



KDE Solaris

The K Desktop Environment

Building Instructions for Solaris 10
with the Sun Studio Compilers

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1. Introduction

This document is a detailed technical specification for building KDE Solaris with the Sun Studio compilers, on IA32/AMD32 and UltraSPARC-II instruction set architectures. While the contents of this document pertain primarily to Solaris 10, the specifications outlined here are applicable to Solaris 9 as well.

The following topics will be covered in detail:

- external library dependencies
- build environment configuration
- compiling a KDE module: kdelibs
- miscellaneous topics which do not fit in any of the categories above

2. External Libraries Dependencies

KDE has a complex explicit dependency tree on external, independent libraries. This complexity is compounded by the implicit transitive dependencies enforced by the explicit dependency tree.

The following table outlines the minimal direct compilation dependencies for KDE 3.4:

[KDE 3.4 External Library Requirements](#)

Here is a more complete list of dependencies and requirements, which includes the transitive dependencies:

a52dec-0.7.4	faad2	gnokii-0.6.4
aalib-1.4.0	fame-0.9.0	gnu-crypto-1.0.0
antlr-2.7.5	libfame-0.9.1	gnu-crypto-2.0.1
aspell-0.60	fam-2.6.9	getopt-0.12.1
aspell6-en-6.0-0	ffmpeg-0.4.8	getopt-0.12.1.tar
atk-1.9.1	ffmpeg-0.4.9-pre1	pth-2.0.1
audiofile-0.2.6	fftw-2.1.5	gnutls-1.2.3
libaudioio	fftw-3.0.1-fma	libtasn1-0.2.13
autoconf-2.58	flac-1.1.2	opencdk-0.5.5
automake-1.7.9	bison-1.875	gocr-0.40
avifile-0.7-0.7.43	flex-2.5.4	dirmngr-0.9.1
berkeley-db-4.2.52	fltk-1.2.2	gnupg-1.4.1
libcaca-0.9	fontconfig-2.2.0	gnupg-1.9.16
libcddb-1.2.1	fortunes	gpgme-1.0.2
libcdio-0.75	gfortune-1.0.0	libassuan-0.6.9
cdk-5.0	freetype-1.3.1	libgcrypt-1.2.1
cdrdao-1.2.0	freetype-2.1.7	libgpg-error-1.0
coreutils-5.2.1	fribidi-0.10.5	libksba-0.9.11
cups-1.1.23	ftgl	openct-0.6.2
curl-7.10.4	ekgwap	opensc-0.9.4
cvs-1.11.2	libgadu-20050411	pcsc-lite-1.2.0
mDNSResponder-98	gaim-1.5.0	pinentry-0.7.2
esound-0.2.36	gdbm-1.8.3	gphoto2-2.1.6
exif-0.6.9	gettext-0.12.1	libgphoto2-2.1.6
gexif-0.5	glade-2.10.0	gpm-1.20.1
libexif-0.6.12	libglade-2.5.1	graphviz-1.13
libexif-gtk-0.3.5	glame-2.0.1	ghostscript-8.15
libmnote-0.5.6	gle-3.1.0	gst-player-0.8.0
libmnote-0.5.6.patch	glut-3.7	gst-plugins-0.8.9
expat-1.95.6	glx	gstreamer-0.8.10
OpenEXR-1.1.1	make-3.80	glib-2.6.3
faac	gnapplet-0.6.2	gtk+-2.6.4

gtkpod-0.94.0	libmikmod-3.1.9	scrollkeeper-0.3.14
libgpod-0.1.3	mjpegtools-1.8.0	GUIlib-1.1.1
glib-1.2.10	libmpeg3-1.5.4	SDL-1.2.6
gtk+-1.2.10	mpeg2dec-0.4.0	SDL_image-1.2.3
hal-0.5.3	mpeg4ip-1.3	SDL_mixer-1.2.5
howl-0.9.6	mpg123-0.59r	SDLmm-0.1.8
icecast-2.2.0	libmpcdec-1.2	SDL_net-1.2.5
libiconv-1.9.1	libmusepack-1.1	SDL_rtf-0.1.0.tar.gz
id3lib-3.8.3	libmusicbrainz-2.1.1	SDL_ttf-2.0.7
ImageMagick-6.2.1	libtunepimp-0.3.0	libshout-2.1
imlib-1.9.15	nas-1.7	libshout-java-
imlib2-1.2.0	ncurses-5.4	0.2.tar.gz
intltool-0.22	netpbm-10.26.15	shout-python-0.2.tar.gz
jasper-1.701.0	freetds-0.63	silc-client-1.0.2
jbigkit	unixODBC-2.2.11	silc-map-1.0
krb5-1.3.5	ode-0.039	silc-server-0.9.20
lame-3.96.1	libogg-1.1.2	silc-toolkit-0.9.14
lcms-1.11	libvorbis-1.0.1	slang-1.4.9
libao-0.8.3	vorbis-tools-1.0	openslp-1.0.11
libart_lgpl-2.3.16	ogle-0.9.2	smpeg-0.4.4
tmdns-0.5.1	ogle_gui-0.9.2	smpeg-xmms-0.3.5
libdv-0.104	openafs-1.3.84	libsndfile-1.0.11
libidn-0.5.15	openal-1.0	net-snmp-5.1.2
libstringprep-0.0.8	openldap-2.2.17	dante-1.1.15
libjpeg-6b	pango-1.8.1	libident-0.22
libmal-0.40	patch-2.5.4	speex-1.0.4
libmng-1.0.5	pccts-1.33	openssh-3.8.1p1
libsamplerate-0.1.2	pcre-4.3	openssl-0.9.6m
tiff-v3.5.7	pilot-link-0.11.8	startup-notification-
libtool-1.4.2	pkgconfig-0.15.0	0.8
libungif-4.1.0	libpng-1.2.8	apr-1.1.1
libvisual-0.2.0	poppler-0.4.2	apr-util-1.1.2
libvisual-bmp-0.2.0	popt-1.6.3	neon-0.2.4
libvisual-plugins-0.2.0	postgresql-7.4.6	subversion-1.2.0
libvisual-xmms-0.2.0	postgresql-8.1.3	tcl8.4.7
libxklavier-2.0	libpostproc	tk8.4.7
xorg-6.8.2	povray-3.6.1	libtheora-1.0alpha4
LPRng-3.8.28	Python-2.3.4	libtidy
m4-1.4	qca-1.0	top-3.5.1
libid3tag-0.15.1b	qca-sasl-1.0	transcode-1.0.0
libmad-0.15.0b	qca-tls-1.0	ttmkfdir-1.3.1
libmad-0.15.1b	readline-4.3	libutempter-1.1.1
madplay-0.15.2b	samba-3.0.9	vcdimager-0.7.20
libebml-0.7.5	sane-backends-1.0.15	vcdimager-0.7.23
libmatroska-0.7.7	sane-frontends-1.0.13	vcdimager-0.7.23.tar
mkvtoolnix-1.5.0	xsane-0.97	vim62
mc-4.6.0	cyrus-sasl-2.1.19	wxGTK-2.6.2
Mesa-6.2.1	screen-4.0.2	libwrap

