

NIST SPECIAL PUBLICATION 1800-34C

Validating the Integrity of Computing Devices

Volume C:
How-To Guides

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As a private-public partnership, we are always seeking feedback on our practice guides. We are particularly interested in seeing how businesses apply NCCoE reference designs in the real world. If you have implemented the reference design, or have questions about applying it in your environment, please email us at supplychain-nccoe@nist.gov.

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NIST CYBERSECURITY PRACTICE GUIDES

NIST Cybersecurity Practice Guides (Special Publication 1800 series) target specific cybersecurity challenges in the public and private sectors. They are practical, user-friendly guides that facilitate the adoption of standards-based approaches to cybersecurity. They show members of the information security community how to implement example solutions that help them align with relevant standards and best practices, and provide users with the materials lists, configuration files, and other information they need to implement a similar approach.

The documents in this series describe example implementations of cybersecurity practices that businesses and other organizations may voluntarily adopt. These documents do not describe regulations or mandatory practices, nor do they carry statutory authority.

ABSTRACT

Organizations are increasingly at risk of cyber supply chain compromise, whether intentional or unintentional. Cyber supply chain risks include counterfeiting, unauthorized production, tampering, theft, and insertion of unexpected software and hardware. Managing these risks requires ensuring the integrity of the cyber supply chain and its products and services. This project demonstrates how organizations can verify that the internal components of the computing devices they acquire, whether laptops or servers, are genuine and have not been tampered with. This solution relies on device vendors storing information within each device, and organizations using a combination of commercial off-the-shelf and open-source tools that work together to validate the stored information. This NIST Cybersecurity Practice Guide describes the work performed to build and test the full solution.

KEYWORDS

Computing devices; cyber supply chain; cyber supply chain risk management (C-SCRM); hardware root of trust; integrity; provenance; supply chain; tampering.

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The Technology Partners/Collaborators who participated in this build submitted their capabilities in response to a notice in the Federal Register. Respondents with relevant capabilities or product components were invited to sign a Cooperative Research and Development Agreement (CRADA) with NIST, allowing them to participate in a consortium to build this example solution. We worked with:

Technology Partner/Collaborator	Build Involvement
Archer	Archer Suite 6.9
Dell Technologies	PowerEdge R650, Secured Component Verification tool; Precision 3530, CSG Secured Component Verification tool
Eclypsium	Eclypsium Analytics Service, Eclypsium Device Scanner

Technology Partner/Collaborator	Build Involvement
HP Inc.	(2) Elitebook 840 G7, HP Sure Start, HP Sure Recover, Sure Admin, HP Client Management Script Library (CMSL), HP Tamperlock
Hewlett Packard Enterprise	Proliant DL360 Gen 10, Platform Certificate Verification Tool (PCVT)
IBM	QRadar SIEM
Intel	HP Inc. Elitebook 360 830 G5, Lenovo ThinkPad T480, Transparent Supply Chain Tools, Key Generation Facility, Cloud Based Storage, TSCVerify and AutoVerify software tools
National Security Agency (NSA)	Host Integrity at Runtime and Start-Up (HIRS), Subject Matter Expertise
Seagate Government Solutions	(3) 18TB Exos X18 hard drives, 2U12 Enclosure, Firmware Attestation API, Secure Device Authentication API

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1 Introduction

The following volumes of this guide show information technology (IT) professionals and security engineers how we implemented this example solution. We cover all of the products employed in this reference design. We do not re-create the product manufacturers' documentation, which is presumed to be widely available. Rather, these volumes show how we incorporated the products together in our environment.

Note: These are not comprehensive tutorials. There are many possible service and security configurations for these products that are out of scope for this reference design.

1.1 How to Use This Guide

This National Institute of Standards and Technology (NIST) Cybersecurity Practice Guide demonstrates a standards-based reference design and provides users with the information they need to replicate verifying that the internal components of the computing devices they acquire are genuine and have not been tampered with. This reference design is modular and can be deployed in whole or in part.

This guide contains three volumes:

- NIST Special Publication (SP) 1800-34A: *Executive Summary*
- NIST SP 1800-34B: *Approach, Architecture, and Security Characteristics* – what we built and why
- NIST SP 1800-34C: *How-To Guides* – instructions for building the example solution (**you are here**)

Depending on your role in your organization, you might use this guide in different ways:

Business decision makers, including chief security and technology officers, will be interested in the *Executive Summary*, NIST SP 1800-34A, which describes the following topics:

- challenges that enterprises face in decreasing the risk of a compromise to products in their supply chain
- example solution built at the NCCoE
- benefits of adopting the example solution

Technology or security program managers who are concerned with how to identify, understand, assess, and mitigate risk will be interested in NIST SP 1800-34B, which describes what we did and why. The following sections will be of particular interest:

- Section 3.4, Risk, describes the risk analysis we performed.
- Section 3.5, Security Control Map, maps the security characteristics of this example solution to cybersecurity standards and best practices.

You might share the *Executive Summary, NIST SP 1800-34A*, with your leadership team members to help them understand the importance of adopting a standards-based solution for verifying that the internal components of the computing devices they acquire are genuine and have not been tampered with.

IT professionals who want to implement an approach like this will find this whole practice guide useful. You can use this How-To portion of the guide, *NIST SP 1800-34C*, to replicate all or parts of the build created in our lab. This How-To portion of the guide provides specific product installation, configuration, and integration instructions for implementing the example solution.

This guide assumes that IT professionals have experience implementing security products within the enterprise. While we have used a suite of commercial products to address this challenge, this guide does not endorse these particular products. Your organization can adopt this solution or one that adheres to these guidelines in whole, or you can use this guide as a starting point for tailoring and implementing parts of verifying that the internal components of the computing devices they acquire are genuine and have not been tampered with. Your organization's security experts should identify the products that will best integrate with your existing tools and IT system infrastructure. We hope that you will seek products that are congruent with applicable standards and best practices. Section 3.6, Technologies, of *NIST SP 1800-34B* lists the products that we used and maps them to the cybersecurity controls provided by this reference solution.

A NIST Cybersecurity Practice Guide does not describe “the” solution, but a possible solution. Comments, suggestions, and success stories will improve subsequent versions of this guide. Please contribute your thoughts to supplychain-nccoe@nist.gov.

1.1.1 Supplemental Material

Throughout this document there are references to code, scripts, and/or configuration files. Due to the size of some of the files, and to provide a more efficient method of access, we have made these assets available via a NIST [GitHub repository](#). This also enables quicker updates of published code to those interested in replicating parts or all of our demonstration.

1.2 Build Overview

This volume describes the steps necessary to set up an environment that focuses on laptop (sometimes referred to by industry as client) computing devices. It also provides guidance on the operational usage of manufacturers' tools that may be useful to your IT personnel who verify that the computing device is acceptable to receive into the acquiring organization. This volume also describes validating the integrity of servers and including additional enterprise services as required to support this capability.

1.3 Typographic Conventions

The following table presents typographic conventions used in this volume.

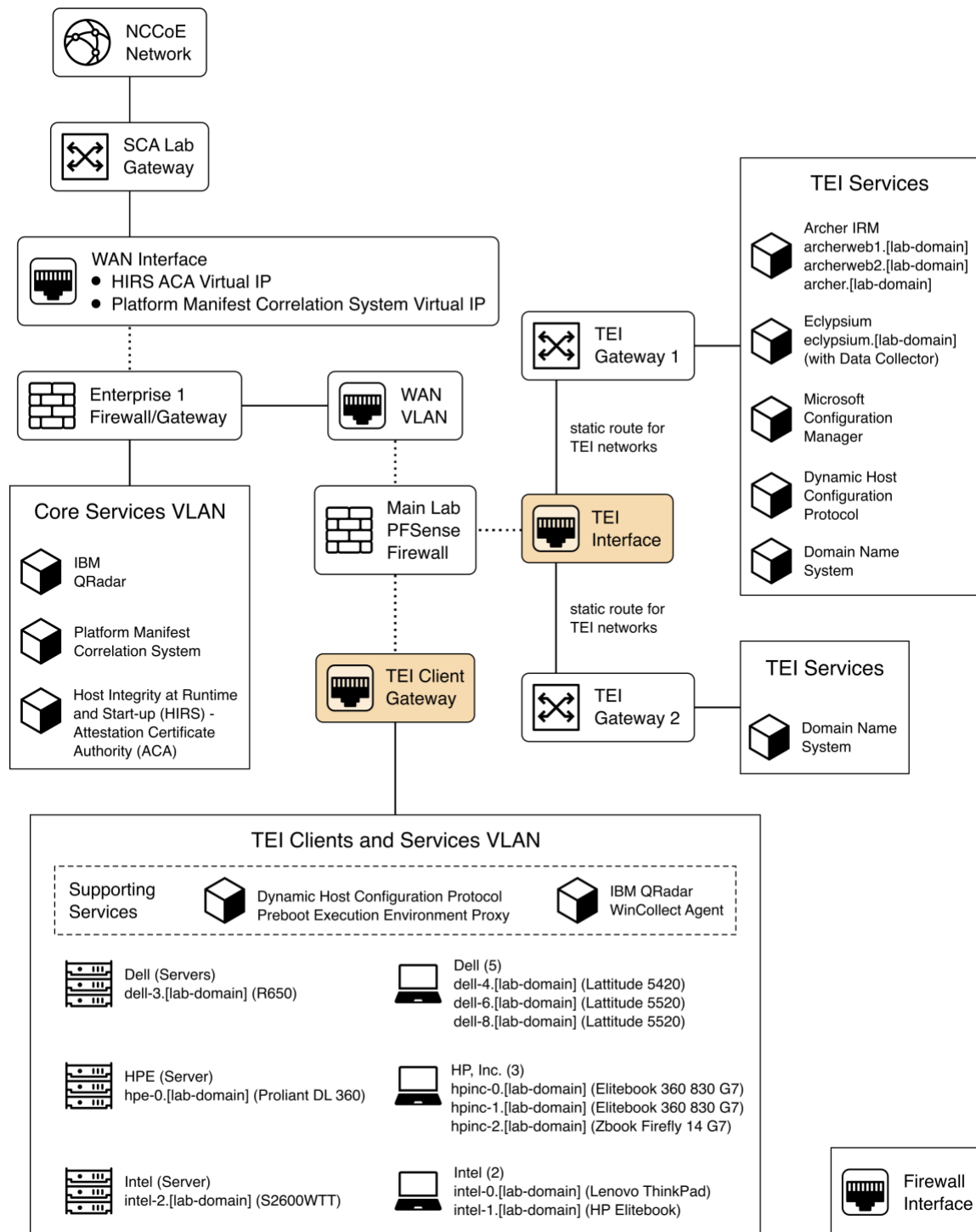
Typeface/Symbol	Meaning	Example
<i>Italics</i>	file names and path names; references to documents that are not hyperlinks; new terms; and placeholders	For language use and style guidance, see the <i>NCCoE Style Guide</i> .
Bold	names of menus, options, command buttons, and fields	Choose File > Edit .
Monospace	command-line input, onscreen computer output, sample code examples, and status codes	<code>mkdir</code>
Monospace Bold	command-line user input contrasted with computer output	<code>service sshd start</code>
blue text	link to other parts of the document, a web URL, or an email address	All publications from NIST’s NCCoE are available at https://www.nccoe.nist.gov .

1.4 Logical Architecture Summary

[Figure 1-1](#) depicts the architecture for the prototype demonstration environment used within the NCCoE network boundaries. The environment uses a combination of physical and virtual systems to emulate an enterprise architecture. We recommend the reader start with Volume B, Section 4 of this publication for a component-level view of the completed architecture before implementing the systems in this section.

Common enterprise services, such as Active Directory (AD) and Domain Name System (DNS), are provided by NCCoE’s Trusted Enterprise Infrastructure (TEI). TEI provides common services that labs can use. Previously each lab would spend time and resources to set up common services at the beginning of each project and tear them down after the end of the project. To provide efficiency and consistency across projects, and to represent a true enterprise infrastructure, NCCoE has initiated the TEI effort, which offers common services such as core services and shared security services for those labs who would like to use them.

Figure 1-1 Demonstration Network Architecture



Services specific to the capabilities of this prototype demonstration are instantiated on the Core Services virtual network. This virtual network represents the integration of supply chain risk management (SCRM) requirements into an enterprise architecture to support the SCRM controls, as described in the Risk Assessment section of Volume B.

2 Product Installation Guides

This section of the practice guide contains detailed instructions for installing and configuring all of the products used to build an instance of the example solution.

2.1 Supporting Systems and Infrastructure

This section describes the supporting infrastructure required to execute the acceptance testing and continuous monitoring capabilities provided by our collaborators.

2.1.1 Network Boot Services

The following procedures will create an environment that will enable the acceptance testing of computing devices into an enterprise. First, we create CentOS 7, CentOS 8, and WinPE images that will be booted on computing devices via a Preboot Execution Environment (PXE). We then configure the PXE environment to boot the images.

2.1.1.1 Linux-Based Acceptance Testing Image Creation

On a development CentOS 7 system, [install the latest version of the Host Integrity at Runtime and Start-Up \(HIRS\) Trusted Platform Module \(TPM\) Provisioner](#). We'll use the system as a basis to create the network booted image. Note that there are a number of [dependencies](#) that you'll need to satisfy before installing the HIRS TPM Provisioner package. One of those dependencies, [PACCOR](#), is maintained by the HIRS project. In our prototype demonstration, we used version [1.1.4 revision 5](#) but recommend using the latest version available. Note that any version prior to revision 5 will not successfully complete the provisioning process with the laptop computing devices used in this demonstration.

2.1.1.1.1 HIRS TPM Provisioner Configuration

The [HIRS TPM provisioner](#) is the core application in the computing device acceptance testing process. The system running the provisioner must be configured for your local environment before use.

1. Use a text editor to configure the HIRS TPM Provisioner for your local environment.

```
$ [your favorite editor] /etc/hirs/hirs-site.config
```

2. Change the variables noted below and save the file.

```
# *****  
# * HIRS site configuration properties file  
# *****
```

```
# Client configuration
CLIENT_HOSTNAME=localhost
TPM_ENABLED=true
IMA_ENABLED=false

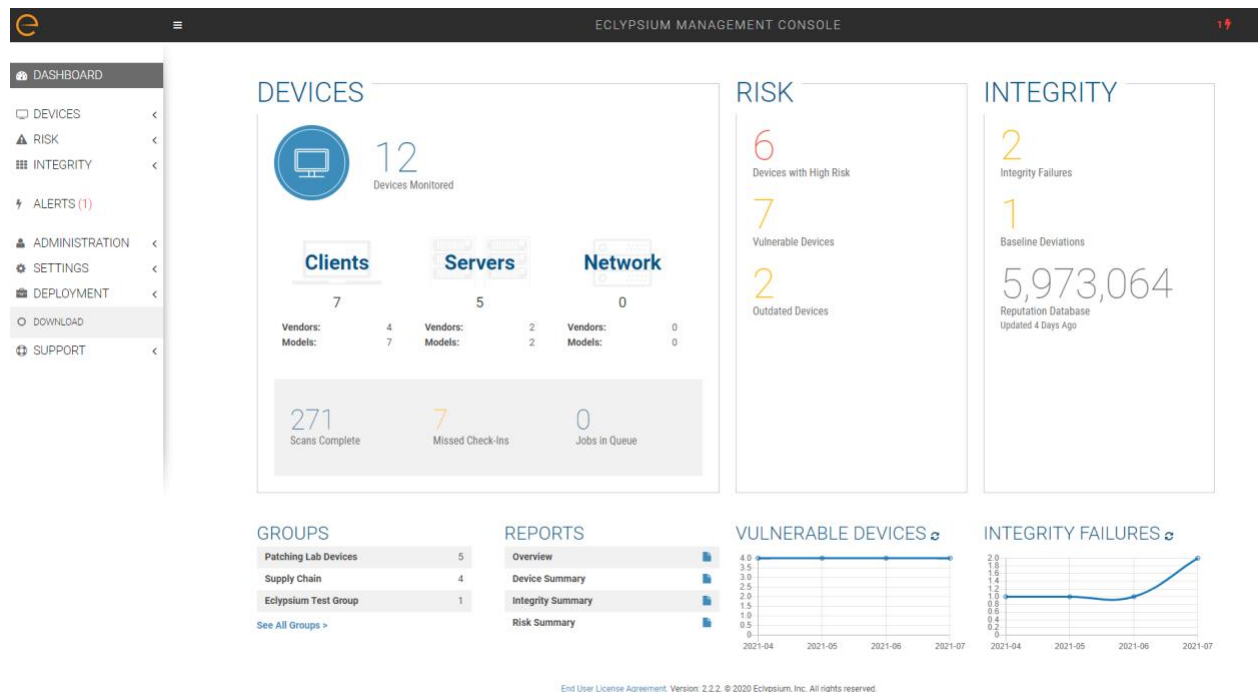
# Site-specific configuration
ATTESTATION_CA_FQDN=hirs-server.yourdomain.test
ATTESTATION_CA_PORT=8443
BROKER_FQDN=hirs-server.yourdomain.test
# Change this port number to your local configuration
BROKER_PORT=61616
PORTAL_FQDN=hirs-server.yourdomain.test
# Change this port number to your local configuration
PORTAL_PORT=8443
```

3. If using a network boot environment, use the configuration file (step 2) in the kickstart file that creates the CentOS 7 provisioner image in the `%post` section.

2.1.1.1.2 Eclipsium Agent Configuration

On the same CentOS 7 system described in [Section 2.1.1.1.1](#), install the Eclipsium Linux agent using the following procedures.

1. Navigate to the **Eclipsium Management Console** in a web browser.



2. Select **Deployment > Download**.

3. Download the Linux (RPM) Portable Scanner. The filename will have the format `eclypsium_agent_builder-x.x.x.run`.
4. Install the prerequisites for the builder script.


```
# yum groupinstall "Development Tools"
# yum install kernel-devel
```
5. Run the builder script downloaded above as a user with root privileges. This will build the Eclypsium Portable Scanner drivers, extract the application binaries, and place them into a directory named `eclypsium_agent`.


```
# ./eclypsium_agent_builder-X.X.X.run -out [PATH]
```
6. Confirm the previous step was successful by listing the `eclypsium_agent` directory and ensuring the portable scanner was created with the name `EclypsiumAppPortable`. This executable is referenced by our customized acceptance testing script.

2.1.1.1.3 CentOS 7 Image Creation

The CentOS 7 image we created enables quick revisions and simultaneous measurements on our devices. The image runs the required kernel, configures the system for reaching our infrastructure, and includes vendor tools to perform platform measurements. In order to generate the CentOS 7 image, the `livecd-creator` tool is utilized on a separate CentOS 7-based system. This tool uses Anaconda, Kickstart, and Lorax to generate the image. The following steps are performed:

1. Install the latest `livecd-tools` package, preferably built directly from the [project GitHub repository](#).
2. Create your own [kickstart file](#) or use the kickstart that will be provided by this project as a basis for your own. In our kickstart, we will insert commands to install required dependencies of our vendor products. Your environment will require further configuration to include networking, host file modification, and user management. You will also need to adjust hostnames and IP addresses to fit your environment.
3. Some tools, such as required drivers, were installed into a local repository (repo) on the image generating system using the `createrepo` command. This repo can be accessed by kickstart during the image generation. Copy `HIRS_Provisioner_TPM_2_0-X.X.X.x86_64.rpm` and `paccor-X.X.X-X.noarch.rpm` into the newly created repository.

```
$ createrepo -u file:///sca-packages sca-packages
```

4. Generate the ISO image from the kickstart file.

```
$ livecd-creator --config=kickstart-filename.ks
```

5. The ISO file will be created in the local directory with a filename indicating the time of generation. Once this is done, the *pxeboot* directory can be generated:

```
$ livedcd-iso-to-pxeboot imagename.iso
```

6. The *pxeboot* directory will be created, containing the required *vmlinuz* and *initrd0.img* files. It will also create a directory named *pxelinux.cfg* which contains a file named *default*. *default* contains the kernel flags necessary to boot the image. Use these files in the PXE environment detailed in Section 2.1.1.3.

2.1.1.1.4 CentOS 8 Image Creation

Before continuing with CentOS 8 image creation, create the prerequisite files in [Section 2.6](#). This set of procedures creates an acceptance testing environment similar to what is described in [Section 2.1.1.1.3](#) with the following deviations:

1. In Step 2, retrieve the CentOS 8 kickstart file (*Integration-Scripts\Acceptance Testing Environment Build Scripts\HPE PCVT - Centos8\HPE - Centos8.ks*) from the project repository.
2. In Step 3, retrieve the latest version of the Java 11 Java Development Kit (JDK). This demonstration uses [Azul Zulu build](#), but other builds may also work. Additionally, create a folder named `HPE Tooling` in your working directory. Copy the provisioning scripts (*Integration-Scripts\Manufacturer-specific Scripts and Tools\HPE Tooling*) from our repository into the directory as well as the HPE Platform Certificate Verification Tool (PCVT) binaries built in [Section 2.6](#).
3. Complete the remaining steps as documented.

2.1.1.2 Windows-Based Acceptance Testing Image Creation

The following procedures will produce a Windows Preinstallation Environment (WinPE) bootable image that can be used in computing device acceptance testing. You will need to have a Windows Server (2016 or above) environment available to complete the following steps.

2.1.1.2.1 Build WinPE

1. Download and install the [Windows Assessment and Deployment Kit \(ADK\)](#) and WinPE add-on.
2. Download the [Dell EMC iDRAC Tools for Microsoft WinPE \(R\), v10.1.0.0](#) software package.
3. Run the self-extractor and choose all defaults.
4. Launch cmd.exe as an administrator and change directory to the extracted folder, then run our modified batch file (`WinPE10.x_driverinst - ps1.bat`).

```
Administrator: Deployment and Imaging Tools Environment
C:\Program Files (x86)\Windows Kits\10\Assessment and Deployment Kit\Deployment Tools>cd C:\OpenManage\iDRACTools_WinPE.
C:\OpenManage\iDRACTools_WinPE>"WINPE10.x_driverinst - ps1.bat"
```

5. If successful, the preceding batch script will create a folder in the same directory with a name similar to *WINPE10.x-%timestamp%* or *WINPE5.x-%timestamp%*.

```
Administrator: Deployment and Imaging Tools Environment
Copyright (C) Microsoft, 1993-2012. All rights reserved.
Licensed only for producing Microsoft authorized content.

Scanning source tree
Scanning source tree complete (189 files in 138 directories)

Computing directory information complete

Image file is 605126656 bytes (before optimization)

Writing 189 files in 138 directories to C:\OpenManage\iDRACTools_WinPE\WINPE10_x_20210820_164042\DellEMC-iDRACTools-Web-
WinPE10.x_amd64-10.0.1.iso
100% complete

Storage optimization saved 1 files, 34816 bytes (0% of image)

After optimization, image file is 605763584 bytes
Space saved because of embedding, sparseness or optimization = 34816

Done.
-----
~10(WinPE10.x_driverinst.bat)-DONE.
-----
```

2.1.1.3 Preboot Execution Environment (PXE)

2.1.1.3.1 Dynamic Host Configuration Protocol (DHCP) Proxy

In this prototype demonstration, we use a combination of [DNSMasq](#) and the [iPXE](#) project to deliver the acceptance testing capabilities to computing devices. DNSMasq provides network boot services via DHCP on a network that already has other DHCP services present, such as assigning IP addresses to hosts. Since our network used DHCP services that could not easily be modified for network boot, we made the design decision to use DNSMasq as a proxy. However, for your setup you may want to include network boot services directly into the DHCP product that is used in your environment.

The iPXE project provides open-source network boot firmware. Using iPXE enabled a script-based boot process from an HTTP server. We also chainload the iPXE boot process from a Trivial File Transfer Protocol (TFTP) server, avoiding the need to replace the network card firmware with an iPXE client.

The system specification and procedures follow below. Note that this project uses computing devices that support Unified Extensible Firmware Interface (UEFI) booting and does not support legacy personal computer (PC) Basic Input/Output System (BIOS) booting. Table 2-1 shows the system information used in our prototype demonstration.

Table 2-1 DHCP Proxy System Information

Operating System	Version	Platform
Ubuntu Server	Release 20.04	Virtual Machine

1. Install DNSMasq, the TFTP server, and the HTTP server using the software package manager of your chosen operating system (OS). On Ubuntu, use the following command.

```
$ apt install dnsmasq tftpd-hpa apache2
```

2. Create a custom iPXE bootloader that directs iPXE to boot from a fixed URL.

- a. Create a file named *embed.ipxe* with the following contents.

```
#!ipxe
dhcp
chain http://<IP or Hostname>/ipxe/boot.ipxe || shell
```

- b. [Download](#) and extract the iPXE source files. Install all software dependencies noted on the download page.

- c. Change directory to *ipxe/src* and run the following command.

```
$ make bin-x86_64-efi/ipxe.efi EMBED=/path/to/embed.ipxe
```

3. Copy the newly built iPXE efi boot file to */var/lib/tftpboot*.

4. Edit the DNSMasq configuration file to suit your environment.

- a. `$ [your favorite editor] /etc/dnsmasq.conf`

- b. Ensure the following configuration variables are set in the configuration file:

```
pxe-service=x86-64_efi,"Network Boot EFI",ipxe.efi
enable-tftp
tftp-root=/var/lib/tftpboot
```

5. Restart DNSMasq.

```
$ systemctl restart dnsmasq
```

6. Copy the WinPE, CentOS 7, and CentOS 8 images to the HTTP server.

- a. In the root of your HTTP server, create two directories to store the images.

```
$ mkdir -p images/winpe images/centos7
```

- b. Copy the `/media` directory created in [Section 2.1.1.2.1](#) to `images/winpe`.
 - c. Copy `initrd.img` and `vmlinuz` created in [Section 2.1.1.1.2](#) to `images/centos7`.
 - d. Copy `initrd.img` and `vmlinuz` created in [Section 2.1.1.1.4](#) to `images/centos8`.
 - e. [Download](#) the latest wimboot binary from the iPXE repository and store it in the `images` directory.
7. Create a directory named `ipxe` in the HTTP server root, and copy the `boot.ipxe` file supplied by this project's repository to this location. Consider our configuration file as a starting point and ensure the contents of this file match your environment. Errors may result in a non-functioning network boot service.

2.1.2 Platform Manifest Correlation System (PMCS)

The PMCS is custom software that allows original equipment manufacturer (OEM) platform manifests (post-acceptance testing) to be translated into a format that is suitable for the Asset Discovery and Repository System (Archer Integrated Risk Management [IRM]). The system provides a web user interface (UI) for the IT administrator, and representational state transfer (REST) application programming interfaces (APIs) are provided for programmatic access. The following steps will set up the environment.

1. The system is based on [Node.js](#), an open-source JavaScript runtime built on [Chrome's V8 JavaScript engine](#) designed to build scalable network applications. [Download](#) and install Node.js on a system best suited for your environment. This demonstration uses an Ubuntu 20.04.2 LTS virtual machine.
2. Install the [node package manager](#) (npm).
3. Install [git](#) on the platform chosen in Step 1. Git provides source code management capabilities used in later steps.
4. Install [Process Manager 2 \(PM2\)](#). This package will manage the Node.js processes that run the PMCS codebase.

```
$ npm install pm2 -g
```

5. Start the application using `pm2` from the cloned copy of the project repository:

```
$ cd platform-manifest-collation-system
```

```
$ pm2 start index.js
```

The PMCS should now be running as a background process. Consider using a [startup script](#) to keep your process list intact across expected or unexpected machine restarts.

2.2 Dell

2.2.1 Laptops

The following section describes how to prepare Dell laptops for acceptance testing and continuous monitoring scenarios. Note that the Dell Trusted Device agent requires access to the Dell cloud. Consult the Dell [website](#) to determine the ports and IP addresses. Additionally, download the custom scripts for the scheduled tasks from our repository and store them on each target Dell laptop. In this demonstration, we chose `c:\Dell\HIRS` and `c:\Dell\TrustedDevice`.

2.2.1.1 Extract the Platform Certificate

Perform the following preparatory steps to create an acceptance testing environment suitable for Dell laptops. Contact your Dell representative to ensure the target laptop has been provisioned with a Platform Certificate from the factory.

1. Boot the target Dell laptop to the Windows 10 environment.
2. Start cmd.exe as an Administrator and run the following command:

```
mountvol o: /s
```
3. Copy `o:\EFI\tcg\cert\platform\Dell.[Line of Business].[Servicetag].ver2.Base.cer` to a system with a text editor available. Note that *Line of Business* and *Servicetag* will be specific to your laptop.
4. Separate the Platform Certificate from the signing certificate:

- a. Cut the signing certificate out of the file and save the Platform Certificate.

```
-----BEGIN CERTIFICATE-----<cert content> -----END CERTIFICATE-----
```

```
{Ctrl} + X
```

```
{Ctrl} + S
```

- b. Create a new file and save it as the signing certificate.

```
{Ctrl} + N
```

```
{Ctrl} + V
```

```
{Ctrl} + S
```

- c. Name the signing certificate.

```
<HSM-Signing-Certificate.cer>
```

5. Create a dedicated CentOS 7 host for running the HIRS Attestation Certificate Authority (ACA) portal that is accessible to the computing device undergoing acceptance testing. This step is detailed in [Section 2.4](#).

6. Create a network bootable CentOS 7 image. This step is detailed in [Section 2.1.1](#).

Note that to perform acceptance testing with Dell laptops, two settings in the BIOS are modified:

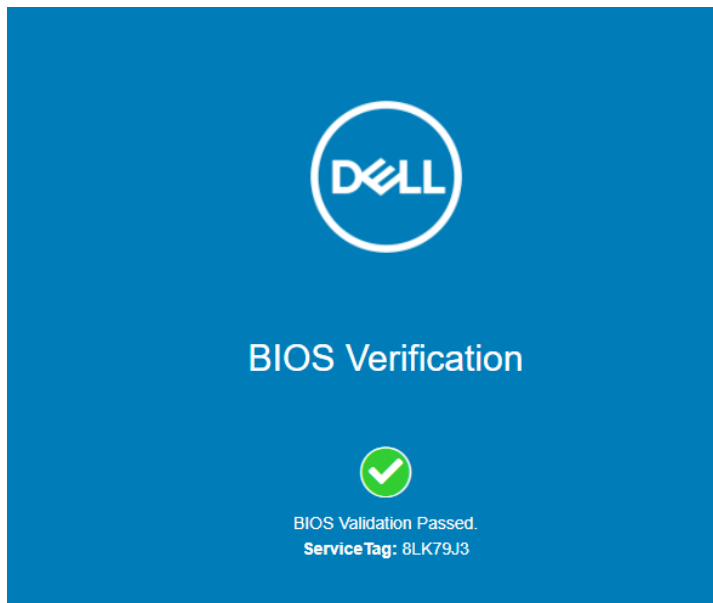
7. Power-on the laptop and boot to the BIOS setup by pressing the Function 2 (F2) key.
8. Clear the TPM to remove Windows ownership of the device. Navigate to *Security > TPM 2.0 Security > Clear* in the main menu. Click the *Clear* radio box and select **Yes** in the dialog box.
9. Turn off *Secure Boot*. Navigate *Secure Boot > Secure Boot Enable* in the main menu. Click the *Clear* radio box and select **Yes** in the dialog box.
10. Reboot the laptop by clicking **Apply** and **Yes** in the dialog box followed by **Exit**.

2.2.1.2 Install the Dell Trusted Device Agent

General installation instructions are posted on the Dell website. Below, we use the interactive graphical installation wizard, but other [deployment options](#) are also available.

1. Download the latest version of the Dell Trusted Agent from the Dell [website](#).
2. Open a command prompt as an Administrator. Install the agent with the following command:

```
msiexec.exe /i Trusted-Device-<version>\Win64R\TrustedDevice-64bit.msi
```
3. An installation wizard will launch. Click **Next** and then the **Install** button. The installation package will warn that the laptop will require a reboot. Accept the warning.
4. Follow the prompt to reboot the laptop. After the reboot, check the installation by manually launching the agent. If successful, a browser window will launch with a message similar to the following.



2.2.1.3 Create the Scheduled Tasks

These procedures will create two tasks that periodically execute our custom scripts, which silently launch the Dell Trusted Device (DTD) agent/HIRS Provisioner Agent and detect platform integrity issues.

1. Open the Task Scheduler as an Administrator on the target laptop.
2. Select **Action > Create New Task**.
3. In the **General** tab, enter a name for the task in the **Name** field. Click the **Change User or Group** button and select the *System* account. Select *Windows 10* from the **Configure for** pull-down menu.

The screenshot shows the 'Create Task' dialog box in Windows Task Scheduler. The 'General' tab is selected. The 'Name' field contains 'HIRS Provisioner Task'. The 'Location' field is empty. The 'Author' field contains 'LAB\cjbrown'. The 'Description' field is empty. Under 'Security options', the text 'When running the task, use the following user account:' is followed by a dropdown menu showing 'NT AUTHORITY\SYSTEM' and a 'Change User or Group...' button. There are three radio buttons: 'Run only when user is logged on' (selected), 'Run whether user is logged on or not', and 'Do not store password. The task will only have access to local computer resources.' (disabled). There is also a checkbox for 'Run with highest privileges' which is unchecked. At the bottom, there is a checkbox for 'Hidden' which is unchecked, and a 'Configure for:' dropdown menu showing 'Windows 10'. The 'OK' and 'Cancel' buttons are at the bottom right.

Create Task

General Triggers Actions Conditions Settings

Name: HIRS Provisioner Task

Location: \

Author: LAB\cjbrown

Description:

Security options

When running the task, use the following user account:

NT AUTHORITY\SYSTEM Change User or Group...

☒ Run only when user is logged on

☐ Run whether user is logged on or not

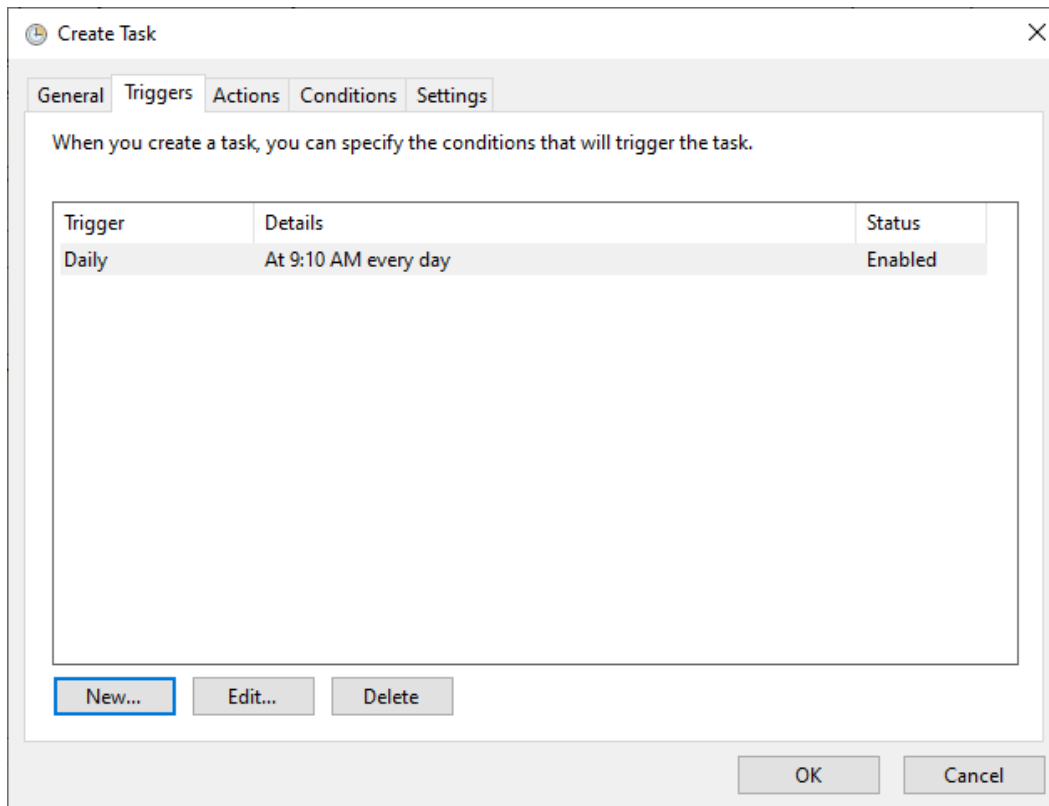
☐ Do not store password. The task will only have access to local computer resources.

☐ Run with highest privileges

☐ Hidden Configure for: Windows 10

OK Cancel

4. In the Triggers tab, click the **New...** button. Select a scheduled time appropriate for your environment. Once per day is shown in the example below.



5. In the Action tab, click the **New...** button. Enter *powershell.exe* in the Program/script field. Enter *-file "C:\Dell\HIRS\hirs_script.ps1"* in the **Add arguments (optional)** field. Adjust this value if needed if the custom script is installed in a different location. Click the **OK** button.
6. Click the **OK** button to save the new scheduled task.

Repeat this section to create a scheduled task that will periodically execute the Dell Trusted Device agent using the custom script.

2.2.2 Servers

The Dell R650 used in this demonstration does not require any preparatory activities for acceptance testing. All platform validation tools are included in the network-booted acceptance testing environment. Continue with creating the WinPE acceptance testing environment as described in [Section 2.1.1.2](#).

2.3 Eclypsium

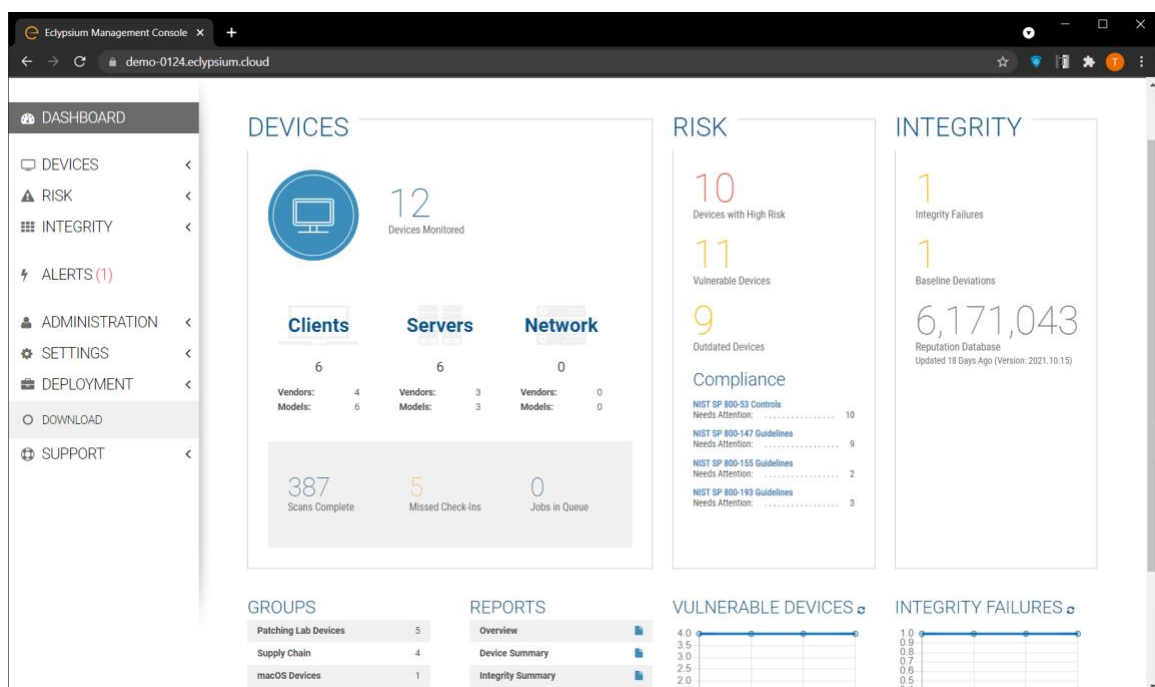
Eclypsium is a firmware security solution with cloud-based and on-premises deployment options. It secures firmware in servers, endpoints, and network devices by:

- identifying devices that contain firmware and creating detailed profiles of each component;
- verifying these profiles are free of vulnerabilities, have maintained their integrity, and are properly configured; and
- fortifying device firmware through a combination of configuration hardening, automated updates, and packaged guidance.

