*Quick Start Guide for the Cavium Software Development Kit (SDK) Version 5.1.**

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GPL Conformance Statement

Some of the software contained in the OCTEON® SDK is covered under the GNU Public License (GPL). All copyright remains with the authors of that software.

To conform with the GPL, all source code covered under GPL, and all changes made by Cavium to that code, is contained in the SDK package. No other restrictions apply beyond the GPL.

All source code covered under GPL including all changes made by Cavium can also be freely downloaded from http://github.com/Cavium-Open-Source-Distributions.

The source code for the compilers and libraries whose binaries are included in the SDK (for example `gcc`, `gdb`, and `glibc`) are available only from http://github.com/Cavium-Open-Source-Distributions. The tool chain source code is not included with the OCTEON SDK distribution.

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1 Introduction

This document is about the Software Development Kit (SDK). This document assumes the reader has either an Evaluation Base Board (EBB) or a Small Form Factor (SFF) evaluation board. These boards allow the customer to start developing their custom software before their custom board is available.

To set up the evaluation board, follow the directions in the model-specific EVB *User Guide* or SFF *User Guide* located on the support site in (substitute the evaluation board's OCTEON model in the following highlighted text):

- OCTEON II: Products->Processors->OCTEON Family->OCTEON II->[OCTEON_MODEL]->Manuals
- OCTEON III: Products->Processors->OCTEON Family->OCTEON III->[OCTON_MODEL]->Manuals

1.1 Development Environment

The development host is an x86 host running Linux. We have tested with Scientific Linux. Other versions of Linux may or may not work.

1.2 Downloading the SDK and Other Packages

The SDK is located on the Cavium support site in Products->Processors->OCTEON Family->->All OCTEON->Software Development->SDK-[SDK Number]. (Substitute the SDK number in the preceding highlighted text.) There may also be a subfolder "Updates" where updates to the SDK and related software are located.

The SDK folder contains a number of items.

The Basics:

- The basic SDK package: this is required by everyone.
  - The base release will include the letters "GA" (General Access).
  - Updates may be provided to the base release (a "patch level" is included in the update name). Updates are installed after the GA package is installed. Only the most recent update is required: it contains all other updates.
- The basic Linux package: this is required to run Linux SMP on the target board
  - The base release will include the letters "GA" (General Access).
  - Updates may be provided to the base release (a "patch level" is included in the update name). Updates are installed after the GA package is installed. Only the most recent update is required: it contains all other updates.

Model-Specific Packages (the OCTEON model must provide the hardware unit). Ignore any packages which are not supported by the OCTEON model or not part of the services required. Generally, the CORE packages provide a Simple Executive API, and the Linux packages supply a Linux API. The `README` file supplied either with the `rpm` or separately in the same folder on the support site as the package `rpm` file will provide more information.

- HFA: Software for the Hyper-Finite Automata (HFA) coprocessor. This regular-expression coprocessor provides hardware accelerated deep-packet-inspection (DPI) applications.
- RAID: Software support for the RAID unit (RAD) which implements a number of XOR and Galois Field (GF) functions that are used in disk-storage applications.
    - RAID-CORE: Provides Cavium RAID API support to use the RAID block on the CN73XX
    - Linux RAID - Provides Linux APIs RAID. Requires the RAID-CORE package.
- CNNIC: Only needed to run an OCTEON target board connected over PCIe to an x86 or ARM development host.
- Crypto: Software encryption/decryption support.
    - OCTEON-ENGINE
    - CRYPTO-CORE
- ZLIB: Support for the ZIP (compression/decompression) coprocessor.
    - ZLIB-CORE: Provides Cavium ZLIB API support.
    - ZLIB-HOST
    - ZLIB-LINUX: Provides Linux ZLIB APIs. Requires the ZLIB-CORE package.
- ASE: CN78XX only. Support for the Algorithmic Search Engine (ASE) unit, which is a high-capacity, high-speed packet classification engine designed to assist in network processing by performing TCP/IP header lookups.

Special Support:

- Components-Common: Required by some of the other specialized packages. Check the `README` supplied either with the `rpm` or separately to determine if this package is needed.

Updates:

- Check the support site for package updates (listed as Patch #).
- A separate update may be available for the GNU-based toolchain binary. This binary is included in the SDK GA release, but if an update to the toolchain occurs, it is typically provided as a separate package. The `tools` directory is a symbolic link to the `tools-gcc-#` directory as shown in Section 1.3 – “Basic SDK Package Contents”. An update to tools will contain a new tools directory ending in a different number.

The installation instructions included here only discuss installation of the basic SDK and basic Linux packages. For directions on installing other packages, see the support site folder where they are located for `README` files.

Visit the Cavium support site at http://support.cavium.com for more information. We are continuously updating/adding new software and manuals and providing more SDK add-on packages.

