This guide is intended for experienced application developers. It describes the main features of the Tru64 UNIX Migration Environment for HP-UX, and how to use the components in this environment.
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About This Manual

This guide describes the Tru64 UNIX Migration Environment for HP-UX and how to use it.

This guide assumes that the HP-UX operating system and the Migration Environment are both installed on your system.

Audience

This guide is intended for application developers who are responsible for designing, building, and testing applications; this manual is not an application development tutorial. You should also have knowledge of the HP-UX operating system concepts, commands, and configuration.

New and Changed Features

If you are upgrading from earlier versions of the Migration Environment, see Section 1.4 before installing Version 1.4 of the Migration Environment.

This is a revised guide. Note the following changes:

- This guide supports HP-UX 11i v2 May 2005 and later for Itanium® and PA-RISC systems.
- Updated shared library (libtru64) references to reflect API migration to base operating system libraries or Migration Environment archive library, libtru64_ext.
- Deprecated use of the _TRU64_SOURCE feature test macro.
- Updated or removed references to the Migration Environment library APIs that have been implemented in the base operating system as of HP-UX 11i v2 update 2 and HP-UX 11i v2 May 2005.
- Added reference to implicit link of portability library to Section 4.5.
- Added reference to implicit -I of Portability Package header file directory to compiler sections.

Organization

This guide is divided into six chapters as follows:

Chapter 1  Describes the Migration Environment contents, directory layout, restrictions, and version information.
Chapter 2  Describes how to set up your Migration Environment.
Chapter 3  Describes the commands available in the Migration Environment.
Chapter 4  Describes the Migration Environment build commands and features.
Related Documents

For more information about porting Tru64 UNIX applications to HP-UX, see the following manuals:
• getting started porting Tru64 UNIX applications to HP-UX 11i
• Tru64 UNIX to HP-UX 11i Porting Guide

You can find both manuals at the following location:
http://www.hp.com/go/tru64appmigration

Click on Porting guide in the technical documents section.

You can find the latest version of this guide at the following location:
http://h30097.www3.hp.com/docs/transition/me/

Conventions

This guide uses the following conventions:

%  A percent sign represents the C shell system prompt.

$  A dollar sign represents the system prompt for the Bourne, POSIX, and Korn shells.

#  A number sign represents the superuser prompt.

% cat  Boldface type in interactive examples indicates typed user input.

file  Italic (slanted) type indicates variable values, placeholders, and function argument names.

[ | ]  In syntax definitions, brackets indicate items that are optional and braces indicate items that are required. Vertical bars separating items inside brackets or braces indicate that you choose one item from among those listed.

...  In syntax definitions, a horizontal ellipsis indicates that the preceding item can be repeated one or more times.

cat(1)  A cross-reference to a reference page includes the appropriate section number in parentheses. For example, cat(1) indicates that you can find information on the cat command in Section 1 of the reference pages.

Return  In an example, a key name enclosed in a box indicates that you press that key.
Ctrl/x  This symbol indicates that you hold down the first named key while pressing the key or mouse button that follows the slash. In examples, this key combination is enclosed in a box (for example, Ctrl/C).
The Tru64 UNIX Migration Environment for HP-UX (also called Migration Environment) contains selected Tru64 UNIX application programming interfaces (APIs), development tools, and commands and utilities to help you migrate your applications from Tru64 UNIX to HP-UX on Itanium®-based and PA-RISC systems. See `me_intro(5)` in the Migration Environment for more information.

The Migration Environment is one of a set of tools to let you migrate applications from Tru64 UNIX to HP-UX. Other tools include the Software Transition Kit for Tru64 UNIX (STKT) and the `binaryScan` utility. For more information on transitioning applications and other tools, go to the Tru64 UNIX HP-UX Transition Web site:

www.hp.com/go/tru64transition

This chapter contains information on the contents, directory layout, and restrictions of the Migration Environment. In addition, it tells you how to report any problems that you might encounter.

1.1 Contents

The Tru64 UNIX Migration Environment installation kit includes the following items:

- Selected APIs, development tools, commands, and utilities
- Compatibility libraries (32-bit and 64-bit)
- Terminal definitions for VT-series terminals
- Support for selected Tru64 UNIX proprietary codesets and converters
- README file, Portable Document Format (PDF) version of the Tru64 UNIX Migration Environment User’s Guide (this guide), and manpages
1.2 Directory Layout

All the Migration Environment files are installed under the /opt/tru64 directory. The following list describes the subdirectories and their contents:

bin
Contains Tru64 UNIX compatible commands such as make and mkcatdefs that may be needed to port applications from Tru64 UNIX to HP-UX on Itanium®-based systems.

include
Contains the header files that are necessary to use the compatibility functions provided in the libraries under the lib subdirectory.

lib/hpux32
Contains the libtru64_ext.a 32-bit compatibility library.

lib/hpux64
Contains the libtru64_ext.a 64-bit compatibility library.

lib/nls/iconv
Contains the iconv converters for the Tru64 UNIX proprietary codesets.

lib/terminfo
Contains the terminfo database that describes the capabilities and method of operation of various VT-series terminals that are not currently included in the base HP-UX operating system.

man
Contains manpages for commands and functions in the Migration Environment.

me_docs
Contains the README file and the PDF version of the Tru64 UNIX Migration Environment User’s Guide (this guide).
1.3 Restrictions

The Migration Environment has the following restrictions:

- Is supported on HP-UX 11i v2 May 2005 and later for Itanium®-based and PA-RISC systems.
- The Migration Environment Version 1.4 requires the installation of the Portability Package included with the HP-UX 11i v2 May 2005 release.
- Provides only a subset of the APIs, commands, and utilities available on Tru64 UNIX.
- Does not provide a complete Tru64 UNIX compatibility habitat (or similar environment) on HP-UX.
- Does not support binary compatibility for Tru64 UNIX applications on HP-UX.

1.4 Important Compatibility Information

This section contains important compatibility information for users of earlier versions of the Migration Environment.

In version 1.3 (and earlier versions) of the Migration Environment, the `libtru64.so` shared library (`libtru64.sl` for PA-RISC) contained APIs under consideration for native implementation in future releases of HP-UX. A number of these APIs have been implemented in the base operating system as of the HP-UX 11i v2 May 2005 release.

Starting with version 1.4 of the Migration Environment, `libtru64.so/sl` has been replaced with a symbolic link to the `libcext.so` base operating system library, (`libcext.sl` for PA-RISC), which contains a number of the APIs that were in `libtru64.so/sl`. The remainder of the `libtru64.so/sl` APIs are now in the Migration Environment `libtru64_ext.a` static library, and are as follows:

- `acalloc` (Itanium®-only)
- `acreate` (Itanium®-only)
- `adelete` (Itanium®-only)
- `afree` (Itanium®-only)
- `amallinfo` (Itanium®-only)
- `amalloc` (Itanium®-only)
- `amallocblksize` (Itanium®-only)
- `amallopt` (Itanium®-only)
- `arealloc` (Itanium®-only)
- `mktemp`
- `mkstemp`
- `mkstemsps`
- `mkdtemp`
- `safe_open`
- `sockatmark`
- `madvise`
- `setbuffer`

Interfaces in `libtru64_ext.a` are not expected to be implemented as native APIs in HP-UX, but are available as an intermediate porting aid, on the path to developing fully native HP-UX 11i applications.
Existing applications with dependencies on any libtru64.so/sl APIs moved to libtru64_ext.a, as previously noted, will need to be relinked once Version 1.4 of the Migration Environment is installed on HP-UX 11i v2 May 2005 or later releases.

