

klik

Application virtualization with



klik

FOSDEM 2008
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Situation

**Every distribution
is its own world**



Applications
and *system* are
melted together,
all managed
by the *distro*

Apps

Apps

Apps

Apps

Apps

Apps

Sys

Sys

Sys

Sys

Sys

Sys



**What's *wrong*
with that?**

**Nothing, as long
as you stay
in your own world**

Complications

1

**What if
you want to test the latest
bleeding edge software
without risking to break
your system?**

Downloads

The current Windows version is **1.5.0**. The current *nix version is **1.5.0**.

Description

Files



(Windows)

[1.5.0.exe](#)
[1.5.0-no-gtk.exe](#)
[1.5.0-debug.exe](#)



(Fedora Core 4)

[Please obtain from a Fedora Core mirror.](#)

(Fedora Core 3)

[Please obtain from a Fedora Core mirror.](#)

(Fedora Core 2)

[1.5.0-0.fc2.i386.rpm](#)
[devel-1.5.0-0.fc2.i386.rpm](#)
[silc-1.5.0-0.fc2.i386.rpm](#)
[tcl-1.5.0-0.fc2.i386.rpm](#)



(Fedora Core 1)

[1.5.0-0.fc1.i386.rpm](#)
[devel-1.5.0-0.fc1.i386.rpm](#)
[silc-1.5.0-0.fc1.i386.rpm](#)
[tcl-1.5.0-0.fc1.i386.rpm](#)

(Red Hat 9)

[1.5.0-0rh9.i386.rpm](#)
[devel-1.5.0-0rh9.i386.rpm](#)
[silc-1.5.0-0rh9.i386.rpm](#)
[tcl-1.5.0-0rh9.i386.rpm](#)

(Mandrake 10.0)

[1.5.0-0.mdk10.0.i586.rpm](#)
[devel-1.5.0-0.mdk10.0.i586.rpm](#)
[silc-1.5.0-0.mdk10.0.i586.rpm](#)
[tcl-1.5.0-0.mdk10.0.i586.rpm](#)



2

Want to switch
from  to  ?

Do it
all over again

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Time is money

A distro switch
shouldn't require
you to *get* and *install*
all apps *again*

Imagine
an mp3 file would
be „melted“
to your system
as soon as you
„install“ it

3

Want to have



2.3

&

?



2.4

Ask an expert

**„Compile with
PREFIX=/usr/local/bin/ooo2“**

```
=====  
Building project mdbtools  
=====  
/usr/src/ark/BUILD/ooo-build/build/src680-m122/mdbtools  
mkout -- version: 1.4  
-----  
Making: ./unxlngi6.pro/misc/mdbtools.dpc  
dmake subdmake=true -f makefile.mk depend=t ALLDPC  
-----  
No Dependencies  
-----  
dmake: Error -- `./unxlngi6.pro/misc/mdbtools-0.6pre1.unpack' not found,  
and  
can't be made  
'---* tg merge.mk *---'
```



4

Want to run apps
from your USB thumbdrive...



And even with all the settings,
plug-ins and bookmarks?

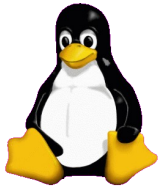


Can do it with some help
(„Portable Apps“)



Mac

Can do it out of the box



Good luck!



5

The classic problem:



No.

