

UEFI Basic Tutorial (Sixteen) - Simple Use of ACPI

原创

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摘要

This article introduces the compilation process of ACPI source code ASL, including UEFI compilation environment initialization, ASL source file creation and compilation process. In addition, it also introduces the dumping method of ACPITable under different operating systems and the process of installing a custom ACPI table in UEFI.

The summary is generated in [C Know](#) , supported by DeepSeek-R1 full version, [go to experience](#)>

1. ACPI source code ASL compilation process

1. Initialize the UEFI compilation environment

edksetup.bat

```
E:\EDK2_DEMO>edksetup.bat
PATH = E:\EDK2_DEMO\BaseTools\BinWrappers\WindowsLike;C:\Program Files (x86)\Microsoft Visual Studio 14.0\
\Common7\IDE\CommonExtensions\Microsoft\TestWindow;C:\Program Files (x86)\MSBuild\14.0\bin;C:\Program Files (x86)\Micros
oft Visual Studio 14.0\Common7\IDE\;C:\Program Files (x86)\Microsoft Visual Studio 14.0\VC\BIN;C:\Program Files (x86)\Mi

E:\EDK2_DEMO>where cl
C:\Program Files (x86)\Microsoft Visual Studio 14.0\VC\bin\cl.exe

E:\EDK2_DEMO>where trim
E:\EDK2_DEMO\BaseTools\BinWrappers\WindowsLike\Trim.bat
```

2. Create ASL source files

Execute the following command in the terminal to generate csdn.asl. and csdnhw.asl

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1

echo '

2

DefinitionBlock ("csdn.asl", "DSDT", 2, "ICSDN", "PLATECSDN", 3)

3

{

4

5

#include "csdnhw.asl"

6

} // end of DSDT

7

' >> csdn.asl

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1

echo '

2

Scope (_SB) {

3

Name(TEMP, 0)

4

5

Device(csdndev) {

6

Name(_HID, EISAID("PNP0C03"))

7

#ifdef CSDN_ENABLE

8

Name(_UID, "CSDNRESV")

9

#endif

10

```

11 |         Method(_STA, 0)
12 |     {
13 |         Return (0)
14 |     }
15 | }
16 | }
17 | ' >> csdnhw.asl
18 |

```

收起 ^

```

E:\EDK2_DEMO\OvmfPkg>mkdir MyHelloWorldAcpi
E:\EDK2_DEMO\OvmfPkg>cd MyHelloWorldAcpi
E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>sh
sh-4.4$ echo '
> DefinitionBlock ("csdn.asl","DSDT",2,"ICSDN","PLATECSDN",3)
> {
>
>     #include "csdnhw.asl"
> } // end of DSDT
> ' >> csdn.asl
sh-4.4$ echo '
> Scope (_SB) {
>     Name(TEMP,0)
>
>     Device(PRRE) {
>         Name(_HID,EISAID("PNP0C03"))
>         #ifdef CSDN_ENABLE
>             Name(_UID,"CSDNRESV")
>         #endif
>
>         Method(_STA, 0)
>         {
>             Return (0)
>         }
>     }
> }
> ' >> csdnhw.asl
sh-4.4$ ls
csdn.asl  csdnhw.asl
sh-4.4$ exit
E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>_

```

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3. Compile ASL

1) Preprocess ASL into .i file

```
Trim --asl-file -o csdn.i csdn.asl
```

```

E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>dir
Volume in drive E is Darren
Volume Serial Number is 2427-9A2E

Directory of E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi

03/21/2021  10:21 PM    <DIR>        .
03/21/2021  10:21 PM    <DIR>        ..
03/21/2021  10:21 PM                106 csdn.asl
03/21/2021  10:21 PM                204 csdnhw.asl
               2 File(s)                310 bytes
               2 Dir(s)  23,308,447,744 bytes free

E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>Trim --asl-file -o csdn.i csdn.asl

E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>dir
Volume in drive E is Darren
Volume Serial Number is 2427-9A2E

Directory of E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi

03/21/2021  10:26 PM    <DIR>        .
03/21/2021  10:26 PM    <DIR>        ..
03/21/2021  10:21 PM                106 csdn.asl
03/21/2021  10:26 PM                369 csdn.i
03/21/2021  10:21 PM                204 csdnhw.asl
               3 File(s)                679 bytes
               2 Dir(s)  23,308,447,744 bytes free

E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>_

