

# Master Project

## Scalability of TensorFlow on Piz Daint

**Duration:** 4 months

**Mentors:** Prof. Olaf Schenk (USI), Claudio Gheller (CSCS)

**Working place:** Lugano, Switzerland

### Prerequisites

The prerequisites for this MSc project are a good math background, same basic concepts of parallelism, and good knowledge of Python.

In 2017 the scalability of distributed TensorFlow was investigated at CSCS. The results indicate a good scalability on Daint up to 128 nodes, which seems to be comparable to benchmarks from Google. Starting from 128 nodes there is a huge performance drop. Further, the performance depends strongly on the number of deployed parameter servers. However, there is no insight why the number of parameter servers affects the performance in the way it does.



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The first goal of the MSc project is to analyze the root cause of these performance related questions. TensorFlow is one of the most popular DL toolkits; however it is one of the least HPC-aware toolkit. Other DL toolkits provide better integration of HPC technology such as Caffe2 which uses MPI as a communication layer. The second goal is to study the performance of Caffe2 on Piz-Daint. A performance analysis is required together with an assessment on the effectiveness of Caffe2 as being more HPC friendly. For instance, does the usage of MPI in Caffe2 justify in term of performance/scalability that we should consider this toolkit a more suitable toolkit than TensorFlow for Piz Daint. A similar performance analysis will be performed as the one already accomplished on TensorFlow.

### Contact information and application

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