Figure 1.32 Screenshot of PLABDM01: Entering the password and clicking Decrypt Now!.

Step 20

Now, the file is now decrypted. In the **Logging** section, the status of the file is now displayed.

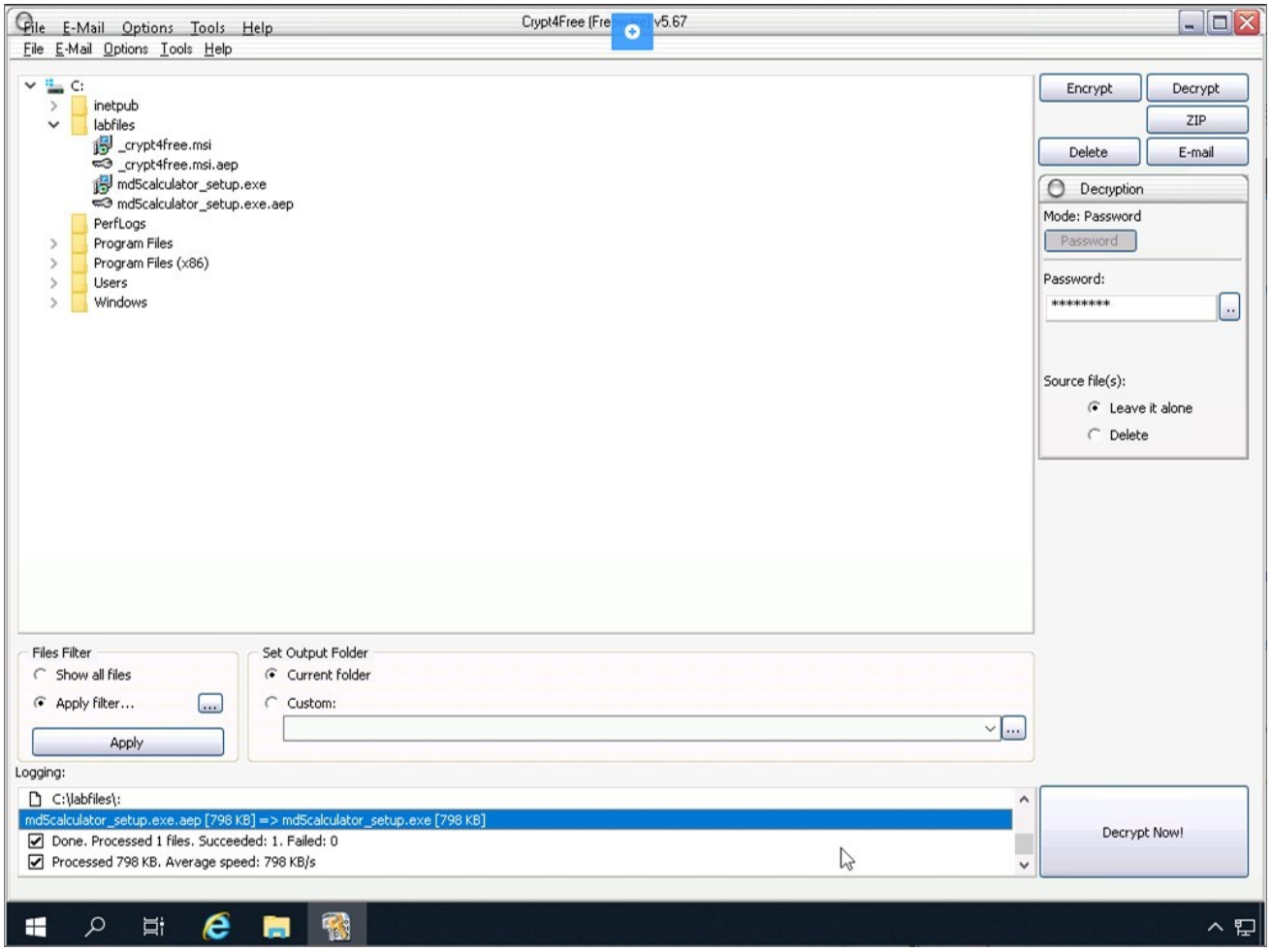


Figure 1.33 Screenshot of PLABDM01: Showing the decryption events in the Logging section.

Close the **Crypt4Free** window.

Task 3 - Download and Install HashCalc

HashCalc allows you to check 13 popular hash and checksum algorithms.

In this task, you will learn to use HashCalc.

Step 1

Ensure you have powered the required devices, **Connect** to **PLABDM01**. Restore the **Internet Explorer** window from the taskbar.

Navigate back to http://intranet and go to **Tools** > **Hacking Tools**

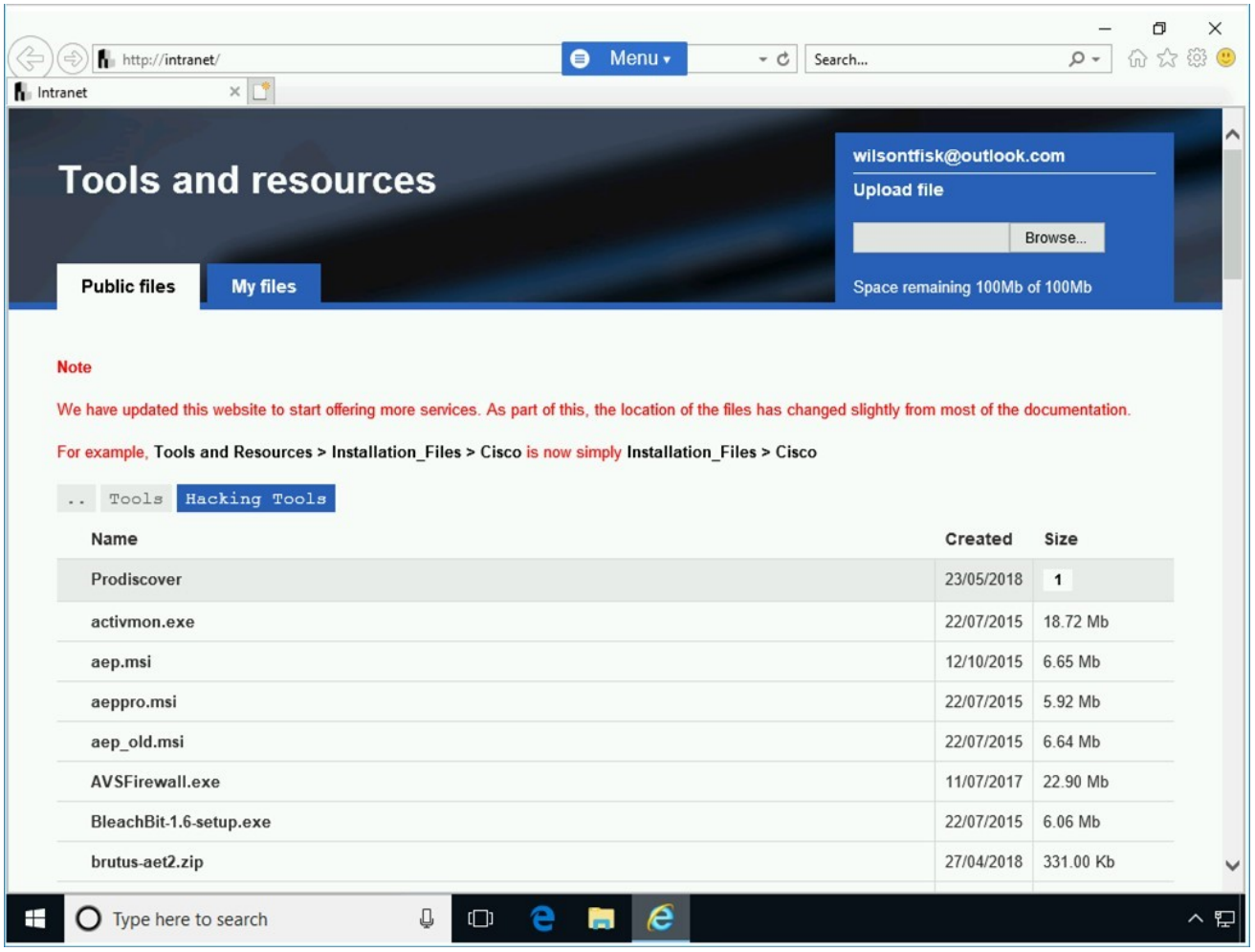


Figure 1.34 Screenshot of PLABDM01: Showing Hacking Tools page.

Step 2

On the **[..] > Tools > Hacking Tools** page, scroll down and locate and click **hashcalc.zip**.

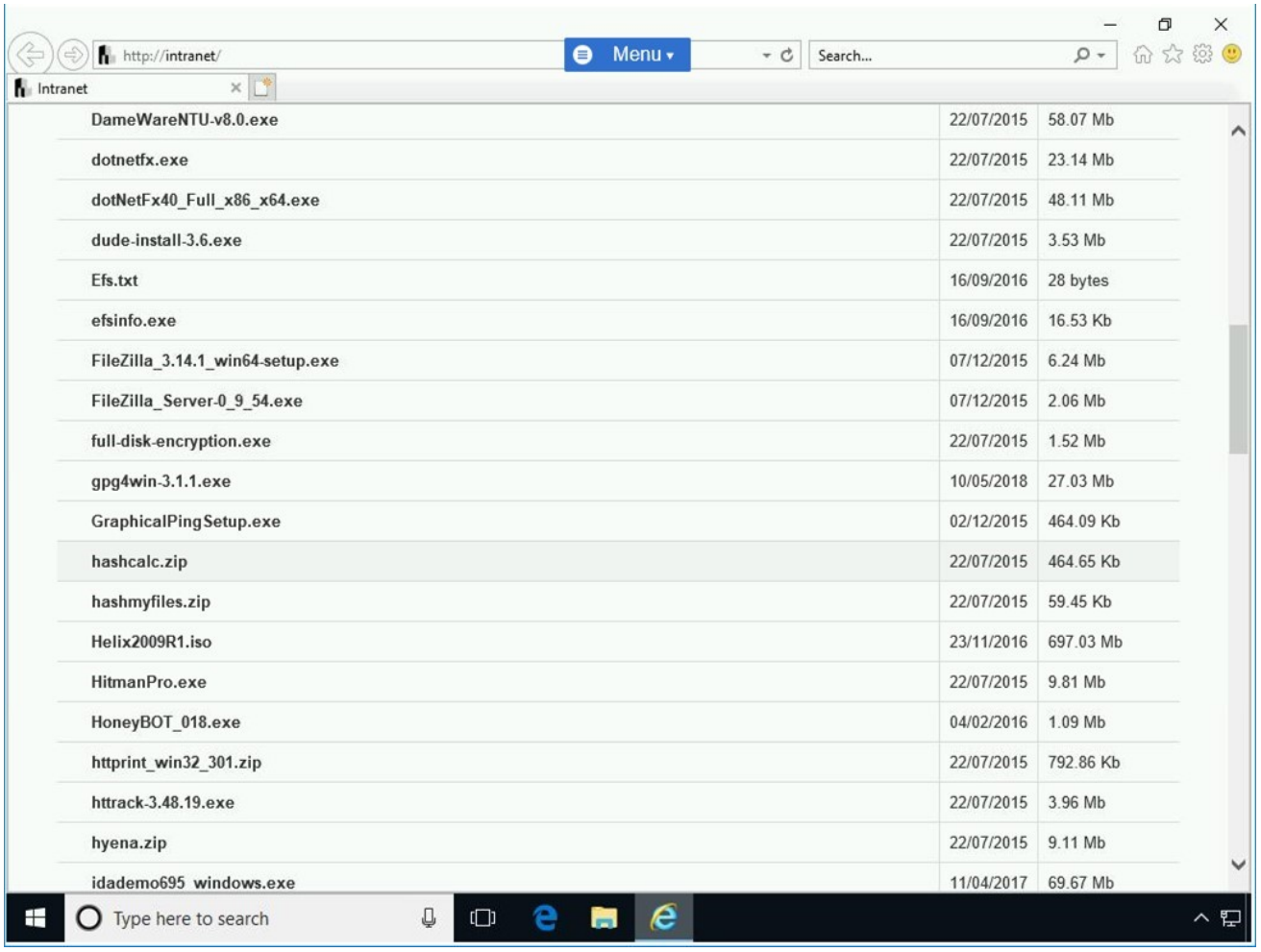


Figure 1.35 Screenshot of PLABDM01: Clicking the hashcalc.zip file.

Step 3

On the notification toolbar, click **Open**.

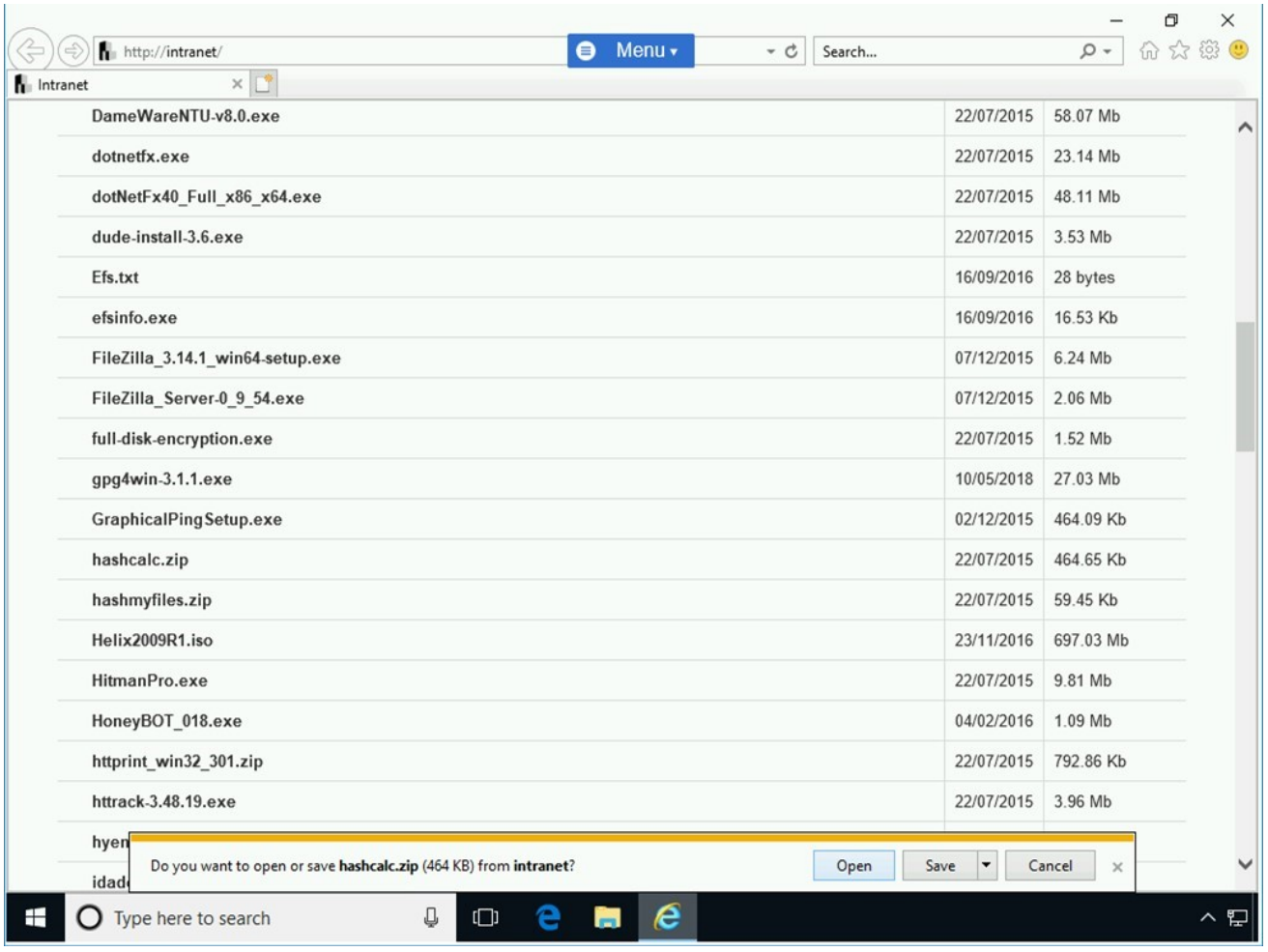


Figure 1.36 Screenshot of PLABDM01: Clicking Open on the notification toolbar.

Step 4

File Explorer opens and redirects you to the folder where the **hashcalc** setup file is saved.

Double-click the **setup** file.

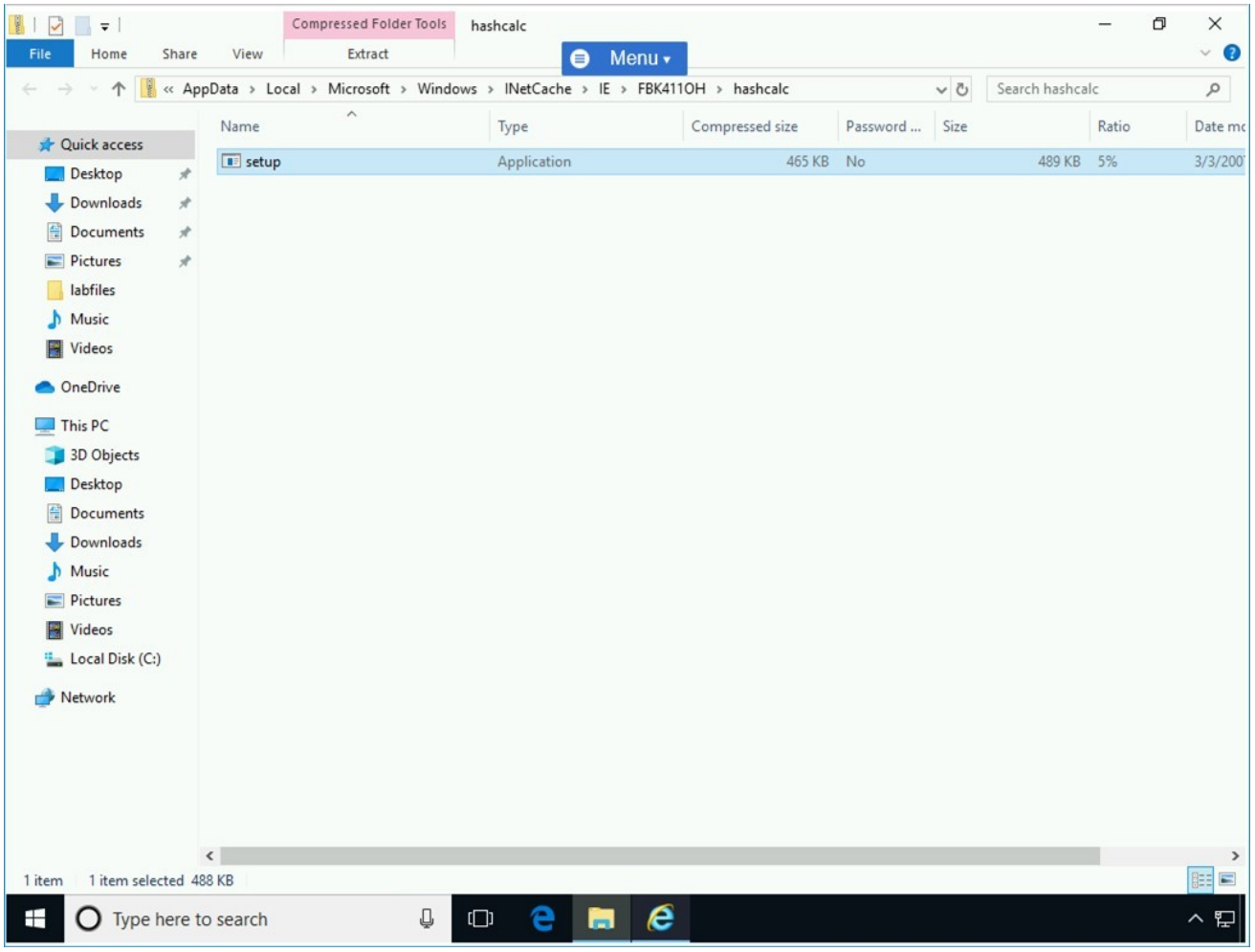


Figure 1.37 Screenshot of PLABDM01: Double-clicking the setup file in the File Explorer window.

Step 5

The **Setup - HashCalc** wizard is displayed. On the **Welcome to the HashCalc Setup Wizard** page, click **Next**.

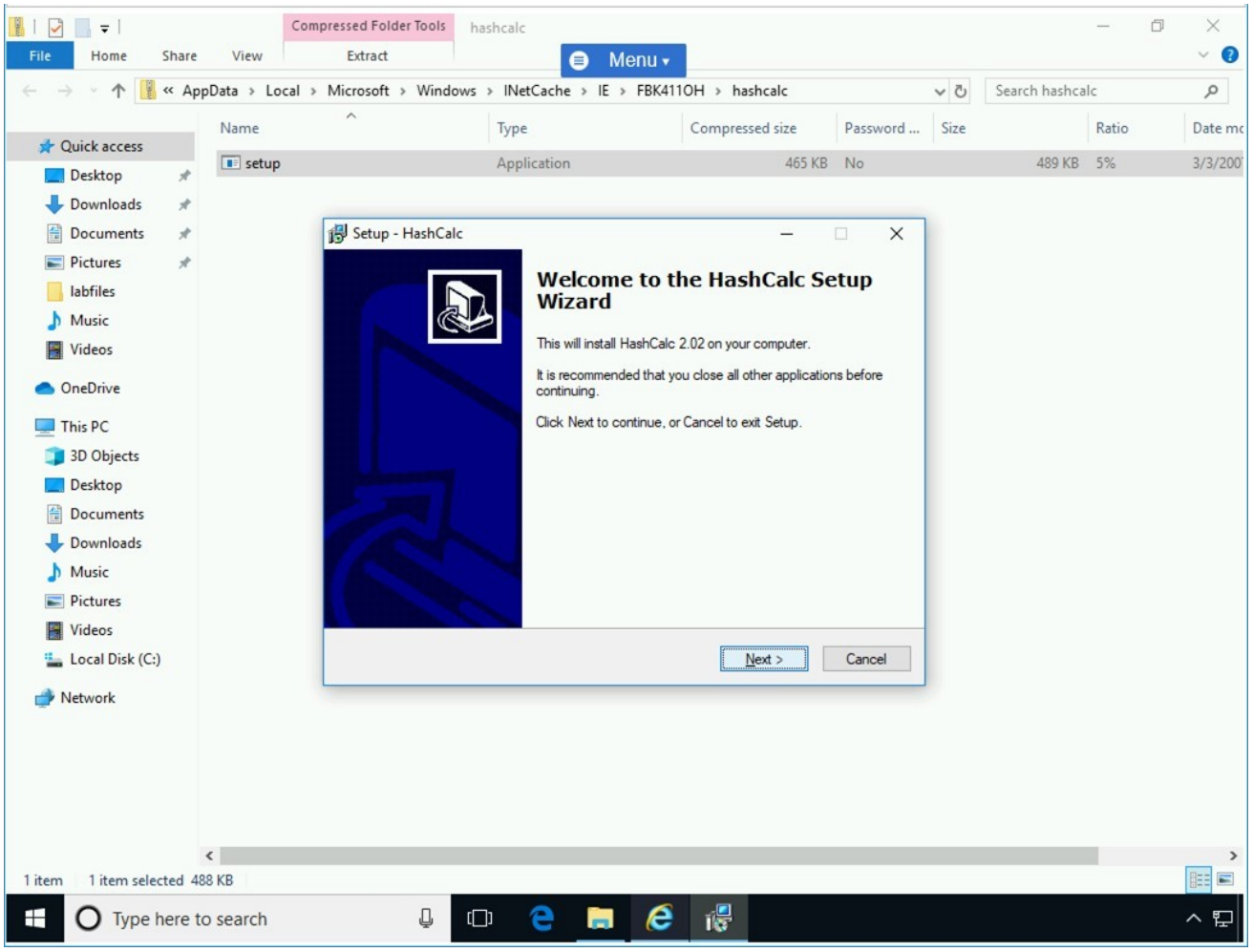


Figure 1.38 Screenshot of PLABDM01: Clicking Next on the Welcome to the HashCalc Setup Wizard page of the Setup - HashCalc wizard.

Step 6

On the **License Agreement** page, select **I accept the agreement** and click **Next**.

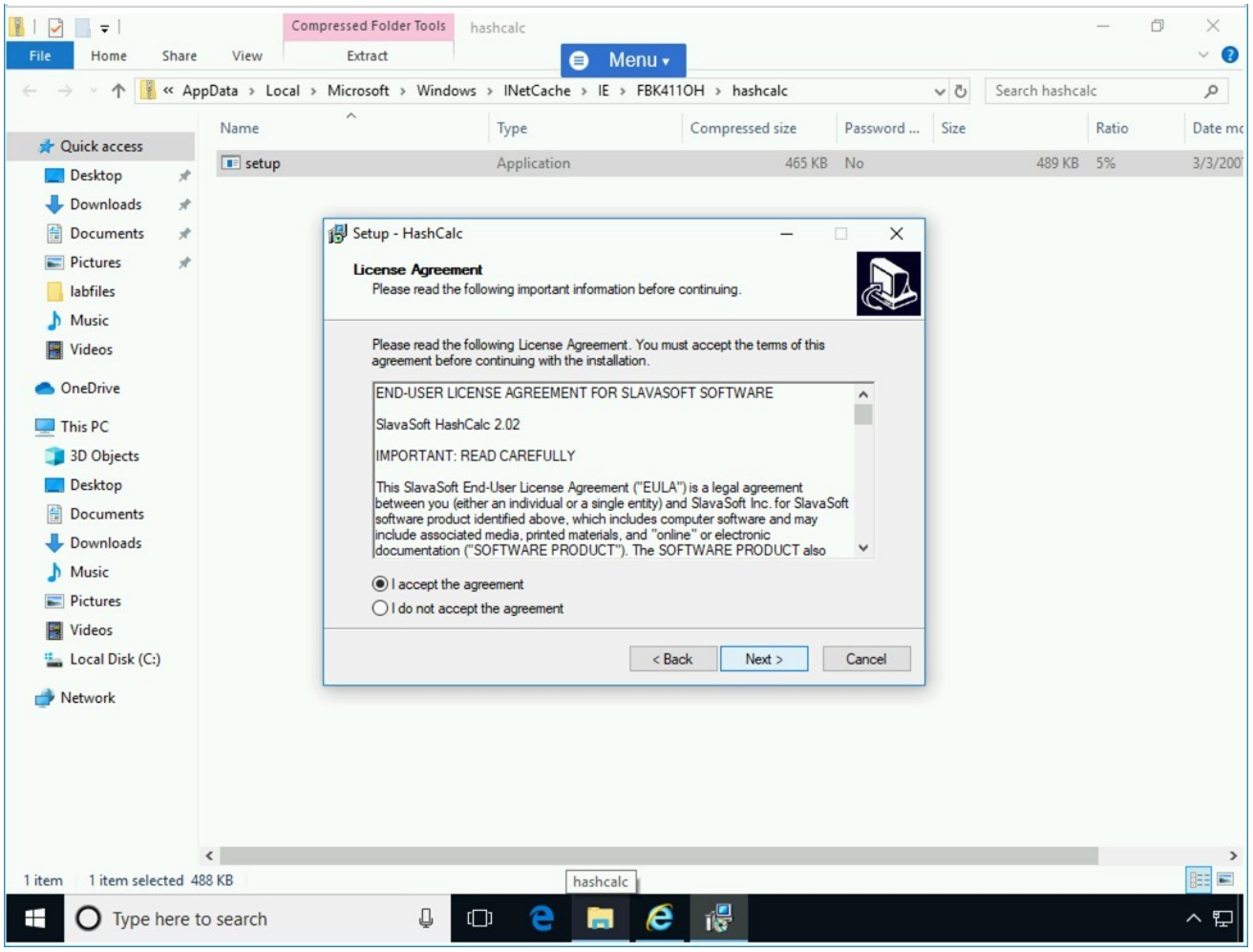


Figure 1.39 Screenshot of PLABDM01: Selecting I accept the agreement and clicking Next.

Step 7

On the **Select Destination Location** page, accept the default settings and click **Next**.

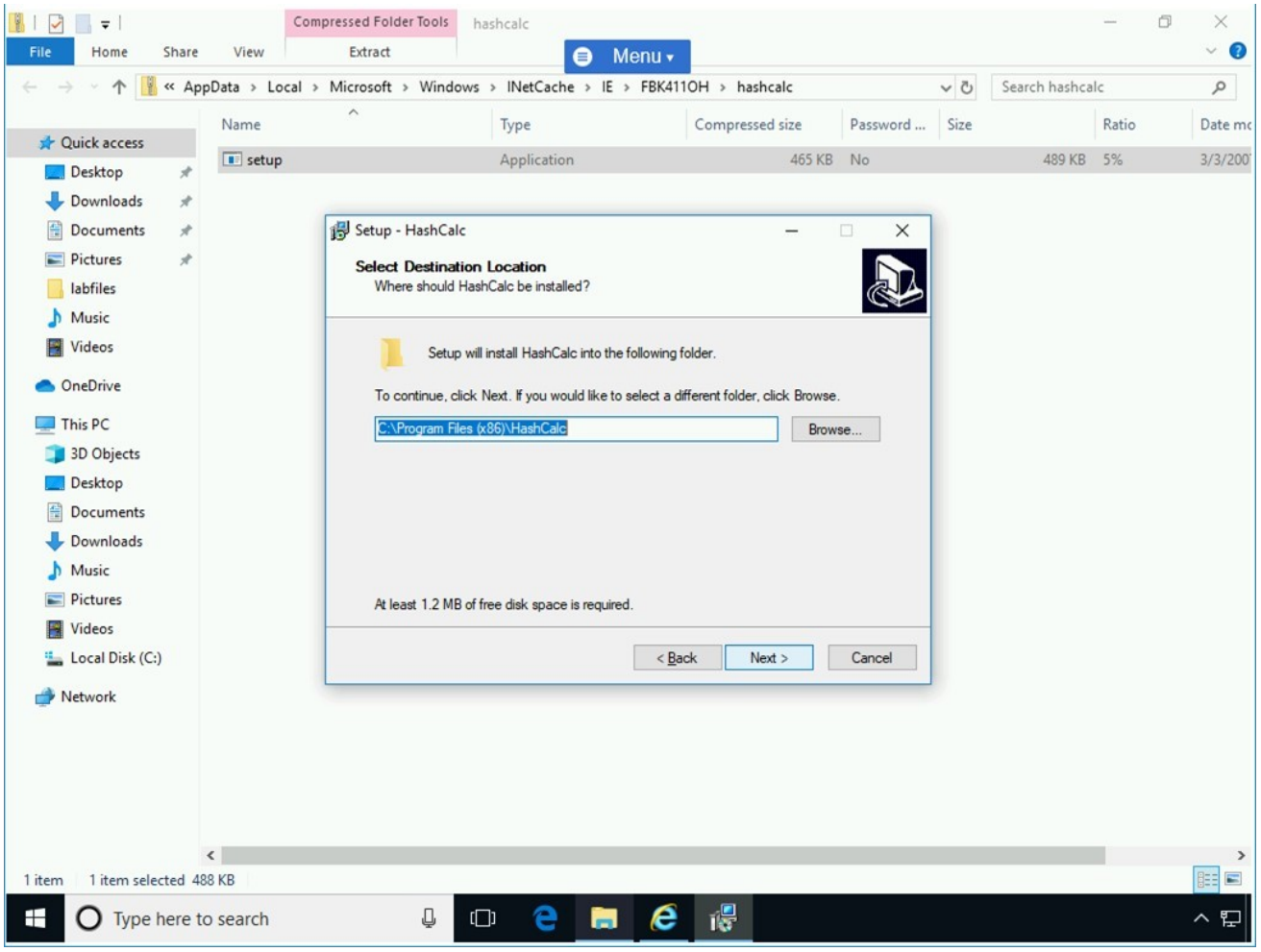


Figure 1.40 Screenshot of PLABDM01: Keeping the default destination path and clicking Next.

