

Helios - MultiTool Server Version 2.10

Software Product

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Author :
D.Segschneider

Helios-MultiTool Server
for MultiTool 5.0

Software Documentation

Version 2.10, November 1989

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1. Purpose of this document

This document describes the installation and usage of version 2.10 of the MultiTool Server for the Helios operating system version 1.1.

Besides the installation of the software, the usage of parsytecs MultiTool transputer development system running under the Helios operating sytem is explained.

The system assumes the original parsytec release of MultiTool beeing installed on your host maschine, so that documentation should be used for further information about MultiTool.

2. Introduction

The Helios-MultiTool server allows you to use parsytecs powerful MultiTool transputer development system directly under the distributed operating system Helios. With the MultiTool server running as a normal application program under Helios all utilities and additional tools based on MultiTool are available too. The Helios-MultiTool server makes use of the normal installation of MultiTool and needs only a very simple installation procedure of his own.

The server has been developed according to the protocols and functions of the original MultiTool 5.0 servers for the different host systems like IBM-PC/XT/AT, SUN-3/SUN-4, VAX, or Apple Macintosh II. In order to have the full exclusively access to the transputer nodes running under MultiTool the server assumes an additional transputer - or a network of transputers - directly connected via a link to the Helios node the server is to be started.

The reader of this paper is expected to be acquainted with the standalone version of MultiTool on his host computer system and with the Helios Operating System.

This manual refers to

1. The MultiTool transputer development system, Release 5.0, further referred as 'MultiTool'

and

2. The Helios Operating System, Version 1, Release 1.1, further referred as 'Helios'.

3. Installation

This chapter describes how to get the software imported on any particular machine and a first run for a checkout of the system. The MultiTool relies on logical keys denoted [KEY]. Some of these logical keys (i.e. [ENTER TOOLKIT]) had to be mapped to different physical keystrokes, because the Helios server does not pass all keys to the application (the MultiTool server in this case). Experienced MultiTool users might have a look at the "mtkeys.def" file.

3.1. Supplied software

The supplied data medium contains three subdirectories named "/bin", "/system" and "/etc". You should find the following components:

/bin :

mtserver	- the server program
testkeys	- a keyboard checkout utility
mtool	- a shell script file for starting MultiTool

/system :

mtkeys.def	- the default used keyboard definition file (in fact a copy of mtkeys.ibm)
mtkeys.ibm	- the keyboard definition file
fileutil.cut	- an enhanced version of the file utilities

/etc :

H1MTOOL1.rm	- example resource map for 2 transputers
H1MTOOL1.map	- compiled resource map

3.2. Installation procedure

This installation procedure consists of two steps: The host machine dependand and the host independand part.

First you should copy (recursivly) the distribution medium completely into a temporary directory, called <temp> here. On a PC this may be located as '/c/tmp', on UNIX machines as '/tmp'.

The supplied disk contains three subdirectories named "/bin", "/system" and "/etc". The "/bin" directory contains the server program "mtserver", a shell script for parameter supply named "mtool" and a keyboard checkout utility, "testkeys". The "/system" directory contains an user definition file for the IBM PC, "mtkeys.ibm". In addition to that, you should install the new file handling utilities. "/etc" contains one simple resource map for using one Helios node and an additional MultiTool node (minimal configuration).

You can install all the files directly from Helios using the following commands (NOTE: These are Helios commands, NO MS-DOS commands !!):

```
cp <temp>/bin/* /helios/bin
cp <temp>/system/* <root>/mtool/system
```

where <temp> is the Helios specification of your temporary directory (e.g. /a in a PC implementation) and <root> specifies the path to your "/mtool" directory (e.g. /c in a PC implementation) .

For a PC this will result in typing the following commands:

```
cp /a/bin/* /helios/bin
cp /a/system/* /c/mtool/system
```

Use 'rehash' to tell Helios that there are additional commands available now.

You may delete the contents of the temporary directory now.

3.3. System setup

To set up your Helios system to use the MultiTool programming environment, you have to

- tell Helios the topology of your transputer network containing naked or native transputer nodes, where MultiTool will be installed.

- prepare a Helios shell script file to start MultiTool and a keyboard definition file.

