



DevNet Certification

네트워크 자동화 전문가로 성장하기

2024. 05. 23

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🔑 Passcode: **devnet!**



ChatGPT야.. 네트워크 엔지니어랑 네트워크 자동화 엔지니어 연봉 알려줘..



네트워크 엔지니어와 네트워크 자동화 엔지니어의 연봉은 여러 요인에 따라 달라질 수 있습니다. 이러한 요인에는 위치, 경력, 회사 규모, 산업, 그리고 개별적인 기술과 자격증이 포함됩니다. 그러나 일반적인 경향을 보면, 네트워크 자동화 엔지니어의 연봉이 대체로 더 높습니다. 이는 자동화와 관련된 고급 기술이 점점 더 중요해지고 있기 때문입니다.

네트워크 엔지니어 연봉

미국 기준:

- 초급 (**Entry Level**): 약 \$60,000 - \$80,000
- 중급 (**Mid Level**): 약 \$80,000 - \$100,000
- 고급 (**Senior Level**): \$100,000 이상, 경험과 위치에 따라 \$120,000 - \$140,000 이상 가능

네트워크 자동화 엔지니어 연봉

미국 기준:

- 초급 (**Entry Level**): 약 \$70,000 - \$90,000
- 중급 (**Mid Level**): 약 \$90,000 - \$120,000
- 고급 (**Senior Level**): \$120,000 이상, 경험과 위치에 따라 \$150,000 - \$180,000 이상 가능

*** ChatGPT can make mistakes.**

Cisco Certified DevNet Expert를 소개합니다.



- Cisco Principal Automation Engineer
- CCIE (2013)
- DevNet Expert #20220001 - Global 최초(!!!)



- Cisco Customer Success Specialist
- 2021년부터 네트워크 자동화를 시작
- DevNet Expert #20240012 - Korea 최초(???)

DevNet 전문가의 임무

- 프로그래밍 및 자동화 도구를 사용하여 네트워크 운영을 간소화합니다.
- 설계, 개발, 구성, 구현, 테스트를 포함한 모든 운영 단계에 참여합니다.

좋아하는 일

- 재사용 가능한 코드의 패턴 찾기
- 프로세스 최적화
- 창의적인 문제 해결

잘하는 일

- 스크립팅 및 프로그래밍 언어
- 네트워크 설계 및 인프라
- 자동화 도구 구현

DevNet 전문가에게 요구되는 기술



DevNet 인증 프로그램의 역사

2014

- DevNet 출범

2020

- DevNet 인증 프로그램 시작

2022

- DevNet Expert 인증 추가



DevNet 인증 유형



Developing Applications and Automating Workflows using Cisco Platforms (DEVASC)



Automating and Programming Cisco **Enterprise** Solutions

Automating and Programming Cisco **Data Center** Solutions

Automating and Programming Cisco **Security** Solutions

Automating and Programming Cisco **Service Provider** Solutions

Automating and Programming Cisco **Collaboration** Solutions

Implementing **DevOps** Solutions and Practices using Cisco Platforms

* Concentration Exams 중 1개 Pass



Developing Applications Using Cisco Core Platforms and APIs (DEVCOR)

Concentration Exam 1개



Cisco Certified DevNet Lab Exam

DEVCOR

DevNet 인증과 시험

트랙	시험 번호	시험 명	시험 언어
DevNet	200-901 DEVASC	Developing Applications and Automating Workflows using Cisco Platforms	영어, 일본어
	350-901 DEVCOR	Developing Applications Using Cisco Core Platforms and APIs	영어
	Cisco Certified DevNet Expert Lab Exam	Cisco Certified DevNet Expert lab exam	영어
	300-910 DEVOPS	Implementing DevOps Solutions and Practices using Cisco Platforms	영어
Enterprise, DevNet	300-435 ENAUTO	Automating and Programming Cisco Enterprise Solutions	영어, 일본어
Collaboration, DevNet	300-835 CLAUTO	Automating and Programming Cisco Collaboration Solutions	영어
Data Center, DevNet	300-635 DCAUTO	Automating and Programming Cisco Data Center Solutions	영어
Security, DevNet	300-735 SAUTO	Automating and Programming Cisco Security Solutions	영어, 일본어
Service Provider, DevNet	300-535 SPAUTO	Automating and Programming Cisco Service Provider Solutions	영어

Cisco Learning Network

- <https://learningnetwork.cisco.com/>
- 인증 시험을 준비하는 데 유용한 정보들을 제공합니다.

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Cisco Certified DevNet Associate Certification and Training

Achieving Cisco Certified DevNet Associate certification proves your skills in developing and maintaining applications built on Cisco platforms. To earn DevNet Associate certification, you pass one exam that covers the fundamentals of software development and design for Cisco platforms.





[Download At-a-glance](#)

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Exam

200-901 DEVASC: DevNet Associate

DevNet Associate Exam v1.1 (DEVASC 200-901) is a 120-minute exam associated with the DevNet Associate - Developer Certification. This exam certifies a candidate's knowledge of software development and design including understanding and using APIs, application deployment and security, and infrastructure and automation on Cisco platforms. The course, Developing Applications and Automating Workflows using Cisco

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Ready to take your exam?

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- CyberOps Associate
- CyberOps Professional
- DevNet Associate**
- DevNet Professional
- DevNet Expert
- CCNP Enterprise
- CCNP Security
- CCNP Data Center
- CCNP Collaboration
- CCNP Service Provider
- CCIE Enterprise Infrastructure

인증 시험 주제와 관련 학습 콘텐츠

The screenshot shows the Cisco Learning Network interface. At the top is the header with the Cisco logo and navigation links: 'Meet Cisco U.', 'Certifications', 'Communities', 'Webinars & Videos', 'Study Resources', 'About/Help', and 'Store'. Below this is a sub-header with tabs for 'Exam', 'Discussions', 'Webinar & Videos', and 'Additional Resources'. The 'Exam' tab is selected, displaying details for the '200-901 DEVASC: DevNet Associate' exam. The exam description states it is a 120-minute exam for the DevNet Associate - Developer Certification, covering software development, design, APIs, application deployment, security, and infrastructure automation on Cisco Core Platforms. Below the description are three buttons: 'Exam Topics', 'Study Material', and 'E-Learning'. To the right of the exam details are two promotional banners. The top banner asks 'Ready to take your exam?' with a 'Book written exam' button. The bottom banner promotes the 'Cisco Modeling Labs CCNA Topology Contest', offering a free one-year Personal Plus subscription to winners, accompanied by a SuperCAT logo.

