

# Jean-Baptiste Besnard

MANAGER · TECHNICAL LEADER

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## Experience

### Manager and Technical Leader

PARATOOLS SAS

- Lead a team of consultants to timely meet their objectives
- Identify and conduct innovative R&D studies and developments
- Respond to public calls
- Interact with clients and write proposals
- Technical assistance to teams

*Bruyère-le-Châtel, France*

*Sept. 2016 - present*

### Expert in High-Performance Computing (HPC)

PARATOOLS SAS

- Development of a thread-based MPI implementation for supercomputers
- Work on high-speed networks for High-Performance Computing
- Extension of GCC to add a new TLS level

*Bruyère-le-Châtel, France*

*Aug. 2014 - Sept. 2016*

### Research Engineer

EXASCALE COMPUTING RESEARCH

- Develop innovative web-based interfaces for performance analysis
- Use of D3.js in frontend and Node.js in backend

*Versailles, France*

*Oct. 2013 - Aug. 2014*

### Ph.D. Student

CEA, DAM, DIF

- Development of an original solution for massive performance trace data-management
- Using in-situ processing techniques for in-flight data-processing
- Validation at super-computer scale (Tera 100 at the time)

*Bruyères-le-Châtel, France*

*Oct. 2010 - Jul. 2013*

## Skills

**Programming** C, Rust, Python, JavaScript (Node.js), Go, C++, Ba(sh)

**Networking** TCP, MPI, Infiniband, Libfabric, gRPC

**Parallelism** MPI, OpenMP, CUDA, Pthread, Profiling

**Administration** Linux, Nginx, Reverse Proxy, Docker, IPTables, Networking

**Project Management** Write calls, software project management, client facing, budget management

**Research** Paper redaction, Respond to calls, Standardization committees (MPI)

**Languages** French (native), English

## Projects

### ADMIRE Euro-HPC Project

PARALLEL PERFORMANCE MONITORING AT SCALE

- Implementation of a distributed always on monitoring infrastructure at supercomputer scale for network and I/O (in Rust)
- Interfacing with existing tools (Grafana and Prometheus)
- Write scientific papers and do reporting including financial

*C, MPI, Rust, I/O, Performance*

*[admire-eurohpc.eu](http://admire-eurohpc.eu)*

### Muti-Processor Computing

A THREAD-BASED UNIFIED IMPLEMENTATION OF MPI AND OPENMP

- Low level development for high-speed networks on supercomputers (libfabric, Infiniband)
- Implementation of RDMA and SHM
- Work in GCC compiler for automatic privatization
- Work on scalability of collective communications

*C, Fortran, MPI, OpenMP*

*[hpcframework.com/mpc/](http://hpcframework.com/mpc/)*

## PCOCC

PRIVATE CLOUD ON A COMPUTE CLUSTER

- Work in a virtual machine orchestrator dedicated to HPC payloads
- Development in GO of an agent for VM
- Extension of the orchestrator to support containers (OCI images)
- Integration of Docker inside a secure environment (inside a VM managed by the orchestrator)

*Python, OCI, Docker, Go, gRPC*

*pcocc.readthedocs.io*

## Muti-Application Online Profiling

AN IN-SITU PROFILING TOOL FOR MPI APPLICATIONS

- Runtime coupling (instead of I/Os) to process data in-flight through network coupling
- Instrumentation of POSIX I/O and MPI calls
- Processing of data at scale (100s of TB)
- Visualization with an interactive HTML interface (Node.js and HTML)

*C, MPI, OpenMP, Node.js, HTML*

*hpcframework.com/malp/*

## Teaching

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### Teaching Module Lead

UNIVERSITÉ DE VERSAILLES SAINT-QUENTIN (UVSQ)

- Courses on Operating Systems internal architecture for HPC Students
- Course on introduction to Software engineering (engineering school students)

*Versailles, France*

*Jan. 2019 - present*

### Teaching Assitant

INSTITUT DES SCIENCES ET TECHNIQUES DES YVELINES (ISTY)

- Processor architecture for second year engineering students

*Velizy, France*

*Oct. 2013 - Jul. 2014*

### Teaching Assistant

UNIVERSITÉ DE VERSAILLES SAINT-QUENTIN (UVSQ)

- Advanced compilation techniques (M2)

*Versailles, France*

*Oct. 2012 - Jul. 2013*

### Teaching Assistant

UNIVERSITÉ DE VERSAILLES SAINT-QUENTIN (UVSQ)

- C programming and UNIX environments (M1)
- Parallel optimization and profiling using MPI and OpenMP (M1)

*Versailles, France*

*Oct. 2011 - Jul. 2012*

## Education

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### Ph.D. in Computer Science

CEA, DAM, DIF

- Profiling and debugging of massively parallel applications.