For this demonstration, Eclypsium is leveraged in the acceptance testing and continuous monitoring scenarios. The procedures below will install the Eclypsium agent and continuously monitor Windows-based laptops and Linux-based servers. In the server use case, we configured the agent to communicate with the on-premises deployment of the Eclypsium analytic backend. Refer to Section 3 in [NIST SP 1800-31C](#) for installation procedures.

2.3.1 Download Eclypsium Agent

1. Navigate to the **Eclypsium Management Console** in a web browser.

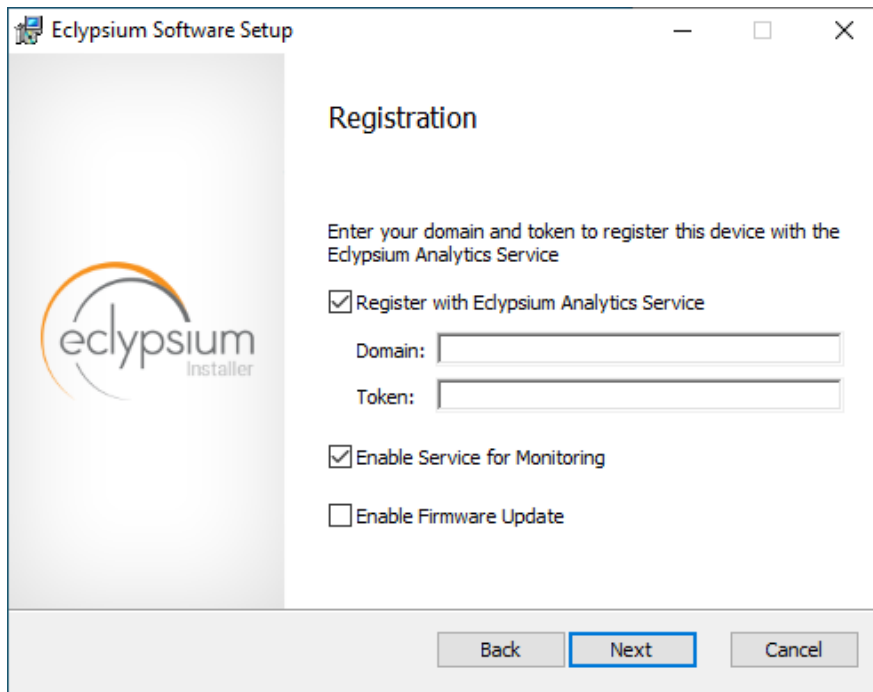


2. Select **Deployment > Download**.
3. Download the installer for the appropriate OS (Windows, macOS, Linux (Deb), or Linux (RPM)).

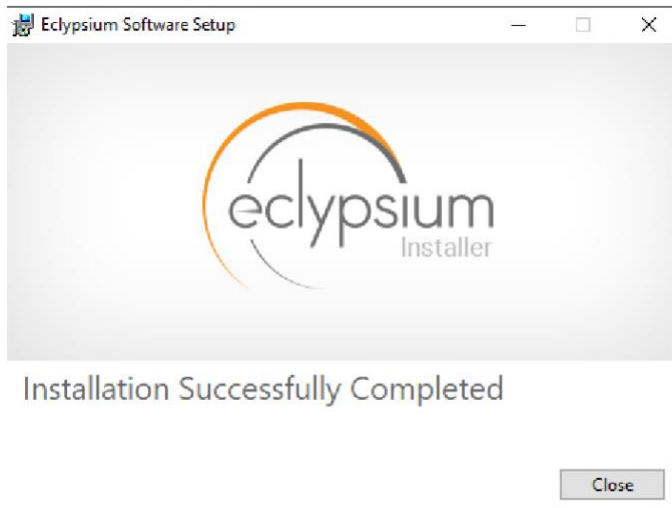
2.3.2 Install Eclypsium Agent for Windows

1. Start the Eclypsium bundled installer, *Eclypsium-<version>.exe*.

2. Select **Next**.
3. Ensure **Register with Eclipsium Analytics Service** and **Enable Service for Monitoring** are selected. Enter the **Domain** and Registration **Token** that can be found on the Download page of the **Eclipsium Management Console**, then select **Next**.



4. Select **Install** to start the Eclipsium installation.
5. When prompted, select **Finish**.
6. The Eclipsium agent has successfully installed once the page depicted below is reached. Select **Close**.



When the system scan completes on a newly installed system, the Eclipsium console will identify supply chain integrity concerns and recommend a resolution.

2.3.3 Install Eclipsium Agent for Linux

1. Ensure the *App* and *Driver* installation packages that are appropriate for your distribution are available on the host server system. The example below is an Ubuntu distribution.
2. Install the packages with the following command with root privileges. Note that there may be prerequisite packages that are required before installing the Eclipsium packages.

```
dpkg -i eclipsiumapp-2.8.1.deb eclipsiumdriver-2.8.1.deb
```

3. Register the Eclipsium agent with the on-premises backend with the following command with root privileges.

```
EclipsiumApp -s2 <Eclipsium-backend-hostname> reg_<token>
```

If successful, the server is registered and an initial scan is performed. The output should be similar to the following.

```
Scan data dumped to '/home/<user>/<hostname>-21ee761e90f38bb0-2022-05-09T12_26_27Z.tar.gz'
```

```
Basic info updated successfully. Check the device at https://<backend-hostname>/resolve-job/6279087374e1ae0726c3d68f
```

```
Successful registration.
```

```
[Dumping system firmware through SPI] \ 16777KB
```

```
[Dumping system firmware through MMIO] / 16777KB
```

```
[Uploaded 100%] [#####] 12999KB/12999KB

Scan data dumped to '/home/<user>/<hostname>-21ee761e90f38bb0-2022-05-09T12_26_27Z.tar.gz'

Scan data updated successfully. Check the device at <backend-hostname>/resolve-job/627908e374e1ae3a06c3d800
```

2.4 Host Integrity at Runtime and Start-Up (HIRS) Attestation Certificate Authority (ACA)

This section describes the installation and configuration of the HIRS-ACA backend components used in the acceptance testing scenario. HIRS-ACA is an open-source tool with three components that are used in this demonstration – the Attestation Certificate Authority, dashboard, and provisioner. The ACA issues identity credentials to devices that have a TPM 2.0 security module; these credentials are requested by the provisioner software. The HIRS-ACA dashboard is available to administrators to view and configure validation reports, credentials, and certificate trust chains. Table 2-2 shows the system information used in our prototype demonstration.

Table 2-2 HIRS-ACA System Information

Operating System	Version	Platform
Centos	7	Virtual Machine

2.4.1 Installing the HIRS-ACA

1. Before installing the required packages, ensure the target system has a fully qualified distinguished hostname. Modify the `/etc/hosts`, `/etc/hostname`, and `/etc/resolv.conf` system configuration files as appropriate.

```
GNU nano 2.3.1 File: /etc/hosts
127.0.0.1 localhost localhost.localdomain localhost4 localhost4.localdomain4
::1 localhost localhost.localdomain localhost6 localhost6.localdomain6
192.168.11.5 hirs_aca.ad.ent1.sca.nccoe.nist.gov hirs_aca

GNU nano 2.3.1 File: /etc/hostname Modified
hirs-aca

GNU nano 2.3.1 File: /etc/resolv.conf Modified
; generated by /usr/sbin/dhclient-script
search ent1.sca.nccoe.nist.gov
nameserver 192.168.11.2
```

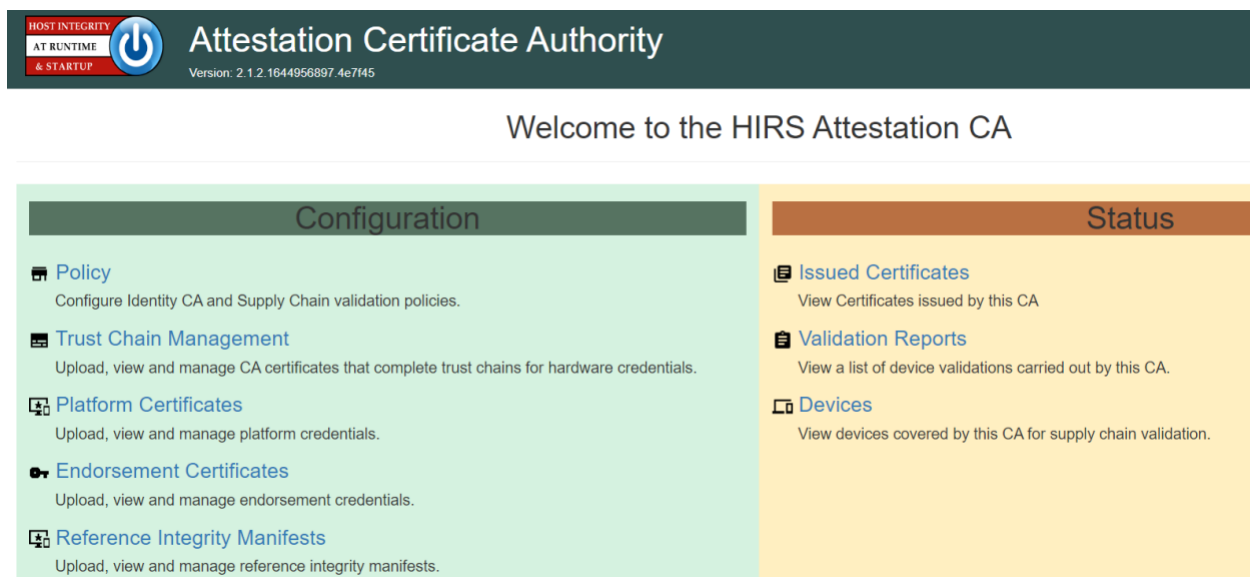
2. Install the HIRS-ACA dependencies using the following command. This will install MySQL/MariaDB, OpenSSL, Tomcat, Java, RPM Dev Tools, GNU Core Utilities, and other Linux commands (initscripts, chkconfig, sed, grep, firewallld, and policycoreutils).

```
# sudo yum install mariadb-server openssl tomcat java-1.8.0 rpmdevtools  
coreutils initscripts chkconfig sed grep firewallld policycoreutils
```

3. Download the latest version of HIRS ACA from the [Release](#) page on GitHub and execute the following command to install the HIRS ACA.

```
# sudo yum install HIRS_AttestationCA*.rpm
```

Ensure the installation was successful by navigating to the dashboard using the fully qualified domain name (FQDN) configured above. It should look like the screenshot below.



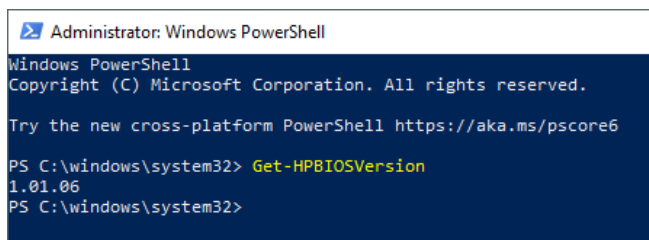
2.5 HP Inc.

The following steps install the HP Client Management Script Library (CMSL) and execute prerequisite provisioning for HP Inc. laptops. The CMSL installs several PowerShell commands on the laptop that will assist in platform validation. Once CMSL is installed, an administrator configures the HP Inc. specific device security feature. In this prototype demonstration, the target computing devices were an HP Inc. Elitebook 840 G7 and Zbook Firefly 14 G7.

2.5.1.1 Install the HP CMSL

1. Download the latest CSML from the HP Developers [website](#) onto the target HP Inc. laptop.

2. Launch the executable file and proceed through the wizard. Accept the agreement and click **Next**.
3. Select **Install into PowerShell** path and click **Next**.
4. Click **Install**.
5. Click **Finish**.
6. Test the installation by opening PowerShell as an administrator and executing a CMSL command such as `Get-HPBIOSVersion`.



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\windows\system32> Get-HPBIOSVersion
1.01.06
PS C:\windows\system32>
```

2.5.1.2 Execute Provisioning Steps

The next steps are used to provision the HP Inc. specific firmware and device security features, HP Sure Start, HP Sure Admin, HP Tamperlock, and HP Sure Recover. Implementers may also want to consult the HP Inc. Developers Blog for [more information](#) on how these payloads were created. Using the example provisioning payloads available from our project repository, use the CMSL to apply the six provisioning payloads as shown below:

1. Open PowerShell as an administrative user. Execute the following commands.

```
Set-HPSecurePlatformPayload -PayloadFile EKProvisionPayload.dat
Set-HPSecurePlatformPayload -PayloadFile SKProvisionPayload.dat
```
2. Reboot the laptop. A local administrator must accept the *Physical Presence Prompt* to complete provisioning of the Endorsement and Signing Key.
3. Execute the following commands from PowerShell as an administrator.

```
Set-HPSecurePlatformPayload -PayloadFile EnableEBAMPayload.dat
Set-HPSecurePlatformPayload -PayloadFile LAKProvisionPayload.dat
```
4. Reboot the laptop. This will expose settings that require a BIOS administrator be configured before the next step can be completed.
5. Execute the following commands from PowerShell as an administrator.

```
Set-HPSecurePlatformPayload -PayloadFile BIOSsettingsPayloadFile.dat
```

```
Set-HPSecurePlatformPayload -PayloadFile SureRecoverProvision.dat
```

2.6 Hewlett Packard Enterprise (HPE)

We demonstrate HPE's Platform Certificate Verification Tool (PCVT) in this project by creating a network bootable acceptance testing environment which has PCVT tools and dependencies pre-installed on the image. This image also includes a bash script which executes the PCVT command and, if successful, uploads the hardware manifest to the PMCS.

First, compile the PCVT tools on a separate CentOS 8 system. The general procedures are on the [HPE GitHub site](#) and our specific commands follow.

1. Download and extract the source code from the HPE [repository](#).

2. Install the software prerequisites onto the system.

```
yum -y install systemd-devel go lang-maven java-11-openjdk java-11-openjdk-devel
```

3. Change directory into the PCVT source code. Run the following command:

```
mvn install:install-file -Dfile=/<pcvt_source_directory>/PCVT-  
pcvt_v1.0.0/lib/HIRS_Utills-1.1.1.jar -DgroupId=HIRS_Utills -  
DartifactId=HIRS_Utills -Dversion=1.1.1 -Dpackaging=jar -  
DlocalRepositoryPath=/<pcvt_source_directory>/m2/repository  
mvn install:install-file -Dfile=/<pcvt_source_directory>/PCVT-  
pcvt_v1.0.0/lib/HIRS_Structs-1.1.1.jar -DgroupId=HIRS_Structs -  
DartifactId=HIRS_Structs -Dversion=1.1.1 -Dpackaging=jar -  
DlocalRepositoryPath=/<pcvt_source_directory>/m2/repository  
mvn install:install-file -Dfile=/<pcvt_source_directory>/PCVT-  
pcvt_v1.0.0/lib/paccor-1.1.3-2.jar -DgroupId=paccor -DartifactId=paccor -  
Dversion=1.1.3-2 -Dpackaging=jar -  
DlocalRepositoryPath=/<pcvt_source_directory>/m2/repository
```

4. Build the PCVT.

```
mvn clean compile assembly:single
```

5. Change to the **diskScan** directory.

6. Set the **GOPATH** to a local directory and set **GO11Module** to **off**.

```
export GOPATH=$HOME/<local_path>/gowork
```

```
go env -w GO11MODULE=off
```

7. Execute the build script in the **build** directory.

