Report

<table>
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<tr><td>Course:</td><td>CISCO – IOT</td><td>USN:</td><td>4AL16EC061</td></tr>
<tr><td>Topic:</td><td>Chapter 4 :
Everything can be automated<table><tr><td>Section 4.0</td><td>Introduction</td></tr><tr><td>Section 4.1</td><td>What can be automated</td></tr><tr><td>Section 4.2</td><td>Summary</td></tr></table></td><td>Semester & Section:</td><td>8th sem “B”section</td></tr>
<tr><td>Github Repository:</td><td>Safiya-Courses</td><td></td><td></td></tr>
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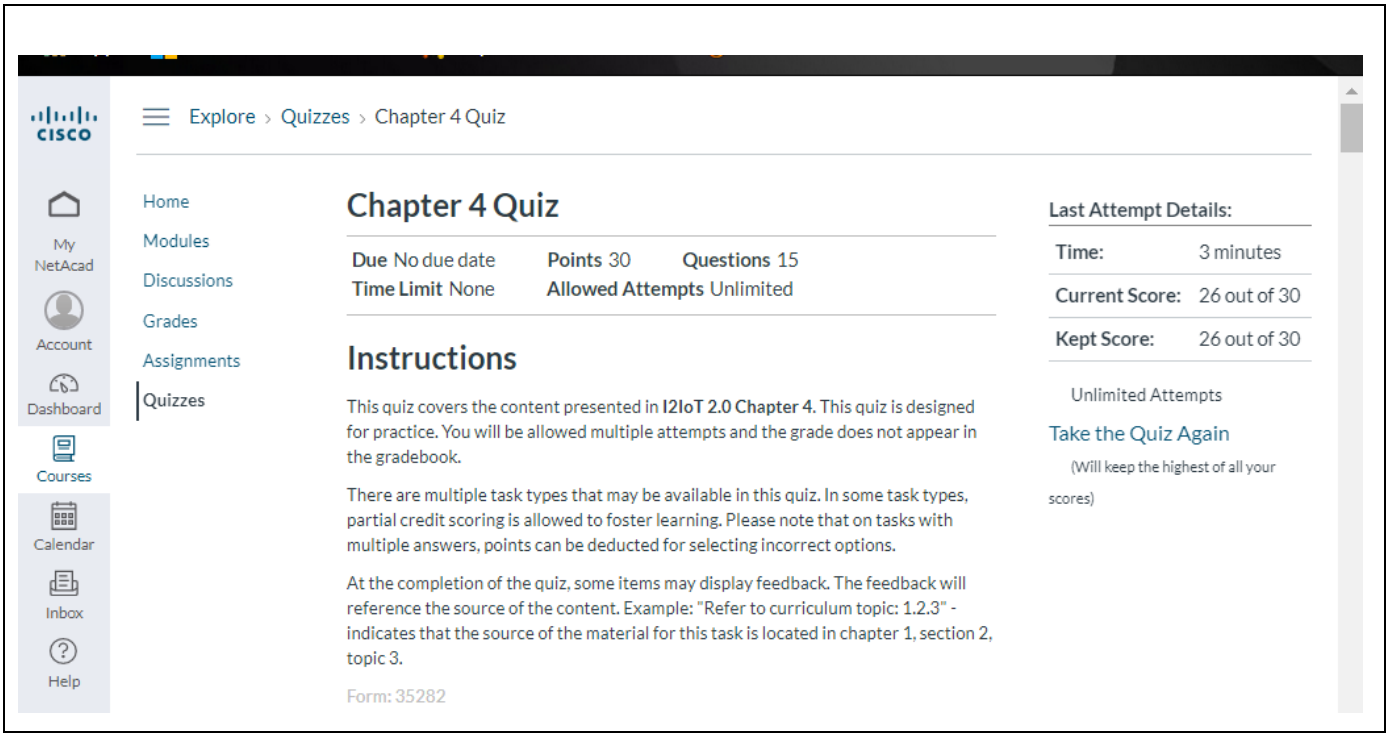

