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Implementing Secure Boot:

A Refresher on Key & Database Configuration

UEFI PlugFest– March 18-22, 2013
Presented by Tim Lewis, CTO, Insyde Software

Agenda

- Securing the boot process
- Why we need Secure Boot
- The engineering of the secure boot feature
- Is my platform ready?

Much Progress in 2012

Window 8 and Windows Server 2012 Launched

“I would add that security improvements alone may justify the purchase for many enterprises. […] Like Windows 8, Windows Server 2012 has replaced the traditional ROM-BIOS with the new and improved industry boot standard known as UEFI using the security-hardened 2.3.1 version.”

Roger Grimes, infoworld.com

UEFI Versions of Fedora and Ubuntu Launched

“UEFI would provide a foundation for a chain of trust that would connect all the way up to the software layer, which could thwart attempts to install illicit, and harmful, software on [Linux] computers.”

Joab Jackson, pcworld.com

Ecosystem Ready for Secure Boot

System Firmware
OpRom Firmware

System Boards
Add-in Cards

Recovery Software
Operating Systems

Benefits of Secure Boot

- UEFI Boot inherently has lots of value
  - Support for large disk drives
  - Support for complex partition structures
  - Rich Network support including IPv6
  - Better PXE provisioning and boot from iSCSI
  - Better Error Reporting and Management Tools

- But UEFI Boot needs Secure Boot to lock down access to the critical boot files

Project Planning is Critical

– Benefits of a hardened system boot are clear, but…

– Secure products require selecting partners that prioritize security, starting in the firmware, and continuing throughout the boot process.

Partners can help you reach your security goals!

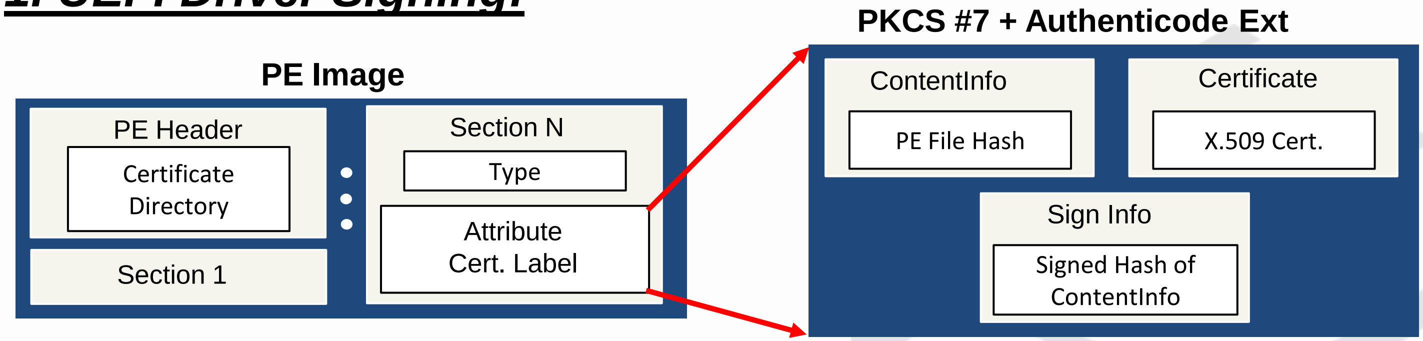
Quick Review – What is Secure Boot?

- UEFI Secure Boot is a technology to eliminate a major security hole during handoff from UEFI firmware to UEFI OS
- Option ROMs and OS boot loaders need to be signed by private key corresponding to a certificate in the systems Security Database
- Database is always provisioned at factory and maintained by OS if required for revocation.

UEFI Firmware
UEFI OS

Secure Boot – Step by Step

1. UEFI Driver Signing:



PKCS #7 + Authenticode Ext

ContentInfo

PE File Hash

Certificate

X.509 Cert.