Step 8

On the **Select Start Menu Folder** page, keep the default menu name and click **Next**.

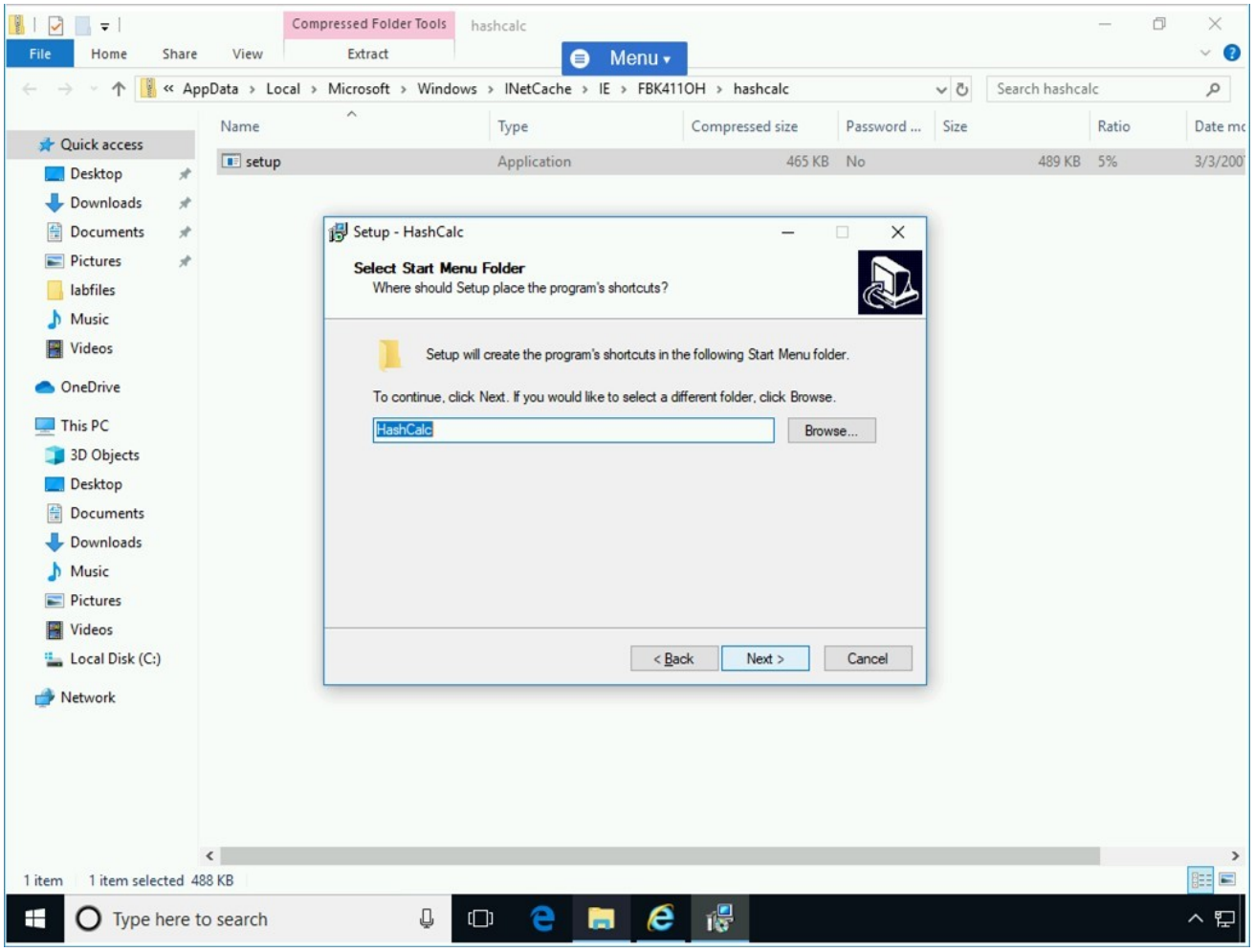


Figure 1.41 Screenshot of PLABDM01: Keeping the default menu name and clicking Next.

Step 9

On the **Select Additional Tasks** page, keep the default selection of **Create a desktop icon**, and click **Next**.

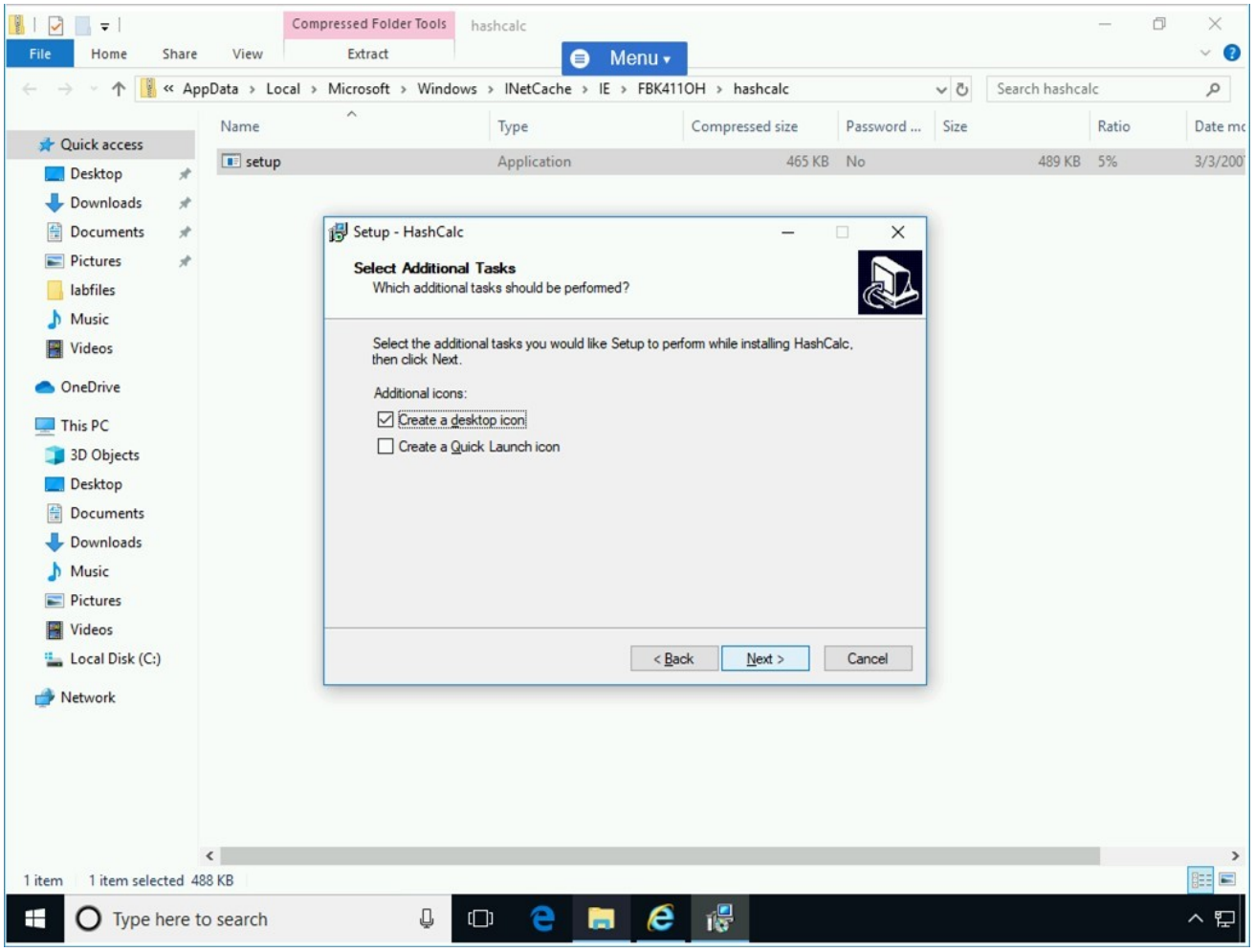


Figure 1.42 Screenshot of PLABDM01: Keeping the default selection of Select Additional Tasks and click Next.

Step 10

On the **Ready to Install** page, click **Install**.

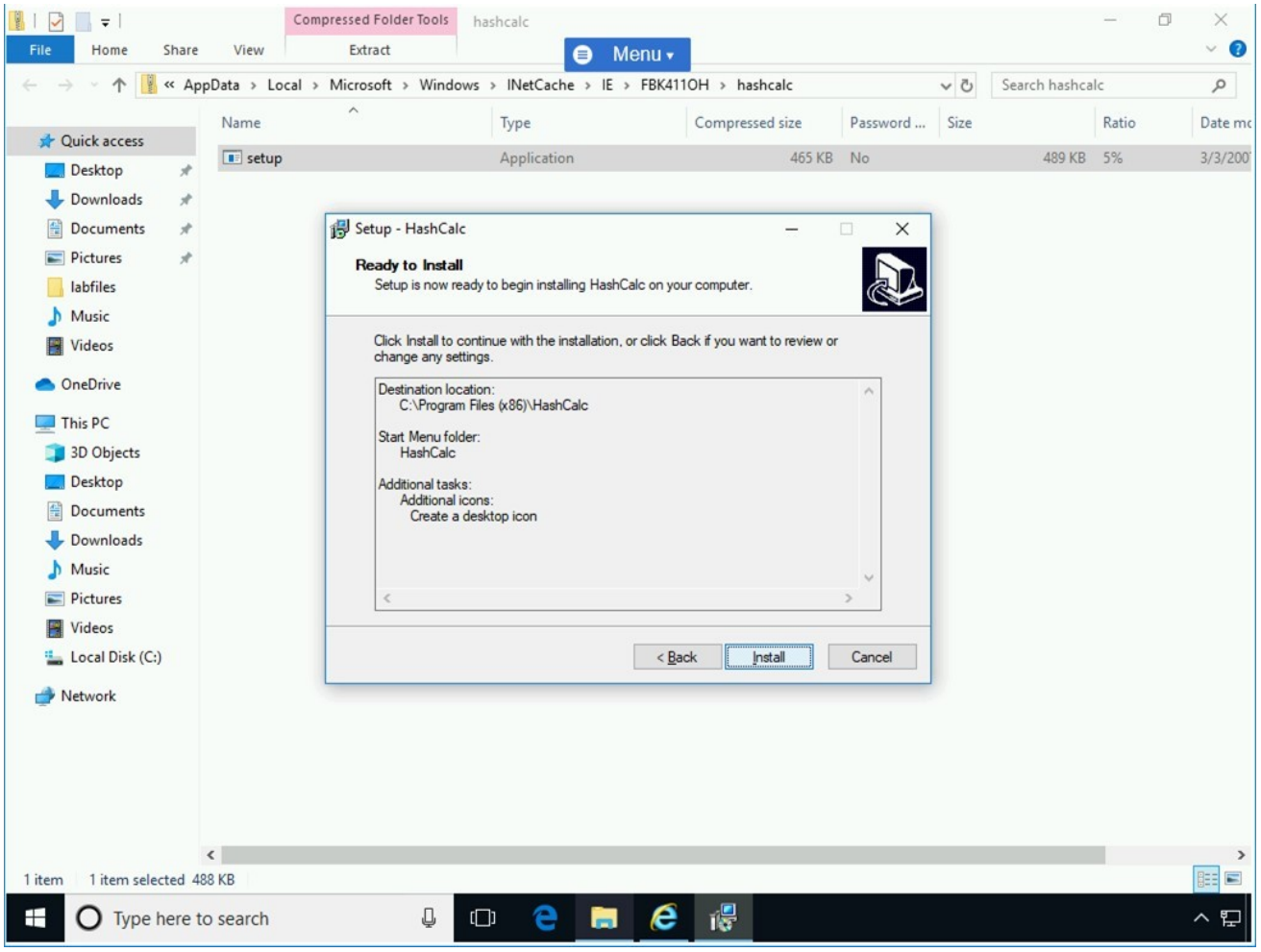


Figure 1.43 Screenshot of PLABDM01: Click Install on the Ready to Install page.

Step 11

On the **Completing the HashCalc Setup Wizard** page, de-select all checkboxes and click **Finish**.

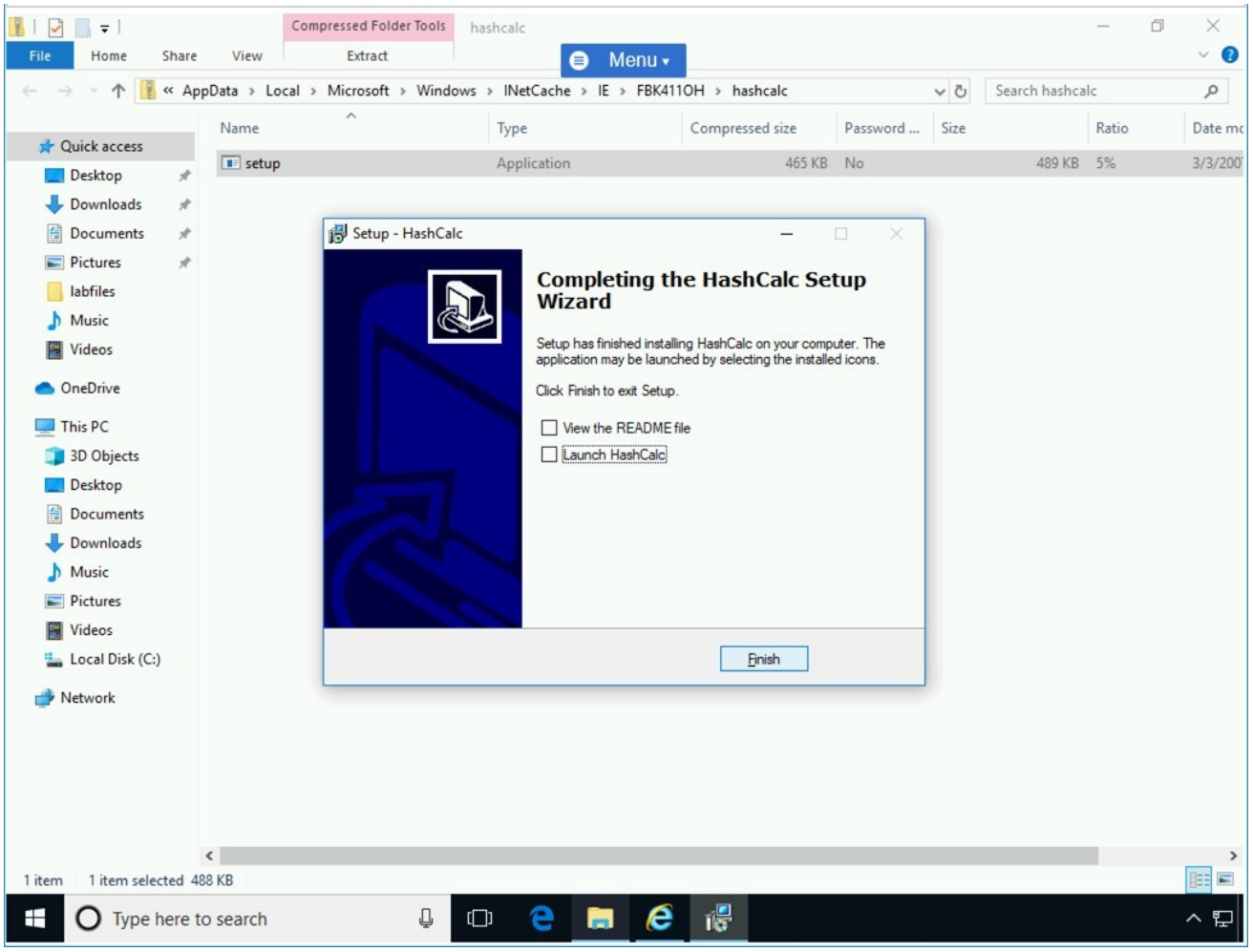


Figure 1.44 Screenshot of PLABDM01: De-selecting the checkboxes and clicking Finish.

Close the **File Explorer** window.

Minimize **Internet Explorer** as you will need this intranet web page later.

Task 4 - Using the HashCalc Tool

After installing the HashCalc tool, you can start using it. To start using the HashCalc tool, perform the following steps:

Step 1

Ensure you have powered the required devices, **Connect** to **PLABDM01**.

Double-click the **HashCalc** icon.

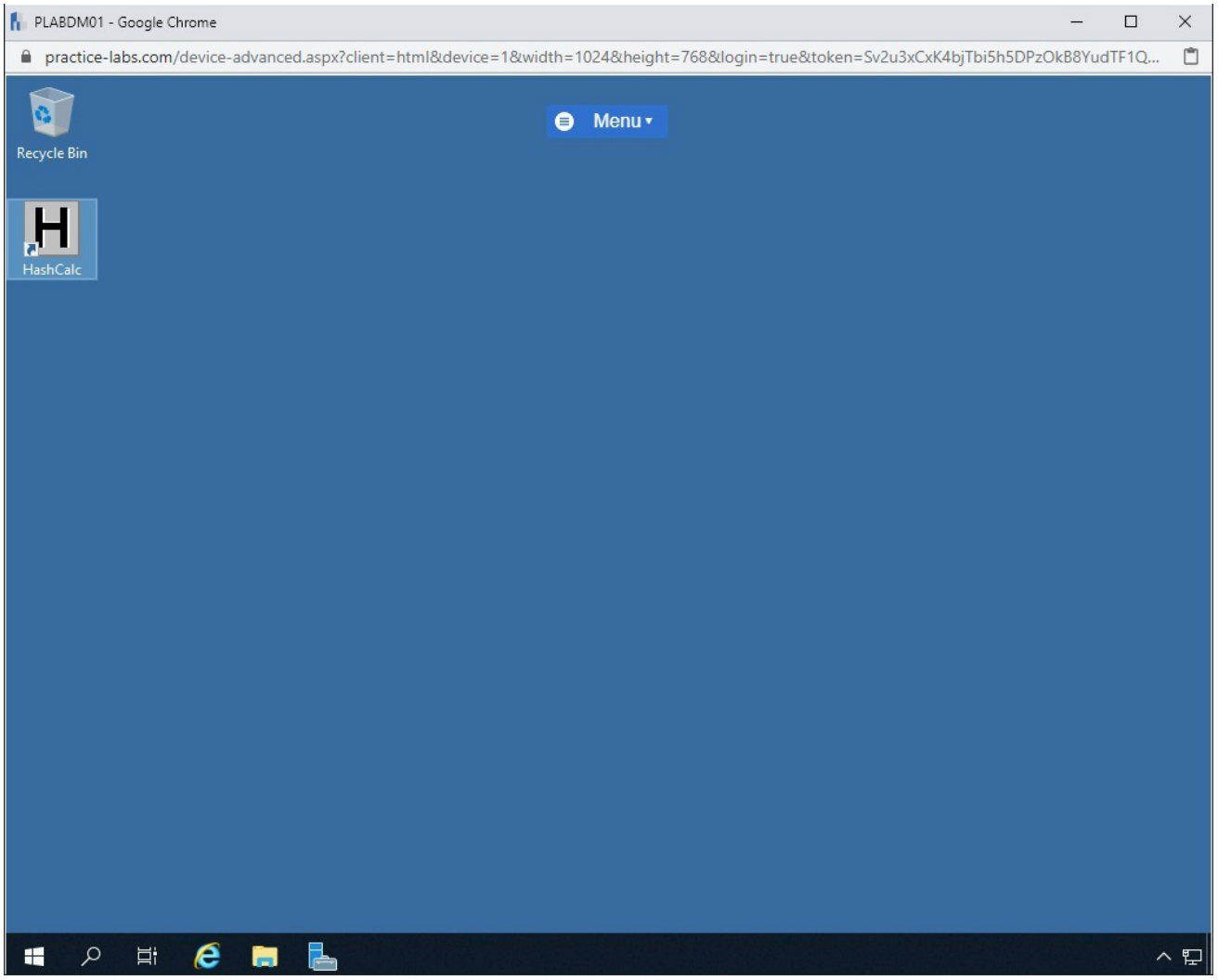


Figure 1.45 Screenshot of PLABDM01: Double-clicking the HashCalc icon on the desktop.

Step 2

The **HashCalc** dialog box is displayed.

In the **Data Format** drop-down, the **File** option is selected by default.

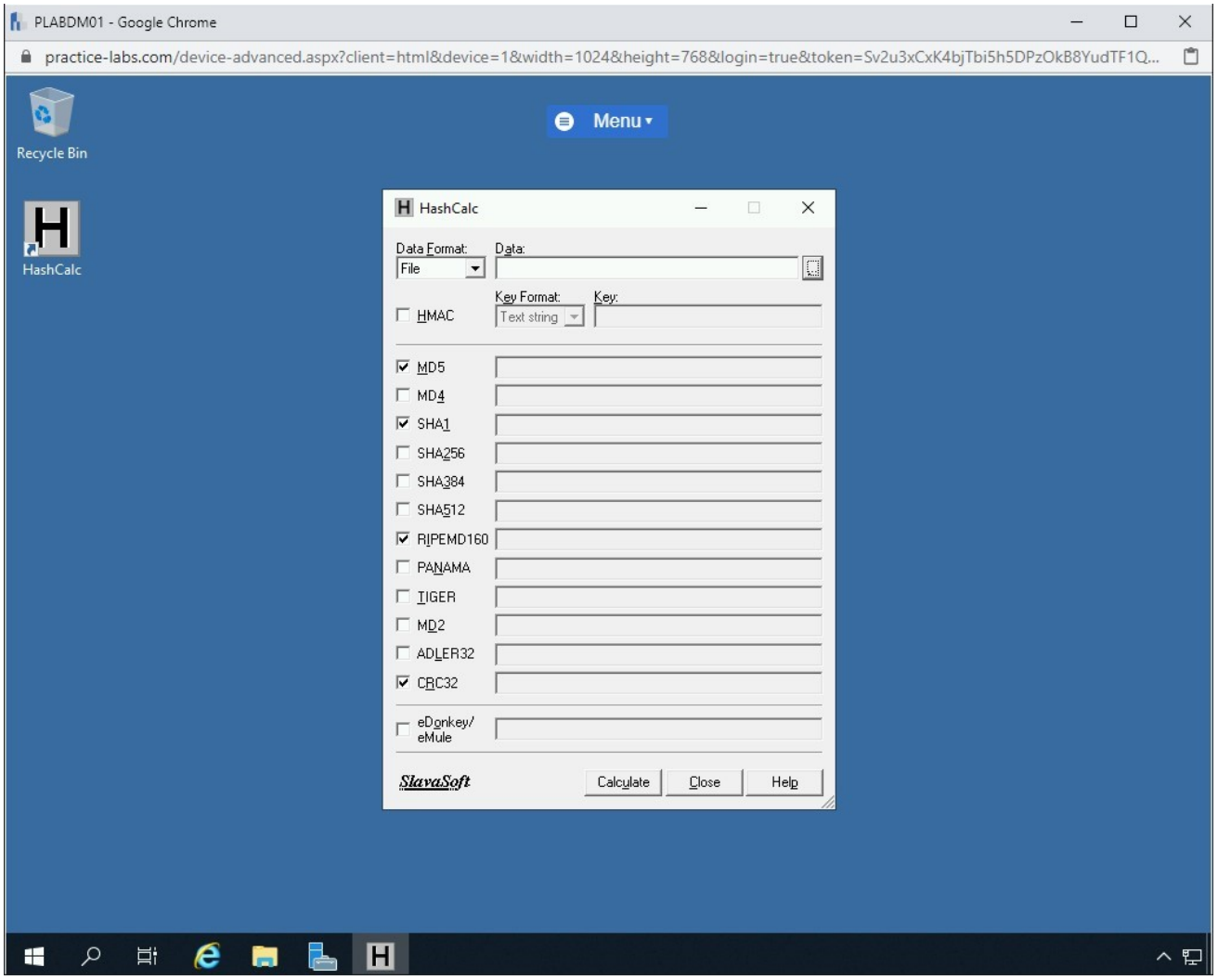


Figure 1.46 Screenshot of PLABDM01: Showing the HashCalc dialog box with File selected as the Data Format.

Step 3

Next to the **Data** textbox, click **[....]**

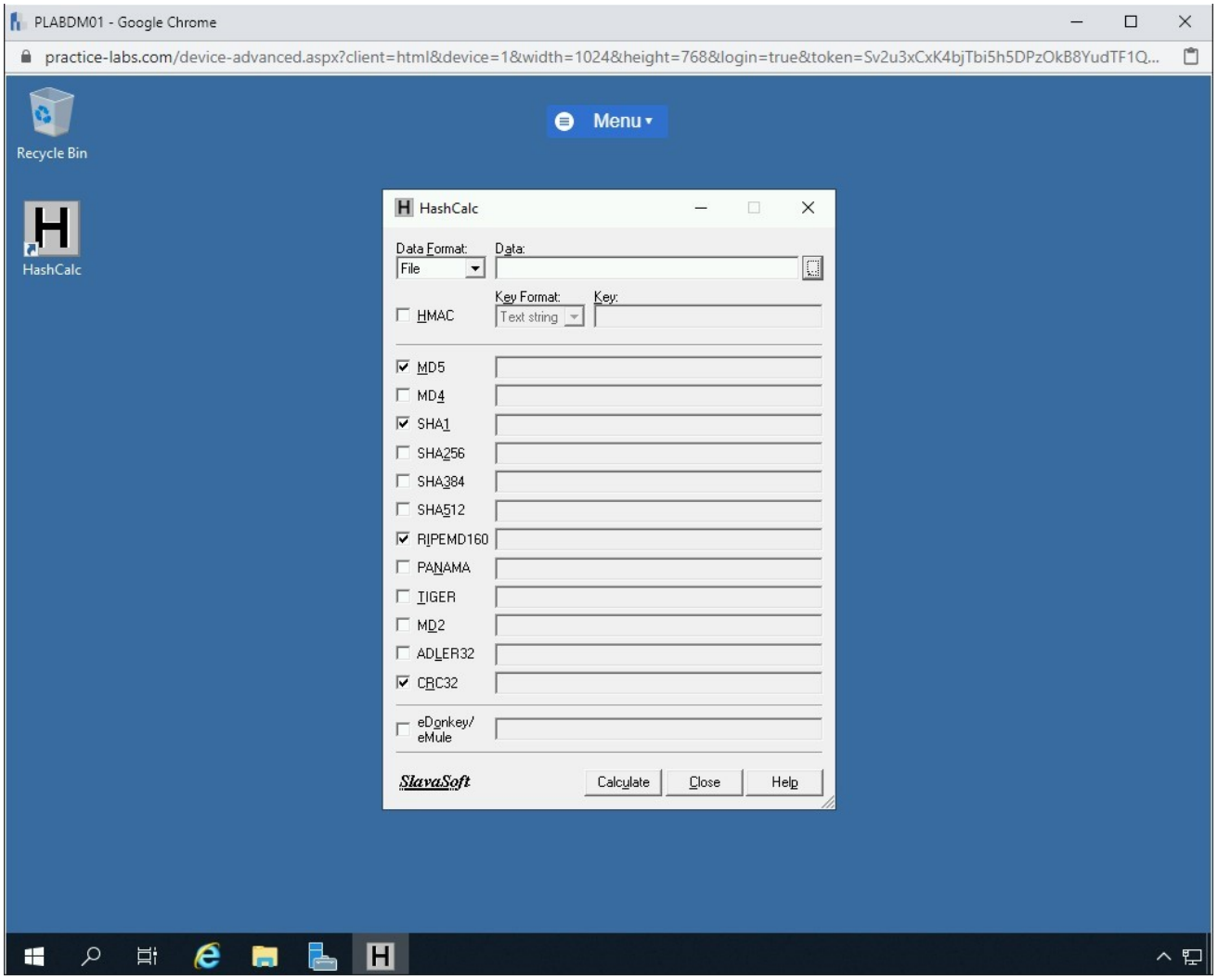


Figure 1.47 Screenshot of PLABDM01: Clicking the eclipse button next to the Data textbox.

Step 4

The **Find** dialog box is displayed.

Click the down arrow on the **Look in** drop-down and select **Local Disk (C:)**.

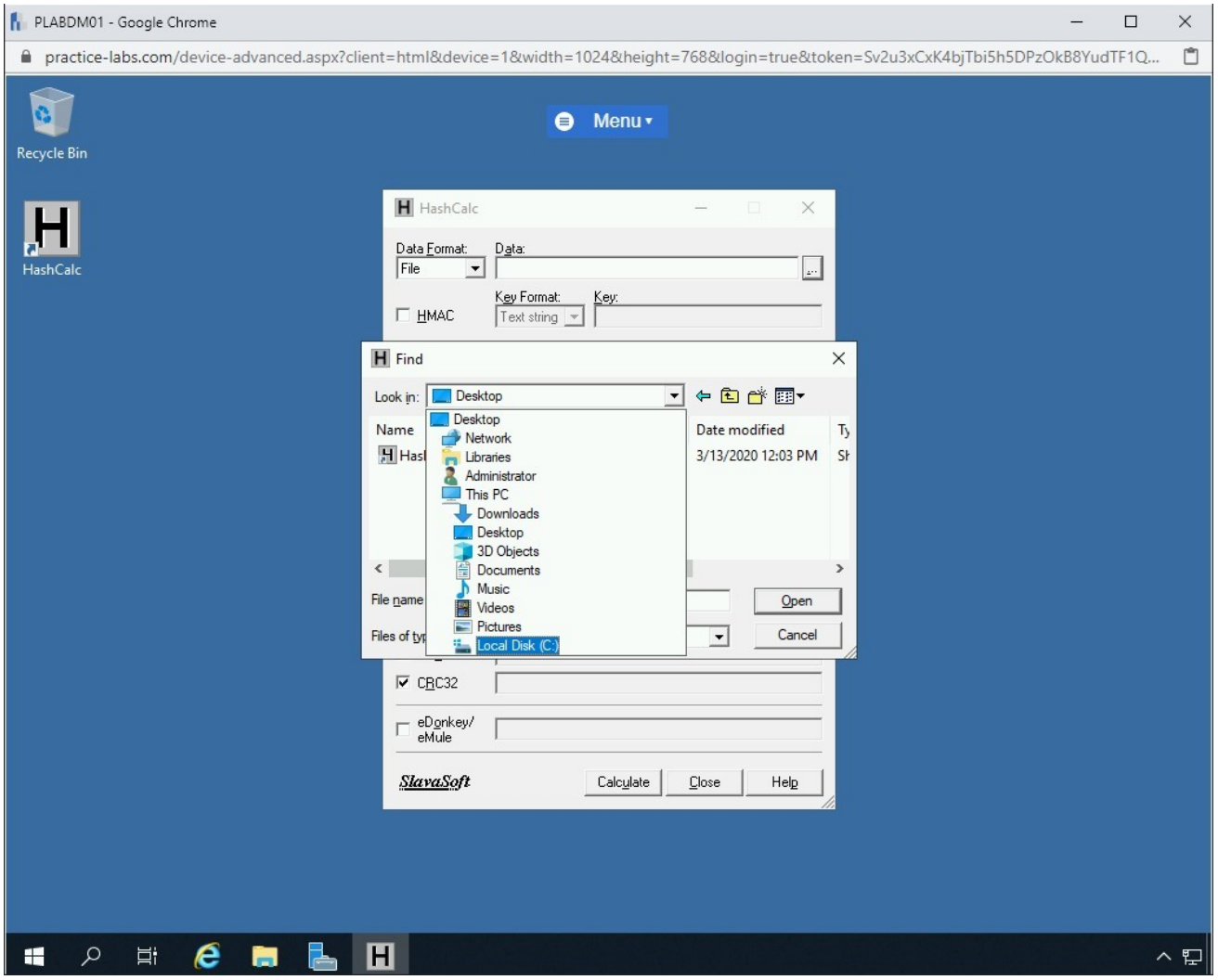


Figure 1.48 Screenshot of PLABDM01: Selecting Local Disk (C:) from the Look In drop-down.

