

Workspace Setup

Charlie Batchelor
LArSoft Workshop 2023



Outline



Task 1: Build our own **sbndcode** (used in following workshops).



Task 2: Create **another** testing area (build) and test some commands.

Before We Begin...

- Have these slides open for your own reference. These should **also** be opened in the VNC session we login to in a moment.
- The \$ symbol before something indicates an **environment variable**. If things haven't been setup correctly, we will likely run into problems.
- Commands that should be run by you are in code font and black boxes. For example:

```
echo "hello world"
```

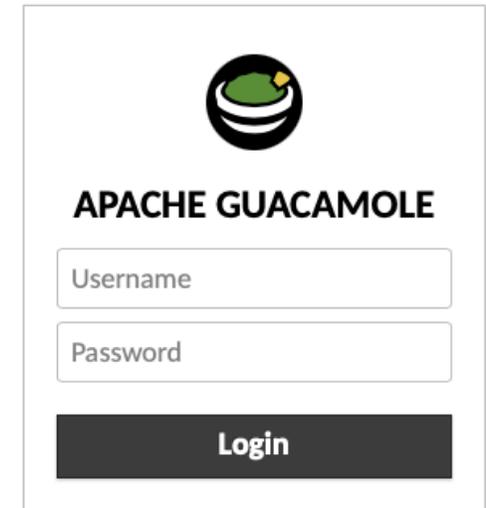
- Screenshots of my own output are included, so you can compare against your own.

Task 1

- **Build our own sbndcode**

Step 1 – Logging In

- [Click here](#) to reach the login screen for this workshop. The prompt on the right should be seen.
- Enter your Username of format **duneXX** and Password which *should* have been given to you by now. (Shout if it hasn't!)



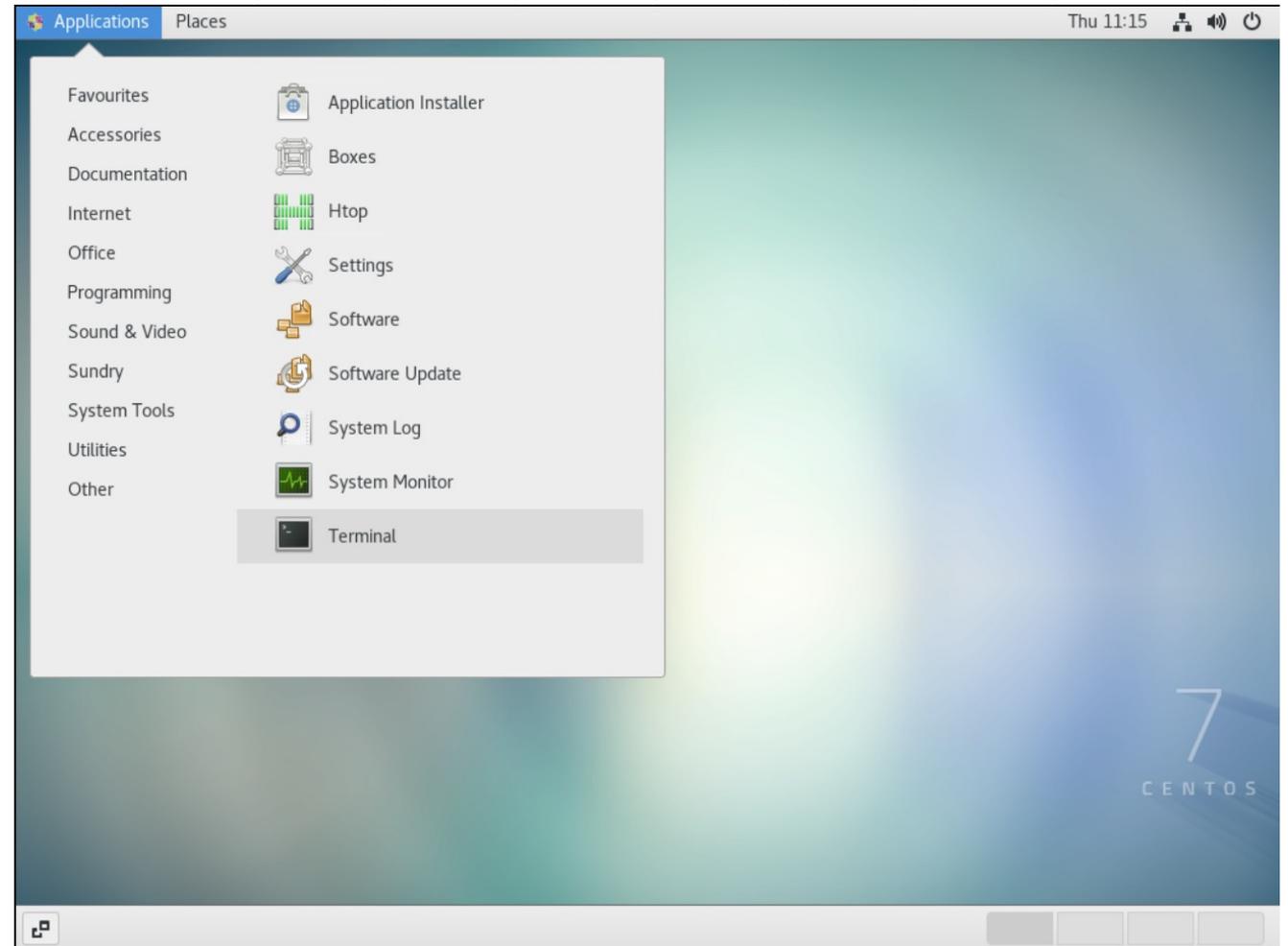
The screenshot shows the Apache Guacamole login interface. At the top center is the Apache Guacamole logo, which consists of a black circle containing a green globe with a yellow cursor arrow pointing to the right. Below the logo, the text "APACHE GUACAMOLE" is displayed in a bold, black, sans-serif font. Underneath the text are two input fields: the first is labeled "Username" and the second is labeled "Password". Both fields are empty and have a light gray border. At the bottom of the form is a dark gray button with the word "Login" written in white, bold, sans-serif font.