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Exam

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Exam Topics Study Material E-Learning

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Exam

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[Exam Topics](#) [Study Material](#) [E-Learning](#)

1.0 Software Development and Design	15%	▼
2.0 Understanding and Using APIs	20%	▼
3.0 Cisco Platforms and Development	15%	▼
4.0 Application Deployment and Security	15%	▼
5.0 Infrastructure and Automation	20%	▼
6.0 Network Fundamentals	15%	▼

1.0 Software Development and Design

15% ^

- 1.1 Compare data formats (XML, JSON, and YAML)
- 1.2 Describe parsing of common data format (XML, JSON, and YAML) to Python data structures
- 1.3 Describe the concepts of test-driven development
- 1.4 Compare software development methods (agile, lean, and waterfall)
- 1.5 Explain the benefits of organizing code into methods / functions, classes, and modules
- 1.6 Identify the advantages of common design patterns (MVC and Observer)
- 1.7 Explain the advantages of version control
- 1.8 Utilize common version control operations with Git
 - 1.8.a Clone
 - 1.8.b Add/remove
 - 1.8.c Commit
 - 1.8.d Push / pull
 - 1.8.e Branch
 - 1.8.f Merge and handling conflicts
 - 1.8.g diff

2.0 Understanding and Using APIs 20% ▼

3.0 Cisco Platforms and Development 15% ▼

4.0 Application Deployment and Security 15% ▼

인증 시험 관련 무료 학습 콘텐츠

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Exam

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[Exam Topics](#) [Study Material](#) [E-Learning](#)

✓ Software Development and Design*	Status: 10%	Duration: 0 min
✓ Understanding and Using APIs*	Status: 0%	Duration: 0 min
✓ Cisco Platforms and Development*	Status: 0%	Duration: 50 mins
✓ Application Deployment and Security*	Status: 0%	Duration: 0 min
✓ Infrastructure and Automation*	Status: 0%	Duration: 0 min
✓ Network Fundamentals*	Status: 0%	Duration: 0 min



[Setting up your macOS workstation as a development environment*](#)

Software Development and Design

100.00%

Launch

[What is a Development Environment and why do you need one?*](#)

Software Development and Design

100.00%

Launch

[A brief introduction to Git*](#)

Software Development and Design

100.00%

Launch

[Intro to Python Part 1*](#)

Software Development and Design

100.00%

Launch

[Intro to Python Part 2*](#)

Software Development and Design

100.00%

Launch

[Coding 202: Parsing JSON using Python*](#)

Software Development and Design

100.00%

View

[Introduction to XML*](#)

Software Development and Design

Launch

< Coding & APIs-Taking it Further

Module Overview

Intro to Python – Part II (Hands-on with Python types, loops, and tools)

Introduction to data formats

Parsing JSON with Python

Introduction

1 Reading and writing files

2 Parsing JSON

3 Working with nested data

4 Where to go to learn more

REST APIs and Python

Hands-on with Python and REST APIs

Coding ... > Coding & APIs-Taki... > Parsing JSON w...
 120 mins

Reading and writing files

Talk to us

Reading from and writing to text files is easy with Python's built-in `open()` function. It returns a file object that we can use to read from and/or write to the file that we opened.

If you have not already cloned the `dne-devfun-code` repository to the development environment, do so now with:

```
cd ~/src/
git clone --branch main https://github.com/CiscoDevNet/dne-c
```

Change to the code repo directory:

```
cd dne-devfun-code
```

Open your Python interactive shell:

```
python -i
```

▶ Click for Sample Output (note the prompt)

Search ...
 .bashrc
 1 export PATH="\${HOME}/.local/bin:\$PATH"
 2 export PS1="\u:\W > "
 3 alias ll="ls -al"
 4 . /etc/profile.d/bash_completion.sh
 5

Terminal
 +
 developer:src > cd ~/src/
 developer:src > git clone --branch main https://github.com/CiscoDevNet/dne-devfun-code.git
 Cloning into 'dne-devfun-code'...
 remote: Enumerating objects: 1758, done.
 remote: Counting objects: 100% (482/482), done.
 remote: Compressing objects: 100% (406/406), done.
 remote: Total 1758 (delta 164), reused 76 (delta 76), pack-reused 1276
 Receiving objects: 100% (1758/1758), 4.00 MiB | 10.93 MiB/s, done.
 Resolving deltas: 100% (467/467), done.
 developer:src > cd dne-devfun-code
 developer:dne-devfun-code > python -i
 Python 3.10.11 (main, Apr 6 2023, 01:17:26) [GCC 11.2.1 20220219]
 Type "help", "copyright", "credits" or "license()" for more
 >>> file = open('intro-python/parsing-json/pep20.txt', mode='r')
 >>>

Cisco Live!를 활용

- <https://www.ciscolive.com>
- On-Demand Library 에서 프레젠테이션과 동영상 자료 검색 가능합니다.
- Learning Maps는 DevNet 콘텐츠를 주제별로 정리하여 제공합니다.

