

Management and Operations of Networks, Services, and Systems

Experimenting with devops

Ricardo Morla

FEUP – GORS/M.EEC, GRS/M.EIC



Continuous Integration Steps

1. Development

- Write code for the network (devices, services, applications)
- Perform automated sanity checks on code

2. Staging

- Perform automated integrated tests in lab (mininet? staging network?)

3. Deployment (provisioning)

- Automatically deploy code that passes tests
- Obtain feedback from network management tools
- Go back to development

Provisioning Playbook

Bootstrap, manual

1. Setup the control device
2. Chose target device and setup remote control mechanism

Cycle, automated

1. Download code and configure device
2. Test running system
3. Apply monitoring mechanisms
4. Control the device via API
5. Connect the NOC to device monitoring and control
6. Perform typical management tasks

Boostrapping

1. Setup the control device

- Your personal laptop or some PC that you can get your hands on
- An RS232 serial to USB connector will be handy
- Install any configuration software you may need (python, libraries, etc)

2. Chose target device and setup remote control mechanism

- This is likely a manual task
- Connect to the console
- Backup and reset the device (clear-slate)
- Choose between setting up a management VLAN or dedicated network vs. management access via service network vs. keep using the console (really??)

Infrastructure to experiment with

- Linux
- Cisco iOS, mikrotik routerOS, etc
- Docker and kubernetes, virtualization server
- Mininet
- neutron

Automation tools to experiment with

- Bash
- Python
- Python libraries (netmiko, nornir)
- Jinja2 for templating
- Ansible, salt, chef, puppet
- etc

Devices and services to deploy

- Apps
 - Simple web server with proxy and load balancing, e.g. using nginx
 - Complex apps like gitlab, wordpress/mysql, react/nodejs/mongodb, ELK, Hadoop
 - Management tools like nagios, nextms, inciga, pandoraFMS, libreNMS, zabbix, observium, etc
- Networking
 - IP addressing and connectivity, including static routing and DMZ
 - DNS server in linux and iOS/routerOS
 - Internal and external routing
 - Firewall and VPN
 - SDN network function programming
 - SDN dynamic network creation for tenants

Goal

- Experiment with infrastructure, automation tools, and devices and services to deploy
- Experiment with 5 apps/services (from previous slide)
 - 2 Apps – Web and management solution
 - 3 networking services – out of the 6
 - Choose, discuss with instructor
- Project:
 - For a given device/service of your choice
 - Design the management solution – requirements, FCAPS, etc
 - Develop code for provisioning the service of your choice
 - Bootstrap and provision service
 - Argue about a specific need for reconfiguring your service
 - Do it, measure how long it takes

Plan

- 4h in class for each of the 5 apps/services (10 weeks)
- 6h in class for wrapping up project (3 weeks)
- Don't forget about the project report:
 - 4 page, double column, IEEE paper format
 - Describe service, management solution, code, tools, and reconfiguration