

OpenCore

Reference Manual [\(0.0.2\)](#)

[2019.05.08]

1 Introduction

This document provides information on OpenCore user configuration file format used to setup the correct functioning of macOS operating system.

1.1 Known defects

For OpenCore issues please refer to Acidanthera Bugtracker. ~~Currently this file has the following entries not completed:~~

- ~~• Not all NVRAM variables are properly described (e.g. boot-args).~~

Default value: false

Description: Provide reset register and flag in FADT table to enable reboot and shutdown on legacy hardware. Not recommended unless required.

2. `IgnoreForWindows`

Type: plist boolean

Default value: false

Description: Disable all sorts of ACPI modifications when booting Windows operating system.

This flag implements a quick workaround for those, who made their ACPI tables incompatible with Windows, but need it right now. Not recommended, as ACPI tables must be compatible with any operating system regardless of the changes.

Note: This option may be removed in the future.

3. `NormalizeHeaders`

Type: plist boolean

Default value: false

Description: Cleanup ACPI header fields to workaround macOS ACPI implementation bug causing boot crashes. Reference: Debugging AppleACPIPlatform on 10.13 by Alex James aka theracermaster. The issue is fixed in macOS Mojave (10.14).

4. `RebaseRegions`

Type: plist boolean

Default value: false

Description: Attempt to heuristically relocate ACPI memory regions. Not recommended.

ACPI tables are often generated dynamically by underlying firmware implementation. Among the position-independent code, ACPI tables may contain physical addresses of MMIO areas used for device configuration, usually grouped in regions (e.g. `OperationRegion`). Changing firmware settings or hardware configuration, upgrading or patching the firmware inevitably leads to changes in dynamically generated ACPI code, which sometimes lead to the shift of the addresses in aforementioned `OperationRegion` constructions.

For this reason it is very dangerous to apply any kind of modifications to ACPI tables. The most reasonable approach is to make as few as possible changes to ACPI and try to not replace any tables, especially DSDT. When this is not possible, then at least attempt to ensure that custom DSDT is based on the most recent DSDT or remove writes and reads for the affected areas.

When nothing else helps this option could be tried to avoid stalls at `PCI Configuration Begin` phase of macOS booting by attempting to fix the ACPI addresses. It does not do magic, and only works with most common cases. Do not use unless absolutely required.

5. `ResetLogoStatus`

Type: plist boolean

Default value: false

Description: Reset BGRT table `Displayed` status field to false.

This works around firmwares that provide BGRT table but fail to handle screen updates afterwards.

4. HideSelf

Type: plist boolean

Default value: false

Description: Hides own boot entry from boot picker. This may potentially hide other entries, for instance, when another UEFI OS is installed on the same volume and driver boot is used.

5. Resolution

Type: plist string

Default value: Empty string

Description: Sets console output screen resolution ~~as specified with the~~ [to request custom resolution from GOP if available.](#)

- [Set to WxH@Bpp](#) (e.g. 1920x1080@32) ~~or~~ [WxH](#) (e.g. 1920x1080) formatted string ~~to request custom resolution from GOP if available.~~
- Set to empty string not to change screen resolution.
- Set to Max to try to use largest available screen resolution.

[On HiDPI screens APPLE_VENDOR_VARIABLE_GUID UIScale NVRAM variable may need to be set to 02 to enable HiDPI scaling in FileVault 2 UEFI password interface and boot screen logo. Refer to Recommended Variables section for more details.](#)

Note: This will fail when console handle has no GOP protocol. When the firmware does not provide it, it can be added with ProvideConsoleGop UEFI quirk set to true.

6. ShowPicker

Type: plist boolean

Default value: false

Description: Show simple boot picker to allow boot entry selection.

7. Timeout

Type: plist integer, 32 bit

Default value: 0

Description: Timeout in seconds in boot picker before automatic booting of the default boot entry.

7.4 Debug Properties

1. DisableWatchDog

Type: plist boolean

Default value: NO

Description: Select firmwares may not succeed in quickly booting the operating system, especially in debug mode, which results in watch dog timer aborting the process. This option turns off watch dog timer.

2. DisplayDelay

Type: plist integer

Default value: 0

Description: Delay in microseconds performed after every printed line visible onscreen (i.e. console).

3. DisplayLevel

Type: plist integer, 64 bit

Default value: 0

Description: EDK II debug level bitmask (sum) showed onscreen. Unless **Target** enables console (onscreen) printing, onscreen debug output will not be visible. The following levels are supported (discover more in DebugLib.h):

- 0x00000002 — DEBUG_WARN in DEBUG, NOOPT, RELEASE.
- 0x00000040 — DEBUG_INFO in DEBUG, NOOPT.
- 0x00400000 — DEBUG_VERBOSE in custom builds.
- 0x80000000 — DEBUG_ERROR in DEBUG, NOOPT, RELEASE.

