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Software for Distributed Systems –The EMI Product Portfolio

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Description of the Work

The EMI project and its contributing middleware consortia provide technical solutions to the DCI community since a decade solving challenges that arise from the distributed nature of Grids, and more recently, clouds. Overcoming those challenges is often a key feature of a product being neglected in activities that promote EMI products in other greater communities, because these features are known to be trivial in the traditional Grid and cloud community (e.g. scalability). In order to work on the uptake of EMI products outside the traditional communities, such as those arising from the European Strategy Forum of Research Infrastructures (ESFRIs) or in e-business solutions, we need to communicate those key features more clearly. The work behind this distribution is therefore to provide a view of the EMI product portfolio at a 10.000 ft. perspective taking into account approaches and challenges of distributed systems in general. This includes comparisons with approaches known from literature such as 'Distributed Systems –Principles and Paradigms'from A.S. Tanenbaum and M.V. Steen or 'Distributed Systems Security –Issues, Processes, and Solutions'from A. Belapurkar et al. just to list a few. The work behind this contribution includes the whole EMI product portfolio covering all its technical areas, but will have a different perspective as previously known from rather 'trivial EMI product lists'and categorizations. In order to augment these rather theoretical perspectives, several use cases from applied sciences will also be described. Finally, the contribution will also outline several possible evolution tracks related to more recent distributed systems implementations such as clouds. All in all, the work behind this contribution should provide a clearer picture of features to external communities that not take advantage of EMI products today, but possibly tomorrow.

Conclusions

We can conclude from many years of work within DCIs that software for distributed systems is complex and non-trivial to develop, maintain, deploy, and operate. Nevertheless, we also can conclude that products that scale on world-wide infrastructures and that are available for the community at basically no cost are also not available at large. Many free open source toolkits, libraries, development branches, plug-ins, etc. covering many technology areas exist –but the key question is whether they work together like a clockwork. We claim in this contribution that the EMI product portfolio for distributed systems is unique in the light of its technical area coverage and, more notably, it's inter-working of products from different technical areas. From the work undertaken in EMI, we can further conclude that especially the latter inter-working aspects are non-trivial and one of the most benefits from the EMI product portfolio.

Impact

This contribution will summarize the work of many product teams undertaken as part of the EMI project not losing sight of the general distributed systems principles that are addressed by those developments and EMI

solutions. Each of the products being part of EMI can be categorized in the four distinct technical areas such as compute, data, information, and security. However, other categorizations can be applied to understand more clearly which problems EMI products aim to address such as transparency, communication, or performance. Exploring these categorizations and comparisons beyond traditional non-Grid/cloud and thus more generally known approaches paves the way for a better uptake and use of EMI components outside the known DCI community. This contribution thus reveals insights about the EMI product portfolio that go beyond traditional simple list of known features with the aim to provide insights to existing and new EMI user communities. The impact that is envisaged from this work is twofold. Firstly, inform a wide variety of potential stakeholders that EMI products can be applied outside the traditional Grid/cloud-based DCI ecosystem. Secondly, broaden the understanding that a working distributed software solution covering all necessary technical areas is extremely complex and hard to put together with available existing other open source software on the market.

URL

http://www.eu-emi.eu

Overview (For the conference guide)

The European Middleware Initiative (EMI) brings together ARC, dCache, gLite, and UNICORE to provide a harmonized set of products and streamlined releases to the DCI community. While there are many technical solutions around, EMI is one of the key players in providing software for large-scale distributed systems that are operated around the world today. Having products and solutions in various technical areas such as compute, data, information, and security, it is interesting to understand that these products also implement many of the principles and paradigms of distributes systems. This contribution will provide an overview of the whole EMI product portfolio focusing on its key features and their role in distributed systems based on comparisons with known literature such as books offered by Tanenbaum.

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