Packaging made easy

How the openSUSE build service makes building packages easy for developers who don't care about packaging

Cornelius Schumacher <cschum@suse.de>
Motivation

• Packaging: Creating installable binaries of software for end users

• Assumption: Software developers don't like packaging
  • Requires specific skills and knowledge
  • Needs time, big fraction of the time is spent waiting
  • Effort multiplies with number of platforms the software should run on

• Solution: openSUSE Build Service provides tools to make packaging easy
Overview

• Architecture
• Tools
  • Web Client
  • Command Line Client
  • Upstream Integration Client
  • Native GUI Client
• Getting Involved
Architecture
Architecture

- Web Client
- Command Line Client
- openSUSE API
- Backend
  - Build Host
  - Build Host
  - Build Host
  - Build Host
  - Build Host
- Frontend
- Your Client
- Installer (YaST, etc.)
- Mirror Interface
Backend

- Building Packages

- Storage for sources (version controlled)
- Farm of build hosts for building packages
- Runs sandboxed builds (using XEN)
- Build for multiple hardware architectures (currently i586, x86_64)
- Storage for built packages
- Provide build status and logs
Mirror Interface

- Interface to mirrors
- Interface to end users through installation tools
- Syncing with mirrors (rsync, drpmsync)
- Installation source meta data (apt, yum, SUSE)
- Redirecting users to up-to-date mirrors
- Support end users with finding and installing packages from openSUSE
- Planned: Notification about new versions (RSS, mail, ...)

- http://software.opensuse.org/download
Frontend

• Programming Interface to the Build Service
• Public API for client tools
• Access to sources
• Access to build status and logs
• Access to built packages
• Control build
• User management
openSUSE API

- Public Programming Interface for the openSUSE Build Service
- Web Service
- REST based API
- XML over HTTP
  - Frontend functionality exposed through HTTP operations
  - Control and meta data is transferred and stored as XML
  - Schema validation for all XML data
- Leverages use of standard tools and frameworks
Client Tools

- User Interface for Developers and Packagers

- Web Client
  - based on Ruby on Rails

- Command Line Client (osc)
  - SVN-style user interface
  - Python
  - supports local builds

- oscupstream
  - integration with upstream SVN repositories
Web Client Demo
Web Client

http://build.opensuse.org
Example: adding a screen package

**mls's Home Project**

*Project ID: home:mls*

[Watch this project]

**mls's Home Project**

[Edit Project Information]

**Tags**

- coming soon

**Category**

- coming soon

**People**

Maintainers

- mls

[Add Maintainer]

**Packages**

[Add Package]

[Link Package from other Project]

**Build Repositories**

[Add Repository]

*Add packages/repositories to enable the build monitor*
Entering package data

New Package in project home:mls

Name:

Title:

Description:

☐ Create RPM SPEC file template

Save changes
New Package in project home:mls

Name:
screen

Title:
A program to allow multiple screens on a VT100/ANSI Terminal

Description:
With this program you can take advantage of the multitasking abilities of your Linux system by opening several sessions over one terminal. The sessions can also be detached and resumed from another login terminal.

[Create RPM SPEC file template]

Save changes
Adding files to a package

Package 'screen' was created successfully

Package screen (Project home:mls)

Title: A program to allow multiple screens on a VT100/ANSI Terminal

Description:
With this program you can take advantage of the multitasking abilities of your Linux system by opening several sessions over one terminal. The sessions can also be detached and resumed from another login terminal.

[Edit Package Information] [Remove Package]

Files

[Add File]

Involved Users

<table>
<thead>
<tr>
<th>Userid</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>mls</td>
<td>maintainer</td>
</tr>
</tbody>
</table>

[Add User]

[Trigger Rebuild]

Back to Project 'home:mls'
cont.

Add File (Project home:mls, Package screen)

Filename (leave empty to take from upload):

Filetype:

source

Local File:

Save changes
Add File (Project home: mls, Package screen)

Filename (leave empty to take from upload):

Filetype:
- source

Local File:
/suse/mls/screen/screen_4.0.2-4.1.spec

Save changes
Package screen (Project home:mls)

Title: A program to allow multiple screens on a VT100/ANSI Terminal

Description:
With this program you can take advantage of the multitasking abilities of your Linux system by opening several sessions over one terminal. The sessions can also be detached and resumed from another login terminal.

