## apigee

## Failover and Disaster Recovery

## Scope

This lesson uses a two-region planet for illustration.

Many of the scenarios, impacts, and recommended actions described are applicable to single-region and larger (three or more) planets.

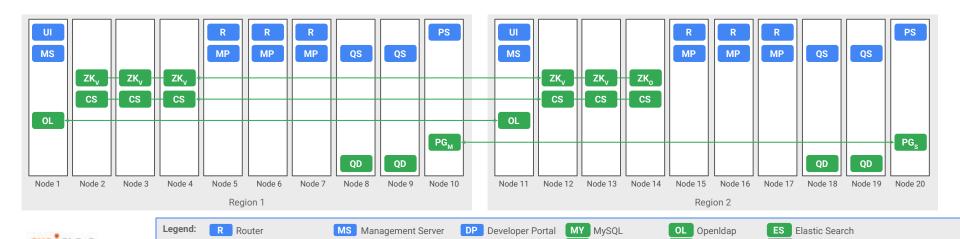
The scenarios examined in this lesson are not exhaustive. Other scenarios may exists and different approaches for handling them may be applicable.

PS Postgres Server

OS Opid/Ingest Server

Message Processor

UI Enterprise UI



BA BaaS Stack

BP BaaS Portal

**ZK** Zookeeper

CS Cassandra

PG PostgreSQL

QD Apache Qpid

Server/Virtual Machine

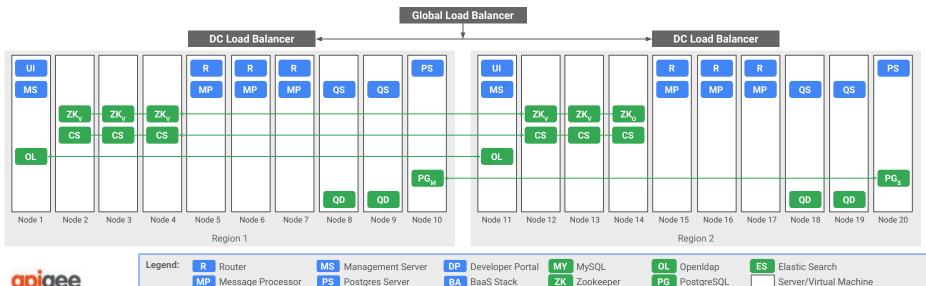
## Load Balancers and Traffic Routing

Edge is, by design, an active/active system. It offers active data replication across all data stores in all regions of the planet. This capability allows customers to decide how to route API traffic each region.

- **DC Load Balancer:** The hardware or software load balancer used by your network in a data center. Each region requires one or more load balancers.
- Global Load Balancer: Globally available software or service that directs traffic to multiple regions.

OS Opid/Ingest Server

Enterprise UI



BP BaaS Portal

CS Cassandra

QD Apache Qpid



## Management Server down

Message Processor

Enterprise UI

#### Scenario

- Node 1 down or unreachable
- UI, MS, or OL processes down or unreachable

#### **Impact**

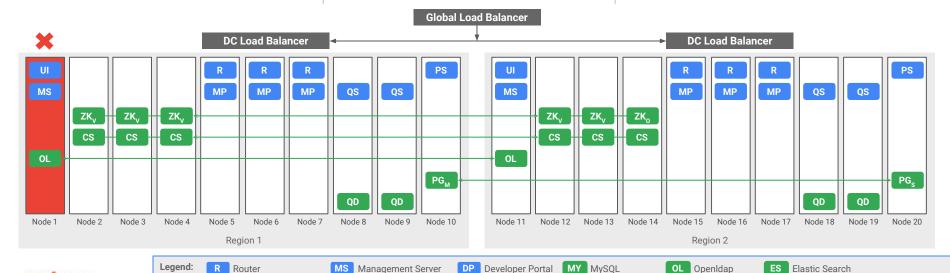
PS Postgres Server

OS Opid/Ingest Server

- No API runtime impact
- No management services impact, assuming global load balancer routes traffic to node 11