```

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2) Preprocess .i to .iii file

```

"C:\Program Files (x86)\Microsoft Visual Studio 14.0\vc\bin\amd64\cl.exe" /nologo /E /C /D CSDN_ENABLE
csdn.i > csdn.iii

```

```

E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>"C:\Program Files (x86)\Microsoft Visual Studio 14.0\vc\bin\amd64\cl.exe" /nologo
/E /C /D CSDN_ENABLE csdn.i > csdn.iii
csdn.i

E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>dir
Volume in drive E is Darren
Volume Serial Number is 2427-9A2E

Directory of E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi

03/21/2021  10:27 PM    <DIR>        .
03/21/2021  10:27 PM    <DIR>        ..
03/21/2021  10:21 PM                106 csdn.asl
03/21/2021  10:26 PM                369 csdn.i
03/21/2021  10:27 PM                360 csdn.iii
03/21/2021  10:21 PM                204 csdnhw.asl
               4 File(s)                1,039 bytes
               2 Dir(s)  23,308,447,744 bytes free

```

向ACPI源文件传递宏定义

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3) Preprocess .iii to .iiii file

```
Trim --source-code -l -o csdn.iiii csdn.iii
```

```

E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>Trim --source-code -l -o csdn.iiii csdn.iii

E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>dir
Volume in drive E is Darren
Volume Serial Number is 2427-9A2E

Directory of E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi

03/21/2021  10:30 PM    <DIR>        .
03/21/2021  10:30 PM    <DIR>        ..
03/21/2021  10:21 PM                106 csdn.asl
03/21/2021  10:26 PM                369 csdn.i
03/21/2021  10:27 PM                360 csdn.iii
03/21/2021  10:30 PM                319 csdn.iiii
03/21/2021  10:21 PM                204 csdnhw.asl
               5 File(s)                1,358 bytes
               2 Dir(s)  23,308,447,744 bytes free

```

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4) Compile the .iiii file into an .aml file

```
C:\ASL\iasl.exe -vr -oi -so csdn.iiii
```

```
E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>C:\ASL\iasl.exe -vr -oi -so csdn.iiii
```

```
Intel ACPI Component Architecture  
ASL+ Optimizing Compiler/Disassembler version 20180105  
Copyright (c) 2000 - 2018 Intel Corporation
```

```
csdn.iiii      9:      Name(TEMP,0)  
Warning 4089 -      ^ Object is not referenced
```

```
ASL Input:      csdn.iiii - 28 lines, 319 bytes, 7 keywords  
AML Output:     csdn.aml - 91 bytes, 6 named objects, 1 executable opcodes  
Offset Table:   csdn.offset.h - 2593 bytes
```

```
Compilation complete. 0 Errors, 1 Warnings, 0 Remarks, 1 Optimizations
```

```
E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>dir  
Volume in drive E is Darren  
Volume Serial Number is 2427-9A2E
```

```
Directory of E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi
```

```
03/21/2021  10:31 PM    <DIR>        .  
03/21/2021  10:31 PM    <DIR>        ..  
03/21/2021  10:31 PM             91 csdn.aml  
03/21/2021  10:21 PM            106 csdn.asl  
03/21/2021  10:26 PM            369 csdn.i  
03/21/2021  10:27 PM            360 csdn.iii  
03/21/2021  10:30 PM            319 csdn.iiii  
03/21/2021  10:31 PM          2,593 csdn.offset.h  
03/21/2021  10:21 PM            204 csdnhw.asl  
              7 File(s)          4,042 bytes  
              2 Dir(s) 23,308,439,552 bytes free
```