The transputer topology description is done in 'resource map' files. For the checkout, please install the map "H1MTOOL1.map" before booting Helios.

To establish the default path to the MultiTool directory, you will have to edit the mtool shell script file in /helios/bin which is used to start the MultiTool server.

The file looks like this:

```
#!/helios/bin/shell
mtserver -r /c -b <xxx>/mtload.cde -f <xxx>/mtool.cde -l $*
```

Please change <xxx> according to the path in your installation to get down to the MultiTool.

You have to create a mtkeys.def file in /mtool/system. This file allows you to add new function keys and key sequences to the default set of Escape sequences and to define a help screen for these keys. The file 'mtkeys.def' in '/mtool/system' defines a set of MultiTool-standalone like function keys. This file can be used as a default (use <xxx> instead of '/mtool/' if necessary).

The formal semantics of the definition file is given here in the form of a BNF grammar.

```
<definition_file> ::= <declarations>
<declarations> ::= <help_declarations> <declarations>
                  | <key_declarations> <declarations>
<help_declarations> ::= help { <help_lines> }
<help_lines> ::= <line> <help_lines>
<line> ::= " <ascii characters> "
<key_declarations> ::= keys { <key_definitions> }
<key_definitions> ::= <single_key> <key_declarations>
<single_key> ::= <sequence> = <ft.name>
```

```
<sequence> ::= <char> <sequence>
              | <line> <sequence>

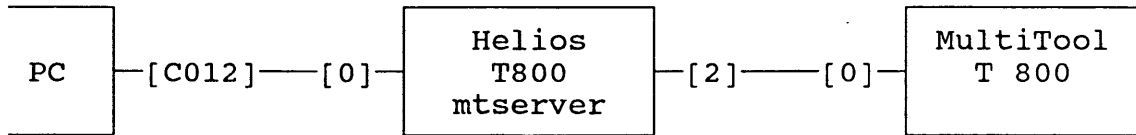
<char> ::= 0x<hexadecimal_character_code>
           | 0<octal_character_code>
           | <decimal_character_code>
```

The comment inducer '#' marks the rest of the same line as a comment.

To explore your keyboard input codes, you might use the testkeys utility. It prints the hexadecimal code and the character representation for each input code. Thus, you may find the input code sequences generated by the different keys on the keyboard.

3.4. Checkout

According to the setup, we are using the Helios resource maps "H1MTOOL1.*" for a checkout. Installing these maps can be done by either copying H1MTOOL1.map to default.map, probably in /etc, or by changing the initrc file. The network requirements to run the MultiTool server are explained in detail in chapter 4. By this operation, we assume your network looking like this:



The corresponding resource map is:

```

subnet /Cluster {
    CONTROL Rst_An1 [/Cluster/00];
    terminal 00 { ~IO, , ~01, ; HELIOS;
                Mnode Rst_An1 [pa_ra.d];
                ptype T800;
            }
    terminal 01 { ~00, , , ; NATIVE;
                ptype T800;
            }
    terminal IO { ; IO;
            }
}
  
```

If your current transputer topology does not match with this configuration, please change either our example H1MTOOL1 or your configuration.

Please reboot the system with the new resource map being valid. After having booted Helios change to the main MultiTool directory of your system:

```
cd <disk>/mtool/examples
```

with <disk> being the path to your standard MultiTool system. For example:

```
cd /c/mtool/examples
```

With this configuration you can start your MultiTool system by typing:

```
mtool 2
```

Now you should get some information on the screen , and the line

booting root transputer...

after a while you should find your standard MultiTool environment, with the *.top folds listed on the screen. Pressing the three keys [ESC] [Q] [U] for [QUIT] will terminate the MultiTool server.

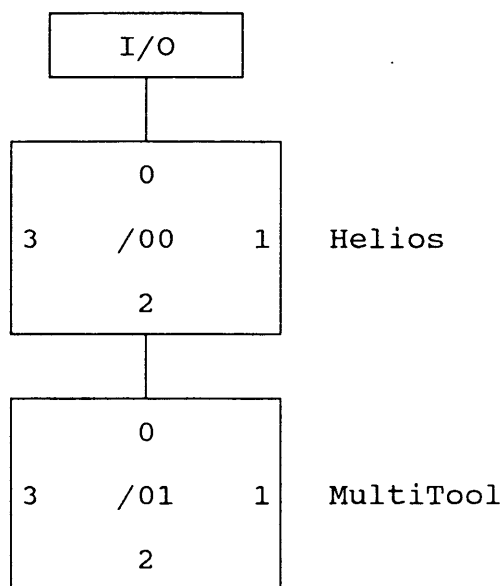
This finishes the checkout.

