

DAS-HEP @ CEPCSW Tutorial 2020



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Outline

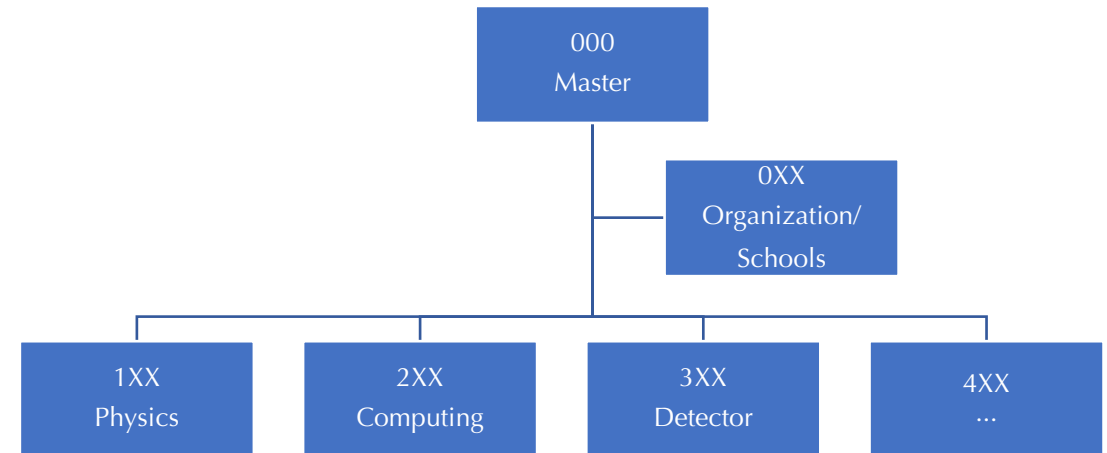
- DAS-HEP
- Software development model
- Programming language
- github.com
- Examples on CEPCSW

What is DAS-HEP?

