
LunaixOS
从零开始
DEVELOPING YOUR OWN
自制操作系统
OPERATING SYSTEM FROM SCRATCH
O Brave New Kernel
简单介绍 ACPI
EP 8-2

The Answer to the Ultimate Question of….

等等，等等……

我的电脑有多少个……

ACPI

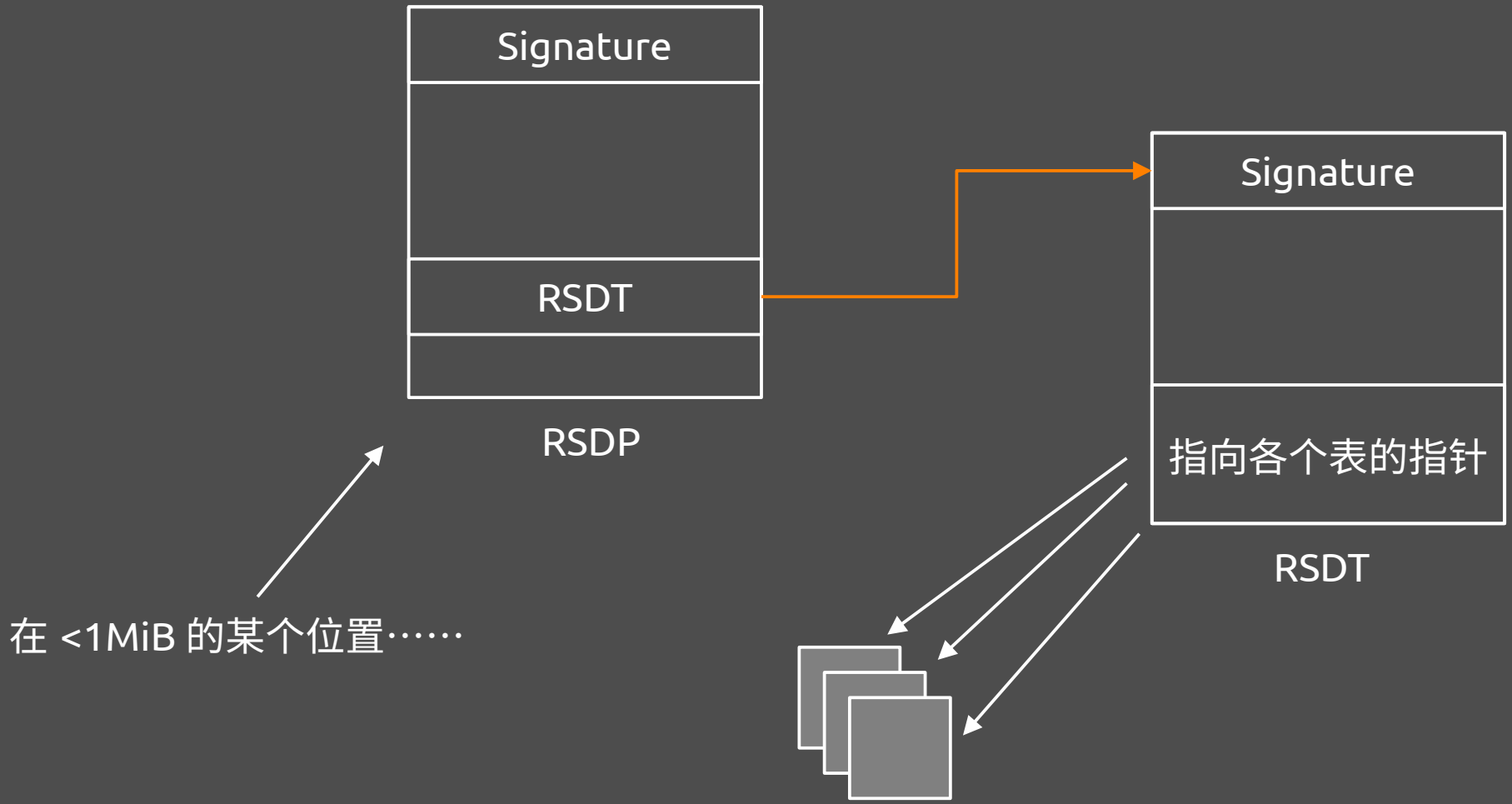
…… 的地址在……

我怎么配置……

关机，重启，休眠

ACPI 使用一堆系统描述表（ System Description Table ）和
一套其自定义的语言 AML 去告诉我们这些答案

ACPI 两步走



), which should conspicuously be placed in the same location as this specification.