4. Helios network requirements

Before starting the Helios-MultiTool server you should be sure that the transputer node on which you start the server is connected to native transputer nodes (at least one). The transputer nodes you will use with MultiTool may only be known by Helios as NATIVE nodes, because MultiTool will use this nodes exclusively.

Simple example:

Assume the following total network layout:



We want to use only the node /00 for Helios and /01 for MultiTool. Thus the appropriate resource map for the network server of Helios is:

```

subnet /Cluster {
  CONTROL Rst_An1 [/Cluster/00];
  terminal 00 { ~IO, , ~01, ; HELIOS;
              Mnode Rst_An1 [pa_ra.d];
              ptype T800;
            }
  terminal 01 { ~00, , , ; NATIVE;
              ptype T800;
            }
  terminal IO {
              ; IO;
            }
}

```

With that resource map, Helios knows about the second processor, but it does not boot it as the /01 node has the Native attribute. In that case, node /00 will run the server program and node /01 the main part of MultiTool as the root processor. The general behaviour of the combination of the I/O node, node /00 and node /01 can be compared to the standalone MultiTool version with one exception : we have added one transputer between the part running on the host system (I/O) and the part which runs MultiTool. Node /00 will act like the i/o part of the standalone version. After having booted Helios with the above resource map, change to the main MultiTool directory of your system. Assuming a standard PC MultiTool installation on drive C (with the main directory called c:\mtool), just type:

```
cd /c/mtool/example
```

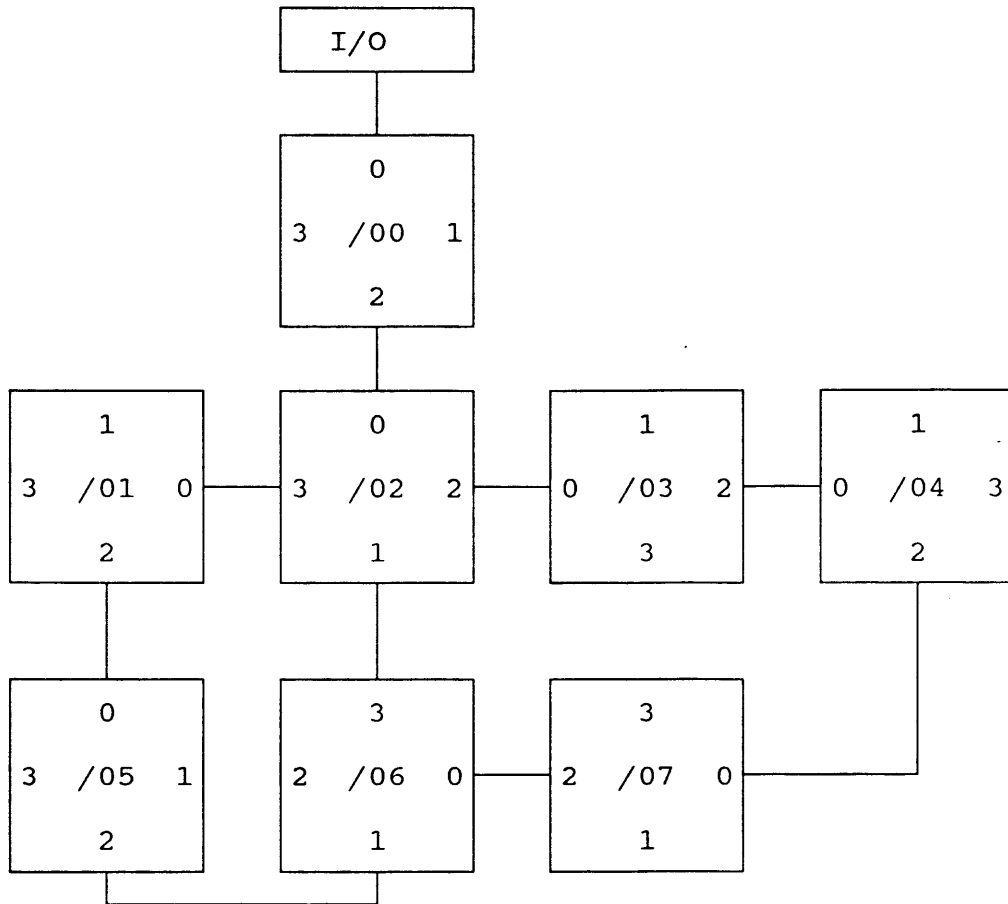
Now we can start the Helios-MultiTool server by typing

```
mtool 2
```