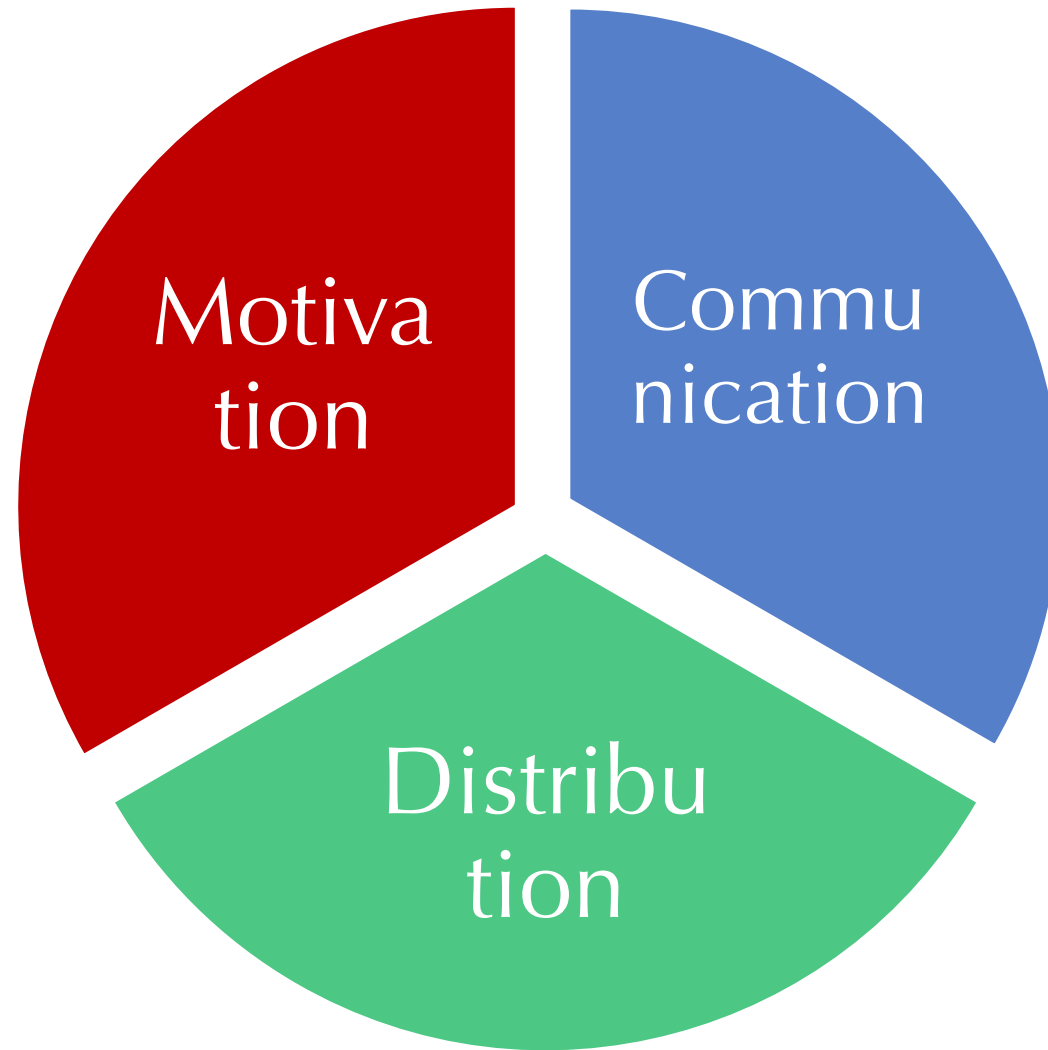
DAS-HEP : Key Ideas

- **D**istributed **A**nalysis **S**cheme for **H**igh **E**nergy **P**hysics
- Goal: transform a new student to a productive and collaborative researcher
- With Schools and online courses