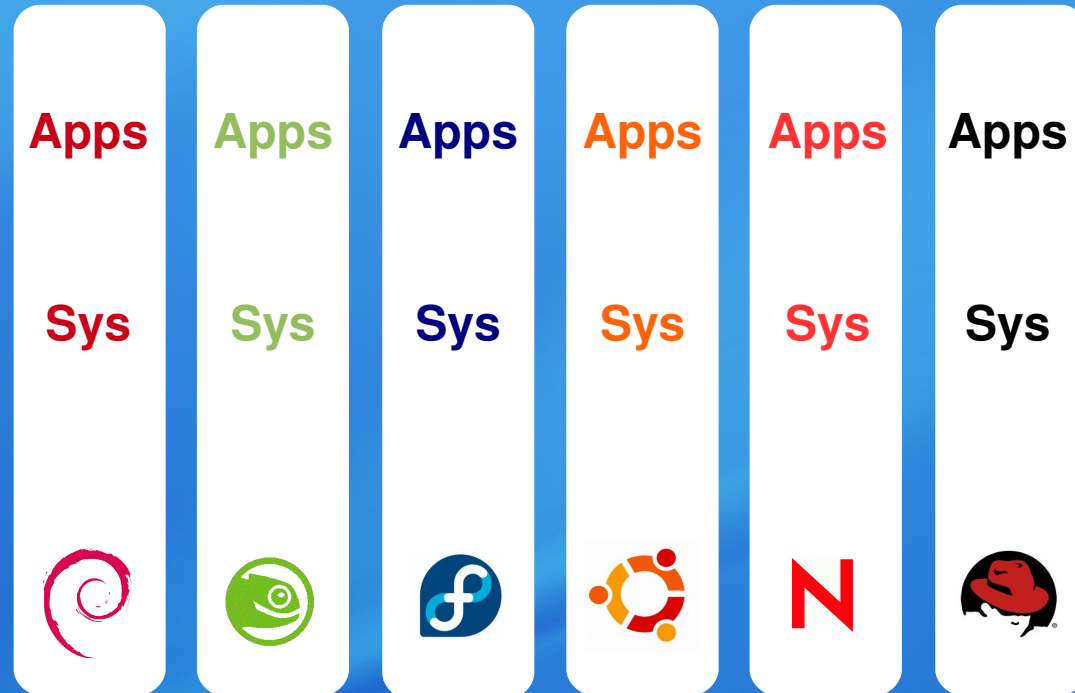
We mean completely.

***(Including the zillions
of dependencies and libs that were
installed along with it...)***



**(if you didn't
just use what came
with your distro
or otherwise are lucky)**

OK, maybe this



isn't the greatest approach of all times

Suggestion

It should really look like this:

End-user application software

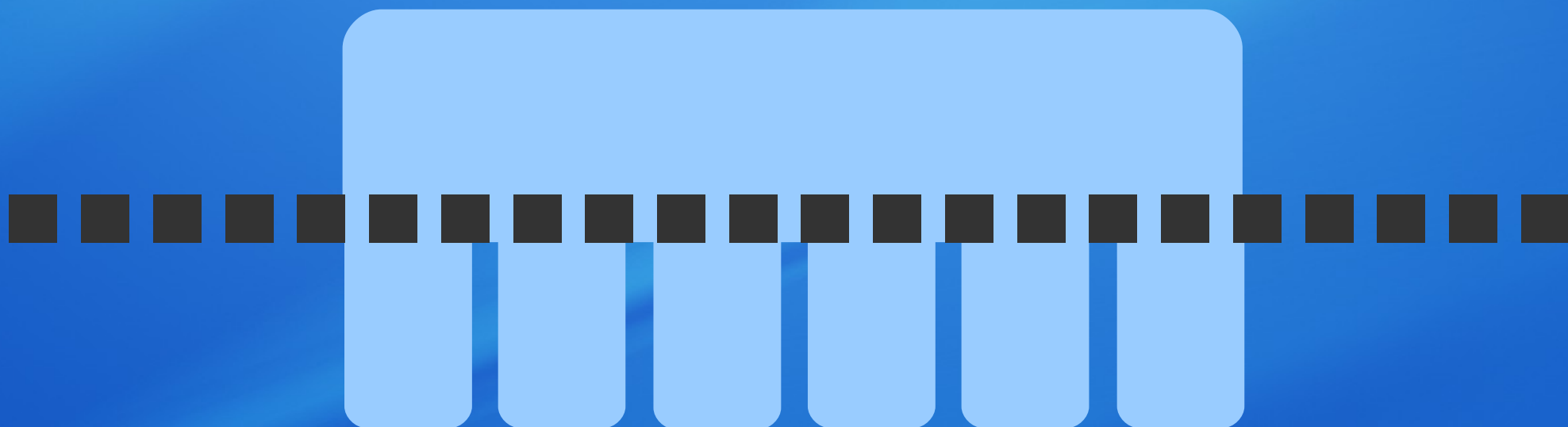


Manually managable by the user

Base system/platform

Centrally managed by distro

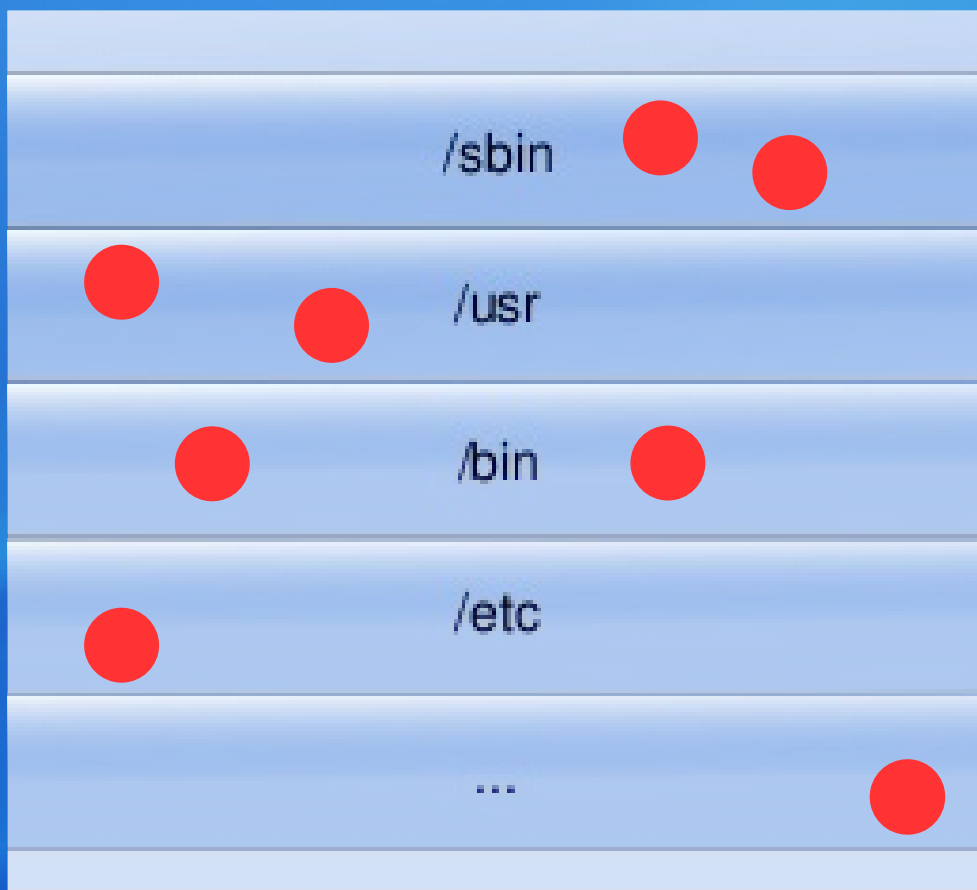
The most important
aspect of this picture:



