* Explain what a kernel module is.

Kernal-module is a short code that can be loaded and uploaded into the kernel upon demand.

When we are writing a firewall, we don’t need to recompile the kernel. By writing a kernel-module and load it into the kernel itself, we can extend the functionality of the kernel without needing to recompile the kernel. So this feature (no need to recompile) it is the main advantage for why we need it for the firewall in Linux/ubuntu.

By loading this module into the kernel so we can build custom firewall to protect servers and the infrastructure (by using the Netfilter – allows to filter the networks packets based on defined rules).

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* What are the advantages and disadvantages of using kernel modules?

Advantages:

1. Dynamically loaded and uploaded this feature will allow to add/remove functionality without rebooting the system.
2. No need to recompile the kernel.

disadvantages:

1. We need to be carefully when we are writing a kernel-module because its can crash the kernel then we have to reboot the system so we will loss all the data that was in the memory and didn’t saved.
2. Writing kernel-module may be complexity which will cause bugs if we didn’t understand the Linux kernels.
3. Direct access to the kernel resources which will cause security issues.

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* Explain the relationship between the kernel and a kernel module.

Kernal-module is the core of the operating system and managing resources.

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* List some examples of real-world kernel modules.

Drivers(devices) – modules for enable the kernel to communicate with the hardware devices like graphic cards.

Netfilter: handle network traffic filtering and for firewall functionality.

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