

## Contributing to OpenSolaris Source code - Mini How to

We all need to refer some documents or need to ask some one who knows about the stuff at some point. Here are some of the OpenSolaris mailing lists that you can subscribe. Go to <http://opensolaris.org/os/discussions/> and subscribe to [opensolaris-discuss@opensolaris.org](mailto:opensolaris-discuss@opensolaris.org) [opensolaris-code@opensolaris.org](mailto:opensolaris-code@opensolaris.org) . Join local OSUG (OpenSolaris User Group) to get in touch with the local experts and share information on the technology. If you don't have an active user group, join Bangalore OpenSolaris User Group, which is the most active group in India, at <http://opensolaris.org/os/discussions/> .

There are lot of activities and projects underway in OpenSolaris, have a look at he communities <http://www.opensolaris.org/os/communities> and projects <http://www.opensolaris.org/os/projects/>. Select an area of your interest and join those discussion forums.

If you are participating in Code for freedom contest. Go to <http://in.sun.com/communities/univ/codeforfreedom/opensolaris.html> and follow the steps given there.

Here are the steps that you can follow to setup environment to compile the OpenSolaris source code and fix a bug. (Assuming that you are using a X86 system with minimum 512 MB RAM)

1. Install a SXDE (Solaris Express Developer Edition) on your machine. You can download a DVD image from [http://opensolaris.org/os/downloads/sol\\_ex\\_dvd/](http://opensolaris.org/os/downloads/sol_ex_dvd/).
2. Download compilers, tools, source code and closed binaries.
  - Sun Studio 11 compilers can be downloaded from [http://opensolaris.org/os/community/tools/sun\\_studio\\_tools/sun\\_studio\\_11\\_tools](http://opensolaris.org/os/community/tools/sun_studio_tools/sun_studio_11_tools) or you can also find it in Open Solaris DVD under /cdrom/sol\_11\_x86/DeveloperTools/SunStudio/ (the compiler that comes with this Solaris Developer Express release is Studio 12)
  - Download other tools from <http://dlc.sun.com/osol/on/downloads/current/> or you can find in CFF kit
    - Build tools – SUNWonbld.i386.tar.bz2
    - Closed binaries – on-closed-bins-nd.i386.tar.bz2
    - Source code – on-src.tar.bz2

3. I used the following link to install tools and build the workspace [http://opensolaris.org/os/community/on/devref\\_toc/devref\\_1/#1\\_3\\_quick\\_start](http://opensolaris.org/os/community/on/devref_toc/devref_1/#1_3_quick_start) Now we will see this in detail steps.

- Install tools

```
# cd /solarisbuild/
# ls
SUNWonbld.i386.tar.bz2
on-closed-bins-nd.i386.tar.bz2
on-src.tar.bz2
sunstudio11-ii-20070828-sol-x86.tar.bz2
# cd /opt
# bzip2 -dc ~/solarisbuild/sunstudio11-ii-20070828-sol-x86.tar.bz2 | tar -xvf -
# cd /var/tmp
# bzip2 -dc ~/solaris/build/SUNWonbld.i386.tar.bz2 | tar -xvf -
# pkgadd -d . SUNWonbld
```
- Create and build your workspace

```
# mkdir /solarisws
# cd /solarisws
# bzip2 -dc ~/solarisbuild/on-src.tar.bz2 |tar -xvf -
# bzip2 -dc ~/solarisbuild/on-closed-bins-nd.i386.tar.bz2 |tar -xvf -
```

It is advised to look at the README.opensolaris in /solarisws before proceeding further.

```

# cp ~/solarisws/usr/src/tools/env/opensolaris.sh
# chmod +w ./opensolaris.sh
# vi opensolaris.sh
change
GATE=solarisws
CODEMGR_WS="/$GATE" (CODEMGR_WS="/export/home/user1/$GATE")
STAFFER=root (change it to user user id)
If you use Studio 12, you need to set __SSNEXT to NULL (__SSNEXT=)

```

Instead of extracting the source archive, you can pull the source form ON Mercurial repository by

```
# hg clone ssh://anon@hg.opensolaris.org/hg/onnv/onnv-gate
```

( you need to connect to internet)

with this you can later on update your workspace with the latest changes by just doing

```
#hg pull --update
```

#### 4. How to work on a bug

- Have a look at the bite-sized bugs to start with at [http://opensolaris.org/os/bug\\_reports/oss\\_bite\\_size/](http://opensolaris.org/os/bug_reports/oss_bite_size/).
- Ideally, pick up bugs marked oss-bite-size. You can also pick up other bugs which do not have a Responsible Engineer and does not have a request-sponsor keyword ('request-sponsor' keyword means another contributor is already working on it). Go to <http://bugs.opensolaris.org>
- This link: [http://opensolaris.org/os/bug\\_reports/request\\_sponsor/](http://opensolaris.org/os/bug_reports/request_sponsor/) has a list of all the bugs that are fixed and being fixed by all the contributors. Make sure the bug you have selected does not appear here.
- You can request for a mentor at [http://www2.sun.de/dct/forms/reg\\_in\\_0810\\_513\\_0.jsp](http://www2.sun.de/dct/forms/reg_in_0810_513_0.jsp). You can ask your mentor for any other help in fixing a bug. Once you have selected a bug and you wanted to work on, it is better to send a mail to [request-sponsor@opensolaris.org](mailto:request-sponsor@opensolaris.org). Saying that you are working on some '123456' bug and will finish working on it by dd-mm-yyyy date. It is just to prevent the conflicts with other contributor. If you decided to work on a RFE (Request For Enhancement), you may need to submit a PSARC case. More details you can find at <http://opensolaris.org/os/community/arc/>. You can take the help of your mentor.
- You need to sign the contributor agreement. Download Sun Contributor Agreement (SCA) from [http://www.opensolaris.org/os/about/sun\\_contributor\\_agreement](http://www.opensolaris.org/os/about/sun_contributor_agreement) and Print the Sun Contributor Agreement, fill it and sign it. Follow the instructions in the page to submit it. You'll be given a SCA number and your email address will be added to [request-sponsor@opensolaris.org](mailto:request-sponsor@opensolaris.org). It is advised to provide your permanent e-mail id.
- If you find any bug or thinking of an any RFE, you can file it at <http://www.opensolaris.org/bug/report.jspa>