Step 5

Double-click on the **labfiles** folder or select and click **Open**.

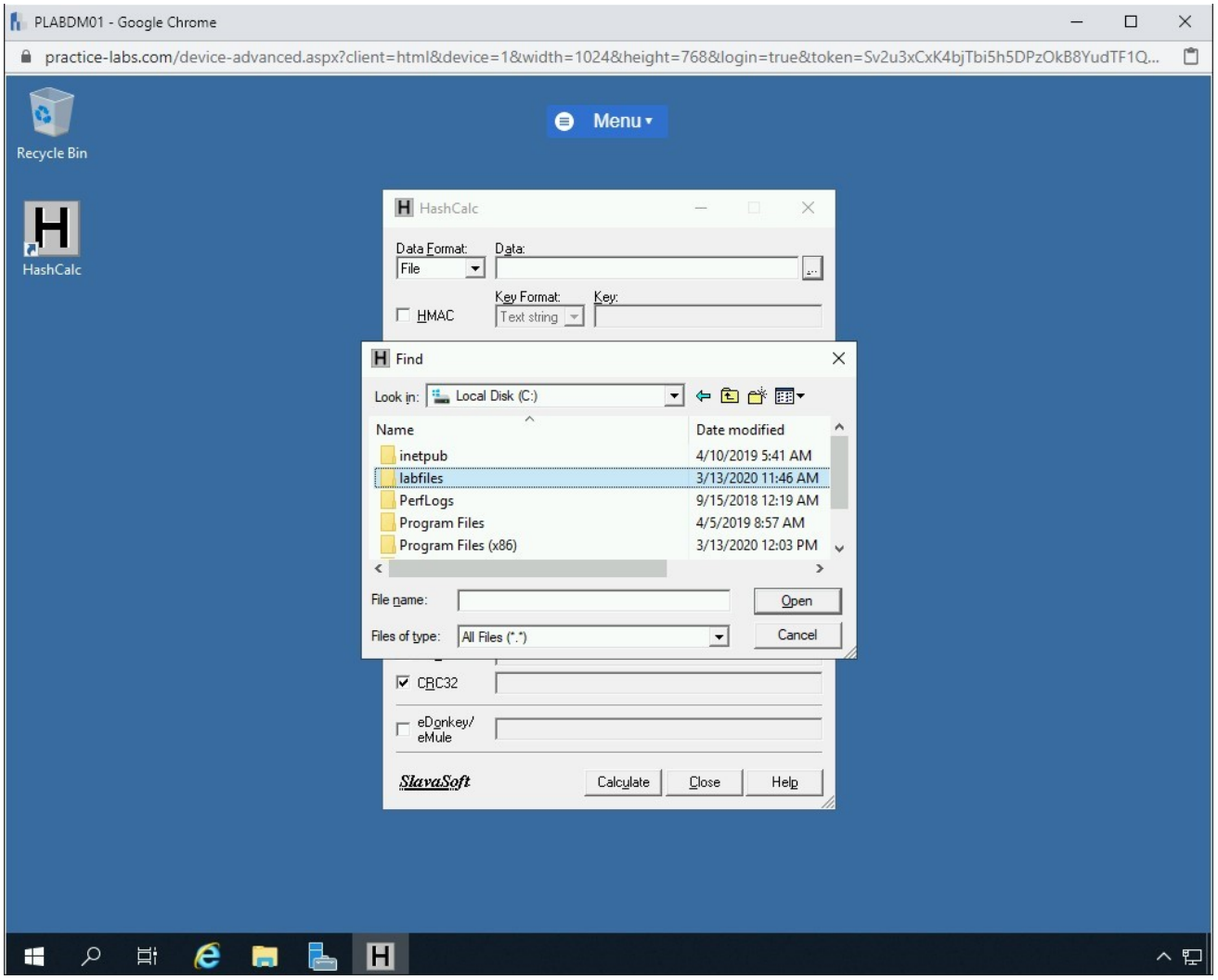


Figure 1.49 Screenshot of PLABDM01: Selecting labfiles and clicking Open in the Find dialog box.

Step 6

Select the **md5calculator_setup** file and click **Open**.

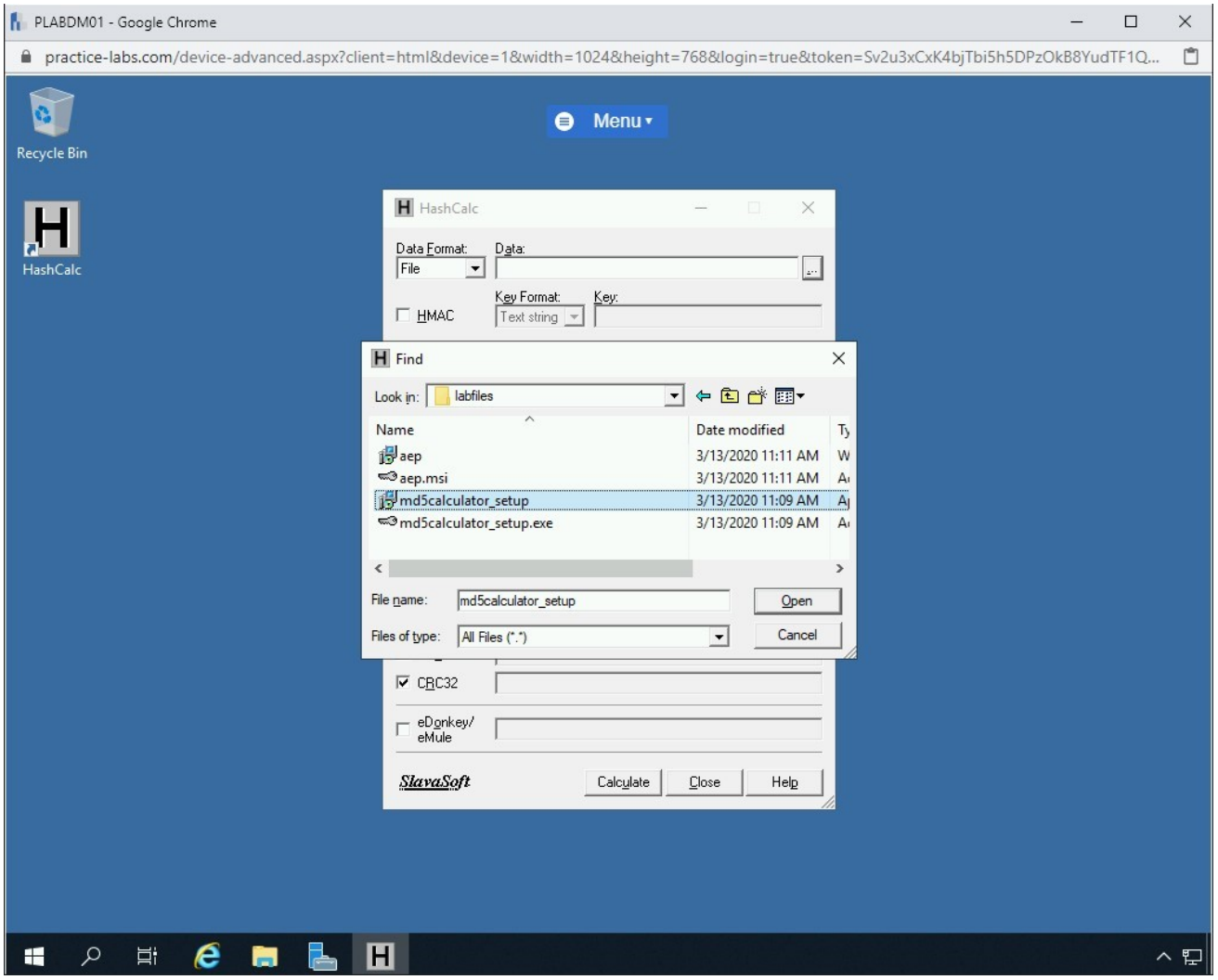


Figure 1.50 Screenshot of PLABDM01: Selecting md5calculator_setup file and clicking Open.

Step 7

The **md5calculator_setup.exe** file is now added.

You can select the hash or checksum algorithm that you can want to check for this file.

For this task, you will use the default selection.

Click **Calculate**.

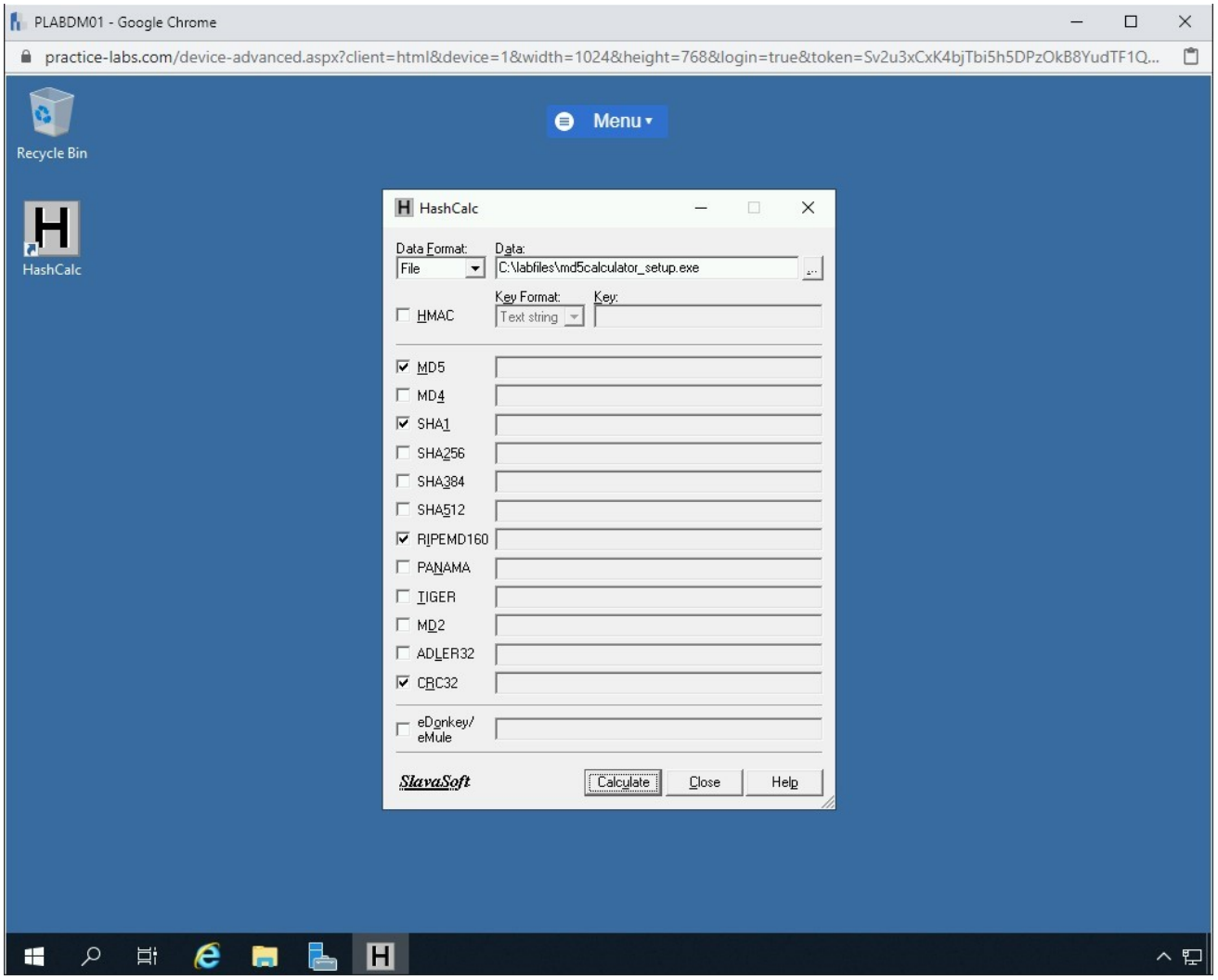


Figure 1.51 Screenshot of PLABDM01: Showing the file selection and then clicking Calculate.

Step 8

The result is displayed instantly. You can use the hash and checksum and compare it with the original hash and checksum of the file.

Typically, all files provide them to ensure that the file has not been tempered with.

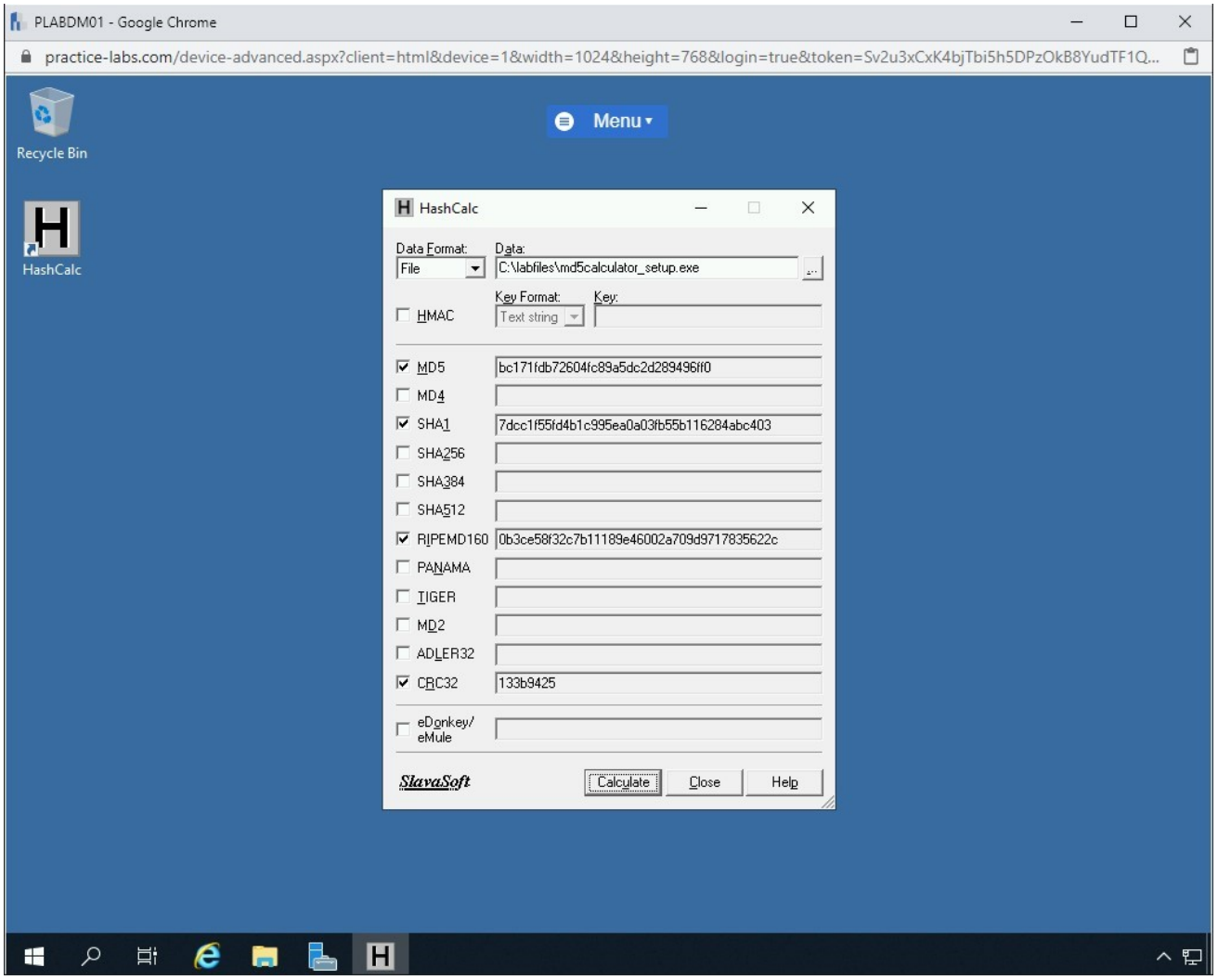


Figure 1.52 Screenshot of PLABDM01: Showing the calculated hashes.

Step 9

Click **Close**.

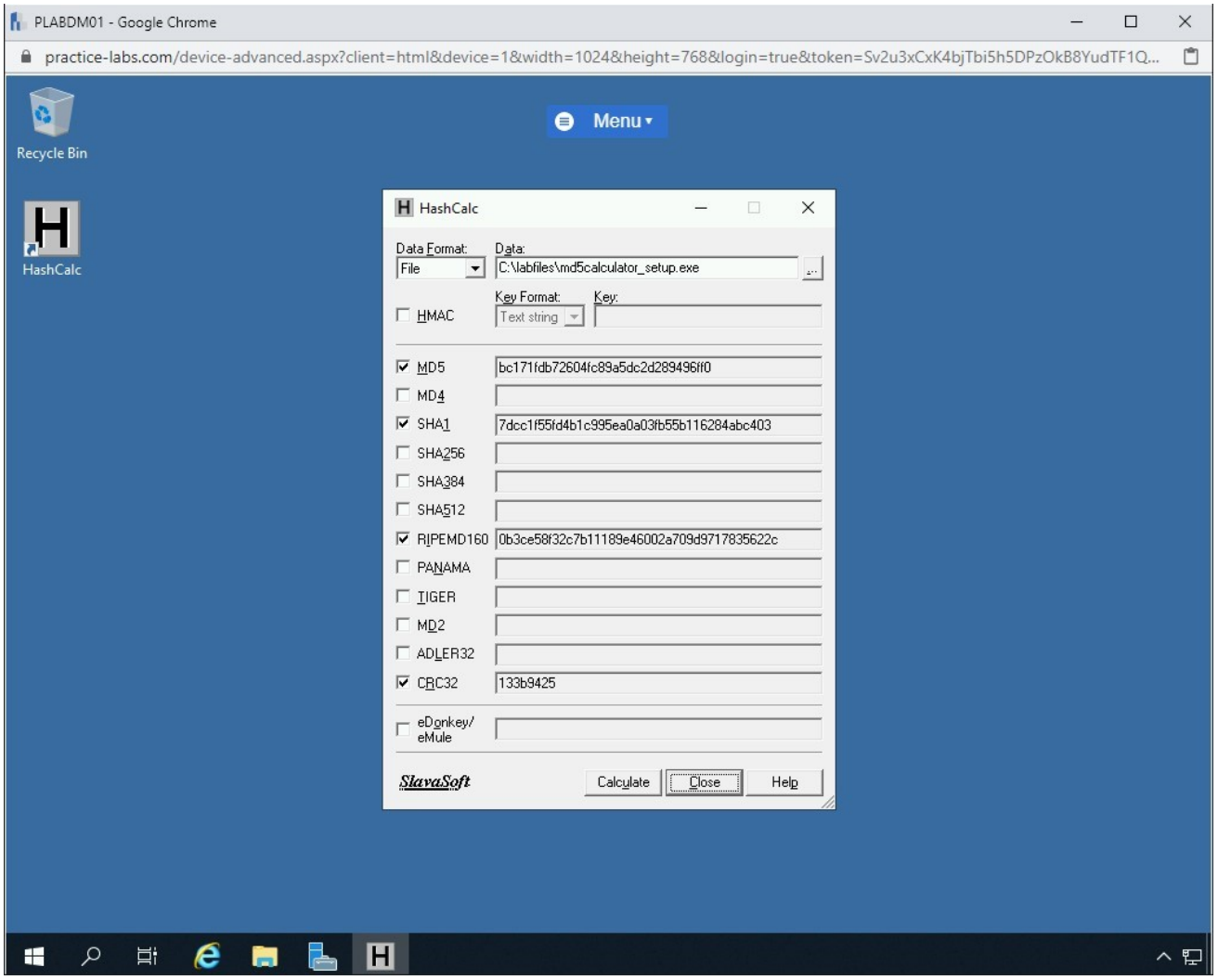


Figure 1.53 Screenshot of PLABDM01: Clicking Close on the HashCalc dialog box.

Task 5 - Install MD5 Calculator

MD5 is a freeware that has some of the following features:

- MD5 Hash Extractor
- MD5 Check
- MD5 Checksum Verifier
- MD5 Hash Viewer

In this task, you will learn to install the MD5 Calculator.

> ***Note:*** *In one of the previous tasks, you had downloaded the MD5 Calculator installer in the c:\labfiles folder.*

To install the MD5 Calculator, perform the following steps:

Step 1

Ensure you have powered the required devices, **Connect** to **PLABDM01**.

From the taskbar, click the **File Explorer** icon.

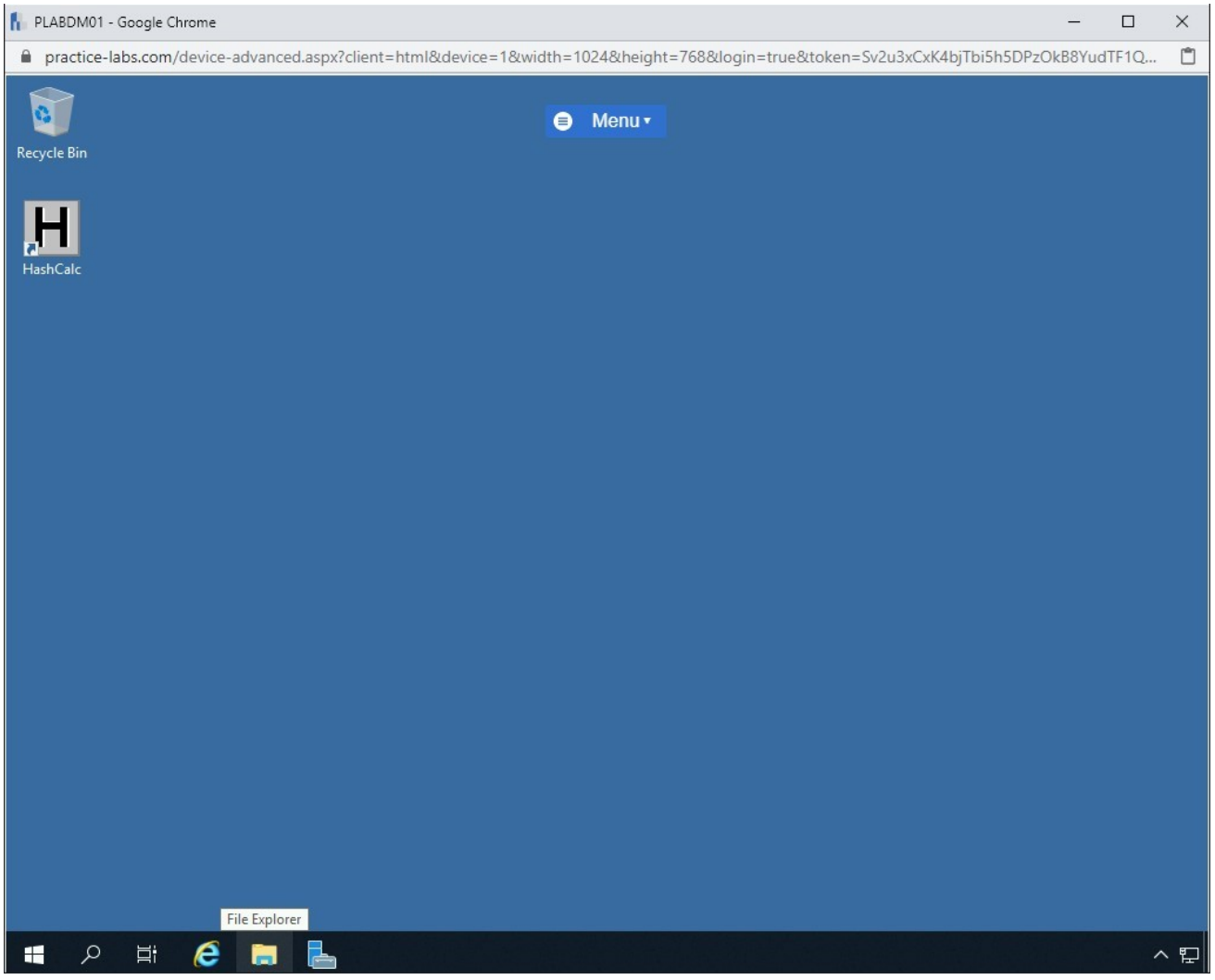


Figure 1.54 Screenshot of PLABDM01: Clicking the File Explorer icon.

Step 2

In the **File Explorer** window, select **Local Disk (C:)** in the left-hand pane and then double-click **labfiles** in the right-hand pane.

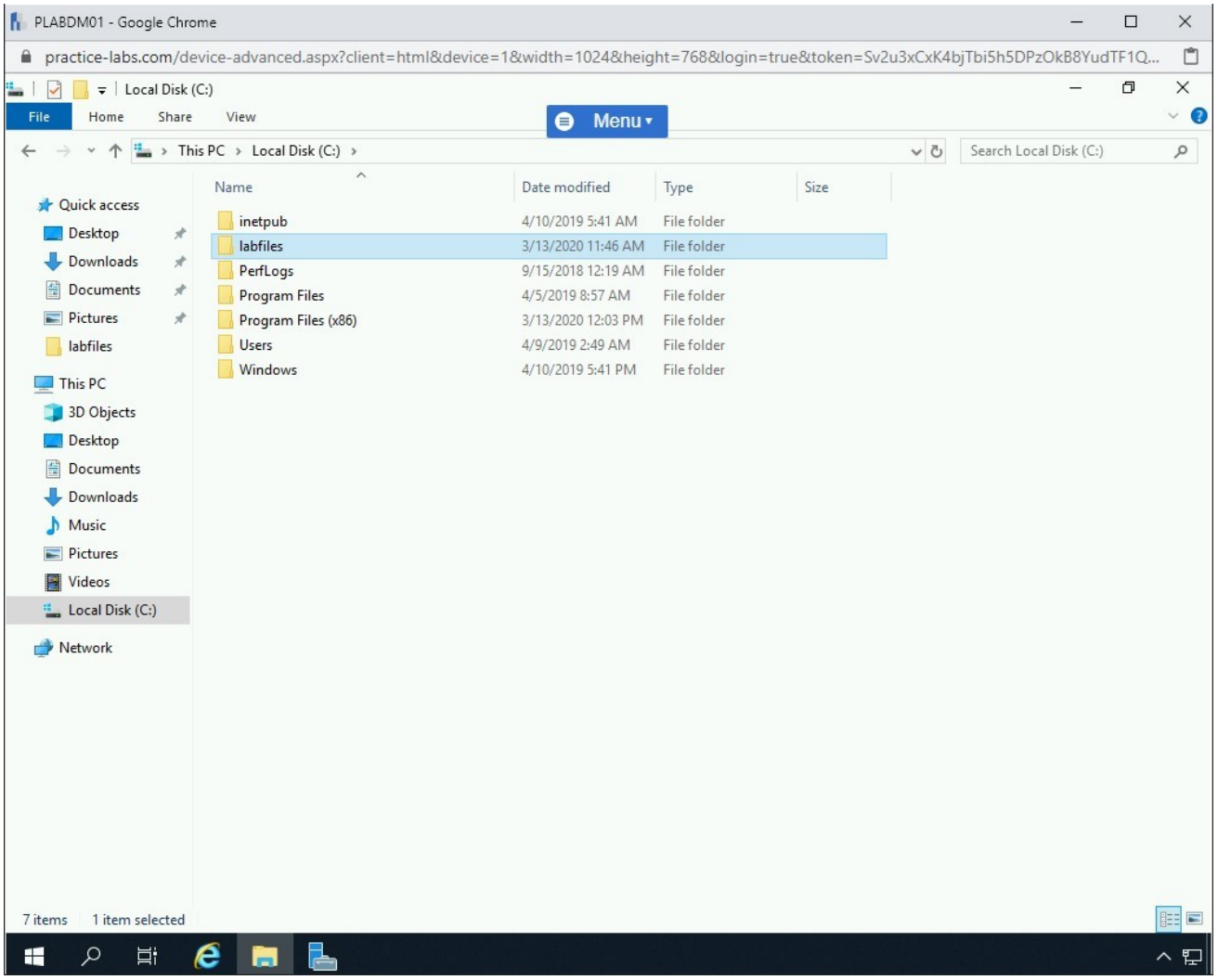


Figure 1.55 Screenshot of PLABDM01: Double-clicking the labfiles folder.

Step 3

Double-click **md5calculator_setup**.

