Building a GEO-CLuster

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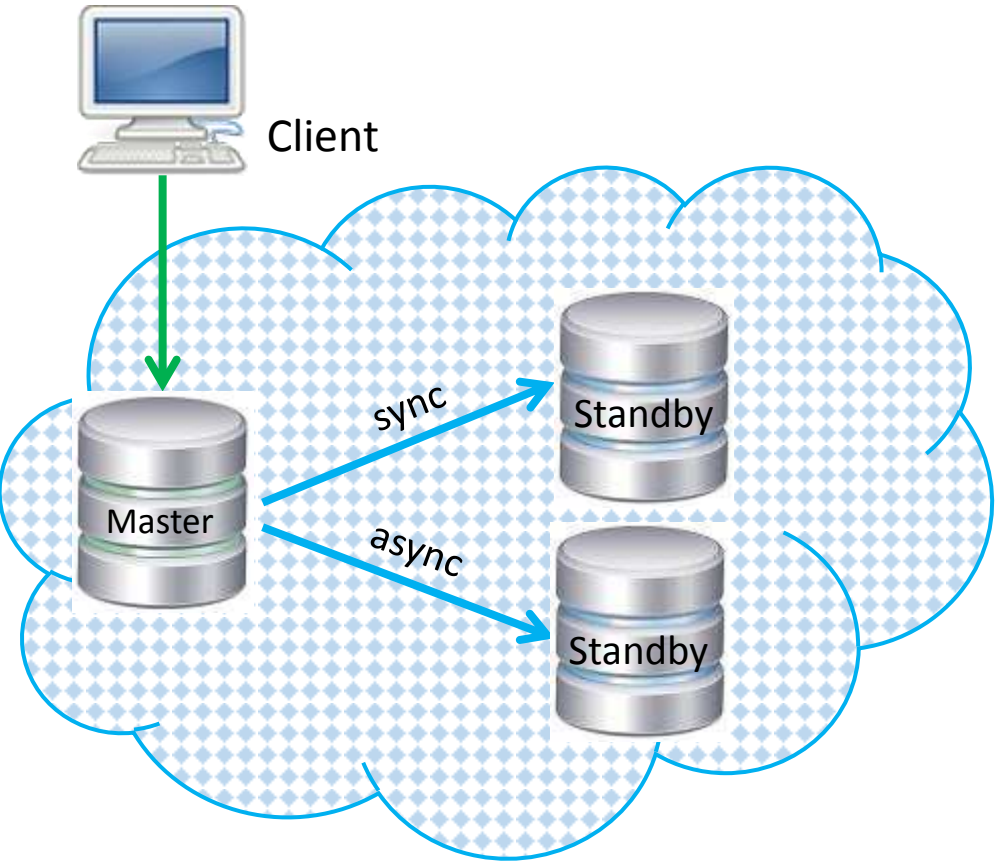
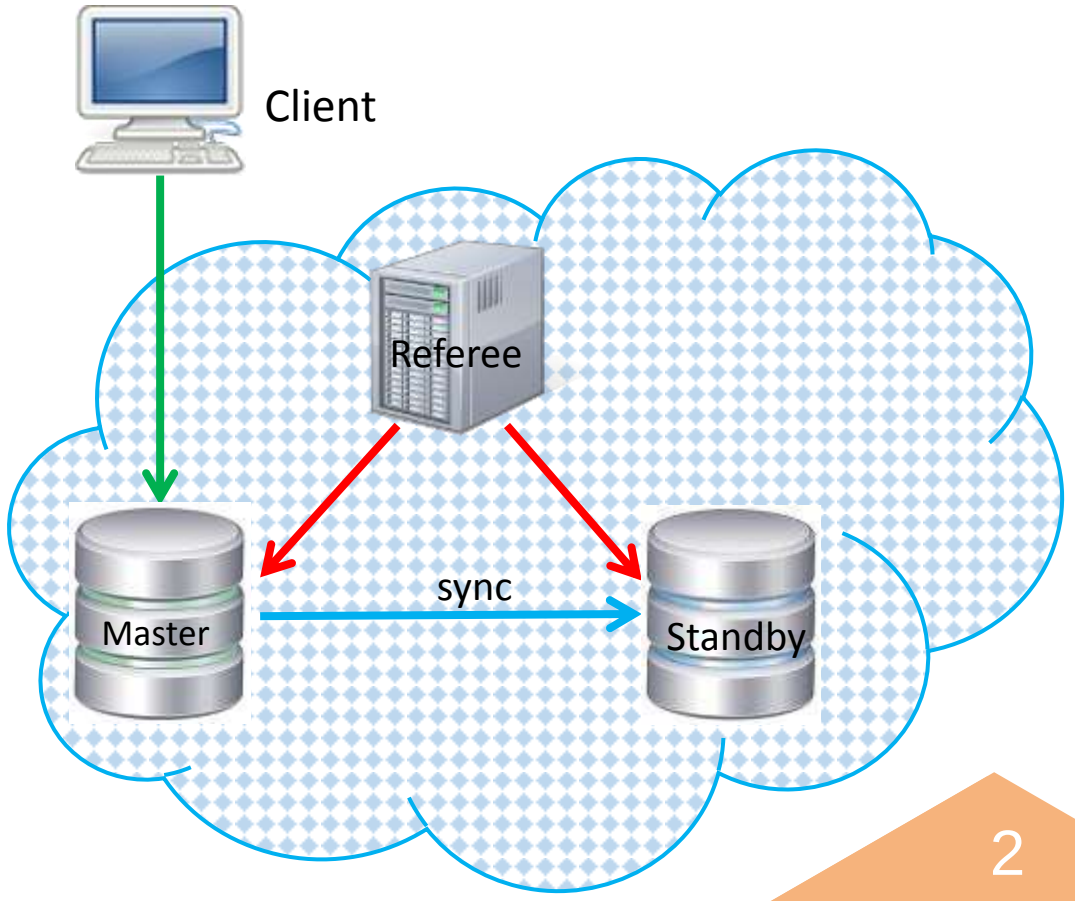
HA-cluster types within data center

