Data Centers

Computer Networking: Beyond Routing & Switching

Herve Marcy

Cisco - Strategic Ecosystem Group

@hervemarcy

November 10th 2015

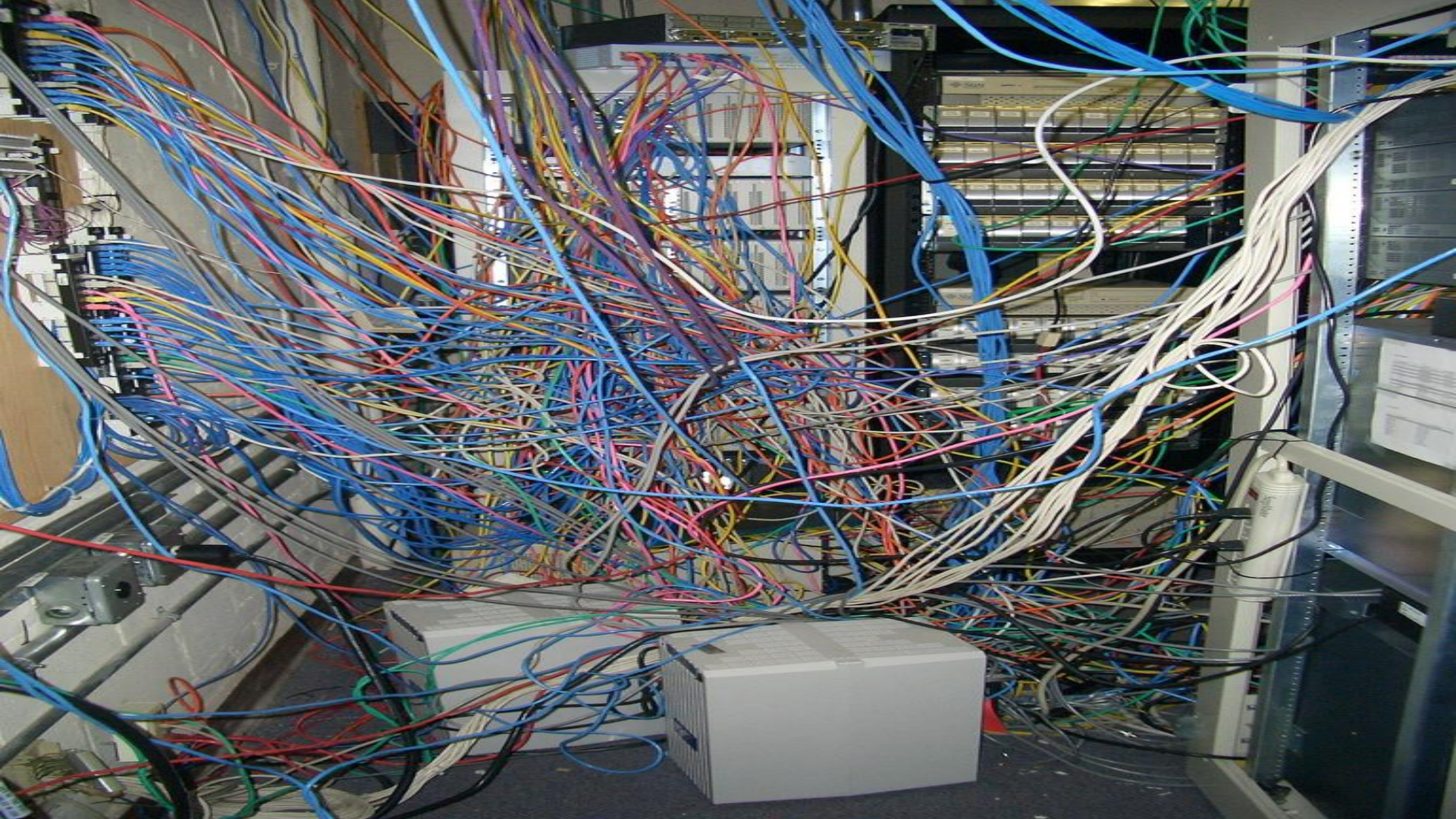

Google

What is a datacenter?