Run the `nm(1)` command on existing unstripped applications to determine whether any of the previously mentioned API references exist. Applications built with prior versions of the Migration Environment that do not have dependencies on any of the APIs previously listed will continue to operate using Version 1.4 of the Migration Environment. Any remaining libtru64.so/sl API dependencies are resolved with the symbolic link to libcext.so/sl on the base operating system. Relinking with Version 1.4 of the Migration Environment eliminates dependencies on libtru64.so/sl, as the updated ld driver resolves relevant APIs against libcext.so/sl and libtru64_ext.a.

If you are upgrading to HP-UX 11i v2 May 2005 and have applications with dependencies on any of the APIs previously listed, but are unable to relink at this time, continue using Version 1.3 of the Migration Environment until you can relink using Version 1.4. Note that this option is only intended to temporarily address run-time compatibility issues. Version 1.3 of the Migration Environment for Itanium® systems installs normally on the HP-UX 11i v2 May 2005 release. Version 1.3 of the Migration Environment for PA-RISC systems (built for HP-UX 11.11) requires additional selections in the `swinstall` tool to override version restrictions. You must select Change Options under the Options menu and select Allow installation of incompatible software prior to installing.

Use of Version 1.3 of the Migration Environment on HP-UX 11i v2 May 2005 should only be considered as a temporary option until any affected applications can be relinked using Version 1.4 of the Migration Environment.

Refer to the documentation provided with the Portability Package included in the HP-UX 11i v2 May 2005 release for details on using the portability library and headers, which contain portions of Migration Environment functionality that are now part of the base HP-UX operating system.

### 1.5 Reporting Problems and Feedback

If you encounter any problems when using the Migration Environment, call your local Response Center.

To send feedback to us about the Migration Environment, send an email message to the following location:

`transition-products@hp.com`

Be sure to include the HP-UX version you are running and the version of the Migration Environment you are using. To obtain the Migration Environment version, enter the following command:

```
$ /opt/tru64/bin/me_ver -v
```
This section describes how to set up your Tru64 UNIX Migration Environment on HP-UX so you can build, debug, and test Tru64 UNIX applications that you want to migrate to HP-UX. Setting up the Migration Environment involves the following:

- Setting the `PATH` environment variable
- Setting the `MANPATH` environment variable
- Setting the `TERMINFO` environment variable

### 2.1 Setting the PATH Environment Variable

As part of the Migration Environment installation, the `/opt/tru64/bin` directory is appended to the system `PATH` environment variable (`/etc/PATH`); unless changed by individual users, all users will have this default path. To ensure explicit access to all commands in the Migration Environment, prepend the following to your `PATH` environment variable:

```
/opt/tru64/bin
```

For example, to set the `PATH` variable in the Korn shell, enter the following commands:

```
$ ksh
$ export PATH=/opt/tru64/bin:${PATH}
```

### 2.2 Setting the MANPATH Environment Variable

As part of the Migration Environment installation, manpages for all APIs, commands, and utilities included in the environment are installed in the `/opt/tru64/man` directory. In addition, the `/opt/tru64/man/%L` and `/opt/tru64/man` directory prefixes are appended to the system `MANPATH` environment variable (`/etc/MANPATH`); unless changed by individual users, all users will have this default path. To ensure explicit access to the Migration Environment manpages, prepend `/opt/tru64/man/%L:/opt/tru64/man` to the `MANPATH` environment variable as follows:

```
$ ksh
$ export MANPATH=/opt/tru64/man/%L:/opt/tru64/man:${MANPATH}
```

See `man(1)` and `environ(5)` for more information on the `MANPATH` environment variable.

As an alternative, you can access the manpages using either of the following commands:

- `/opt/tru64/bin/man`
- `man -M /opt/tru64/man/%L:/opt/tru64/man entry_name`

All Migration Environment manpages have the words `Tru64 UNIX Migration Environment` in the header line to distinguish them from the base HP-UX manpages.
The Migration Environment installation does not update the whatis database. Therefore, using the `man -k` command will not display a description of any Migration Environment manpages.

### 2.3 Setting the TERMINFO Environment Variable

To use the `terminfo` database to support any of the various VT-series terminals that are not currently included in the base HP-UX operating system, you must set the `TERMINFO` environment variable as follows:

```bash
$ksh
$ export TERMINFO=/opt/tru64/lib/terminfo
```
Using the Migration Environment Commands

The Tru64 UNIX Migration Environment for HP-UX commands are as follows:

- `cpio`
- `dspcat`
- `dspmsg`
- `jsy2atokxtxt`
- `man`
- `me_ver`
- `mkcatdefs`
- `pax`
- `stty`
- `tar`

The following sections describe each command.

### 3.1 Using the cpio Command

The `cpio` command copies files between archive storage and the file system. You can use the Migration Environment `cpio` command only to restore or copy in data (`cpio -i` command) from `cpio` archives that were created on Tru64 UNIX. This command is especially useful if:

- You archived files with Access Control Lists (ACLs) or other extended attributes (for example, user ID, group ID, and access permission). The Migration Environment `cpio` command can successfully extract the files; however, the ACLs and extended attributes are not preserved. The HP-UX `cpio` command will report a directory checksum error for these archives.

- You are using a script that relies on Tru64 UNIX specific options. The Tru64 UNIX and HP-UX `cpio` commands have different options, and the same options that behave differently.

_________________________ Note _________________________

Do not use the Migration Environment `cpio` command to extract archives that were created with the HP-UX `cpio` command.

As part of the Migration Environment installation, the `cpio` command is installed in the `/opt/tru64/bin` directory. To use this command, prepend the following to your `PATH` environment variable:

```
/opt/tru64/bin
```

Alternatively, you can also invoke the command by using the command's full path name, as follows:

```
/opt/tru64/bin/cpio
```

See `cpio(1)` in the Migration Environment for more information about the command options and examples.
3.2 Using the dspcat Command

The dspcat command, part of the Tru64 UNIX Message Facility, displays a particular message, all of the messages in a set, or all of the messages in a message catalog. This command is provided in the Migration Environment because it does not exist on HP-UX. Support for this command is planned for a future release of HP-UX.

As part of the Migration Environment installation, the dspcat command is installed in the /opt/tru64/bin directory. To use this command, prepend the following to your PATH environment variable:

```
/opt/tru64/bin
```

Alternatively, you can also invoke the command by using the command's full path name, as follows:

```
/opt/tru64/bin/dspcat
```

See dspcat(1) in the Migration Environment for more information about the command options and environment variables.

3.3 Using the dspmsg Command

The Migration Environment dspmsg utility displays a particular message from a message catalog. The display includes a message identifier, depending on the presence of the -e or -E option, and settings for the CAT_MIDSET_catname, CAT_MIDSET, and CAT_MIDFMT environment variables. This command is provided in the Migration Environment because it does not exist on HP-UX. Support for this command is planned for a future release of HP-UX.

As part of the Migration Environment installation, the dspmsg utility is installed in the /opt/tru64/bin directory. To use this utility, prepend the following to your PATH environment variable:

```
/opt/tru64/bin
```

Alternatively, you can also invoke the utility by using the utility's full path name, as follows:

```
/opt/tru64/bin/dspmsg
```

See dspmsg(1) in the Migration Environment for more information about the command options and environment variables.

3.4 Using the jsy2atokxtxt Command

The jsy2atokxtxt command converts a JSY personal dictionary text file that was created on Tru64 UNIX into the ATOK X dictionary text file format. This command works in the eucJP, SJIS, and UTF-8 codesets. The command is provided in the Migration Environment because it does not exist on HP-UX.

