

ACTIVE LEARNING OF NETWORKING IN THE GNS3 VIRTUALIZED ENVIRONMENT

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Extended Abstract

The practical activities during networking learning are usually done in the specialized laboratories including computers and special network equipment (cables, switches, routers, etc.). This approach is quite expensive, needs a long time for configuration and maintenance. These activities are usually performed in teams of 3-4 students because it is impossible to provide each of them a real network for experimentation.

An alternative solution may be the use of specialized network simulation software such as ns2, OPNET, OMNeT ++, NetSim, REAL, QualNet [1] or the Cisco Packet Tracer. All these solutions are based on the simulation models that are often far from reality and they don't allow learners to acquire practical skills to work with real networks.

A much more interesting solution concerns the network virtualization techniques using network emulators in order to provide a working environment close to the real one [2]. Network nodes (special equipment, routers, switches, but also workstations and servers) can be also virtualized by using specialized software such as QEMU, VirtualBox and VMware. All they provide a generic platform to install operating systems exactly as we do on real computers. They also offer the possibility to emulate a small internal network on the host machine but don't provide tools for more complex network topologies. The GNS3 network emulator [3,4] offers the possibility to federate most popular platforms for virtualizing operating systems, providing them a tool to define the topology of the network and many other tools like the packet analyzer, some models of network equipment, appliances developed by GNS team and by the community, etc.

The main purpose of this article is to share our experience in the use of GNS3 software for active network learning. GNS3 allows us to use nodes in the network on which real operating systems are installed and between which real data flows. All protocols that are implemented in the operating systems can be emulated under very close conditions to the real ones. It is possible to emulate communication links with losses and with defined parameters which makes it possible to study various advanced domains of networks such as the quality of services (QoS), traffic management, multimedia transmission, network security, etc.

Keywords: *Networking, virtual networks, network emulator, graphical network simulator, active learning*

References

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