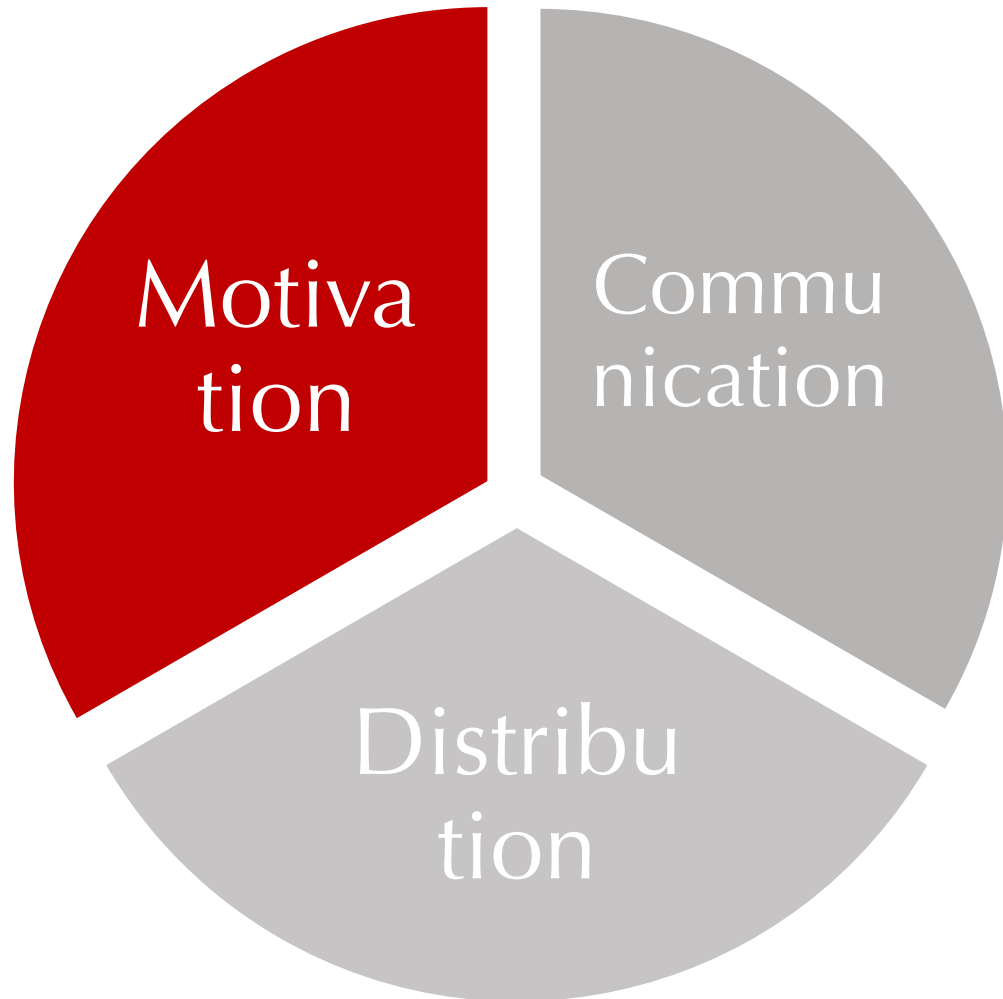
Course Overall Structure



Three pillars for DAS-HEP

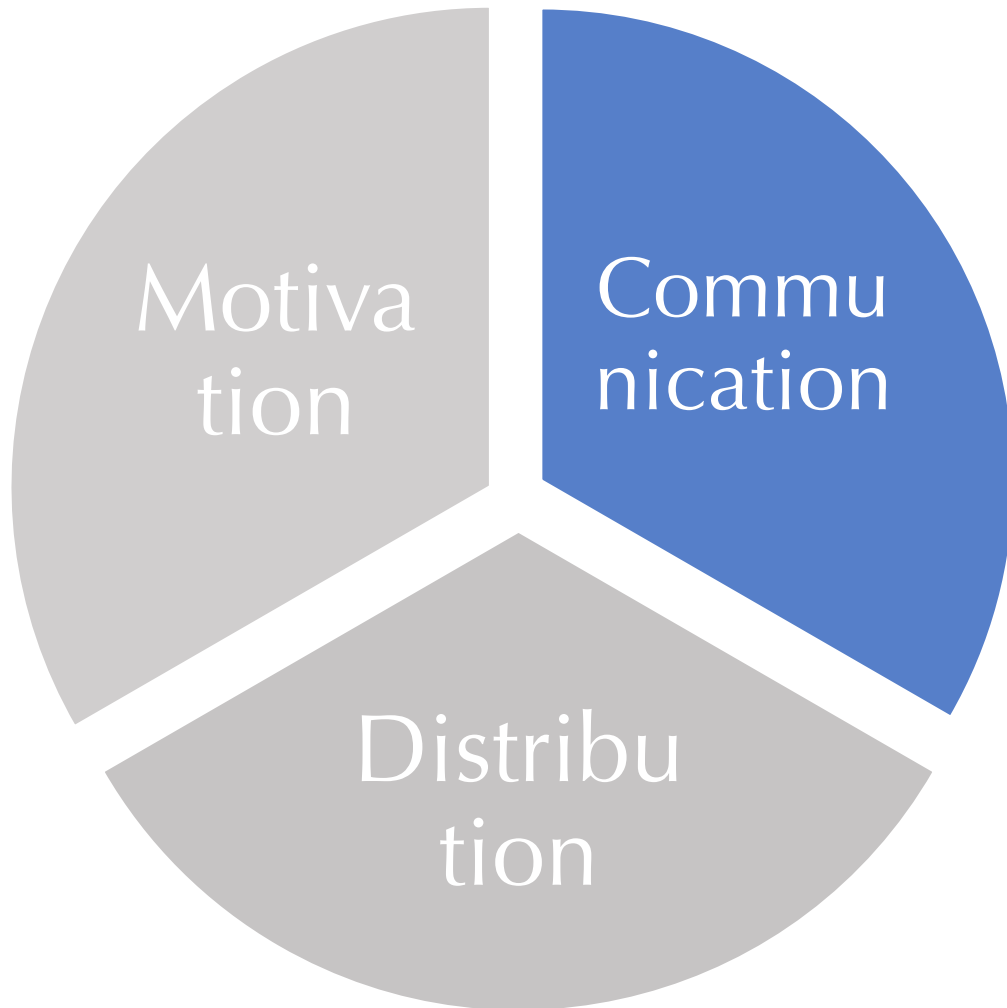


Motivation



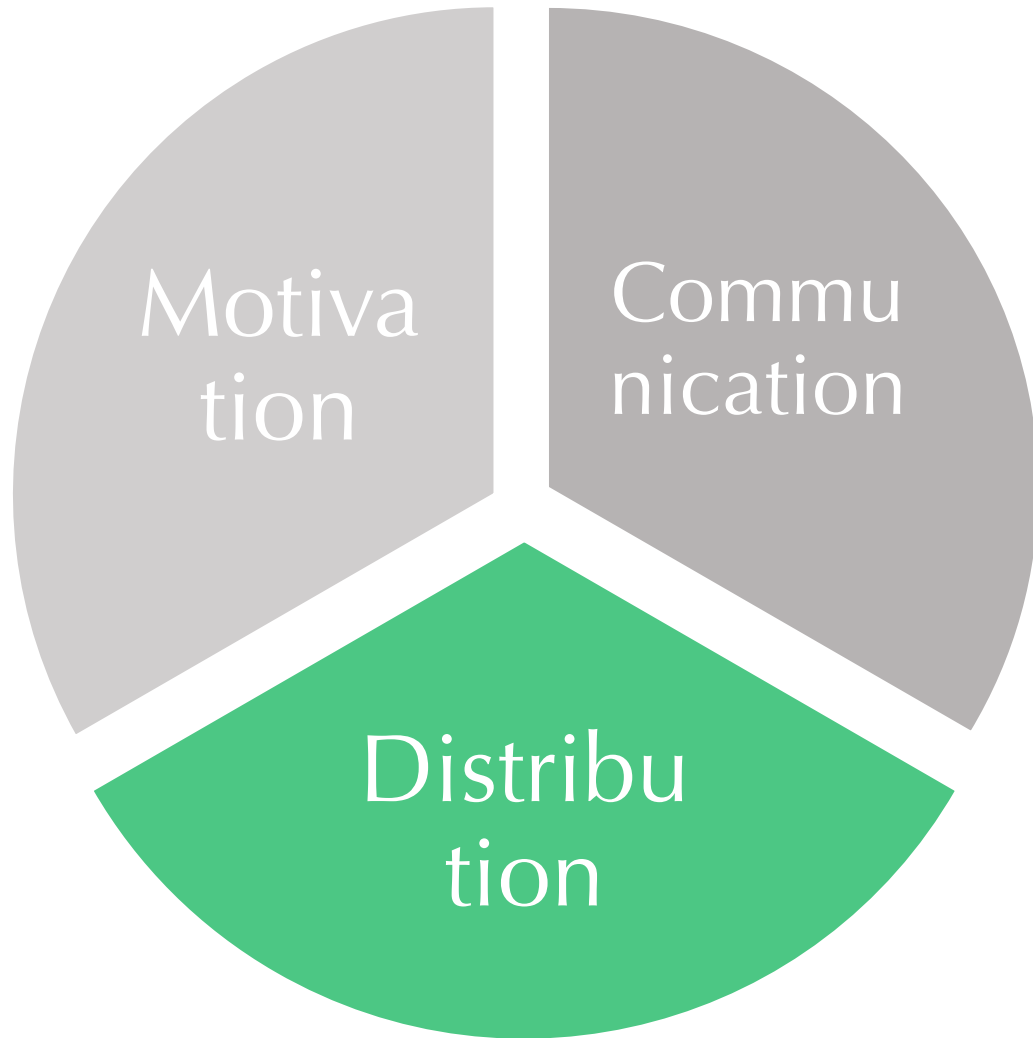
- What is the world made of ?
- Personal connection
 - Every human being is unique
 - Remove the “label”
 - Appearance, Physical, School, Wealth ...
- Trigger your “Atomic Bomb” !
- Tip#1: Flight mode

Communication



- Human language: Chinese and English
- Computer language:
 - System level: bash (10%)
 - Algorithm level: C++ (20%)
 - Fluent level: **python** (70%)
- Tip#2: just USE it !

Distribution



- Centralization vs. Distribution
 - Windows vs. Linux
 - Online News vs. WeChat
 - Classroom vs. Home work
- Advantage and Challenge
 - Adaptive pace
 - Anywhere & Anytime
 - Need well organized !
- Tip#3: **git and web interface**