Sign Info

Signed Hash of ContentInfo

PE Image

PE Header

Certificate Directory

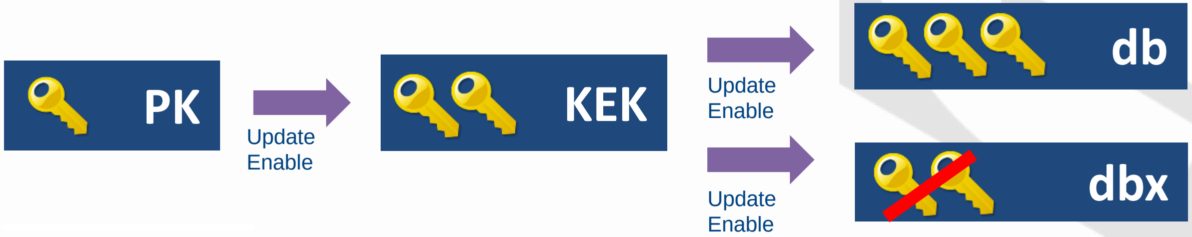
Section 1

Section N

Type

Attribute Cert. Label

2. UEFI Secure Boot Database:



PK

Update Enable

KEK

Update Enable

db

Update Enable

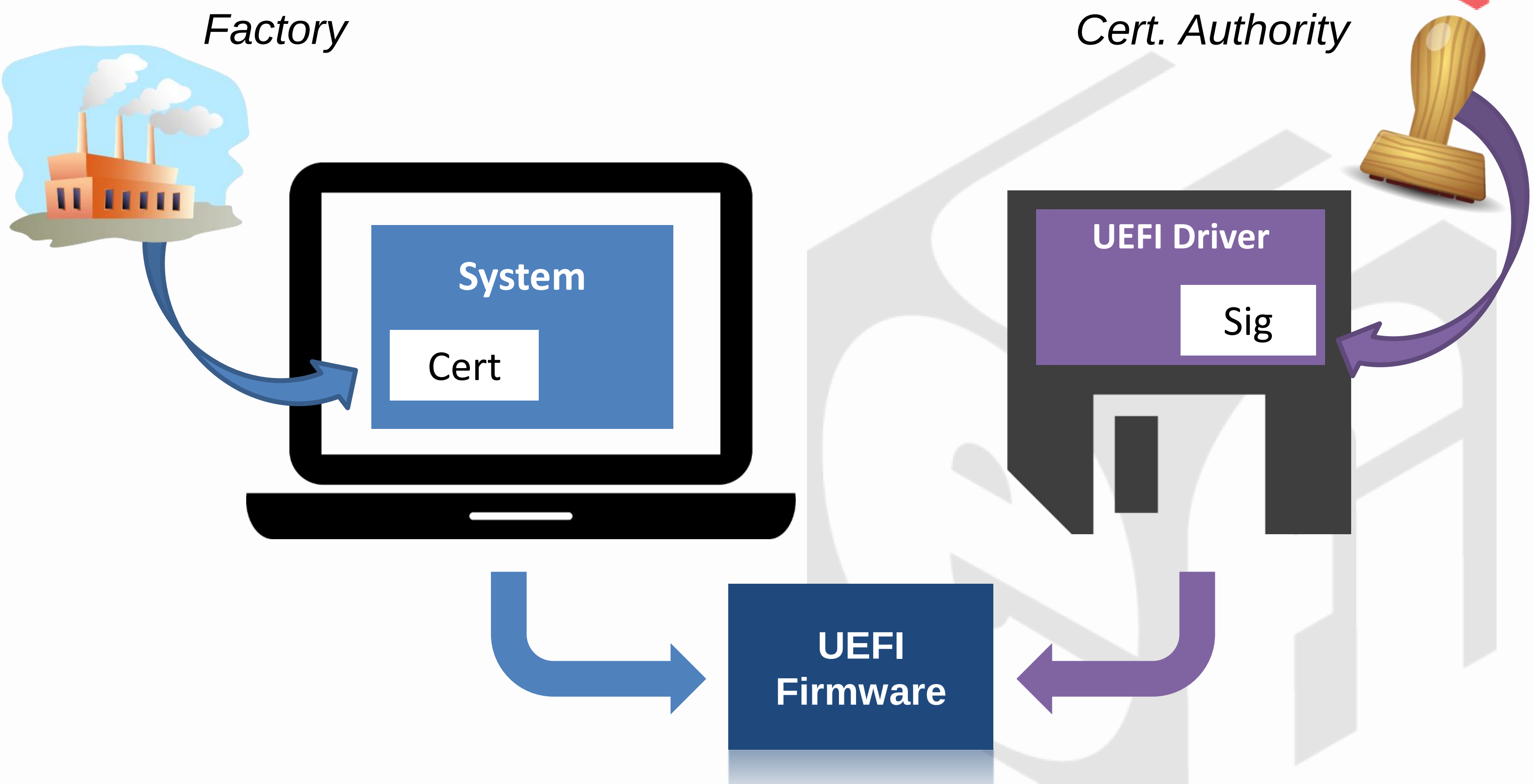
dbx

If Signed by key in db, driver or loader can Run!

If Signed by key in dbx, driver/loader forbidden!

Secure Boot – Step by Step

3. Platform does UEFI Driver Checking:



Firmware compares signature to database and if it matches, drivers are approved.

