OS/VS2 Development Series
Installing the Hercules Emulator on Linux

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Contents

Revision History

July 1, 2010

The initial version of this document was released.

February 1, 2011

The hosting Linux system bzip and bzip-devel packages were upgraded to version 6.e15_5. References to “GNU” Linux have been replaced with “RPM” or “RPM-compatible Linux”. Screen images have been added to depict various configuration steps.

Introduction

About This Series

This series of documents describes the installation, configuration and use of an OS/VS2 Release 3.8 computing environment for software development, suitable for adapting to later generations of this operating system while retaining backward compatibility with older systems.

About This Document

This document describes the installation, configuration and use of the Hercules emulator on Linux. This document refers to the Hercules emulator as “Hercules” and to the OS/VS2 Release 3.8 operating system as “OS/VS2”.

Intended Readership

This series of documents is intended for those interested in developing software for the mainframe using contemporary operating systems descended from OS/VS2 or legacy operation systems such as version 3.8. This document may also be of use to those interested in learning more about how OS/VS2 is installed, configured and maintained.

About the Author

David J. Walling has developed commercial software professionally for various operating platforms including mainframes, minis and microcomputers since 1986.

Installing Hercules on Linux

This section describes installing Hercules. The first part of this section describes installation software packages required to run Hercules on RPM-compatible Linux operating systems. The second part of this section describes installing Hercules.

Installation Prerequisites

The version of Hercules used in this document is 3.07. The installation steps for Linux describe downloading and compiling Hercules from source code. The compilation and installation process for Hercules requires several software packages. Some packages are required to compile Hercules from source code. Other software packages are required to run Hercules using the sample configuration. For example, Hercules can be configured to emulate Direct Access Storage Devices (DASD using compressed data files. In order for such a configuration to operate, the bzip2 and bzip2-devel packages or corresponding zlib packages for Linux must be installed.

This document includes installation command examples that use the Yellowdog Updater, Modified (yum) utility program. Other Linux distributions may provide similar installation utilities to accomplish the same package installation tasks. Where necessary, adapt the sample commands given here to those appropriate to your Linux distribution.

In this sample installation, the following packages were installed as prerequisites for Hercules.

package	version	release
zlib	1.2.3	3
zlib-devel	1.2.3	3
bzip2	1.0.3	6.e15_5
bzip2-devel	1.0.3	6.e15_5
m4	1.4.5	3.e15.1
autoconf	2.59	12
binutils	2.17.50.0.6	14.e15
gcc	4.1.2	48.e15

The yum utility can be run to report the version of the installed packages. For example, running the command "yum info zlib" will report version information for the zlib package.

If the yum utility is not available, RPM packages may be downloaded using ftp. The following series of commands is a template for downloading, configuring, compiling and installing a package. Substitute your package name for "<package>".

```
# mkdir /src/gnu
# cd /src/gnu
# ftp anonymous@ftp://mirrors.kernel.org/gnu/<package>
# get <package>.tar.bz2
# tar -xjvf <package>.tar.bz2
# cd <package-build-dir>
# ../<package>/configure --prefix/usr/gnu
# make
# make install
```

Downloading the Hercules Emulator

As of this writing, Hercules is downloadable at http://www.hercules-390.org. At this site, a link is provided for the hercules-3.07.tar.gz file. This is the source-code archive for Hercules version 3.07. The location on your server where you store and install software is up to you. In these examples, the Hercules compressed archive was stored as:

```
/var/opt/hercules/hercules-3.07.tar.gz
```

The gunzip and tar utilities will unzip and untar the source-code archive, creating the hercules-3.07 directory.

```
# cd /var/opt/hercules
# gunzip hercules-3.07.tar.gz
# tar -xvf hercules-3.07.tar
```

Reclaim disk storage by compressing the source-code archive.

```
# gzip hercules-3.07.tar
```

Compiling and Installing the Hercules Emulator

In the hercules-3.07 directory, configure the build files, compile the program components and install the product.

```
# cd /var/opt/hercules/hercules-3.07
# ./configure
# make
# make install
```

The installation process writes libraries to /usr/local/lib and /usr/local/lib/hercules. Executable files are written to /usr/local/bin. Make sure that /usr/local/bin is added to the PATH environment variable. Make sure that /usr/local/lib is added to the LD_LIBRARY_PATH environment variable.

