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Printing History

New editions of this manual will incorporate all new or changed content since the previous edition was published (minor typographical or formatting corrections do not result in the publication of a new edition). The publishing date, manufacturing part number, and edition number all change each time a new edition is published, providing unique identification for each edition.

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About This Document

This manual describes how to get started using the HP-UX 11i v2 Driver Development Kit.

The document printing date and part number indicate the document’s current edition. The printing date will change when a new edition is printed. Minor changes may be made at reprint without changing the printing date. The document part number will change when extensive changes are made.

Document updates and CDs may be issued between editions to correct errors or to document product changes. To ensure you receive updated and new editions, users should subscribe to the appropriate product support service using the following link: http://h21007.www2.hp.com/dspp/reg/reg_Registration/1,2575,,00.html. The latest version of the HP-UX 11i v2 Driver Development Kit (DDK) documents can be found on line at http://www.hp.com/go/hpux_ddk.

NOTE

This book contains many examples of C programs to help design device drivers. Because of page width restrictions, some long lines of code exceed the space available and break in unintended places. Please treat these "broken" lines as one line. We recommend that you use the sample files included with this manual when possible, rather than retyping the examples.

Intended Audience

This document is intended for system administrators or developers responsible for porting or writing drivers. Developers are expected to:

• Have experience writing programs in the C language.
• Have working knowledge of the basic concepts of writing a driver.
• Understand the functionality of the hardware for which the driver is being written.
• Understand the HP-UX System Administration Tasks manual and performed system administration.
• Have working knowledge of the virtual memory, I/O, and file system areas in the HP-UX and/or UNIX.

This document is not a tutorial Training in this field can be attained at http://h21007.www2.hp.com/dspp/edu/edu_EducationHome_IDX/1,1727,,00.html.

What’s New In This Edition Of The Getting Started Guide

• APITI is included with the tools listed in this edition. APITI is used to test kernel interfaces of kernel modules.
• A reference to a new white paper detailing instructions on porting a Solaris GLD based network driver to an HP-UX HP-DLPI driver is included in this edition.
• A reference to a new Network Driver Migration Guide white paper is included in this edition.
• A reference to a new DDG chapter (Chapter 23) describing the usage of "Kernel Registry Services" is included in this edition.
What's in This Document

The HP-UX 11i v2 Driver Development Kit (DDK) Getting Started Guide is divided into several sections, and each contains information on prerequisites and necessary skills.

Typographical Conventions

This document uses the following conventions.

Book Title The title of a book. On the web and on the Instant Information CD, it may be a hot link to the book itself.

KeyCap The name of a keyboard key. Note that Return and Enter both refer to the same key.

Emphasis Text that is emphasized.

Bold Text that is strongly emphasized.

Bold The defined use of an important word or phrase.

ComputerOut Text displayed by the computer.

UserInput Commands and other text that you type.

Command A command name or qualified command phrase.

Variable The name of a variable that you may replace in a command or function or information in a display that represents several possible values.

[ ] The contents are optional in formats and command descriptions. If the contents are a list separated by |, you must choose one of the items.

( ) The contents are required in formats and command descriptions. If the contents are a list separated by |, you must choose one of the items.

... The preceding element may be repeated an arbitrary number of times.

| Separates items in a list of choices.

HP-UX Release Name and Release Identifier

Each HP-UX 11i release has an associated release name and release identifier. The uname(1) command with the -r option returns the release identifier. This table shows the releases available for HP-UX 11i.

Table 1 HP-UX 11i Releases

<table>
<thead>
<tr>
<th>Release Identifier</th>
<th>Release Name</th>
<th>Supported Processor Architecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.11.11</td>
<td>HP-UX 11i v1</td>
<td>PA-RISC</td>
</tr>
<tr>
<td>B.11.20</td>
<td>HP-UX 11i v1.5</td>
<td>Intel® Itanium®</td>
</tr>
<tr>
<td>B.11.22</td>
<td>HP-UX 11i v1.6</td>
<td>Intel® Itanium®</td>
</tr>
<tr>
<td>B.11.23</td>
<td>HP-UX 11i v2.0</td>
<td>Intel® Itanium®</td>
</tr>
<tr>
<td>B.11.23</td>
<td>HP-UX 11i v2.0 September 2004</td>
<td>PA RISC and Intel® Itanium®</td>
</tr>
</tbody>
</table>
Related Documents

Additional information about the DDK and its contents can be found at:
http://www.hp.com/go/hpux_ddk

Other documents in this collection include:
• HP-UX 11i v2 Driver Development Guide
• HP-UX 11i v2 Driver Development Reference Guide

HP Encourages Your Comments

HP encourages your comments concerning this document. We are committed to providing documentation that meets your needs.

