



NetDevOps!

Get ready to get your hands dirty



INTUITIVE



It is all about learning!



Agenda

- What do we want to resolve
- What resources/tools you have



74% of operators report network changes have significantly impacted their business*

97% of operators admit human factors cause network outages*

22% of unplanned outages caused by human error**

From: [REDACTED]
Date: [REDACTED]
To: [REDACTED]
Cc: [REDACTED]
Subject: switch uptime

[REDACTED] 1>sh ver

Cisco Internetwork Operating System Software
IOS (tm) s72033_rp Software (s72033_rp-ADVENTERPRISEK9_WAN-M), Version
12.2(18)SXF3, RELEASE SOFTWARE (fc1)
Technical Support: <http://www.cisco.com/techsupport>
Copyright (c) 1986-2006 by Cisco Systems, Inc.
Compiled Tue 11 Feb 2008 14:14:10
Image text-base: c:\10101040, data-base: c:\122h0000

***Don't encourage this
kind of behavior!!!!***

ROM: System Bootstrap, Version 12.2(17r)S2, RELEASE SOFTWARE (fc1)
BOOTLDR: s72033_rp Software (s72033_rp-ADVENTERPRISEK9_WAN-M), Version
12.2(18)SXF3, RELEASE SOFTWARE (fc1)

[REDACTED] uptime is 11 years, 31 weeks, 1 day, 16 hours, 46 minutes
Time since r-secmgtel-1 switched to active is 11 years, 31 weeks, 1 day, 17
hours, 29 minutes

System returned to ROM by s/w reset (SP by power-on)

System restarted at 20:47:24 UTC Thu Mar 9 2006

“Every time we implement a network change something goes wrong...”

“Isn’t it great, our switch hasn’t been rebooted in 6 years”

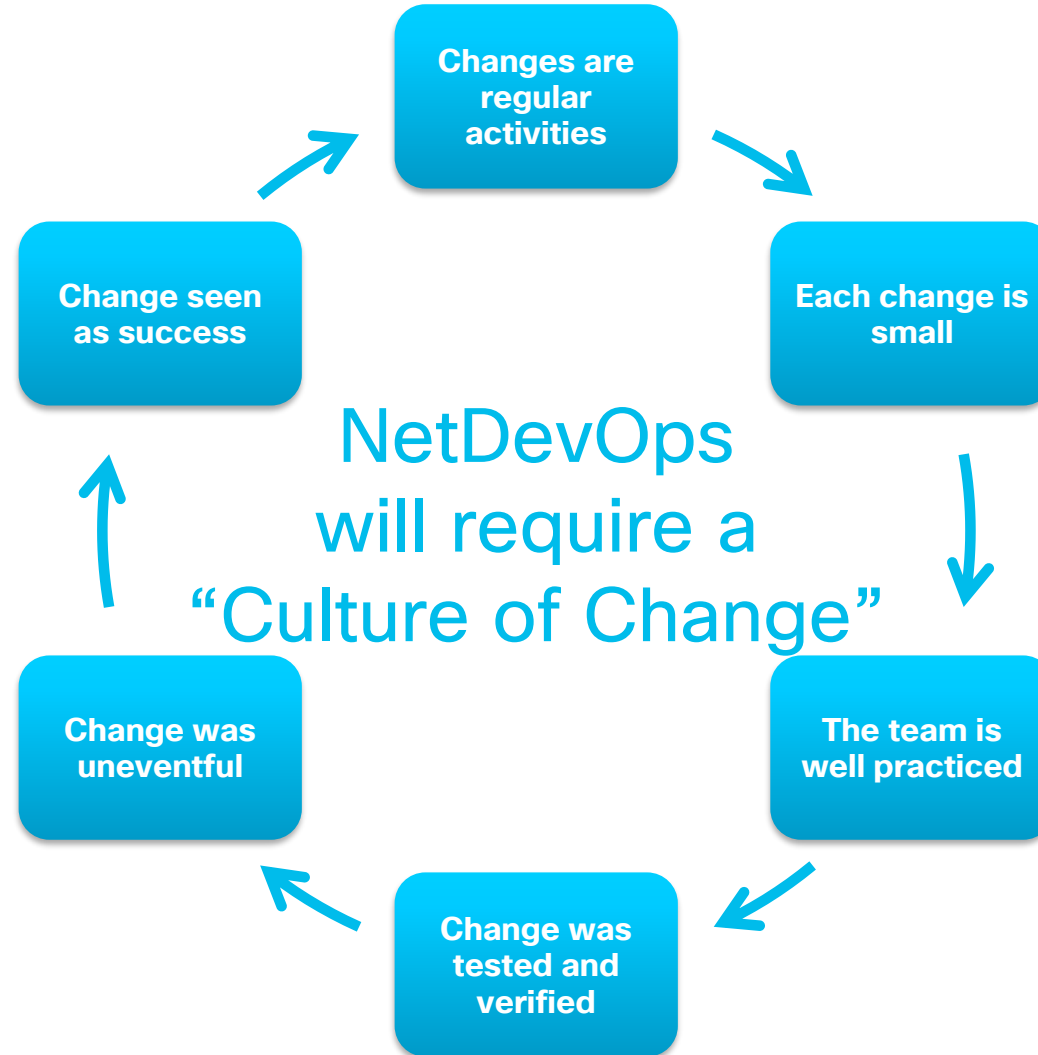
“We can’t update/change the network, our business won’t allow it”

