

IDIA Workshop 3

Next generation digital infrastructures

INSTITUT POLYTECHNIQUE DE PARIS

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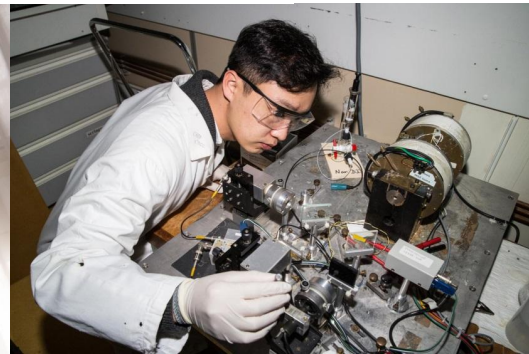

Workshops

1. CS, biotechnologies and Health
2. Trust, Safety and Cybersecurity
3. Next Generation Digital Infrastructures
   - Animators : M. Coupechoux, T. Clausen, D. Zeghlache, F. Trahay, G. Thomas, B. Geller, P. Jacquet
   - Keywords : IoT, 5G/6G and beyond, intelligent networks, quantum networks, distributed systems, HPC, multimedia services...
4. Robotics, Visual Computing, Interaction
5. Foundations of CS
6. Data and AI

Research groups involved

- Research groups and main subthemes
  - Networks: RMS (TP), R3S (TSP), Networks (X), Tribe (X), GTO (TP), CCN (TP), Methode (TSP)
  - Distributed systems/databases: Cedar (X), Cosynus (X), PDS (TSP), DiSSEM(TSP), ACES (TP), Comète (X), ASR (ENSTA)
  - Quantum networks: IQA (TP), GTO (TP)
  - For more details, see https://www-inf.telecom-sudparis.eu/COURS/idia/atelier3/

- Existing and planned joint projects
  - Green Computing ?!

Context and collaborations

- Context
  - IP Paris: Hi! PARIS, E4C, CIEDS
  - Plateau de Saclay: LRI, Li-PaRAD, DAVID, IBISC, CEA
  - National: LIP6, IRISA, CRIStAL, LIG, LIP, LIRIS, IRIT, LaBRI, LAAS
  - International: all the universities ranked in the top 50 of Shanghai in CS (MIT, Berkeley, UMass, CMU, Columbia, EPFL, ETH Zurich, Univ. Sydney, Technion…)
- Collaboration
  - France: LIRIS, LIG, LaBRI, LIP6
  - International: TUB, Univ. Neuchatel, Univ. Minho, Riken, Southwest University of China
  - Industry: Alibaba

Scientific vision and challenges

- Combine hardware, networks, systems, middleware, databases, IA techniques to build efficient and [...] systems, where [...] ==
  - Green systems:
    - resource sharing at cross layer/tradeoff between perfs and energy (*Cedar* at database/analytic level, *Methodes* with optimization and AI, GTO - *Networks* at network level, *RMS* in wireless networks (cellular and IoT) and in clouds/edge/virtualized networks, *DISSEM* at the software architecture and the middleware level, *PDS* for HPC/HPDA/Cloud runtimes)
  - Autonomic systems that involves networks, infra, people, service providers
    - interoperability(R3S(IoT end-to-end))/multiple systems at cross-layer/people have to collaborate at different layers (R3S (IoT embedded and distributed AI), *Methodes* (autonomicity via AI), , ACES probably at the middleware level, Tribe detects mobility of people => frontier between networks and social interactions, vertical performance optimization/reconfiguration)
  - Reliability (critical applications), correctness (anomaly detection), scalability (DoS), predictability, security: build reliable networks, proved distributed systems and applications:
    - quantum network (security is provided by the physical layer, need to integrate with network), how can we build an end-to-end correct infrastructure (invariants? language/compilation techniques? Proofs!),
- Joint challenges
  - Performance (15/15 groups) and energy (9/15 groups)
  - Scalability (9/15 groups) and dynamicity (9/15 groups)
  - Correctness (6/15 groups) and privacy (4/15 groups)
  - Heterogeneity (5/15 groups) and autonomic (4/15 groups)
- What could be done better, scientifically, together

Our needs

- Organization : seminars, shared platforms, budget, joint teams
  - **We need more time to discuss :)**
  - Seminar to present the teams (3 teams/session), then/mixed with PhD student seminar (helpful to create a “community” and know deeply the topics we work on)? Start in february, twice or once a month? -> Gaël in charge of the organization :)
  - Seminar to discuss/brainstorm and refine our ideas!
  - Disseminate/share the call for projects
  - Discuss other scientific challenges!
  - Meet to present the existing experimental platforms and the scientific issued by them (to encourage federation)
  - Create a mailing list? Use the Slack group created by Eric G.? (does it already exists?)
- Recruitment : faculty, students, support -> see that a next time :) add maybe infrastructures also

Any other thoughts ?

- Any remark…
- …