parsytec

Helios - MultiTool Server Version 2.10

Software Product

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Helios-MultiTool Server
for MultiTool 5.0

Software Documentation

Version 2.10, November 1989

0. Contents

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>
```

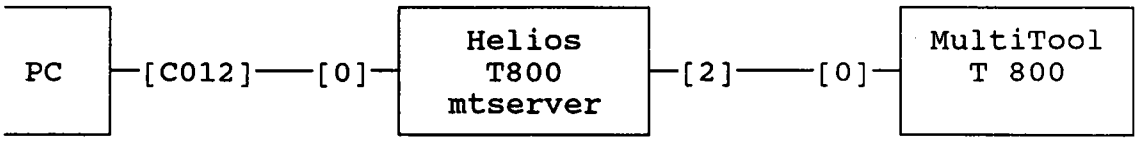
```
<sequence>          ::=   <char> <sequence>
                        | <line> <sequence>

<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_Anl [/Cluster/00];
       terminal 00 { ~IO,    , ~01,   ; HELIOS;
                                        Mnode Rst_Anl [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.

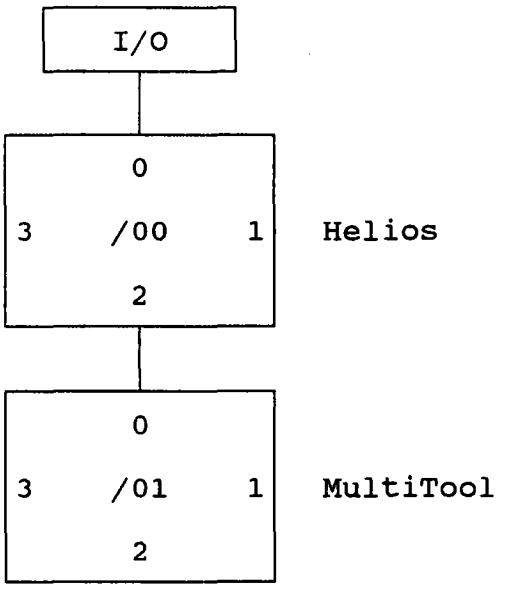
This finishes the checkout.

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_Anl [/Cluster/00];
        terminal 00 { ~IO,    , ~01,   ; HELIOS;
                                         Mnode Rst_Anl [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
```

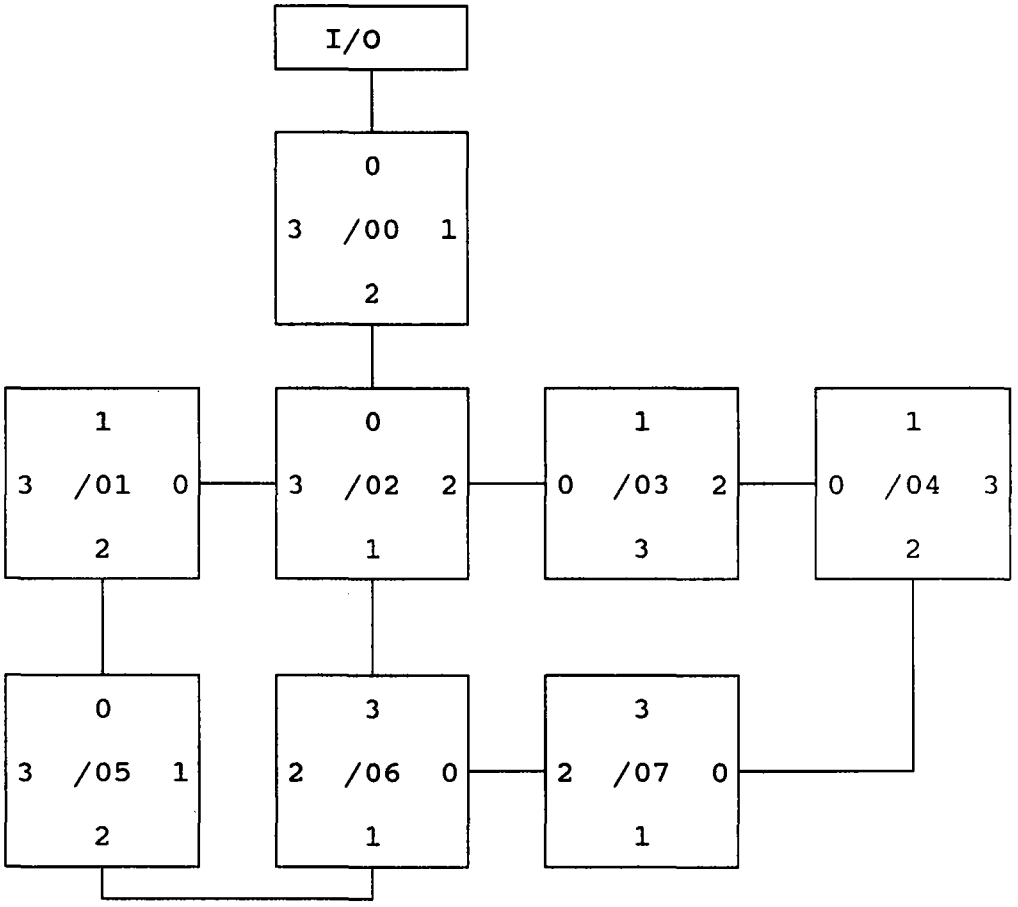
Now we can start the Helios-MultiTool server by typing

```
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_Anl [/Cluster/00];
   terminal  00 {~IO,   ,~02,   ;  HELIOS;
                                   Mnode Rst_Anl[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
                                              next exe   NE   setup       SE
word left WL  delete line DL  create fld CR   next util  NU    parameters
word righ.WR  undel. line UL  remove fld RE
                                              clear exe  CE   select      SP
line up   LU  move line   MO  file fold  FF   clear util CU    parameter
line down LD  copy line   CO  fold info  FI   clear all  CA
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			Cursor left		Cursor right
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").