Here I am showing you, how we can fix a bug (6323746)

- First we have look at the bug description and understand what 'useradd' does by looking at man page.

```
#man useradd
```

- Man page says '-m' mean 'Create the new user's home directory if it does not already exist'. Then we have to simply try to reproduce it on our system as a root.

```

# touch /export/home/test
# /usr/sbin/useradd -m -d /export/home/test test
UX: useradd: WARNING: test has no permissions to use /export/home/test.
# tail -1 /etc/passwd test: x:218450:1::/export/home/test:/bin/sh
# su - testsu: No directory!

```

- This has created the user but not able to switch to user. Since the home directory we have

specified is a file, su(1M) failed to become user 'test'. So useradd should not create a user in this case and it should fail.

- Then we have to browse the code using OpenSolaris source browser at <http://src.opensolaris.org/source/>. we have to type "useradd" in 'File Path' text box and search for useradd source code.
- There we can see this 'mflag' check in the source code(useradd.c) where it is just checking whether the given path exists or not, and it is not checking whether it is directory or not. <http://src.opensolaris.org/source/xref/onnv/onnv-gate/usr/src/cmd/oamuser/user/useradd.c#491>
- The fix is, to add a check to see whether it is directory or not. For doing this we have to know what stat is doing. Do a  
# man stat
- There we can find st\_mode, which has the information about file type. Then we do a  
#man -s 2 mknod  
This tells what are all the different file types. What we are looking for is 'S\_IFDIR'. Now we know what to fix.
- Then we have to do following things in our workspace. If you are fixing a kernel bug you need to do nightly.

```
#cd /solarisws
# export PATH=$PATH:/opt/SUNWspro/bin:/opt/onbld/bin
# nightly ./opensolaris.sh &
( This builds your entire workspace)
# tail -f /solarisws/log/nightly.log
( You can monitor the compilation in this file. It took 12 hours on my intel pentium 3
processor with 512 MB RAM. )
#ls
README.opensolaris log proto
closed opensolaris.sh usr
```

If you are fixing an user land bug, you no need to build entire workspace, you can just build that particular module.

```
# cd /solarisws
# export PATH=$PATH:/opt/SUNWspro/bin:/opt/onbld/bin
# vi opensolaris.sh
remove 't' in NIGHTLY_OPTIONS="-FNnaCDImrt" and it becomes
NIGHTLY_OPTIONS="-FNnaCDImr"
# bldenv ./opensolaris.sh
# cd usr/src/cmd/oamuser/user
# chmod +w useradd.c
# cp useradd.c useradd.c.orig
# vi useradd.c ( Apply the fix)
if (statbuf.st_mode != S_IFDIR) {
errmsg(M_RELPATH, homedir);
exit(EX_BADARG);
}
# cd ..
# dmake all
# cd user
# ls useradd*
useradd useradd.c useradd.c.orig useradd.o
```

- Then we have to take the 'useradd' binary generated in the workspace and test it.  
#./useradd -m -d /export/home/test test  
UX: ./useradd: ERROR: /export/home/test is not a full path name. Choose another.

- Now we are ready with the fix. Take the diffs of the fix.

```
# diff -u useradd.c.orig useradd.c
--- useradd.c.orig      Thu Nov 15 20:55:31 2007
+++ useradd.c          Thu Nov 15 20:56:59 2007
@@ -491,6 +491,10 @@
     if (mflag) {
         /* Does home dir. already exist? */
         if (stat(homedir, &statbuf) == 0) {
+
+             if (statbuf.st_mode != S_IFDIR) {
+                 errmsg(M_RELPATH, homedir);
+                 exit(EX_BADARG);
+             }
         /* directory exists - don't try to create */
         mflag = 0;
     }

```

We can submit our code changes to <http://cr.opensolaris.org> for code review.

#### 5. How can I integrate this fix in the source base.

- Send a mail to [request-sponsor@opensolaris.org](mailto:request-sponsor@opensolaris.org) with bugid, synopsis of bugid, description of the bug, which category the bug belongs to, fix (diff's output) and your SCA number. A sponsor will do the integration on your behalf in the opensolaris code base.
- Sponsor will integrate the fix by giving credits to you in the source code comments. Or you can have your own copyright in the code. For more information have a look at [http://opensolaris.org/os/community/on/devref\\_toc/devref\\_7/#7\\_2\\_3\\_nonformatting\\_considerations](http://opensolaris.org/os/community/on/devref_toc/devref_7/#7_2_3_nonformatting_considerations)
- Your sponsor will notify you about the putback. If you are participating in CFF send a mail to [codeforfreedom@sun.com](mailto:codeforfreedom@sun.com) with the Subject: '[Open Solaris] Bug-ID: putback Complete' to intimate that you have completed the fix.

#### 6. How will I benefit from this

- Once you select a bug, first get a complete knowledge about the related technology, like what it is and how it works by looking at the documents or playing with corresponding commands on your system.
- Now you know the technology and you have the source code, it is just you have to understand the code. This is where you can learn more about a particular command or library or system call or kernel module.
- You can not only learn about the technology, you can learn about some good algorithms and data structures during this process ..... I can say very good learning opportunity.