As part of the Migration Environment installation, the jsy2atokxtxt command appends the following to your PATH environment variable:

```
/opt/tru64/bin
```

Alternatively, you can also invoke the command by using the command's full path name, as follows:

```
/opt/tru64/bin/jsy2atokxtxt
```

To display Japanese messages from the jsy2atokxtxt command, add the following value to your NLSPATH environment variable:

```
/opt/tru64/lib/nls/msg/%L/%N.cat
```
3.5 Using the man Command

The Migration Environment man command enables you to display Migration Environment manpages without the need to modify the MANPATH environment variable.

As part of the Migration Environment installation, the man command is installed in the /opt/tru64/bin directory. To use this command, prepend the following to your PATH environment variable:

```
/opt/tru64/bin
```

Alternatively, you can also invoke the command by using the command's full path name, as follows:

```
/opt/tru64/bin/man
```

3.6 Using the me_ver Command

The Migration Environment me_ver command prints the version number of the Migration Environment. You need to send this information to us when reporting problems or providing feedback. See Section 1.5 for more information.

As part of the Migration Environment installation, the me_ver command is installed in the /opt/tru64/bin directory. To use this command, prepend the following to your PATH environment variable:

```
/opt/tru64/bin
```

Alternatively, you can also invoke the command by using the command's full path name, as follows:

```
/opt/tru64/bin/me_ver
```

See me_ver(1) in the Migration Environment for more information.

3.7 Using the mkcatdefs Command

The Migration Environment mkcatdefs utility preprocesses a message source file to do one or more of the following operations. These operations ease maintenance of compilable programs, scripts, or both:

- Convert symbolic identifiers for message sets and messages into numeric constants required by the gencat command.
- Create a `catname_msg.h` file that defines macros to map symbolic identifiers to corresponding numeric constants in the `.cat` file.
- Create an include file, similar to `catname_msg.h`, but for use in scripts rather than programs.

This command is provided in the Migration Environment because it does not exist on HP-UX. Support for this command is planned for a future release of HP-UX.

As part of the Migration Environment installation, the mkcatdefs utility is installed in the /opt/tru64/bin directory. To use this utility, prepend the following to your PATH environment variable:

```
/opt/tru64/bin
```

Alternatively, you can also invoke the utility by using the utility's full path name, as follows:
See `mkcatdefs(1)` in the Migration Environment for more information about the command options and environment variables.

### 3.8 Using the pax Command

Use the Migration Environment `pax` command only to extract member files and write lists of the member files of archives that were created on Tru64 UNIX. This command is especially useful if:

- You archived files with Access Control Lists (ACLs) or other extended attributes (for example, user ID, group ID, and access permission). The Migration Environment `pax` command can successfully extract the files; however, the ACLs and extended attributes are not preserved. The HP-UX `pax` command will report a directory checksum error for these archives.
- You are using a script that relies on Tru64 UNIX specific options. The Tru64 UNIX and HP-UX `pax` commands have different options, and the same options behave differently.

The `-r` option specifies the archive operation performed by the `pax` command.

```
Note

Do not use the Migration Environment `pax` command to extract archives that were created with the HP-UX `pax` command.
```

As part of the Migration Environment installation, the `pax` utility is installed in the `/opt/tru64/bin` directory. To use this utility, prepend the following to your `PATH` environment variable:

```
/opt/tru64/bin
```

Alternatively, you can also invoke the command by using the command's full path name, as follows:

```
/opt/tru64/bin/pax
```

See `pax(1)` in the Migration Environment for more information about the command options and examples.

### 3.9 Using the stty Command

The Migration Environment `stty` utility sets or reports on terminal I/O characteristics for the device that is its standard input. The command has four forms:

- `stty` reports the settings of a system-defined set of options.
- `stty -a` reports all of the current option settings.
- `stty -g` reports the current settings in a form that can be used as an argument to another `stty` command.
- `stty options` sets terminal I/O options as defined by `options`. 

3-4 Using the Migration Environment Commands
This command is provided in the Migration Environment because the `dec` option does not exist on HP-UX. The `dec` option sets all modes suitable for terminals developed by Digital Equipment Corporation (now Hewlett-Packard Company). Support for this option is planned for a future release of HP-UX.

As part of the Migration Environment installation, the `stty` utility is installed in the `/opt/tru64/bin` directory. To use this utility, prepend the following to your `PATH` environment variable:

```
/opt/tru64/bin
```

Alternatively, you can also invoke the utility by using the utility's full path name, as follows:

```
/opt/tru64/bin/stty
```

See `stty(1)` in the Migration Environment for more information about the command options and environment variables.

### 3.10 Using the `tar` Command

You can use the Migration Environment `tar` command only to restore data from traditional format `tar` archives that were created on Tru64 UNIX. This command is especially useful if:

- You archived files with Access Control Lists (ACLs) or other extended attributes (for example, user ID, group ID, and access permission). The Migration Environment `tar` command can successfully extract the files; however, the ACLs and extended attributes are not preserved. The HP-UX `tar` command will report a directory checksum error for these archives.
- You are using a script that relies on Tru64 UNIX specific options. The Tru64 UNIX and HP-UX `tar` commands have different options, and the same options behave differently.

```
------------------------------------------- Note -------------------------------------------
Do not use the Migration Environment `tar` command to extract archives that were created with the HP-UX `tar` command.
```

As part of the Migration Environment installation, the `tar` utility is installed in the `/opt/tru64/bin` directory. To use this command, prepend the following to your `PATH` environment variable:

```
/opt/tru64/bin
```

Alternatively, you can also invoke the command by using the command's full path name, as follows:

```
/opt/tru64/bin/tar
```

See `tar(1)` in the Migration Environment for more information about the command options and environment variables.
The Tru64 UNIX Migration Environment for HP-UX build environment consists of the following features:

- Feature test macro
- Header files and libraries
- cc driver command
- cxx driver command
- ld driver command
- make command
- mcs command

The following sections describe each topic.

4.1 Using the Feature Test Macro

The Migration Environment name space is controlled by the `_TRU64_SOURCE_EXTENDED` feature test macro. This macro enables features from the Migration Environment header files and `libtru64_ext.a` archive library that are provided as transition aids; this macro is not being considered for a future release of HP-UX.

---

Note

The `_TRU64_SOURCE` macro used in previous versions of the Migration Environment is no longer necessary. Features previously available under this name space have either been moved into the base operating system as of HP-UX 11i v2 May 2005, or are now available under the `_TRU64_SOURCE_EXTENDED` name space (and the corresponding `libtru64_ext.a` static library) in Version 1.4 of the Migration Environment. Defining the `_TRU64_SOURCE` macro in Version 1.4 will now enable the expanded `_TRU64_SOURCE_EXTENDED` name space instead.

4.2 Using the Header Files and Libraries

The Migration Environment header files (specified in the SYNOPSIS section of the manpages for each Migration Environment API) are located in the `/opt/tru64/include/` directory. These header files contain function declarations and other supporting features for the APIs that are in the Migration Environment compatibility libraries. The `#include` directives that specify Migration Environment header files should be formatted just as they would be for normal system header files. For example:

```c
#include <stdio.h>
```

When compiled using the Migration Environment `/opt/tru64/bin/cc` driver (or with an explicit `-I /opt/tru64/include` compiler directive), the Migration Environment `/opt/tru64/include/stdio.h` header file is used. When the Migration Environment feature test macro is specified, the appropriate name space, function declarations, and supporting features for the Migration Environment...
APIs are enabled. In addition, the base HP-UX /usr/include/stdio.h system header is included indirectly when the Migration Environment version of this header file is included.

