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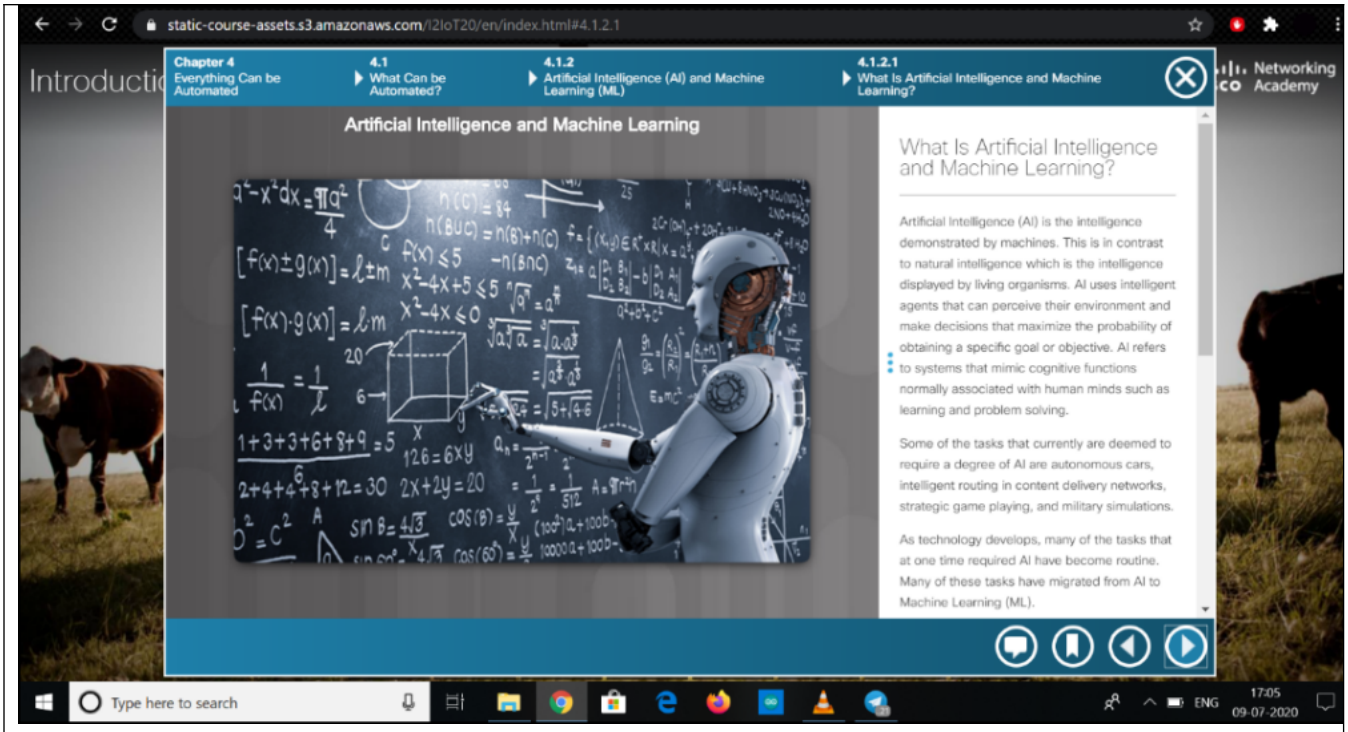
Course:	Introduction to Internet of Things	USN:	4AL17EC097
Topic:	Chapter4, Chapter5, Chapter6 & certificate	Semester Section:	6th SEM & 'B' section
GitHub repository	yamunashree-course		

AFTERNOON SESSION DETAILS

Image of session



Report:

What is Python?

Python is a very popular language that is designed to be easy to read and write. Python's developer community adds value to the language by creating all types of modules and making them available to other programmers.

The core philosophy of the language is summarized by the document The Zen of Python:

- Beautiful is better than ugly
- Explicit is better than implicit
- Simple is better than complex
- Complex is better than complicated
- Readability counts

Despite the fact Python is designed to be easy, there is still a learning curve. To make it easier to learn Python, a beginner can use blocky to enhance his or her Python understanding.

While different programming languages have different semantics and syntax, they all share the same programming logic. Beginners can use Blackly to easily create a language-independent program, export it as Python code and use this newly created code to learn about Python syntax, structure and semantics.

The Python Interpreter

Python is an interpreted language; therefore, an interpreter is required to parse and execute Python code. The Python interpreter understands and executes Python code. Python code can be created in any text editor and Python interpreters are available for many operating systems. Python developers can create and deploy Python programs in practically any operating system. Third party tools such as Py2exe and Pyinstaller can also be used to package the Python source code into an executable file, eliminating the need for the Python interpreter when running Python code.

In Linux machines, the Python interpreter is usually installed in /usr/bin/python or /usr/bin/python3 (depending on the available Python versions on the system). With the new Windows Python installer, Python is installed by default into the user's home directory. In older Windows machines, Python is often placed in C:\PythonXX (where XX is the version of Python). After the Python interpreter has been installed, it operates somewhat like the Linux shell. This means that when called with no

arguments, it reads and executes commands interactively. When called with a file name argument or with a file as standard input, it reads and executes a script from that file.

To start the interpreter, simply type python or python3 at the shell prompt.

Some legacy systems are still running on an older version of Python 2, but many new systems are moving to use the new Python version 3. Python's version is printed on the first line when the interpreter is launched (Figure 1). This course is built on Python 3 code.