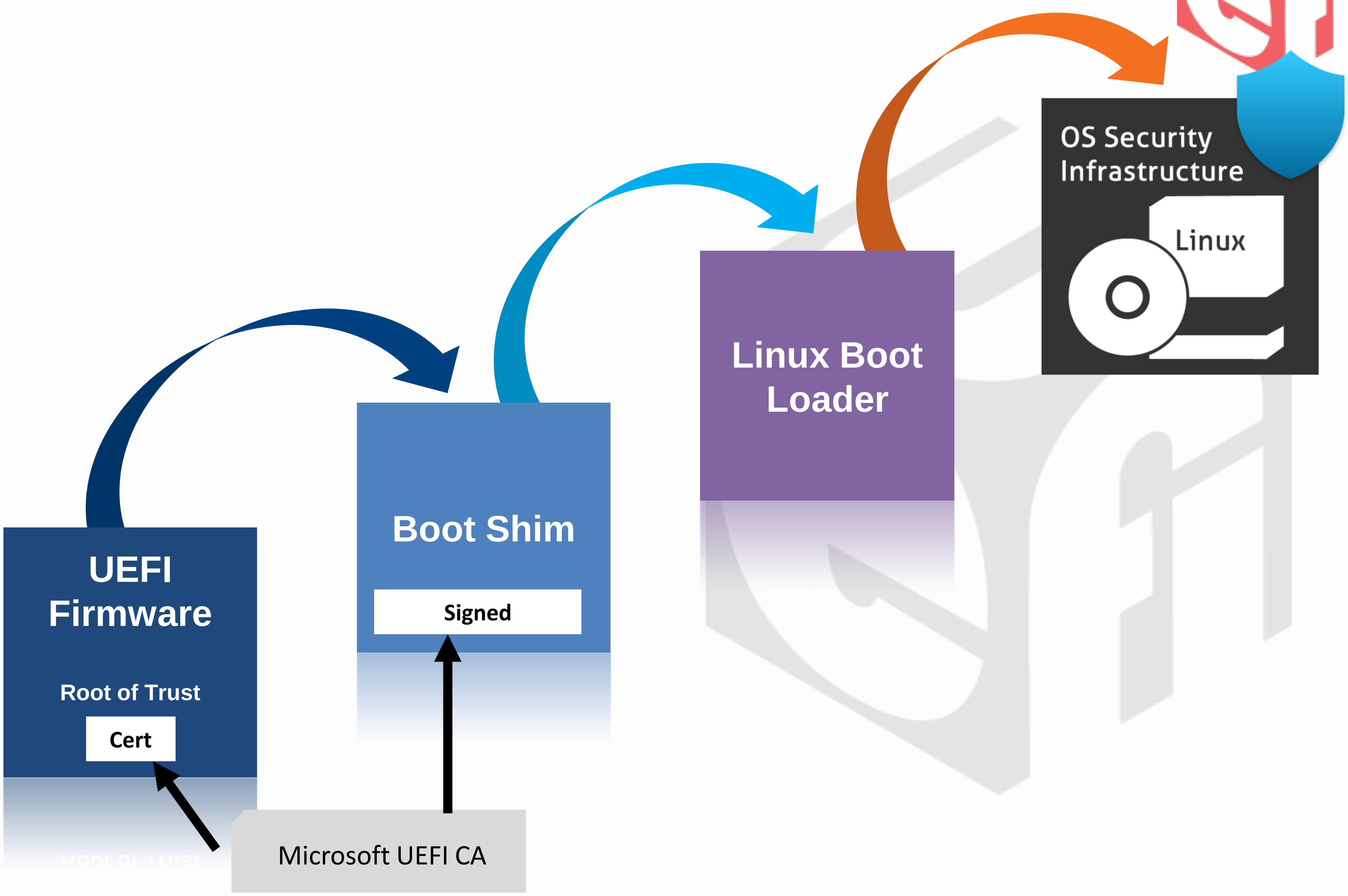
Microsoft CA

- UEFI Option ROMs need to be signed by a widely trusted Certificate Authority
- Microsoft has CA experience and volunteered to host the first all-industry UEFI CA
- Manufacturers are encouraged to put MS CA certificate into “Allowed” database
- Microsoft policies are non-discriminatory, for example Microsoft CA signed the Linux ‘Shim’ boot driver
- Could there emerge another trusted CA?

