TDSE-Hub: A Repository for Reproducible Test-driven Software Experiments

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Reproducible TDSEs

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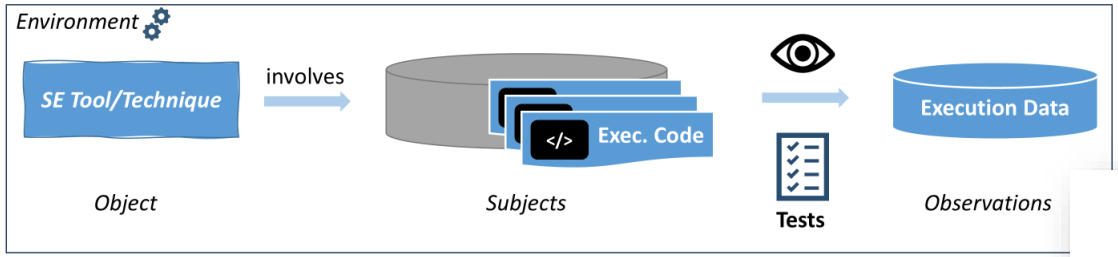
Test-driven Software Experiments (TDSEs)



Test-driven software experiments (TDSE)

- *"an experiment in which the experimental unit involves software (i.e., code) that is executed und controlled conditions by means of one or more tests"*
- Execution data: analysis of observational data obtained at run-time from code executions
- Example TDSEs
  - assessing performance of test generators
  - Benchmarking code LLMs for code generation tasks

Solution

- Large-scale Software Observatorium – LASSO
  - provides simple, transparent, domain-specific languages and data structures to create, analyze and store execution data at ultra-large scales

Executable Code Corpus

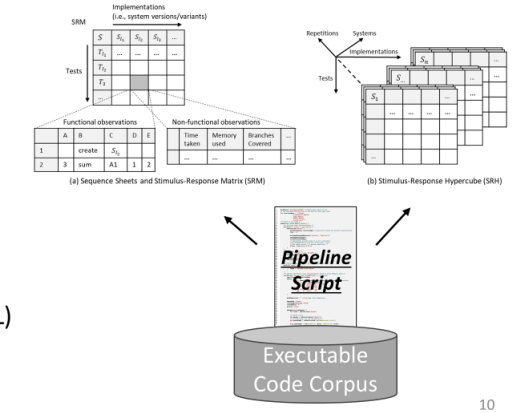
- extensible

Reusable Data structures (tabular)

- Sequence Sheets (Test/Execution Data)
- Stimulus Response Matrices (SRMs)
- Stimulus Response Hypercubes (SRHs)

Domain-specific Languages

- Study designs: LASSO Scripting Language (LSL)
- Tests: Sequence Sheet Notation (SSN)



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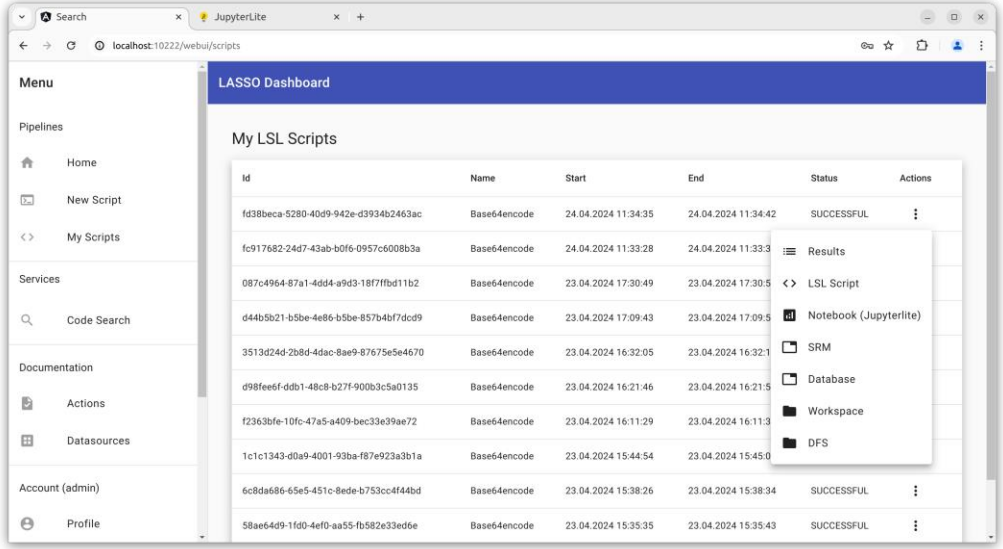
TDSE-Hub – Sharing TDSEs for Reproducibility

- a community-driven repository for researchers with communication features inspired by social networks
  - sharing TDSEs in terms of LSL scripts and results for reproducibility
  - tagging features to improve users' ability to interact
  - add metadata
  - etc.



Promoting FAIR Principles

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- **Findability**
  - To facilitate discovery, TDSE-Hub gives users the ability to submit their study designs and, optionally, the results, for analysis and sharing. To this end, the repository will support search capabilities based on information retrieval techniques.
- **Accessibility**
  - TDSE-Hub will make all submitted materials openly available, including the LSL study scripts as well as the execution results (if available).
- **Interoperability**
  - TDSE-Hub will use standardized file formats to store the LSL scripts and the corresponding execution results.
- **Reusability**
  - To maximize the potential for reuse, TDSE-Hub will encourage all users to fully document their contributed materials to engage in collaborations.

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Thank you!

Resources

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- Kessel, Marcus, and Colin Atkinson. "Promoting open science in test-driven software experiments." Journal of Systems and Software 212 (2024):111971. https://doi.org/10.1016/j.jss.2024.111971
  - Open Access
- LASSO Platform, https://softwareobservatorium.github.io/
  - Open Source