libXft-2.1.7	out_lame-0.2.2.tar.gz	spice-dlm-2.20
render-0.8	xmms-1.2.10	xglobe-0.51
xft-2.1.2	xmms-crossfade-	xplanet-1.2.0
xrender-0.8.3	0.3.8.tar.gz	xantfarm-1.16.tgz
gxine-0.4.6.tar.gz	xmmsctrl-1.6	xball-3.0
xine-lib-1.1.0	xmms-nas-0.2.tar.gz	xscreensaver-4.13
xine-ui-0.99.4	xmms-nebulus-0.5.0	xvidcore-1.0.3
libxml2-2.6.19	T1Lib-1.3	x11vnc-0.7.1
libxslt-1.1.14	xpdf-3.00	

As we can see from this table, there are 265 external library dependencies required for building KDE 3.4. Some of these dependencies can be satisfied by the libraries provided by Solaris in /opt/sfw. However, in many cases, the libraries in /opt/sfw are not sufficiently up-to-date with KDE's library version requirements.

3. Build Environment Configuration

The build system for KDE 3.4, and for most of its associated libraries, is based on the GNU autotools. Following is a detailed overview of the necessary steps for getting the GNU autotools build system to work on Solaris (8, 9, or 10) and Sun Studio.

By default, the GNU autotools make the following assumptions:

1. software installs by default in `/usr/local`
2. any dependencies of the software to be configured can be found either in `/usr` or in `/usr/local`
3. the X Window System is located in `/usr/X11R6`
4. `/bin/sh` is, in fact, `bash`
5. `make` is GNU `make`
6. `cc` is, in fact, `gcc`
7. any C function prototype from any existing library can be overridden by a function prototype of the same name, but which returns a `char` and takes no arguments (`void`). this assumption is particularly annoying when using any compiler other than GCC
8. several environment variables are set (explained below)
9. `pkg-config` exists, it is reasonably up-to-date, and it can satisfy any dependency, including transitive ones

These assumptions do not necessarily work correctly on Solaris (actually, the function prototype assumptions do not work at all with Sun Studio). There are several simple steps required for adjusting these assumptions to the Sun compilers. This can be achieved by modifying the `./configure` script.

1. If you do not want to install in `/usr/local`, do a global search and replace for `'/usr/local'`, replacing it with the directory tree of your choice. For example, in vi: `:1,$ s#/usr/local#/opt/fsw4sun#g`
2. Search `./configure` for any GCC-specific compiler flags. the usual suspects are: `-Wall`, `-Wfunction-prototypes`, `-fomit-frame-pointer`, `-fpic`. If you run into any of these, remove them, and replace them with a space.
3. Certain packages use a three-stage check for any of their dependencies:
 1. Existence of a specific header file, possibly containing a specific macro indicating the current release and version of this library.
 2. Correct preprocessing of this header file.
 3. Correct compilation of the `"confptest.c"` program, which will include this header file, and will attempt to link against this required library. The `"confptest.c"` program is dynamically generated for every test.

If any of these three stages fails, the header file and its associated library will be rejected by `./configure`. If this happens, manual intervention and editing of `./configure` is required, for this particular header file and library. If you are certain that this library and the header file exist on your system, and they are at the minimum release number and version required by the package being configured, you can save yourself some time (and irritation) by modifying `./configure` to assume that the return value of the compilation of the "confptest.c" program is 0 (zero).

