

# Automation

## Workflow orchestration

In this lesson, we're going to start talking about orchestration because orchestration is the automation of multiple steps in a deployment process.

Orchestration is the automation of automations.

Now, when you start talking about orchestration, there's really three types of orchestration.

The first one is resource orchestration, this is to provision and allocate resources within a cloud environment or other solution.

When you talk about workload orchestration, this is for the management of applications and other cloud workloads that need to be performed, and basically looking at the components to create the product you need.

The third one that we have, is what's known as service orchestration, this is going to be used to deploy services into cloud environments.

Notice the differences here, resources is like an EC2 instance in Amazon. You're going to start up a new server, a new VM. If you're dealing with workload orchestration, this is about managing apps and other things that are working together. And then we talk about service orchestration, this is working on those services themselves.

## CI/CD

1. Development
2. Testing/Integration
3. Staging
4. Production

**Continuous integration** is a software development method where code updates are tested and committed to a development or build server or code repository rapidly.

So, this allows us to create something, test it, and then once we know it's good, we can say, this is ready to be implemented in the environment.

Now, when I talk about **continuous delivery**, this is a software development method where the application and platform requirements are frequently tested and validated for immediate availability.

Now, with **continuous deployment**, we take the concept of continuous integration and continuous delivery, and we take it even one step further. Now, we have a software development model where application and platform updates are committed to production rapidly. Essentially, I'm going to create some new piece of code, maybe a security fix. It's going to go through integration testing. Once that's been approved, it goes back to the code repository.

Now, when we talk about continuous delivery, I want you to remember that continuous delivery is focused on automated testing of code in order to get it ready for release. Not released, just ready for release. Now, when I talk about continuous deployment, I'm taking it a step further. I'm focusing on automated testing and the release of code in order to get it into the production environment much more quickly.

## DevSecOps

### DevOps

Now, DevOps was created to speed up the development and get things into production faster. As I mentioned, DevOps really relies on the concepts of continuous integration so that we all can be working together on the same thing and make sure we don't have big divergent changes. Now, when we talk about DevOps, this is an organizational culture shift that's going to combine the software development and the systems operations people into one team. This is basically the practice of integrating these two disciplines within a company.

### DevSecOps

Now, this is development, security, and operations, and it's a combination of software development, security operations, and systems operations by integrating with all those disciplines together in one team. Now, this is a great way of doing things because when you're using DevSecOps, this is going to utilize a shift-left mindset.

# Infrastructure as Code or IAC

Now, when we talk about infrastructure as code, this is a provisioning architecture in which the deployment of resources is performed by scripted automation and orchestration. Now, we mentioned the fact that we use scripted automation and orchestration in cloud computing all the time.

## AI/ML

### Artificial Intelligence

Now, artificial intelligence is the science of creating machines with the ability to develop problem solving and analysis strategies without significant human direction or intervention.

### Machine Learning

Machine learning is a component of AI that really enables the machines to develop strategies for solving a given task. Now, if you get a labeled dataset where the features have been manually identified, but they don't have further explicit instructions. And so, machine learning, the concept here is, you have to train the machine.

### Artificial Neural Network or ANN

This is an architecture of input, hidden, and output layers that can perform algorithmic analysis of a dataset to achieve outcome objectives. Now, essentially, when we have an artificial neural network, this is the pathways that are being created based on that learning it's doing.

### Deep Learning

Now, when we talk about deep learning, this is refinement of machine learning that enables a machine to develop strategies for solving a task, given a labeled dataset. Now, all of that, so far, sounds like machine learning, but here's the difference, without further explicit instructions. So, I can just hand it a dataset and it will start making its own determinations.