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5) Package .aml into .raw file

```
GenSec -s EFI_SECTION_RAW -o csdn.raw csdn.aml
```

```
E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>GenSec -s EFI_SECTION_RAW -o csdn.raw csdn.aml
```

```
E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>dir  
Volume in drive E is Darren  
Volume Serial Number is 2427-9A2E
```

```
Directory of E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi
```

```
03/21/2021  10:40 PM    <DIR>        .  
03/21/2021  10:40 PM    <DIR>        ..  
03/21/2021  10:31 PM             91 csdn.aml  
03/21/2021  10:21 PM            106 csdn.asl  
03/21/2021  10:26 PM            369 csdn.i  
03/21/2021  10:27 PM            360 csdn.iii  
03/21/2021  10:30 PM            319 csdn.iiii  
03/21/2021  10:31 PM          2,593 csdn.offset.h  
03/21/2021  10:40 PM             95 csdn.raw  
03/21/2021  10:21 PM            204 csdnhw.asl  
              8 File(s)          4,137 bytes  
              2 Dir(s) 23,308,439,552 bytes free
```

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6) Package .raw into .ffs file

```
GenFfs -t EFI_FV_FILETYPE_FREEFORM -g B4BA6241-936C-4485-A483-9FA832C758CA -o B4BA6241-936C-4485-A483-9FA832C758CA.ffs -oi csdn.raw
```

```
E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>GenFfs -t EFI_FV_FILETYPE_FREEFORM -g B4BA6241-936C-4485-A483-9FA832C758CA -o B4BA6241-936C-4485-A483-9FA832C758CA.ffs -oi csdn.raw

E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>dir
Volume in drive E is Darren
Volume Serial Number is 2427-9A2E

Directory of E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi

03/21/2021  10:40 PM    <DIR>          .
03/21/2021  10:40 PM    <DIR>          ..
03/21/2021  10:40 PM             119 B4BA6241-936C-4485-A483-9FA832C758CA.ffs
03/21/2021  10:31 PM             91 csdn.asl
03/21/2021  10:21 PM            106 csdn.asl
03/21/2021  10:26 PM            369 csdn.i
03/21/2021  10:27 PM            360 csdn.iii
03/21/2021  10:30 PM            319 csdn.iiii
03/21/2021  10:31 PM           2,593 csdn.offset.h
03/21/2021  10:40 PM             95 csdn.raw
03/21/2021  10:21 PM            204 csdnhw.asl
               9 File(s)              4,256 bytes
               2 Dir(s)  23,308,439,552 bytes free

E:\EDK2_DEMO\OvmfPkg\MyHelloWorldAcpi>_
```

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This step can actually be omitted, because `ACPI raw` the file will eventually `efi,ui,depex` be packaged with the file `ffs`. Refer to the following definition:

AI generated projects

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```
1 [Rule.Common.DXE_RUNTIME_DRIVER.DRIVER_ACPITABLE]
2 FILE DRIVER = $(NAMED_GUID) {
3     DXE_DEPEX DXE_DEPEX Optional      $(INF_OUTPUT)/$(MODULE_NAME).depex
4     PE32      PE32                    $(INF_OUTPUT)/$(MODULE_NAME).efi
5     RAW ACPI  Optional                |.acpi
6     RAW ASL   Optional                |.asl
7     UI        STRING="$(MODULE_NAME)" Optional
8     VERSION   STRING="$(INF_VERSION)" Optional BUILD_NUM=$(BUILD_NUMBER)
9 }
```

ACPI Table Dump

1. For Linux OS

1. Install acpi-tools

```
rpm -ivh http://mirrors.163.com/centos/8/BaseOS/x86_64/os/Packages/acpica-tools-20180629-3.el8.x86_64.rpm
```

OR

```
wget http://mirrors.163.com/centos/8/BaseOS/x86_64/os/Packages/acpica-tools-20180629-3.el8.x86_64.rpm
yum install acpica-tools-20160527-3.el7.x86_64.rpm
```

2. Dump all tables to xxx.dat

```
acpidump > alltables.dat OR acpidump -o alltables.dat
```

3. Extract all tables from text dat file

