Engaging Students with Customized Linux Images for Cybersecurity Training

Atom & Marie Ramirez

SCALE 19x

Agenda

- Intros
- Cyberpatriots and Cybersecurity
- Why Custom VMs
- Approach to Customizing Linux VMs
- Demo
- Questions

Intros - Atom

- Freshman at UC Merced - Majoring in Applied Mathematics concentration in Computer Science
- Been in Cybersecurity for about 7 years
- Founded Cybersecurity club, President for 3 years
- I enjoy playing basketball and volleyball
- I have published three articles about Cybersecurity

@rksmissionpossible

Intros - Marie

- Rising senior at Bishop Amat High School
- Competed in CyberPatriots for 7 years
- President of Cyber Security Club
- I have published three articles about Cybersecurity
- I like volleyball and photography

@rksmissionpossible

What is Cyberpatriots ?

- Cyber Defense
- National competition
    But includes Canada, UK, AUS,Saudi Arabia
- High School & MIddle School
- Teach cybersecurity and inspire students to pursue careers in Cybersecurity and STEM fields

https://www.uscyberpatriot.org/

NORTHROP GRUMMAN

AFA

CYBER PATRIOT

Cyberpatriot Competition

- Teams consists of up to 5 members
- Approx. 5,200 teams competed nationwide this year
- Uses standalone virtual machines
- Goal - Find vulnerabilities to reach 100 points per image
- Focus on cyber defense tasks

Cyberpatriot Competition Challenges

Ubuntu 16   Windows Server 2019   Windows 10 Desktop   Cisco Packet Tracer   Quiz/Internet Searches

Each team is given 3 VMs - Ubuntu/Linux, Windows 10, Windows Server

The Cyber Training Linux Image

- Ubuntu 18 or 20 (never the latest)
- VMWare based virtual machine
- Competitors are given a zipped up VM to download during the competition
- Contains vulnerabilities, mis configurations, and policy violations
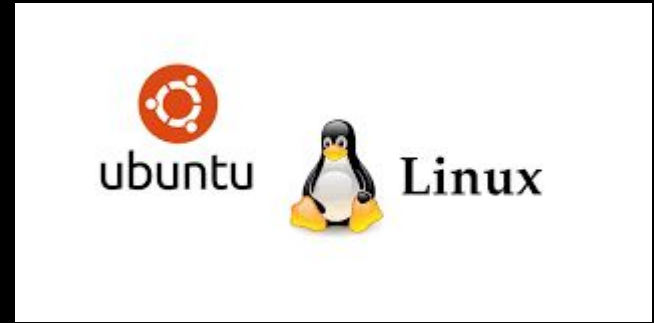
Cyberpatriot Cyber Defense

- OS updates
- Firewall
- Local Security policies
  - Password policies
  - Lockout policies
- Software management
- User Account management
- Unauthorized software

Approach to Customizing Linux VM

- Understanding the students interests
     We were once student
- Identify what can be customized
- Identify how it can be automated
- Create script to automate customization settings

Cyber Camps Training

- Each student is given a Linux VM
- Hands on training
    - Command line
    - GUI administration
- Presented with challenges similar to the competition

Why Custom VMs?

- Problem keeping kids engaged
- Making custom VMs to help students associate cyber task with something they are familiar with
- Great Teaching tool

Customizations

- Themed background
- Hostname
- User Accounts with passwords, some weak others complex
- Unauthorized software
- Scenario a.ka. README file
- Unauthorized files e.g. media files

Customizing with Python

- Our constraints
  - No external modules - Standalone script
  - Keep it simple - just enough to run the commands
- Some features
  - Command line options
  - Use YAML configurations to define each theme

make_theme.py Layout

```
make_theme/
├── conf
│   └── mk_theme.yml
├── log
├── mk_theme.py
├── themes
│   ├── among_us
│   ├── avengers
│   ├── justice_league
│   └── stranger_things
│       ├── README.html
│       ├── readme.tmpl.html
│       ├── wallpaper_st.png
│       └── theme.yml
```

Configuration directory

Log directory

Theme directories

Theme directory - Stranger Things

README template file

Wallpaper image

Theme configuration (YAML format)

make_theme.py command line

```
$ make_theme.py [options]

[options]
- theme <theme_name>
- undo Undo the -theme specified
- list List supported themes
- v Run in verbose mode
- h Display the help
```
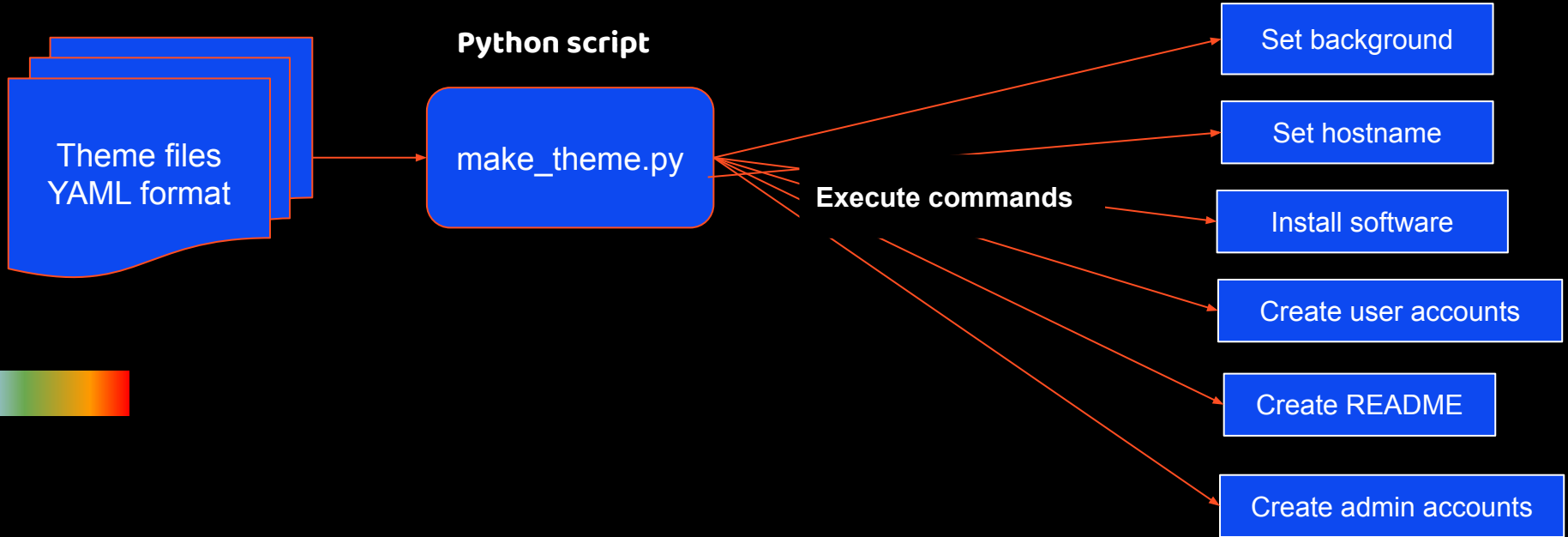
Sample YAML file

https://github.com/gravityatom/make_theme/blob/main/themes/stranger_things/theme.yml

Make_theme.py Workflow

Python script

Theme files
YAML format

make_theme.py

Execute commands

Set background

Set hostname

Install software

Create user accounts

Create README

Create admin accounts

Question Time !!!!

Marie's email: mariecurieramirez@gmail.com

Atom's email: ramirezatom@gmail.com

Source code for make_theme available on github

https://github.com/gravityatom/make_theme