Open Solaris
Source Juicer

Brian Nitz
Solaris Engineering
Sun Microsystems
Software!

Software is wonderful!
Software is magical!
Software!

Software is wonderful!
Software is magical!
Software breaks!

WHY???
Software!

Software is wonderful!
Software is magical!
Software breaks!

WHY???

(Well, actually it works for me...)
What's so different about developers?
Software development process
Actually it's slightly more complicated
Actually it's slightly more complicated.
Could we put some of this into the cloud?
Or, if you don't like clouds...
Standardize the build environ behind a web service?
What is OpenSolaris™ Source Juicer?

Community interface for contributing to OpenSolaris
http://pkg.opensolaris.org/ contrib
Lower barrier for contribution
  Community driven
  Scalable
Two Components
Web Application
BuildGrid – Build system
  Live right now!
http://jucr.opensolaris.org
Source Juicer Components

Opensolaris (good use of zones + zfs)
The Django Python Framework
Subversion
Webserver and database
OpenSolaris Authentication Framework
The OpenSolaris desktop CBE
Sun Studio
**Summary**

- **Identifier**: pygoogle - Google Python API
- **Files**:
  - specs/pygoogle.spec [diff]
  - copyright/pygoogle.copyright [diff]
- **Submitter**: Christian Kelly
- **Submitted On**: 2009-05-27
- **Status**: active
- **Votes**: +0 -0

**Validation**

- **Syntax check**: OK
- **Name**: pygoogle
- **License**: missing
- **Copyright tag**: pygoogle.copyright
- **Copyright file**: pygoogle.copyright
- **Community Website**: missing

**Review Activities**
### All Submissions

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Submitter</th>
<th>Date</th>
<th>Files</th>
<th>Validated?</th>
<th>Comments</th>
<th>Votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>mesene</td>
<td>Sergio Enrique Schvezov</td>
<td>2009-09-30</td>
<td>mesene-01-env.diff, mesene.spec, mesene.copyright</td>
<td></td>
<td>3</td>
<td>+0</td>
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<tr>
<td>scummvm_emulator</td>
<td>Mark Duggan</td>
<td>2009-09-29</td>
<td>scummvm.spec, scummvm.copyright</td>
<td>✔</td>
<td></td>
<td>-0</td>
</tr>
<tr>
<td>pygoogle - google_API</td>
<td>Mark Duggan</td>
<td>2009-09-29</td>
<td>pygoogle.spec, pygoogle.copyright</td>
<td>✔</td>
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<td>-0</td>
</tr>
<tr>
<td>python25-matplotlib</td>
<td>Federico Beffa</td>
<td>2009-09-26</td>
<td>python25-matplotlib-02-backend_gdk.c.diff, python25-matplotlib.copyright, python25-matplotlib.spec</td>
<td>✔</td>
<td></td>
<td>+0</td>
</tr>
<tr>
<td>python25-ipython</td>
<td>Federico Beffa</td>
<td>2009-09-26</td>
<td>python25-ipython.spec, python25-ipython.copyright</td>
<td>✔</td>
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<td>+0</td>
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<td>python25-scipy</td>
<td>Federico Beffa</td>
<td>2009-09-26</td>
<td>python25-scipy.copyright, python25-scipy.spec</td>
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<td></td>
<td>+0</td>
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<tr>
<td>python-django</td>
<td>Roboporter</td>
<td>2009-09-25</td>
<td>python-django.spec</td>
<td>✔</td>
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</table>
## Build Jobs

