

Sentinel LDK 9.0

SOFTWARE PROTECTION AND LICENSING TUTORIAL:
DEMO KIT



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Build 2303-1 DK-EMS

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Which Tutorial is Right for Me?

A number of tutorials for learning about Sentinel LDK are available. We recommend that you review the information below to ensure that you choose the tutorial that is most appropriate for your requirements.

All the tutorials are included in the Sentinel LDK Demo kit and Starter kit.

Software Protection and Licensing Tutorial — Sentinel SL (Software-based) Keys

This tutorial demonstrates how to protect and license an application with Sentinel SL (software) protection keys.

Requirements: Download the free Sentinel LDK Demo Kit. *No hardware keys are required to perform this tutorial.*

NOTE The remaining tutorials described below demonstrate how to protect and license an application with either Sentinel SL (software) or Sentinel HL (hardware) protection keys.

Software Protection and Licensing Tutorial — “Demo Kit” or “Starter Kit”

Sentinel LDK-EMS (Entitlement Management System) is used as the back office system to manage definition of Features and Products and to generate and track customer entitlements.

> The **Demo Kit** tutorial uses a provided demonstration hardware key.

Requirements: Obtain the free physical Sentinel LDK Demo Kit from your Thales sales representative or from the Thales web site.

> The **Starter Kit** tutorial uses your own Sentinel Developer key and Sentinel HL key to protect and license an application.

Requirements: Purchase the Sentinel LDK Starter kit and Sentinel HL protection keys from your Thales sales representative.

Software Protection and Licensing API Tutorial — “Demo Kit” or “Starter Kit”

These tutorials demonstrate how you can use Sentinel LDK APIs to generate and update licenses. It is assumed that you would use your own back office systems to handle all ERP functionality.

A **Demo Kit** tutorial and a **Starter Kit** tutorial are available as described above.

Introduction

Thank you for choosing to evaluate Sentinel License Development Kit (Sentinel LDK) as the method to protect and license your software against unauthorized use. In this Tutorial, you use the Sentinel LDK system to protect, license, and distribute software.

The strength, uniqueness, and flexibility of Sentinel LDK are based on two primary principles:

Protect Once—Deliver Many—Evolve Often™: the concept of separating the software engineering and business processes

Cross-Locking: the technology that supports the Protect Once—Deliver Many—Evolve Often concept, enabling a protected application to work with a Sentinel HL (hardware) or a Sentinel SL (software) key

All commercial decisions, package creation, and license definitions are executed by product or marketing managers after the protection has been implemented.

This workflow model provides you with greater flexibility and freedom when defining new sales and licensing models, including feature-based and component licensing, evaluation, rental, floating, subscription, trialware (trial/grace), pay-per-use, and more, enabling you to focus on revenue growth.

Sentinel Keys

Your Sentinel LDK - Demo Kit includes the following Sentinel Demo keys:

- > Sentinel HL Time (Driverless configuration) key



- > Sentinel HL Max (Driverless configuration) key



The Sentinel HL Time key provides an on-board real-time clock. All Sentinel HL (Driverless configuration) keys can be used without installing a Run-time environment on the end user's computer. For a complete description of each key, see the [Sentinel HL Data Sheet](#).

You can use any of these keys to perform the lessons in this tutorial. (Use the same key for all lessons in the tutorial.)

Roles

The Sentinel LDK system is role-based, and the tasks you can perform depend on the user roles assigned to you by the Sentinel LDK Administrator.

In order to enable you to experience the broad functionality of the Sentinel LDK system in this tutorial, you will have access to all roles. The roles you assume in the various lessons include:

> **Product Manager** role

The person, usually a product manager, who determines the product components to be protected (called Features in Sentinel LDK), how these components are used to define Products, and the license structure for the Products.

> **Development** role

The person, usually a software engineer, who protects the software using Sentinel LDK Envelope or the Sentinel Licensing API, and performs other development-related tasks, such as generating the Sentinel Runtime Environment Installer.

> **Customer Services** role

The person responsible for performing manual Product activations.

> **Entitlement Manager** role

The person responsible for defining and managing customer entitlements (orders).

> **Production** role

The person responsible for producing customer entitlements.

In addition, you will assume the role of an end user in order to test, use, and update the products licensed using Sentinel LDK.

Conventions

Each of the lessons in this tutorial begins with a focused breakdown of the lesson, similar to the following:

Objective:	A short description of the lesson objective
Roles in this lesson:	The role or roles that you assume during the lesson
Applications used:	Sentinel LDK applications that you use in the lesson

Lessons in This Tutorial

This tutorial is based on a Windows operating system and includes the following lessons:

- > ["Preliminary Preparation" on page 9](#) – In this lesson, you install the Sentinel LDK system and learn how to launch Sentinel Vendor Suite.
- > ["Defining Features" on page 11](#) – In this lesson, you use Sentinel LDK-EMS to define two programs as Features, which you will later license and protect.

-
- > ["Protect Once" on page 14](#) – In this lesson, you use Sentinel LDK Envelope to apply protection to your software.
 - > ["Defining Products" on page 18](#) – In this lesson, you use Sentinel LDK-EMS to define your offering by defining Products based on the Features you already defined and protected.
 - > ["Defining an Unlocked Trialware Product" on page 22](#) – In this lesson, you use Sentinel LDK-EMS to define an Unlocked Trialware Product based on one of the Products you defined, enabling you to distribute a trial version of your software later.
 - > ["Creating and Distributing an Entitlement for Sentinel SL-protected Software" on page 25](#) – In this lesson, you lock your protected software to a Sentinel SL key for later distribution. You will create an entitlement, define a customer, code the Sentinel SL key, and use the software as an end user. You will also learn how to activate a license, in order to convert the trial version of a program to a full-featured program.
 - > ["Creating and Distributing an Entitlement for Sentinel HL-protected Software" on page 30](#) – In this lesson, you lock your protected software to a Sentinel HL key for later distribution. You will create an entitlement, define a customer, code the Sentinel HL key, and use the software as an end user. You will also learn how to create a license update for a deployed Product that has its license locked to a Sentinel HL key.
 - > ["Using Sentinel Licensing API" on page 36](#) – In this lesson, you learn how to program the memory on Sentinel protection keys.

We recommend that you follow the lessons sequentially to familiarize yourself with the Sentinel LDK system and to gain a clear understanding of the strength of the Protect Once—Deliver Many—Evolve Often model, and the flexibility it provides.

Additional Resources

You can use the following resources to help you learn about the Sentinel LDK system:

- > [Sentinel LDK Software Protection and Licensing Guide](#)

This book describes Sentinel LDK licensing concepts and provides a detailed overview of the system.

- > [Sentinel LDK Release Notes](#)

The Release Notes provide information about the current release, including:

- latest enhancements
- supported platforms
- available documentation
- known issues

LESSON 1: Preliminary Preparation

Objective:	Prepare your computer and Sentinel LDK for the tutorial
Applications used:	<ul style="list-style-type: none">> Sentinel LDK installation package> Sentinel Vendor Suite

The procedures in this lesson are required in order for you to be able to implement the processes outlined in subsequent lessons of this tutorial. They include:

- > Instructions for installing the Sentinel LDK software, including Sentinel LDK-EMS Server
- > Instructions for launching Sentinel Vendor Suite

Installing the Sentinel LDK Software

Before proceeding with this tutorial, install the Sentinel LDK software on your computer.

CAUTION! Do not connect your Sentinel Demo key before installing the Sentinel LDK software!

