

# Packaging made easy

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

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**Novell.**



# Motivation

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- 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

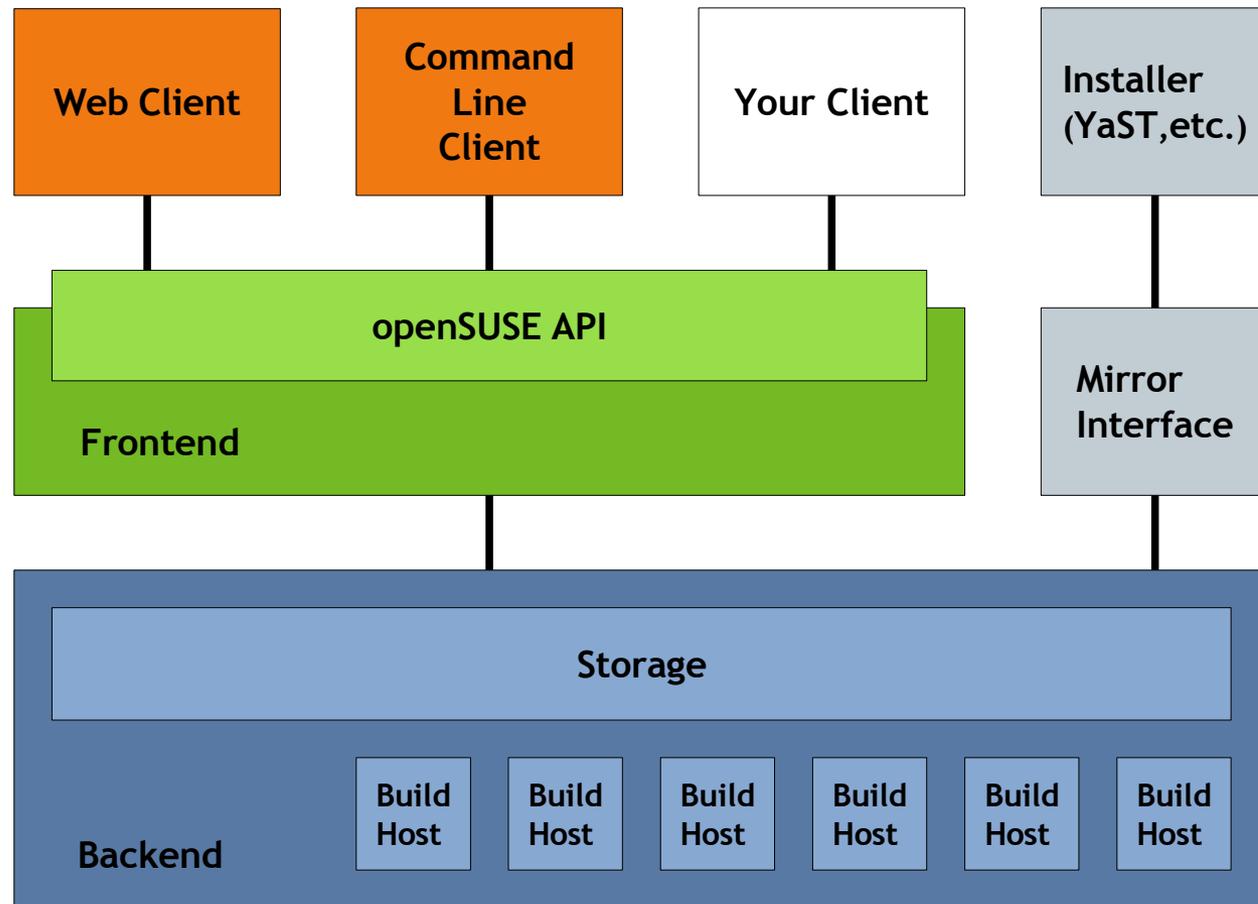
---

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

Architecture



# Architecture





# Backend

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- 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

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- 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

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- 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