Using the #include directive format that is consistent with standard system header file usage ensures that your ported code will continue to compile as Migration Environment dependencies are removed from the code over time, and as certain Migration Environment features are moved into the appropriate system header files and libraries in future HP-UX releases.

In addition to the header files that support the APIs in the compatibility libraries, the Migration Environment also contains the builtins.h header file for Tru64 UNIX applications that currently include it. This header file contains functions whose names are specially recognized by the compiler (similar to intrinsic functions). The #include directive for this header file is as follows:

#include <machine/builtins.h>

The Migration Environment compatibility libraries are in the following locations:
- /opt/tru64/lib/hpux32/libtru64_ext.a
- /opt/tru64/lib/hpux64/libtru64_ext.a

As described in Section 4.1, the libtru64_ext.a archive library contains APIs that are provided as a transition aid; they will not be ported to HP-UX.

Note that there are two versions of the Migration Environment archive library: one for the 32-bit data model and one for the 64-bit data model. By default, the Migration Environment /opt/tru64/bin/ld link editor inserts the appropriate libraries on the link line, depending on which options are specified, eliminating the need to specify these directly.

The following example uses the Migration Environment /opt/tru64/bin/cc driver and the /opt/tru64/bin/ld driver to implicitly reference the Migration Environment header files and libraries:

$ cat t.c
#include <stdio.h>
int main()
{
  char buf[100];
  setbuffer(stdout, buf, 100);
}

$ /opt/tru64/bin/cc -D_TRU64_SOURCE_EXTENDED t.c -o t

If you compile the same program using the HP-UX C compiler directly, you must explicitly specify the -I, -L, and -l flags to access the Migration Environment header files and libraries, as follows:

$ /opt/ansic/bin/cc -Ae +DD64 -D_TRU64_SOURCE_EXTENDED -I /opt/tru64/include -L /opt/tru64/lib/hpux64 -ltru64_ext t.c -o t

Migration Environment APIs in the libtru64_ext.a archive library that are enabled by the _TRU64_SOURCE_EXTENDED feature test macro are prefixed with _TRU64_. This indicates that they are only available in the Migration Environment as transition aids and are not being considered for a future release of HP-UX.

The Migration Environment header files contain macros to rename all references to these APIs to the actual _TRU64_ prefixed symbol names. This is relevant when referencing symbol names (for example, using the nm command or a debugger) in a resulting object file or in an executable built with the Migration Environment.

If code for such an application uses a Migration Environment interface (for example, sigblock), all references to this symbol in the resulting executable will
be renamed to _TRU64_sigblock. This symbol is visible when using a command like nm or a debugger.

### 4.3 Using the cc Driver

The Migration Environment cc driver translates Tru64 UNIX cc commands to HP-UX commands and executes them. You can also use the cc driver to port Makefiles and build scripts to HP-UX; the driver can report translations for Tru64 UNIX cc commands.

As part of the Migration Environment installation, the cc driver is installed in the /opt/tru64/bin directory. To use this driver, prepend the following to your PATH environment variable:

```
/opt/tru64/bin
```

Alternatively, you can also invoke the driver by using the driver’s full path name, as follows:

```
/opt/tru64/bin/cc
```

If your Makefiles and build scripts need to invoke the native HP-UX cc driver in addition to the Migration Environment cc driver, use each driver’s full path name to distinguish between them. You can invoke the native HP-UX cc driver as follows:

```
$ /usr/ccs/bin/cc
```

In addition to the Tru64 UNIX cc driver options and arguments, the driver also accepts additional options and environment variables to assist in the porting process. Use the -port_* options to request that additional porting information be displayed, including the translated cc command.

You can also use the DEC_CC environment variable to add options to the cc commands without updating Makefiles or build scripts. For example, to translate the Tru64 UNIX cc commands in a Makefile without executing the translated commands, use the Migration Environment cc driver as follows:

```
$ ksh
$ export PATH=/opt/tru64/bin:${PATH}
$ export DEC_CC=-port_command_only
$ make
```

The translated cc commands are displayed to stdout. You can then use these translations to replace the Tru64 UNIX cc commands in the Makefile.

The cc driver uses 64-bit mode by default. To use 32-bit mode, use the -xtaso_short option.

As noted in the Migration Environment cc(1) manpage, the Migration Environment -I/opt/tru64/include header file directory is added by default to the compile line in order to include declarations for Migration Environment APIs as necessary. As of Version 1.4 of the Migration Environment, the compiler also adds, by default, an implicit reference to the Portability Package -I/usr/include/ep header file directory, provided with the base operating system as of the HP-UX 11i v2 May 2005 release. This provides access to declarations for Portability Package APIs formerly included in the Migration Environment header files.

See cc(1) in the Migration Environment for more information about the command options and environment variables.

### 4.4 Using the cxx Driver

The Migration Environment cxx driver translates Tru64 UNIX cxx commands to HP-UX commands and executes them. You can also use the cxx driver to port
Makefiles and build scripts to HP-UX; the driver can report translations for Tru64 UNIX cxx commands.

As part of the Migration Environment installation, the cxx driver is installed in the /opt/tru64/bin directory. To use this driver, prepend the following to your PATH environment variable:

```
/opt/tru64/bin
```

Alternatively, you can also invoke the driver by using the driver’s full path name, as follows:

```
/opt/tru64/bin/cxx
```

If your Makefiles and build scripts need to invoke the native HP-UX aCC driver in addition to the Migration Environment cxx driver, use each driver’s full path name to distinguish between them. You can invoke the native HP-UX aCC driver as follows:

```
$ /opt/aCC/bin/aCC
```

In addition to the Tru64 UNIX cxx driver options and arguments, the driver also accepts additional options and environment variables to assist in the porting process. Use the -port_* options to request that additional porting information be displayed, including the translated cxx command.

You can also use the DEC_CXX environment variable to add options to the cxx commands without updating Makefiles or build scripts. For example, to translate the Tru64 UNIX cxx commands in a Makefile without executing the translated commands, use the Migration Environment cxx driver as follows:

```
$ ksh
$ export PATH=/opt/tru64/bin:${PATH}
$ export DEC_CXX=-port_command_only
$ make
```

The translated cxx commands are displayed to stdout. You can then use these translations to replace the Tru64 UNIX cxx commands in the Makefile.

The cxx driver uses 64-bit mode by default. To use 32-bit mode, use the -xtaso_short option.

As noted in the Migration Environment cxx(1) manpage, the Migration Environment -I/opt/tru64/include header file directory is added by default to the compile line in order to include declarations for Migration Environment APIs as necessary. As of Version 1.4 of the Migration Environment, the compiler also adds, by default, an implicit reference to the Portability Package -I/usr/include/ep header file directory, provided with the base operating system as of the HP-UX 11i v2 May 2005 release. This provides access to declarations for Portability Package APIs formerly included in the Migration Environment header files.

See cxx(1) in the Migration Environment for more information about the command options and environment variables.

### 4.5 Using the ld Driver

The Migration Environment linker translates Tru64 UNIX link commands to HP-UX commands and executes them. You can also use the linker to port Makefiles and build scripts to HP-UX; the driver can report translations for Tru64 UNIX link commands.

As part of the Migration Environment installation, the linker is installed in the /opt/tru64/bin directory. To use this driver, prepend the following to your PATH environment variable:
Alternatively, you can also invoke the driver by using the driver’s full path name, as follows:

```
/opt/tru64/bin/ld
```

If your Makefiles and build scripts need to invoke the native HP-UX linker in addition to the Migration Environment linker, use each driver’s full path name to distinguish between them. You can invoke the native HP-UX linker as follows:

```
$ /usr/ccs/bin/ld
```

In addition to the Tru64 UNIX linker options and arguments, the linker also accepts additional options and environment variables to assist in the porting process. The linker also accepts most HP-UX linker options and passes them directly to the HP-UX linker, except for the -G, -L dir, -Q, -S, -t, and -b options. You can use the -port_* options to request that additional porting information be displayed, including the translated link command.