Step 2 – Open A Terminal

- Follow:

**Applications →
System Tools → Terminal**

to open a terminal window.



Step 3 – Create A Work Directory

- The terminal opens in your home area. In the terminal, type the following to create a new work directory there:

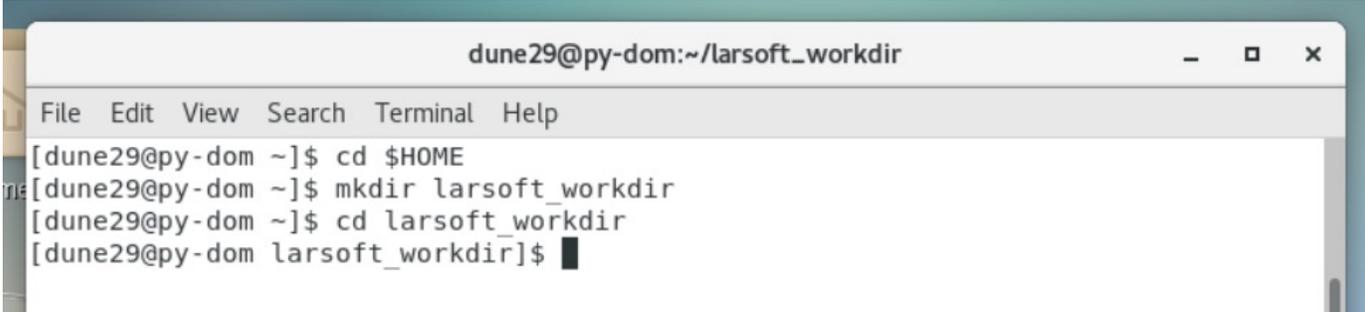
```
cd $HOME
```

```
mkdir larsoft_workdir
```

- And then move into it:

```
cd larsoft_workdir
```

Expected Terminal Output

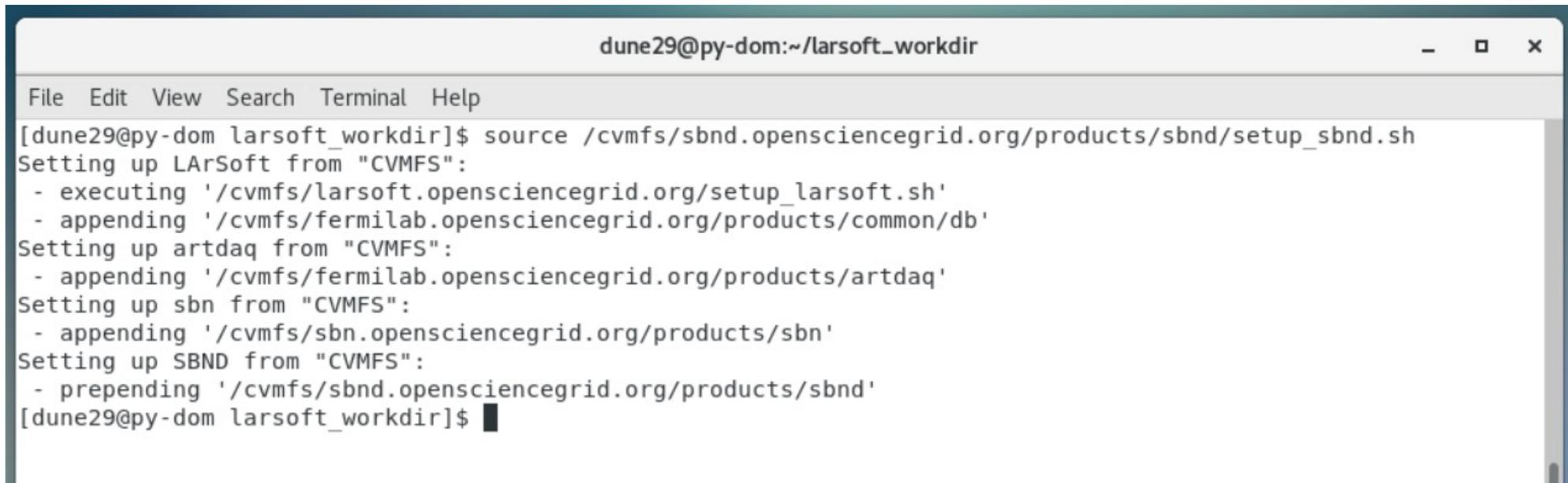


```
dune29@py-dom:~/larsoft_workdir
File Edit View Search Terminal Help
[dune29@py-dom ~]$ cd $HOME
[dune29@py-dom ~]$ mkdir larsoft_workdir
[dune29@py-dom ~]$ cd larsoft_workdir
[dune29@py-dom larsoft_workdir]$
```