For instructions on how to install Sentinel LDK-EMS and Sentinel LDK Vendor Tools, refer to the section “Installing Sentinel LDK With Sentinel LDK-EMS (On-Premises)” in the [Sentinel LDK Installation Guide](#).

During the installation procedure, you can accept most defaults.

When prompted for Installation Options, select:

- > **Vendor Suite**
- > **Entitlement Management System**
 - **Sentinel LDK-EMS - install on this machine**

When prompted to choose a setup type for Sentinel LDK-EMS, click the **Express** option.

Starting the Sentinel LDK Launcher

After completing the installation, launch Sentinel Vendor Suite as follows:

1. In the Windows Services window, ensure that the Sentinel LDK-EMS Service is active
2. From the **Start** menu, open **Sentinel LDK**. The Sentinel LDK Launcher is displayed. You can access the primary Vendor Suite applications from this screen.

You are now ready to start the tutorial.

LESSON 2: Defining Features

Objective:	Learn how to define Features
Roles in this lesson:	Product Manager
Applications used:	Sentinel LDK-EMS

A Feature is an identifiable functionality of a software application that can be independently protected or licensed. In Sentinel LDK, a Feature may be an entire application, a module, or a specific functionality such as Print, Save, or Draw.

Features are typically defined by the Product Manager based on business decisions, and are then implemented by the company's software engineers.

In this lesson, you assume the Product Manager role and use Sentinel LDK-EMS to define two Features for use in subsequent lessons.

To launch Sentinel LDK-EMS

1. From the **Start** menu, open **Sentinel LDK**. The Sentinel LDK Launcher is displayed.
2. In the Sentinel LDK Launcher, click **Sentinel LDK-EMS**.
3. In the **User ID** and **Password** fields, type `admin`.

NOTE The first time you log in to Sentinel LDK-EMS, you must change the default password for the **admin** account. You can also change this password at any time from the top-right corner of Sentinel LDK-EMS.

4. Click **Login**. The Sentinel LDK-EMS Home screen is displayed. Click the **Catalog** tab to see a typical web screen.

Sentinel LDK-EMS web screens typically includes the following:

- > Function bars, in which you select the function to perform
- > Main pane, in which you view and select items
- > Details pane, in which you view details of the item selected in the Main pane
- > Task buttons, which you use to perform actions

Function bars

Filter tool

Main pane

Task buttons

Details pane

Product	Product ID	Ref ID 1	Status	Type	Actions
Product A	36		Complete	Base	
MyProductHL	35		Complete	Base	
MyProduct	34		Complete	Base	
ProductcZNBHXIsr	33	33408	Complete	Base	
ProductpledOumBKN	32	88453	Complete	Base	
ProductNyequQeCWID	31	29347	Complete	Base	
ProductUPGKurPHic	30	12819	Complete	Base	
ProductBExirFKzBg	29	82253	Complete	Base	
ProductLmVxkTPmwh	28	85451	Complete	Base	
ProductkvfydDljwD	27	48540	Complete	Base	
ProductYyfnIIGC	26	15229	Complete	Base	
ProductVXJuswVePc	25	14158	Complete	Base	

Feature	License Terms	Excludable?
Diamond 2.0	Perpetual	<input type="checkbox"/>
DMBTFeature	Perpetual	<input checked="" type="checkbox"/>

Defining a Feature for the Sample Bouncing Ball Program

In this section, you define a Feature for an existing program, the Bouncing Ball sample program supplied with Sentinel LDK.

To define the Bounce Feature

1. From the function bar of the Sentinel LDK-EMS screen, **click Catalog > Features**. The Features screen is displayed. This screen shows the list of Features defined and displays details of the current Feature. The right side of the screen contains task buttons for the tasks that can be performed in this screen.
2. Click **New Feature**. The Create Feature screen is displayed.
3. In the **Feature Name** field, type `Bounce`.
4. In the **Feature ID** field, erase the default value and type `50`.
5. Click **Save**. The Create Feature screen closes and the “Bounce” Feature you defined is displayed in the main pane of the Features screen.

Defining a Feature for the MyNotepad Program

In this section, you define a Feature for the MyNotepad program. You will create the MyNotepad program in ["Protect Once" on page 14](#).

To define the MyNotepad Feature

1. In the Sentinel LDK-EMS screen, display the Features screen.
2. Click **New Feature**. The Create Feature screen is displayed.
3. In the **Feature Name** field, type `MyNotepad`.
4. In the **Feature ID** field, erase the default value and type `10`.

NOTE If a message is displayed informing you that this Feature ID is not available, **do not** use a different Feature ID number. Close the Add Feature screen, and in the main pane of the Features screen, identify Feature 10 and note its name. For the remainder of this tutorial, continue to use Feature ID 10, with the name you noted (instead of MyNotepad).

5. Click **Save**. The Create Feature screen closes and the MyNotepad Feature you defined is displayed in the main pane of the Features screen.
6. Close the Sentinel LDK-EMS browser window.

LESSON 3: Protect Once

Objective:	Learn how to apply Sentinel LDK automatic protection functionality
Roles in this lesson:	Development
Applications used:	Sentinel LDK Envelope

In this lesson, you use Sentinel LDK Envelope to define protection parameters for two programs, using the two Features you defined earlier.

Sentinel LDK Envelope is an innovative, advanced solution for protecting software against illegal or unauthorized use. The solution deters illegal access and execution of protected applications.

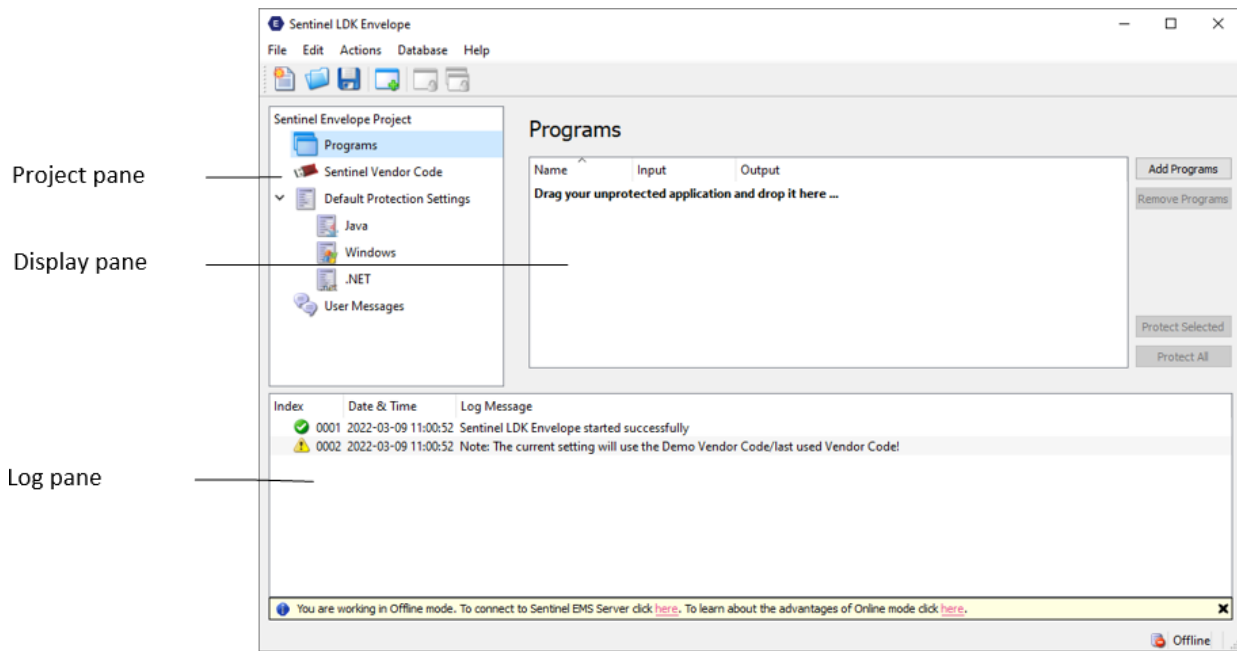
A deployed Sentinel LDK-protected program requires access to a Sentinel protection key in order to run. The protected program queries the Sentinel protection key for predefined information. If the Sentinel protection key is not present, or the information returned is incorrect, the program does not execute, or stops functioning.