For example:

```
echo "$as_me:$LINENO: checking for strerror in -lcposix" >&5
echo $ECHO_N "checking for strerror in -lcposix... $ECHO_C" >&6
if test "${ac_cv_lib_cposix_strerror+set}" = set; then
  echo $ECHO_N "(cached) $ECHO_C" >&6
else
  ac_check_lib_save_LIBS=$LIBS
LIBS="-lcposix $LIBS"
cat >confptest.$ac_ext <<_ACEOF
/* confdefs.h. */
_ACEOF
cat confdefs.h >>confptest.$ac_ext
cat >>confptest.$ac_ext <<_ACEOF
/* end confdefs.h. */

/* Override any gcc2 internal prototype to avoid an error. */
#ifdef __cplusplus
extern "C"
#endif
/* We use char because int might match the return type of a gcc2
   builtin and then its argument prototype would still apply. */
char strerror ();
int
main ()
{
  strerror ();
  ;
  return 0;
}
_ACEOF
rm -f confptest.$ac_objext confptest.$ac_exeext
if { (eval echo "$as_me:$LINENO: \"$ac_link\"") >&5
  (eval $ac_link) 2>confptest.er1
  ac_status=$?
  grep -v '^ *+' confptest.er1 >confptest.err
  rm -f confptest.er1
  cat confptest.err >&5
```

```

    echo "$as_me:$LINENO: \ $? = $ac_status" >&5
    (exit $ac_status); } &&
        { ac_try='test -z "$ac_c_werror_flag"
test ! -s conftest.err'
    { (eval echo "$as_me:$LINENO: \"$ac_try\"") >&5
    (eval $ac_try) 2>&5
    ac_status=$?
    echo "$as_me:$LINENO: \ $? = $ac_status" >&5
    (exit $ac_status); }; } &&
        { ac_try='test -s conftest$ac_exeext'
    { (eval echo "$as_me:$LINENO: \"$ac_try\"") >&5
    (eval $ac_try) 2>&5
    ac_status=$?
    echo "$as_me:$LINENO: \ $? = $ac_status" >&5
    (exit $ac_status); }; }; then
    ac_cv_lib_cposix_strerror=yes
else
    echo "$as_me: failed program was:" >&5
    sed 's/^/| /' conftest.$ac_ext >&5

ac_cv_lib_cposix_strerror=no
fi
rm -f conftest.err conftest.$ac_objext \
    conftest$ac_exeext conftest.$ac_ext
LIBS=$ac_check_lib_save_LIBS
fi
echo "$as_me:$LINENO: result: $ac_cv_lib_cposix_strerror" >&5
echo "${ECHO_T}$ac_cv_lib_cposix_strerror" >&6
if test $ac_cv_lib_cposix_strerror = yes; then
    LIBS="$LIBS -lcposix"
fi

```

To trick ./configure into thinking that the test program has compiled correctly, and that strerror(3C) is present in the libcposix.so library (non-existent on Solaris), change all the lines:

```
ac_status=$?
```

to

```
ac_status=0
```

and all the lines similar to

```
ac_cv_lib_cposix_strerror=no
```

to

```
ac_cv_lib_cposix_strerror=yes
```


These modifications will most certainly require several iterations of running `./configure`. I very strongly recommend making a backup copy of the original `./configure` provided with the library, before modifying it.

The following environment variables must be set before running `./configure`:

```
CC
CPP
CXX
CFLAGS
CXXFLAGS
CPPFLAGS
LDFLAGS
GCC
M4
CONFIG_SHELL
PYTHON
MAKE
PKG_CONFIG_PATH
PKG_CONFIG
PKG_CONFIG_FOUND
QTDIR
KDEDIR
```