Files

screen_4.0.2-4.1.spec [Edit] [Download] [Remove]

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[Add User]

[Trigger Rebuild]

Back to Project 'home:mls'
cont.

Package screen (Project home:mls)
Title: A program to allow multiple screens on a VT100/ANSI Terminal
Description:
With this program you can take advantage of the multitasking abilities of your Linux system by opening several sessions over one terminal. The sessions can also be detached and resumed from another login terminal.

Files
screen_4.0.2-4.1.diff.gz  [Download] [Remove]
screen_4.0.2-4.1.dsc  [Download] [Remove]
screen_4.0.2-4.1.spec  [Edit] [Download] [Remove]
screen_4.0.2.orig.tar.gz  [Download] [Remove]

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</tbody>
</table>

[Add User]

[Trigger Rebuild]

Back to Project 'home:mls'
We have a new package!

mls's Home Project

Project ID: home:mls
[Watch this project]

mls's Home Project

[Edit Project Information]

Tags
  coming soon

Category
  coming soon

People
  Maintainers
    mls

[Add Maintainer]

Packages

Build Repositories

[Add Repository]

Add packages/repositories to enable the build monitor
Adding Repositories

Add Repository (Project home:mls)

- SUSE Linux 10.1
- SUSE Linux 10.0
- SUSE Linux 9.3
- SLE 10
- SLES 9
- SUSE Factory
- Debian Etch
- Fedora 4 with Extras
- Fedora 5 with Extras
- Mandriva 2006
- xUbuntu 6.06

[Advanced]
Target 'SUSE:Factory/standard' was added successfully

**mls's Home Project**

**Project ID:** home:mls

[Watch this project]

**mls's Home Project**

[Edit Project Information]

**Tags**

- coming soon

**Category**

- coming soon

**People**

Maintainers
mls

[Add Maintainer]

**Packages**

- screen

[Add Package]

[Link Package from other Project]

**Build Repositories**

<table>
<thead>
<tr>
<th>Name</th>
<th>i586</th>
<th>x86_64</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUSE_Factory</td>
<td></td>
<td></td>
<td>[Remove]</td>
</tr>
</tbody>
</table>

[Add Repository]

[Monitor Build Status]
mls's Home Project

Project ID: home:mls

[Watch this project]

mls's Home Project

[Edit Project Information]

**Tags**
- coming soon

**Category**
- coming soon

**People**
- Maintainers
  - mls

[Add Maintainer]

**Packages**

| screen | [Remove] |

[Add Package]
[Link Package from other Project]

**Build Repositories**

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</thead>
<tbody>
<tr>
<td>SUSE_Factory</td>
<td>building: 1</td>
<td>building: 1</td>
<td>[Remove]</td>
</tr>
<tr>
<td>Mandriva_2006</td>
<td>building: 1</td>
<td>n/a</td>
<td>[Remove]</td>
</tr>
<tr>
<td>Debian_Etch</td>
<td>building: 1</td>
<td>n/a</td>
<td>[Remove]</td>
</tr>
</tbody>
</table>

[Add Repository]

[Monitor Build Status]
cont.

screen_4.0.2-4.1.diff.gz  [Download] [Remove]
screen_4.0.2-4.1.dsc     [Download] [Remove]
screen_4.0.2-4.1.spec   [Edit] [Download] [Remove]
screen_4.0.2.orig.tar.gz [Download] [Remove]

[Add File]

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<td>maintainer</td>
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</table>

[Add User]

Build Status

SUSE_Factory
- x86_64 building [Live Build Log]
- i586 building   [Live Build Log]

Mandriva_2006
- i586 building   [Live Build Log]

Debian_Etch
- i586 building   [Live Build Log]

[Trigger Rebuild]

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Build Log for Package screen (Project home:mls)

Repository: SUSE_Factory
Architecture: x86_64

[Start Autoscroll]

[Start Refreshing]

Status: Live Log not started

build07 started "build screen_4.0.2-4.1.spec" at Mon Aug 7 21:45:11 CEST 2006.