Configuring Hercules

Editing the Hercules Configuration File

Create a simple Hercules configuration file to test that the system will start properly. Save the following as s370.conf. Change the localhost IP address shown below (127.0.0.1) to the IP address appropriate to your environment. Change the HTTPPORT, SHRDPORT and CNSLPORT settings as required if the default ports are already used by other processes on your server.

```
ARCHMODE            S/370
OSTAILOR            LINUX
LOADPARM            0120....
PGMPRDOS            LICENSED
CPUSERIAL           000611
CPUMODEL            3090
CPUVERID            FD
LPARNAME            HERCULES
MAINSIZE            64
XPNDSIZE            0
NUMCPU              1
SYSEPOCH            1900
TZOFFSET            -0600
HTTPROOT            /usr/local/share/hercules/
HTTPPORT            8081 NOAUTH
SHRDPORT            3990
PANRATE             FAST
CNSLPORT            3270
TODDRAG             1
MODPATH             /usr/local/lib/hercules
CCKD                COMP=2,COMPPARM=9

0009   3215-C /
000C   3505 127.0.0.1:3505 sockdev ascii trunc eof
00C0.8 3270
```

Customizing the Hercules Welcome Screen

To create a custom welcome screen displayed by Hercules each time a 3270 client connection is established, copy the default welcome screen text file, herclogo.txt from the Hercules source directory and edit it. Direct Hercules to use this edited file during startup by using the "-b" command-line argument.

```
cd ~
cp /var/opt/hercules/hercules-3.07/herclogo.txt ./herclogo
vi herclogo
```

A Sample Herclogo File

Alternative initial screens for 3270 sessions can be defined using the instructions found in the file README.HERCLOGO, also found in the hercules-3.07 directory. A sample screen definition is below. To direct Hercules to use an alternate file to define the initial 3270 screen, use the "-b" parameter when starting Hercules, or set the "herclogo" configuration parameter in the Hercules configuration file.

```
@ALIGN NONE
@SF P
@NL
@NL
@NL
@ALIGN LEFT
      Welcome to ...

               HH         HH  TTTTTTTTTTTT  AAAAAAAAAAAA  MM         MM
              HH         HH  TTTTTTTTTTTT  AAAAAAAAAAAA  MMM       MMM
             HH         HH       TT       AA         AA  MMMM     MMMM
            HH         HH        TT       AA         AA  MM MM   MM MM
           HH         HH         TT       AA         AA  MM  MMMM  MM
          HHHHHHHHHHHH          TT       AAAAAAAAAAAA  MM   MM   MM
         HHHHHHHHHHHH           TT       AAAAAAAAAAAA  MM        MM
        HH         HH          TT       AA         AA  MM        MM
       HH         HH           TT       AA         AA  MM        MM
      HH         HH            TT       AA         AA  MM        MM
     HH         HH             TT       AA         AA  MM        MM
    HH         HH              TT       AA         AA  MM        MM

       Hercules -- The S/370, ESA/390 and z/Architecture Emulator
      Copyright (c) 1999-2009 Roger Bowler, Jan Jaeger, and others
@NL
      Terminal: $(CCUU)
```