<table>
<thead>
<tr>
<th>JobID</th>
<th>Identifier</th>
<th>Submitter</th>
<th>Build Start</th>
<th>Build Finish</th>
<th>Install</th>
<th>Build Log</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1570</td>
<td>pygguide - Google Python API</td>
<td>Christian Kelly</td>
<td>May 27 12:05</td>
<td>May 27 12:05</td>
<td>Log</td>
<td></td>
<td>Building</td>
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<tr>
<td>1569</td>
<td>gnuplot</td>
<td>N/A</td>
<td>May 27 10:05</td>
<td>May 27 10:05</td>
<td>Install</td>
<td>Log</td>
<td>Passed</td>
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<tr>
<td>1568</td>
<td>pureftpd.spec</td>
<td>N/A</td>
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<td>Log</td>
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<td>Failed</td>
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<tr>
<td>1567</td>
<td>net-snmp</td>
<td>Steven Stallion</td>
<td>May 27 09:05</td>
<td>May 27 09:05</td>
<td>Log</td>
<td></td>
<td>Passed</td>
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<tr>
<td>1566</td>
<td>scribes</td>
<td>Abhishek Gupta</td>
<td>May 27 09:05</td>
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<td>Log</td>
<td>Passed</td>
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<tr>
<td>1565</td>
<td>gnome-schedule</td>
<td>Abhishek Gupta</td>
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<td>Abhishek Gupta</td>
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<td>Failed</td>
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<td>1562</td>
<td>XZ Utilities</td>
<td>N/A</td>
<td>May 27 06:05</td>
<td>May 27 06:05</td>
<td>Install</td>
<td>Log</td>
<td>Passed</td>
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<tr>
<td>1561</td>
<td>XZ Utilities</td>
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<td>May 27 05:05</td>
<td>May 27 05:05</td>
<td>Install</td>
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<td>Passed</td>
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<tr>
<td>1560</td>
<td>murrine - a GTK theme for GNOME</td>
<td>Markus Weber</td>
<td>May 27 05:05</td>
<td>May 27 05:05</td>
<td>Log</td>
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<td>Failed</td>
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<tr>
<td>1559</td>
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<td>May 27 05:05</td>
<td>May 27 05:05</td>
<td>Install</td>
<td>Log</td>
<td>Passed</td>
</tr>
</tbody>
</table>
Making a submission

Spec file
  Build recipe to build a particular piece of software
  Built using pkgbuild

Copyright file
  License needed for validation
  Roughly equivalent to a COPYING file

Other files
  Patches
  Manpages
  Base specs
  Extra sources

Minimum submission is 1x spec and 1x copyright

Let's look at a spec file...
%include Solaris.inc

Name: pygoogle
Summary: Python API for Google
Group: System/Libraries
Version: 0.6
License: Python
Url: http://pygoogle.sf.net
Source: %{sf_downloads}/pygoogle/%{name}- %{version}.tar.gz
BuildRoot: %{_tmppath}/%{name}- %{version}
SUNW_Copyright: %{name}.copyright
BuildRequires: SUNWPython

Meta(info.maintainer): Christian Kelly <christian.kelly@sun.com>
Meta(info.classification): "org.opensolaris.category.2008:Development/Other Languages"
Meta(info.upstream): Brian Landers
%prep
%setup -q -n %{name}-%{version}

%build

%install
rm -rf $RPM_BUILD_ROOT
python setup.py install --prefix=%_prefix --root=$RPM_BUILD_ROOT

%files
%defattr (-, root, bin)
%{_libdir}/python2.4/site-packages/pygoogle/*
%{_libdir}/python2.4/site-packages/pygoogle.pth
Source Juicer's build process

Job is assigned to available zone
Build zone is reset (zfs rollback)
Svn update into build zone grabs new files
Sources downloaded into tar repository
Tools and dependencies installed to zone
pkgbuild builds the package(s)
IF build fails, save logs and return
ELSE pkgbuild publishes to build repo
Test install
Publish to pending!
Using Source Juicer
Submission
Validation
Build
Review
Source Juicer Advantages

Syntax checking, legal review and minimal peer review proceed build.
Comments and votes tied to package.
No contamination of build environments.
Requires can be strictly enforced.
Auto smoke test of install before publish.
Single click install from build status page.
Source Juicer Community

~500 People
1599 Packages built
219 Packages published to pending
106 Packages promoted to contrib
Some Promotions

Porting Applications

How do we add applications to Solaris?

Sun

Independent Software Vendors (ISVs)

http://partneradvantage.sun.com/

Individuals and projects

Package Factory (Fully Automated)

Source Juicer (Semi-Automated)

Note: Most well-written Open Source applications for *BSD, Linux... can be built on OpenSolaris
Package Factory

Downloads Open Source Code
Filters & Analyzes
Creates Spec Files
Builds / Installs pkgs
Reviews / Tests pkgs

Roboporter
Submits Spec Files to Source Juicer
Ports Massive Numbers of Packages!!
Anyone can take ownership of packages
The Future?

