Idmx-sw Tutorial Course: Advanced Methods

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Outline



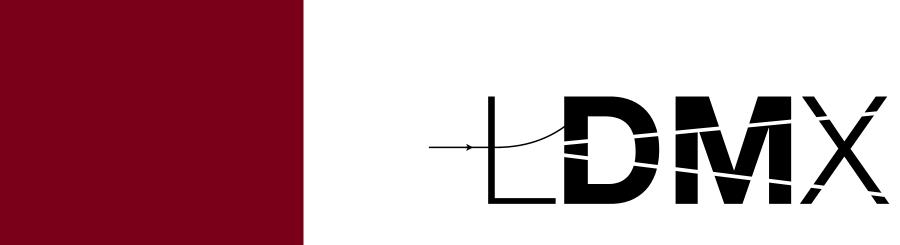


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Pre-Requisites





Familiarity with ldmx-sw already

Warning

If you are more inexperienced with ldmx-sw, much of this information may be out of your reach. That is okay. Seeing it early will help you learn it later if you need to use it.



Simulation Filters





- Implemented as UserActions
- Used mainly for event filtering and track filtering
 - Event Filtering: Abort the sim event early to save time if criteria aren't met
 - Track Filtering: Make sure sim saves a specific particle information to output file
- Check out Biasing module for examples
- Very flexible Handles to different points in the simulation
 - At end of each step
 - Choose which tracks are processed first ("classification")
 - A handle to when a stack is emptied ("stage")
 - Start and end of processing each track
 - Start and end of processing each event
 - Start and end of processing the run
 - Any mixture of the above

HistogramPool





- Exemplified by EcalPN analyzer in DQM module
- get: Get a histogram by name
- create: Make a new histogram by name and type
- You can tell the HistogramPool what kinds of 1D histograms to create in your python configuration by using build1DHistogram member function of a processor
 - Then you don't need to create those histograms in the Analyzer code

NtupleManager





- Only needs to be done in Analyzer code
- create: Make a new tree to put variables in
- addVar: Put a new variable name into a tree (template)
- setVar: Set the variable value during processing

Upcoming Changes

Will soon be using the same buffer for the NtupleManager and the Event Bus, so the NtupleManager will soon be able to handle vectors as well as individual values.

Skimming Events





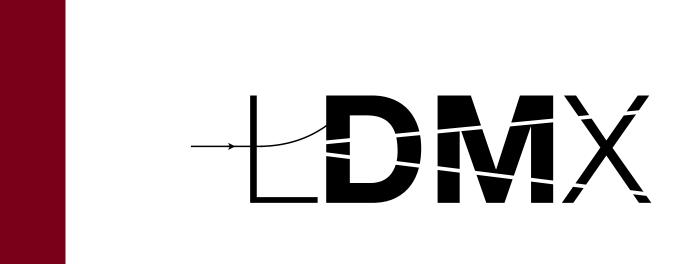
After using setStorageHint in your processor, you also need to tell the process that it should listen to your processor.

In your python configuration file:

```
myAna = ldmxcfg.Analyzer( "myAna" , "ldmx::MyAnalzer" )
# p is Process object created earlier
p.skimDefaultIsDrop() # drop events unless told otherwise
p.skimConsider(myAna.instanceName) # tell Process to listen to myAna
```

Drop/Keep Event Objects



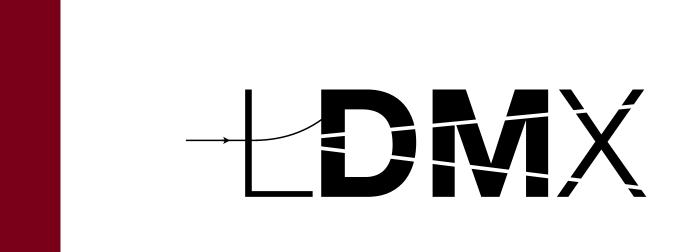


Maybe you know for a fact that you will never use the simulated hits later in your analysis chain and you want to save some space in your output file.

In your python configuration file:

Drop/Keep Event Objects





Another use-case would be re-running the digitization and reconstruction after some developments. You don't want to keep the old stuff, so you can drop it.

In your python configuration file:

```
# p is Process object created earlier
p.keep = [
# don't save Digi and Rec of ending with the 'old' pass
# "drop .*Digi.*old", "drop .*Rec.*old"

]
```



git submodules





submodule Documentation

- Isolates different codes from each other <
- Requires more git nonsense (like git submodule update)

Basically

Think of a submodule as a totally separate repo. Idmx-sw only stores which commit of that repo it should put into that submodule (i.e. Idmx-sw only "references" the submodule).

```
# checkout trunk and the submodules pointed-to by trunk

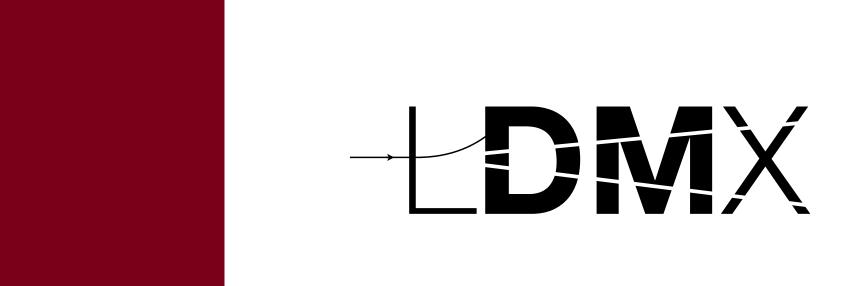
ldmx checkout trunk

trunk but have Ecal be in developments

ldmx checkout trunk Ecal:developments
```

Code Formatting



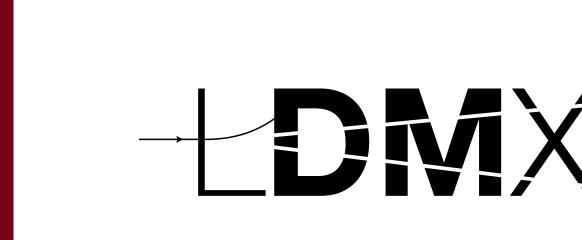


Using Google Style Guide and clang-format.

```
# need clang-format installed
find <directory > -type f -name "*.h" -o -name "*.cxx" \
-exec clang-format -i --style=Google {} \;
```

Pull Request Workflow





Template

ldmx-sw has a PR Template that walks you through the three big steps.

- Explain what you changed (and what it is supposed to fix and/or improve)
- Confirm that your changes don't break anything else (using the tests)
- Prove that your changes do what you say they do (depends on the changes)

Submodules

Since submodules are separate repositories, you will need separate PRs if you have changes in the submodule: One in the submodule for the changes and one in ldmx-sw to update the submodule reference.