*Bruyères-le-Châtel, France*

*Oct. 2010 - Sept. 2013*

### Engineering Diploma

INSTITUT SUPÉRIEUR DE L'ÉLECTRONIQUE ET DU NUMÉRIQUE (ISEN)

- Specialization in Telecommunication and Networks.

*Brest, France*

*Sept. 2007 - Jun. 2010*

### Preparatory Mathematics Classes

INSTITUT SUPÉRIEUR DE L'ÉLECTRONIQUE ET DU NUMÉRIQUE (ISEN)

- Specialization in Telecommunication and Networks.

*Brest, France*

*Sept. 2005 - Jun. 2007*

- Jean-Baptiste Besnard, Ahmad Tarraf, Alberto Cascajo, and Sameer Shende. Introducing the metric proxy for holistic i/o measurements (in press). In *HPC-IODC'24: Proceedings of the 10th HPC I/O in the Data Center Workshop*, 2024.
- Ahmad Tarraf, Martin Schreiber, Alberto Cascajo, Jean-Baptiste Besnard, Marc-André Vef, Dominik Huber, Sonja Happ, André Brinkmann, David E Singh, Hans-Christian Hoppe, et al. Malleability in modern hpc systems: Current experiences, challenges, and future opportunities. *IEEE Transactions on Parallel and Distributed Systems*, 2024. doi: 10.1109/TPDS.2024.3406764.
- Julien Adam, Jean-Baptiste Besnard, Paul Canat, Hugo Taboada, Adrien Roussel, Marc Pérache, Julien Jaeger, and Sameer Shende. Generating and scaling a multi-language test-suite for MPI. In *Proceedings of the 30th European MPI Users' Group Meeting, EuroMPI 2023, Bristol, United Kingdom, September 11-13, 2023*, pages 11:1–11:10. ACM, 2023. doi: 10.1145/3615318.3615329.
- Jean-Baptiste Besnard, Ahmad Tarraf, Clément Barthélemy, Alberto Cascajo, Emmanuel Jeannot, Sameer Shende, and Felix Wolf. Towards smarter schedulers: Molding jobs into the right shape via monitoring and modeling. In Amanda Bienz, Michèle Weiland, Marc Baboulin, and Carola Kruse, editors, *High Performance Computing - ISC High Performance 2023 International Workshops, Hamburg, Germany, May 21-25, 2023, Revised Selected Papers*, volume 13999 of *Lecture Notes in Computer Science*, pages 68–81. Springer, 2023. doi: 10.1007/978-3-031-40843-4\_6.
- Jesús Carretero, Javier García Blas, André Brinkmann, Marc-André Vef, Jean-Baptiste Besnard, Massimo Torquati, Yi Ju, and Raffaele Montella. Adaptive HPC input/output systems. In Demetris Zeinalipour, Dora Blanco Heras, George Pallis, Herodotos Herodotou, Demetris Trihinas, Daniel Balouek, Patrick Diehl, Terry Cojean, Karl Furlinger, Maja Hanne Kirkeby, Matteo Nardelli, and Pierangelo di Sanzo, editors, *Euro-Par 2023: Parallel Processing Workshops - Euro-Par 2023 International Workshops, Limassol, Cyprus, August 28 - September 1, 2023, Revised Selected Papers, Part II*, volume 14352 of *Lecture Notes in Computer Science*, pages 199–202. Springer, 2023. doi: 10.1007/978-3-031-48803-0\_16.
