OSLC Adapter for Software Analysis

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#1 WHY Motivation

Analysis tools are the most **useful** when someone actually actively uses them **in practice**.

We strive to make them more **accessible** to users by making their **adoption and use** as **convenient** as possible, which in turn should lead to more active **users**, more **feedback**, more **motivation** for development, and more analysis tool **improvements**.

The **main issues** at hand for the users are the need to go through the tool's **setup process** and the need to get familiar with **each and every** tool's individual **interface**.

#2 WHAT Goals & Challenges

Goals

- Adding a **standardized interface** to analysis tools: This can make it much **easier to integrate** them into bigger solutions, e.g., allowing a tool to be executed through an IDE with a **single click**.
- Turning analysis tools into **web-services**: This allows the tool to be **setup and managed by its creator**. Users can then very easily try out the tool **remotely** with **no need to set it up** themselves.
- Creating a **portable and configurable solution** that can be used universally with **as many analysis tools as possible** while being able to provide as much of the tool's functionality as possible.

Main Challenges

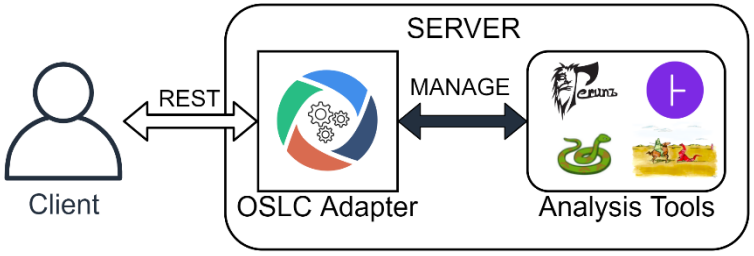
- **Finding** a suitable **OSLC** domain, **mapping** OSLC resources to analysis tool usage.
- Determining analysis **tool requirements**, **figuring out a way** to make an adapter **universal**.
- **Implementing** a reliable solution.

#3 HOW Solution

We created a **configurable OSLC adapter** which can add a **web-based standardized interface** to almost any analysis tool by leveraging its existing **command-line** interface.

OSLC (Open Services for Lifecycle Collaboration)

- A standard that defines **communication** and **interfaces** for integrating tools across different domains.
- Uses **REST** interfaces and **RDF** resource representation.
- Chosen due to its **growing popularity** in both **academia** (Arrowhead Tools and AUFOVER projects) and **industry** (IBM Jazz platform, Atlassian products).



The Adapter

- A **toolchain of two sub-adapters** with interfaces based on the **OSLC Automation** interface.
  1) **Compilation** sub-adapter takes care of transferring and compiling SUTs (System under test).
  2) **Analysis** sub-adapter is configurable to execute any analysis tool. The tool's command line **interface is mimicked** in OSLC Automation Plans during configuration. Input parameters supplied by clients are then transformed to execute the analysis tool.
- **Users** need to **create their SUT** and then **request analysis** execution. Results can be queried with **OSLC Query** and stored **persistently** using a database.
- Implemented with Java, Maven, **Eclipse Lyo** and fully tested on both **Linux and Windows** for portability**.**

#4 Experiments

The adapter was tested with the following tools:

- VeriFIT
  - **ANaConDA** – dynamic analysis of concurrency,
  - **Perun** – dynamic performance analysis,
  - **Spectra** – past-time LTL verification,
- **Facebook Infer** – static analysis,
- **Valgrind** – dynamic analysis,
- **HiLiTE** (Honeywell) – test case generation,
- **Grep** – UNIX utilities representative.

All these tools have been **successfully used** through the adapter. The tool selection was focused on verifying usability of the adapter with various analysis tools of **different types**.

#5 Results

Current Usage in Practice

- The adapter is currently **being used in Honeywell** to integrate **HiLiTE** with other tools and to enable a web client interface. Honeywell really appreciated the adapter's extensibility and configurability.

In Development Integrations

- Adding an OSLC interface to **Spectra** at VeriFIT (contribution to the **TAČR AUFOVER** project).
- The adapter is being used to create a **verification server** which would offer **VeriFIT** analysis tools as online services (contrib. to the **AUFOVER** project).
- An **Eclipse IDE plug-in** is being developed which uses the adapter to offer **one-click analysis** execution from the IDE. Contribution to the **H2020 ECSEL Arrowhead Tools** project.