

# The Helios Parallel Operating System

Installation Guide

PERIHELION SOFTWARE LTD

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The Unix compatibility library described in chapter *Compatibility*, implements functions which are largely compatible with the Posix standard interfaces. The library does not include the entire range of functions provided by the Posix standard, because some standard functions require memory management or, for various reasons, cannot be implemented on a multi-processor system. The reader is therefore referred to IEEE Std 1003.1-1988, IEEE Standard Portable Operating System Interface for Computer Environments, which is available from the IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA. It can also be obtained by telephoning USA (201) 9811393.

The Helios software is available for multi-processor systems hosted by a wide range of computer types. Information on how to obtain copies of the Helios software is available from Distributed Software Limited, The Maltings, Charlton Road, Shepton Mallet, Somerset BA4 5QE, UK (Telephone: 0749 344345).

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# Chapter 1

## Installation guide

### 1.1 Introduction

We are pleased that you have purchased Helios 1.3, and we hope that you will enjoy using it. Please read this part of the Helios documentation carefully, so that you will derive the maximum benefit from the product. This installation guide is divided into six sections, entitled:

*Before you install Helios*  
*Installation*  
*The next step*  
*Booting multiple processors*  
*The helios directory structure*  
*Helios version 1.3*

We suggest that you read each section in turn. The section entitled *The next step* is further subdivided into two subsections: *New users* and *Experienced users*. Read the subsection which applies to you. We have tried to give sufficient information in this document for you to start using Helios 1.3. However, there are places where you will be redirected to other documents for supplementary information.

### 1.2 Before you install Helios

#### 1.2.1 Package contents

There should be a packing list in the *Helios Operating System* binder. Check that you have received all of the items listed. Contact your dealer immediately for assistance if any item is missing.

#### 1.2.2 Licence agreement

Before opening the disc envelope, read the terms and conditions of the software licence, which are printed on the envelope. This agreement is for the protection of the user and of the future of the Helios product.

A Helios licence provides cover for one copy of Helios on one computer. Unauthorised multiple copying of Helios is detrimental to product development, and it is illegal under the terms of the licence agreement. Although Helios can run on several hundred processors, the standard licence permits it to run on up to 20 processors in one machine. An additional licence is required for more than 20 processors.

### 1.2.3 Registration card

Please complete and return your registration card as soon as possible. Only registered users are eligible for technical support and updates of DSL software.

### 1.2.4 Technical support

If you have problems using Helios 1.3, DSL provides a technical support service. The details of this service are on the product registration card. On return of this card, DSL provides written and telephone support for the first 90 days, and written support only for the following 9 months. Registered users are offered an extended support contract with 'hotline' telephone support, news service and upgrade benefits.

## 1.3 Installation

To install the complete Helios package, you will need 4Mb of hard disc space. If your system has limited disc space, the online help system may be omitted, saving 1.8Mb.

Helios requires 512 Kb of host PC RAM. If there is not enough memory in your PC to run Helios, read the chapter on the I/O server in *The Helios Operating System* for advice on how to save memory. Helios will run on transputer processors with 1 Mb of RAM, but for compilation 2Mb or two 1Mb processors is the recommendation.

### Procedure

1. Make a back-up copy of your discs and keep the originals in a safe place.
2. Insert disc 1 into one of the external drives and execute the installation batch file called **install.bat**. The batch file copies the operating system from disc to a helios subdirectory. The batch file expects two arguments: the source drive and the destination of the Helios subdirectory. the following command line would load Helios from drive a: to a subdirectory called helios in the root directory of drive c:.

```
a:install a: c:
```

**CAUTION:** If this directory already exists, its contents will be overwritten. If you have an earlier version of Helios, we recommend that you

rename it and delete it once you have transferred your personal files to the new system.

If the helios subdirectory is not at the root level of your drive, use a PC text editor to edit the file **host.con** which contains references to the helios directory.

3. Once the installation has started, follow the instructions on the screen. The installation process copies operating system files on disc 1 and 2 to your hard disc. There are optional support discs which may be loaded once Helios has been started.
4. Before starting Helios, ensure that the **host.con** file in the helios directory has the correct setting for your hardware. If not, edit **host.con** to reflect your hardware configuration. Details of the options available are to be found in the chapter on the Helios I/O server in *The Helios Operating System*.
5. Start Helios by making the helios directory your current directory, and then execute **server.exe**. This starts the I/O server and boots a single processor.
6. You will be prompted for a login name. Helios has three names predefined in the **passwd** file: **guest**, **root** and **shutdown**. Type **guest**, for example, to start a Helios session in the **/helios/users/guest** directory. You may later decide to change the **passwd** file to a more suitable login name.
7. Once you are running a Helios session, you may load the two base software packages: the online help and public domain programs. Type **loadpac** at the Helios prompt to load these packages. This is a menu driven installation and maintenance program. First, select the drive for loading software (if the default value is not correct). Then select the **install new software** option. The two base packages shipped with Helios are listed in addition to other, optional packages which must be purchased separately. If you have purchased Helios-PC you will have a copy of the C compiler, which may be loaded using **loadpac**. To load each item, simply follow the prompts. After using **loadpac**, you may need to type **rehash** before using the loaded software for the first time. This informs the shell that there are new executables in the search path.
8. Helios should now be installed on a single processor. Now you need to configure Helios for the particular transputer configuration you are using. Further details are to be found in the section of this guide entitled *Booting multiple processors*. This involves the use of Helios commands and tools, and the next section suggests how you might proceed.

