note that the double colon specifies the DECnet transport for this DEC host connection. In order for an X client to connect to the Open Windows server, the DECnet node addresses must also be mapped to their DECnet node names by initializing the NCP database on the Sun (and similarly on the DEC VMS host).

A typical session might then look like this:

```
sun > dnilogin decvax

$ define DECW$DISPLAY SUN_machine::0

$ spawn/nowait run X11_client
```

If you want to run a client, such as mailtool, on the Sun and export the display to the VAX, you can simply use the environment variable as follows:

```
sun> setenv DISPLAY decvax::0

sun> mailtool
```

but note that this will only work if the proper fonts have been installed on the DEC machine, in this case, the Sun Open Windows fonts. For an Open Windows system, these fonts are a minimum set needed to run.

```
olcursor.bdf

olglyph10.bdf (also 12, 14, and 19 points)

luBS08.bdf (also 10, 12, 14 points)

luRS08.bdf (also 10 points)

luFS12.bdf

lutBS12.bdf

lutRS10.bdf (also 12 points)
```

4.3.11 Some typical problems on VMS

Depending on the level of security running on your system, there may be some problems with host access. You should enter names of all the hosts on your network in the xhosts file and in the DECNET_NAMES.DAT file. Just add the names with each one on a new line as follows "<hostname>::".

If you have to convert fonts, there should be .bdf fonts for all the DEC fonts. In most cases these fonts duplicate the X11R5 fonts available with the MIT X distribution, however they may have slightly different names, and there may be some proprietary fonts supplied by DEC. A little investigation of fonts that cannot be loaded often shows the problem and a simple alias for the font name is a good solution.

If you have proprietary DEC fonts in an incompatible format, you must compile them in the HDS ViewStation .snf format, but that compilation must be done on a Unix or Ultrix host. These fonts can be moved to the TCP/IP part of the network as .bdf fonts and converted with the "bdftohds" utility program as described in Section 1.9.5. The resulting .snf fonts can then be moved back to the DECnet side or retained on the TCP side, since the ViewStation can access fonts from any host.

4.3.9.2 Preparing Other Special Fonts

The second situation, that of compiling other fonts for use on the VMS server, is also straightforward. This example shows how to convert Sun Open Windows fonts for use on the DEC VMS server. Go to the source of the special fonts and copy them to the DEChost:

```
sun> cd $OPENWINHOME/share/src/fonts/misc

sun> dnicp *.bdf decvax::[vaxdir]
```

then, on the decvax machine, compile them with the "font" utility:

```
$ font olcursor.bdf

$ font olglyph10.bdf
```

This results in fonts with file names in the form "olglyph10.decw$font;1". Now copy the fonts to the "sysfont" directory (you must have system privileges to do this):

```
$ set def sys$sysroot: [sysfont.decw.user_cursor16]

$ copy [vaxdir] olcursor.decw$font;1 *
```

(note: the Lucida fonts should be put in [sysfont.decw.user_75dpi] and sysfont.decw.user_100dpi]

4.3.10 DECnet Operation with Open Windows

Some systems, such as Open Windows on Sun machines, use their own conventions to communicate with DECnet. This is called "DECnet Internetworking" or DNI (Vers. 7.0 is used for these examples).

There are some steps to do before you make the connection. First, enable the DNI environment for the Open Windows system. Set the environment variable:

```
sun> setenv DNI_X_ENABLE 7
```

and then check whether authorization is needed for the DEC machine. If this is needed, you must modify the xhosts file:

```
sun> xhost decvax::
```

CLIENTS.CONFIG (configuration file for HDS download clients)
CONFIG.FX (the FX configuration file, including sample files)
SYSLOG.CONF (the syslog.conf file for error reporting)

[.HDS-FX.INCLUDE]

Include files needed for some compilations

[.HDS-FX.CONTRIB]

Other contributed files provided for the user's convenience

[.BOOTP] - source code and BSD and Sys V executables
[.XSCOPE] - source code and Sun4 executables
[.XMKMF] - shell script to generate a makefile from an Imakefile
[.SNFTOBDF] - utility program for generating bdf font files
[.USEPTY] - utility program for pseudo-terminal operations
[.XRSH] - utility program for Xrsh

[.HDS-FX.EXTENSIONS]

X11R5 extensions downloadable into the ViewStation server

These files require approximately 60 MB of storage space (or less, depending on the directories you choose to load), so you should allocate sufficient space for them.