** Paraphrased quotes from actual network operators*

Today's Network Operations Culture and Mindset



The NetDevOps Culture and Mindset




```
module "vpc" {  
  source = "terraform-aws-modules/vpc/aws"  
  
  name = "my-vpc"  
  cidr = "10.0.0.0/16"  
  
  azs          = ["eu-west-1a", "eu-west-1b", "eu-west-1c"]  
  private_subnets = ["10.0.1.0/24", "10.0.2.0/24", "10.0.3.0/24"]  
  public_subnets  = ["10.0.101.0/24", "10.0.102.0/24", "10.0.103.0/24"]  
  
  enable_nat_gateway = true  
  enable_vpn_gateway = true
```

This doesn't count as "Network as Code"
(or at least isn't ENOUGH)

```
tags = {  
  Terraform = "true"  
  Environment = "dev"  
}
```

Principles of "Network as Code"

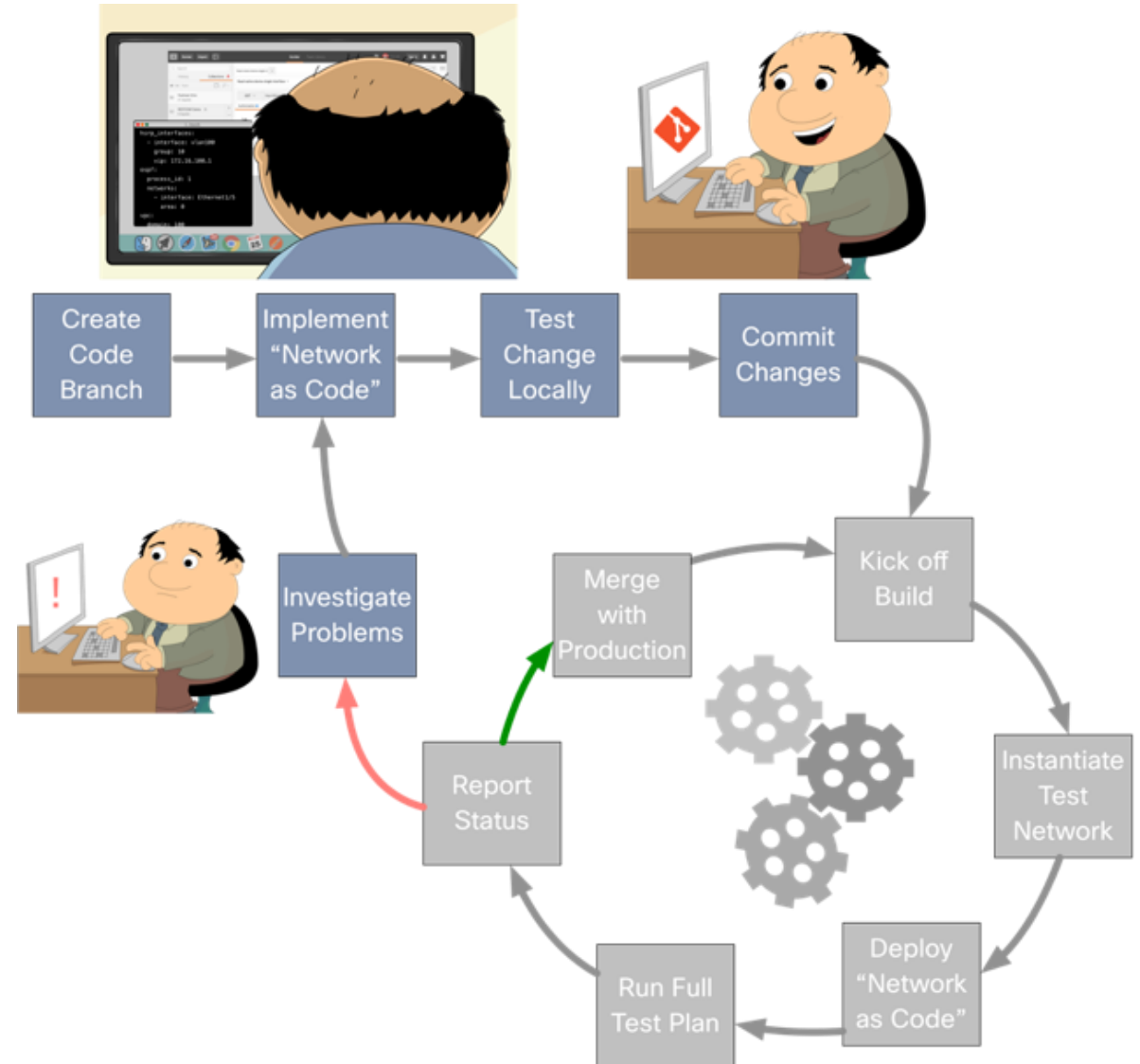
- Store Network Configurations in Source Control
- Source Control is a Source of Truth*
- Configuration Management Deployment through APIs