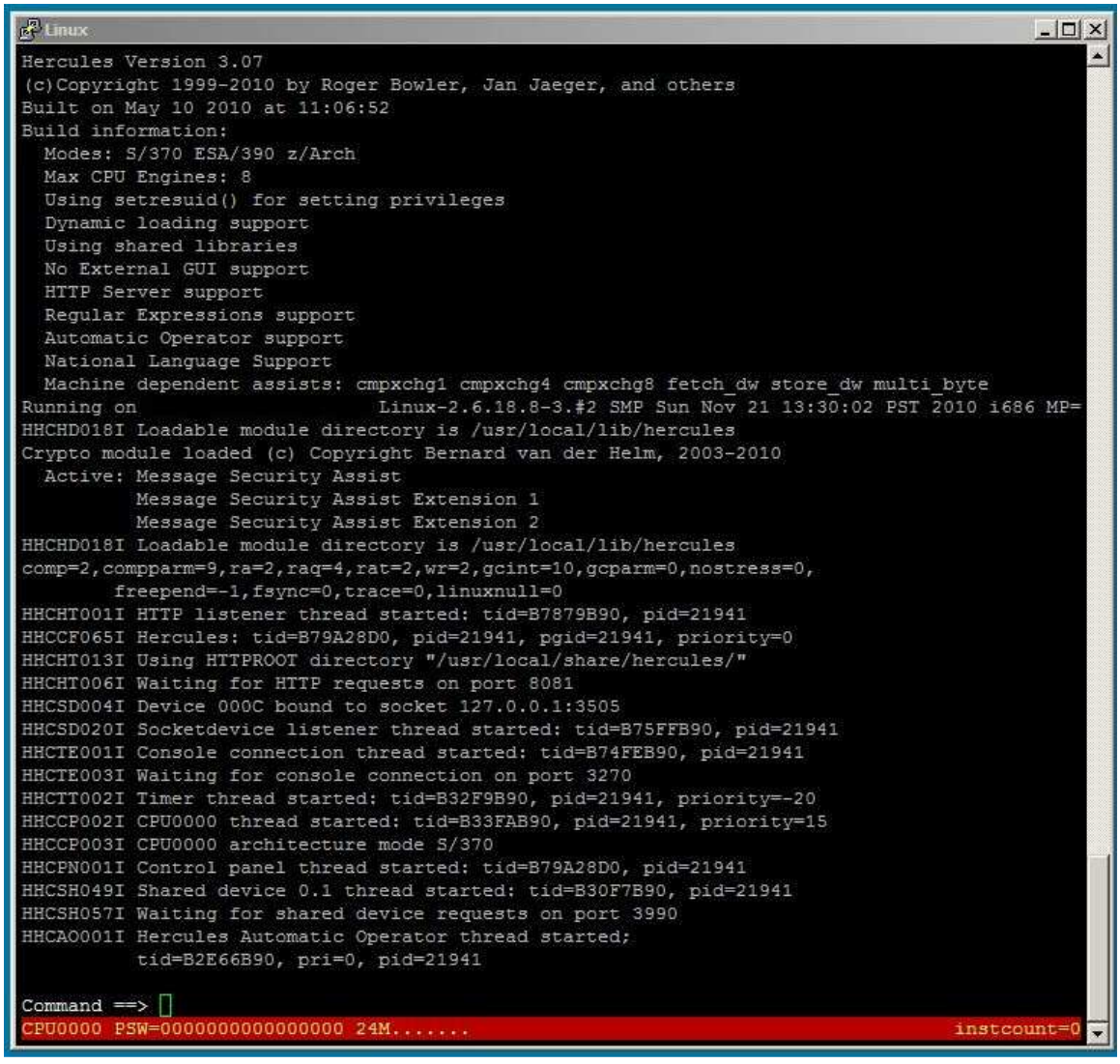
Operating Hercules

Starting Hercules

Verify that Hercules will start by running the “hercules” program. This will allow the operator to switch between a log display and a dynamic status display using the escape key.

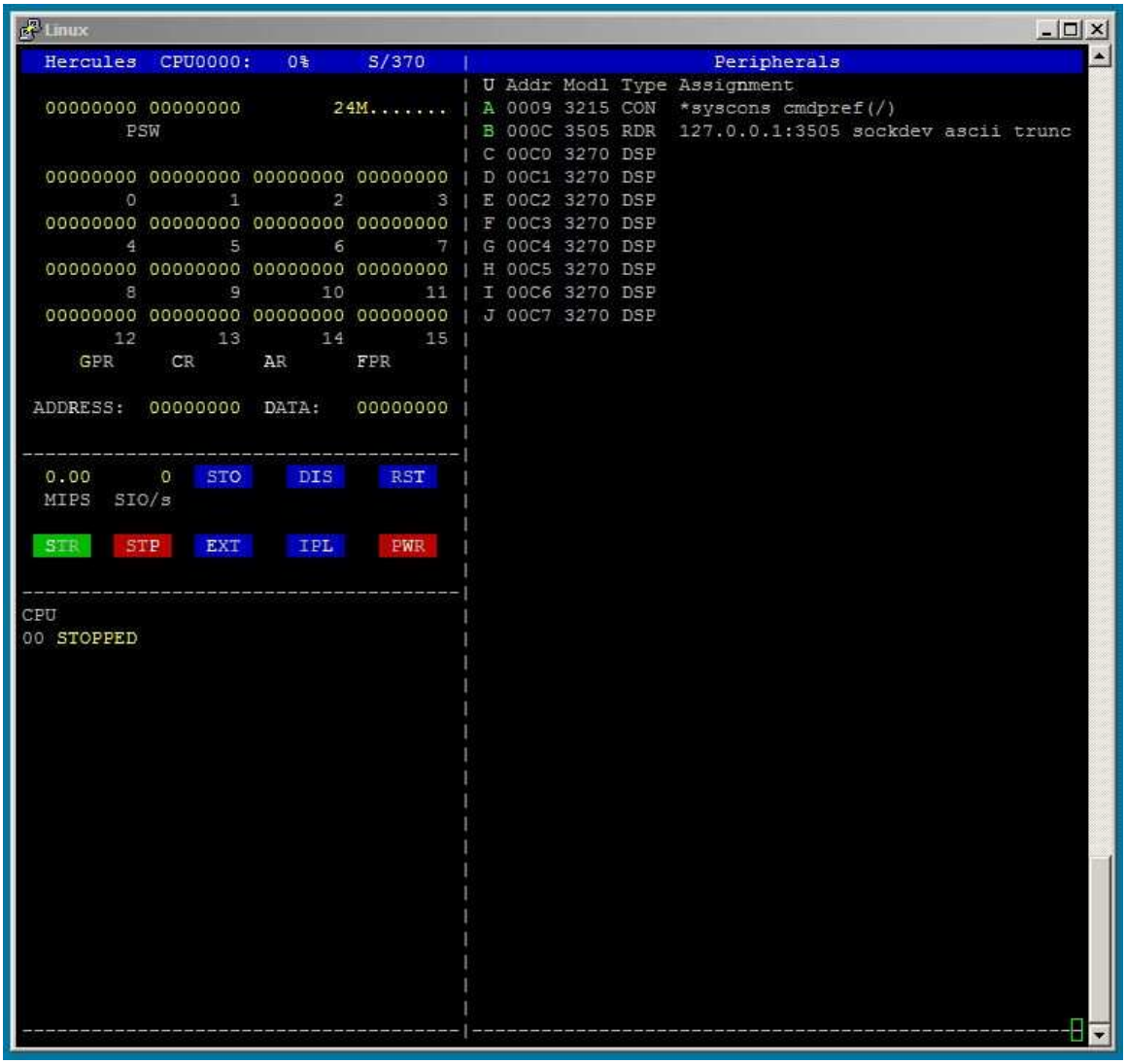
```
# cd ~
# ./bash_profile
# hercules -f s370.conf -b herclogo
```