Here are the environment variable settings I used for building KDE 3.4.3, and any of its required dependencies:

```
setenv WORKSHOP_ROOT "/opt/Forte-10.0/SUNWspro/prod"
setenv VERBOSE_TEMPLATE "-verbose=template"
setenv CC "${WORKSHOP_ROOT}/bin/cc"
setenv CXX "${WORKSHOP_ROOT}/bin/CC"
setenv XLDScope "-xldscope=symbolic"
setenv OPENSslROOT "/opt/fsw4sun/ssl"
setenv QTDIR "/opt/qt-3.3.4-32"
setenv KDEDIR "/opt/kde-3.4.3"
```

```
setenv CFLAGS " -erroff=%all -errshort=full -errfmt=error -errwarn=%
none -xO5 -s -xc99=all -xjobs=2 -xregs=no%frameptr -xrestrict=%all
-dalign -xprefetch=auto -xbuiltin=%all -xcsi -xinline=%auto
-xustr=ascii_utf16_ushort -z now -z rescanner -z absexec -xildoff
${XLDScope} ${XPAGESIZE} ${XLINKOPT} -xF=%none -xalias_level=std
-xsafe=mem -xthreadvar -lpthread -lposix4 -lrt -mt -D_REENTRANT
-DLIBXML_THREAD_ALLOC_ENABLED -D__EXTENSIONS__ -D_XPG6
-D_POSIX_PTHREAD_SEMANTICS -DSOLARIS -DSOLARIS10 -DUSE_SOLARIS
-DKSSL_HAVE_SSL -DQT_QLOCALE_NEEDS_VOLATILE -DQT_THREAD_SUPPORT
-DNDEBUG -DNO_DEBUG -DGTK_COMPILATION -UGTK_DISABLE_DEPRECATED -KPIC
```

```
-xtarget=pentium4 -xarch=sse2 -xchip=pentium4 -xcache=8  
/64/4:256/128/8 -xO5 -s "
```

```
setenv CPP "${CC} ${CFLAGS} -E -D_REENTRANT  
-DLIBXML_THREAD_ALLOC_ENABLED"
```

```
setenv LDFLAGS " -Y
```

```
P,/opt/fsw4sun/lib:/opt/fsw4sun/ssl/lib:/opt/fsw4sun/freetype-  
2.1.7/lib:/opt/fsw4sun/fontconfig-2.2.0/lib:/opt/fsw4sun/libxml2-  
2.6.19/lib:/opt/fsw4sun/libxslt-1.1.14/lib:/opt/fsw4sun/python-  
2.3.4/lib:/opt/fsw4sun/glib-2.6.3/lib:/opt/fsw4sun/atk-  
1.9.1/lib:/opt/fsw4sun/pango-1.8.1/lib:/opt/fsw4sun/gtk+-  
2.6.4/lib:/opt/qt-3.3.4-32/lib:/opt/kde-3.4.3/lib:/opt/kde-  
3.4.3/lib/kde3:/opt/fsw4sun/krb-1.3.5/lib:/opt/fsw4sun/net-snmp-  
5.1.2/lib:/opt/fsw4sun/sasl-2.1.19/lib:/opt/fsw4sun/openldap-  
2.2.17/lib:/opt/fsw4sun/samba-3.0.9/lib:/opt/fsw4sun/openslp-  
1.0.11/lib:/opt/fsw4sun/cups-  
1.1.23/lib:/usr/ccs/lib:/usr/openwin/lib:/usr/X11/lib:/usr/dt/lib:/us  
r/lib -i -L/opt/fsw4sun/lib -liconv -lintl -L/opt/fsw4sun/freetype-  
2.1.7/lib /opt/fsw4sun/freetype-2.1.7/lib/libfreetype.so.6 -lz -L  
/opt/fsw4sun/fontconfig-2.2.0/lib /opt/fsw4sun/fontconfig-  
2.2.0/lib/libfontconfig.so.1 -L/opt/kde-3.4.3/lib -L  
/opt/fsw4sun/glib-2.6.3/lib -L/opt/fsw4sun/atk-1.9.1/lib -L  
/opt/fsw4sun/pango-1.8.1/lib -L/opt/fsw4sun/gtk+-2.6.4/lib -L  
/opt/fsw4sun/libxml2-2.6.19/lib -L/opt/fsw4sun/libxslt-1.1.14/lib -L  
/opt/fsw4sun/krb-1.3.5/lib -L/opt/fsw4sun/openldap-2.2.17/lib -L  
/opt/fsw4sun/net-snmp-5.1.2/lib -L/opt/fsw4sun/samba-3.0.9/lib -L  
/opt/fsw4sun/sasl-2.1.19/lib -L/opt/fsw4sun/cups-1.1.23/lib -L  
/opt/fsw4sun/ssl/lib -L/opt/qt-3.3.4-32/lib -L${WORKSHOP_ROOT}/lib  
-lc -lsunmath -lm -ldl -L/usr/dt/lib -L/usr/X11/lib -L  
/usr/openwin/lib -L/usr/ccs/lib -L/usr/lib -R  
/opt/fsw4sun/lib:/opt/fsw4sun/glib-2.6.3/lib:/opt/fsw4sun/atk-  
1.9.1/lib:/opt/fsw4sun/pango-1.8.1/lib:/opt/fsw4sun/gtk+-  
2.6.4/lib:/opt/fsw4sun/freetype-2.1.7/lib:/opt/fsw4sun/fontconfig-  
2.2.0/lib:/opt/fsw4sun/libxml2-2.6.19/lib:/opt/fsw4sun/libxslt-  
1.1.14/lib:/opt/kde-3.4.3/lib:/opt/qt-3.3.4-  
32/lib:/usr/openwin/lib:/usr/X11/lib:/usr/dt/lib:/usr/ccs/lib:/usr/li  
b -KPIC -lpthread -lpthread -lposix4 -lrt -mt -D_REENTRANT  
-DLIBXML_THREAD_ALLOC_ENABLED -DSOLARIS -DSOLARIS10 -DUSE_SOLARIS  
-DKSSL_HAVE_SSL=1 -DQT_QLOCALE_NEEDS_VOLATILE -DQT_THREAD_SUPPORT  
${LINKCRUNCSTD} ${XLDScope} -xlibmil ${XPAGESIZE} -xF=%none  
-xthreadvar -z now -z rescan -z absexec -xtarget=pentium4 -xarch=sse2  
-xchip=pentium4 -xcache=8/64/4:256/128/8 -xO5 -s "
```

```