```
./build/create_install_bundle.sh
```

Ensure two files named **pcvt-mvn-0.0.1-jar-with-dependencies.jar** and **libdiskscan.so** are generated. Next, the acceptance testing environment is built. Continue with the procedures documented in [Section 2.1.1.1.4](#).

2.7 Intel

The Intel Transparent Supply Chain (TSC) requires two client applications to support acceptance testing and continuous monitoring scenarios: **TSCVerifyUtil** and **AutoVerifyTool**. Contact your Intel representative to download the installation packages for both utilities.

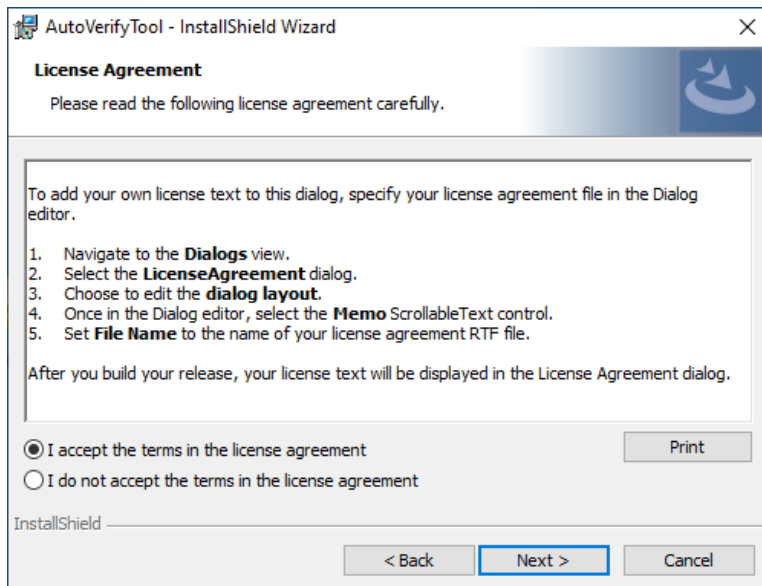
2.7.1 Laptops

Once the binaries have been retrieved, follow these procedures on the target laptop. Table 2-3 lists the laptops used within this demonstration.

Table 2-3 Intel-Contributed Laptops

Machine Name	Operating System	Manufacturer	Model
intel-0	Windows 10	HP Inc.	Elitebook 360 830 G5
intel-1	Windows 10	Lenovo	ThinkPad T480

1. Download and install the latest [Microsoft Visual C++ Redistributable for Visual Studio](#).
2. Launch the AutoVerifyTool installation wizard. Click **Next**.
3. Accept the license and client **Next**.



4. Enter your Name and Organization. Click **Next**.
5. Select the **Typical** installation. Click **Next**.
6. Click **Install**.

2.7.2 Servers

The server contributed by Intel requires the installation of the TSCVerifyUtil application. Contact your Intel representative to determine the best method in your use case. In this prototype implementation, we opted to execute TSCVerifyUtil from a directory created at `/opt/intel/tsc`. Table 2-4 lists the server contributed by Intel for this demonstration.

Table 2-4 Intel-Contributed Server

Machine Name	Operating System	Manufacturer	Model
intel-2	CentOS 8	Intel	S2600WTT Server Board

Additionally, to complete the implementation we connected the Seagate enclosure to this server board. Refer to [Section 2.9](#) for a description of this process.

2.8 Archer Integrated Risk Management (IRM)

This section describes the installation of the Archer IRM system for this demonstration. Our instantiation of Archer IRM is viable for a lab environment, but the reader is encouraged to refer to the architecture planning guide on the Archer IRM website for specific guidance for your environment. We elected to install the Archer IRM system across two virtual machines—one hosting a Microsoft SQL database and the other hosting the remainder of the Archer IRM services. Note that the screenshots below are from our original installation of Archer IRM 6.9. During the course of the project, we updated our Archer IRM instance to version 6.10. As a result, some screenshots may differ in your implementation from what is presented in this document.

Table 2-5 shows the system information used in this prototype demonstration for Archer IRM.

Table 2-5 Archer IRM System Information

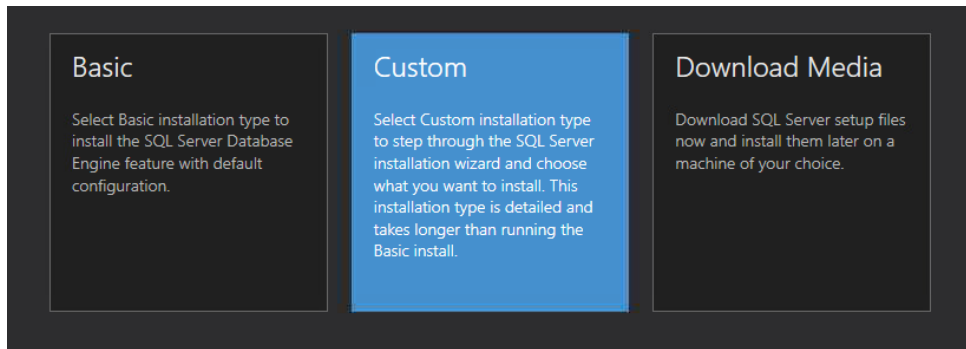
Machine Name	Machine Type	Operating System
Archer Database Server	Virtual	Windows 2019 Server
Archer Services	Virtual	Windows 2019 Server

2.8.1 Prerequisites

Before installing Archer IRM services, several prerequisites must be fulfilled. In this section, we describe those prerequisites involving the database server and Microsoft’s Internet Information Services (IIS) web server.

2.8.1.1 Install SQL Server on Database Server

1. Download SQL Server 2019 from <https://www.microsoft.com/en-us/sql-server/sql-server-downloads> onto the database server.
2. Run the SQL Server 2019 executable.
3. Select the **Custom** installation type.



4. Specify the download location and select **Install**.
5. Allow the installer to download the SQL Server 2019 package.
6. The SQL Server Installation Center should automatically open. From the left menu panel, select **Installation**. Select the option **New SQL Server stand-alone installation or add features to an existing installation**.
7. Enter the product key or select a free edition of the software. Then select **Next**.

SQL Server 2019 Setup

Product Key

Specify the edition of SQL Server 2019 to install.

Product Key

License Terms

Global Rules

Microsoft Update

Product Updates

Install Setup Files

Install Rules

Feature Selection

Feature Rules

Feature Configuration Rules

Ready to Install

Installation Progress

Complete

Validate this instance of SQL Server 2019 by entering the 25-character key from the Microsoft certificate of authenticity or product packaging. You can also specify a free edition of SQL Server: Developer, Evaluation, or Express. Evaluation has the largest set of SQL Server features, as documented in SQL Server Books Online, and is activated with a 180-day expiration. Developer edition does not have an expiration, has the same set of features found in Evaluation, but is licensed for non-production database application development only. To upgrade from one installed edition to another, run the Edition Upgrade Wizard.

☒ Specify a free edition:

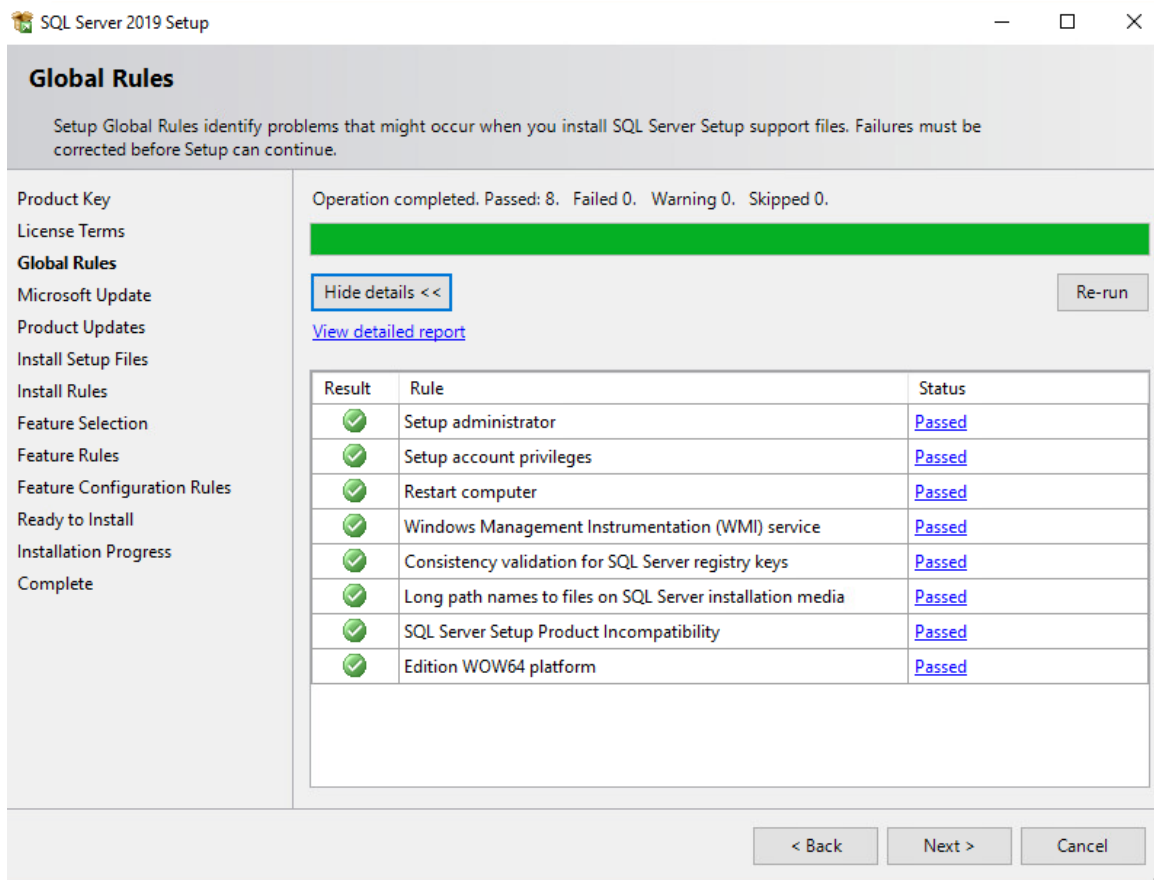
Evaluation

☐ Enter the product key:

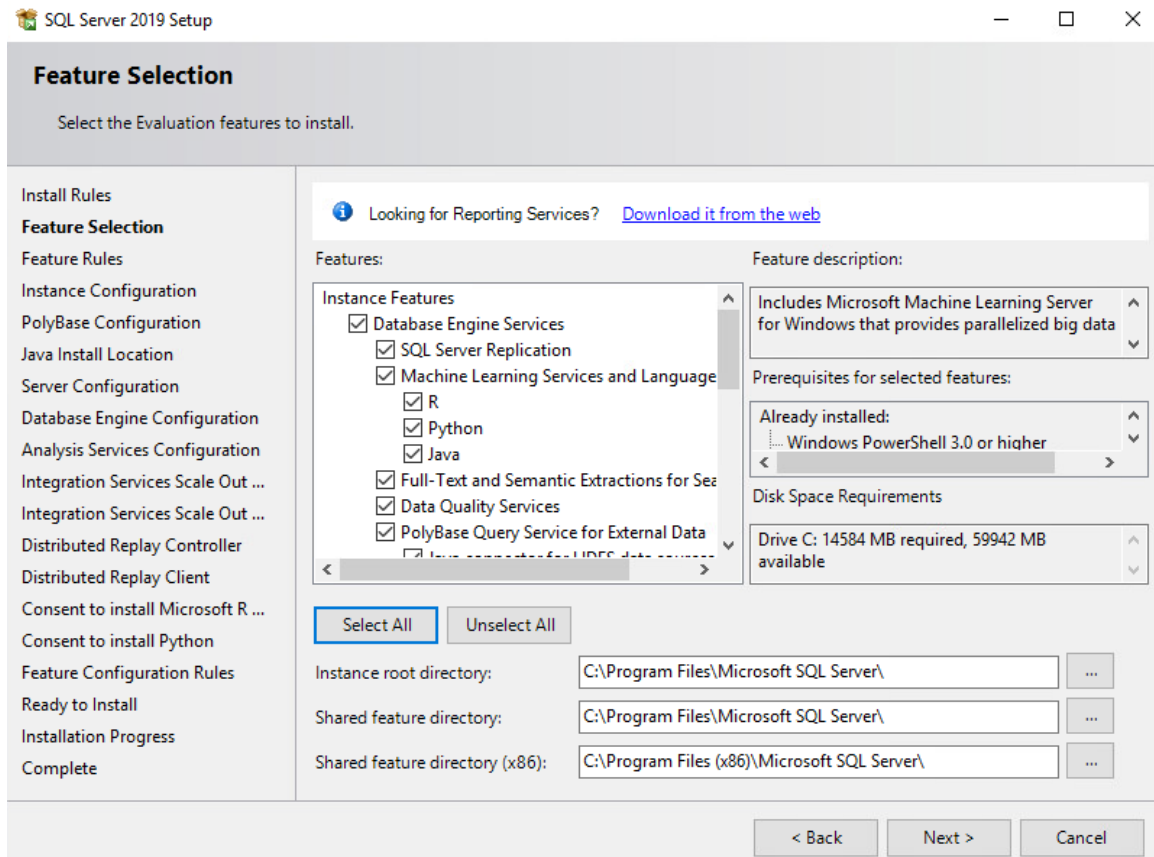
- - - -

< Back Next > Cancel

8. Read and accept the License Terms. Then select **Next**.
9. Ensure that all the **Global Rules** have passed. Then select **Next**.



10. To use Microsoft Update to automatically deliver updates, check the box **Use Microsoft Update to check for updates (recommended)**. Then select **Next**.
11. Ensure that all the **Install Rules** have passed. Then select **Next**.
12. Select the desired features to install. Then select **Next**. Complete the sections for the selected features.



13. In the **Instance Configuration** section, select the **Named instance** radio button and choose a name for the database server, or select the **Default instance** radio button to use the default name. Then select **Next**.

SQL Server 2019 Setup

Instance Configuration

Specify the name and instance ID for the instance of SQL Server. Instance ID becomes part of the installation path.

Install Rules
Feature Selection
Feature Rules
Instance Configuration
PolyBase Configuration
Java Install Location
Server Configuration
Database Engine Configuration
Analysis Services Configuration
Integration Services Scale Out ...
Integration Services Scale Out ...
Distributed Replay Controller
Distributed Replay Client
Consent to install Microsoft R ...
Consent to install Python
Feature Configuration Rules
Ready to Install
Installation Progress
Complete

☐ Default instance
☒ Named instance:

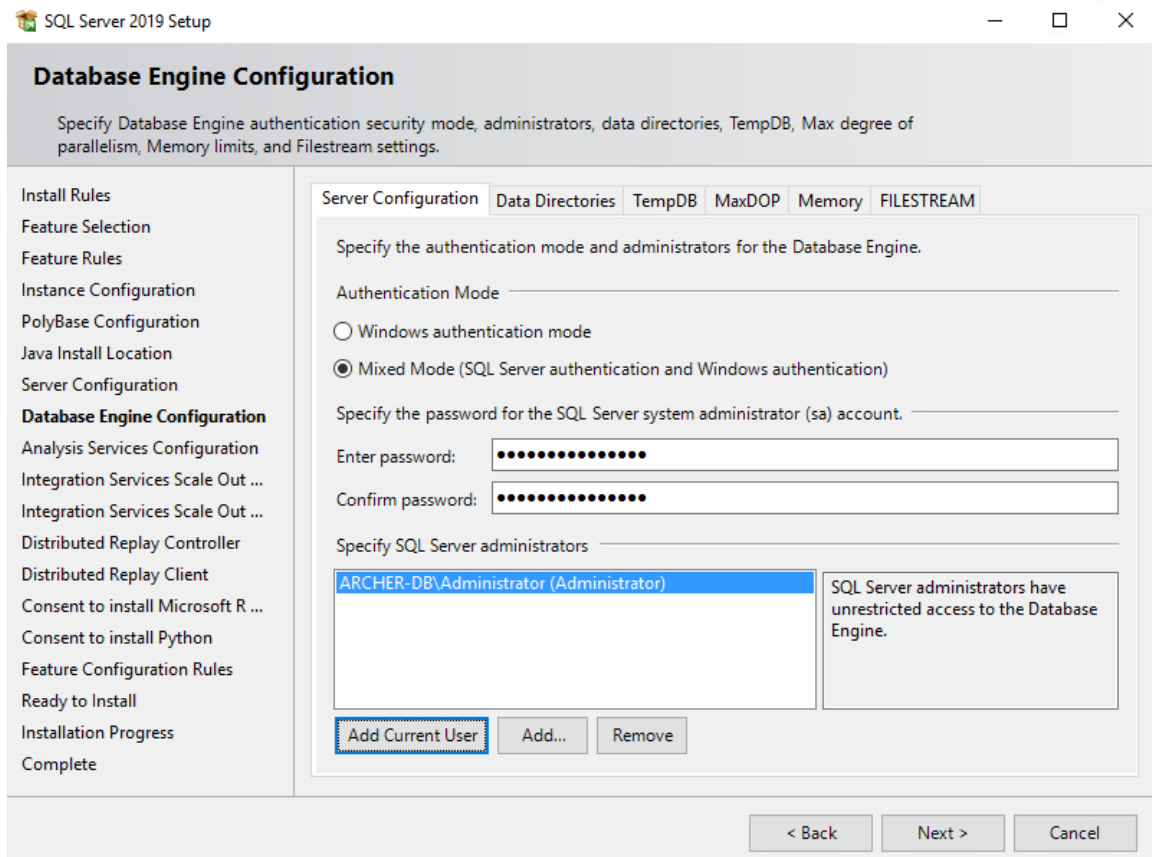
Instance ID:

SQL Server directory: C:\Program Files\Microsoft SQL Server\MSSQL15.MSSQLSERVER
Analysis Services directory: C:\Program Files\Microsoft SQL Server\MSAS15.MSSQLSERVER

Installed instances:

Instance Name	Instance ID	Features	Edition	Version

- In the **Database Engine Configuration** section, select the desired Authentication Mode. Select **Add Current User** to add the current user as a SQL Server administrator and select **Next**.



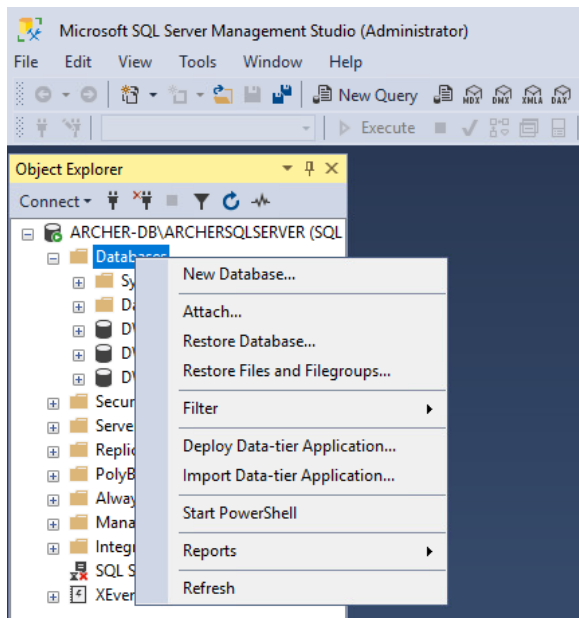
15. Ensure that all the **Feature Configuration Rules** have passed and select **Next**.

16. Confirm the selected settings are desired and select **Install**.

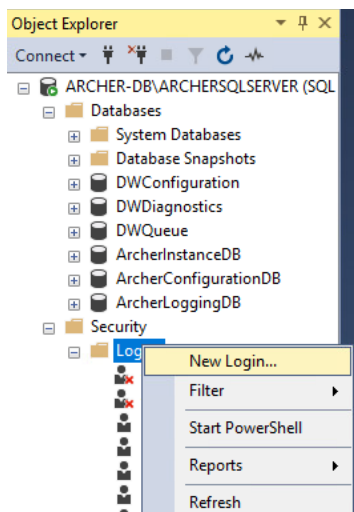
17. Once the installation completes, select **Close**.

2.8.1.2 Create the Archer IRM Databases

1. Download SQL Server Management Studio (SSMS) from <https://aka.ms/ssmsfullsetup>. Follow the installation steps.
2. Once installed, open SSMS.
3. Expand the ARCHERSQLSERVER tree. Right-click on **Databases** and select **New Database**. Create three databases: *ArcherInstanceDB*, *ArcherConfigurationDB*, and *ArcherLoggingDB*.



4. Next, create a local Administrator user. Right-click **Security** and select **New Login**.



5. Under the **General** tab, input the **Login Name** and select the **SQL Server Authentication** radio button. Create a password for this user. These credentials will be used during the Archer IRM installation.

Login - New

Select a page

- General
- Server Roles
- User Mapping
- Securables
- Status

Script ? Help

Login name: Administrator Search...

☐ Windows authentication
☒ SQL Server authentication

Password:

Confirm password:

☐ Specify old password
 Old password:

☒ Enforce password policy
☐ Enforce password expiration
☐ User must change password at next login

☐ Mapped to certificate
☐ Mapped to asymmetric key
☐ Map to Credential

Mapped Credentials

Credential	Provider

Add Remove

Default database: master

Default language: <default>

OK Cancel

Connection

Server: ARCHER-DB\ARCHERSQLSERVER

Server: C:\ARCHER-DB\ARCHERSQLSERVER

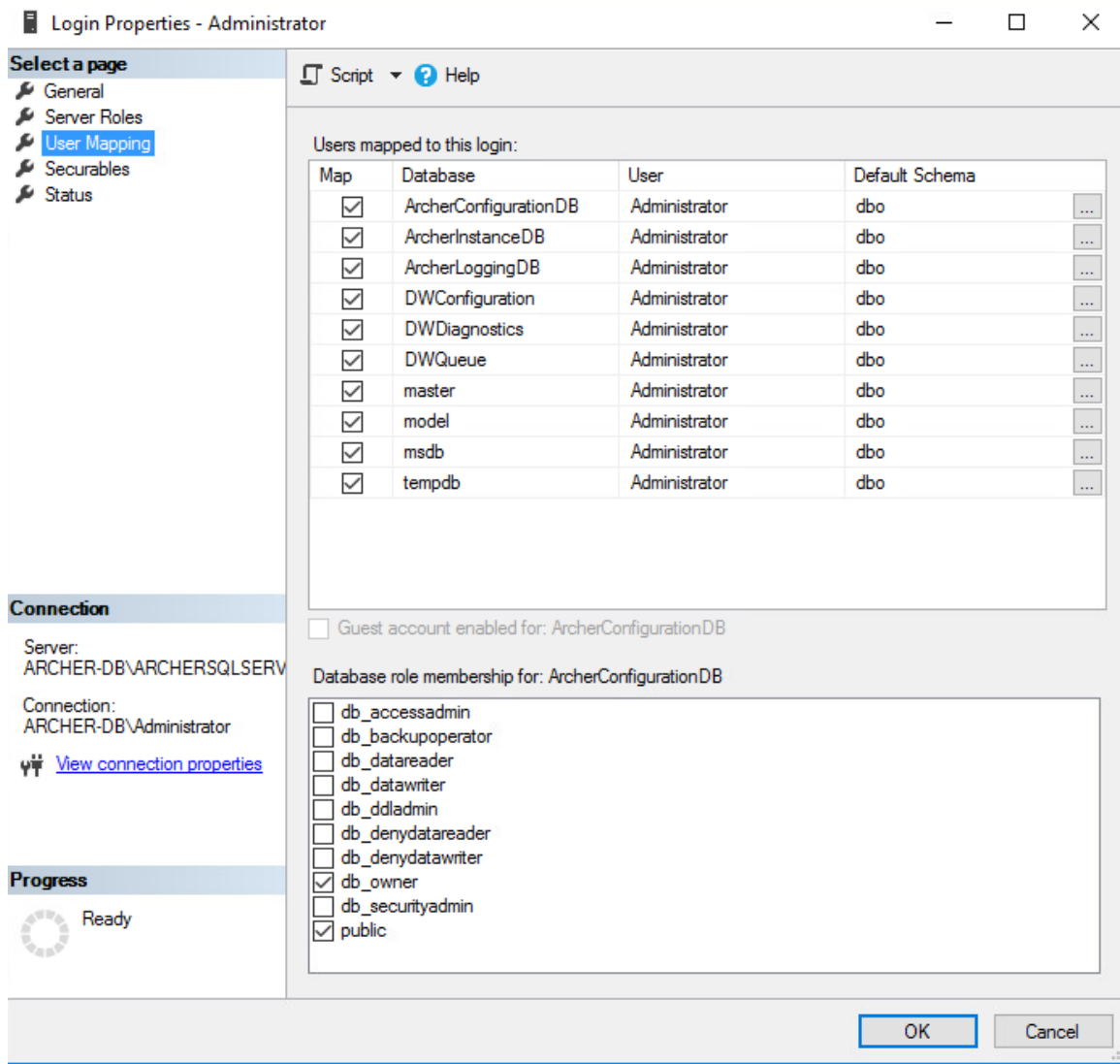
ARCHER-DB\Administrator

[View connection properties](#)

Progress

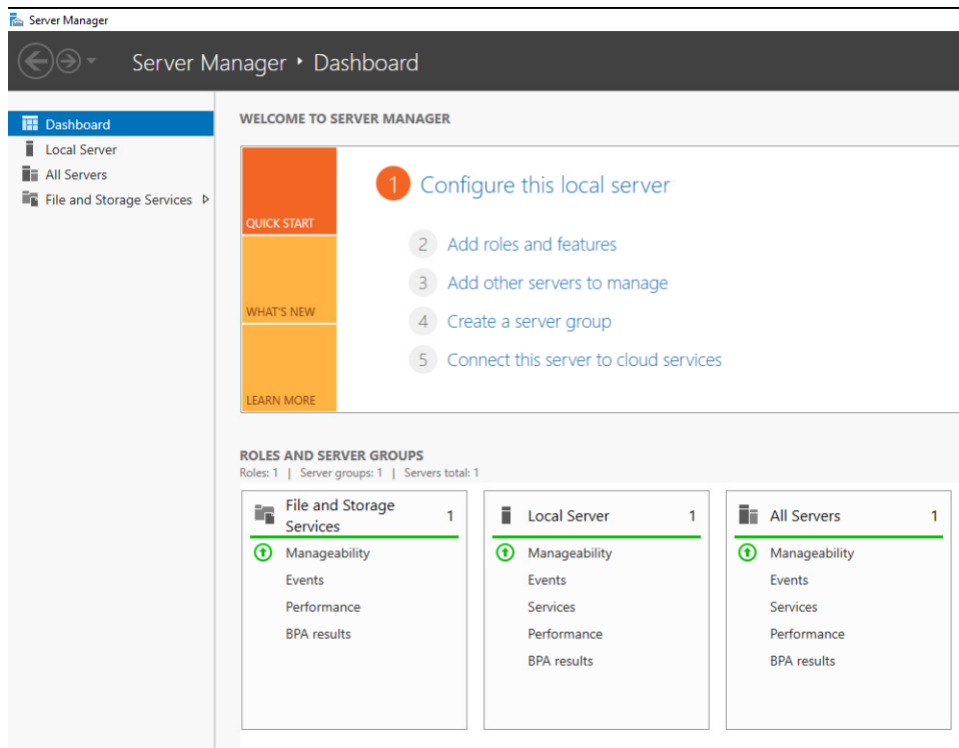
Ready

- Navigate to the **User Mapping** tab. Ensure all the databases have the **Default Schema** set to **dbo**. Also, ensure that **db_owner** is selected for each database under the **Database role membership** section. **Select OK.**

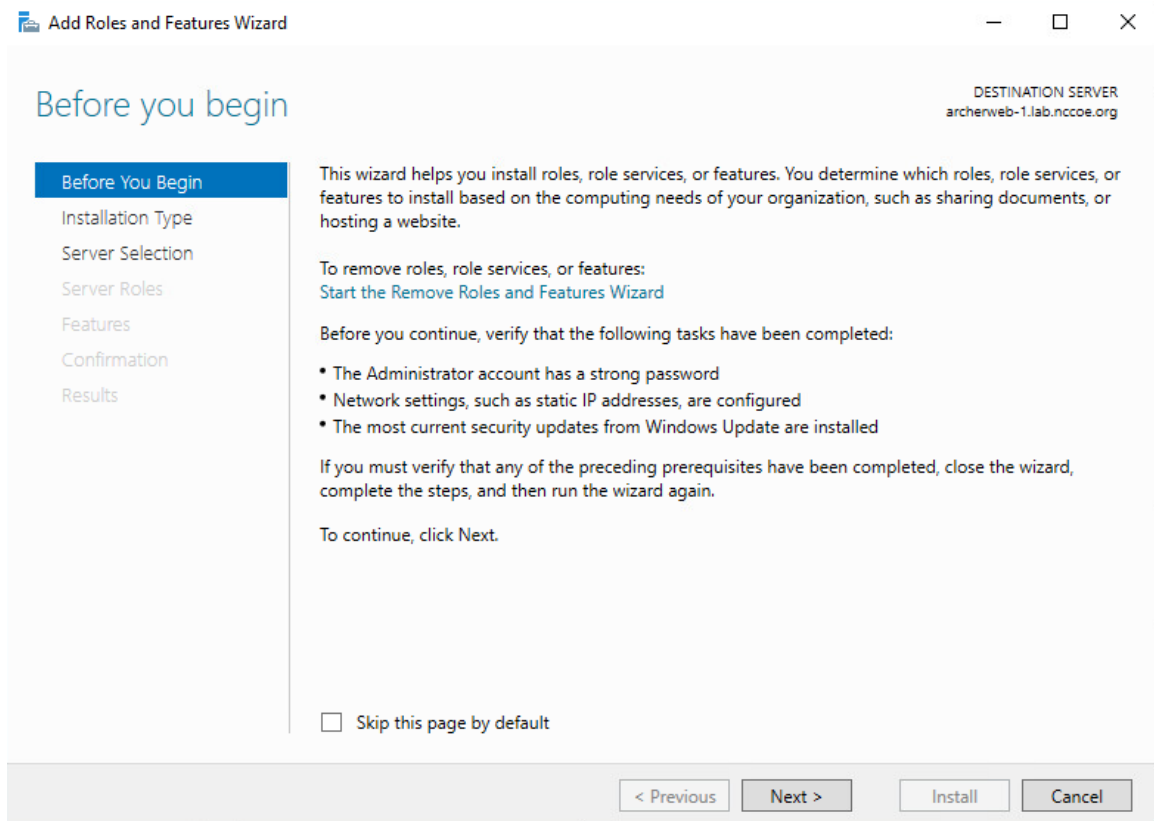


2.8.1.3 Install Internet Information Services on the Web Server

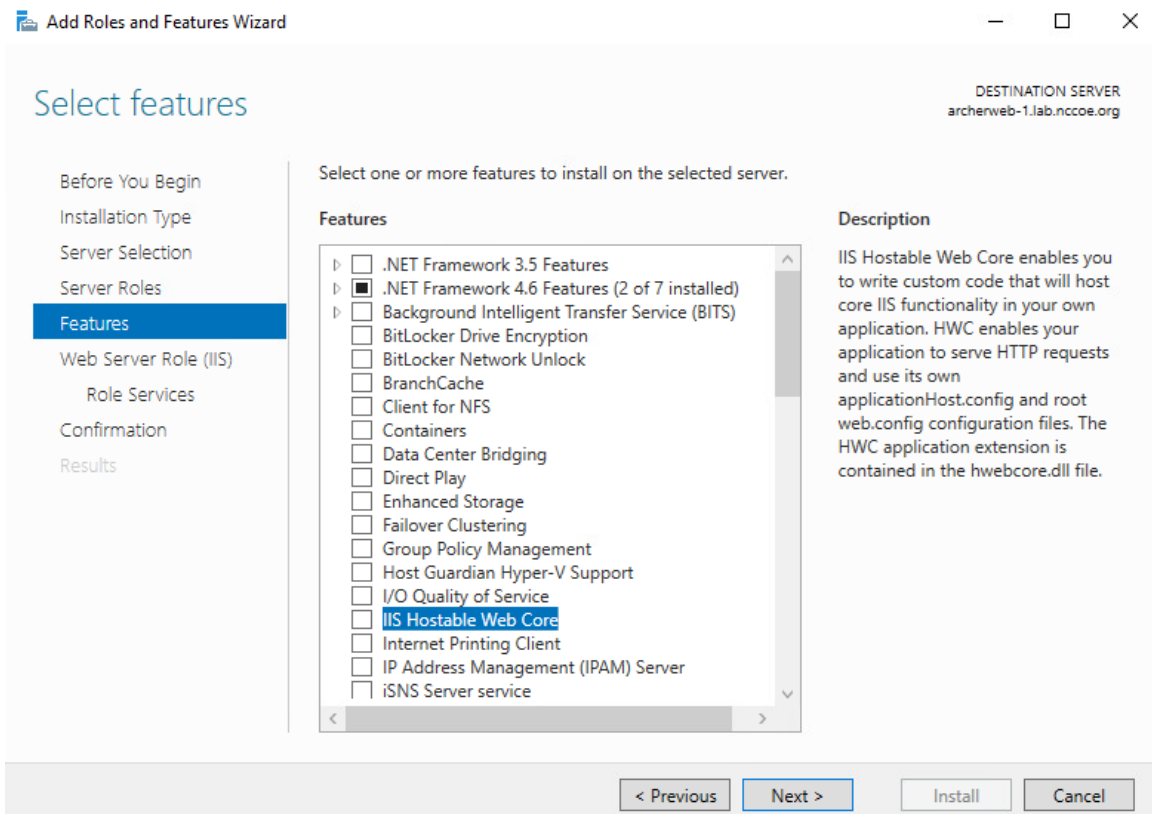
1. On the web server, open **Server Manager**.



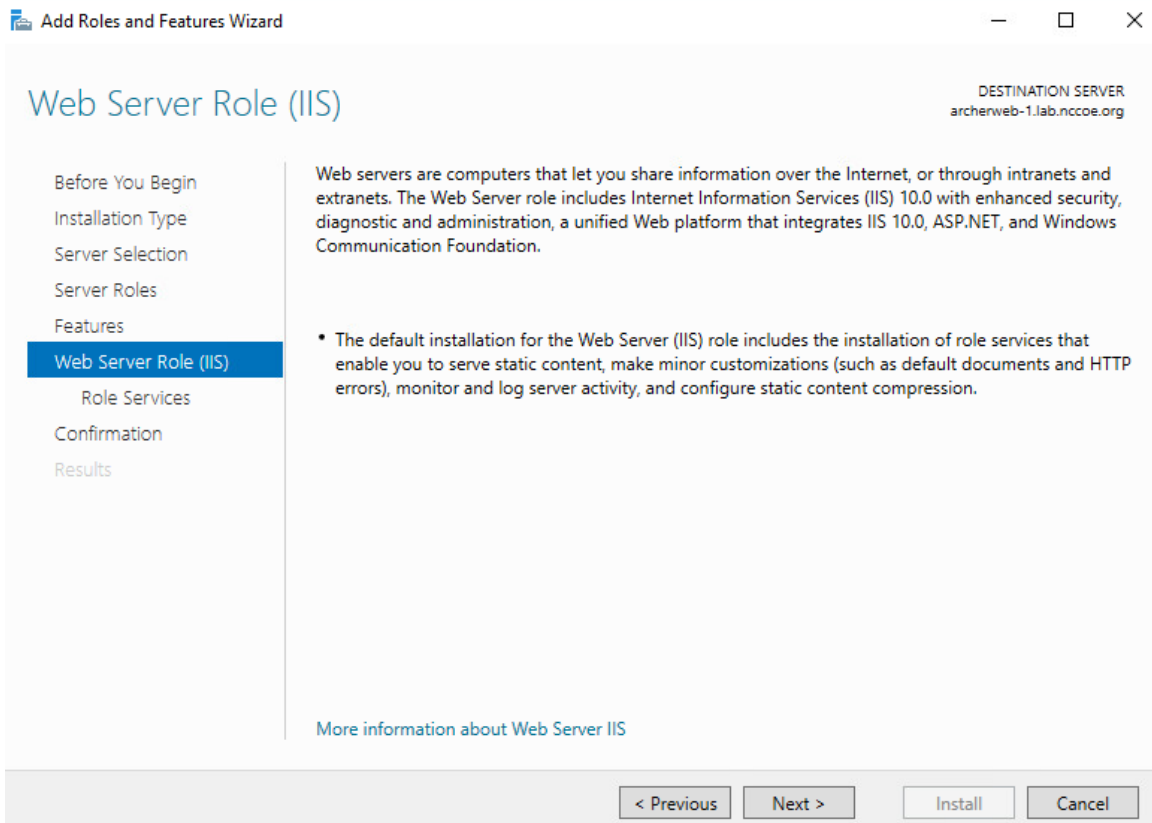
2. Under **Manage**, select **Add Roles and Features**.
3. Select **Next**.



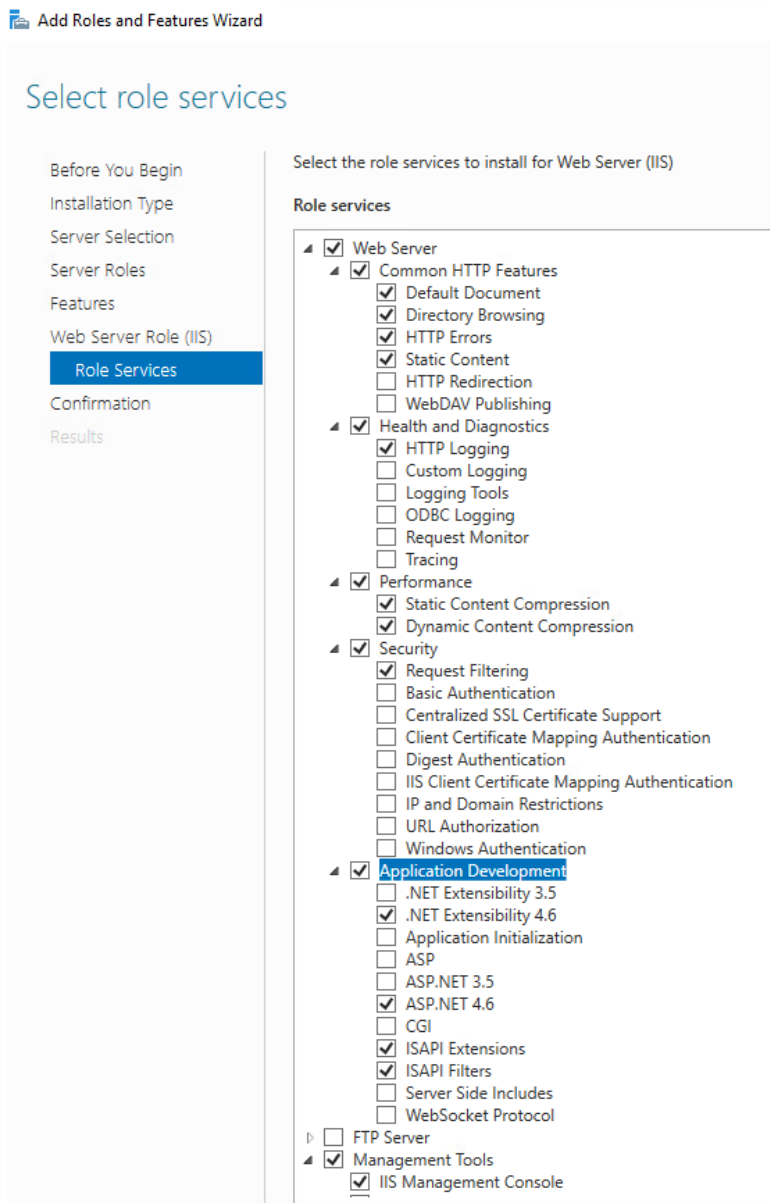
4. Select the **Role-based or feature-based installation** radio button. Select **Next**.
5. Select the **Web Server (IIS)** server role. Then select **Next**.
6. In the pop-up window, select **Add Features**.
7. Select **Next**.



8. Select **Next**.



9. Ensure that the **Role Services** shown below are selected. Then select **Next**.



10. Confirm that the selected options are correct and select **Install**.

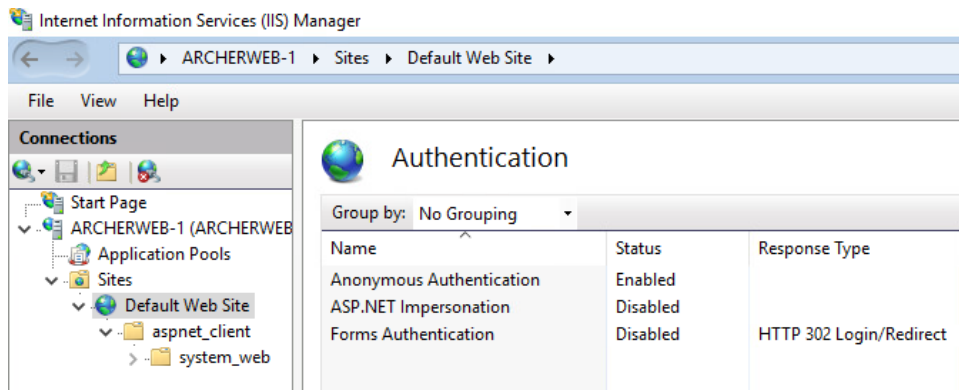
11. Once the installation completes, select **Close**.

12. Restart the computer.

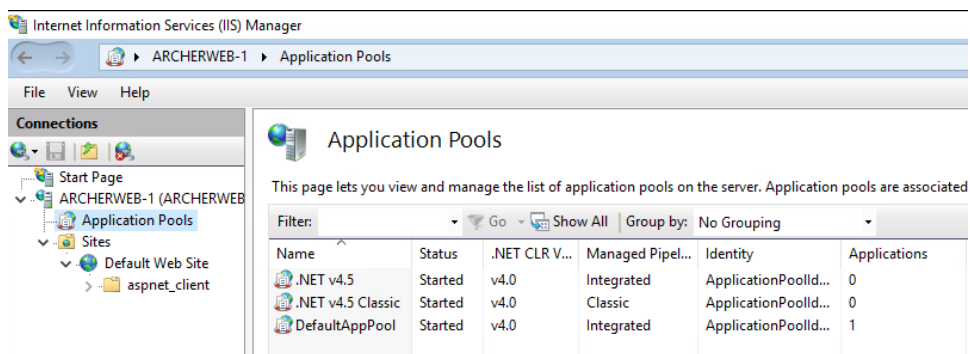
2.8.1.4 Configure IIS

1. Open the IIS application.

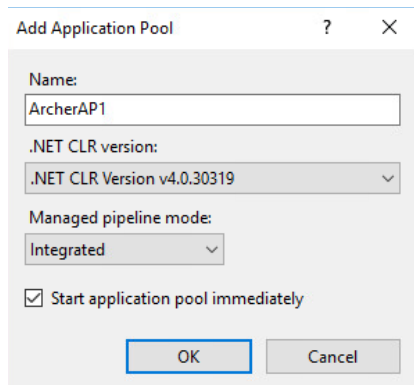
- Click on the web server in the left pane. **Select Authentication.**
- Ensure that **Anonymous Authentication** is enabled and **ASP.NET Impersonation** and **Forms Authentication** are disabled for the **Default Web Site**.



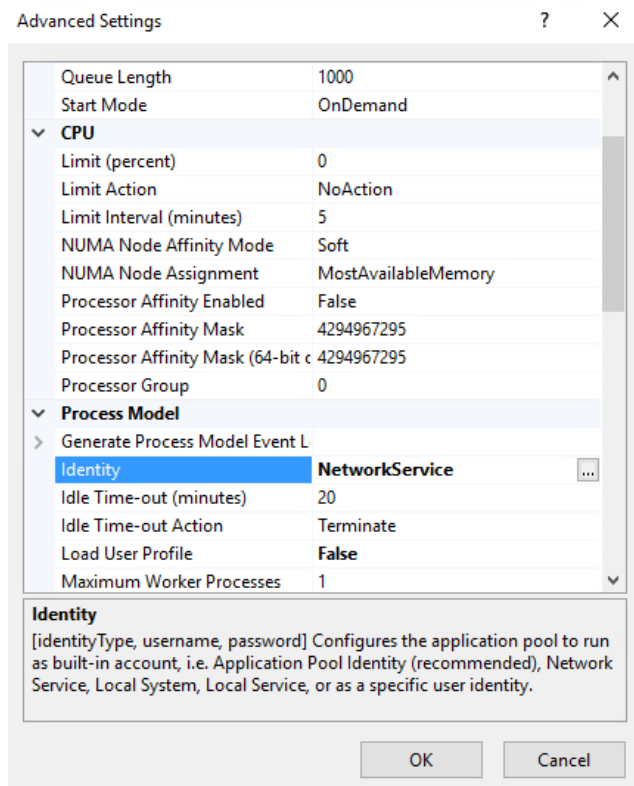
- Expand the web server tree and select **Application Pools**. In the far-right pane, select **Add Application Pool**.



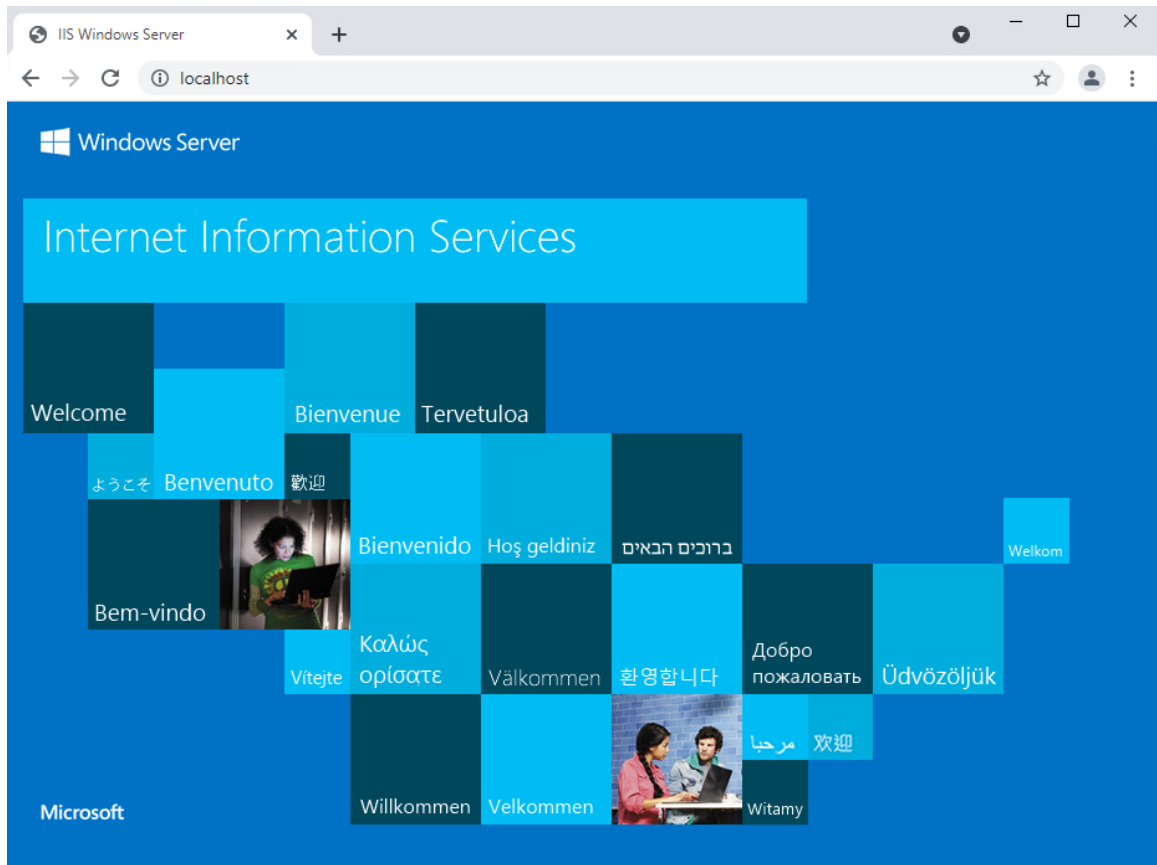
- Add a name to the **Name** input field. Ensure that **Managed pipeline mode** is set to **Integrated** and that **Start application pool immediately** is selected. Then, select **OK**.



- Right-click on the newly created application pool and select **Advanced Settings**. Under **Process Model**, select the ellipsis button that is next to the **Identity** field.

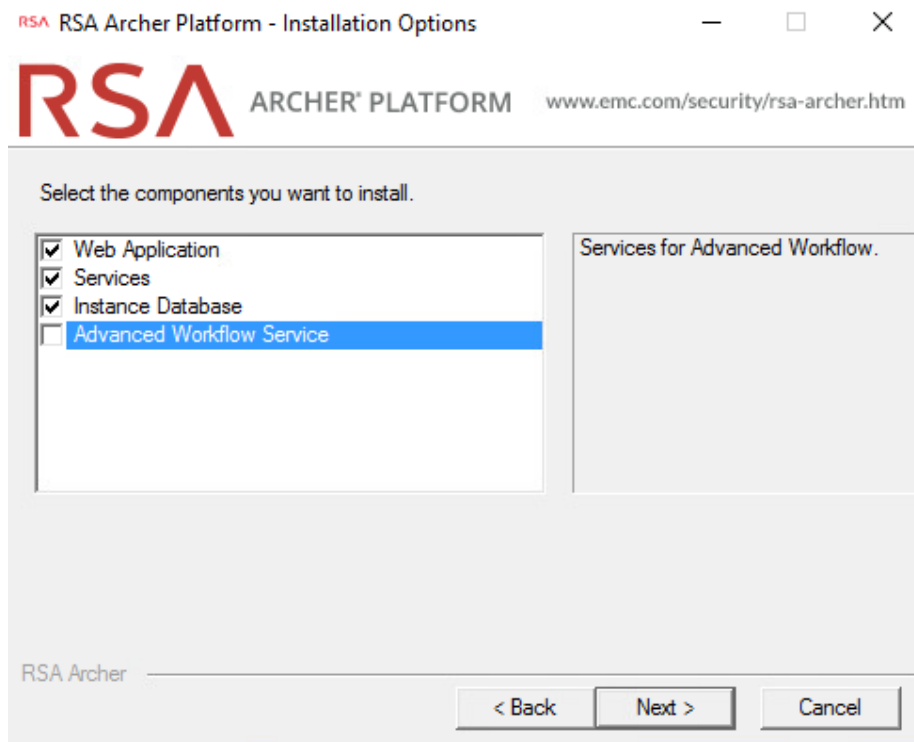


- Select **Custom account**, select **Set**, and enter the appropriate information. Then select **OK**.
- Click on the web server. In the far-right pane, select **Restart**.
- Open a browser and navigate to localhost. If the screen below is shown, then the web server is running properly, and Archer IRM can now be installed.

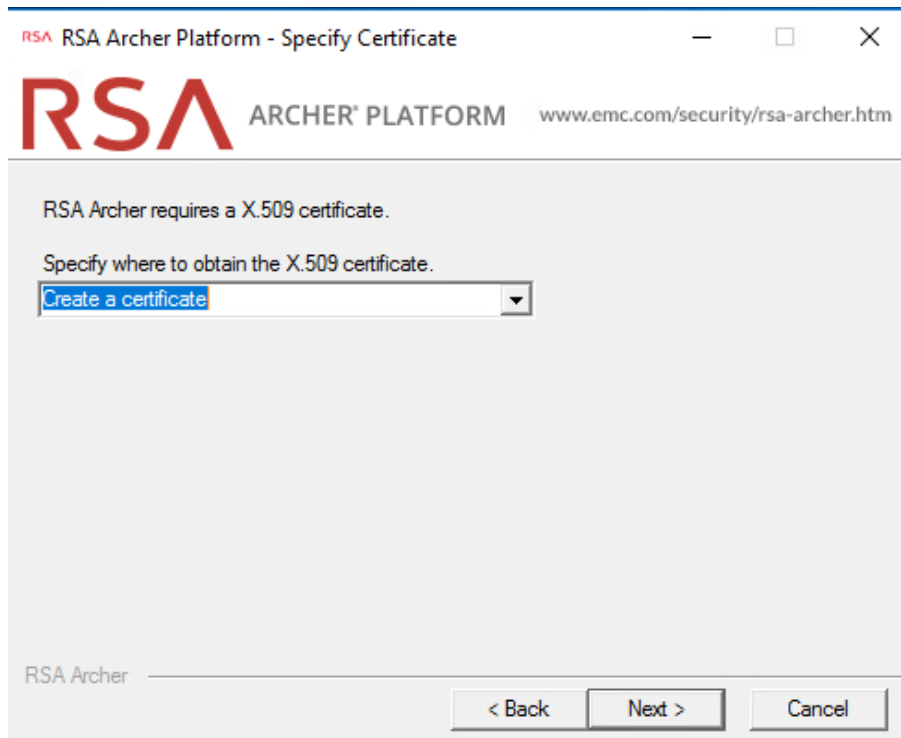


2.8.2 Archer IRM Installation

1. Before installing Archer IRM, .NET Framework version 4.7.2 must be installed. It can be downloaded at <https://dotnet.microsoft.com/download/dotnet-framework/net472>.
2. Extract the zip file that was downloaded from the Archer IRM download page.
3. Open the folder and run the executable **ArcherInstall**.
4. Accept the License Agreement and select **Next**.
5. Select **Next**.
6. For the web server, make sure the components **Web Application**, **Services**, and **Instance Database** are selected, then select **Next**.



7. Select **Create a certificate** from the dropdown menu and select **Next**.



8. Select the database server that was previously created. Enter the credentials that were created in SSMS. Then select the configuration database from the dropdown menu and click **Next**.

RSA Archer Platform - Configuration Database Options

RSA ARCHER PLATFORM www.emc.com/security/rsa-archer.htm

Specify connection properties for the Configuration database.

Important: It is strongly recommended that you do not use the Instance database as the Configuration database

Connection Properties

SQL Server: ARCHER-DB\ARCHERSQLSERVER

☐ Use integrated security

Login name: Administrator

Password:

Database: ArcherConfigurationDB

RSA Archer

< Back Next > Cancel

9. Select the preferred language from the dropdown menu and select **Next**.
10. Repeat step 8 and select the instance database from the dropdown menu. Then select **Next**.

RSA Archer Platform - Instance Database Options

RSA ARCHER PLATFORM www.emc.com/security/rsa-archer.htm

Specify connection properties for the Instance database.

Connection Properties

SQL Server: ARCHER-DB\ARCHERSQLSERVER

☐ Use integrated security

Login name: administrator

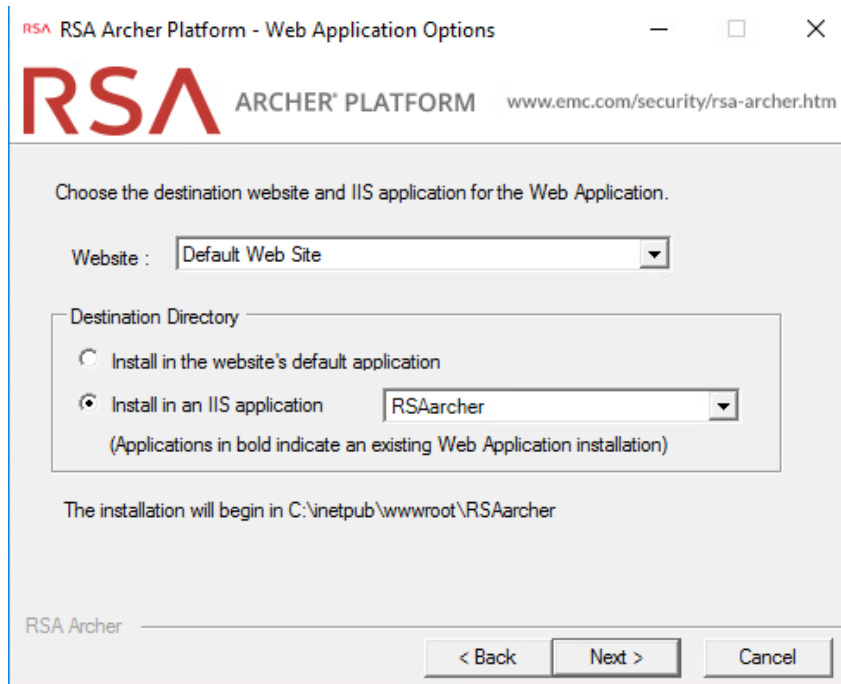
Password:

Database: ArcherInstanceDB

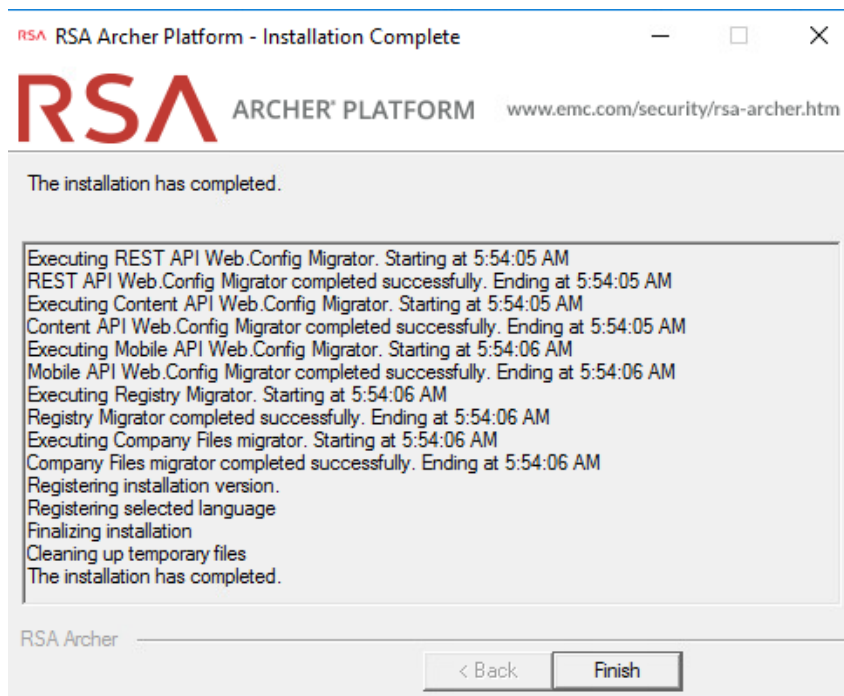
RSA Archer

< Back Next > Cancel

11. Select the time zone and select **Next**.
12. Select **Default Web Site** as the website location and choose the **Install an IIS application** radio button. Select **RSAArch**er from the dropdown menu. Then select **Next**.

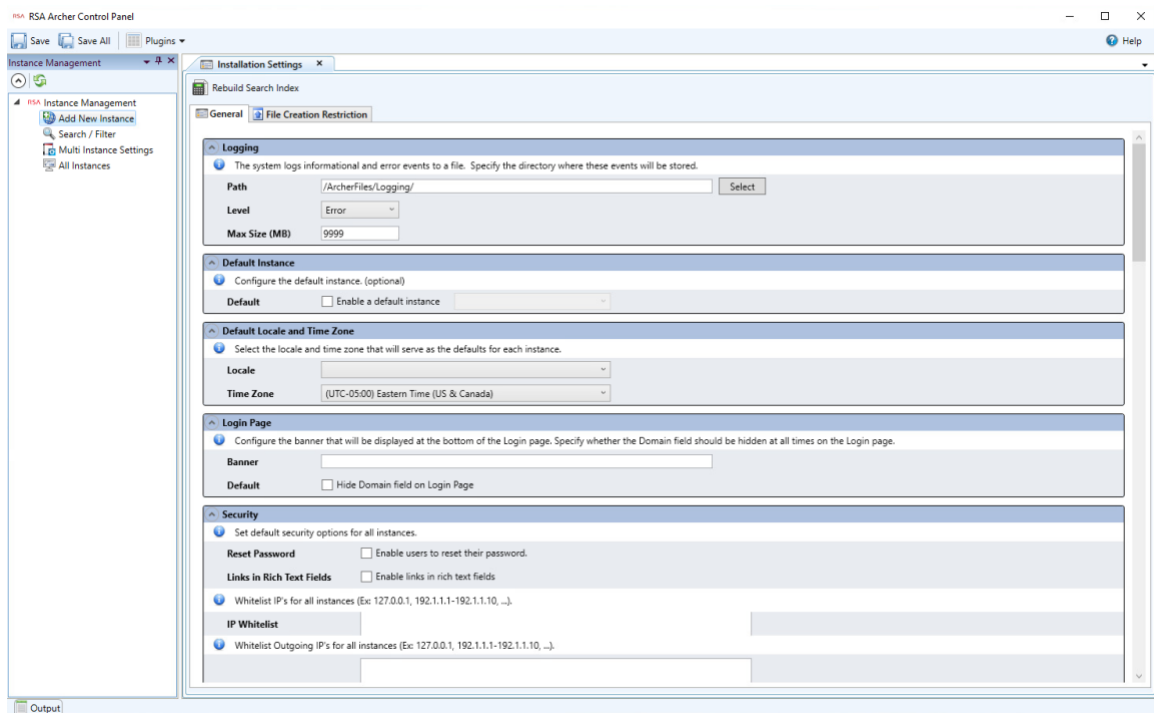


13. To add an Instrumentation Database, repeat step 8 and use the **ArcherLogging** database that was created in SSMS. Otherwise, select **Not using Archer IRM Instrumentation service**. Select **Next**.
14. Specify the account to run the services. Then select **Next**.
15. Confirm or edit the installation paths for the services and application files. Select the **Create Archer IRM program group for all users** radio button. Then select **Next**.
16. Confirm or edit the path for installation logs. Then select **Next**.
17. Select **Install** and wait for the installation to complete. Once completed, select **Finish**.

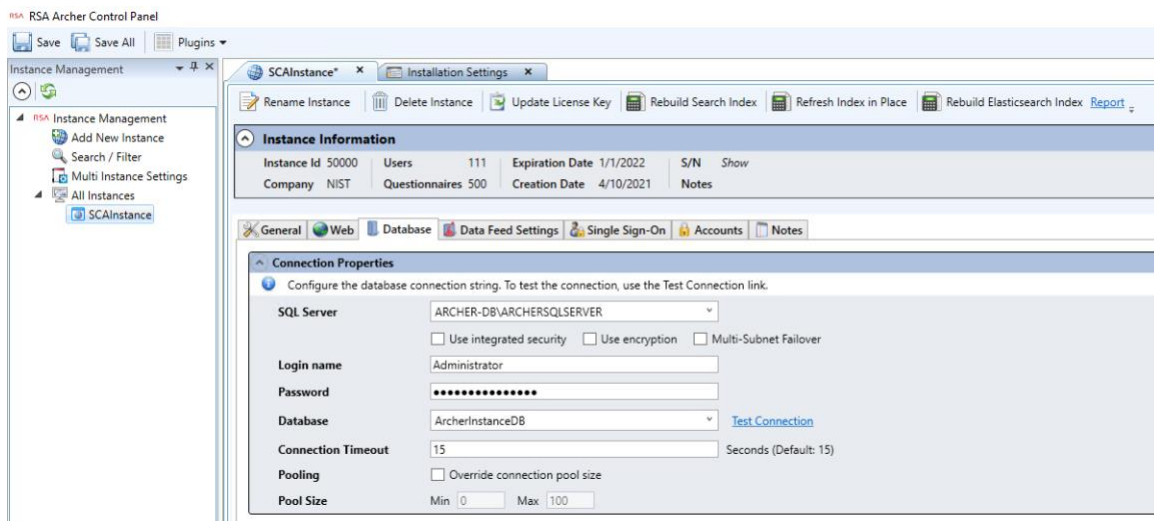


2.8.2.1 Configure Options in the Control Panel

1. Open the RSA Control Panel.
2. In the left pane, select **Add New Instance**.

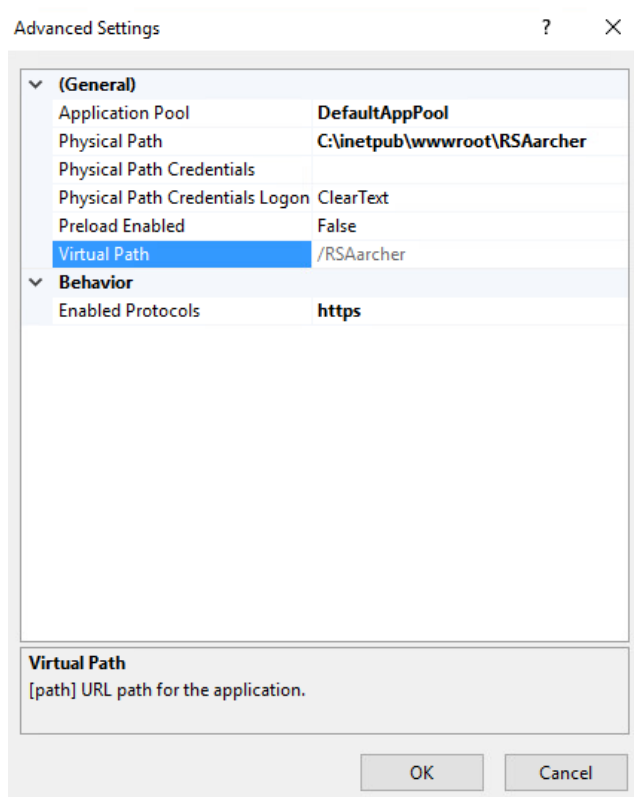


3. Enter a name for the instance in the **Instance Name** field. Select **Go**.
4. Double-click on the new instance. Input the required information in the **General**, **Web**, and **Database** tabs. When completed, click **Save** in the top left corner.

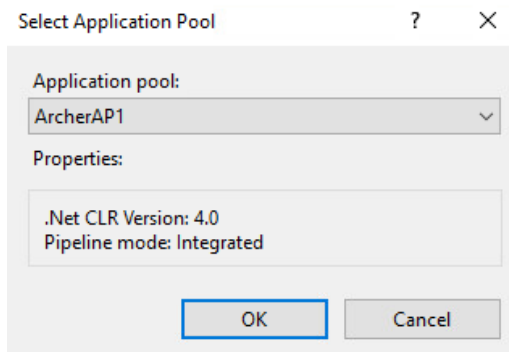


2.8.2.2 Add New Application to Application Pool

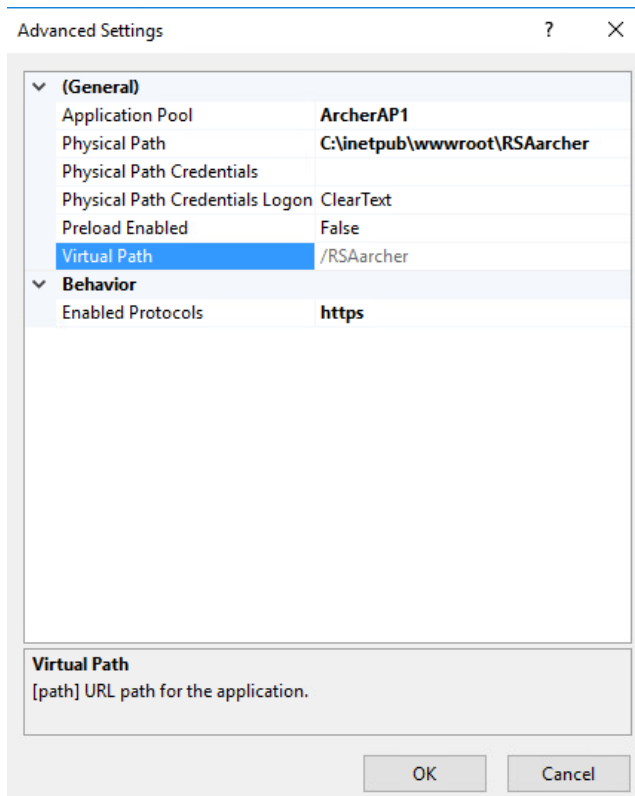
1. Navigate back to IIS. Expand the web server directory, expand the **Sites** directory, and expand the **Default Web Site** directory.
2. Select the RSAarcher site. Click on **Authentication** and ensure that **Anonymous Authentication** is the only thing that is enabled.
3. Right-click on the RSAarcher site and select **Manage Application > Advanced Settings**.
4. Click on **Application Pool** and select the ellipsis button. You will see a screen similar to the following:



5. Select the application pool that was previously created and select **OK**.



6. Select **OK**. You should see something similar to the screenshot below:



7. Restart the Archer IRM site.
8. Open a browser and navigate to the URL that was set in the RSA Control Panel application. If the following page displays, then Archer IRM installed successfully.



2.9 Seagate

Seagate contributed three hard drives (Table 2-6) stored within a 2U12 enclosure. As described in [Section 2.7.2](#), the enclosure is connected to our demonstration Intel server via a Serial Attached SCSI (SAS) interface. The demonstration server did not have the required SAS interface, so we purchased a Broadcom 9500-8e Tri-Mode Storage Adapter to complete the connection.

Table 2-6 Seagate Hardware Contribution

Machine Name	Operating System	Manufacturer	Model
N/A	N/A	Seagate	Exos 18TB Self Encrypting Hard Disk Drive x 3
N/A	N/A	Seagate	Exos E 2U12 Rackmount Enclosure

Once the enclosure is connected to the server, power on the server into the native Linux environment. Execute the **lshw** command which prints detailed hardware information about the server. The output should resemble the following for one of the Seagate drives. Note that because these are SAS drives there are two paths to the drive. As a result, you will notice two `/dev/sdx` devices pointing to the same physical drive.