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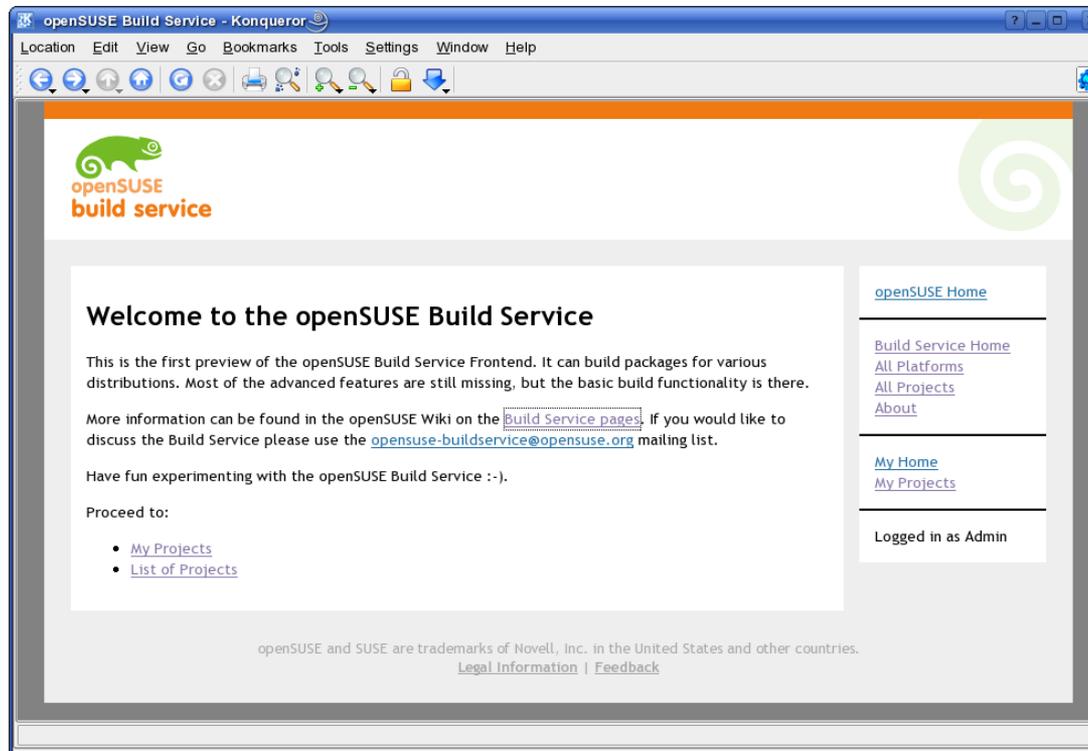
- User Interface for Developers and Packagers
- Web Client
  - based on Ruby on Rails
- Command Line Client (osc)
  - SVN-style user interface
  - Python
  - supports local builds
- oscupstream
  - integration with upstream SVN repositories

# 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



# cont.

## New Package in project home:mls

Name:

Title:

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

Userid	Role
mls	maintainer

[\[Add User\]](#)

[\[Trigger Rebuild\]](#)

[Back to Project 'home:mls'](#)



# cont.

## Add File (Project home:mls, Package screen)

Filename (leave empty to take from upload):

Filetype:

Local File:





# cont.

## Add File (Project home:mls, Package screen)

Filename (leave empty to take from upload):

Filetype:

Local File:





# 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.

[\[Edit Package Information\]](#) [\[Remove Package\]](#)

### Files

screen\_4.0.2-4.1.spec [\[Edit\]](#) [\[Download\]](#) [\[Remove\]](#)

[\[Add File\]](#)

### Involved Users

Userid	Role
mls	maintainer

[\[Add User\]](#)

[\[Trigger Rebuild\]](#)

[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.

