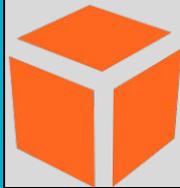# Desktop software in pkgsrc

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pkgsrc
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whoami(1)

Long time GNU/Linux user (since 90ties)

NetBSD user since 6.1

NetBSD developer since 2015

pkgsrc contributor

Desktop metaphor

An interface metaphor used in computing, which treats monitor as a real desktop and maps items on a real desktop with graphical objects represented on a monitor.

Desktop metaphor

An interface metaphor used in computing, which treats monitor as a real desktop and maps items on a real desktop with graphical objects represented on a monitor.

Computer Environment	Real-world desk
Application Window	Paper copy
Utility applications (calculator, calendar etc)	Desk accessories
Documents and folders	Documents and folders

Desktop metaphor

Mac OS (1984)

Users operate with their computers with graphical metaphors rather than textual commands.

Desktop metaphor

An interface metaphor used in computing, which treats monitor as a real desktop and maps items on a real desktop with graphical objects represented on a monitor.
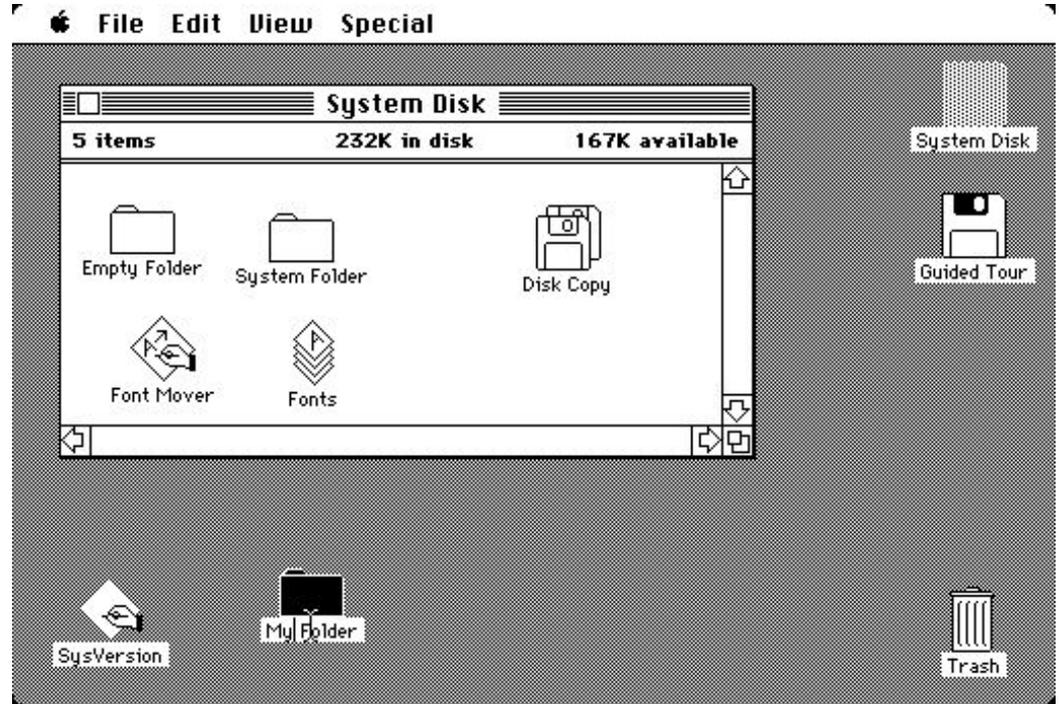
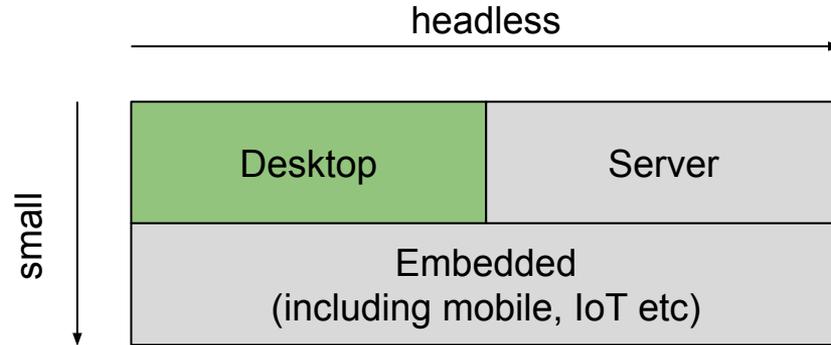Computer specific desktop items:

➢ menu bars,
➢ task bars,
➢ docks etc.

Desktop environment evolution

From WIMP (windows, icons, menus and pointer) [Xerox - 1974] to BumpTop [Google - 2012].

