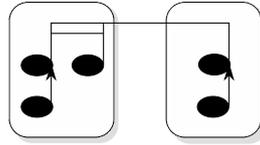# VeRDi - Verified Reconfiguration Driven by execution

Engineering position

keywords : Deployment, reconfiguration, verification, distributed systems

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VeRDi project

The VeRDi project is funded by the French region *Pays De La Loire* where Nantes is located. VeRDi is an acronym for *Verified Reconfiguration Driven by execution*. It aims at addressing distributed software reconfiguration in an efficient and verified way.

Configuring complex distributed software for heterogeneous distributed infrastructures is a non-trivial and technical task, often called *deployment*. A deployment, because of its error-prone and complex nature, needs to be automated[1][2][3] in an efficient and verified manner to guarantee its behavior. This is the work under research by a few members of the STACK research group, a joint team of Inria and LS2N located in Nantes. However, both distributed infrastructures and software are nowadays evolving towards more dynamic behaviors. For instance, in *Edge Computing* infrastructures, small computational devices frequently enter or leave the network because of their mobility or because of failures, thus creating a need for system re-configuration over time. Other examples are IoT, Smart-* or services-oriented applications composed of many different modules that evolve through time according to dynamic information.

If ad-hoc specific solutions have already emerged, both in production and research, to address a subpart of possible reconfigurations, there is an active research trend to address reconfiguration expressivity and execution in a generic fashion applicable to most software reconfiguration cases [1, 2, 3, 5]. Moreover, given the high frequency of reconfigurations and the high availability required by service-oriented applications, reconfigurations have to be as efficient as possible which is difficult to address for large-scale infrastructures, applications and systems.

The aim of the VeRDi project is to build an argued disruptive view of the problem. To do so we want to validate the work already performed on the deployment in the team [4] and extend it to reconfiguration. A Ph.D. student is already working on this subject and the VeRDi project will bring additional forces to the team by means of this engineering position as well as a postdoc position.

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[1] https://kubernetes.io/
[2] https://www.ansible.com/
[3] https://www.chef.io/chef/

Position description

As a member of the VeRDi project, the hired engineer will collaborate with different researchers from different domains. The activity of the engineer will be divided into three main parts: (1) development, (2) experiments and (3) dissemination.

Development. Two research prototypes have already been implemented in the team. These prototypes need to be consolidated and improved. For example, the Madeus deployment model has been implemented in Python and is available under a GPL license[4]. Much interesting development are possible such as the implementation of new functionalities to help both the Ph.D. student and the postdoc in their research tasks, or new ideas to improve the abstraction level offered by our prototypes. For example, being able to directly use Ansible[2] or Chef[3] deployments within Madeus could substantially facilitate the adoption of the solution by developers.

Experiments. In research, once a contribution is identified and formalized we need to validate it through complex use-cases that the related work is not able to solve. Such use-cases often ask an engineering expertise and a lot of time. For example, to validate Madeus, the deployment of OpenStack has been defined. The engineer will help the team to design and implement reproducible complex experiments, such as OpenStack, on real infrastructures. Thanks to this work the team will be able to publish papers in top-ranked conferences.

Dissemination. The engineer will also have a dissemination mission. As soon as stable versions of our frameworks will be released, the engineer will be responsible for the animation of tutorials in international conferences. Moreover, the engineer will participate, as already mentioned, to the redaction of research papers. Finally, the engineer will be free to propose internships and student projects to help her/im experimenting new ideas or new use-cases.

The expected skills of the candidate are:

- being a graduate of a Master 2 in computer science (ideally be a Ph.D. in computer science),
- having strong development skills in Python and other languages,
- having experiences in software comissionning on clusters and/or clouds,
- having a good level of English,
- having an ability to collaborate, and a strong motivation for the project.

Details

The engineer position is based in Nantes at the IMT Atlantique engineer school. The candidate will be a member of the Inria project team STACK. This team is part of the LS2N laboratory of Nantes, and the DAPI department of IMT Atlantique. This position is available between February and June 2019 (strict). The earliest is the best for the project. The salary depends on the experience of the candidate with a basis of 2100€net salary. Please contact Helene Coullon if you want to postulate: **helene.coullon@inria.fr**

References

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[4]`https://gitlab.inria.fr/Madeus/mad`