```
*-disk:0
    description: SCSI Disk
    product: ST18000NM005J
    vendor: SEAGATE
    physical id: 0.0.0
    bus info: scsi@0:0.0.0
    logical name: /dev/sdb
    version: ET02
```

```
serial: ZR5056HD0000C107GP5G
size: 16TiB (18TB)
capacity: 45TiB (50TB)
capabilities: 7200rpm
configuration: ansiversion=7 logicalsectorsize=512
sectorsize=4096
```

Additionally, we recommend using Seagate's [command line interface tool](#) that communicates with the drives via the Trusted Computing Group (TCG) Storage API to confirm successful integration. Use the following command to print drive information:

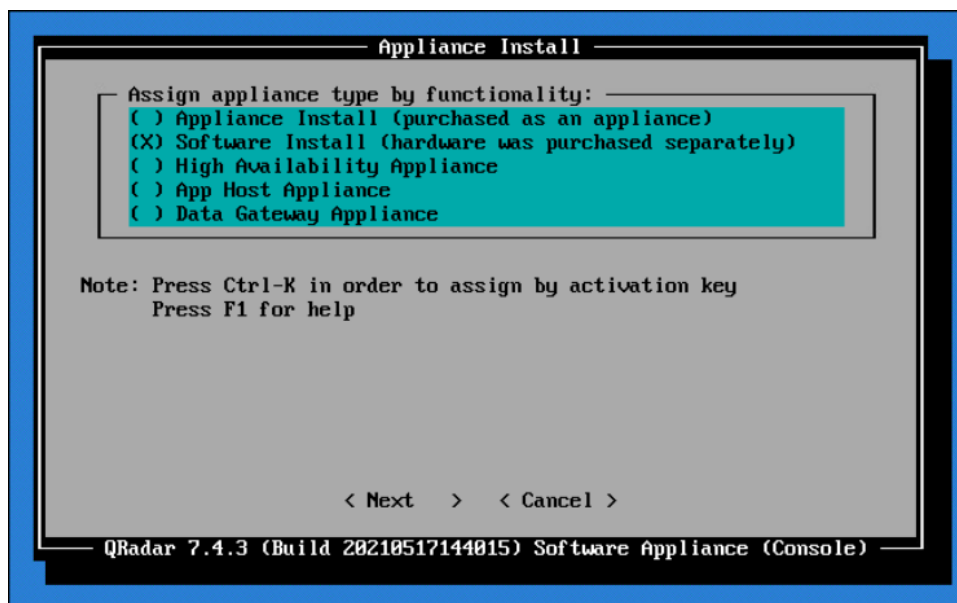
```
python3 sed_cli.py --device=/dev/sdb --operation=printdriveinfo
```

2.10 IBM QRadar

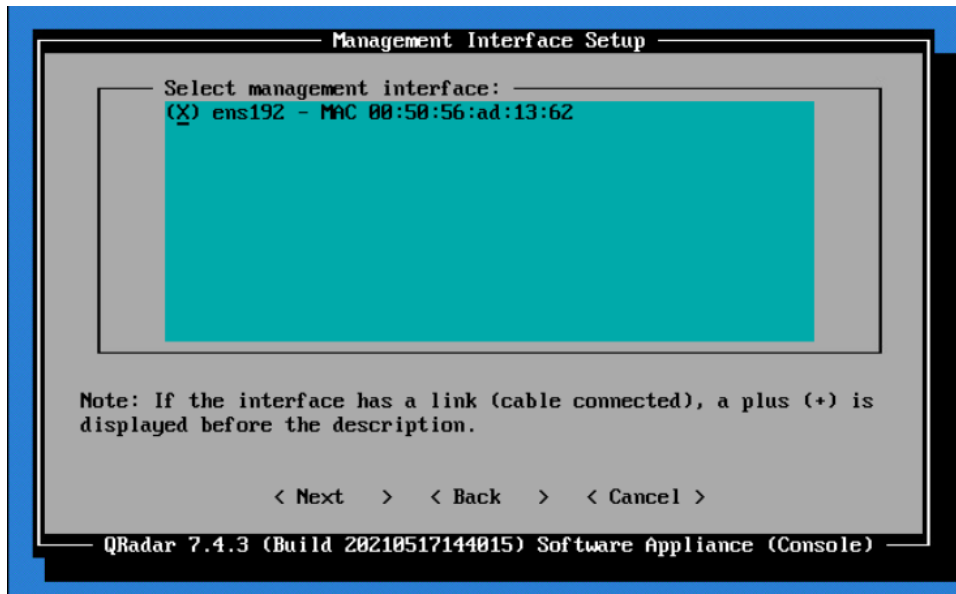
This section describes the installation of the IBM QRadar system for this demonstration. Our instantiation of IBM QRadar is viable for a lab environment, but the reader is encouraged to refer to the architecture planning guide on the IBM [website](#) for specific guidance for your environment.

We opted to install the full IBM QRadar suite onto a single virtual machine via an ISO provided by the IBM engineering team. Note that Red Hat Enterprise Linux Server V7.6 (or binary equivalent) must be deployed on the virtual machine before the QRadar installation. Once this prerequisite is met, boot the virtual machine using the ISO provided by IBM. This process will be unique to your environment. Next, follow the instructions provided by the IBM documentation [website](#). The remainder of this section includes example screenshots from the installation wizard we used in our environment.

1. Select the **Software Install** option for the appliance type.



2. For the functionality, select **"All-In-One" Console**.
3. Select **Normal Setup (default)** as the type of setup.
4. Either manually adjust the date and time, or add the name or IP address of a Network Time Protocol (NTP) server to automatically update the date and time.
5. Select the appropriate time zone.
6. Select the appropriate network adapter that will allow communication with the installed system.



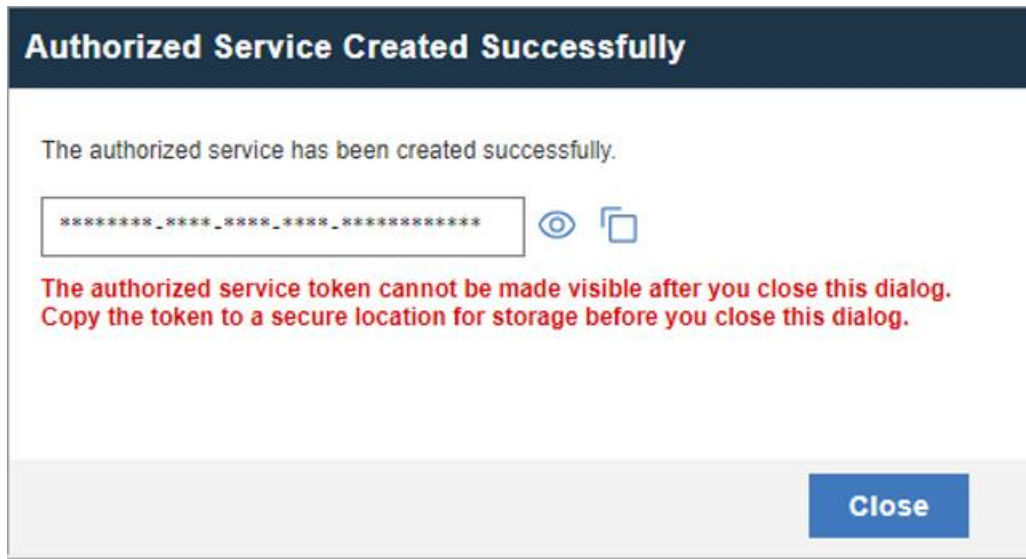
7. Enter the network information for this installation. Note that only static addresses are supported.
8. Set the Admin user password.
9. Set the Root password for console access.

2.10.1 WinCollect Agent

On a separate Windows Server system, configure and install the WinCollect agent. This component polls the remote hosts (laptops), and then sends event information to QRadar.

1. Install the WinCollect application on the QRadar system if not already present or upgrade to the latest version. This process is documented on the IBM [website](#).

2. Create an authentication token so that the managed WinCollect agents can exchange data with QRadar appliances. This process is documented on the IBM [website](#). Note that you will not be able to retrieve the token from QRadar after it has been created.



3. Configure a forwarding destination host for the log source data. This process is documented on the IBM [website](#). Enter the appropriate values for your environment.

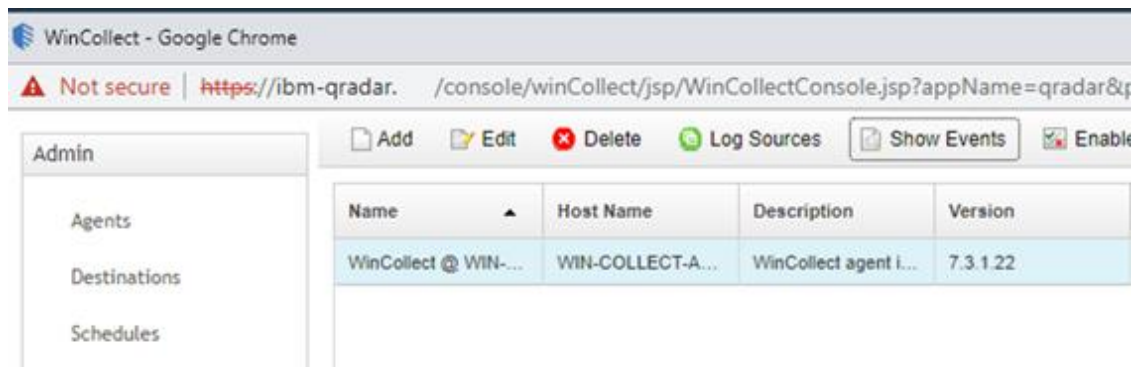
The screenshot shows the "WinCollect Forwarding Destination Properties" configuration window. It includes a header "WinCollect Forwarding Destination Properties" and a note "All fields are required". The configuration is divided into two sections: "Destination Details" and "Store and Forward Options".

Destination Details	
Name	qradar
Host Name	qradar
Port	514
Protocol	UDP
Throttle (events per second)	5,000

Store and Forward Options	
Schedule Mode	Forward Events
Schedule(s)	

At the bottom right of the "Schedule(s)" field is a "New..." button. At the bottom of the window are "Save" and "Cancel" buttons.

4. Install the managed WinCollect agent on the Windows Server host. This process is documented on the IBM [website](#). If successful, the agent will appear in the QRadar console under **Admin > Data Sources > WinCollect > Agents**.



2.11 Integrations

This section describes the steps we took to configure and integrate the products described earlier in this volume. The integrations are generally network-based and require connectivity both between the systems and to Internet-based cloud services.

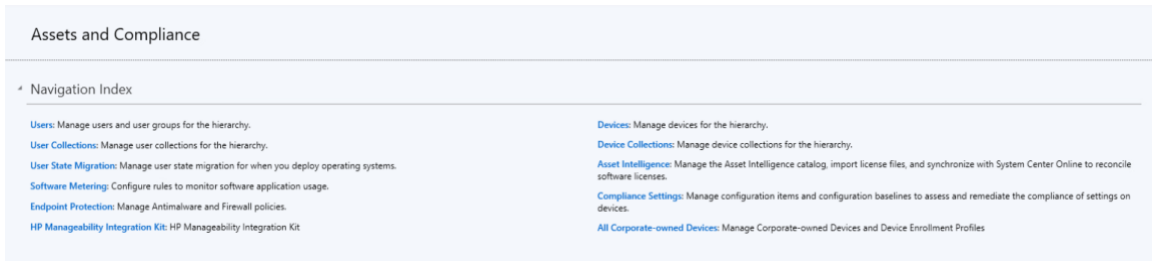
2.11.1 Microsoft Endpoint Configuration Manager and Platform Validation Tools

For the Intel laptops, a command-line version of the AutoVerify tool named TSCVerifyUtil periodically monitors the changes to laptop components. A custom PowerShell script installed on each laptop and run every hour via task scheduler captures the result of TSCVerifyUtil execution and stores it in the Windows registry. This section describes how to configure Microsoft Endpoint Configuration Manager to run a configuration baseline which monitors the results of the customized PowerShell script. This data is reflected in the Archer IRM dashboard.

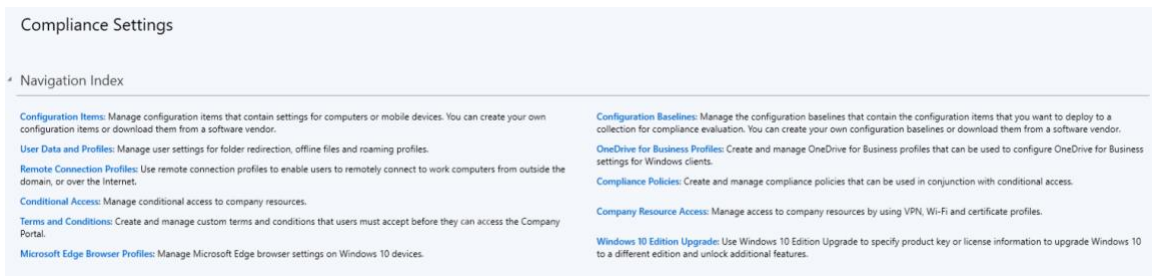
Similarly for HP Inc. and Dell laptops, the HIRS-ACA Windows-based Provisioner periodically monitors the changes to laptop components. We chose to use the same monitoring approach for consistency – the Windows task scheduler captures the result of the Provisioner execution and stores it in the Windows registry. Repeat this section to configure Microsoft Endpoint Configuration Manager with the HIRS Provisioner, changing input where noted.

2.11.1.1 Set Up Configuration Item

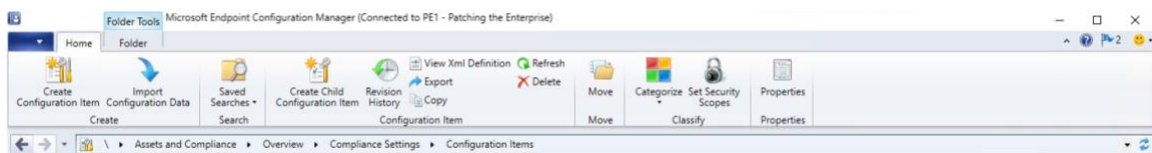
1. In the Microsoft Endpoint Configuration Manager console, under **Assets and Compliance > Overview**, select **Compliance Settings**.



2. Next, select **Configuration Items**.




3. From the **Home** panel at the top, select **Create Configuration Item**.



4. Enter a name and description for the configuration item in the **Name** and **Description** fields. Ensure that **Windows Desktops and Servers (custom)** is selected. Then select **Next**.

Create Configuration Item Wizard X

 General

General

Supported Platforms

Settings

Compliance Rules

Summary

Progress

Completion

Specify general information about this configuration item

Configuration items define a configuration and associated validation criteria to be assessed for compliance on devices.

Name:

Description:

Specify the type of configuration item that you want to create:

Settings for devices managed with the Configuration Manager client

☐ Windows 10

☐ Mac OS X (custom)

☒ Windows Desktops and Servers (custom)

☐ This configuration item contains application settings

Settings for devices managed without the Configuration Manager client

☐ Windows 8.1 and Windows 10

☐ Windows Phone

☐ iOS and Mac OS X

☐ Android and Samsung KNOX

☐ Android for Work

Assigned categories to improve searching and filtering:

Categories...

< Previous


Next >

Summary

Cancel

5. Ensure that all versions are selected and click **Next**.

Create Configuration Item Wizard X

 Supported Platforms

General
Supported Platforms
Settings
Compliance Rules
Summary
Progress
Completion

Specify the client operating systems that will assess this configuration item for compliance

☒ Select the versions of Windows that will assess this configuration item for compliance:

☒ Select all

☒ Windows XP
☒ Windows Vista
☒ Windows 7
☒ Windows 8
☒ Windows 8.1
☒ Windows 10
☒ Windows 2003
☒ Windows 2008
☒ Windows Server 2012
☒ Windows Server 2012 R2
☒ Windows Server 2016
☒ Windows Server 2019
☒ Windows Embedded

☐ Specify the version of Windows manually:

6. On the **Settings** tab, select **New**.
7. On the **General** tab, enter a name and description in the **Name** and **Description** fields. For **Setting type**, select **Registry value** from the dropdown. For **Data type**, selection **String** from the dropdown. To specify the registry value, select the appropriate **Hive Name** and enter the **Key Name** and **Value Name** in their respective fields (Note: When configuring the HIRS Provisioner, use SOFTWARE\HIRS\provisioner as the **Key Name**). Next, switch to the **Compliance Rules** tab.

Create Setting ✕

General Compliance Rules

Specify details about this setting that represents a business or technical condition to assess for compliance on client devices.

Name: Registry Value

Description: Check the registry value "Return Value"

Setting type: Registry value

Data type: String

Specify the registry value to assess for compliance on computers.

Hive Name: HKEY_LOCAL_MACHINE Browse...

Key Name: SOFTWARE\Intel\TSCVerify

Value Name: Return Value

☐ This registry value is associated with a 64-bit application

OK Cancel Apply

8. Select **New**.
9. Specify the name and description for the rule in the **Name** and **Description** fields. For **Rule type**, select **Value** from the dropdown. Under **The setting must comply with the following rule**, select **Registry Value** and **Equals**, and enter 0 (zero) in the **the following values:** field. Ensure that **Report noncompliance if this setting instance is not found** is selected. Choose the **Noncompliance severity for reports** appropriate for your environment. Then select **OK**.

Create Rule X

Specify rules to define compliance conditions for this setting

Name:

Description:

The registry value 'Return Value' must be 0 in order for the laptops to be compliant.

Selected setting:

Rule type:

The setting must comply with the following rule:

Registry Value

Equals

v

the following values:

☐ Remediate noncompliant rules when supported

☒ Report noncompliance if this setting instance is not found

Noncompliance severity for reports:

Critical

OK

Cancel

10. Select **Apply**. Then select **OK**.

Create Setting

General Compliance Rules

Use compliance rules to specify the conditions that make a configuration item setting compliant on client devices. The following compliance rules are associated with this configuration item.

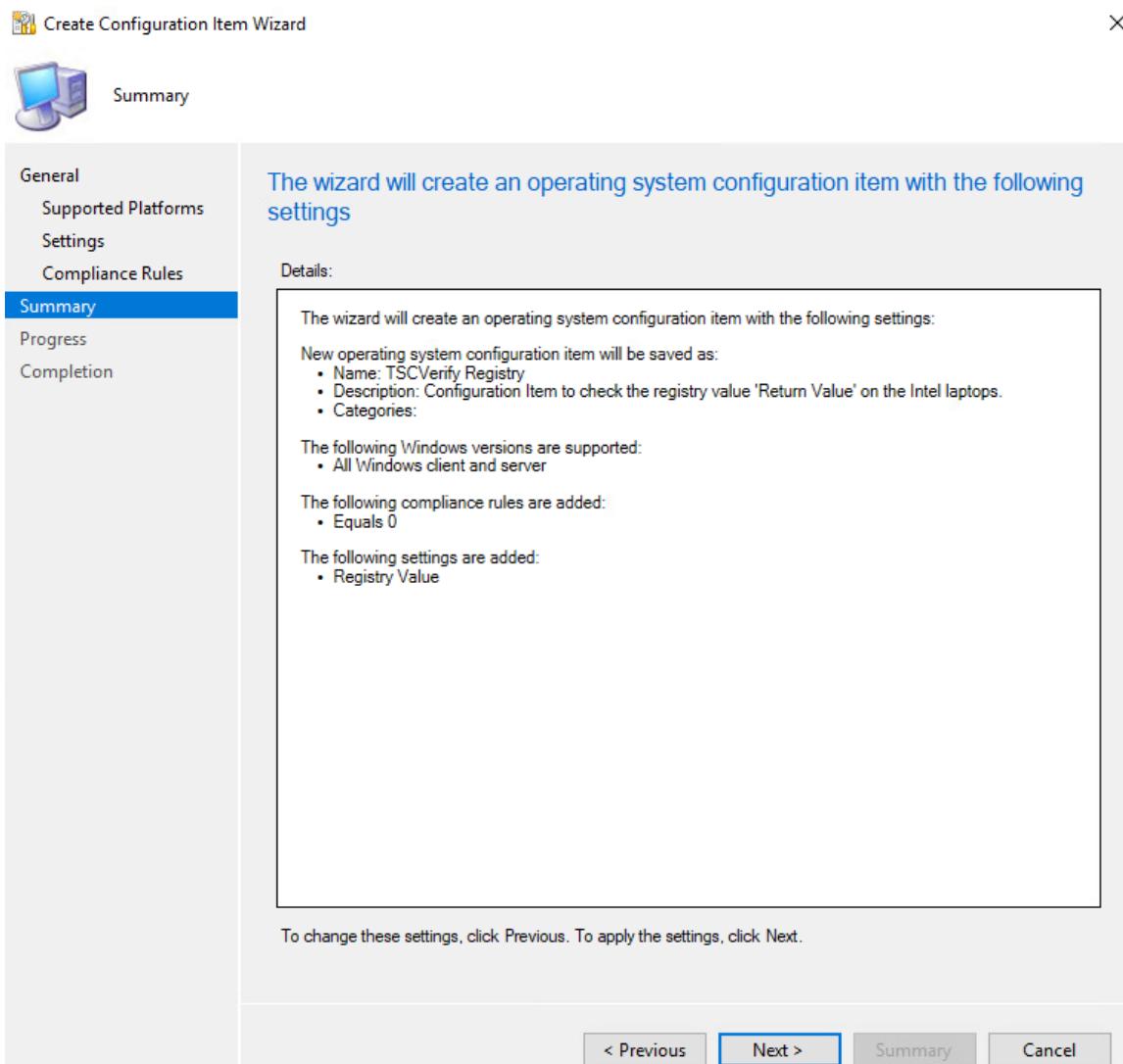
☐ Track remediation history when supported

Name	Condition	Severity	Remediate
Equals 0	Equals 0	Critical	No

New... Edit... Delete

OK Cancel Apply

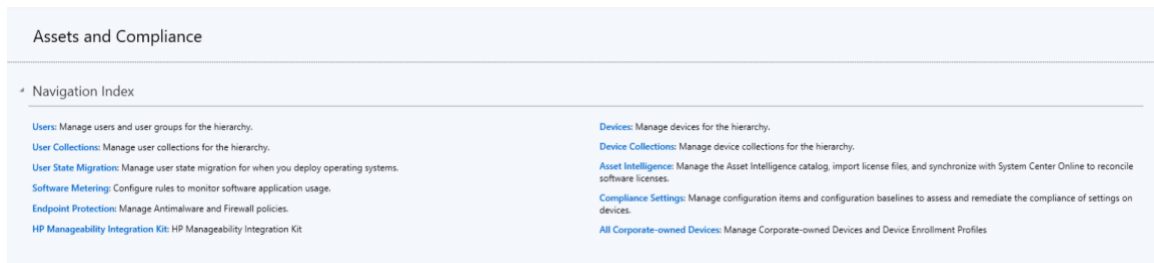
11. Review the configurations on the Summary page. After confirming that the configurations are correct, select **Next**.



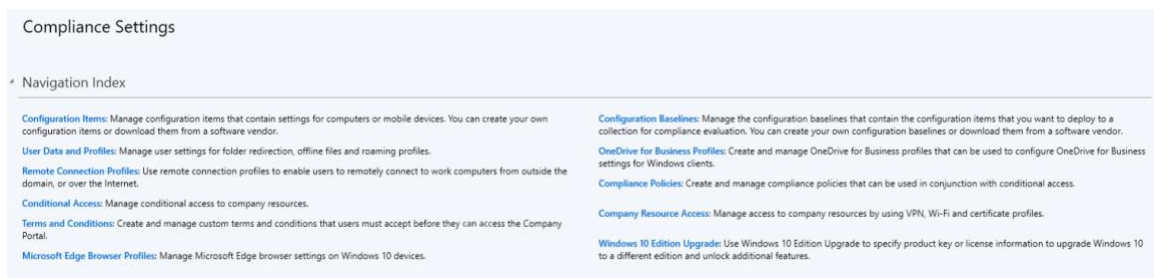
12. After the wizard completes, select **Close**.

2.11.1.2 Set Up Configuration Baseline

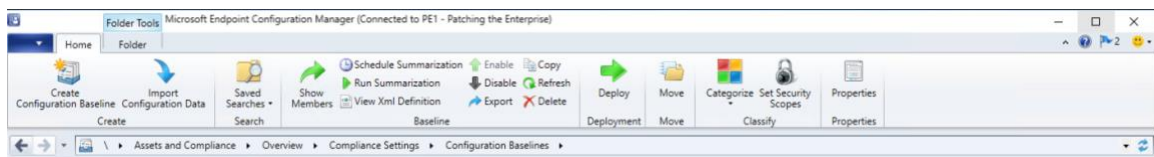
1. In the Microsoft Endpoint Configuration Manager console, under **Assets and Compliance > Overview**, select **Compliance Settings**.




2. Next, select **Configuration Baselines**.




3. From the **Home** panel at the top, select **Create Configuration Baseline**.



4. Provide a name and description for the configuration baseline in the **Name** and **Description** fields. Next, select **Add** and choose **Configuration Items**.

 Create Configuration Baseline X

Specify general information about this configuration baseline

 Name:

Description:

Select the configuration data (configuration items, configuration baselines, and software updates) to be evaluated for compliance by this configuration baseline. This configuration baseline will be assessed as compliant if all the items specified are compliant. Optional items are evaluated only if the relevant application is present on the client devices.

Configuration data:

Filter...

Name	Type	Purpose	Revision
There are no items to show in this view.			

- Configuration Items
- Software Updates for co-managed clients
- Configuration Baselines compliance policy assessment

Assigned categories to improve searching and filtering:

5. Select the previously created configuration item from the list and select **Add**.
6. Select **OK**.

Add Configuration Items ✕

Select the configuration items that you want to add to this configuration baseline

Available configuration items:

Filter...

Name	Type	Latest Revision	Description	Status
------	------	-----------------	-------------	--------

Add Remove

Configuration items that will be added to this configuration baseline:

Filter...

Name	Type	Latest Revision	Description	Status
TSCVerify Registry	Operating System	Revision 1	Configuration Item to chec...	Enabled

OK Cancel

7. Select **OK**.

Create Configuration Baseline

Specify general information about this configuration baseline

Name: TSCVerify Baseline

Description: Baseline of the Intel Laptops

Select the configuration data (configuration items, configuration baselines, and software updates) to be evaluated for compliance by this configuration baseline. This configuration baseline will be assessed as compliant if all the items specified are compliant. Optional items are evaluated only if the relevant application is present on the client devices.

Configuration data:

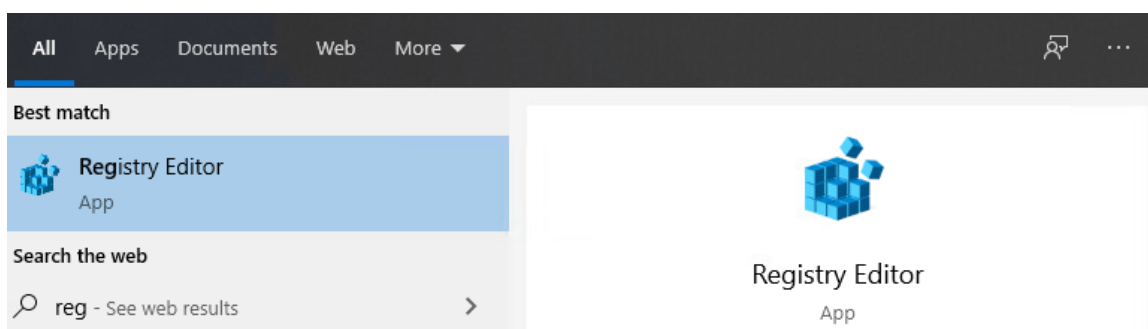
Name	Type	Purpose	Revision
TSCVerify Registry	Operating System	Required	Latest

☐ Always apply this baseline even for co-managed clients
☒ Evaluate this baseline as part of compliance policy assessment

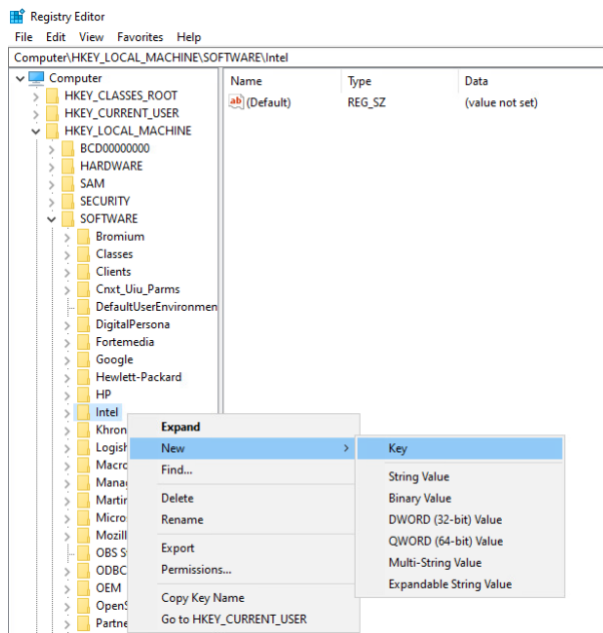
Assigned categories to improve searching and filtering:

2.11.1.3 Set Up Registry Entry on Intel Devices

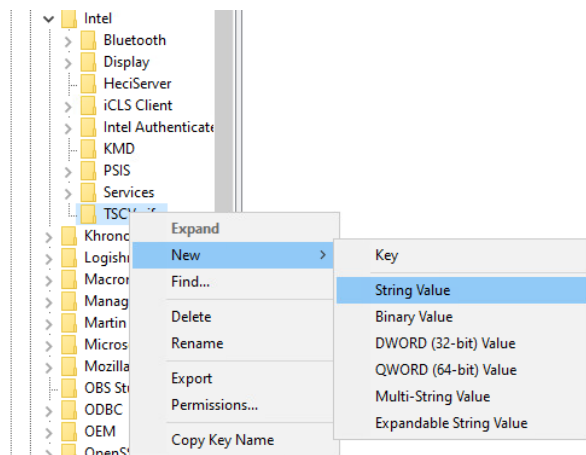
1. On the Windows 10 laptop, go to **Start**, search for the **Registry Editor**, and open that program.



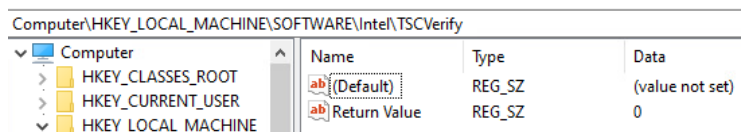
2. Find the Intel folder located in **HKEY_LOCAL_MACHINE\SOFTWARE**. Right click and select **New > Key**. Name the key **TSCVerify**.



3. Select the **TSCVerify** key, right-click and select **New > String Value**.



4. Enter *Return Value* in the **Name** field.



2.11.1.4 Run Script Via Task Manager

1. Place the script onto the local machine (snippet shown below). A copy of this script can be obtained from our repository.