OpenSolaris desktop consolidation
User interface improvements
Personal build zones
Integrated test environment
Integrated defect tracking
You!
More Information

Software Porters Community
http://www.opensolaris.org/os/community/sw-porters/
sw-porters-discuss@opensolaris.org

Source Juicer and Source Juicer Project
http://jucr.opensolaris.org/
sourcejuicer-discuss@opensolaris.org

Package Factory Project
http://www.opensolaris.org/os/project/pkgfactory/
pkgfactory-discuss@opensolaris.org

Development Resources (Test Farm)
http://www.opensolaris.org/os/community/testing/
testing-discuss@opensolaris.org
Developer resources

OpenSolaris Test Farm
Virtual Machines
Development Zones
Kernel and Application Development
Sparc and X86 Advanced Servers
SunStudio Compiler and Tools
More Developer Resources

Get Sun Studio
Download:
http://developers.sun.com/sunstudio

OpenSolaris repository
Search for “sunstudio12u1” in package manager

Join the Sun Developer Community at developers.sun.com

Developer forums at http://forum.sun.com  ->
“Developer Tools” -> “Solaris and Linux Tools”

Get a SPARC, Intel, or AMD multi-core system FREE (for 60 days)
http://www.sun.com/tryandbuy
Questions?
Thank You!!

OpenSolaris Source Juicer

brian.nitz@sun.com
# BugJuicer Tagged Bugs

## 1-8 of 8 BugJuicer Tagged Bugs

**Filtered on **tg_staff**

<table>
<thead>
<tr>
<th>Module</th>
<th>Priority</th>
<th>Severity</th>
<th>Upstream ID</th>
<th>scm_fixed</th>
<th>Synopsis</th>
<th>Community Tags</th>
</tr>
</thead>
<tbody>
<tr>
<td>opensolaris</td>
<td>high</td>
<td>enhancement</td>
<td>483</td>
<td>0</td>
<td>Introduce testing framework for Scheme codes</td>
<td></td>
</tr>
<tr>
<td>opensolaris</td>
<td>high</td>
<td>enhancement</td>
<td>1923</td>
<td>0</td>
<td>RFE: need test branch for testing the packaging system (20041125)</td>
<td></td>
</tr>
<tr>
<td>opensolaris</td>
<td>medium</td>
<td>normal</td>
<td>12056</td>
<td>0</td>
<td>Unable compile avdsv-git-20070818 with Debian testing Xorg</td>
<td></td>
</tr>
<tr>
<td>opensolaris</td>
<td>P1</td>
<td>critical</td>
<td>1011</td>
<td>0</td>
<td>terminal window output in latest build results in hard to read text</td>
<td>1 tags</td>
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<tr>
<td>opensolaris</td>
<td>P2</td>
<td>major</td>
<td>1719</td>
<td>0</td>
<td>Indiana RC2 Test Install: keyboard and networking problem on a MacBook Pro</td>
<td>1 tags</td>
</tr>
<tr>
<td>opensolaris</td>
<td>P2</td>
<td>major</td>
<td>2130</td>
<td>0</td>
<td>TESTpatchTEST fails to apply to TESTTarballTEST</td>
<td>2 tags</td>
</tr>
<tr>
<td>opensolaris</td>
<td>P2</td>
<td>major</td>
<td>1673</td>
<td>0</td>
<td>zfs space accounting impacts php testing</td>
<td>4 tags</td>
</tr>
<tr>
<td>Nautilus</td>
<td>P5</td>
<td>trivial</td>
<td>2865</td>
<td>0</td>
<td>IGNORE TEST fails to apply to</td>
<td>2 tags</td>
</tr>
</tbody>
</table>

---

**Find:** len  
**Previous**  **Next**  **Highlight all**  **Match case**  
Done
BugJuicer Tagged Bug Sets

...bug set continued from page1

<table>
<thead>
<tr>
<th>Module</th>
<th>Priority</th>
<th>Severity</th>
<th>Upstream ID</th>
<th>scm fixed</th>
<th>Synopsis</th>
</tr>
</thead>
<tbody>
<tr>
<td>OpenSolaris distro</td>
<td>medium</td>
<td>normal</td>
<td>10247</td>
<td>0</td>
<td>liboI should use sigsetjmp when testing for CPU.</td>
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**RequiredForCustomerX tag set**