Send comments to: hphp.support@hp.com

Include the document title and manufacturing part number with your comments.

Support/Compatibility Disclaimers

Since drivers function at the level of the kernel, Hewlett-Packard Company (HP) reminds you of the following:

☐ Adding your own driver to HP-UX requires relinking the driver into HP-UX. With each new release you should plan on recompiling your driver in order to reinstall it into the new HP-UX kernel. Many header files do not change. However, drivers typically use some header files that could change across releases (i.e., you can have some system dependencies).

☐ HP provides support services for HP products, including HP-UX. Products, including drivers, from non-HP parties receive no support, other than the support of those parts of a driver that rely on the documented behavior of supported HP products.

☐ Should difficulties arise during the development and test phases of writing a driver, HP may provide assistance in isolating problems to determine if:
  • HP hardware is not at fault; and
  • HP software (firmware) is not at fault by removing user-written kernel drivers.

☐ When HP hardware, software, and firmware are not at fault, you should seek help from the third party from whom you obtained software or hardware.
Reference Documentation

- Hewlett-Packard Company
  - Dealer Configuration File Creation Guide, HP Part No. D2230-90001
  - STREAMS Programmer's Guide for HP 9000 Computer Systems, HP Part No. 5990-7246
  - HP 9000 Networking DLPI Programmer's Guide, HP Part No. 98194-90059
  - HP-UX Managing Systems and Workgroups, HP Part No. B2355-90664
  - HP-UX Reference, HP Part No. B2355-90052
  - HP-UX System Administration Tasks, HP Part No. B2355-90079
  - HP C Programmer's Guide, HP Part No. 92434-90002
  - Configuring HP-UX for Peripherals, HP Part No. B2355-90053
  - Installing and Updating HP-UX, HP Part No. B2355-90078
  - Managing HP-UX Software with SD-UX, HP Part No. B2355-90044

- Other References
  - PCI Local Bus Specification, Revision 2.1, PCI Special Interest Group
  - PCI System Design Guide, Revision 1.0, PCI Special Interest Group
  - Data Link Provider Interface Specifications, Unix International
1 Components

Documentation is provided as part of the HP-UX 11i v2 Driver Development Kit (DDK).

Documents

- **HP-UX 11i v2 Driver Development Guide (DDG)**
  This document contains detailed information on the HP-UX 11i v2 **Driver Development Environment (DDE)** for I/O subsystems, driver stacks, cookbook approaches on writing a particular class of driver, and implementing high availability features in a driver. Specific components of the DDG include the following:
  
  - **WSIO Driver Specific**
    Refer to DDG chapters 1 thru 8. These chapters contain detailed information on writing WSIO driver. This includes driver environment overview, subsystem features, multiprocessing, writing drivers, DLKM drivers, kernel module configuration, tunables in drivers, and writing PCI drivers.
  
  - **Mass Storage Specific**
    Refer to DDG chapters 16 thru 18. These chapters contain detailed information on mass storage stack architecture, writing SCSI class drivers and writing a SCSI transport driver. In addition, refer to WSIO driver specific chapters, as well as Chapter 21 “Interrupt Migration”, and Chapter 20 “PCI Driver OLA/R Support”.
  
  - **Network Specific**
    Refer to DDG Chapters 9 thru 15. These chapters contain detailed information on HP-UX LAN architecture, writing a native DLPI LAN driver, LAN commands support in LAN drivers, tracing and logging in LAN drivers, SAM support in LAN drivers, understanding OOP and transport drivers. In addition, refer to WSIO driver specific chapters, as well as Chapter 21, “Interrupt Migration”, and Chapter 20, “PCI driver OLA/R Support”.
  