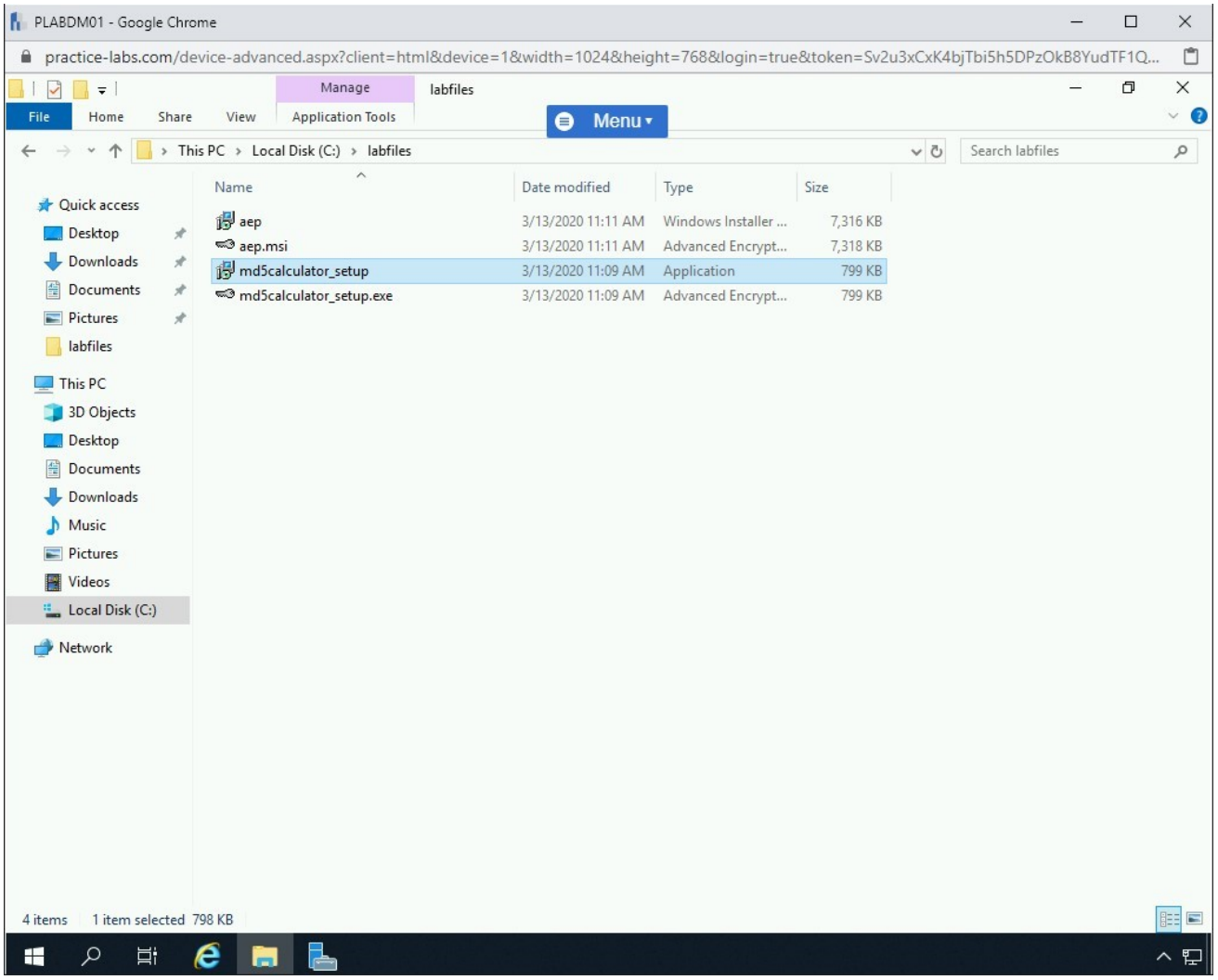


Figure 1.56 Screenshot of PLABDM01: Double-clicking the md5calculator_setup file.

Step 4

The **Setup - MD5 Calculator** wizard is displayed. On the **Welcome to the MD5 Calculator Setup Wizard** dialog box is displayed, click **Next**.

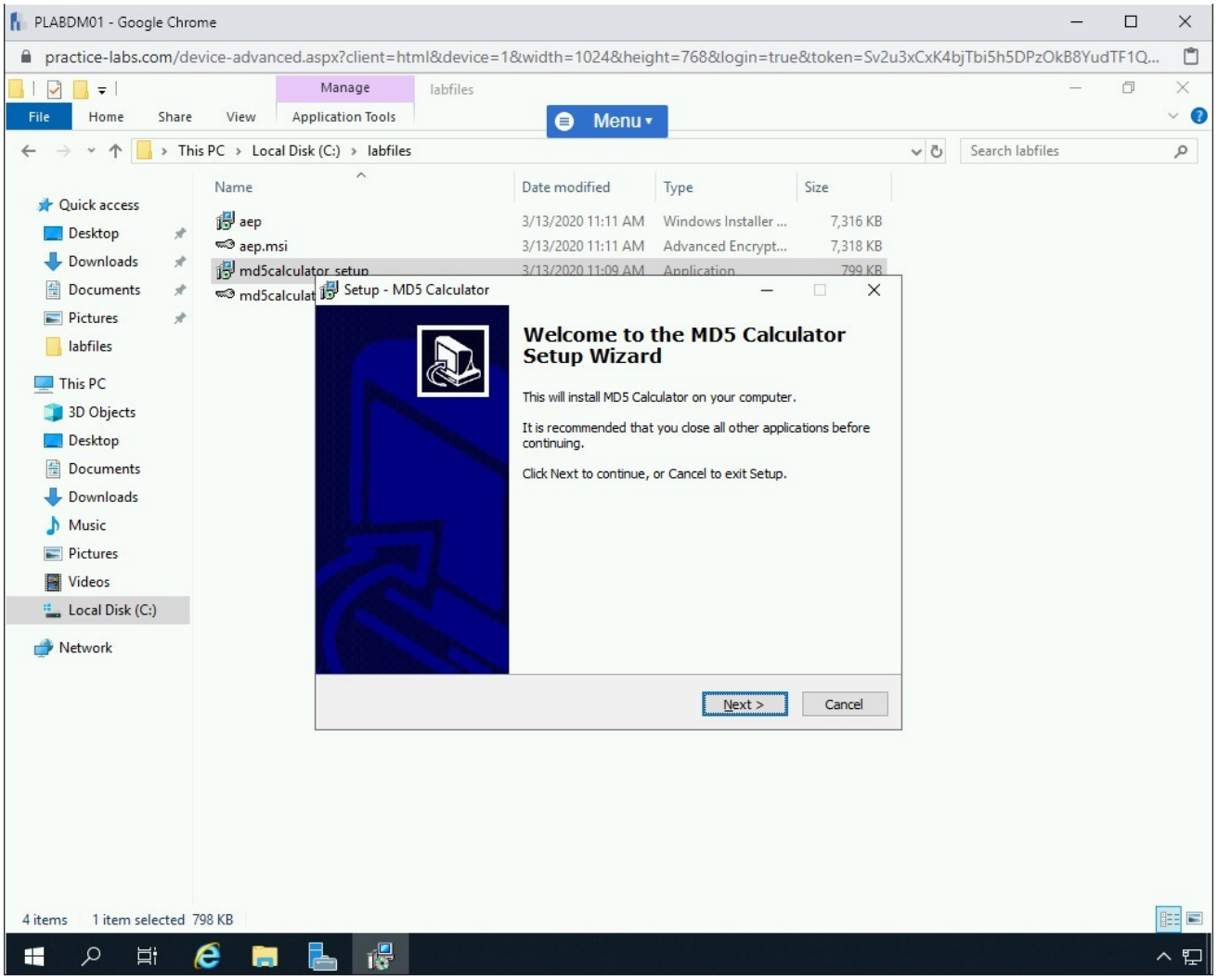


Figure 1.57 Screenshot of PLABDM01: Clicking Next on the Welcome to the MD5 Calculator Setup Wizard page.

Step 5

On the **Select Destination Location** page, keep the default installation path and click **Next**.

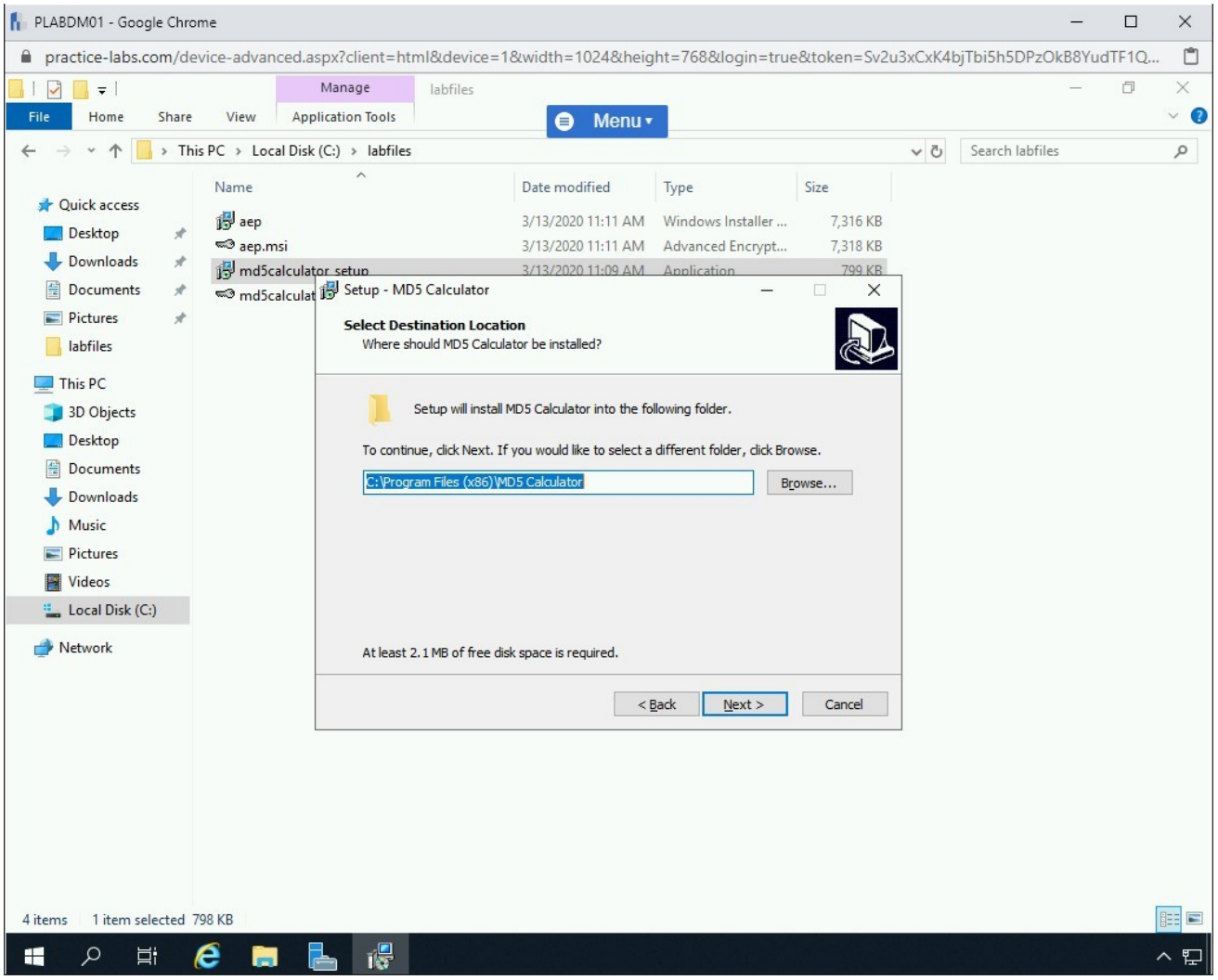


Figure 1.58 Screenshot of PLABDM01: Keeping the default installation location and clicking Next.

Step 6

On the **Select Start Menu Folder** page, keep the default menu name and click **Next**.

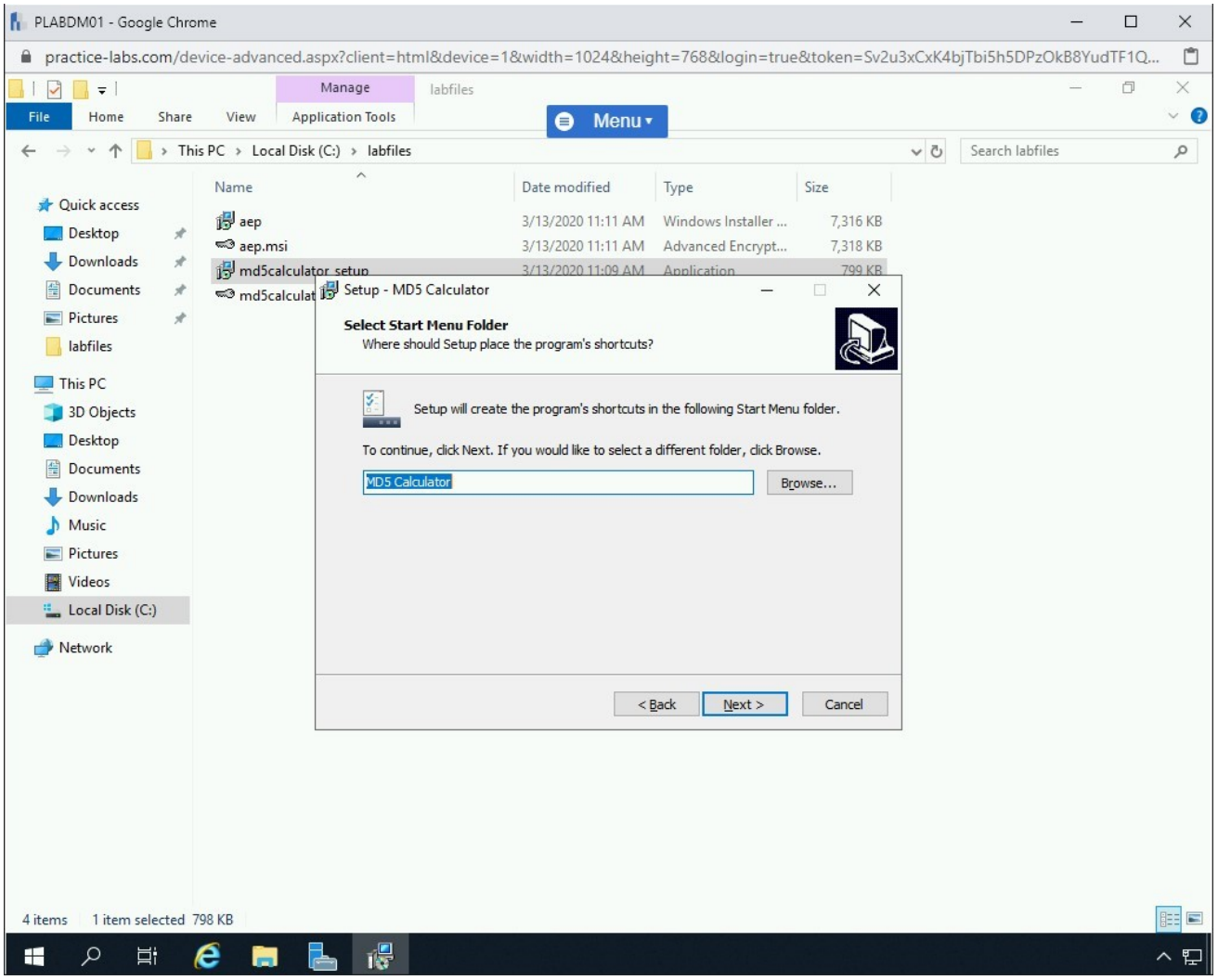


Figure 1.59 Screenshot of PLABDM01: Keeping the default menu path and clicking Next.

Step 7

On the **Select Additional Tasks** page, keep the default selection and click **Next**.

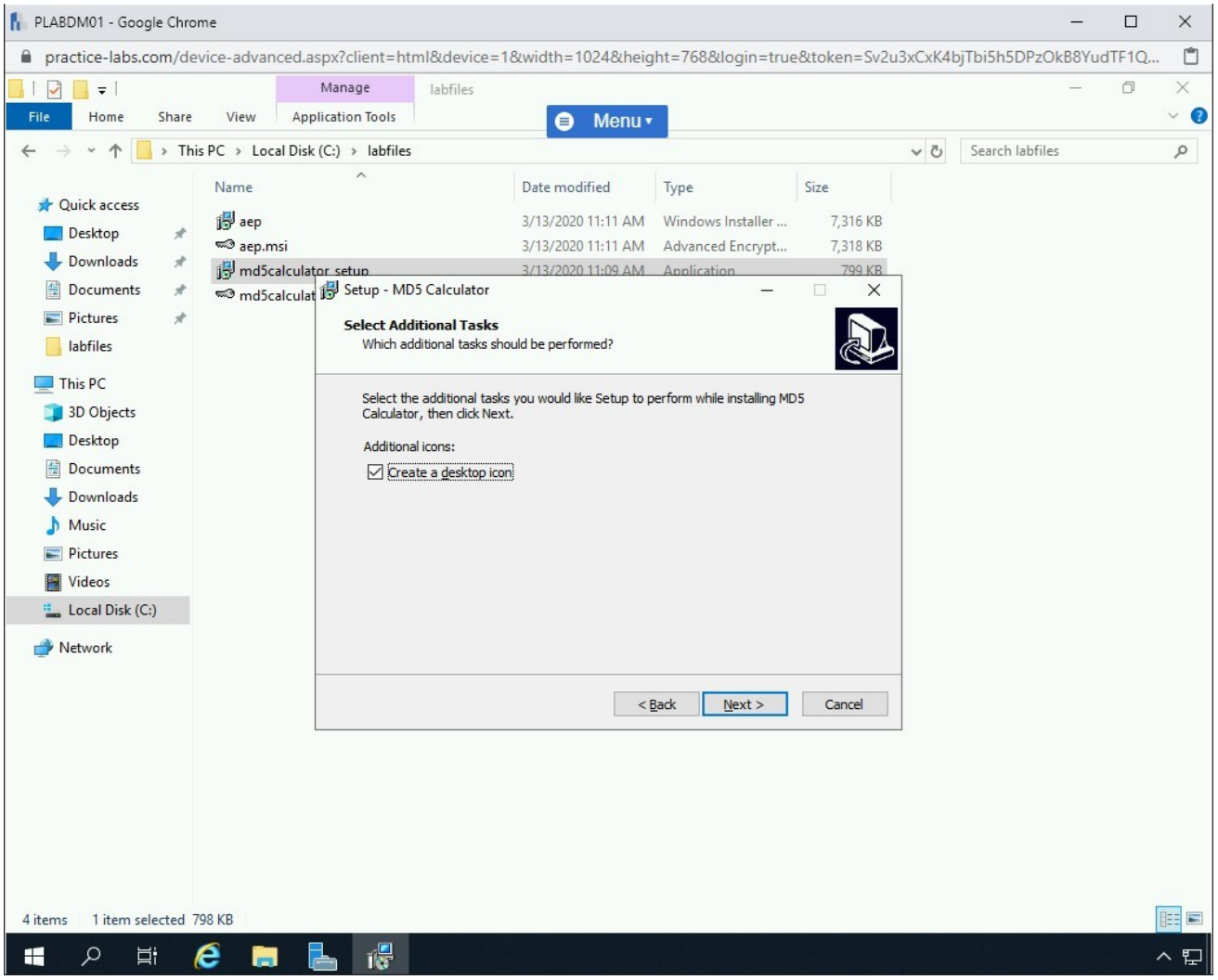


Figure 1.60 Screenshot of PLABDM01: Clicking Next on the Select Additional Tasks page.

Step 8

On the **Ready to Install** page, review the settings, and click **Install**.

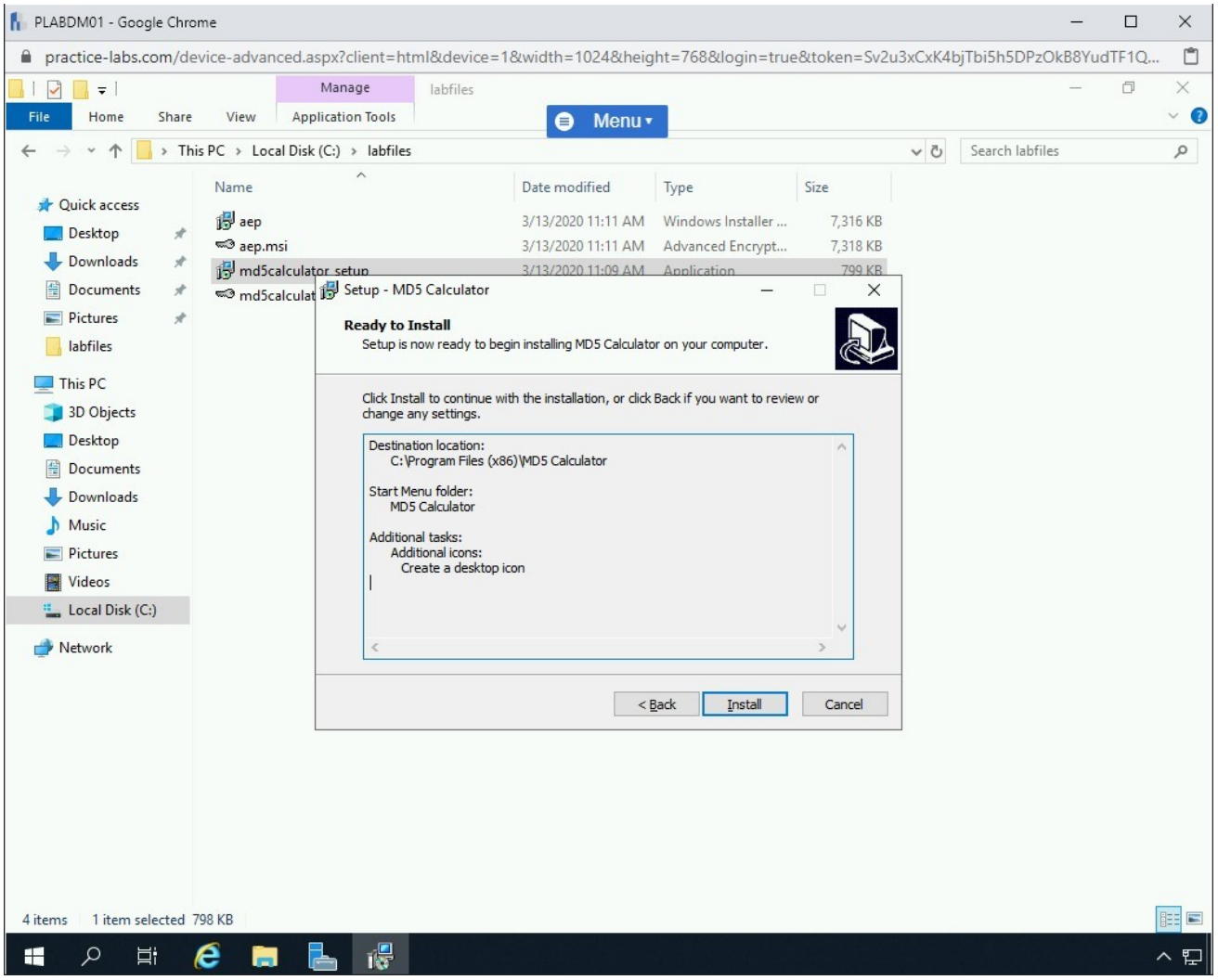


Figure 1.61 Screenshot of PLABDM01: Clicking Install on the Ready to Install page.

Step 9

On the **Completing the MD5 Calculator Setup Wizard** page, clear the **Launch MD5 Calculator** checkbox.

Click **Finish** and close the **File Explorer** window.

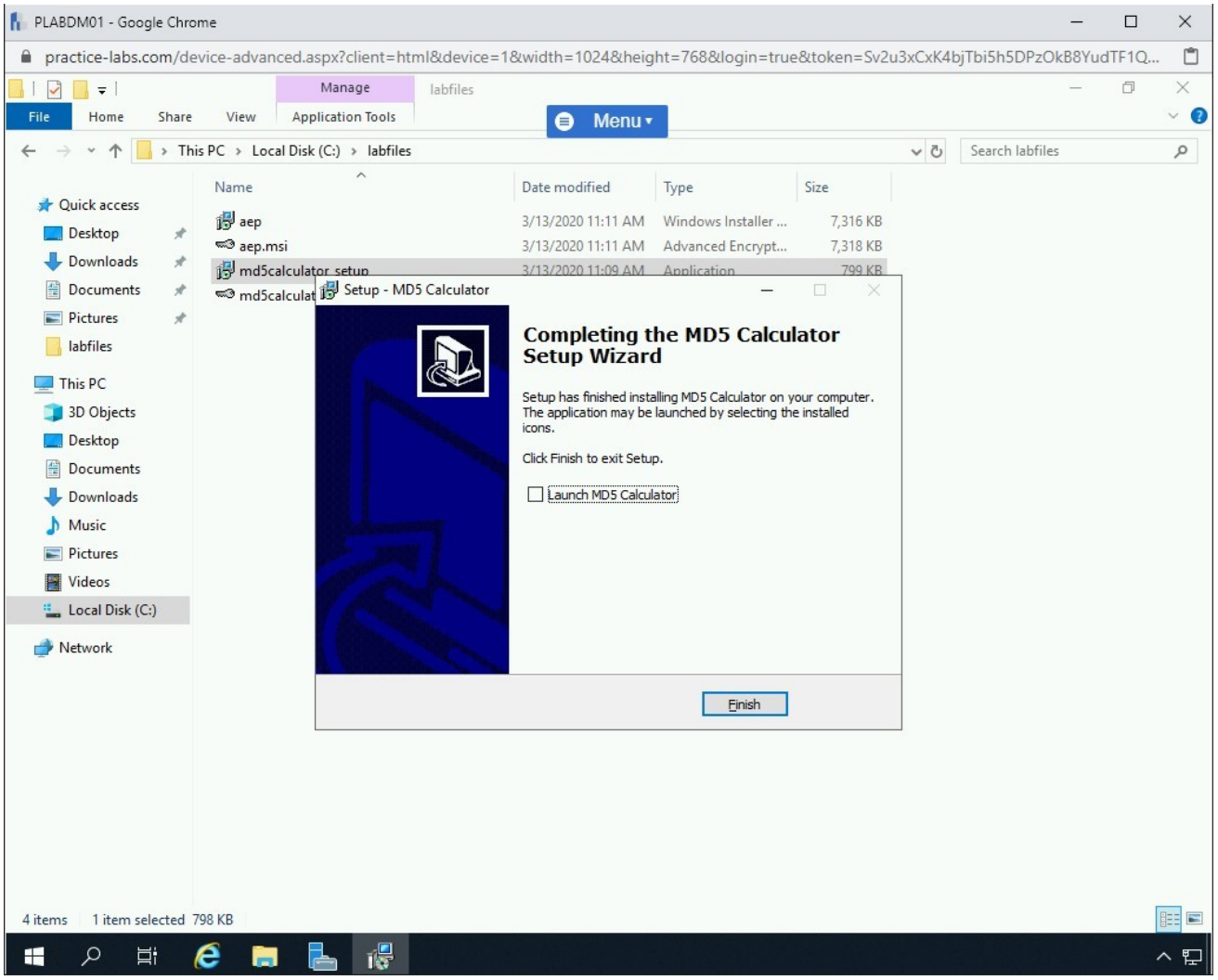


Figure 1.62 Screenshot of PLABDM01: Clicking Finish on the Completing the MD5 Calculator Setup Wizard page.

Task 6 - Using MD5 Calculator

After installing the MD5 Calculator, you can now start using it. To start using MD5 Calculator application, perform the following steps:

Step 1

Ensure you have powered on the required devices, and **Connect** to **PLABDM01**.

Double-click the **MD5 Calculator** icon on the desktop.

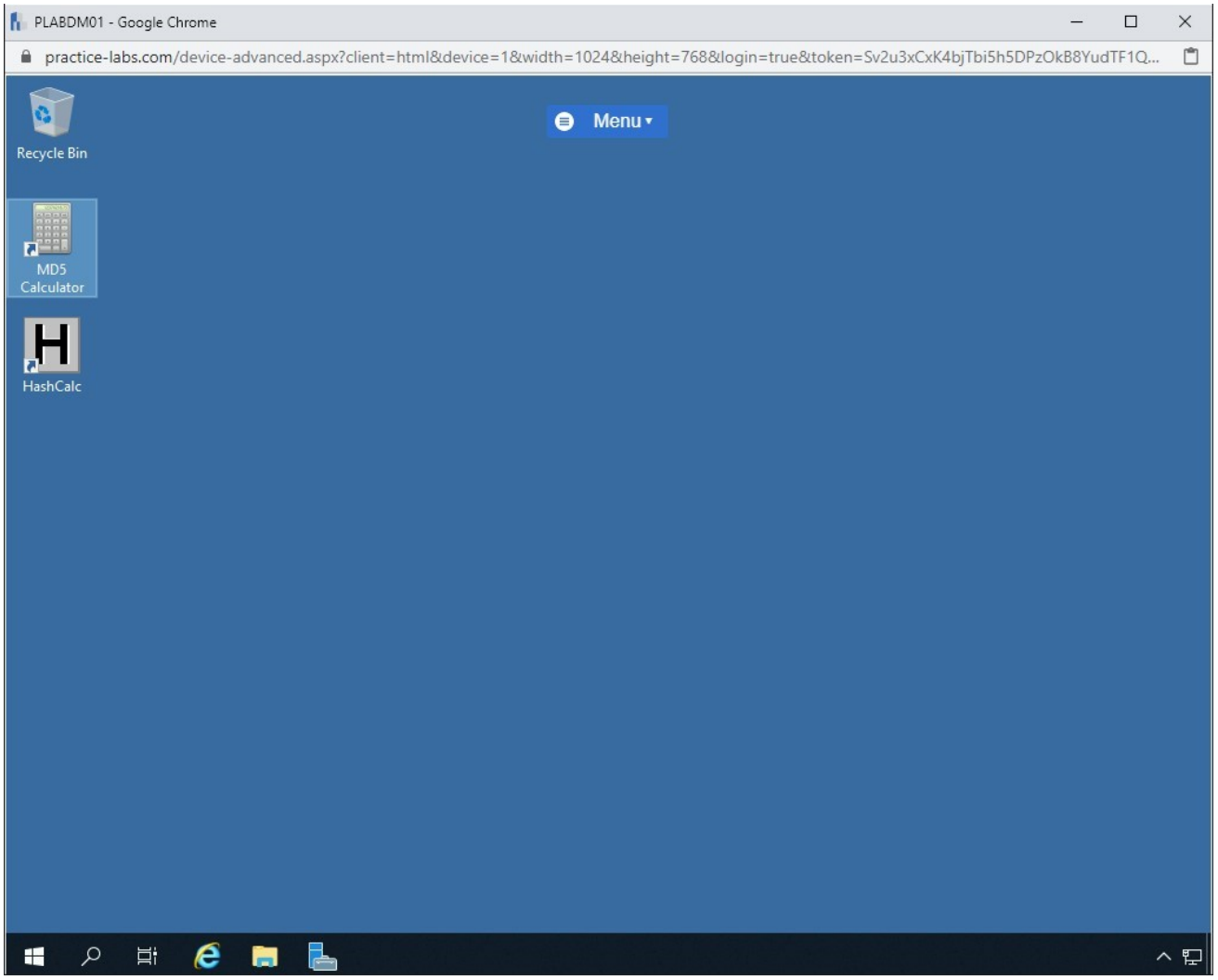


Figure 1.63 Screenshot of PLABDM01: Double-clicking MD5 Calculator icon on the desktop.

Step 2

The **MD5 Calculator** dialog box is displayed.

Click **Add Files**.