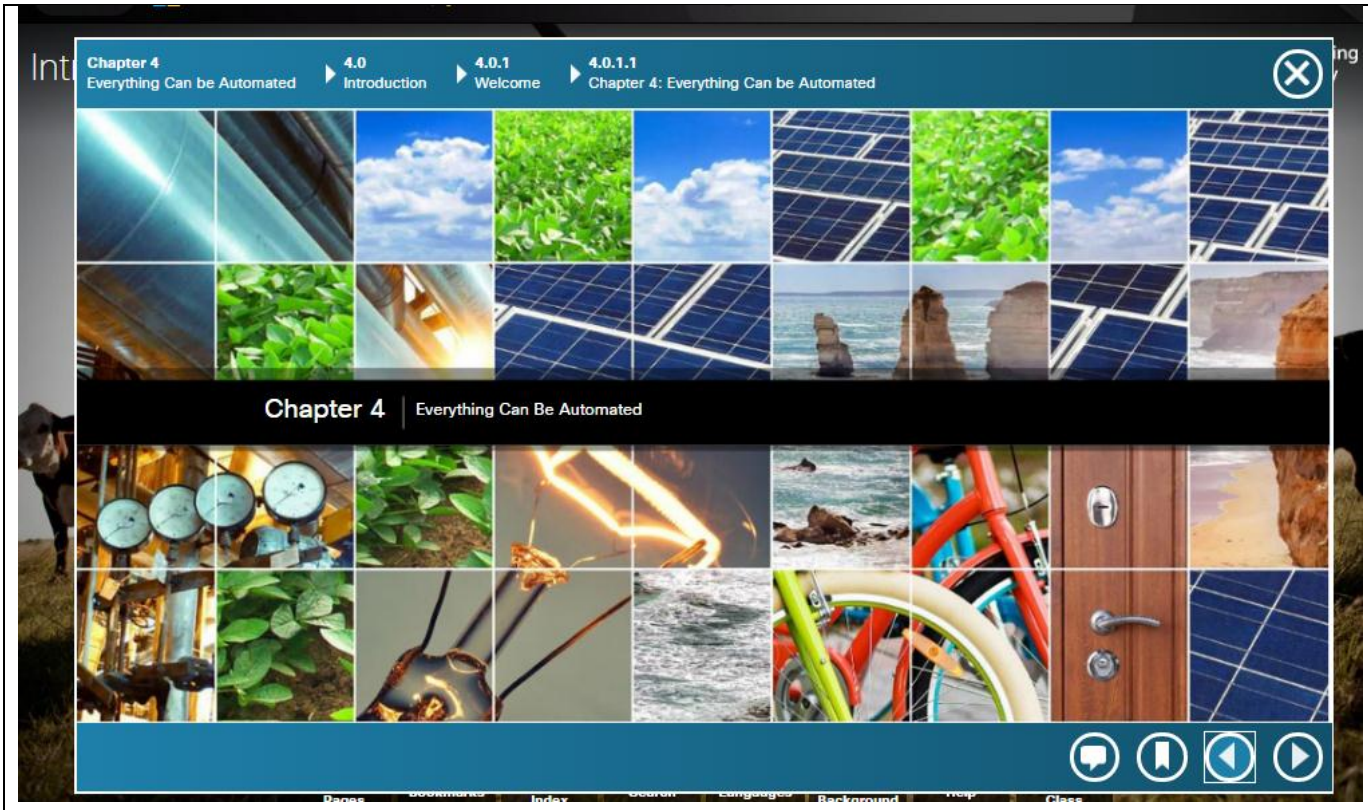

What is Automation?

Automation is any process that is self-driven and reduces, then eventually eliminates, the need for human intervention.

Automation was once confined to the manufacturing industry. Highly repetitive tasks such as automobile assembly were turned over to machines and the modern assembly line was born. Machines are excellent at repeating the same task without fatigue and without the errors that humans are prone to make in such jobs. This results in greater output, because machines can work 24 hours a day without breaks. Machines also provide a more uniform product.