setenv CPPFLAGS "-I${WORKSHOP_ROOT}/include/CC -I  
${WORKSHOP_ROOT}/include/CC/Cstd -I/opt/fsw4sun/freetype-  
2.1.7/include/freetype2 -I/opt/fsw4sun/freetype-2.1.7/include -I  
/opt/fsw4sun/fontconfig-2.2.0/include -I/opt/fsw4sun/fontconfig-
```

```
2.2.0/include/fontconfig -I/opt/fsw4sun/glib-2.6.3/include -I
/opt/fsw4sun/atk-1.9.1/include -I/opt/fsw4sun/pango-1.8.1/include -I
/opt/fsw4sun/gtk+-2.6.4/include -I/opt/fsw4sun/libxml2-2.6.19/include
-I/opt/fsw4sun/libxslt-1.1.14/include -I/opt/fsw4sun/krb-
1.3.5/include -I/opt/fsw4sun/openldap-2.2.17/include -I
/opt/fsw4sun/net-snmp-5.1.2/include -I/opt/fsw4sun/sasl-
2.1.19/include -I/opt/fsw4sun/samba-3.0.9/include -I
/opt/fsw4sun/cups-1.1.23/include -I/opt/fsw4sun/ssl/include -I
/opt/fsw4sun/include -I/usr/openwin/include -I/usr/X11/include -I
/usr/dt/include -I/opt/fsw4sun/libxml2-2.6.19/include -I
/opt/fsw4sun/libxslt-1.1.14/include -I/opt/fsw4sun/python-
2.3.4/include -I/opt/fsw4sun/include -I/opt/kde-3.4.3/include -I
/opt/qt-3.3.4-32/include -I/opt/fsw4sun/openslp-1.0.11/include -I
/opt/fsw4sun/cups-1.1.23/include -I/opt/fsw4sun/krb-1.3.5/include -I
/opt/fsw4sun/sasl-2.1.19/include -I/opt/fsw4sun/openldap-
2.2.17/include -I/opt/fsw4sun/net-snmp-5.1.2/include -I
/opt/fsw4sun/samba-3.0.9/include "
```

```
setenv CXXFLAGS " -features=%all,extensions -instances=global
-template=geninlinefuncs ${VERBOSE_TEMPLATE} -xO5 -s -xregs=no%
frameptr -xrestrict=%all -xprefetch=auto -xbuiltin=%all -xinline=%
auto -xjobs=2 ${XPAGESIZE} -xlibmil -xustr=ascii_utf16_ushort
-xlibmopt -z now -z rescan -z absexec ${XLDScope} ${XLINKOPT}
-xalias_level=compatible -xildoff -lpthread -lposix4 -lrt -mt
-D_REENTRANT -DLIBXML_THREAD_ALLOC_ENABLED -DKSSL_HAVE_SSL -DNDEBUG
-DNO_DEBUG -DQT_QLOCALE_NEEDS_VOLATILE -DQT_THREAD_SUPPORT -KPIC
${XPAGESIZE} -xF=%none -xthreadvar ${XDUMPMACROS} -D_EXTENSIONS__
-D_XPG6 -D_POSIX_PTHREAD_SEMANTICS -DSOLARIS -DSOLARIS10
-DUSE_SOLARIS -DKSSL_HAVE_SSL=1 -DGTK_COMPILATION
-UGTK_DISABLE_DEPRECATED -xtarget=pentium4 -xarch=sse2
-xchip=pentium4 -xcache=8/64/4:256/128/8 -xO5 -s "
setenv F77FLAGS " -erroff=%all -errshort=full -errfmt=error
-errwarn=%none -xO5 -s -xc99=all -xjobs=2 -dalign -xprefetch=auto
-dbl_align_all=yes -f77=%all -xbuiltin=%all -xcsi -xinline=%auto
-xustr=ascii_utf16_ushort -z now -z rescan -z absexec -xildoff -xF=%
none -xsafe=mem -xthreadvar -mt -lpthread -lposix4 -lrt -D_REENTRANT
-DLIBXML_THREAD_ALLOC_ENABLED -DSOLARIS -DSOLARIS10 -DUSE_SOLARIS
-DKSSL_HAVE_SSL=1 -DQT_QLOCALE_NEEDS_VOLATILE -DQT_THREAD_SUPPORT
-DNDEBUG -DNO_DEBUG -KPIC -xarch=sse2 -xchip=pentium4 -xcache=8
/64/4:256/128/8 -xO5 -s "
```

```
setenv FFLAGS "${F77FLAGS}"
setenv CXXCPP "${CXX} ${CXXFLAGS} -E -D_REENTRANT
-DLIBXML_THREAD_ALLOC_ENABLED"
setenv GCC "no"
setenv GXX "no"
setenv M4 "/opt/fsw4sun/bin/m4"
setenv PKG_CONFIG_PATH "/opt/fsw4sun/lib/pkgconfig"
```

```

setenv PKG_CONFIG "/opt/fsw4sun/bin/pkg-config"
setenv PKG_CONFIG_FOUND "/opt/fsw4sun/bin/pkg-config"
setenv MAKE "/opt/fsw4sun/bin/gmake"
setenv GS_LIB "/opt/fsw4sun/share/ghostscript/8.15/lib/fonts"
setenv XSLT_CONFIG "/opt/fsw4sun/libxslt-1.1.14/bin/xslt-config"
setenv XMLLINT "/opt/fsw4sun/libxml2-2.6.19/bin/xmllint"
setenv XSLTPROC "/opt/fsw4sun/libxslt-1.1.14/bin/xsltproc"
setenv XML_CONFIG "/opt/fsw4sun/libxml2-2.6.19/bin/xml2-config"
setenv CONFIG_SHELL "/bin/bash"
setenv PYTHON "/opt/fsw4sun/python-2.3.4/bin/python2.3"
setenv LANG "C"
setenv LC_CTYPE "C"
setenv LC_NUMERIC "C"
setenv LC_TIME "C"
setenv LC_COLLATE "C"
setenv LC_MONETARY "C"
setenv LC_MESSAGES "C"
setenv LC_ALL "C"