When running Hercules in the shell foreground, Hercules will map its terminal output to give the appearance of two alternating screens with structured fields. Use the Escape key to toggle between the two screens. The first screen displays a scrolling log history with a command prompt and status line at the bottom of the screen.



Hercules log messages begin with a nine-character message code followed by message text. Informational messages end with the letter “I”. Warning messages end with the letter “W”. Error messages end with the letter “E”. Note any warnings or errors that appear when Hercules is started. These can indicate problems in the configuration file, such as port conflicts.

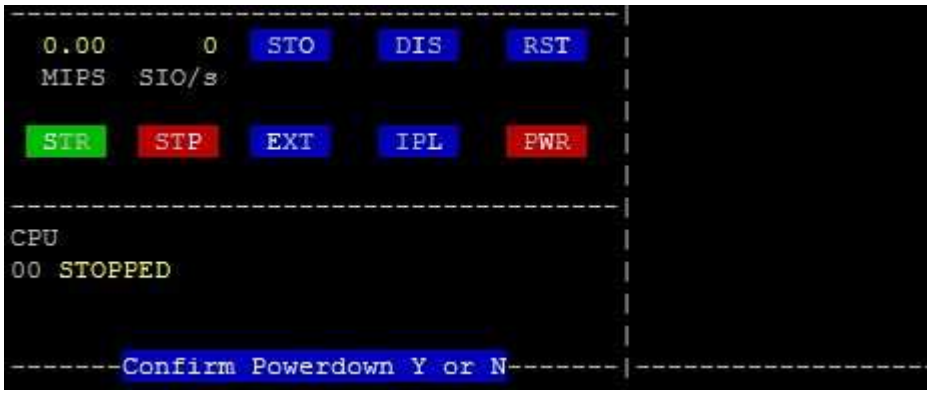
The second mapped terminal screen displays the emulated S/370 machine state including register values and device status. The screen also presents simulated S/370 console buttons of varying color, each with a single-letter shortcut that is highlighted.



