Easy Software Installation with pkgsrc

One 3rd Party Software collection for *BSD, Solaris, Linux ... and more!

Prepared by Hubert Feyrer <hubertf@NetBSD.org>
Presented by D’Arcy J. M. Cain <darcy@NetBSD.org>
The NetBSD Foundation
Installation of Open Source software on Unix and Unix-like systems has a number of problems:

- Many programs and lots of version changes
- Compilation costs time
- Software often is not written with portability in mind (but we don’t want to give a coding lesson here...)
- Installation is not trivial
Installation is not trivial:
- Some basic knowledge about tools is necessary
- Various ways to configure things (GNU autoconf, Imake, ...)
- Side effects (depending on other packages, compiler, ...)
- Many inter-depending packages
- Troubleshooting requires expert knowledge
Illustration of complexity of inter-depending packages:

(created from a pkgsrc system running NetBSD, using pkgdepgraph and dot/graphviz)
Solution: It depends! (1/2)

Classic, flexible software management:

- difficult to install
- easy to maintain

E.g. Solaris, Irix, Linux From Scratch

Hybrid systems:

+ easy to install
+ easy to maintain

E.g. NetBSD, FreeBSD, Debian & Gentoo Linux

Complete integration of applications and system:

+ easy to install
- difficult to maintain

E.g. SuSE, RedHat, Mandrake Linux
Where do you want to go today?

- **Easy Installation**: choose this if your software doesn’t change often. Use ready-to-user binary distribution. E.g. for desktop systems install Windows or SuSE Linux from CD/DVD.

- **Easy Maintenance**: choose this if you have few packages that change a lot. Take a stable base operating system, and install important packages on your own, e.g. compile on your own on a webserver with Solaris, Apache and PHP.

- **Both**: Welcome to pkgsrc!
A Cross-Platform Solution: pkgsrc
Introducing pkgsrc

- System for easy installation and updating of packages
- Source-based package management system
- Uses original source code for compiling
- Creation and installation of binary packages is possible
- Components: Management tools & packages collection (pkgsrc)
- Automatic handling of dependencies (of course!?!)

Hubert Feyrer <hubertf@pkgsrc.org>, D’Arcy J. M. Cain <darcy@NetBSD.org>
Introducing pkgsrc (cont’d)

- Originally ported from FreeBSD to NetBSD
- Primary development platform of pkgsrc: NetBSD
- Ported to: AIX, BSD/OS, Darwin, FreeBSD, Irix, Linux, OpenBSD, Solaris, Windows w/ “Interix”
- Linux Distributions: SuSE 9.0, Debian, ROOT Linux, Slackware, RedHat 8.1/9, Mandrake 9.2, Bluewall, ...
pkgsrc in Detail
How to get going

- Grab pkgsrc
- Install bootstrap kit (binary, or compile via pkgsrc/bootstrap)
- cd pkgsrc/www/mozilla
- bmake install
Grabbing pkgsrc

$ cd $HOME/OS
$ env CVS_RSH=ssh \n   cvs -d \n    anoncvs@anoncvs.NetBSD.org:/cvsroot \n    co pkgsrc
U pkgsrc/Makefile
U pkgsrc/Packages.txt
U pkgsrc/README
...

- **Grab a precompiled binary or compile on your own**

- **Precompiled binary kits are available on** http://www.pkgsrc.org/ **for:**

<table>
<thead>
<tr>
<th>Platform</th>
<th>FreeBSD Version</th>
<th>OpenBSD Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Darwin 5.5/powerpc</td>
<td>FreeBSD 5.1/i386</td>
<td>OpenBSD 3.5/i386</td>
</tr>
<tr>
<td>Darwin 6.6/powerpc</td>
<td>FreeBSD 5.2.1/i386</td>
<td>Slackware 8.1/i386</td>
</tr>
<tr>
<td>Darwin 7.6/powerpc</td>
<td>FreeBSD 5.3/i386</td>
<td>Slackware 9/i386</td>
</tr>
<tr>
<td>Darwin 7.8/powerpc</td>
<td>Interix 3.5</td>
<td>Solaris 8/sparc</td>
</tr>
<tr>
<td>Debian GNU Linux/i386</td>
<td>IRIX 6.5/mips</td>
<td>Solaris 8/i386</td>
</tr>
<tr>
<td>FreeBSD 3.5/i386</td>
<td>IRIX64 6.5/mips</td>
<td>Solaris 9/sparc</td>
</tr>
<tr>
<td>FreeBSD 4.7/i386</td>
<td>OpenBSD 3.2/i386</td>
<td></td>
</tr>
<tr>
<td>FreeBSD 5.0/i386</td>
<td>OpenBSD 3.3/i386</td>
<td></td>
</tr>
</tbody>
</table>
$ cd pkgsrc/bootstrap
$ export MY_HOME=$HOME/OS/OS-`uname -s`
$ export LOCALBASE=${MY_HOME}/pkg
$ export PKG_DBDIR=${MY_HOME}/db/pkg
$ ./bootstrap

