SCIOPTA Installation Manual

v2.2

Abstract

This document describes the **SCIOPTA Installation** for the SCIOPTA Kernels.

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1. Introduction

1.1. SCIOPTA Real-Time Operating System

SCIOPTA is a high performance fully pre-emptive real-time operating system for hard real-time application available for many target platforms.

Available modules:
• Pre-emptive Multitasking Real-Time Kernel
• Board Support Packages
• IPS - Internet Protocols v4/v6(TCP/IP)
• IPS Applications - Internet Protocols Applications (Web Server, TFTP, FTP, DNS, DHCP, Telnet, SMTP etc.)
• FAT File System
• (fail) SAFE FAT File System
• Flash File System, NOR and NAND
• Universal Serial Bus, USB Device
• Universal Serial Bus, USB Host
• DRUID - System Level Debugger
• SCIOPTA PEG - Embedded GUI
• CONNECTOR - support for distributed multi-CPU systems
• SCIOPTA Memory Management System - Support for MMU
• SCAPI - SCIOPTA API for Windows or LINUX host
• SCSIM - SCIOPTA Simulator

SCIOPTA Real-Time Operating System contains design objects such as SCIOPTA modules, processes, messages and message pools. SCIOPTA is designed on a message based architecture allowing direct message passing between processes. Messages are mainly used for interprocess communication and synchronization.
SCIOPTA messages are stored and maintained in memory pools. The memory pool manager is designed for high performance and memory fragmentation is avoided. Processes can be grouped in SCIOPTA modules, which allows you to design a very modular system. Modules can be static or created and killed during runtime as a whole. SCIOPTA modules can be used to encapsulate whole system blocks (such as a communication stack) and protect them from other modules in the system.

The SCIOPTA Real-Time Kernel has a very high performance. The SCIOPTA architecture is specifically designed to provide excellent real-time performance and small size. Internal data structures, memory management, interprocess communication and time management are highly optimized. SCIOPTA Real-Time kernels will also run on small single-chip devices without MMU.

1.2. SCIOPTA Safety Kernels

SCIOPTA provides a Real-Time Operating System for some CPU families which is certified according to IEC 61508 up to SIL3, CENELEC EN 50128 up to SIL3/4 and ISO 26262 up to ASIL D:

IEC INTERNATIONAL STANDARD 61508
Edition 2.0 2010-04
Functional safety of electrical/electronic/programmable electronic safety-related systems
Part 1: General requirements
Part 2: Requirements for electrical/electronic/programmable electronic safetyrelated systems (in addition for INT Kernel)
Part 3: Software requirements
Part 4: Definitions and abbreviations

CENELEC European Committee for Electrotechnical Standardization FprEN 50128:2011/A2:2020
Railway applications
Communication, signalling and processing systems

Software for railway control and protection systems

ISO International Organization for Standardization 26262
First Edition 2018-12
Road vehicles – Functional safety
Part 2: Management of functional safety
Part 6: Product development at the software level
Part 8: Supporting processes
Please consult the SCIOPTA Kernel Manuals for more information (Ref. SCIOPTA Kernel Reference Manual and SCIOPTA Architecture Manual).

1.3. Supported Processors

SCIOPTA version	CPU families
V1 Kernels	ARM and Coldfire (active), PowerPC (inactive) (all assembly)
V2 Kernels	Analog Devices Blackfin, Renesas RX and RXv2, Infineon Aurix and ARM64 (all mainly C) ARM (assembly)
V2 Kernel INT	PowerPC (assembly)

Please consult the latest version of the SCIOPTA Price List for the complete list.

1.4. About This Manual

The purpose of this SCIOPTA Installation and Getting Started Manual is to give all needed information how to use SCIOPTA Real-Time Kernel in an embedded project for all CPU family.

Chapter Installation describes how to install SCIOPTA. Topics such as system requirements, installation procedure and removing are covered.

Please consult also the **SCIOPTA Kernel Reference Manual** which contains a complete description of all system calls and error messages and the **SCIOPTA GDD and Utilities User's and Reference Manual** for a detailed description of the GDD interface and SCIOPTA utilities.