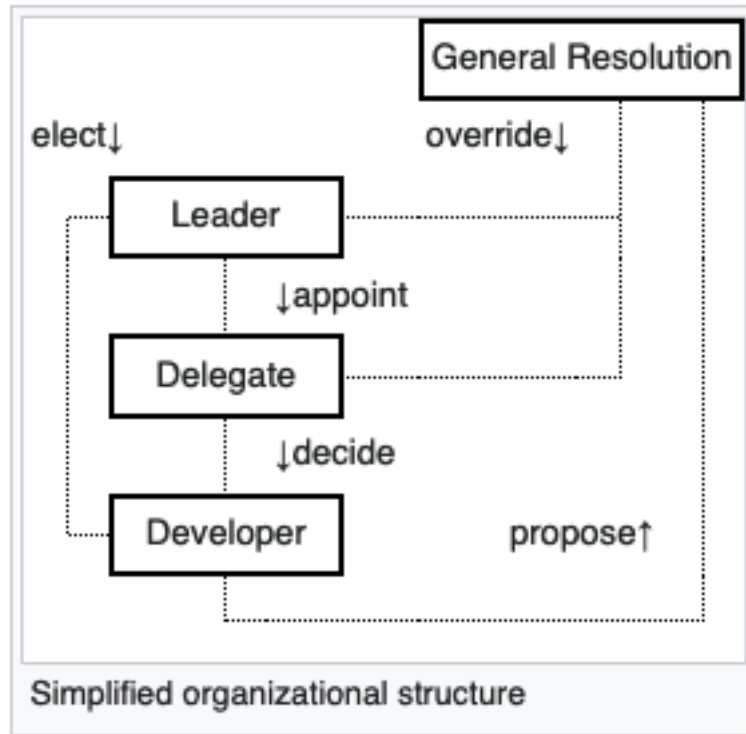
Software development model

Debian Develop Model

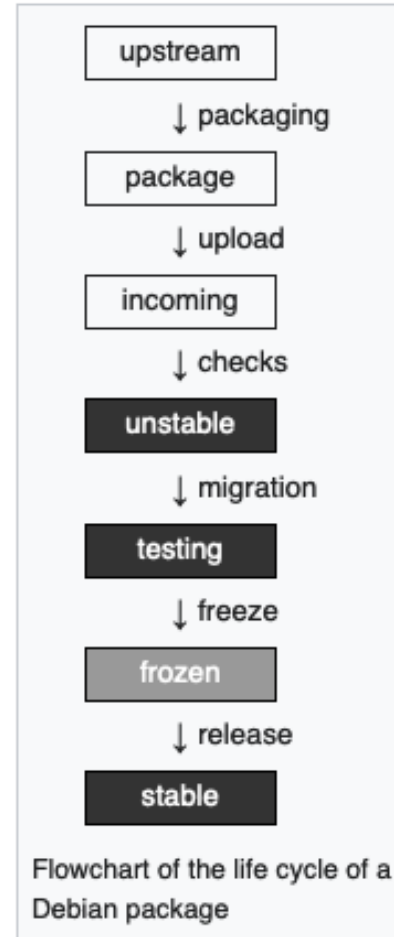
- Organization, lifecycle and **package** system

Debian project leaders^[199]

2021	Jonathan Carter
2020	Sam Hartman
2019	Chris Lamb
2018	Mehdi Dogguy
2017	Neil McGovern
2016	Lucas Nussbaum
2015	Stefano Zacchiroli
2014	Steve McIntyre
2013	Sam Hocevar
2012	Anthony Towns
2011	Branden Robinson
2010	Martin Michlmayr
2009	Bdale Garbee
2008	Ben Collins
2007	Wichert Akkerman
2006	Ian Jackson
2005	Bruce Perens
2004	Ian Murdock
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<https://en.wikipedia.org/wiki/Debian>



Flowchart of the life cycle of a Debian package

> 50,000 packages !

Package	unstable sid	testing bullseye	10 buster	9 stretch
abiword (3.0.4)	3.0.4	3.0.4	3.0.2	3.0.2
alsa-lib (1.2.3.2)	1.2.3.2	1.2.3.2	1.1.8	1.1.8
ati-driver (18.30)	--	--	--	--
bash (5.0)	5.0	5.0	5.0	4.4
bind (9.17.5)	9.16.6	9.16.6	9.11.5-P4	9.10.3-P4
chromium (85.0.4183.102)	83.0.4103.116	83.0.4103.116	73.0.3683.75	59.0.3071.86
cups (2.3.3)	2.3.3	2.3.3	2.2.10	2.2.1
dhcp (4.4.2)	4.4.1	4.4.1	4.4.1	4.3.5
e2fsprogs (1.45.6)	1.45.6	1.45.6	1.44.5	1.43.4
firefox (80.0.1)	80.0.1	--	60.7.2	52.2.0
freetype (2.10.2)	2.10.2	2.10.2	2.9.1	2.6.3
gcc (10.2.0)	10.1.0	10.1.0	8.3.0	6.3.0

