

presented by



An overview of ACPICA Userspace Tools

UEFI Spring Plugfest – May 18-22, 2015
Presented by David Box, Intel

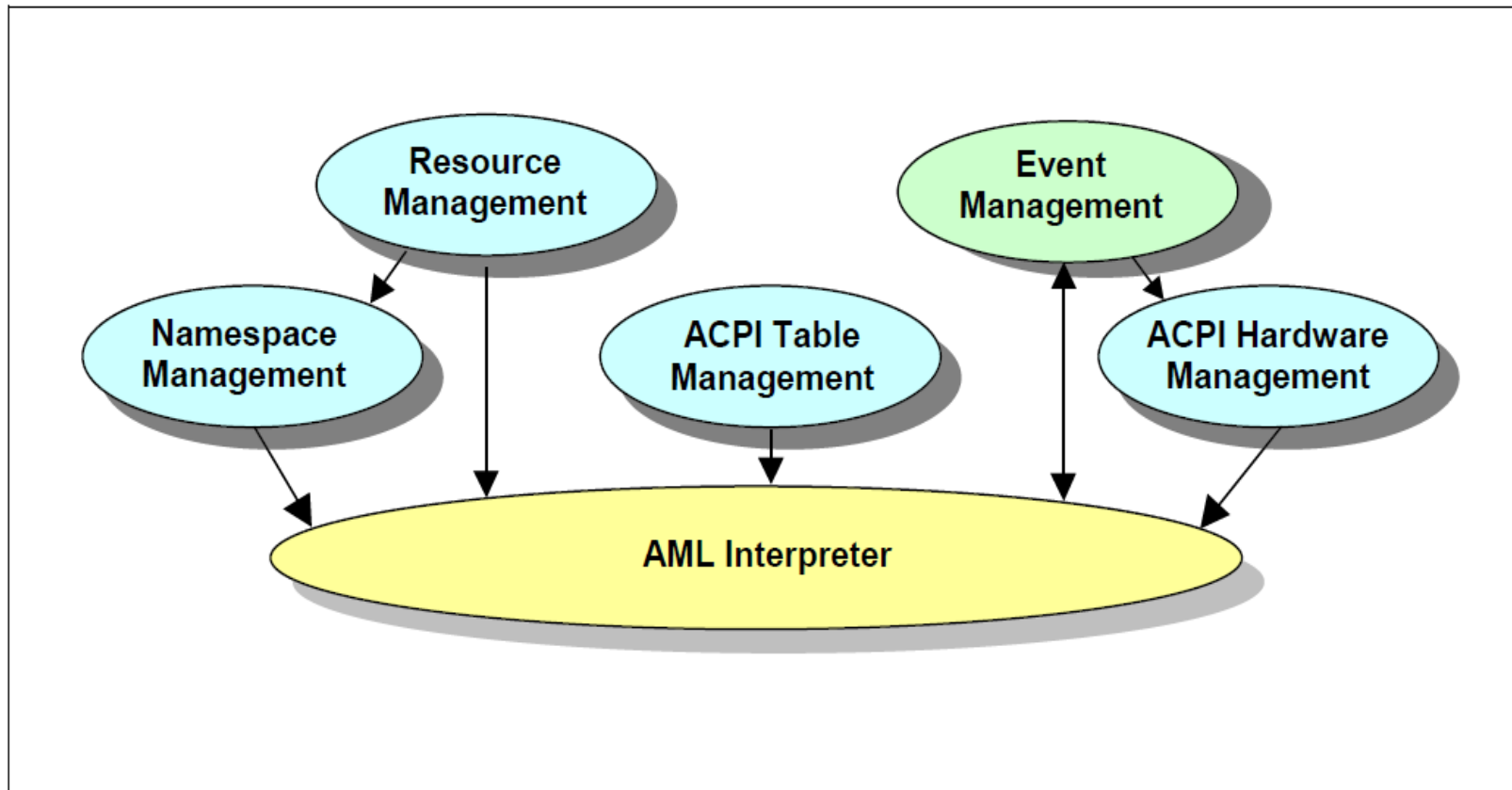
Agenda



- Introduction
- iASL
- acpiexec
- Call to action

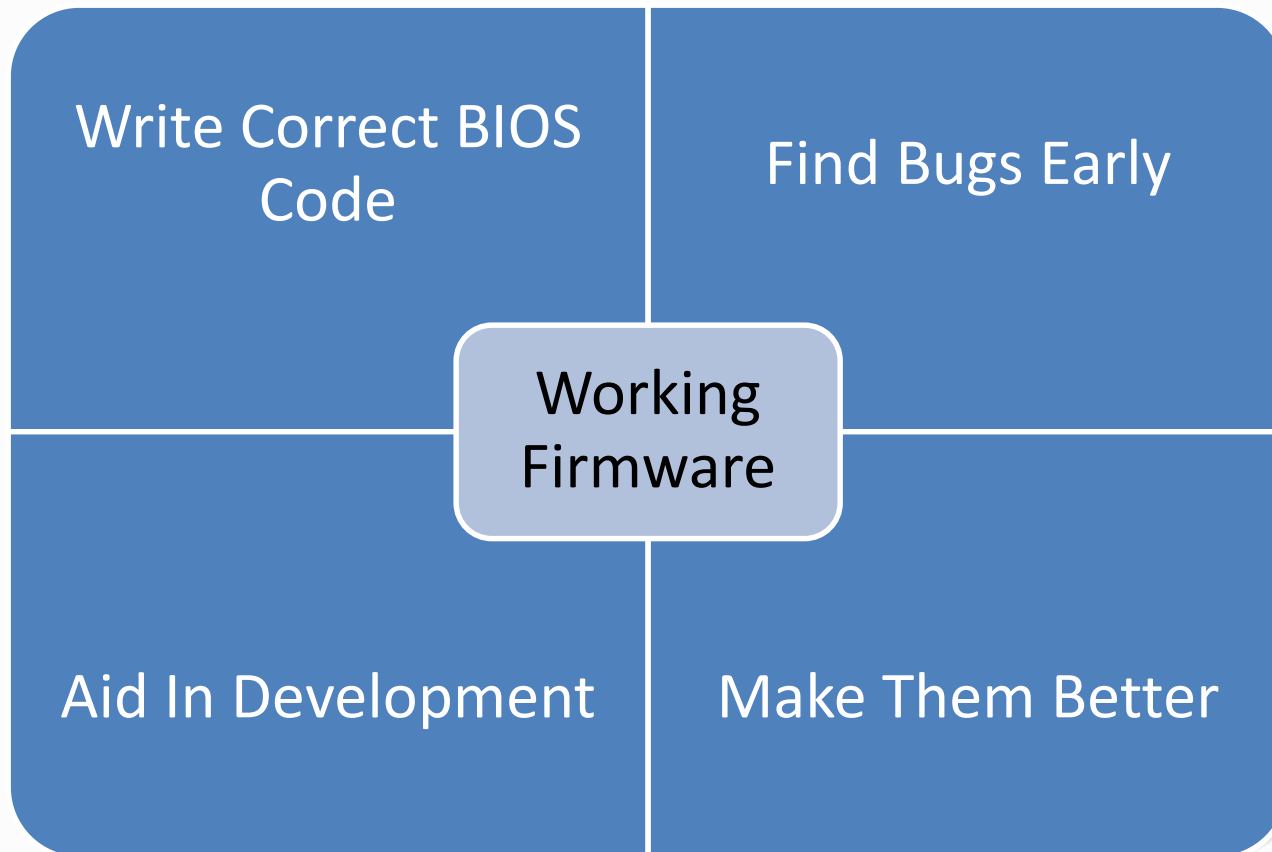


ACPICA: ACPI Component Architecture