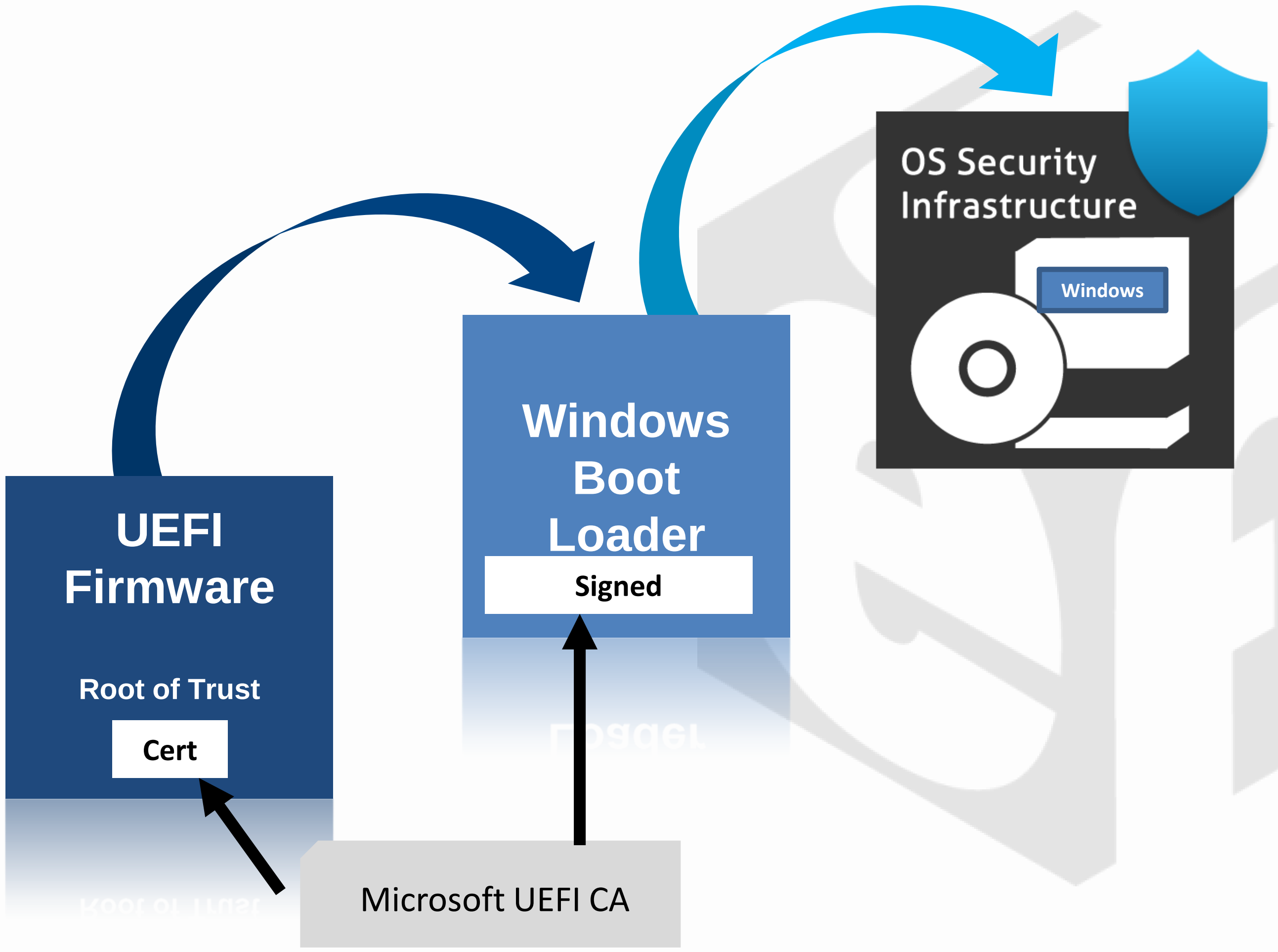
  - Possible, plenty of room in the database

