Anycast as a Load Balancing Feature
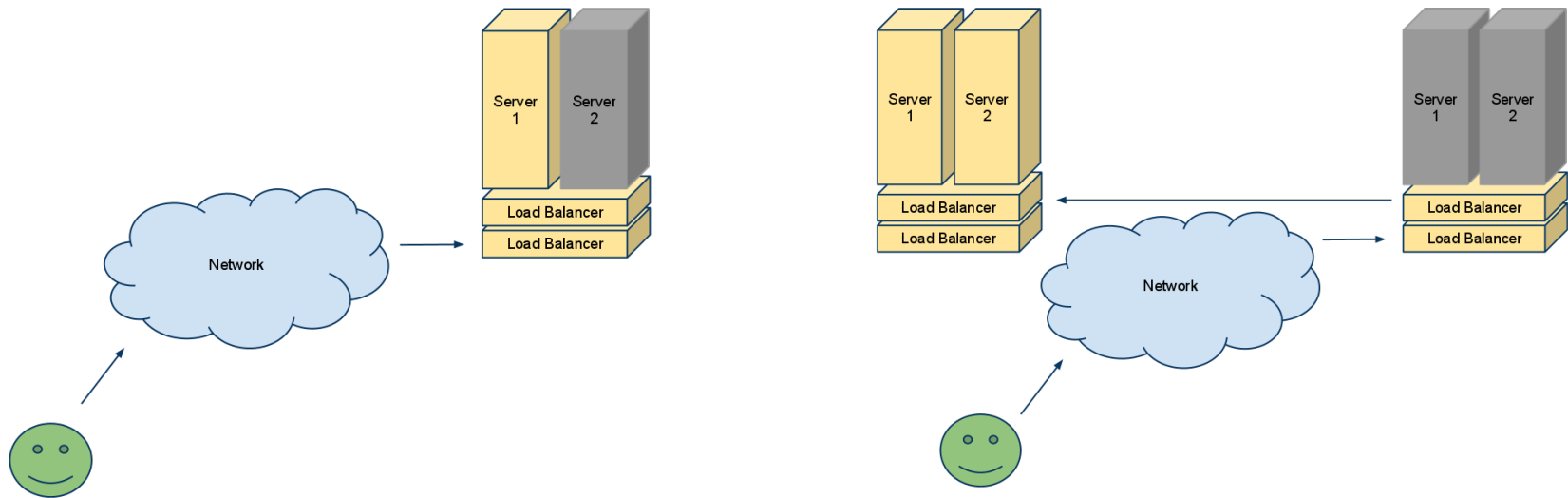
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Google

Introduction

- Service availability is critical to business function

- Large scale failures often require slow, manual restoration

- Maintenance of next-nearest fallback configuration is painful

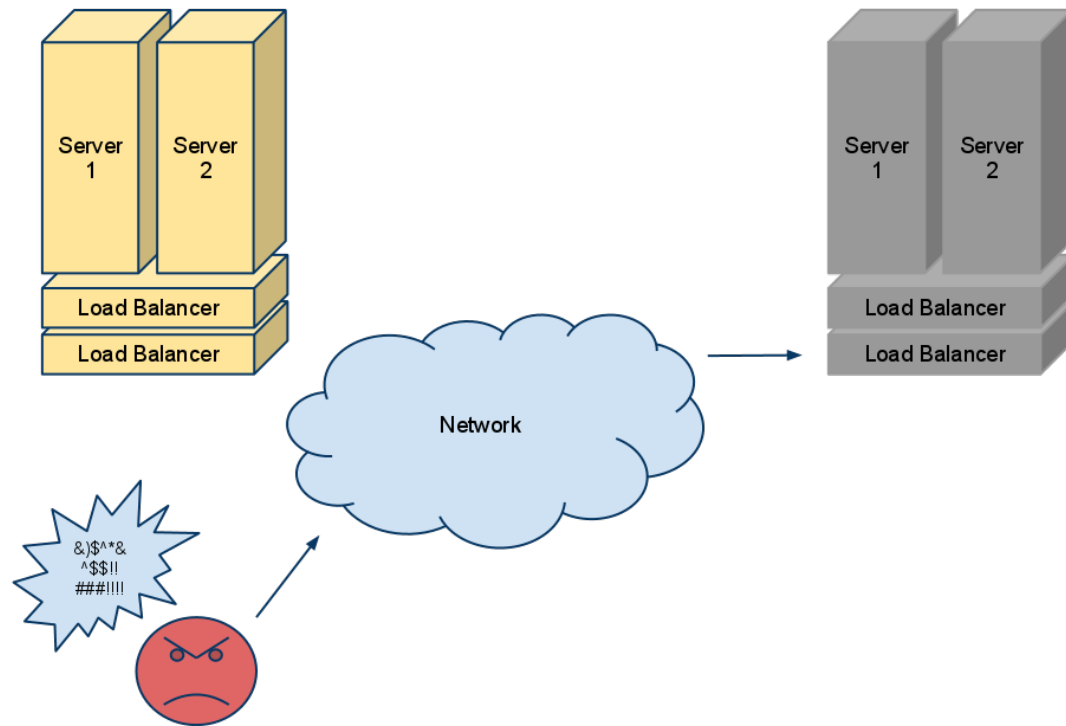- Traditional Anycast deployments scale poorly with capacity