  - **Driver Packaging Specific**
    Refer to DDG Chapter 22, “Creating a Software Depot.” This chapter contains detailed information on creating a software depot.
  
  - **Kernel Registry Services**
    Refer to DDG Chapter 23 to find out how to use "Kernel Registry Services" to manage persistent attributes in device drivers.

- **HP-UX 11i v2 Driver Development Reference Guide (DDR)**
  This document contains reference pages in manpage format for various services the DDE offers. These include:
  
  - **Kernel Services**
    Reference pages for all the services and data structures that are kernel specific.
  
  - **WSIO Services**
    Reference pages for all the services and data structures that are WSIO driver specific.
Components

Sample Drivers

- **Network Services**
  Reference pages for all the services and data structures that are network driver specific. In addition to these, see Kernel and WSIO services.

- **SCSI Services**
  Reference pages for all the services and data structures that are mass storage specific. In addition to these, see Kernel and WSIO services.

- **White Papers**
  White papers provide information targeting a specific problem, enhancement, etc., to be used in conjunction with DDG/DDR. Specific white papers are:
  - Memory Ordering
  - Strong Order
  - DLKM Support for Software Distributor (SD)
  - KWDB
  - STREAMS Programming Guide
  - Solaris 10.x Generic LAN Driver to HP-UX HP-DLPI LAN Driver Porting Guide
  - Network Driver Migration Guide

- **FAQ**
  FAQs are a set of commonly asked HP-UX driver development questions, to be used in conjunction with DDG/DDR for the targeted OS release. The questions addressed here span across all topics like HP-UX DDE, driver compiling issues, building and installing, mass storage and network stacks.

---

**Sample Drivers**

Sample drivers in the HP-UX 11i v2 DDK provide C program sources for functional drivers. They also include supplemental README files, driver installation notes, Makefiles, etc. A set of sample drivers are included that are specific to:

- **Mass Storage**
  The qlisp pSCSI HBA driver is provided as a mass storage specific sample driver. This driver includes driver sources, Makefiles, build scripts, and README files for the pSCSI HBA sample driver.

- **Network**
  Native and Non-Native enet and ielan drivers are provided as part of the network sample drivers. These drivers include driver sources, Makefiles, build scripts, and a README for ielan and enet sample drivers.

- **Miscellaneous**
  This includes three drivers:
  - iklpm — printer class driver
  - pcishm — Shared memory access driver
**Build Environment (BE)**

The necessary driver build tools and sample Makefiles required to build and install drivers are included. Manpages for all build tools and macro files for the stub mechanism are also included. The following items are are provided with the BE:

- **Build and install tools**
  These sets of tools are required for driver building and installing. They include `modmeta`, `kmsecgen`, `modlink` and the `convert_master`.

- **Sample Makefiles**
  Sample Makefiles can be used to generate your own Makefiles for driver development.

- **Stub macro files**
  These macro files can be used during Auto load of the stub mechanism.

- **Manpages**
  A set of manpages for build and install tools.

**Build and Install Tools**

The following tools, binaries, and manpages are provided as part of the BE of the DDK:

- **modmeta**
  Used to compile a `modmeta` file. A `modmeta` file for a module defines the metadata characteristics of the module and adds dynamic loading data to the module.

- **kmsecgen**
  Adds dynamic loading data to the module.

- **modlink**
  Creates a kernel module for a set of component object files.

- **convert_master**
  Reads an existing master file and produces a `modmeta` file required by current HP-UX releases.
Components
Development Tools

Sample Makefiles
The following sample makefiles are provided in the DDK:

- **Makefile**
  Sets the Build Environment for driver building and calls Makefile.bld

- **Makefile.bld**
  Defines build options and builds the driver.

In addition to Makefile and Makefile.bld, a “stub.m4” macro assembler file, for generating auto load stubs and a “modprep” script manpage, are also provided.

Build Tool Manpages

- modmeta(4)
- modmeta(1)
- modlink(1)
- kmsecgen(1)
- convert_master(1)

In addition to the previous build tool manpages;

- modprep(9e) — modprep script manpage is also provided.