Learning Maps



DevNet

- [Bringing DevOps to Life](#)
- [Dev + Sec + Ops = Success](#)
- [Getting Started with Cloud Native](#)
- [Infrastructure-as-Code](#)
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DevNet

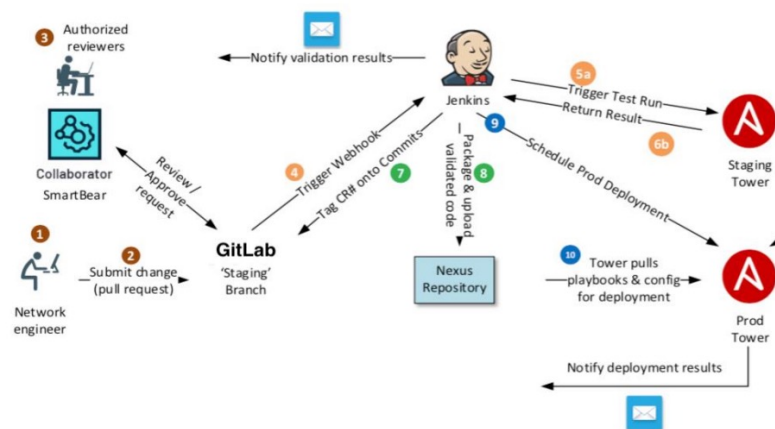
Infrastructure-as-Code

The concepts of infrastructure and code can seem diametrically opposed, yet the fundamentals come from a route of repeatability and simplification. In this session, you will learn developer concepts for how you can automate the "sweaty armpit work" in your network.



Example of a CI/CD Pipeline Workflow

CISCO Live!



The screenshot shows the GitLab CI/CD configuration page for a project named 'cicd'. The configuration file is '.gitlab-ci.yml' (1.28 KB). The configuration is valid. The pipeline consists of three stages: 'pyats-pre-snapshot', 'deploy-OSPF', and 'pyats-post-snapshot'. The 'pyats-pre-snapshot' stage runs a script to capture pre-snapshot data. The 'deploy-OSPF' stage runs an Ansible playbook to configure OSPF. The 'pyats-post-snapshot' stage runs a script to capture post-snapshot data. The configuration is as follows:

```
1 default:
2   before_script:
3     - export ANSIBLE_HOST_KEY_CHECKING=False
4
5
6 image: 'adrianii/cicd-en:0.1.0'
7
8 stages:
9   - pyats-pre-snapshot
10  - deploy-OSPF
11  - pyats-post-snapshot
12
13 pyats-pre-snapshot:
14   stage: pyats-pre-snapshot
15   script: cd pyats && pyats run job job.py --testbed-file cml_test.yaml --trigger-datafile pre_trigger_datafile.yaml --html-logs pre_snapshots
16   artifacts:
17     paths:
18       - pyats/pre_snapshots/pre_ospf_dist-sw01.json
19       - pyats/pre_snapshots/pre_ospf_dist-sw02.json
20     when: always
21
22 deploy-OSPF:
23   stage: deploy-OSPF
24   script: ansible-playbook -i hosts actions/configure-ospf/configure-ospf.yml
25
26 pyats-post-snapshot:
27   stage: pyats-post-snapshot
28   script:
29     - cd pyats && pyats run job job.py --testbed-file cml_test.yaml --trigger-datafile post_trigger_datafile.yaml --html-logs post_snapshots
```

CISCO Live!

#CiscoLive

DEVNET-2117

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DevNet 인증 관련 Cisco 커뮤니티

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[Programmability](#)

The screenshot displays the 'DevNet Certifications Community' page, specifically the 'DevNet Associate Practice Questions' section. The page features a navigation bar with 'Discussions', 'Articles', 'Blogs', and 'Events'. Below this, there's a 'Sort by' dropdown menu set to 'Top Questions'. The main content area lists several discussions, including 'Project Management Methodology Comparison' and 'DevNet Associate Practice Question #14: WebEx App API'. Each discussion entry shows the author, date, and engagement metrics (views, likes, replies). On the right side, there are social sharing options (Email, Facebook, X, LinkedIn), a 'Start a Discussion' button, a 'Follow' button, and statistics for '21 FOLLOWERS' and '17 POSTS'.

DevNet 관련 웨비나 & 비디오

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Diverse Perspectives

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Enterprise Wireless

Security

Service Provider

Multicloud

Ask the Experts (ATXs)

Cisco Modeling Labs

DevNet | Programmability

Welcome to the DevNet | Programmability Webinars and Training Videos. If you find a video that you like in particular or want to share it, click the social sharing buttons to share out to your favorite social network.

Professional-Level Essentials Training Videos

Join Cisco experts as they cover exam topics from the DevNet Professional-Level Essentials Training Videos, Using APIs, Cisco Platforms, Applications, and more.

Watch Professional-Level Essentials Training Videos

DevNet Associate Prep Program

Join Cisco experts as they cover exam topics from the DevNet Associate Prep Program, Understanding and Using APIs, Cisco Platforms, and more.

Watch DevNet Associate Prep Training Videos

DevNet Prep Program Practice Quiz

The DevNet Associate Prep program practice quiz is finally here. Test your knowledge and prepare for the DEVASC 200-901 exam.

Take the DevNet Prep Program Practice Quiz

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Cisco DevNet Exam Topics Update v1.1*

Status: 0%

Duration: 54 mins

Lesson 1: Roadmap Publishing Process and Revision Framework

Cisco DevNet Exam Topics Update v1.1: Lesson 1: Roadmap Publishing Process and Revision Framework

8 mins

Launch

Lesson 2: DEVASC, DEVCOR, and DEVOPS Updates

Cisco DevNet Exam Topics Update v1.1: Lesson 2: DEVASC, DEVCOR, and DEVOPS Updates

7 mins

Launch

Lesson 3: Extra Tips and Study Resources

Cisco DevNet Exam Topics Update v1.1: Lesson 3: Extra Tips and Study Resources

14 mins

Launch

Lesson 4: DevNet Expert

Cisco DevNet Exam Topics Update v1.1: Lesson 4: DevNet Expert

12 mins

Launch

Lesson 5: Questions and Answers

Cisco DevNet Exam Topics Update v1.1: Lesson 5: Questions and Answers

13 mins

Launch

How to study for any Cisco Automation Exam*

Status: 0%

Duration: 1 hr 12 mins

Automating a Network Inventory with Python*

Status: 0%

Duration: 1 hr 10 mins

Enforcing Interface Configuration Standards Through Automation*

Status: 0%

Duration: 1 hr 29 mins

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SUPERCAT

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Content Type

- ☒ Learning Path (74)
- ☐ Assessments (46)
- ☐ Labs (52)
- ☐ CE Credits (39)

Technology

- ☐ Networking (20)
- ☐ Cloud and Computing (13)
- ☐ Security (12)
- ☐ Software (8)
- ☐ Collaboration (3)
- ☐ Mobility and Wireless (2)
- ☐ Data Center (1)
- ☐ Other (3)

Skill Levels

- ☐ Beginner (22)
- ☐ Intermediate (43)

Relevant Learning Paths

LEARNING PATH

Developing Applications Using Cisco Core Platforms and APIs | DEVCOR

Learn how to implement network applications using Cisco platforms while you prepare to take the 350-901 DEVCOR exam.