[\[Edit Package Information\]](#) [\[Remove Package\]](#)

### Files

screen_4.0.2-4.1.diff.gz	<a href="#">[Download]</a> <a href="#">[Remove]</a>
screen_4.0.2-4.1.dsc	<a href="#">[Download]</a> <a href="#">[Remove]</a>
screen_4.0.2-4.1.spec	<a href="#">[Edit]</a> <a href="#">[Download]</a> <a href="#">[Remove]</a>
screen_4.0.2.orig.tar.gz	<a href="#">[Download]</a> <a href="#">[Remove]</a>

[\[Add File\]](#)

### Involved Users

Userid	Role
mls	maintainer

[\[Add User\]](#)

[\[Trigger Rebuild\]](#)

[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

screen	<a href="#">[Remove]</a>
--------	--------------------------

[\[Add Package\]](#)

[\[Link Package from other Project\]](#)

### 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

[\[Advanced\]](#)



# cont.

 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 [\[Remove\]](#)

[\[Add Package\]](#)

[\[Link Package from other Project\]](#)

### Build Repositories

Name	i586	x86_64	Action
<b>SUSE_Factory</b> SUSE:Factory/standard			<a href="#">[Remove]</a>

[\[Add Repository\]](#)

[\[Monitor Build Status\]](#)



# cont.

## 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

Name	i586	x86_64	Action
<b>SUSE_Factory</b> SUSE:Factory/standard	building: 1	building: 1	<a href="#">[Remove]</a>
<b>Mandriva_2006</b> Mandriva:2006/standard	building: 1	n/a	<a href="#">[Remove]</a>
<b>Debian_Etch</b> Debian:Etch/standard	building: 1	n/a	<a href="#">[Remove]</a>

[\[Add Repository\]](#)

[\[Monitor Build Status\]](#)



# 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      [\[Download\]](#) [\[Remove\]](#)

[\[Add File\]](#)

## Involved Users

userid	Role
mls	maintainer

[\[Add User\]](#)

## Build Status

SUSE_Factory		
x86_64	building	<a href="#">[Live Build Log]</a>
i586	building	<a href="#">[Live Build Log]</a>
Mandriva_2006		
i586	building	<a href="#">[Live Build Log]</a>
Debian_Etch		
i586	building	<a href="#">[Live Build Log]</a>

[\[Trigger Rebuild\]](#)



# cont.

## 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 '9f1411622a59ca3a7a7d49adc6a
Using BUILD_ROOT=/BUILD/root_7
Using BUILD_ARCH=x86_64:i686:i586:i486:i386

processing specfile /BUILD/root_7/.build-srcdir/screen_4.0.2-4.1.spec...
init_buildsystem --rpmfile /BUILD/root_7/.rpmfile 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...
```



## cont.