You can also use the DEC_LD environment variable to add options to the link commands without updating Makefiles or build scripts. For example, to translate the Tru64 UNIX link commands in a Makefile without executing the translated commands, use the Migration Environment linker as follows:

```
$ ksh
$ export PATH=/opt/tru64/bin:${PATH}
$ export DEC_LD=-port_command_only
$ make
```

The translated link commands are displayed to stdout. You can then use these translations to replace the Tru64 UNIX link commands in the Makefile.

As noted in the Migration Environment ld(1) manpage, by default, the Migration Environment libraries from /opt/tru64/lib are added to the link line to include Migration Environment APIs as necessary. As of Version 1.4 of the Migration Environment, the linker also adds, by default, an implicit link to the portability library, libcext.so/sl, provided with the base operating system as of the HP-UX 11i v2 May 2005 release. This provides access to portability library APIs that were formerly included in the Migration Environment libraries.

See ld(1) in the Migration Environment for more information about the command options and environment variables.

### 4.6 Using the make Command

The make command updates the target based on whether the target’s dependencies have been modified relative to the time of last modification to the target, or if the target itself does not exist. The following table lists the macros whose values are different from the Tru64 UNIX make command macros:

<table>
<thead>
<tr>
<th>Macro Name</th>
<th>Value (Tru64 UNIX)</th>
<th>Value (Itanium®-based systems)</th>
<th>Value (PA-RISC systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACHINE</td>
<td>alpha</td>
<td>ipf</td>
<td>hppa</td>
</tr>
<tr>
<td>TARGET_MACHINE</td>
<td>ALPHA</td>
<td>IPF</td>
<td>HPPA</td>
</tr>
<tr>
<td>target_machine</td>
<td>alpha</td>
<td>ipf</td>
<td>hppa</td>
</tr>
<tr>
<td>ARCHIVE_FORMAT</td>
<td>COFF</td>
<td>ELF64</td>
<td>ELF64</td>
</tr>
</tbody>
</table>

As part of the Migration Environment installation, the make command is installed in the /opt/tru64/bin directory. To use this command, prepend the following to your PATH environment variable:
/opt/tru64/bin

Alternatively, you can also invoke the command by using the command's full path name, as follows:

/opt/tru64/bin/make

See `make(1)` in the Migration Environment for more information about the command options and environment variables.

4.7 Using the mcs Command

The `mcs` command lets you perform operations on the comment section (.comment) of ELF object files and archives. You can add to, delete, compress, or print the contents of the comment section. ELF object file types include relocatable object files, executable object files, and shared libraries and archive libraries that contain ELF object files.

_________________________ Note _________________________

The `mcs` command only works on 64-bit PA objects and not on 32-bit PA objects because of differences in object types: ELF for 64-bit and COFF for 32-bit.

_________________________ Note _________________________

As part of the Migration Environment installation, the `mcs` command is installed in the `/opt/tru64/bin` directory. To use this command, prepend the following to your `PATH` environment variable:

```
/export/tru64/bin
```

Alternatively, you can also invoke the command by using the command's full path name, as follows:

```
/export/tru64/bin/mcs
```

See `mcs(1)` in the Migration Environment for more information about the command options and environment variables.
The application programming interfaces (APIs) in the Tru64 UNIX Migration Environment for HP-UX are grouped as follows:

- Math routines
- Pthread and Thread-Independent Services (TIS) routines
- Arena malloc routines
- Secure temp file routines
- Networking routines
- Signal routines
- Miscellaneous routines

### 5.1 Migration Environment Libraries

In Version 1.3 (and earlier versions) of the Migration Environment, the `libtru64.so` shared library (`libtru64.sl` for PA-RISC), contained APIs under consideration for native implementation in future releases of HP-UX. Several of these APIs have been implemented in the base operating system as of the HP-UX 11i v2 May 2005 release, and are as follows:

- `flock`
- `memcntl`
- `mvalid`
- `setenv`
- `unsetenv`
- `setlinebuf`
- `seteuid`
- `setegid`

The remainder of `libtru64.so/sl` APIs have been moved to the Migration Environment static library, `libtru64_ext.a`. Interfaces in `libtru64_ext.a` are not expected to be implemented as native APIs in HP-UX, but are available as an intermediate porting aid in the Migration Environment. See Section 1.4 for more information about the Migration Environment library dependencies.

The following sections list the APIs available in the Migration Environment `libtru64_ext.a` static library along with availability information for Itanium® and PA-RISC. These APIs are enabled using the `–D_TRU64_SOURCE_EXTENDED` feature test macro at compile time.

### 5.2 Using the Math Routines

Table 5-1 shows the math APIs that are available in the Migration Environment.
Table 5-1: Migration Environment Math Routines

<table>
<thead>
<tr>
<th>Routine Name</th>
<th>Itanium® and PA-RISC Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>atand2, atand2f</td>
<td>Both</td>
</tr>
<tr>
<td>atand2l</td>
<td>Itanium® only</td>
</tr>
<tr>
<td>cabs, cabsf, cabsl</td>
<td>Itanium® only</td>
</tr>
<tr>
<td>cvt_ftof</td>
<td>Both</td>
</tr>
<tr>
<td>drem</td>
<td>Both</td>
</tr>
<tr>
<td>dremf, dreml</td>
<td>Itanium® only</td>
</tr>
<tr>
<td>finite, finitef, finitel</td>
<td>Both</td>
</tr>
<tr>
<td>fp_class, fp_classf, fp_classl</td>
<td>Both</td>
</tr>
<tr>
<td>isnanf, isnanl</td>
<td>Both</td>
</tr>
<tr>
<td>nint</td>
<td>Both</td>
</tr>
<tr>
<td>nintf, nintl</td>
<td>Itanium® only</td>
</tr>
<tr>
<td>unordered, unorderedf, unorderedl</td>
<td>Both</td>
</tr>
</tbody>
</table>

See the individual routine's manpage in the Migration Environment for more information.

The following math APIs, previously available in the Migration Environment, are now available in the base operating system math library, libm, as of the HP-UX 11i v2 update 2 and later releases:

- cot
- cotf
- cotl
- cotd
- cotdf
- cotdl
- sinh
- sinhf
- sinhl

5.3 Using the pthread and TIS Routines

Table 5-2 and Table 5-3 show the pthread and Thread-Independent Services (TIS) routines, respectively, that are available in the Migration Environment.
### Table 5-2: Migration Environment pthread Routines (cont.)

<table>
<thead>
<tr>
<th>Routine Name</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>pthread_lock_global_np</td>
<td>Both</td>
</tr>
<tr>
<td>pthread_mutex_getname_np, pthread_mutex_setname_np</td>
<td>Both</td>
</tr>
<tr>
<td>pthread_rwlock_getname_np, pthread_rwlock_setname_np</td>
<td>Both</td>
</tr>
<tr>
<td>pthread_setname_np</td>
<td>Both</td>
</tr>
<tr>
<td>pthread_unlock_global_np</td>
<td>Both</td>
</tr>
<tr>
<td>pthread_use_only_cpu</td>
<td>Both</td>
</tr>
<tr>
<td>pthread_yield_np</td>
<td>Both</td>
</tr>
</tbody>
</table>

See the individual routine's manpage in the Migration Environment for more information.