Intermediate 54h 35m 64 Credits v2.0 Subscribe now

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Learn to automate application deployment and prepare for the 300-910 DevOps certification exam.

Intermediate 32h 40m 40 Credits v1.0 Subscribe now

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Developing Applications and Automating Workflows using Cisco Platforms | DEVASC

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Implementing Automation for Cisco Enterprise Solutions | ENAUI

Learn to implement Cisco Enterprise automated solutions and prepare for the 300-435 ENAUTO certification exam.

LEARNING PATH

Implementing Automation for Cisco Service Provider Solutions | SPAUI

Learn to implement automation solutions in a service provider network infrastructure and prepare for the 300-535 SPAUTO exam.

Developing Applications Using Cisco Core Platforms and APIs

Learning Path Completion 0%

Learning Path Curriculum Expand All

Labs Assessments Courses

- 1 Software Development and Design 12h 30m
- 2 Using APIs 8h 15m
- 3 Application Security 6h 30m
- 4 Application Deployment and CI / CD Pipeline 10h 40m
- 5 Infrastructure and Automation 16h 40m



DevNet Expert 인증

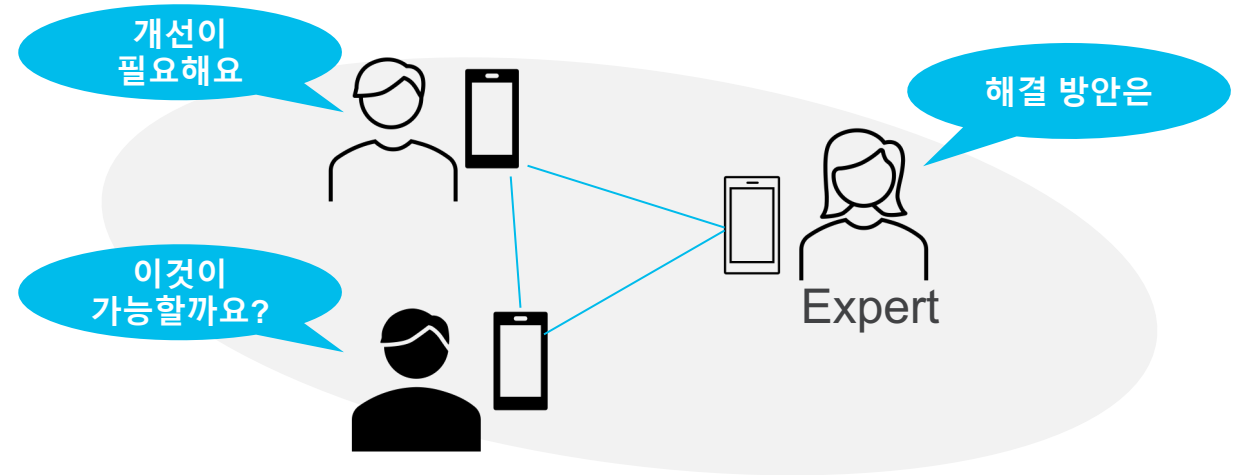
- DEVCOR 시험과 DevNet Expert Lab 시험을 Pass해야 합니다.
- DevNet Expert Lab 시험은 2개의 모듈로 구성된 총 8시간 동안 진행되는 시험입니다.

DevNet Expert Lab Exam

모듈 1 (Design)	모듈 2 (Develop, Test, Deploy, Maintain)
<ul style="list-style-type: none">• 3시간• 객관식 (다중 선택)• 드래그 앤 드롭 형식• 이전 문제 다시 풀기(되돌아가기) 불가• 문항별 배점 미공개• 모듈1 제출완료 후, 모듈2 진행	<ul style="list-style-type: none">• 5시간• 핸즈온 (코드 수정, 실행)• 객관식• 이전 문제 다시 풀기 가능• 문항별 배점 제공

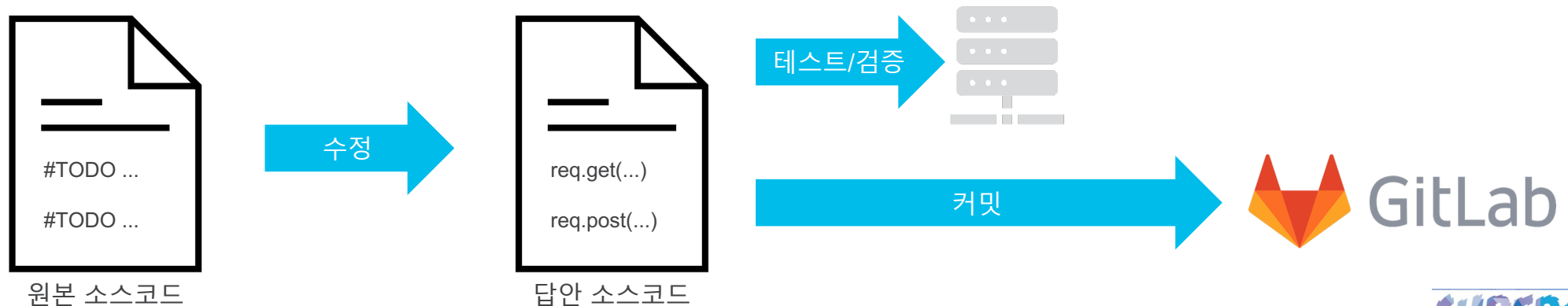
DevNet Expert Lab 시험 - Module 1

- 응시자는 가상의 회사의 시니어 네트워크 자동화 전문가가 되어, 다양한 이슈에 대하여 최적의 방안을 제시하는 형식으로 문제가 출제됩니다.
- 문제와 관련된 다수의 정보가 응시자에게 제공되며, 해당 정보들을 종합적으로 참고하여, 해결방안을 도출해야 합니다.
 - 담당자 간의 이메일 내용
 - 메신저 대화
 - 장비 설정 정보 등



