# Lab Four: Containers

Write up due 3/16 in the dropbox.

## Introduction/ Use Case:

In our labs so far we have been exploring how to control virtual machines through a centralized configuration management system. This lab is going to look a very different way to deploy services that has become very popular based on its ability to support the trend toward breaking large monolithic applications into loosely coupled systems hosted in a horizontally scaled datacenter environment. The problem with deploying a large number of virtual machines is that you end up deploying a large amount of the same static code for each of the VMs. Containers deal with this issue by relying on the services of the host they are deployed on for much of their basic functionality. In this lab we are going to deploy a set of containerized operating systems on a server in your current environment. In our next lab we are going to convert our previous VM environment managed through CM to a containerized environment managed through the same CM tools.

## Goals for This Lab

Our goals for this lab are to configure the basic architecture to support two containerized Apache web servers on one of your Linux servers. By doing this we will gain a better understanding of how containers work and how to integrate and manage these servers. But we can declare victory we need to know more about how these containers work and their relationship to their hosts and the other VMs around them. To do this you will develop a series of tests that will help you to gain better understanding of containers and specifically the following questions:

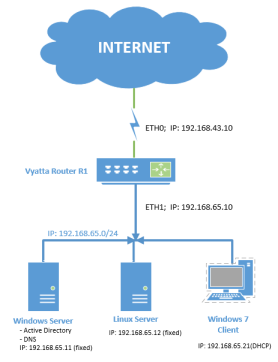
* If containers share some of the basic hardware with the hosts they are deployed on how does this impact their existence on a network? If they share network interface card drivers do they also share IP addresses? If multiple IP addresses are associated with one network interface card can you see this from the host?
* If containers are the next big thing after virtualization due to their smaller footprint in memory, how much smaller is that footprint? Is it significant at a small scale or does it only become significant at a much larger scale?
* If containers share more closely the basic systems of their host how can we get accurate metrics to manage them without looking at the host’s metrics?

## Lab Outcomes:

The main outcome for this lab is to build a test bed for container implementation that allows us to try out the technology and to answer some basic questions about containers and their use in a modern large scale network.

Outcome One:

Develop a Visio drawing that displays the architecture of the lab after you have completed your work. This should be done **before** lab so you have a sheet to work off of. Include in your drawings things like machine names, IP addresses for those machines that will receive their addresses statically and services provided by the machines. I have included an example below, but it is not a correct version of what you will have after this lab. It is just to look at.



Prior to lab you are to develop a Visio drawing of what you are building complete with the servers and clients that you plan to deploy and the relevant information needed to accurately deploy them (computer name, IP Address, services to be deployed, relationship to other machines, etc.). The drawing above is illustrative of what I want, but it obviously does not have the correct information on it. It is resizable, just drag on a corner.

### Deliverables:

Visio drawing is complete with devices displayed and network illustrated. IP addresses are shown and services deployed shown.

|  |  |  |  |
| --- | --- | --- | --- |
| How difficult do you feel this part of the lab will be for your group? | Way hard | Not so hard | Easy |
| What resources do you plan to use to help you complete this part of the lab? | |  | |
| **Outcome one completed:** Visio drawing completed of acceptable quality. | | **Your signature:** | |

## Outcome Two:

The main outcome for this part of the lab is for you to configure at least one server in your environment to support containers. I have not specified a specific container to implement so you are welcome to select one on your own. Docker.com is very popular, but containers have a long history in Linux so you are sure to find other implementations.

**Deliverables:**

The container server and clients are functioning correctly and the server is able to host a web server environment.

|  |  |  |  |
| --- | --- | --- | --- |
| How difficult do you feel this part of the lab will be for your group? | Way hard | Not so hard | Easy |
| What resources do you plan to use to help you complete this part of the lab? | |  | |
| **Outcome Two completed:** | | **Your signature:** | |

**Outcome Three:**

As you know we always test what we build. In this case we want to test the ability of our container server to control the configuration of our web servers without having to access the console of the web servers. Develop a series of tests that allow you to answer the following questions:

* If containers share some of the basic hardware with the hosts they are deployed on how does this impact their existence on a network? If they share network interface card drivers do they also share IP addresses? If multiple IP addresses are associated with one network interface card can you see this from the host?
* If containers are the next big thing after virtualization due to their smaller footprint in memory, how much smaller is that footprint? Is it significant at a small scale or does it only become significant at a much larger scale?
* If containers share more closely the basic systems of their host how can we get accurate metrics to manage them without looking at the host’s metrics?

**Deliverables:**

A test has been developed that allows you to answer the questions

|  |  |  |  |
| --- | --- | --- | --- |
| How difficult do you feel this part of the lab will be for your group? | Way hard | Not so hard | Easy |
| What resources do you plan to use to help you complete this part of the lab? | |  | |
| **Outcome Three completed:** | | **Your signature:** | |

## Results:

Please answer the following questions in a short (one or two paragraph) answer:

1. If containers share some of the basic hardware with the hosts they are deployed on how does this impact their existence on a network? If they share network interface card drivers do they also share IP addresses? If multiple IP addresses are associated with one network interface card can you see this from the host?
2. If containers are the next big thing after virtualization due to their smaller footprint in memory, how much smaller is that footprint? Is it significant at a small scale or does it only become significant at a much larger scale?
3. If containers share more closely the basic systems of their host how can we get accurate metrics to manage them without looking at the host’s metrics?

**How Would You Do This Differently Next Time?**

Please take a few minutes and tell me how this went for you. How could we do this better next time?