<https://distrowatch.com/table.php?distribution=debian>

Semantic Versioning

- Avoid “dependency hell” in software management
- Semantic Versioning: <http://semver.org>
- X.Y.Z = Major.Minor.Patch
 - Major: incompatible API changes
 - Minor: add backwards-compatible functionality
 - Patch: make backwards-compatible bug fixes

Programming Language

Programming language rank



Sep 2020	Sep 2019	Change	Programming Language	Ratings	Change
1	2	▲	C	15.95%	+0.74%
2	1	▼	Java	13.48%	-3.18%
3	3		Python	10.47%	+0.59%
4	4		C++	7.11%	+1.48%
5	5		C#	4.58%	+1.18%
6	6		Visual Basic	4.12%	+0.83%
7	7		JavaScript	2.54%	+0.41%
8	9	▲	PHP	2.49%	+0.62%
9	19	▲▲	R	2.37%	+1.33%
10	8	▼	SQL	1.76%	-0.19%

<https://www.tiobe.com/tiobe-index/>

Three levels of programming language

- Main **goal** of any “language” is for **communication!**

- System level: `bash` (10%)



- Algorithm level: `C++` (20%)



- Fluent level: **`python`** (70%)



Always document your code well !

github.com

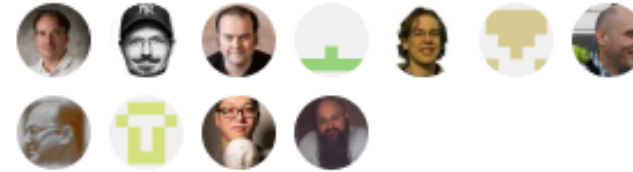


github.com

- Linux Kernel Source code
<https://github.com/torvalds/linux>

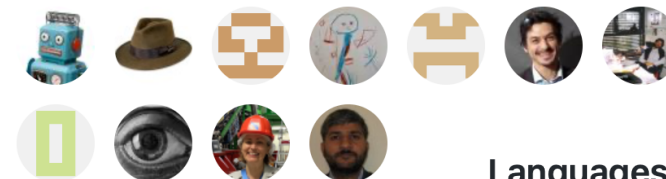
- LHC: CMS core software
<https://github.com/cms-sw/cmssw>

Contributors 5,000+



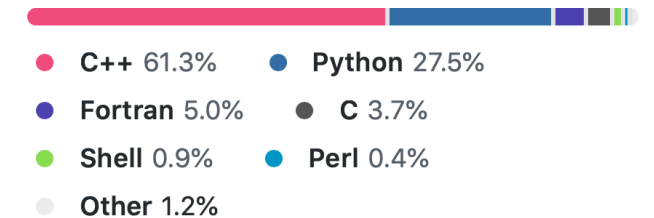
+ 10,976 contributors

Contributors 872



+ 861 contributors

Languages



Examples on CEPCSW

<https://github.com/cepc/CEPCSW>

Example #1: Setup B-Field in Simulation

- <https://github.com/cepc/CEPCSW/pull/7>

Setup B-Field in Simulation #7

Merged mirgquest merged 2 commits into `cepc:master` from `mirgquest:field` 23 days ago

Conversation 0 Commits 2 Checks 0 Files changed 2

mirgquest commented 23 days ago

As the B-field is missing in the CEPCSW, I add an example to setup a uniform B-field.

Ref:

- [DD4hep B-field example](#)
- [Geant4 uniform field](#)

mirgquest added 2 commits 23 days ago

- WIP: hardcode a uniform magnetic field. 8aa102d
- WIP: integrate DDG4's magnetic field. 327aea1