Failover Techniques

- Backend failure

Failover Techniques

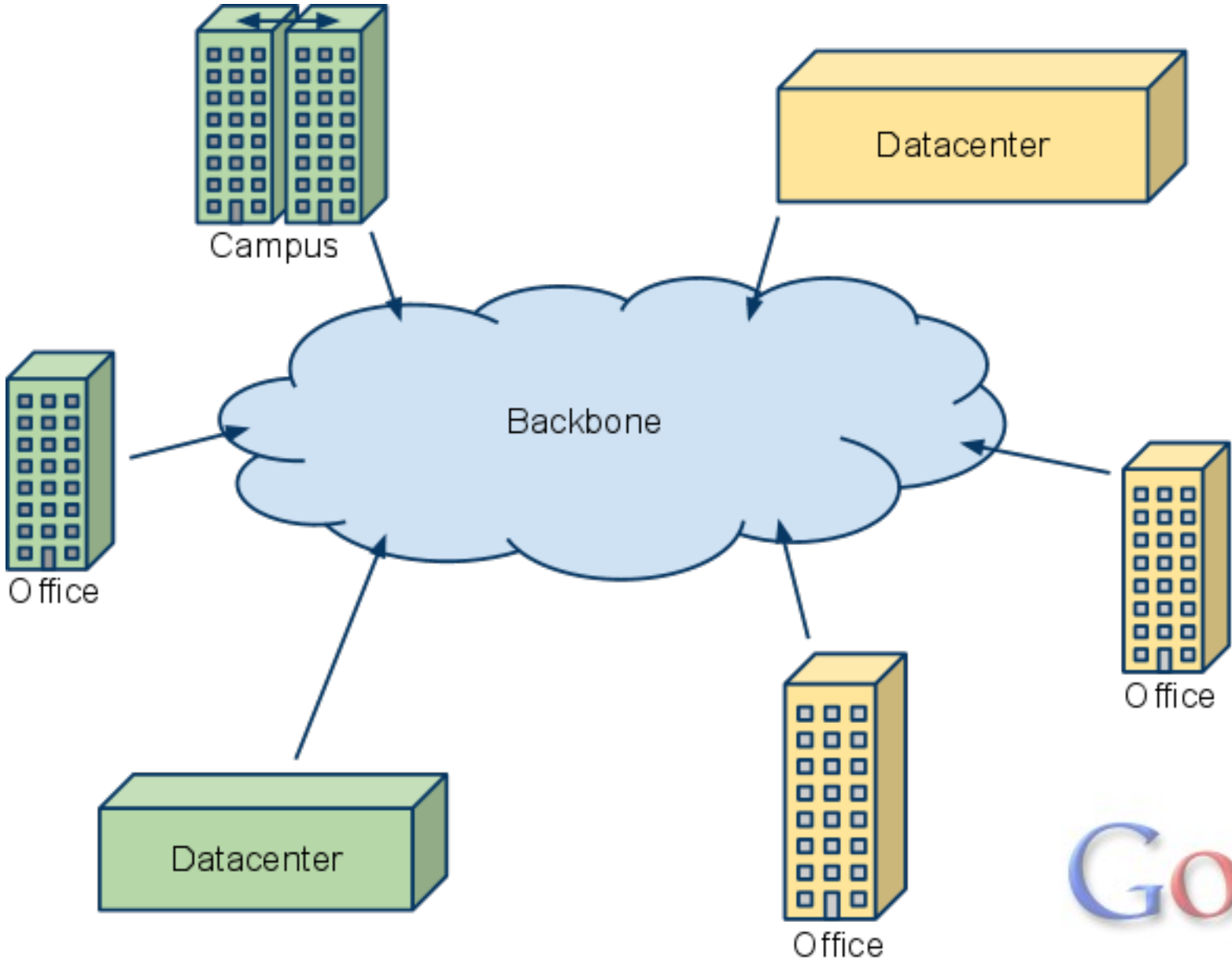- Load Balancer failure, site failure

Anycast

Anycast is a network routing technique where many hosts have the exact same IP address.