Step 4 – Setup sbndcode Using CVMFS

- CVMFS contains a script that we would like to use to setup sbndcode. Run it with:
`source /cvmfs/sbnd.opensciencegrid.org/products/sbnd/setup_sbnd.sh`

Expected Terminal Output



```
dune29@py-dom:~/larsoft_workdir
File Edit View Search Terminal Help
[dune29@py-dom larsoft_workdir]$ source /cvmfs/sbnd.opensciencegrid.org/products/sbnd/setup_sbnd.sh
Setting up LArSoft from "CVMFS":
- executing '/cvmfs/larsoft.opensciencegrid.org/setup_larsoft.sh'
- appending '/cvmfs/fermilab.opensciencegrid.org/products/common/db'
Setting up artdaq from "CVMFS":
- appending '/cvmfs/fermilab.opensciencegrid.org/products/artdaq'
Setting up sbn from "CVMFS":
- appending '/cvmfs/sbn.opensciencegrid.org/products/sbn'
Setting up SBND from "CVMFS":
- prepending '/cvmfs/sbnd.opensciencegrid.org/products/sbnd'
[dune29@py-dom larsoft_workdir]$
```

Step 5 – Make A New Development Area

- Executing that script has given us a new command called `mrB`
- Use it to turn the current directory into a new development area:

```
mrB newDev -v v09_78_02 -q prof:e20
```

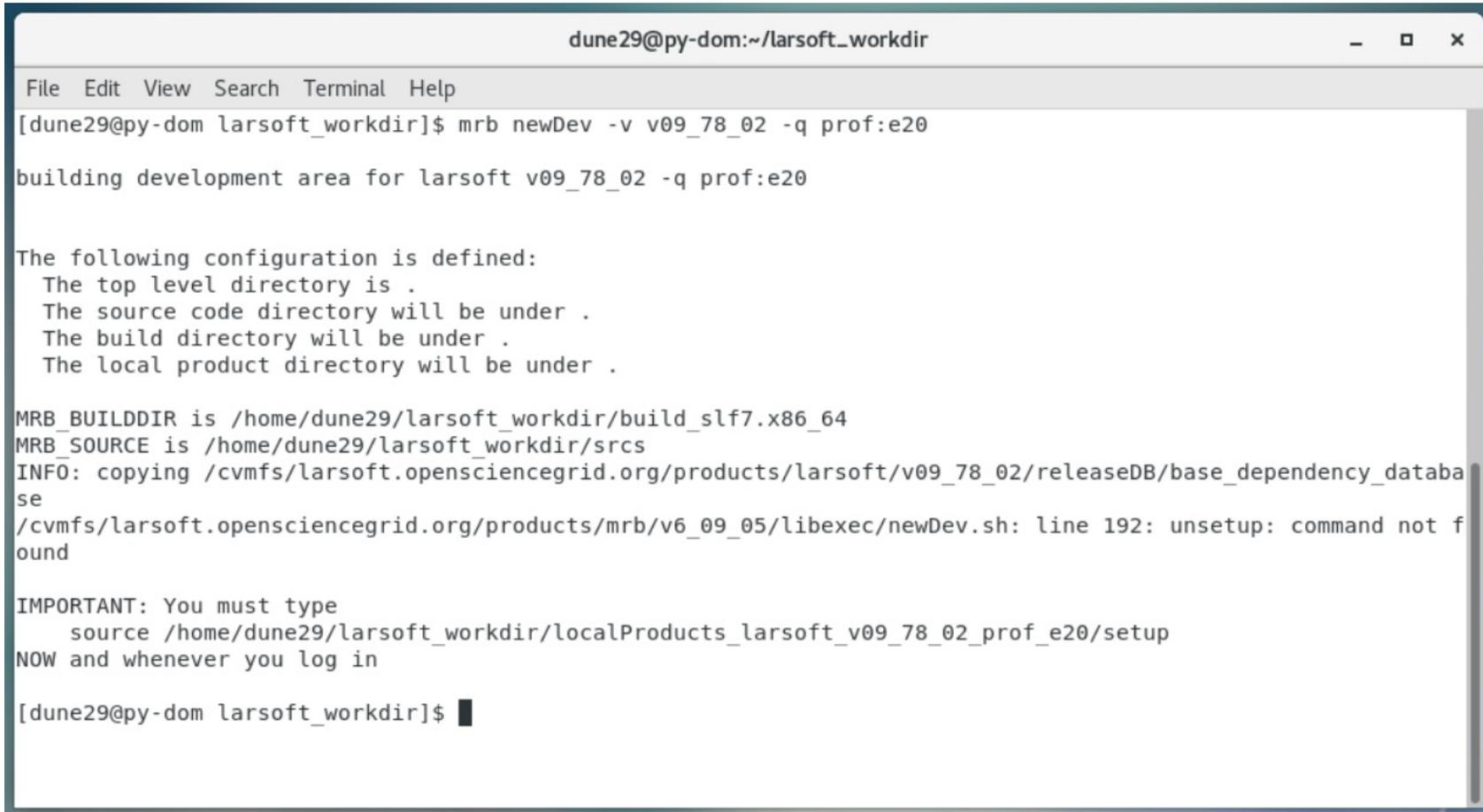
The `-v` allows us to specify the version of larsoft we'd like to setup a development area for.

`v09_78_02` in this case!

The `-q` specifies a "qualifier". The 'prof' part indicates to build with minimal debug symbols, and the `e20` part determines the compiler to use.