Animated wallpaper from http://bumptop.github.io/

Basic computer types

headless →

small ↓

Desktop	Server
Embedded (including mobile, IoT etc)	

Types of desktop programs

➤ **Application** - a computer program designed to help people perform an activity,

➤ **System utility** - performs maintenance or general–purpose chores,

➤ **Programming Tool** - creates programs.

```
main( ) {
        printf("hello, world");
}
```

Application software

➤ **Office software** – accounting, data management (contacts, spreadsheet, database), documents (word processor, publishing software, presentation software, E-mail), resource and project planning, financial software, …

➤ **Entertainment software** – screen savers, video games, …

➤ **Education software**

➤ **Multimedia software** – 3D graphics, animation, images, video, audio, html, …

➤ **Simulation software** – scientific, entertaining and educational, …

```
main( ) {
        printf("hello, world");
}
```

System utilities

- **Security** - Anti-virus, cryptographic, ...
- **Archivers** - backup, data compression, data synchronization, ...
- **Disk management** - defragmentation, checkers, space analyzers, ...
- **System monitors** - profilers, process management, ...
- **Network tools** - connectivity analysis, Wi-Fi, ...

```
main( ) {
        printf("hello, world");
}
```

Programming tools

- **Compilers**
- **Debuggers**
- **Profilers**
- **GUI designers** - RAD tools
- **Integrated Development Environment**
- **Development automation** - building, release, testing

```c
main( ) {
        printf("hello, world");
}
```

pkgsrc

Pkgsrc as a package manager is a utility (system management) software.

- ➢ pkgin – high–level package manager
- ➢ pkg_add – install and upgrade software
- ➢ pkg_info – display information on software packages
- ➢ pkg_delete – delete already installed software packages
- ➢ …

pkgsrc

Creating and maintaining packages requires development tools.

- � url2pkg – automatic package generator
- ✻ pkgdiff – package patch management
  - ✻ pkgvi – edit a given source-code file with $EDITOR
  - ✻ mkpatches – generate patch files for a package from edited source-code
- ✻ pkglint – static validator of a package
- ✻ createbuildlink – generator of buildlink3.mk
- ✻ ...

pkgsrc groups

archivers 118	editors 170	mail 365	regress 17
audio 508	emulators 359	math 299	security 515
benchmarks 48	filesystems 44	mbone 14	shells 32
biology 40	finance 52	meta-pkgs 109	sysutils 676
cad 73	fonts 813	misc 366	textproc 919
chat 151	games 383	multimedia 215	time 180
comms 85	geography 75	net 855	wm 102
converters 129	graphics 724	news 23	www 860
cross 48	ham 54	parallel 21	x11 793
databases 475	inputmethod 134	pkgtools 71	
devel 2235	lang 249	print 1259	wip 4350
			Total 19008

pkgsrc desktops
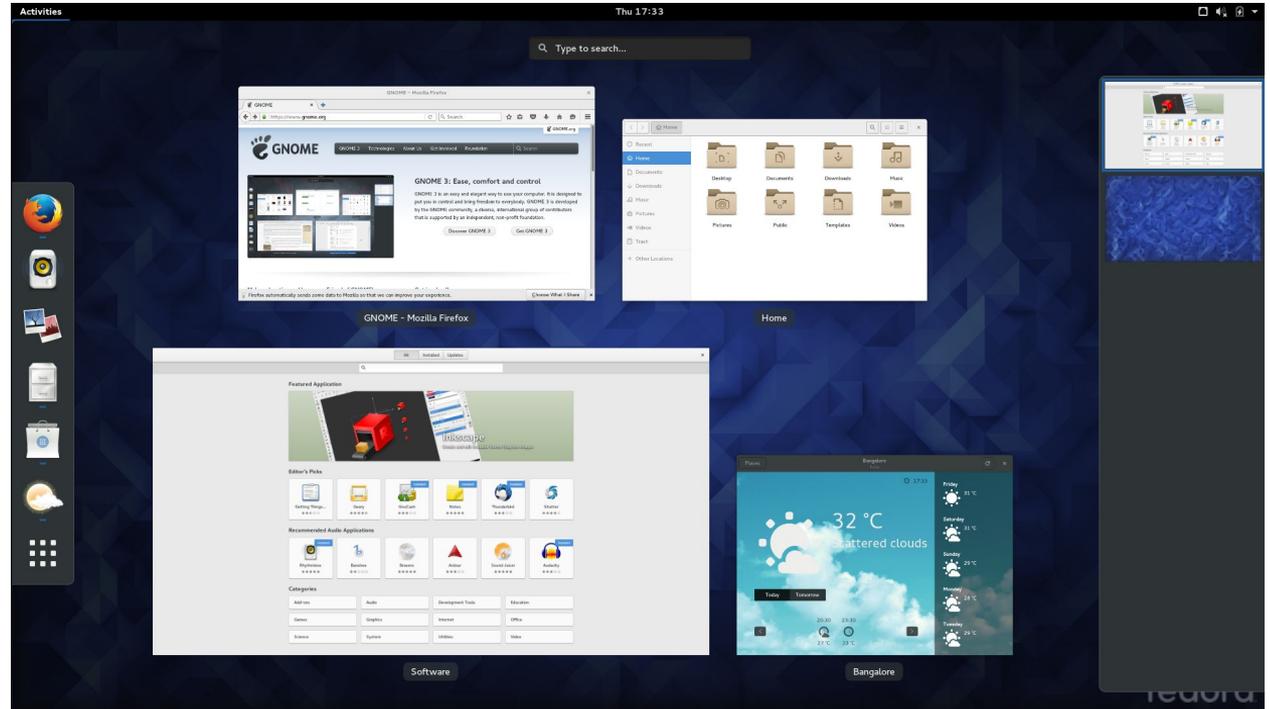
There are two main types of graphical desktops:

➢ Window Managers – manages windows on a screen
  ➢ dwm
  ➢ pekwm
  ➢ ctwm
  ➢ …
➢ Desktop Environments – WM + set of dedicated applications and utilities
  ➢ kde3, kde4
  ➢ gnome (2.x)
  ➢ mate
  ➢ xfce
  ➢ …

Gnome (GNU Network Object Model Environment)

Desktop environment that is composed of free software.

Currently part of the GNU Project.

Gnome (GNU Network Object Model Environment)

The GNOME desktop is composed out of 300 home-grown packages.
Some of them and promoted solutions:

- **GLib, GObject, GTK**+ – data structures, objects, type system, widget toolkit
- **WebKit** – layout engine software component for rendering web pages
- **D-Bus** – IPC framework
- **Cairo** – 2d vector-based drawing library
- **Pango** – international text rendering library
- **PulseAudio** – low-level audio API
- **Clutter** – accelerated graphics
- **Telepathy** – instant messaging

Gnome (GNU Network Object Model Environment)

Common portability problems:

⤻ Embedded calling Linux-specific commands or standard commands with Linux-specific options – for example *useradd*(8) *userdel*(8) in *accountsservice*

⤻ *udev* dependency – device manager for the Linux kernel

⤻ *inotify* – Linux kernel subsystem to notice changes to filesystems

⤻ GNU specific and unportable libc calls – e.g. *fgetpwent*()

⤻ *epoll* – Linux kernel scalable I/O event notification mechanism

⤻ Linux specific *procfs* dependencies

Gnome (GNU Network Object Model Environment)

Common portability problems & usual solutions:

- Embedded calling Linux-specific commands or standard commands with Linux-specific options – for example *useradd*(8) *userdel*(8) in *accountsservice*
  - Patch the source-code for portable or specific for other OSes command calls
- *udev* dependency – device manager for the Linux kernel
  - Sometimes rewrite the code for *libusb* support
- *inotify* – Linux kernel subsystem to notice changes to filesystems
  - Rewrite the code for *kqueue*(2) or use libinotify
- GNU specific and unportable libc calls – e.g. *fgetpwent*()
  - If possible use alternatives or reimplement functionality
- *epoll* – Linux kernel scalable I/O event notification mechanism
  - Rewrite the code for *kqueue*(2)
- Linux specific *procfs* dependencies
  - Reimplement needed functionality with *sysctl*(7) or fallback to Linux-compat procfs

Gnome (GNU Network Object Model Environment)

Common maintenance issues:

- hundreds of packages to keep up to date
  - major manpower issues
- maintain relations between libraries and their dependencies
  - often need to cooperate with upstream to get aligned with the recent libraries
- need for keep multiple versions of dependencies
  - notably multiple instances of WebKitGTK (GTK2, GTK3; version 2.4 API, version 3.0 API)
- frequent revolutions of low-level libraries
  - hal ↠ udev
  - policykit ↠ polkit
  - systemd?

Gnome (GNU Network Object Model Environment)

Current status of GNOME in pkgsrc (as of 2016Q2):

- **Gnome** 2.x – in *pkgsrc*
- Partial set of **Gnome3** packages in *pkgsrc* and *pkgsrc-wip*
- **MATE** (Gnome 2.x successor) imported into *pkgsrc*
- **Cinnamon** – not started, blocked by the lack of **Gnome3** core dependencies
- **Unity** (*Ubuntu*) – not started, at the moment not planned

Other desktop environments

The current status of other major desktop environments:

- **KDE** – similar story to GNOME
  - **KDE3, KDE4** in pkgsrc
  - **KF5** imported into *pkgsrc*
  - **plasma5** still in development in *pkgsrc-wip*
  - **TDE/Trinity** (**KDE3** successor) – not started
- **XFCE4** – actively maintained and supported on several platforms
- **LXDE** – lately imported into *pkgsrc*
- **LXQt** – partial support in *pkgsrc-wip*
- **Lumina** – initial package in *pkgsrc-wip*
- *...*

Benefits of first-class support of major DEs

➢ Match users' needs
➢ Easier deployment of user-friendly setup into end-user environment
➢ Validation of completeness of standard (POSIX) interfaces
➢ Verification of correctness of kernel and base system libraries and tools
➢ Reduced porting effort of 3rd party software to NetBSD and other OSes

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THANKS