#### **Actions**

- Recover UI, MS, or OL processes
- If node can't be recovered, restore from backups or decommission and replace components with new installation



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## Two Management Servers down

#### Scenario

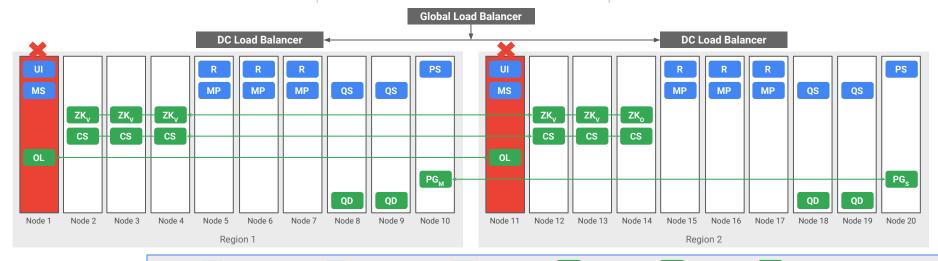
- Node 1 down or unreachable
- UI, MS, or OL processes down or unreachable

#### **Impact**

- No API runtime impact
- Management services impacted

#### **Actions**

- Recover UI, MS, or OL processes
- If node can't be recovered, restore from backups





Legend: R Router Message Processor Enterprise UI

MS Management Server PS Postgres Server OS Opid/Ingest Server

DP Developer Portal BA BaaS Stack BP BaaS Portal

CS Cassandra

MY MySQL **ZK** Zookeeper QD Apache Qpid

OL OpenIdap PG PostgreSQL ES Flastic Search Server/Virtual Machine

## Single Cassandra node down

#### Scenario

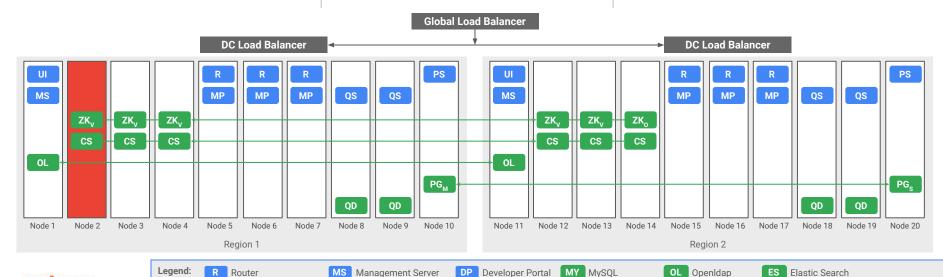
- Node 2 down or unreachable
- ZK and CS processes down or unreachable

#### **Impact**

- No API runtime impact
- No management services impact

#### **Actions**

- Recover CS and ZK processes
- If node can't be recovered, decommission and replace data store node (ZK, CS)





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OL OpenIdap
PG PostgreSQL
QD Apache Qpid

ES Elastic Search
Server/Virtual Machine

## Two Cassandra nodes down in different regions

#### Scenario

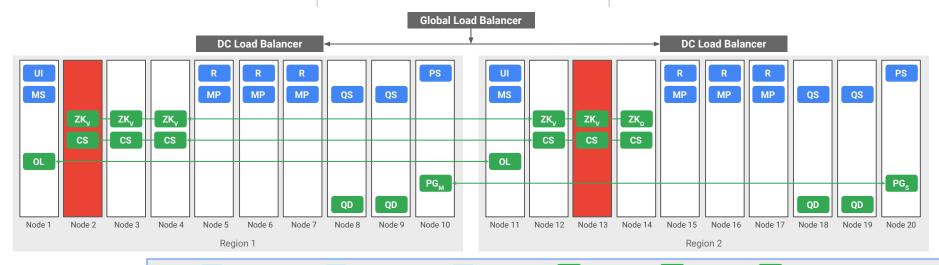
- Node 2 and 13 down or unreachable
- ZK and CS processes down or unreachable

