Klepsydra AI Performance Benchmark

PolarFire RISC-V on Linux and RTEMS6 SMP

This report summarizes the results of a performance benchmarking campaign conducted on the specified version of Klepsydra, executed on the PolarFire ICICLE 4-core CPU. The benchmarks were performed using the Klepsydra AI Benchmark tools to compare the performance of two inference engines: Klepsydra AI and TensorFlow Lite on Linux, and Klepsydra AI on RTEMS.

Technical setup

The benchmark application runs in a Docker container on Ubuntu 22.04 on a Raspberry Pi 5, with the image including Klepsydra AI and TensorFlow Lite 2.4.4 (compiled with NEON extensions). For RTEMS, the AI benchmarks are deployed directly on the target binary.

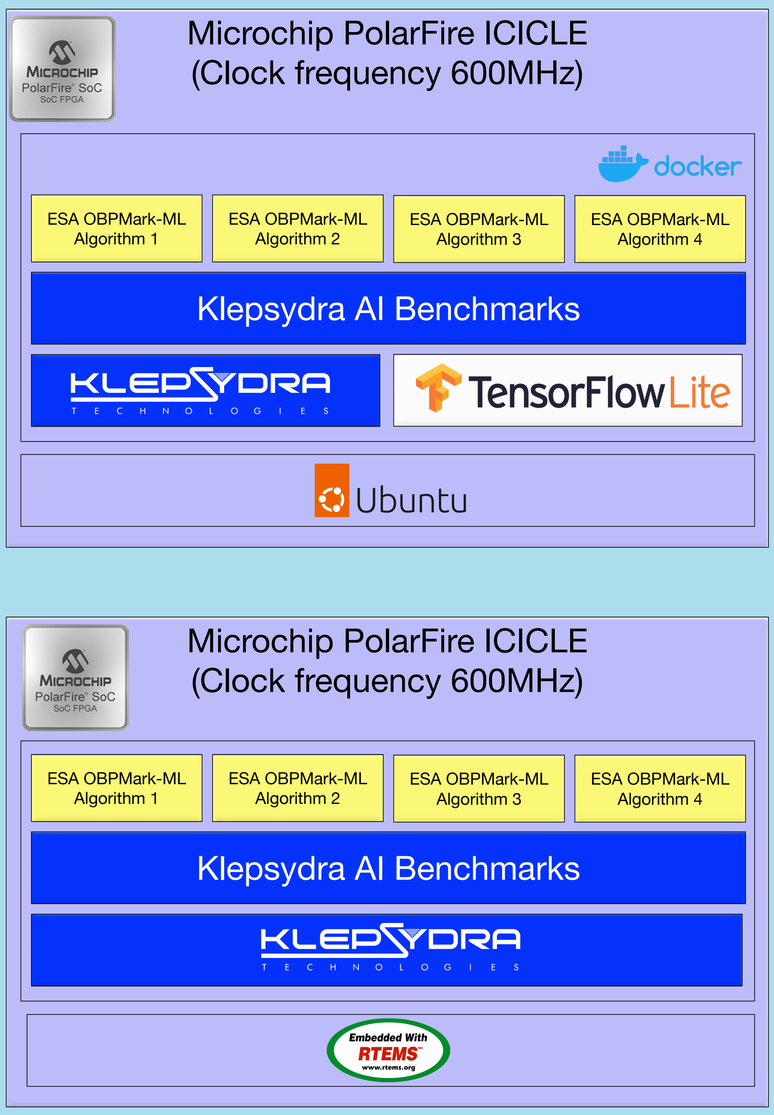
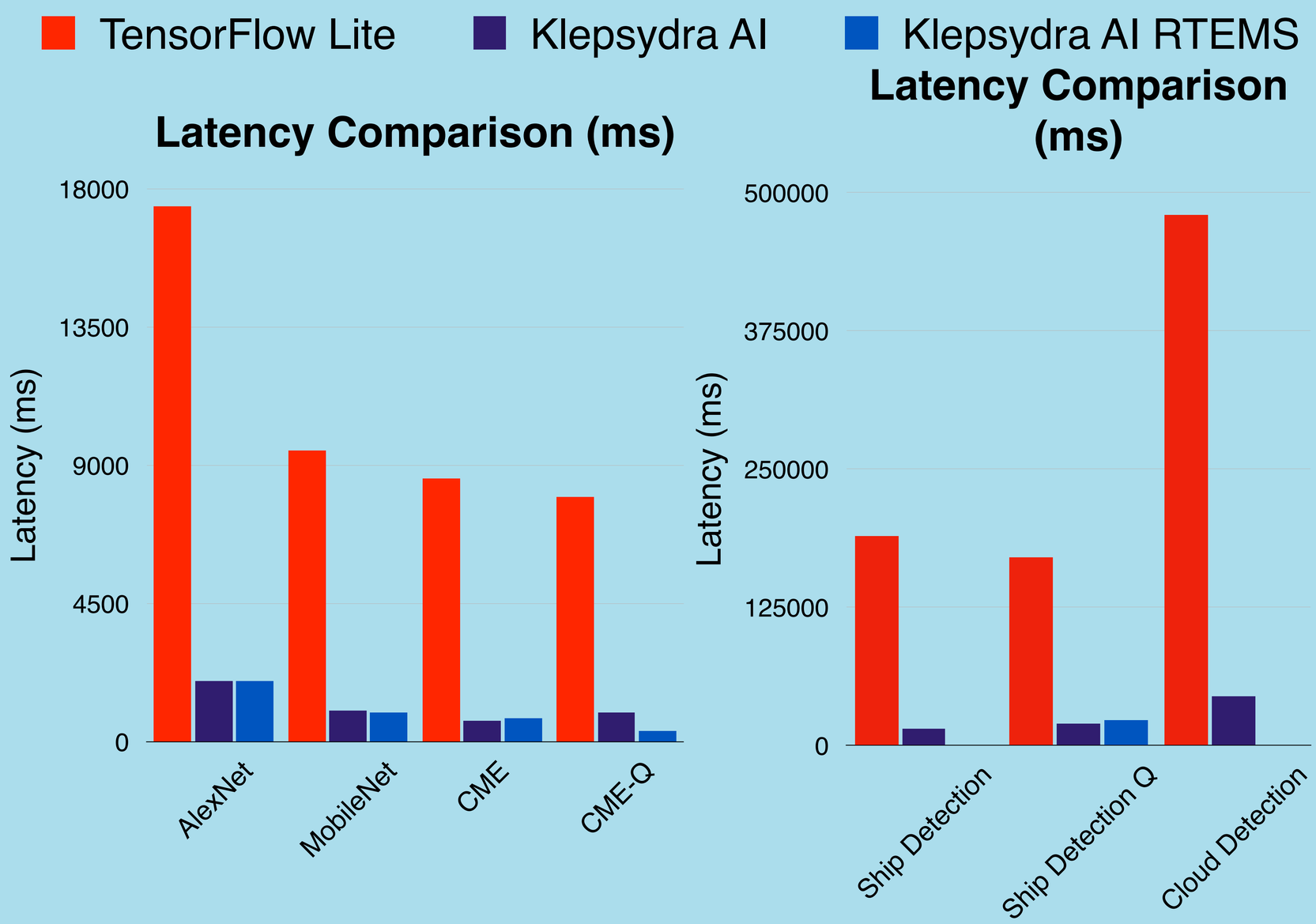