The IoT opens up a new world in which tasks previously requiring human intervention can become automated. As we have seen, the IoT allows the collection of vast amounts of data that can be quickly analyzed to provide information that can help guide an event or process.

As we continue to embrace the benefits of the IoT, automation becomes increasingly important. Access to huge amounts of quickly processed sensor data started people thinking about how to apply the concepts of machine learning and automation to everyday tasks. Many routine tasks are being automated to improve their accuracy and efficiency.

Automation is often tied to the field of robotics. Robots are used in dangerous conditions such as mining, firefighting, and cleaning up industrial accidents, reducing the risk to humans. They are also used in such tasks as automated assembly lines

When Things Start to Think

Can things think? Can a device learn from its environment? In this context, there are many definitions of the word “think”. One possible definition is the ability to connect a series of related pieces of information together, and then use them to alter a course of action.

For example, when we are young we have no concept that a fire is hot and that placing our hand in the fire will cause pain. A fire may appear visually pleasing and actually encourage one to try and touch the flames. We quickly learn that the fire can cause injury. We then start to associate the image of the fire with the pain it can cause. From this point on we start to think about the results of touching the fire and base our actions on this acquired information.

Many devices now incorporate smart technology to alter their behavior under certain circumstances. This can be as simple as a smart appliance lowering its power consumption during periods of peak demand or as complicated as a self-driving car.

Whenever a decision or course of action is taken by a device based on an outside piece of information, then that device is referred to as a smart device. Many devices that we interact with now have the word smart in their names. This indicates that the device has the ability to alter its behavior depending on its environment.

What Is Intent-Based Networking (IBN)

For a business to survive, it must be agile and respond quickly to the needs and demands of its customers. Businesses are increasingly dependent on their digital resources to meet customer demands, so the underlying IT network must also be responsive enough to quickly adapt to these requirements. This normally involves adjustments to many systems and processes. These adjustments may include changes to security policies and procedures, business services and applications, and operational policies.

With traditional networks, many different components must be manually adjusted to meet ever-changing business requirements. This requires different technicians and engineers to ensure that the systems are changed in a manner that allows them to work together to accomplish their goal. This sometimes results in errors and delays, and often in sub-optimal network performance.

The new business network must seamlessly and securely integrate IoT devices, cloud-based services, and remote offices in an agile, responsive, and business-relevant manner. Additionally, the network must secure these new digital initiatives from the ever-changing threat landscape.

To address this need, the IT industry has initiated an effort to create a systematic approach to tie infrastructure management to business intent. This approach is known as intent-based networking. The figure illustrates the general idea behind intent-based networking. With this new paradigm, business needs are automatically and continually translated into IT infrastructure execution.

Summary

This chapter began by discussing automation. Automation is any process that is self-driven and reduces, then eventually eliminates, the need for human intervention. The IoT opens up a new world in which tasks previously requiring human intervention can become automated. Many devices now incorporate smart technology to alter their behavior under certain circumstances. Some examples of smart technology can be found in smart homes and buildings, cities, a smart power grid, and smart cars.

Next, the chapter detailed Artificial Intelligence (AI). AI is the intelligence demonstrated by machines. As technology develops, many of the tasks that at one time required AI have become routine. Many of these tasks have migrated from AI to Machine Learning (ML). ML is a subset of AI that uses statistical techniques to give computers the ability to "learn" from their environment. Some examples of ML in the IoT include speech and facial recognition, product recommendation, and credit card fraud detection.

The next topic of this chapter covered Intent-Based Networking (IBN). The new business network must integrate IoT devices, cloud-based services, and remote offices in a way that is relevant and responsive to business. The network must secure these new digital initiatives from the ever-changing threat landscape. IBN is a systematic approach to tie infrastructure management to business intent.

Finally, this chapter discussed how intent-based network uses AI and ML to ensure that any services that are deployed meet the required service level. A model of IBN contains three elements including assurance, translation and activation. The Cisco Digital Network Architecture (Cisco DNA) is an example of an intent-based network. It is an open, extensible, software-driven architecture.