<table>
<thead>
<tr>
<th>Module</th>
<th>Priority</th>
<th>Severity</th>
<th>Upstream ID</th>
<th>scm fixed</th>
<th>Synopsis</th>
</tr>
</thead>
<tbody>
<tr>
<td>OpenSolaris distro</td>
<td>P2</td>
<td>major</td>
<td>2130</td>
<td>0</td>
<td>TESTpatchTEST fails to apply to TESTtarballTEST</td>
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</tbody>
</table>

**RequiredForProductY tag set**

<table>
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<tr>
<th>Module</th>
<th>Priority</th>
<th>Severity</th>
<th>Upstream ID</th>
<th>scm fixed</th>
<th>Synopsis</th>
</tr>
</thead>
<tbody>
<tr>
<td>OpenSolaris distro</td>
<td>high</td>
<td>enhancement</td>
<td>1923</td>
<td>0</td>
<td>RFE: Need test branch for testing the packageing system (20041125)</td>
</tr>
<tr>
<td>OpenSolaris distro</td>
<td>high</td>
<td>normal</td>
<td>2907</td>
<td>0</td>
<td>Errors testing cairo 0.4.0</td>
</tr>
<tr>
<td>OpenSolaris distro</td>
<td>P2</td>
<td>major</td>
<td>1673</td>
<td>0</td>
<td>ZFS space accounting impacts php testing</td>
</tr>
</tbody>
</table>

**YuckyBug tag set**

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<thead>
<tr>
<th>Module</th>
<th>Priority</th>
<th>Severity</th>
<th>Upstream ID</th>
<th>scm fixed</th>
<th>Synopsis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firefox</td>
<td>--</td>
<td>major</td>
<td>370653</td>
<td>0</td>
<td>Firefox often loses keyboard focus when switching tabs</td>
</tr>
<tr>
<td>Firefox</td>
<td>--</td>
<td>major</td>
<td>440007</td>
<td>0</td>
<td>Flash player does not &quot;receive focus&quot;. Cannot click on buttons.</td>
</tr>
<tr>
<td>Firefox</td>
<td>--</td>
<td>normal</td>
<td>393540</td>
<td>0</td>
<td>onload=style.focus() doesn't work when reuse tab that already exists</td>
</tr>
<tr>
<td>Firefox</td>
<td>--</td>
<td>normal</td>
<td>396490</td>
<td>0</td>
<td>Calling element.blur() removes focus unconditionally, even when &quot;element&quot; doesn't have focus.</td>
</tr>
<tr>
<td>OpenSolaris distro</td>
<td>high</td>
<td>enhancement</td>
<td>483</td>
<td>0</td>
<td>Introduce testing framework for Scheme codes</td>
</tr>
</tbody>
</table>
### Distro Bug Databases

Distro bug databases view down through layers but are detached from code.

### Upstream Bug Tracking

Upstream bug tracking systems usually confined to single codebase.
<table>
<thead>
<tr>
<th>Distro 1</th>
<th>Distro 2</th>
<th>Distro 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mozilla</td>
<td>Firefox2</td>
<td>Firefox3</td>
</tr>
<tr>
<td>Java 1.4</td>
<td>Java 1.6</td>
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</tr>
<tr>
<td>GNOME 2.6</td>
<td>GNOME 2.20</td>
<td>GNOME 2.24</td>
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<tr>
<td>XSun</td>
<td>Xorg</td>
<td>Xorg</td>
</tr>
<tr>
<td>S10u5 kernel</td>
<td>OS2008.05kernal</td>
<td>OS2008.11kernal</td>
</tr>
</tbody>
</table>