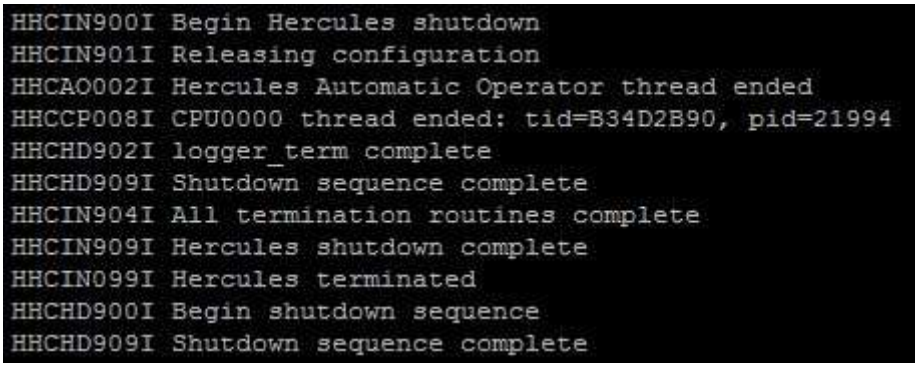
Stopping Hercules

Hercules can be stopped from either screen provided at the shell terminal. From the command prompt, enter the “quit” command.

From the S/370 console screen, enter the “W” (power off) key and confirm by entering “y”.



Using either method to stop Hercules, several exiting messages should be logged to the terminal indicating a normal shutdown process.

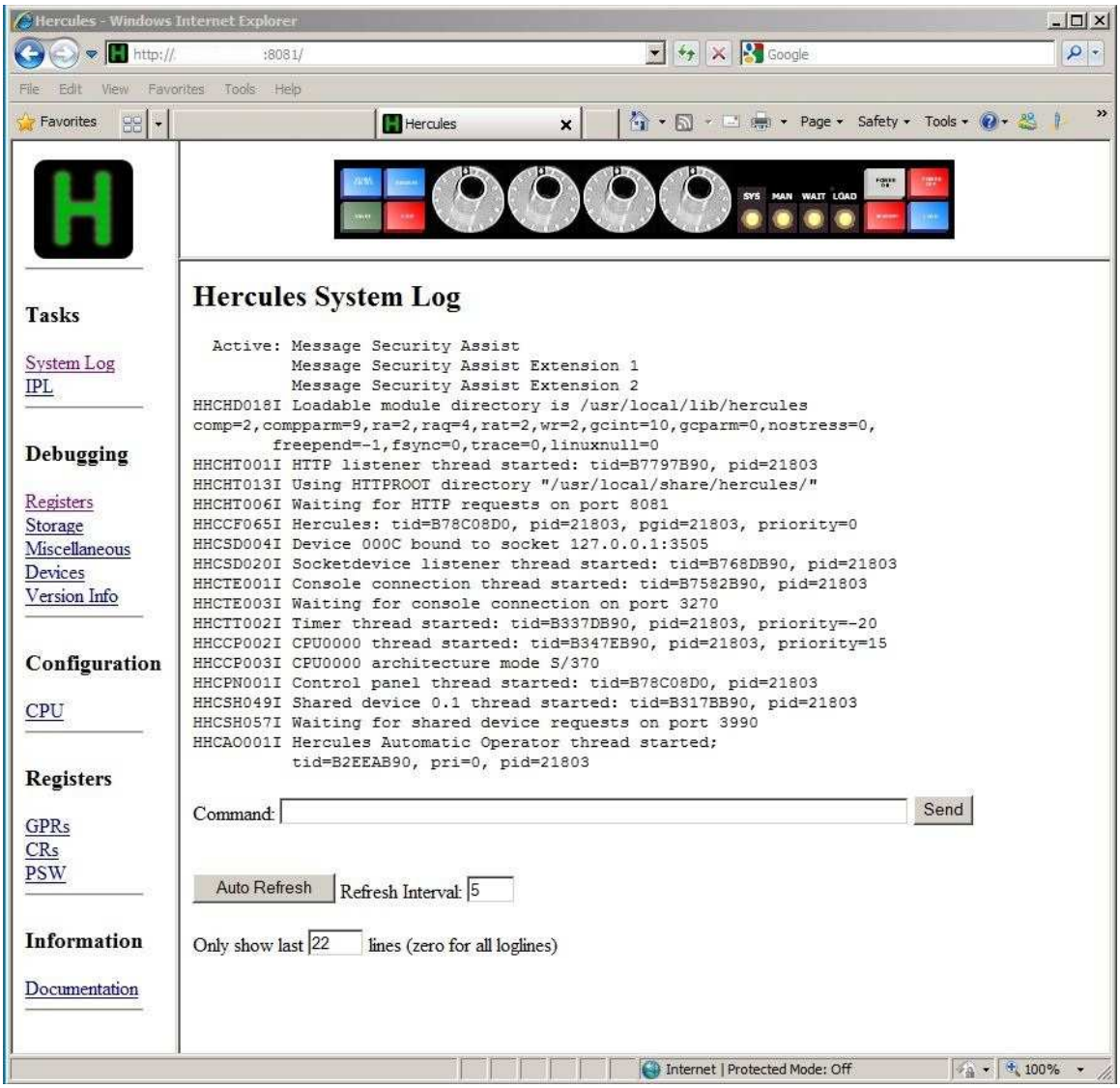


Verifying the Hercules HTML Control Panel

Using a web browser, navigate to the IP interface and port specified in the s370.conf file for the HTTPPORT parameter.

```
http://<ip-address>:<console-port>
```