**Clear separation
between the base system
and the applications**

„Application virtualization“

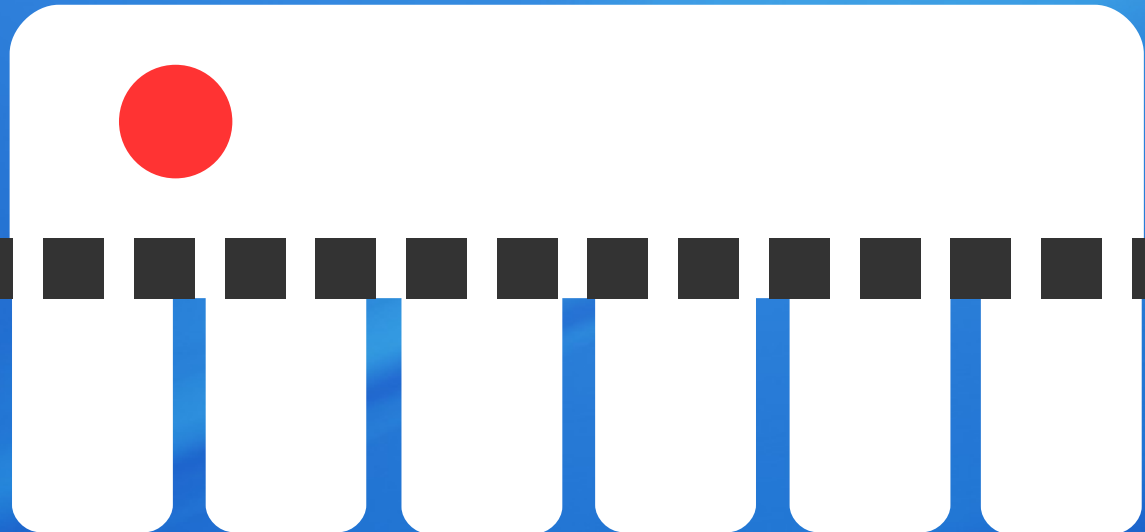
Traditional installers
put files all over the place
in the system:



By the way, that's known
to  users as
„DLL hell“ and
„registry hell“.

klik does it differently:

Apps

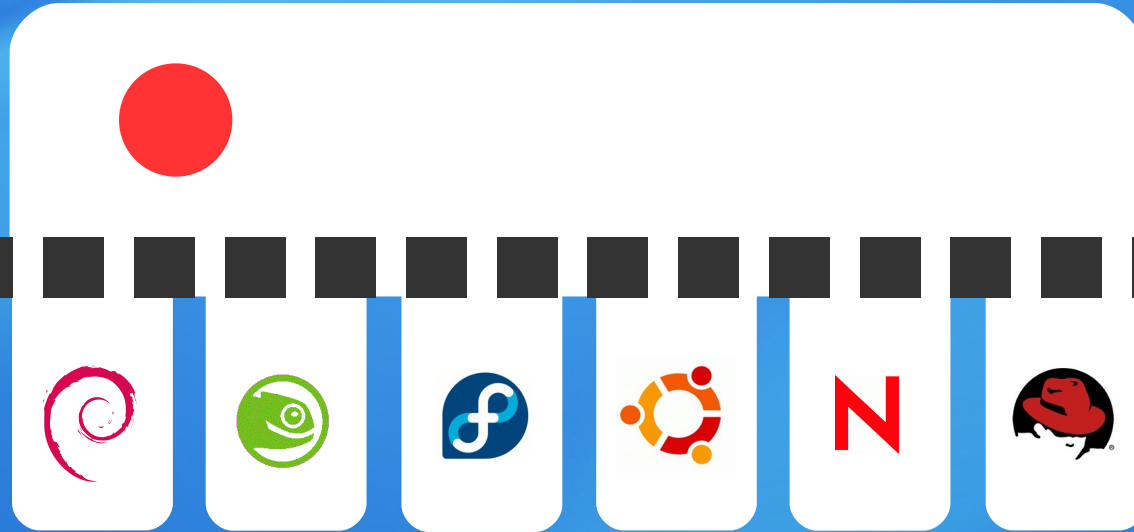


Platform

1 app
= 1 file

And the dependencies?



Apps



Platform

Are either
part of the platform
or part of the **1** file

Some advantages:

- 1** Only **1** file per app (no confusion)
- 2** Can take this **1** file from e.g.,  to 
- 3** Multiple versions of app in parallel
- 4** Can run **1** file from USB thumbdrive
- 5** Put **1** file into trash to delete it all

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And some more:

- 6 Can't mess up the system
- 7 Saves disk space, 1 file is compressed
- 8 Lower costs for ISV software packaging
- 9 Can run apps in jail, take settings with me
- 10 No root rights required! ...