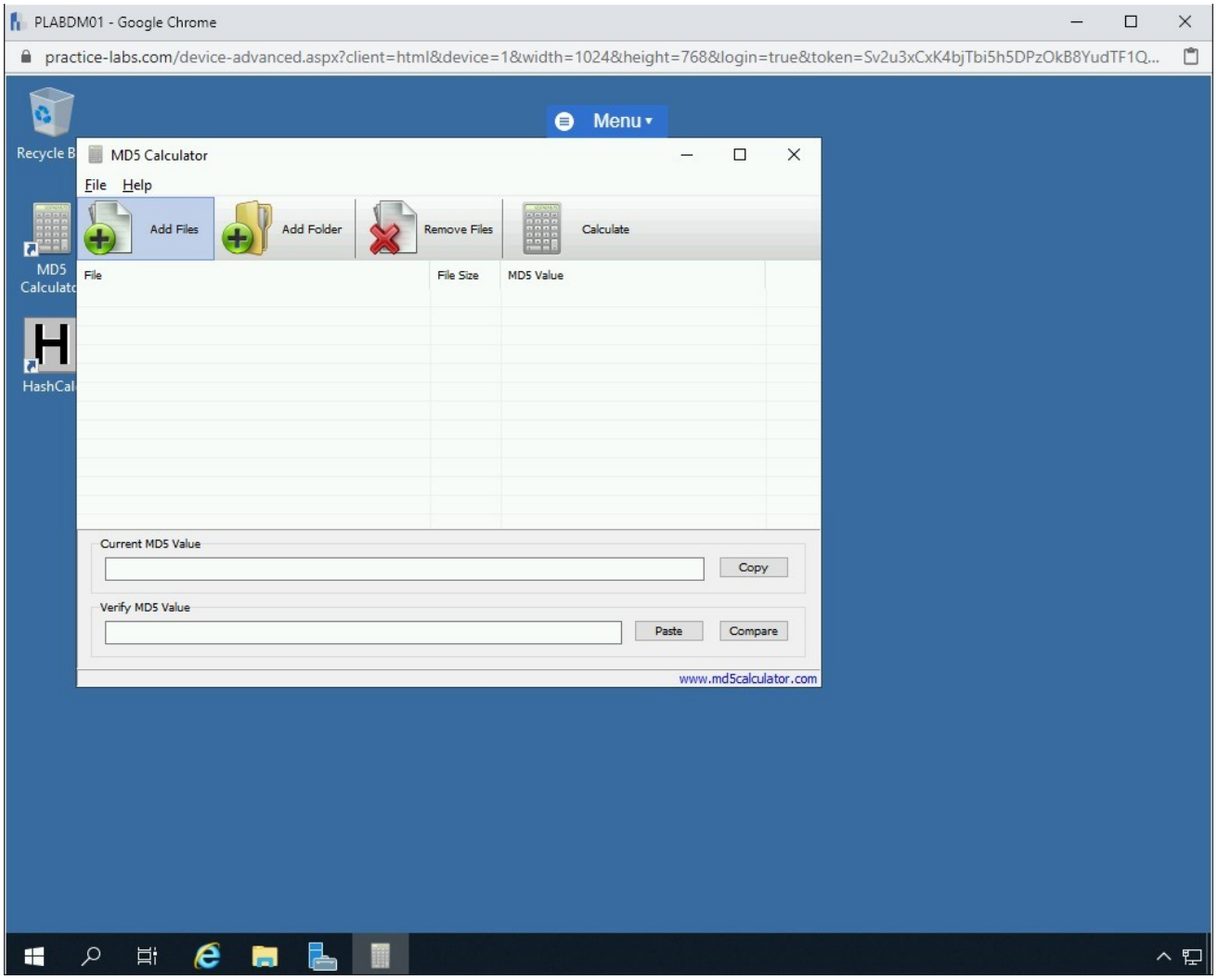


Figure 1.64 Screenshot of PLABDM01: Clicking Add Files on the MD5 Calculator dialog box.

Step 3

The **Open** dialog box is displayed. In the left pane, expand the **Local Disk (C**:), and then select the **labfiles** folder.

On the details pane, select **aep**.

Click **Open**.

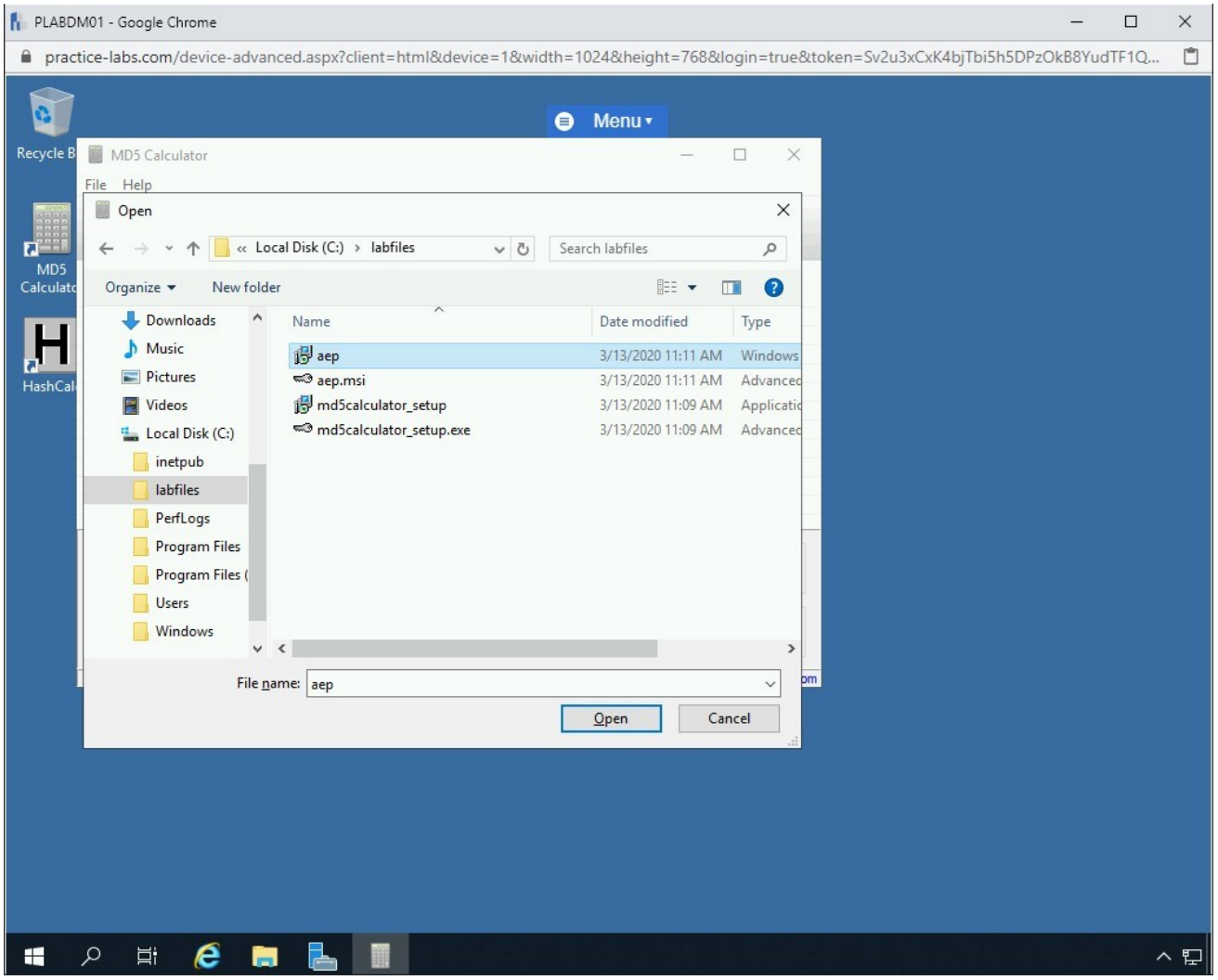


Figure 1.65 Screenshot of PLABDM01: Selecting the aep file and clicking Open.

Step 4

The **aep** file is now added to the list.

Click **Calculate**.

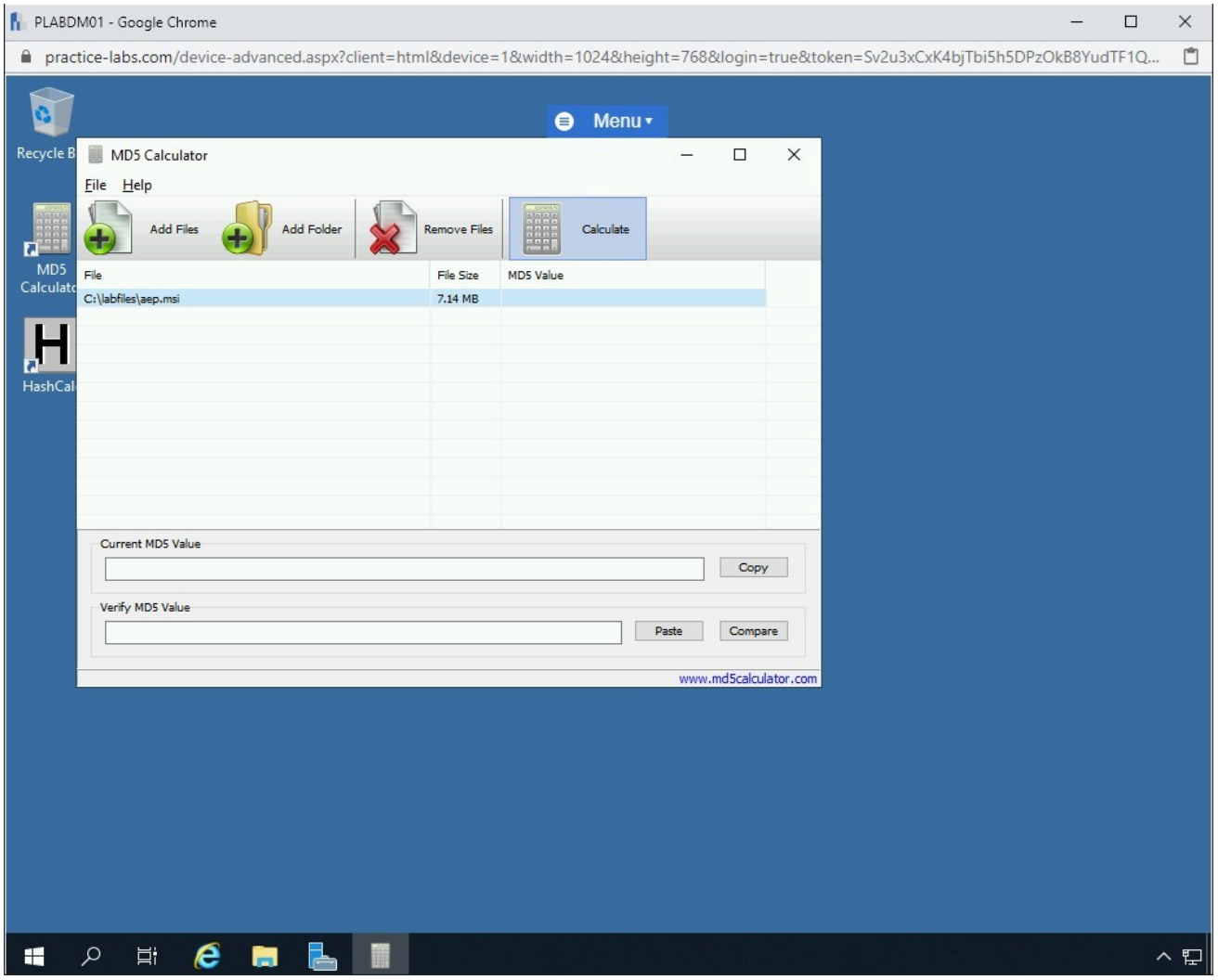


Figure 1.66 Screenshot of PLABDM01: Showing the added aep file and then clicking Calculate.

Step 5

Note that the **MD5** value is displayed in the **Current MD5 Value** textbox.

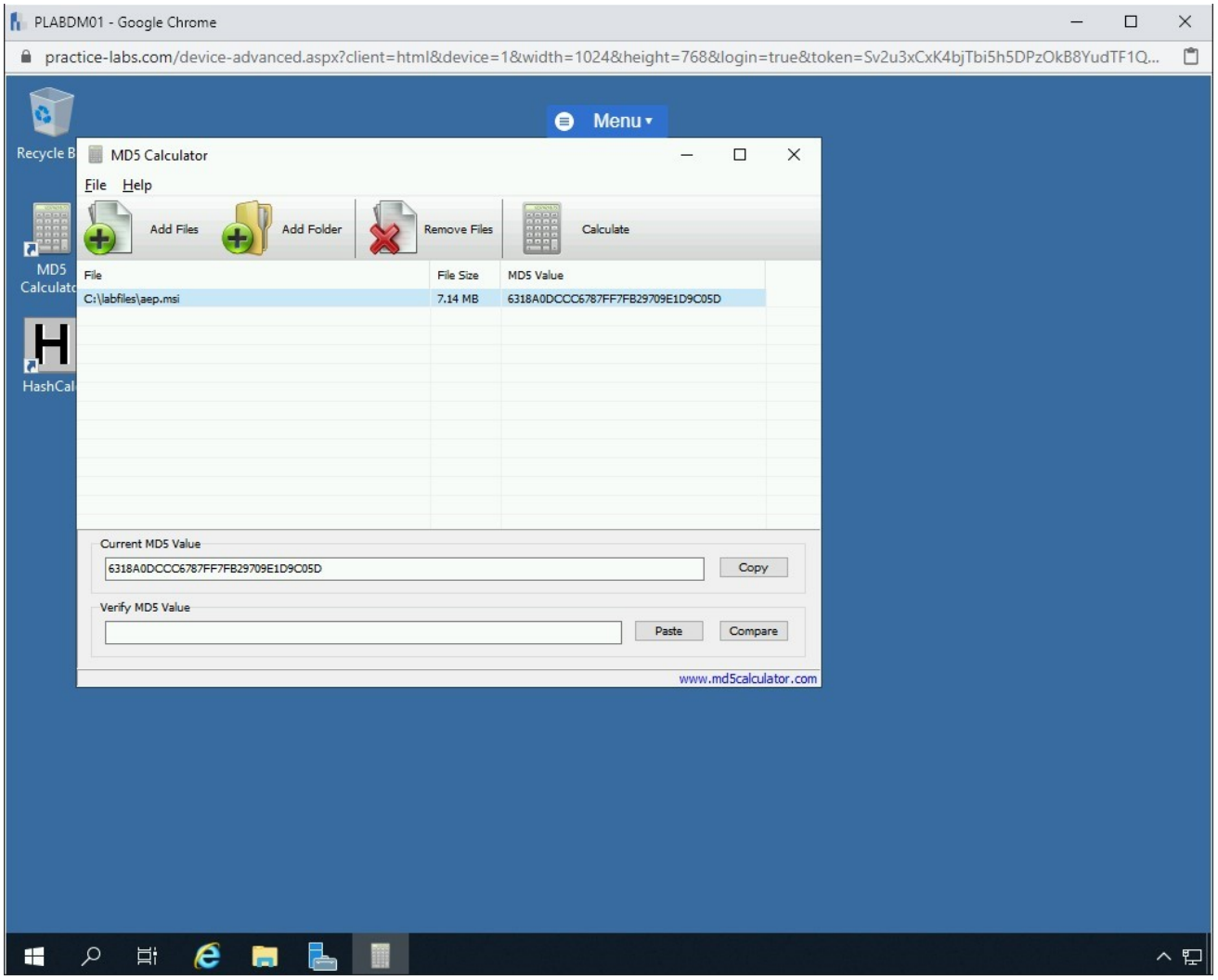


Figure 1.67 Screenshot of PLABDM01: Showing the calculated hash in the MD5 Calculator dialog box.

Step 6

Click the **HashCalc** icon on the desktop.

> ***Note:*** *In a real-world scenario, most software developers / organizations will put the MD5 or SHA hashes next to the files that you need to download. You can also search for the software name in a search engine and verify the hashes. In this task, you will re-generate the hashes of the same file using HashCalc and then compare them in MD5 Calculator.*

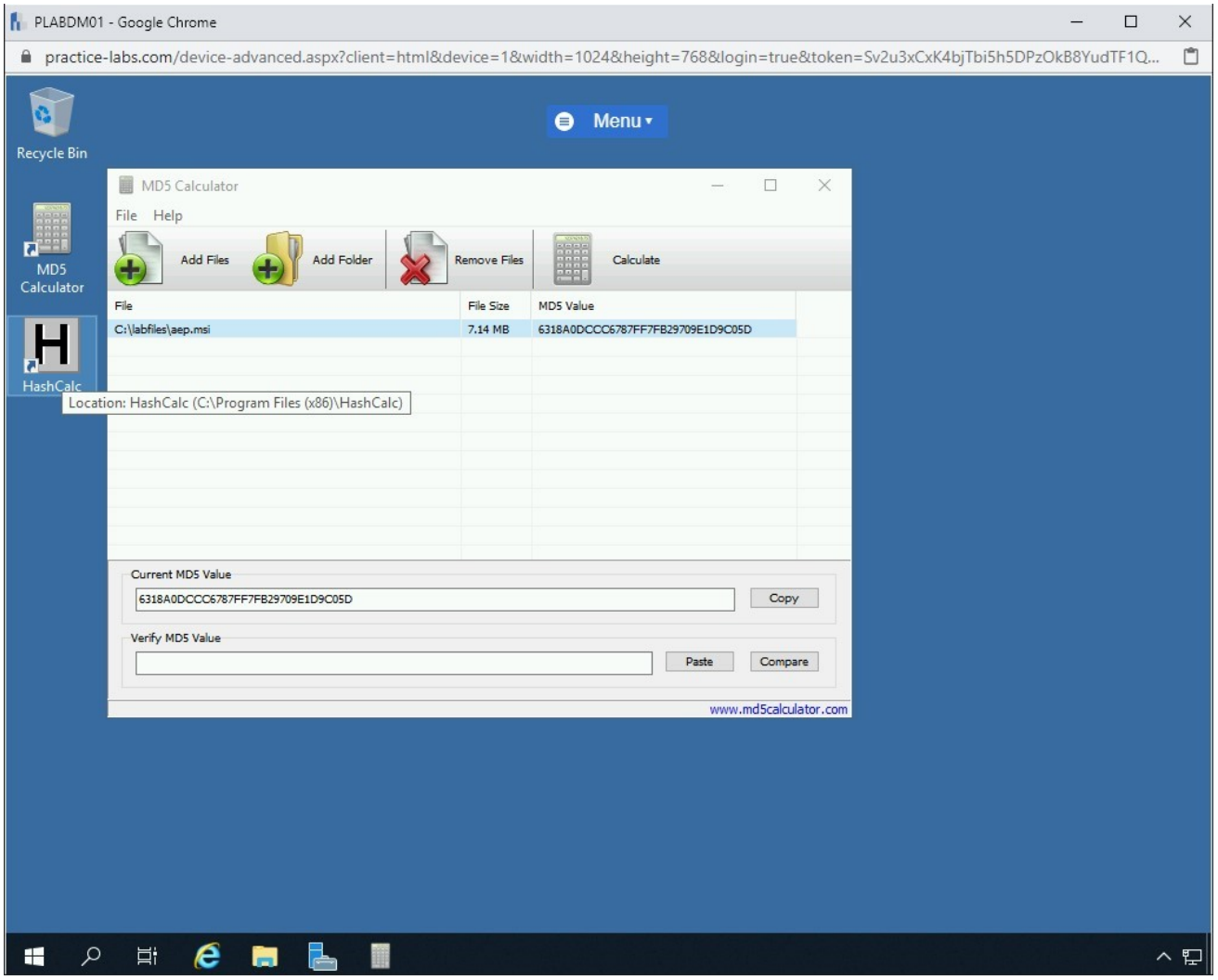


Figure 1.68 Screenshot of PLABDM01: Double-clicking the HashCalc icon on the desktop.

Step 7

Next to the **Data** textbox, click **[....]**

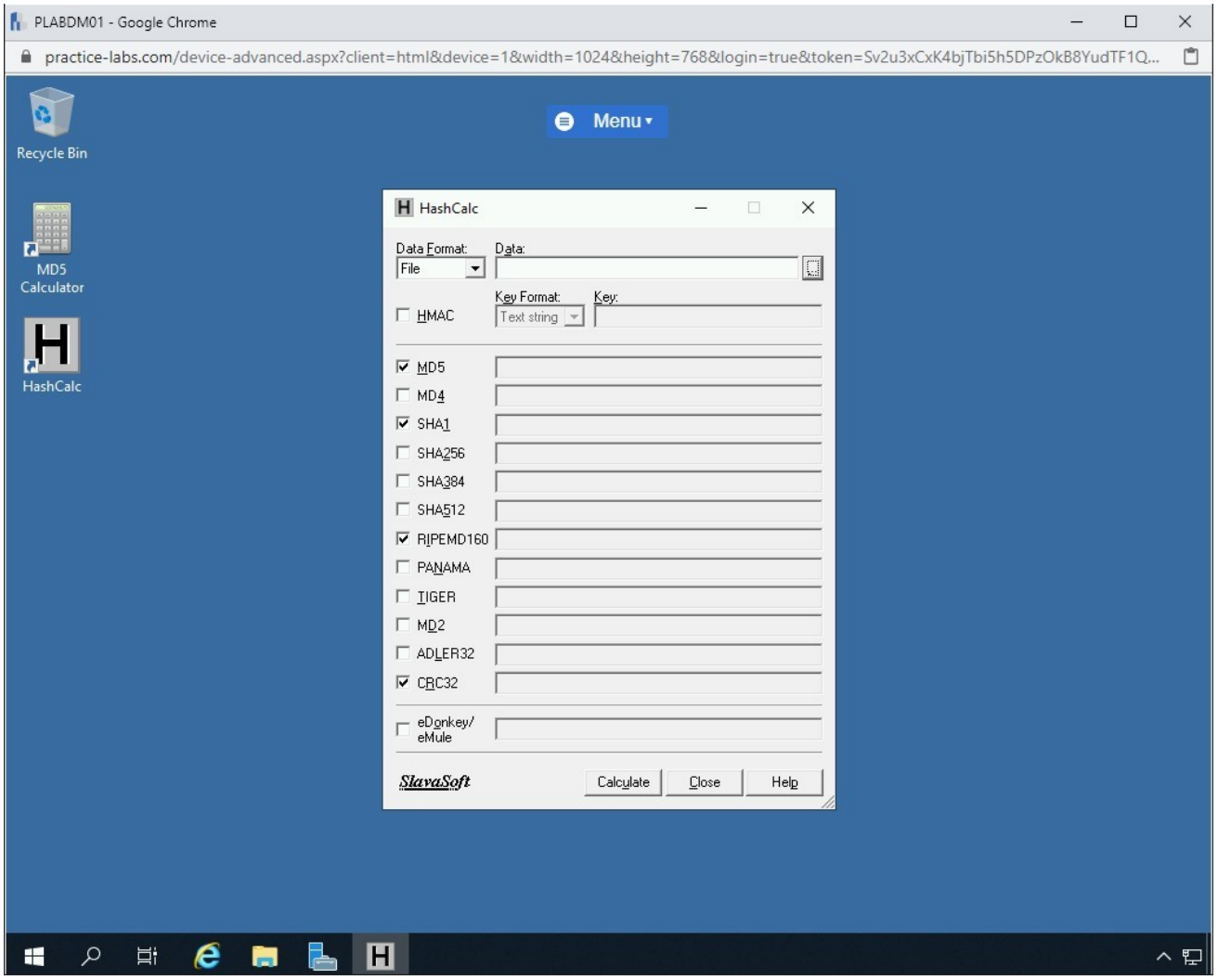


Figure 1.69 Screenshot of PLABDM01: Clicking the eclipse button next to the Data textbox.

Step 8

The **Find** dialog box is displayed.

Click the down arrow on the **Look in** drop-down and select **Local Disk (C:)**.

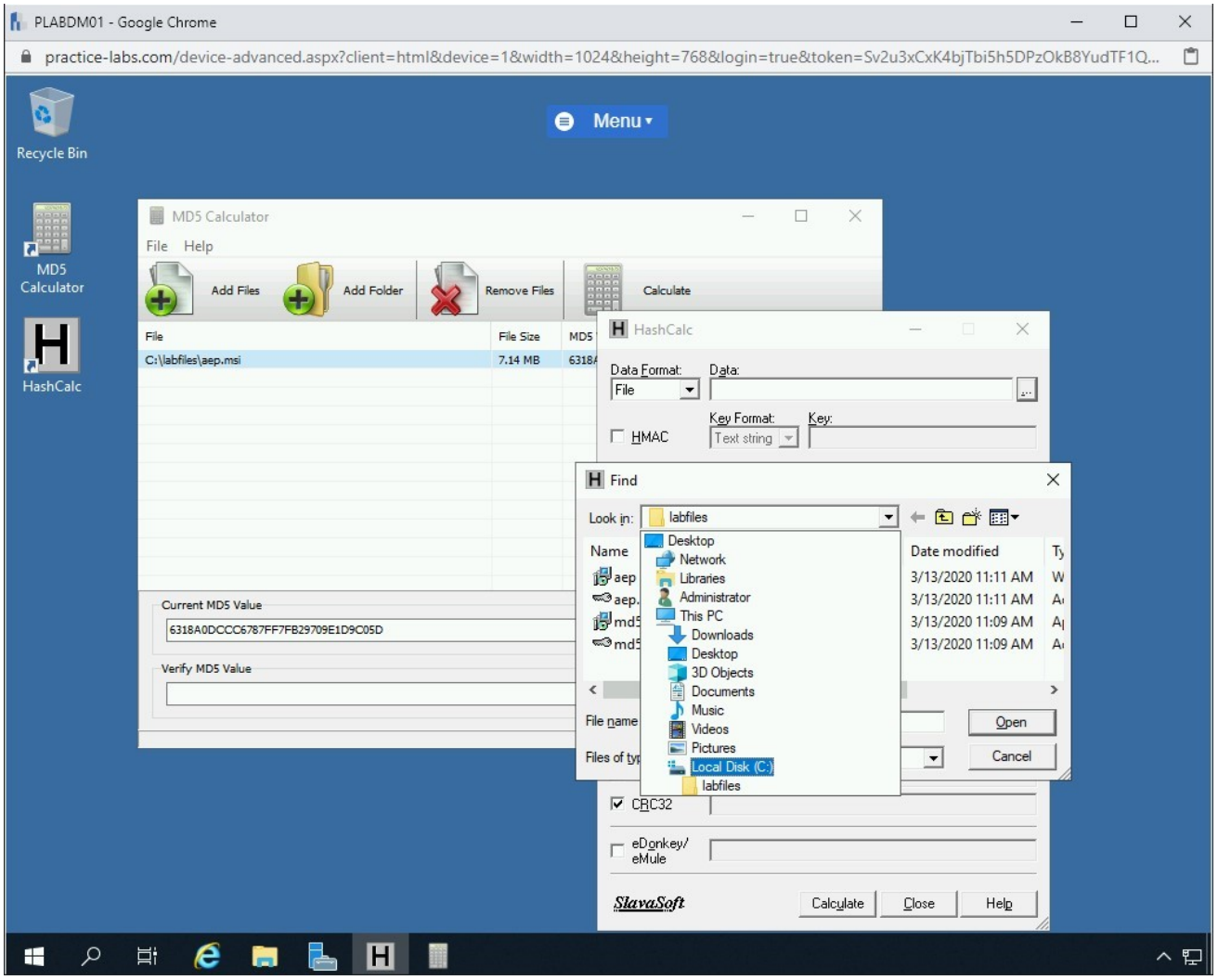


Figure 1.70 Screenshot of PLABDM01: Selecting Local Disk (C:) from the drop-down.

Step 9

Double-click on the **labfiles** folder or select and click **Open**.

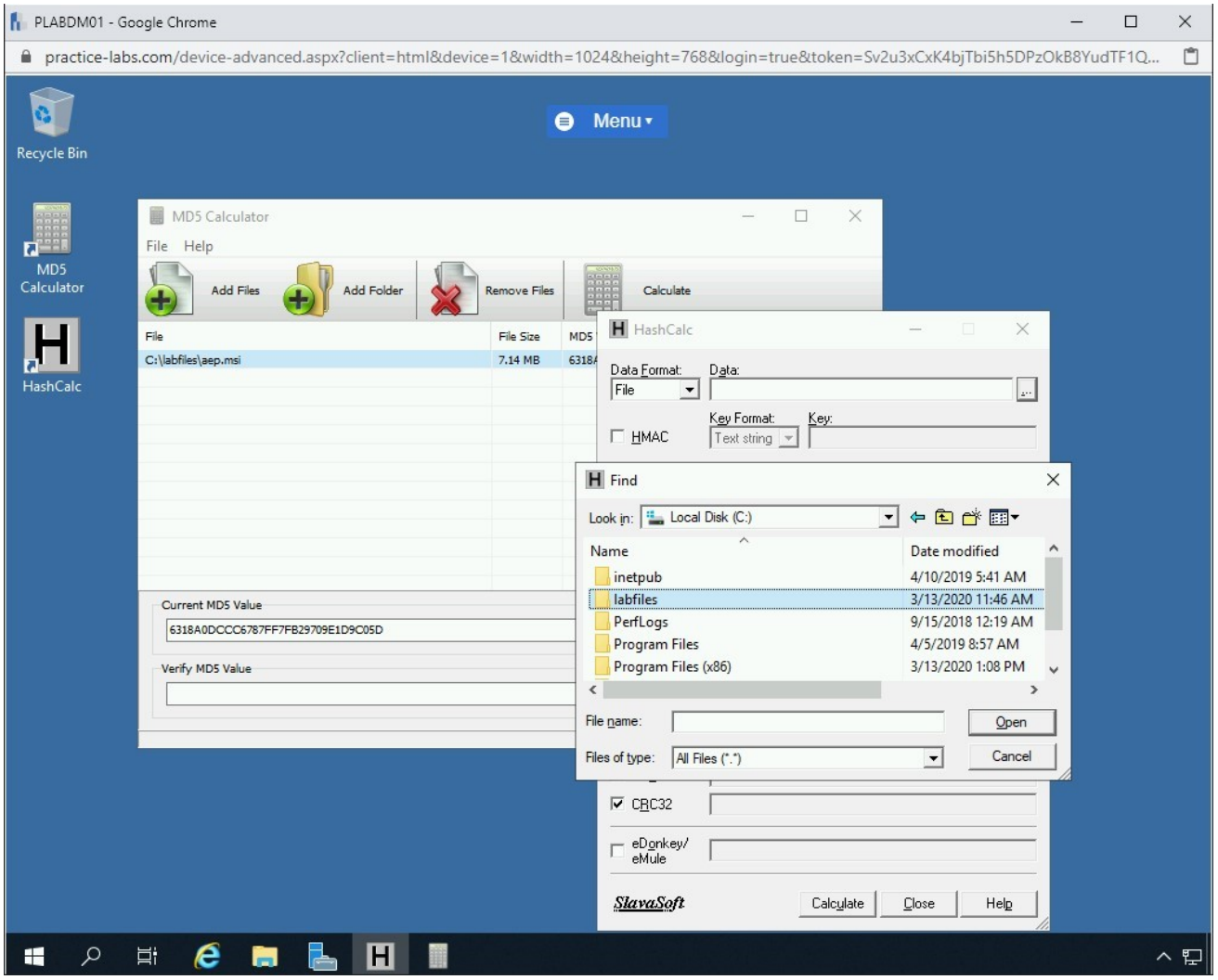


Figure 1.71 Screenshot of PLABDM01: Selecting the labfiles folder and clicking Open.