- It is a facility with dedicated power and cooling for the use of **IT equipment** (servers, storage, networking) using **software**

- It is aimed at **delivering IT services** via the network to end users


Google



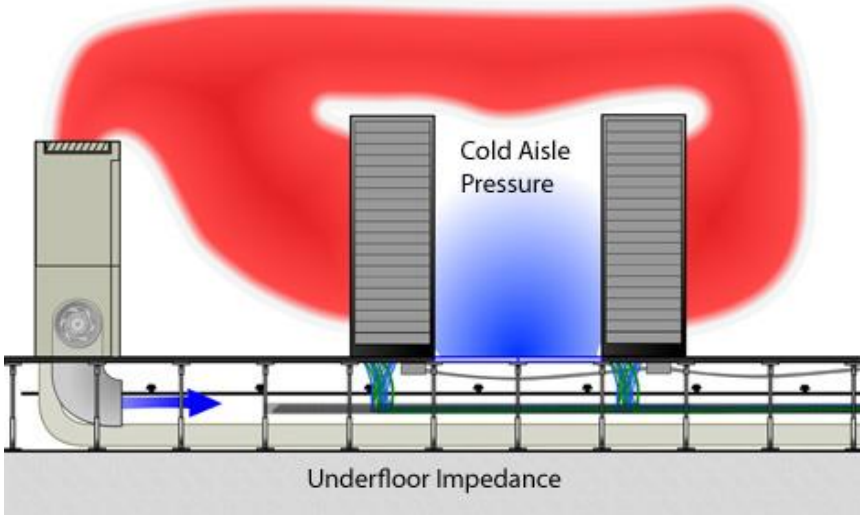
What is needed to make sure this hardware works properly?

- Power

- Cooling

- Racks

- Cables!