#### **Impact**

- No API runtime impact
- No management services impact

#### **Actions**

- Recover CS and ZK processes
- If nodes can't be recovered, decommission and replace data store nodes (ZK, CS)





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Server/Virtual Machine

POD

## Two Cassandra nodes down in one region

#### Scenario

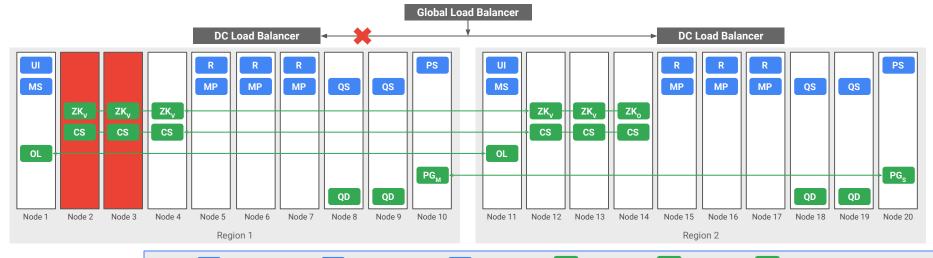
- Node 2 and 3 down or unreachable
- ZK and CS processes down or unreachable

#### **Impact**

 No API runtime impact or management services impact, assuming global load balancer routes traffic to region 2

#### **Actions**

- Edge uses a replication factor of 3 and local quorum consistency for CS
- With 2 or more nodes down in region 1 traffic must be fail over to region 2





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## One Router/Message Processor down

#### Scenario

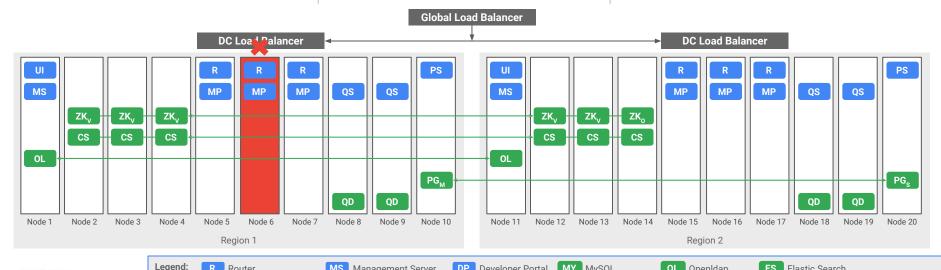
- Node 6 down or unreachable
- R and MP processes down or unreachable

#### **Impact**

- No API runtime impact, assuming local load balancer routes traffic around failed node and there is sufficient capacity
- No Management services impact

#### **Actions**

- Recover R and MP processes
- If node can't be recovered, restore from backups or decommission and replace R and MP





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POD

## All Routers/Message Processors down in a region

#### Scenario

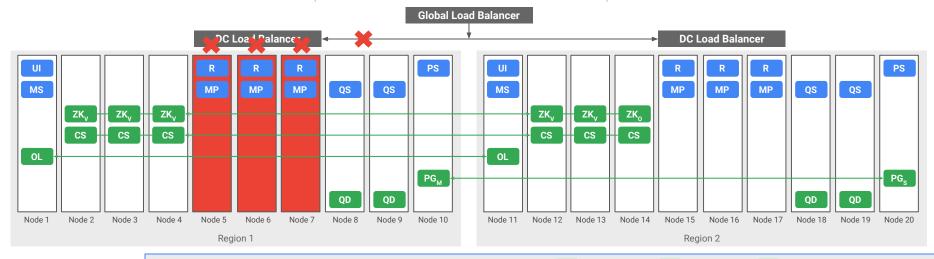
- Node 5, 6, 7 down or unreachable
- R and MP processes down or unreachable

#### **Impact**

- API runtime impact assuming traffic is routed to region 2
- No management services impact

#### **Actions**

- Failover API traffic to region 2
- Recover R and MP processes
- If nodes can't be recovered, restore from backups or decommission and replace R and MP