Step 5 – Make A New Development Area

Expected Terminal Output



```
dune29@py-dom:~/larsoft_workdir
File Edit View Search Terminal Help
[dune29@py-dom larsoft_workdir]$ mrbs newDev -v v09_78_02 -q prof:e20

building development area for larsoft v09_78_02 -q prof:e20

The following configuration is defined:
  The top level directory is .
  The source code directory will be under .
  The build directory will be under .
  The local product directory will be under .

MRB_BUILDDIR is /home/dune29/larsoft_workdir/build_slf7.x86_64
MRB_SOURCE is /home/dune29/larsoft_workdir/srcs
INFO: copying /cvmfs/larsoft.opensciencegrid.org/products/larsoft/v09_78_02/releaseDB/base_dependency_database
/cvmfs/larsoft.opensciencegrid.org/products/mrb/v6_09_05/libexec/newDev.sh: line 192: unsetup: command not found

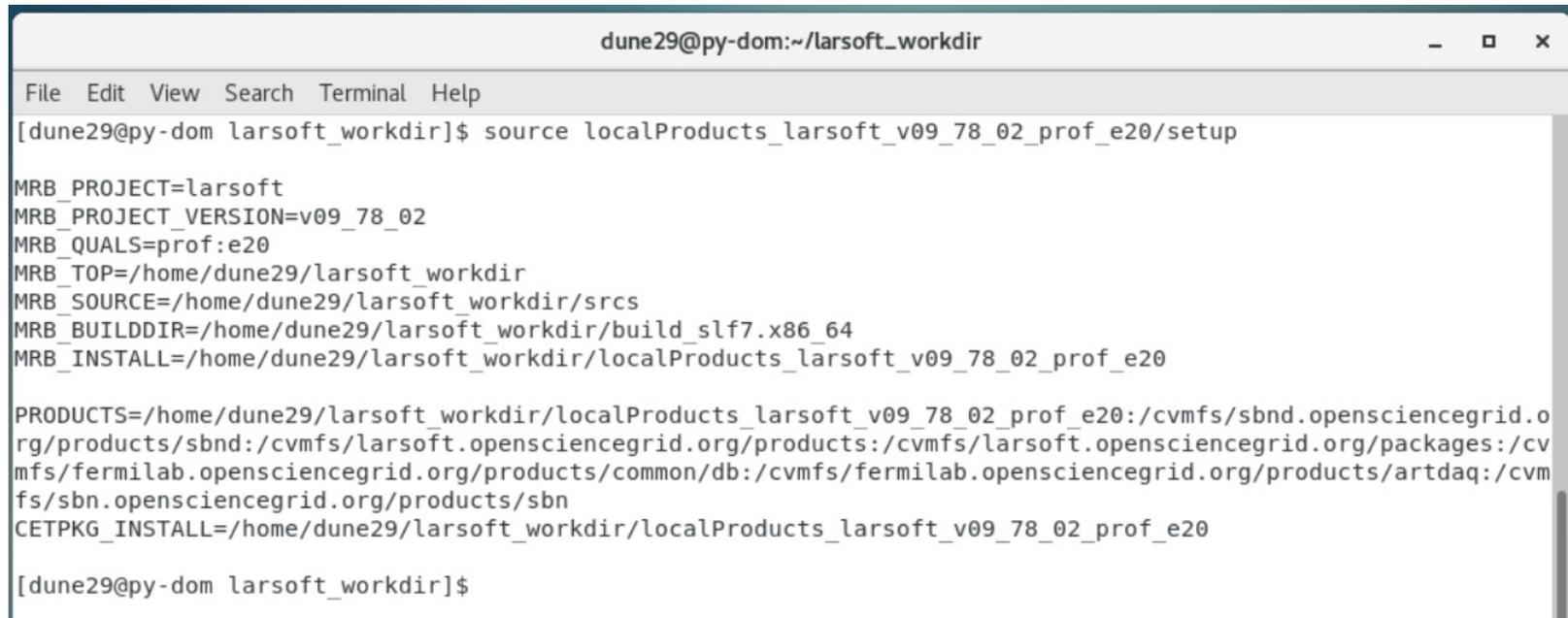
IMPORTANT: You must type
  source /home/dune29/larsoft_workdir/localProducts_larsoft_v09_78_02_prof_e20/setup
NOW and whenever you log in

[dune29@py-dom larsoft_workdir]$
```

Step 6 – Source The Local Products

- As the terminal output suggested, we now want to source the local products placed in the current directory.

```
source localProducts_larsoft_v09_78_02_prof_e20/setup
```



```
dune29@py-dom:~/larsoft_workdir
File Edit View Search Terminal Help
[dune29@py-dom larsoft_workdir]$ source localProducts_larsoft_v09_78_02_prof_e20/setup

MRB_PROJECT=larsoft
MRB_PROJECT_VERSION=v09_78_02
MRB_QUALS=prof:e20
MRB_TOP=/home/dune29/larsoft_workdir
MRB_SOURCE=/home/dune29/larsoft_workdir/srcs
MRB_BUILDDIR=/home/dune29/larsoft_workdir/build_slf7.x86_64
MRB_INSTALL=/home/dune29/larsoft_workdir/localProducts_larsoft_v09_78_02_prof_e20

PRODUCTS=/home/dune29/larsoft_workdir/localProducts_larsoft_v09_78_02_prof_e20:/cvmfs/sbnd.opensciencegrid.org/products/sbnd:/cvmfs/larsoft.opensciencegrid.org/products:/cvmfs/larsoft.opensciencegrid.org/packages:/cvmfs/fermilab.opensciencegrid.org/products/common/db:/cvmfs/fermilab.opensciencegrid.org/products/artdaq:/cvmfs/sbn.opensciencegrid.org/products/sbn
CETPKG_INSTALL=/home/dune29/larsoft_workdir/localProducts_larsoft_v09_78_02_prof_e20

[dune29@py-dom larsoft_workdir]$
```

