The State of ACPI Source Language (ASL) Programming

Spring 2018 UEFI Seminar and Plugfest
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Agenda

• Intro to ACPI/ASL
• Challenges of ASL
• Addressing Challenges
• Questions
What is Advanced Configuration and Power Interface (ACPI)?

• Firmware interface used by OS
  – Enables device discovery and configuration
  – Enables OS power management
• Specifies firmware data tables as well as executable bytecode called AML
• This talk will focus on the executable bytecode written in a language called ASL
What is ACPI Source Language (ASL)?

• A language written by firmware developers to define executable ACPI tables
• Stands for ACPI source language
• ASL gets compiled to AML
• AML gets interpreted in the kernel space of the OS
ACPI Firmware Development

Hardware specification → ASL → AML → ACPI Tables
ACPI Firmware Interaction with OS

ACPI tables

AML Interpreter

OS Kernel
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Challenges of ASL Programming

• We have identified a shortage of skilled ASL programmers
• Firmware code is increasing in complexity
• Firmware code for a new platform is often copy/pasted from older platforms
• This frequently results in poor code quality
Examples of Bad ASL Code

Name (OBJ1, 0) //create object OBJ1
OBJ1 = 1

The store is unnecessary
We can avoid the store operation by initializing OBJ1 to 1
Examples of Bad ASL Code

Method (_PCD, 1, NotSerialized)
{
    \_PR.CPU0.M001 = INT1
}

M001 is a method that returns a reference, INT1 is an integer. This results in a runtime error.
Examples of Bad ASL Code

External (DEV1)
Name (PKG1,
   Package() {DEV1})

The named object, DEV1, is not defined but is referenced by PKG1
Impact of Challenges

• Some operating systems emit errors from the AML interpreter that users can see
  – This can frighten end-users (FUD)

• Run time errors during AML evaluation abort the execution
  – This means that the OS could be missing functionality that firmware developers think they enabled
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What Can We Do About this?

• Use the latest ASL compiler
  – intel ASL compiler (iASL) catch many errors that could happen during runtime.

• Use a user-space interpreter to execute AML before packaging with firmware
  – Verify that ACPI tables load correctly

• Create an ACPI firmware developer tutorial
  – Introduces ASL to firmware developers
  – Outlines how ASL should be used
What Can We Do About this?

• Communicate with ACPIA developers and give us feedback!
  – If you write **ANY** amount of ASL, we would love to interact with you!
Questions?
Thanks for attending the Spring 2018 UEFI Plugfest

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

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References

• ACPICA project website
  https://acpica.org/

• ACPICA mailing list
  https://lists.acpica.org/mailman/listinfo