Linux

Multiarch overview in Linux distros and their build systems
Agenda

1. Package basics
2. Fedora, OpenSUSE && build processes
3. Debian/Ubuntu, Gentoo, ArchLinux
4. Summary
Basic package stack

Smart package manager

- yum, dnf, zypper
- apt-get, aptitude
- Portage (ebuild)
- Pacman (PKGBUILD)

Low level manager

- rpm (.spec)
- dpkg (.dsc)

Package formats

- .rpm
- .deb
- .tbz2
- .pkg.tar.xz
Package internals

- Meta-information
  - Package name
  - Package arch
  - ...

- Content
  - Binaries
  - Libraries
  - Docs
  - Headers
  - Debug files
  - ...

<table>
<thead>
<tr>
<th>Package</th>
<th>Name</th>
<th>Arch</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>somepac</td>
<td>x86_64</td>
<td>64bit binaries</td>
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</table>

Excellence in Software Engineering
Multiarch (bi-arch, multilib)

- SW issues
  - Builds not on all arches
    - Grub, wine
  - No sources, only binaries
    - Steam, skype, other vendor packages

- Resolution
  - Place different arches in one setup
  - Start point x86_32 in x86_64
Fedora build process
# Fedora build process

<table>
<thead>
<tr>
<th>Sources</th>
<th>Build System (koji)</th>
<th>Publish (mash)</th>
<th>Final repo</th>
</tr>
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<tbody>
<tr>
<td>Package sources (cgit)</td>
<td></td>
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<tr>
<td>Build arch x86_64</td>
<td>Builder (buildenv)</td>
<td>name: glibc32</td>
<td>x86_64 repository</td>
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<td>Build arch i686</td>
<td>Packages (internal repo)</td>
<td>arch: x86_64</td>
<td>i686 repository</td>
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<tr>
<td></td>
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<td>Content: 32bit</td>
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<td></td>
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<td>merge</td>
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</table>
# yum install pkgname.arch

/lib32, /lib64
## OpenSUSE build process (OBS)

<table>
<thead>
<tr>
<th>Sources</th>
<th>Build System</th>
<th>Publish to repo</th>
</tr>
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<tr>
<td>Package sources</td>
<td>Worker (buildenv; obs-build)</td>
<td>x86_64 repository</td>
</tr>
<tr>
<td>Build arch x86_64</td>
<td>Packages (internal repo)</td>
<td></td>
</tr>
<tr>
<td>Build arch i686</td>
<td>Packages (internal repo)</td>
<td>Basinlibs: pkgname-&gt;pkgname-32bit Pkgarch: i686-&gt;x86_64</td>
</tr>
<tr>
<td></td>
<td>Worker (buildenv; obs-build)</td>
<td>i686 repository</td>
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</table>
OpenSUSE zypper

# zypper install pkgname

/lib32, /lib64
Debian < 7, Ubuntu < 11.04

- Pkgname:
  - ia32-libs* (20130215)
  - lib32gcc1
  - lib32*

- Pkgarch: amd64
- Pkgcontent: 32bit
Debian 7, Ubuntu 11.04

- **dpkg**
  - “pkgname:arch”
- **Pkgname**
  - Same for both arches: libgcc1:amd64, libgcc1:i686
- **Pkgarch**: amd64
- **Pkgcontent**: 64-bit

- **gcc-multilib deps?**
  - No, still lib32gcc1,etc.
- **buildd?**
  - Manual package build/upload?
- **FHS ignore**
  - \{prefix\}/lib/\{gnu-triplet\}
Gentoo

• emul-linux*
  – 15 big packages
  – Content 32bit, pkgarch amd64

• gx86-multilib project
  – eclasses wrapper
  – Abi use flags (abi_x86_32, abi_x86_64)

– “wine” in tree as example

• multilib-portage (fork)
  – No modifications in ebuilds
ArchLinux

• Multilib repo
  – 174 packages
    • x86_64 pkg arch
    • lib32-* pkg names
    • wine, skype, steam
  – gcc-multilib replaces gcc
Summary

• Fedora in OBS possible future improvements:
  – Spec release: fixed
  – File deps: no (prjconf)
  – Fedora multiarch (for build): like koji – bad
  – Fedora multiarch (for images): no/yes

• Dependencies

• Future
  – pkgarch == pkgcontentarch
  – Running not old packages/programs/arches
  – Arch switch without reinstall
    • Binaries collision, FHS
  – Automation, clear processes
  – Virtualization