Table 5.5: **DESCRIPTION_HEADER Signatures for tab**
by ACPI

Signature	Description	Reference
"APIC"	Multiple APIC Description Table	Section 5.2.12
"BERT"	Boot Error Record Table	Section 18.3.1
"BGRT"	Boot Graphics Resource Table	Section 5.2.22
"CPEP"	Corrected Platform Error Polling Table	Section 5.2.18
"DSDT"	Differentiated System Description Table	Section 5.2.11.
"ECDT"	Embedded Controller Boot Resources Table	Section 5.2.15
"EINJ"	Error Injection Table	Section 18.6.1
"ERST"	Error Record Serialization Table	Section 18.5
"FACP"	Fixed ACPI Description Table (FADT)	Section 5.2.9
"FACS"	Firmware ACPI Control Structure	Section 5.2.10
"FPDT"	Firmware Performance Data Table	Section 5.2.23
"GTDT"	Generic Timer Description Table	Section 5.2.24
"HEST"	Hardware Error Source Table	Section 18.3.2
"MSCT"	Maximum System Characteristics Table	Section 5.2.19
"MPST"	Memory Power StateTable	Section 5.2.21
"NFIT"	NVDIMM Firmware Interface Table	Section 5.2.25
"OEMx"	OEM Specific Information Tables	OEM Specific tures starting for OEM use.
"PCCT"	Platform Communications Channel Table	Section 14.1
"PHAT"	Platform Health Assessment Table	Section 5.2.30
"PMTT"	Platform Memory Topology Table	Section 5.2.21.
"PSDT"	Persistent System Description Table	Section 5.2.11.
"RASF"	ACPI RAS Feature Table	Section 5.2.20
"RSDT"	Root System Description Table	Section 5.2.7
"SBST"	Smart Battery Specification Table	Section 5.2.14
"SDEV"	Secure DEVices Table	Section 5.2.26
"SLIT"	System Locality Distance Information Table	Section 5.2.17
"SRAT"	System Resource Affinity Table	Section 5.2.16
"SSDT"	Secondary System Description Table	Section 5.2.11.
"XSDT"	Extended System Description Table	Section 5.2.8

Table 5.6: **DESCRIPTION_HEADER Signatures for tabl**
by ACPI

Signature	Description and External Reference
"AEST"	**Arm Error Source Table**. See Links to ACPI-Related Doc "Arm Error Source Table".
"BDAT"	**BIOS Data ACPI Table – exposing platform margining** Related Documents under the heading "BIOS Data ACPI Ta
"BOOT"	Reserved Signature
"CDIT"	**Component Distance Information Table**. See Links to under the heading "Component Distance Information Table"

Table 5.6 – continued from previous page

Signature	Description and External Reference
"CEDT"	**CXL Early Discovery Table**. See "Links to ACPI-Related Documents" (http://uefi.org/acpi) under the heading "CXL Early Discovery Table".
"CRAT"	**Component Resource Attribute Table**. See Links to ACPI-Related Documents under the heading "Component Resource Attribute Table".
"CSRT"	**Core System Resource Table**. See Links to ACPI-Related Documents under the heading "Core System Resour
"DBGP"	**Debug Port Table**. See L Port Table".
"DBPG2"	**Debug Port Table 2**. See bug Port Table 2".
"DMAR"	**DMA Remapping Table** "DMA Remapping Table'
"DRTM"	**Dynamic Root of Trust** ments under the heading '
"ETDT"	**Event Timer Description** This signature has been s
"HPET"	**IA-PC High Precision E** under the heading "IA-PC
"IBFT"	**iSCSI Boot Firmware T** ing "iSCSI Boot Firmwar
"IORT"	**I/O Remapping Table**. "I/O Remapping Table".
"IVRS"	**I/O Virtualization Repo** der the heading "I/O Virt
"LPIT"	**Low Power Idle Table**. "Low Power Idle Table".
"MCFG"	PCI Express **Memory-m** PCI Firmware Specificat under the heading "PCI S
"MCHI"	**Management Controller** Transport Protocol (MCT Documents under the hea
"MPAM"	Arm **Memory Partitioni** under the heading "Arm M
"MSDM"	**Microsoft Data Manage** the heading "Microsoft S
"PRMT"	**Platform Runtime Mech** the heading "Platform Ru
"RGRT"	**Regulatory Graphics Re** the heading "Regulatory
"SDEI"	**Software Delegated Exc** under the heading "Software Delegated Exceptions Interface."
"SLIC"	Microsoft **Software Licensing** table. See Links to ACPI-Related Documents under the heading "Microsoft Software Licensing Table Specification".
"SPCR"	Microsoft **Serial Port Console Redirection** table. See Links to ACPI-Related Documents under the heading "Serial Port Console Redirection Table".
"SPMI"	**Server Platform Management Interface** table. See Links to ACPI-Related Documents under the heading "Server Platform Management Interface Table".
"STAO"	**_STA Override** table. See Links to ACPI-Related Documents under the heading "_STA Override Table".