3-nodes cluster



Cluster 2+1



Types of failures

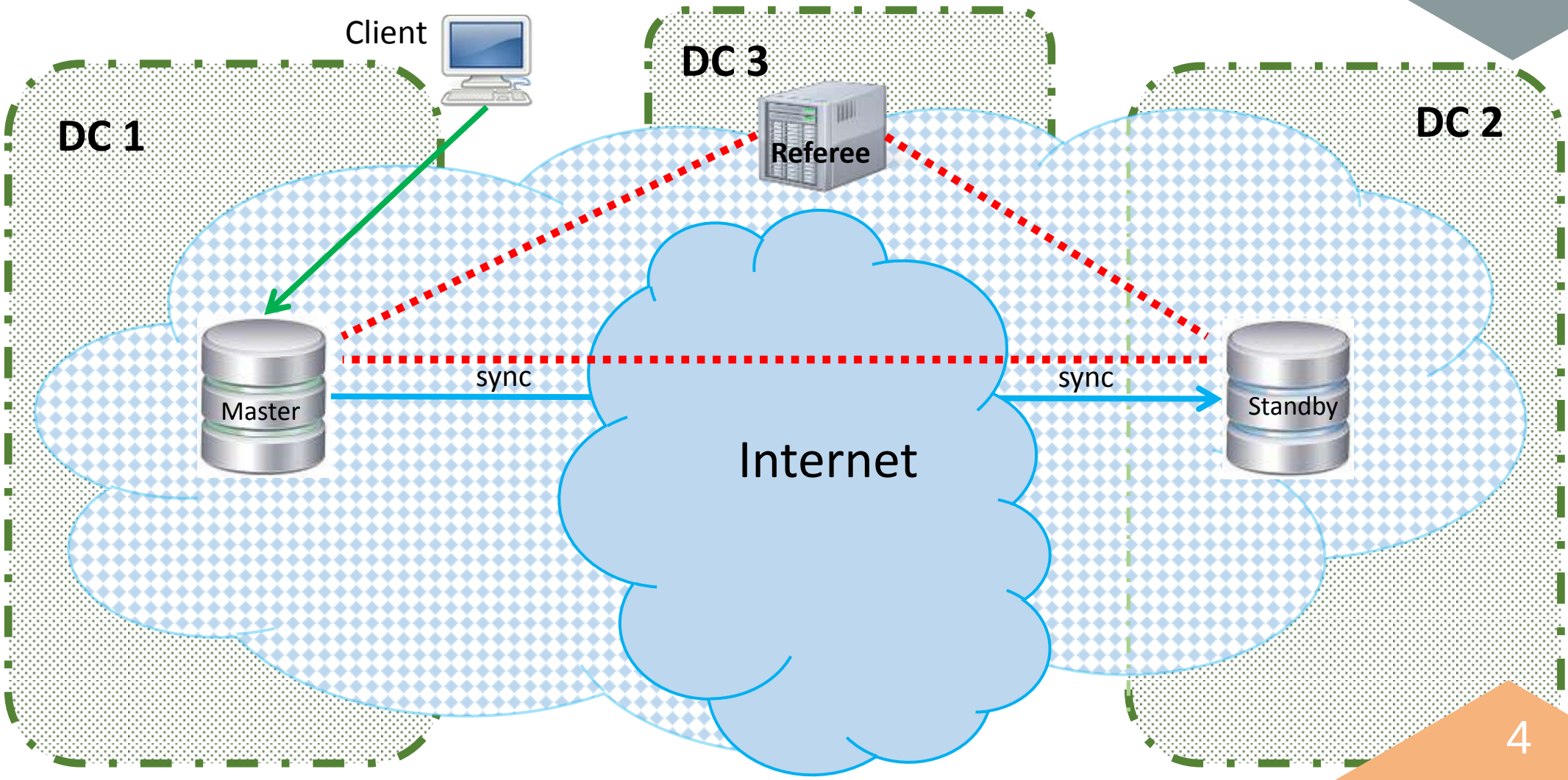
for HA-cluster

- Power failure (all nodes)
- PostgreSQL process failure (Master, Standby)
- Network split (all nodes)
- Corosync process failure (all nodes)
- Temporarily slowing down the corosync process (all nodes)

