Font Support 4

This chapter provides information on font support in the Solaris X server. The chapter includes information on the following topics:

- Available font formats
- Outline and bitmap fonts
- Location of fonts and changing the default font path

Font Support in the Solaris X Server

The Solaris X server provides font support in both the X11 server and the Display PostScript (DPS) extension. Font formats from numerous vendors can be used to display text in English or foreign languages, including Asian languages. Symbol fonts can be used to display mathematical equations. The Solaris environment provides 55 Latin fonts for European text and two symbol fonts. Other fonts can also be added to the system.

The Solaris X server can also be a client of the font server `fs`. The font server renders fonts for the X server. `fs` can be started manually or automatically. For more information on this command, see the `fs(1)` man page.

4

Available Font Formats

Fonts from different vendors come in different formats. Table 4-1 and Table 4-2 list the various font formats, their vendors, and the associated file types supported by the Solaris environment. Table 4-1 lists outline fonts; Table 4-2 lists bitmap fonts.

Table 4-1 Outline Font Formats

Font Format	Vendor	File Type
F3	SunSoft	`.f3b`
Type1 (ASCII)	Adobe and various foundries	`.pfa`
Type1 (binary)	Adobe and various foundries	`.pfb`
Type 3	Adobe and various foundries	`.ps`
Speedo	Bitstream	`.spd`

Table 4-2 Bitmap Font Formats

Font Format	Vendor	File Type
Portable compiled format	MIT	`.pcf`
Bitmap distribution format	Adobe	`.bdf`
Big Endian prebuilt format	Adobe	`.bepf`
Little Endian prebuilt format	Adobe (for x86 only)	`.lepf`

The fonts provided by the Solaris X server are located in the `/usr/openwin/lib/X11/fonts` directory. For more information on the directory structure, see “Locating Fonts” on page 48.

The Solaris environment is configured so that most X11 fonts are also available in DPS (see Table 4-3). DPS supports a slightly different set of fonts than those supported by X11.

Table 4-3 Font File Availability

Font Format	Available in X11	Available in DPS
F3	Yes	Yes
Type1 outline fonts-ASCII	Yes	Yes
Type1 outline fonts-binary	Yes	Yes
Type 3	Yes	Yes
Speedo	Yes	No
Portable compiled format	Yes	Yes
Bitmap distribution format	Yes	No
Big Endian prebuilt format	No	Yes
Little Endian prebuilt format	No	Yes

Associated Files

The Solaris environment provides files with these extensions. They are not intended to be edited.

- `.afm` Adobe Font Metrics files read by client for kerning information
- `.map` F3 files read by X11 and DPS for encoding purposes
- `.trans` F3 files read by DPS for composite font construction
- `.ps` PostScript Files for composite font and PostScript resource construction
- `.enc` Encoding files used by X11 and DPS
- `.upr` Display PostScript resource files

4

Outline and Bitmap Fonts

Solaris supports two types of font representation: *outline* fonts and *bitmap* fonts. In the X server, outline fonts can be scaled to any size; in Display PostScript they can also be rotated and skewed. To display a letter from an outline font, the server scales and rotates only the outline of the character. This repositioned outline is then *rendered* into pixel form (bitmap) for display on the screen. This rendered bitmap is also stored in the glyph cache for reuse.

Because certain font sizes occur frequently, they are also kept in separate files in prerendered bitmap form. This saves the server from having to scale and render them. However, the resulting bitmap fonts can be displayed in only one size and orientation. Some of these fonts have also been hand-tuned to look better and be more readable. As they are encountered, these bitmaps are also placed in the glyph cache. The recommended bitmap format is the portable compiled format (`.pcf`).

The `/usr/openwin/bin` directory contains the following tools to convert fonts between the outline and bitmap font representation, as well as between various bitmap formats. See the corresponding man pages for more detailed information.

- `makebdf` Creates bitmap distribution format files (`.bdf`) from outline font files (`.f3b`)
- `bdftopcf` Converts a font from `.bdf` format to portable compiled format (`.pcf`)

As illustrated in Table 4-4, many bitmap font file formats are architecture-dependent binary files. They cannot be shared between machines of different architectures (for example, between SPARC and x86).

Table 4-4 Bitmap Font Binaries

Font Format	Binary	Architecture-Specific
Bitmap distribution format	No	No
Portable compiled format	Yes	No
Little Endian prebuilt format	Yes	Yes (x86)
Big Endian prebuilt format	Yes	Yes (SPARC)

The Solaris environment contains compressed `.pcf` files (files with `.pcf.Z` extensions). You can uncompress these if you want. If you add fonts to your system, you can either compress the files or not. Use uncompressed files if you want the fonts to display somewhat faster. Leave the files compressed if you want to conserve disk space.