Protecting the Sample Bouncing Ball Program

In this section, you launch Sentinel LDK Envelope and identify the Vendor Code with which you will protect the software. You then define an end-user error message. Finally, you protect the Bouncing Ball program.

The Sentinel LDK Envelope window includes the following:

- > Project pane, in which you select the function to perform
- > Display pane, in which you select items and perform actions. The name of the pane changes to reflect the function you selected in the Project pane—for example, in the screen below, the Display pane has the title **Programs**.
- > Log pane, in which Sentinel LDK Envelope messages are displayed



To prepare for protection

1. Connect your Demo key.
2. From the **Start** menu, open **Sentinel LDK**. The Sentinel LDK Launcher is displayed.
3. Click **Envelope** to launch Sentinel LDK Envelope. The Sentinel LDK Envelope main window is displayed.
4. Before protecting an application, Sentinel LDK Envelope must identify the correct Vendor Code. In the **Sentinel LDK Envelope Project** pane, select **Sentinel Vendor Code**.
5. In the right pane of the Sentinel Vendor Code window, click **Toggle connection with the Server**. The Log In to Sentinel LDK-EMS screen is displayed.
6. Enter the user name and password to log in to Sentinel LDK-EMS; then click **OK**. (The default user name and password are **admin – admin**.) The available Vendor Codes are displayed in the **Sentinel Vendor Codes** pane.
7. Select **Use Vendor Code from Database**, and then select the DEMOMA Vendor Code.

To protect the Bouncing Ball program

1. In the Sentinel LDK Envelope **Project** pane, select **Programs**.
2. Click **Add Programs** in the top right of the **Programs** pane.

The Add Programs window is displayed, showing the contents of the \VendorSuite\samples folder.

If a different folder is displayed, browse to:

```
%ProgramFiles(x86)%\Thales\Sentinel LDK\VendorTools\VendorSuite\samples\
```

3. Select **Win32_Bounce.exe** and click **Open**. Win32_Bounce is now listed in the **Programs** pane.

4. In the **Project** pane, under **Programs**, select **Win32_Bounce**. The **Display** pane lists the Protection Details.
5. In the **Name** field (to the right of the **Feature ID** field), select **Bounce** from the list (the Feature that you defined for the Bounce program in ["Defining Features" on page 11](#)).
6. In the **Project** pane, under **Default Protection Settings**, select **Windows**. The **Display** pane now displays **Windows - Default Protection Settings**.
7. In the **Windows - Default Protection Settings** pane, decrease the number of **Periodic background checks** from the default value to **5** seconds. This means that during run-time, the protected program will check every 5 seconds to ensure that the required Sentinel HL key is connected.
8. In the **Project** pane, under **Programs**, select **Win32_Bounce**, then in the **Display** pane, click **Protect Selected**. A message informs you that the protection process is running.
9. Click **Close** when Sentinel LDK Envelope notifies you that the protection process has completed.

The protected Bouncing Ball program is saved in this folder:

```
%HomePath%\Documents\Thales\Sentinel LDK 9.0\VendorTools\VendorSuite\Protected
```

Protecting the MyNotepad Program

In this section, you create a copy of the Thales text viewer sample application, define protection parameters for protecting it using the MyNotepad Feature, and protect the program.

To protect the MyNotepad program

1. Locate the Thales text viewer application (textviewer.exe). This utility can be found under:


```
%ProgramFiles(x86)%\Thales\Sentinel LDK\VendorTools\VendorSuite\samples\
```
2. Create a copy of the text viewer application and rename it **MyNotepad.exe**.
3. Verify that your Demo key is connected to your computer.
4. If it is not already open, launch Sentinel LDK Envelope. The Sentinel LDK Envelope main window is displayed.
5. Select the program to protect:
 - a. In the **Sentinel LDK Envelope Project** pane, select **Programs**.
 - b. Click **Add Programs** in the top right of the **Programs** pane. The Add Programs window is displayed.
 - c. Navigate to the folder where MyNotepad.exe is located. Select the file and click **Open**. Note that a new **MyNotepad** entry is displayed in the **Project** pane under **Programs**.

6. Protect the selected program:
 - a. In the **Project** pane, under **Programs**, select **MyNotepad**. The **Display** pane lists the Protection Details.
 - b. In the **Feature ID** field, type **10** (the Feature defined for the MyNotepad program in "[Defining Features](#)" on [page 11](#)).
 - c. In the **Project** pane, under **Default Protection Settings**, select **Windows**. The **Display** pane now displays **Windows - Default Protection Settings**.
 - d. In the **Windows - Default Protection Settings** pane, ensure that **Periodic background checks** is set to **5** seconds.
 - e. In the **Project** pane, under **Programs**, select **MyNotepad**, then in the **Display** pane, click **Protect**. A message informs you that the protection process is running.
 - f. Click **Close** when Sentinel LDK Envelope notifies you that the protection process has completed. The protected MyNotepad program is saved in this folder:

```
%HomePath%\Documents\Thales\Sentinel LDK 9.0\VendorTools\VendorSuite\Protected
```
7. Close Sentinel LDK Envelope. You are prompted to save the changes to the current project.
8. Click **Save**. The Save As dialog box is displayed.
9. In the **File Name** field, type **Tutorial** and click **Save**. The dialog box closes and the project is saved.

LESSON 4: Defining Products

Objective:	Learn how to define the Products you want to license
Roles in this lesson:	Product Manager
Applications used:	Sentinel LDK-EMS

A *Product* is a licensing entity that represents one of the vendor’s marketable software products. The Product is coded into the memory of a Sentinel key and contains one or more Features. License terms are defined for each Feature in a Product.

Like Features, Products are defined using Sentinel LDK-EMS. Typically, this function is performed by the Product Manager, and implemented by the software engineer. In a true production environment, a number of Products might be defined and held in readiness for inclusion in customer entitlements. However, you can define new Products—mixing and matching Features—at any time.

In this lesson, you define a number of Products. The Products will include license terms for the Bounce and MyNotepad Features you defined in ["Defining Features" on page 11](#). The Products that you define now will be included in the entitlements you define in later lessons.

In this lesson, you define the following Products:

- > “Bounce_Lite”—A “rental” Product, in which the license expires after three executions
- > “Bounce_Full”—A “full-featured” Product, in which the license enables unrestricted access to all the Features in the program. This Product will be created by duplicating the “rental” Product and modifying the license terms.
- > “MyNotepad_Full”— A “full-featured” Product that enables unrestricted access to all the Features in the program

NOTE In ["Creating and Distributing an Entitlement for Sentinel SL-protected Software" on page 25](#), and ["Creating and Distributing an Entitlement for Sentinel HL-protected Software" on page 30](#) you will assume the role of an end user, and will install licenses and run these Products.

Defining a Product With an Execution-based License

In this lesson, you define a Product based on the Bounce Feature (**ID 50**), with a license that enables the program to be launched three times. Following the third execution, the license must be updated to enable further use of the program.