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Demo

Notice what did NOT happen:

Did NOT add repositories

Did NOT need root rights

Did NOT change the base system

Implementation

The **1** file
is an ISO file
called
„Compressed
Application Image“

**It contains
everything the app
needs...**

**...that is not part of the
base system**

The **1** file is generated locally by the klik client



Recipe



Binary ingredients



XML

Recipe

In clear text:

„Go to the Skype website, check for the latest version, download it, unpack it, and put it into the ISO“



Closed apps can be used
Existing mirror infrastructure
Instant updates
Increases trust

XML

Recipe

Developed with 0install to share same structure

- **Name**
- **Version**
- **Debtags**
- **Description**
- **Icon**
- **URLs of ingredients**
- **Custom mv, cp,... instructions**
- **Environment variables**
- **Command to run**
- **GPG signature**

***YOU* can also do it !**

XML

Recipe

Example (simplified)

```
<?xml version="1.0" ?>
<interface>
  <name> ■■■ </name>
  <summary> ■■■ </summary>
  <description> ■■■ </description>
  <group main="■■■">
    <implementation>
      <recipe>
        <archive href="■■■" />
      </recipe>
    </implementation>
  </group>
</interface>
```

XML

Recipe

Example

```
<?xml version="1.0" ?>
<interface>
  <name>xvier</name>
  <summary>a "Four in a row" game</summary>
  <description>Xvier is a simple X game
</description>
  <group main="">
    <implementation union="/"
version="1.0-7.3p2" downloadsize="22.6kB">
      <recipe>
        <archive
href="http://de.archive.ubuntu.com/.../xvier_1.0-7.
3ubuntu2_i386.deb"
md5="4855dc27db1736ca7d0ae6952a2a70d2" name="xvier"
/>
      </recipe>
    </implementation>
  </group>
</interface>
<!-- Base64 Signature
iD8DBQBHo1WwuqXsV3v0BTkRAocIAJ9rvbItJiWX/tIIsxdf5M
+wgXd0BACdGg700rWI7qBn2x9SeUMFDyeiB3Y=
-->
```

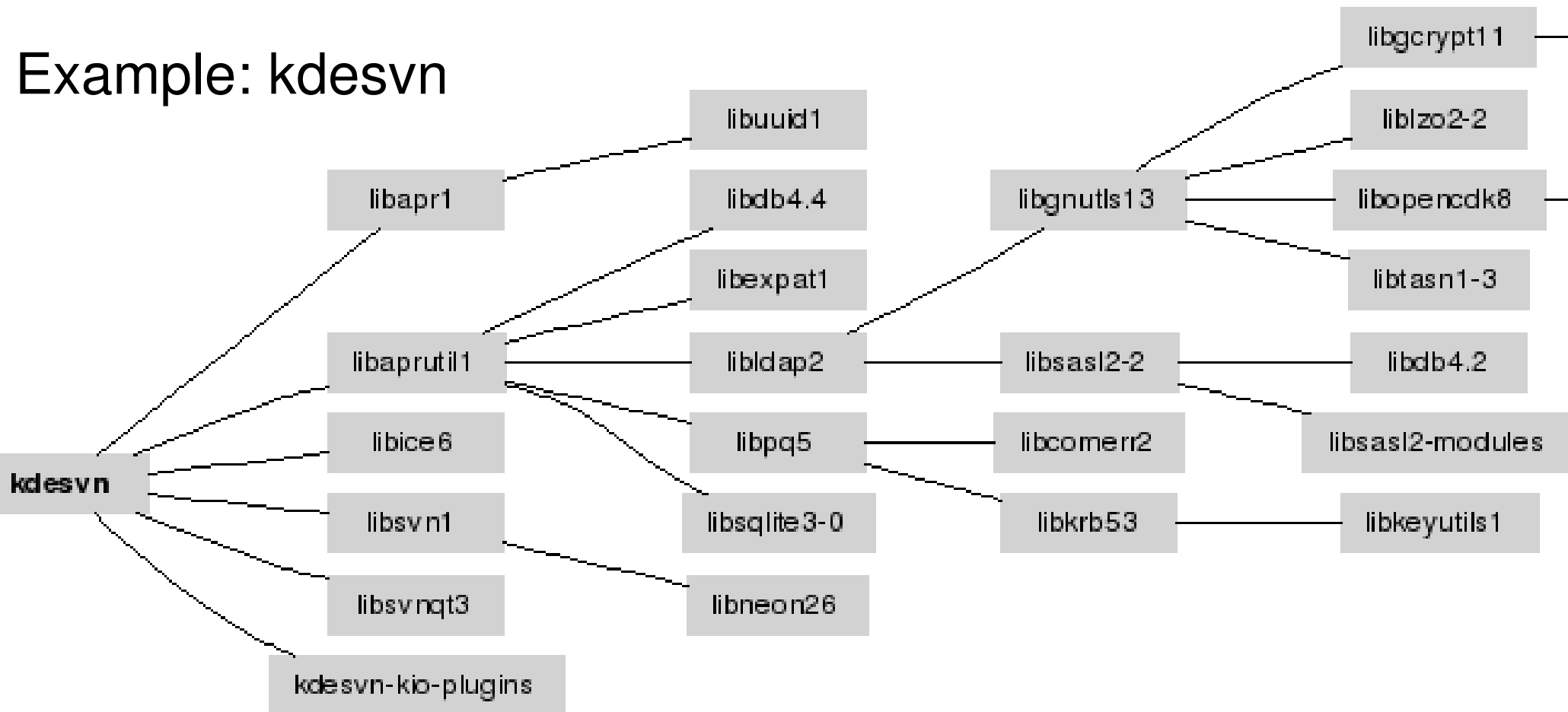
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Demo