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Server/Virtual Machine

### One Qpid node down

#### Scenario

- Node 8 down or unreachable
- QS and QD processes down or unreachable

#### **Impact**

PS Postgres Server

OS Opid/Ingest Server

Message Processor

UI Enterprise UI

- No API runtime impact
- No management services impact.
- No impact to analytics data collection, assuming the remaining Qpids are sufficient to handle analytics data volumes

#### **Actions**

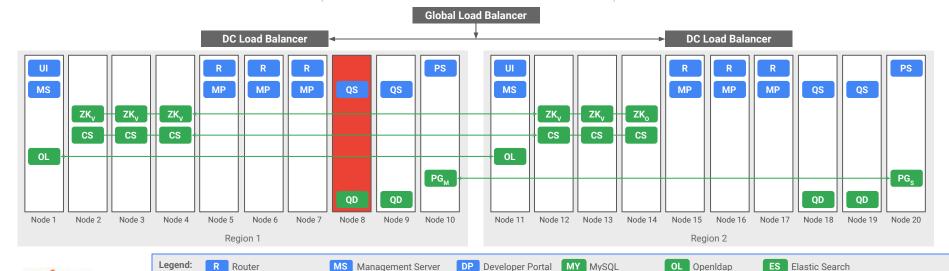
- Recover QS and QD processes
- If node can't be recovered, decommission and replace QS and QD
- Update analytics groups

PG PostgreSQL

QD Apache Qpid

Server/Virtual Machine

i POD



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**ZK** Zookeeper

CS Cassandra



## All Qpid nodes down in a region

#### Scenario

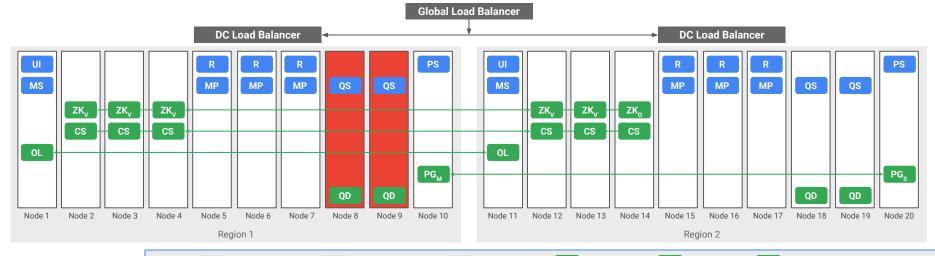
- Node 8 and 9 down or unreachable
- QS and QD processes down or unreachable

#### **Impact**

- No API runtime impact
- No management services impact
- Analytics data capture in region one impacted; MPs dispose of analytics data after in-memory buffers are consumed

#### **Actions**

- Recover QS and QD processes
- If nodes can't be recovered, decommission and replace QS and QD
- Update analytics groups





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## PostgreSQL master node down

#### Scenario

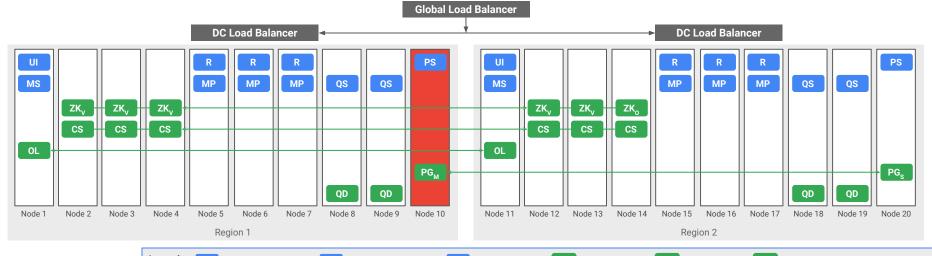
- Node 10 down or unreachable
- PS and PG master processes down or unreachable

#### **Impact**

- No API runtime impact
- No management services impact
- No impact to analytics data capture as long as Qpids have enough disk space and queue depth to store analytics data

