Hands-on session
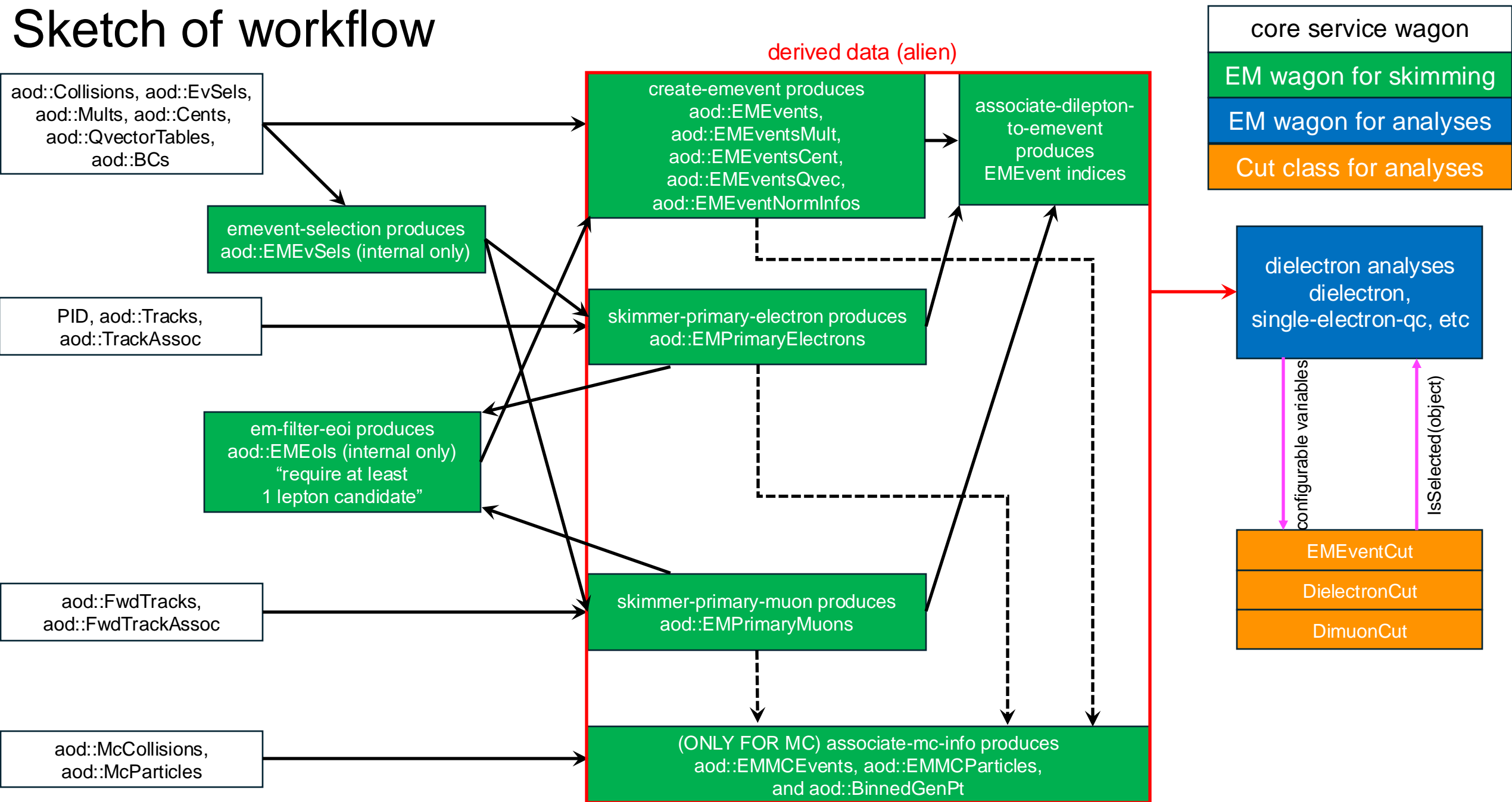# Dilepton O2Physics framework
Main focus today : MC

Daiki Sekihata (Tokyo)

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File structure

- Data model:
  O2Physics/PWGEM/Dilepton/DataModel/dileptonTables.h

- Skimming tasks:
  O2Physics/PWGEM/Dilepton/TableProducer/eventSelection.cxx   → for MB events (only to reduce data size)
  O2Physics/PWGEM/Dilepton/TableProducer/filterEoI.cxx   → for MB events (only to reduce data size)
  O2Physics/PWGEM/Dilepton/TableProducer/skimmerPrimaryElectron.cxx   → for electrons
  O2Physics/PWGEM/Dilepton/TableProducer/skimmerPrimaryMuon.cxx   → for muons
  O2Physics/PWGEM/Dilepton/TableProducer/createEMEventDilepton.cxx   → for events and lepton-to-collision indexing
  O2Physics/PWGEM/Dilepton/TableProducer/associateMCinfoDilepton.cxx   → for MC truth

- Analysis tasks:
  O2Physics/PWGEM/Dilepton/Tasks/dielectron.cxx
  O2Physics/PWGEM/Dilepton/Tasks/dielectronMC.cxx, etc.