Step 7 – Git Clone sbndcode With MRB

- Move to the srcs directory
`cd srcs`
- And clone the sbndcode repository with
`mrbs g sbndcode`

Expected Terminal Output

```
[dune29@py-dom larsoft_workdir]$ cd srcs/  
[dune29@py-dom srcs]$ mrbs g sbndcode  
Cloning into 'sbndcode'...  
remote: Enumerating objects: 35619, done.  
remote: Counting objects: 100% (3344/3344), done.  
remote: Compressing objects: 100% (1159/1159), done.  
remote: Total 35619 (delta 2243), reused 3210 (delta 2160), pack-reused 32275  
Receiving objects: 100% (35619/35619), 78.88 MiB | 13.21 MiB/s, done.  
Resolving deltas: 100% (24256/24256), done.  
NOTICE: Adding sbndcode to CMakeLists.txt file  
[dune29@py-dom srcs]$ █
```

Step 8 – Checkout Workshop Branch

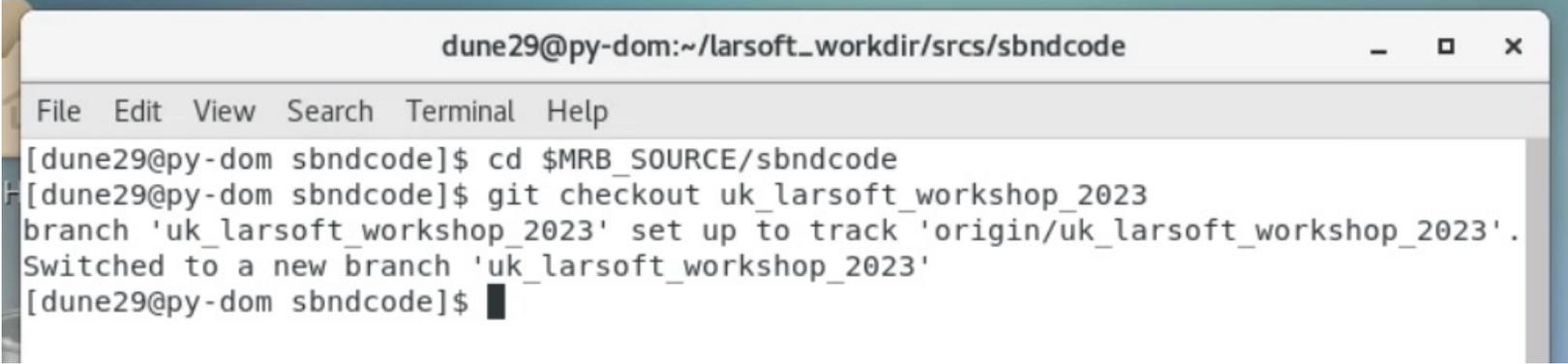
- Move to the srcs directory

```
cd $MRB_SOURCE/sbndcode
```

- And clone the sbndcode repository with

```
git checkout uk_larsoft_workshop_2023
```

Expected Terminal Output



```
dune29@py-dom:~/larsoft_workdir/srcs/sbndcode
```

```
File Edit View Search Terminal Help
```

```
[dune29@py-dom sbndcode]$ cd $MRB_SOURCE/sbndcode
```

```
[dune29@py-dom sbndcode]$ git checkout uk_larsoft_workshop_2023
```

```
branch 'uk_larsoft_workshop_2023' set up to track 'origin/uk_larsoft_workshop_2023'.
```

```
Switched to a new branch 'uk_larsoft_workshop_2023'
```

```
[dune29@py-dom sbndcode]$
```

Step 9 – Set The Environment

- Use the following command to set the development environment:

