

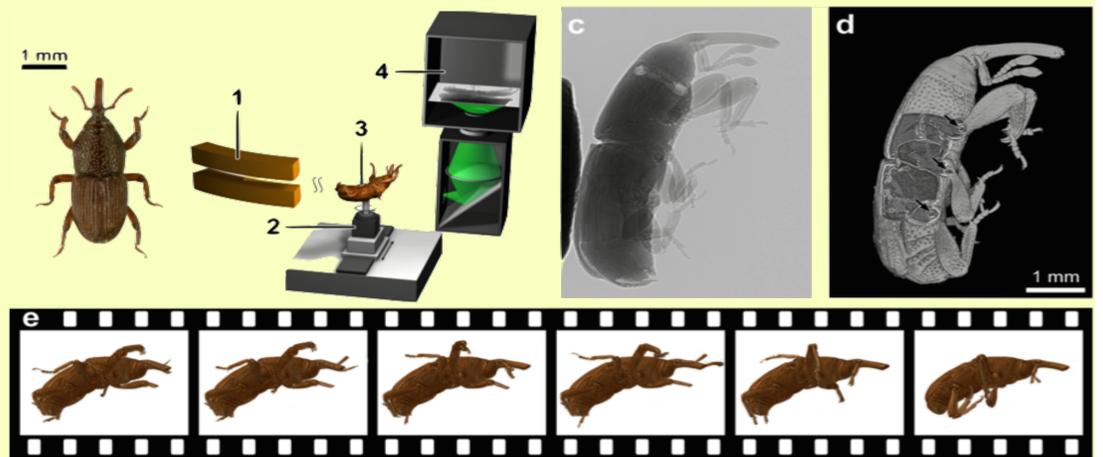
InfiniBand Interconnects for High-Speed Data Acquisition in a TANGO Environment

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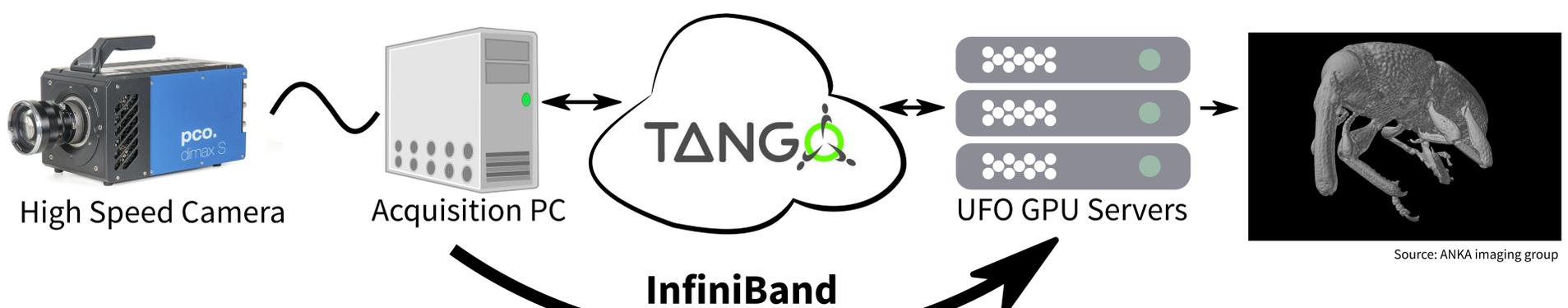
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The UFO project aims for ultra-fast 4D tomography (3D + time) with fast online control. Its distributed experiment setup requires to transmit slow-control data as well as camera data over a network. To realise the desired fast-feedback-loops, a network inter-connect with high bandwidth and low latency is required.

Since the setup for the UFO project at ANKA uses TANGO[1] as its control mechanism, we need to incorporate our interconnect into this existing framework.



Source: [2]



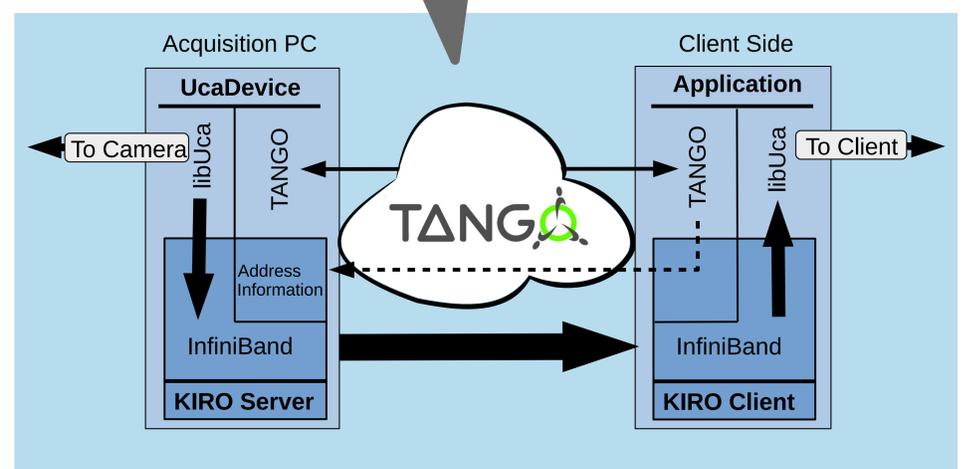
Source: ANKA imaging group

Problem

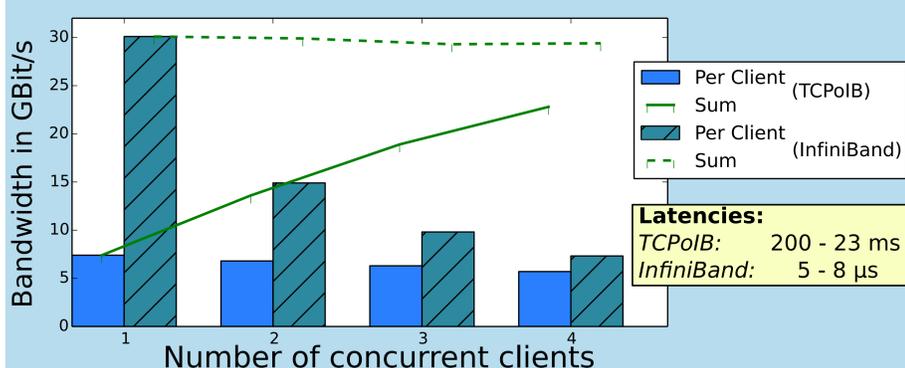
- TANGO performance is limited by TCP/IP (~30Gbit/s)

Architecture

- We bypass TANGO with an InfiniBand data channel
- The channel setup is governed by TANGO
- Data transfer is done transparently over InfiniBand
- RDMA is used to drastically reduce InfiniBand latency



Bandwidth comparison between CORBA over TCPoIB, and InfiniBand



Solution

- InfiniBand latencies are as low as 6 μs compared to TCP/IP over InfiniBand (TCPoIB) 200 - 23 ms
- Bandwidths of up to 30 Gbit/s are possible (4xQDR), which is ~94% efficiency

[1] A Götz et al. "TANGO is a CORBA based Control System." In: ICALEPCS2003, Gyeongju, October (2003).
[2] dos Santos Rolo, Tomy, et al. "In vivo X-ray cine-tomography for tracking morphological dynamics." Proceedings of the National Academy of Sciences 111.11 (2014): 3921-3926