Step 10

Select the **aep** file and click **Open**.

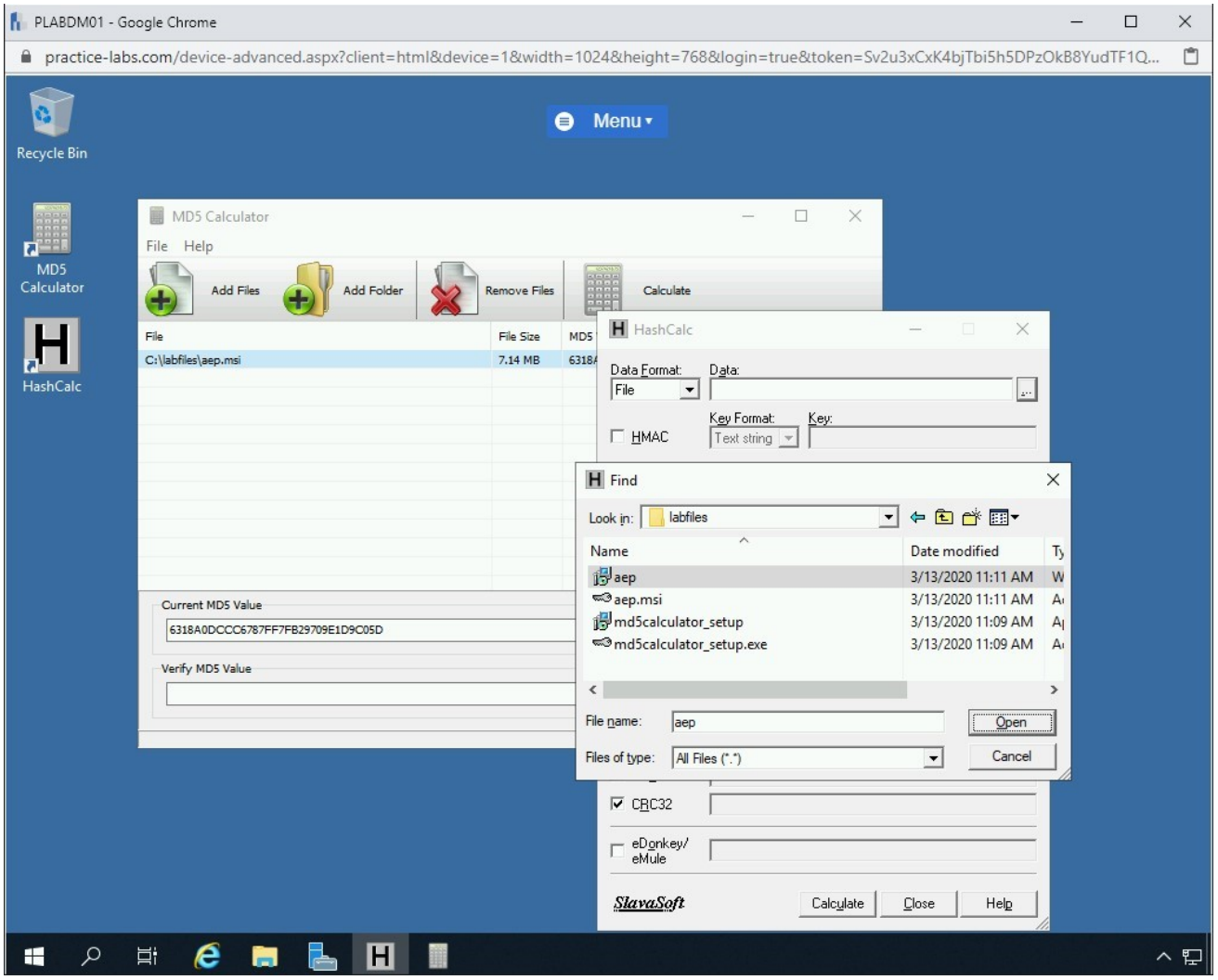


Figure 1.72 Screenshot of PLABDM01: Selecting the aep file and clicking Open.

Step 11

The **aep.msi** file is now added.

As before, you can select the hash or checksum algorithm that you can want to check for this file.

For this task, you will use the default selection.

Click **Calculate**.

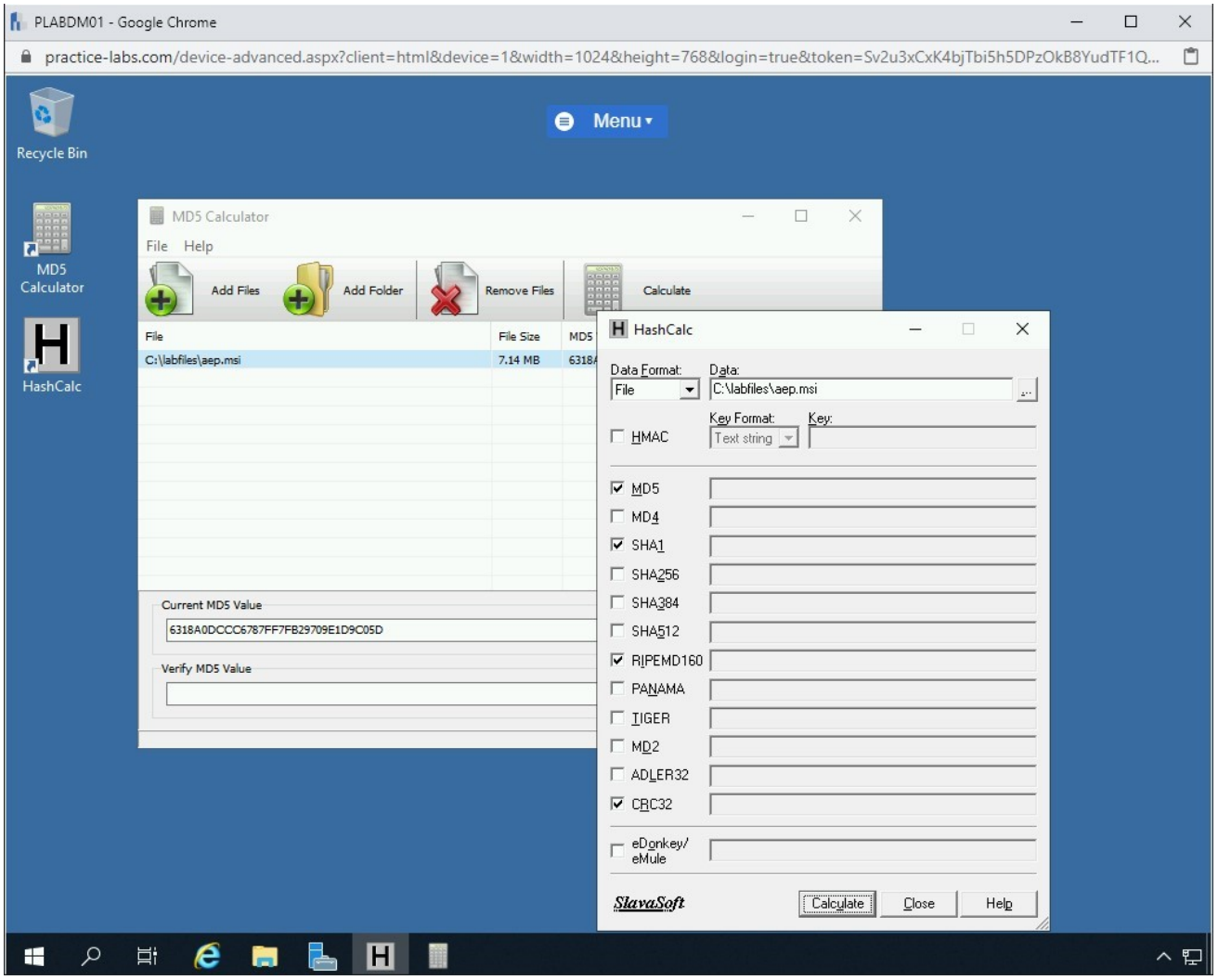


Figure 1.73 Screenshot of PLABDM01: Clicking the Calculate button on the HashCalc dialog box.

Step 12

The hash values are displayed. In the **MD5** hash value field, select the hash, right-click and then select **Copy**.

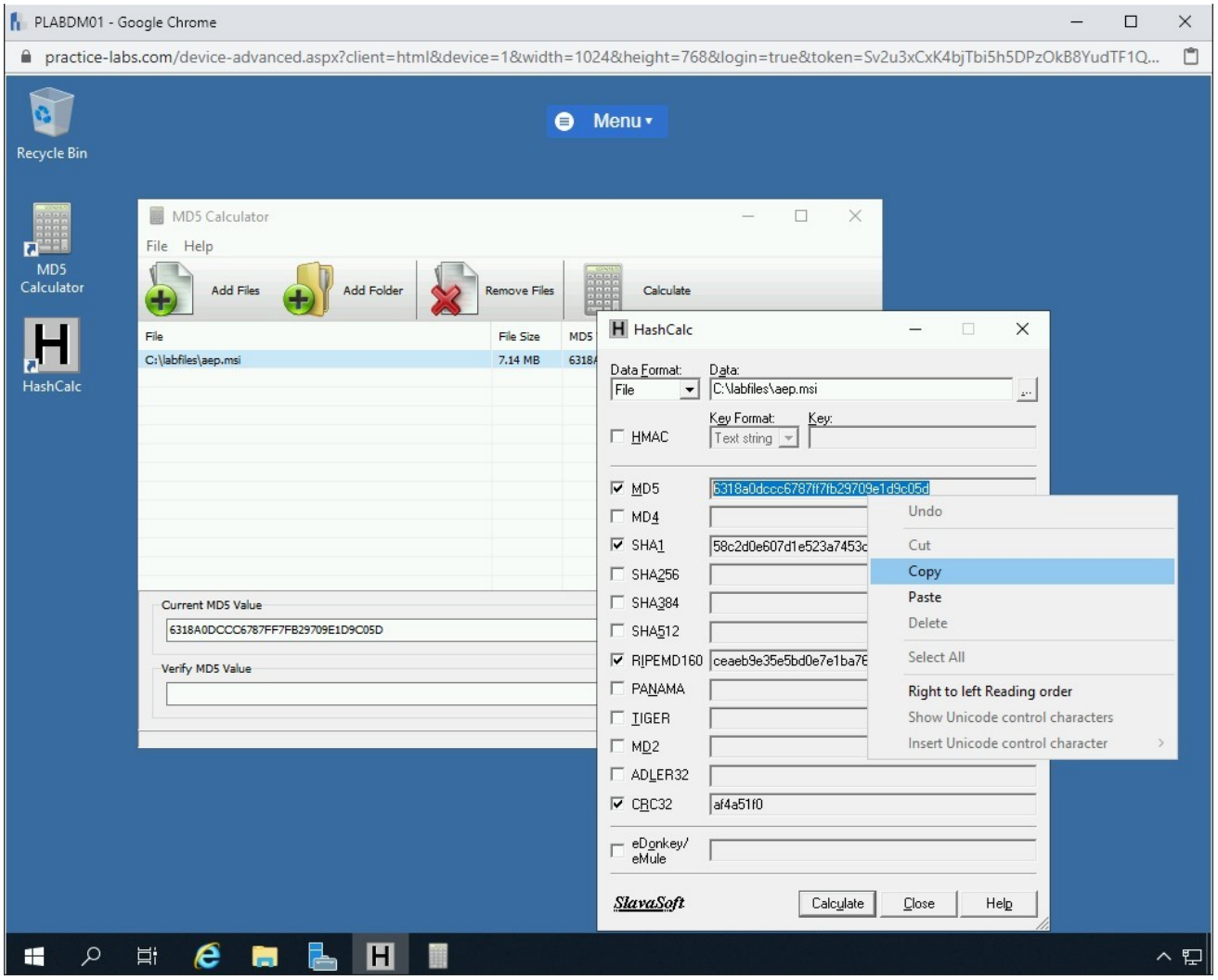


Figure 1.74 Screenshot of PLABDM01: Right-clicking on the MD5 hash and selecting Copy.

Step 13

Click **Close**.

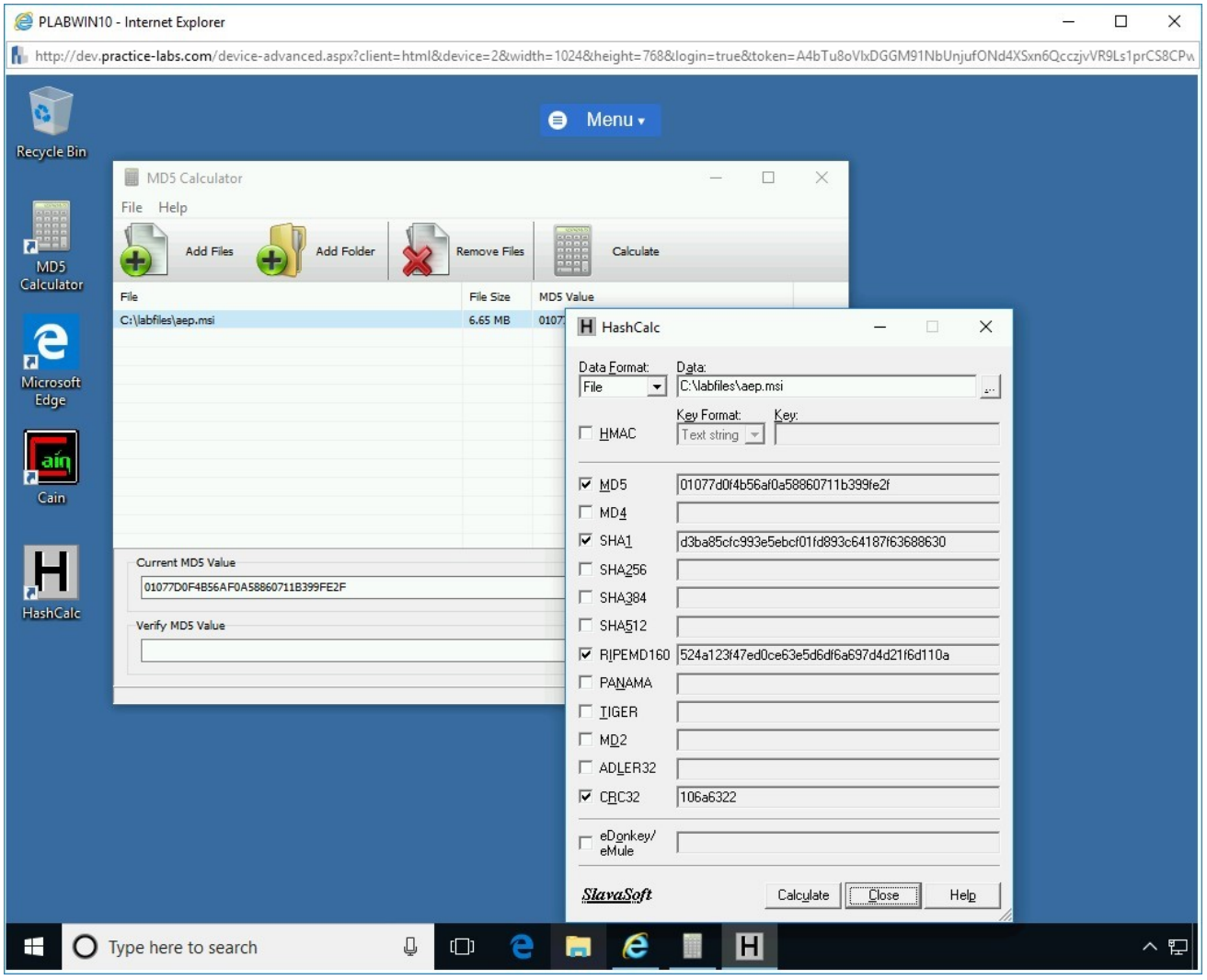


Figure 1.75 Screenshot of PLABDM01: Clicking Close on the HashCalc dialog box.

Step 14

Go back to the **MD5 Calculator** application.

Place the cursor inside the **Verify MD5 Value** textbox, right-click and select **Paste**.

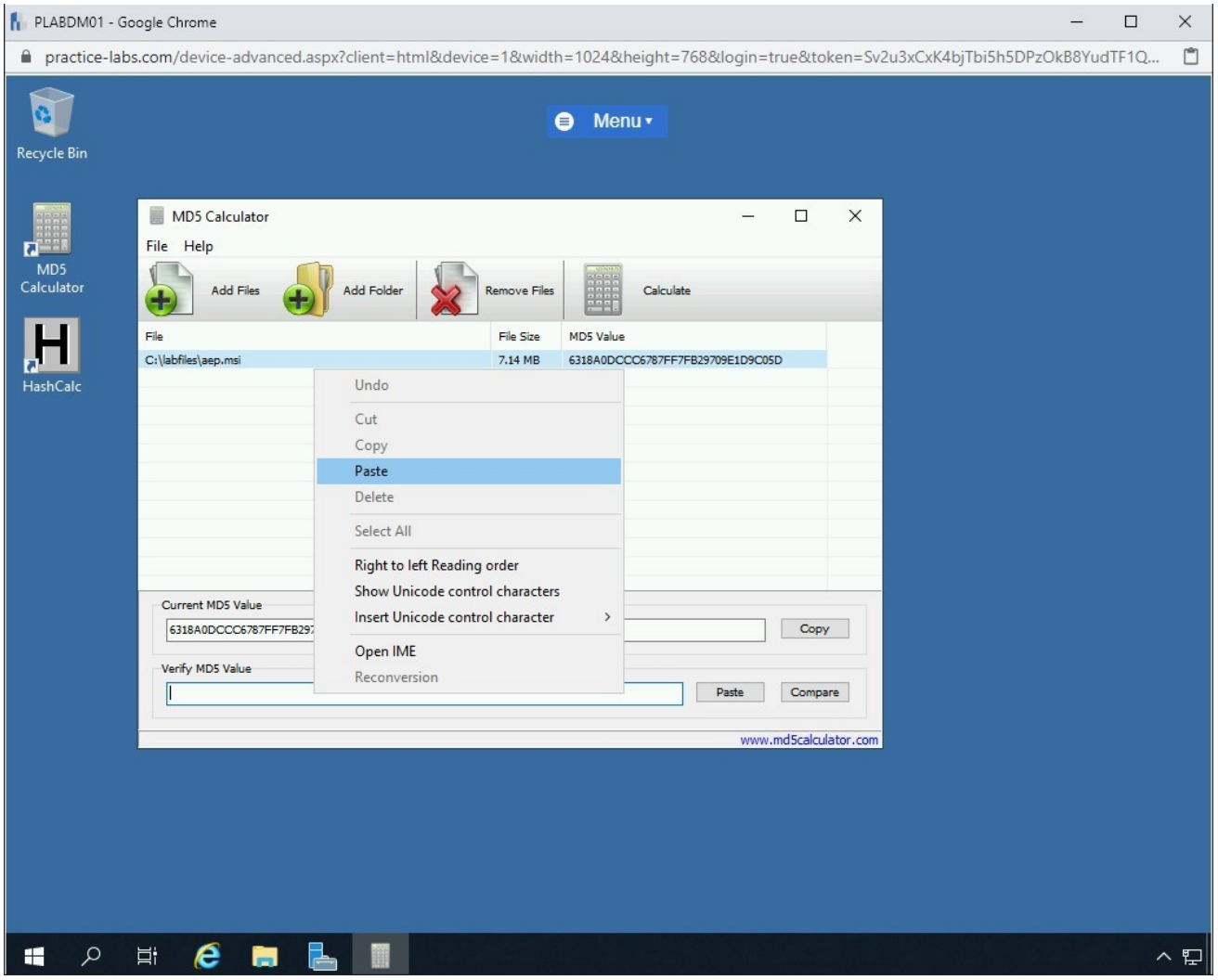


Figure 1.76 Screenshot of PLABDM01: Right-clicking in the Verify MD5 Value textbox and clicking Paste.

Step 15

Click **Compare**.

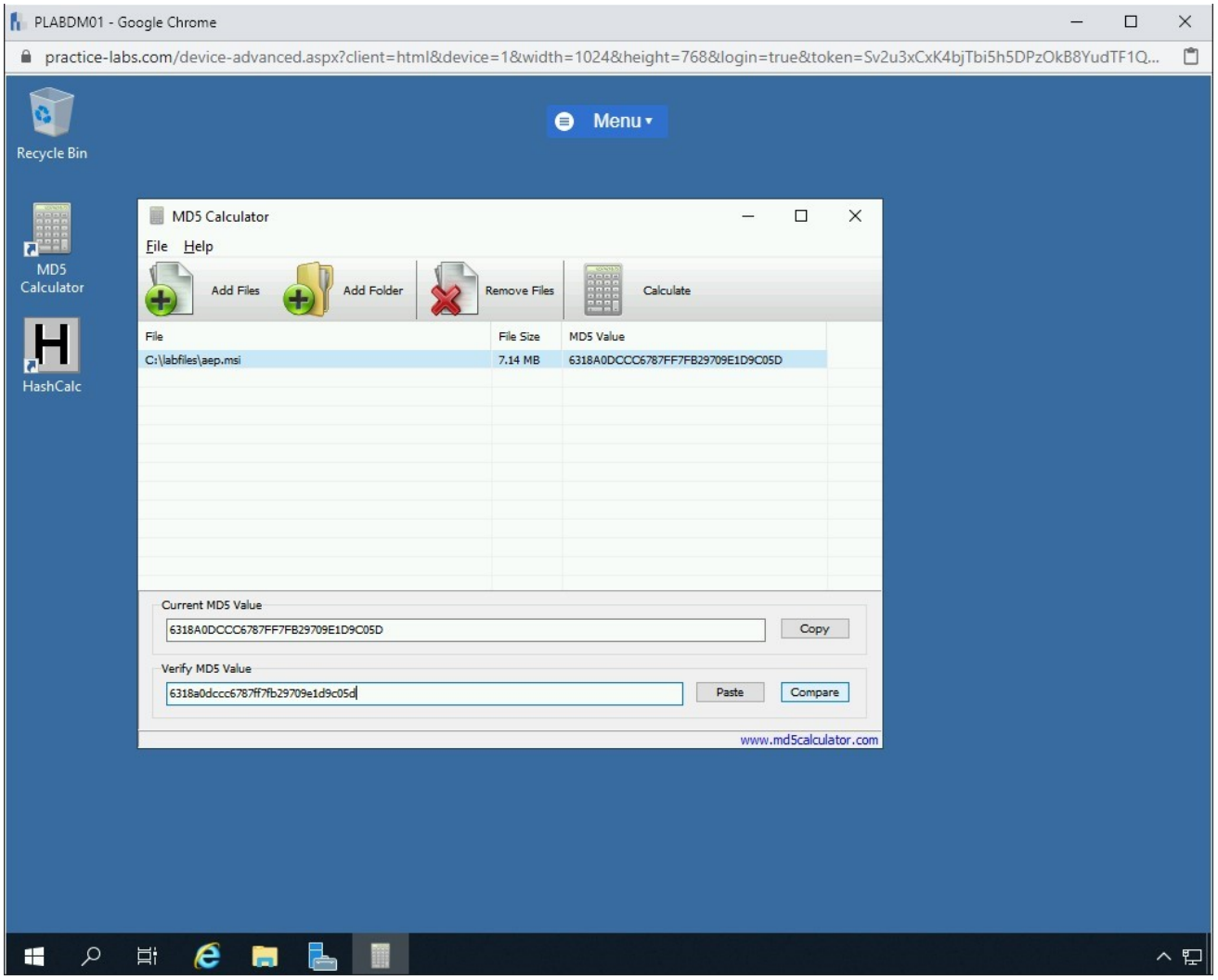


Figure 1.77 Screenshot of PLABDM01: Clicking the Compare button in the MD5 Calculator dialog box.

Step 16

The **Information dialog** box is displayed.

The **Information** dialog box is displayed with a message: "**OK, two MD5 values are equal**." Click **OK** to close the Information dialog box.

Click **OK**.

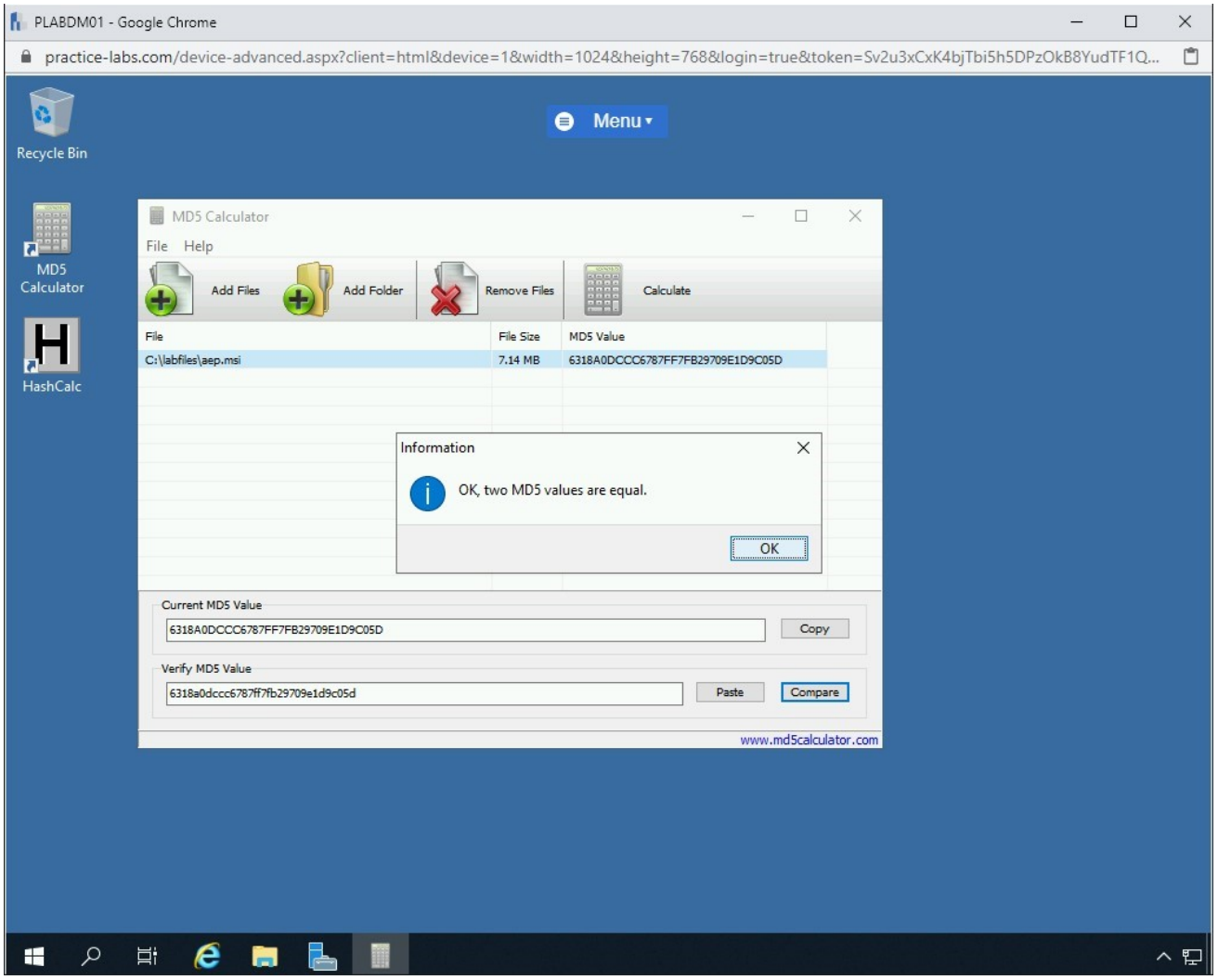


Figure 1.78 Screenshot of PLABDM01: Clicking OK on the Information dialog box.

Step 17

Close the **MD5 Calculator** dialog box.

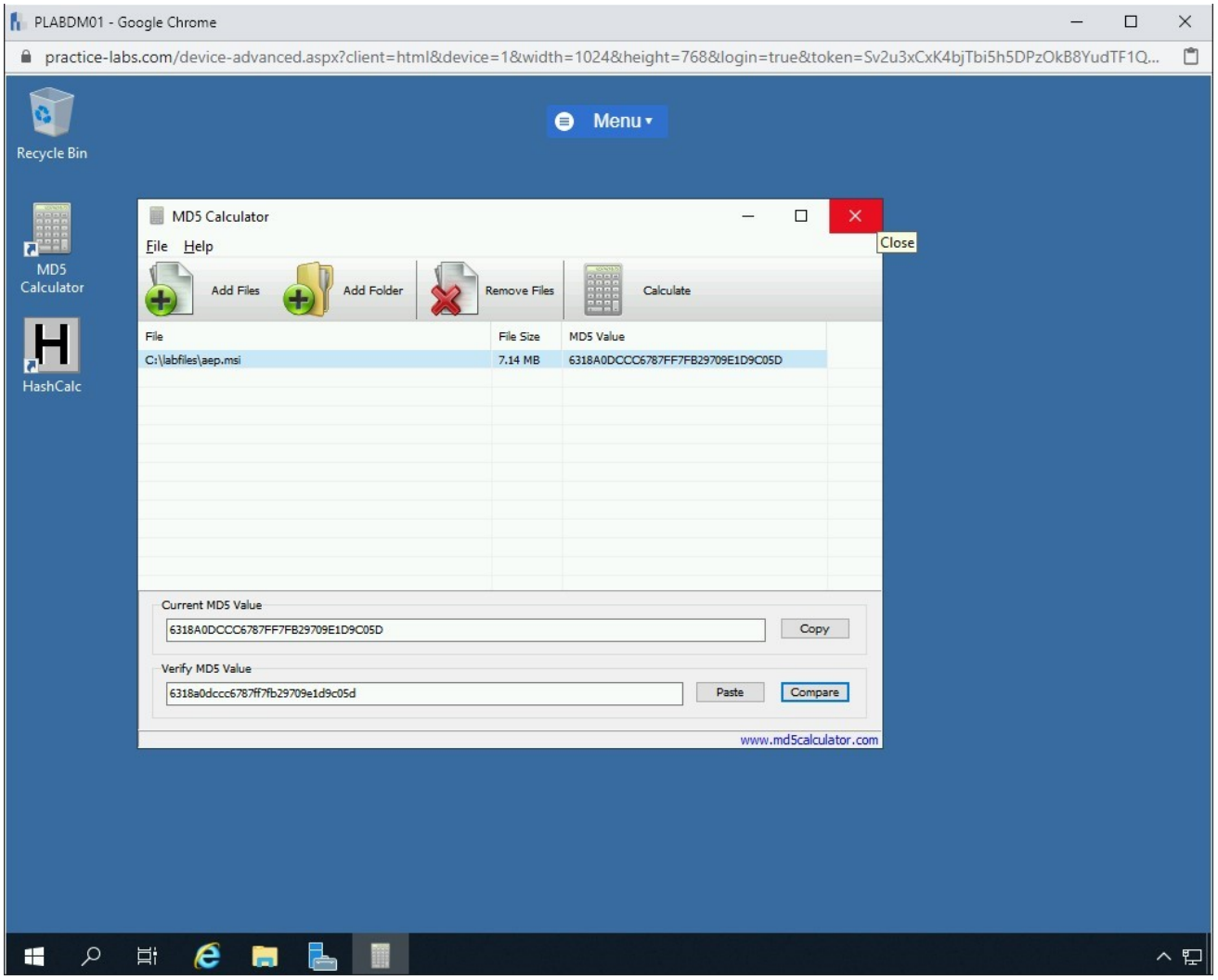


Figure 1.79 Screenshot of PLABDM01: Closing the MD5 Calculator dialog box.