```

(using T or C shell syntax).

Always use the "C" locale for compilation.

I recommend creating two files containing these environment variable settings, for both `#!/bin/tcsh` (or `#!/bin/csh`, if you still use it) **and** `#!/bin/bash`. You should include the contents of this `#!/bin/bash` syntax environment variables file at the top of `./configure`, right below the `#!/bin/bash` directive. Here's an example:

```

#!/bin/bash

# Guess values for system-dependent variables and create Makefiles.
# Generated automatically using autoconf version 2.13
# Copyright (C) 1992, 93, 94, 95, 96 Free Software Foundation, Inc.
#
# This configure script is free software; the Free Software
Foundation
# gives unlimited permission to copy, distribute and modify it.

. /home/steleman/programming/skel/.workshop10.KDE343.FSW.sh
. /home/steleman/programming/skel/.ld_library_path.kde343.sh
. /home/steleman/programming/skel/.pkg_config_path.sh
. /home/steleman/programming/skel/.python.sh
. /home/steleman/programming/skel/.make.sh
. /home/steleman/programming/skel/.qt-334.sh

```

[...]

The ./configure script accepts numerous arguments. most of these arguments are in the form of key-value pairs, but not all:

```
./configure --prefix=/opt/fsw4sun --disable-warnings --disable-debug
```

Due to the fact that ./configure needs so much customization, and that you will most likely run ./configure more than once, I recommend writing a simple wrapper shell script, which calls ./configure. I usually name mine 'runConfigure', and most of them look like this:

```
#!/bin/tcsh

source /home/steleman/programming/skel/.workshop10.KDE343.FSW
source /home/steleman/programming/skel/.ld_library_path.kde343
source /home/steleman/programming/skel/.pkg_config_path
source /home/steleman/programming/skel/.python
source /home/steleman/programming/skel/.make
source /home/steleman/programming/skel/.qt-334
source /home/steleman/programming/skel/.kde-343
source /home/steleman/programming/skel/.path.kde343
source /home/steleman/programming/skel/.locale
setenv CONFIG_SHELL "/bin/bash"
setenv GS_LIB "/opt/fsw4sun/share/ghostscript/8.15/lib/fonts"
setenv XSLT_CONFIG "/opt/fsw4sun/libxslt-1.1.14/bin/xslt-config"
setenv XMLLINT "/opt/fsw4sun/libxml2-2.6.19/bin/xmllint"
setenv XSLTPROC "/opt/fsw4sun/libxslt-1.1.14/bin/xsltproc"
setenv XML_CONFIG "/opt/fsw4sun/libxml2-2.6.19/bin/xml2-config"

setenv X11_CFLAGS " -I/usr/X11/include -I/usr/dt/include"
setenv GTK_CFLAGS ""
setenv GLIB_CFLAGS ""
setenv ATK_CFLAGS ""
setenv PANGO_CFLAGS ""
setenv FONTCONFIG_CFLAGS " -I/opt/fsw4sun/fontconfig-2.2.0/include -I
/opt/fsw4sun/fontconfig-2.2.0/include/fontconfig"
setenv FREETYPE_CFLAGS " -I/opt/fsw4sun/freetype-
2.1.7/include/freetype2 -I/opt/fsw4sun/freetype-2.1.7/include"

setenv X11_LIBS " -L/usr/X11/lib -L/usr/dt/lib"
setenv GTK_LIBS ""
setenv GLIB_LIBS ""
setenv PANGO_LIBS ""
setenv ATK_LIBS ""
setenv FONTCONFIG_LIBS " -L/opt/fsw4sun/fontconfig-2.2.0/lib
/opt/fsw4sun/fontconfig-2.2.0/lib/libfontconfig.so.1 -R
/opt/fsw4sun/fontconfig-2.2.0/lib"
```

```
setenv FREETYPE_LIBS " -L/opt/fsw4sun/freetype-2.1.7/lib
/opt/fsw4sun/freetype-2.1.7/lib/libfreetype.so.6 -lz"
```

```
./configure --prefix=/opt/kde-3.4.3 --x-includes=/usr/openwin/include
--x-libraries=/usr/openwin/lib --disable-warnings --disable-debug --
disable-dependency-tracking --disable-libtool-lock --enable-shared --
disable-static --disable-final --disable-closure --with-pic --with-
extra-includes="/opt/fsw4sun/include -I/opt/fsw4sun/libxml2-
2.6.19/include -I/opt/fsw4sun/libxml2-2.6.19/include/libxml2 -I
/opt/fsw4sun/libxslt-1.1.14/include -I/opt/fsw4sun/libxslt-
1.1.14/include/libxslt ${X11_CFLAGS} ${GTK_CFLAGS} ${GLIB_CFLAGS}
${ATK_CFLAGS} ${PANGO_CFLAGS} ${FONTCONFIG_CFLAGS} ${FREETYPE_CFLAGS}
-I/opt/fsw4sun/openldap-2.2.13/include -I/opt/fsw4sun/sasl-
2.1.19/include -I/opt/fsw4sun/krb-1.3.5/include -I
/opt/fsw4sun/include -I/opt/fsw4sun/openssl-1.0.11/include -I
/opt/fsw4sun/glut-3.7/include -I/opt/fsw4sun/ssl/include -I
/opt/fsw4sun/cups-1.1.23/include" --with-extra-libs="/opt/fsw4sun/lib
-L/opt/fsw4sun/ssl/lib -L/opt/fsw4sun/libxml2-2.6.19/lib -L
/opt/fsw4sun/libxslt-1.1.14/lib ${X11_LIBS} ${GTK_LIBS} ${GLIB_LIBS}
${ATK_LIBS} ${PANGO_LIBS} ${FONTCONFIG_LIBS} ${FREETYPE_LIBS} " --
with-qt-dir="${QTDIR}" --with-qt-includes="${QTDIR}/include" --with-
qt-libraries="${QTDIR}/lib"
```