To define a Product

1. Launch Sentinel LDK-EMS.
2. From the function bar in the Sentinel LDK-EMS screen, select **Catalog > Products**. The Products screen is displayed.
3. Click **New Product**. The Create Product screen is displayed.
4. In the **Name** field, type `Bounce_Lite`.
5. In the **Locking Type** field, select **HL or SL (AdminMode or UserMode)**. This option enables the protection type to be determined at the time when each entitlement is defined.
6. On the **Product Features** tabbed page, click **Add Features**.
7. On the Add Features to Product screen, select the check box next to the **Bounce** Feature and click **Add Features to Product**.
8. On the **Product Features** tabbed page, click **Configure** on the **Bounce** Feature line to specify the license terms for the Feature. The Configure License Terms screen is displayed.
9. In the **License Type** field, select **Execution Count**.
10. Under **License Terms**:
 - a. Clear the check box for **Specify at entitlement time**.
 - b. In the **Executions** field, type 3.
11. Click **Save**. The Configure License Terms screen closes and the license terms are displayed in the **License Terms** column.
12. Click **Save as Complete**. The new `Bounce_Lite` Product is displayed in the Products screen. The status for the Product is listed as **Complete**. This indicates that the Product is available for distribution.

Defining Products With Full-Featured Licenses

In this section, you duplicate existing Products in order to define two additional Products:

- > A Product based on the Bounce Feature (ID 50), with a perpetual license that will allow the end user unlimited access to the program. This Product will later be used to update the limited, execution-based `Bounce_Lite` Product to a full-featured license.

- > A Product based on the MyNotepad Feature (ID 10), with a perpetual license that will allow the end user unlimited access to the program. In *"Defining an Unlocked Trialware Product" on page 22*, you will define an evaluation MyNotepad Product. The MyNotepad_Full Product you define in this lesson will later be used to update the evaluation license to a full-featured license.

To define the Bounce_Full Product

1. From the function bar in the Sentinel LDK-EMS screen, select **Catalog > Products**. The Products screen is displayed.
2. Click **New Product**. The Create Product screen is displayed.
3. In the **Name** field, type `Bounce_Full`.
4. In the **Locking Type** field, select **HL or SL (AdminMode or UserMode)**. This option enables the protection type to be determined at the time when each entitlement is defined.
5. On the **Product Feature** tabbed page, click **Add Features**.
6. On the Add Features to Product screen, select the check box next to the **Bounce** Feature and click **Add Features to Product**.
7. On the **Product Features** tabbed page, note that the License Type for the Bounce Feature is **Perpetual** by default. Therefore, it is not necessary to perform any additional configuration for the Feature.
8. Click **Save as Complete**. There are now two items listed in the Products screen: `Bounce_Lite` and `Bounce_Full`. The status for the `Bounce_Full` Product is listed as **Complete**.

To define the MyNotepad_Full Product

1. From the function bar in the Sentinel LDK-EMS screen, select **Catalog > Products**. The Products screen is displayed.
2. Click **New Product**. The Create Product screen is displayed.
3. In the **Name** field, type `MyNotepad_Full`.
4. In the **Locking Type** field, select **HL or SL (AdminMode or UserMode)**. This option enables the protection type to be determined at the time when each entitlement is defined.
5. On the **Product Feature** tabbed page, click **Add Features**.
6. On the Add Features to Product screen, select the check box next to the **MyNotepad** Feature and click **Add Features to Product**.
7. To define memory data, click the **Memory** tab (next to the **Product Features** tab), and then do the following:
 - a. Click **New**. The New Memory Segment screen is displayed.
 - b. In the **Offset** field, type `0`. (Afterward, this will change automatically to `0x0000`).
 - c. In the **Length** field, type `16`.
 - d. In the **Text** field, type `Hello World`.

LESSON 5: Defining an Unlocked Trialware Product

Objective:	Learn how to define an Unlocked Trialware Product that can be supplied as a trial product
Roles in this lesson:	<ul style="list-style-type: none">> Product Manager> Development
Applications used:	Sentinel LDK-EMS

In this lesson, still in the Production Management role, you define the “MyNotepad_Evaluation” Product as a trial version of the “MyNotepad_Full” Product you defined in [“Defining Products” on page 18](#). You then assume the Development role to prepare the Product for distribution by creating a customized Sentinel Run-time Environment Installer executable file.

An Unlocked Trialware Product is typically used for evaluation purposes, to enable the provision of a grace period, or for super-distribution. An Unlocked Trialware Product can be used on any computer for a limited time period. After the allotted period expires, the software no longer runs unless it is activated with a Sentinel protection key.

Defining an Unlocked Trialware Product

In this section, in the Production Management role, you define the “MyNotepad_Evaluation” Product—an Unlocked Trialware Product that is a trial version of the “MyNotepad_Full” Product, with a license that expires 60 days after the application is first used.

To define an Unlocked Trialware Product

1. From the function bar in the Sentinel LDK-EMS screen, select **Catalog > Products**. The Products screen is displayed.
2. In the list of Products, select the **MyNotepad_Full** Product.
3. From the task buttons, select **Actions > Unlocked**. The Create Unlocked Product screen is displayed.
4. In the **Name** field, type `MyNotepad_Evaluation`. Note that:
 - The **Base Product** field displays **MyNotepad_Full**.

- The MyNotepad Feature you defined in "Defining Features" on page 11 is included in the Product with the **Unlocked (Time Period)** license type. For an Unlocked Trialware license, the user is granted a usage period of 30 days by default.
5. On the **Product Features** page, click **Configure** for the **MyNotepad** Feature.
 6. In the Configure License Terms screen, change the value for **Number of Days** from **30** to **60**.
 7. Click **Save**. The Configure License Terms screen closes.
 8. Click **Save as Complete**.

Defining a Bundle of Unlocked Trialware Products

In this section, you assume the Development role. You bundle the "MyNotepad_Evaluation" Unlocked Trialware Product that was defined by the Product Manager. You then prepare a Sentinel LDK Run-time Environment Installer executable file. (In a true production environment, you would embed this file in your own application installer.)

To define a bundle of Unlocked Trialware Products

NOTE For the purposes of this tutorial, ensure that the *Download location* (described below), if it exists, does not contain any V2C files at this point.

1. From the function bar in the Sentinel LDK-EMS screen, select **Developer > Bundle Unlocked Products**. The Bundle Unlocked Products screen is displayed.
2. Verify that **DEMOMA** is selected in the **Batch Code** field.
3. Select the task **Actions > Add**. The Products screen is displayed.
4. Select the **MyNotepad_Evaluation** entry and click **OK**. The Products screen closes and the MyNotepad_Evaluation Product is displayed in the Bundle Unlocked Products screen.

NOTE An Unlocked Products bundle can contain any number of Unlocked Trialware Products. In this procedure, you are only adding a single Unlocked Trialware Product—MyNotepad_Evaluation—to the Unlocked Products bundle.

5. In the **Product Details** pane, select the check box for the **MyNotepad_Evaluation** Product.
6. Click **Produce V2C**. The V2C file is generated.
7. Choose the option to save the file. The file is saved to:

`%HomePath%\Documents\Downloads\`

NOTE The location to which the file is saved may vary depending on your operating system and web browser. For the remainder of the lessons in this tutorial, this location is referred to as the *Download location*.

Preparing a Sentinel Run-time Environment Installer

Remaining in the Development role, you now prepare a Sentinel Run-time Environment Installer executable that includes the V2C file you created. (The Installer automatically applies any V2C file located in the same directory.) The Run-time Environment may be required on the end user's computer in order for your Sentinel LDK protected and licensed program to function correctly. (This depends on the type of protection key that you will be providing. For this tutorial, you will install the Run-time Environment.)