---

**NOTE**
A linker symbols text file “linkersyms” is provided in the DDK as part of the BE to pre-enable drivers built in the future for vpars compatibility.

---

Development Tools
The HP-UX 11i v2 DDK includes performance analysis tools, configuration and admin tools, driver compliance tools, certification tools and test tools. All tools have either a “Usage Guide” or “manpage” with binaries. The following are the types of tools supplied as part of HP-UX 11i v2 DDK:

- **General Purpose Tools**
  Used mainly for system performance and diagnostics. Glanceplus, VSAR, and lsof are provided as General Purpose Tools.

- **Mass Storage Tools**
  Performance and diagnostic tools are used for mass storage driver development. Diskbench, SCU, and DT are provided as mass storage tools.

- **Network Tools**
  The performance, diagnostic and testing tools can be used for network driver development. The KIVT, APITI, netperf, pkgen, and nttcp tools are provided for testing HP-UX network drivers.
Certification Tools

- Diskbench

  **Diskbench** (DB) is used to measure disk subsystem, HBA, and driver throughput performance for sequential operations and the number of I/Os for random operations.

- Netperf

  The **Netperf** is a benchmark to measure various aspects of network performance. Its primary focus is on bulk data transfer and request/response performance using either TCP or UDP and Berkeley sockets interface.

Compliance Tools

- DDICT

  DDICT is used to check the compliance of driver interfaces and data structures used in drivers.

Configuration and Administration Tools

- lsof

  **list open files** (lsof) lists information about files opened by processes for various UNIX dialects like SCO UnixWare, Solaris, and HP-UX.

Performance Analysis Tools

- DT

  A generic data test program used to verify correct operation of peripherals and I/O subsystems, and for obtaining performance information.

- GlancePlus

  Consists of performance monitoring and diagnostic tools providing immediate system information.

- PKGEN

  A program that allows the user to generate various types of packets on a TCP/IP LAN

- SCU

  A SCSI utility used for normal maintenance of SCSI peripherals. This utility can be used for device specific setup, diagnostics, and queries for SCSI device information.

- VSAR

  A performance tool that collects statistics from the OS and provides CPU, network, disk, and performance statistics used to obtain a first level understanding of system activity.

- NTTCP

  Measures the transfer rate on TCP, UDP or UDP multicast connections.
### Test Tools

- **KIVT**

  The Kernel Interface Verification Tool (KIVT), is used for testing HP-DLPI based networking drivers for their implementation of HP-DLPI interfaces.

- **APITI**

  The Application Programming Interface Test Infrastructure (APITI), is used for testing the implementation of DLPI primitives and HP-DLPI extensions in networking drivers.

### System Support

Should difficulties arise during the development and test phases of writing a driver, HP may provide assistance in isolating problems to determine if:

- HP hardware is not at fault
- HP software (firmware) is not at fault by removing user-written kernel drivers.

When HP hardware, software, and firmware are not at fault, seek help from the third party from whom that software or hardware was obtained.

### System Requirements

All components of the DDK (except documentation) require an HP-UX 11i v2 PA/IPF operating system. The document component can be installed on any HP-UX 11.0, HP-UX 11i v1 or HP-UX 11i v2 system.

### Installation Locations

#### Document Hierarchy

The HP-UX 11i v2 DDK documents will be installed in the directory hierarchy as shown in Table 1-1, “Document Hierarchy.”
Table 1-1  Document Hierarchy

<table>
<thead>
<tr>
<th>Document</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>All the components of the DDK are installed automatically under this directory only.</td>
<td>/opt/ddk/11.23/</td>
</tr>
<tr>
<td>White Papers</td>
<td>/opt/ddk/11.23/DOCS/white_papers/memory_ordering.pdf</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/DOCS/white_papers/strong_order.pdf</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/DOCS/white_papers/SD_DLKM.pdf</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/DOCS/white_papers/KWDB.pdf</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/DOCS/white_papers/NetworkDriverMigration.pdf</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/DOCS/white_papers/streams.pdf</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/DOCS/white_papers/sol2hpux-lan.pdf</td>
</tr>
<tr>
<td>FAQ</td>
<td>/opt/ddk/11.23/DOCS/11iv2-FAQs.pdf</td>
</tr>
</tbody>
</table>

Sample Driver Hierarchy

The HP-UX 11i v2 DDK Sample Drivers will be installed into the directory hierarchy shown in Table 1-2, “Sample Driver Hierarchy.”

