Maxime Gonthier

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PUBLICATIONS

Research Report 2023
Locality-aware batch scheduling of I/O intensive workloads

Future Generation Computer Systems Journal 2023
Taming data locality for task scheduling under memory constraint in runtime systems

IPDPS 2022 2022
Memory-Aware Scheduling of Tasks Sharing Data on Multiple GPUs with Dynamic Runtime Systems

Research Report 2021
Locality-Aware Scheduling of Independent Tasks for Runtime Systems - Extended version

5th workshop on data locality - EuroPar 2021
Locality-Aware Scheduling of Independent Tasks for Runtime Systems

EXPERIENCE

Research Collaboration Uppsala, Sweden
Ångström Laboratory - Division of Scientific Computing *April 2022 - June 2022*

- **Locality-aware batch scheduling of I/O intensive workloads**: I had the chance to collaborate with Elisabeth Larsson and Carl Nettelblad during a three months stay in Uppsala. Workload Manager schedulers are typically unaware of jobs sharing large input files, which may happen in data intensive scenarios. We studied how to design a data-aware job scheduler capable of distributing the load between the computing nodes as well as re-using an input file already loaded in the memory of some node as much as possible. An article is being written on this topic.

Thesis: Memory-Aware Scheduling for Runtime Systems Bordeaux and Lyon, France
Inria Bordeaux - STORM and ENS Lyon - ROMA *October 2020 - October 2023*

- **Interest of the thesis**: Acceleratorsare often used to achieve high performance on modern computing systems. They come with their own limited memory and are connected to the main memory of the machine through a bus with limited bandwidth. Data movements may become a bottleneck for performance, especially when several GPUs have to share the communication bus. The goal of my thesis is to propose schedulers able to distribute and order tasks sharing data in order to minimize data transfers and thus maximize the throughput.
- **Working with StarPU**: Task-based runtime schedulers are a convenient and efficient way to use heterogeneous platforms. I implemented my schedulers in the StarPU runtime. I also developed a custom eviction policy implemented in StarPU.
- **Designing schedulers**: A good part of my thesis consists in creating schedulers that are able to both distribute the tasks on the GPUs and order them within each GPUs. The scheduler should be able to achieve good performance both when memory is a constraint and when it is not limited.
- **Developing visualization tools**: In order to better understand the behavior of our schedulers, I developed visualization tools in python adapted to StarPU to represent the processing order on multiple GPUs for the matrix multiplication and the Cholesky decomposition.

Internship: Memory-Aware Scheduling for Runtime Systems Bordeaux, France
Inria Bordeaux - STORM *April 2020 - July 2020*

- **Interest of the internship**: Creating and implementing an offline scheduler that can minimize data transfers with the StarPU runtime.

Summer camp leader France
6 months in total *2016-2019*

EDUCATION

University of Versailles St-Quentin Versailles, France
Master's degree in Algorithms and Modeling for Scientific Interface *2018 - 2020*

- **Coursework**: Study of graph algorithms, game theory, distributed algorithms, operational research, databases, ranking methods, simulation, networks

- **University of Versailles St-Quentin** Versailles, France
  Bachelor's degree in Computer Science *2015 - 2018*

- **Lycée Hoche** Versailles, France
  High school diploma *2012 - 2015*

Teaching

- **Computer hardware architecture - 20h** Enseirb-Matmeca Bordeaux
  Bachelor students *2023*

- **Algorithmic - 24h** Enseirb-Matmeca Bordeaux
  Bachelor students *2022*

- **Internship tutoring and member of the jury - 8h** Enseirb-Matmeca Bordeaux
  Master students *2022*

- **Network programming - 24h** Enseirb-Matmeca Bordeaux
  Master students *2022*

- **Internship tutoring and member of the jury - 8h** Enseirb-Matmeca Bordeaux
  Master students *2021*

- **Network Programming - 24h** Enseirb-Matmeca Bordeaux
  Master students *2021*

- **Systems - 20h** University Lyon 1
  Bachelor students *2020*

Projects

- **Algorithms for a Time Office**: Development and implementation of algorithms for a Time Office.
- **Google Bombing**: Study and comparison of different methods allowing google bombing.
- **Genetic Algorithm**: Development and implementation of a genetic algorithm from the specifications to the manual user.

Programming Skills

- **Languages**: C, Python, R, C++, SQL **Technologies**: StarPU