  - Need to convince OEMs to include

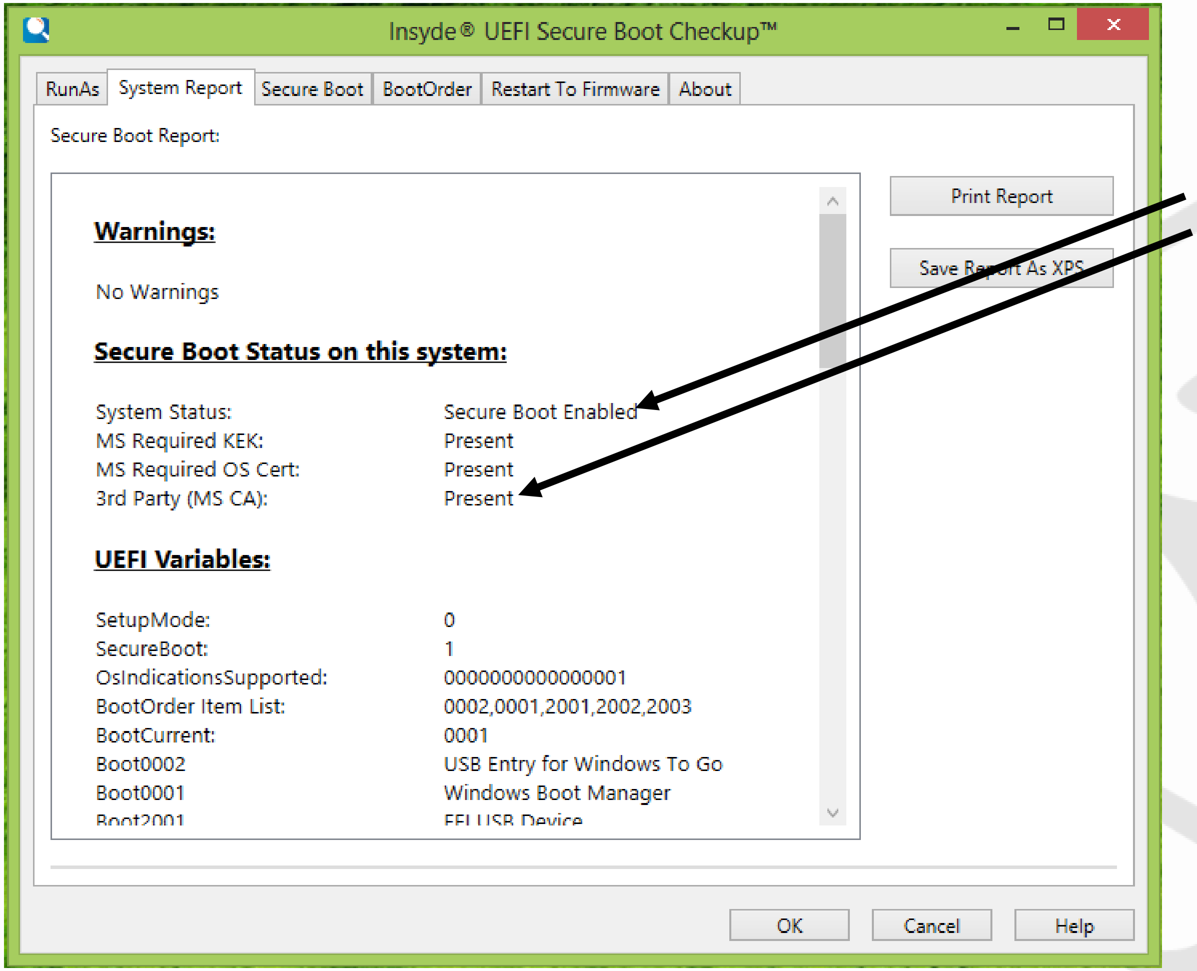
Secure Boot, Linux, & Chain of Trust



Secure Boot, Windows, & Chain of Trust



DEMO #1 – Is my System Ready?



Secure Boot Report:

Warnings:

No Warnings

Secure Boot Status on this system:

```
System Status:            Secure Boot Enabled
MS Required KEK:          Present
MS Required OS Cert:      Present
3rd Party (MS CA):        Present
```

UEFI Variables:

```
SetupMode:                0
SecureBoot:               1
OsIndicationsSupported:   0000000000000001
BootOrder Item List:      0002,0001,2001,2002,2003
BootCurrent:              0001
Boot0002                  USB Entry for Windows To Go
Boot0001                  Windows Boot Manager
Boot2001                  EFI USB Device