```
# dump all tables from text output files, dsdt.dat, ssdt.dat
acpixtract -a alltables.dat
# gen xxx.dsl code from xxx.dat
iasl -d dsdt.dat
```

PS:

Or directly

```
# de-compile DSDT to DSDT.dsl
cp -R /sys/firmware/acpi/tables/* .
iasl -d DSDT
```

2. For Win OS

RWEverything

Or

acpidump.exe -b (acpi windwos tool download link: <https://acpica.org/downloads/binary-tools>)

3. For EFI SHELL

acpiDump.efi -b (acpi efi tool download link: <https://acpica.org/downloads/binary-tools>)

3. Install ACPI Table for FW

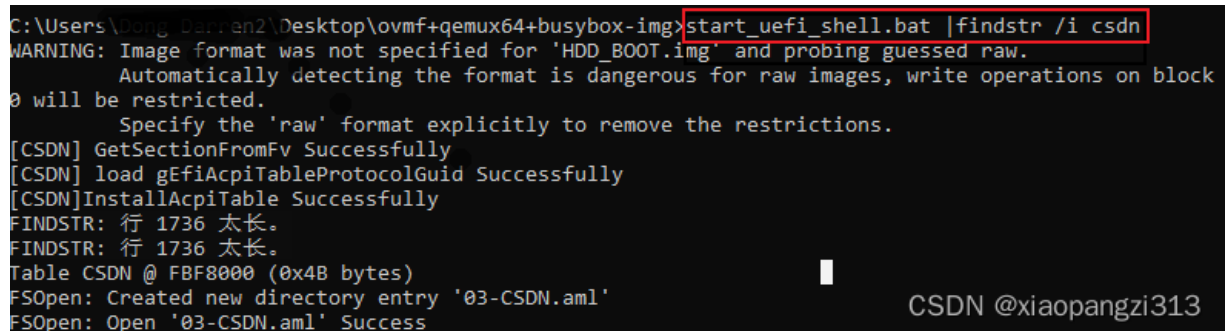
AI generated projects

登录复制

```
1  EFI_ACPI_TABLE_PROTOCOL      *AcpiTable;
2  UINTN                        TableKey;
3  EFI_ACPI_DESCRIPTION_HEADER  *Table.;
4  UINTN                        TableSize;
5
6  // 从efi所在的ffs中提取 aml section
7  Status = GetSectionFromFv (
8      &gEfiCallerIdGuid,
9      EFI_SECTION_RAW,
10     0,
11     (VOID **) &Table,
12     &TableSize
13 );
14
15 //获取Acpi protocol
16 Status = gBS->LocateProtocol (&gEfiAcpiTableProtocolGuid, NULL, (VOID **) &AcpiTable);
17 TableKey = 0;
18 CopyMem (Table->OemId, "CSDN " sizeof (Table->OemId) );
19 Status = AcpiTable->InstallAcpiTable (
20     AcpiTable,
twen    Table,
twen    TableSize,
twen    &TableKey
twen    );
```

收起 ^

The following diagram shows the effect of **ACPI table** installing a custom one **UEFI** into : **UEFI shell dump**



```
C:\Users\dong_ban_en2\Desktop\ovmf+qemu64+busybox-img>start_uefi_shell.bat |findstr /i csdn
WARNING: Image format was not specified for 'HDD_BOOT.img' and probing guessed raw.
Automatically detecting the format is dangerous for raw images, write operations on block
0 will be restricted.
Specify the 'raw' format explicitly to remove the restrictions.
[CSDN] GetSectionFromFv Successfully
[CSDN] load gEfiAcpiTableProtocolGuid Successfully
[CSDN]InstallAcpiTable Successfully
FINDSTR: 行 1736 太长。
FINDSTR: 行 1736 太长。
Table CSDN @ FBF8000 (0x4B bytes)
FSOpen: Created new directory entry '03-CSDN.aml'
FSOpen: Open '03-CSDN.aml' Success
```

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```

0 Dir(s)
FS0:\>
FS0:\> AcpiDump.efi
Dumping tables to '\.'
Table FACP @ FBF5000 (0x74 bytes)
Table DSDT @ FBF6000 (0x13EA bytes)
Table FACS @ FBF0000 (0x40 bytes)
Table CSDN @ FBF8000 (0x4B bytes)
Table APIC @ FBF4000 (0x78 bytes)
Table HPET @ FBF3000 (0x38 bytes)
Table BGRT @ E301000 (0x38 bytes)
All done!
FS0:\> _