Replacing Outline Fonts With Bitmap Fonts

The Solaris environment automatically replaces some outline fonts with bitmap fonts when the size is appropriate. This improves performance, and in some cases improves the aesthetics and readability of the text. There may be several sizes at which replacement occurs for a given outline font.

Replacement Conditions

Currently in DPS, the `.pcf` bitmap format is substituted for F3 outline fonts and the `.bepf` (or `.lepf`) is substituted for Type1 fonts. Substitution occurs when there is no rotation, the requested pixel size is within one half of a pixel of the `.pcf` font size, and the `.pcf` font is an `F3Bitmap` resource in a `.upr` (PostScript resource) file.

Using F3 Fonts in DPS

F3 fonts behave exactly like Type1 fonts, except /FontType returns 7 instead of 1. For example, the following PostScript code works the same regardless of the kind of font.

```
/Helvetica findfont 50 scalefont setfont
10 10 moveto (ABC) show
```

But the following code yields 7 for an F3 font and 1 for a Type1 font.

```
currentfont /FontType get ==
```

The kind of font returned depends on the current DPS internal resource path. See “Changing the Resource Path in DPS” on page 50 for details.)

4

Locating Fonts

By default, the Solaris server looks for fonts in directories under the `/usr/openwin/lib/X11/fonts` directory. Table 4-5 shows the complete font directory structure. The directory names are preceded by `/usr/openwin/lib/X11/fonts`.

Table 4-5 Font Directory Structure

Directory	Subdirectory	File Suffixes	Contents
`/100dpi`		`.pcf`	Bitmap fonts
`/75dpi`		`.pcf`	Bitmap fonts
`/F3`	`/afm`	`.f3b`	F3 format outline fonts
	`/map`	`.map`	F3 character set specifications
`/F3bitmaps`		`.pcf`	Bitmap fonts
`/Speedo`		`.spd`	Bitstream Speedo format outline fonts
`/Type1`		`.pfa, .pfb`	Type1 outline fonts
	`/afm`	`.afm`	Adobe font metrics
	`/outline`	`.pfa, .pfb`	Type1 outline fonts
	`/prebuilt`	`.bepf, .lepf`	Bitmaps for SPARC Solaris and x86
`/Xt+`		`.pcf`	Bitmap fonts
`/Type3`		`.ps`	PostScript outline fonts
`/encodings`		`.enc`	Encodings
`/misc`		`.pcf`	Bitmap fonts

Changing the Default Font Path in X11

In X11, the default font path is:

```
/usr/openwin/lib/X11/fonts/F3,
/usr/openwin/lib/X11/fonts/F3bitmaps,
/usr/openwin/lib/X11/fonts/Type1,
/usr/openwin/lib/X11/fonts/Speedo,
/usr/openwin/lib/X11/fonts/misc,
```

```
/usr/openwin/lib/X11/fonts/75dpi,
/usr/openwin/lib/X11/fonts/100dpi,
/usr/openwin/lib/X11/fonts/Xt+
```

You can change the default font path either at startup or after the server has been started. At startup, use the following command to change the font path. In this command, the user-defined directory list is a comma separated list of directories for the server to search. Note that the directory paths *must* be absolute.

```
example% openwin -fp /<user-defined-directory-list>
```

After the server has started, you can change the font path using either the `xset` command or the Xlib function `XSetFontPath`. For `xset`, use only *one* of the following:

```
example% xset +fp /user-defined-directory-list
example% xset fp+ /user-defined-directory-list
example% xset fp- /user-defined-directory-list
```

The `xset +fp` command prepends */dir1/dir2/fonts* to the X11 font path.

```
example% xset +fp /dir1/dir2/fonts
```

The `xset fp+` command appends */dir1/dir2/fonts* to the X11 font path. The `xset fp-` command removes */dir1/dir2/fonts* from the X11 font path.

```
example% xset fp- /dir1/dir2/fonts
```

Note – Since `xset` dynamically changes the font path, you do not need to restart the server to change the default font path.

For more information on `xset`, see the `xset` man page; for information on `XSetFontPath`, see the *Xlib Reference Manual*.

4

Changing the Resource Path in DPS

In DPS, fonts are considered resources in the font category. Their associated files are specified by resource (`.upr`) files. DPS resource files reside in directories specified by the resource (font) path. This path is a list of directories maintained internally by DPS. DPS uses the default resource path specified by the `PSRESOURCEPATH` environment variable to initialize itself. If `PSRESOURCEPATH` is not defined, DPS uses `/usr/openwin/lib/X11`. (See *Programming the Display PostScript System with X* for further information on resource database files.)

