Management and Operations of Networks, Services, and Systems

Repositories and CI/CD

Ricardo Morla

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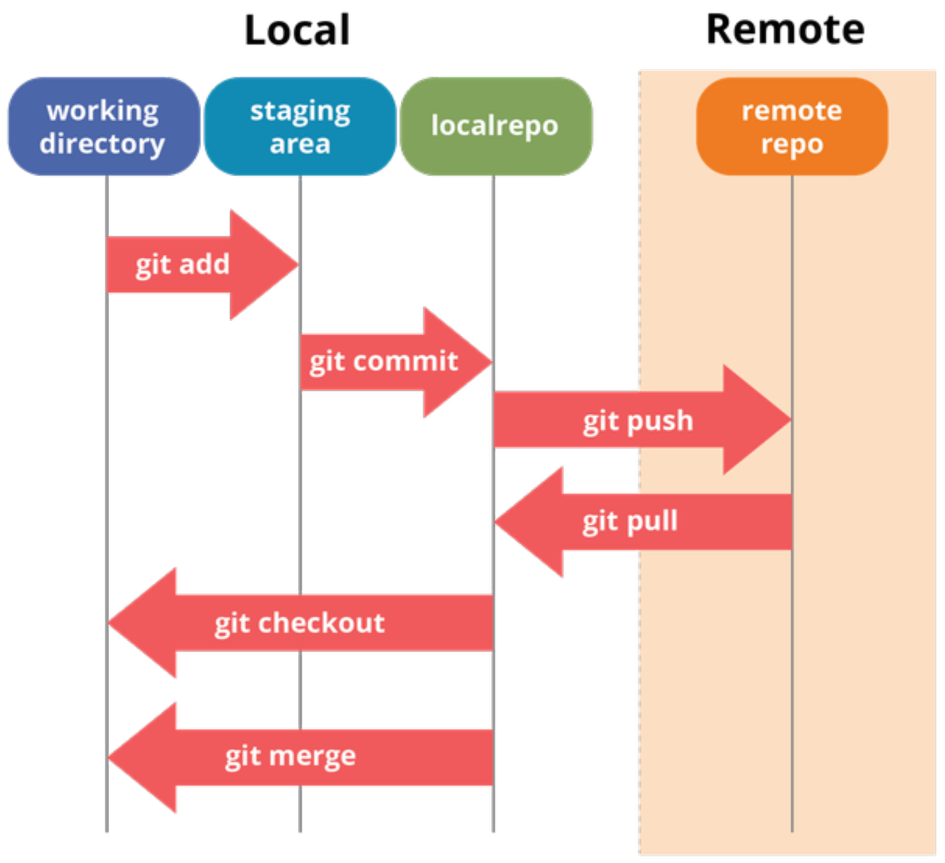
Code Repository Workflow

- Add, commit, push
- Pull
- Checkout, merge



Branches

- Alternative “realities” or different versions of the code
- Always start with master
- Branch to try new concepts, features, different implementations
- Can merge branches into others
  - e.g. bring new features back to master

Continuous Integration / Continuous Deployment

- Version control
  - Found problem with code, can get back to an older version that worked
- Agile
  - Divide in small parts, implement
- Pipeline
  - Workflow of code delivery process

https://gruntwork.io/guides/automations/how-to-configure-a-production-grade-ci-cd-setup-for-apps-and-infrastructure-code/#cicd_workflows

Types of code

- Application code
  - Source tar.gz, jar, exe, docker image, VM image
  - The software you want to run in your infrastructure
- Infrastructure code
  - The code that you write to setup the infrastructure
  - Code that interacts with the docker API, etc
- Live infrastructure config
  - Frontend for infrastructure deployments
  - Parametrized for a particular deployment (e.g. dev vs. deploy1 vs. deploy2)