- Jesús Carretero, Javier García-Blas, Marco Aldinucci, Jean-Baptiste Besnard, Jean-Thomas Acquaviva, André Brinkmann, Marc-André Vef, Emmanuel Jeannot, Alberto Miranda, Ramon Nou, Morris Riedel, Massimo Torquati, and Felix Wolf. Adaptive multi-tier intelligent data manager for exascale. In Andrea Bartolini, Kristian F. D. Rietveld, Catherine D. Schuman, and Jose Moreira, editors, *Proceedings of the 20th ACM International Conference on Computing Frontiers, CF 2023, Bologna, Italy, May 9-11, 2023*, pages 285–290. ACM, 2023. doi: 10.1145/3587135.3592174.
- Jeff R. Hammond, Lisandro Dalcín, Erik Schnetter, Marc Pérache, Jean-Baptiste Besnard, Jed Brown, Gonzalo Brito Gadeschi, Simon Byrne, Joseph Schuchart, and Hui Zhou. MPI application binary interface standardization. In *Proceedings of the 30th European MPI Users' Group Meeting, EuroMPI 2023, Bristol, United Kingdom, September 11-13, 2023*, pages 1:1–1:12. ACM, 2023. doi: 10.1145/3615318.3615319.
- Hugo Taboada, Romain Pereira, Julien Jaeger, and Jean-Baptiste Besnard. Towards achieving transparent malleability thanks to MPI process virtualization. In Amanda Bienz, Michèle Weiland, Marc Baboulin, and Carola Kruse, editors, *High Performance Computing - ISC High Performance 2023 International Workshops, Hamburg, Germany, May 21-25, 2023, Revised Selected Papers*, volume 13999 of *Lecture Notes in Computer Science*, pages 28–41. Springer, 2023. doi: 10.1007/978-3-031-40843-4\_3.
- Jean-Baptiste Besnard, Sameer Shende, Allen Malony, Julien Jaeger, and Marc Perache. Enabling global mpi process addressing in mpi applications. In *Proceedings of the 29th European MPI Users' Group Meeting, EuroMPI/USA'22*, page 27–36, New York, NY, USA, 2022. Association for Computing Machinery. doi: 10.1145/3555819.3555829.
- Jean-Baptiste Besnard, Julien Adam, Allen D Malony, Sameer Shende, Julien Jaeger, Patrick Carribault, and Marc Pérache. Exploring space-time trade-off in backtraces. In *Tools for High Performance Computing 2018/2019*, pages 151–168. Springer, 2021. doi: 10.1007/978-3-030-66057-4\_8.
- Julien Adam, Maxime Kermarquer, Jean-Baptiste Besnard, Leonardo Bautista-Gomez, Marc Pérache, Patrick Carribault, Julien Jaeger, Allen D. Malony, and Sameer Shende. Checkpoint/restart approaches for a thread-based MPI runtime. *Parallel Computing*, 85:204–219, 2019. doi: 10.1016/j.parco.2019.02.006.
- Jean-Baptiste Besnard, Julien Jaeger, Allen D. Malony, Sameer Shende, Hugo Taboada, Marc Pérache, and Patrick Carribault. Mixing ranks, tasks, progress and nonblocking collectives. In *Proceedings of the 26th European MPI Users' Group Meeting, EuroMPI '19*, New York, NY, USA, 2019. Association for Computing Machinery. doi: 10.1145/3343211.3343221.
- Jean-Baptiste Besnard, Allen D. Malony, Sameer Shende, Marc Pérache, Patrick Carribault, and Julien Jaeger. Unifying the analysis of performance event streams at the consumer interface level. In Christoph Niethammer, Michael M. Resch, Wolfgang E. Nagel, Holger Brunst, and Hartmut Mix, editors, *Tools for High Performance Computing 2017*, pages 57–71, Cham, 2019. Springer International Publishing. doi: 10.1007/978-3-030-11987-4\_4.