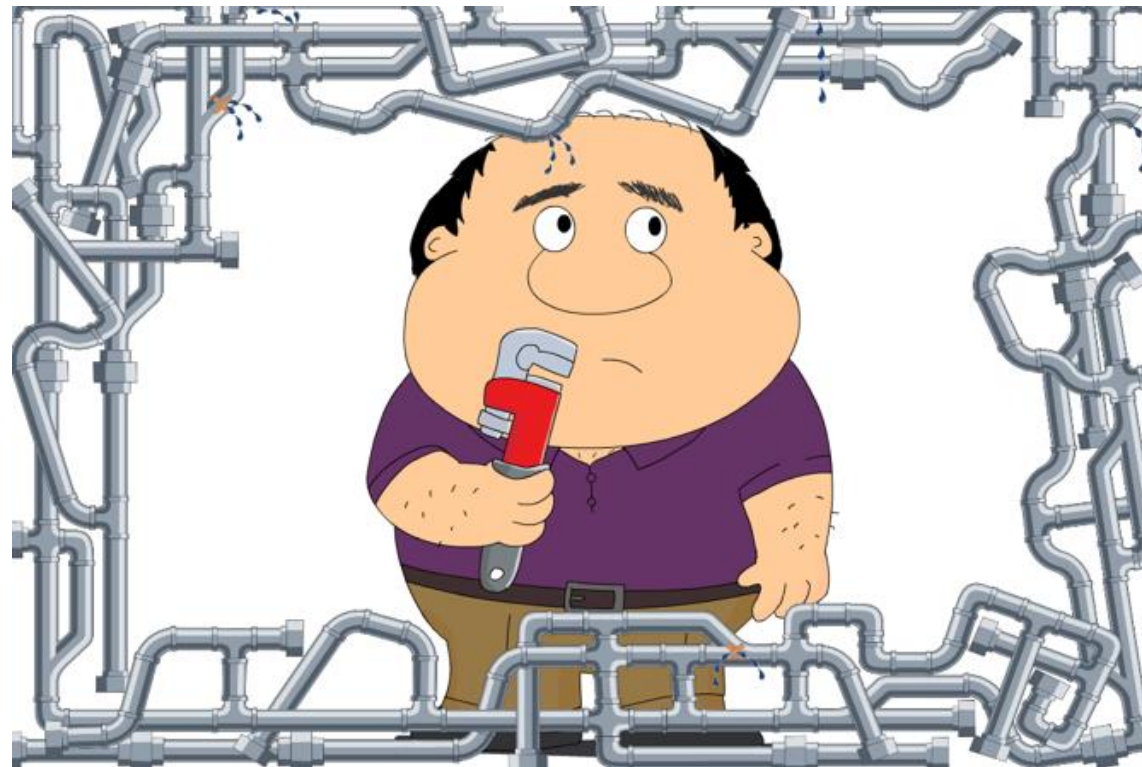
** The "Source of **Whole** Truth" for the network will likely be constructed from multiple systems holding specific details. For example, IP details would come from IP Address Management.*