```

1. Secure Boot Enabled
2. MS CA Cert Present

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Goals for UEFI Forum in 2013 and Beyond

- Progress toward wide adoption is an important goal!
- Also launching UEFI-style Secure Firmware Update for smoother user experience

- To achieve this UEFI community promises:
  - Attention to all elements of the ecosystem
    - Systems, expansion cards, firmware and OS
  - Education on the benefits
  - Responsive to the needs of each segment

Thanks for attending the UEFI Spring PlugFest 2013

For more information on the Unified EFI Forum and UEFI Specifications, visit http://www.uefi.org

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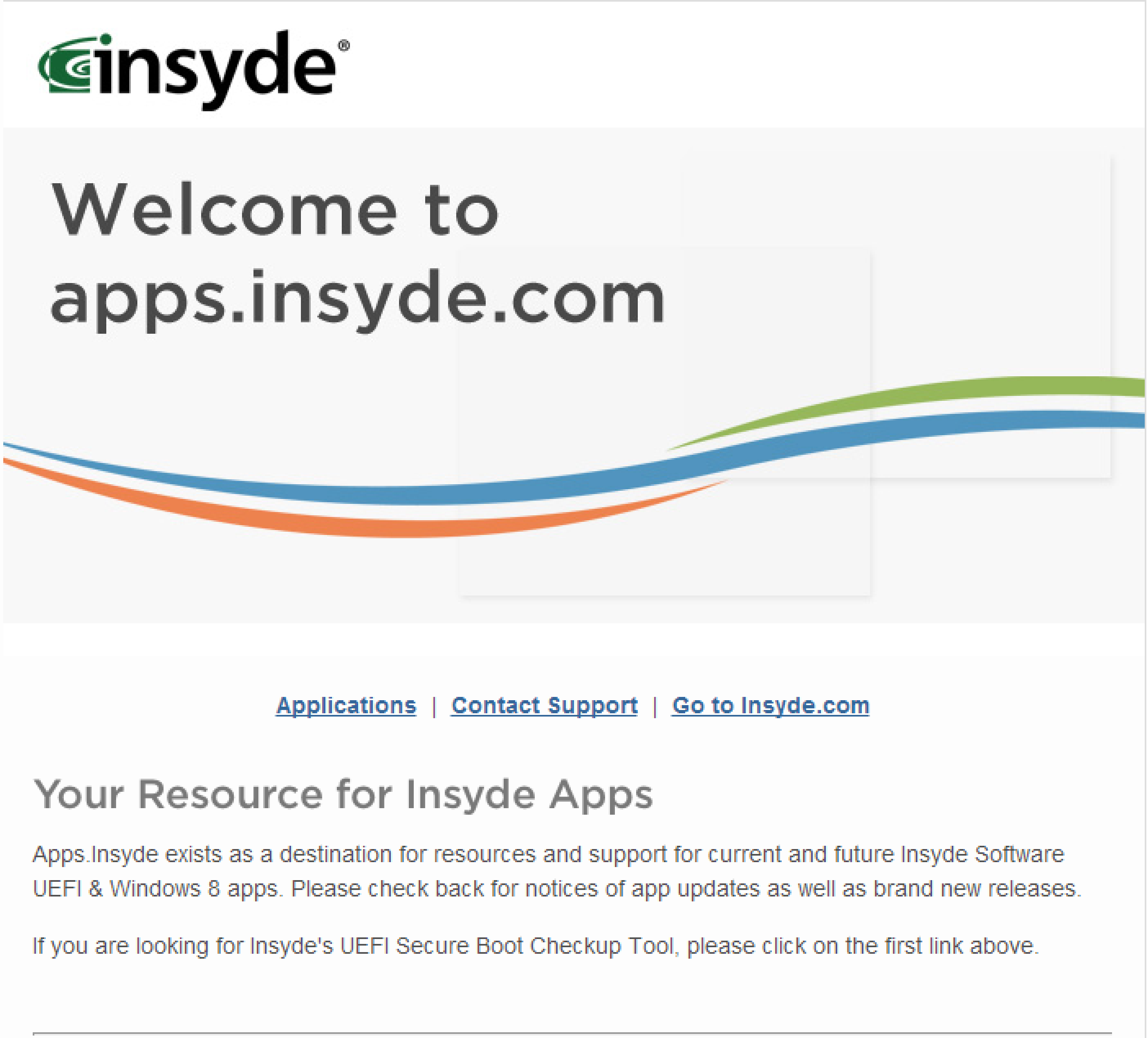