- Julien Adam, Jean-Baptiste Besnard, Allen D. Malony, Sameer Shende, Marc Pérache, Patrick Carribault, and Julien Jaeger. Transparent high-speed network checkpoint/restart in MPI. In *Proceedings of the 25th European MPI Users' Group Meeting, Barcelona, Spain, September 23-26, 2018*, pages 12:1–12:11, 2018. doi: 10.1145/3236367.3236383.
- Jean-Baptiste Besnard, Allen D. Malony, Sameer Shende, Marc Pérache, Patrick Carribault, and Julien Jaeger. Towards a better expressiveness of the speedup metric in MPI context. In *46th International Conference on Parallel Processing Workshops, ICPP Workshops 2017, Bristol, United Kingdom, August 14-17, 2017*, pages 251–260, 2017. doi: 10.1109/ICPPW.2017.45.
- Antoine Capra, Patrick Carribault, Jean-Baptiste Besnard, Allen D. Malony, Marc Pérache, and Julien Jaeger. User co-scheduling for mpi+openmp applications using openmp semantics. In *Scaling OpenMP for Exascale Performance and Portability - 13th International Workshop on OpenMP, IWOMP 2017, Stony Brook, NY, USA, September 20-22, 2017, Proceedings*, pages 203–216, 2017. doi: 10.1007/978-3-319-65578-9\_14.
- Jean-Baptiste Besnard, Julien Adam, Sameer Shende, Marc Pérache, Patrick Carribault, and Julien Jaeger. Introducing task-containers as an alternative to runtime-stacking. In *Proceedings of the 23rd European MPI Users' Group Meeting, EuroMPI 2016, Edinburgh, United Kingdom, September 25-28, 2016*, pages 51–63, 2016. doi: 10.1145/2966884.2966910.
- Jean-Baptiste Besnard, Allen D. Malony, Sameer Shende, Marc Pérache, and Julien Jaeger. Gleaming the cube: Online performance analysis and visualization using malp. In Andreas Knüpfer, Tobias Hilbrich, Christoph Niethammer, José Gracia, Wolfgang E. Nagel, and Michael M. Resch, editors, *Tools for High Performance Computing 2015*, pages 53–66, Cham, 2016. Springer International Publishing. doi: 10.1007/978-3-319-39589-0\_5.
- Jean-Baptiste Besnard, Allen D. Malony, Sameer Shende, Marc Pérache, Patrick Carribault, and Julien Jaeger. An MPI halo-cell implementation for zero-copy abstraction. In *Proceedings of the 22nd European MPI Users' Group Meeting, EuroMPI 2015, Bordeaux, France, September 21-23, 2015*, pages 3:1–3:9, 2015. doi: 10.1145/2802658.2802669.
- Jean-Baptiste Besnard. *Profiling and debugging by efficient tracing of hybrid multi-threaded HPC applications*. Theses, Université de Versailles-Saint Quentin en Yvelines, July 2014. doi: <https://theses.hal.science/tel-01133344/file/2014VERS0007.pdf>.
- Jean-Baptiste Besnard, Marc Pérache, and William Jalby. Event streaming for online performance measurements reduction. In *42nd International Conference on Parallel Processing, ICPP 2013, Lyon, France, October 1-4, 2013*, pages 985–994, 2013. doi: 10.1109/ICPP.2013.117.