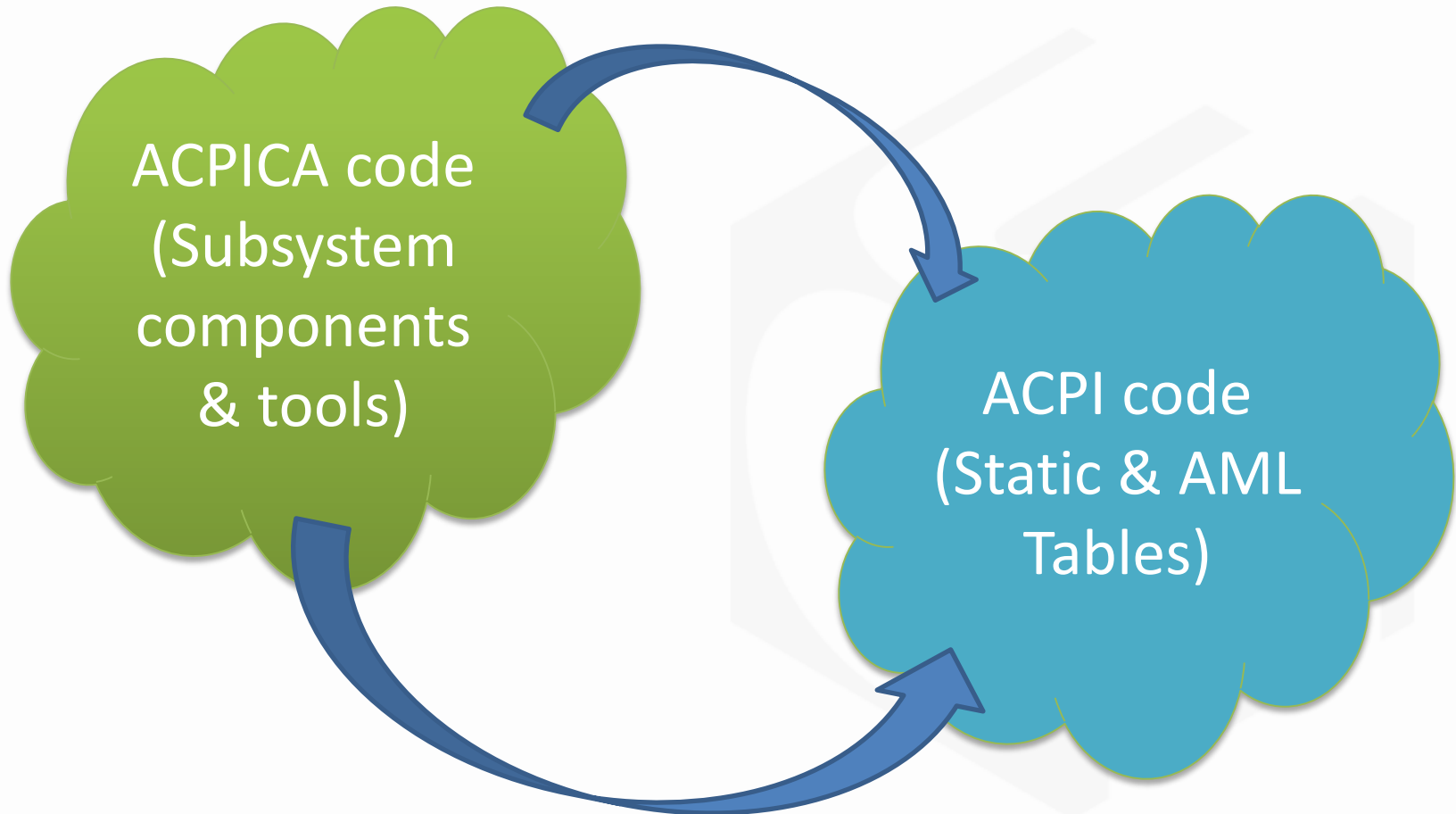


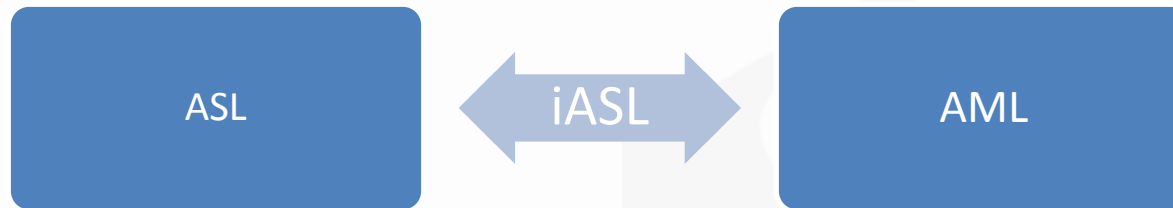
www.acpica.org: Documentation, Tools, Binaries

Why learn about these tools?



ACPICA and ACPI interaction





iasl: More than what you may know

iASL: Catch bad code



iASL: Warning Examples



badcode.asl 29: Name (BIG, 0x1234567887654321)
Warning 3038 - ^ 64-bit integer in 32-bit table, truncating (DSDT version < 2)

badcode.asl 33: Name (PKG1, Package(5) {0,1})
Remark 2063 - ^ Initializer list shorter than declared package length

badcode.asl 80: CreateField (BUF1, 0, Subtract (4, 4), FLD1)
Remark 2089 - Object is not referenced ^ (Name is within method [MTH1])