Continuous Delivery Pipeline for Network Configuration

- Network Configuration stored in Source Control
- Changes are proposed in code “branches”
- CI/CD Build Servers deploy and test proposed configurations
- Successful configurations automatically deployed to “Production”



- What resources/tools you have



The NetDevOps Engineers Tool Bag

(Example tools, not comprehensive)

Distributed Source Control

(git, Subversion, Mercurial, GitHub, BitBucket, GitLab)

Build Server

(GitLab, Jenkins, Team City, Drone)

Configuration Management

(Ansible, Puppet, NSO, NAPALM, DIY)

Network Test Tooling

(PyATS, TRex, Robot, Behave)

Telemetry & Monitoring

(ELK, Grafana, Pipeline, UTM)

CLI

SNMP

NETCONF/
RESTCONF

gRPC

REST APIs

YANG/Native Data Model

Configuration Data

Operational Data

Network Device

Network
Virtualization
Platforms
(VIRL/CML, NFVIS,
Vagrant)

Development Environment

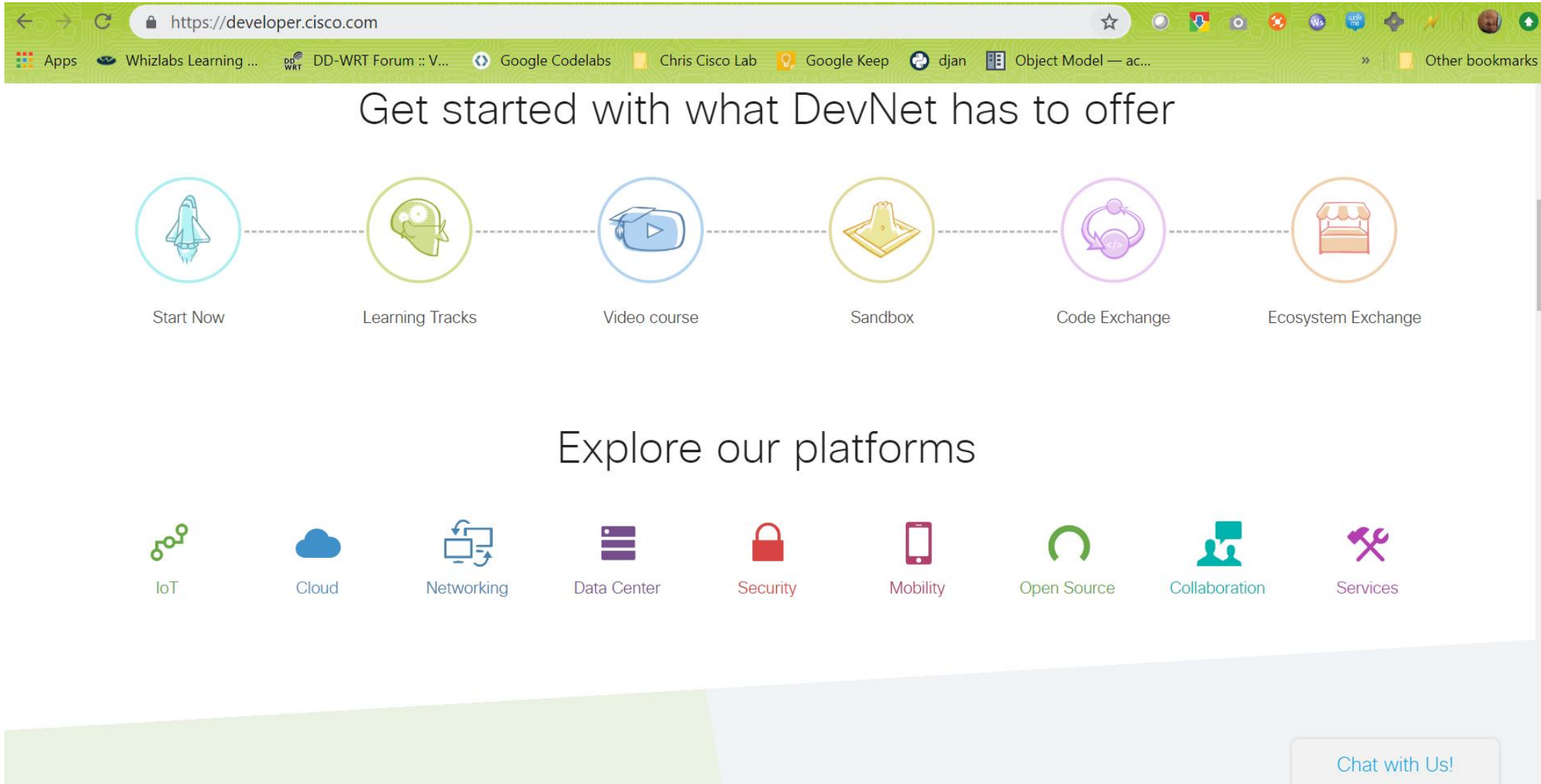
(Vagrant, NSO, VIRL/CML)