Bugs can span multiple layers, distros and codebases

Bugjuicer can search and tag bugs across multiple layers, distros and codebases
IPS Repositories

pkg.opensolaris.org
## Solaris Packaging Differences

<table>
<thead>
<tr>
<th>Solaris 10</th>
<th>OpenSolaris</th>
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<tbody>
<tr>
<td>SVR4 package format</td>
<td>IPS package format</td>
</tr>
<tr>
<td>pkgadd, pkgrm...</td>
<td>pkg, PackageMgr GUI</td>
</tr>
<tr>
<td>Package tarballs</td>
<td>Network repositories</td>
</tr>
<tr>
<td>Dependencies identified</td>
<td>Dependencies resolved</td>
</tr>
<tr>
<td>Patch granularity</td>
<td>Package granularity</td>
</tr>
<tr>
<td>Separate OS upgrade process</td>
<td>pkg image-update</td>
</tr>
<tr>
<td></td>
<td>ZFS snapshots, rollback</td>
</tr>
</tbody>
</table>
Other Development Resources

OpenSolaris Test Farm
Virtual Machines
Development Zones
Kernel and Application Development
Sparc and X86 Advanced Servers
SunStudio Compiler and Tools
Sites in USA and China
Source Juicer Process

Submit
Validate
Build & Publish to /pending repo
Review
Vote
Promote to /contrib repo
Source Juicer Demo
More Information

Software Porters Community
http://www.opensolaris.org/os/community/sw-porters/
sw-porters-discuss@opensolaris.org

Source Juicer and Source Juicer Project
http://jucr.opensolaris.org/
sourcejuicer-discuss@opensolaris.org

Package Factory Project
http://www.opensolaris.org/os/project/pkgfactory/
pkgfactory-discuss@opensolaris.org

Development Resources (Test Farm)
http://www.opensolaris.org/os/community/testing/
testing-discuss@opensolaris.org
Application Performance is Critical

Can be the difference between a successful or failed deployment

On multi-core systems its all about throughput
Designing multi-threaded apps can achieve high throughput

But … creating MT applications is difficult
Coding is based on assumptions about behavior. Behavior of multi-core systems is not well understood.
What about existing serial apps? Hard to retrofit parallelism

Developers need tools to help get this right
New Tools for MT Applications

Many new tools are being introduced to help developers ...

Write correct MT code
Quickly debug MT-related errors
Achieve acceptable throughput
Find problems unique to MT apps (memory management errors, race conditions, deadlocks, etc.)
Observe an app's performance in a 'live' system
Sun Studio 12 Update 1
Suite of C/C++ Tools with Multi-Core Capabilities

**Performance**
World class code generation
Dozens of benchmark records on Intel, AMD, Sun, & Fujitsu architectures!

**Parallelism**
Auto-parallelizing compilers
Thread analysis and profiling
Data race / deadlock detection
OpenMP 3.0
MPI support

**Productivity**
Graphical debugger
Memory leak detection
Application Profiler / Analyzer
DTrace Visualization
NetBeans-based IDE

**Platforms**
- Solaris
- OpenSolaris
- Oracle Enterprise Linux
- SUSE
- Ubuntu
- Red Hat

32-bit & 64-bit
Parallelize Loops with **Autopar**
Compiler automatically multi-threads serial code

```
for (i=0; i<m; i++)
    for (j=0; j<n; j++)
        a[i][j] = b[i][j] + c[i][j];
```

Turns on auto-parallelization
Prints parallelization information

```
$ cc -xO4 -xautopar -xloopinfo main.o loop.c
"loop.c", line 7: PARALLELIZED, and serial version generated
"loop.c", line 8: not parallelized, not profitable
$ time a.out  // Default is 1 thread
real  0m37.96s
user  0m36.64s
sys   0m0.97s
$ PARALLEL=2
$ time a.out
real  0m21.99s
user  0m41.07s
sys   0m2.23s
```

*The same* binary can run with different numbers of threads.
Parallelize Data Processing with Vectors
Do more work in each clock cycle

Simultaneously process multiple data elements in adjacent memory ("Single Instruction, Multiple Data")

Compiler option: -xvector=simd
Best suited for array processing via loops
Experience shows gains in the 1-7% range

You write this:
```
for (i=0; i<1024; i++)
c[i] = a[i] * b[i]
```

Compiler generates code like this:
```
for (i=0; i<1024; i+=4)
c[i:i+3] = a[i:i+3]*b[i:i+3]
```
Thread Analyzer detects **data races** and **deadlocks**