```
screen.c: In function 'CoreDump':
screen.c:1510: 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
```

[\[Stop Autoscrol\]](#)



# cont.

## Involved Users

Userid	Role
mls	maintainer

[\[Add User\]](#)

## Build Status

SUSE_Factory		
x86_64	succeeded	<a href="#">[Live Build Log]</a>
	<a href="#">screen-4.0.2-64.1.x86_64.rpm</a>	
	<a href="#">screen-4.0.2-64.1.src.rpm</a>	
i586	succeeded	<a href="#">[Live Build Log]</a>
	<a href="#">screen-4.0.2-64.1.i586.rpm</a>	
	<a href="#">screen-4.0.2-64.1.src.rpm</a>	
Mandriva_2006		
i586	building	<a href="#">[Live Build Log]</a>
Debian_Etch		
i586	building	<a href="#">[Live Build Log]</a>

[\[Trigger Rebuild\]](#)

[Back to Project 'home:mls'](#)



# cont.

## Build Status

SUSE_Factory		
x86_64	succeeded	<a href="#">[Live Build Log]</a>
	<a href="#">screen-4.0.2-64.1.x86_64.rpm</a>	
	<a href="#">screen-4.0.2-64.1.src.rpm</a>	
i586	succeeded	<a href="#">[Live Build Log]</a>
	<a href="#">screen-4.0.2-64.1.i586.rpm</a>	
	<a href="#">screen-4.0.2-64.1.src.rpm</a>	
Mandriva_2006		
i586	succeeded	<a href="#">[Live Build Log]</a>
	<a href="#">screen-4.0.2-64.1.i586.rpm</a>	
	<a href="#">screen-4.0.2-64.1.src.rpm</a>	
Debian_Etch		
i586	succeeded	<a href="#">[Live Build Log]</a>
	<a href="#">screen_4.0.2-4.1_i386.deb</a>	

[\[Trigger Rebuild\]](#)

[Back to Project 'home:mls'](#)



# Example: home:mls

Location: http://software.opensuse.org/download/home:/mls/

## Index of /download/home:/mls

<u>Name</u>	<u>Last modified</u>	<u>Size</u>	<u>Description</u>
<a href="#">Parent Directory</a>		-	
<a href="#">Debian Etch/</a>	07-Aug-2006 21:41	-	
<a href="#">Mandriva 2006/</a>	07-Aug-2006 21:41	-	
<a href="#">SUSE Factory/</a>	07-Aug-2006 21:40	-	

Apache/2.0.49 (Linux/SuSE) Server at software.opensuse.org Port 80



cont.

Location:  [http://software.opensuse.org/download/home:/mls/SUSE\\_Factory/repoata/](http://software.opensuse.org/download/home:/mls/SUSE_Factory/repoata/)

mls's Home Project (SUSE\_Factory)

[System.Console](#)  
[\\_\\_latest\\_\\_](#)

### 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**

Status	Refresh	Name	URL
On	On	YUM	http://software.opensuse.org/download/home:/kfreitag/openSUSE_10.2/
On	On	YaST	http://download.opensuse.org/distribution/10.2/repo/oss/
Off	On	YaST	http://download.opensuse.org/distribution/10.2/repo/non-oss/