2. Installation

2.1. Introduction

This chapter describes how to install the SCIOPTA Safety Certified Kernel and its associated products. Topics such as system requirements, delivery verification, installation procedure, and removal are covered herein.

2.2. The SCIOPTA Delivery

Before you start the installation, please verify the integrity and authenticity of your SCIOPTA delivery. The delivery package is cryptographically signed and includes a software bill of materials (SBOM) to support supply chain transparency.

The following items should be included in your delivery:

- A 7-Zip file named `<Customer-ID>_<version>_<cpu>_delivery.7z`
- A PGP signature file `<Customer-ID>_<version>_<cpu>_delivery.7z.asc` (to verify the archive)
- A `sciopta.spdx.json` file (the Software Bill of Materials in SPDX-2.3 format)
- An installation password for your purchased SCIOPTA products
- SHA256 hash over above file.
- The following products are available:
  - Kernel, Basic BSP
  - Support for MMU or MPU
  - DRUID System Level Debug Package
  - Internet Protocols v4/v6(TCP/IP)
  - IPS Applications (Web Server, TFTP, FTP, DNS, DHCP, Telnet and SMTP etc.)
  - FAT File System
  - (fail) SAFE FAT File System
  - Flash File Systems
  - USB Device
  - USB Host
  - SCIOPTA Connector, transparent distributed systems
  - Board Support Package and Device Driver
  - PEG+ Embedded GUI (Separate delivery)
  - SCIOPTA CONNECTOR (Separate delivery)
- SCIOPTA Architecture Manual
- SCIOPTA Kernel Reference Manual
- Sciopta kernel Configuration Manual
- Sciopta Getting Start Manual

2.3. System Requirements

A personal computer or workstation running Microsoft® Windows. A free hard disk space of maximum 200 Mbytes should be available. Access to the internet is required to download the SCIOPTA public key for signature verification.

2.4. Verifying the Delivery

Before unpacking the installation archive, you are strongly advised to verify its authenticity and integrity. SCIOPTA deliveries are signed with a PGP key and include a software bill of materials (SBOM) in SPDX format. These measures support compliance with the EU Cyber Resilience Act (CRA).

2.4.1. Prerequisites

- GnuPG (GPG) installed on your system.
- Access to the SCIOPTA public key.

2.4.2. Step-by-Step Verification

1. **Download the SCIOPTA Public Key**

   Download the public key from the SCIOPTA website:

   https://www.sciopta.com/keys/sciopta-public-key.asc

   Import the key into your keyring:

   ```
   gpg --import sciopta-public-key.asc
   ```

2. **Verify the 7-Zip Archive Signature**

   Ensure the archive has not been tampered with:

   ```
   gpg --verify <Customer-ID>_<version>_<cpu>_delivery.7z.asc <Customer-ID>_<version>_<cpu>_delivery.7z
   ```

   Expected output:

   ```
   gpg: Good signature from "SCIOPTA Systems GmbH <support@sciopta.com>"
   ```

3. **Review the SBOM**

   The SBOM (`sciopta.spdx.json`) lists all components included in the delivery, including their versions and SHA256 hashes. You can inspect it to understand the software supply chain and verify component integrity.

If any verification step fails, **do not proceed with the installation**. Contact SCIOPTA support immediately.

2.5. Installation Password

The installation password for your purchased SCIOPTA products is delivered separately via a **signed email** from SCIOPTA. This provides an additional independent channel for authentication, as required by secure distribution practices.

2.6. Installation Procedure

2.6.1. Unpack the SCIOPTA Delivery

The SCIOPTA delivery is included in compressed one 7-zip file (see: http://www.7-zip.org/) which you have downloaded from a SCIOPTA server.

The file name is constructed as follows:
<SCIOPTA customer number>_<CPU family>_<version>.7z

- The **SCIOPTA customer number** is composed of the string SCN and a 5 digit number (e.g. SCN10248).
- **Version** is a four field compound number as described in the next paragraph (e.g. 1.9.6.14).

Example file name: **SCN10248_arm_1.9.6.14.7z**.

Copy the archive at the location you want to have SCIOPTA installed. Unpack the file. You must enter a password which was delivered by email.
The SCIOPTA installation does not create any entries in the Windows registry.

