The Problem: Experimental & Computational (Stodden et al 2013)

- The untracked changes (libraries, compilers, scheduler, ...) in the user session that lead to non-repeatable simulation results.
- The untracked changes of a valve, pump or any other specific sensing or measurement part that lead to non-repeatable experiment results.
- The variety of operating systems, computer architectures and paradigms complicate the reproiability and dissemination of the scientific results.
- The multitude of machines, calibration techniques and procedures harden the repeatability, collaboration and verification of the research results claims.

Research Solutions: Record and Share all the investigation's relevant data

- Identify the key parameters of the scientific investigation environment: Hardware specs, Operating System, Machine and Calibration specs.
- Identify the key parameters of the investigation itself: Source code, Dependencies, Compiling options (Jézequel et al 2014), Execution parameters, Experimental procedure, the execution settings, Experiment Requirements.
- Identify the investigation input and output: Input, Output data for Computational; Sample specs, Results for Experimental.

Cloud Platform

The CoRR platform is composed of: A mongoDB database server; two flask services: Cloud and API; and a material design web client front-end and is detailed in (Congo 2015). It is accessed from the web through the front-end or from its API which is interfaced with the Software management tool in the computer or experiment management tool in the machine.

By recording all the identified keys components (cited), one is able to assess the reproducibility of a scientific experiment:
- Different results should point to key elements variations that can be correlated: Non-reproducibility source extraction.
- After Sharing, Enforce investigation parameters before execution to be able to repeat or use previous results foundation.

Existing Approaches

Currently in the computational side, three approaches exist:
- Work-flow based tools: Taverna, Galaxy
- Event Base control tools: Sumatra, Dexy
- Library based tools: Sumatra, OOF GTKLogger

For the experimental side, there are three techniques that can also be used:
- Application Programming Interfaces: Automated labs.
- File system watcher: No API but open files format.
- Custom approaches: No API and proprietary files.

Conclusion & Perspectives

- CoRR provides a centralized way for investigation management tools to record the investigation execution.
- CoRR is a cloud platform built to help scientists collaborate and disseminate their Reproducible Records.
- CoRR advocates the necessity of experimental investigation to enforce the design of more automated lab machines for full control of the key parameters of the whole experiment.
- CoRR will be linked to a pool of computing resources to allow direct computing on the cloud. The execution of a computation and the record captured will then all be executed in the cloud and collaborators will be able to repeat, reproduce, extend and run a record in the cloud as well.

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