4.3.8.1 VMS File Names and Syntax

You must use VMS naming conventions in all ViewStation entries specific to the VMS host, such as path names, configuration file entries, etc. VMS file names are specified with period separators, as in these examples:

Unix syntax: /fonthost/hds-fx/fonts/misc
VMS syntax: /fonthost/disk$pack:[hds-fx.fonts.misc]

Examples for the configuration file:

Unix syntax: /FXUtilities/hds-fx/config/config-fx
VMS syntax: /FXUtilities/disk$pack:[hds-fx.config]config.fx

4.3.9 Handling Special DEC or VMS Fonts

There are two sides to this problem, first, preparing DEC fonts for the HDS ViewStation, and second, preparing any special fonts (such as Open Windows fonts discussed below) for display on the VAX.

4.3.9.1 Preparing DEC Fonts

DEC fonts typically reside in a "sysfont" directory belonging to the root user. The ViewStation can use .pcf, .bdf, or .snf font files directly (it can also use the X11R5 font server if one is available). This is sufficient flexibility that it is unlikely that you have to do anything to the DEC fonts to use them on the ViewStation.

[.LOTUS123] (special Lotus 123 fonts)
[.SOFTPC] (special SoftPC fonts)

[.HDS-FX.BIN]

HDS client files, such as window managers and HDSperx clients

[.HDS-FX.LIB]

Library directory - containing libraries needed for HDS clients

[.APP-DEFAULTS]
[.BITMAPS]
[.HDSSCRIPT]
[.SHARED]

[.HDS-FX.UTILS]

Utility program directories, with two subdirectories

[.SRC] (Source code with appropriate Makefiles, etc.)
[.SRC.HDSFC960]
[.SRC.BDFTO960]
[.SRC.GETBDF]
[.SRC.HDSMKDIR]
[.SRC.HDSCRYPT] (for password encryption)
[.SRC.FLASHFILESYS] (scripts for managing the flash file system)
[.EXECS] (executable HDS utility programs above)
[.EXECS.SUN4]
[.EXECS.VAX_ULTRIX]
[.EXECS.SCO386]
[.EXECS.HP700]
[.EXECS.DG_AVIION]
[.EXECS.IBM_RS6000]

Other utilities and sample files

[.HDS-FX.RGB]

Sample rgb.txt stored in ViewStation memory

[.HDS-FX.MAN]

Manual pages for the HDS clients in several formats

[.HDS-FX.CONFIG]

Sample configuration files

[.LPD-SUPPORT] (LPD print spooler)
[.LP-SUPPORT] (LP print support)

4.3.7 Automatic ViewStation Configuration

When the HDSware tape is loaded and the HDSware information (host IP address and path) entered in Setup Mode, the ViewStation will configure itself automatically when it is rebooted. The tape location is entered in the ViewStation’s internal configuration file, which is then used during the reboot. In this way, the appropriate fontpath information, the server code location, the locations and resources for the HDSperx clients, etc., are automatically entered. (You probably should save these settings in NVM also.)

On reboot, the ViewStation will have the HDSperx clients, the Motif and OPEN LOOK window managers, and X11R4 fonts available, and the HDSperx pull-down menu for your local window managers will be in place. All this configuration takes place automatically with the HDSware feature.

4.3.8 HDSware Tape Contents

The HDSware tape contains server code files, fonts, client application programs, utility programs, font management programs, etc. The HDSware files, including the configuration files, font names, etc. have been modified to conform to VMS syntax. There directories are shown below with their subdirectories. Note that some of these directories, such as [.UTILS] and [.CONTRIB] are provided for sites with Unix platforms.

This list changes with each HDSware release, but this is representative.