badcode.asl 94: Store (5, INT1)
Warning 3134 - ^ Statement is unreachable

badcode.asl 120: Store (MTH2 (), Local0)
Warning 3122 - ^ Called method may not always return a value

badcode.asl 164: Method (_OSC, 5)
Warning 3101 - ^ Reserved method has too many arguments (_OSC requires 4)

badcode.asl 205: Method (_REG, 2)
Warning 3079 - ^ _REG has no corresponding Operation Region

iASL: Disassemble Static Tables



```
$ iasl apic.dat
```

```
[000h 0000 4] Signature : "APIC"
[004h 0004 4] Table Length : 00000138
[008h 0008 1] Revision : 02
[009h 0009 1] Checksum : 8E
[00Ah 0010 6] Oem ID : "INTEL "
[010h 0016 8] Oem Table ID : "DX58SO "
[018h 0024 4] Oem Revision : 00001346
[01Ch 0028 4] Asl Compiler ID : "MSFT"
[020h 0032 4] Asl Compiler Revision : 0100000D

[024h 0036 4] Local Apic Address : FEE00000
[028h 0040 4] Flags (decoded below) : 00000001
                PC-AT Compatibility : 1

[02Ch 0044 1] Subtable Type : 00 [Processor Local APIC]
[02Dh 0045 1] Length : 08
[02Eh 0046 1] Processor ID : 00
[02Fh 0047 1] Local Apic ID : 00
[030h 0048 4] Flags (decoded below) : 00000001
                Processor Enabled : 1

...
```

iASL: Generating Templates

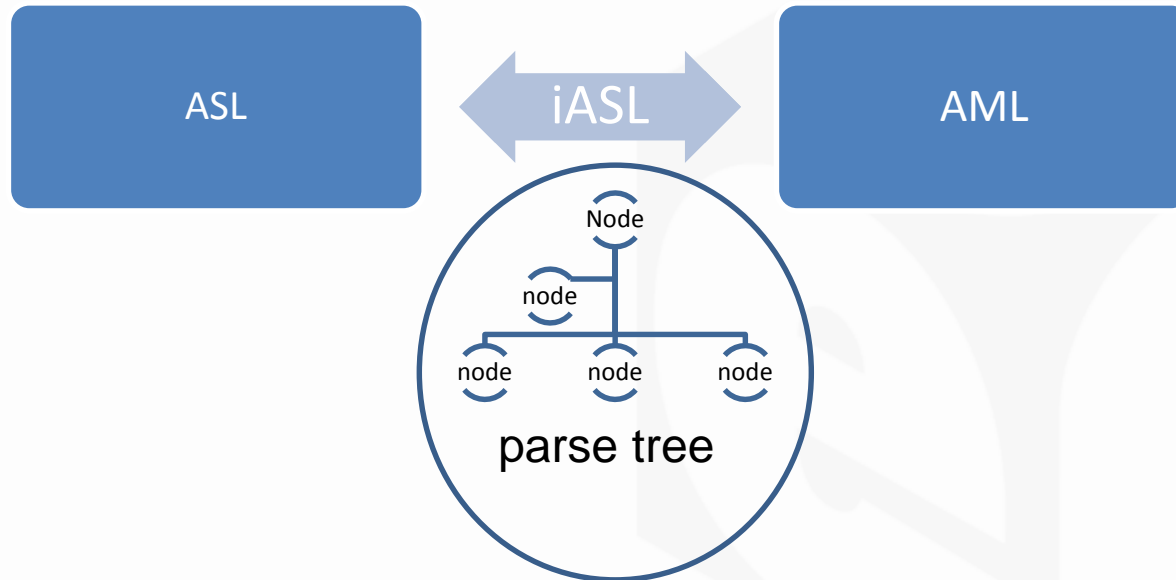


```
$ iasl -T FADT
```

```
[0004]                Signature : "FACP"
[0004]                Table Length : 0000010C
[0001]                Revision : 05
[0001]                Checksum : 64
[0006]                Oem ID : "INTEL "
[0008]                Oem Table ID : "TEMPLATE"
[0004]                Oem Revision : 00000000
[0004]                Asl Compiler ID : "INTL"
[0004]                Asl Compiler Revision : 20131115

[0004]                FACS Address : 00000001
[0004]                DSDT Address : 00000001
[0001]                Model : 00
[0001]                PM Profile : 00 [Unspecified]
[0002]                SCI Interrupt : 0000
[0004]                SMI Command Port : 00000000
[0001]                ACPI Enable Value : 00
[0001]                ACPI Disable Value : 00
[0001]                S4BIOS Command : 00
[0001]                P-State Control : 00
[0004]                PM1A Event Block Address : 00000001
...
```

