ExaMPI14

2nd Workshop on ExascaleMPI

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CRESTA and EPIGRAM Projects

EC-funded Exascale projects focusing on the exascale software challenge. One of the goals of the projects is investigate potential limitations of MP programming model that might obstacle exascale performance.
Thanks to the Program Committee

• Erwin Laure, KTH Royal Institute of Technology
• William Gropp, University of Illinois at Urbana-Champaign
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• Lorna Smith, Edinburgh Parallel Computing Centre
• Mark Parsons, Edinburgh Parallel Computing Centre
Why MPI at Exascale?

• The vast majority of scientific applications on petascale machines uses MPI and MPI + OpenMP.
• MPI broke the petascale wall first; now in good position to break the exascale wall.
• Exascale machine likely to arrive 2018-2020. Not much time left for development disruptive exascale programming systems. MPI can still include disruptive algorithms and/or work with other programming systems.

From PRACE survey on applications running on PRACE supercomputers. 85% of applications uses MPI.
Motivations of the ExaMPI workshop

Discuss potential limitations of MPI to reach exascale:

• **scalability** in execution time and memory consumption.

• adaptation of MPI to new **HW architectural trends** and **HW exascale issues**:
  – Support hybrid architectures → **interoperability** of MPI with other programming systems
  – Increased occurrence of failures/faults → **fault tolerance**
  – Interconnection network congestion
Motivations of the ExaMPI workshop - 2

Discuss Potential limitations of MPI to reach exascale:

• understand the obstacles for an **increased adoption of new MPI features** (and old ones that are not widely in use) by application community.

• Increase **productivity** (Tools and Auto-tuning frameworks)

• MPI for emergent **data-centric applications**:
  – Bulk-synchronous Applications (Computing Intensive) → fine-grained, irregular, non local Applications (Data-centric applications)
ExaMPI14 Program at a Glance

From ExaMPI14 abstract submissions
ExaMPI14 Program Topics

- Hybrid approaches with MPI, MPI + X
- Support for large counts
- Tools
- Collectives
- Fault Tolerance
- Auto-tuning
- MPI I/O
ExaMPI14 Contributions

• 3 Key-note Talks (40 minutes)
• 3 Talks on Regular Papers (30 minutes) – papers available as proceedings at the ACM website.
• 8 Talks on Hot Topic Research (15 minutes) – papers available at https://www.pdc.kth.se/exampi14
Agenda

9.20 - 10.00 Is MPI+X enough for Exascale? - Keynote Talk - W. D. Gropp

10.00 - 10.30 Break

10.30 - 11.00 Early Experiences Co-Scheduling Work and Communication Tasks for Hybrid MPI+X Applications by D.Stark, R. Barrett, R. Grant, S. Olivier, K. Pedretti and C. Vaughan (Regular Paper)

11.00 - 11.15 Context id allocation for end-points communicators by D. Holmes (Hot topic paper)

11.15 - 11.45 To INT_MAX ... and beyond! by J. Hammond, A. Schäfer and R. Latham (Regular paper)

11.45 - 12.00

12.00 - 1.30 Lunch

1.30 - 2.10 MPI-IO: Time to Move On ? - Keynote Talk - D. Kimpe

2.10 - 2.25 OmpSs Collective Offload by F. Sainz, V. Beltran and J. Labarta (Hot topic paper)

2.25 - 2.40 MPI collectives at scale by C. Niethammer, P. Manninen, R. W Nash, D. Khabi and J. Gracia (Hot topic paper)

2.40 - 2.55 Tolerating Process Imbalance in Hierarchical Collective Operations by B. S. Parsons and V. Pai (Hot topic paper)

3.00 - 3.30 Break

3.30 - 4.10 MPI Communication Library for Next Exascale Systems Keynote Talk - S. Sumimoto

4.10 - 4.40 Simplifying the Recovery Model of User Level Failure Mitigation by W. Bland, K. Raffenetti and P. Balaji (Regular paper)

4.40 - 4.55


4.55 - 5.10

Running Fault-Tolerant MPI-based Applications in Unstable Systems by E. Tavares Camargo and E. Procópio Duarte (Hot topic paper)

5.10 - 5.25 A Personalized MPI library for Exascale Applications and Environments by S. Jha, E. Gabriel and S. Feki (Hot topic paper)

5.25 - 5.30 Final Remarks - Stefano Markidis