[.HDS-FX.IMAGE]

  Server code directories - FX server files with different configurations
  README
  VNN-D.HDS (server code capable of downloading clients)
  VNN.HDS (no download capability in server code)
  VNN-BOOTPROM.BIN (bootprom file)

[.HDS-FX.IMAGE_U]

  These same files in uncompressed format (.UHDS extensions)

[.HDS-FX.FONTS]

  X11R5 Font directories - a main font directory, with subdirectories:
  [.100DPI]
  [.75DPI]
  [.MISC]
  [.DEC] (DEC fonts)
  [.XOL] (MIT X11R5 OPEN LOOK fonts)
  [.ASTERX2_1] (Applix Aster*x v2.1 fonts)
  [.ASTERX3_0] (Applix Aster*x v3.0 fonts)
  [.WP5_1] (special WordPerfect v5.1 fonts)

```
BACKUP/NOASSIST <tape device name>:HDS304.BCK/SAVE [...]
```

This will load the HDSware and its directory structure on your system. The tape label has "HDS304" (or the appropriate version number) as its name. The [...] is an important part of the command line; it permits the creation of the HDSware subdirectories in the proper levels and relationships.

This tape requires approximately 60 MB of storage, including the document files.

4.3.6 Booting the ViewStation from a VMS Host

If you want to boot the ViewStation from a VMS host, you must first load the HDSware on the host, as in the previous section. You must have HDSware version 3.0.4 or later (both server code and bootprom) to use this VMS booting procedure.

When you start the ViewStation, press "m" at the beginning of the white screen to enter Monitor Mode. In Monitor Mode, make these settings:

Set the ViewStation's IP address:	**ip** *nnn.nnn.nnn.nnn* also set the netmask and gateway addresses, if needed
Set the HDSware (VMS) host address:	**hh** *nnn.nnn.nnn.nnn*
Set the HDSware path (VMS syntax):	**hd** <*directory name*> as in the example above, this is: **hd** HDS$HOME:
Set the Configuration file:	**cf** /FXUtilities/[hds-fx.config]config.fx note that "FXUtilities" is an abbreviation for the path: **hh** + **hd**
Set the host type to VMS:	**set** HDSsetup.FXUtilities.hosttype: VMS

If needed, you can also set the file transfer protocol to FTP, including the entry of a username and password with the "set" command with the appropriate configuration resource names.

Select the FTP protocol:	**set** HDSsetup.FXUtilities.protocol: FTP
Set the username (for FTP):	**set** HDSsetup.FXUtilities.username: <username>
Set the password (for FTP):	**set** HDSsetup.FXUtilities.password: <password>

When all of these settings are made, you can boot the ViewStation.

Boot the ViewStation:	**boot**

This boots the ViewStation by loading the server code file, whose location is specified in the configuration file, by means of the file transfer protocol you specified. Both of these conditions must be met - that is, the file must be in the location entered (the configuration file knows the correct location unless the HDSware tree has been modified), and the file transfer protocol (TFTP or FTP) must be running and have access to that location.

Access Parameters:

User Name: <*login_id for FTP*>

Password: <*password for FTP*>

These entries are needed to tell the ViewStation to use VMS naming syntax for this host, and FTP is needed because some versions of VMS and UCX may not support the TFTP protocol.

User Preferences menu

Font Path and RGB Settings

Default Font Path: /fonthost/disk$pack:[*fontpath*]

(for example, /fonthost/disk$pack:[hds-fx.fonts.misc])

(or the preferred path: /FXUtilities/[hds-fx.fonts.misc])

4.3.4 NFS on VMS Systems

If the TCP/IP protocol running on your VMS host supports NFS (almost all do), then NFS can be used to load files (such as fonts, clients, etc.) when the ViewStation requests them. Note that NFS is available for booting the ViewStation with HDSware version 3.2 and later.

NFS transport uses UNIX-style file naming, so you should enter paths and filenames with UNIX syntax on the ViewStation (both in Setup Mode and in the configuration file) if you are using NFS to load them. The NFS protocol on the VMS host translates the syntax to the correct VMS type. The FXUtilities hosttype should be set to UNIX, not VMS.