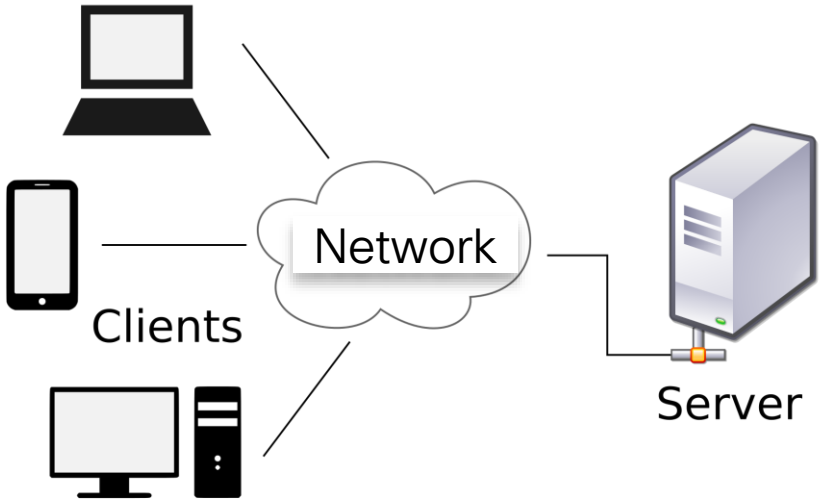


Architectural changes

- Mainframes

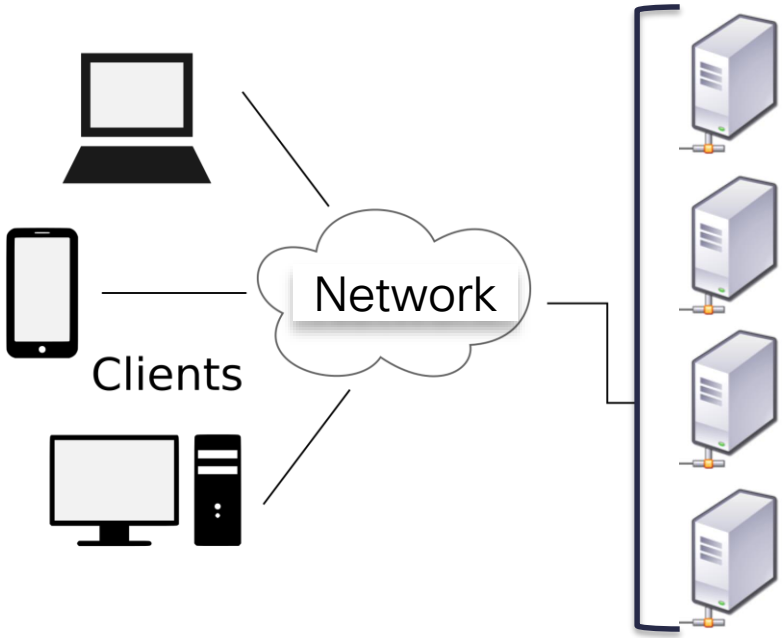
Architectural changes

- Client / Server



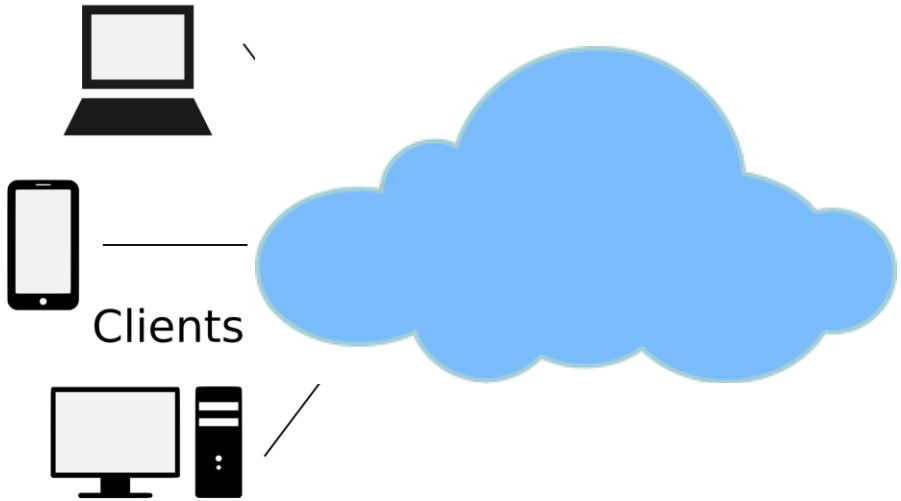
Architectural changes

- Client / Server with virtualization



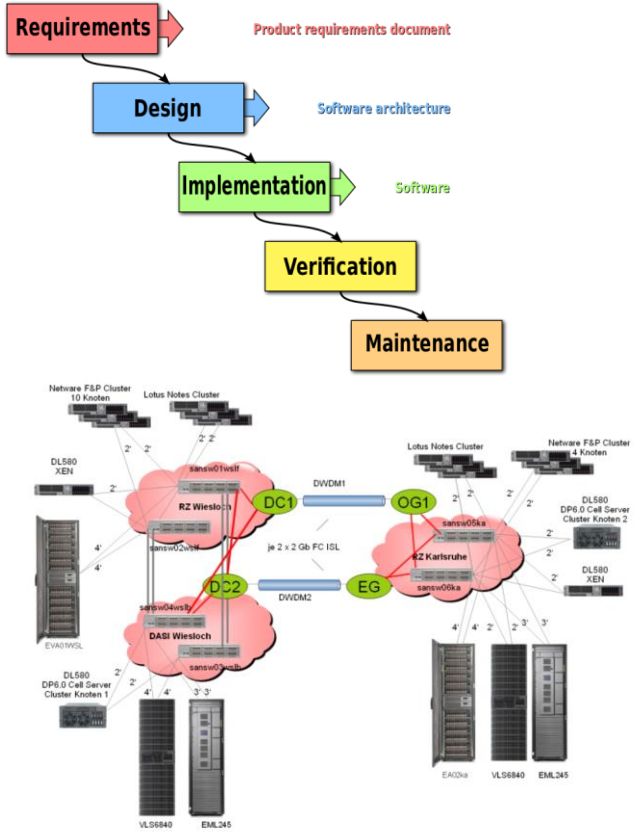
Architectural changes

- Cloud
- Cloud?
  - Software-as-a-Service
  - Infrastructure-as-a-service
  - Platform-as-a-service
- Hybrid cloud