Task 7 - Perform Full Disk Encryption

Full Disk Encryption encrypts the contents of a drive, which also includes the encryption of bootable partition. There are several tools available in the market that can perform full disk encryption. In this task, you will use GiliSoft Full Disk Encryption, which is specifically designed for laptops and devices that are on the move constantly. It encrypts the hard drive with one or partitions. It has the capability to encrypt the system partition as well.

To use GiliSoft Full Disk Encryption, perform the following steps:

Step 1

Ensure you have powered the required devices, **Connect** to **PLABDM01**.

Restore **Internet Explorer** and ensure that you are in **[..] > Tools > Hacking Tools** page.

Locate and click **full-disk-encryption.exe.**

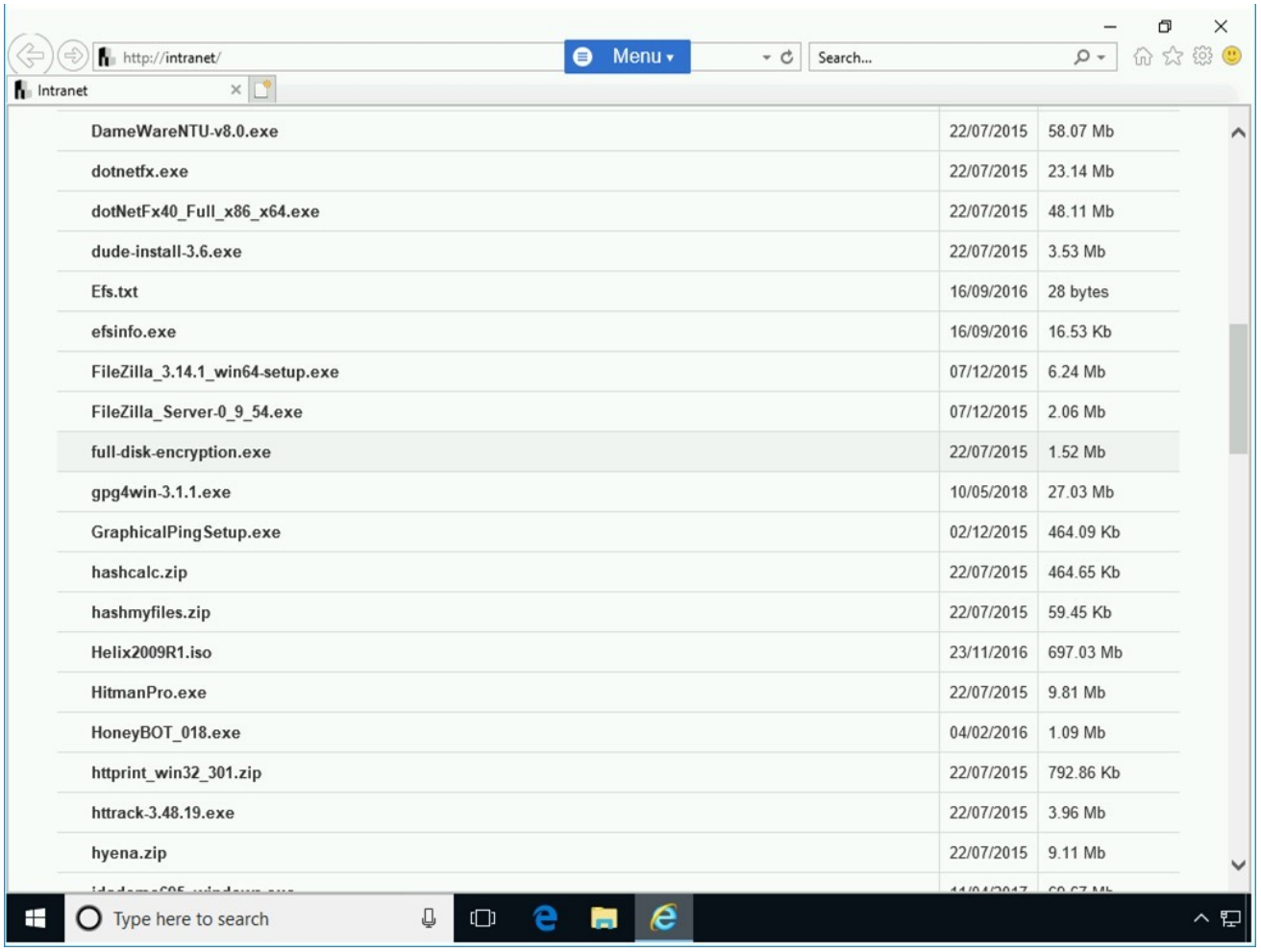


Figure 1.80 Screenshot of PLABDM01: Locating and clicking the full-disk-encryption.exe file on the Hacking Tools page.

Step 2

On the notification toolbar, click **Run**.

Alert: If you are shown that the file is not commonly downloaded and could harm your computer, select Actions, More Options drop down and Run Anyway.

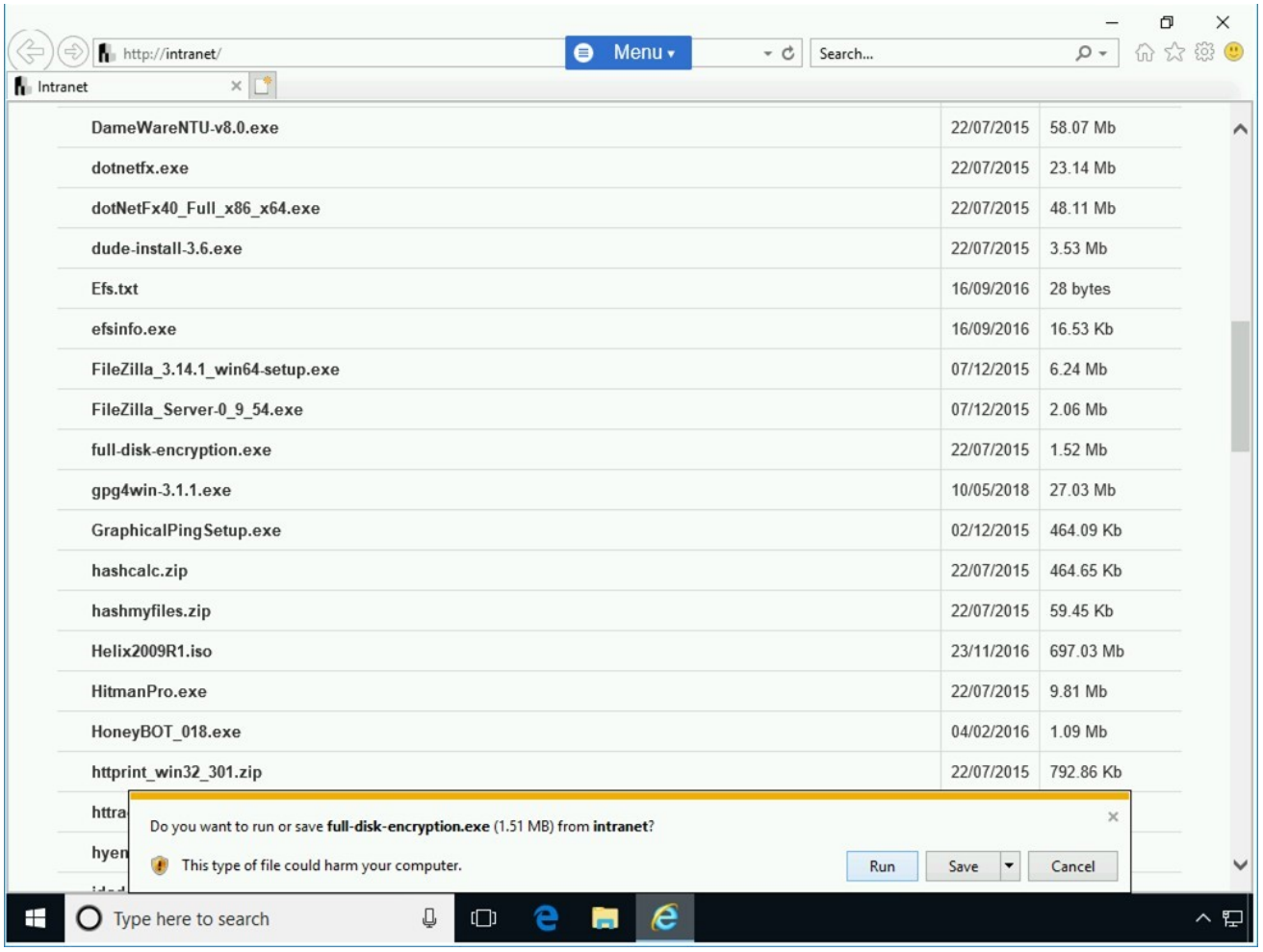


Figure 1.81 Screenshot of PLABDM01: Clicking Run in the notification bar.

Step 3

The **Setup - GiliSoft Full Disk Encryption** wizard is displayed. On the **Welcome to the GiliSoft Full Disk Encryption Setup Wizard** dialog box, click **Next**.

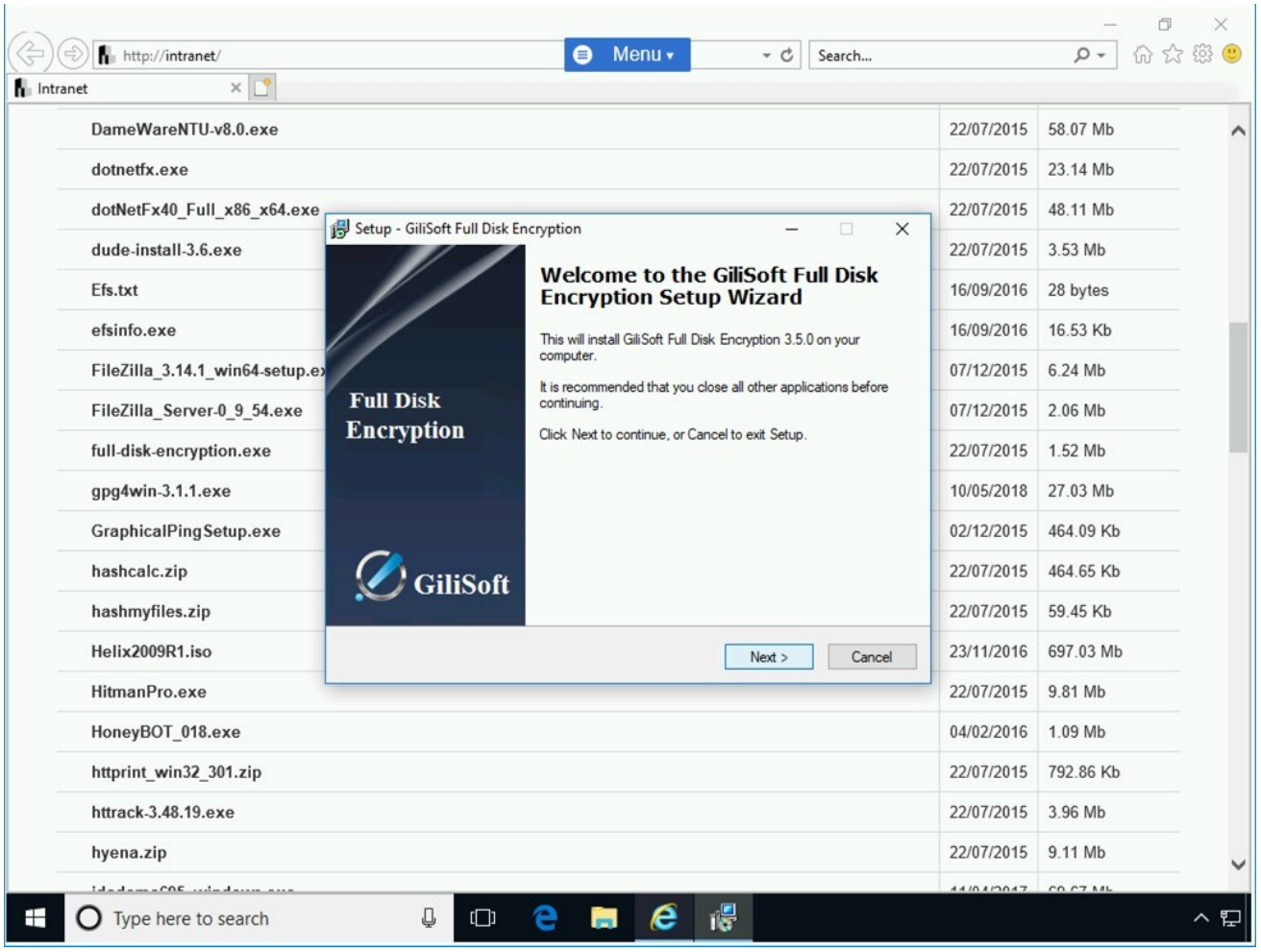


Figure 1.82 Screenshot of PLABDM01: Clicking Next on the Welcome to the GiliSoft Full Disk Encryption Setup Wizard page.

Step 4

On the **Select Destination Location** page, keep the default installation location and click **Next**.

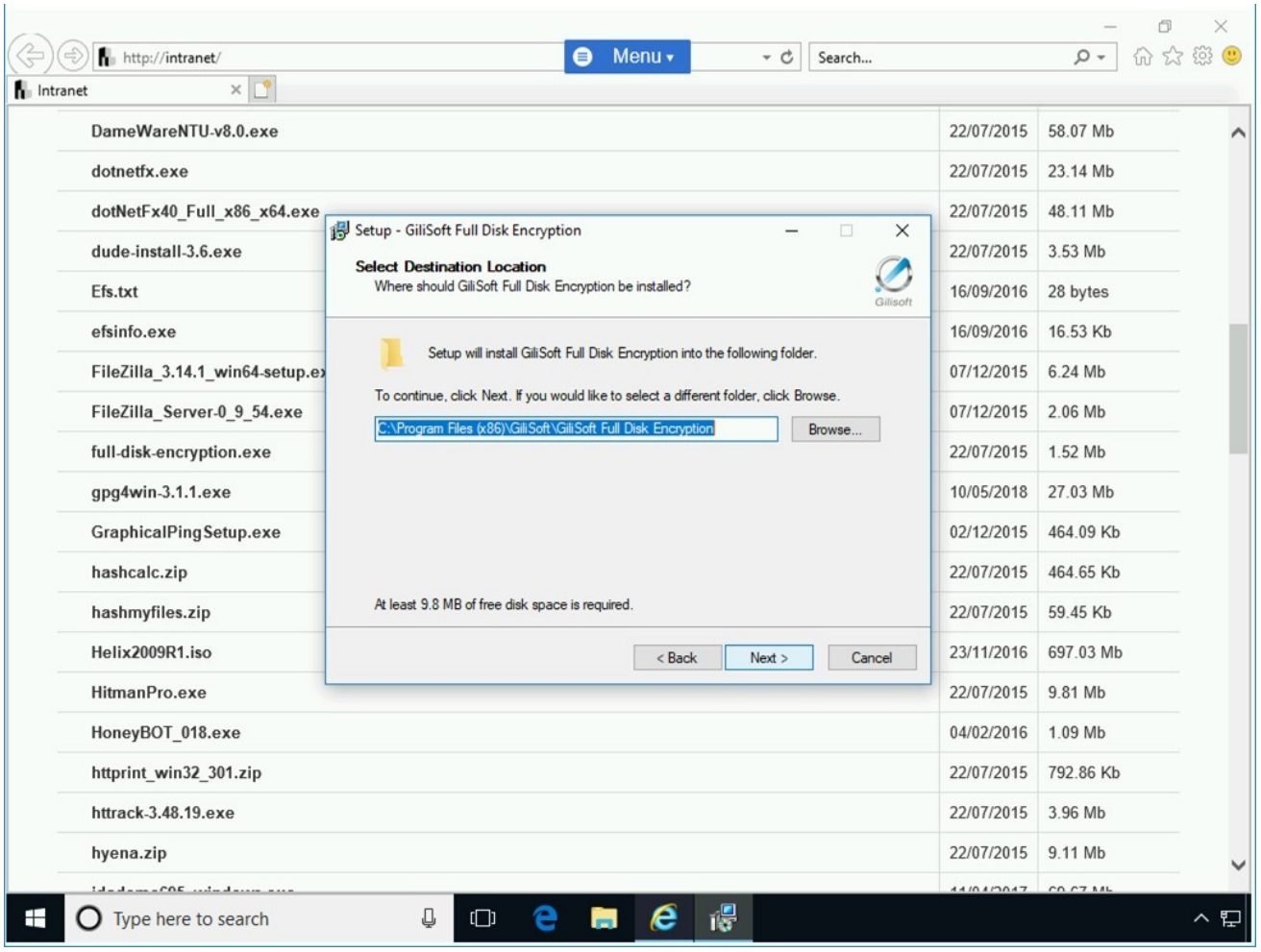


Figure 1.83 Screenshot of PLABDM01: Keeping the default installation path and clicking Next on the Select Destination Location page.

Step 5

On the **Select Start Menu Folder** page, keep the default menu name and click **Next**.

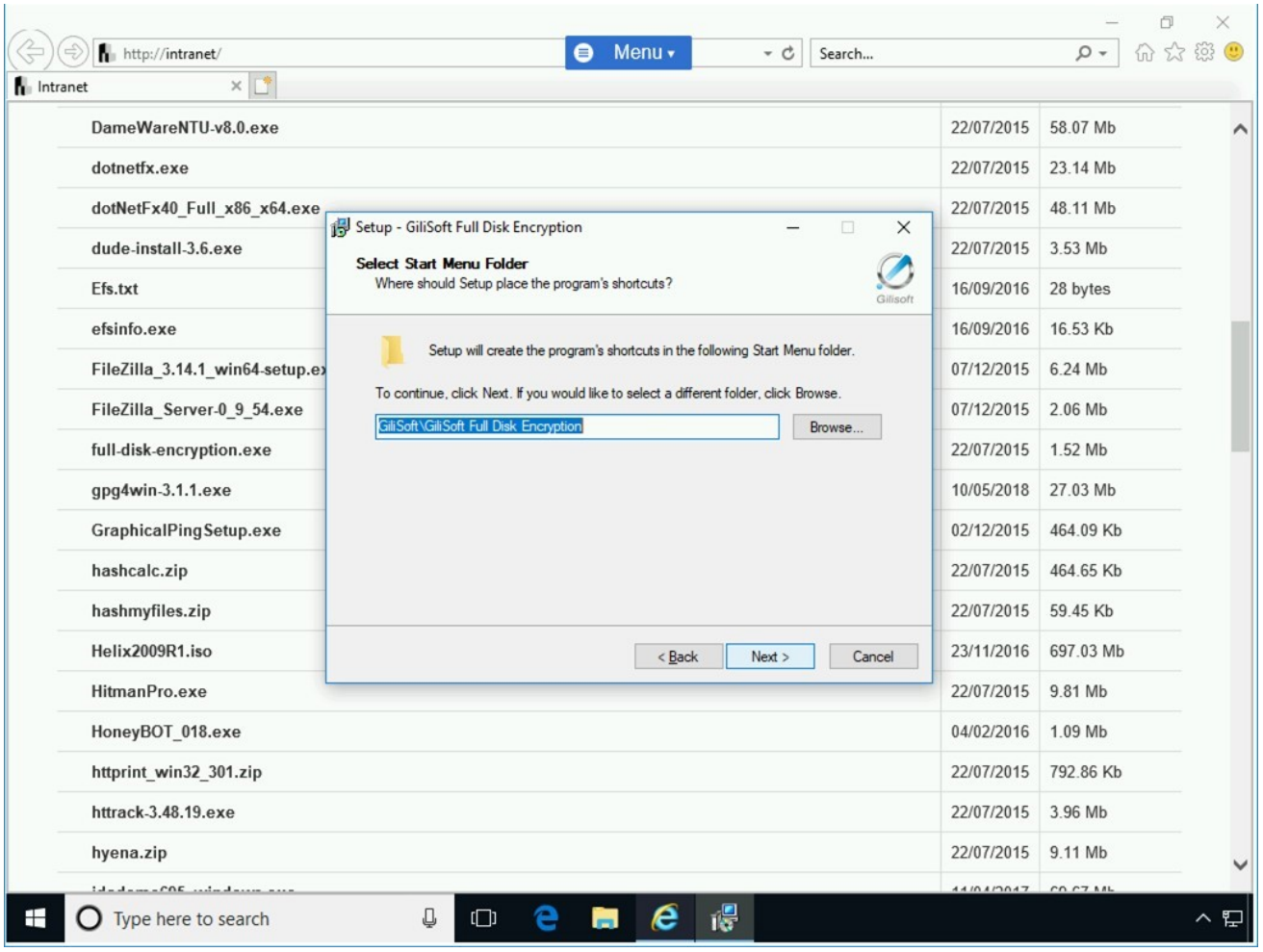


Figure 1.84 Screenshot of PLABDM01: Keeping the default menu name on the Select Start Menu Folder page and clicking Next.

Step 6

On the **Select Additional Tasks** page, keep the default selection and click **Next**.

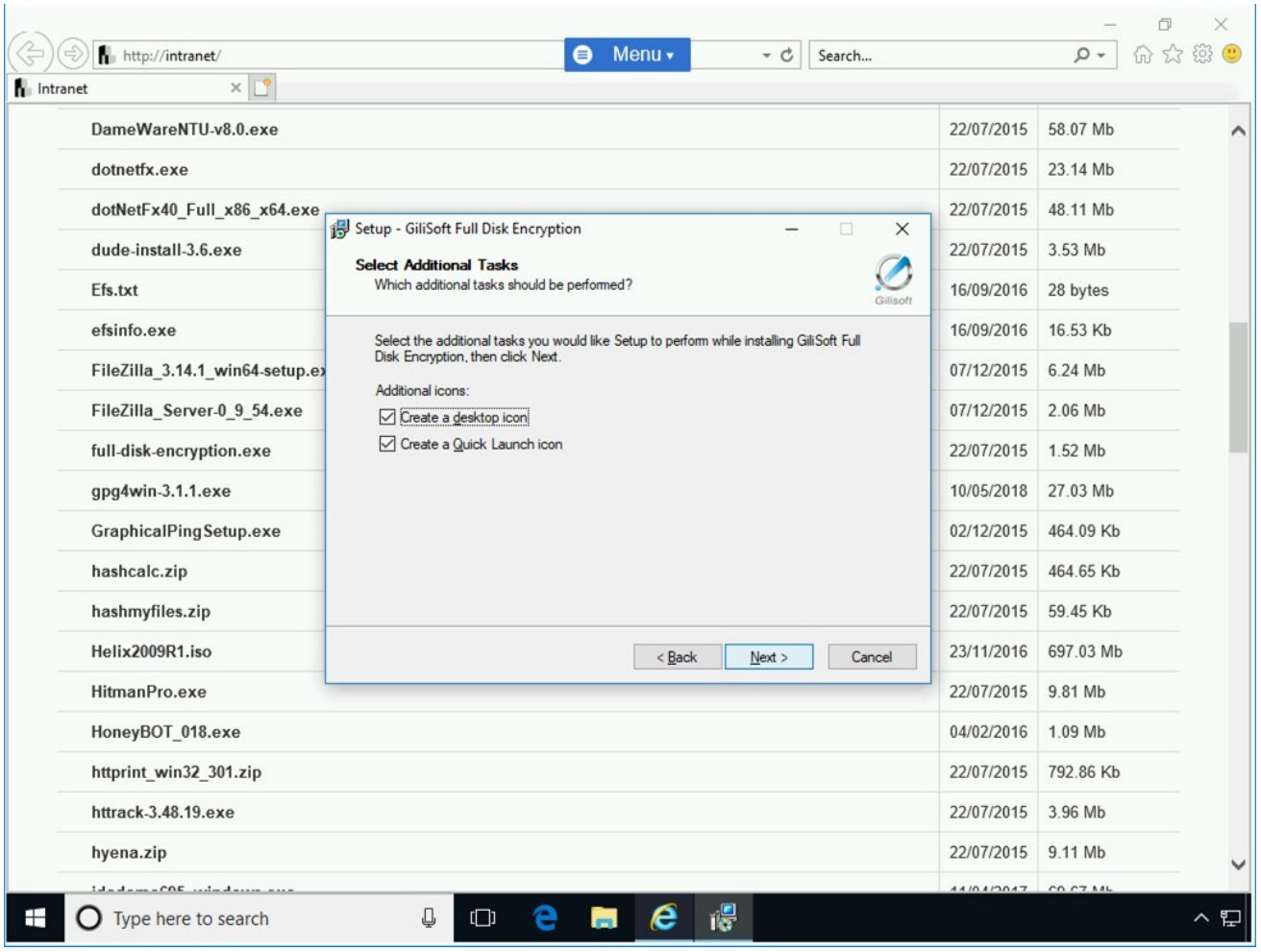


Figure 1.85 Screenshot of PLABDM01: Keeping the default options on the Select Additional Tasks page and clicking Next.

Step 7

On the **Ready to Install** page, review the settings, and click **Install**.

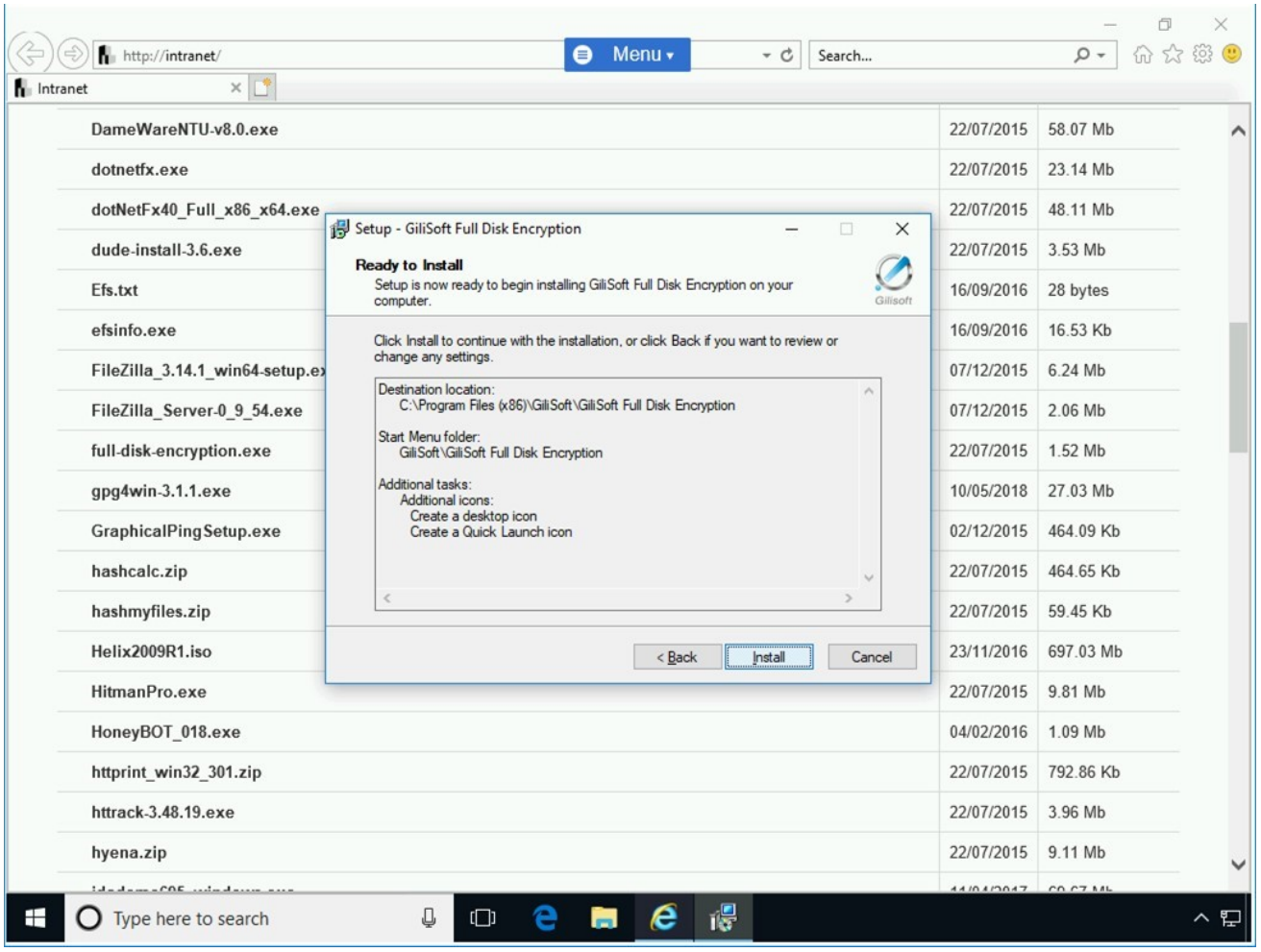


Figure 1.86 Screenshot of PLABDM01: Clicking Install on the Ready to Install page.

The **Installing** page displays the installation progress.