On	On	YUM	http://software.opensuse.org/download/openSUSE:/Tools/openSUSE_10.2/
On	On	YUM	http://software.opensuse.org/download/X11:/XGL/openSUSE_10.2/
On	On	YUM	http://gd.tuwien.ac.at/linux/suse.com/suse/update/10.2

Synchronize Changes with ZENworks

Add Edit Delete Source Settings

Abort Finish



# Installing the package

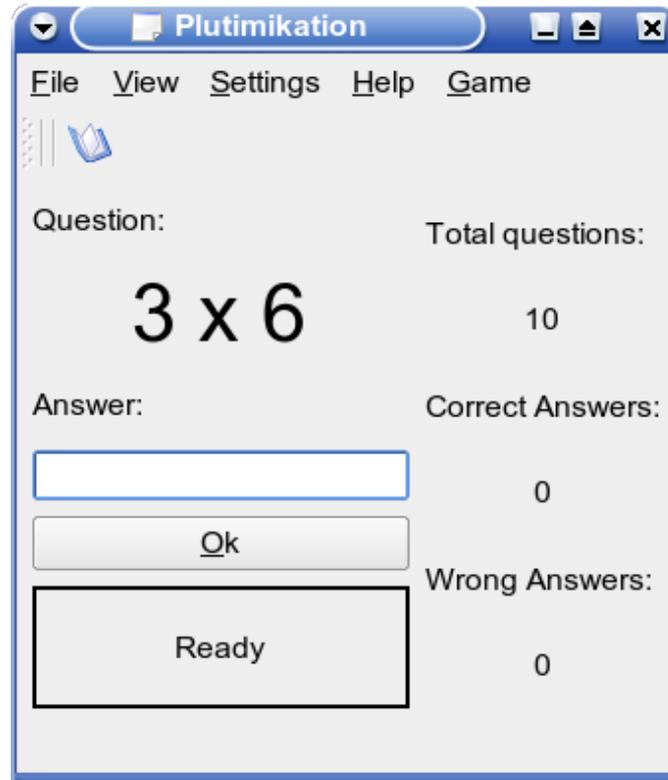
The screenshot shows the YaST2@monalisa window with the following components:

- Search Panel:** Filter: Search, Search: plutimi, Search in: Name, Summary, Description, RPM "Provides", RPM "Requires". Search Mode: Contains, Case Sensitive: unchecked.
- Package List:** A table with columns: Package, Summary, Size, Avail. Ver., Inst. Ver., Source. One row is selected:  plutimikation A math learning game for children 95.4 K 0.1-60.1
- Package Details Panel:** Description, Technical Data, Dependencies, Versions, File List, Change Log. Description: **plutimikation** - A math learning game for children. 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>
- Disk Usage Table:**

Name	Disk Usage	Used	Free	Total
/	89%	8.8 GB	1.1 GB	9.8 GB
/data	62%	12.3 GB	7.4 GB	19.7 GB
/build	36%	7.1 GB	12.6 GB	19.7 GB
- Buttons:** Check,  Autocheck, Cancel, Accept



# Running the program



# Command Line Client Demo



# OSC Demo

---

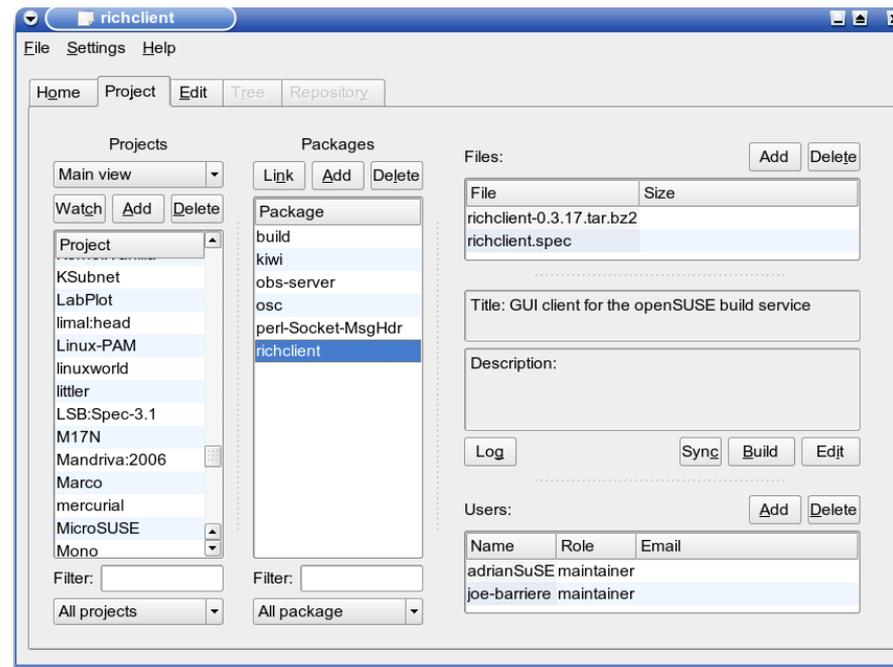
```
osc ls
osc co home:cschum plutimikation
cd home:cschum/plutimikation
vi plutimikation.spec
osc add plutimikation.spec
osc ci
osc results
osc log
```

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

A screenshot of a terminal window titled "Shell - Konsole". The window has a menu bar with "Session", "Edit", "View", "Bookmarks", "Settings", and "Help". The terminal content shows a user named "cschum" at a host named "monalisa" performing a series of "oscupstream" commands. The commands and their outputs are: "oscupstream add svn svn://server/plutimikation" resulting in "Filename will be: plutimikation.tar.gz"; "oscupstream uploadmeta home:cschum plutimikation" resulting in "Meta file \_upstream uploaded"; and "oscupstream import home:cschum plutimikation" resulting in "Checking out...", "Creatung tarball...", "Importing in build service...", and "Done". The prompt "cschum@monalisa:~>" is visible at the end of the output.