iASL: ACPI Data Manipulation



Platform data in compiler parse tree

iASL: map file output



```
$ iasl -lm dsdt.dat
```

```
Resource Descriptor Connectivity Map
```

```
-----
```

```
GPIO Controller: INT0002  \_SB.GPED // Virtual GPIO Controller

Pin  Type      Direction  Polarity  Dest_HID  Destination // Virtual GPIO Controller
0002 GpioInt  -Interrupt- ActiveHigh INT0002  \_SB_.GPED

GPIO Controller: INT33FC  \_SB.GP00 // Intel Baytrail GPIO Controller

Pin  Type      Direction  Polarity  Dest_HID  Destination // Intel Baytrail SOC GPIO Controller
0000 GpioInt  -Interrupt- ActiveBoth INTCFD9  \_SB_.TBAD // Intel Baytrail SOC GPIO Controller
0000 GpioInt  -Interrupt- ActiveBoth INTCFD9  \_SB_.TBAD // Intel Baytrail SOC GPIO Controller
0000 GpioInt  -Interrupt- ActiveBoth INTCFD9  \_SB_.TBAD // Intel Baytrail SOC GPIO Controller
0001 GpioInt  -Interrupt- ActiveBoth INTCFD9  \_SB_.TBAD // Intel Baytrail SOC GPIO Controller
0001 GpioInt  -Interrupt- ActiveBoth INTCFD9  \_SB_.TBAD // Intel Baytrail SOC GPIO Controller
0001 GpioInt  -Interrupt- ActiveBoth INTCFD9  \_SB_.TBAD // Intel Baytrail SOC GPIO Controller
0002 GpioIo   OutputOnly -Field-   \_SB_.GP00.CCU2 // **** No references in table
0003 GpioIo   OutputOnly -Field-   \_SB_.GP00.CCU3 // **** No references in table
0026 GpioIo   InputOnly  80860F14 \_SB_.SDHC // Intel Baytrail SDIO/MMC Host Controller
0026 GpioInt  -Interrupt- ActiveBoth 80860F14 \_SB_.SDHC // Intel Baytrail SDIO/MMC Host Controller
...
```

iASL: Symbolic Syntax Support (ACPI 6.0)

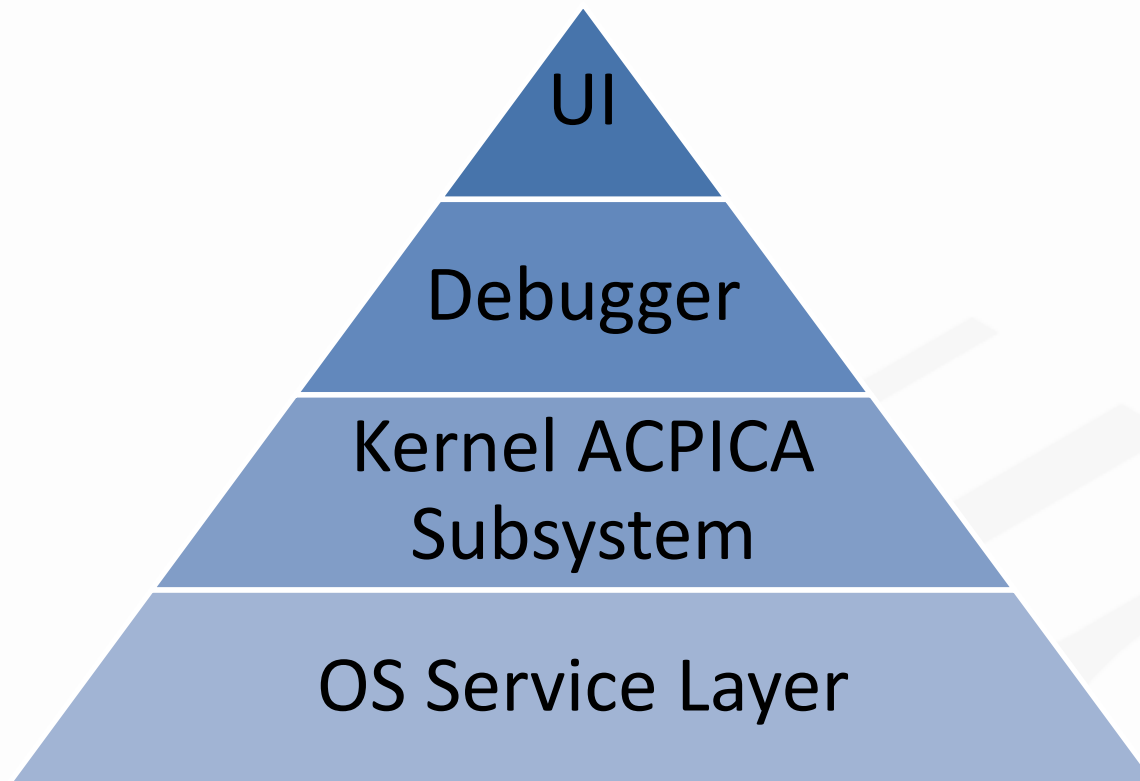


```
/* Legacy ASL */  
If (LAnd (LEqual (CHPD, Zero), LEqual (Arg1, Zero)))
```

```
/* ASL 2.0 */  
If (((CHPD == Zero) && (Arg1 == Zero)))
```