4. ExposeBootPath

Type: plist boolean

Default value: false

Description: Expose printable booter path to OpenCore.efi or its booter (depending on the load order) as an UEFI variable.

To obtain booter path use the following command in macOS:

```
nvram 4D1FDA02-38C7-4A6A-9CC6-4BCCA8B30102:boot-path
```

To use booter path for mounting booter volume use the following command in macOS:

```
u=$(nvram 4D1FDA02-38C7-4A6A-9CC6-4BCCA8B30102:boot-path | sed 's/.*GPT,\([^,]*\),.*\/1/'); \  
if [ "$u" != "" ]; then sudo diskutil mount $u ; fi
```

5. Target

Type: plist integer

Default value: 0

Description: A bitmask (sum) of enabled logging targets. By default all the logging output is hidden, so this option is required to be set when debugging is necessary.

The following logging targets are supported:

- 0x01 — Enable logging, otherwise all log is discarded.
- 0x02 — Enable basic console (onscreen) logging.
- 0x04 — Enable logging to Data Hub.
- 0x08 — Enable serial port logging.
- 0x10 — Enable UEFI variable logging.
- 0x20 — Enable non-volatile UEFI variable logging.
- 0x40 — Enable logging to file.

Console logging prints less than all the other variants. Depending on the build type (**RELEASE**, **DEBUG**, or **NOOPT**) different amount of logging may be read (from least to most).

Data Hub log will not log kernel and kext patches. To obtain Data Hub log use the following command in macOS:

```
ioreg -lw0 -p IODeviceTree | grep boot-log | sort | sed 's/.*<\(.*\)>.*\/1/' | xxd -r -p
```

UEFI variable log does not include some messages and has no performance data. For safety reasons log size is limited to 32 kilobytes. Some firmwares may truncate it much earlier or drop completely if they have no memory. Using non-volatile flag will write the log to NVRAM flash after every printed line. To obtain UEFI variable log use the following command in macOS:

```
nvram 4D1FDA02-38C7-4A6A-9CC6-4BCCA8B30102:boot-log | \  
awk '{gsub(/%0d%0a%00/, ""); gsub(/%0d%0a/, "\n")}'1'
```

Warning: Some firmwares are reported to have broken NVRAM garbage collection. This means that they may not be able to always free space after variable deletion. Do not use non-volatile NVRAM logging without extra need on such devices.

While OpenCore boot log already contains basic version information with build type and date, this data may also be found in NVRAM in **opencore-version** variable even with boot log disabled:

```
nvram 4D1FDA02-38C7-4A6A-9CC6-4BCCA8B30102:opencore-version
```

File logging will create a file named **opencore.log** at EFI volume root with log contents. Please be warned that some file system drivers present in firmwares are not reliable, and may corrupt data when writing files through UEFI. Log is attempted to be written in the safest manner, and thus is very slow. Ensure that **DisableWatchDog** is set to **true** when you use a slow drive.

7.5 Security Properties

1. HaltLevel

Type: plist integer, 64 bit

Default value: 0x80000000 (**DEBUG_ERROR**)

Description: EDK II debug level bitmask (sum) causing CPU to halt (stop execution) after obtaining a message of **HaltLevel**. Possible values match **DisplayLevel** values.

8.4 Recommended Variables

The following variables are recommended for faster startup or other improvements:

- `7C436110-AB2A-4BBB-A880-FE41995C9F82:csr-active-config`
32-bit System Integrity Protection bitmask. Declared in XNU source code in `csr.h`.
- `4D1EDE05-38C7-4A6A-9CC6-4BCCA8B38C14:ExtendedFirmwareFeatures`
Combined `FirmwareFeatures` and `ExtendedFirmwareFeatures`. Present on newer Macs to avoid extra parsing of SMBIOS tables
- `4D1EDE05-38C7-4A6A-9CC6-4BCCA8B38C14:ExtendedFirmwareFeaturesMask`
Combined `FirmwareFeaturesMask` and `ExtendedFirmwareFeaturesMask`. Present on newer Macs to avoid extra parsing of SMBIOS tables.
- `4D1EDE05-38C7-4A6A-9CC6-4BCCA8B38C14:HW_BID`
Hardware BoardProduct (e.g. `Mac-35C1E88140C3E6CF`). Not present on real Macs, but used to avoid extra parsing of SMBIOS tables, especially in `boot.efi`.
- `4D1EDE05-38C7-4A6A-9CC6-4BCCA8B38C14:HW_MLB`
Hardware BoardSerialNumber. Override for MLB. Present on newer Macs (2013+ at least).
- `4D1EDE05-38C7-4A6A-9CC6-4BCCA8B38C14:HW_ROM`
Hardware ROM. Override for ROM. Present on newer Macs (2013+ at least).
- `7C436110-AB2A-4BBB-A880-FE41995C9F82:prev-lang:kbd`
ASCII string defining default keyboard layout. Format is `lang-COUNTRY:keyboard`, e.g. `ru-RU:19456` for Mac keyboard. Also accepts short forms: `ru:19456` or `ru:0`. Full decoded list of keyboards in `AppleKeyboardLayouts-L.dat` can be found on AppleLife.
- `7C436110-AB2A-4BBB-A880-FE41995C9F82:security-mode`
ASCII string defining FireWire security mode. Legacy, can be found in `IOFireWireFamily` source code in `IOFireWireController.cpp`. It is recommended not to set this variable, which may speedup system startup. Setting to `full` is equivalent to not setting the variable and `none` disables FireWire security.
- `4D1EDE05-38C7-4A6A-9CC6-4BCCA8B38C14:UIScale`
8-bit integer defining `boot.efi` user interface scaling. Should be 1 for normal screens and 2 for HDPI screens.

