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NETWORK SIMULATOR

COE351 Computer Networks

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NETWORK SIMULATOR

A network simulator is a tool used for simulating the real-world network, considered as the software which forecasts the performance of a computer network. By using conventional analytical approaches, it becomes complicated to know the exact functionality of the system, and to reduce the complexity, network simulators are employed. In the network simulators, the computer system is designed using links, applications, devices, and others, and using these the performance is analyzed. These devices are used as assistance for many latest and updated networks and methodologies that are in an application today like IoT, wireless local area networks, 5G internet, WSN wireless sensor systems, cognitive radio systems, mobile Adhoc networks, LTE and many other.

Network simulation offers an i.e.; efficient, cost-effective to assess the network under different operating conditions. It results are often analyzed to assess i.e.; network performance, identify potential problems, understand the basis cause, and resolve the problems before deployment. The network simulations are faster and less expensive than performing live tests, and it's easier to research different alternatives using simulations before deploying a network or making changes to an existing network.

THE PURPOSE OF NETWORK SIMULATION

Using simulation tools, it is easy to study the topologies and design of a networking system.
The purpose of using a simulator tool is to analyze the behavior of networks under different conditions in a budget-saving, user-friendly manner.
Additionally, it provides you with a progressive aspect of your career as a networking engineer with rewards and achievements recorded as certificates.

TYPES OF NETWORK SIMULATION

Network Simulator Version 2: It is used for simulating the protocols of networking as well as routing protocols for the networks like wired & wireless. These can be implemented through C++.

Ns3: It is designed for the purpose of education as well as research. When compared with Ns2, it uses Python to work during a far better way thanks to the low-level of abstraction. It includes i.e.; protocols and network devices, written within the languages of C++, Python.

Netki: Netki is open-source software that uses User-mode Linux. This simulator is employed whenever there's a requirement to make a networking environment with small endeavors. It is a simulation tool supported the instruction and also want to create a complete network over one PC through exploiting virtual network devices.

Marionet: It is utilized as an educational tool because of smart Graphical user interface. A complex network can be defined by the user on a computer.

Java-based Simulation: It is used in web-based simulation i.e.; to create by using the event package otherwise process the package. It is used to design quantitative numeric models & estimate with respect to the data from the experiment.

OPNET: It is used in research & development to provide flexibility to study regarding i.e.; communication networks, protocols, and applications. When both programming environment and GUI, provides a platform for the user to form the network when they require it.

QualNet: It is used to build virtual models for i.e.; all kinds of data, voice & video networks. The testing, planning and a training tool used for signify the network situation with accuracy.

SIMULATOR VS EMULATOR

If network simulator software creates a virtual copy of a physical device, it is called emulation. If the software uses an emulation process to create a virtual device, the virtual device needs all hardware and software configurations of the physical device. If network simulator software creates a virtual copy of the features and functions of the physical device, it is called simulation. If software uses a simulation process to create a virtual device, the virtual device does not need hardware and software configurations of the physical device. It creates a copy of some features, commands, and functions
of the physical device and implements them on a virtual device. Since the virtual device provides only some selected functions of the physical device, it needs very less hardware configurations.
In simple words, in the emulation process, network simulator software makes a copy of the hardware of the actual device. If you emulate a Cisco device, you need the same IOS image file to operate the emulated device that the actual device has. In the simulation process, the software creates a copy of some selected features and functions of the actual device. If you simulate a device, you don't need any IOS image file or an operating-system file to operate it. The network simulator software automatically installs the minimal OS in each simulated device.
The following table lists key differences between emulation and simulation:

Emulation	Simulation
Create an exact virtual copy of the physical device	Create a virtual copy of some selected features and functions of the device
Provide all features and functions of the device	Provide limited features and functions of the device
Need the same hardware and software configuration	Need less hardware and software configuration
Complex to manage and create	Easy to manage and create
Recommended for advanced users	Recommended for beginners
Useful in intermediate or advanced level certification courses	Useful in elementary or associate-level certification courses

BEST NETWORK SIMULATORS

List of Best Network Simulators:

1. GNS3- Graphical Network System 3 : Graphical Network System 3 is a network simulation tool that allows you to access software images from various vendors and import them into the software.

2. Cisco Packet Tracer : Cisco Packet Tracker is a popular network simulation tool developed by Cisco Systems. It allows you to create simple or complex networks in the packet tracer. You can create, configure and run a test of your network conditions with actual equipment but in a virtual ecosystem.

3. EVE-NG :It is paid software that acts as a network emulator tool that runs commercial network devices and open-source router images. This is also a viable graphical network option to look into as a network server learner.

4. Virtual Internet Routing Lab : VIRL is a virtual network emulator from the popular Cisco software. It is included in this list of excellent network simulation tools as it offers high scale variants specially developed for business enterprises ranging from medium to large scale.

5. Boson NetSim : Boson NetSim is a simulation software application that simulates Cisco switches and routers. The application provides packet-level simulation for network engineers to model protocol networks and communications.

Which is a better simulator tool between GN3 and EVE-NG?

Both applications are equally capable of meeting the user's requirements. With a close comparison, the GN3 network simulator comes out on top for its free services, easy configuration, and maintenance.

Which is the best network simulator for starters?

Any one of the networks mentioned above will be good to go for beginners in the field. Professionals and experts recommend GN3 for beginners who want to gain experience with networking devices and become a better networker in the future.

ADVANTAGES/DIS OF NETWORK SIMULATION

The advantages of network simulators include the following:

- Simulators have the main advantage of providing real-time feedback to users while designing real-world systems.
- They allow the system designer to study the problem at various abstraction levels
- They can be used to instruct or demonstrate concepts to students in an effective way.

Disadvantages of Network Simulation:

- Real systems are too complex to model
- Bugs are unreliable.

CONCLUSION

Using a network simulation tool is first-hand experience of real-time network management and design. The primary requirement of an IT company is the no-nonsense skill expected from you as an employee of networking. Certificates from the network simulation courses can act as a cherry on top, as can the practical knowledge gained in the course.

We provide you with a comprehensive list of network simulation tools so that your selection process is streamlined and efficient. Then, you can choose your desired network simulation software and start preparing dynamic network topologies for the future of your career. Simulation makes it possible to feel the networking gears that are huge and expensive in real life

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