### Table 5-3: Migration Environment TIS Routines

<table>
<thead>
<tr>
<th>Routine Name</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>tis_cond_broadcast, tis_cond_destroy, tis_cond_signal, tis_cond_timedwait, tis_cond_init</td>
<td>Both</td>
</tr>
<tr>
<td>tis_get_expiration</td>
<td>Both</td>
</tr>
<tr>
<td>tis_getspecific</td>
<td>Both</td>
</tr>
<tr>
<td>tis_key_create, tis_key_delete</td>
<td>Both</td>
</tr>
<tr>
<td>tis_mutex_destroy, tis_mutex_init, tis_mutex_initwithnameg, tis_mutex_lock, tis_mutex_trylock, tis_mutex_unlock</td>
<td>Both</td>
</tr>
<tr>
<td>tis_once</td>
<td>Both</td>
</tr>
<tr>
<td>tis_read_lock, tis_read_trylock, tis_read_unlock</td>
<td>Both</td>
</tr>
<tr>
<td>tis_rwlock_destroy, tis_rwlock_init</td>
<td>Both</td>
</tr>
<tr>
<td>tis_self</td>
<td>Both</td>
</tr>
<tr>
<td>tis_setcancelstate</td>
<td>Both</td>
</tr>
<tr>
<td>tis_setspecific</td>
<td>Both</td>
</tr>
<tr>
<td>tis_testcancel</td>
<td>Both</td>
</tr>
<tr>
<td>tis_write_lock, tis_write_trylock, tis_write_unlock</td>
<td>Both</td>
</tr>
</tbody>
</table>

See \texttt{tis(3)} in the Migration Environment for more information.

### 5.4 Using the Arena malloc Routines

Table 5-4 shows the Arena \texttt{malloc} routines that are available in the Migration Environment.
Table 5-4: Migration Environment Arena malloc Routines

<table>
<thead>
<tr>
<th>Routine Name</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>acalloc</td>
<td>Itanium® only</td>
</tr>
<tr>
<td>acreate</td>
<td>Itanium® only</td>
</tr>
<tr>
<td>adelete</td>
<td>Itanium® only</td>
</tr>
<tr>
<td>afree</td>
<td>Itanium® only</td>
</tr>
<tr>
<td>amallinfo</td>
<td>Itanium® only</td>
</tr>
<tr>
<td>amalloc</td>
<td>Itanium® only</td>
</tr>
<tr>
<td>amallocblksize</td>
<td>Itanium® only</td>
</tr>
<tr>
<td>amallopt</td>
<td>Itanium® only</td>
</tr>
<tr>
<td>arealloc</td>
<td>Itanium® only</td>
</tr>
</tbody>
</table>

See amalloc(3) in the Migration Environment for more information.

5.5 Using the Secure Temporary File Routines

Table 5-5 shows the secure temporary file routines that are available in the Migration Environment.

Table 5-5: Migration Environment Secure Temporary File Routines

<table>
<thead>
<tr>
<th>Routine Name</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>mktemp</td>
<td>Both</td>
</tr>
<tr>
<td>mkstemp</td>
<td>Both</td>
</tr>
<tr>
<td>mkstemps</td>
<td>Both</td>
</tr>
<tr>
<td>mkdtemp</td>
<td>Both</td>
</tr>
<tr>
<td>safe_open</td>
<td>Both</td>
</tr>
</tbody>
</table>

See mktemp(3) and safe_open(3) in the Migration Environment for more information.

5.6 Using the Networking Routines

Table 5-6 shows the networking routines that are available in the Migration Environment.

Table 5-6: Migration Environment Networking Routines

<table>
<thead>
<tr>
<th>Routine Name</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>ether_aton</td>
<td>Both</td>
</tr>
<tr>
<td>ether_hostton</td>
<td>Both</td>
</tr>
<tr>
<td>ether_line</td>
<td>Both</td>
</tr>
<tr>
<td>ether_ntohost</td>
<td>Both</td>
</tr>
<tr>
<td>ether_ntoa</td>
<td>Both</td>
</tr>
<tr>
<td>sockatmark</td>
<td>Both</td>
</tr>
</tbody>
</table>

See ethers(3) and sockatmark(3) in the Migration Environment for more information.

5.7 Using the Signal Routines

Table 5-7 shows the signal routines that are available in the Migration Environment.
Table 5-7: Migration Environment Miscellaneous Routines

<table>
<thead>
<tr>
<th>Routine Name</th>
<th>Itanium® and PA-RISC Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>sigblock</td>
<td>Both</td>
</tr>
<tr>
<td>sigsetmask</td>
<td>Both</td>
</tr>
<tr>
<td>sigvec</td>
<td>Both</td>
</tr>
</tbody>
</table>

See `sigblock(3)`, `sigsetmask(3)`, and `sigvec(3)` in the Migration Environment for more information.

5.8 Using the Miscellaneous Routines

Table 5-8 shows the miscellaneous routines that are available in the Migration Environment.

Table 5-8: Migration Environment Miscellaneous Routines

<table>
<thead>
<tr>
<th>Routine Name</th>
<th>Itanium® and PA-RISC Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>madvise</td>
<td>Both</td>
</tr>
<tr>
<td>setbuffer</td>
<td>Both</td>
</tr>
</tbody>
</table>

See `madvise(3)` and `setbuffer(3)` in the Migration Environment for more information.
Using the Tru64 UNIX Proprietary Codesets

The Tru64 UNIX Migration Environment extends both the iconv command and the iconv APIs on HP-UX to support the Tru64 UNIX proprietary codesets; for example, the DEC Hanyu codeset. This extension consists of additional iconv converters.

As part of the Migration Environment installation, this functionality is installed in the /opt/tru64/lib/nls/iconv directory as well as in the /usr/lib/nls/iconv directory, where the system default iconv libraries are located. For example, to convert the contents of input.txt file from DEC Hanyu to eucTW and save the result into output.txt file, enter:

\[ \text{iconv -f dechanyu -t eucTW input.txt > output.txt} \]

6.1 Activating the Tru64 UNIX Proprietary Codesets

To activate the Tru64 UNIX proprietary codesets for HP-UX 11i v2 and later on Itanium®-based systems and HP-UX 11i v2 update 2 and later for PA-RISC systems, you must install the PHCO_30072 patch (or superseding patch, such as PHCO_31549). The PHCO_30072 patch has the following name:

\[ \text{s700_800 11.23 iconv cumulative patch} \]

This patch configures the Migration Environment iconv converter codesets and installs the following Tru64 UNIX specific iconv aliases:

- deckorean
- GB18030
- HKSCS
- ibmkanji
- ISO8859-1
- ISO8859-2
- ISO8859-5
- ISO8859-6
- ISO8859-7
- ISO8859-8
- ISO8859-9
- ISO8859-15
- ISO-2022-J P
- TACTIS
- UCS-8
If the Migration Environment Version 1.1 for Itanium®-based systems of Version 1.3 for PA-RISC systems is currently installed on your system, and if you have previously configured the iconv codesets using the iconv.setup.ksh script, you must remove these changes before you remove these earlier kits and install the 11.23 iconv cumulative patch. Run the following script:

```
$ /opt/tru64/lib/nls/iconv/bin/iconv.setup.ksh uninstall
```

## 6.2 Converters

The Migration Environment provides the following converters for the Tru64 UNIX proprietary codesets:

- dechanyu=big5 (see Table 6-1)
- dechanyu=eucTW (see Table 6-2)
- dechanzi=hp15CN (see Table 6-3)
- deckanji=eucJP (see Table 6-4)
- deckanji=SJIS (see Table 6-5)
- sdeckanji=eucJP (see Table 6-6)
- sdeckanji=SJIS (see Table 6-7)

The following tables show the code point mappings for each code conversion.