```
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...
Creatung tarball...
Importing in build service...
Done
cschum@monalisa:~> 
```



# apbuddy

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

Template System - Build your packages Easily

File Extras Help

Package Name

Source File

Messages

Template System - Build your packages Easily

File Extras Help

Version

Release

License

Group

Distribution

Architecture

Section

Messages

Trying to unpack file. Please Wait..  
Unpacking successful  
Finding the processor architecture  
Searching for license..  
Detecting distribution..

# 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>

The screenshot shows a web browser window titled "openSUSE Build Service Frontend - Konqueror". The page content includes the openSUSE logo and the word "Frontend" in a large font. Below this, it says "openSUSE API" and "Version: 0.1". A paragraph explains that only authenticated users can access the API and that authentication is done via Basic HTTP Authorisation headers. It also notes that names cannot contain spaces, slashes, or colons. A "Table of Contents" section follows, listing various API endpoints under categories like "About", "Sources", "Platform data", "User data", "RPMs", and "Build Results".

**openSUSE API**  
Version: 0.1

Only authenticated users are allowed to access the API. Authentication is done by sending a Basic HTTP Authorisation header.

All names aren't allowed to contain spaces, slashes or colons.

**Table of Contents**

- About
  - [GET /about](#)
- Sources
  - Project meta data
    - [GET /source/](#)
    - [GET /source/<project>/ meta](#)
    - [PUT /source/<project>/ meta](#)
  - Package meta data
    - [GET /source/<project>/<package>/ meta](#)
    - [PUT /source/<project>/<package>/ meta](#)
  - Other source files
    - [GET /source/<project>/<package>/<filename>](#)
    - [PUT /source/<project>/<package>/<filename>](#)
  - RPM spec file template
    - [POST /source/<project>/<package>?cmd=createSpecFileTemplate](#)
- Platform data
  - [GET /platform/](#)
- User data
  - [GET /person/<userid>](#)
  - [PUT /person/<userid>](#)
- RPMs
  - [GET /rpm/<project>/<platform>/<package>/<arch>/<rpm-name>](#)
- Build Results
  - [GET /result/<project>/<platform>/result](#)
  - [GET /result/<project>/<platform>/<package>/result](#)
  - [GET /result/<project>/<platform>/<package>/<arch>/log](#)



# API Specification Example

---

`<project>`: Project name

**GET /source/**

Read list of projects.

XmlResult: projects directory.xsd

**GET /source/<project>/\_meta**

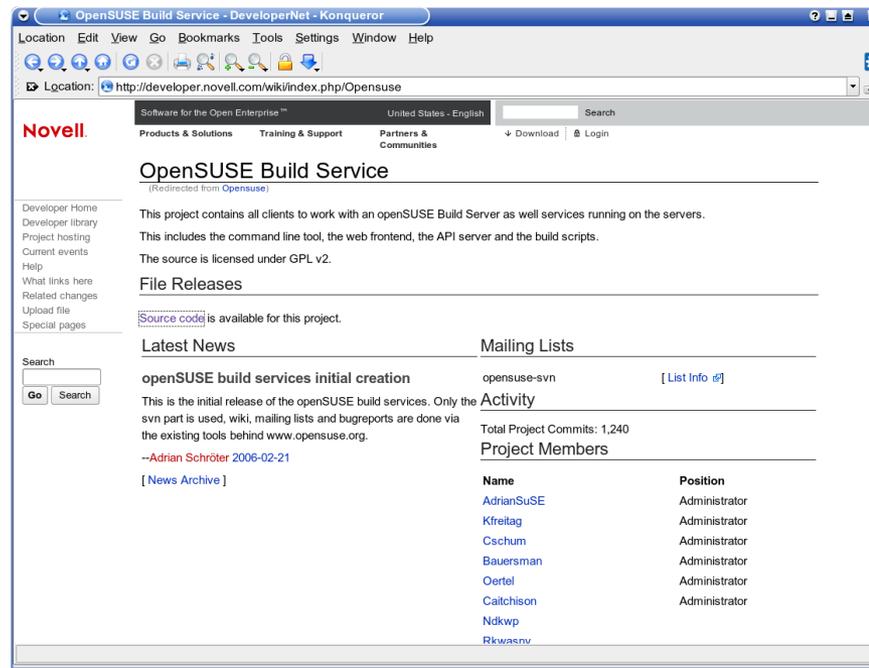
Read project meta file.

XmlResult: project



# Getting the Source

<http://developer.novell.com/wiki/index.php/Opensuse>



`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](http://en.opensuse.org/Build_Service)

Mailing List: [opensuse-buildservice@opensuse.org](mailto:opensuse-buildservice@opensuse.org)

IRC: #opensuse-buildservice on [irc.opensuse.org](http://irc.opensuse.org)

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