Warning – Because DPS maintains so many internal font caches, you cannot remove a path from the DPS resource path. DPS appends all paths subsequent to the default path to the resource path, regardless of where they end up in the X11 font path. Thus fonts available in X windows might be different from those available in DPS. However, the DPS resource path is dynamic. Fonts should be accessible after the `xset` command completes. Any change to the X font path is passed to DPS. If there are `.upr` files present, DPS appends the font files to its internal resource path. The examples in the remainder of this section illustrate some of the DPS and X11 font path behavior.

As shown in "Changing the Default Font Path in X11" on page 48, use `xset +fp` to prepend */dir1/dir2/fonts* to the font path, and use `xset fp+` to append */dir1/dir2/fonts* to the font path. If there are any `.upr` files present, the `xset` command (with either `fp+` or `+fp`) also appends */dir1/dir2/fonts* to the DPS resource path.

The following command removes */dir1/dir2/fonts* from the X11 font path, but does not alter the DPS resource path.

```
example% xset fp- /dir1/dir2/fonts
```

The following `openwin` command appends */dir1/dir2/fonts* to the DPS resource path.

```
example% openwin -fp /dir1/dir2/fonts
```

Use the following `xset` command to set the X11 font path to */dir1/dir2/fonts* and to append */dir1/dir2/fonts* to the existing DPS resource path.

```
example% xset fp= /dir1/dir2/fonts
```

Note – To clear the X11 font path and the DPS resource path, exit OpenWindows and then restart.

Adding New Fonts

To add new bitmap and outline fonts to the OpenWindows Server, follow the steps outlined in the following sections. These instructions apply to one byte fonts, such as the ISO Latin-1 fonts for English and European character sets. Multibyte fonts, such as Kanji fonts, might require additional files from the font supplier.

1. **Create a directory for the new fonts.**
   Do not add fonts to existing font directories—you might corrupt files in those directories, and you also must be superuser.

   For this example, */newfonts* is the directory name.

```
example% mkdir /newfonts
```

2. **Copy or move all fonts to the */newfonts* directory.**

If you are installing bitmap fonts (`pcf`, `snf`, `bdf`, or `fb`), see additional steps in "Adding Bitmap Fonts." If you are installing outline fonts (`f3b`, `pfa`, `pfb`, or `spd` formats), see "Adding Outline Fonts" on page 53.

4

Adding Bitmap Fonts

Follow these steps if you are installing any of the bitmap font formats (`pcf`, `snf`, `bdf`, or `fb`).

1. **Use `mkfontdir` to create the `fonts.dir` file.**

```
example% cd /newfonts
example% /usr/openwin/bin/mkfontdir
```

   See the `mkfontdir(1)` man page for further details.

2. **If you want to define font "aliases," create a `fonts.alias` file.**
   Use this file to map the long internal XLFD font names to shorter names that are easier to enter on a command line. A sample `fonts.alias` file is shown below.

```
courier "-adobe-courier-medium-r-normal--0-0-0-0-m-0-iso8859-1"
courier-italic "-adobe-courier-medium-i-normal--0-0-0-0-m-0-iso8859-1"
courier-bold "-adobe-courier-bold-r-normal--0-0-0-0-m-0-iso8859-1"
courier-bolditalic "-adobe-courier-bold-i-normal--0-0-0-0-m-0-iso8859-
1"
```

   See the `mkfontdir(1)` man page for further details.

3. **Use `xset` to add the *`/newfonts`* directory to the server font path.**

```
example% xset fp+ /newfonts
```

   See the `xset(1)` man page for more information.

4. **Use `xlsfonts` to determine whether the server recognizes the new fonts.**
   `xlsfonts` lists all the names of all fonts that are accessible to the window server.

Adding Outline Fonts

Follow these steps to install outline fonts. The Solaris environment supports Type1 (`pfa`), Speedo (`spd`), and F3 (`f3b`) outline fonts.

Multibyte fonts might require additional files from the font supplier. For F3 format fonts, you need the `.map` and `.trans` files. The server also uses the `.map` file. It provides a mapping between the character name and its F3 code. The DPS extension uses the `.trans` file to support multiple byte encodings. It contains the definitions of these encodings.

1. **If you are installing Type1 (`pfa` or `pfb`) fonts or Type 3 (`ps`) fonts, run `makepsres` in the *`/newfonts`* directory.**
   This creates a `PSres.upr` file. The system requires this file if you want to use these fonts in X or DPS client applications.

2. **If you are installing F3 fonts, create a `.upr` file.**
   Use the template below for the `.upr` file. Replace the example values with values that reflect the fonts you want to add. Follow the syntax used in the example. Include the `//` before the directory name you want to install into. Use the = in the lines where you include the map file and font file names.