Table 1-2  Sample Driver Hierarchy

<table>
<thead>
<tr>
<th>Sample Driver</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network</td>
<td>/opt/ddk/11.23/sampldrvs/net/ENET/11.23.1.1/&lt;sources, README, Makefiles, supplementals, etc.&gt;</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/sampldrvs/net/ielan/11.23.1.1/&lt;sources, README, Makefiles, supplementals, etc.&gt;</td>
</tr>
<tr>
<td>Mass Storage</td>
<td>/opt/ddk/11.23/sampldrvs/ms/qlisp/11.23.1.1/&lt;sources, README, Makefiles, supplementals, etc.&gt;</td>
</tr>
</tbody>
</table>
Revision numbers in the versioning scheme are used only for sample drivers. Sample drivers are not overwritten when new versions are installed. Both new and previous HP-UX versions of the sample drivers are retained.

<table>
<thead>
<tr>
<th>Sample Driver</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misc.</td>
<td>/opt/ddk/11.23/sampldrvs/misc/iklpm/11.23.1.1/sources, README, Makefiles, supplementals, etc.&gt;</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/sampldrvs/misc/pcishm/11.23.1.1/sources, README, Makefiles, supplementals, etc.&gt;</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/sampldrvs/misc/rdisk/11.23.1.1/sources, README, Makefiles, supplementals, packaging files, etc.&gt;</td>
</tr>
<tr>
<td>Sample Makefiles</td>
<td>/opt/ddk/11.23/BE/Sample_makefiles/&lt;Makefile, Makefile.bld&gt;</td>
</tr>
</tbody>
</table>

Build Hierarchy Environment

The HP-UX 11.23 v2 DDK Build Environment will be installed into the directory hierarchy shown in Table 1-3, “Build Hierarchy.”

<table>
<thead>
<tr>
<th>Sample Driver</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build Tools</td>
<td>/opt/ddk/11.23/BE/bin/modmeta</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/BE/bin/kmsecgen</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/BE/bin/modlink</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/BE/bin/convert_master</td>
</tr>
<tr>
<td>Build Tool Documentation</td>
<td>/opt/ddk/11.23/BE/man/man1/convert_master.1</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/BE/man/man1/kmsecgen.1</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/BE/man/man1/modlink.1</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/BE/man/man1/modmeta.1</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/BE/man/man4/modmeta.4</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/BE/docs/ktune_computed_default.txt</td>
</tr>
<tr>
<td>Module preparation script</td>
<td>/opt/ddk/11.23/BE/man/man9/modprep.9e</td>
</tr>
<tr>
<td>Macro file for stub mechanism</td>
<td>/opt/ddk/11.23/BE/macro_files/stub.m4</td>
</tr>
<tr>
<td>Linker symbols for vpar compatibility</td>
<td>/opt/ddk/11.23/BE/bin/linkersyms</td>
</tr>
</tbody>
</table>
Tool Hierarchy

The HP-UX 11i v2 DDK Tools will be installed into the directory hierarchy shown in Table 1-4, “Tool Hierarchy.”