### Table 6-1: Mapping of dechanyu Code Points to big5

<table>
<thead>
<tr>
<th>Character Set</th>
<th>From dechanyu:</th>
<th>To big5:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCII</td>
<td>0x0</td>
<td>0x0</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0x7F</td>
<td>0x7F</td>
</tr>
<tr>
<td>CNS 11643-1986</td>
<td>0xA1A1</td>
<td>0xA140</td>
</tr>
<tr>
<td>Plane 1</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xA3CE</td>
<td>0xA2AE</td>
</tr>
<tr>
<td></td>
<td>0xA3CF</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xA3FE</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>0xA4A1</td>
<td>0xA2AF</td>
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<td></td>
<td>...</td>
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</tr>
<tr>
<td></td>
<td>0xA5F0</td>
<td>0xA3BF</td>
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<tr>
<td></td>
<td>0xA5F1</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xA5FE</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>0xA6A1</td>
<td>0xC6A1</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xA6BE</td>
<td>0xC6BE</td>
</tr>
<tr>
<td></td>
<td>0xA6BF</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xA6FE</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>0xA7A1</td>
<td>0xA440</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xA9B9</td>
<td>0xEF86</td>
</tr>
</tbody>
</table>
### Table 6-1: Mapping of dechanyu Code Points to big5 (cont.)

<table>
<thead>
<tr>
<th>Character Set</th>
<th>From dechanyu:</th>
<th>To big5:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0xA9BA</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xA9FE</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>0xC2A1</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xC2CA</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>0xC2CB</td>
<td>Error [EINVAL]</td>
</tr>
<tr>
<td></td>
<td>0xC2CC</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xC3FE</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>0xC4A1</td>
<td>0xA440</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xFDDB</td>
<td>0xC67E</td>
</tr>
<tr>
<td>CNS 11643-1986</td>
<td>0xA121</td>
<td>0xC940</td>
</tr>
<tr>
<td>Plane 2</td>
<td>0xF244</td>
<td>0xF9D5</td>
</tr>
<tr>
<td>EDPC Part I</td>
<td>0xC2CBA1A1</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xC2CBE2C6</td>
<td>0xFEFE</td>
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<tr>
<td>EDPC Part II</td>
<td>0xC2CBE2C7</td>
<td>0xFEFE</td>
</tr>
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<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xC2CBE4B5</td>
<td>0xFEFE</td>
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<tr>
<td>UDC</td>
<td>0xFDCC</td>
<td>0xC7B9</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xFEFE</td>
<td>0xC8AC</td>
</tr>
<tr>
<td></td>
<td>0xAAA1</td>
<td>0x095D</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xC1FE</td>
<td>0x9EB8</td>
</tr>
<tr>
<td></td>
<td>0xF245</td>
<td>0x095D</td>
</tr>
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<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xF26D</td>
<td>0x9EB8</td>
</tr>
<tr>
<td></td>
<td>0xF26E</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xF27E</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>0xF321</td>
<td>0xFA40</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xFE7E</td>
<td>0x905C</td>
</tr>
</tbody>
</table>

### Table 6-2: Mapping of dechanyu Code Points to eucTW

<table>
<thead>
<tr>
<th>Character Set</th>
<th>From dechanyu:</th>
<th>To eucTW:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCII</td>
<td>0x0</td>
<td>0x0</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0x7F</td>
<td>0x7F</td>
</tr>
<tr>
<td>CNS 11643-1986</td>
<td>0xA1A1</td>
<td>0xA1A1</td>
</tr>
<tr>
<td>Plane 1</td>
<td>0xA9FE</td>
<td>0xA9FE</td>
</tr>
</tbody>
</table>
Table 6-2: Mapping of dechanyu Code Points to eucTW (cont.)

<table>
<thead>
<tr>
<th>Character Set From dechanyu:</th>
<th>To eucTW:</th>
</tr>
</thead>
<tbody>
<tr>
<td>0xC2A1</td>
<td>0xC2A1</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>0xC2CA</td>
<td>0xC2CA</td>
</tr>
<tr>
<td>0xC2CB</td>
<td>Error [EINVAL]</td>
</tr>
<tr>
<td>0xC2CC</td>
<td>0xC2CC</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>0xFDCB</td>
<td>0xFDCB</td>
</tr>
<tr>
<td>CNS 11643-1986 Plane 2</td>
<td>0xA121</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>0xF244</td>
<td>0x8EA2F2C4</td>
</tr>
<tr>
<td>EDPC Part I</td>
<td>0xC2CBA1A1</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>0xC2CBE2C6</td>
<td>0x8EA3E2C6</td>
</tr>
<tr>
<td>EDPC Part II</td>
<td>0xC2CBE2C7</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>0xC2CBE2C8</td>
<td>0x8EA4A1D9</td>
</tr>
<tr>
<td>0xC2CBE2C9</td>
<td>0x8EA4A1F1</td>
</tr>
<tr>
<td>0xC2CBE2CA</td>
<td>0x8EA4A1F3</td>
</tr>
<tr>
<td>0xC2CBE2CB</td>
<td>0x8EA4A2B4</td>
</tr>
<tr>
<td>...</td>
<td>(Not sequential numbers)</td>
</tr>
<tr>
<td>0xC2CBE4B1</td>
<td>0x8EA4EBA9</td>
</tr>
<tr>
<td>0xC2CBE4B2</td>
<td>0x8EA4EBF4</td>
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<tr>
<td>0xC2CBE4B3</td>
<td>0x8EA4EDB7</td>
</tr>
<tr>
<td>0xC2CBE4B4</td>
<td>0x8EA4EEB7</td>
</tr>
<tr>
<td>0xC2CBE4B5</td>
<td>0x8EA4EEDB</td>
</tr>
<tr>
<td>UDC</td>
<td>0xFDCC</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>0xFDCC</td>
<td>0xFDCC</td>
</tr>
<tr>
<td>GB2312–80 Graphic symbols</td>
<td>0xA1A1</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>0xA9FE</td>
<td>0xA9FE</td>
</tr>
</tbody>
</table>

Table 6-3: Mapping of dechanzi Code Points to hp15CN

<table>
<thead>
<tr>
<th>Character Set From dechanzi:</th>
<th>To hp15CN:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCII</td>
<td>0x0</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>0x7F</td>
<td>0x7F</td>
</tr>
<tr>
<td>GB2312–80 Graphic symbols</td>
<td>0xA1A1</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>0xA9FE</td>
<td>0xA9FE</td>
</tr>
</tbody>
</table>
### Table 6-3: Mapping of dechanzi Code Points to hp15CN (cont.)

