Welcome in the

PhD track in CS and DataAI!

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Parallel and Distributed team

Overview of the PhD track

- An 5-year integrated curriculum that integrates both a master and a PhD
  - You start research the first day of the master, yipee!
  - You do research during 5 years
  - You validate a master during the same time (in max 3 years)

- The ideal vision
  - You work (physically) in a research team during the 5 years, like any PhD student
  - Except that you have to attend some courses

So welcome in master and welcome in PhD!

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What is research?

Research consists in better understanding the world

- ■ By observing the world
  - Mainly by doing experiments
  - They have to be correct and reproducible

- ■ By devising models of the world
  - Mainly with theoretical tools
  - That have to approximate as best as we can what we observe

- ■ By deducing properties
  - Directly from the observations (experimental approach)
  - From the models (theoretical approach)
  - In any case, you have to validate your deductions
    - With experiments, with formal proofs

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And why doing research?

■ Most important: to do cool stuffs that you enjoy

■ To become "the" expert on your subject

■ To advance human knowledge
  • By doing cool stuffs that you enjoy and that are also **new** and **correct/verifiable/reproducibe**

How to do find "your" cool stuff

- First step: find a field
  - For that you have to be sure that your master track suits you
  - Of course, you can move from one track to another

- Second step: find both a subject and a PhD advisor
  - You have to find both of them during the first two years
  - For that, you will better see what you enjoy with
    - the courses
    - different research projects on different topics of your field
      - Can be a single research project during the two years if you like your first project

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How can you ensure that what you do is...

- **New**
  - Take courses, read research papers, attend research seminars, discuss with other researchers

- **Correct/verifiable/reproducible**
  - With experiments or formal tools

- **But you cannot say that you do is new and correct alone!**
  - Other researchers have to validate what you do
  - For that, you have to publish research papers
    - Other researchers will review what you write
    - When your paper is accepted, your findings are included in the human knowledge (and it's not new anymore)

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The PhD thesis

- A long research project of 3 years on a single subject (5 if you include the master)

- With a PhD grant: a salary of roughly 1700€ net/month

- At the end, you write a report called the PhD thesis
  - 2 external reviewers read your thesis, write a report and accept the defense

- And when the report is accepted, you defend your thesis during 45mn
  - You have a jury with the 2 reviewers, 2 or 3 examiners and your PhD advisors

The PhD grant

- Some of you already have a PhD grant with the PhD track => you "just" have to show that you deserve the grant during the 2 first years of the PhD track

- For the others, it's not the case. You can:
  - Apply to a PhD grant (many calls each year at IP Paris)
  - Or find a professor that has a research grant on a subject that you enjoy
  - Or find an enterprise that hires you to do a PhD (CIFRE thesis)

- If you are interested by doing research but without the PhD track grant, don't worry!
  Many solutions exist, and if your are motivated with a good academic record, you will find a PhD grant

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After the PhD

- **You can work as a highly skilled engineer in industry**
  - Among my 10 former PhD students, 7 are engineer
    (2 at google, 1 at Amazon, 1 at Oracle, 1 at DataDog, 1 at ARM, 1 at Applidium, 1 at MicroDoc)

- **Or you can continue to do research**
  - Among my 10 former PhD students, 3 are doing research
    - 1 is researcher at Oracle in industry
    - 1 is postdoc at University of Sydney in academia
    - 1 is postdoc still in our research group (he defended few weeks ago:))

The PhD track rules

- To validate the master, you need 120 ECTS
  - You have three years to acquire these 120 ECTS
  - But it's often more comfortable to validate the master in 2 years

- You cannot acquire more than 60 ECTS in one year
  - You can validate more ECTS, but you will only earn 60 ECTS

- In one year, you cannot acquire more then 30 ECTS in research projects and internships in M1 and 42.5 in M2
  - Roughly, you should spend half of your time in courses, and half of your time in research

- Additionally to the 120 ECTS, you have to acquire 10 ECTS in non-scientific courses (often during the third year)

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Who I am

- I'm full professor in computer science, specialized in parallel and distributed systems
  - Head of the parallel and distributed systems research group
  - Head of the PDS track and of the master in CS of IP Paris

- Mainly with an experimental approach
  - I enjoy development (yes, really, I code all the time!)
  - and understanding how our large computing infrastructures work
  - and improving their performance, safety and maintainability

- And I'm doing this job because I don't see where I could be happier

# The parallel and distributed systems group

- 9 permanent researchers, 10 PhD students, 3 Postdocs

- Publications at SOSP, Eurosys, DISC, OOPSLA, ASPLOS, Usenix ATC, Middleware, TPDS, ACM TOCS, DSN, ACM Tosem…
- Ongoing research projects : 5 ANRs (JCJC included), 1 FUI, 1 H2020
- International collaborations : IMDEA (Spain), Univ. Neuchatel (Switzerland), TU Braunschweig (Germany), Southwest Univ. Chongqing (China), Univ. do Minho (Portugal)
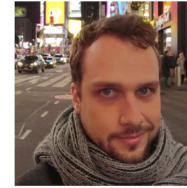
Mathieu Bacou

Elisabeth Brunet
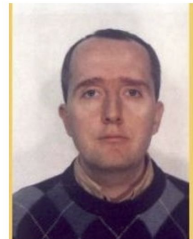
Denis Conan

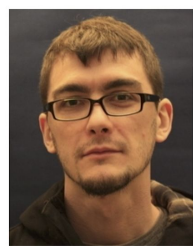Amina Guermouche

Pascal Hennequin

Michel Simatic

Pierre Sutra

Gaël Thomas

François Trahay

Current research projects

Performance analysis for parallel applications

A. Colin (PhD), A. Daumen (PhD), F. Trahay (MdC), G. Thomas (P)

Rackscale computing/cloud computing

A. Lescouet (PhD), Y. Pipereau (PhD), D. Thenot (PhD), M. Bacou (MdC), G. Thomas (P)

Energy consumption for HPC applications

A. Guermouche (MdC), F. Trahay (MdC)

Scalable File Systems and Serverless Computing

T. Rezende (PhD), B. Kane (PhD), P. Sutra (MdC), D. Conan (MdC), M. Bacou (MdC)

Non volatile memory

A. Lefort (PhD), R. Dulong (PhD), P. Sutra (MdC), M. Bacou (MdC), G. Thomas (P)

Runtime for HPC and IA applications

E. Brunet (MdC)

Multiscale Distributed Event-Based Systems

D. Conan (MdC) (also DiSSEM group)

Language to enforce privacy

S. Tanigassalame (PhD), G. Thomas (P)

Useful information

- Web site: cs.ip-paris.fr/master

- My mail: gael.thomas@telecom-sudparis.fr

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