1.3 Basic SDK Package Contents

The basic SDK package (`OCTEON-SDK-5.1.*.i386.rpm`) includes:

- The GNU-based toolchain binary (`gcc`, `gdb`, ...): compiler, linker and libraries optimized to take advantage of the cnMIPS® processors contained within the OCTEON
- The OCTEON software simulator with extensive performance measuring capabilities.
- Cavium Network's "Simple Executive" that enables quick development of super-fast data plane applications
- Several example applications which can be used as the base for a custom application
- The bootloader (U-Boot) and bootloader source
- Various utilities

The files are organized into the following directories:

- `bootloader`
- `docs`
- `ejtag`
- `examples`
- `executive`
- `host`
- `licenses`
- `simulator`
- `target`
- `tools` (a symbolic link to the `tools-gcc-4.7` directory)
- `tools-gcc-4.7`

1.4 The Basic Linux Package Contents

The basic Linux package (`OCTEON-LINUX-5.1.*.i386.rpm`) includes:

- Linux kernel source code
- Linux root filesystems (rootfs)
- Various Linux utilities

The files are installed in the `linux` directory.

2 Installing and Using the SDK

This section contains brief information on installing and using the SDK. For detailed information, see the references in Section 2.3 – "Documentation".

2.1 Installing the SDK and Linux

To install the SDK, run as root and use the command:

```
rpm –i OCTEON-SDK/*.rpm
```

By default, the SDK will be installed in:

```
/usr/local/Cavium_Networks/OCTEON-SDK
```

This directory has no special requirement beyond being readable by all users intending to use the SDK.

Optionally, the SDK can be installed in an alternate path by using the `prefixdir` option to the `rpm` command shown above. This is very helpful if multiple versions of the SDK will be installed. For example:

```
rpm --prefix /opt -i OCTEON-SDK-5.1.*.i386.rpm
```

will install the SDK in the directory `/opt/OCTEON-SDK`.

> ***Note: If installing the Linux or any application packages, it is required they be installed with the same `prefix` as the SDK package.***

Within each directory in this archive, there are `README` files containing detailed information about their contents.

After installing the SDK, install any other packages which are needed, including any updates.

It is *strongly recommended* that in order to allow multiple users to share the SDK that any source code which will be modified (for example, `examples` and `linux` directories) be copied to a user's workspace prior to modification. For example, in the user's home directory (replace '*' with the last number for the release (listed in the `rpm` file), such as 5.1.0):

```
mkdir SDK-5.1.*
cd SDK-5.1.*
cp –r /usr/local/Cavium_Networks/OCTEON-SDK ~/
```

See the *SDK Tutorial* chapter in the *OCTEON Programmer's Guide* for more information on how to get started.

2.2 Using the SDK

In the SDK directory, there is an environment setup script: `env-setup`. The `env-setup` script usage is described in the `README.txt` file found there. Modify the `env-setup` file to specify the `OCTEON_MODEL` in use and source the env-setup file. (See the `/usr/local/Cavium_Networks/OCTEON-SDK/octeon-models.txt` file for the supported `OCTEON_MODEL` values.)

If `bash` is the login shell, add the following lines to the `~/.bashrc` file:

```
pushd /usr/local/Cavium_Networks/OCTEON-SDK
source env-setup <OCTEON_MODEL>
popd
```

If `csh`, is the login shell, add the following lines to the `~/.login` file:

```
pushd /usr/local/Cavium_Networks/OCTEON-SDK
source env-setup <OCTEON_MODEL>
popd
```

2.2.1 Example Programs

Perhaps the most interesting items you can find in the SDK are the example applications under the `examples` directory. There are several example applications running under the OCTEON Simple Executive and some also under Linux on OCTEON. Please refer to the individual `README` files for details. The `hello` example is used to check booting, console connection, and Ethernet connection (downloading the `hello` example over `tftp`). The `passthrough` and `traffic-gen` examples are suitable to use as a basis for a custom application.

2.3 Documentation

There is extensive indexed HTML documentation under the `docs` directory. Within that directory, there is an `html` directory which contains `index.html` that can be displayed with your favorite browser. This documents the OCTEON simulator, simple executive, debugger, and bootloader (U-Boot).

Additionally, the *OCTEON Programmer's Guide* is located on the support site in Products->Processors->OCTEON Family->All OCTEON->Manuals->OCTEON Programmer's Guide. Note that there are sub-directories for each volume: 1, 2, and 3.

Other documentation is located in the White Papers and Manuals folders within the OCTEON model-specific folders (substitute the evaluation board's OCTEON model in the following highlighted text):

- OCTEON II: Products->Processors->OCTEON Family->OCTEON II->[OCTEON_MODEL]
- OCTEON III: Products->Processors->OCTEON Family->OCTEON III->[OCTON_MODEL]