- Useful utility functions:
  O2Physics/PWGEM/Dilepton/Utils/

- Event selection:
  O2Physics/PWGEM/Dilepton/Core/EMEventCut.cxx

- Electron and dielectron pair selection:
  O2Physics/PWGEM/Dilepton/Core/DielectronCut.cxx

- Muon and dimuon pair selection:
  O2Physics/PWGEM/Dilepton/Core/Dimuon.cxx

Sketch of workflow

core service wagon

EM wagon for skimming

EM wagon for analyses

Cut class for analyses

derived data (alien)

aod::Collisions, aod::EvSels, aod::Mults, aod::Cents, aod::QvectorTables, aod::BCs

create-emevent produces aod::EMEvents, aod::EMEventsMult, aod::EMEventsCent, aod::EMEventsQvec, aod::EMEventNormInfos

associate-dilepton-to-emevent produces EMEvent indices

emevent-selection produces aod::EMEvSels (internal only)

PID, aod::Tracks, aod::TrackAssoc

skimmer-primary-electron produces aod::EMPrimaryElectrons

dielectron analyses dielectron, single-electron-qc, etc

em-filter-eoi produces aod::EMEoIs (internal only) "require at least 1 lepton candidate"

configurable variables

IsSelected(object)

EMEventCut

DielectronCut

DimuonCut

aod::FwdTracks, aod::FwdTrackAssoc

skimmer-primary-muon produces aod::EMPrimaryMuons

aod::McCollisions, aod::McParticles

(ONLY FOR MC) associate-mc-info produces aod::EMMCEvents, aod::EMMCParticles, and aod::BinnedGenPt

Now, it's your turn.

1. Go to lxplus ($ ssh -X <your cern account>@lxplus.cern.ch;)

2. $ /cvmfs/alice.cern.ch/bin/alienv enter VO_ALICE@O2Physics::daily-20241017-0200-1;

3. $ alien-token-init;

4. $ cd /eos/user/d/dsekihat; with your account.

5. $ mkdir -p your/directory && cd your/directory;

6. $ tar zxvf o2tutorial_20241018.tar.gz; (attached on today's indico page.)

7. $ cd o2tutorial_20241018;

   tar file can be also copied from
   /afs/cern.ch/user/d/dsekihat/public/o2tutorial_20241018.tar.gz

8. $ cd mbmc/; or cd hfmc/;

9. $ cat commands.txt; and do alien_cp and run skimming and analysis commands in each directory.

Produce derived data on hyperloop 1

← processDummy for MC to study event loss.

Produce derived data on hyperloop 2

For example, https://alimonitor.cern.ch/hyperloop/view-analysis/50852

Event table

Store	Origin	Binding	Description	Version
☑	AOD	EMEventsCent	EMEVENTCENT	0
☑	AOD	EMEventsMult	EMEVENTMULT	0
☑	AOD	V0KFEMEventIds	V0KFEMEVENTID	0
☑	AOD	EMEventsQvec	EMEVENTQVEC	0
☑	AOD	EMPrimaryElectronEMEventIds	PRMELMEVENTID	0
☑	AOD	EMPrimaryMuonEMEventIds	PRMMUEMEVENTID	0
☑	AOD	EMEvents	EMEVENT	0

Electron table

Store	Origin	Binding	Description	Version
☑	AOD	EMPrimaryElectrons	EMPRIMARYEL	0
☑	AOD	EMAmbiguousElectronSelfIds	EMAMBELSELFID	0
☑	AOD	EMPrimaryElectronsCov	EMPRIMARYELCOV	0
☑	AOD	EMPrimaryElectronsPrefilterBit	PRMELPFB	0

Muon table

Store	Origin	Binding	Description	Version
☑	AOD	EMPrimaryMuons	EMPRIMARYMU	0
☑	AOD	EMPrimaryMuonsCov	EMPRIMARYMUCOV	0
☑	AOD	EMAmbiguousMuonSelfIds	EMAMBMUSELFID	0

MC table

Store	Origin	Binding	Description	Version
☑	AOD	EMPrimaryElectronMCLabels	EMPRMELMCLABEL	0
☑	AOD	V0LegMCLabels	V0LEGMCLABEL	0
☑	AOD	EMMCEventLabels	EMMCEVENTLABEL	0
☑	AOD	EMMCParticles	EMMCPARTICLE	0
☑	AOD	EMMCEvents	EMMCEVENT	0
☑	AOD	EMPrimaryMuonMCLabels	EMPRMMUMCLABEL	0
☐	AOD	EMMCGenVectorMesons	EMMCGENVM	0

Analyze derived data on hyperloop

subwagons:
wagons with different configurations.
Change parameters,
only if it is different from Base.

Summary

- This hands-on session is aimed at instructions about MC analyses.

- Good luck.