```
# Run Scan and capture exit code.
# 0=No components have changed and platform certificate validation passed
# 1=At least one component has changed OR platform certificate validation
failed
# 2=At least one component has changed AND Platform Certificate validation
failed

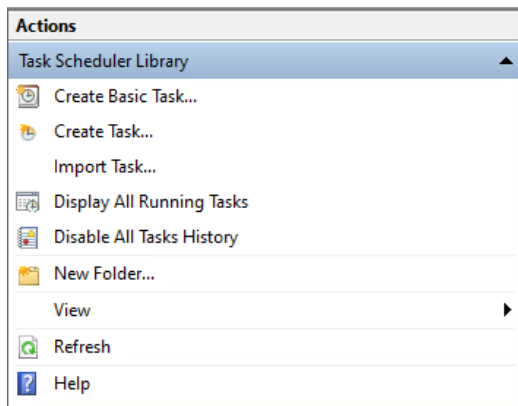
# Write-Output "Starting DPD file scan and compare..."
$tscpinfo = New-Object System.Diagnostics.ProcessStartInfo
$tscpinfo.FileName = "TSCVerifyTool_3.40.exe"
$tscpinfo.WorkingDirectory = $artifactdirectory
$tscpinfo.RedirectStandardError = $true
$tscpinfo.RedirectStandardOutput = $true
$tscpinfo.UseShellExecute = $false
$tscpinfo.Arguments = "SCANREADCOMP -in $dpdfile"
$dpdprocess = New-Object System.Diagnostics.Process
$dpdprocess.StartInfo = $tscpinfo
$dpdprocess.Start() | Out-Null
$stdout = $dpdprocess.StandardOutput.ReadToEnd()
$dpdprocess.WaitForExit()

# Write-Output "Starting Platform Certificate validation ..."
$tscpinfo.Arguments = "PFORMCRTCOMP -in $platformcertificatefile"
$platformcertprocess = New-Object System.Diagnostics.Process
$platformcertprocess.StartInfo = $tscpinfo
$platformcertprocess.Start() | Out-Null
$stdout = $platformcertprocess.StandardOutput.ReadToEnd()
$platformcertprocess.WaitForExit()

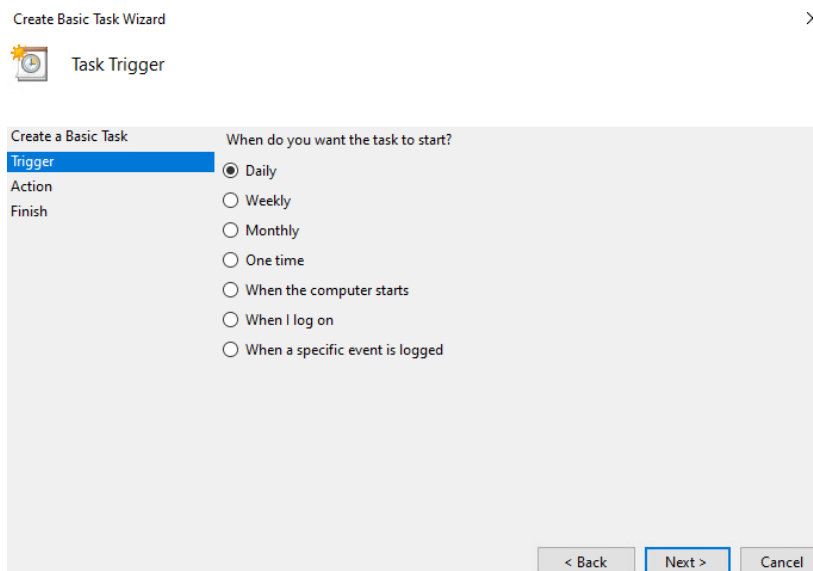
# If the return value is nonzero, then the computer is not compliant
$retValue = $dpdprocess.ExitCode + $platformcertprocess.ExitCode
Write-Output $retValue

# Add retValue to registry location
$regPath = "HKLM:\SOFTWARE\Intel\TSCVerify"
Set-ItemProperty -Path $regPath -Name "Return Value" -Value $retValue
```

2. From the **Start Menu**, search for **Task Scheduler** and open the program.
3. Under the **Actions** panel, select **Create Basic Task**.




4. Fill in the **Name** and **Description** fields. Then select **Next**.
5. Select the frequency for this task to run. Then select **Next**.



6. Select the start date and time for the task. Then select **Next**.
7. Select the action **Start a program**. Then select **Next**.
8. In the **Start a program** section, type the following in the **Program/script** field: *powershell.exe*. Next, add the following to the add arguments (optional) field: *-file "<Location of script>"*. Then select **Next**.
9. Confirm the settings are correct and select **Finish**.

Create Basic Task Wizard ×

 Summary

Create a Basic Task

Trigger
Daily
Action
Start a Program
Finish

Name:

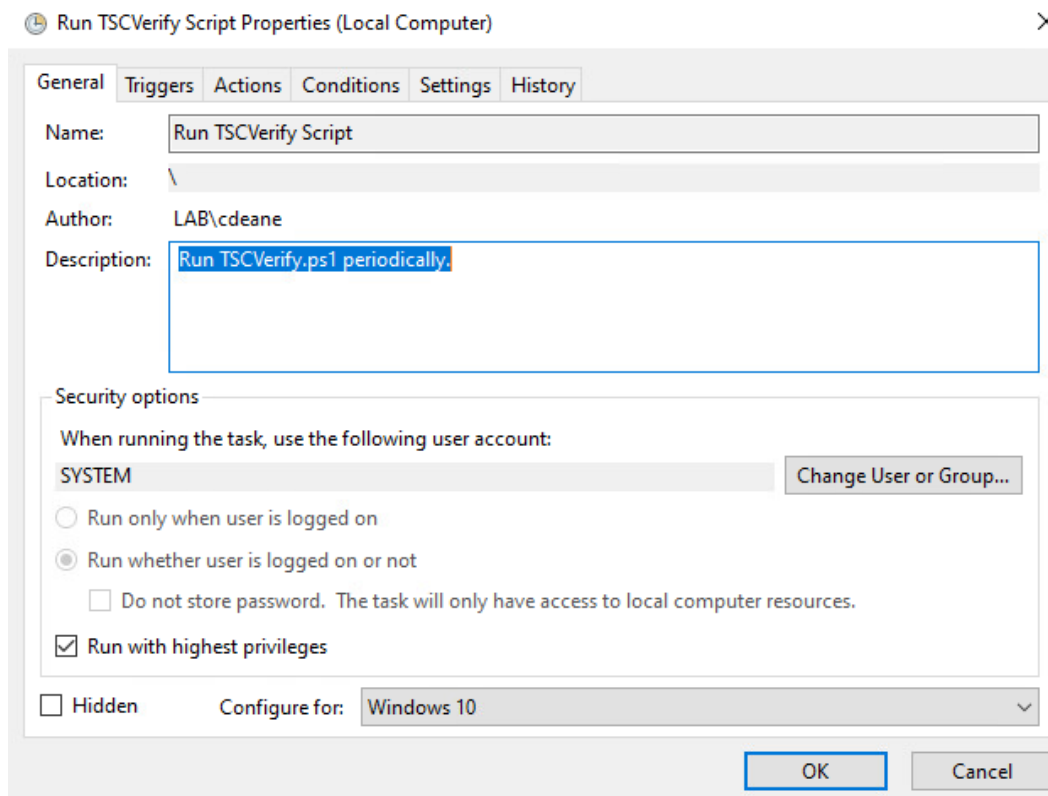
Description:

Trigger:

Action:

☐ Open the Properties dialog for this task when I click Finish
When you click Finish, the new task will be created and added to your Windows schedule.

10. On the main page of Task Scheduler, select the newly created task, right-click it, and select **Properties**.
11. On the **General** tab, under **Security Options**, change the user to **SYSTEM**. Next, ensure that the option **Run with highest privileges** is checked.



12. Navigate to the **Triggers** tab. Select the existing trigger and select **Edit**.
13. Under the **Advanced Settings** section, ensure that **Repeat task every 1 hour for a duration of Indefinitely** is checked, as well as **Enabled**. Select **OK**.

Edit Trigger ✕

Begin the task: On a schedule ▾

Settings

☐ One time Start: 6/24/2021 ▾ 12:00:00 PM ▾ ☐ Synchronize across time zones

☒ Daily Recur every: 1 days

☐ Weekly

☐ Monthly

Advanced settings

☐ Delay task for up to (random delay): 1 hour ▾

☒ Repeat task every: 1 hour ▾ for a duration of: Indefinitely ▾

☐ Stop all running tasks at end of repetition duration

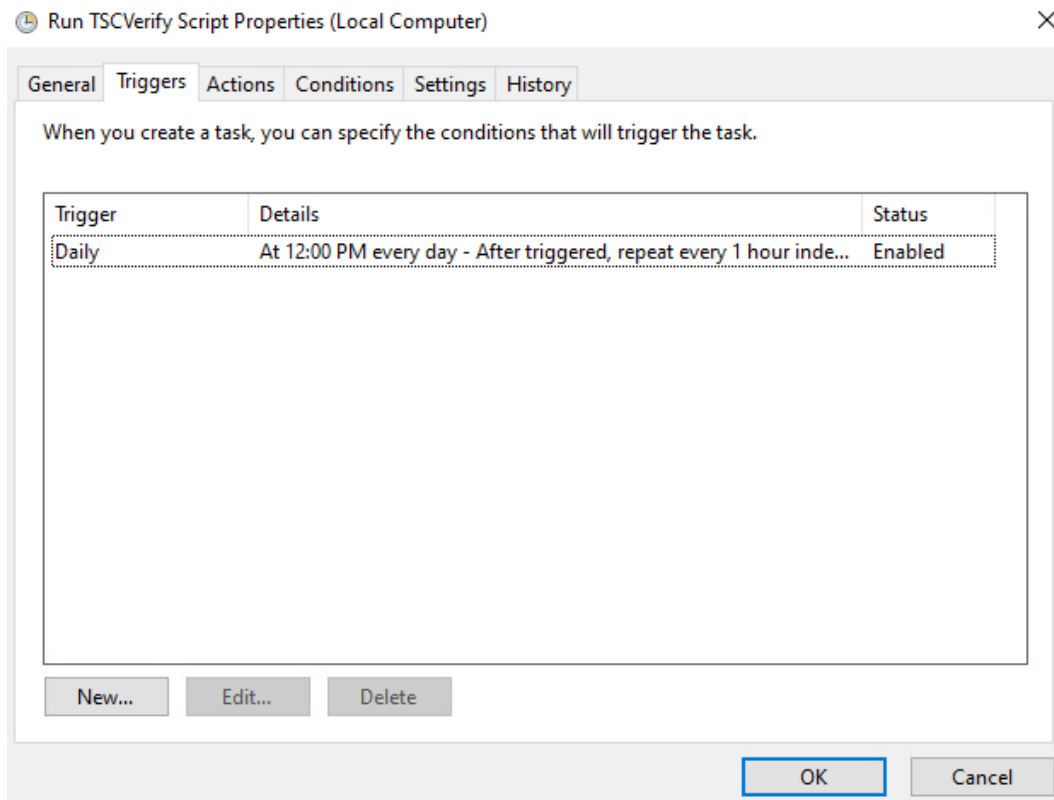
☐ Stop task if it runs longer than: 3 days ▾

☐ Expire: 8/27/2022 ▾ 1:23:44 PM ▾ ☐ Synchronize across time zones

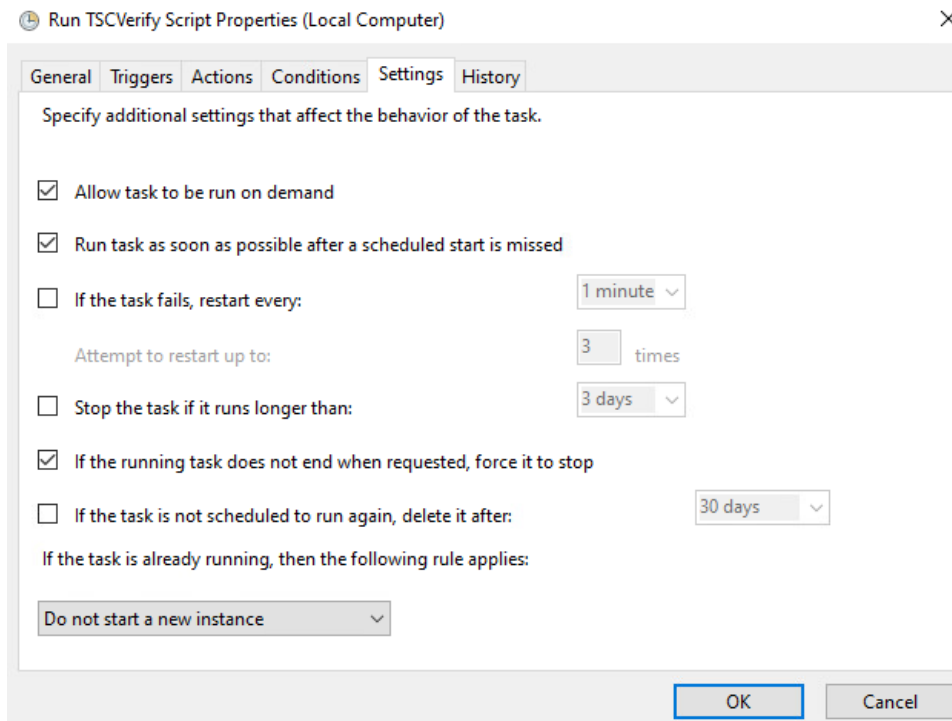
☒ Enabled

OK Cancel

14. Select **OK**.



15. Navigate to the **Settings** Tab and ensure the following are checked, then select **OK**.
 - a. Allow task to be run on demand
 - b. Run task as soon as possible after a scheduled start is missed
 - c. If the running task does not end when requested, force it to stop
 - d. Select other options to suit your environment.



2.11.2 Archer IRM DataFeed Integrations

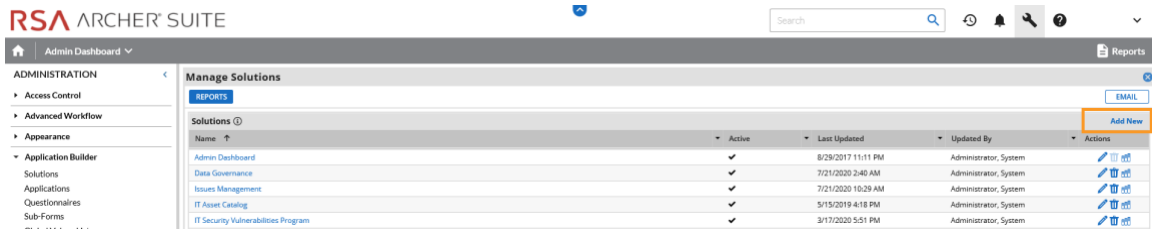
Archer IRM serves a dual role in the prototype demonstration - the Asset Management and Discovery System and the IT Administrator Dashboard. This section will detail the steps necessary to integrate Archer IRM with the PMCS, the Eclysium Firmware Analytics Platform, and Microsoft Configuration Manager, which will form the basis of the Asset Management and Discovery System. From there, we will describe how to create a dashboard using the data gathered from the preceding integrations.

2.11.2.1 Create the Devices Application

Before platform and firmware data can be stored in the in the Asset Management and Discovery System, the Archer IRM application must be created. For this task, we leverage the default *Devices* application described as *the central repository of knowledge about your business-critical devices*.

We use the Devices application as a starting point for our customizations that are described in the section. Your organization may have additional requirements that can also be integrated into this solution. As a user with administrative privileges, ensure your installation has the *IT Asset Catalog* solution included before starting the following procedures.

1. In the administration menu, navigate to **Application Builder > Solutions**. Select **Add New**.



2. Select **Copy an existing Solution** and the **IT Asset Catalog**. Click **OK**.

Add Solution

Creation Method

Method: ☐ Create a new Solution from scratch.
☒ Copy an existing Solution.

Solutions

Name
<input type="radio"/> Admin Dashboard
<input type="radio"/> Data Governance
<input type="radio"/> Issues Management
<input checked="" type="radio"/> IT Asset Catalog
<input type="radio"/> IT Security Vulnerabilities Program

3. Enter an identifier for the catalog in the **Name** field. Click **SAVE AND CLOSE**.

Manage Solutions

SAVE SAVE AND CLOSE DELETE REPORTS EMAIL

General Information

Name: Organization IT Asset Catalog Alias: Copy_of_IT_Asset_Catalog

Type: Solution ID: f43c1e2b-2992-4719-8b0f-9fa50c6b0c59

Status: Active Language: English

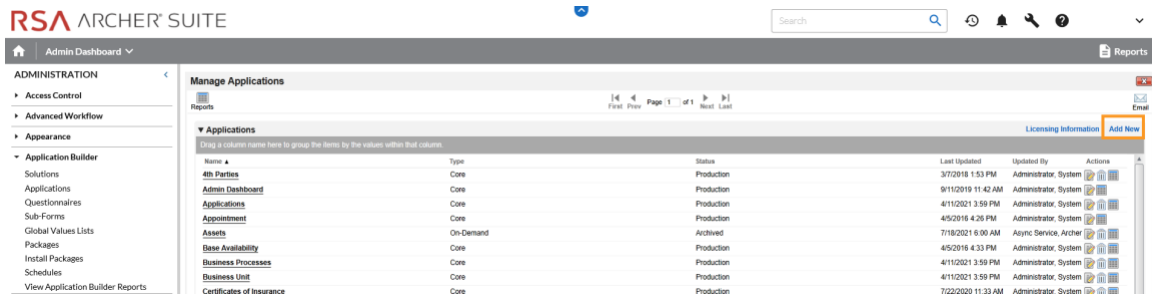
Description: The applications within the IT Asset Catalog solution are leveraged by the greater GRC platform to map the dependencies between eGRC and ITGRC.

Created By: Brown, Christopher 8/26/2021 7:57 AM Updated By: Brown, Christopher 8/26/2021 7:57 AM

2.11.2.1.1 Create Supporting Applications

Next, create custom applications that will augment the default *Devices* application. Refer to Appendix B as you work through creating the supporting application. The application in the following steps, named *Components*, will store the components associated with each computing device that satisfies acceptance testing.

1. In the administration menu, navigate to **Application Builder > Applications**. Select **Add New**.



2. Select **Create a new Application from scratch** and click **OK**.

New Application

Creation Method

Select a method for creating your Application. If you choose to copy an existing Application, select which Application you want to copy.

Method:

☒ Create a new Application from scratch.

☐ Copy an existing Application.

3. Create an identifier in the **Name** field and select the solution created earlier. Click **OK**.

New Application

General Information

* Name: Organization Component Application

* Solution(s):

* Language:

* Required

Available Selected

Find: Organization IT Asset Catalog

IT Asset Catalog

IT Security Vulnerabilities Program

Organization IT Asset Catalog

SCA IT Asset Catalog

Schedule Management

Task Management

Third Party Catalog

OK Cancel

4. Click **Save**.

Manage Application: Organization Component Application

The development trial period for this application ends in 90 days. Change the application status to production to continue use.

Save Apply Delete

General Fields Layout Navigation Menu Workflow Advanced Workflow Administration

General Information

* Name: Organization Component Application * Alias: Organization_Component_Application

Type: Application ID: (1EE9A44A-9AC3-43F2-BC1F-4B374D42E53)

* Solution(s): Organization IT Asset Catalog Status: Development

Description:

Created By: Last Updated:

In the next series of steps, we will add several [Data Fields](#) to the newly created application. These are like table columns you might define in a relational database. Note that we will only walk through one

example, but the steps can be repeated for the remaining data fields. Before starting these steps, download and open the Components application schema from our repository. Some data fields, such as **Tracking ID**, **First Published**, and **Last Updated** are automatically created with each new application and do not need to be repeated.

5. Open the target Components application from the Administration menu under **Application Builder > Applications**.
6. Click the **Fields** tab.

Manage Application: Organization Component Application

The development trial period for this application ends in 90 days. Change the application status to production to continue use.

General Fields Layout Navigation Menu Workflow Advanced Workflow Administration

▼ General Information

• Name: Organization Component Application

• Alias: Organization_Component_Application

Type: Application

ID: (1EE9A44A-8AC3-43F2-8C1F-4B374D42E53)

• Solution(s): Organization IT Asset Catalog

Status: Development

Description:

7. Click **Add New**. Match the Field Type from Appendix B to the **Field Type** field in Archer IRM. Click **OK**.

General:	Field Name:	Class
	Alias:	Class
	Field ID:	{5F63BC40-3B7D-40C2-9251-4F2BAD988A99}
	Field Type:	Text
	Status:	TRUE
	Description:	
	Display Control:	TextField
	Field Permissions:	FALSE
Options:	Required:	FALSE
	Search Results:	TRUE
	Unique:	FALSE
	Calculated:	No
	Enable Inline Edit:	FALSE
	Enable Bulk Update:	FALSE
Configuration Attributes:	Default Behavior:	TRUE
	Default Value:	No Default Value
	Input Mask:	None
	Maximum Characters:	
Advanced Display:		No
Help Text:	Text:	
	View Display:	Tooltip
	Edit Display:	Tooltip

Add Field

Creation Method

Select a method for creating your Field. If you choose to copy an existing Field, select which Field you want to copy.

Method: ☒ Create a new Field from scratch. ☐ Copy an existing Field.

Encrypt Field Data: ☐

Field Types

Field Type

☒ Basic

- ☐ Attachment
- ☐ Date
- ☐ External Links
- ☐ Image
- ☐ IP Address
- ☐ Numeric
- ☒ Text
- ☐ User/Groups List
- ☐ Values List
- ☐ Voting

☐ Advanced

☐ System

8. Match the **Field Name** from Appendix B to the **Field Name** field in Archer IRM. Click **Save**.

General:	Field Name:	Class		
	Alias:	Class		
	Field ID:	{5F63BC40-387D-40C2-9251-4F2BAD988A99}		
	Field Type:	Text		
	Status:	TRUE		
	Description:			
	Display Control:	TextField		
	Field Permissions:	FALSE		
Options:	Required:	FALSE	Auditing:	FALSE
	Search Results:	TRUE	Search Default:	FALSE
	Unique:	FALSE	Key:	FALSE
	Calculated:	No	Validate Always:	FALSE
	Enable Inline Edit:	FALSE	Encrypted:	FALSE
	Enable Bulk Update:	FALSE		
Configuration Attributes:	Default Behavior:	TRUE		
	Default Value:	No Default Value		
	Input Mask:	None		
	Maximum Characters:			
Advanced Display:	Text:	No		
Help Text:	View Display:	Tooltip		
	Edit Display:	Tooltip		

Manage Field: New Field

Save Apply Delete

General Options Help Text Access

▼ General Information

* Name: * Alias:

Type: ID:

Status:

Description:

Created By: Last Updated:

9. Repeat this process for all remaining data fields in [Appendix B](#). Refer to the [online documentation](#) for other data types that might require additional configuration.

At this point, you have created the first supporting application for the Asset Discovery and Inventory system. Repeat these procedures to create the *HP UEFI Configuration Variables*, *Seagate Firmware Attestation*, and *Seagate Firmware Hash* applications. These applications support the demonstration's dashboard capability that continuously monitors HP Inc.'s laptop platform security configurations and Seagate measurement values respectively. Make note of these applications as they are also referenced in the integration procedures ([Section 2.11.2.2](#)).

2.11.2.1.2 Modify Default *Devices* Application

In the next series of steps, modify the *Devices* with custom data fields that support the capabilities of this demonstration. You will also link this application to the supporting applications created in [Section 2.11.2.1.1](#).

1. Using the *Devices* table in [Appendix B](#), add the custom data fields using the same method as described in [Section 2.11.2.1.1](#). Note that [cross-referenced](#) data fields are links that will automatically create a new data field in the associated application.
2. Modify the layout of the *Devices* application to include data field customizations created in this section. The layout will be used to display detailed information about a computing device that has completed the acceptance testing process. Of note, we have added three sections—*General Information*, *Eclipsium Firmware Analytics*, and *Associated Components*. Use the screenshots below as a starting point for customizations that fit into your organization's workflow. More information regarding layouts can be found on RSA's [website](#).

+

About

▼

About

▢

General Information

▼

Enterprise Unique Identifier

Serial Number

Make

Manufacturer

Operational Use Validation Status

▢

Eclipsium Firmware Analytics

▼

Last System Scan Date

System Firmware Date

Eclipsium Integrity Scan Status

System Firmware Version

▢

Associated Components

▼

Manufacturer Specific Attributes

▼

Intel

HP, Inc

Seagate

Dell Technologies

Hewlett Packard Enterprise

HP Inc. Security Events

HP Inc UEFI Variables

New

▢

Direct Platform Data

▼

Original Equipment Manufacturer

Product Name

Original Design Manufacturer

SKU

Model

Family

Default Tab Set

▼

Business Continuity

Issues Management

Vulnerability Management

Privacy Management

New

Technology Profile

Business Context

Risk Management

Compliance Management

+

Operating System Details

▼

Operating System

+

Network Details

▼

Additional IPs Discovered On Asset

Subnet Mask

Default Gateway

DHCP Server

WINS Server

Domain Name

Placeholder

Network Role

MAC Address

Network Name

Secondary DNS Servers

+

Server Details

▼

Drive Type

Processors

Server Drives

Total Storage Capacity

Hardware Specification

Rack Identifier

Rack Location

Physical/Virtual

Installation Date

Location

2.11.2.1.3 Modify Default Security Incidents Application

Modify the *Security Incidents* application with custom data fields that support the capabilities of this demonstration. Using Table 2-7, add the custom data fields using the same method as described in [Section 2.11.2.1.1](#). Note that [cross-referenced](#) data fields are links that will automatically create a new data field in the associated application.

Table 2-7 Security Incidents Application Custom Data Fields

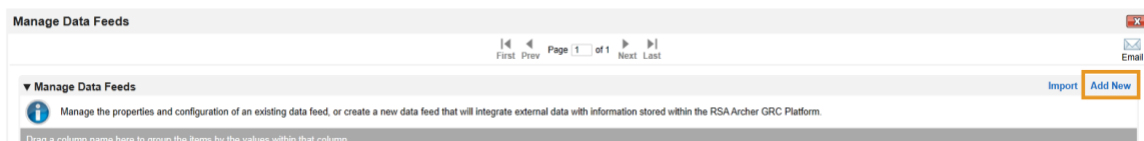
Data Field Name	Data Field Type	Notes
Date/Time QRadar LastUpdate	Date	Stores the date from each <i>QRadar Offense</i>
Incident ID (QRadar)	Text	Stores the <i>QRadar Offense</i> unique identifier
SCA Computing Device	Cross-Reference	Links to the <i>Devices</i> application computing device unique identifier

2.11.2.2 Create Data Feed Integrations

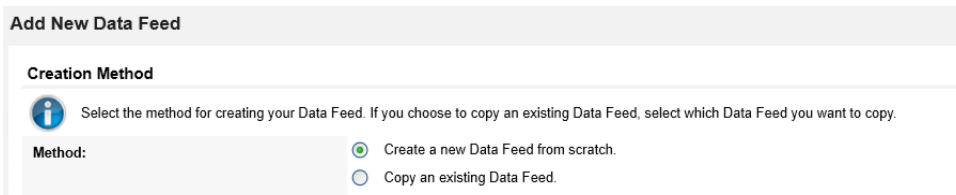
In this section, the implementer will create [data feeds](#) in Archer IRM that will complete the integration with the PMCS, Microsoft Configuration Manager, IBM QRadar, and Eclysium. The data feeds will periodically pull data from the three data sources and map it to the *Devices* application created in the preceding section.

2.11.2.2.1 Create Eclysium Data Feeds

1. In the Administration menu, navigate to **Integration > Data Feeds**. Click **Add New**.



2. Select **Create a new Data Feed from scratch**. Click **OK**.



3. Create an identifier in the **Name** field. Select the **Devices** application created in [Section 2.11.2.1](#) in the **Target** field.

Data Feed Manager: (New)

Save Apply Delete Export Email

General Transport Navigation Source Definition Data Map Schedule

▼ General Information

* Name: Edysplum Data Feed - 1 * Alias: ID:

Type: Data Feed

Status: Active

Description:

Created By: Last Updated:

▼ Feed Information

Select the type of data feed you are creating, and select the destination within RSAArcher for your source information. Select the user account that will be associated with the data feed. This user account will be associated with record creation and updates in History Log fields within the RSAArcher GRC Platform.

* Target: Devices * User Name: userArcherDataFeedService

Feed Type:

☒ Standard Define a standard data feed that will integrate source information with a RSAArcher application.

☐ Transport Only Define a data feed that will locate a specific file only. This file will contain information for launching subsequent, standard data feeds.

- Click the **Transport** tab. Select **JavaScript Transporter**.

Data Feed Manager: (New)

Save Apply Delete

General **Transport** Navigation Source Definition Data Map Schedule

▼ Transport

Select the approach the data feed should use to access and obtain the external source data.

* Transport Method:

Select a Transport Method

Select a Transport Method

Archer Web Services Transporter

Database Query Transporter

DeepSight Transporter 2.0

DeepSight Transporter 4.0

File Transporter

FTP Transporter

HTTP Transporter

JavaScript Transporter

Mail Monitor Transporter

RSS Transporter

- Click **Upload** in the **Transport Configuration** section.

Data Feed Manager: (New)

Save Apply Delete Export Email

General **Transport** Navigation Source Definition Data Map Schedule

▼ **Transport**

Select the approach the data feed should use to access and obtain the external source data.

Transport Method: JavaScript Transporter

▼ **Transport Configuration** JavaScript Sample Upload

Upload the JavaScript File that will be executed to retrieve the source data.

Filename	Size (KB)	File Type	Upload Date	Actions
No Record(s) Found				

▼ **Custom Parameters** Add New

Custom Parameters:

Key	Type	Value	Actions
	Plain Text		

▼ **Post-Processing - Local Copy**

Determine how the data feed should handle the local copy of the source information when the integration is complete.

On Success:

☒ Nothing Remove the temporary source file when the data feed completes successfully.

☐ Rename Save the source file under a new name when the data feed completes successfully. Enter the location where the file should be saved and the new name for the file in the following field.

6. Click **Add New**.

Upload Javascript File

Files to Upload Add New

Cancel

7. In the file selection modal, select the Eclipsium JavaScript data feed file from the repository. Click **OK**.

Upload Javascript File

Files to Upload Add New

eclipsium-scenario_2_3.js	15.40 KB	X
---------------------------	----------	---

Total 0% 15.40 KB

OK Cancel

8. Enter “scenario” in the **Key** field and “2” in the **Value** field.

Transport

Select the approach the data feed should use to access and obtain the external source data.

Transport Method: JavaScript Transporter

Transport Configuration

Upload the JavaScript File that will be executed to retrieve the source data.

Filename	Size (Kil)	File Type	Upload Date	Actions
eclypsium_scenario_2_3.js	15.41	JS	7/8/2021 9:14 AM	

Custom Parameters

Custom Parameters:

Key	Type	Value	Actions
scenario	Plain Text	2	

9. Click the **Navigation** tab. Ensure **XML File Iterator** is selected in the **Navigation Method** dropdown menu.

General Transport **Navigation** Source Definition Data Map Schedule

Navigation

Based on the format of the source information, select the approach the data feed should use to properly process the source information. For example, if the source information is in a delimited file, select the "Delimited Text File Iterator" method. If you select "Database Query Iterator" there are no additional fields to fill out on this tab.

Navigation Method: Xml File Iterator

Xml File Definition

Select whether the XML file's structure is in the desired format for processing. If not, upload a transform file that the data feed should use to update the XML structure to the desired format.

Options: ☐ Transform

10. Click the **Source Definition** tab. In the **Source Data** sub-tab, select **Load Fields**. Select the Eclypsium example XML file. The configuration in Archer should populate the **Source Fields** as follows.

General Transport Navigation **Source Definition** Data Map Schedule

Source Data Data Filter Tokens

Identify the fields from your source information that you want to include with the data feed. Once you have identified the fields, select how the data feed should process the information. The data feed can import the information "as is" or modify the data based on the selection in the Field Type column.

Source Fields

Source Name	Field Type	Source	Token	Status	Actions
record	None	record			
deviceid	Raw Field Data	deviceid	<input type="checkbox"/>		
customerid	Raw Field Data	customerid	<input type="checkbox"/>		
currentFirmwareDate	Raw Field Data	currentFirmwareDate	<input type="checkbox"/>		
currentFirmwareVersion	Raw Field Data	currentFirmwareVersion	<input type="checkbox"/>		

11. Click the **Data Map** and tab which will default to the **Field Map** sub-tab. Drag and drop the source fields onto the application data fields. Due to the large amount of data fields in the Devices application, below we present a truncated view of the mapping.

Source Fields

record

- currentFirmwareDate
- currentFirmwareVersion
- customerid
- deviceid

Target Fields

Target Field	Field Type	Source Field
Eclysium Integrity Scan Status	Values List	
Enhanced HP Firmware Runtime Intrusion Prevention and Detection	Values List	
Enterprise Unique Identifier	Text	customerid
Environment	Values List	
System Firmware Date	Date	currentFirmwareDate
System Firmware Version	Text	currentFirmwareVersion

- Click the **Key Field Definitions** tab. Select **Enterprise Unique Identifier** in the Field Name column.

Field Map **Key Field Definitions** Update / Archive

To update records within the target RSA Archer application, you must specify one or more fields as key fields that will uniquely identify the record. If the data feed finds a match, the data feed will update the RSA Archer record. If no match is found, the data feed will create a new RSA Archer record. Specify a key field definition for every level and reference.

Order	Field Name	Action
1	Enterprise Unique Identifier	

- Click the **Update / Archive** tab. Ensure only the **Update** option is selected. Choose **None** for the **Archive Options**.

General Transport Navigation Source Definition **Data Map** Schedule

Field Map Key Field Definitions **Update / Archive**

Specify how the data feed should interact with application records.

Update Options:

- ☐ Create
- ☒ Update

Archive Options:

- ☒ None
- ☐ Delete
- ☐ Set Value

Create new records in the target application for records found in the source information and not in the target application.
Update records in the target application when a matching record (based on the key field definition) exists in the source information.
Ignore records in the target application that will not be matched with records in the source information.
Delete records in the target application that will not be matched with records in the source information.
Set a value in a Values List Field for records in the target application that will not be matched with records in the source information.

- Click the **Schedule** tab. Select a cadence appropriate for your organization. In this example, we've chosen to run the data feed on a daily frequency at 12:00AM.

General Transport Navigation Source Definition Data Map **Schedule**

Recurrences

Specify the automatic schedule for the data feed.

Frequency: Daily Every: 1
Start Time: 12:00 AM Start Date: 4/22/2021
Time Zone: (UTC-05:00) Eastern Time (US & Canada)

Immediate Processing

To ignore the normal schedule and execute the data feed now, click the Run Data Feed Now button.

Run Data Feed Now: Completed

At this point, the data feed for Eclypsium (Scenario 2) is configured. Scenario 3 is configured with the same process, except that in Step 8, a “3” is used in the Value field instead of a “2”. Click the **Start** button to confirm that the data feed has been properly configured. Archer IRM will report any errors that are useful for debugging.

2.11.2.2.2 Create Microsoft Configuration Manager Data Feed

Repeat the preceding steps to add the Microsoft Configuration Manager Data Feed with the following modifications:

- In the **Transport** tab, select **Database Query Transporter**. Insert the following values in the form:

Provider	Odbc Data Provider
-----------------	--------------------

Connection String	Driver=ODBC Driver 17 for SQL Server;server=PEMSQL2019;database=CM_PE1;PWD=[SQL USER PASSWORD];UID=[SQL USER]
Query	select dbo.vSMS_R_System.Name0, dbo.vSMS_R_System.SMBIOS_GUID0 from dbo.vSMS_R_System inner join dbo.v_CIComplianceStatusDetail on dbo.v_CIComplianceStatusDetail.Netbios_Name0 = dbo.vSMS_R_System.Netbios_Name0 where dbo.v_CIComplianceStatusDetail.CurrentValue = '2' and dbo.v_CIComplianceStatusDetail.ConfigurationItemName = 'TSCVerify - Registry'

Data Feed Manager: Microsoft Configuration Manager Feed

Save Apply Delete Export Email

General Transport Navigation Source Definition Data Map Schedule

Transport

Select the approach the data feed should use to access and obtain the external source data.

Transport Method: Database Query Transporter

Database Configuration

Enter the required credentials to allow the data feed to locate and access the database and retrieve the specified source information. Provide a valid query that retrieves the desired information.

Provider: Odbc Data Provider Connection Timeout: 0 seconds

Connection String: Driver=ODBC Driver 17 for SQL Server;server=PEMSQL2019;database=CM_PE1;PWD=[SQL USER PASSWORD];UID=[SQL USER]

User Name: Password:

Query: select dbo.vSMS_R_System.Name0, dbo.vSMS_R_System.SMBIOS_GUID0 from dbo.vSMS_R_System inner join dbo.v_CIComplianceStatusDetail on dbo.v_CIComplianceStatusDetail.Netbios_Name0 = dbo.vSMS_R_System.Netbios_Name0 where dbo.v_CIComplianceStatusDetail.CurrentValue = '2' and dbo.v_CIComplianceStatusDetail.ConfigurationItemName = 'TSCVerify - Registry'

2. In the **Navigation** tab, select **Database Query Iterator**.

Data Feed Manager: Microsoft Configuration Manager Feed

Save Apply Delete Export Email

General Transport Navigation Source Definition Data Map Schedule

Navigation

Based on the format of the source information, select the approach the data feed should use to properly process the source information. For example, if the source information is in a delimited file, select the "Delimited Text File Iterator" method. If you select "Database Query Iterator" there are no additional fields to fill out on this tab.

Navigation Method: Database Query Iterator

Xml File Definition

Select whether the XML file's structure is in the desired format for processing. If not, upload a transform file that the data feed should use to update the XML structure to the desired format.

Options: ☐ Transform Modify the XML file structure by entering your transform information in the field below or uploading a transform file.

3. In the **Source Definition** tab, add a new **Source Field** named Compliance.

Data Feed Manager: Microsoft Configuration Manager Feed

Save Apply Delete Export Email

General Transport Navigation Source Definition Data Map Schedule

Source Definition

Source Data Data Filter Tokens

Identify the fields from your source information that you want to include with the data feed. Once you have identified the fields, select how the data feed should process the information. The data feed can import the information "as is" or modify the data based on the selection in the Field Type column.

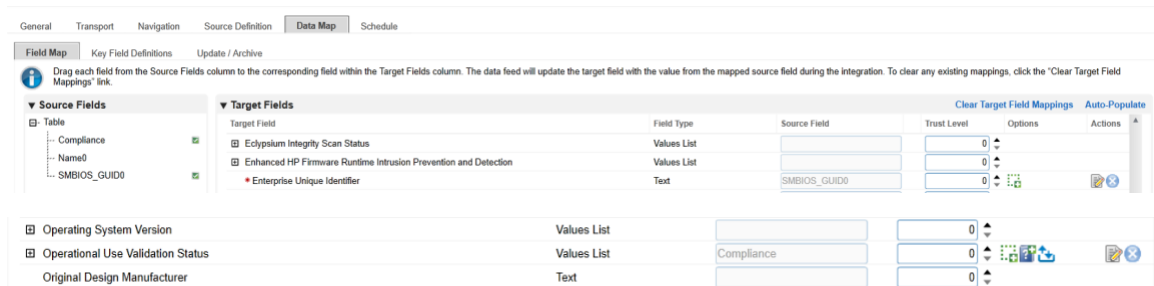
Source Fields

Source Name	Field Type	Source	Token	Status	Actions
Table	None	Table			
Name0	Raw Field Data	Name0			
SMBIOS_GUID0	Raw Field Data	SMBIOS_GUID0			
Compliance	Static Text	NewSourceName		Configured	

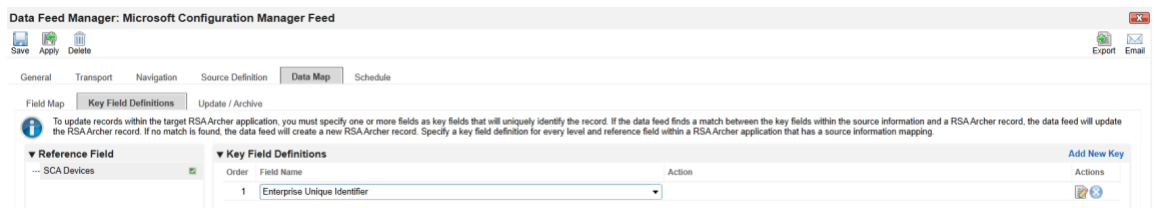
4. Edit the new **Source Field** with the static text “Out of Policy”.



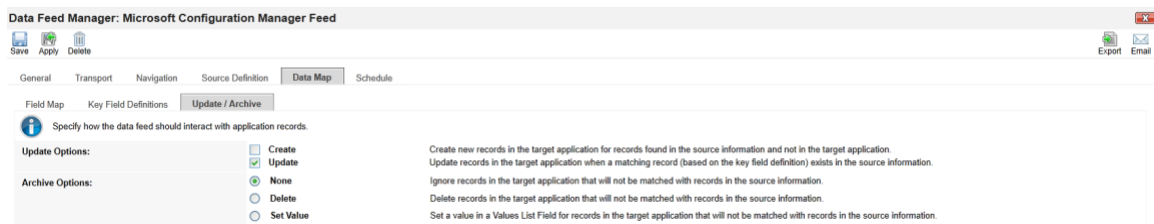
5. In the **Field Map** sub-tab in the **Data Map** tab, drag and drop the **Source Fields** onto the **Target Fields** as shown in the images below.



6. In the **Key Field Definitions** sub-tab in the **Data Map** tab, select **Enterprise Unique Identifier**.



7. In the **Update / Archive** sub-tab in the **Data Map** tab, ensure only **Update** is selected.



At this point, the Data Feed for the Microsoft Configuration Manager is configured. Click the **Start** button to confirm that the Data Feed has been properly configured. Archer will report any errors that are useful for debugging.

2.11.2.2.3 Create the PMCS Data Feed

Repeat the initial steps to add the Data Feed for the PMCS with the following modifications:

1. In the **Transport** tab, upload the custom JavaScript from the project repository. In the Custom Parameters fields, add **filter** and **url** keys as shown below. The value for **filter** may be blank or set to a specific manufacturer (refer to comments in the script for the specific values we used). Set **url** to the location of the PMCS in your environment.

Data Feed Manager: SCA Collator Asset Feed(SCA Devices)

General **Transport** Navigation Source Definition Data Map Schedule

▼ **Transport**

Select the approach the data feed should use to access and obtain the external source data.

Transport Method: JavaScript Transporter

▼ **Transport Configuration** [JavaScript Sample](#) [Upload](#)

Upload the JavaScript File that will be executed to retrieve the source data.

Filename	Size (KB)	File Type	Upload Date	Actions
archer_script.js	9.7	JS	8/10/2021 1:37 PM	

▼ **Custom Parameters** [Add New](#)

Custom Parameters:

Key	Type	Value	Actions
filter	Plain Text		
url	Plain Text	https://platform-manifest-collator-	

2. In the **Source Definition** tab, upload the example XML file from the project repository. The **Source Fields** should resemble the following screenshot.

Data Feed Manager: SCA Collator Asset Feed(SCA Devices)

General Transport Navigation **Source Definition** Data Map Schedule

Source Data Data Filter Tokens

Identify the fields from your source information that you want to include with the data feed. Once you have identified the fields, select how the data feed should process the information. The data feed can import the information "as is" or modify the data based on the selection in the Field Type column.

▼ **Source Fields**

Source Name	Field Type	Source	Token	Status	Actions
Device	None	Device			
Manufacturer	Raw Field Data	Manufacturer			
Make_and_Model	Raw Field Data	Make_and_Model			
Serial_Number	Raw Field Data	Serial_Number			
Original_Equipment_Manufacturer	Raw Field Data	Original_Equipment_Manufacturer			
Original_Design_Manufacturer	Raw Field Data	Original_Design_Manufacturer			
Product_Name	Raw Field Data	Product_Name			
UUID	Raw Field Data	UUID			
SKU	Raw Field Data	SKU			
Family	Raw Field Data	Family			
Configuration_Scan_Results	Raw Field Data	Configuration_Scan_Results			
Components	None	Components			

3. Map the **Source Fields** to the **Target Fields** and the **Field Map** sub-tab in the **Data Map** tab. Use Table 2-8 for reference.

Table 2-8 PMCS Data Feed Source Field to Destination Field Mapping


Source Field	Destination Field
/Component/Addresses/Address	Associated Components/Addresses/Address

Source Field	Destination Field
/Component/Class	Associated Components/Class
/Component/Field_Replaceable	Associated Components/Field Replaceable
/Component/Manufacturer	Associated Components/Manufacturer
/Component/Model	Associated Components/Model
/Component/Platform_Certificate	Associated Components/Platform Certificate
/Component/Platform_Certificate_URI	Associated Components/Platform Certificate URI
/Component/Revision	Associated Components/Revision
/Component/Serial	Associated Components/Serial
/Component/Version	Associated Components/Version
UUID	Enterprise Unique Identifier
Family	Family
Make_and_Model	Make
Manufacturer	Manufacturer/Value
Original_Design_Manufacturer	Original Design Manufacturer
Original_Equipment_Manufacturer	Original Equipment Manufacturer
Product_Name	Product Name
Serial_Number	Serial Number
SKU	SKU



4. In the **Key Field Definitions** sub-tab in the **Data Map** tab, choose Enterprise Unique Identifier as the **Key Field** definition.

General Transport Navigation Source Definition **Data Map** Schedule

Field Map **Key Field Definitions** Update / Archive

 To update records within the target RSA Archer application, you must specify one or more fields as key fields that will uniquely identify the record. If the data feed finds a match to the data feed will update the RSA Archer record. If no match is found, the data feed will create a new RSA Archer record. Specify a key field definition for every level and reference field.

▼ Reference Field

- SCA Devices 
- Associated Components 

▼ Key Field Definitions

Order	Field Name	Action
1	Enterprise Unique Identifier	


The Data Feed for the PMCS is configured. Click the **Start** button to confirm that the Data Feed has been properly configured. Archer will report any errors that are useful for debugging.

2.11.2.2.4 Create IBM QRadar Offenses Data Feed

Repeat the steps from [Section 2.11.2.2.1](#) to add the Data Feed for IBM QRadar with the following modifications:


1. In the **Transport Settings** section of **Source Settings**, choose the IBM QRadar script (*Integration-Scripts\Archer Integrated Risk Management Data Feed Integrations\IBM QRadar\app.js*) from the project repository.

▼ TRANSPORT CONFIGURATION ⓘ

FILE NAME	SIZE	UPLOAD DATE
 qradar_data_feed.js	12.36 KB	4/22/2022, 10:33:09 AM

2. In the Custom Parameters section of the Source Connection tab, enter the hostname of the QRadar system and the API key created in Section 2.11.3.2.4. Ensure that the QRadarAPIKey is of type Protected.

▼ CUSTOM PARAMETERS ⓘ

KEY	TYPE	VALUE
QRadarHostname	Plain Text 	qradar.lab.nccoe.org
QRadarAPIKey	Protected 

3. In the **Source Data** section of the **Source Definition** tab, upload the example XML QRadar response file.

GENERAL

SOURCE CONNECTION

SOURCE PARSING

SOURCE DEFINITION

DATA MAP

RUN CONFIGURATION

SOURCE DATA

SOURCE FILTER

SOURCE FIELD	FIELD TYPE	SOURCE
▼ offense	None	offense
UUID	Raw Field Data	UUID
lastUpdate	Raw Field Data	lastUpdate
description	Raw Field Data	description
event	Raw Field Data	event
id	Raw Field Data	id

4. Map the **Source Fields** to the **Target Fields** in the **Field Map** sub-tab in the **Data Map** tab. Use Table 2-9 for reference.

Table 2-9 QRadar Data Feed Source Field to Destination Field Mapping

Source Field	Destination Field
UUID	/SCA Computing Device/Enterprise Unique Identifier
lastUpdate	Date/Time QRadar LastUpdate
description	Incident Summary
event	Title
id	Incident ID (QRadar)

5. In the **Key Field Definition** sub-tab in the **Data Map** tab, choose **Incident ID (QRadar)** as the Key Field Definition. Additionally, choose **Enterprise Unique Identifier** as the **Key Field** definition for the **SCA Computing Device** reference field.

GENERAL
SOURCE CONNECTION
SOURCE PARSING
SOURCE DEFINITION
DATA MAP

FIELD MAP
KEY FIELD DEFINITION

Reference Fields

Search Reference Fields

- Security Incidents
 - SCA Computing Device

ORDER	FIELD NAME
1	Incident ID (QRadar)

GENERAL
SOURCE CONNECTION
SOURCE PARSING
SOURCE DEFINITION
DATA MAP

FIELD MAP
KEY FIELD DEFINITION

Reference Fields

Search Reference Fields

- Security Incidents
 - SCA Computing Device

ORDER	FIELD NAME
1	Enterprise Unique Identifier

2.11.2.2.5 Create Seagate API Data Feeds

Repeat steps from [Section 2.11.2.2.1](#) to add the Data Feed for Seagate drive firmware attestation and firmware hash data with the following modifications:

1. Enter *Seagate Attestation Feed* in the **Name** field section of the **General** tab. In the **Feed Information** section of the same tab, select *Seagate Firmware Attestation* from the **Target Application** pull-down menu.

FEED INFORMATION ⓘ


Feed Type

- ☒ Standard
- ☐ Transport Only

*Target Application
Seagate Firmware Attestation

2. In the **Transport Configuration** section of **Source Settings**, choose the Seagate script from the project repository.

▼ TRANSPORT CONFIGURATION ⓘ

FILE NAME	SIZE	UPLOAD DATE
 archer_script.js	9.7 KB	2/10/2022, 3:42:17 PM

3. In the **Custom Parameters** section of **Source Connection** tab, enter the PMCS URL and the **filter** value of *seagate.fw.attestation*.

▼ CUSTOM PARAMETERS ⓘ

KEY	TYPE	VALUE
filter	Plain Text ▼	seagate.fw.attestation
url	Plain Text ▼	http://

4. In the **Source Data** section of the **Source Definition** tab, upload the example Seagate Firmware Attestation XML response file.

SOURCE FIELD	FIELD TYPE	SOURCE
▼ SeagateDriveFirmwareAttestation	None	SeagateDriveFirmwareAttestation
device_uuid	Raw Field Data	device_uuid
drive_serial	Raw Field Data	drive_serial
assessor_id	Raw Field Data	assessor_id
root_of_trust_id	Raw Field Data	root_of_trust_id
root_of_trust_nonce	Raw Field Data	root_of_trust_nonce
device_nonce	Raw Field Data	device_nonce
fw_version	Raw Field Data	fw_version
secure_boot_device_state	Raw Field Data	secure_boot_device_state
signing_auth_database	Raw Field Data	signing_auth_database

5. Map the **Source Fields** to the **Target Fields** and the **Field Map** sub-tab in the **Data Map** tab. Use Table 2-10 for reference.

Table 2-10 Seagate Drive Data Feed Field Mapping

Source Field	Destination Field
drive_serial	/Seagate Drive Serial/Serial
assessor_id	Assessor Identifier
root_of_trust_id	Root of Trust Identifier
root_of_trust_nonce	Root of Trust Nonce
device_nonce	Device Nonce
fw_version	Firmware Version
secure_boot_device_state	Secure Boot Device State
signing_auth_database	Signing Auth Database

6. In the **Key Field Definition** tab within the **Data Map** tab, select *Serial* in the pull-down **Field Name** column.

The screenshot shows the 'Data Map' configuration interface. The 'DATA MAP' tab is selected at the top. Below it, the 'KEY FIELD DEFINITION' sub-tab is active. On the left, under 'Reference Fields', there is a search bar and a list of fields. 'Seagate Drive Serial' is selected with a green checkmark. On the right, a table lists the field mappings:

ORDER	FIELD NAME
1	Serial

7. Save the new Data Feed.

Repeat the procedures in this section to create a Data Feed that will collect the Seagate drive firmware hash values. Note that this Data Feed will target the *Seagate Firmware Hash* application.

2.11.2.3 Create the Dashboard

1. Create a new report by clicking **Reports** in the administrative console and **Add New**.

The screenshot shows the administrative console interface. At the top, there are navigation links for 'Admin Dashboard' and 'SCA Devices Project Developmen...'. Below this, the 'Master Report Listing' page is displayed. It includes a search bar, 'PRINT' and 'EMAIL' buttons, and an 'Add New' button at the bottom right.

2. Select the Devices application that was created in the preceding steps—in this case, **Enterprise Computing Devices**.

Add New Report

Available Applications

Name
Devices
Division
Engagement Risk Assessments
Engagement Types
Engagements
Enterprise Computing Devices
Exception Requests
Facilities
Findings
Findings Folders
HP Security Events
HP UEFI Configuration Variables
Information Assets
Malicious Code
Master Service Agreement
Notice and Consent Library
Organization Component Application
Patches
Privacy Roles and Responsibilities
Processing Activities
Products and Services
Question Library
Remediation Plans

Page 1 of 1

Displaying 1 - 59 of 59

OK CANCEL

- Click the **Statistics Mode** option. In the **Fields to Display** section, select **Operational Use Validation Status** and remove the default selections.

Search Enterprise Computing Devices

SEARCH

Keyword Search

Enter Search Criteria Here

Enterprise Computing Devices

Fields to Display

Available	Selected
Find:	Enterprise Computing Devices
<input type="checkbox"/> HP Sure Start <input type="checkbox"/> HP Tamper Lock <input type="checkbox"/> Last System Scan Date <input type="checkbox"/> Last Updated <input type="checkbox"/> Make <input type="checkbox"/> Manufacturer <input type="checkbox"/> Model <input type="checkbox"/> Operational Use Validation Status <input type="checkbox"/> Original Design Manufacturer <input type="checkbox"/> Original Equipment Manufacturer	Count of Operational Use Validation Status

☒ **Statistics Mode** Return search results in the form of a statistics report by grouping and aggregating field values.

- In the **Filters** section, select *Operational Use Validation Status* for **Field to Evaluate**, *Equals* for **Operator**, and *Policy violation* for **Value(s)**.

Filters

Field to Evaluate	Operator	Value(s)	Relationship	Actions
1 Operational Use Validation Status	Equals	Policy violation	And	
2			And	

Advanced Operator Logic: Example (1 AND 2) OR 3

- Select **Display Totals** in the **Display Options** section.

Display Options

Display Format: Column - Flat

Record Count: ☐ Return All ☐ Limit To

Results Per Page: 50

Headings: ☐ Criteria Display search criteria ☐ Date Display date

☒ **Display Totals** In a statistical report, display a grand total for the aggregated values in each grouping.

☐ **Display Zero Values** Display all values, including those not contained in the result set.

☐ **Fix Headers** Fix the column headers when viewing the result set.

6. Select **Chart Only** and click **Save** and supply a unique name for the report.

Enterprise Computing Devices

SAVE MODIFY NEW REPORT RELATED REPORTS

Chart Only Featured Metric

7. Create a new iView by navigating to **Workspaces and Dashboards > Global iViews** in the administrative menu. Click **Add New**.

8. In the **iView Types** section, select **Report** and click **OK**.

iView Type Selection

Creation Method ⓘ

Method:

- ☒ Create a new Global iView from scratch.
- ☐ Copy an existing Global iView

iView Types ⓘ

Type	Description
<input type="radio"/> Canvas	Add content to create canvas iViews.
<input type="radio"/> Custom	Use common code to create custom iViews.
<input type="radio"/> Embedded URL	Create an iView that contains an embedded web page or allow users to determine the page they wish to display.
<input type="radio"/> Global Search	Define applications and images to create quick search iViews.
<input type="radio"/> Landing Page	Create a list of frequently used tasks for the default home page.
<input type="radio"/> Links List	Create a published list of links to internal and external pages. The links can be fixed or extended.
<input checked="" type="radio"/> Report	Create an iView containing a selection of reports which can be accessed and displayed within the iView.
<input type="radio"/> RSS Feed	Create an iView that displays data from an RSS feed, such as headlines and summary information.
<input type="radio"/> Video	Use common code to create video iViews.

9. In the **General Information** section, supply a name and a folder to store the new iView.

Manage Global iView: (New)

SAVE DELETE EMAIL

General Access

General Information

* Name: Devices iView Alias:

Type: Report ID:

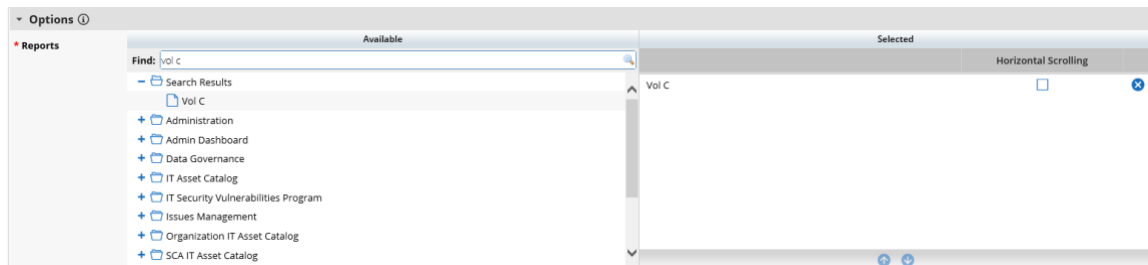
Status: Active * Folder: Enterprise Computing Devices Edit

Language: English

Description:

Created By: Last Updated:

10. In the **Options** section, choose the report that was created in the preceding steps and save the iView.



11. Create a new Dashboard by navigating to **Workspaces and Dashboards > Dashboards** in the administration menu. Click **Add New**.
12. Select **Create a new Dashboard from scratch** and click **OK**.

Add Dashboard

Creation Method ⓘ

Method:

☒ Create a new Dashboard from scratch.
☐ Copy an existing Dashboard.

13. In the **General** tab, supply a name for the Dashboard.
14. In the **Layout** tab, click **Select iViews**. Choose *Select* from **Global iView Library** for the **Creation Method**. Choose the iView created in the preceding steps and click **OK**.

iView Type Selection

Creation Method ⓘ

Method:

☐ Create a new Global iView from scratch.
☒ Select from Global iView Library

15. The selected iView will appear in the layout. Save the Dashboard.

Manage Dashboards: (New)

SAVE DELETE
EMAIL

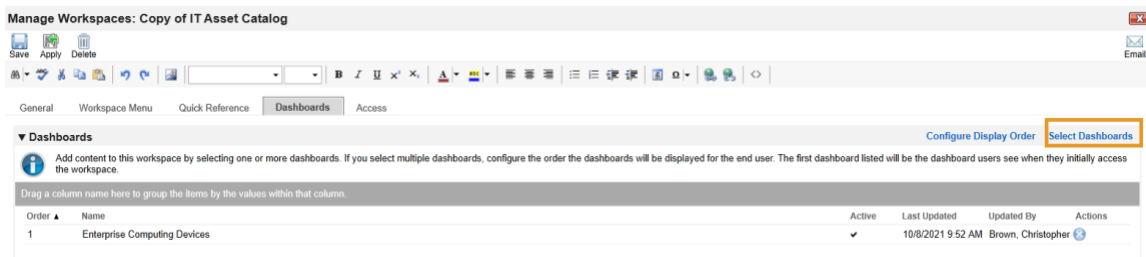
General
Layout
Access

Dashboard Layout ⓘ

Devices iView

[Select iViews](#)

16. Open the solution workspace by navigating to **Workspaces and Dashboards > Workspaces** in the administration menu. In the **Dashboards** tab, choose the Dashboard created in the preceding steps by clicking **Select Dashboards**.



17. Save the workspace. At this point, the new Dashboard will appear as part of the workspace. For further customization options, refer to the [RSA website](#).
18. Repeat the steps in this section to create a report that tracks platform integrity issues that are detected from the following sources:

Platform	Archer Application	Archer Data Field
Eclipsium Analytic Platform	Enterprise Computing Devices	Eclipsium Integrity Scan Status
HP Inc	HP UEFI Configuration Variables	HP Inc BIOS Configuration Status
Seagate	Seagate Firmware Hash	Firmware Hash Status

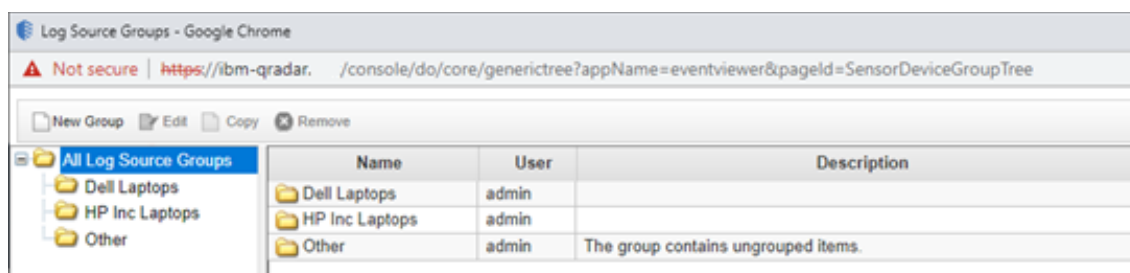
2.11.3 IBM QRadar Integrations

The following sections describe how to integrate Dell and HP Inc. laptops with QRadar so that the laptops transmit continuous monitoring event logs to the QRadar console.

2.11.3.1 Dell and HP Inc. Laptops

Perform the prerequisite steps in [Section 2.2.1.3](#), then on each target laptop:

1. Ensure [Remote Event Log Management](#) is enabled for each laptop.
2. (Optional) In the QRadar console, create a [new log source group](#) which may be desirable to help organize target laptops. In our demonstration, we created a group for each manufacturer.



3. [Create a new log source](#) for the WinCollect Agent (see [Section 2.10.1](#)). Note that when configuring the Log Source parameters, a Windows account is required to retrieve the relevant

security event. This demonstration created a domain account with privileges limited to the scope of this capability ([Manage auditing and security log](#) permission enabled).

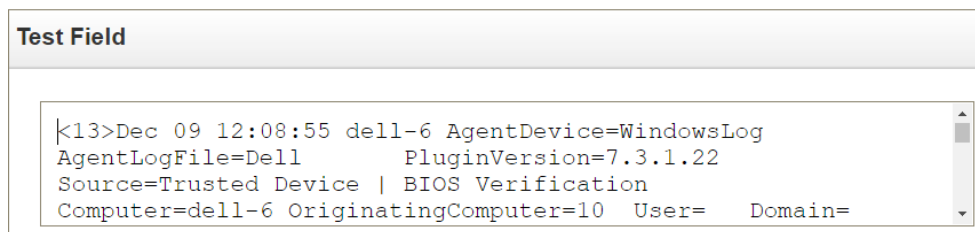
2.11.3.2 IBM QRadar

The section describes the procedures that will create *Offenses* generated from detected laptop platform integrity security events. Additionally, it also describes an API key that is used to access the QRadar REST API. The key is used as input to [Section 2.11.2.2.4](#).

2.11.3.2.1 Create Custom Event Property (UUID)

This property uses a regular expression (regex) to identify universally unique identifiers (UUIDs) that are embedded in Windows 10 Event Logs that are sent from laptops when a platform integrity issue is detected.

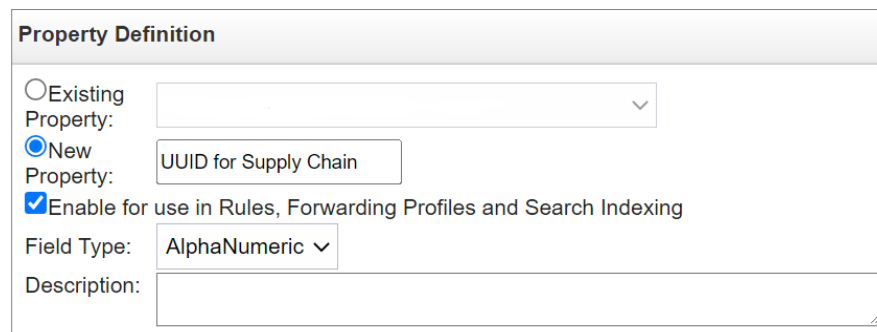
1. In the QRadar console, navigate to **Admin > Custom Event Properties**. Click **Add** and a new window pops up. In the **Test Field**, paste in the example event log.



The screenshot shows a 'Test Field' window with a text area containing the following event log entry:

```
<13>Dec 09 12:08:55 dell-6 AgentDevice=WindowsLog  
AgentLogFile=Dell PluginVersion=7.3.1.22  
Source=Trusted Device | BIOS Verification  
Computer=dell-6 OriginatingComputer=10 User= Domain=
```

2. In the **Property Definition** section, select **New Property** and enter *UUID for Supply Chain*. Check *Enable for use in Rules, Forwarding Profiles and Search Indexing*.



The screenshot shows the 'Property Definition' window with the following settings:

- ☐ Existing Property: (empty dropdown)
- ☒ New Property:
- ☒ Enable for use in Rules, Forwarding Profiles and Search Indexing
- Field Type:
- Description: (empty text area)

3. In the **Property Expression Definition** section, ensure *Enabled* is checked. In the **Log Source Type** pull-down, select *Microsoft Windows Security Event Log* and select *All* in the **Log Source** pull-down. Select the **Category** radio button. Choose *Any* in both the **High Level Category** and **Low Level Category** pull-downs. In the **Regex** field, insert the value below.

```
(([0-9a-fA-F]{8})\-[0-9a-fA-F]{4})\-[0-9a-fA-F]{4}\-[0-9a-fA-F]{4}\-[0-9a-fA-F]{12})
```

Property Expression Definition

Enabled: ☒

Selection

Log Source Type: Microsoft Windows Security Event Log

Log Source: All

Event Name: Please browse for an event Browse

Category: High Level Category Any

Low Level Category Any

Extraction using

Regex ([0-9a-fA-F]{8})\-[0-9a-fA-F]{4} Capture Group: 1 Test

- Click the **Test** button. If successful, a message will appear that the expression has been highlighted in the payload. Click the **Save** button.

2.11.3.2.2 Create Custom Event Properties (Security Events)

This section describes how to create filters that will identify the individual HP Inc. and Dell platform integrity events that have been detected and reported to QRadar. Use Table 2-11 as a guide. We used existing [QRadar Categories](#) which group manufacturer security events. These procedures also require an example of the security event payload that is created on the manufacturer's laptop when a platform integrity issue is detected. For HP Inc laptops, the payloads are generated by custom PowerShell scripts which consume the output from the CMSL [Get-HPFirmwareAuditLog](#) command. Dell security event payloads are generated directly by the [Dell Trusted Devices](#) platform.

Table 2-11 QRadar Security Event Mapping

QRadar Category	Manufacturer Event Category	Manufacturer Event Value
Custom Policy 1	HP_Sure_Start	Integrity violation
Custom Policy 2	HP_Sure_Start	Policy violation
Custom Policy 3	HP_Sure_Start	Recovery
Custom Policy 4	HP_Sure_Start	Revert to default
Custom Policy 5	Sys_Config	Policy violation
Custom Policy 6	HP_Sure_Start	Attack mitigation
Custom Policy 7	HP_Sure_Start	SMM execution halted
Custom Policy 8	Secure_Platform	Management Attack mitigation
Custom Policy 9	HP_Sure_Recover	Recovery initiated
Custom User 1	HP_Sure_Recover	Recovery success
Custom User 2	HP_Sure_Recover	Recovery failure
Custom User 3	HP_Sure_Start	Illegal DMA Blocked
Custom User 4	HP_Sure_Admin	Power off due to failure authentication
Custom User 5	HP_Sure_Admin	WMI blocked due to failed authentication
Custom User 6	HP_Sure_Start	EpSC execution halted
Custom User 7	HP_TamperLock	Cover removed
Custom User 8	HP_TamperLock	TPM cleared based on Policy
Custom User Medium	Dell Laptop DTD BIOS Violation	N/A

1. In the QRadar console, navigate to **Admin > Custom Event Properties**. Click **Add** and a new window pops up. In the **Test Field**, paste in the example event payload. In the screenshots below, we are using a payload which includes a *HP_Sure_Start Policy violation*.

Test Field

```

      "HP_Sure_Start": {
        "Integrity violation": [
          {
            "Timestamp": "1/1/2000 12:00:00 AM",
            "Message": 2
          }
        ]
      }

```

2. In the **Property Definition**, select *New Property*. Name the new property “[Event Category] [Event Value]”. Check *Enable for use in Rules, Forwarding Profiles and Search Indexing*.

Property Definition

☐ Existing Property: Select a property...

☒ New Property: HP_Sure_Start Policy violat

☐ Enable for use in Rules, Forwarding Profiles and Search Indexing

Field Type: AlphaNumeric

Description:

3. In the **Property Expression Definition** section, make sure **Enabled** is checked. In **Log Source Type**, select *Microsoft Windows Security Event Log*. In **Log Source** select **All**. Select the **Event Name** radio button.
 - a. Click **Browse** and search for “*Application Information Event*” (with quotes) in the **QID/Name** field. Select it and click **OK**.
 - b. Select **Extraction using JSON Keypath**. “*HP_Sure_Start Policy violation*” will look like the following as an example:

```
/"data"/"Events"/"HP_Sure_Start"/"Policy violation"[]
```

Property Expression Definition

Enabled: ☒

Selection

Log Source Type: Microsoft Windows Security Event Log

Log Source: All

☒ Event Name: Application Information event Browse

☐ Category: High Level Category Any

Low Level Category Any

Extraction using

JSON Keypath /"data"/"Events"/"HP_Sure_Start"/"Policy violati ✓

Test

- Click the **Test** button. If successful, the security event is found in the **Test Field**. Click **Save**.

Continue the process for all events listed in Table 2-11.

2.11.3.2.3 Create QRadar Rules

- In the QRadar console, click **Log Activity**. Select **Rules > Rules** then **Actions > New Rule**.
- Ensure **Events** is selected, then click **Next**.
- Enter a name for the rule. We used the following pattern: *"[Event Category] [Event Value] rule"*.
- In the rules editor, search for *"event matches this AQL filter query"*. Click the *"this"* hyperlink to launch the Ariel Query Language (AQL) filter query. Enter the query below and click **Submit**.