Table 1-4 Tool Hierarchy

<table>
<thead>
<tr>
<th>Tool</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certification Tools</td>
<td>/opt/ddk/11.23/tools/cert/diskbench/&lt;binaries, documents&gt;</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/tools/cert/netperf/&lt;binaries, documents&gt;</td>
</tr>
<tr>
<td>Driver Compliance tools</td>
<td>/opt/ddk/11.23/tools/compliance/ddict/&lt;binaries, documents&gt;</td>
</tr>
<tr>
<td>Configuration and admin tools</td>
<td>/opt/ddk/11.23/tools/config_admin/1sof/&lt;binaries, documents&gt;</td>
</tr>
<tr>
<td>Performance analysis tools</td>
<td>/opt/ddk/11.23/tools/perf/DT/&lt;binaries, documents&gt;</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/tools/perf/GlancePlus/&lt;documents&gt;</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/tools/perf/PKGEN/&lt;binaries, documents&gt;</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/tools/perf/SCU/&lt;binaries, documents&gt;</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/tools/perf/VSAR/&lt;binaries, documents&gt;</td>
</tr>
<tr>
<td>Test Tools</td>
<td>/opt/ddk/11.23/tools/test/kivt_ihv/&lt;binaries, documents&gt;</td>
</tr>
<tr>
<td></td>
<td>/opt/ddk/11.23/tools/test/apiti/&lt;binaries, documents&gt;</td>
</tr>
</tbody>
</table>

Some of the tools run under particular default directories such as /opt/, /usr/local/, etc. When tools are installed as part of HP-UX 11i v2 DDK, a soft link to their respective default directories is created.

Tools binaries are platform specific. They are installed on the respective platforms and a soft link is created with the actual tool name, as shown in the following examples:

On an HP-UX 11i v2 PA system, under /opt/ddk/11.23/tools/cert/netperf, the files are:

- netperf-PA
- netperf -> /opt/netperf/netperf-PA

On an HP-UX 11i v2 IPF system, under /opt/ddk/11.23/tools/cert/netperf, the files are:

- netperf-IA
- netperf -> /opt/netperf/netperf-IA
Component Depot Names

The Driver Development Kit (DDK) consists of:

**DDK** — ddk11_23.1.1.depot
- The entire 11i v2 Driver Development Kit.

**BE** — ddk.be11_23.1.1.depot
- All build tools and sample Makefiles.

**docs** — ddk.docs11_23.1.1.depot
- This includes the HP-UX 11i v2 Driver Development Guide (DDG), Driver Development Reference Guide (DDR), Whitepapers and FAQs.

Sample Drivers

- **ddk.net_drvs11_23.1.1.depot**
  - Sample driver sources include enet and ielan Makefiles, readme and supplemental files.

- **ddk.ms_drvs11_23.1.1.depot**
  - Mass Storage HBA qlisp sample driver sources, Makefiles, readme and supplemental files.

- **ddk.misc_drvs11_23.1.1.depot**
  - Miscellaneous sample drivers; iklpm, pcishm, ramdisk sample driver sources, Makefiles, readme and supplemental files.

Tools

- **ddk.misc_tool11_23.1.1.depot** — General purpose tools.
- **ddk.ms_tool11_23.1.1.depot** — Mass storage tools.
- **ddk.net_tool11_23.1.1.depot** — Network tools.
- **ddk.ddict_tool11_23.1.1.depot** — DDICT compliance tool.
- **ddk.kivt_tool11_23.1.1.depot** — KIVT test tool.
- **ddk.apiti_tool11_23.1.1.depot** — APITI test tool.

Versioning

Versioning is maintained for the HP-UX 11i v2 Driver Development Kit. All components except sample drivers are replaced when a new release of the same component is installed on a system. Sample drivers from previous versions are retained to allow easy comparison of changes between versions. It is advised to make a backup copy of all components except the sample drivers if you want to keep access to previous release components.
Verifying Component System Availability

HP-UX 11i v2 Driver Development Kit users are advised to check the availability of the (DDK) and its components on their systems before downloading to avoid downloading the same product on the system again. All HP-UX 11i v2 DDK components available on that system can be done using the following command:

```bash
# swlist -l product B11_23DDK
```

Installing the Driver Development Kit (DDK)

There are two ways of installing the DDK:

1. Installing the entire DDK product

   The HP-UX 11i v2 DDK depot file installs the entire driver development kit with all of its components, such as documentation, tools, sample drivers, and the build environment.

2. Independent component installation

   The HP-UX 11i v2 Driver Development Kit can also be installed in parts. Each DDK component comes in its own depot so users can install each DDK component independently.

**NOTE** Whether installing the whole DDK or only a component, use the `swlist -l product B11_23DDK` to view which components have been installed.
Components

Verifying Component System Availability