Identifies non-deterministic or incorrect execution
Identifies actual and potential deadlock situations

**Process:**
Compile source code with `-xinstrument=datarace`
Run app and collect runtime info with `collect -r all`
Run `tha` to graphically display races and conflicts
Works with OpenMP, Pthreads, Solaris Threads

**lock_lint** static source code **lock analyzer**

Analyzes mutex and multiple readers / single writer locks
Reports on inconsistent usage of locks that may lead to data races and deadlocks
Performance Analyzer detects performance bottlenecks in MT code
Works with unmodified binaries, low overhead
Performance data at statement, instruction, function level
Displays Compiler Commentary describing optimizations

D-Light correlates DTrace data to app's source code
Uses DTrace mechanism to collect and display real-time system events
Time-line view of running applications
Unprecedented level of insight into how an app interacts with the instrumented infrastructure
Multi-core computing is here; throughput is the new performance focus

New developer tools are available for creating new MT code and retro-fitting MT into existing serial apps

Sun offers a world-class suite of MT app developer tools for Solaris and Linux platforms

Get Sun Studio and try the compiler's `autopar` flag

Incrementally parallelize serial code using OpenMP
Welcome to OpenSolaris Source Juicer!

What is OpenSolaris Source Juicer?
OpenSolaris Source Juicer is a web service which allows OpenSolaris community developers to build packages and publish them for review. It is the gateway to the OpenSolaris /pending and /contrib repositories. Here is a list of the packages which have been promoted to /contrib from Source Juicer. To learn more about Source Juicer you can visit the project page.

How do I use OpenSolaris Source Juicer?
To summarize, OpenSolaris Source Juicer requires you to submit a spec file and a copyright file along with other files which are necessary to build your package. When these requirements are met, Source Juicer attempts to build a package based on your spec file and publish the resulting package into a /pending repository, where it will be assessed by Approvers. Upon successful completion of review and approval, the package can be promoted into the /contrib repo and made available to the OpenSolaris community, as a trusted package. It is also possible to submit a spec file which updates the versions of packages which were previously published to the /pending or /contrib repository.

If you would like to start using Source Juicer, you should read the Source Juicer Howto help page. The Source Juicer video demo page is a good place to look for tutorials which demonstrate typical Source Juicer usage.

[Workflow Diagram]
Opensolaris.org login
Submit Tab
ERROR: Package entry needs to contain a spec file and a copyright file. Missing the copyright file.

Return to Source Juicer Home
Submission complete
Submission successful

The following files have been submitted:
- pygoogle.spec
- pygoogle.copyright

Please Note: Your submission will not be built until the
- name
- license, and
- copyright
details have been validated by an approver.

This page will send you to your submission in 10 seconds.
If you are not automatically redirected, please click here.
Validation (by Approver)
## Submission validated

### All Submissions

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Submitter</th>
<th>Date</th>
<th>Files</th>
<th>Validated?</th>
<th>Comments</th>
<th>Vote</th>
</tr>
</thead>
<tbody>
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<td>pygoogle - Python interface to the Google API</td>
<td>Mark Duggan</td>
<td>2009-09-28</td>
<td>pygoogle.spec, pygoogle.copyright</td>
<td>✔️</td>
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### Build Jobs

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<th>Build Finish</th>
<th>Install</th>
<th>Build Log</th>
<th>Status</th>
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</tr>
</tbody>
</table>
Install from /pending with Pkg Mgr
Install with Pkg Mgr contd.
Install successful
Voting in review thread

On 2009-05-08, Doug Leavitt: **voted 1**
with the following comment:

Tested this by running the utility on `zipped` files. This did not achieve further compression (we believe because the test zip files chosen could not be further compressed) but the utility did not core and showed the output correctly.

On 2009-05-09, Luis de Bethencourt: **voted 1**
with the following comment:

Loads of stuff coming from Roboporter. Great!
Pkg published to /contrib

<table>
<thead>
<tr>
<th>Name</th>
<th>Version</th>
<th>Install</th>
<th>Manifest</th>
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<tbody>
<tr>
<td>Cheekah</td>
<td>2.0.1.5.11-0.101:20081209T221828Z</td>
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<td>Cython</td>
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Source Juicer Demo End