

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).~~

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?)