DevNet Expert Lab 시험 - Module 2

- 각각의 문제는 특정 작업을 수행하는 데 필요한 미완성의 소스코드를 문제로 제시합니다.
 - Terraform 또는 Ansible 스크립트
 - Python 스크립트
 - CI/CD 파이프라인 코드
 - XML, JSON, YANG 파일
 - 기타 자동화 코드
- 응시자는 작업에 요구되는 기능을 보완하거나 추가해야 합니다.
- 문제의 소스 코드에는 해결해야 할 사항이 #TODO 로 표기되어 있습니다.
- 소스코드의 수정을 완료한 후에 해당 문제의 GitLab Project에 소스코드를 Commit 해야 합니다.



DevNet Expert Lab 시험 주제

1.0 Software Design, Development, and Deployment	20%	✓
2.0 Infrastructure as Code	30%	✓
3.0 Network Programmability and Automation	25%	✓
4.0 Containers	10%	✓
5.0 Security	15%	✓

DevNet Expert Lab 시험 주제

1.0 Software Design, Development, and Deployment

1.1 **Design** a solution based on an on-premises, hybrid, or public cloud deployment, considering these factors:

1.1.a Deployment: maintainability, modularity

(e.g., containers, VM, orchestration, automation, components, & infrastructure requirements)

1.1.b Reliability: high availability and resiliency

1.1.c Performance: scalability, latency, and rate limiting

1.1.d Infrastructure: monitoring, observability, and metrics

(e.g., instrument placement and instrument deployment)

1.2 **Recommend** a deployment strategy to mitigate risk and impact on service availability, for a given scenario

1.3 **Modify** an existing network automation solution based on business and technical requirements (includes gap analysis)

1.4 **Use** Git in a CI/CD development workflow

1.5 **Troubleshoot** issues with a CI/CD pipeline
(e.g., code-based failures, pipeline issues, and tool incompatibility)

DevNet Expert Lab 시험 주제 (2)

2.0 Infrastructure as Code

- 2.1 **Create** a scalable solution for infrastructure automation
(considering areas such as network impact, risk, and tool selection)
- 2.2 **Build, manage, and operate** a Python-based REST API with a web application framework
(endpoints, HTTP request, and response)
- 2.3 **Build, manage, and operate** a Python-based CLI application to use a REST API
- 2.4 **Consume and use** a new REST API, given the documentation
- 2.5 **Create** a RESTCONF or NETCONF payload based on a given YANG module, and interpret the response

DevNet Expert Lab 시험 주제 (3)

2.0 Infrastructure as Code

2.6 **Create** a NETCONF filter by using XPath

2.7 **Configure** network devices on an existing infrastructure by using NETCONF or RESTCONF, given YANG analysis tools

2.8 **Create and use** a role by utilizing Ansible to manage infrastructure, given support documentation

- 2.8.a Loop control

- 2.8.b Conditionals

- 2.8.c Use of variables and templating

- 2.8.d Use of connection plug-ins such as network CLI, HTTPAPI, and NETCONF

DevNet Expert Lab 시험 주제 (4)

2.0 Infrastructure as Code

2.9 **Use** Terraform to statefully manage infrastructure, given support documentation

2.9.a Loop control

2.9.b Resource graphs

2.9.c Use of variables

2.9.d Resource retrieval

2.9.e Resource provision

2.9.f Management of the state of provisioned resources

2.10 **Create** a basic Cisco NSO service package to meet given business and technical requirements. The service would generate a network configuration on the target device platforms using the **"cisco-ios-cli" NED** and be of type **"python-and-template"**

2.10.a Create a service template from a provided NSO device configuration


2.10.b Create a basic YANG module for the service containers (including lists, leaf lists, data types, leaf references, and single argument "when" and "must" conditions)

2.10.c Create basic actions to verify operational status of the service

2.10.d Monitor service status by reviewing the NCS Python VM log file

DevNet Expert Lab - Module 2 - Tasks, Resources

- 해결해야 할 자동화 요구 사항과 상세 구현을 위한 정보가 제공됩니다



Tasks

Tasks

Previous Item

New Resources 0

Next Item

Lab Exercises :
The Hardcore Way!

Exercise 1 ↑

Exercise 2 ↑

Exercise 3 ↑

Lab Exercises :
Detailed Lab Guide

Exercise 1 :
Detailed Lab Guide ↑

Exercise 2 :
Detailed Lab Guide ↑

Exercise 3 :
Detailed Lab Guide ↑

Exercise 1

Build a Python CLI Utility To Make Key and Secret Rotation Simpler for the Network


A task every network engineering and operations team dreads is the regular need to rotate keys, secrets, and common credentials. These include TACACS/RADIUS secrets, NTP and routing protocol keys, and SNMP community strings among others. When done manually, this work is tedious and error prone - making it an excellent candidate for network automation.

In this task you will be working on a CLI tool **rotatekey** that is being built to make this regular bit of engineering simpler and more successful. The application is in early development phase, and only the SNMP community string rotation is being built as this proof of concept phase. Much of the code has already been written by other members of the team. Your task is to update the **rotatekey/rotatekey.py** file with the changes required to leverage the Python Click library to make this a functional CLI application.