mirgquest merged commit 47a940d into `cepc:master` 23 days ago

mirgquest deleted the `mirgquest:field` branch 23 days ago

mirgquest restored the `mirgquest:field` branch 23 days ago

mirgquest deleted the `mirgquest:field` branch 17 days ago

mirgquest added this to the v0.1 milestone 7 days ago

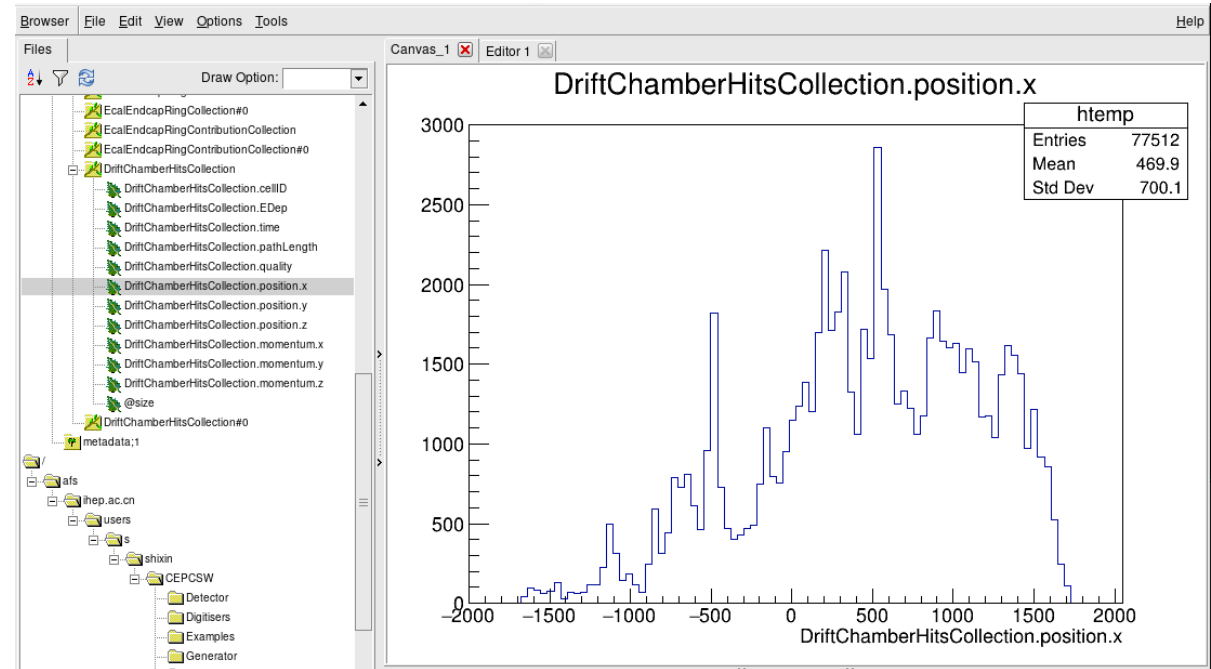
Example #2

(Replace the **USERNAME** with your github ID)

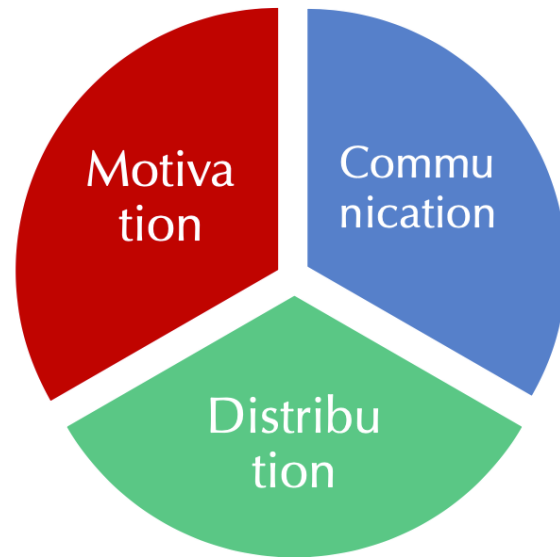
- Fork <https://github.com/cepc/CEPCSW> to your own repository:
`https://github.com/USERNAME/CEPCSW`
- Login to lxslc
- `$ /cvmfs/container.ihep.ac.cn/bin/hep_container shell SL6`
- `$ git clone https://github.com/USERNAME/CEPCSW.git`
- `$ cd CEPCSW`
- `$ git remote add cepec https://github.com/cepc/CEPCSW.git`
- `$ git remote update`
- `$ git merge cepec/master`

Setup and Build

- `$ source setup.sh`
- `$./build.sh`
- `$./run.sh Examples/options/tut_detsim_SDT.py`
- `$ root -l test-detsim10.root`



Let's explore, share, and build the
DAS-HEP community together.



<https://das-hep.github.io>

Have fun in this school !