mrbsetenv

Expected Terminal Output



```
dune29@py-dom:~/larsoft_workdir/srcs/sbndcode
File Edit View Search Terminal Help
[dune29@py-dom sbndcode]$ mrbsetenv
The working build directory is /home/dune29/larsoft_workdir/build_slf7.x86_64
The source code directory is /home/dune29/larsoft_workdir/srcs
----- check this block for errors -----
-----
To inspect build variable settings, execute /home/dune29/larsoft_workdir/build_slf7.x86_64/cetpkg_info.sh

Please use "buildtool" (or "mrb b") to configure and build MRB project "larsoft", e.g.:

    buildtool -vTl [-jN]

See "buildtool --usage" (short usage help) or "buildtool -h|--help"
(full help) for more details.

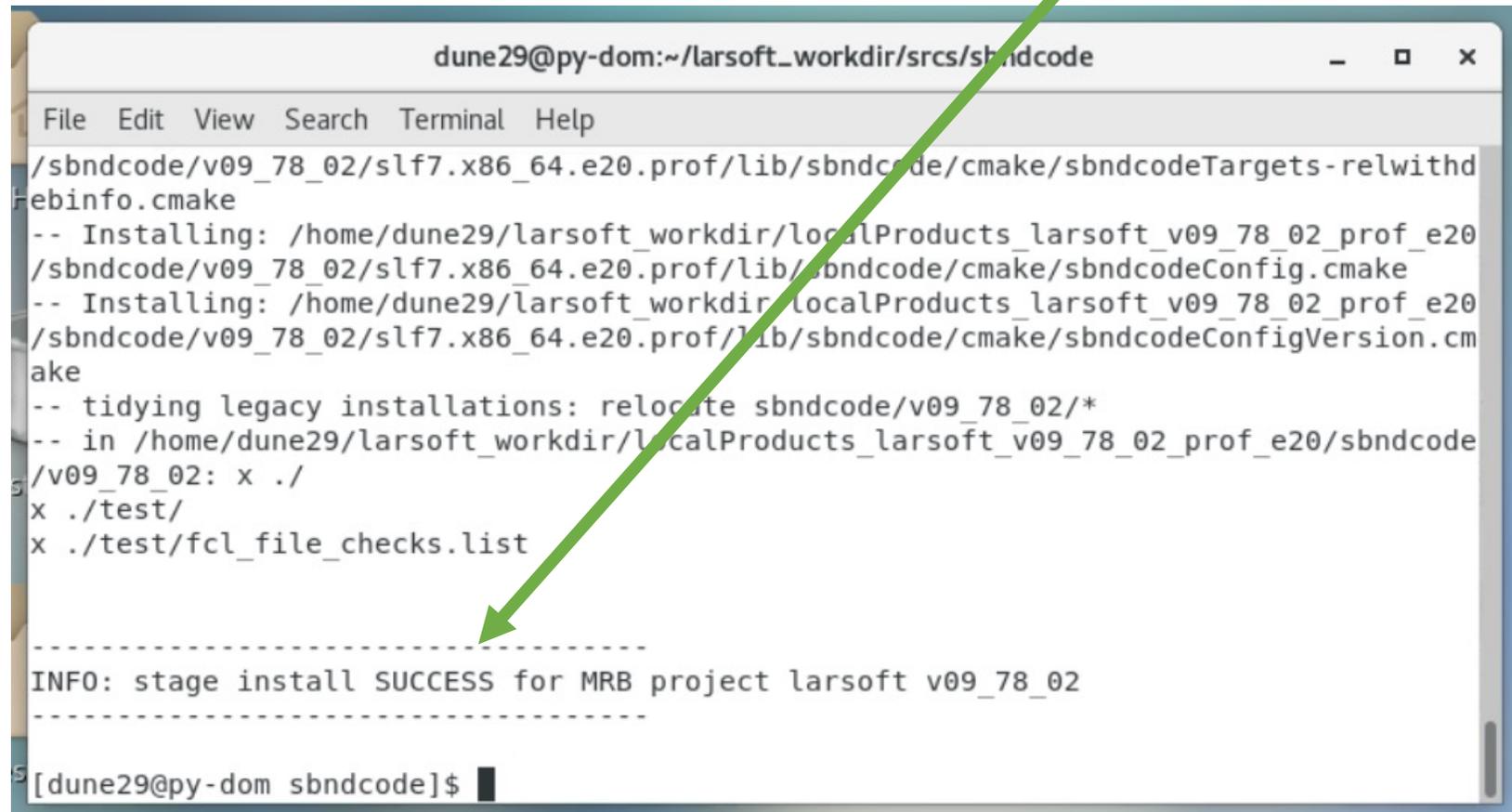
[dune29@py-dom sbndcode]$
```

Step 10 – Build & Install

- Use the following command to **build** and **install** the code:
`mrbi -j4`
- The "i" stands for "install" and the "-jX" indicates how many cores X to use for this process.

Expected Terminal Output

IMPORTANT BIT!



```
dune29@py-dom:~/larsoft_workdir/srcs/sbndcode
File Edit View Search Terminal Help
/sbndcode/v09_78_02/slf7.x86_64.e20.prof/lib/sbndcode/cmake/sbndcodeTargets-relwithd
ebinfo.cmake
-- Installing: /home/dune29/larsoft_workdir/localProducts_larsoft_v09_78_02_prof_e20
/sbndcode/v09_78_02/slf7.x86_64.e20.prof/lib/sbndcode/cmake/sbndcodeConfig.cmake
-- Installing: /home/dune29/larsoft_workdir/localProducts_larsoft_v09_78_02_prof_e20
/sbndcode/v09_78_02/slf7.x86_64.e20.prof/lib/sbndcode/cmake/sbndcodeConfigVersion.cm
ake
-- tidying legacy installations: relocate sbndcode/v09_78_02/*
-- in /home/dune29/larsoft_workdir/localProducts_larsoft_v09_78_02_prof_e20/sbndcode
/v09_78_02: x ./
x ./test/
x ./test/fcl_file_checks.list

-----
INFO: stage install SUCCESS for MRB project larsoft v09_78_02
-----

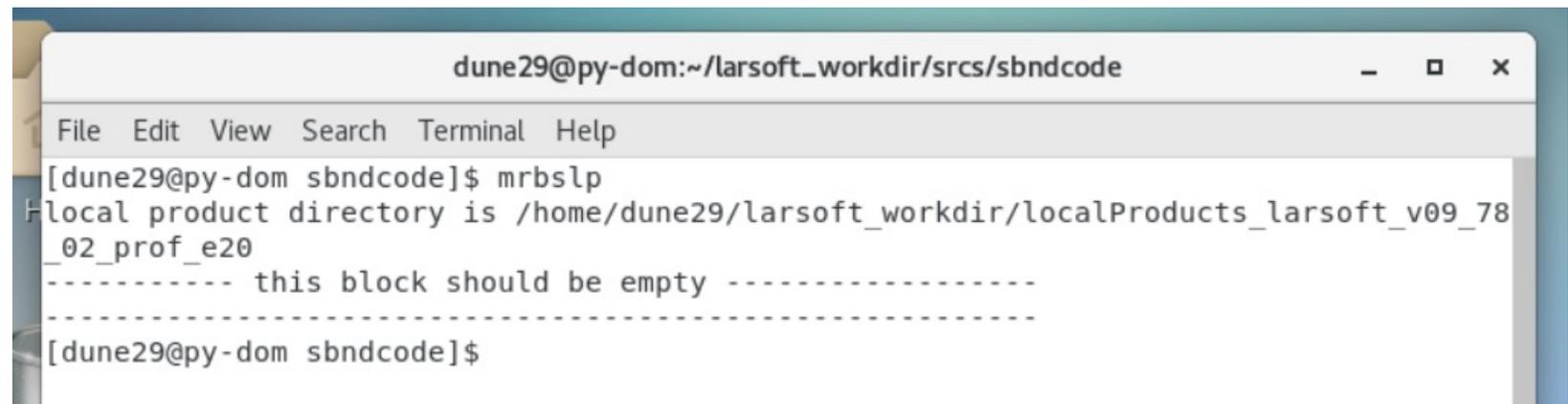
[dune29@py-dom sbndcode]$
```

