

KFSCIS/Florida International University

Fall 2025 Senior Design Project

AutoSec - Automated Network Configuration

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PROBLEM

Many individuals lack awareness of automated network configuration systems and have little understanding of how routers and switches actually operate. This often leads to confusion when managing network setups, troubleshooting connectivity issues, or even implementing basic networking tasks. Recent industry surveys show that only 3% of organizations feel their teams have sufficient automation skills, and more than 25% cite staffing shortages as a major barrier to adopting network automation. In educational environments, limited funding and understaffed IT departments create additional challenges, with nearly 30% of schools reporting they do not have enough resources to support modern networking technologies. Together, these factors highlight a growing need for tools and solutions that simplify configuration processes, automate repetitive tasks, and reduce the reliance on deep technical expertise.

SYSTEM DESIGN

Frontend: HTML, and CSS were used to create the website in which we educate our users about automated configuration environments.
Backend: Python and YAML were used to create the switch and router scripts. YAML is used to automate the configurations while Python is utilized for storing the configurations.

FUTURE WORK

- Creating a full curriculum that teaches our viewers how to create their own automated configuration environments entirely from scratch, even if they have no prior experience in coding or hardware.
- Provide a live demo in which they can ask questions and take notes. After their video lesson is complete, users can demonstrate their newfound knowledge through a real-life exercise that could be used in a real IT job setting.
- Providing a live chat with trained professionals to answer questions and to guide our users along their training videos.
- Research and observe IT professionals in order to create authentic and genuine virtual experiences that our clients will use during their curriculum

CURRENT SYSTEM

There are many websites that can explain what switches and routers are but very few actually teach IT professionals how to actually configure them especially through Automation. Most resources teach users basic concepts and definitions rather than teaching hands-on skills. Even automation tools such as Python scripts, YAML files, or configuration frameworks to automate network setups are rarely covered. Basically, there is a lack of skill-based education in automated network configuration.

OBJECT DESIGN

After utilizing HTML, CSS, Python, and YAML, we were able to create three deliverables:

AutoSec official website with the following pages:
Home - an introduction to our company with corresponding links to each page
Switch 1 - provides information about the main switch used in the switch/router demo
Router - teaches users about what a router is and how it is used
Failover Switch - explains that a failover switch is used in case the main switch fails
Usage - provides a step-by-step guide on how to set up the switch/router demo
About - teaches users about Python scripts

Python Switch File
Router YAML file

SUMMARY

AutoSec streamlines network configuration by replacing manual processes with automated and beginner-friendly tools. The system demonstrates how automation improves reliability, reduces human error, and provides assistance for users with limited technical experience without driving them away with more complicated terminology.

IMPLEMENTATION

```
PS C:\Users\Cecil\Desktop> python Firewall.py
[.] Using detected port: 22

[*] Starting FIU Capstone Cisco 2600 Router configuration...

~ enable
~ configure terminal
~ hostname FIU_SHOWCASE_FIREWALL
~ no ip domain-lookup
~ service password-encryption
~ enable secret 123456789
~ username admin privilege 15 secret 123456789
~ line console 0
~ password 123456789
~ login local
~ exec-timeout 10 0
~ logging synchronous
~ exit
~ line vty 0 4
~ password 123456789
~ login local
~ transport input ssh telnet
~ exec-timeout 10 0
~ exit
~ ip domain-name fiu.lab
~ ip cef
~ ip dhcp excluded-address 192.168.1.1 192.168.1.10
~ ip dhcp pool LAN01
~ network 192.168.1.0 255.255.255.0
~ default-router 192.168.1.1
~ dns-server 8.8.8.8
~ lease 7
~ exit
~ access-list 1 permit 192.168.1.0 0.0.0.255
~ access-list 10 permit 192.168.1.50
~ access-list 10 deny any
~ access-list 100 permit tcp 192.168.1.0 0.0.0.255 any eq 80
~ access-list 100 permit tcp 192.168.1.0 0.0.0.255 any eq 443
~ access-list 100 permit udp 192.168.1.0 0.0.0.255 any eq 53
```

REQUIREMENTS

AutoSec is required to help people without intimate technical knowledge. It will come with basic glossary terms and other optional help that will walk users through the actions, doing so without taking too much time explaining all the technical jargon.

- Glossary of basic networking terms
- Quick help pop-ups explaining features in simple terms
- Optional help that walks the users through each action

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