Building 'screen' for project 'home:mls' target 'SUSE_Factory' arch 'x86_64' srcmd5 '9f141622a59ca3a7a7d49ad6a Using BUILD_ROOT=/BUILD/root_7 Using BUILD_ARCH=x86_64:

.1686:

.1586:

.1486:

.1386

processing specfile /BUILD/root_7/build-srmdir/screen_4.0.2-4.1.spec... init_buildsystem --rpmlist /BUILD/root_7/rpmlist screen_4.0.2-4.1.spec ... preinstalling aaa_base... preinstalling acl... preinstalling attr... preinstalling bash... preinstalling bzip2... preinstalling coreutils... preinstalling db... preinstalling diffutils... preinstalling filesystem...
screen.c: In function 'CoreDump':
screen.c:1518: warning: ignoring return value of 'write', declared with attribute warn_unused_result
screen.c: In function 'Panic':
screen.c:1992: warning: ignoring return value of 'write', declared with attribute warn_unused_result
screen.c:1993: warning: ignoring return value of 'write', declared with attribute warn_unused_result
screen.c: In function 'serv_select_fn':
screen.c:2919: warning: ignoring return value of 'write', declared with attribute warn_unused_result
gcc -c -I. -I. -fmessage-length=0 -D_FORTIFY_SOURCE=2 -O2 ansi.c
In file included from screen.h:25,
   from ansi.c:31:
os.h:148:1: warning: "bcopy" redefined
In file included from /usr/include/string.h:422,
   from os.h:90,
   from screen.h:25,
   from ansi.c:31:
/usr/include/bits/string3.h:100:1: warning: this is the location of the previous definition
gcc -c -I. -I. -fmessage-length=0 -D_FORTIFY_SOURCE=2 -O2 fileio.c
In file included from screen.h:25,
   from fileio.c:33:
os.h:148:1: warning: "bcopy" redefined
In file included from /usr/include/string.h:422,
   from os.h:90,
   from screen.h:25,
   from fileio.c:33:
/usr/include/bits/string3.h:100:1: warning: this is the location of the previous definition
fileio.c: In function 'WriteFile':
fileio.c:442: warning: ignoring return value of 'ftruncate', declared with attribute warn_unused_result
fileio.c: In function 'printpipe':
fileio.c:775: warning: ignoring return value of 'dup', declared with attribute warn_unused_result
gcc -c -I. -I. -fmessage-length=0 -D_FORTIFY_SOURCE=2 -O2 mark.c

[Stop Autoscroll]
Involved Users

<table>
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<tr>
<td>mls</td>
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[Add User]

Build Status

<table>
<thead>
<tr>
<th>Platform</th>
<th>Status</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>x86_64</td>
<td>succeeded</td>
<td>[Live Build Log]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>screen-4.0.2-64.1.x86_64.rpm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>screen-4.0.2-64.1.src.rpm</td>
</tr>
<tr>
<td>i586</td>
<td>succeeded</td>
<td>[Live Build Log]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>screen-4.0.2-64.1.i586.rpm</td>
</tr>
<tr>
<td></td>
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<td>screen-4.0.2-64.1.src.rpm</td>
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Mandriva_2006

<table>
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<th>Platform</th>
<th>Status</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>i586</td>
<td>building</td>
<td>[Live Build Log]</td>
</tr>
</tbody>
</table>

Debian_Etch

<table>
<thead>
<tr>
<th>Platform</th>
<th>Status</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>i586</td>
<td>building</td>
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[Trigger Rebuild]

Back to Project 'home:mls'
## Build Status

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<td>[Live Build Log]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>screen_4.0.2-4.1_i386.deb</td>
</tr>
</tbody>
</table>

[Trigger Rebuild]

Back to Project 'home:mls'
Example: home:mls
cont.

mls's Home Project (SUSE_Factory)

- Indexed Packages: 3
- Available Architectures: i586, src, x86_64

Latest packages:

- 07-Aug-2006: [screen-4.0.2-64.1] A program to allow multiple

Available Groups

- System/Console
- Last 1 Packages Updated
Adding YaST Installation Source

In this dialog, manage configured software catalogs.

Adding a New Catalog
To add a new catalog, use Add and specify the software catalog.

To install packages from CD, have the openSUSE CD set or the DVD available.

The openSUSE CDs can be copied to the hard disk. Then use that as the installation source. Insert the path name where the first CD is located, for example, /data1/CD1. Only the base path is required if all CDs are copied into one directory.