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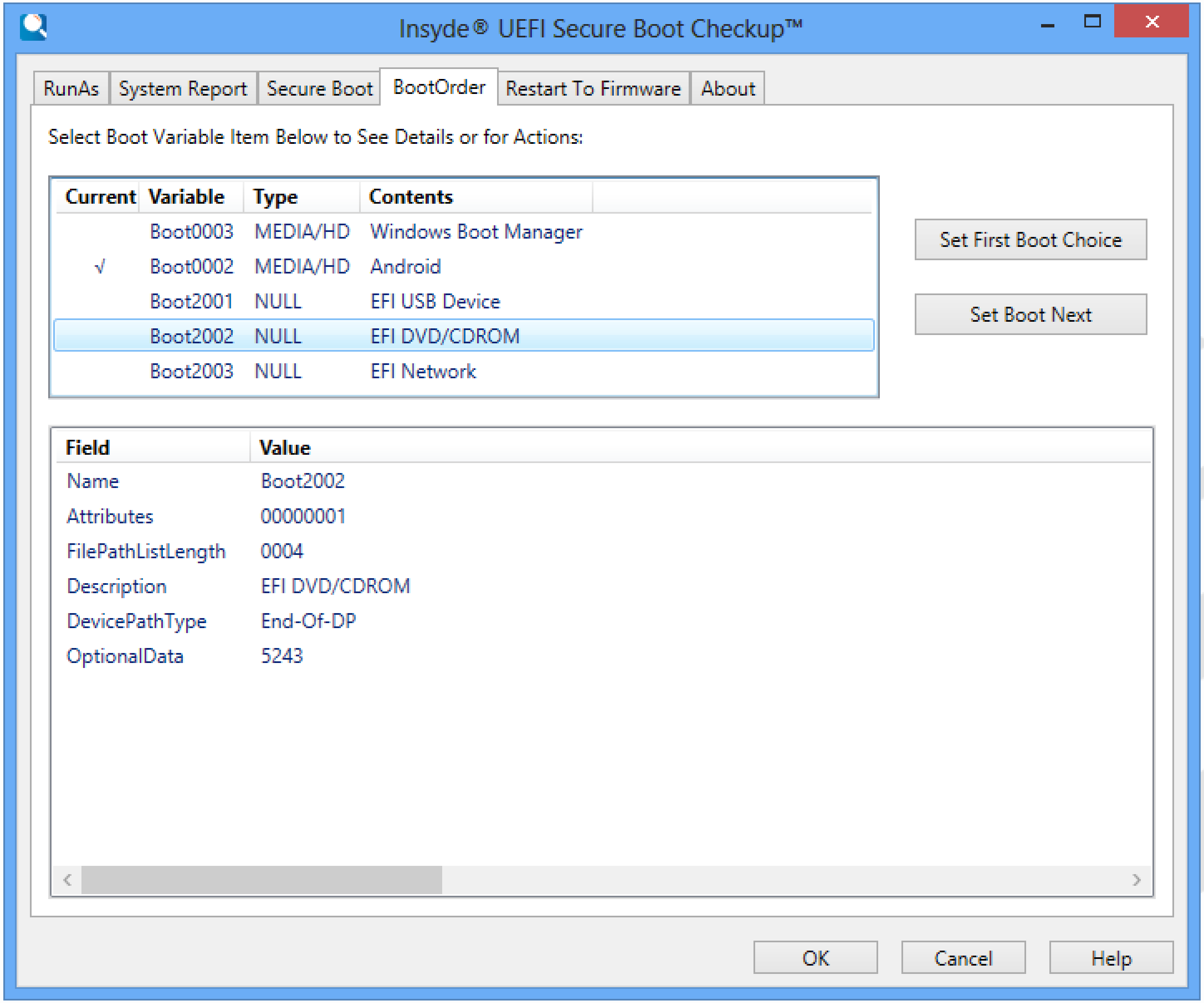
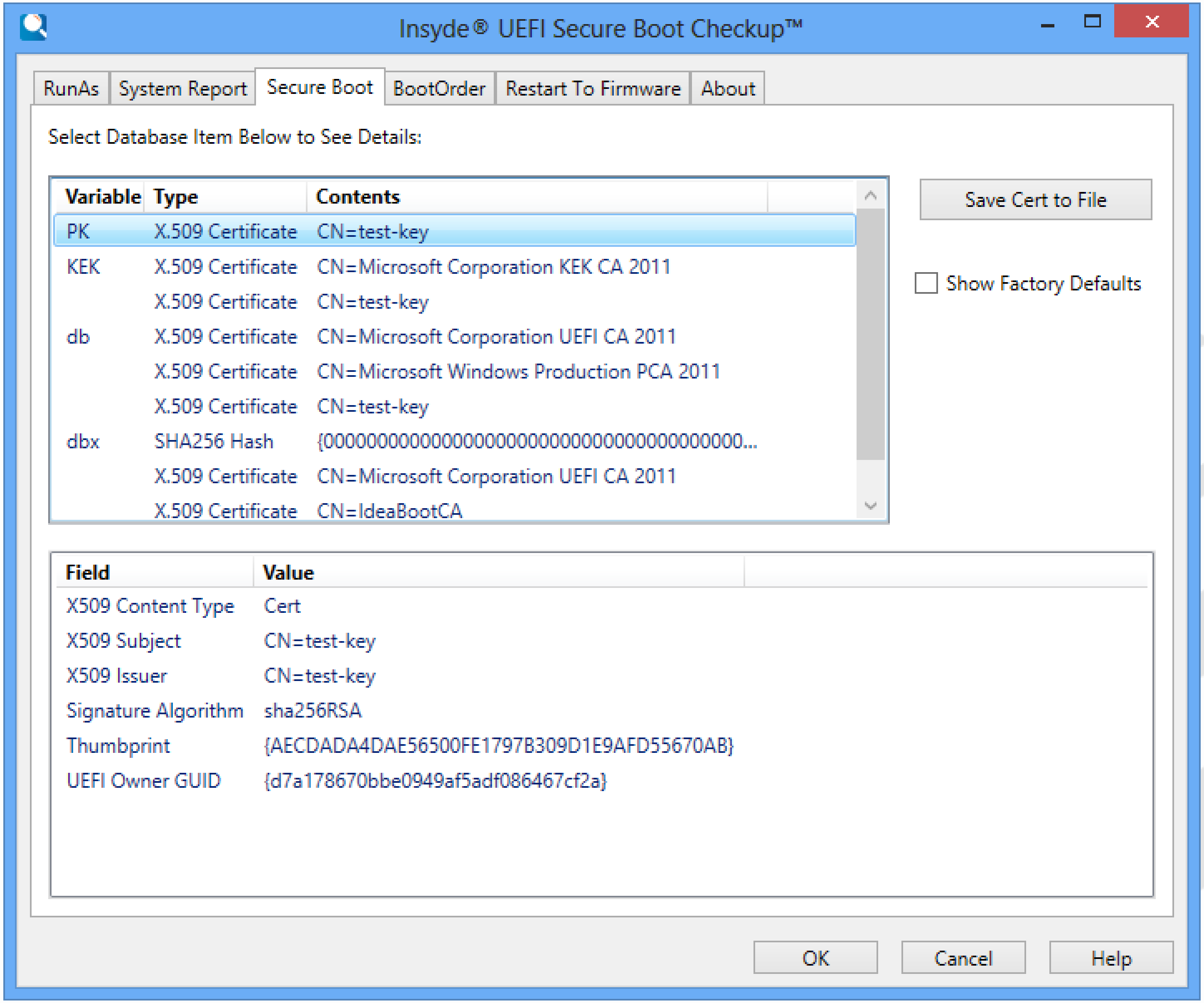
If you are looking for Insyde's UEFI Secure Boot Checkup Tool, please click on the first link above.