## 1.4 The next step

### 1.4.1 New users

To modify configuration files in Helios you need to use the Helios editor and to become familiar with Helios commands. If you have not used Helios or Unix before, read the tutorial entitled *Getting Started* to understand the basic commands. The tutorial entitled *Parallel Programming* provides a brief overview of programming using Helios. Detailed reference material is to be found in *The Helios Operating System*. If you need help do not forget to try the online help, which can answer most of your questions. For example, if you type

```
help me compile
```

the online help gives you a list of useful information about compiling programs. You do not need to know any command names to use the online help.

When you have mastered the basic skills, you can configure Helios to boot multiple processors. A brief outline is given in the section of this guide entitled *Booting multiple processors*. It is not compulsory to read the last two sections, which refer to the directory structure and release changes respectively, since these are explained in the *Getting Started* tutorial.

### 1.4.2 Experienced users

Many enhancements have been made to Helios and to the Helios documentation. *The Helios Operating System* manual should be read carefully to gain the maximum benefit from this release. The following two sections of this installation guide briefly outline the new network booting configuration files and the changes to the directory structure. The final section contains release information.

## 1.5 Booting multiple processors

In Helios 1.3 the booting of networks has been made more flexible. This section explains how to boot multiple processors in an equivalent manner to that used in previous versions of the operating system. This involves the modification of two configuration files, namely **etc/initrc** and **etc/nsrc**, and the writing of a resource map to describe the hardware topology.

### Procedure

1. Use the MicroEmacs editor to create a resource map in the **helios/etc** directory. An example resource map is given in chapter 4 of *The Helios Parallel Programming Tutorial*. If you change the names of the I/O processor or root processor from I/O and 00, you must reflect these changes in the **host.con** file.
2. If the name of your resource file is **n.map** for example, edit the **etc/initrc** file to use the new map by adding the following lines:

```
run -e /helios/bin/startns startns -r /helios/etc/n.map
waitfor /sm
run -e /helios/bin/newuser newuser guest
```

3. The **etc/nsrc** configuration file contains a list of options for the networking software. It should not require modification for this example, but it should contain the following entries:

```
single_user
share_root_processor
waitfor_network
```

Helios should then be rebooted. For a comprehensive description of the new options, read the chapter entitled *Networks* in *The Helios Operating System*.

## 1.6 The Helios directory structure

Helios refers to all directories relative to a standard place known as **/helios**. This name is built into certain commands which attempt to open files such as **/helios/etc/help**. The I/O server maps **/helios** to any directory on the PC. This is specified by the **helios\_directory** entry in the **host.con** file. By default, this is set to **/helios** for the current DOS partition.

Figure 1 illustrates the complete Helios directory structure. Some directories are created when optional software packages are installed. Physical drives can be accessed by prefixing the drive name with a **/** symbol. For example, the command which lists the contents of drive **c:** is as follows:

```
ls /c
```

The **lib** subdirectory contains library stubs and C prologue, which are required for linking. It also contains system servers such as the RAM server, and device drivers. The **bin** subdirectory contains all helios commands. A **local/bin** is provided for unsupported public domain programs and user programs. The **include** subdirectory contains the C header files for the system, which define all of the data structures. The **users** directory holds the directories of all users. Three of these (guest, root and shutdown) are predefined. Each directory contains a **login** and **csorc** script with useful customising commands. These names correspond to the three users defined in the **etc/passwd** file. The guest directory has several example subdirectories which demonstrate programming under Helios. When using the CDL language, remember to set the shell variable **cdl**.

The **etc** directory holds text based configuration files and the help database. The file **initrc** is executed after the first processor is booted. This file starts system services such as login sessions. It also starts network booting according to resource maps and the **nsrc** file held in this directory. Further details are to be found in the chapter of *The Helios Operating System* entitled *Networks*. The

**passwd** file holds lists of users with the following format: user name, password (possibly blank), user and group number, home directory and shell to be called. The file **etc/motd** is an optional file which is displayed on login to announce administration messages.

## 1.7 Helios version 1.3

The following list summarises some of the major changes and enhancements which have been made to Helios version 1.3.

### Compatibility

1. Programs compiled under Helios 1.1 should run without recompilation on Helios 1.3. However, programs compiled on version 1.3 will **not** run on earlier versions of the operating system.
2. The syntax of the network resource map has been considerably enhanced. The resource map compiler (**rmgen**) will still accept the old syntax.
3. Networking software has been totally revised. The new version supports multiple login sessions and multiple users sharing a common pool of processors.
4. The C library floating point functions have been combined into the C library, so some Helios 1.1 makefiles may need modification for Helios 1.3. (See the C compiler manual for further information).
5. For UNIX compatibility the startup code module **cstart.o** has been split into two files: **c0.o** and **c.lib**. Makefiles which do not use the compiler driver should be modified to reflect this change, although **cstart.o** is provided for this release.
6. The Helios system library call **Grabpipe()** is no longer supported. This should be replaced with raw socket calls for equivalent operation, which will improve the portability of the code.

### New features

1. More than thirty new commands have been added to Helios 1.3. Most of the commands are based on the POSIX standard, whereas others are new commands for network administration and multi-user support.
2. The C compiler now supports code generation for the Inmos T425 processor. This is achieved with the **-T5** option switch to the compiler driver.
3. A BSD compatibility library (**bsd.lib**) has been added to Helios. Details are to be found in *The Helios Operating System*.

4. Socket and select support has been added to Helios. Details are to be found in *The Helios Operating System*.
5. Online help has been added. To get help, type **help**!
6. The network software now supports multiple login sessions. This can be achieved with the **newuser** command. See the chapter entitled *Networks*.
7. The network software now supports multiple users sharing a common pool of processors.