Configured Software Catalogs

<table>
<thead>
<tr>
<th>Status</th>
<th>Refresh</th>
<th>Name</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>On</td>
<td>YUM</td>
<td><a href="http://software.opensuse.org/download/home/%5CAfraTag/openSUSE_10.2/">http://software.opensuse.org/download/home/\AfraTag/openSUSE_10.2/</a></td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>YaST</td>
<td><a href="http://download.opensuse.org/distribution%5C10.2%5Crepo%5Coss/">http://download.opensuse.org/distribution\10.2\repo\oss/</a></td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>YaST</td>
<td><a href="http://download.opensuse.org/distribution%5C10.2%5Crepo%5Cnon-oss/">http://download.opensuse.org/distribution\10.2\repo\non-oss/</a></td>
</tr>
<tr>
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<td>On</td>
<td>YUM</td>
<td><a href="http://software.opensuse.org/download/openSUSE%5CTools/openSUSE_10.2/">http://software.opensuse.org/download/openSUSE\Tools/openSUSE_10.2/</a></td>
</tr>
<tr>
<td>On</td>
<td>On</td>
<td>YUM</td>
<td><a href="http://gd.tuwen.ac.at/linux/suse.com/suse/update/10.2">http://gd.tuwen.ac.at/linux/suse.com/suse/update/10.2</a></td>
</tr>
</tbody>
</table>

Synchronize Changes with ZENworks

Add  Edit  Delete

Abort  Finish

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Installing the package

![Image of YaST2 interface with package details]

**plutimikation** - A math learning game for children

Description:

This is a math learning game for children. It asks questions, checks the answers of the child and gives feedback and statistics about the results.

Authors:

- Cornelius Schumacher <schumacher@kde.org>

File System Usage:

<table>
<thead>
<tr>
<th>Directory</th>
<th>Disk Usage</th>
<th>Used</th>
<th>Free</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>/</td>
<td>89%</td>
<td>8.8 GB</td>
<td>1.1 GB</td>
<td>9.9 GB</td>
</tr>
<tr>
<td>/data</td>
<td>62%</td>
<td>12.3 GB</td>
<td>7.4 GB</td>
<td>19.7 GB</td>
</tr>
<tr>
<td>/build</td>
<td>36%</td>
<td>7.1 GB</td>
<td>12.6 GB</td>
<td>19.7 GB</td>
</tr>
</tbody>
</table>
Running the program

![Image of a multiplication program window showing 3 x 6 and counting correct and wrong answers.](image-url)
Command Line Client Demo
OSC Demo

osc ls
osc co home:cschum/plutimikation
cd home:cschum/plutimikation
vi plutimikation.spec
osc add plutimikation.spec
osc ci
osc results
osc log
Clients under development
Native GUI Client

- Google Summer of Code 2006 project
- Author: Jonathan Arsenault
Upstream Integration

- Google Summer of Code 2006 project
- Author: Rafal Kwasny

```
  cschum@monalisa:~> oscupstream add svn svn://server/plutimikation
  Filename will be: plutimikation.tar.gz
  cschum@monalisa:~> oscupstream uploadmeta home:cschum plutimikation
  Meta file _upstream uploaded
  cschum@monalisa:~> oscupstream import home:cschum plutimikation
  Checking out...
  Creating tarball...
  Importing tarball...
  Done
  cschum@monalisa:~> 
```
apbuddy

- Google Summer of Code 2006 project
- Author: Rajagopal Natarajan
Getting Involved
Getting Involved

• Public openSUSE API makes it easy to write own clients
• Build Service is free software
  • Improving existing clients
  • Improving the server parts (frontend, backend)
• Build your own software on the Build Service
• Package software on the Build Service
• Getting involved with development of the openSUSE distribution
openSUSE API Documentation

http://api.opensuse.org/apidocs
API Specification Example

<project>: Project name

**GET /source/**
Read list of projects.
XmlResult: projects directory.xsd

**GET /source/<project>/_meta**
Read project meta file.
XmlResult: project
Getting the Source


svn co https://forgesvn1.novell.com/svn/opensuse/trunk
Conclusion
Conclusion

- openSUSE Build Service makes packaging easy
- Various tools to help to do the job
  - Web Client
  - Command Line Client
  - Upstream Integration, Native GUI Client, apbuddy
- Writing own tools is easy

openSUSE Build Service: http://build.opensuse.org
Wiki: http://en.opensuse.org/Build_Service
Mailing List: opensuse-buildservice@opensuse.org
IRC: #opensuse-buildservice on irc.opensuse.org
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