If you have placed the 7-Zip file at **<install_folder>** the SCIOPTA products will be installed at the following location:

```
<install_folder>\sciopta\<version>\
```

The expression <version> stands for the SCIOPTA four digit version number (e.g. 1.9.6.14).
Please make sure that all SCIOPTA products of one version are installed in the same destination folder.
You can have more than one SCIOPTA version installed. To switch between versions you just need to modify the **SCIOPTA_HOME** and **PATH** environment variable as described below.

2.6.2. Product Versions

Each SCIOPTA product release is identified by a version number consisting of a four field compound number of the format:

“X.Y.Z.F”

The first digit, **X**, is used for the major release number which will identify a major increase in the product functionality and involves usually a total rewrite or redesigning of the product including changes in the SCIOPTA kernel API. This number starts at 1.

The second digit, **Y**, is used for a release number which is used to identify important enhancements. This number is incriminated to indicate new functionality in the product and may include changes in function calls without modifications in the SCIOPTA kernel API. This number starts at 0.

The third digit, **Z**, stands for feature release number. The feature release number is iterated to identify when functionality have been increased and new files, board support packages or CPUs have been added. This requires also changes in the documentation. This number starts at 0.

The fourth digit, **F**, is called the build number and changes if modifications on the examples or board support packages have been made. This number starts at 0.

2.6.3. SCONF Configuration Utility

The kernel of a SCIOPTA system needs to be configured before you can generate the whole system. The included **SCONF** (sconf.exe) configuration tool is used to setup a SCIOPTA system. You will define system parameters and operating system objects such as SCIOPTA modules, processes and message pools.

The **SCONF** tool is located here:

```
<install_folder>\sciopta\<version>\bin\win32\sconf.exe
```

Define a link to sconf.exe from the desktop if you wish to start **SCONF** from a desktop icon.

2.6.4. DRUID System Level Debugger

If you have installed the SCIOPTA DRUID system level debugger two programs (druid.exe and druids.exe) are included in the \bin directory:

```
<install_folder>\sciopta\<version>\bin\win32\druid.exe
<install_folder>\sciopta\<version>\bin\win32\druids.exe
```

Define links to druid.exe and/or druids.exe from the desktop if you wish to start DRUID from a desktop icon.
Please consult the SCIOPTA DRUID, User's and Reference Manuals for more information about the DRUID system level debugger.

2.6.5. SCIOPTA_HOME Environment Variable

The SCIOPTA system building process needs the **SCIOPTA_HOME** environment variable to be defined.
Please define the **SCIOPTA_HOME** environment variable and set it to the following value:

```
<install_folder>\sciopta\<version>
```

The expression <version> stands for the SCIOPTA four digit version number.

2.6.6. Setting SCIOPTA PATH Environment Variable

If you are using makefiles to build your system, please include

```
<install_folder>\sciopta\<version>\bin\win32
```

in your path environment variable.

2.6.7. Removing SCIOPTA

The SCIOPTA installation does not create any entries in the Windows registry. Therefore there is no removing utility needed to remove SCIOPTA from your computer. You just need to delete the folder.

```
<install_folder>\sciopta\<version>
```

to remove SCIOPTA of a specific version from your computer.

3. Manual Versions

3.1. Manual Version 1.0

- Initial version based on SCIOPTA – Real Time Kernel, SCIOPTA Installation and Getting Started.

3.2. Manual Version 2.0

- Rewrite the whole manual.

3.3. Manual Version 2.1

- Chapter folding
  - Initial chapters are folded.
  - Some clarifcations.
  - Layout fixes.

3.4. Manual Version 2.2

- **Secure Delivery & Verification**
  - Added PGP signature verification instructions for the delivery package.
  - Added SBOM (Software Bill of Materials) review instructions using the SPDX-2.3 format.
  - Documented the installation password delivery via signed email as an additional secure channel.
- **CRA Compliance Alignment**
  - Updated delivery contents to include `sciopta.spdx.json` and its PGP signature.
  - Added guidance on verifying the integrity and authenticity of the delivery.
  - Enhanced the installation procedure to reference the secure verification steps.