?     --prefix=${LOCALBASE} \
?     --pkgdbdir=${PKG_DBDIR} \
?     --ignore-user-check

===> bootstrap command: ./bootstrap --prefix=/home/feyrer/OS/OS-Linux/pkg --pkgdbdir=/home
===> bootstrap started: Wed Dec 8 14:42:23 CET 2004

Working directory is: work

===> running: /usr/bin/sed -e 's|@DEFAULT_INSTALL_MODE@|0755|' files/install-sh.in
===> running: /bin/chmod +x work/install-sh

===> building as unprivileged user feyrer/bedienst

===> Building libnbcompat

===> running: /bin/sh work/install-sh -d -o feyrer -g bedienst work/libnbcompat
===> running: (cd work/libnbcompat; /bin/sh ./configure -C --prefix=/home/feyrer/OS)

configure: creating cache config.cache
checking build system type... i686-pc-linux-gnu
checking host system type... i686-pc-linux-gnu
checking whether make sets $(MAKE)... yes

......
Bootstrap Kit: Compiling (2/2)

....

/usr/bin/install -c -m 444 linkfarm.cat1 /home3/bedienst/feyrer/OS/OS-Linux/pkg/man/c
/usr/bin/install -c -m 444 pkg_view.1 /home3/bedienst/feyrer/OS/OS-Linux/pkg/man/man1
/usr/bin/install -c -m 444 pkg_view.cat1 /home/feyrer/OS/OS-Linux/pkg/man/cat1/pkg_view

===> Installing packages(7) man page

===> running: /bin/sh work/install-sh -c -m 444 files/packages.cat7 /home/feyrer/OS

Please remember to add /home/feyrer/OS/OS-Linux/pkg/bin to your PATH environment variable and /home/feyrer/OS/OS-Linux/pkg/man to your MANPATH environment variable, if necessary.

An example mk.conf file "work/mk.conf.example" with the settings you provided to "bootstrap" has been created for you. Please copy work/mk.conf.example to /home/feyrer/OS/OS-Linux/pkg/etc/mk.conf.

You can find extensive documentation of the NetBSD Packages Collection in /home/feyrer/OS/pkgsrc/Packages.txt and packages(7).

Hopefully everything is now complete.
Thank you

===> bootstrap started: Wed Dec 8 14:44:09 CET 2004
===> bootstrap ended: Wed Dec 8 14:55:52 CET 2004
$

Hubert Feyrer <hubertf@pkgsrc.org>, D'Arcy J. M. Cain <darcy@NetBSD.org>
$ cd $HOME/OS/OS-`uname -s`/pkg
$ export PATH=`pwd`/bin:`pwd`/sbin:${PATH}
$ export PKG_DBDIR=$HOME/OS/OS-`uname -s`/db/pkg
$
$ pkg_info
digest-20021220 Message digest wrapper utility
Installed Commands

The binaries installed by the bootstrap procedure provide the core functionality of the pkgsrc system:

$ cd OS/OS-`uname -s`/pkg/
$ ls bin sbin

bin:
  bmake  cpio  digest  ftp
  pax  tar

sbin:
  linkfarm  pkg_add  pkg_create  pkg_info
  mtree  pkg_admin  pkg_delete  pkg_view
**Beware!** Make sure that instead of “make” the BSD-compatible “bmake” is being used!

```
$ export MAKECONF=`pwd`/pkgsrc_env_no-root # see below
$
$ cd $HOME/OS/pkgsrc
$ cd misc/figlet
$ bmake
...
$ bmake install
...
$
$ pkg_info
digest-20021220 Message digest wrapper utility
figlet-2.2.1nb2 Print text banners in fancy ASCII art characters
```
$ bmake