Step 11 – Setup The Local Install

Expected Terminal Output

- Use the following command to setup local products 'slp' :

mrbslp



```
dune29@py-dom:~/larsoft_workdir/srcs/sbndcode
File Edit View Search Terminal Help
[dune29@py-dom sbndcode]$ mrbslp
local product directory is /home/dune29/larsoft_workdir/localProducts_larsoft_v09_78_02_prof_e20
----- this block should be empty -----
[dune29@py-dom sbndcode]$
```

This will setup all of the things installed in your **localProducts*/** directory.

Step 12 – Create A Setup Script

- Let's make a script to run the setup instructions, so you don't have to do this for each new workshop.

```
cd $MRB_TOP  
touch setup.sh
```

- Paste the following lines into this script file using your favourite text editor e.g. **vim**, **emacs**...

```
source /cvmfs/sbnd.opensciencegrid.org/products/sbnd/setup_sbnd.sh  
source localProducts_*/setup  
mrbsetenv  
mrbslp
```

- Save and close this file.

Step 13 – Test Setup Script

- Open a new terminal window and go to your work area.

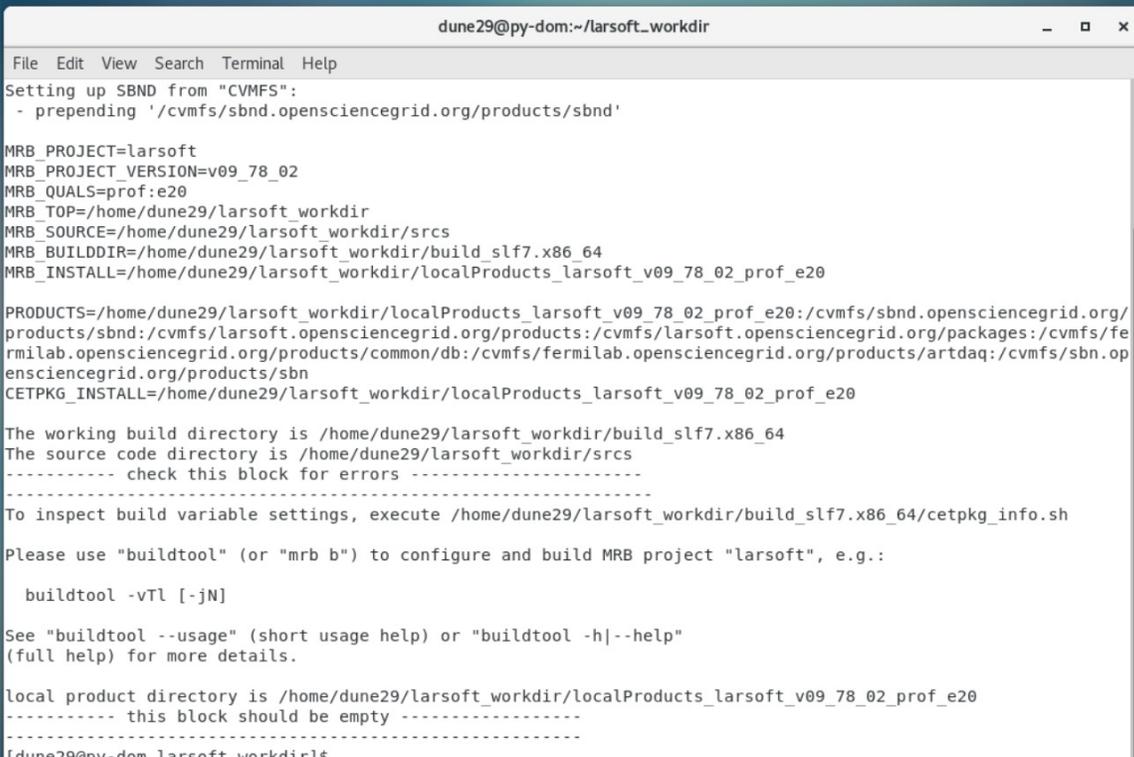
```
cd $HOME/larsoft_workdir
```

- Now try sourcing the script you just made in this directory:

```
source setup.sh
```

- If no errors, we are done! You now have your own development area for the remaining workshops.

