

Academic Salon on High-Performance Ethernet: Host Networking and Monitoring

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Acknowledgements: All that helped in the preparation of the Academic Salon





Welcome



Academic Salon series on high-performance networks https://www.net.cit.tum.de/events/

- Academic Salon on Time-Sensitive Networking and Deterministic Applications, October 2021 https://www.net.in.tum.de/events/academic_salon_21.html
- Academic Salon on Low-Latency Communication, Programmable Network Components and In-Network Computation 2022 https://www.net.in.tum.de/events/academic_salon_22.html
- Academic Salon on High-Performance and Low Latency Networks and Systems 2023 https://www.net.in.tum.de/events/academic_salon_23/academic_ salon_23.html
- Academic Salon on High-Performance Ethernet 2025
 https://academic.salon.net.cit.tum.de/

Aims and Scope

- High-Speed Ethernet: current data rates of up to 800 Gbit/s
- Scale-Out networks: expand horizontally by adding more interconnected nodes
- Scale-Up networks: increase the resources of individual nodes
- Software protocol stacks:
 significant latency and processing overheads
- Ability to monitor and analyze individual network flows: critical for effective network management, security, and optimization

Technologies

- High-Speed Ethernet
 - Server architectures, NICs, GPU and NPU co-processors
- Hardware Acceleration in Network Interface Cards (NICs)
 - RDMA, flow classification, and packet filtering
 - Programmable NICs and monitoring capabilities of NICs
- Network architectures and acceleration for AI computing
 - Scale-out network architecture, and transport design for Al training
 - Scale-up networking, and protocols for AI applications
 - Networking and acceleration for AI
- eBPF for Flow Monitoring and Flow Management
 - Traffic filtering, performance monitoring, and anomaly detection
- Instrumented Protocol Stacks
 - Software and hardware capabilities for different applications
 - Al training, Al interference, HPC and others

Organisational Issues

Hybrid event

- We have remote participants, and 4 remote presenters
- For questions and comments, please use the microphones Recording
- As in the last Academic Salons, we do recordings which we plan to make accessible via the web page of the event
- As a presenter, if you do not want to your presentation to be recorded, please notify us, and we do not record this presentation Questions and Comments
- To collect questions and comments, we prepared a Hedgedoc, with a link provided at the web page with the schedule: https://academic.salon.net.cit.tum.de/

Wednesday Afternoon, 12 March

- 13:00 Arrival (with light lunch)
- 14:00 Session starts
- Hedgedoc to collect questions and comments: https://hedgedoc.net.in.tum.de/gxK9_gwJRd-z_HCzNY1yZg?both

Agenda Day 1

14:00 Session 1 - Session Chair: Georg Carle

- Andreas Herkersdorf (Technical University of Munich, DE): "NIC Architectures and their Role in High-Speed Networking"
- Sergio Iserte, Antonio Pena (Barcelona Supercomputing Center, ES): "Leveraging SmartNICs in HPC via OpenMP offloading with ODOS"
- Marco Chiesa (KTH, SE) online: "Breaking Limits: Terabit Speeds on a single CPU server"

15:45 Coffee Break

16:15 Session 2 - Session Chair: Sebastian Gallenmüller

- Marco Canini (KAUST, SA): "Metrics, Mayhem, and Microservices: Taming the Cloud Observability Beast"
- Pedro J. García, Jesus Escudero-Sahuquillo (University of Castilla-La Mancha, ES): "High-Performance Interconnection Networks in the Exascale and AI Era: Challenges and Solutions"
- Sebastiano Miano (Polytechnic Univ. of Milan, IT) online: "State-Compute Replication: Parallelizing High-Speed Stateful Packet Processing"
- Panel: "Future-Ready High-Performance Networking and Acceleration"

Agenda Day 2

09:00 Session 3 - Session Chair: Andreas Herkersdorf

- Jörg Ott (Technical University of Munich, DE): "Towards Multicast for Consensus in (Large-Scale) Distributed Systems"
- Michio Honda (University of Edinburgh, GB) online: "Designing Transport-Level Encryption for Datacenter Networks"
- Marios Kogias (Imperial College London, GB) online: "Towards Functional Verification of eBPF Programs"

10:30 Coffee Break

11:00 Session 4 - Session Chair: Jörg Ott

- Leonardo Linguaglossa (Telecom ParisTech, FR): "The Data Uncertainty Principle: Measurement and analysis in high-speed network systems"
- Sebastian Gallenmüller (Technical University of Munich, DE): "High-Performance Packet Processing Experiments"
- Gabriel Paradzik, Michael Menth (University of Tübingen, DE): "Scaling Threat Detection to High Data Rates Using IPFIX"
- Plenary discussion, Conclusion and wrapup



