



Brno University of Technology

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Karol Molnár | Brno University
Assistant Professor

Network Troubleshooting Courses

Brno University of Technology, the second oldest and largest university in the Czech Republic, covers the whole spectrum of technical sciences: machine, civil and electrical engineering, architecture, chemistry, computer science, business and management, and design. With a student population of 15,000 and eight different technical faculty departments, the Brno University of Technology is known as the leading technical university in the Czech Republic.

The faculty at Brno University continually evaluates their course offerings to ensure students are receiving the correct blend of practical and theoretical instruction. To teach principles of network and networking analysis, the department uses the Observer protocol analyzer as their tool of choice for practical applications.

Networking courses are taught within the Department of Telecommunications, which belongs to the Faculty of Electrical Engineering and Communication (FEEC). This department, which studies predominately fixed and wireless data network technologies, is the largest at Brno University. Assistant Professor Karol Molnár teaches classical theoretical courses and practical-based courses in network engineering.

“Our department, which studies predominately fixed and wireless data network technologies, is the largest at Brno University,” said Molnár. “The volume of practical oriented courses has gradually increased over the years, much to the delight of our students. ‘Information Network Practice’, a course that focuses on solving real problems of data networks, began in 2002. A significant part of this course is based on laboratory exercises where students use the Observer Performance Management Platform. With Observer Analyzer, we are able to teach our students how to understand and solve real-world networking problems.”

The ‘Information Network Practice’ course contains laboratory exercises that can be divided into three main groups of activities. The first group introduces the basic functions of Analyzer. For example, students learn that when the Analyzer Console is first initiated, they immediately receive vital network data for understanding network health.

“First we introduce the basic tools available in the Observer Platform, their basic configurations, and situations where these tools can be useful and problems these tools are able to solve,” said Molnár. “These lab exercises mainly focus on network monitoring tasks, like finding Top Talkers, Communication Pairs, checking Bandwidth Utilization, Protocol Distribution, etc.”

The second group of lab exercises deals with short-term and long-term analysis. For example, students learn to use the Observer Platform to recognize network trends and perform deeper error analysis. With Analyzer's robust filtering capabilities, students can easily sift through packet data and decodes for faster problem resolution.

"During these exercises, the use of the Observer Platform's filters – both capture filter and post-filter – is examined in detail," said Molnár. "Different types of address and protocol filters and their logic combinations are configured and evaluated."

The third group of exercises concerns capturing and decoding network traffic. Once the packet capture is performed, students are taught what packet features are important and worthy of further investigations.

"The students examine the packet capture tool, setup options, memory management options, implementation of filters in detail" said Molnár. "Traffic decoding makes up the most significant part of the laboratory exercise. This exercise is combined with other network service oriented exercises like installation and configuration of ftp and http servers.

"As a result the students have the possibility to analyze network traffic generated by their colleagues in the laboratory. The operation of basic control and end-user network services is analyzed. The corresponding messages are filtered out first and then the communication flow and protocol related data are examined at length."

By using the Observer Platform in the labs, the staff at Brno University is able to better illustrate the finer points of network troubleshooting and analysis. Molnár plans to continue using the Observer Platform and hopes to expand the networking courses.

"Since laboratory exercises based on Observer Analyzer are so popular among students, we plan to extend the use of this application," said Molnár. "There are two more fields where we plan to implement the Observer Platform. The first one is complex WLAN network analysis and the second is utilization of the traffic generator tool available in Analyzer. The traffic generator will be used to stimulate Quality of Service related issues in our labs."

Students at the Brno University of Technology use the Observer protocol analyzer to analyze and review network traffic generated by colleagues. Practical Laboratory Exercises such as these better prepare students to deal with real-world networking issues.



About the Department of Telecom at Brno University of Technology

The department is responsible for education in the general subjects of the specialization Telecommunication Technology: communication theory, communication networks and systems, fundamentals of data communication, and programming of large-scale systems. In addition to these basic courses the teaching activities of the department cover transmission networks and their switching. Research activities are focused on telecommunication networks diagnostics, data communication systems, and digital signal processing. Research is also pursued in processing and transmission of signals for end telecommunication systems. Staff of the department are involved in the development of digital systems for defense and special filters for cable TV. The main fields of interest are: digital filters and applications of signal processors, conversion of analog and digital signals, security coding of digital signal transmission, low velocity transmission of speech signals with regard to nature and recognizability of the speaker, combined signal transmission via ISDN channel, synthetic highorder circuit elements, transmission networks based on ATM technology.

The main courses offered are: Signal Processing, Data Communication, Transmission Systems, Switching Systems, Telecommunication Systems Control and Programming, Microprocessor Application in Telecommunications, Measurement and Maintenance in Telecommunications, Transmission Lines and Optical Fibre Communications. Students work in laboratories and measurements are carried out on up-to-date telecommunication systems. Most courses also include computer work (digital signal processing, printed-circuits architecture, telecommunication systems and transmission systems architecture, modeling of the function of telecommunication systems and computeraided circuit design).



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