Expected Terminal Output



```
dune29@py-dom:~/larsoft_workdir
File Edit View Search Terminal Help
Setting up SBND from "CVMFS":
- prepending '/cvmfs/sbnd.opensciencegrid.org/products/sbnd'

MRB_PROJECT=larsoft
MRB_PROJECT_VERSION=v09_78_02
MRB_QUALS=prof:e20
MRB_TOP=/home/dune29/larsoft_workdir
MRB_SOURCE=/home/dune29/larsoft_workdir/srcs
MRB_BUILDDIR=/home/dune29/larsoft_workdir/build_slf7.x86_64
MRB_INSTALL=/home/dune29/larsoft_workdir/localProducts_larsoft_v09_78_02_prof_e20

PRODUCTS=/home/dune29/larsoft_workdir/localProducts_larsoft_v09_78_02_prof_e20:/cvmfs/sbnd.opensciencegrid.org/
products/sbnd:/cvmfs/larsoft.opensciencegrid.org/products:/cvmfs/larsoft.opensciencegrid.org/packages:/cvmfs/fermilab.opensciencegrid.org/products/common/db:/cvmfs/fermilab.opensciencegrid.org/products/artdaq:/cvmfs/sbn.opensciencegrid.org/products/sbn
CETPKG_INSTALL=/home/dune29/larsoft_workdir/localProducts_larsoft_v09_78_02_prof_e20

The working build directory is /home/dune29/larsoft_workdir/build_slf7.x86_64
The source code directory is /home/dune29/larsoft_workdir/srcs
----- check this block for errors -----
-----

To inspect build variable settings, execute /home/dune29/larsoft_workdir/build_slf7.x86_64/cetpkg_info.sh

Please use "buildtool" (or "mrb b") to configure and build MRB project "larsoft", e.g.:

    buildtool -vTl [-jN]

See "buildtool --usage" (short usage help) or "buildtool -h|--help"
(full help) for more details.

local product directory is /home/dune29/larsoft_workdir/localProducts_larsoft_v09_78_02_prof_e20
----- this block should be empty -----
-----

[dune29@py-dom larsoft_workdir]$
```

Task 2

- **Test LArSoft command(s), whilst practicing the above steps**

Step 1 – Create A New Test Area

- Open a **new terminal**. Create a new testing directory:

```
cd $HOME
```

```
mkdir larsoft_testdir
```

```
cd larsoft_testdir
```

- Repeat **steps 4 – 11** in Task 1 (Creating a new development area, checking out code, building and installing...)

Step 2 – Make a Data Directory

- Use the following commands to create a directory for your data:

```
cd $HOME
```

```
mkdir data
```

```
cd data
```

- When working on the Fermilab gpvms (General Purpose Virtual Machines), you should use: /EXPERIMENT_NAME/**data**/ directories to store **data** /EXPERIMENT_NAME/**app**/ directories to store **code**, these have a smaller quota but are backed up.

Step 3 – LArSoft Test Run

- The following is an example LArSoft = “lar” command. This is the one you’ll be learning about in the remaining workshops:

```
lar -c prodsingle_sbnd.fcl -n 5 -o muons.root
```

The command to run LArSoft.

The configuration for the job you’re running. The job is defined here in the *.fcl file.

The number of events to produce/process.

The name of the output ROOT file.

Step 3 – LArSoft Test Run

- The following is an example LArSoft = “lar” command. This is the one you’ll be learning about in the remaining workshops:

```
lar -c prodsingle_sbnd.fcl -n 5 -o muons.root
```

Expected Terminal Output

```
=====
```

TimeTracker printout (sec)	Min	Avg	Max	Median	RMS	nEvts
Full event	14.2137	14.4343	14.67	14.3934	0.159493	5

source:EmptyEvent(read)	0.000425832	0.000495432	0.000578783	0.000476217	5.87875e-05	5
simulate:rns:RandomNumberSaver	4.4915e-05	0.000126908	0.000420675	5.7043e-05	0.000146966	5
simulate:generator:SingleGen	4.8018e-05	0.00121978	0.00589734	5.1163e-05	0.00233878	5
simulate:loader:PhysListLoader	1.764e-06	2.0002e-06	2.281e-06	2.038e-06	1.80439e-07	5
simulate:largeant:larg4Main	0.152829	0.165176	0.181004	0.167185	0.0109737	5
simulate:ionandscint:IonAndScint	0.00755878	0.00853533	0.0098196	0.00824693	0.000771919	5
simulate:pdfastsim:PDFastSimPAR	2.18741	2.35843	2.53169	2.32895	0.131857	5
simulate:simdriфт:SimDriftElectrons	0.710371	0.775507	0.816528	0.793669	0.0372001	5
simulate:daq:SimWireSBND	9.73953	9.84461	9.90645	9.85296	0.0611941	5
[art]:TriggerResults:TriggerResultInserter	2.8364e-05	3.74166e-05	5.9642e-05	3.2802e-05	1.1319e-05	5
end_path:out1:RootOutput	7.515e-06	1.16262e-05	2.3983e-05	9.069e-06	6.22671e-06	5
end_path:out1:RootOutput(write)	1.24822	1.27896	1.30277	1.28864	0.0199714	5

```
%MSG-i NuRandomService: RootOutput:out1@EndJob 19-Oct-2023 13:46:04 BST ModuleEndJob
```

Complete!

- **You now should have a work area with a working build of sbndcode for the remaining workshops.**