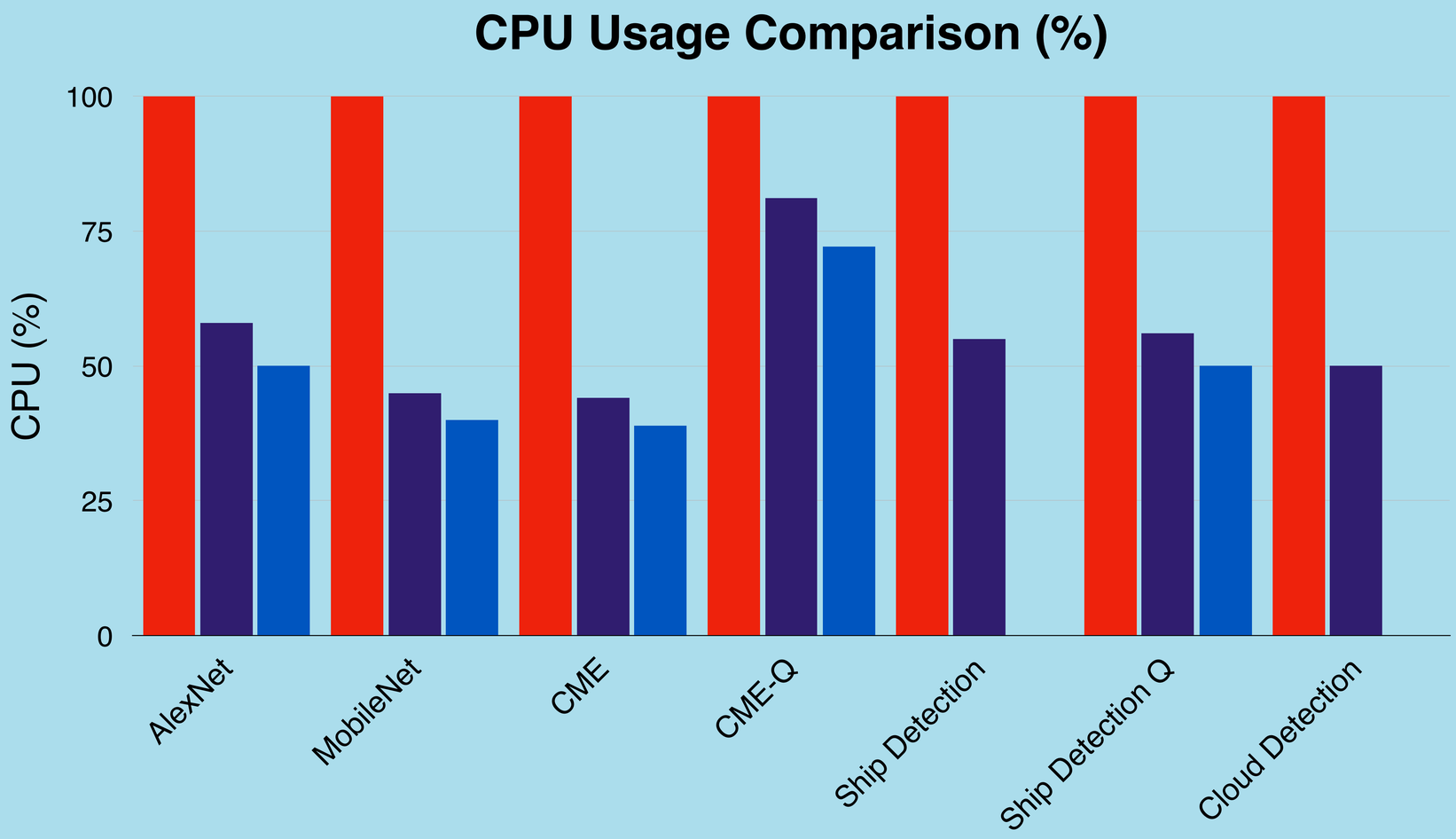
Figure 1: Klepsydra AI Benchmarks Architecture for Linux and RTEMS respectively

Benchmark Deep Neural Networks

Several networks were tested as part of this campaign. These networks come from different sources as specified:

- AlexNet (open source)
- ESA Coronal Mass Ejection Detection (CME)
- ESA CME Quantised (ESA OBPMark-ML)
- YoloX / Ship Detection (ESA OBPMark-ML)
- YoloX / Ship Detection Quantised (ESA OBPMark-M)
- Cloud Detection (ESA OBPMark-ML)





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