## Program Committees

2024	<b>Reviewer</b> , DynResHPC: 3rd EuroHPC Workshop on Dynamic Resources in HPC	<i>Euro-Par Workshop</i>
2024	<b>Reviewer</b> , Programming, Compilers and Performance at Euro-Par 2024	<i>Conference</i>
2024	<b>Reviewer</b> , System Software and Cloud Computing at SC24	<i>Conference</i>
2024	<b>Co-Chair</b> , Tech Paper Track Performance at ICCP 2024	<i>Conference</i>
2023	<b>Reviewer</b> , HPC Bug Fest 2023	<i>SC23 Workshop</i>
2023	<b>Reviewer</b> , ProTools 2023: Workshop on Programming and Performance Visualization Tools	<i>SC23 Workshop</i>
2023	<b>Reviewer</b> , Future Generation Computer Systems 2023 Journal	<i>Journal</i>
2023	<b>Poster-Chair</b> , EuroMPI 2023	<i>Conference</i>
2023	<b>Co-Chair</b> , Performance Track SC23	<i>Conference</i>
2023	<b>Reviewer</b> , HPCMALL 2023 : 2nd International Workshop on Malleability Techniques Applications in High-Performance Computing	<i>ISC23 Workshop</i>
2023	<b>Reviewer</b> , Architectures and Accelerators, EuroPar 2023, the 29th International European Conference on Parallel and Distributed Computing	<i>Conference</i>
2023	<b>Reviewer</b> , Evaluation, & Analysis track program committee, ISC High Performance Conference	<i>Conference</i>
2022	<b>Reviewer</b> , International Journal of High Performance Computing Applications	<i>Journal</i>
2022	<b>Reviewer</b> , ProTools 2022: Workshop on Programming and Performance Visualization Tools	<i>SC22 Workshop</i>
2022	<b>Reviewer</b> , Performance Measurement, Modeling, and Tools, The International Conference for High Performance Computing, Networking, Storage, and Analysis, SC 2022	<i>Conference</i>
2022	<b>Reviewer</b> , Future Generation Computer Systems 2022	<i>Journal</i>
2022	<b>Reviewer</b> , HPCMALL 2022 : Malleability Techniques Applications in High-Performance Computing	<i>Workshop</i>
2022	<b>Reviewer</b> , Performance Modeling and Evaluation track, 22nd IEEE/ACM International Conference on Cluster, Cloud, and Grid Computing (CCGrid 2022)	<i>Conference</i>
2021	<b>Reviewer</b> , Future Generation Computer Systems 2021	<i>Journal</i>
2021	<b>Reviewer</b> , ProTools 2021: Workshop on Programming and Performance Visualization Tools	<i>SC21 Workshop</i>
2021	<b>Reviewer</b> , ICPP 21 : International Conference on Parallel Processing	<i>Conference</i>
2020	<b>Reviewer</b> , ProTools 2020: Workshop on Programming and Performance Visualization Tools	<i>SC20 Workshop</i>
2020	<b>Reviewer</b> , Workshop on Monitoring and Analysis for High Performance Computing Systems Plus Applications 2020 (HPCMaspa 2020)	<i>Workshop</i>
2019	<b>Reviewer</b> , 1st International Workshop on Containers and New Orchestration Paradigms for Isolated Environments in HPC (CANOPIE HPC 19)	<i>SC19 Workshop</i>
2019	<b>Reviewer</b> , Workshop on Programming and Performance Visualization Tools (ProTools 19)	<i>SC19 Workshop</i>
2019	<b>Reviewer</b> , Workshop on Monitoring and Analysis for High Performance Computing Systems Plus Applications 2017 (HPCMaspa 2019)	<i>Workshop</i>
2019	<b>Reviewer</b> , Performance Modeling and Evaluation track, 18th IEEE/ACM International Conference on Cluster, Cloud, and Grid Computing (CCGrid 2019)	<i>Conference</i>
2018	<b>Reviewer</b> , 7th Workshop on Extreme-Scale Programming Tools	<i>SC18 Workshop</i>
2018	<b>Reviewer</b> , Posters, EuroMPI 2018	<i>Conference</i>
2018	<b>Reviewer</b> , Performance Track, International Conference on Parallel Processing (ICPP)	<i>Conference</i>
2018	<b>Reviewer</b> , Performance Modeling and Evaluation track, 18th IEEE/ACM International Conference on Cluster, Cloud, and Grid Computing (CCGrid 2018)	<i>Conference</i>
2017	<b>Reviewer</b> , Workshop on Monitoring and Analysis for High Performance Computing Systems Plus Applications 2017 (HPCMaspa 2017)	<i>Workshop</i>
2017	<b>Reviewer</b> , 6th Workshop on Extreme-Scale Programming Tools	<i>SC17 Workshop</i>
2017	<b>Reviewer</b> , Future Generation Computer Systems 2017	<i>Journal</i>
2017	<b>Reviewer</b> , Posters, EuroMPI/USA 2017	<i>Conference</i>
2017	<b>Reviewer</b> , Performance Measurement, Modeling, and Tools, The International Conference for High Performance Computing, Networking, Storage, and Analysis, SC 2017	<i>Conference</i>
2016	<b>Reviewer</b> , Performance Measurement, Modeling, and Tools, The International Conference for High Performance Computing, Networking, Storage, and Analysis, SC 2016	<i>Conference</i>
2016	<b>Reviewer</b> , Workshop on Monitoring and Analysis for High Performance Computing Systems Plus Applications 2016 (HPCMaspa 2016)	<i>Conference</i>