EET-3310: INDUSTRIAL SOFTWARE APPLICATIONS DEVELOPMENT

Cuyahoga Community College

Viewing: EET-3310 : Industrial Software Applications Development

Board of Trustees:
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Academic Term:
Fall 2024

Subject Code
EET - Electrical/Electronic Engineer

Course Number:
3310

Title:
Industrial Software Applications Development

Catalog Description:
This course prepares the student for the Cisco Certified DevNet Associate (DEVASC 200-901) exam. Includes software development and design, understanding and use of APIs, application deployment and security, infrastructure, and automation. IoT, DevOps and Cloud on Cisco platforms are topics that are also covered.

Credit Hour(s):
4

Lecture Hour(s):
2

Lab Hour(s):
4

Requisites

Prerequisite and Corequisite
EET-3100 Manufacturing Network Devices.

Outcomes

Course Outcome(s):
Apply knowledge of basic networking fundamentals in understanding and using APIs (Application Programming Interfaces).

Objective(s):

1. Make use of APIs and RESTful APIs (Representational State Transfer API) in the development of web design, mobile applications and device applications.
2. Construct a REST API request to accomplish a task given API documentation.
3. Make use of the six guiding constraints for a REST API.
4. Utilize the four resource methods used in a REST API.
5. Compare and contrast the differences between a SOAP API and a REST API.
6. Explain what a webhook is.
7. Examine common usage patterns related to webhooks.
8. Explain common HTTP (HyperText Transfer Protocol) response codes associated with REST APIs.
9. Given the HTTP response code request and API documentation, conclude the instigating problem.
10. Compare common API styles (REST, RPC (Remote Procedure Call), synchronous and asynchronous).
11. Construct a Python script that calls a REST API using the requests library.

Course Outcome(s):

Apply the basic concepts of networking in Cisco platforms and development.

Objective(s):

1. Explain the concept of an SDK (Software Development Kit).
2. Construct a Python script that uses a Cisco SDK given the SDK documentation.
3. Compare and contrast the capabilities of Cisco network management platforms and APIs (Meraki, Cisco DNA (Digital Network Architecture) Center, ACI (Application Centric Infrastructure), Cisco SD-WAN (Software-defined Wide-Area Network), and NSO(Network Service Orchestrator)).
4. Evaluate the capabilities of Cisco compute management platforms and APIs (UCS Manager, UCS Director, and Intersight).
5. Evaluate the capabilities of Cisco collaboration platforms and APIs (Webex Teams, Webex devices, Cisco Unified Communication Manager including AXL and UDS interfaces, and Finesse).

Course Outcome(s):

Apply network concepts to Cisco Application Development and Security.

Objective(s):

1. Utilize the concept of Edge Computing to show its benefits.
2. Practice using the Application Deployment Model.
3. Examine the attributes of different Application Deployment Models (Private Cloud, Public Cloud, Hybrid Cloud, and Edge).

Course Outcome(s):

Apply network concepts to Cisco infrastructure and automation.

Objective(s):

1. Employ model-driven programmability for infrastructure automation through hands-on labs.
2. Practice using controller-level to device-level management.
3. Demonstrate the roles of network simulation and test tools (such as VIRL(Virtual Internet Routing Lab)) and pyATS (Python-Automated Test Systems) thru the use of hands-on labs.
4. Make use of infrastructure and automation.

Course Outcome(s):

Identify the hardware and software components which comprise Cisco network fundamentals.

Objective(s):

1. Make use of IP addresses, routes, subnet mask/prefix, and gateways thru hands-on labs.
2. Use common networking components (switches, routers, firewalls, and load balancers) thru hands-on labs.
3. Interpret a basic network topology diagram with elements such as switches, routers, firewalls, load balancers, and port values.
4. Illustrate the functionality of IP Services (DHCP (Dynamic Host Configuration Protocol), DNS (Domain Name System), NAT (Network Address Translation), SNMP (Simple Network Management Protocol), NTP (Network Time Protocol)).
5. Apply common network protocol port values (SSH (Secure Shell), Telnet, HTTP (HyperText Transfer Protocol), HTTPS (HyperText Transfer Protocol Secure), and NETCONF (Network Configuration Protocol) thru hands-on labs.
6. Analyze the cause(s) of application connectivity issues (NAT problem, Transport Port blocked, proxy, and VPN).
7. Determine the impacts of network constraints on application.

