

User-Friendly Text Editor for the language AWN

(Internship @ Data61, CSIRO, Sydney, Australia)

Background

Wireless Mesh Networks (WMNs) are a promising technology that is currently being used in a wide range of application areas, including Public Safety, Transportation, Mining, etc. Typically, these networks do not have a central component (router), but each node in the network acts as an independent router, regardless of whether it is connected to another node or not. They allow reconfiguration around broken or blocked paths by “hopping” from node to node until the destination is reached. Unfortunately, the performance of current systems often does not live up to the expectations of end users in terms of performance and reliability, as well as ease of deployment and management.

In cooperation with Macquarie University (Sydney, Australia) and Queensland University (Brisbane, Australia), Data61 explores and develops new adaptive network protocols and mechanisms for Wireless Mesh Networks that can overcome the major performance and reliability limitations of current systems. To support the development of these new protocols, the project also aims at new Formal Methods based techniques, which can provide powerful new tools for the design and evaluation of protocols and can provide critical assurance about protocol correctness and performance. Close collaboration with industry partners ensures the use-inspired nature of the project.

Research Questions and Tasks

The techniques we use for modelling, analysing and verifying routing protocols for WMNs are based on the simple programming language AWN, which offers expressions for (arbitrary) data structures and basic primitives for WMNs, such as broadcast and unicast. The intention is to use this language right from the beginning when designing protocols; but this can only be achieved if tools support the development.

In the past¹ we have developed several tools for analysing AWN. This includes the support of model checkers such as Uppaal, and interactive theorem provers such as Isabelle/HOL.

The task of the project is the development of a user-friendly text editor for the language AWN. The editor should support syntax-highlighting as well as simple type checks. It could for example be based on the freely available text editor jEdit. Last but not least the developed editor should be linked to the developed tools, mentioned above. Another feature the editor should support is its extensionality, that means in case we develop further tools it should be easy (and modular) to link them to the editor.

The ideal applicant should have experience in programming, preferable using Scala or Java; knowledge about model checking, interactive theorem proving and mesh networks is not required and will be explained when needed.

¹For example through a project performed under the umbrella of DAAD Rise 2013

General Information

Data61 is Australia's leading digital research powerhouse, offering the research capabilities, IP and collaboration programs to unleash the country's digital and data-driven potential, with a global context. By driving collaboration across industry, academia, government and the startup space, Data61 is able to help existing industries transform, and act as a catalyst in the creation of new technology-based industries.

The intern will be part of *Concurrency and Protocol Verification* (<http://ts.data61.csiro.au/projects/concurrency/home.pml>), a highly motivated group with different backgrounds (e.g., formal methods and network engineers), working at different institutes (Data61, UNSW, UQ, and Macquarie University). The successful applicant will work together with Dr. Maksym Bortin, Prof. Rob van Glabbeek and Dr. Peter Höfner.

Sydney is the largest and most populous city in Australia. It is located on Australia's south-east coast of the Tasman Sea. With an approximate population of 5 million in the Sydney metropolitan area the city is the largest in Oceania. Sydney also ranks among the top 10 most liveable cities in the world according to Mercer Human Resource Consulting and The Economist.

Contact Information

If you have any questions concerning the internship, please do not hesitate to contact **Maksym Bortin**.

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FOR FURTHER INFORMATION

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