

Internship: Elastic Deployment of a Replicated Public Key Infrastructure (PKI)

IRT SYSTEMX CONTEXT

Located within a global scientific campus, the Research Institute of Technology SystemX is dedicated to the future system digital engineering. Working closely with the best French research organizations and bringing together academic & industrial research teams. SystemX has the ambition to generate major technologies and solutions by using digital engineering breakthroughs and to spread skills in all economic sectors.

You will take part to a research collaborative project called Secure Cooperative Autonomous systems (SCA). The SCA project is positioned to provide operational solutions to respond to new technological and economic challenges of automotive environment. The project partners are: **Renault, PSA Peugeot Citroën, Valeo, Transdev, IDnomic, Trialog, Yogoko, Oppida, and Telecom ParisTech.**

INTERNSHIP CONTEXT

You will be part of a project team composed by 3 interns working in collaboration within the SCA project. One of the objectives of the SCA project is to implement the security management infrastructure of Cooperative Intelligent Transport Systems (C-ITS). The stakes are high because these ITS systems must be able to securely process thousands of messages exchanged per second and provide strong guarantees for the protection of personal data in accordance with national legislation and EU directives. The reliable and secure infrastructure (PKI) developed in the ISE project will therefore needs to respond to the issue of large-scale design in order to be able to distribute billions of digital identities to the ITS embedded stations. Moreover, the PKI should be able to adapt to the incoming load: it should increase the resource allocated when the load increase and diminish them when the load decrease. The internship focuses on two main topics: (i) a research axis on adaptive PKI dimensioning and (ii) a practical axis on the PKI deployment to the cloud (in particular Kubernetes). The selected candidate will define PKI dynamic replication objectives and requirements, draw up a dynamic dimensioning strategy and measure its impact on costs/performances ratio. The internship involves a research work on distributed systems, dynamic replication and cooperative ITS. This research work will be submitted for publication in an international conference or workshop.

YOUR MISSIONS

- Definition of dynamic dimensioning objectives/requirements
- Definition of the replication strategy
 - Parameters to measure (CPU, memory, network) in order to take the decision to increase/decrease the resources
 - Resources increasing/decreasing strategy
- Measurements campaign
- Results analysis and benchmarking
- Results submission to an international conference or workshop

The ideal candidate should meet the following criteria: Master degree (ongoing), experience on software development and distributed systems, interested in research. The internship last for six months and is located at IRT-SYSTEMX headquarter in Paris-Saclay campus (France).

YOUR SKILLS

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| • Good knowledge on software engineering and deployment (java, jenkins) | • Teamwork and cooperation: progress report, results documentation |
| • The knowledge of Docker / Kubernetes is an advantage | • English mandatory |

Reference: [CREE_2018_SCA_03_03](#)

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