EICUG Software Working Group: Commonality and Common Software

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Meeting on Software for Detector II

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EIC Users Group Software Working Group

- Markus regularly gives thorough updates of the Software WG that I'll reference, not try to reproduce
  - For example, a Dec '22 talk in India and a Nov '22 EIC UG quarterly meeting talk
- But how much more is there to say on common software after a talk on the EIC Single Software Stack?
  - Kudos to the EIC community for agreeing on a single stack! No small thing, recalling my LHC experience
- But there is more to say! A common stack smooths the way to more commonality
  - From data formats to data & processing management to conditions database to analysis tools to…
- *And commonality in the (many) areas not compromising independent science programs benefits the science programs: more time and resources for the science*
- The Software WG contributed to cultivating the common ground on software that paved the way to a common stack
  - A common stack seemed very distant a few years ago
  - Steps like the Software EoI prior to the proto-collaboration phase and the Software Statement of Principles brought it closer
- And the Software WG is ready to continue to promote and facilitate common software efforts

The inception of the Detector II software effort is a good time to address how to organize EIC software efforts across multiple detector-specific activities and a common activity

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Commonality and Common Software

- The software WG is a meeting place, facilitator, umbrella for common activity
  - Point of engagement and collaboration on common efforts
- *Here are examples of software WG activities, nascent activities we want to build on, and engagement with others on common efforts:*
- Finding common ground: common principles and practices
  - Statement of software principles is a guide and catalyst for common, inclusive efforts
  - Followed on from the EIC community Expression of Interest for Software
- Common infrastructure such as EIC's GitHub home (to become a member just ask)
- EIC AI Working Group
  - Scientific, systematic approach to applying AI/ML approaches to EIC problems
  - Uncertainty quantification, AI-leveraged detector design, reference datasets, …
  - AI4EIC workshop series
- User-centered design
  - Enable scientists of all levels to actively participate in EIC science, keep the barriers low for smaller teams
  - Informed by software surveys and focus group discussions
- eAST simulation project: R&D towards next-gen simulations
  - Developing and refining EIC physics list with input from test beams
  - Integrated full and fast simulations, flexibility in level of detail in detector descriptions, leveraging AI/ML
  - Support for many-core and heterogeneous architectures, sub-event level parallelism

Commonality and Common Software 2

- Collaboration with theory
  - MC4EIC workshop series a forum for theory/phenomenology questions
  - Address particular event generator needs of EIC, e-A collisions, spin-dependent effects
  - Forum for community collaboration where interests meet (e.g. HEP LHC high precision QCD)
- Community software events
  - Future Trends in Nuclear Physics Computing Workshop every 18 months or so (most recent in Oct '22)
  - Software and Computing Round Table meeting ~monthly brings together NP and HEP S&C communities
- Collaboration with wider community
  - Alliance with the HEP Software Foundation established, 3 EIC community members are currently HSF working group conveners (training, reconstruction/trigger, event generators)
- Data and analysis preservation
  - Rewards early attention because it benefits analysis, software, computing today *(ATLAS is my reference)*
  - Reproducibility, ease of use, documentation, portability, best practices, robust QA/testing, sustainability, powerful analysis workflow tools, …
- In the nascent or pre-nascent category: publications
  - EIC software community paper(s) or paper collection discussed, interest from a scientific publisher

The bottom line: there is much to do in common software for the EIC, and a second detector software effort can help clarify the Software WG's role