=>> *** No /home/feyrer/OS/OS-Linux/../.distfiles/pkg-vulnerabilities
=>> *** skipping vulnerability checks. To fix, install
=>> *** the pkgsrc/security/audit-packages package and run
=>> *** '/home/feyrer/OS/OS-Linux/pkg/sbin/download-vulnerability
=>> Checksum OK for figlet221.tar.gz.
work.i386 -> /home/feyrer/OS/OS-Linux/tmp/misc/figlet/work.i386
=>> Extracting for figlet-2.2.1nb2
=>> Patching for figlet-2.2.1nb2
=>> Applying pkgsrc patches for figlet-2.2.1nb2
=>> Overriding tools for figlet-2.2.1nb2
=>> Configuring for figlet-2.2.1nb2
=>> Building for figlet-2.2.1nb2

gcc -O2 -DDEFAULTFONTDIR="/home/feyrer/OS/OS-Linux/pkg/share/figlet"
chmod a+x figlet

gcc -O2 -o chkfont chkfont.c
$

Hubert Feyrer <hubertf@pkgsrc.org>, D'Arcy J. M. Cain <darcy@NetBSD.org>
$ bmake install
===> Installing for figlet-2.2.1nb2
===> Becoming root@rfhinf032 to install figlet.
Warning: not superuser, can’t run mtree.
Become root and try again to ensure correct permissions.
install -d -o feyrer -g bedienst -m 755 /home/feyrer/OS/OS-Linux/pkg
mkdir -p /home/feyrer/OS/OS-Linux/pkg/share/figlet
cp figlet /home/feyrer/OS/OS-Linux/pkg/bin
cp chkfont /home/feyrer/OS/OS-Linux/pkg/bin
chmod 555 figlist showfigfonts
cp figlist /home/feyrer/OS/OS-Linux/pkg/bin
cp showfigfonts /home/feyrer/OS/OS-Linux/pkg/bin
cp fonts/* .flf /home/feyrer/OS/OS-Linux/pkg/share/figlet
cp fonts/* .flc /home/feyrer/OS/OS-Linux/pkg/share/figlet
cp figlet.6 /home/feyrer/OS/OS-Linux/pkg/man/man6
===> Registering installation for figlet-2.2.1nb2
$
Compiling Packages - Running

$ type figlet
/home/feyrer/OS/OS-Linux/pkg/bin/figlet
$
$ figlet Hello `uname -s`
Compiling as Non-root

To use pkgsrc without root privileges, put the following into $MAKECONF (shortened!):

```
MY_NAME!= whoami
MY_GROUP!= groups | sed ’s/.*$$//' 
MY_HOME= ${HOME}/OS
BINOWN= ${MY_NAME}
BINGRP= ${MY_GROUP}
WRKOBJDIR= ${MY_HOME}/tmp
LOCALBASE= ${MY_HOME}/pkg
VARBASE= ${MY_HOME}/var
OBJMACHINE= 1
SU_CMD= /bin/sh -c
CHOWN= true
CHGRP= true
BINMODE= 755 # for Solaris strip(1)
```

Complete: http://www.feyrer.de/OS/pkgsrc_env_no-root!
1. **make fetch**: Download sources
Other Interesting Targets

- **make package**: Create binary package for `pkg_add(8)`
- **make clean**: Remove working directory
- **make deinstall**: Deinstall package
- **make replace**: Replace installed package with new version
- **make update**: Rebuild package and all dependencies
$ cd .../pkgsrc/
$ ls
CVS    comms   games   misc    security
Makefile converters geography mk shells
Packages.txt cross graphics multimedia sysutils
README databases ham net templates
textproc
archivers devel inputmethod packages
benchmarks distfiles lang licenses
biology doc mail
bootstrap editors

chat finance mbone

fonts meta-pkgs

regress
$ cd .../pkgsrc
$ ls www
CVS         cadaver    jakarta-servletap  p5-Apache-Test
Makefile    calamaris  jakarta-tomcat  p5-Apache-ePerl
Mosaic      cgic       jakarta-tomcat4 p5-CGI
SpeedyCGI   cgicc      jsdk20         p5-CGI-Applicatio
adzap       cgilib     jssi           p5-CGI-FastTempla
amaya       checkbot   kannel         p5-CGI-FormBuild
analog      chimera    kdewebdev3     p5-CGI-Kwiki
ap-Embperl  clearsiver kimagemapeditor p5-CGI-Minimal
ap-access-referer cocoon lhs             p5-CGI-Session
ap-aolserver communicator libghttp     p5-CGI_Lite
ap-auth-cookie cronolog   libgtkhtml   p5-ExtUtils-XSBui
ap-auth-ldap  curl      libwww        p5-FCGI
ap-auth-mysql cvsweb     liferea        p5-HTML-Clean
ap-auth-pam   dillo     links          p5-HTML-FillInFor
ap-auth-pgsql drivel     links-gui     p5-HTML-FixEntiti
ap-auth-postgresq elinks  lynx           p5-HTML-Format
ap-auth-script elinks04  mMosaic       p5-HTML-Mason
ap-bandwidth emacs-w3m  make_album     p5-HTML-Parser
Number of Available Packages