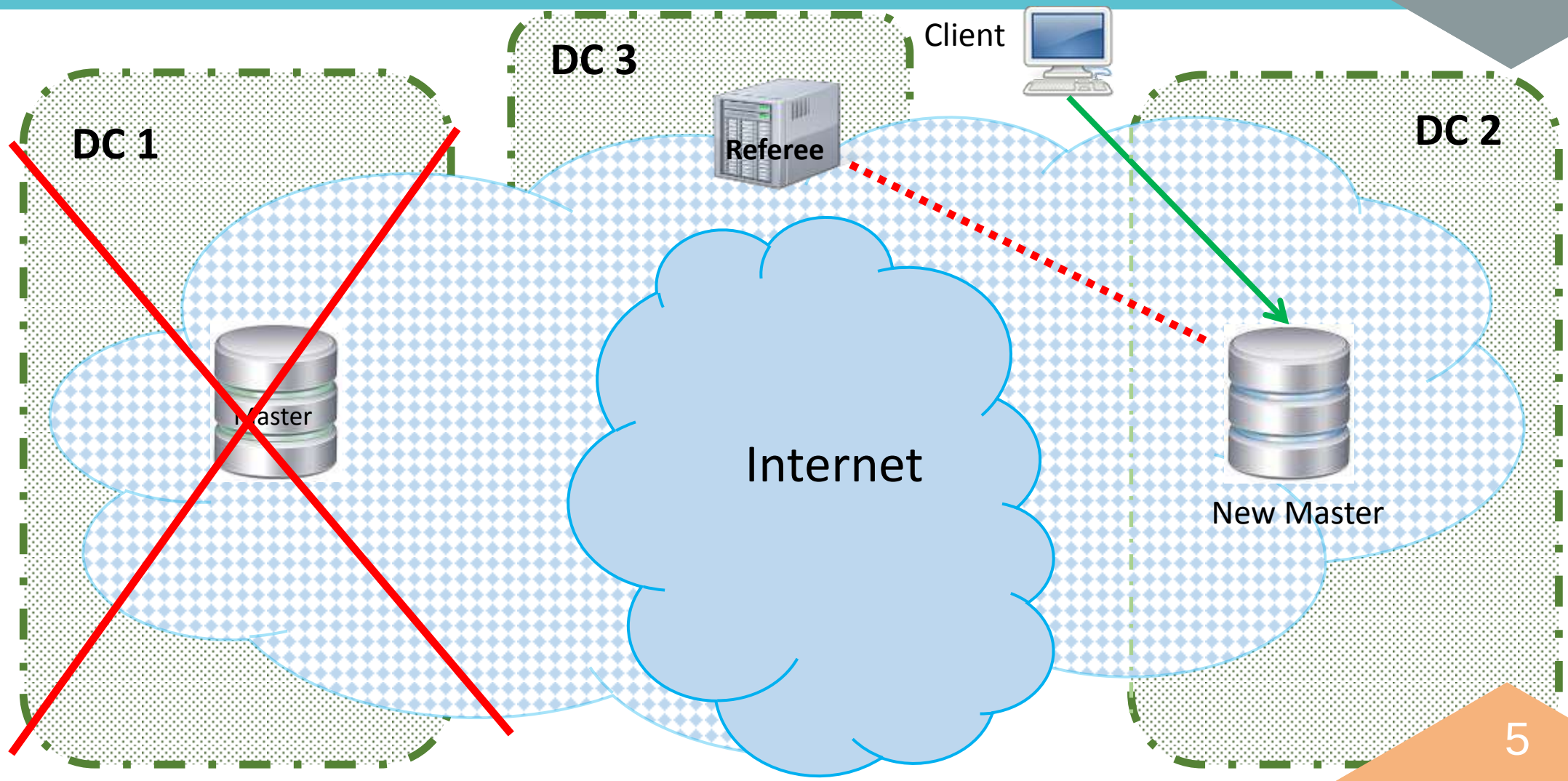
for GEO-cluster

- DC failure
- Loss of communication between DCs

Extended HA-cluster as GEO-cluster with remote sync Standby