   If the `.map` file included with your font is not in `/usr/openwin/lib/X11/F3/map`, then include it in the `.upr` file.

```
PS-Resources-1.0          #mandatory
F3MapFile                 #put this in if you are adding map files
FontOutline               #put this in if you are installing F3 fonts
.                         #mandatory
//home/newfonts           #name of directory to install fonts in:
                          #// required (this is an example)
F3MapFile                 #put this in if you are adding map files
latin=map/latin.map       #name of the map file and where it is
                          located (this is an example)
.                         #put this in if you are adding map files
FontOutline               #put this in if you are installing F3 fonts
Helvetica=Helvetica.f3b   #put the font file name here (this is
                          an example)
Times-Roman=Times-Roman.f3b#put in as many font files as you want
.                         #mandatory
```

3. **If you are installing Type1 (`pfa` or `pfb`), Type 3 (`ps`), or Speedo (`spd`) fonts, create a `fonts.scale` file.**
   The `fonts.scale` file contains the mapping of an internal X11 font name to a known font name. The `fonts.scale` file is copied to the `fonts.dir` file automatically. Do not edit the `fonts.dir` file. Any changes you make are overwritten when you run `mkfontdir`.

   For example, here is a `fonts.scale` file for a directory containing four Type1 fonts.

```
cour.pfa -adobe-courier-medium-r-normal--0-0-0-0-m-0-iso8859-1
couri.pfa -adobe-courier-medium-i-normal--0-0-0-0-m-0-iso8859-1
courb.pfa -adobe-courier-bold-r-normal--0-0-0-0-m-0-iso8859-1
courbi.pfa -adobe-courier-bold-i-normal--0-0-0-0-m-0-iso8859-1
```

   See the `mkfontdir(1)` man page for more information on the `fonts.scale` file.

Note – X11 names must follow the standard XLFD font naming convention, using 0's in appropriate fields to indicate outline fonts. See the *X Protocol Reference Manual* for information on the XLFD font naming convention.

4. **Use `mkfontdir` to create the `fonts.dir` file.**
   If you are installing Type1 or Speedo fonts, your `fonts.scale` file is copied to `fonts.dir`.

```
example% cd /newfonts
example% /usr/openwin/bin/mkfontdir
```

   See the `mkfontdir(1)` man page for further details.

5. **If you want to define font "aliases," create a `fonts.alias` file.**
   Use this to map the long internal XLFD font names to shorter names that are easier to enter on the command line.

   Here is an example `fonts.alias` file.

```
courier "-adobe-courier-medium-r-normal--0-0-0-0-m-0-iso8859-1"
courier-italic "-adobe-courier-medium-i-normal--0-0-0-0-m-0-iso8859-1"
courier-bold "-adobe-courier-bold-r-normal--0-0-0-0-m-0-iso8859-1"
courier-bolditalic "-adobe-courier-bold-i-normal--0-0-0-0-m-0-iso8859-1"
```

   See the `mkfontdir(1)` man page for further details.

   If you are installing an F3 font and the character set supported by this font is *not* one of the following, the font supplier must provide an encoding file (`.enc` file).

   - iso8859-1
   - iso8859-2
   - symbol
   - jisx0201.1976-0
   - jisx0208.1983-0

6. **Copy the `.enc` file described in Step 5 (if you have one) to `/usr/openwin/lib/X11/fonts/encodings`, and add an entry for it in the `encodings.dir` file in the same directory.**

7. **Use `xset` to add the *`/newfonts`* directory to your font path.**

```
example% xset fp+ /newfonts
```

   See the `xset(1)` man page for more information.

8. **Use `xlsfonts` to determine whether the server recognizes your new fonts.**
   `xlsfonts` lists the names of all fonts that are accessible to the window server.

For DPS, you can determine whether the server recognizes your fonts using the following commands:

```
example% dpsexec
PostScript(r) Version 2015.103
(c) Copyright 1984-1994 Adobe Systems Incorporated.
Typefaces (c) Copyright 1981 Linotype-Hell AG and/or its subsidiaries.
All Rights Reserved.
PS> /fontname findfont
```

You can now use the fonts in the */newfonts* directry in your applications. In X11, you do not need to restart the Solaris X server since `xset` dynamically changes the font path. See “Changing the Default Font Path in X11” on page 48 for more information.

Using OPEN LOOK Fonts on X Terminals

The `/usr/openwin/share/src/fonts` directory contains OPEN LOOK fonts in `bdf` format. Follow the instructions from your vendor on how to install the fonts.