Instituto Superior Técnico, Universidade de Lisboa
Large-Scale Systems Engineering

Project: Stage 02

Goals

The ESLE project is an open-ended project intended to introduce students to hands-on experience with the deployment, management and analysis of a distributed system in a realistic scenario close to what they will find in the industry or academia.

Assignment

In the second stage of the project, students need to extend the work done in the first stage and systematize the system analysis and evaluation process.

Besides the work done on the first stage, for the second stage of the project students are expected to:

- Design and describe the evaluation process of the system under test, namely:
  - Identify and describe the system and workload parameters.
  - Select, and justify, the metrics, factors and levels used in the experimental design.
  - Design an experiment that allows to efficiently assess the effect of the different factors and levels. The experiment should consider at least 6 factors at two levels each.
  - Discuss and justify the experimental design (sign table) and the obtained results with the help of clear and meaningful plots.
- Select one of the factors with the most effect and analyse the scalability properties of the system. Discuss the different portions that limit the scalability of the system under test according to the USL.
- Detail the request processing pipeline for the selected workload. For workloads with different request types, identify the portions of the pipeline that affect each request type and propose improvements, if possible, for the stage or stages with the most negative impact.

Students are encouraged to perform the evaluation in a cloud environment such as Amazon Web Service, Google Cloud platform or Microsoft Azure which provide free tiers for students.

Project files

As in the first stage, the project should be hosted in the private git repository previously shared. All the artifacts, scripts, code, measurements, and the report should be present in the repository, together with a top level README.md file that explains: i) the structure of the repository; and, ii) how to run a small demo of the experiments conducted.

Submission

The submission of the project will be done through Fénix.

The submission will consist of a report in the LLNCS format [1] with up to 12 pages, excluding references and annexes. The report should extend the report of the first stage. All the other material relevant to the evaluation should be available in the repository at the time of the submission, as specified above. If deemed necessary, students can include annexes in the report but it should be possible to assess the work without considering the annexes.

The report should include the following:

- **Identification of the group members**: Name, Email and Student Number and Group Number.
- **Introduction**: brief presentation of the selected system and the justification for its choice. The report should also specify the git commit identifier that should be considered for evaluation purposes. Failure to do so will result in a grade penalty.
- **System Description**: detailed description of the system, including an analysis of its main characteristics.
- **Experimental Design**: description and justification of the selected experimental design.
- **Results**: presentation and discussion of the experimental design, scalability and performance experiments conducted, together with any additional information the group deems relevant to understand the obtained results.
- **Conclusion**: discussion of the main insights obtained.

The deadline for the submission is **November 12 at 19:00.**

Bibliography

[1] Information for Authors of Springer Computer Science Proceedings. https://www.springer.com/gp/computer-science/lncs/conference-proceedings-guidelines