Once you have created this configure wrapper file, and the environment variables files, you can proceed with running `./configure`. You will do this many times before you can get a correctly setup build environment. `./configure` will generate all the Makefiles required for building the library, and, in most (but not all) cases, it will also generate three additional, and important, files:

```
libtool
config.status
config.h
```

`libtool` is a shell script wrapper around the compilation and linking directives in the Makefiles. It is written for `#!/bin/sh`, which in the GNU/Linux world translates to `#!/bin/bash` on Solaris. You have to change the `exec(2)` directive at the top from `#!/bin/sh` to `#!/bin/bash`. In other words, the Makefiles generated by `./configure` do not call the compiler, or linker, directly. They call `libtool`, which in its turn calls the compiler drivers, or the linker. `libtool` is also the home of some famous and never-to-be-fixed bugs, which will interfere with the correct compilation and linking of your libraries and executables, resulting in compiler or linker failures. I recommend creating a customized `libtool`, which works around the most annoying bugs, and keeping a backup copy of it. You can then reuse this patched `libtool` for every autotools-based package. Since `libtool` is called from the Makefiles during compilation and linking, I also recommend including the environment variables file (with

#!/bin/bash syntax) at the top of libtool, right below the #!/bin/bash directive.

The following modifications to libtool are necessary for a successful compilation and link:

1. Replace all the lines

```
SHELL="/bin/sh"  
with  
SHELL="/bin/bash"
```

2. Replace all the lines containing

```
archive_cmds="\$LD -G\${allow_undefined_flag} -h \${soname} -o  
\$lib \${libobjs} \${deplibs} \${linker_flags}"  
with  
archive_cmds="\$CC \$CFLAGS \$LDFLAGS -G  
\${allow_undefined_flag} -h \${soname} -o \$lib \${libobjs}  
\${deplibs} \${linker_flags}"
```

3. Replace all the lines containing

```
wl="-Qoption ld "  
with  
wl=" "
```

This is required for correctly building a shared library by fully extracting all the symbols from several archive libraries into the target shared library.

4. Replace the two lines at line 2344:

```
$_echo "$modename: cannot find the library `\$lib'" 1>&2  
exit 1  
with  
$_echo "$modename: useless libtool error [ignored]." 1>&2  
continue
```

5. Replace all the lines

```
old_archive_cmds="\$AR \$AR_FLAGS  
\$oldlib\${oldobjs}\$old_deplibs~\$RANLIB \$oldlib"  
with  
old_archive_cmds="\$CC \$CXXFLAGS \$LDFLAGS -xar -o \$oldlib  
\$oldobjs"
```

6. Replace all the lines

```
archive_cmds="\$LD -G\${allow_undefined_flag} -h \${soname} -o  
\$lib \${libobjs} \${deplibs} \${linker_flags}"  
with  
archive_cmds="\$CC \$CXXFLAGS \$LDFLAGS -G  
\${allow_undefined_flag} -nolib -h\${soname} -o \$lib  
\$predep_objects \${libobjs} \${deplibs} \${postdep_objects}
```

```
\$compiler_flags"
```

These modifications will ensure that `libtool` passes the correct compiler and linker flags to Sun Studio.

`config.status` is a shell script. It serves two primary purposes:

- be a fallback script, in case any of the Makefiles are accidentally deleted.
- be a driver for the GNU M4 macro generator, which will generate any files for which the `*.in` template is provided by the library.

It usually also plays the third, unintended role, of maximum annoyance generator, when, for a number of relatively valid reasons, GNU make decides to invoke it, and, in turn, it decides to regenerate all the autoconf files. This will usually result in your customized `./configure` file being deleted, and a new set of `./configure` and `*.in` files to be generated. This, in its turn, will result in all the Makefiles being re-generated. You do **not** want this to happen. The workaround against this potential disaster is simple, and effective:

- rename this `config.status` file to something else (I recommend `config.status.useless`)
- create a new `config.status` file, containing only the following lines:

```
#!/bin/bash
```

```
/bin/true
```

This will keep everyone happy, including you.

Finally, `config.h` is the operating system and site-specific header file, generated by `./configure` from `config.h.in`. This file contains C-style macros which are conditionally used in the source code, to exclude, or include in the compilation, operating-system- or library-dependent- specific code paths. You should **always** check this file for any potential errors or omissions. The following conditional macro should always be added to this file, if `./configure` has not already done so:

```
#if defined (__sparc) || defined (__sparcv9)
#define WORDS_BIGENDIAN 1
#endif
```

After all this configuring and editing, we are now ready to proceed with building KDE.

4. Building a KDE Module: kdelibs-3.4.3

Now it's time to take a detailed look at actually building a KDE module. The example we will use is `kdelibs`, because it is one of the most complex.