**serverside-apt
does this
for most packages**

serverside dependency calculation on the fly

Example: kdesvn





Recipe

+



**Binary
ingredients**

=



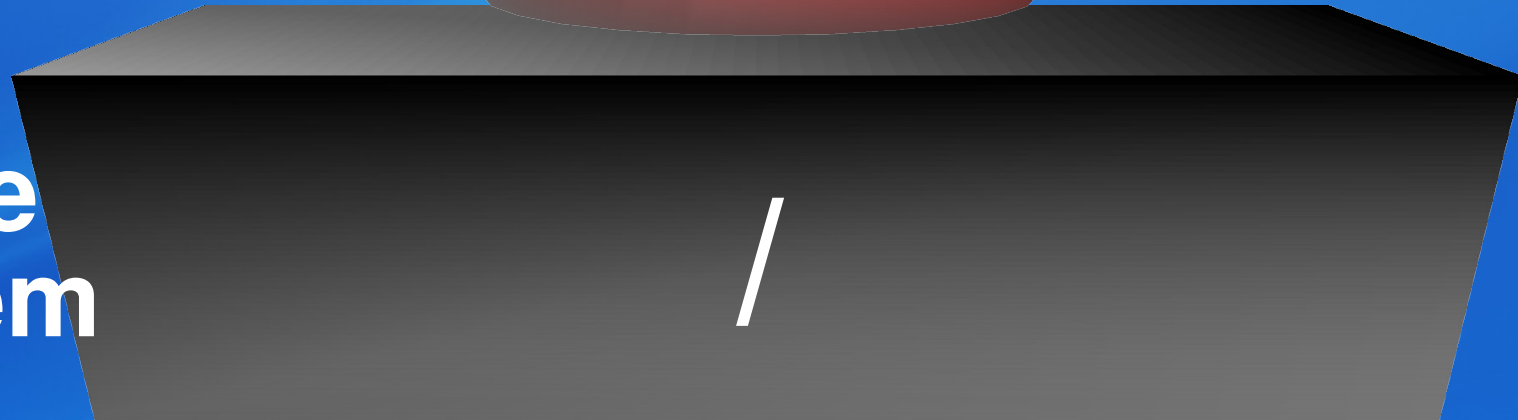
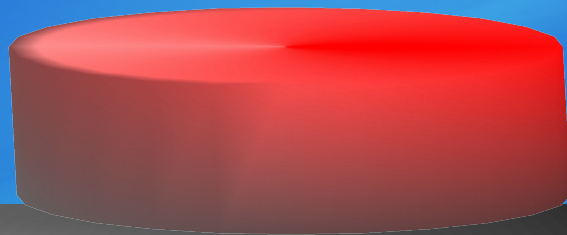
The result looks like this:



/usr
/usr/bin
/usr/lib
/usr/share
/recipe.xml
/.DirIcon

At runtime,
the app.cmg is mounted
and overlaid over /

application

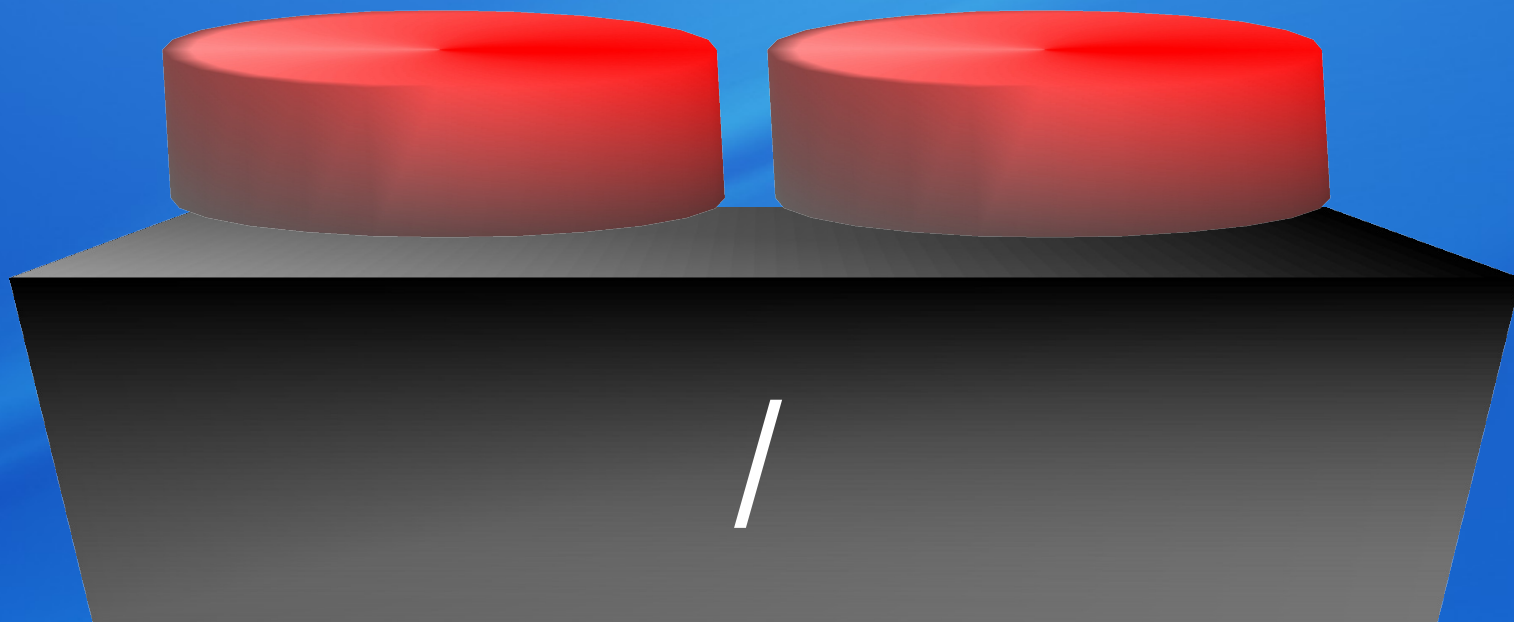


base
system

Per-process (other apps don't see it)

App 1

App 2



**FUSE
does this
for us**

**klik client mounts ISO in userland
with FUSE/fusioniso**

**fusioniso mirrors /
to /tmp/klik/foo**

**fusioniso overlays cmg file
hierarchy to /tmp/klik/foo**

**Application runs in a chroot
„seeing“ /tmp/klik/foo as /
using fakechroot**

FUSE = Filesystem in a UserSpaceE

- Available for



2.4/2.6
(default
2.6.14+)