As shown in the diagram, node /00 is connected to node /01 via its link 2. Therefore we specify a '2' as the obligate link number. MultiTool will start as usual and you can use it in the same way as the standalone version with some slight changes in the keyboard layout.

More complex example:

Assume the following total network layout :



We want to use the subnet consisting of nodes /03, /04, /07 and /06 (which forms a simple link-2/link-0 pipeline) for MultiTool. The rest of the network should be used as normal Helios nodes. Thus the appropriate resource map for the network server of Helios is

```

subnet /Cluster {
  CONTROL Rst_An1 [/Cluster/00];
  terminal 00 {~IO, ,~02, ; HELIOS;
              Mnode Rst_An1[pa_ra.d];
              ptype T800;
            }
  terminal 01 {~02, ,~05, ; HELIOS;
              ptype T800;
            }
  terminal 02 {~00,~06,~03,~01; HELIOS;
              ptype T800;
            }
  terminal 03 {~02, ,~04, ; NATIVE;
              ptype T800;
            }
  terminal 04 {~03, ,~07, ; NATIVE;
              ptype T800;
            }
  terminal 05 {~01, ,~06, ; HELIOS;
              ptype T800;
            }
  terminal 06 {~07,~05, ,~02; NATIVE;
              ptype T800;
            }
  terminal 07 {~04, ,~06, ; NATIVE;
              ptype T800;
            }
  terminal IO {~00, , , ; IO;
            }
}

```

Helios will only boot the nodes /00, /02 and /05, as the other nodes are marked as Native.

Of course, Helios allows you to start MultiTool on different nodes at the same time. With the above network layout you may start the Helios-MultiTool server on node /02 (using 'remote' or another shell 'wsh 02') booting node /03 via link 2. Using a different shell you can start it on node /02 too, booting via link 3 the node /01 with the main part of MultiTool. The latter possibility needs another resource map as the above one, because we want to have access to the nodes /01 and /05 exclusively. You should note that the host screen usually can support only one shell at the same time and you should use [REFRESH] to update the screen after switching from one shell to the other.

5. Using the software

5.1. Starting the System

Starting the system which holds at least two transputer nodes and 1 MByte external memory per transputer requires the following steps, which are described above very detailed.

- connect the two nodes via a link cable (the node on which will run Helios (link 2) with link 0 of the node on which will run MultiTool (see technical documentation).
- start Helios
- copy the resource map H1MTOOL1.map to DEFAULT.map
- restart Helios
- change the current directory to your MultiTool working directory (e.g. "/c/mtool/examples")
- start the MultiTool-server
(e.g. with the command line "mtool 2")

If you are not able to start the system please contact your local distributor.

5.2. The MultiTool server program

The server is called from the Helios shell usually via the script file "mtool" (see above). For some special purposes it might be necessary to call the server explicitly. The server command line is as follows :

```
mtserver [parameters]
```

Server Parameters:

```
-h
```

This option causes the server to print a short explanation of its parameters.

```
-l <link_number>
```

<link_number> is the number of the required link (e.g. "-l 2"). Normally MultiTool is running on a Helios native node which is connected via the link <link_number> to the Helios node running the server.

```
-r <root_path>
```

<root_path> is the pathname of the MultiTool root directory (e.g. "-r /c").

```
-b <boot_filename>
```

<boot_filename> specifies a file which is to be booted onto the MultiTool root transputer. The file must be in correct transputer boot file format (e.g. "-b /mtool/mtload.cde"). If the name is absolute (starting with a '/'), the root_path will be concatenated in front of it.

```
-f <application_filename>
```

<application_filename> is the name of the transputer application (e.g. "-f /mtool/system/mtool.cde"). If the name is absolute (starting with a '/'), the root_path will be concatenated in front of it.

```
-t <toplevel_filename>
```

<toplevel_filename> is the pathname of a toplevel file (will be created).

```
-k <keydef_filename>
```

<keydef_filename> is the pathname of the key definition file.