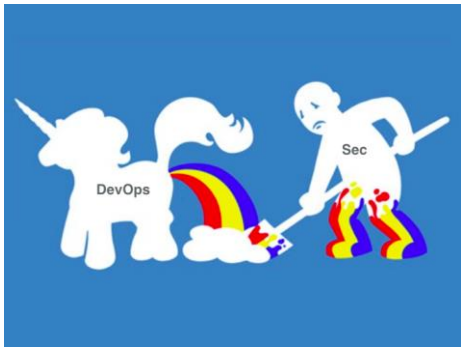
What about processes?

- Development:
  - Waterfall / Agile / Scrum
- Infrastructure
  - ITIL (IT Infrastructure Library): Catalogue of good practices to manage an IT infrastructure
  - Remember the Google picture?
  - Security
  - Business continuity



The convergence between IT operations and development: the rise of DevOps

- Container technology (Docker) allows to abstract the underlying infrastructure to provide only what developers need for their application
- New trend: microservices
- Continuous Integration (CI) / Continuous Delivery (CD)
- If the devs have more power… what about Ops people?
- Reorganization of the teams, security management, etc.



“Software is eating the world”

Marc Andreessen

Open-source software: working on common problems together

- Development model (not a business model)
- Free software movement started in the 80's (Richard Stallman) - Linux and Open-source software is ubiquitous in the datacenter
- People solve their problems and share them so that others contribute make the software better
- Main advantage: innovation
- Recent successful examples:
  - Hadoop
  - OpenStack
  - Docker

Hadoop: an open-source project that helps users analyze large quantities of data

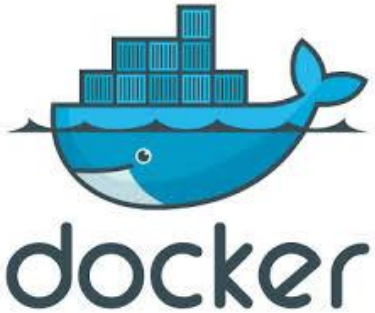
- Collection of open-source projects (from the Apache foundation) to ingest and process large quantities of data
- Impact on the datacenter: how does that fit into our environment?
  - Rearchitect the application environment
  - Change data gathering processes
  - Redesign the server/storage/networking environment
- Advantage/drawback of open-source: volatility of the ecosystem
- **Hot topic:** Need for data scientists!!!!!!

OpenStack: a suite of components to build clouds, both private and public

- Open-source project started by NASA and Rackspace (a hosting company)
- Backed by major players in the industry (Cisco, HP, Red Hat, etc.) and start-ups (Mirantis)
- Impact on the datacenter: integrate existing infrastructure to build the cloud, change the processes
- **Hot topic**: NFVi (NFV infrastructure)

Docker is a project that aimed at creating containers for developers to easily deploy their applications

- Open-source project started by DotCloud (a PaaS service provider)
- Docker made it easy to deploy applications from the laptop to a server
- Promise:
  - more freedom and flexibility for developers
  - shorter time to market to deliver applications
  - Microservices to clean the application architecture



- Quickly gained popularity
- Impact on the datacenter: tools, organizational and process changes
- **Hot topic**: anything related to Docker ☺

The future of the datacenter: the evolution of the cloud architecture might be the fog architecture

- The amount of data produced around the world might become unmanageable (both from a storage and network perspective)
- The idea to solve this problem: analyze the data closer to its acquisition source
- Example: Analyze a pattern of people moving inside an airport
  - The data does not need to be uploaded to a central DC
  - Analysis can be done in a small DC/rack on site
  - If needed, the data or analysis results can be retrieved to a central DC to compare it with other airports

The bottom line

- A datacenter is more than just a big fridge
- It is made of hardware, software and processes
- Innovation in software (often driven by open-source) impacts both the hardware architecture and processes in the datacenter
- As students: look at how you can contribute to open-source projects
  - (true story, I get a job like that ☺)
- Be passionate about what you do!

Thank you.