The HDSware VMS distribution has a separate configuration file for using NFS with a VMS system. This is labeled *./hds-fx/config/config_fx.nfs*. Its syntax is correct for VMS systems using the NFS protocol.

4.3.5 HDSware Installation for VMS Systems

You can install HDSware easily with a few simple commands. You should enter a definition in your SYS$MANAGER:SYLOGICALS.COM file:

```
DEFINE/SYSTEM/TRANS=CONCEAL HDS$HOME: <disk device |Logical>:[install-directory.]
```

where <*disk device|Logical*> is the name of the disk where the tape is loaded and *install-directory* is the directory name. Note the period after *install-directory*; this is very important because it links HDSware with that directory. Be careful with the syntax in this command. A sample line might be:

```
DEFINE/SYSTEM/TRANS=CONCEAL HDS$HOME: DUA0:[HDS.]
```

This sets up a logical name HDS$HOME for HDSware.

Set the directory to the install directory:

```
SET DEF HDS$HOME:
```

Insert the tape in the tape device (note its name in your system). Then load the HDSware software with the command:

1129 San Antonio Road
Palo Alto, CA 94303
(415) 962-7100

Multi-Net, a TCP/IP multi-format product from:

TGV Corp.
603 Mission Street
Santa Cruz, CA
(800) 848-3440

Public domain networking software called PCIP from Carnegie Mellon University. This software is available only through Carnegie Mellon University at a cost of $150 for the media and the documentation. (An HDS customer reports that the PCIP materials are "a very nice package, and easy to install".)

You can obtain the PCIP software from:

Computer Science Department
Carnegie-Mellon University
Pittsburgh, PA
(412) 268-2647

Using the HDS ViewStation on VMS systems has two major considerations. The ViewStation runs only on TCP/IP networks, so the VMS host must run on TCP/IP (DECnet is not supported). A variety of TCP/IP implementations are available, including one from DEC. The CMU TCP/IP implementation is not supported.

The second consideration is VMS syntax on file names and paths; the ViewStation will use VMS syntax, but its defaults are UNIX-based names and paths, so you must specify host type as VMS so the ViewStation communicates correctly.

4.3.3 ViewStation Setup Mode Entries for VMS

You must make some adjustments to your Setup Mode entries for working on VMS systems. These adjustments are mainly just the syntax needed for file names and paths. Since these syntax changes are present in the HDSware VMS release, that is the easiest way to enter them. When the ViewStation uses the configuration file to start, it uses those paths as current entries; you should save them in NVM so they are permanently entered in Setup Mode as well.

These are discussed, with examples, below.

Remote Hosts menu

Host Name: <*VMS hostname*>
Network Address: <*IP address*>
Host Type: VMS
Access Protocol: FTP or TFTP or NFS (NFS is available for bootingwith HDSware version 3.2 and later)

Using the ViewStation on Selected Host Systems

This chapter will help you connect an HDS ViewStation to a number of different host systems.

Section 4.0 - Using the ViewStation on Selected Host Systems

4.3 DEC VMS Systems

4.3.1 Overview

Digital Equipment Corporation (DEC) has created a proprietary operating system called VMS. It is most frequently used on an Ethernet network with a proprietary transport protocol called DECnet using other proprietary protocols such as LAT. At the same time, DEC manufactured systems using a Unix-based operating system, DEC's Ultrix, with the TCP/IP transport protocol on Ethernet. DEC customers had their choice between these independent systems. DEC's windowing system, DECwindows, is available on both VMS and Ultrix hosts.

In 1990, DEC announced a new transport protocol product, UCX - the VMS/ Ultrix Connection, which merged the DECnet and TCP/IP protocols for DEC products, including DECwindows. You must have this TCP/IP layered product for your VMS system.

4.3.2 DEC UCX Protocol

The VMS/Ultrix Connection is available as a DEC product. There are also a number of commercial products that do the same thing, such as WIN/TCP from Wollengong, Multi-Net from TGV, and public domain software PCIP written at Carnegie Mellon University and available on the Internet.

Wollongong's WIN/TCP networking software.

The Wollongong Group