$ date
Sat May  7 06:08:52 EDT 2005
$
$ cd .../pkgsrc/
$ ls */*/Makefile | wc -l
  5526  <- pkgsrc
$ ls wip/*/Makefile | wc -l
  1053  <- SourceForge’s pkgsrc-wip
$ expr 5526 + 1053
6579  <- total
Internals
$ cat x11/xteddy/Makefile

DISTNAME= xteddy-1.1
CATEGORIES= x11 games
MASTER_SITES= http://www.ITN.LiU.SE/~stegu/xteddy/

MAINTAINER= johnam@mail.kemper.org
HOMEPAGE= http://www.ITN.LiU.SE/~stegu/xteddy
COMMENT= Xteddy is a cuddly teddy bear for your X Windows desktop

USE_X11= YES
GNU_CONFIGURE= YES

pre-install:

    ${INSTALL_DATA_DIR} ${PREFIX}/share/xteddy
    ${INSTALL_DATA_DIR} ${PREFIX}/share/xteddy/pixmaps

.include "../../graphics/xpm/buildlink3.mk"

.include "../../mk/bsd.pkg.mk"
Dependencies

Various ways:

- Compile-time only: BUILD_DEPENDS
- Compile- and runtime: DEPENDS
- Compile- and runtime: buildlink3.mk

Hubert Feyrer <hubertf@pkgsrc.org>, D'Arcy J. M. Cain <darcy@NetBSD.org>
The variables BUILD_DEPENDS and DEPENDS are assigned pairs of “Name-Version:Directory”. “Name-Version” is name and version of the required package, “Directory” is the path relative to this pkg’s directory where the package can be found if it’s not installed and needs to be built from source.
The `buildlink3.mk` files contain variables which say ...

- which header-files to use
  (BUILDLINK_INCDIRS.$BUILDLINK_PACKAGES)
- which libraries to use
  (BUILDLINK_LIBDIRS.$BUILDLINK_PACKAGES)
- which name+version of this package should be expected
  (BUILDLINK_DEPENDS.$BUILDLINK_PACKAGES)
- in which pkgsrc directory to look if the package needs to be installed
  (BUILDLINK_PKGSRCDIR.$BUILDLINK_PACKAGES)
- if there are additional CPP flags to use
  (BUILDLINK_CPPFLAGS.$BUILDLINK_PACKAGES)
- if this package needs further packages installed
```bash
$ cat graphics/tiff/buildlink3.mk
# $NetBSD: buildlink3.mk,v 1.8 2004/10/03 00:14:58 tv Exp $

BUILDLINK_DEPTH:= ${BUILDLINK_DEPTH}+
TIFF_BUILDLINK3_MK:= ${TIFF_BUILDLINK3_MK}+

.if !empty(BUILDLINK_DEPTH:M+)
BUILDLINK_DEPENDS+= tiff
.endif

BUILDLINK_PACKAGES:= ${BUILDLINK_PACKAGES:Ntiff}
BUILDLINK_PACKAGES+= tiff

.if !empty(TIFF_BUILDLINK3_MK:M+)
BUILDLINK_DEPENDS.tiff+= tiff>=3.6.1
BUILDLINK_RECOMMENDED.tiff+= tiff>=3.6.1nb3
BUILDLINK_PKGSRCDIR.tiff?= ../../../graphics/tiff
.endif  # TIFF_BUILDLINK3_MK

.include "../../../devel/zlib/buildlink3.mk"
.include "../../../graphics/jpeg/buildlink3.mk"

BUILDLINK_DEPTH:= ${BUILDLINK_DEPTH:S/+$//}
```

Hubert Feyrer <hubertf@pkgsrc.org>, D'Arcy J. M. Cain <darcy@NetBSD.org>
http://www.pkgsrc.org/

http://www.NetBSD.org/packages/