You need only embed the V2C file and the Installer executable in your software setup to create a ready-to-run Sentinel LDK-protected and licensed program. In this scenario, you have already specified that the MyNotepad program will run in Trial mode for a maximum of 60 days.

To prepare a Sentinel Run-time Environment Installer executable

1. A Run-time Environment Installer is available on the machine where you installed Sentinel LDK. Copy the file **haspdinst.exe** from the directory `%ProgramFiles(x86)%\Thales\Sentinel LDK\Redistribute\Runtime Environment\cmd Install` to the Download location described earlier. The Download location now contains both the Installer and the V2C file.

NOTE Do not execute the generated file at this time! You will install this bundle in *"Creating and Distributing an Entitlement for Sentinel SL-protected Software" on page 25*.

You are now ready to ship your Product with its license locked to either:

- > a Sentinel SL key, as described in *"Creating and Distributing an Entitlement for Sentinel SL-protected Software" on page 25*.

OR

- > a Sentinel HL key, as described in *"Creating and Distributing an Entitlement for Sentinel HL-protected Software" on page 30*.

LESSON 6: Creating and Distributing an Entitlement for Sentinel SL-protected Software

Objective:	<ul style="list-style-type: none">> Learn how to define an entitlement locked to a Sentinel SL key, specify the customer for the entitlement, and produce the entitlement.> Simulate a variety of end-user interactions with programs protected by Sentinel protection keys.
Roles in this lesson:	<ul style="list-style-type: none">> Entitlement Manager> Production> End User
Applications used:	<ul style="list-style-type: none">> Sentinel LDK-EMS> Sentinel LDK-EMS Customer Portal> Admin Control Center

In this lesson, you assume the Entitlement Manager role and define an entitlement. For the order process, you also define the customer and produce the entitlement so that it is ready for shipment.

The entitlement you define is based on the “MyNotepad_Full” Product that you defined in ["Defining Products" on page 18](#). The license is locked to a Sentinel SL key that will be activated on the end-user’s machine to convert the trial MyNotepad software to a full-featured product.

When you defined the Products, you specified the license terms for the Features included within those Products at that time. Note that instead of specifying the license terms when you defined the Product, you could have enabled the functionality for specifying the license terms at this stage as part of order processing.

In this lesson, you will also assume the end-user role to install and use the Product. You will then use the Sentinel SL Product Key received from the vendor to convert a trial version of the software to a full-featured program.

NOTE When a customer wants to purchase additional Features or to extend the current license for a Product that has its license locked to a Sentinel SL key, you can update the deployed license, as described in ["Creating an Update for a License in the Field" on page 33](#).

Defining a Perpetual License With a Product Key

In this section, you create an entitlement for the “MyNotepad_Full” Product that you defined in ["Defining Products" on page 18](#), locked to a Sentinel SL key. This license will then be used to convert the trial MyNotepad_Evaluation Product you defined in ["Defining an Unlocked Trialware Product" on page 22](#) to a full-featured product.

To define an entitlement with a perpetual license

1. From the function bar in the Sentinel LDK-EMS screen, select **Customers**. The Customers screen is displayed.
2. Click **New Customer**. The Create Customer screen is displayed.
3. Ensure that the type **Company** is selected.
4. In the **Company Name** field, type `Bob Doe Ltd.`
5. In the **Contact Information** pane, enter your own (or any other) name and email information.
6. Click **Save**. The new customer is listed in the Customer screen.
7. From the function bar in the Sentinel LDK-EMS screen, select **Entitlements**. The Entitlements screen is displayed.
8. Click **New Entitlement**. The Create New Entitlement screen is displayed.
9. In the **Customer** field, type `Bob`.
10. Select **Bob Doe Ltd.** from the list of customers that appears. The full name of the customer is displayed.
11. In the **Product Details** pane, click **Add Product**.
12. In the Product Selection screen, select the check box for **MyNotepad_Full** and click **Add Product to Entitlement**. The MyNotepad_Full Product is added to the Product list.
13. Select the check box for **MyNotepad_Full**.
14. For **Entitlement Type**, ensure that **Product Key** is selected. Accept all other default values.
15. Click **Produce**. The Download Product Keys screen is displayed.
16. Click **Download**.
17. Choose the option to save the Product Keys file. The file is saved to the Download location (described in ["Defining a Bundle of Unlocked Trialware Products" on page 23](#)).

In the Entitlements screen, the new entitlement is displayed with the status **Product Keys Generated**.

Installing a Trial Product

In this section, you simulate the experience of the end user when installing and running your MyNotepad “trial” software program.

Although in a true production environment your software engineer would typically embed the Run-time Environment installation which includes the trialware license (for trial use) into your software installation so that it executes as part of the installation process, in this tutorial you perform several installation and simulation steps.

To install the Sentinel Run-time Environment and trialware license on an end-user machine

1. From the **Start** menu, select **Run**.
2. Click **Browse** and navigate to the Download location (described in ["Defining a Bundle of Unlocked Trialware Products" on page 23](#)) that contains the RTE Installer (**haspdinst.exe**) and V2C file that you created earlier.
3. Select the **haspdinst.exe** file and click **Open**. The browse window closes and the file path is displayed in the **Open** field.
4. In the **Open** field, type a space followed by `-i` at the end of the file path.

For example:

```
"C:\Users\Thomas\Downloads\haspdinst.exe" -i
```

5. Click **OK**. The Sentinel Run-time Environment is installed and a success message is displayed. The V2C file that is present in Download location together with Run-time Environment Installer is applied automatically to create the trial license.

To confirm the license status of the trial Product

1. Navigate to the following folder:


```
%HomePath%\Documents\Thales\Sentinel LDK 9.0\VendorTools\VendorSuite\Protected
```
2. Double-click **MyNotepad.exe**. A message is displayed to warn you that the program is only protected with a demo Sentinel protection key.
3. Click **OK**.
4. While the application is running, from the **Start** menu, open **Sentinel LDK**. In the Sentinel LDK Launcher, click **Additional Tools > Admin Control Center**. (The Admin Control Center is part of the Run-time Environment.)
5. In the **Options** pane, select **Sentinel Keys**. All the Sentinel protection keys that are accessible on the Sentinel License Manager are displayed.

#	Location	Vendor	Key ID	Key Type	Version	Sessions	Actions
0	Local	DEMOMA	1143840225975854213	SL Admin-mode	2.00	-	Products Features Sessions Certificates

6. Locate the entry for your Demo key and click the **Features** button in the **Actions** column. The Features that are licensed in your key are displayed. Note that the **Logins** field shows that there is currently one login to MyNotepad_Evaluation and that the **Restrictions** field for Feature ID 10 indicates that the 60-day trial has begun.
7. Close the MyNotepad program.

Notifying the Customer

Sentinel LDK-EMS can be configured so that when you produce an entitlement, Sentinel LDK-EMS automatically sends an email notification to the customer. This email contains the Product Key and a link to the Sentinel LDK-EMS *Customer Portal*.

The *Customer Portal* is a web portal in your installation of Sentinel LDK-EMS that your customers access to activate the licenses for their full-featured Products.