```

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```

C:\Users\Dong Darren2\Desktop\ovmf+qemu64+busybox-img>iasl.exe -d 03-CSDN.aml

Intel ACPI Component Architecture
ASL+ Optimizing Compiler/Disassembler version 20221020
Copyright (c) 2000 - 2022 Intel Corporation

File appears to be binary: found 23 non-ASCII characters, disassembling
Binary file appears to be a valid ACPI table, disassembling
Input file 03-CSDN.aml, Length 0x4B (75) bytes
ACPI: CSDN 0x0000000000000000 00004B (v02 MCSDN PLATECSD 00000003 INTL 20160527)
Unknown ACPI table signature [CSDN], decoding ACPI table header only
Acpi Data Table [CSDN] decoded
Formatted output: 03-CSDN.dsl - 1320 bytes

```

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```

03-CSDN.dsl
6 * Disassembly of 03-CSDN.aml, Tue Jan 3 22:40:33 2023
7 *
8 * ACPI Data Table [CSDN]
9 *
10 * Format: [HexOffset DecimalOffset ByteLength] FieldName : FieldValue (in hex)
11 */
12
13 [000h 0000 004h] Signature : "CSDN"
14 [004h 0004 004h] Table Length : 0000004B
15 [008h 0008 001h] Revision : 02
16 [009h 0009 001h] Checksum : 5B
17 [00Ah 0010 006h] Oem ID : "MCSDN "
18 [010h 0016 008h] Oem Table ID : "PLATECSD"
19 [018h 0024 004h] Oem Revision : 00000003
20 [01Ch 0028 004h] Asl Compiler ID : "INTL"
21 [020h 0032 004h] Asl Compiler Revision : 20160527
22
23
24 **** Unknown ACPI table signature [CSDN]
25
26
27 Raw Table Data: Length 75 (0x4B)
28
29 0000: 43 53 44 4E 4B 00 00 00 02 5B 4D 43 53 44 4E 20 // CSDNK....[MCSDN
30 0010: 50 4C 41 54 45 43 53 44 03 00 00 00 49 4E 54 4C // PLATECSD....INTL
31 0020: 27 05 16 20 10 26 5C 5F 53 42 5F 08 54 45 4D 50 // '...&\_SB_.TEMP
32 0030: 00 5B 82 18 43 53 44 4E 08 5F 48 49 44 0C 41 D0 // [...CSDN._HID.A.
33 0040: 0C 03 14 08 5F 53 54 41 00 A4 00 // ...._STA...
34

```

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The specific effects of AcpiDump under Linux are as follows:

```
~ # acpidump |more
acpidump |more
APIC @ 0x0000000000000000
0000: 41 50 49 43 78 00 00 00 01 ED 42 4F 43 48 53 20 APICx.....BOCHS
0010: 42 58 50 43 41 50 49 43 01 00 00 00 42 58 50 43 BXPCAPIC....BXPC
0020: 01 00 00 00 00 00 E0 FE 01 00 00 00 00 08 00 00 .....
0030: 01 00 00 00 01 0C 00 00 00 00 C0 FE 00 00 00 00 .....
0040: 02 0A 00 00 02 00 00 00 00 00 02 0A 00 05 05 00 .....
0050: 00 00 0D 00 02 0A 00 09 09 00 00 00 0D 00 02 0A .....
0060: 00 0A 0A 00 00 00 0D 00 02 0A 00 0B 0B 00 00 00 .....
0070: 0D 00 04 06 FF 00 00 01 .....

BGRT @ 0x0000000000000000
0000: 42 47 52 54 38 00 00 00 01 32 49 4E 54 45 4C 20 BGRT8....2INTEL
0010: 45 44 4B 32 20 20 20 02 00 00 00 20 20 20 20 20 EDK2 .....
0020: 13 00 00 01 01 00 01 00 18 D0 C6 BE 00 00 00 00 .....
0030: 2F 01 00 00 0F 01 00 00 /.....

CSDN @ 0x0000000000000000
0000: 43 53 44 4E 4B 00 00 00 02 5B 4D 43 53 44 4E 20 CSDNK....[MCSN
0010: 50 4C 41 54 45 43 53 44 03 00 00 00 49 4E 54 4C PLATECSD....INTL
0020: 27 05 16 20 10 26 5C 5F 53 42 5F 08 54 45 4D 50 '....&\_SB\_TEMP
0030: 00 5B 82 18 43 53 44 4E 08 5F 48 49 44 0C 41 D0 .[...CSDN\_HID.A.
0040: 0C 03 14 08 5F 53 54 41 00 A4 00 ....._STA...

DSDT @ 0x0000000000000000
--More--
```