Clients trying to reach that IP address are routed to the nearest host.

Architecture

Combining Load Balancing and Anycast

- Reduced amount of route advertisers
- Reduced number of routing changes
- Tolerates LB failure
- No need for manual configuration to define failover location
- No need for manual intervention to deal with LB failure

...and turning it into a service

- Many services per location
- One load balancing instance per location
- Centralized management for it all
- Simple to use to by other service owners/sysadmins

Implementation Details - Load Balancer
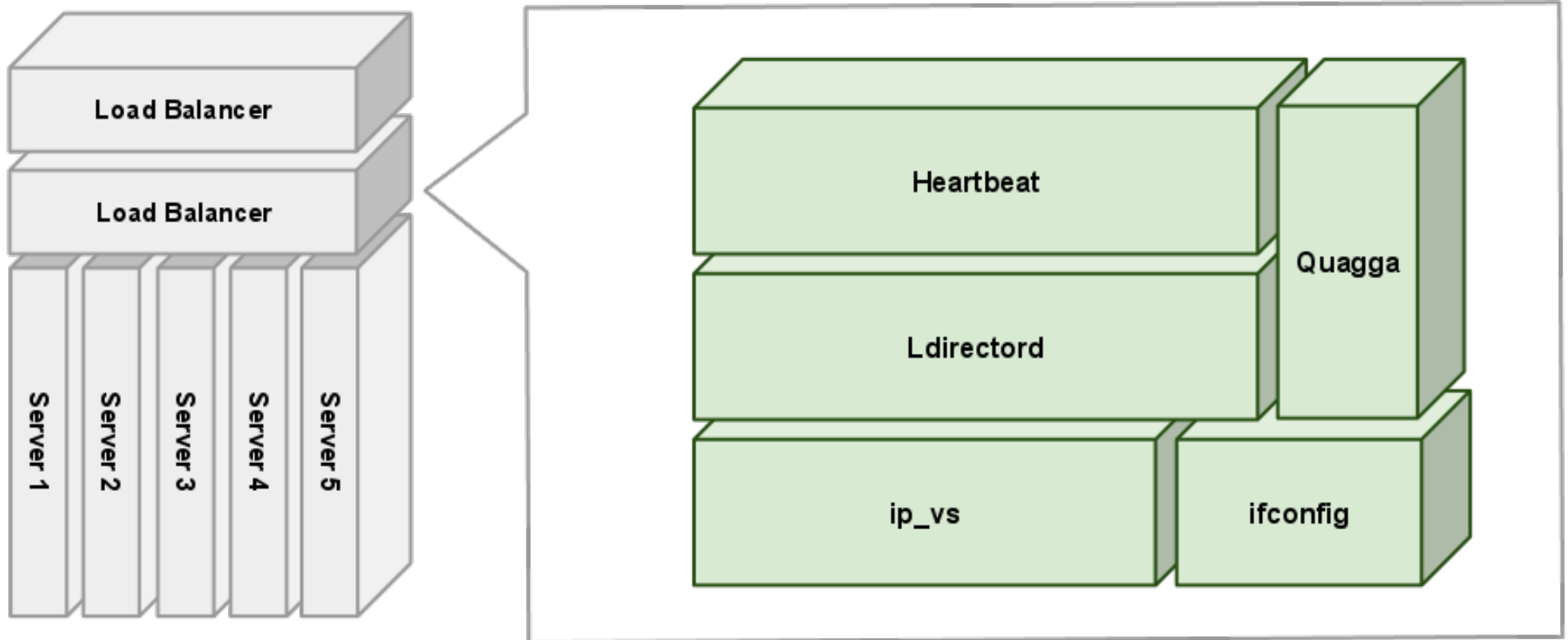
Software details

Heartbeat
- Active-passive cluster resource management

ldirectord
- Backend monitoring software
- Patched to add "fallback command"

ip_vs
- Linux kernel module for load balancing

Quagga
- Software implementation of routing protocol daemons
- Advertises availability of services using /32 routes

If a new service owner wants to use it...

- Reserve IP on the Anycast subnet.
- Create the new Anycast VIP config:
  - Same as a normal/local VIP
  - Plus a "fallback command"
- Done.

Google

Reference links

- Load Balancing, http://en.wikipedia.org/wiki/Load_balancing_(computing)
- The Linux Virtual Server Project, http://www.linuxvirtualserver.org
- High Availability, http://www.linux-ha.org
- Quagga, a software routing suite, http://www.quagga.net
- RFC1771 - A Border Gateway Protocol 4, http://www.faqs.org/rfcs/rfc1771.html
- Ldirectord, http://www.vergenet.net/linux/ldirectord/

Questions?

Thank you!