A typical email notification looks like this:

Dear Bob Doe,

Congratulations! An entitlement has been created for you with the following details:

Entitlement Details		
Start Date:	05/03/2012	End Date:
Customer:	Bob Doe Ltd (E-mail: BobDoe@safenet-inc.com)	
Channel Partner:		
Product key:	02572219-68f6-4ff7-9420-a8fd64bdf2aa	Quantity (per product key):
Products		
Name	Lock Type	
MyNotepad_Full	SL-AdminMode	

Now, follow the steps given below to activate and manage your entitlement(s):

1. Access the Entitlement Management System at <http://localhost:8080/ems/customerLogin.html>.
2. Log on using product key given above.

This notification provides all the information that the customer needs to activate the Product.

To simplify this tutorial, we did not configure Sentinel LDK-EMS to send email notifications, so we will simulate the end-user experience.

Activating a License With a Product Key

In this section, still in the role of the end user, you assume that you have purchased the MyNotepad_Full program and received an email notification from the vendor. You use the Product Key to convert the trial version of the software to a full-featured program that is locked to your machine.

To activate the protected program

1. To access the Customer Portal, the customer would click a link provided in the email notification.

To simulate this action, click the link below or enter the URL in your Web browser address field:

<http://localhost:8080/ems/customerLogin.html>

The Sentinel LDK-EMS Product Key Login screen is displayed.

2. The customer would copy the Product Key from the email notification and paste it into the **Product Key** field in the login screen. To simulate this action, open the **.txt** file that contains the Product Key you generated earlier in this lesson in "Defining a Perpetual License With a Product Key" on page 26. This file can be found in the Download location described in "[Defining a Bundle of Unlocked Trialware Products](#)" on page 23.

Copy the Product Key from the file and paste it into the **Product Key** field in the login screen. Click **Login**.

The Sentinel LDK-EMS Activation screen is displayed. This screen contains information about the entitlement. If the entitlement allows multiple activation, this screen indicates how many activations remain.

The customer can choose to perform online activation or offline activation.

Offline activation can be used if the license will be installed on a machine from which it is not possible to access the Customer Portal. This includes downloading a utility from Sentinel LDK-EMS and transferring files manually to and from the target machine.

Most customers will prefer to use online activation.

3. Click **Online Activation**. A progress indicator is displayed for a few seconds, followed by the message **Activation installed successfully**.
4. This marks the end of the activation process. Click **Close** to dismiss the notice.
5. Open Sentinel Admin Control Center to see that you now have a **Perpetual** license for Feature ID 10.

LESSON 7: Creating and Distributing an Entitlement for Sentinel HL-protected Software

Objective	<ul style="list-style-type: none">> Learn how to define an entitlement locked to Sentinel HL keys, specify the customer for the entitlement, and produce the entitlement> Simulate a variety of end-user interactions with programs protected by Sentinel protection keys> Learn how to update a license in the field
Role in this lesson	<ul style="list-style-type: none">> Entitlement Manager> Production> End User
Applications used	<ul style="list-style-type: none">> Sentinel LDK-EMS> Admin Control Center

In this lesson, you assume the Entitlement Manager role and define two different customer orders. For the order process, you define an entitlement, define a new customer, and produce the entitlement so that it is ready for shipment. You also assume the end-user role to test different types of Sentinel protection keys and licenses.

When a customer wants to purchase additional Features, or to extend the current license for your protected program, you can update the deployed license without having to recall or redeploy keys.

In this lesson, you will also assume the Entitlement Manager role and learn how to update the deployed license.

The entitlements that you define are based on the Products that you defined in ["Defining Products" on page 18](#), and include:

- > An entitlement for the Bounce_Lite Product.
- > An entitlement for the Bounce_Full Product. This entitlement will be used to update the license on the Sentinel HL key provided to the end user with the Bounce_Lite Product. You will learn how to convert its functionality from Bounce_Lite to Bounce_Full in the field.

When you defined the Products, you specified the license terms for the Features included within those Products at that time. Note that instead of specifying the license terms when you defined the Product, you could have enabled the functionality for specifying the license terms at this stage as part of order processing.

Defining a “Rental” Product Entitlement With Sentinel HL Locking

In this section, you define an entitlement for the Bounce_Lite Product, with its license locked to a Sentinel HL key.

To produce a Sentinel HL key-based entitlement for a customer

1. From the function bar in the Sentinel LDK-EMS screen, select **Customers**. The Customers screen is displayed.
2. In the **Batch Code** field, ensure that DEMOMA is selected.
3. Click **New Customer**. The Create Customer screen is displayed.
4. Ensure that the type **Company** is selected.
5. In the **Company Name** field, type `John Smith Ltd.`
6. In the **Contact Information** pane, enter your own (or any other) name and email information.
7. Click **Save**. The new customer is listed in the Customer screen.
8. From the function bar in the Sentinel LDK-EMS screen, select **Entitlements**. The Entitlements screen is displayed.
9. Click **New Entitlement**. The Create New Entitlement screen is displayed.
10. In the **Customer** field, type `John`.
11. Select **John Smith Ltd.** from the list of customers that appears. The full name of the customer is displayed.
12. In the **Product Details** pane, click **Add Product**.
13. In the Product Selection screen, select the check box for **Bounce_Lite** and click **Add Product to Entitlement**. The Bounce_Lite Product is added to the Product list.
14. Select the check box for **Bounce_Lite**.
15. For **Entitlement Type**, select **Hardware Key**.
16. In the **Number of keys** field, type `1`.

TIP At this point, you can “queue” the entitlement. The procedure that follows could then be performed by a person in the Production role, who is authorized to use Sentinel LDK-EMS only for the purpose of burning licenses to HL keys and does not have access to other functions.

To lock the license to a Sentinel HL key

1. Connect the Demo Sentinel HL key to which you want to burn the entitlement to your computer.
2. Click **Produce**. The Produce Sentinel HL Key screen is displayed.
3. In the list of keys, select the check box for your Sentinel HL key.
4. Click **Burn**. A graphical display indicates that the burn is taking place. Upon completion, a success message is displayed.
5. Close the Update Physical Key screen.

Using an Application With a Sentinel HL Key

When a customer receives an application that you protected with a Sentinel HL key, the actual key must be accessible by the application in order to run the program. In the following procedure, you assume the end-user role to test Bounce, with a Bounce_Lite license locked to a Sentinel HL key.

In this part of the lesson, you use Sentinel Admin Control Center to manage the use of your licensed software. In a true production environment, a system administrator in your customer's organization uses this Web-based application to manage network licenses for your software.

To operate a Product protected with a Sentinel HL key

1. Connect the Demo key on which you burned the entitlement to your computer. The required licensing information for Bounce_Lite is contained, in encrypted format, in the key. As long as the license is valid, the protected application can run.
2. (Optional) Examine the license on the HL key as follows:
 - a. From the **Start** menu, open **Sentinel LDK**. The Sentinel LDK Launcher is displayed. In Sentinel LDK Launcher, click **Additional Tools > Admin Control Center**. Sentinel Admin Control Center is displayed. This interface enables customers to track the status and usage of their Sentinel licenses.
 - b. In the **Options** pane, select **Sentinel Keys**. All the Sentinel protection keys that are accessible on the Sentinel License Manager are displayed.

#	Location	Vendor	Key ID	Key Type	Version	Sessions	Actions
0	Local	DEMOMA	1133728459601576022	SL Admin-mode	2.00	-	Products Features Sessions Certificates
1	Local	DEMOMA	1527760096	HL NetTime 10	3.25	-	Products Features Sessions Blink on

- c. Locate the entry for your Demo key and click the **Features** button in the **Actions** column. The Features that are licensed in your key are displayed.

Note that the **Restrictions** field for Feature ID 50 displays **Executions 3 left**, indicating that the remaining number of logins permitted by the license is **3**.