<table>
<thead>
<tr>
<th>Character Set</th>
<th>From dechanzi:</th>
<th>To hp15CN:</th>
</tr>
</thead>
<tbody>
<tr>
<td>GB2312–80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 1 characters</td>
<td>0xB0A1...</td>
<td>0xB0A1...</td>
</tr>
<tr>
<td></td>
<td>0xD7FE</td>
<td>0xD7FE</td>
</tr>
<tr>
<td>GB2312–80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 2 characters</td>
<td>0xD8A1...</td>
<td>0xD8A1...</td>
</tr>
<tr>
<td></td>
<td>0xF7FE</td>
<td>0xF7FE</td>
</tr>
<tr>
<td>UDC</td>
<td>0xA121...</td>
<td>0xFB3F...</td>
</tr>
<tr>
<td></td>
<td>0xA460...</td>
<td>0xFE7E...</td>
</tr>
<tr>
<td></td>
<td>0xAA461...</td>
<td>0xEE7E...</td>
</tr>
<tr>
<td></td>
<td>0xFE7E...</td>
<td>0xFE7E...</td>
</tr>
</tbody>
</table>

### Table 6-4: Mapping of deckanji Code Points to eucJP

<table>
<thead>
<tr>
<th>Character Set</th>
<th>From deckanji:</th>
<th>To eucJP:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCII</td>
<td>0x0...</td>
<td>0x0...</td>
</tr>
<tr>
<td></td>
<td>0x7F...</td>
<td>0x7F...</td>
</tr>
<tr>
<td>C1 Control Character</td>
<td>0x80...</td>
<td>0x80...</td>
</tr>
<tr>
<td></td>
<td>0x8D...</td>
<td>0x8D...</td>
</tr>
<tr>
<td></td>
<td>0x90...</td>
<td>0x90...</td>
</tr>
<tr>
<td></td>
<td>0x9F...</td>
<td>0x9F...</td>
</tr>
<tr>
<td>DEC Extended Kanji</td>
<td>0xA121...</td>
<td>0xF5A1...</td>
</tr>
<tr>
<td>Character Set</td>
<td>0xAA7E...</td>
<td>0xFEFE...</td>
</tr>
<tr>
<td></td>
<td>0xAB21...</td>
<td>0x8F5A1...</td>
</tr>
<tr>
<td></td>
<td>0xB47E...</td>
<td>0x8FEEFE</td>
</tr>
<tr>
<td></td>
<td>0xB521...</td>
<td>0x8FEEA1</td>
</tr>
<tr>
<td></td>
<td>0xBB7E...</td>
<td>0x8F4FE</td>
</tr>
<tr>
<td></td>
<td>0xBC21...</td>
<td>0xA2A2...</td>
</tr>
<tr>
<td></td>
<td>0xFE7E...</td>
<td>0xA2A2...</td>
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<tr>
<td>JIS X 0208</td>
<td>0xA1A1...</td>
<td>0xA1A1...</td>
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<td></td>
<td>0xA17E...</td>
<td>0xA1FE...</td>
</tr>
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<td></td>
<td>0xFDA1...</td>
<td>0xFDA1...</td>
</tr>
<tr>
<td></td>
<td>0xFEFE...</td>
<td>0xFEFE...</td>
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### Table 6-5: Mapping of deckanji Code Points to SJIS

<table>
<thead>
<tr>
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<th>From deckanji:</th>
<th>To SJIS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCII</td>
<td>0x0</td>
<td>0x0</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0x7F</td>
<td>0x7F</td>
</tr>
<tr>
<td>C1 Control Character</td>
<td>0x80</td>
<td>0x81A0</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0x9F</td>
<td>0x81A0</td>
</tr>
<tr>
<td></td>
<td>0xA121</td>
<td>0xF040</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xBA7E</td>
<td>0xFCFC</td>
</tr>
<tr>
<td></td>
<td>0xBB21</td>
<td>0x81A0</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xFE7E</td>
<td>0x81A0</td>
</tr>
<tr>
<td>JIS X 0208</td>
<td>0xA1A1</td>
<td>0x8140</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xA1FE</td>
<td>0x819E</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xFD4A1</td>
<td>0xEF40</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0xFEFE</td>
<td>0xEFFC</td>
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### Table 6-6: Mapping of sdeckanji Code Points to eucJP

<table>
<thead>
<tr>
<th>Character Set</th>
<th>From sdeckanji:</th>
<th>To eucJP:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCII</td>
<td>0x0</td>
<td>0x0</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0x7F</td>
<td>0x7F</td>
</tr>
<tr>
<td>C1 Control Character</td>
<td>0x80</td>
<td>0x80</td>
</tr>
<tr>
<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0x8D</td>
<td>0x8D</td>
</tr>
<tr>
<td></td>
<td>0x90</td>
<td>0x90</td>
</tr>
<tr>
<td></td>
<td>0x9F</td>
<td>0x9F</td>
</tr>
<tr>
<td>JIS X 0201 RH</td>
<td>0x8EA1</td>
<td>0x8EA1</td>
</tr>
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<td></td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td></td>
<td>0x8EDF</td>
<td>0x8EDF</td>
</tr>
<tr>
<td>DEC Extended Kanji Character Set</td>
<td>0xA121</td>
<td>0xF5A1</td>
</tr>
<tr>
<td></td>
<td>0xAA7E</td>
<td>0xFEFE</td>
</tr>
<tr>
<td></td>
<td>0xAB21</td>
<td>0xFF5A1</td>
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<tr>
<td></td>
<td>0xB47E</td>
<td>0xFFFEFE</td>
</tr>
<tr>
<td></td>
<td>0xB521</td>
<td>0xFFEEA1</td>
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<tr>
<td></td>
<td>0xBB7E</td>
<td>0xFF4F</td>
</tr>
<tr>
<td></td>
<td>0xBC21</td>
<td>0xA2A2</td>
</tr>
<tr>
<td></td>
<td>0xFE7E</td>
<td>0xA2A2</td>
</tr>
</tbody>
</table>
### Table 6-6: Mapping of sdeckanji Code Points to eucJP (cont.)

<table>
<thead>
<tr>
<th>Character Set From sdeckanji:</th>
<th>To eucJP:</th>
</tr>
</thead>
<tbody>
<tr>
<td>JIS X 0208 0xA1A1 ... 0xA1FE</td>
<td>0xA1A1 ... 0xA1FE</td>
</tr>
<tr>
<td>JIS X 0212 0x8FA1A1 ... 0xFEFE</td>
<td>0x8FA1A1 ... 0xFEFE</td>
</tr>
</tbody>
</table>

### Table 6-7: Mapping of sdeckanji Code Points to SJIS

<table>
<thead>
<tr>
<th>Character Set From sdeckanji:</th>
<th>To SJIS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASCII 0x0 ... 0x7F</td>
<td>0x0 ... 0x7F</td>
</tr>
<tr>
<td>C1 Control Character 0x80 ... 0x9F</td>
<td>0x81A0 ... 0x81A0</td>
</tr>
<tr>
<td>JIS X 0201 RH 0xBEA1 ... 0xFE7E</td>
<td>0xA1 ... 0x81A0</td>
</tr>
<tr>
<td>DEC Extended Kanji Character Set 0xA1A1 ... 0xF040</td>
<td>0x81A0 ... 0x81A0</td>
</tr>
<tr>
<td>JIS X 0208 0xA1A1 ... 0xA1FE</td>
<td>0xA1A1 ... 0xA1FE</td>
</tr>
<tr>
<td>JIS X 0212 0x8FA1A1 ... 0xFEFE</td>
<td>0x8FA1A1 ... 0xFEFE</td>
</tr>
</tbody>
</table>

Characters that are valid in the input codeset but do not have a corresponding character in the output codeset are converted into the Galley character (the replacement character), which is unique in each output codeset (see `genxlt(1)`).
Table 6-8 lists the Galley characters for each output codeset that is defined for the seven converters in the Migration Environment.

<table>
<thead>
<tr>
<th>Output Codeset</th>
<th>Galley Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>big5</td>
<td>0xFEFE</td>
</tr>
<tr>
<td>eucTW</td>
<td>0xFEFE</td>
</tr>
<tr>
<td>hp15CN</td>
<td>0xFFFF</td>
</tr>
<tr>
<td>eucJP</td>
<td>0xA2A2</td>
</tr>
<tr>
<td>SJ IS</td>
<td>0x81A0</td>
</tr>
</tbody>
</table>

See `iconv_intro(5)` in the Migration Environment for more information.
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A

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