preCICE: A sustainable and flexible research software ecosystem for multi-X simulations

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Having started from an efficient and flexible solution for multi-physics simulations, preCICE [1, 2] is currently being extended to enable multi-scale simulations and is making first steps towards coupling to data-based models. Thus, preCICE will soon allow building multi-X simulations by easily plugging together the tools we already have at hand, already offering sophisticated numerical coupling methods and scalability on ten thousands of compute cores [1]. However, sustainable growth and expansion of the involved components is crucial. Moving from simulation prototypes to an ecosystem of ready-to-use findable, accessible, interoperable, and reproducible components required significant effort and led to novel solutions to challenges specific to the partitioned simulation concept.

Today, it is significantly easier to design partitioned simulations by selecting from a list of ready-to-use integrations with widely-used simulation codes, following a unified and actively maintained online documentation, and connecting with an expanding community of users and contributors, counting more than 100 research groups worldwide. This growing ecosystem of subprojects creates challenges in structuring and automating the development, documentation, testing, and continuous integration from unit to system level. This poster will present the challenges and lessons learned in growing preCICE from an as-is coupling library to a sustainable, batteries-included ecosystem [2] and will give an overview of current extensions towards a becoming general solution for multi-X simulations.

References

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