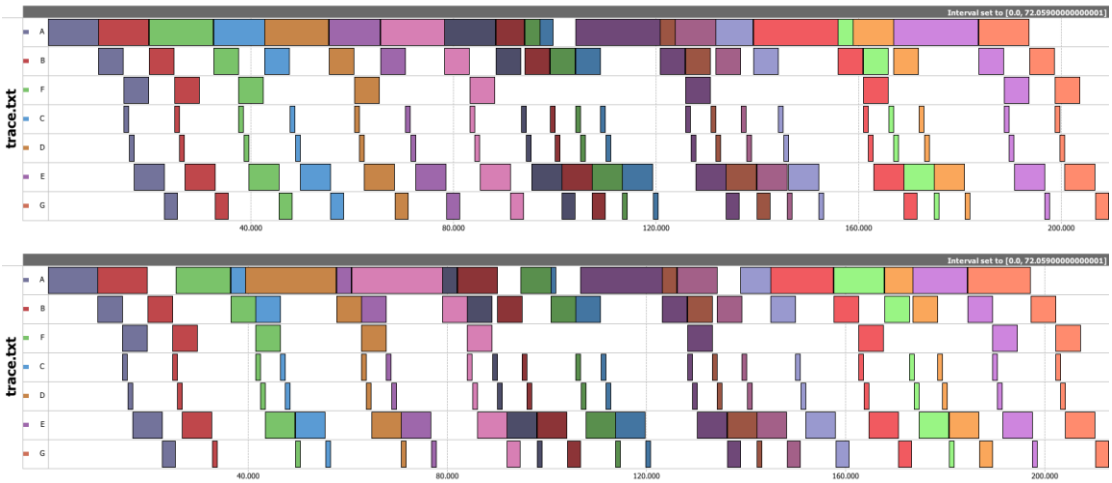
Embedded Systems Innovation BY TNO

# Student assignment: Measuring trace distances

## Context

Within the Octo+ project (TNO-ESI and Océ), we use system-level performance models to predict the performance of future implementations of the datapath of high-end printers and copiers. This model-based way of working can lead to shorter development times and improved performance of products. An important step in this process is to validate and calibrate the models that we use.

For instance, the figures below show two execution traces of an example system. Time is on the x-axis, and the y-axis shows the various functional steps in the system (A – G). The coloured blocks indicate activity. The first trace could be produced by the *actual system*, and the second trace could be produced by a *model of the system.* These traces look very similar, but there are subtle differences that are due to the inherent mismatch between model and reality.




## Assignment

The goal of the assignment is to investigate distance metrics for (sets of) execution traces. Such metrics can contribute to the automated validation and calibration of performance models. The challenge is to design the metrics in such a way that they capture important system-level performance indicators such as latency and throughput, as well as more elusive properties such as preservation of task ordering and the critical path. A further question is how to deal with *sets* of execution traces, which naturally occur in situations where systems contain uncertainty caused, e.g., by variation in the input or by unpredictable OS overhead. The developed metrics are expected to be implemented in a prototype tool.

This assignment has a challenging theoretical side, but its results can directly be applied and tested in an industrial setting.

## More information

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