2016 SUMMER INTERNSHIP @Google

Rafael Lourenço October 7th, 2016 NetLab Friday Group Meeting

(all info in this presentation is publicly available)



Alphabet

verily

Now you can create shortcuts for easier navigation across your favorite Google products. Show me how

Google fiber



Mobile

Google

About Google Products

Mobile
Get Google products on your mobile phone

Search for mobile Search Google wherever you are

Google

mobile phone

Maps for mobile View maps, your location and get directions on your phone Some products are handled by the same organizational structure (aka team)

Calico

 Each team <u>might</u> have its own developers, managers, commercial people, etc...





(...)

Google Platforms

- Most teams within the Platforms group exist to serve other product teams in Google, e.g.:
 - Infrastructure software: Borg, MapReduce, GFS, FlumeJava, BigTable, etc...
 - Infrastructure hardware: Servers, Racks, Cooling systems, Chips (TCUs), etc...
 - Networking hardware and software
 - Operations



Google Platforms and other Teams

Ex: Google Search Autocomplete

To implement Autocomplete functionality, Google Search Team needs low latency

Delegates construction of new Datacenters Google Platforms deploys new Datacenters: design ("manufacture") servers, network configuration, operation, etc.

The Datacenter as a Computer





SDN @Google

- SDN implementation started several years ago: already a well established technology
- B4 and Jupiter: fully SDN
- Each domain has its control plane, each control plane has several pieces of specialized software





My Internship Project

Developed a tool to perform a time-continuous assessment of Google's Software Defined Networks. This tool checked how different network properties evolved in a timeline. This computational-intensive task was distributed across several machines using Flume, a Google library that creates highly efficient parallel data-processing pipelines.



Next Challenges

- General:
 - ➢ Run the networks as hot as possible
 - > Make latency as small as possible
- Specific Colorless, Directionless, Contention-less ROADMs:
 - How to coordinate L2 and L3 restoration? (Should repair be made on L3 or L2?)
 - What is the availability improvement of CDC? Capacity utilization improvement? How much cheaper?
 - Demand forecast unpredictable: what is a good buffer strategy for capacity allocation?

