PROJECT-3(NETWORK SECURITY)

In this project, we have done simulations on the denial of service by gathering the data before the dos attack and after the attack.

1. Two plotted figures:

Before Attack graph:

Chart

Description automatically generated

After Attack graph:

Chart

Description automatically generated

1. Lessons Learned (including step 1 & 2):

In these 2 projects we used concepts & tool,

1. **VMware:** VMware is a virtualization and cloud computing software provider. It specializes in providing a platform for the virtualization of IT infrastructure as an alternative to dedicated hosts.
2. **Ubuntu:** Ubuntu is a Linux distribution based on Debian and composed mostly of free and open-source software. Ubuntu is officially released in three editions: Desktop, Server, and Core for Internet of things devices and robots. All the editions can run on the computer alone, or in a virtual machine.
3. **Mininet:** Mininet creates a realistic virtual network, running real kernel, switch,and application code, on a single machine (VM, cloud or native), in seconds using the command “sudo mn”. Mininet is a software emulator for prototyping a largenetwork on a single machine. Mininet can be used to quickly create a realistic virtual network running actual kernel, switch, and software application code on a personal computer.
4. **Wireshark:** Wireshark is the world's foremost and widely used network protocol analyzer. It lets you see what's happening on your network at a microscopic level and is the de facto (and often de jure) standard across many commercial and non-profit enterprises, government agencies, and educational institutions. Wireshark is a free and open-source packet analyzer. It is used for network troubleshooting, analysis.
5. **Python:** Python is a general-purpose, versatile, and powerful programming language. It’s a great first language because it’s concise and easy to read. Whatever you want to do, Python can do it. From web development to machine learning to data science, Python is the language for you.
6. **Networkx & Plotly & Pandas Packages:** NetworkX is a Python package for the creation, manipulation, and study of the structure, dynamics, and functions of complex networks.**Plotly** is a technical computing company headquartered in Montreal, Quebec, that develops online data analytics and visualization tools. **pandas** is **a** package providing fast, flexible, and expressive data structures designed to make working with “relational” or “labeled” data both easy andintuitive. It aims to be the fundamental high-level building block for doing practical, real-world data analysis in Python.
7. **DOS Attack:** A **Denial-of-Service (DoS) attack** is an attack meant to shut down a machine or network, making it inaccessible to its intended users. DoS attacks accomplish this by flooding the target with traffic or sending it information that triggers a crash. In both instances, the DoS attack deprives legitimate users (i.e., employees, members, or account holders) of the service or resource they expected.

System Setup:

We have downloaded & installed the VMware, Ubuntu iso and loaded them. In ubuntu, we install the mininet by following the mininet walkthrough & installed the wireshark for the above mentioned usecases.

Network Creation:

We must code a python file to create the network topology for our group id & able to ping each of them.

Analysis the Network:

By using the Wireshark while the pingall command was running to analyze the packets tranfers for each host as submitted.

Visualization of the dataset:

After the dataset captured using the wireshark in the ubuntu, we use that to visual the graph before & after the attack by using the above mentioned python packages.

1. Specify how you choose n, the number of nodes removed:

I chose n value as 4 and deleted 4 routers in the network to divide the whole network into 4 parts. In how many parts we decide to divide the network to avoid the packets flow by that we chose n value. If we consider that our topology is circular, we chose the n value based on how many parts we want to divide the