

Two Internships at IRISA laboratory - Rennes

LOCATION: CAMPUS UNIVERSITAIRE DE BEAULIEU, RENNES

SUBJECT: INTEROPERABILITY TESTING TOOLS FOR IoT PROTOCOLS.

KEYWORDS: {IoT; INTERNET OF THINGS; INTERNET PROTOCOLS; NETWORKS; WSN; SOFTWARE DEVELOPMENT; CoAP; 6LoWPAN; WEB OF THINGS (WoT); W3C; IETF}

START: AS SOON AS POSSIBLE; DURATION: 4 TO 6 MONTHS

Context:

This internship is in the context of the project is **F-interop** European project (call H2020-ICT-2015) with 9 partners from Belgium, France, Germany, Luxembourg, Switzerland and UK, and including our joint Irisa/Inria Dionysos team of Irisa laboratory, Rennes (France).

It is a Research and Innovation Action (RIA) project, which started in November 2015 and that will last three years. Among others activities, F-Interop aims to develop and provide remotely accessible interoperability and conformance tools to support and accelerate standardization processes for IoT (Internet of Things) protocols.

It will address the needs of emerging standards such as oneM2M, 6TiSCH, 6LoWPAN, Web of Things, CoAP, etc. Within this F-Interop project, our Dionysos team leads the Work-package 2 (WP2) dedicated to “Online interoperability and conformance testing tools”.

The interns will integrate the R&D team working for F-Interop project.

The internships described in this document target the study of interoperability and conformance testing for [6LoWPAN](#) (standardized communication protocol by the IETF) and [Web of Things](#) (a set of W3C recommendations documents for building the future web for the IoT).

The interns will work in the requirements study and the software development of a testing tool called TTProto (Testing Tool Prototype), more specially, in the extension of its functionalities to the aforementioned protocol and architecture (6LoWPAN and WoT).

About TTProto (Testing Tool Prototype)

TTProto is an experimental tool for implementing testing tools, for conformance and interoperability testing. It was first implemented to explore new features and concepts for the TTCN-3 standard, but later on it was used to implement a passive interoperability test suite provided for the CoAP interoperability event held in Paris in March 2012.

TTProto is now being used for the purpose of developing testing tools (for interoperability and conformance testing) for the [F-Interop European project](#)

Internship Subject 1: 6LoWPAN interoperability testing tool development

Description:

The intern will help with the development of new features of TTPROTO to enable 6LoWPAN protocol interoperability and conformance testing, and help with its integration to the F-Interop platform.

The development will be done mainly in Python language; previous experience is appreciated but is not necessary required.

Tasks:

- Development of the 6LoWPAN testing tool.
- Wireless packets sniffers/injectors, IoT devices and motes manipulation.
- Integration of the developed 6LoWPAN testing tool to F-Interop platform.

Required skills:

Applicant should be preferable a student of Bac+5 engineering school (computer science in software engineering or networks and telecommunications) or university equivalent (M2). Applications from Students of Bac+4 may also be considered.

The applicant should have some basic software engineering and programming skills as well as networks and Internet protocols knowledge (HTTP, IPv4, TCP, UDP, etc.). Notions in IPv6, 6LoWPAN, CoAP Protocols are a plus. The applicant must feel comfortable working in an English-speaking environment.

Obtained skills after the internship:

After this internship, the intern will have very good knowledge in software development, for the whole software development life cycle. He/she will gain protocol testing, IoT protocols and technologies, Web APIs, Python language knowledge. He/she will improve level of English, and obtain experience working in an international context.

Remuneration:

Standard compensation provided by the university, corresponding to the degree of the applicant.

Contact and application:

CV + Transcripts + Motivation letter to be sent by e-mail to: Cesar.Viho@irisa.fr, and Federico.Sismondi@irisa.fr with the subject: F-Interop Internship

Internship Subject 2: Requirements study and PoC software development for a Web of Things (WoT) architecture testing tool.

Description:

The intern will help with the requirements study, solution design and software development of a testing tool for testing the Web of Things architecture. The scope of the work will be limited to CoAP protocol binding of WoT, in other words the tests (for interoperability/conformance) will be based on CoAP binding only when doing the analysis of the traces of the interactions between implementations (“Things”). Nevertheless, the work must have a modular and extensible approach, enabling future extensions to other protocol bindings.

Software engineering knowledge/experience, Python language, CoAP protocol, JavaScript, html, http and web architecture knowledge is appreciated but are not requirements for the intern.

Tasks:

Phase 1: The intern will start by doing a state-of-the-art study on the WoT’s interest group documents such as [WoT architecture](#), [current practices](#) document.

He/she will participate on the work for the requirements specification of the testing tool for the conformance/interoperability testing. During this phase, the intern will participate with the development leader in the official W3C’s meetings (face to face and remote) for making sure the specified requirements take into consideration the community needs.

Outcome 1: a specification document for the testing tool requirements. It will be written in English.

Phase 2: During the second phase of the internship, the intern will help working on a solution design, and then its implementation.

Outcome 2: Proof-of-concept type of tool (Web of Things testing tools) with few test cases implemented, for evaluating conformance and interoperability between components of the architecture.

Required skills:

Applicant should be preferable a student of Bac+5 engineering school (computer science in software engineering or networks and telecommunications) or university equivalent (M2). Applications from Students of Bac+4 may also be considered.

The applicant should have some basic software engineering and programming skills as well as networks and Internet protocols knowledge (HTTP, IPv4, TCP, UDP, etc.). Notions in IPv6, 6LowPAN, CoAP protocols and/or Web of Things architecture are a plus.

A good level of English (written and spoken) is required.

Obtained skills after the internship:

After this internship, the intern will have very good knowledge in software development, for the whole software development life cycle. He/she will gain protocol testing, IoT protocols and technologies, Web APIs, Python language knowledge. He/she will improve level of English, and obtain experience working in an international context.

Remuneration:

Standard compensation provided by the university, corresponding to the degree of the applicant.

Contact and application: CV + Transcripts + Motivation letter to be sent by e-mail to: Cesar.Viho@irisa.fr, and Federico.Sismondi@irisa.fr with the subject: F-Interop Internship