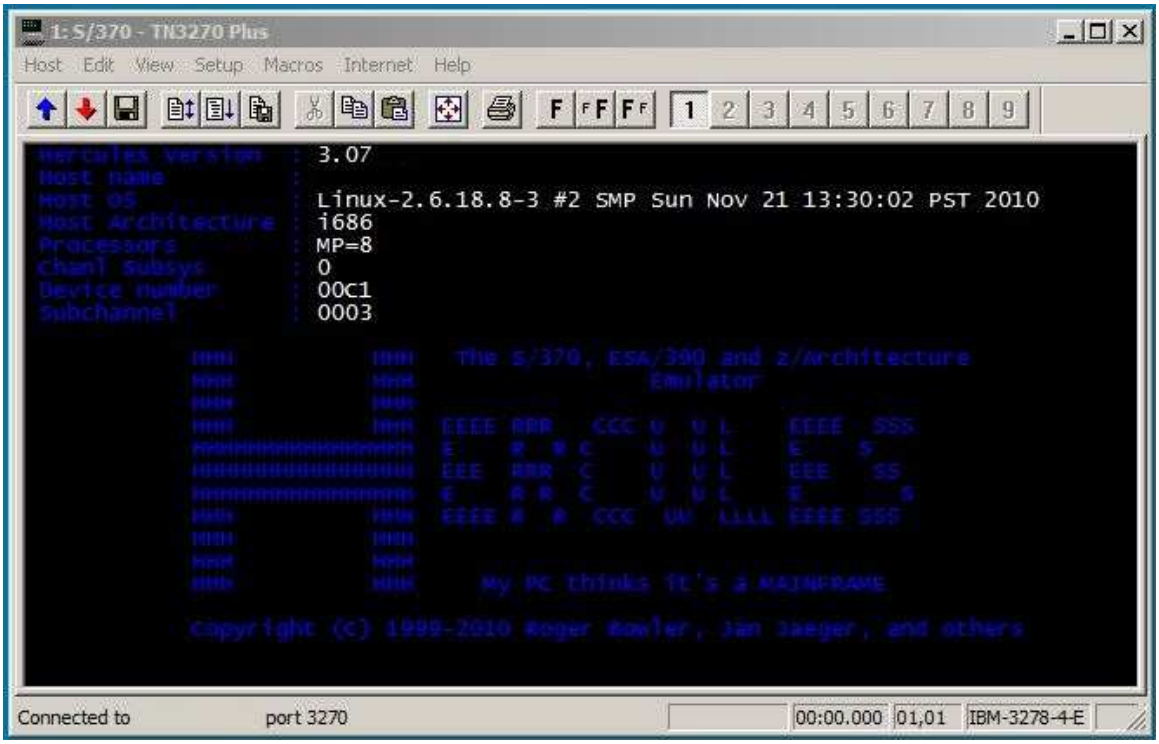
If Hercules is running, it should return the following HTML version of the console screen to your browser. Note that in shared environments, it is advisable to secure access to this console by adding a login and password to the HTTPPORT configuration settings.



Stop Hercules by entering 'quit' in "Command" field and clicking the "Send" button.

Verifying the Hercules 3270 Welcome Screen

Attach a 3270 terminal emulator to the IP interface and port specified in the s370.conf file for the CNSLPORT parameter. The default logon screen provided with Hercules appears as shown.



Running Hercules as a Daemon

Use the nohup utility and specify the '&' option to start Hercules in the background, unattached to a terminal session.

```
# cd ~
# ./bash_profile
# nohup hercules -f mvs.conf -b herclogo &
```

When hercules is running in the background as a daemon, you can verify that it is running using the “ps –ef” command or by using the HTML console window shown above.

This concludes the Hercules installation and configuration description for Linux. In the next document in this series, we will present steps to install, configure and operate the OS/VS2 operating system within an emulated S/370 environment provided by Hercules.