8.5 Other Variables

The following variables may be useful for certain configurations or troubleshooting:

- `7C436110-AB2A-4BBB-A880-FE41995C9F82:boot-args`
Kernel arguments, used to pass configuration to Apple kernel and drivers. There are many arguments, which may be found by looking for the use of `PE_parse_boot_argn` function in the kernel or driver code. [Some of the known boot arguments include:](#)
 - ~~FIXME: document several known values! -debug, keepsyms, slide, -v, -s, -x, cpus=x, io=x, kextlog=x, -nehalem_error_disable -no_compat_check nvda_drv=1, etc?~~ `acpi_layer=0xFFFFFFFF`
 - `acpi_level=0xFFFF5F` (implies `ACPI_ALL_COMPONENTS`)
 - `cpus=VALUE`
 - `debug=VALUE`
 - `io=VALUE`
 - `keepsyms=1`
 - `kextlog=VALUE`
 - `nvda_drv=1`
 - `slide=VALUE`
 - `-nehalem_error_disable`
 - `-no_compat_check`
 - `-s`
 - `-v`
 - `-x`
- `7C436110-AB2A-4BBB-A880-FE41995C9F82:bootercfg`
Booter arguments, similar to `boot-args` but for `boot.efi`. Accepts a set of arguments, which are hexadecimal 64-bit values with or without `0x` prefix primarily for logging control:
 - `log=VALUE`
 - * 1 — `AppleLoggingConOutOrErrSet/AppleLoggingConOutOrErrPrint` (classical `ConOut/StdErr`)
 - * 2 — `AppleLoggingStdErrSet/AppleLoggingStdErrPrint` (`StdErr` or serial?)

patching AppleSmbios.kext and AppleACPIPlatform.kext to read from another GUID: "EB9D2D31" -> "EB9D2D35" (in ASCII).

6. Generic
Type: plist dictionary
Optional: When Automatic is false
Description: Update all fields. This section is read only when Automatic is active.
7. DataHub
Type: plist dictionary
Optional: When Automatic is true
Description: Update Data Hub fields. This section is read only when Automatic is not active.
8. PlatformNVRAM
Type: plist dictionary
Optional: When Automatic is true
Description: Update platform NVRAM fields. This section is read only when Automatic is not active.
9. SMBIOS
Type: plist dictionary
Optional: When Automatic is true
Description: Update SMBIOS fields. This section is read only when Automatic is not active.

9.2 Generic Properties

1. SpoofVendor
Type: plist boolean
Default value: false
Description: Sets SMBIOS vendor fields to Acidanthera.
It is dangerous to use Apple in SMBIOS vendor fields for reasons given in SystemManufacturer description. However, certain firmwares may not provide valid values otherwise, which could break some software.
2. SystemProductName
Type: plist string
Default value: MacPro6,1
Description: Refer to SMBIOS SystemProductName.
3. SystemSerialNumber
Type: plist string
Default value: OPENCORE_SN1
Description: Refer to SMBIOS SystemSerialNumber.
4. SystemUUID
Type: plist string, GUID
Default value: OEM specified
Description: Refer to SMBIOS SystemUUID.
5. MLB
Type: plist string
Default value: OPENCORE_MLB_SN11
Description: Refer to SMBIOS BoardSerialNumber.
6. ROM
Type: plist data, 6 bytes
Default value: all zero
Description: Refer to 4D1EDE05-38C7-4A6A-9CC6-4BCCA8B38C14:ROM.

9.3 DataHub Properties

1. PlatformName
Type: plist string