Code Exercise Notes

- You will find the files for this exercise in the directory `~/src/tasks/lab001-python-cli-app`.
- One possible solution to this exercise is available in the `answer_key/` directory. This is not the only possible way to complete this exercise, but it is a functional answer. You can reference this during work should you find yourself stuck and in need of a pointer.
- All changes required are found in the following files:
 - `rotatekey/rotatekey.py`
- Within the files that require changes, **TODO:** indications have been included for all changes and tasks you are expected to complete.
 - Code without TODOs indicating changes can be assumed to be correct and no changes are

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Resources

Resources

Previous Resource

External Documentation

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Exercise 1 Resources

Exercise 1 : Expected Results ↑

Exercise 2 Resources 2

Exercise 2 : Expected Results ↑

Exercise 2: Reference Material 1

Exercise 2: Reference Material ↑

Exercise 3 Resources 1

Exercise 3 : Expected Results ↑

Diagrams 1

Diagrams ↑

Exercise 1 : Expected Results

Expected Results

The following are examples of how the **rotatekey** CLI application is expected to work when a correct answer has been developed.

While a solution that generates the same output as provided below is likely correct, in order to fully complete the exercise and earn listed in the question must be satisfied.

Examples of help messages:

```
# Main Application Help
(main) expert@aws:~/src/tasks/lab001-python-cli-app$ rotatekey --help

Usage: rotatekey [OPTIONS] COMMAND [ARGS]...

Utilities for rotating network secrets and keys.

Options:
  --debug           Print debug messages during processing
  --cli-verbose     Stream CLI connection info to screen
  --prefer-restconf Attempt to use RESTCONF even if not defined in
                    inventory.

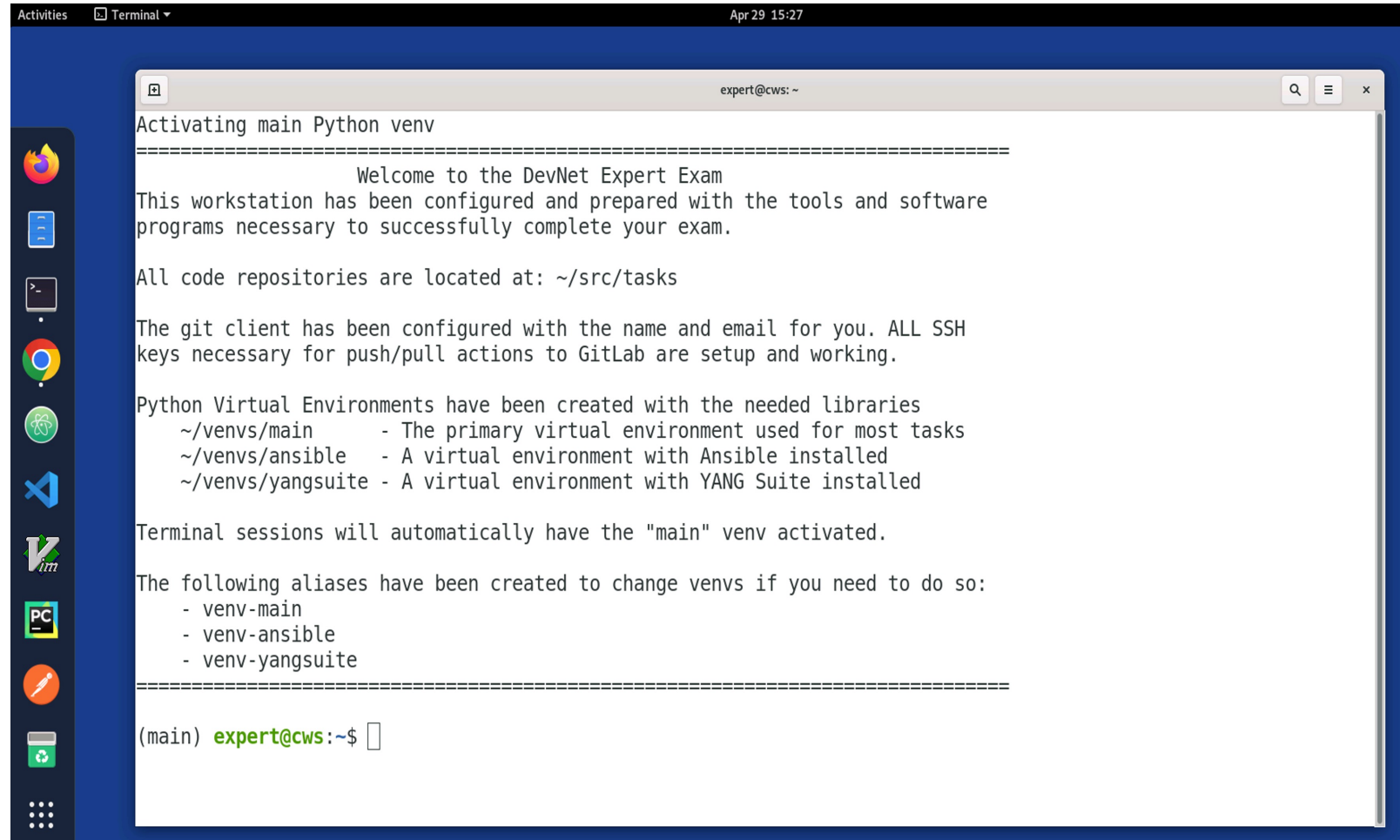
  -i, --inventory TEXT The network inventory file to operate on
  --help            Show this message and exit.

Commands:
```

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DevNet Expert Lab - Module 2 - Candidate Workstation