```
"Event ID"=3001
```

- Create another criteria by using *"when the event matches this search filter"*. Click *"this search filter"* and locate the matching **Custom Property**. Select *"is not N/A"* and click **Add**. Click **Submit**.

Rule (Click on an underlined value to edit it)
Invalid tests are highlighted and must be fixed before rule can be saved.

Apply on events which are detected by the system

☒ ☒ and when the event matches "Event ID"=3001 AQL filter query

☒ ☒ and when the event matches HP_Sure_Start Policy violation (custom) is not N/A

- (Optional) Make the rule part of a group to organize platform integrity offenses. We created a custom group named *"Supply Chain Security Event"*.

Please select any groups you would like this rule to be a member of:

- ☐ Response
- ☒ Supply Chain Security Event
- ☐ Suspicious
- ☐ System
- ☐ Threats

- Click **Next**. In the **Rule Response** section, select **Dispatch New Event**. Create an **Event Name** and **Event Description** following the same pattern as above.
- In the **Event Details** section, select the **High-Level Category** of *"User Defined"* and choose the **Low-Level Category** noted in Table 2-11.
- Check *"Ensure the dispatched event is part of an offense"*. Index offense based on *"UUID for Supply Chain"* in the pull-down menu.
- In the **Offense Naming** section, select the second option (replace).

Rule Response

Choose the response(s) to make when an event triggers this rule

☒ Dispatch New Event

Enter the details of the event to dispatch

Event Name: HP_Sure_Start Policy violation

Event Description: HP_Sure_Start Policy violation

Event Details:

Severity 1

Credibility 0

Relevance 0

High-Level Category: User Defined

Low-Level Category: Custom Policy 2

☐ Annotate this offense:

☒ Ensure the dispatched event is part of an offense

Index offense based on UUID for Supply Chain (cu

☐ Include detected events by UUID for Supply Chain (custom) from this point forward, in the offense, for :

second(s)

Offense Naming

☐ This information should contribute to the name of the associated offense(s)

☒ This information should set or replace the name of the associated offense(s)

☐ This information should not contribute to the naming of the associated offense(s)

11. Click **Finish**. The new rule will appear in the **Offenses > Rules** tab.

Offenses	Display: Rules Group: Supply Chain Security Event
My Offenses	
All Offenses	
By Category	
By Source IP	
By Destination IP	
By Network	
Rules	

Rule Name	Group	Rule Category
Dell Laptop - DTD fails BIOS verific...	Supply Chain Sec...	Custom Rule
HP_Sure_Start Integrity violation	Supply Chain Sec...	Custom Rule
HP_Sure_Start Policy violation rule	Supply Chain Sec...	Custom Rule

Repeat this section for every security event listed in [Table 2-11](#).

2.11.3.2.4 Create an Authorized Service Token

1. In the administration console, click **Authorized Services**, then **Add New**. Enter an **Authorized Service Label** and appropriate **Security Profile** and **User Role** for your environment. Click **Save**.

New Authorized Service

Authorized Service Label

RSA Archer Data Feed Token

Permissions

Security Profile

Admin

User Role

Admin

Expiry Settings

This Authorized Service expires

05/22/2022

02:45 PM

- The QRadar console will display the following dialog. Click the “eye” to reveal the secret token. Store the token securely.

Authorized Service Created Successfully

The authorized service has been created successfully.

*****_****_****_****_*****

The authorized service token cannot be made visible after you close this dialog. Copy the token to a secure location for storage before you close this dialog.

Close

3 Operational Considerations

This section describes the execution steps of an IT administrator assigned to the acceptance testing or monitoring of computing devices during their operational lifecycle. Each subsection restates the scenarios from the project description, but this prototype demonstration does not address each scenario in totality

NIST SP 1800-34C: Validating the Integrity of Computing Devices

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Create an environment as described in [Section 2](#) before attempting to use the proof-of-concept tools below.

3.1 Scenario 2: Verification of Components During Acceptance Testing

In this scenario, an IT administrator receives a computing device through nonverifiable channels (e.g., off the shelf at a retailer) and wishes to confirm its provenance and authenticity to establish an authoritative asset inventory as part of an asset management program.

The general execution steps are as follows:

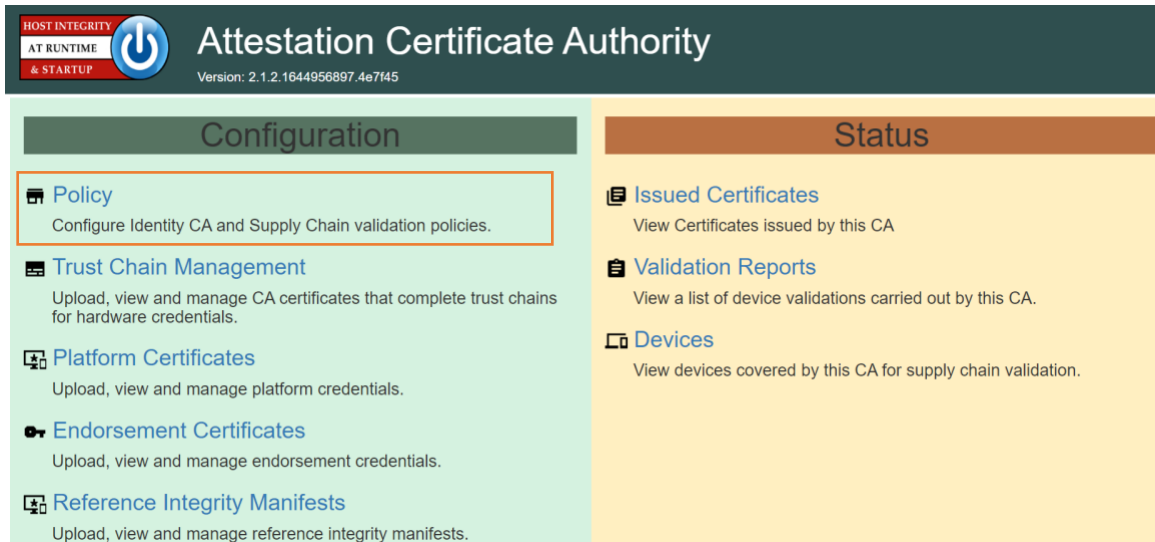
1. As part of the acceptance testing process, the IT administrator uses tools to extract or obtain the verifiable platform artifact associated with the computing device.
2. The IT administrator verifies the provenance of the device's hardware components by validating the source and authenticity of the artifact.
3. The IT administrator validates the verifiable artifact by interrogating the device to obtain platform attributes that can be compared against those listed in the artifact.
4. The computing device is provisioned into the physical asset management system and is associated with a unique enterprise identifier. If the administrator updates the configuration of the platform (e.g., adding hardware components, updating firmware), then the administrator might create new platform artifacts to establish a new baseline.

3.1.1 Technology Configurations

3.1.1.1 *Configure the HIRS ACA*

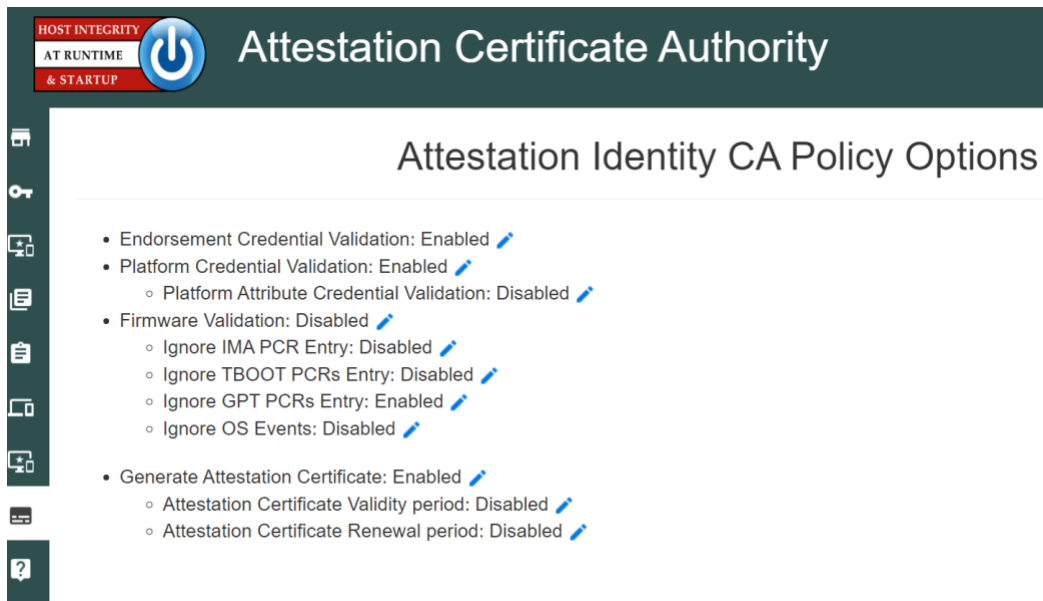
Before running the acceptance test on Dell and HP Inc. laptops, the HIRS ACA must be configured with the target laptop's platform attribute certificate and any trust chains associated with the platform attribute certificate and endorsement credential.

1. On the HIRS ACA web portal, under the **Configuration** panel, select **Policy**.

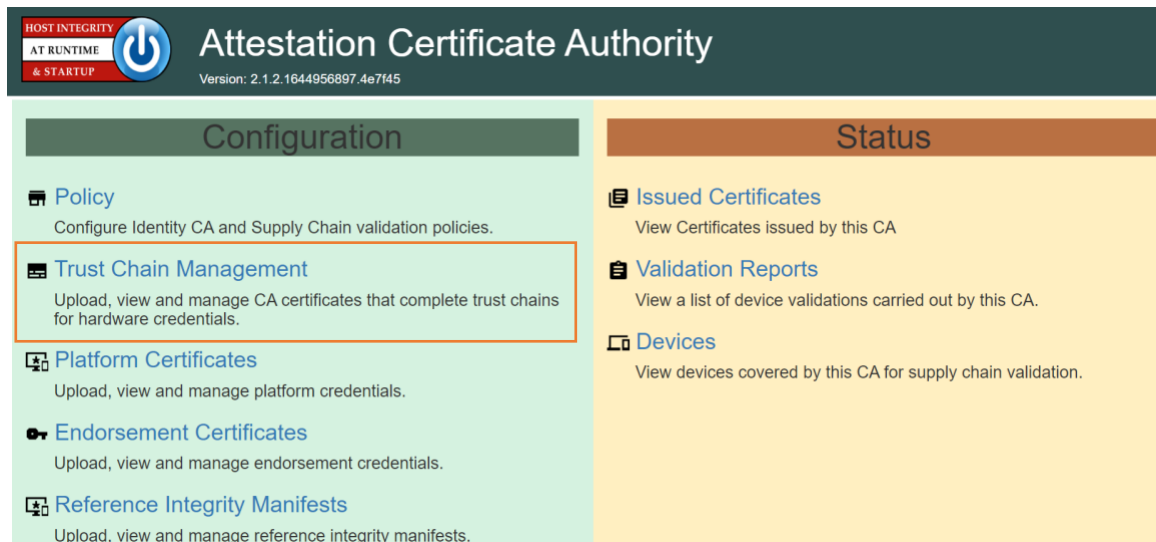


- For this prototype demonstration, make sure the following policy options are set as listed in the table below.

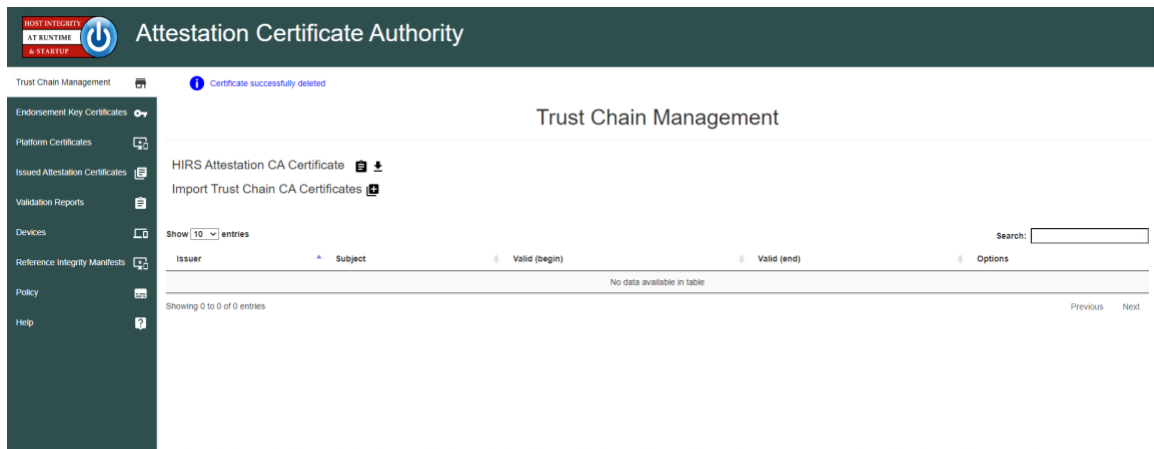
Policy Option	Setting
Endorsement Credential Validation	Enabled
Platform Credential Validation	Enabled
Platform Attribute Credential Validation	Enabled
Firmware Validation	Disabled
Ignore IMA PCR Entry	Disabled
Ignore TBOOT PCRs Entry	Disabled
Ignore GPT PCRs Entry	Disabled
Ignore OS Events	Disabled
Generate Attestation Certificate	Enabled
Attestation Certificate Validity period	Disabled
Attestation Certificate Renewal period	Disabled



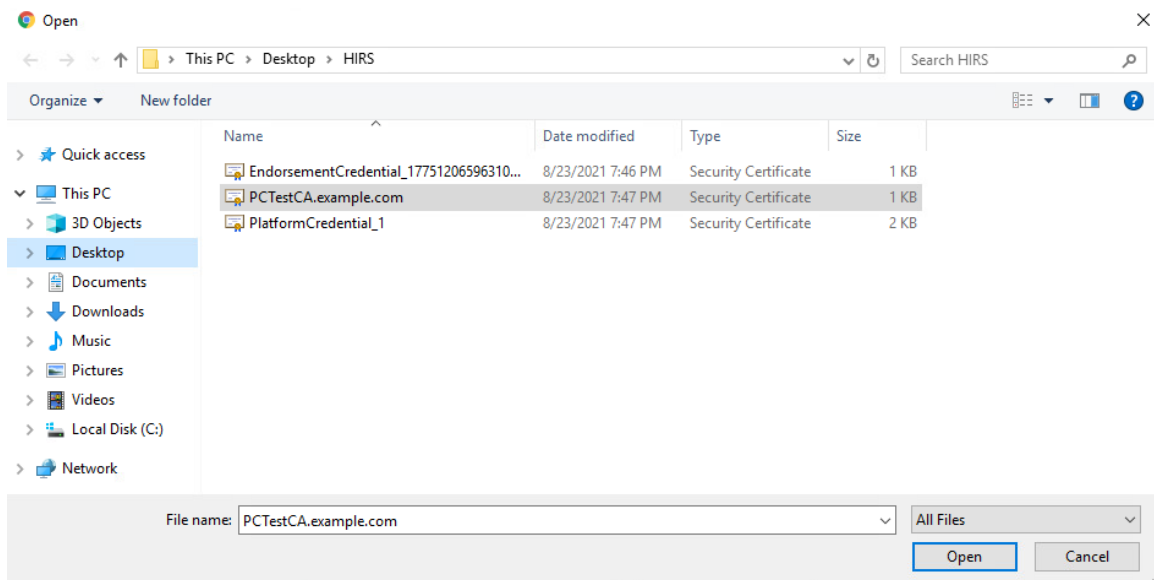
3. Upload the trust chain certificates by navigating to the **Configuration** panel, then selecting **Trust Chain Management**.



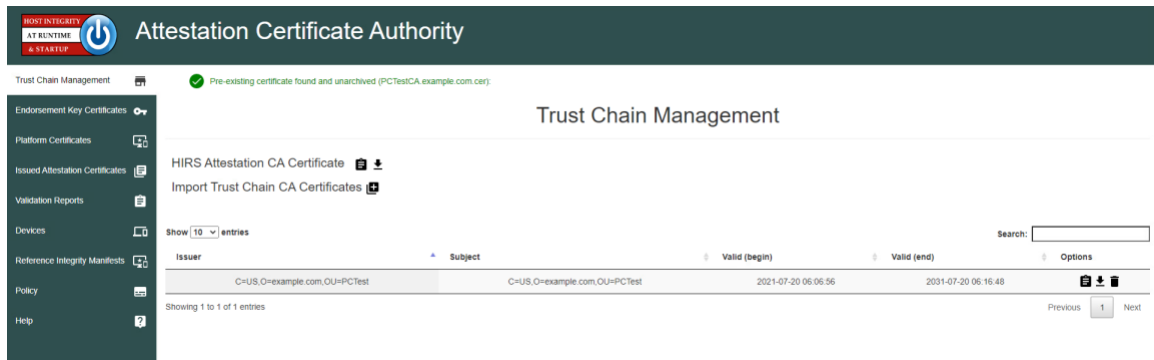
4. Select the icon beside **Import Trust Chain CA Certificates**.



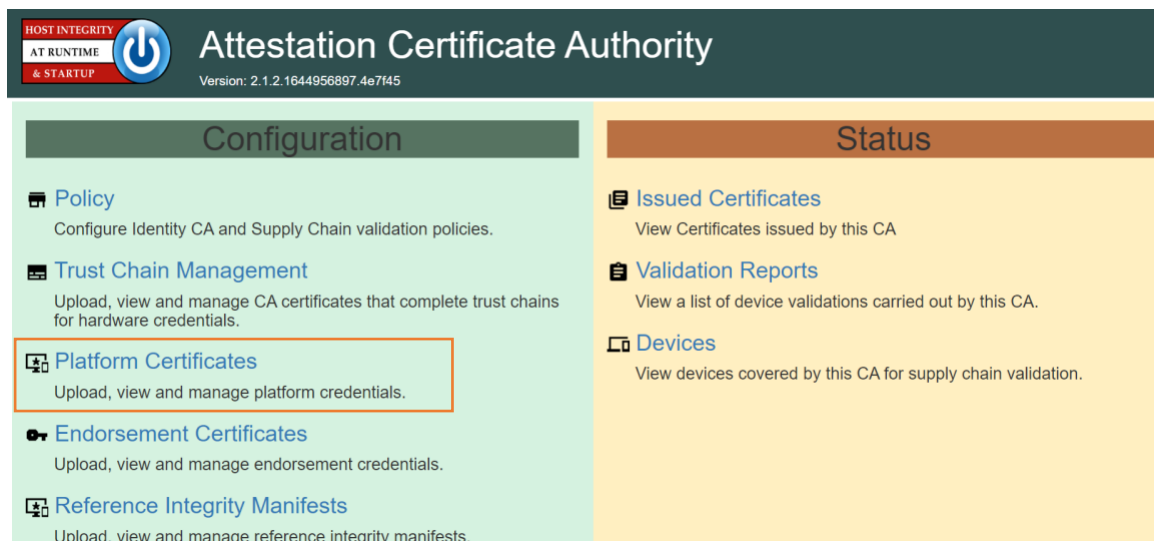
5. Select **Choose Files**.
6. Select the Trust Chain Certificate from the local computer. In the example below, the .crt file is named *PCTestCA.example.com*. Optionally, select multiple certificates if your implementation includes computing devices from distinct manufacturers. Click **Open**.



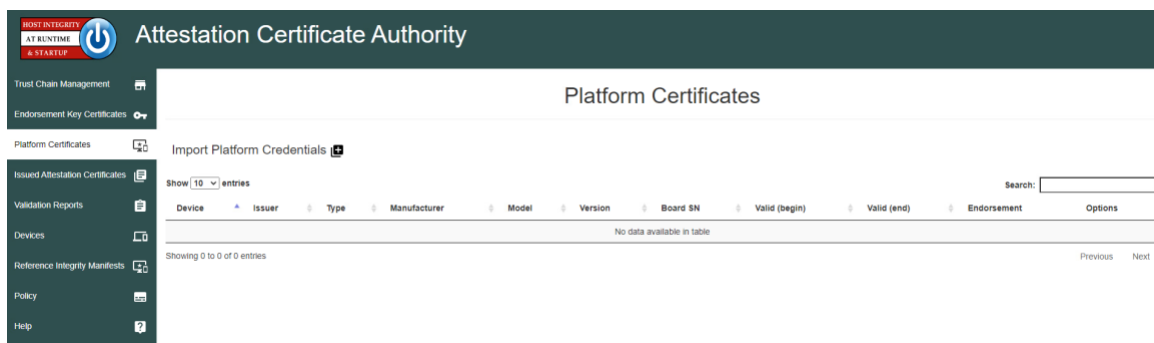
7. Select **Save**.
8. The Trust Chain certificate should appear under the **Trust Chain Management** tab. Repeat this process for all root and intermediate certificates.



9. Update the Platform Attribute certificates by navigating to the **Configurations** panel, then selecting **Platform Certificates**.

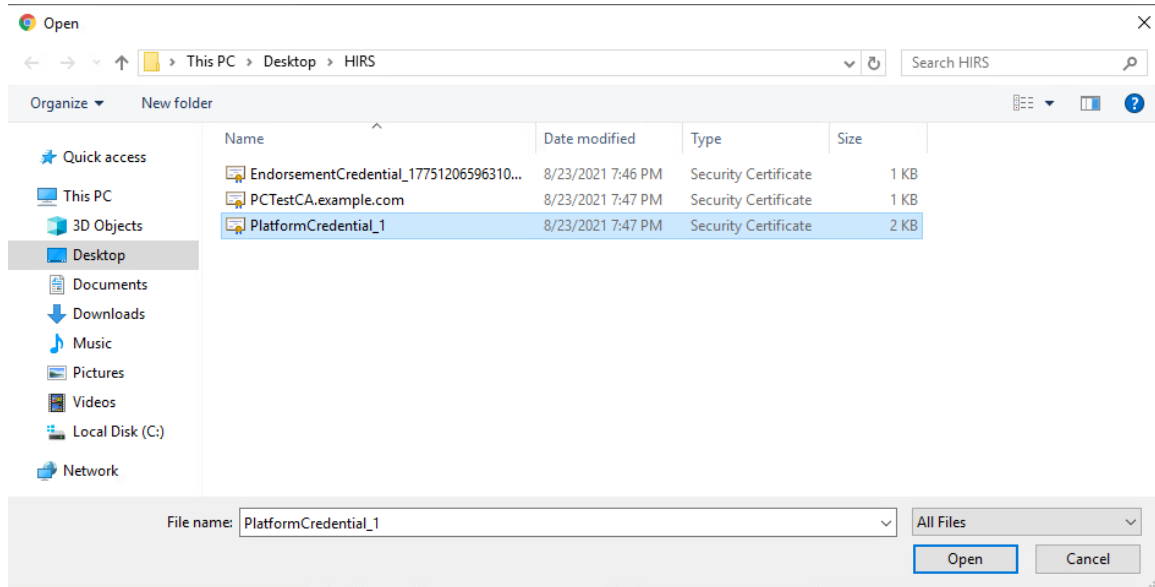


10. Select the icon beside **Import Platform Certificates**.



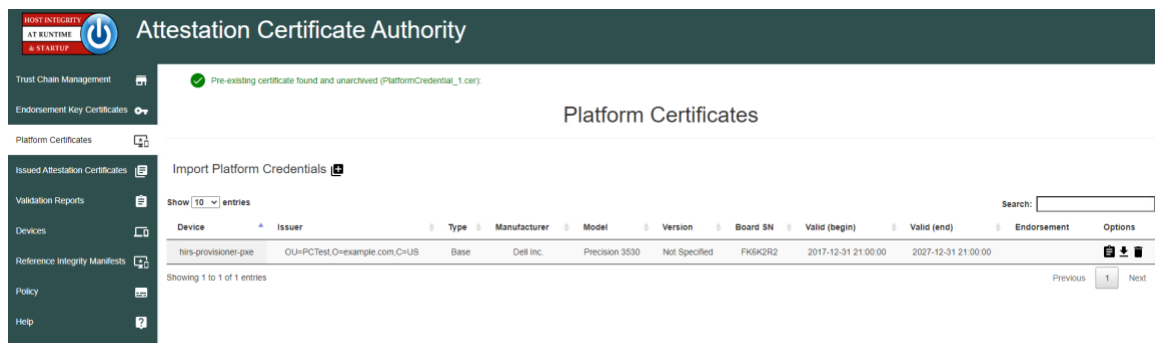
11. Select **Choose Files**.

12. Select the Platform Certificate from the local computer. In the example below, the .crt file is named **PlatformCredential_1**. Select the file and click **Open**.

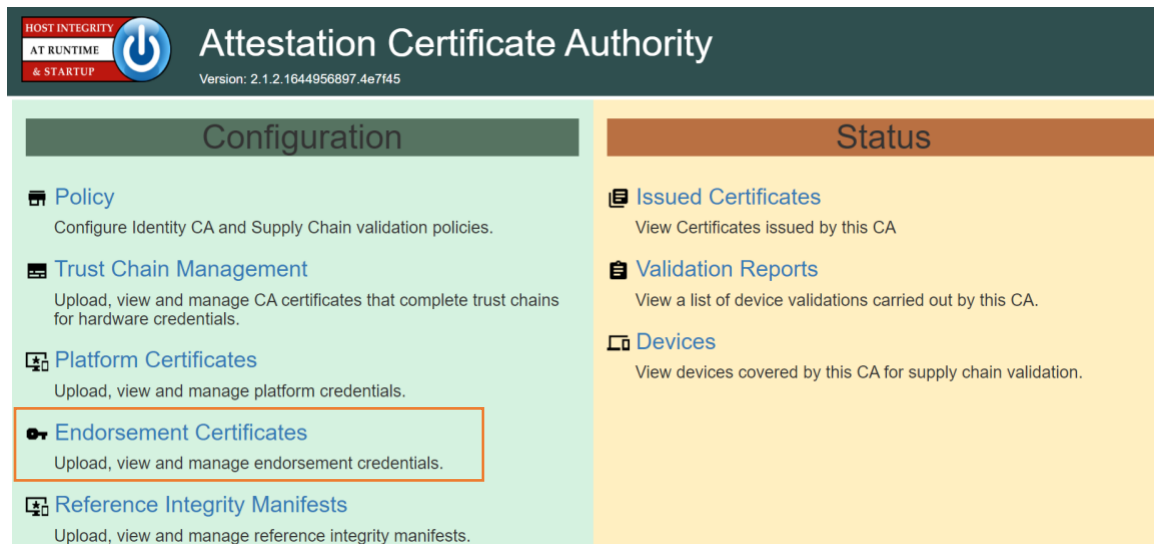


13. Select **Save**.

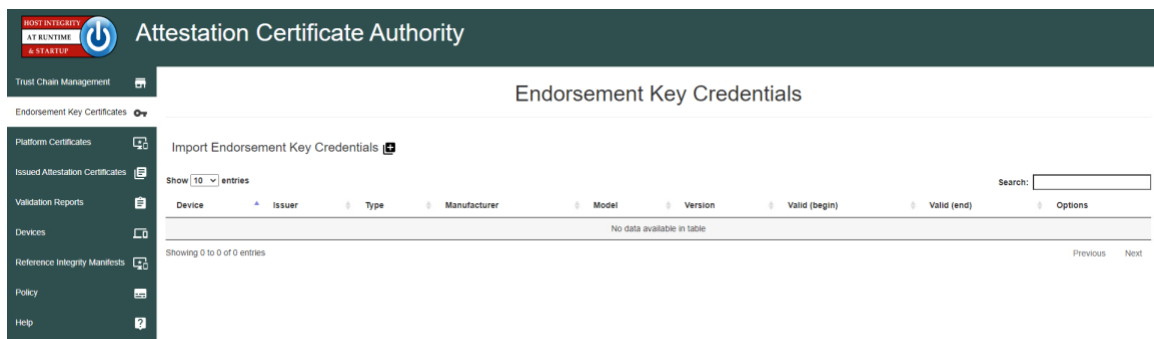
14. The Platform certificate should appear under the **Platform Certificates** tab.



15. Upload the Endorsement Key certificate by navigating to the **Configuration** panel, then selecting **Endorsement Certificates**.

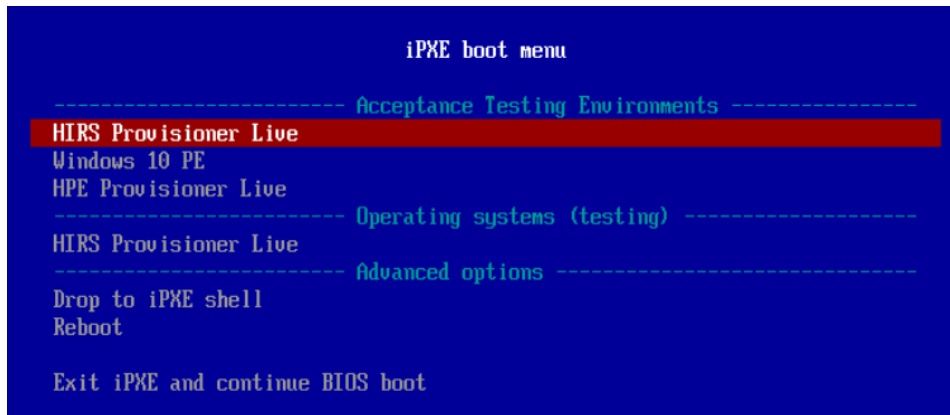


16. Select the icon beside **Import Endorsement Key Certificates**.



17. Select **Choose Files**.

18. Select the Endorsement Credential from the local computer. For this project, the .crt file is *EndorsementCredential_17751206596310784982788*. Select the file and click **Open**.



2. Once the live environment has loaded, log in as a user with root privileges. Run the provision.sh script. The script will attempt to:
 - a. Change the hostname of the live environment. This assists the administrator in locating the target machine in the Eclipsium console.
 - b. Run the Eclipsium scanner and submit results to the Eclipsium Analytic cloud platform.
 - c. Run the HIRS provisioning script. If successful, post the results to the PMCS.

The script will exit at any point an error is detected. Refer to the comments in the script to set this up in your own environment. Up-to-date information related to debugging the HIRS provisioning process can be found on the project [site](#).

3.1.1.3 Intel-Contributed Laptops

The Auto Verify tool is central to scenario 2 acceptance testing. The tool compares the Direct Platform Data (DPD), allowing the customer to identify certain system changes from the time of manufacturing to the time of first boot. [Install the Auto Verify Tool](#) on the target system before attempting to execute the steps in this section.

The DPD files and platform certificate files for the target laptop are available from Intel's Transparent Supply Chain demo page, <https://tsc.intel.com>. Work with your Intel representative to obtain credentials for your organization.

3.1.1.3.1 Download DPD File and Platform Certificate

1. Authenticate to the Intel TSC Client Demo portal page.

intel TSC Client Demo

Home Auto Verify Tool Demo Information Support

Increased Security And Accountability
Intel® Transparent Supply Chain helps assure resellers and end-customers that their products come with a level of accountability and traceability unprecedented in the industry. The end result is a more secure supply chain for the industry.

Intel® Transparent Supply Chain

To look up your system and get access to the validation files you will need to sign-in below. If you do not have an account, you will need to request one. It can take up to 5 working days to get an account.

I would like to:
☒ Login ☐ Register ☐ Forgot?

Login
 Username or Email

Password

Login

You can remove your account at any time, simply fill out the form:
[Remove Account Form »](#)

200720v10

2. Enter the serial number of the Intel laptop. Select **Search**.

intel TSC Client Demo

Home Auto Verify Tool Demo Information Support

Increased Security And Accountability
Intel® Transparent Supply Chain helps assure resellers and end-customers that their products come with a level of accountability and traceability unprecedented in the industry. The end result is a more secure supply chain for the industry.

Intel® Transparent Supply Chain

Intel® Transparent Supply Chain Download Portal
To download the Intel® Transparent Supply Chain files you will need to enter the system serial number. The system serial number is located on the bottom of your system as show below.

User: cdeane

How many devices?
☒ One ☐ Multiple

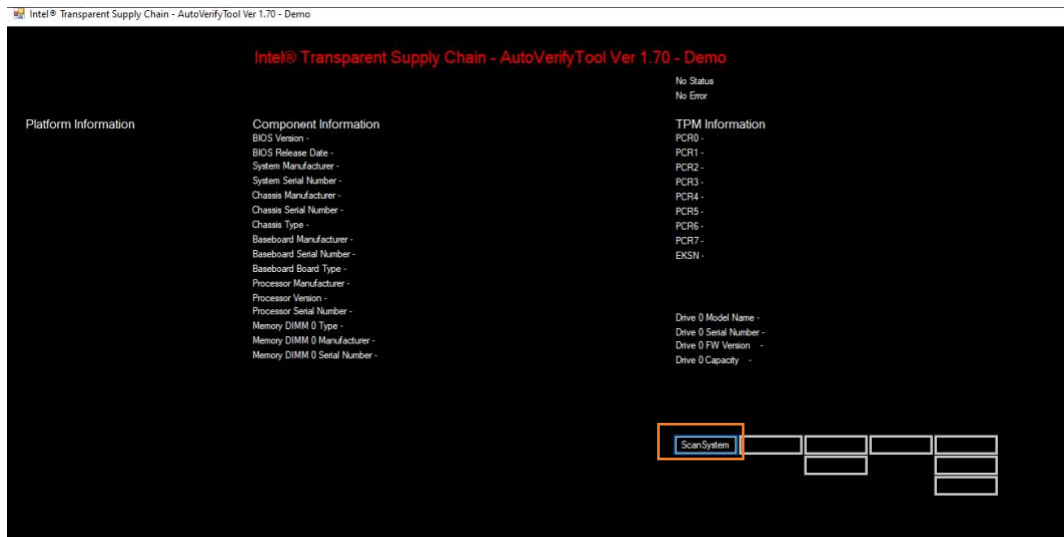
Device Info

Search

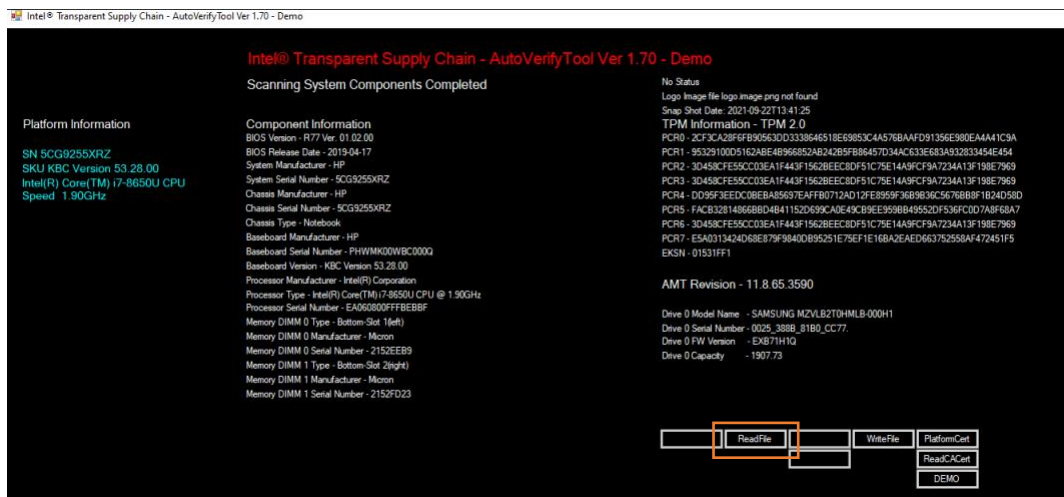
Resources:
[TSC Web Portal User's Guide v1.45 »](#)
[Auto Verify Tool v1.70 »](#)
[Example Serials »](#)

3. Download the zip file containing the DPD files and platform certificate. Save and unzip the file on the target laptop. These files will be used with the Auto Verify tool to determine if any components have been changed.
4. Launch the Auto Verify Tool.

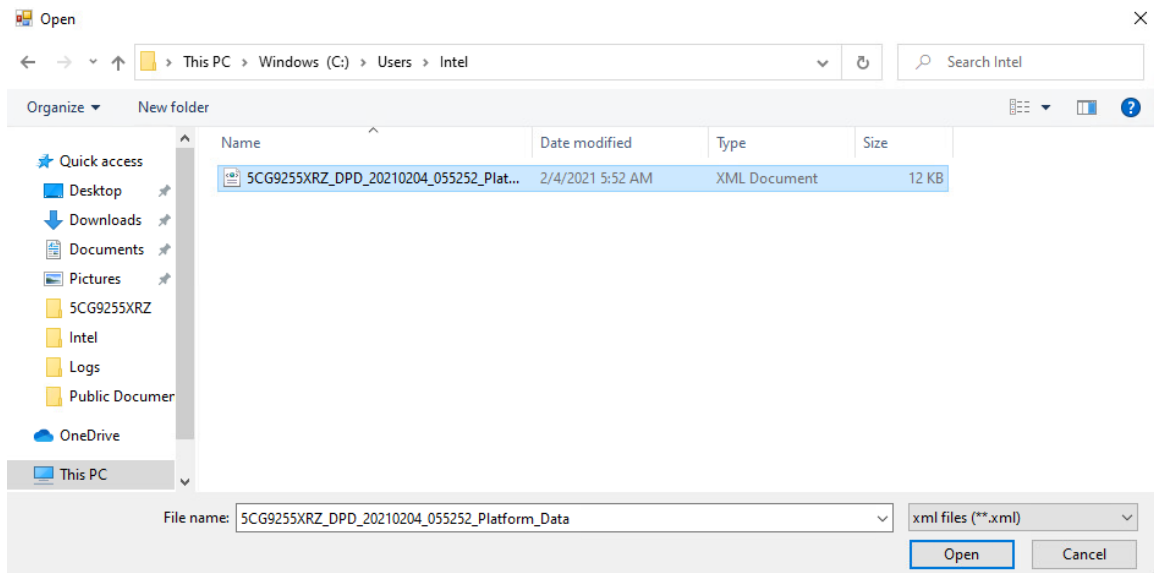
- Click the **Scan System** button.



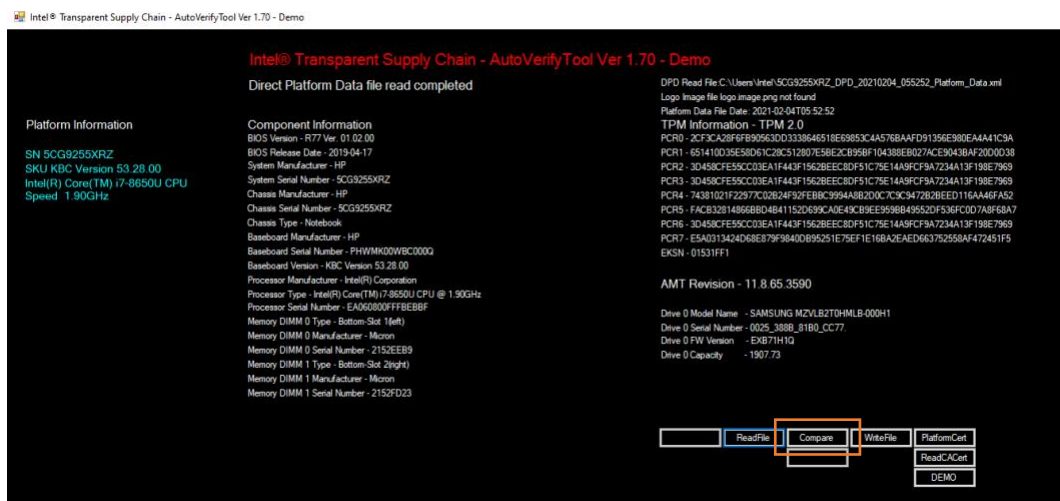
- The Auto Verify Tool should populate the Component Information entries with the platform details of the computer. To compare the data to the DPD file stored on the local computer, click **ReadFile**.



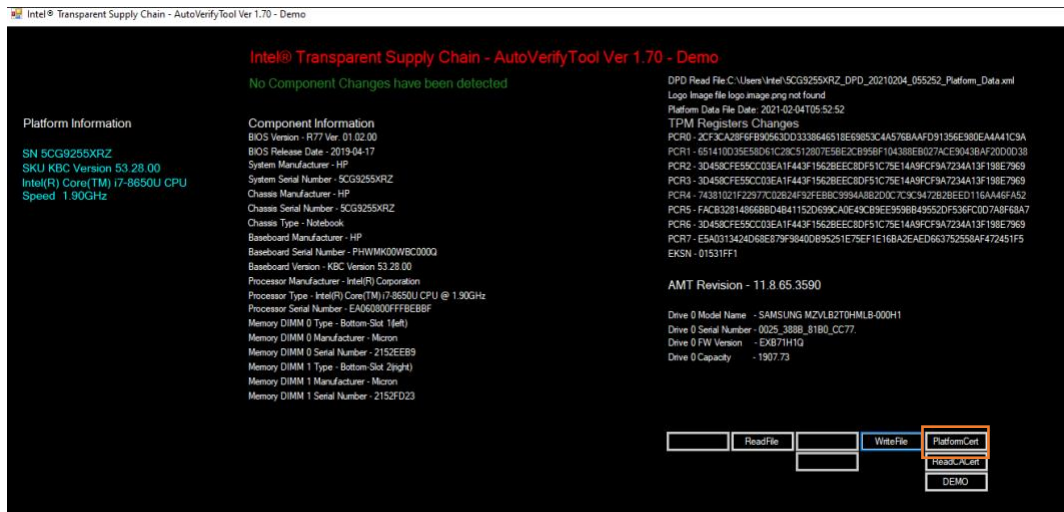
- Navigate to the downloaded DPD file and select **Open**.



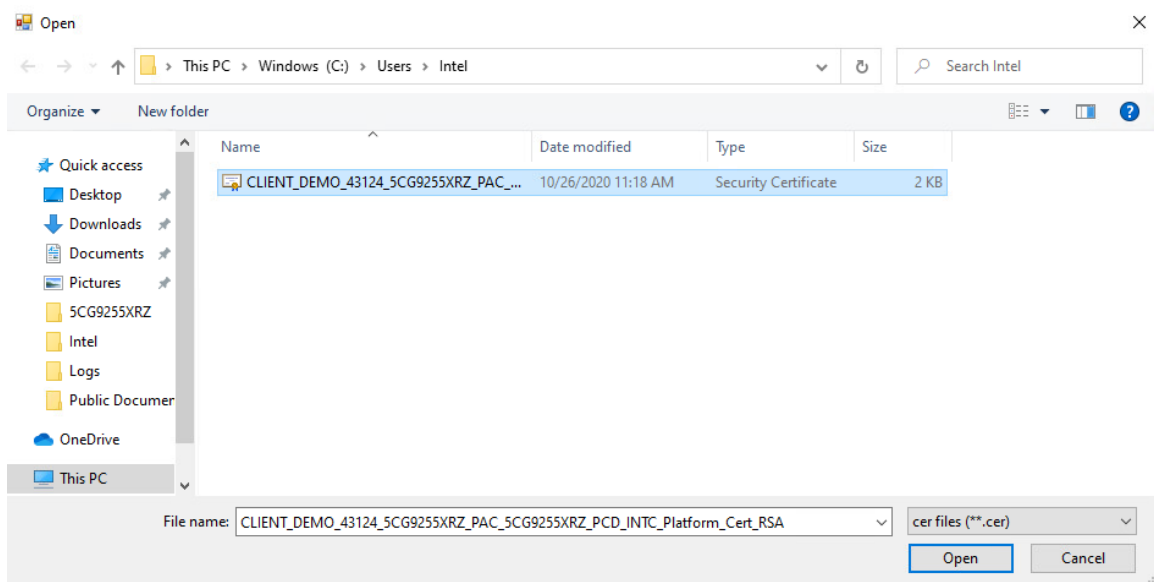
8. Next, click the **Compare** button.



9. If no changes have been made, the Auto Verify tool should output a green message that says, **“No Component Changes have been detected.”** To compare the certificate file, click the **PlatformCert** button.



10. Navigate to the location of the platform certificate and select **Open**.



11. If the certificate matches the certificate that the AutoVerify tool detected, the tool will output another green message that reads *"Platform Certificate Matches."*

3.1.1.4 HPE Servers

1. Boot the target HPE server into the CentOS 8 acceptance testing environment via iPXE. This requires a one-time boot execution to prevent the server from loading the native OS. Press F11 in the POST screen after a server reboot to access the one-time boot menu and choose the appropriate network interface card. Then choose *HPE Provisioner Live* from the iPXE boot menu.

```

                                iPXE boot menu

----- Acceptance Testing Environments -----
HIRS Provisioner Live
Windows 10 PE
----- Acceptance Testing Environments (testing) -----
HPE Provisioner Live
HIRS Provisioner Live
----- Advanced options -----
Drop to iPXE shell
Reboot

Exit iPXE and continue BIOS boot
```

2. Once the live environment has loaded, log in as a user with root privileges. Run the *hpe_provision.sh* script. The script will attempt to execute the PCVT against the verifiable artifacts stored in the image. If successful, the script posts the platform manifest to the PMCS.

The script will exit when an error is detected. Refer to the comments in the script to set this up in your own environment.

3.1.1.5 Dell Servers

1. Boot the target Dell server into the Windows PE acceptance testing environment via iPXE. This requires a one-time boot execution to prevent the server from loading the native OS. Press F12 in the POST screen after a server reboot to access the one-time PXE boot option and choose the appropriate network interface card. Then choose *Windows 10 PE* from the iPXE boot menu.