Methods of Evaluation:

1. Tests
2. Quizzes
3. Laboratory Reports
4. Homework
5. Projects

Course Content Outline:

1. Introduction to Cisco DevNet Associate Certification
   a. Cisco DevNet Certifications
   b. Cisco Certified DevNet Associate Certification (DEVASC)
   c. Cisco Certified DevNet Professional Certification 1
   d. Cisco DevNet Overview
2. Software Development and Design
   a. Directory Navigation
   b. File Management
   c. Environment Variables
   d. Software Version Control
   e. Conducting Code Review
3. Introduction to Python
   a. Understanding Python Syntax
   b. Data Types
   c. Strings and Lists, and I/O
   d. Dictionaries
   e. Flow Control with Conditionals and Loops
4. Python Functions, Classes, and Modules
   a. Python Classes
   b. Python Functions
   c. Methods
   d. Inheritance
   e. Working with Python Modules
   f. The Python Standard Library
5. Working With Data in Python
   a. Comma-Separated Values (CSV)
   b. JavaScript Object Notation (JSON)
   c. Extensible Markup Language (XML)
   d. YAML Aint Markup Language (YAML)
   e. Error Handling in Python
6. Application Programming Interfaces (APIs)
   a. Application Programming Interfaces (APIs)
   b. Synchronous Versus Asynchronous APIs
   c. Representational State Transfer (REST) APIs
   d. RESTful API Authentication
   e. API Keys
   f. Simple Object Access Protocol (SOAP)
   g. Remote-Procedure Calls (RPCs)
7. RESTful API Requests and Response
   a. API Types and Access Types
   b. HTTP Basics
   c. Uniform Resource Locator (URL)
   d. REST Methods and CRUD
   e. Request and Response Headers, Response Codes
   f. REST Constraints
   g. REST API Versioning
8. Cisco Enterprise Network Management Platforms and APIs
   a. SDK
   b. Cisco Meraki
   c. Cisco DNA Center
   d. Cisco SD-WAN
9. Cisco Data Center and Compute Management Platforms and APIs
   a. Cisco ACI
   b. APIC REST API
   c. Cisco UCS Director
   d. Cisco Intersight
10. Cisco Collaboration Platforms and APIs

   a. Cisco Webex Teams, Webex, Unified Communications Manager, and Contact Center
   b. Unified Contact Center
   c. Cisco Collaboration Endpoints
   d. Cisco Finesse
   e. Terminology
11. Cisco Securing Platforms and APIs
   a. Cisco Umbrella
   b. Cisco Firepower
   c. Cisco Advanced Malware Protection (AMP)
   d. Endpoints
   e. APIs
12. Model-Driven Programmability
   a. NETCONF
   b. RESTCONF
   c. Model-Driven Telemetry
13. Deploying Applications
   a. NIST
   b. Private, Public, Hybrid, and Community Clouds
   c. Edge and Fog Computing
   d. DevOps
14. Application Security
   a. Using Nmap for Vulnerability Scanning
   b. CVE Detection Using Nmap
   c. Encryption Fundamentals
   d. Data Integrity
   e. Firewalls, IDSs, and IPSs
   f. DNS
   g. Load Balancing
15. Infrastructure Automation
   a. Controller Versus Device-Level Management
   b. Cisco Network Services Orchestrator (NSO)
   c. Cisco Network Services Orchestrator (NSO)
   d. Cisco Modeling Labs/Cisco Virtual Internet Routing Laboratory (CML/VIRL)
   e. Python Automated Test System (pyATS)
16. Network Fundamentals
   a. The OSI Model
   b. TCP/IP Model
   c. Switching Concepts
   d. Ethernet
   e. MAC and VLAN
   f. Routing Concepts
   g. IPv4 and IPv6 Addresses
17. Networking Components
   a. Hubs, Bridges, Switches, VLANs, Routers, Software Routing
   b. Network Diagrams
   c. SDN Controllers
   d. Cisco Software-Defined Networking (SDN)

Resources

Jackson, Chris, Jason Gooely, Adrian Liesiu, Ashutosh Malegankar. *Cisco Certified DevNet Associate DEVASC 200-901 Official Cert Guide*. Cisco Press, 2020. https://www.ciscopress.com/store/cisco-certified-devnet-associate-devasc-200-901-official-9780136642961

Jackson, Chris. "Cisco Certified DevNet Associate DEVASC 200-901 Complete Video Course (Video Training)" *Training Videos*. Pearson IT Certification, 2021. https://www.ciscopress.com/store/cisco-certified-devnet-associate-devasc-200-901-complete-9780136904427

Contantin Mohorea. *Cisco DevNet Professional DEVCOR 350-901 Study Guide*. Cisco Press, 2021. https://www.ciscopress.com/store/cisco-devnet-professional-devcor-350-901-study-guide-9780137500048

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