3. Navigate to the following folder:

%HomePath%\Documents\Thales\Sentinel LDK 9.0\VendorTools\VendorSuite\Protected

4. Double-click **Win32_Bounce.exe**. (A message is displayed, warning you that the program is only protected with a demo Sentinel key. Click **OK**.) The Bouncing Ball program launches.
5. Close the Bounce software.
6. Repeat step 4 and step 5 two more times, to consume all the permitted executions.
7. Repeat step 4. Bounce fails to open and a message is displayed indicating that the Feature has expired.
8. In Sentinel Admin Control Center, in the **Options** pane, select **Sentinel Keys**. All the Sentinel protection keys that are accessible on the Sentinel License Manager are displayed.
9. Locate the entry for your Demo key and click the **Features** button in the **Actions** column.

TIP If you are not sure which entry relates to your specific key, click the **Blink on** button and identify the key on which the LED is blinking.

Note that the **Restrictions** field for Feature ID 50 displays **Expired**, meaning that the number of allowed logins defined in the license has been exhausted.

Creating an Update for a License in the Field

John Smith requested a license upgrade—from Bounce_Lite to Bounce_Full. In this part of the lesson, you will assume the Order Management role to create an update for the deployed license, and the Production role to produce the entitlement for the updated license. You will then assume the role of the end user (John Smith) to activate the license update.

To produce an entitlement for a license update

1. From the function bar in the Sentinel LDK-EMS screen, select **Entitlements**. The Entitlements screen is displayed.
2. Click **New Entitlement**. The New Entitlement screen is displayed.
3. In the **Customer** field, type *John*.
4. Select **John Smith Ltd.** from the list of customers that appears. The full name of the customer is displayed.
5. In the **Product Details** pane, click **Add Product**.
6. In the Product Selection screen, select the check box for **Bounce_Full** and click **Add Product to Entitlement**. The Bounce_Full Product is added to the Product list.
7. Select the check box for **Bounce_Full**.
8. For the **Entitlement Type**, select the **Protection Key Update** option.
9. Click **Locate**. The Located Sentinel Keys screen is displayed.
10. Select Key ID, and then click **Locate**. The key information is displayed in the upper table.

11. In the list of protection keys, select the check box for John Smith's Sentinel HL key.
12. Click **Add To List**. The selected key is added to the **Sentinel Keys to Update** table.
13. In the **Sentinel Keys to Update** table, select the check box for John Smith's Sentinel HL key; then click **OK**. The Locate Sentinel Keys screen closes.
14. Click **Produce**. The Generate License screen is displayed.
15. In **License Output Type**, select the **V2C** option.
16. Click **Generate**. The message **V2C generated successfully** is displayed at the top of the screen.
17. In the **Activation Details** pane, click **Download V2C File**. Save the file to your desktop.

The file saved is named **[KeyID].v2c**, where **[KeyID]** is Key ID of the Sentinel HL protection key for which the license was generated.
18. Click **Close**. The Generate License screen closes.

Updating a License at the Customer's Site

In this section, you retain the role of "John Smith Ltd." You have purchased a full-featured version (Bounce_Full) of the program to replace the execution-based Bounce_Lite version. You update your license using the Sentinel Admin Control Center and the HaspUpdate.v2c file you receive from the vendor.

To apply a license update

1. Ensure that the Demo key is connected to your computer.
2. Launch Sentinel Admin Control Center, as follows.
 - a. From the **Start** menu, open **Sentinel LDK**. The Sentinel LDK Launcher is displayed.
 - b. From the navigation pane, click **Additional Tools > Admin Control Center**. Sentinel Admin Control Center opens.
3. In the **Options** pane, select **Update/Attach**. The Update/Attach License window is displayed.
4. Click **Browse** and navigate to your desktop.
5. Select the **[HASP KeyID].v2c** file that you created when producing the entitlement for the license update in your Entitlement Manager role earlier, in step 17 in ["Creating an Update for a License in the Field" on the previous page](#).
6. Click **Open**. The file path is displayed in the **Select a V2C... file** field.
7. Click **Apply File**. A message is displayed confirming that your update was applied successfully.
8. In the **Options** pane, select **Sentinel Keys**.
9. Locate the entry for your Demo key and click the **Features** button. The Features that are licensed in your key are displayed.

Note that an additional row is created for Feature ID 50. The **Restrictions** field in this row is **Perpetual**, indicating that the remaining number of logins permitted by the license is unlimited.

10. Navigate to the following folder:

%HomePath%\Documents\Thales\Sentinel LDK 9.0\VendorTools\VendorSuite\Protected

11. Double-click **Win32_Bounce.exe**. A message is displayed, warning you that the program is only protected with a demo Sentinel key.

12. Click **OK**. The Bouncing Ball program launches.

13. Close the Bouncing Ball program and disconnect the Demo key.

NOTE This lesson demonstrates using Sentinel Admin Control Center to examine licenses and to update a license at the customer's site.

Sentinel Admin Control Center is part of the Sentinel LDK Run-time Environment. The Run-time Environment was placed on your computer when you installed Sentinel LDK Vendor Tools. However, the Run-time Environment is not required for Sentinel HL Driverless keys.

If you have not included the Run-time Environment with your protected application, you can update licenses at the customer's site using other methods. For more information, see the description of the Sentinel Remote Update System in the [Sentinel LDK Software Protection and Licensing Guide](#).

LESSON 8: Using Sentinel Licensing API

Objective	Learn how to implement Sentinel Licensing API functions using Sentinel LDK ToolBox
Role in this lesson	Development
Applications used	Sentinel LDK ToolBox

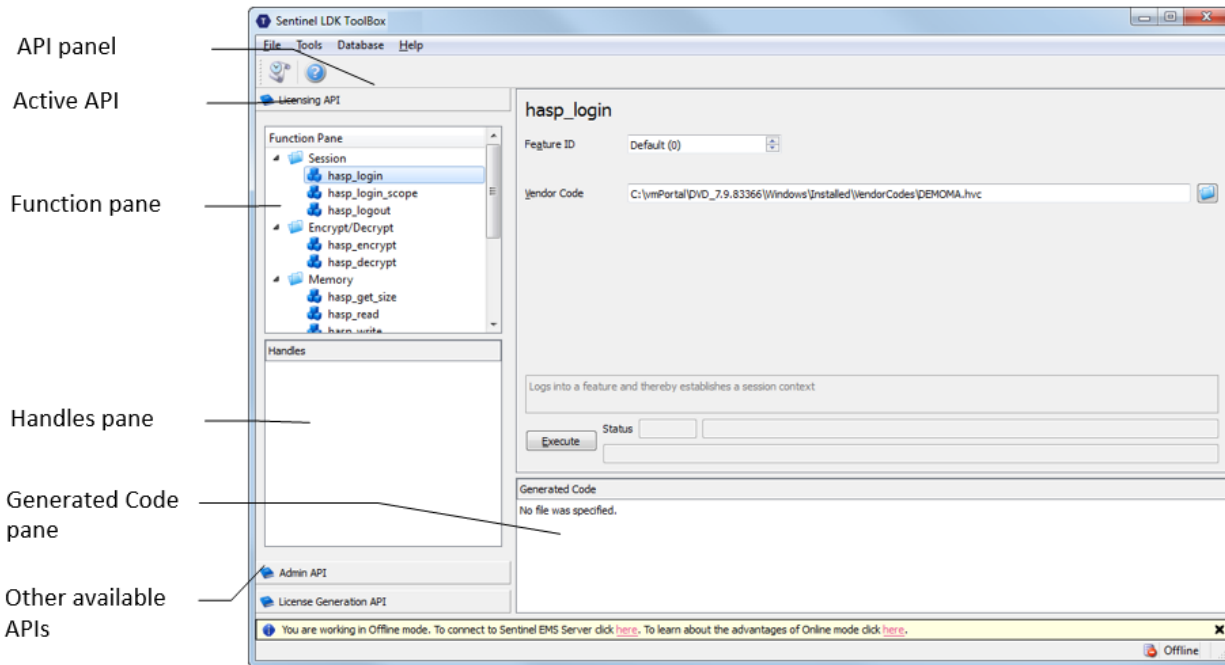
Now that you have completed the other lessons in this tutorial, you should have a good understanding of how Sentinel LDK works. This lesson builds on your accumulated knowledge and introduces you to the Sentinel Licensing API through Sentinel LDK ToolBox, which is an interactive GUI application that helps you familiarize yourself with various Sentinel APIs.