NetBSD



FreeBSD



Mac OS X



GNU Hurd

- Kernel module

- /dev/fuse

- Userspace libs and programs

- fusemount
 - libfuse

Fakechroot = FakeChangeroot

- **Userland chroot implementation**
- **LD_PRELOAD**
Regular, non-setuid program
- **Our patched fakechroot gives direct access to /tmp, /proc, /dev and /var/run since FUSE does not emulate them for security reasons**
- **Rewrites paths to give the illusion of a jail from the filesystem point of view**

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Demo

**Something
is still missing
for full
„application
virtualization“**

A writeable layer



**fusioniso
does that**

**klik client mounts ISO in userland
with FUSE**

fusioniso mirrors / to /tmp/klik/foo (ro)

**fusioniso overlays cmg file hierarchy
to /tmp/klik/foo (ro)**

**fusioniso overlays data directory
to /tmp/klik/foo (rw)**

**Application runs in a chroot
„seeing“ /tmp/klik/foo as /**

fusioniso

- **Based on fuseiso**
 - **FUSE module to mount ISO9660 images**
 - **Allows for compressed images (zisofs)**
- **Added two main functions**
 - **Union mounting merge filesystems**
 - **Sandboxing redirect writes**

What goes into the writeable layer can be adjusted

Description	Ingredients	Recipe	Options
Jail:	<p>None</p> <p>Entire System</p> <p>Allow home folder access</p> <p>Make application portable</p>		

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Demo

Desktop menu integration?

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**klikd
does that**

**klikd watches Desktop/ (or other)
for changes**

**As soon as a cmg appears or
disappears, it extracts the .desktop file**

**The .desktop file updates the menus
and integrates the application into the
system**

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Demo

Command line applications?

**Work transparently,
just put them into
the \$PATH**

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Demo

Challenges

Problem:

**Which binaries run on
most distros?**

Solution: Backports*
compiled on the LSB
reference platform

* Do it!

Problem:

**Some apps aren't recent
or aren't working**

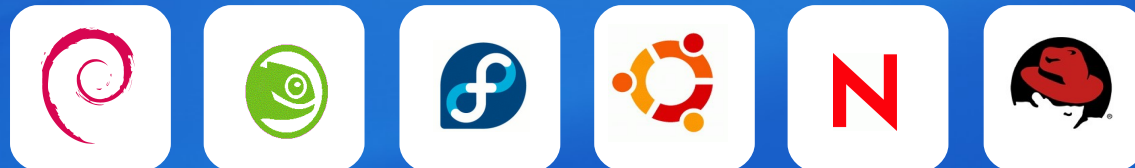
Solution: Volunteers*

*** upstream authors/packagegers: contact us**

Problem:

The klik client itself
needs to be installed

Solution:
Get it into



Inspiration from, thanks to...

Apple software in disk images

ISO image format

Knoppix zero config success

FUSE userspace mounting

Dmitry Morozhnikov fuseiso

Piotr Roszatycki fakechroot

Plan-9 union mounting

Debian apt, debtags

Ubuntu ingredients

Users feature requests

Get involved

Simon Peter PROJECT LEAD, RECIPES

Kurt Pfeifle EVANGELIST

Jason Taylor KLIKCLIENT

Lionel Tricon FUSIONISO

RazZziel KLIKD

Niall Walsh DEB PACKAGER

You? KDE FRONTEND

You? RPM PACKAGER

You? RECIPE WRITER + QC

You? ...

Q&A



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**<http://klikclient.googlecode.com>
#klik on irc.freenode.net**



Thanks to all contributors on #klik, Thanks to debian and Ubuntu for the software compilation and packaging. Thanks to our hosting sponsor, atekon. Thanks to all users who give feedback. © 2004-08 Simon Peter, probono@myrealbox.com. Published under Creative Commons Attribution-NoDerivs 2.5 License. <http://creativecommons.org/licenses/by-nd/2.5/> All trademarks are quoted for informational purposes only and are trademarks of their respective holders.