Session 2 – What Linux Developers Need to Know About Recent UEFI Spec Advances

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Agenda

• Overview - The UEFI Process
• Some UEFI 2.5 Spec Highlights
  – System Firmware Versions Published
  – Security Profile Management at the Data Center
  – System Prep Applications
• Progress To Date
• Call to Action
UEFI Content Builds From Wide Industry Participation

The UEFI Committee Agenda is Driven by Community Input

- User Community
- Cloud Operators
- Enterprise
- OS Vendors
- OEMs
- IHV
- ISV
- ISV
- IBV

LinuxCon EU 2015
www.uefi.org
Some Messages UEFI Heard From The Ecosystem

1. PXE Boot too slow and unreliable
2. Field provisioning of Secure Boot security keys was awkward
3. Manual matching of firmware updates was too hard
4. UEFI did not support ISV needs for pre-OS tools like disk encryption
UEFI ‘ECR’ Process

Problem Statement → Member Contribution → Topic Experts From Member Companies

Sub Team

Proposal for Spec Change

Full Committee Review

UEFI Forum sub-teams include: Security, Network, Configuration, ARM, Shell and Video
Spec Approval Process

- Approved ECRs
- Revised Spec with New Content Merged
- Approval By UEFI Board and Membership Review
- Publication!
After Publication

Self-Certification Test Suite

Implementation Teams

Open Source Reference Implementation

Spec Update Revised w/ Errata

2.5

New Spec

2.5a
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Deeper Review Of 3 Important New Elements

1. [New] Section 22.3, EFI System Resource Table
2. [New] Section 30.3.x Audit Mode and Deployed Mode
3. [New] Section 3.1.7 System Prep Applications

In Upcoming Session:
4. [New] Section 23.7.1 Boot from URL
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Enable System To Advertise Updatable Firmware

- UEFI 2.5 has added ESRT table
  - List of Firmware Elements
  - Identified by GUID and Version
  - Status of last update

- Expansion Boards are added to ESRT by platform and updated by Firmware Management Protocol
ESRT Allows Automation

OS
Checks Firmware Versions, Schedules Updates

Update Server

ESRT
UEFI Firmware

Expansion Cards
Local Devices

Updates
Advantages Of ESRT-based Firmware Management

1. Move away from older proprietary schemes which require user learning for each platform or expansion board / vendor

2. OS able to easily confirm that correct (latest) versions are installed

3. Increased update participation will help to more quickly close any security flaws
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Security Profile Management

- Secure Boot and its database of signing keys can protect every boot step
Provisioning Local Signing

- Some sites use local signing. Until UEFI 2.5, local key provisioning was a manual process with non-std. menus.
- Hands on steps added greatly to the workload of setting up new server.
- UEFI 2.5 adds new ‘Audit’ and ‘Deployed’ modes (these modes are security enforcement states).
Using Audit and Deployed Modes

• Audit Mode
  – OS can update security signing key lists and test the revised boot chain
  – Unbootable state is avoided

• Deployed Mode
  – Entered with OS is satisfied with key list
  – Most Secure Mode
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System Prep Applications

Problems we are solving:

1. Enable ISV Software that needs to run before OS to unlock encrypted disk (client and server)
2. Enable Firmware Version monitor/update when multiple OS are supported (enterprise/data center)
3. Pre-OS provisioning due to changing work-loads (data center)

• Why change was needed - Avoid war with OS over BootOrder – “OS always fights to be first”
Boot Timeline

UEFI Phase

HW Init (by System FW) → SysPrep#1 → SysPrep#2 → OS UEFI Bootloader

Success → OS UEFI Bootloader → Boot Failure → OS Recovery
Sys Resources Available

• System Prep can use same system resources as OS bootloader
  – Screen, Kbd, etc.
  – Network

• If a required device is not normally initialized by fast boot a new API is provided to request device be made operational for the App to use
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# UEFI 2.5 Partial Feature List

Implementation Status

<table>
<thead>
<tr>
<th>UEFI 2.5 Item</th>
<th>Open Source Sys Firmware</th>
<th>OS Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boot from http <em>(details session 4)</em></td>
<td>In final test</td>
<td>Ready to engage with OS teams</td>
</tr>
<tr>
<td>Boot from https</td>
<td>Scheduled</td>
<td>Currently in review/plan</td>
</tr>
<tr>
<td>ESRT Firmware Table</td>
<td>In final test, early versions shipping</td>
<td>Linux* &amp; Windows have support, distribution path from OEM needs work</td>
</tr>
<tr>
<td>Security Profile Audit Mode</td>
<td>To be Scheduled</td>
<td>Time to review/plan</td>
</tr>
<tr>
<td>System Prep Applications</td>
<td>In final test</td>
<td>Ready to engage</td>
</tr>
</tbody>
</table>

* [https://github.com/vathpela/linux-esrt](https://github.com/vathpela/linux-esrt)
Development System

Purchase at www.tunnelmountain.net ($1399)

Note: UEFI 2.5 binary is not yet posted, still in test
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We have heard from our user community, especially data center operators, about the improvements they need to streamline their operations. UEFI firmware is a good foundation for solutions, but only a foundation.

**Requires:**

- Cooperative and interactive development effort from IBVs, OEMs, distros, IHVs and...

- Feedback from the original requestors.

Let’s figure out how to work together!
Interested In Joining?
www.uefi.org/membership

UEFI FW/OS Forum:
uefi.org/FWOSForum
A free public forum focused on firmware and O/S integration

USRT Security Issue Reporting:
uefi.org/security
A safe reporting site to inform the UEFI of any security issue or vulnerability based on firmware