

Inria Chair of junior professor

Lead institution/organization: Inria Center at University Grenoble Alpes

Name of the head of institution/organization: Frédéric Desprez

Site concerned: Grenoble

Academic Area: Rhône-Alpes

Partner institutions/organizations: Grenoble Alpes University

Project name: Sovereign Systems and Clouds

Acronym: SSC

Keywords : systems, virtualization, cloud, edge computing, Fog

Target duration: 6 years

Scientific theme: System, cloud, edge

Corresponding CNU/CoNRS/CSS section(s): CNU27, CoCNRS 7.

Required profile: The required degree is a thesis or equivalent. An experience of 3 years after the thesis is desired in order to consider an integration as Director of Research INRIA between 3 and 6 years after taking up the post.

Financial environment: 200 k€ for the duration of the project.

The project will also be supported by Inria and the University of Grenoble Alpes.

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Establishment strategy

INRIA has long been involved in research on distributed computing platforms, from supercomputers to Cloud Computing infrastructures and now to Edge and Fog platforms, at every level of the software stack. The scientific issues and problems are numerous, from the lowest layers close to the hardware, to the programming and management models of large-scale distributed infrastructures. The subject of energy consumption is also of primary importance.

In conjunction with Grenoble Alpes University, the Inria center at Grenoble Alpes University wishes to strengthen the system theme in the Grenoble area and to revive these essential subjects to ensure European sovereignty in this field. This will involve strengthening existing teams and/or creating a new joint team.

As far as training is concerned, the person recruited will be involved in teaching within the IM2AG UFR in the school of computer science, which is responsible for the bachelor's degree in computer science, the master's degree in computer science, the master's degree in business administration and the master's degree in computer science. The needs of teaching in operating systems and cloud are present in all the IT courses of the UFR.

Strategy in terms of international attractiveness

There are many opportunities to collaborate with international laboratories, both at Inria and at UGA. In addition, the chairholder will be encouraged to participate in the creation of an INRIA associate team between his/her host team and the university of his/her choice.

Summary of the scientific project

Cloud computing platforms have become essential for the industrial world, administrations and individuals. The possibility of providing sovereign clouds is also now a major issue for states. Moreover, the distribution of these Clouds is at the center of many researches. By taking into account the location of data production and processing it as close as possible to where it is produced, gains can be made in terms of latency, privacy preservation, resilience and energy efficiency.

In addition to the issues of data storage and confidentiality, this sovereignty implies having control over the entire software layer and providing the services associated with these platforms with top-notch quality of service guarantees.

Recent advances in hardware and networking open up the possibility of revisiting the low-level OS and virtualization layers (Hypervisor, VM and Container) as well as the associated service layers to have a better quality of service while having a high level of control over these services.

Candidates should have strong experience in at least one of the following topics:

- Operating system and virtualization,
- Distributed systems,
- Storage Systems.

They will be part of a joint project team between INRIA Grenoble and the LIG.

Summary of the teaching project

The person recruited will be part of the cloud, systems and/or networks teaching teams. Finally, he/she may be asked to intervene in training courses offered by the MIAI Institute and the MSTIC Graduate School (Mathematics, Science and Information and Communication Technologies) in connection with the CPJ theme. Some courses are taught in English. She must be able to teach in English.

The teaching project aims to expand the offer of Cloud training provided by the training entities involved so as to increase the expertise of students (expert public in initial / continuing education, with or without alternation). This amplification will be achieved via:

- A. The **reinforcement** of existing training modules focused on Cloud, via the consideration of new technological approaches and the creation of new practical projects, allowing to broaden the spectrum of business skills covered.
- B. The **creation** of new Cloud-focused training modules for Cloud Infrastructure Administrator and Virtualization Engineer (IaaS, PaaS, SaaS) that will replace existing training modules that have become less strategic, or that will complement training offerings currently under construction.

Competencies

- Scientific excellence
- Supervisory skills
- Teaching capacity (in English)
- Participation in the scientific orientation of the team - Project development and funding research

Financial summary

In addition to the salary of the CPJ holder, the financial needs necessary to carry out the scientific project include

- 1 PhD student for 36 months (120 k€)
- 1 post-doctoral student for 24 months (96 k€)
- Operating resources, computer, missions, internship bonuses (34 k€)

We also request a 200 k€ funding from the ANR.

Total financed on CPJ (including ANR package)	400 k€
Co-financing	50 k€
Total of the project	450 k€

Scientific dissemination

The results of the work carried out within the framework of the Chair will be published in leading international journals and conferences such as:

- Eurosys, Aplos, OSDI, SOCC, Middleware, VEE, Usenix, INFOCOM, IPDPS
- IEEE Transaction on Parallel and Distributed Systems, IEEE Transactions on Cloud Computing, Journal of Parallel and Distributed Computing
- ...

The chairholder will participate in PEPR Cloud and ESFRI SLICES projects.

Open Science

The project is part of an open science approach, which can be implemented according to the following principles:

- Availability of codes and software on a public platform such as git with associated free software license. For completed software, registration in the Software Heritage initiative.
- Publications in Open Access journals and registration in HAL with provision of a pdf copy of the author.
- Availability of experimental data on the SILECS infrastructure in FAIR mode.
- Science and society

The holder of the CPJ and the other persons involved will intervene in events such as the science festival.

Science et société

Le (ou la) titulaire de la CPJ et les autres personnes impliquées interviendront dans les manifestations telles que la fête de la science.

Indicators

Follow-up indicators could be :

- Recruitment of a doctoral student and a postdoctoral fellow.
- Quality supervision, as evidenced by the publications of the PhD student and the post-doctoral fellow in the best international conferences and journals.
- Effective provision of software and experimental data.
- Effective collaboration between the chairholder and the LIG laboratory teams, as evidenced by co-supervision and joint publications.
- Defense of an HDR.
- Presentation of the teaching model.
- Participation in the creation of an INRIA associated team with a foreign university.

A shared collaboration space will be opened on mybox.inria.fr in order to deposit all documents related to the project and to be able to follow the indicators.

A project monitoring committee will be organized every year to monitor the progress of the project with the chairholder, the project participants and the representatives of the relevant supervisory bodies.