JSC's Horizon 2020

Projects for Designing Future HPC Technologies

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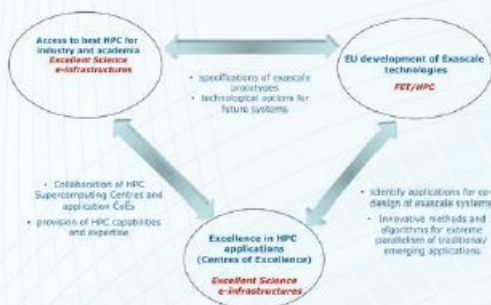
In 2012 the European Commission (EC) adopted a dedicated HPC strategy [1] which formulates as one objective the independent access to HPC technologies and systems for the EU (the pillars of the strategy implementation are shown in Fig. 1). Within the new program for research and innovation, Horizon 2020, the EC started funding 19 new projects. The call for these projects had been formulated on the basis of the first Strategic Research Agenda [2] of the European Technology Platform for HPC (ETP4HPC). JSC successfully joined the efforts of two consortia which aim for the development of future HPC core technologies and architectures, namely ExaNoDe (European Exascale Processor & Memory Node Design) and SAGE (Percipient StorAGe for Exascale data centric computing), which are coordinated by CEA and Seagate, respectively. The goal of the ExaNoDe project is to design a high-performance, heterogeneous compute element based on the chiplet concept and Unimem memory architecture previously explored in the EUROSERVER project [3]. This memory architecture aims for an elastic allocation of memory resources to different coherence islands by routing load/store operations between differ-

ent chiplets. While ExaNoDe focuses on the design of future compute nodes, SAGE has the objective of providing a next-generation multi-tiered data storage that integrates computing capabilities. The project addresses two important exascale challenges: Today's disk-based storage architectures, which are highly cost-efficient for providing large storage capacity, will not be able to scale bandwidth as compute performance increases. Hierarchical storage architectures comprising high-bandwidth non-volatile memory devices will allow to mitigate this problem. The second challenge is the need for minimizing data movement as it is expensive in terms of energy consumption. SAGE's approach to this challenge is to integrate compute capabilities into the storage hierarchy, i.e. move data processing capabilities to where the data is. These new exascale projects are meant to be a first step within Horizon 2020 towards a European ecosystem for HPC capable of providing exascale class solutions. In a few years the results of these projects are expected to be integrated in extreme-scale demonstrator systems. This will be the litmus test for these development projects as they will have to proof that they can deliver technology which is ready for addressing large-scale computational challenges.

References

[1] http://eur-lex.europa.eu/LexUriServ/ LexUriServ.do?uri=COM:2012:0045: FIN:EN:PDF

[2] http://www.etp4hpc.eu/strategy/ strategic-research-agenda/

[3] http://dx.doi.org/10.1109/DSD.2014.15

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