Test Environment

(VIRL/CML)

Production Environment

DevNet



<https://developer.cisco.com>

SIGN UP FREE

Vagrant UP



HashiCorp

Vagrant

Development Environments Made Easy

Guestshell and spark integration

https://github.com/CiscoDevNet/python_code_samples_network/tree/master/spark_checkin#create-folder-for-scripts-and-add-script

- It can be spark or other application integration

Windows Subsystem for Linux



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About the Windows Subsystem for Linux

Install on Windows 10

Install on Windows Server

Initialize Distro

User accounts and permissions

Distro management

Windows Subsystem for Linux for Enterprise

Interoperability

Build a Custom Distro

Frequently Asked Questions

Troubleshooting

Release Notes

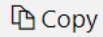
Windows Subsystem for Linux Installation Guide for Windows 10

07/23/2018 • 2 minutes to read • Contributors  all

Install the Windows Subsystem for Linux

Before installing any Linux distros for WSL, you must ensure that the "Windows Subsystem for Linux" optional feature is enabled:

1. Open PowerShell as Administrator and run:

```
PowerShell  Copy  
  
Enable-WindowsOptionalFeature -Online -FeatureName Microsoft-Windows-Subsystem-
```

2. Restart your computer when prompted.

In this article

[Install the Windows Subsystem for Linux](#)

[Install your Linux Distribution of Choice](#)

[Complete initialization of your distro](#)

[Troubleshooting:](#)

Is this page helpful? ✕

Yes


No

<https://docs.microsoft.com/en-us/windows/wsl/install-win10>

DevNet Sandbox

Which type of Sandbox do I need?

ALWAYS-ON LABS ▸




Always-on

These ready-to-go labs run on the DMZ with public access and provide access to “kick the tires” with non-admin APIs on the fly.

- ✓ No reservations required
- ✓ Instant access with no setup time
- ✓ Easily shared by many
- ✓ Powerful access to APIs

Learn more

RESERVATION LABS ▸



Reservation

These “pre-packaged” labs require reservations. They include Cisco Technology packaged into a mini enterprise network!

- ✓ Full, administrative access
- ✓ Private environment with VPN
- ✓ In-lab automation tools
- ✓ Custom setup automation

Learn more

Chat with Us!

<https://developer.cisco.com/site/sandbox/>

NetDevOps {LIVE}



<https://developer.cisco.com/netdevops/live/>

What do do next?

- NetDevOps Readings
 - [Embrace NetDevOps, Say Goodbye to a "Culture of Fear"](#)
 - [NetDevOps Goes Beyond Infrastructure as Code](#)
 - [What does "Network as Code" Mean?](#)
 - [A Network Engineers Journey in Programmability](#)
 - [NetDevOps and the Rise of the Programmable Network](#)
- NetDevOps Learning Resources
 - [Network Programmability Basics Video Course](#)
 - [NetDevOps Learning Labs](#)
 - [NetDevOps Live!](#)
- NetDevOps Videos
 - [How to be a Network Engineer in a Programmable Age](#)
 - [Network as Code in Action](#)
 - [Benefits of Configuration Management](#)



Thank you



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