- 리눅스 기반의 개발 환경이 제공됩니다.
- Python, Ansible, Terraform 등에서 필요한 라이브러리, 모듈은 사전 설치되어 있습니다.
- 개발 환경에서 네트워크 장비 또는 문제 어플리케이션으로 액세스가 가능합니다.
 - 스위치, 라우터, GitLab 등
- 시험 응시 전에 개발 환경에 익숙해 질 수 있도록, 개발 환경 OVA파일을 다운로드하여 VM으로 실행해 볼 수 있습니다. (다운로드 무료)**
- 개발 환경 관련 상세 내용은 아래를 참고하세요.
 - <https://learningnetwork.cisco.com/s/article/devnet-expert-equipment-and-software-list>



```
Activities Terminal Apr 29 15:27
expert@cws: ~
Activating main Python venv
=====
Welcome to the DevNet Expert Exam
This workstation has been configured and prepared with the tools and software
programs necessary to successfully complete your exam.

All code repositories are located at: ~/src/tasks

The git client has been configured with the name and email for you. ALL SSH
keys necessary for push/pull actions to GitLab are setup and working.

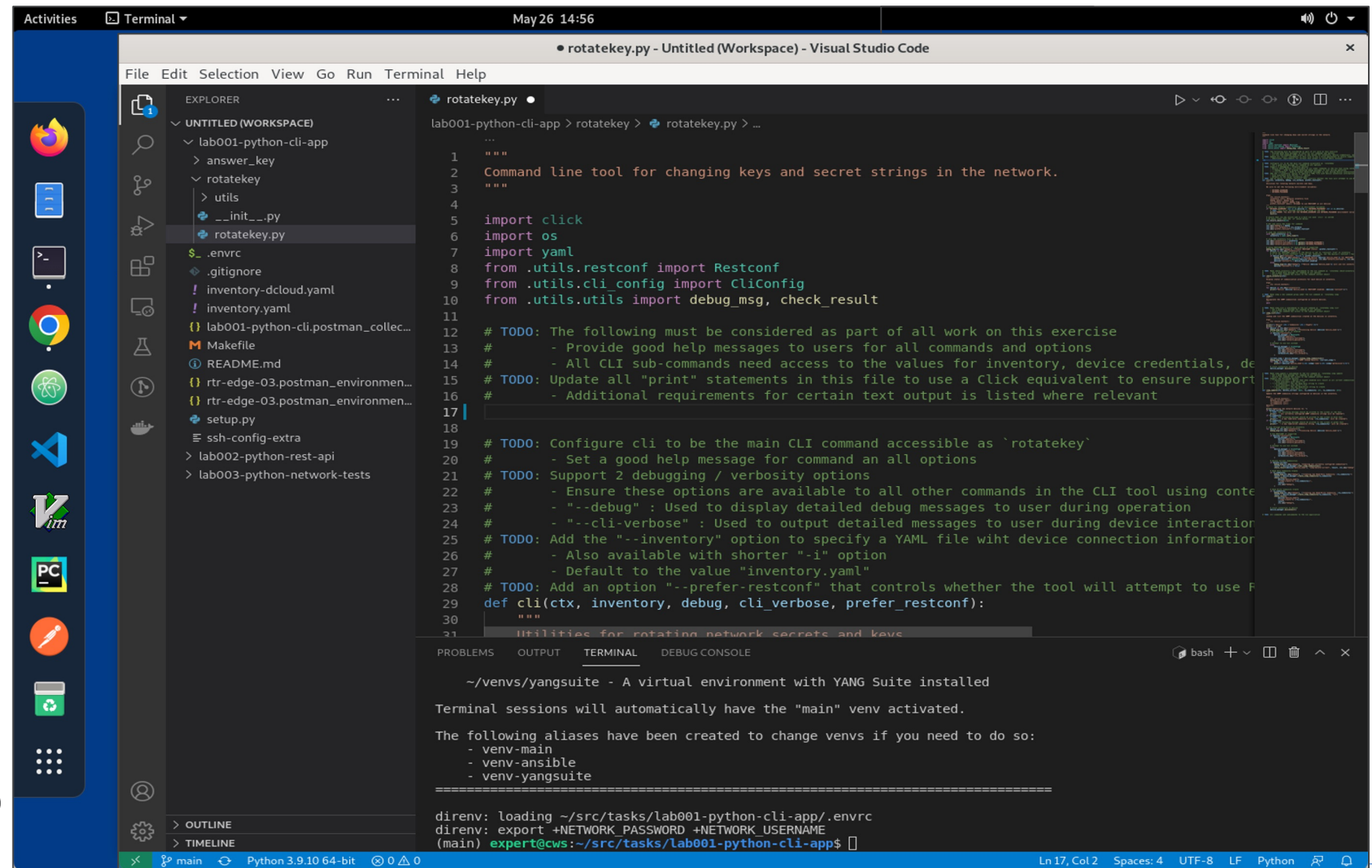
Python Virtual Environments have been created with the needed libraries
~/venvs/main - The primary virtual environment used for most tasks
~/venvs/ansible - A virtual environment with Ansible installed
~/venvs/yangsuite - A virtual environment with YANG Suite installed

Terminal sessions will automatically have the "main" venv activated.

The following aliases have been created to change venvs if you need to do so:
- venv-main
- venv-ansible
- venv-yangsuite
=====
(main) expert@cws:~$
```

DevNet Expert Lab - Module 2 - 개발 도구

- 개발도구는 개발 환경에 사전 설치되어 있으며, 응시자가 원하는 도구를 선택적으로 사용가능합니다.
 - Visual Studio Code
 - Atom
 - Vim
 - **개발 도구 사용 시, 단축키를 잘 활용하면 좋습니다!**
 - Search, Replace
 - Page UP, Down
 - Go Line/Column
 - Last Edition Location
 - 기타
- (* VSCode 리눅스 기준 단축키)



DevNet Expert Lab - Module 2 - 기술 문서

- 외부 참고 문서(External Document) link 제공


The screenshot displays the Cisco DevNet Expert Documentation website. The 'THIRD PARTY SOFTWARE' section lists various tools, with 'Git' circled in red. A red arrow points from this link to a separate screenshot of the Git documentation website. The Git website shows the 'Reference' section, which includes links to 'Quick reference guides: GitHub Cheat Sheet' and 'Visual Git Cheat Sheet', as well as a 'Complete list of all commands'.

[illegible]

DevNet Expert Lab 시험 응시 결과

- 시험 결과는 당일 오후 또는 다음날, 이메일로 통보됩니다.