The Sentinel LDK system offers a rich variety of API calls to support customized protection of your program, as well as other operations on Sentinel protection keys.

You can also use Sentinel LDK ToolBox to generate source code that you can immediately copy and paste into your own application source code.

The Sentinel LDK ToolBox window contains these elements:

- > API panel, in which you select the API to work with
- > Function pane, in which you select the function to perform
- > Display pane, in which you can view and edit the details of the function call you selected
- > Generated Code pane, in which code is displayed. You can copy this code and paste it into your own files.
- > Handles pane, in which the session handle is displayed



To launch Sentinel LDK ToolBox

1. From the **Start** menu, open **Sentinel LDK**. The Sentinel LDK Launcher is displayed.
2. Click **ToolBox** to launch the Sentinel LDK ToolBox application. The Sentinel LDK ToolBox main window is displayed.

The API panel on the left of the ToolBox window contains all the available APIs. For the selected API, the available functions are displayed.
3. Browse the list. You can select any API, and then select an available function for that API. After you select a function, the Display pane on the right of the ToolBox window displays the parameters that you must specify in order to execute the function call.

Selecting Your Programming Language

Sentinel LDK ToolBox can generate code in several programming languages.

To select your programming language

1. From the **File** menu in Sentinel LDK ToolBox, select **Settings**. The Settings window is displayed.
2. Select the **ToolBox** tab.
3. From the **Programming language** list, select your preferred language.

NOTE For this tutorial, it is recommended that you select **C-API**. If C-API is not selected, select it and click **OK**. If C-API is already selected, click **Cancel**.

The Settings window closes with the programming language selected.

Starting With Login

Each Sentinel Licensing API session typically begins with the `hasp_login` API call, which establishes a connection with a Sentinel protection key and enables access to its resources. For this lesson, you will connect the Demo key.

NOTE `hasp_get_info()` and `hasp_update()` are standalone functions. You do not have to log in before you call these functions.

To log in to the Demo key

1. Connect the Demo key.
2. In the **Function** pane, select **hasp_login**. The **Display** pane displays all the parameters with the default values that are appropriate for the login operation.
3. Specify the location of your stored Vendor Code file.
To locate your Vendor Code file, click the browse button.
By default, the DEMOMA Vendor Code is stored in:
`%HomePath%\Documents\Thales\Sentinel LDK 9.0\VendorCodes`
4. Select **DEMOMA.hvc** and click **Open**. The code is displayed in the **Vendor Code** field.
5. In the **Feature ID** field, type 50.
You must specify a Feature ID that exists in the protection key. If you did not define Feature ID 50 earlier in the tutorial, select **0** in the **Feature ID** field.
6. At the bottom left of the **hasp_login** pane, click **Execute**. The result of the executed login is summarized to the right of the **Execute** button in three **Status** fields—number, code and message.

Encrypting Data and Writing to Memory

Now that you have established a session with the connected Sentinel protection key, you can access its resources through other API calls.

One of the most important and powerful resources available in a Sentinel protection key is its internal encryption engine. You can optimize protection by using this engine and the encryption facilities in Sentinel LDK as an additional method for verifying that the correct key is accessible when the protected program is running. To do this, proceed as follows:

- > Encrypt a string using the Sentinel protection key
- > Incorporate the encrypted string into the application source code

- > Define your source code to send the encrypted string to the key for decryption and then to verify the result

In its encrypted form, the string prevents the program from running correctly. The protected program will run only if it can decrypt the string, and this can only be achieved if the Sentinel protection key is accessible. This section demonstrates how the key encrypts and decrypts a string.

To encrypt a string

1. In the **Function** pane, select **hasp_encrypt**. The **Display** pane displays parameters for the **hasp_encrypt** API call.
2. Specify the **Size** as **100**.
3. Click the first dot to the right of the memory editor, on the far right of the window, and type: `Sentinel LDK`.
4. Click **Execute**. Note that the string has been encrypted by the Sentinel protection key and is now illegible.

NOTE Sentinel LDK uses a unique encryption key for each encryption process, based on your unique Sentinel Vendor keys and the current Feature. Therefore, the string you type is encrypted differently from any other software vendor (and differently for each Feature).

5. In the **Function** pane, select **hasp_decrypt**. The editor still displays the encrypted string.
6. Click **Execute**. The Sentinel protection key decrypts the string. **Sentinel LDK** is now displayed in the editor.

Retrieving Sentinel Protection Key Information

Sentinel LDK ToolBox enables you to retrieve key-related information. In this section, you use the **hasp_get_sessioninfo** function to retrieve information relating to the identity and memory size of the Sentinel protection key.

To retrieve Sentinel protection key information

1. In the **Function** pane, under **Management**, select **hasp_get_sessioninfo**. The **Display** pane displays parameters for the **hasp_get_sessioninfo** API call.
2. In the **Display** pane, from the **Format Template** list, select **HASP_KEYINFO**. Note that a description of the Format definition is displayed in the gray box below the **Information** field.
3. Click **Execute**. The **Information** pane displays XML tags with information on the key, including:
 - The unique ID number of the connected key
 - The key Read/Write memory size
 - The key Read-only memory size

Reading and Programming Sentinel Protection Key Memory

In this section, you log in to Feature ID 10 on the Sentinel SL key that you defined in ["Defining Products" on page 18](#). You write to and then read from the memory of the protection key.

To log in to the Sentinel protection key

- > Follow the Demo key login procedure on ["To log in to the Demo key" on page 38](#), but this time, in step 5, type 10.

To program the Sentinel protection key memory

1. In the **Function** pane, under **Memory**, select **hasp_write**. The **Display** pane displays parameters for the **hasp_write** API call and an editor for the Sentinel protection key memory.
2. In the memory editor, set the **Offset** field to **16** and the **Length** field to **24**.
3. On the right side of the pane, click the first "." and type:

```
The World says Hello
```
4. Click **Execute**. The string is stored in the protection key memory.

To read the Sentinel protection key memory

1. In the **Function** pane, under **Memory**, select . The **Display** pane displays parameters for the **hasp_read** API call and an editor for the Sentinel protection key memory.
2. In the memory editor, set the **Offset** field to **0** and the **Length** field to **40**.
3. Click **Execute**. The memory editor now displays:
 - the string **Hello World**, which you stored in the key in ["Defining Products" on page 18](#).
 - the string that you typed in the procedure above, in step 3.

What's Next?

This concludes the Sentinel LDK tutorial. You are now ready to use Sentinel LDK applications to license your software and protect it against unauthorized use.

For additional information about the Sentinel LDK system, refer to the [Sentinel LDK Software Protection and Licensing Guide](#) and to the Help documentation available in the Sentinel LDK applications.