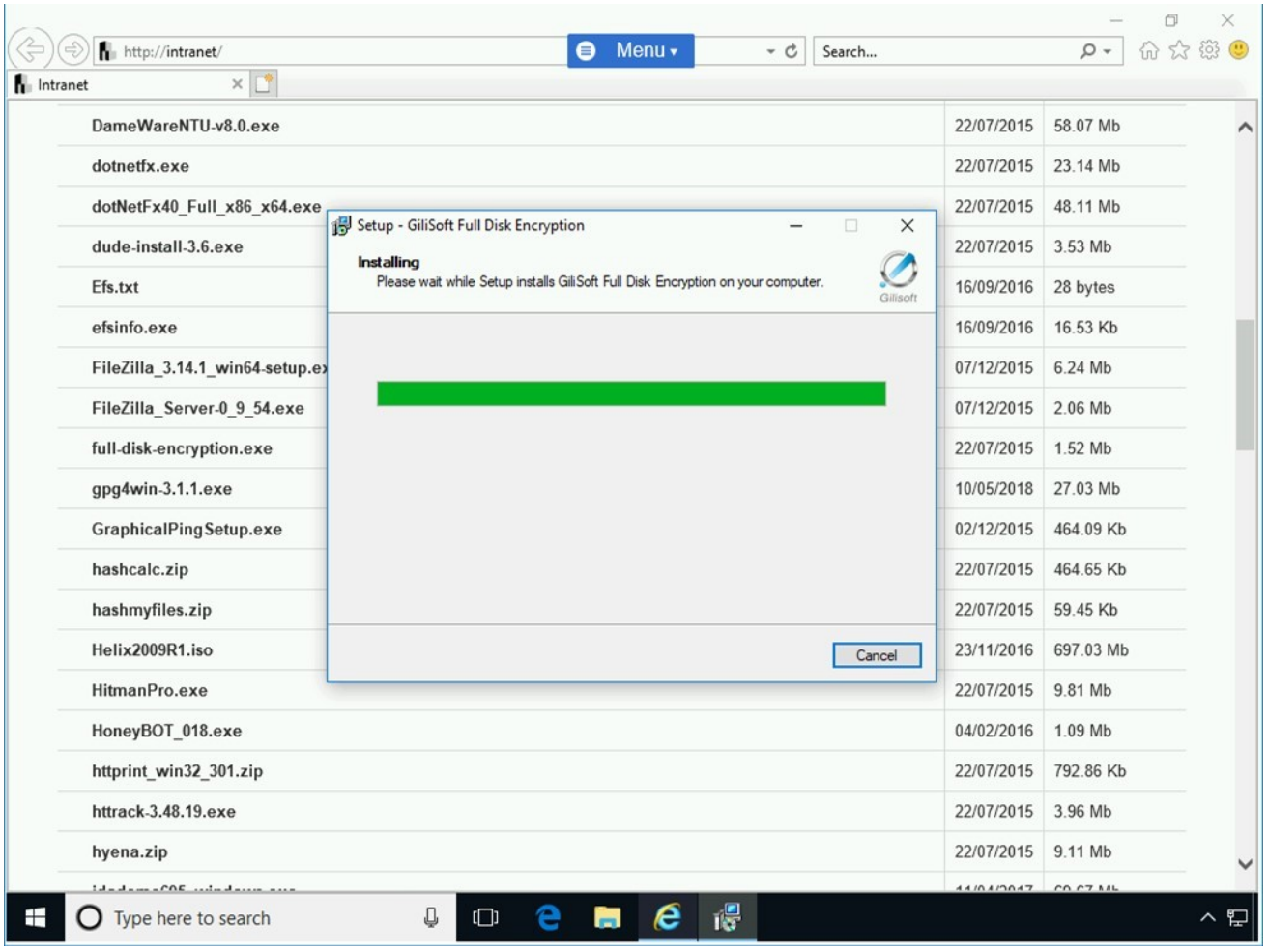


Figure 1.87 Screenshot of PLABDM01: Showing the installation progress on the Installing page.

Step 8

After the installation is complete, you are navigated to the **Completing the GiliSoft Full Disk Encryption Setup Wizard** page. Ensure that **Yes, restart the computer now** option is selected.

Click **Finish**.

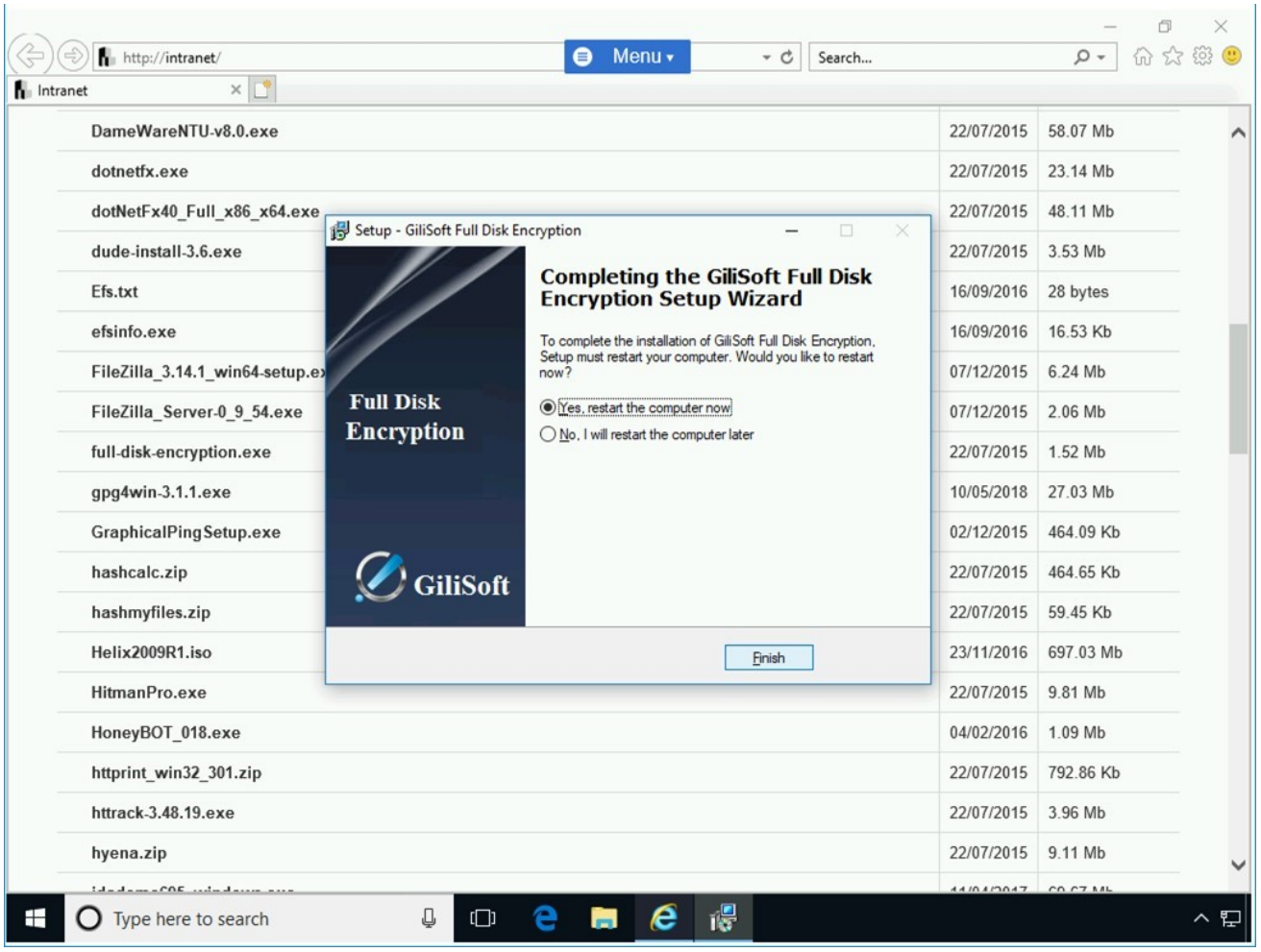


Figure 1.88 Screenshot of PLABDM01: Keeping the restart option and clicking Finish.

Step 9

Connect to **PLABDM01** after **1** minute.

Once you are connected to **PLABDM01**, double-click the **Gilisoft Full Disk Encryption 3.5.0** icon on the Desktop.

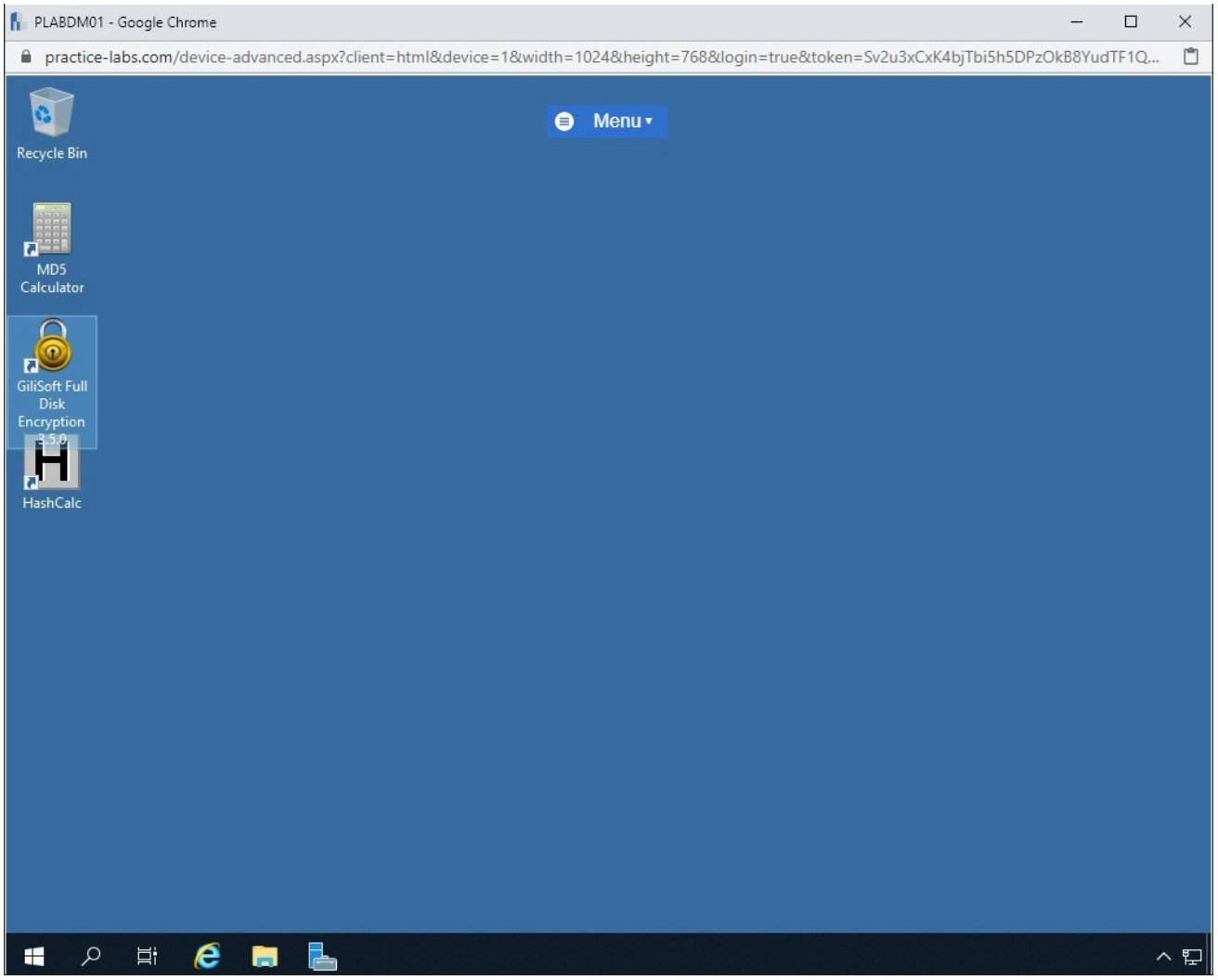


Figure 1.89 Screenshot of PLABDM01: Double-clicking the GiliSoft Disk Encryption 3.5.0 icon on the desktop.

Step 10

On the **Software Registration** dialog box, click **Evaluate**.

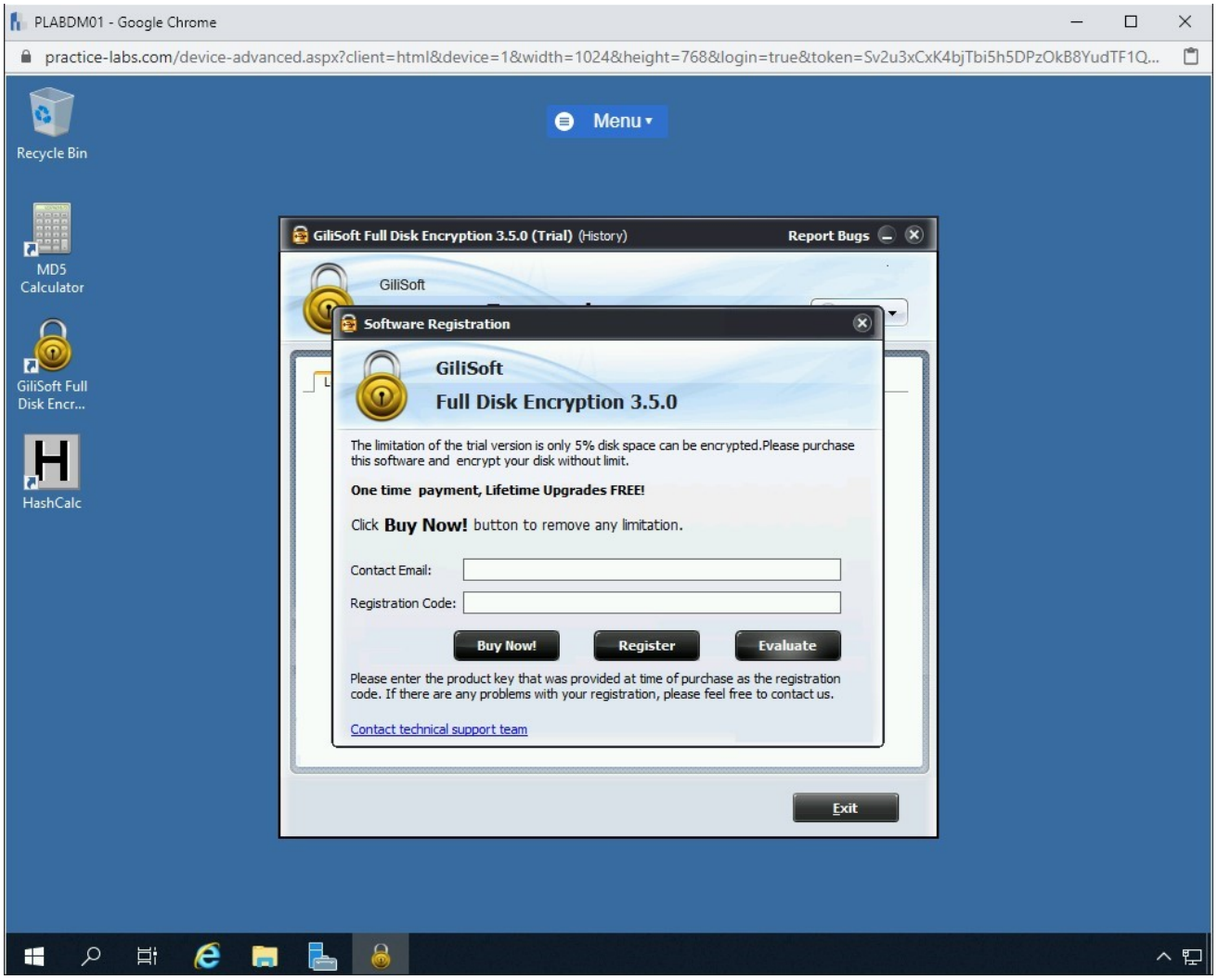


Figure 1.90 Screenshot of PLABDM01: Clicking Evaluate on the Software Registration dialog box.

Step 11

The **GiliSoft Full Disk Encryption 3.5.0** dialog box is displayed.

Select the **C:\ [System]** checkbox and click **Encrypt**.

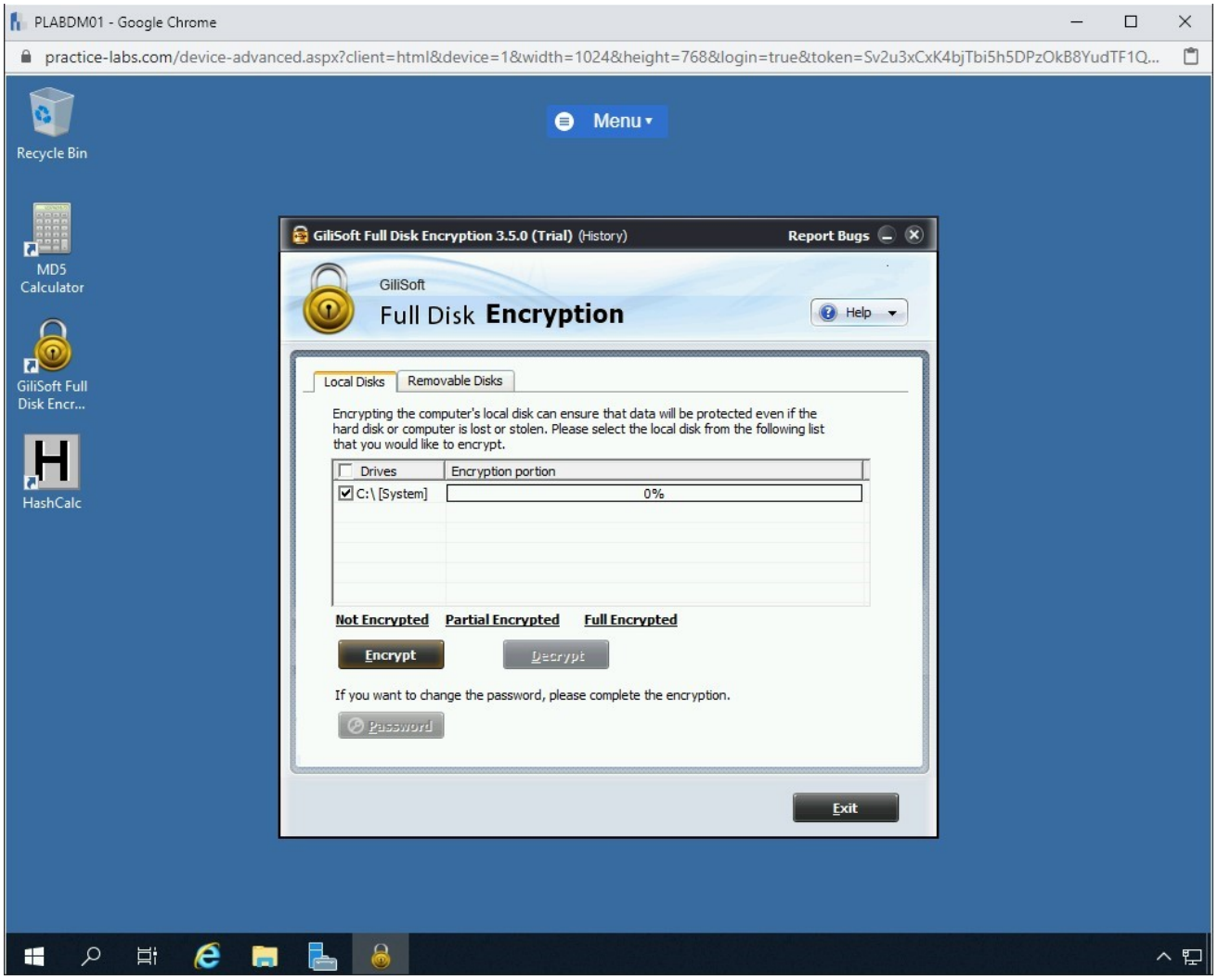


Figure 1.91 Screenshot of PLABDM01: Selecting C:\ [system] and then clicking Encrypt.

Step 12

The **Software Registration** dialog box is again displayed.

Click **Evaluate**.

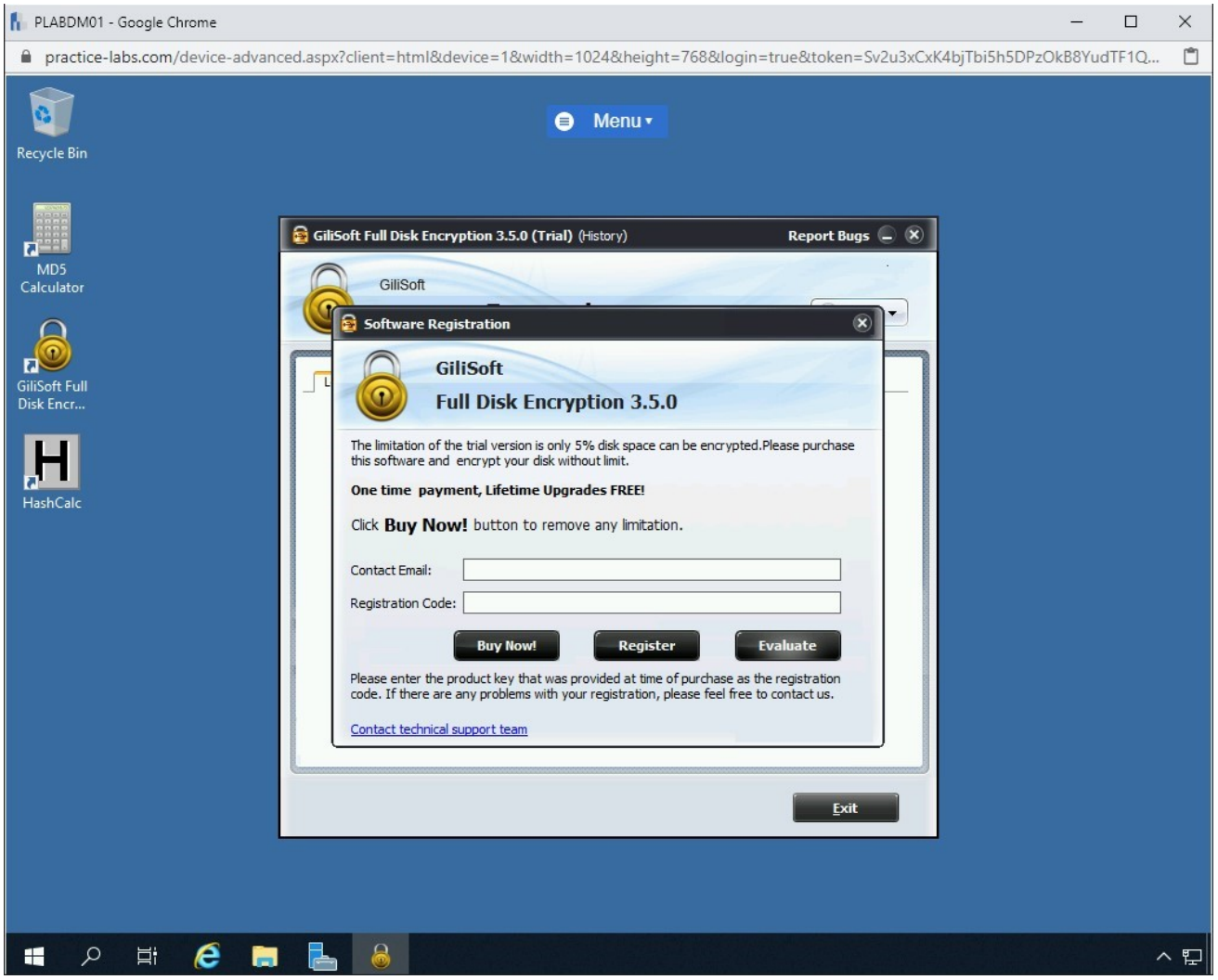


Figure 1.92 Screenshot of PLABDM01: Clicking Evaluate on the Software Registration dialog box.

Step 13

The **Set password** dialog box is displayed. In the **Password** and **Confirm Password** text boxes, type the following password:

```
Passw0rd
```

Click **OK**.

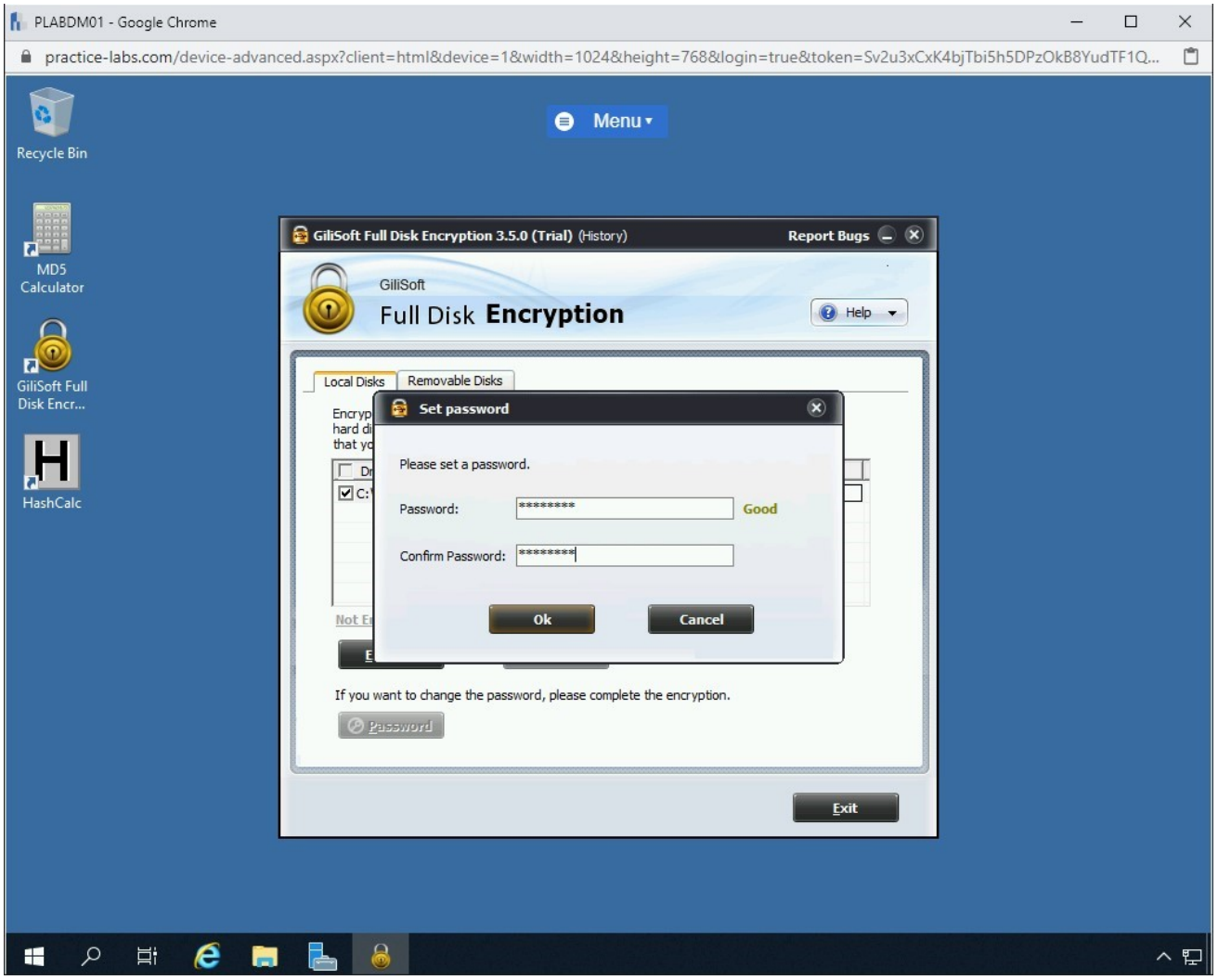


Figure 1.93 Screenshot of PLABDM01: Entering the password in the Password and Confirm Password text boxes and clicking OK.

Step 14

The disk encryption process starts.

This process will take several minutes to finish, and you can choose to wait or abort this lab and proceed to the next module.

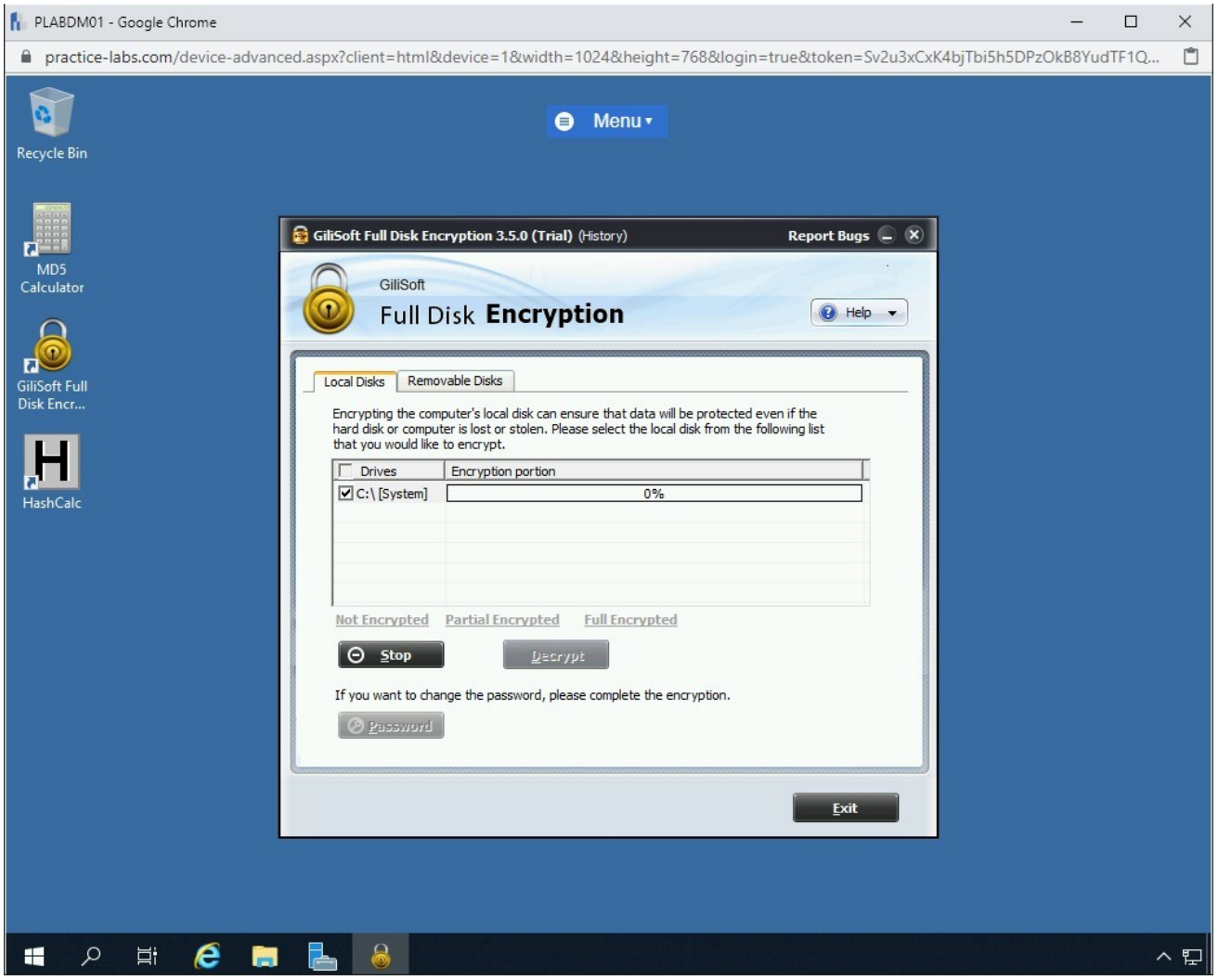


Figure 1.94 Screenshot of PLABDM01: Showing the disk encryption process started.

Review

Well done, you have completed the **Cryptography** Practice Lab.

Summary

You completed the following exercises:

- Exercise 1 - Using Cryptography tools

You should now be able to:

- Prepare Files and Folders for Encryption
- Install and Use Advanced Encryption Package
- Download and Install HashCalc
- Use the HashCalc Tool
- Use MD5 Calculator
- Perform Full Disk Encryption

Feedback

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