Your Cisco Expert Level Certification exam score report is now available

 ccie@cisco.com
To: [REDACTED]

Please do not respond to this email.

DevNet Expert Score Report

Candidate: [REDACTED]
Lab Date [REDACTED]
Lab Site: [REDACTED]

Your Cisco expert level exam score report is now available and can be viewed in the Cisco Expert Level Certifications Tracker portal at:
https://ccie.cloudapps.cisco.com/CCIE/Schedule_Lab/CCIEOnline/CCIEOnline

The score report will show your performance in each topic of the practical exam version you took, as per the published Practical Exam Topics. Your breakdown in each exam topic is a percentage of the total number of possible points, not the number of points earned. If you PASS the practical exam, you will not see the percentage breakdown per exam topic.

IMPORTANT: Please let us know how we are doing by completing the survey. Your feedback is critical to improving the Cisco expert level certification program. You have two weeks from your practical exam date to complete the survey. Thank you in advance for completing the lab survey and for any positive or negative comments.

Keep your profile on the Cisco Expert Level Certifications Tracker portal up to date with your primary email ID to ensure you receive all notifications.

Stay informed of timely and relevant information about changes in the Cisco certification exams with the Cisco Certification Roadmaps at:
<https://learningnetwork.cisco.com/s/cisco-certification-roadmaps>

For track-specific information, policies, and more about the Cisco expert certifications, visit:
<https://www.cisco.com/c/en/us/training-events/training-certifications/certifications/expert.html>

If you have questions about this notification or want to contact a support agent, visit Certification Online Support at:
www.cisco.com/go/certsupport

Regards,
Cisco Global Certifications

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- [중국 베이징](#)
- [벨기에 브뤼셀](#)
- [아랍에미리트 두바이](#)
- [싱가폴](#)
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- [호주 시드니](#)
- [일본 도쿄](#)
- [Mobile Labs](#)

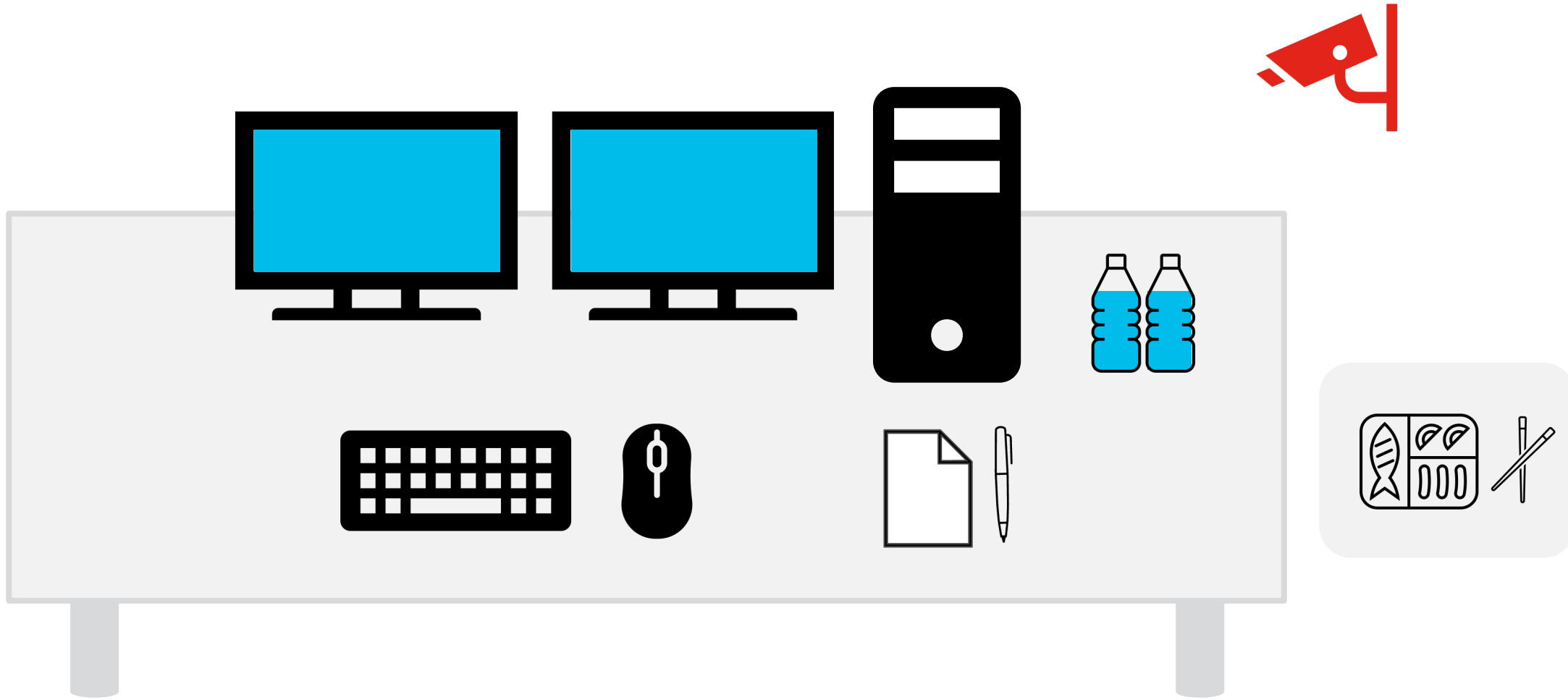


<https://www.cisco.com/site/us/en/learn/training-certifications/certifications/expert/exams-training.html#accordion-494ee38d1e-item-02a004a8af>

DevNet Expert Lab 체험기 - 시험장 환경



DevNet Expert Lab 체험기 - 시험장 환경



이번 세션 마무리

- DevNet 인증 시험 준비 시, 시험 주제 및 업데이트 내용을 미리 확인하세요!
- DevNet과 Cisco Learning Network 에서 제공되는 학습 콘텐츠를 잘 활용하세요!
- DevNet Learning Labs Center
 - <https://developer.cisco.com/learning/>
- Cisco Learning Network
 - <https://learningnetwork.cisco.com/>

감사합니다!