#### **Actions**

- Recover PS and PG master processes
- If extended downtime period is required, promote PG standby to master
- If node can't be recovered, restore from backups or decommission and replace PS and PG, then update analytics groups





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## PostgreSQL standby node down

#### Scenario

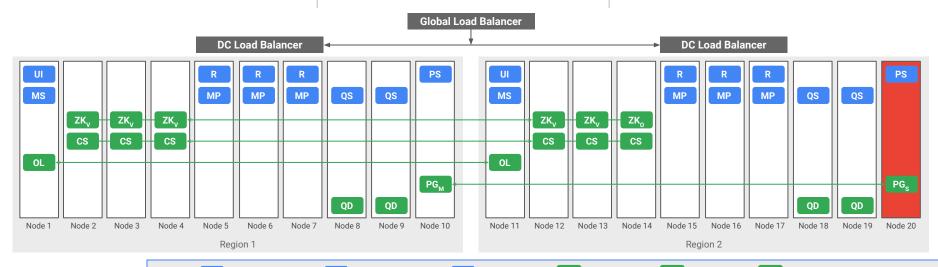
- Node 20 down or unreachable
- PS and PG standby processes down or unreachable.

#### **Impact**

- No API runtime impact
- No management services impact

#### **Actions**

- Recover PS and PG standby processes
- If node can't be recovered. decommission and replace PS and PG, then update analytics groups





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QD Apache Qpid

## One region down

#### Scenario

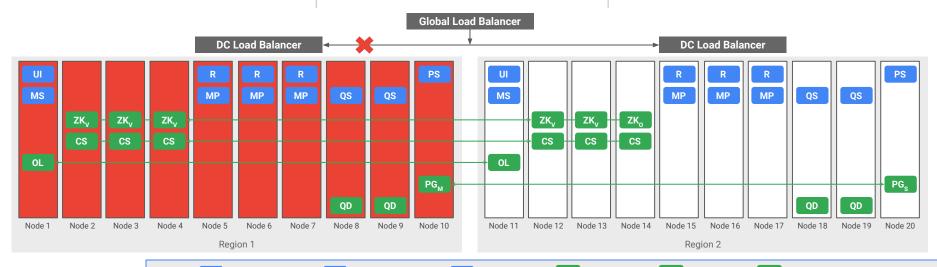
- Region 1 down or unreachable
- All nodes in region 1 down or unreachable
- Network down in region 1

#### **Impact**

- No API runtime impact, assuming global load balancer directs traffic to region 2
- No management services impact

#### **Actions**

Recover the nodes or processes in order: 1) CS+ZK nodes, 2) PS+PG nodes, 3) QS+QD nodes, followed by everything else: R+MP nodes, UI+MS+OL nodes





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QD Apache Qpid i POD

## All regions down

#### Scenario

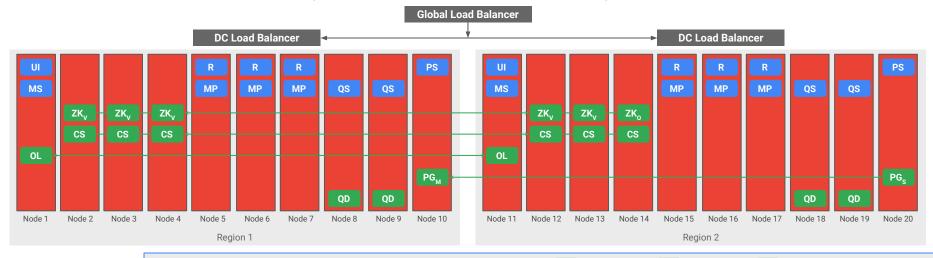
- All regions down or unreachable
- All nodes in all regions down or unreachable
- Network down across all regions

#### **Impact**

- API runtime impact
- Management services impact

#### **Actions**

- Time to consider moving to the cloud :)
- Recover the nodes or processes in order: 1) CS+ZK nodes, 2) PS+PG nodes,
   3) QS+QD nodes, followed by everything else: R+MP nodes, UI+MS+OL nodes





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# apigee Thank You