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4. Linux kernel create ACPI service flow

c

AI generated projects

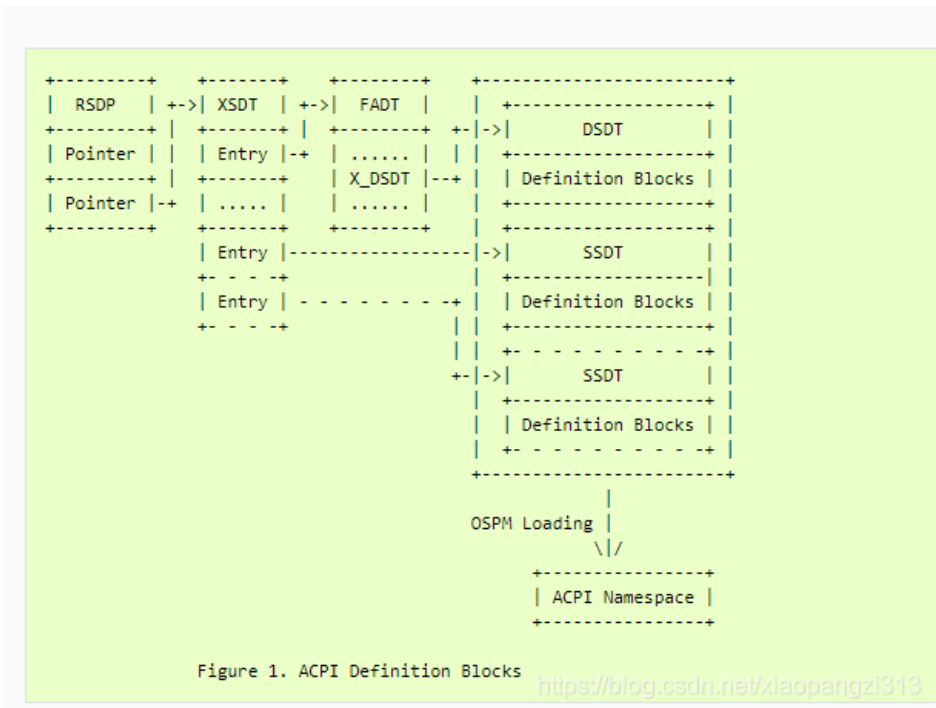
登录复制

run

```
1 arch/x86/kernel/head64.S ->
2 arch/x86/kernel/head64.c:x86_64_start_kernel() ->
3 arch/x86/kernel/head64.c:x86_64_start_reservations ->
4 init/main.c:start_kernel() ->
5 arch/x86/kernel/setup.c:setup_arch() ->
6     acpi_boot_table_init() ->
7     acpi_table_init() ->
8     acpi_initialize_tables() ->
9     acpi_os_get_root_pointer() ->
10    acpi_find_root_pointer()
```

收起 ^

5. ACPI table topology



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Code Link

你有1个CSDN礼包待领取！

广告

达标即送：1) CSDN会员月卡（价值98元）2) 年卡立减60元券3) AI学习大礼包（含AI工具/Cursor/deepseek等学习笔记）4) 限时福利额外...

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