**NIT3222 – Virtualisation in Computing**

**Tutorial 3**

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1. Name and describe the three types of virtual networks available in Hyper-V.

There are three types of virtual networks that you can connect to in Hyper-V:

* Private Virtual Network
* Internal Virtual Network
* External Virtual Network

A Private Virtual Network is a virtual switch to which only virtual machines can connect. Guest operating systems that are connected to the same Private Virtual Network can communicate with each other, but they cannot communicate with the Host operating system and the Host operating system cannot connect to the VMs on the Private Virtual Network. Private Virtual Networks are great if you need total isolation from all other Virtual Networks, but they can sometimes be problematic if you need to copy files to the virtual machines, since there is no connectivity to any physical network or to the Host operating system. In this scenario, you can create a virtual machine that functions as a firewall or a router, and connect one virtual network adapter to the Private Virtual Network and another virtual network adapter to the physical network (through an External Virtual Network, which we’ll talk about in just a bit).

An Internal Virtual Network is similar to a Private Virtual Network in that it isn’t bound to any physical NIC. The Internal Virtual Network is an isolated virtual switch like the Private Virtual Network, but in the case of the Internal Virtual Network, the Host operating system has access to the guest virtual machines through the Internal Virtual Network virtual switch. However, there is no DHCP-like functionality with this virtual switch (as there is with some instantiations of VMware Workstation), so if you want to communicate with virtual machines that are connected to the Internal Virtual Network switch, you are going to need to assign an IP address to the virtual NIC that’s associated with that Internal Virtual Network for the Host operating system that is valid on the virtual network to which you are trying to connect.

An External Virtual Network is different from the other Virtual Networks because this type of virtual network is associated with physical network adapters. You can have one External Virtual Network for each physical NIC that’s installed on the Hyper-V server. The External Virtual Network switch will actually appear to take the place of the physical NIC on the Hyper-V server – so that if you were to look at the configuration of the former NIC, it would appear to not have any IP addressing assigned to it. Instead, a virtual NIC is added to the Network Connections window and that virtual NIC is connected to the External Virtual Network switch, and it is that virtual NIC that has the IP addressing assigned to it that allows it to communicate with the physical network.

1. What is Single-Root I/O Virtualization (SR-IOV)? Comparing with Dynamic Virtual Machine Queue, what are advantages?

SR-IOV (Single Root I/O Virtualization) is an extension to the PCI Express (PCIe) specification and offers greater benefits in performance over VMDq. Unlike VMDq, where a separate queue for each VM is created, SR-IOV creates a Virtual Function (VF) that acts like a separate physical NIC for each VM.

1. What is the Software Defined Networking (SDN) in hyper-V networking?

Software-defined networking (SDN) is the decoupling of the network control logic from the devices performing the function, such as routers, which control the movement of information in the underlying network. This approach simplifies the management of infrastructure, which may be specific to one organization or partitioned to be shared among several.

SDN features controllers that overlay above the network hardware in the cloud or on-premises, offering policy-based management. Technically speaking, the network control plane and forwarding plane are separated from the data plane (or underlying infrastructure), enabling the organization to program network control directly. This differs significantly from traditional [data center](https://www.ibm.com/cloud/learn/data-centers) environments. In a traditional environment, a router or switch — whether in the cloud or physically in the data center — will only be aware of the status of network devices adjacent to it. With SDN, the intelligence is centralized and prolific; it can view and control everything.