```

                                iPXE boot menu

----- Acceptance Testing Environments -----
HIRS Provisioner Live
Windows 10 PE
----- Acceptance Testing Environments (testing) -----
HIRS Provisioner Live
----- Advanced options -----
Drop to iPXE shell
Reboot

Exit iPXE and continue BIOS boot
```

2. Once the live environment has loaded, log in as a user with root privileges. Run the *dell-server-scv.ps1* script. The script will attempt to execute the Dell Secured Component Verification (SCV) tool against the verifiable artifacts stored on the server. If successful, the script posts the platform manifest to the PMCS.

The script will exit when an error is detected. Refer to the comments in the script to set this up in your own environment.

3.1.1.6 Intel Server

3. Boot the Intel Server into the CentOS 8 host OS environment. Note that for the demonstration Intel server, a network-booted acceptance testing environment was not implemented.
4. Once the operating system has completed booting, log in as a user with root privileges. Run the *provision.sh* script. The script will attempt to execute the *TSCVerifyUtil* against the verifiable artifacts stored on the server. If successful, the script posts the platform manifest to the PMCS.

The script will run *TSCVerifyUtil* again with different command arguments which directs the program to access the Seagate drive APIs. If successful, the drive attestation data and measurements are posted to the PMCS.

The script will exit when an error is detected. Refer to the comments in the script to set this up in your own environment.

3.1.2 Asset Inventory and Discovery

Organizational members with access to the enterprise database of computing devices can access a listing by authenticating to the Archer system. We have configured our instance to display only the relevant Archer solution menus. In Figure 3-1, the administrator clicks the *SCA Devices* menu link to retrieve the listing.

Figure 3-1 Archer Solution Menu

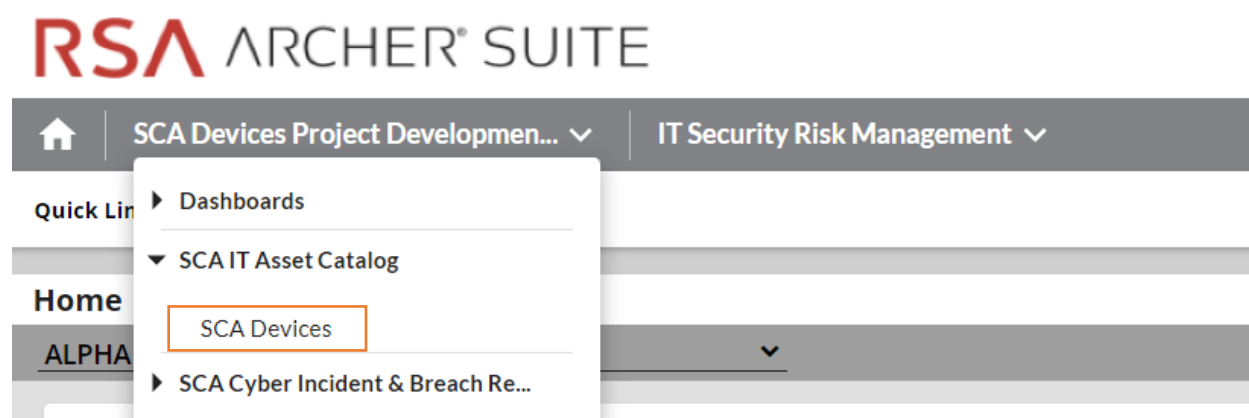


Figure 3-2 shows a listing of all enterprise computing devices that have had their platform validated in accordance with Scenario 2. The computing device *Enterprise Unique Identifier* is hyperlinked and when clicked displays additional data, as described below.

Figure 3-2 Enterprise Computing Devices Listing

SCA Devices

SAVE

MODIFY

NEW REPORT

RELATED REPORTS

1 to 7 (of 7)

Manage ColumnsOptions

SEARCH RESULTS

Drag a column name here to group the items by the values within that column.

Enterprise Unique Identifier	Manufacturer	Platform Model
00787415-1181-e411-906e-0012795d96dd	Intel Corporation	S2600WTT
1e5473ed-48f5-4bb0-940d-2b359bf6f0a5	HPE	ProLiant DL360 Gen10
30C586CC-2510-11B2-A85C-F3DD5F26B170	LENOVO	20L551S000
3206d7fa-d7d3-b406-daf5-62d4c47d6d79		
4C4C4544-004A-4610-8042-C7C04F564433	Dell Inc.	PowerEdge R650
c06593cb-e07c-10dc-9bc8-54c2bf608a25	HP, INC	Elitebook 840 G7
ce181b94-6de5-8542-2709-a6defa2e8a1e	HP	HP ZBook Firefly 14 G7 Mobile Workstation

Page 1 of 1 (7 records)

Figure 3-3 shows a representative laptop computing device that has completed the acceptance testing process by an IT administrator. In the **General Information** section, we have opted to display characteristics that are common across all the manufacturers in our project such as the serial number and the make of the computing device. Separately in the **Associated Components** section, we store and track the components from the initial manufacturer manifest. We will continue to iterate on the asset inventory user interface to surface meaningful and easily understandable information that is appropriate for individuals responsible for IT security.

Figure 3-3 Asset Inventory Screenshot

RSA ARCHER® SUITE

Search

ITOps

SCA Devices Project Development... Task Management

Reports

SCA Devices : C06593CB-E07C-10DC-9BC8-54C2BF608A25

EDIT VIEW

First Published: 10/5/2021 10:04 AM Last Updated: 10/12/2021 11:21 AM

Record 4 of 4

ABOUT

GENERAL INFORMATION

Enterprise Unique Identifier: C06593CB-E07C-10DC-9BC8-54C2BF608A25

Serial Number: 5CG03681XB

Make: Elitebook 840 G7

Manufacturer: HP, INC

Operational Use Validation Within Policy Status:

ECLYPSIUM FIRMWARE ANALYTICS

ASSOCIATED COMPONENTS

This section displays the computing device declared components.

Tracking ID	Class	Manufacturer	Model	Serial
276880	Baseboard	HP, INC	Elitebook 840 G7	5CG03681XB
276881	BIOS	HP, INC	Not Specified	
276882	Memory	Micron	Not Specified	7272700000000
276883	Memory	Micron	Not Specified	38383700000000
276884	Network Interface Card	168C	003E	505BC2F378BFA3

For those computing devices that support Eclipsium during acceptance testing, Archer retrieves the initial firmware data from the Eclipsium backend (cloud or on-premises) and displays it in the Eclipsium Firmware Analytics section of the record as shown in Figure 3-4.

Figure 3-4 Eclipsium Acceptance Testing Firmware Data

▼ ECLYSIUM FIRMWARE ANALYTICS

 Integrity data from the Eclipsium platform.

Last System Scan Date:

Eclipsium Integrity Scan Status:

System Firmware Date: 4/26/2021

System Firmware Version: S70 Ver. 01.05.00

3.1.2.1 Manufacturer-Specific Attributes

As described in Volume B of this guide, this demonstration also collects manufacturer-specific platform integrity attributes in addition to the agnostic data described above. For HP Inc. laptops, BIOS configuration settings, represented as UEFI variables, are associated with the laptop in the asset inventory when available. From this perspective the security operator is able to view each variable value, description, and the recommended setting for each value. The operator is also alerted if the variable value has changed since the initial baseline (column 2), where a remediation action could be initiated.

HP Inc UEFI Variables

▼ HP UEFI CONFIGURATION VARIABLES (ASSOCIATED COMPUTING DEVICE)						View All
UEFI Variable Friendly Name	HP Inc BIOS Configuration Status	Value	UEFI Variable Description	UEFI Variable Possible Values	UEFI Variable Recommended Values	
Enhanced HP Firmware Runtime Intrusion Prevention and Detection	No Change Detected	Enable	Utilizes specialized hardware in the platform chipset to prevent, detect, and remediate anomalies in the Runtime HP SMM BIOS.	[Disable, Enable]	Enable	
Cover Removal Sensor	No Change Detected	Not found	Policy defined actions taken when Tamperlock cover removal sensor is triggered. Administrator credential or password requires valid response before continuing to startup after the cover is opened.	[Disable, Notify user, Administrator Credential, Administrator Password]	Administrator Credential or Administrator Password	

Computing devices that use the Intel Transparent Supply Chain platform declare (if present) additional attributes such as values for the OEM, original design manufacturer (ODM), model, product name, stock keeping unit (SKU), and product family. The screenshot below is an example from a demonstration laptop asset inventory record.

▼ INTEL HARDWARE PROPERTIES	
Original Equipment Manufacturer: LENOVO	Product Name: 20L5S15000
Original Design Manufacturer: LENOVO	SKU: LENOVO_MT_20L5_BU_Think_FM_ThinkPad T480
Model:	Family: ThinkPad T480

Finally, each Seagate drive asset inventory entry displays associated data from its firmware attestation and measurement capabilities. The security operator can view the currently running version of the firmware and click on the Tracking ID hyperlink for more details associated with the firmware. In the lower section, the Firmware Hash Status column informs the operator if measurement values have changed since the baseline, which may indicate an integrity issue that requires remediation.

▼ SEAGATE FIRMWARE ATTESTATION (SEAGATE DRIVE SERIAL)		
First Published	Firmware Version	Tracking ID
5/2/2022 4:26 PM	0x01	277346
5/2/2022 4:26 PM	0x01	277348
5/2/2022 4:26 PM	0x01	277349

▼ SEAGATE FIRMWARE HASH (SEAGATE DRIVE)	
Firmware Hash Status	Tracking ID
No Change Detected	277347

3.2 Scenario 3: Verification of Components During Use

In this scenario, the computing device has been accepted by the organization (Scenario 2) and has been provisioned for the end user. The computing device components are verified against the attributes and measurements declared by the manufacturer or purchasing organization during operational usage.

The general execution steps are as follows:

1. The end user takes ownership of the computing device from the IT department and uses it to perform daily work tasks within the scope of normal duties.
2. The computing device creates a report that attests to the platform attributes, such as device identity, hardware components, and firmware measurements that can be identified by interrogating the platform.
3. The attestation is consumed and validated by existing configuration management systems used by the IT organization as part of a continuous monitoring program.
4. The measured state of the device is maintained and updated as the authorized components of the device are being maintained and associated firmware is updated throughout the device's operational life cycle.
5. Optionally, the IT administrator takes a remediation action against the computing device if it is deemed out of compliance. For example, the computing device could be restricted from accessing certain corporate network resources.

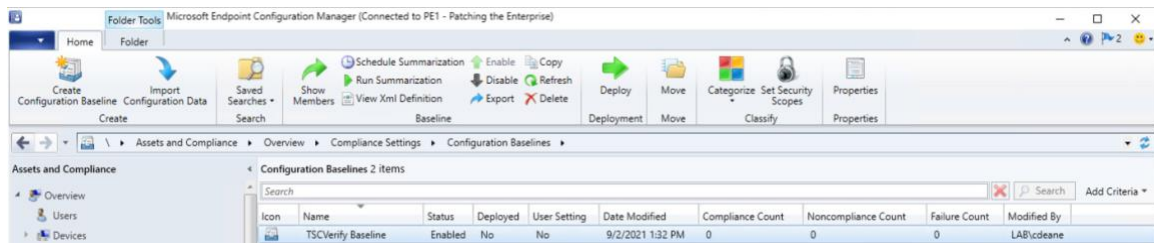
3.2.1 Technology Configurations

3.2.1.1 Monitoring Using Intel and HIRS-ACA Validation Clients

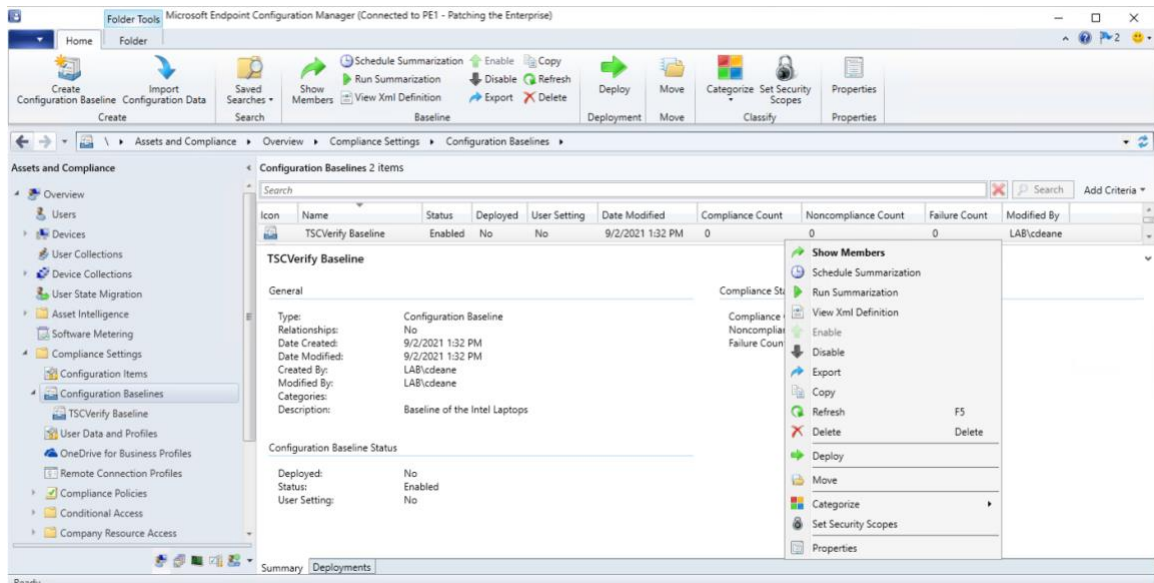
This section describes the steps that monitor for unexpected component changes using Intel TSC/HIRS-ACA tooling and Microsoft Configuration Manager capabilities.

3.2.1.1.1 Deploy Baseline

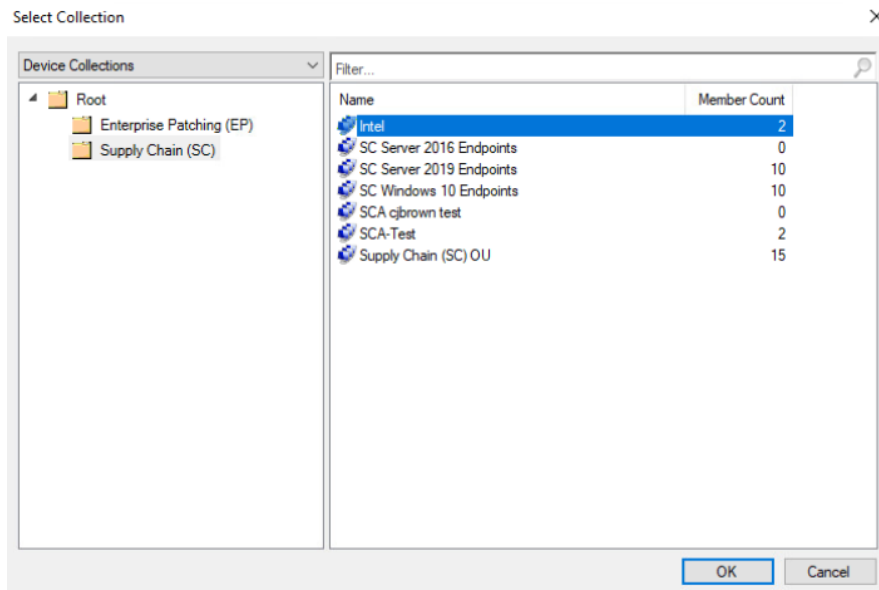
1. Navigate to the newly created configuration baseline located at **Assets and Compliance > Overview > Compliance Settings > Configuration Baselines**.



2. Right-click on the configuration baseline and select **Deploy**.



3. Select the device collection for the Intel TSC-supported machines. For this project, the device collection is named **Intel**. Select **OK**.



4. Ensure that the baseline is selected and then select the desired frequency of when to run the baseline. Select **OK**.

This completes the configuration for Intel TSC platform validation tools. Repeat this section to create a similar baseline for Dell and HP Inc. laptops that leverage HIRS-ACA platform validation tools.

3.2.1.2 Updating the Platform Verifiable Artifact During Operational Use

During the operational use of a computing device, a member of security operations may observe a warning in a computing device's asset record that it is out of compliance. This could indicate that the platform has been updated but the change has not been reflected in the verifiable artifact. Archer will continue to display this warning until the verifiable artifact is updated with the new platform manifest. Figure 3-5 illustrates this scenario.

Figure 3-5 Out of Policy Computing Device

▼ GENERAL INFORMATION	
Enterprise Unique Identifier: c06593cb-e07c-10dc-9bc8-54c2bf608a25	Serial Number: 5CG03681XB
Platform Model: Elitebook 840 G7	Manufacturer: HP, INC
Continuous Monitoring Platform Integrity Status: Out of Policy	

Address the policy warning by using the following procedures to create a Delta Platform Certificate on HP Inc. and Dell laptops which reflects changes in the target platform components. A Delta Platform Certificate can be created in Linux or Windows; however, this demonstration only exercises creation on the Windows platform.

Ensure the following prerequisites are met:

- The administrator has installed PACCOR onto the target laptop.
- A base Platform Certificate has been created and configured in the HIRS ACA. Creation of a Delta Platform Certificate is dependent on the existence of another base Platform Certificate for the same laptop.

Next, complete the following procedures to create a Delta Platform Certificate.

1. Open a command prompt as an Administrator on the target laptop. Change directories to the following:

```
<paccor install folder>\scripts\windows
```

2. Create a directory named *pc_testgen* in the working directory from the previous step if it does not already exist.
3. Retrieve the base Platform Certificate from the HIRS ACA portal or other means. Change the filename of the Platform Certificate to *holder.crt* and place it into the *pc_testgen* directory.
4. Execute PACCOR's component gathering script and capture the output with the following command.

```
powershell -ExecutionPolicy Bypass ./allcomponents.ps1 components.json
```

5. The component list needs to be manually edited to reflect added, modified, or removed components of the system. Using a JSON file editor, open the *components.json* file.
 - a. In the **COMPONENTS** object, identify the objects that represent components to be saved in the new Delta Platform Certificate. Add a **STATUS** field at the end of these components with a value of **ADDED**, **MODIFIED**, or **REMOVED**. For example, to modify the chassis serial number, create a **COMPONENTS** entry similar to the following.

```
{
  "COMPONENTS": [
    {
      "COMPONENTCLASS": {
        "COMPONENTCLASSREGISTRY": "2.23.133.18.3.1",
        "COMPONENTCLASSVALUE": "00020001"
      },
      "MANUFACTURER": "Example Manufacturer",
      "MODEL": "1",
      "SERIAL": "1234",
      "STATUS": "MODIFIED"
    }
  ]
}
```

- b. Delete all other objects under **COMPONENTS**.
 - c. Once finished editing the *components.json* file, move it to the **pc_testgen** folder.
6. Using a text editor, modify the **pc_certgen** script header variables.
 - a. Set the **ekcert** variable to point to **holder.crt** from step 3.
 - b. Set the **componentlist** variable to point to **components.json** from step 5.
 - c. Change the value of **serialnumber** to 0002.
 - d. If you have a specific signing key and cert, move those files to **pc_testgen** as well and update the **sigkey** and **pcsigncert** variables to point to them.
7. Execute the *pc_certgen.ps1* script using the following command:


```
powershell -ExecutionPolicy Bypass ./pc_certgen.ps1
```
8. The resulting Delta Platform Certificate will be stored in the **pc_testgen** folder.
9. Upload the new Delta Platform Certificate to the HIRS-ACA portal.

Note that laptops that are continuously monitored with the Windows-based HIRS Provisioner will be evaluated against this new baseline.

3.2.2 Dashboards

The dashboard created in [Section 2.11.2.3](#) attempts to consolidate and communicate potential integrity issues to the IT administrator while computing devices are in operational use. The timeliness of this information will depend on the cadence that your organization follows for updating the various data feeds from Microsoft Configuration Manager and the Eclipsium Analytic platform. This demonstration displays to the administrator if there are detected component swaps from computing devices that can leverage Intel TSC and HIRS-ACA platforms. Further, it displays any detected firmware platform integrity

issues from the Eclypsium Analytic cloud and on-premises platform across all manufacturers in this prototype.

The Archer IRM dashboard should resemble the screenshots below, where a count of computing devices with potential integrity issues is displayed (Figure 3-6 and Figure 3-7). Your organization's security operations team may also want to access the Eclypsium Analytic platform directly to obtain detailed information, including remediation actions, for computing devices with detected integrity issues.

Figure 3-6 Dashboard with No Integrity Issues Detected

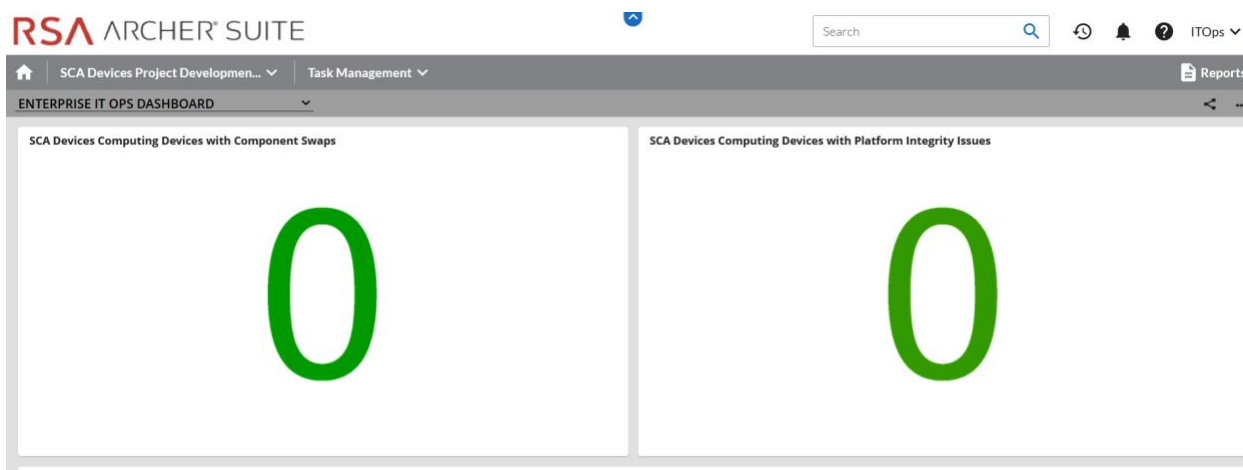
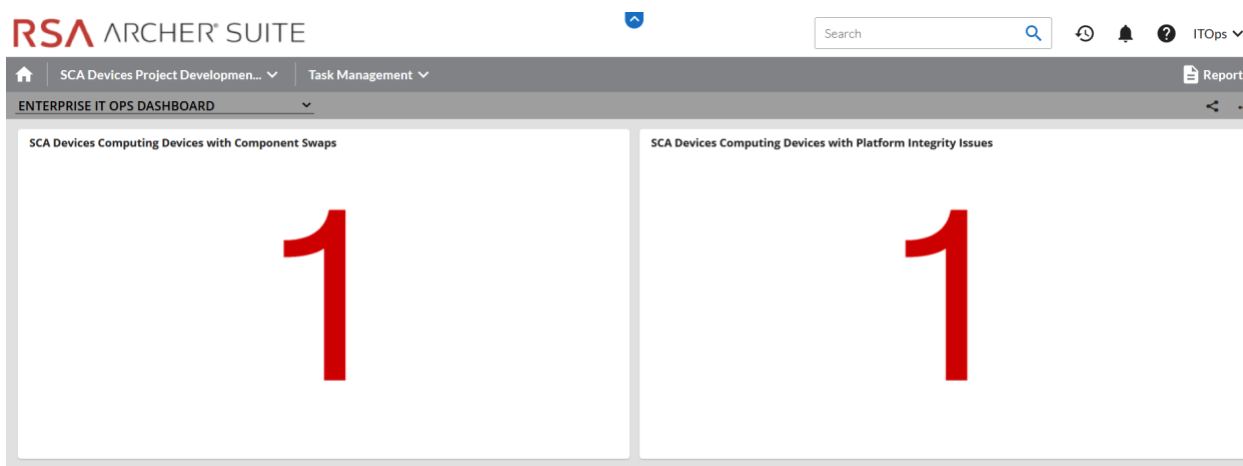
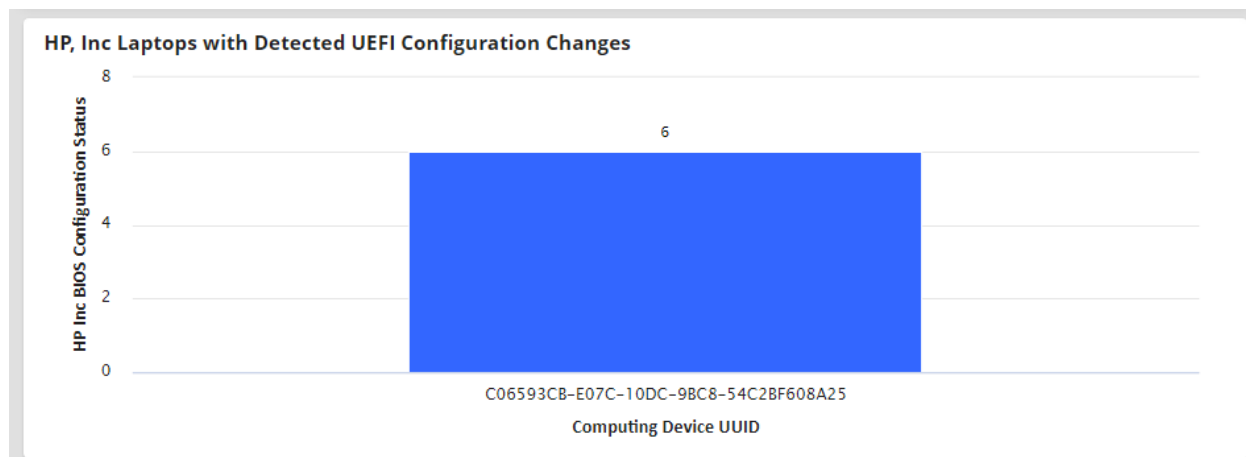


Figure 3-7 Dashboard with Integrity Issues Detected



The demonstration dashboards are also capable of monitoring manufacturer-specific platform integrity datapoints. In Figure 3-8, we show a dashboard component that captures the number of UEFI configuration parameters that have changed from the baseline values (Y-axis) for each HP Inc. computing device (X-axis).

Figure 3-8 HP Inc. Laptop Continuous Monitoring

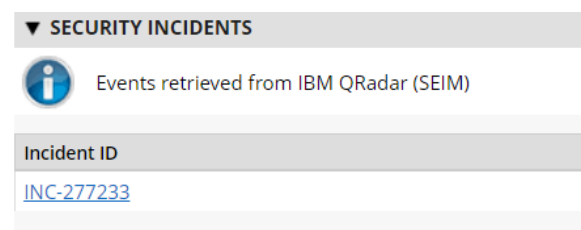


In the final dashboard component, the security operator can display the number of Seagate drives with firmware hash values that have changed since the initial acceptance testing baseline. In a production setting, it could be more useful to compare the drive measurements against known values communicated directly from the manufacturer (Seagate).

3.2.3 Platform Integrity Incident Management

The final continuous monitoring scenario we demonstrate is the automated creation of Archer *Incidents* when the QRadar continuous monitoring data feed ([Section 2.11.2.2.4](#)) retrieves a platform integrity issue. In the asset inventory record shown in Figure 3-9, we have triggered a platform integrity issue in one of our demonstration HP Inc. laptops, which has automatically created an Archer *Security Incident*. Note that the Archer platform offers workflow customization options that are not documented here that can support more complex organizational structures.

Figure 3-9 New Security Incident



The security operator can click the hyperlink, which displays more detailed information about the issue. In the case depicted in Figure 3-10, the *HP Sure Start* capability has flagged a potential issue.

Figure 3-10 Incident Summary

▼ INCIDENT SUMMARY

🔍 Incident ID: INC-277233

🔍 Source: IBM Qradar

🔍 Title: HP_Sure_Start Integrity violation

🔍 Incident Summary: HP_Sure_Start Integrity violation

🔍 Incident Details:

This indicates that HP Sure Start has detected that the main drive partition table has been altered, and HP Sure Start has returned the partition table to the desired state. This event could be indicative of an attack on the device in the event the change to the drive partition tables was made by an unauthorized party.

In the *Incident Status* section, metadata associated with the incident is displayed, including whether remediation is requested by the security operator. Figure 3-11 shown an example of this.

Figure 3-11 Incident Status

▼ INCIDENT STATUS

🔍 Date Created: 2/7/2022 7:42 AM

🔍 Date/Time Modified: 3/24/2022 2:13 PM

🔍 Date/Time Closed:

🔍 Days Open: 44 Day(s)

🔍 No. of 0 Aggregated Alerts:

🔍 Priority:

🔍 Incident Status: Remediation Requested

🔍 Incident Owner: Administrator, ITAdmin

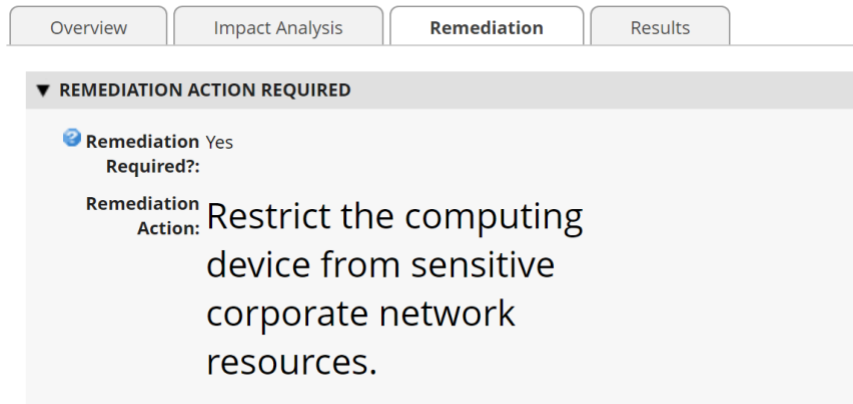
🔍 Incident Queue: L1 Incident Handlers

🔍 Incident Coordinator:

🔍 Members: Administrator, ITAdmin

If remediation is requested, the security operator clicks the *Remediation* tab within the *Security Incident* where a suggested action is displayed (see Figure 3-12).

Figure 3-12 Incident Remediation Action



Appendix A List of Acronyms

ACA	Attestation Certificate Authority
AD	Active Directory
ADK	(Windows) Assessment and Deployment Kit
API	Application Programming Interface
AQL	(IBM QRadar) Ariel Query Language
BIOS	Basic Input/Output System
CMSL	(HP) Client Management Script Library
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
DPD	Direct Platform Data
DTD	Dell Trusted Device
FQDN	Fully Qualified Domain Name
HIRS	Host Integrity at Runtime and Start-Up
HPE	Hewlett Packard Enterprise
HTTP	Hypertext Transfer Protocol
IIS	(Microsoft) Internet Information Services
IP	Internet Protocol
IRM	(Archer) Integrated Risk Management
IT	Information Technology
JDK	Java Development Kit
JSON	JavaScript Object Notation
NCCoE	National Cybersecurity Center of Excellence
NIST	National Institute of Standards and Technology
NTP	Network Time Protocol
ODM	Original Design Manufacturer

OEM	Original Equipment Manufacturer
OS	Operating System
PC	Personal Computer
PCVT	(HPE) Platform Certificate Verification Tool
PM2	Process Manager 2
PMCS	Platform Manifest Correlation System
PXE	Preboot Execution Environment
REST	Representational State Transfer
SAS	Serial Attached SCSI
SCA	Supply Chain Assurance
SCRM	Supply Chain Risk Management
SCSI	Small Computer System Interface
SCV	(Dell) Secured Component Verification
SKU	Stock Keeping Unit
SP	Special Publication
SSMS	(Microsoft) SQL Server Management Studio
TB	Terabyte
TCG	Trusted Computing Group
TEI	(NCCoE) Trusted Enterprise Infrastructure
TFTP	Trivial File Transfer Protocol
TPM	Trusted Platform Module
TSC	(Intel) Transparent Supply Chain
UEFI	Unified Extensible Firmware Interface
UI	User Interface
URL	Uniform Resource Locator
UUID	Universally Unique Identifier

WinPE	Windows Preinstallation Environment
XML	Extensible Markup Language

Appendix B Archer Applications

The following tables detail the data fields in each Archer application for use in [Section 2.11.2.1](#). The first column is the name of the data field we used in this demonstration and the second column is the data type. Data fields that are calculated are indexed in the third column and available in the subsequent table. Bolded rows are *Key Fields*, similar to a primary key.

Table 3-1 Devices Application

Data Field Name	Data Field Type	Calculated
Associated Components	Cross-Reference	
Last Event Timestamp	Date	
Last System Scan Date	Date	
System Firmware Date	Date	
Firmware Integrity Aggregation Status	Numeric	
Firmware Integrity Check Status	Numeric	
Count of Failed Configuration Scan Results	Text	
Count of Configuration Scans	Text	
Enterprise Unique Identifier	Text	
Family	Text	
Platform Model	Text	
Model	Text	
Original Design Manufacturer	Text	
Original Equipment Manufacturer	Text	
Product Name	Text	
SKU	Text	
System Firmware Version	Text	
Manufacturer	Values List	
Device Scan State	Values List	1
Eclysium Integrity Scan Status	Values List	2
Continuous Monitoring Platform Integrity Status	Values List	3

Table 3-2 Calculated Fields (Devices)

Index	Calculation
1	IF (ISEMPTY([Helper Previous Last Scanned Date Calc]), VALUEOF([Device Scan State], "New"), IF (DATEDIF([Helper Max Last Scanned Date Calc], [Helper Previous Last Scanned Date Calc])=0, [Device Scan State], VALUEOF([Device Scan State], "Matched")))
2	IF (ISEMPTY([Firmware Integrity Check Status]), VALUEOF([Eclipsium Integrity Scan Status], "No Data"), IF ([Firmware Integrity Check Status]=1, VALUEOF([Eclipsium Integrity Scan Status], "No Integrity Issues Detected"), IF ([Firmware Integrity Check Status]=0, VALUEOF([Eclipsium Integrity Scan Status], "Integrity Issue Detected - Action Recommended"))))
3	IF (ISEMPTY([Continuous Monitoring Platform Integrity Status]), VALUEOF([Continuous Monitoring Platform Integrity Status], "No Data from Configuration Management System"))

Table 3-3 Components Application

Data Field Name	Data Field Type
Addresses	Text
Class	Text
Field Replaceable	Text
First Published	First Published Date
Free Text	Text
Last Updated	Last Updated Date
Manufacturer	Text
Model	Text
Platform Certificate	Text
Platform Certificate URI	Text
Revision	Text
SCA Devices (Associated Components)	Related Records
Seagate Firmware Attestation (Seagate Drive Serial)	Related Records
Seagate Firmware Hash (Seagate Drive)	Related Records
Serial	Text
Tracking ID	Tracking ID
Version	Text
Associated Components	Cross-Reference

Table 3-4 HP UEFI Configuration Variables Application

Data Field Name	Data Field Type	Calculated
Associated Computing Device	Cross-Reference	
CompositeUUIDVariable	Text	1
Computing Device UUID	Text	
First Published	First Published Date	
HP Inc BIOS Configuration Status	Values List	
Last Updated	Last Updated Date	
Tracking ID	Tracking ID	
UEFI Variable Description	Text	2
UEFI Variable Friendly Name	Text	
UEFI Variable Name	Text	
UEFI Variable Possible Values	Text	3
UEFI Variable Recommended Values	Text	4
Value	Text	

Table 3-5 Calculated Fields (HP UEFI Configuration Variables)

Index	Calculation
1	CONCATENATE([Computing Device UUID],[UEFI Variable Name])
2	IF ([First Published]<>[Last Updated], "Change Detected", IF ([First Published]=[Last Updated], "No Change Detected"))
3	IF ([UEFI Variable Name]="SS_SB_KeyProt", "Provides enhanced protection of the secure boot databases and keys used by BIOS to verify the integrity and authenticity of the OS bootloader before launching it at boot.", IF ([UEFI Variable Name]="FW_RIPD", "Utilizes specialized hardware in the platform chipset to prevent, detect, and remediate anomalies in the Runtime HP SMM BIOS.", IF ([UEFI Variable Name]="TL_Power_Off", "HP Tamperlock feature: The system immediately turns off if the cover is removed while the system is On or in Sleep state S3 or Modern Standby.", IF ([UEFI Variable Name]="TL_Clear_TPM", "TPM is cleared on the next startup after the cover is removed. Be aware that all customer keys in the TPM are cleared. This setting should only be Enabled in a situation where manual recovery is possible using remote backups, or no recovery is desired. In the case of BitLocker being enabled, the BitLocker recovery key is required to decrypt the drive.", IF ([UEFI Variable Name]="SS_GPT_HDD", "HP Sure Start maintains a protected backup copy of the MBR/GPT partition table from the primary drive and compares the backup copy to the primary on each boot. If a difference is

Index	Calculation
	<p>detected, the user is prompted and can choose to recover from the backup to the original state, or to update the protected backup copy with the changes.",</p> <pre> IF ([UEFI Variable Name]="SS_GPT_Policy", "Defines Sure Start behavior to either Local User Control or Automatic to restore the MBR/GPT to the saved state any time differences are encountered.", IF ([UEFI Variable Name]="DMA_Protection", "BIOS will configure IOMMU hardware for use by operating systems that support DMA protection.", IF ([UEFI Variable Name]="PreBoot_DMA", "IOMMU hardware-based DMA protection is enabled in a BIOS pre-boot environment for Thunderbolt and / or all internal and external PCI-e attached devices.", IF ([UEFI Variable Name]="Cover_Sensor", "Policy defined actions taken when Tamperlock cover removal sensor is triggered. Administrator credential or password requires valid response before continuing to startup after the cover is opened.", IF ([UEFI Variable Name]="", "No Description", "No Description"))))))) </pre>
4	<pre> IF ([UEFI Variable Name]="SS_SB_KeyProt", "[Disable, Enable]", IF ([UEFI Variable Name]="FW_RIPD", "[Disable, Enable]", IF ([UEFI Variable Name]="TL_Power_Off", "[Disable, Enable]", IF ([UEFI Variable Name]="TL_Clear_TPM", "[Disable, Enable]", IF ([UEFI Variable Name]="SS_GPT_HDD", "[Disable, Enable]", IF ([UEFI Variable Name]="SS_GPT_Policy", "[Local user control, Recover in event of corruption]", IF ([UEFI Variable Name]="DMA_Protection", "[Disabled, Enabled]", IF ([UEFI Variable Name]="PreBoot_DMA", "[Thunderbolt Only, All PCI-e Devices]", IF ([UEFI Variable Name]="Cover_Sensor", "[Disable, Notify user, Administrator Credential, Administrator Password]", IF ([UEFI Variable Name]="", "No Possible Values", "No Possible Values"))))))) </pre>

Table 3-6 Seagate Firmware Attestation Application

Data Field Name	Data Field Type
Assessor Identifier	Text
Associated Computing Device	Cross-Reference
Device Nonce	Text
Firmware Version	Text
First Published	First Published Date
Last Updated	Last Updated Date
Root of Trust Identifier	Text
Root of Trust Nonce	Text
Seagate Drive Serial	Cross-Reference

Data Field Name	Data Field Type
Secure Boot Device State	Text
Signing Auth Database	Text
Tracking ID	Tracking ID

Table 3-7 Seagate Firmware Hash Application

Data Field Name	Data Field Type	Calculated
Associated Computing Device	Cross-Reference	
BFW IDBA Hash	Text	
BFW ITCM Hash	Text	
CFW Hash	Text	
Drive Serial Number	Text	
Firmware Hash Status	Values List	1
First Published	First Published Date	
History	History Log	
Last Updated	Last Updated Date	
Seagate Drive	Cross-Reference	
SEE Firmware Hash	Text	
SEE Signing AuthN Key Certificate Hash	Text	
SERVO Firmware Hash	Text	
Signing AuthN Key Certificate Hash	Text	
Tracking ID	Tracking ID	

Table 3-8 Calculated Fields (Seagate Firmware Hash)

Index	Calculation
1	IF ([First Published]<>[Last Updated], "Change Detected", IF ([First Published]=[Last Updated], "No Change Detected"))