The following parameters are not interpreted by this server, but passed on to the MultiTool itself.

Loader Parameters:

-p <processor_type>

This option tells the MultiTool loader the type of processor it is running on. Possible values for processor.type are T414 (t414, T4 t4) or T800 (t800, T8, t8). If no -P parameter is supplied, T414 is assumed.

-s <board_size>

This option tells the loader the size of memory on the boards that should be used for running the main MultiTool kernel. <board_size> is the size of the memory, in bytes, as a decimal number or as a hexadecimal number (preceded by #).

-x

This option causes the server to analyse the transputer before downloading a boot file, rather than resetting it. This option may be useful if you want to force the server to produce a core dump.

5.3. The keyboard layout

Under MultiTool you have to press the key sequence "[ESC]HE" to get the MultiTool help screen; it will be displayed on the terminal screen:

```

*****
**  P S E U D O - F U N C T I O N - K E Y S  **
**                (press any to continue)                **
*****

      Escape-key followed by 2 letter code:

move cursor      editing      fold handling  code handling  miscellaneous
-----
up      UP  delete char DC  open fold  OP  get code  GE  refresh ESC ESC
down    DN  delete back DB  close fold CL  autoload  AL
left    LE                                enter fold EN  code info  CI  browse    BR
right   RI  del. to eol DE  exit fold  EX

word left WL  delete line DL  create fld CR  next exe  NE  setup      SE
word righ.WR  undel. line UL  remove fld RE  next util NU  parameters

line up  LU  move line  MO  file fold  FF  clear exe  CE  select     SP
line down LD  copy line  CO  fold info  FI  clear util CU  parameter

start lin SL                                put code  PC
end line  EL  pick line  PI      macros      run exe  RU
copy pick CP  -----  function 0 F0  help     HE
start fld SF  put pick  PP  define mac.DM  :        suspend  SU
end fold  EF                                call macro CM  function 9 F9  quit     QU
    
```

A second page showing the assignment of logical keys to special function keys will be shown after pressing a key:

```

----- MultiTool Key assignment for IBM-PC under Helios -----
F1,F2   Help      Fold info      Enter fold  Cursor up  Exit fold
Shift   Browse    File/Unfile fold"
Alt

F3,F4   Move line   Copy line      Open fold   Cursor down  Close fold
Shift   Put        Enter toolkit"
Alt     Pick line   Copy pick      Create fold          Delete right

F5,F6   Get code    Run exe
Shift   Autoload   Clear all      Tab          Select parameter
Alt     Next util  Next exe
Shift-Alt Clear util  Clear exe      ESC QU       Finish
                                                ESC RE       Remove fold
F7,F8   Start of line End of line    ESC DE       Delete to end of line
Shift   Word left  Word right
Alt     Delete line  Restore line
Shift-Alt Del word left Del word right  ESC and number key calls utility

F9,F10  Line up     Line down      Ctrl-A       Set abort flag
Shift   Top of fold Bottom of fold Ctrl-K       Kill exe
Alt     Page up    Page down      Ctrl-T       Terminate server
Shift-Alt Define macro Call macro"

```

If you want to create your own layout please read chapter 3 of this documentation and the MultiTool documentation.

5.4. File utilities

The file "fileutil.cut" is an enhanced version of the MultiTool file utilities for using the MultiTool under Helios (see above).

But there are some restrictions using special functions:

- The functions [WRITE PROTECT] and [WRITE ENABLE] don't work correctly under Helios, because the Helios Release 1.1 does not implement file attributes.

On the other side:

- The important functions [COPY IN], [COPY OUT] and [COMPACT LIBRARIES] work as aspected.

NOTE: Please use the naming conventions of Helios to refer files (e.g. "//a/example.top" instead of "a:\example.top").