The `kdelibs` module comes with specific dependencies. These dependencies are:

```
OpenEXR 1.1.1
fam 2.6.9
MIT kerberos 1.3.5
pcre
aspell
```

This is what our `runConfigure` script for `kdelibs-3.4.3` looks like:

```
#!/bin/tcsh

source /home/steleman/programming/skel/.workshop10.KDE343.FSW
source /home/steleman/programming/skel/.ld_library_path.kde343
source /home/steleman/programming/skel/.pkg_config_path
source /home/steleman/programming/skel/.python
source /home/steleman/programming/skel/.make
source /home/steleman/programming/skel/.qt-334
source /home/steleman/programming/skel/.kde-343
source /home/steleman/programming/skel/.path.kde343
source /home/steleman/programming/skel/.locale
setenv CONFIG_SHELL "/bin/bash"
setenv GS_LIB "/opt/fsw4sun/share/ghostscript/8.15/lib/fonts"
setenv XSLT_CONFIG "/opt/fsw4sun/libxslt-1.1.14/bin/xslt-config"
setenv XMLLINT "/opt/fsw4sun/libxml2-2.6.19/bin/xmllint"

setenv X11_CFLAGS " -I/usr/X11/include -I/usr/dt/include"
setenv FONTCONFIG_CFLAGS " -I/opt/fsw4sun/fontconfig-2.2.0/include -I
/opt/fsw4sun/fontconfig-2.2.0/include/fontconfig"
setenv FREETYPE_CFLAGS " -I/opt/fsw4sun/freetype-
2.1.7/include/freetype2 -I/opt/fsw4sun/freetype-2.1.7/include"

setenv X11_LIBS " -L/usr/X11/lib -L/usr/dt/lib"
setenv FONTCONFIG_LIBS " -L/opt/fsw4sun/fontconfig-2.2.0/lib
/opt/fsw4sun/fontconfig-2.2.0/lib/libfontconfig.so.1 -R
/opt/fsw4sun/fontconfig-2.2.0/lib"
setenv FREETYPE_LIBS " -L/opt/fsw4sun/freetype-2.1.7/lib
/opt/fsw4sun/freetype-2.1.7/lib/libfreetype.so.6 -lz"

./configure --prefix=/opt/kde-3.4.3 --disable-debug --disable-
warnings --disable-closure --disable-dependency-tracking --enable-
```

```

ltdl-install --enable-mt --enable-threading --disable-rpath --
disable-final --enable-sendfile --enable-mitshm --enable-dnssd --
disable-openpty --enable-fast-malloc=no --enable-cups --enable-libfam
--disable-dnotify --enable-pcre --enable-shared --disable-static --
with-qt-dir="/opt/qt-3.3.4-32" --with-qt-includes="/opt/qt-3.3.4-
32/include" --with-qt-libraries="/opt/qt-3.3.4-32/lib" --enable-
threading --x-includes='/usr/openwin/include' --x-
libraries='/usr/openwin/lib' --with-pic --with-extra-
includes="/usr/dt/include -I/usr/X11/include -I/usr/openwin/include
-I/opt/fsw4sun/include -I/opt/fsw4sun/ssl/include -I
/opt/fsw4sun/OpenEXR-1.1.1/include -I/opt/fsw4sun/krb-1.3.5/include
-I/opt/fsw4sun/sasl-2.1.19/include -I/opt/fsw4sun/openldap-
2.2.17/include -I/opt/fsw4sun/libxml2-2.6.19/include -I
/opt/fsw4sun/libxslt-1.1.14/include -I/opt/fsw4sun/cups-
1.1.23/include -I/opt/fsw4sun/openslp-1.0.11/include -I
/opt/fsw4sun/OpenEXR-1.1.1/include " --with-extra-libs="/usr/dt/lib
-L/usr/X11/lib -L/usr/openwin/lib -L/opt/fsw4sun/lib -L
/opt/fsw4sun/ssl/lib -L/opt/fsw4sun/krb-1.3.5/lib -L
/opt/fsw4sun/sasl-2.1.19/lib -L/opt/fsw4sun/openldap-2.2.17/lib -L
/opt/fsw4sun/libxml2-2.6.19/lib -L/opt/fsw4sun/libxslt-1.1.14/lib -L
/opt/fsw4sun/cups-1.1.23/lib -L/opt/fsw4sun/openslp-1.0.11/lib -I
/opt/fsw4sun/OpenEXR-1.1.1/lib " --with-arts --with-distribution --
without-libthai --disable-dnotify --enable-libfam --enable-pcre --
without-dmalloc --with-tiff --with-jasper --with-openexr --enable-
cups --with-ssl-dir=/opt/fsw4sun/ssl --with-gssapi=/opt/fsw4sun/krb-
1.3.5 --with-aspell --with-pic --without-alsa

```

We indicate that we want to enable cups, fam, OpenEXR, sendfile, the MIT Shared Memory Extension and Kerberos, and we specifically pass the include (-I) and library (-L) paths to ./configure in the

--with-extra-includes and --with-extra-libraries command-line arguments. We also indicate that we are disabling dnotify, which is specific to GNU/Linux (--disable-dnotify), and we also disable ALSA (--without-alsa), which is GNU/Linux specific as well.

Upon a successful run of our runConfigure wrapper, we can observe ./configure generating a large number of Makefiles, and performing some preprocessing and precompilation tasks. After these preliminary tasks have completed successfully, ./configure will let us know that the configuration is now complete, and we can now proceed to running 'gmake'.

Before we actually start the compilation, we double-check the config.h file for any missing or incorrect macros and #define's. We then rename the config.status file to config.status.orig, replacing it with our no-op config.status, and we rename libtool to libtool.orig, replacing it with our modified libtool.

We are now ready to start building kdelibs. At the shell prompt, type

```
example%> gmake
```

You should now see the compilation steps being performed by `gmake`, which in turn calls `libtool`, which in turn calls the compilers and the linker.

If everything goes smoothly, `kdelibs-3.4.3` should compile in about 3.5 hours on a Sun Blade 2000 with 2GB RAM and 2x900 MHz UltraSPARC-III+ CPUs.