Select Boot Variable Item Below to See Details or for Actions:

Current	Variable	Type	Contents
	Boot0003	MEDIA/HD	Windows Boot Manager
√	Boot0002	MEDIA/HD	Android
	Boot2001	NULL	EFI USB Device
	Boot2002	NULL	EFI DVD/CDROM
	Boot2003	NULL	EFI Network

Field	Value
Name	Boot2002
Attributes	00000001
FilePathListLength	0004
Description	EFI DVD/CDROM
DevicePathType	End-Of-DP
OptionalData	5243

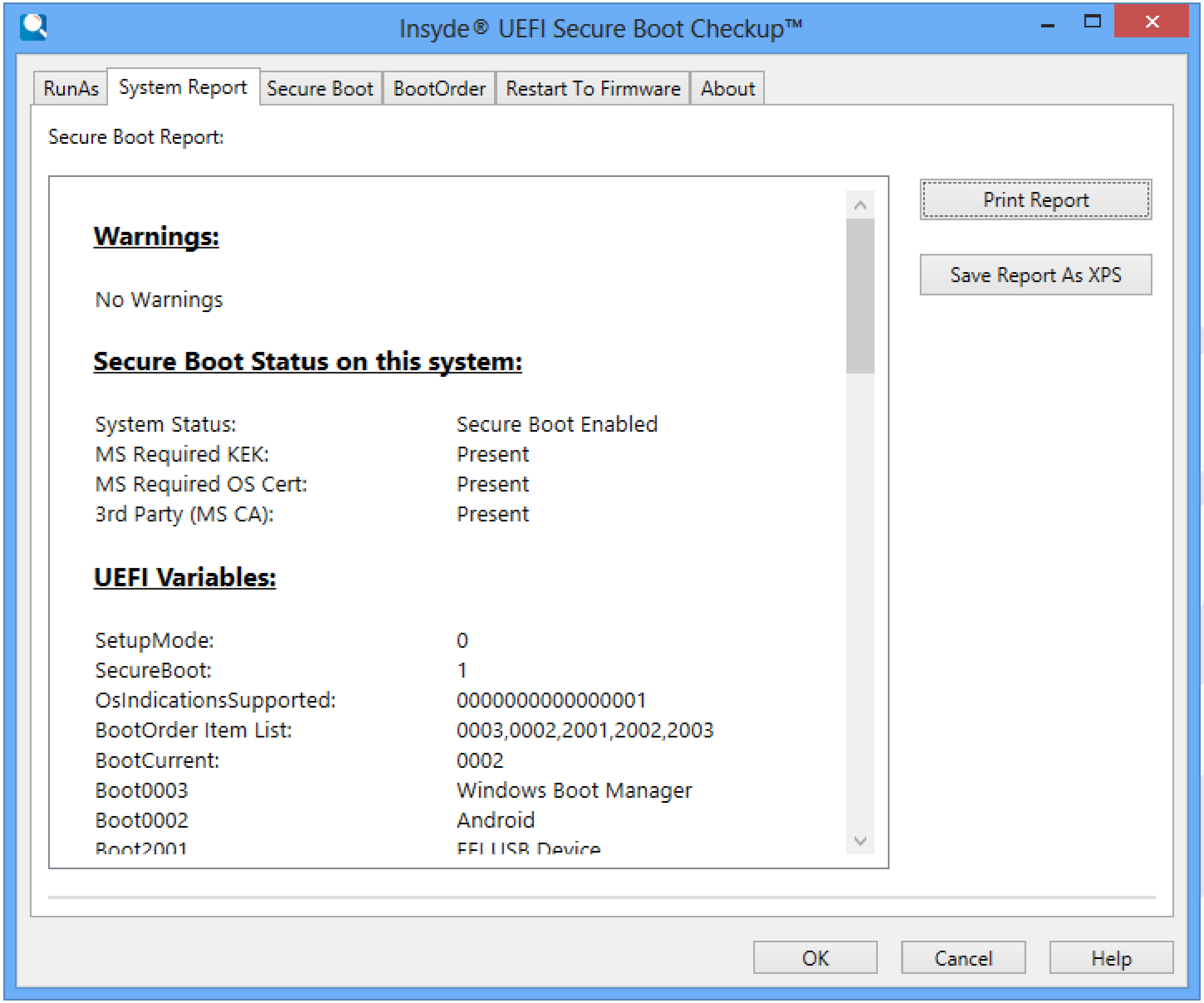


Select Database Item Below to See Details:

Variable	Type	Contents
PK	X.509 Certificate	CN=test-key
KEK	X.509 Certificate	CN=Microsoft Corporation KEK CA 2011
	X.509 Certificate	CN=test-key
db	X.509 Certificate	CN=Microsoft Corporation UEFI CA 2011
	X.509 Certificate	CN=Microsoft Windows Production PCA 2011
	X.509 Certificate	CN=test-key
dbx	SHA256 Hash	{00000000000000000000000000000000000000...
	X.509 Certificate	CN=Microsoft Corporation UEFI CA 2011
	X.509 Certificate	CN=IdeaBootCA

□ Show Factory Defaults

Field	Value
X509 Content Type	Cert
X509 Subject	CN=test-key
X509 Issuer	CN=test-key
Signature Algorithm	sha256RSA
Thumbprint	{AECDADA4DAE56500FE1797B309D1E9AFD55670AB}
UEFI Owner GUID	{d7a178670bbe0949af5adf086467cf2a}



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