Welcome to Unit one - Introduction to cloud resources requirements.
Read the objectives for this unit.

- List the need and use of clouds
- Recognize the major components of a cloud environment
- Identify cloud resources requirements
- Validate cloud resources requirements in the lab environment
To start with, you are assumed to have no cloud computing experience. To get started, take a closer look at what you are doing at work and ask yourself these below questions as some examples. However, do not worry if you are not familiar with some of the terms. You will understand them at the end of this class. These questions are just examples. You might ask your own questions.

- Do you work with business processes or applications?
- Do you buy and install or outsource software?
- Do you develop applications?
- Do you buy or build machines or systems?
- Do you work with networks or storages
To help with focusing on major workgroups that you might be working in everyday job, IT works are grouped into these four general areas:

- Building or buying systems and all required infrastructures
- Install required Operating System (OS) and middleware like database management software
- Developing software or working with applications
- Using applications as tools for business processes

A personal experience that you might go through with these four IT work areas:

1. Build or buy a PC – some might come with OS
2. Install a Linux or Windows OS and software like DB2 or compiler
3. Develop or install applications for your works
4. Use the PC for your business such as presentation or data analytics

You do not need to do all this work yourself. Someone can build a PC to specifications for you to obtain or buy. You can develop the applications and sell that to someone else. Cloud expands this idea to make the work a service.
If you work with IT as shown in a previous slide as the four general areas, you can use the cloud. Think about your IT work again in term of services that “transform” the following work areas.

- Building or buying systems and all required infrastructures
- Install required Operating System (OS) and middleware like database management software
- Developing software or working with applications
- Using applications as tools for business processes

Each of the work areas is covered by a service delivery model even to the personal level:

1. **Infrastructure as a Service** -> Rent or lease a PC – some might come with OS
2. **Platform as a Service** -> Rent or lease a computing environment with Windows OS and software like DB2 or compiler
3. **Software as a Service** -> Rent or lease applications for your works
4. **Business process as a Service** -> Order selected business services like presentation or data analytics

Each service in turn creates more services. Search and you might find a service for your work. Welcome to the cloud service delivery models!
Cloud services do not come from the sky. No matter how small a service is, it requires certain resources. Take renting a PC for example, the PC has to be an available resource in the backend of the cloud. However, if all resources are physical in the cloud, then it is not much difference from building your own PC. A cloud environment uses virtualization to turn physical resources into cloud resources for services. The bi-directional arrows in the diagram emphasize that resources flow both ways. You receive a service that consumes certain amount of resources. When you are done with the service, the same amount of resources are returned. A cloud environment is built based on this resource-service model.
In IT work, you usually see only the components that you work with. However, when you are introduced to a new cloud environment, take the first steps to understand where your work fits in and what are other components in the environment. The four components in the diagram should cover the views of all types of users who work with the cloud in general.

- Infrastructure: where cloud builders and computer engineers work on hardware resources
- Virtualization: where cloud administrators and cloud providers work with virtual resources and provide services
- Services: where developers work on services and cloud tenants or organizations run their services
- Interfaces: where any user or device initiates and follow-ups service requests – user interfaces (UI) or application programming interface (API)
Not all cloud services require virtual resources. Demands for resources are based on quality of service, which ranges from the highest performance to the minimal resource allocation only as needed. Simply put, highest performance requires bare-metal machines with all the powerful components. At the low-end of the spectrum, physical resources have to be sliced or chunked into the smallest pieces as possible. Virtualization is the technology that does this work for a long time. Examples include z System virtual machine or Power System Logical Partition (LPAR).
Demands of minimizing resources continue to prove the usefulness of virtualization. Now that you do not need a physical PC to run applications, can a virtual machine (VM) be more flexible? Does a VM need to have virtual cpus, memory, and storage? The Kernel-based virtual machine (KVM) is a virtualization software that runs in the kernel. A VM is just a running process, which sheds much weight.

At the same time, physical memory and storage are packed with denser units. As a result, total available memory or storage for applications is increasing. When this total is the sum of distributed units of memory or storage, the capacity is unlimited.
A potential virtualization technology is a container. Applications are built like packages of components to be delivered to different environments. The components can be modified or extended dynamically and in a simple way. Docker is one software project that implements the container and its components. Vagrant is another virtual components packaging project that aims at ease of use, lightweight, and portable development environment.

For more information visit these URL’s:

http://www.docker.com/

https://www.vagrantup.com/
Built on virtualization and the latest technologies, the cloud has its rules of services and operations. You can discover more of these characteristics when working with cloud environments. In a way, cloud is addressing age-old IT issues and concerns. The visual lists the top three rules as examples for you to consider.

- Supporting quality of services: Cost versus demand
- Recycling of resources: Automating reuse
- Sharing or isolating of resources: Private versus public

You do not have to think hard to add security and other topics to the list.
To serve different types of users who have different demands, those self-servicing qualities might vary. Users pay only for what they use. They might choose to pay for different prices to get the performance they ask for.
In general, a cloud operation allocates resources from the infrastructure and makes the resources available as cloud resources or services through virtualization. An example of such an operation is called provisioning, as in provisioning a virtual machine. When the virtual machine is no longer in use, an opposite operation that is called de-provisioning is required to return its resources to the pool in the infrastructure.
Back to the picture of virtualizing resources that come from the same sources. When a virtual machine (VM) is created, its virtual processors and memory come from a hardware host. Many VMs might share one host. Sharing implies impacts on total performance and data exposure. It might not be as obvious in the sharing of network or storage. Keep in mind, even if you have a dedicated host, it might be on the same network with other hosts. When it comes to storage, there are many ways your disk spaces might share with or separate from other users. You see how cloud addresses these conflicts, which are not particular to cloud environment but to IT in general.
Please review these important keywords.
Make sure you understand these keywords.
Write your answers here:
Checkpoint solutions

1. Cloud services are offered in these IT areas:
   a. Infrastructure
   b. Platform
   c. Software
   d. Business Process
   e. All of the above

2. True or false?
   Virtualization environments provide resources to be used in a cloud environment.

3. Cloud requires resources from:
   a. Server
   b. Network
   c. Storage
   d. All of the above

4. True or false?
   Cloud resources can be physical or virtual.

Check your answers.
We will now review a demonstration.
Can you answer the listed objectives?