FIK3227 Network Systems with Edge or Cloud Datacenters 7.5 credits

Nätverkssystem med kant- eller molndatacenter

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for FIK3227 valid from Spring 2025

Grading scale

P, F

Education cycle

Third cycle

Specific prerequisites

Knowledge in advanced Internet technique, 7.5 higher education credits, equivalent completed
course IK2215.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After passing the course, the student should be able to:

- explain and analyze methods for interconnect networks and end host devices in a data center including emerging aspects of topology, technologies for link layer and protocols
- explain and analyze methods to operate virtualized multi-tenant networks in data centers.
- explain and analyze methods and concepts related to programmable networks including aspects of Software-Defined Networking, routing, packet forwarding and congestion control.
- explain and analyze concepts and applications related to in network computing and support for machine learning applications
- explain and analyze aspects related to energy efficiency of different data center technology.
- analyse scientific papers in a critical manner
- design advanced data center network systems that support massive I/O workload (e.g. machine
- learning)
- apply the knowledge from the course to analyze your research domain, demonstrating its practical use and impact
- analyze the connections between the course material and your own research, emphasizing their significance
- argue for the validity of these connections, providing clear and evidence-based reasoning

Course contents

The development of data centre including network speeds, scale, geographic spread, multi-tenancy,
and tongue I/O applications.
Increase of data transfer speeds from 1Gbps to 400Gbps and over.
Link layer technology for the data center of the next generation with a focus on Ethernet products
compared with specialised Infiniband.
The complexity of managing networks of geographically dispersed data centers and their related
energy consumption aspects.
The balance between compact edge data centers and their expansive cloud counterparts, designed to
optimize latency.
The bases of the software defined the paradigm and protocol-independent programmable networks.
Relating the above infrastructure aspects to concrete workloads focusing on new machine learning
applications with heavy I/O requirements.
How these applications are shaping data center design and operation, pushing the boundaries of
what is possible.

Aspects of data center networking related to multitenancy, its requirements, and the role of virtualization technologies in mitigating potential disruptions.

Examination

- PRO1 - Project assignments, 2.5 credits, grading scale: P, F
- SEM1 - Paper summaries, 2.5 credits, grading scale: P, F
- TEN1 - Written exam, 2.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.