When the Python interpreter is called with no arguments, and commands are entered via the keyboard, the interpreter is said to be in interactive mode. In this mode, the interpreter waits for commands. The primary prompt is represented by three greater-than signs (>>>). Continuation lines are represented by three dots (...). Continuation is the default secondary prompt.

The >>> prompt indicates the interpreter is ready and waiting commands.

Continuation lines are needed when entering multi-line code.

Another way of using the interpreter is python -c command [arg] ... which executes the statement(s) in the command. Because Python statements often contain spaces or other characters that are particular to the shell, it is suggested to enclose the entire command between single quotes.

Useful Functions and Data Types in Python

Python supports many useful functions and datatypes. Some of the more important ones are as follows:

Range()

The range () function generates a list of numbers usually used to iterate with FOR loops. Figure 1 shows examples of the range () function.

- Range (stop) - This is the number of integers (whole numbers) to generate, starting from zero.
- Range ([start], stop [, step] – This is the starting number of the sequence, the ending number in the sequence, and the difference between each number in the sequence.

Tuples

A tuple is a sequence of unchangeable Python objects. Tuples are sequences, separated by parentheses. Figure 2 shows examples of tuples.

Lists

Lists are a sequence of changeable Python objects. Lists can be created by putting different comma-separated values between square brackets. Figure 3 shows examples of lists and how they can be updated.

Sets

Sets are unordered collections of unique elements. Common uses include membership testing, removing duplicates from a sequence, and computing standard math operations on sets such as intersection, union, difference, and symmetric difference. Figure 4 shows examples of sets.

Dictionary

A dictionary is a list of elements that are separated by commas. Each element is a combination of a value and a unique key. Each key is separated from its value by a colon. The entire dictionary is written within braces. Dictionary elements can be accessed, updated, and deleted. There are also many built-in dictionary functions such as a function that compares elements within different dictionaries and another that provides a count of the total number of elements within a dictionary. Figure 5 shows examples of dictionaries.

What is Big Data?

Data is information that comes from a variety of sources, such as people, pictures, text, sensors, and web sites. Data also comes from technology devices like cell phones, computers, kiosks, tablets, and cash registers. Most recently, there has been a spike in the volume of data generated by sensors. Sensors are now installed in an ever growing number of locations and objects. These include security cameras, traffic lights, intelligent cars, thermometers, and even grape vines!

Big Data is a lot of data, but what is a lot? No one has an exact number that says when data from an organization is considered “Big Data.” Here are three characteristics that indicate an organization may be dealing with Big Data:

- They have a large amount of data that increasingly requires more storage space (volume).
- They have an amount of data that is growing exponentially fast (velocity).
- They have data that is generated in different formats (variety).

How much data do sensors collect? Here are some estimated examples:

- Sensors in one autonomous car can generate 4,000 gigabits (Gb) of data per day.
- An Airbus A380 Engine generates 1 petabyte (PB) of data on a flight from London to

Singapore.

- Safety sensors in mining operations can generate up to 2,4 terabits (TB) of data every minute.
- Sensors in one smart connected home can produce as much as 1 gigabyte (GB) of information a week.

While Big Data does create challenges for organizations in terms of storage and analytics, it can also provide invaluable information to fine-tune operations and improve customer satisfaction.

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.

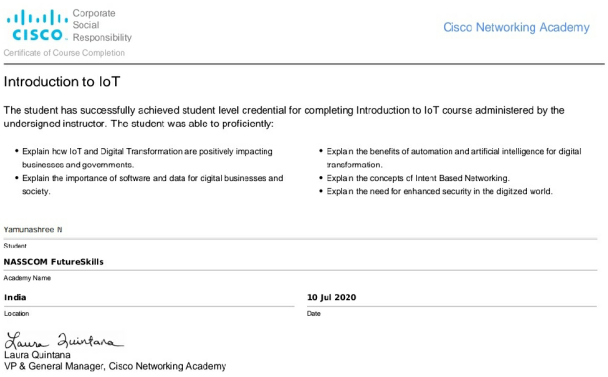
We now see automation everywhere, from self-serve checkouts at stores and automatic building environmental controls, to autonomous cars and planes. How many automated systems do you encounter in a single day?

Become an Informed Consumer

The last few years have given us improvements in the speed and availability of Internet services, as well as advances in cloud computing and sensor technology. These technical gains, together with recent developments in automation and artificial intelligence, have created a highly digitized world. Digitization currently impacts every aspect of our daily lives. Digitization continues to provide new opportunities for professionals who are trained to develop and support the technology that is used to deliver the IoT.

The IoT provides an immeasurable amount of information that is readily available for consumption. This information can be quickly analyzed and used to automate many processes that were previously considered impossible to turn over to machines. For example, just a few years ago self-driving cars existed only in our imaginations and now they are a reality. Think about what else has changed in your life because of the IoT.

Certificate:



Corporate Social Responsibility

Cisco Networking Academy

Certificate of Course Completion

Introduction to IoT

The student has successfully achieved student level credential for completing Introduction to IoT course administered by the undersigned instructor. The student was able to proficiently:

- Explain how IoT and Digital Transformation are positively impacting businesses and governments.
- Explain the importance of software and data for digital businesses and society.
- Explain the benefits of automation and artificial intelligence for digital transformation.
- Explain the concepts of Intent Based Networking.
- Explain the need for enhanced security in the digitized world.

Yamunashree N

Student

NASSCOM FutureSkills

Academy Name

India

Location

10 Jul 2020

Date

Laura Quintana

Laura Quintana
VP & General Manager, Cisco Networking Academy