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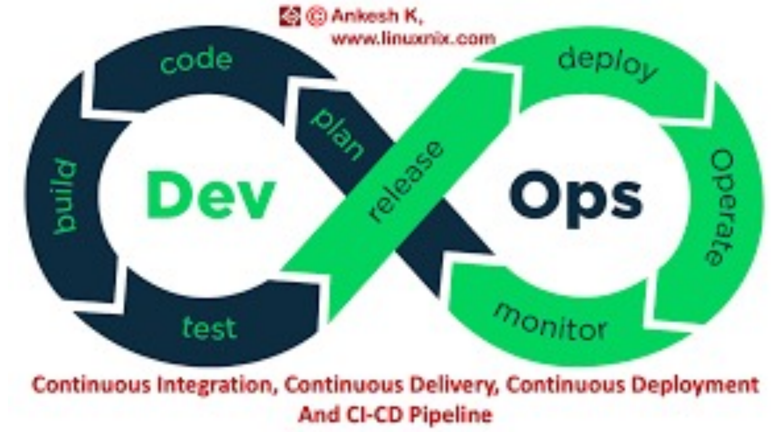
Continuous Integration / Continuous Deployment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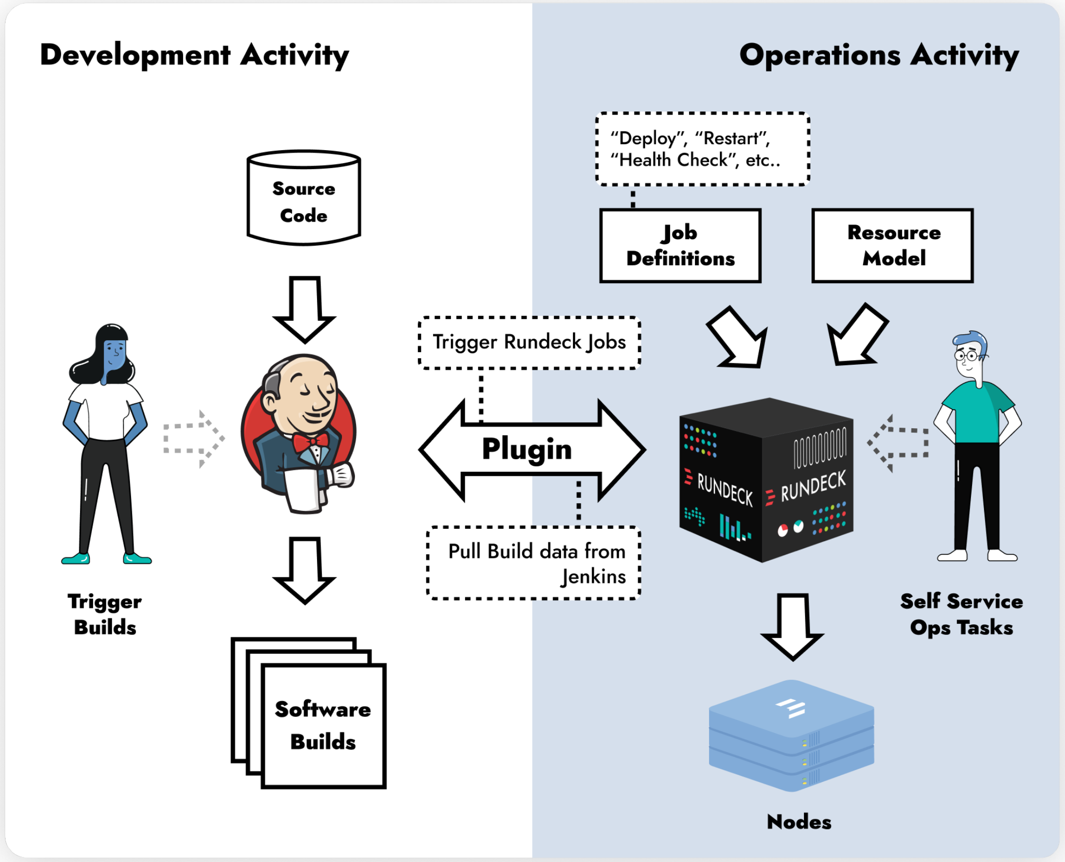
code
plan
build
Dev
test
release
deploy
Ops
Operate
monitor
Continuous Integration, Continuous Delivery, Continuous Deployment And CI-CD Pipeline



Code vs. build

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Continuous Integration, Continuous Delivery, Continuous Deployment And CI-CD Pipeline

- Straightforward distinction e.g. in C or Java … or when you package repositories
  - Source code vs. executable binaries
- Need a build phase for infrastructure?
  - Depends on which language you write the infrastructure code and tools
  - What you’re actually deploying are configuration files

Test

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Continuous Integration, Continuous Delivery, Continuous Deployment And CI-CD Pipeline

- Unit test
  - Sandbox or dry run tests of individual components / configurations
  - Some networking equipment has this option
- System test
  - Deploy the different network components and test their interactions
  - Testing environment? Network emulator, virtualization
- Staging environment
  - Replica of production environment
  - Test specifics of production environment (number of nodes, addresses, etc)

Release vs. deploy

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Continuous Integration, Continuous Delivery, Continuous Deployment And CI-CD Pipeline

- A release is the software product, ready to be deployed
- A deployment is a release configured for the target environment

- What’s the difference for infrastructure?

Abstractions for infrastructure code

- Target: specific deployment of infrastructure
- Abstraction 1:
  - Function that takes parameters in and outputs configuration files
  - How do the configuration files end up in the infrastructure?
- Abratraction 2:
  - Code that takes care of generating and deploying configuration files
  - Based on parameters from the user

Example

https://archive.nanog.org/sites/default/files/monday_general_autobuild_vicente_63.28.pdf

- NETCONF communication with devices
- Ansible with NETCONF module for automation
- Github as repository
- Jenkins for automating CI/CD

- Operations
  - Build: gets facts from deployment, validates configurations
  - Test: dry run in target devices (JunOS, commit-check)
  - Deploy: see if there are changes pending (config vs state of devices), only deploy changes

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