Both produce identical AML output

100% legacy support remains



**acpiexec: entire ACPICA subsystem
in userspace**

acpiexec



- Identical kernel code
- Debugger interface
- Test/execute tables from any machine



```
$ acpiexec dsdt.dat ssdt*.dat
```

PUT THIS IN YOUR BUILDS!

acpiexec: loading example



Intel ACPI Component Architecture

AML Execution/Debug Utility version 20150410-64

Copyright (c) 2000 - 2015 Intel Corporation

Loading Acpi table from file dsdt.aml - Length 00017985 (004641)

Loading Acpi table from file ssdt.aml - Length 00052415 (00CCBF)

ACPI: RSDP 0x0000000000682480 000024 (v02 Intel)

ACPI: XSDT 0x0000000002344AB0 000034 (v00 Intel AcpiExec 00001001 INTL 20131218)

ACPI: FACP 0x00000000006822A0 00010C (v05 Intel AcpiExec 00001001 INTL 20131218)

ACPI: DSDT 0x0000000002344CB0 004641 (v02 INTEL DX58SO 00001346 INTL 20150410)

ACPI: FACS 0x0000000000682440 000040

ACPI: SSDT 0x0000000002349540 00CCBF (v01 INTEL SSDT PM 00001346 INTL 20150410)

Table [DSDT] (id 0001) - 675 Objects with 70 Devices, 43 Regions, 165 Methods (42/123/39
Serial/Non/Cvt)

**ACPI Error: [HECI] Namespace lookup failure, AE_ALREADY_EXISTS
(20150410/dswload-451)**

ACPI Exception: AE_ALREADY_EXISTS, During name lookup/catalog (20150410/pobject-305)

...

acpiexec: Step through code



```
- d _SB.PMI0._PMC
```

```
Evaluating \_SB.PMI0._PMC
```

```
[_PMC] @00000 #0070: Store ("PMI - _PMC", Debug)
```

```
%
```

```
ArgObj: 0x7679f0 [Debug]
```

```
ArgObj: 0x769cd0 <Obj> String(10) "PMI - _PMC"
```

```
[ACPI Debug 15543187] String [0x0A] "PMI - _PMC"
```

```
ResultObj: 0x769cd0 <Obj> String(10) "PMI - _PMC"
```

```
[_PMC] @0000F #0008: Name (RET0 (Path \_SB_.PMI0._PMC.RET0), [_PMC]
```

```
@00014 #0012: Package (0x0E) {})
```

```
%
```

acpiexec: We use it too



- ASL Test Suite (ASLTS)
 - Over 2000 tests ran through acpiexec
 - Available from www.acpica.org/downloads
- Main tool for bug reports

ACPI 6.0 Printf macro



```
Store (Concatenate (Concatenate (Concatenate (Concatenate  
(Concatenate ("Loop ", Local0), " of "), Local1), ",  
Register value "), REGV), Debug)
```

```
printf("Loop %0 of %0, Register value %0, Local0, Local1,  
REGV)
```

More please?



Yes, but ...



The best ideas will come from you

Call To Action



- Use these tools for testing and build automation.
 - www.acpica.org
- Ask questions. Provide feedback. Contribute code.
 - devel@acpica.org
- Report bugs. Suggest Ideas.
 - <http://bugs.acpica.org> (post bugs and feature requests)

Thanks for attending the
UEFI Spring Plugfest 2015



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



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