continues on next page

Table 5.6 – continued from previous page

Signature	Description and External Reference
"SVKL"	**Storage Volume Key Data** table in the Intel Trusted Domain Extensions. See Links to ACPI-Related Documents under the heading "Storage Volume Key Data".
"TCPA"	**Trusted Computing Platform Alliance** Capabilities Table. TCPA PC Specific Implementation Specification. See Links to ACPI-Related Documents under the heading "Trusted Computing Platform Alliance Capabilities Table".
"TPM2"	**Trusted Platform Module 2** Table. See Links to ACPI-Related Documents under the heading "Trusted Platform Module 2 Table".
"UEFI"	**Unified Extensible Firmware Interface** Specification. See the UEFI Specifications web page.
"WAET"	Windows ACPI Emulated Devices Table**. See Links to ACPI-Related Documents under the heading "Windows ACPI Emulated Devices Table".
"WDAT"	**Watch Dog Action Table**. Requirements for Hardware Watchdog Timers Supported by Windows - Design Specification. See Links to ACPI-Related Documents under the heading "Watchdog Action Table (WDAT)".
"WDRT"	**Watchdog Resource Table**. Watchdog Timer Hardware Requirements for Windows Server 2003. See Links to ACPI-Related Documents under the heading "Watchdog Timer Resource Table (WDRT)".
"WPBT"	**Windows Platform Binary Table**. See Links to ACPI-Related Documents under the heading "Windows Platform Binary Table".
"WSMT"	**Windows Security Mitigations Table**. See Links to ACPI-Related Documents under the heading "Windows SMM Security Mitigations Table (WSMT)."
"XENV"	**Xen Project**. See Links to ACPI-Related Documents under the heading Xen Project Table.

寻找 RSDP

5.2.5.1 Finding the RSDP on IA-PC Systems

OSPM finds the Root System Description Pointer (RSDP) structure by searching physical memory ranges on 16-byte boundaries for a valid Root System Description Pointer structure signature and checksum match as follows:

- The first 1 KB of the Extended BIOS Data Area (EBDA). For EISA or MCA systems, the EBDA can be found in the two-byte location 40:0Eh on the BIOS data area.
- The BIOS read-only memory space between 0E0000h and 0FFFFFh.

5.2.5.3 Root System Description Pointer (RSDP) Structure

The revision number contained within the structure indicates the size of the table structure.

Table 5.3: **RSDP Structure**

Field	Byte Length	Byte Offset	Description
Signature	8	0	"RSD PTR " (Notice that this signature must contain a trailing blank character.)
Checksum	1	8	This is the checksum of the fields defined in the ACPI 1.0 spec-

寻找 IOAPIC 寄存器的映射地址

#1. 找到 MADT

#2. 找到 I/O APIC Structure

Table 5.19 – continued from previous page

Field	Byte Length	Byte Offset	Description
Signature	4	0	'APIC' Signature for the Multiple APIC Description Table.
Length	4	4	Length, in bytes, of the entire MADT.
Revision	1	8	5
Checksum	1	9	Entire table must sum to zero.
OEMID	6	10	OEM ID
OEM Table ID	8	16	For the MADT, the table ID is the manufacturer model ID.
OEM Revision	4	24	OEM revision of MADT for supplied OEM Table ID.
Creator ID	4	28	Vendor ID of utility that created the table. For tables containing Definition Blocks, this is the ID for the ASL Compiler.
Creator Revision	4	32	Revision of utility that created the table. For tables containing Definition Blocks, this is the revision for the ASL Compiler.
Local Interrupt Controller Address	4	36	The 32-bit physical address at which each processor can access its local interrupt controller.
Flags	4	40	Multiple APIC flags. See Multiple APIC Flags for a description of this field.
Interrupt Controller Structure[n]	–	44	A list of interrupt controller structures for this implementation. This list will contain all of the structures from Interrupt Controller Structure Types needed to support this platform. These structures are described in the following sections.

Table 5.24: **I/O APIC Structure**

Field	Byte Length	Byte Offset	Description
Type	1	0	1 I/O APIC structure
Length	1	1	12
I/O APIC ID	1	2	The I/O APIC's ID.
Reserved	1	3	0
I/O APIC Address	4	4	The 32-bit physical address to access this I/O APIC. Each I/O APIC resides at a unique address.

continues on next page

Bingo!

额外的注意事项

5.2.12.5 Interrupt Source Override Structure

Interrupt Source Overrides are necessary to describe variances between the IA-PC standard dual 8259 interrupt definition and the platform's implementation.

It is assumed that the ISA interrupts will be identity-mapped into the first I/O APIC sources. Most existing APIC designs, however, will contain at least one exception to this assumption. The Interrupt Source Override Structure is provided in order to describe these exceptions. It is not necessary to provide an Interrupt Source Override for every ISA interrupt. Only those that are not identity-mapped onto the APIC interrupt inputs need be described.

- This specification only supports overriding ISA interrupt sources.

For example, if your machine has the ISA Programmable Interrupt Timer (PIT) connected to ISA IRQ 0, but in APIC mode, it is connected to I/O APIC interrupt input 2, then you would need an Interrupt Source Override where the source entry is '0' and the Global System Interrupt is '2.'

Table 5.25: **Interrupt Source Override Structure**

Field	Byte Length	Byte Offset	Description
Type	1	0	2 Interrupt Source Override
Length	1	1	10
Bus	1	2	0 Constant, meaning ISA
Source	1	3	Bus-relative interrupt source (IRQ)
Global System Interrupt	4	4	The Global System Interrupt that this bus-relative interrupt source will signal.
Flags	2	8	MPS INTI flags. See the corresponding tabel below for a description of this field.

Code Time