Extended HA-cluster as GEO-cluster with remote sync Standby



Advantages and disadvantages

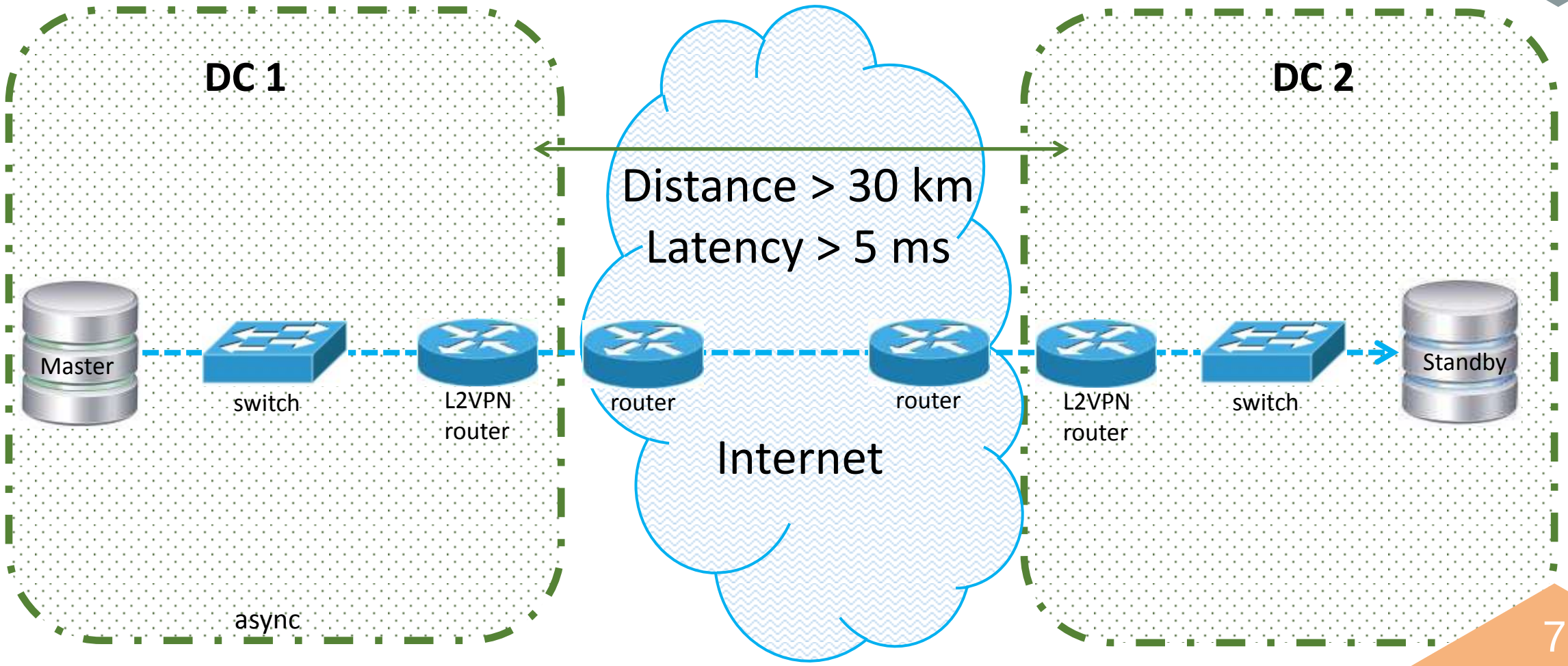
Advantages (+):

- RPO=0 (when DC-1 is destroyed)
- Automatic failover

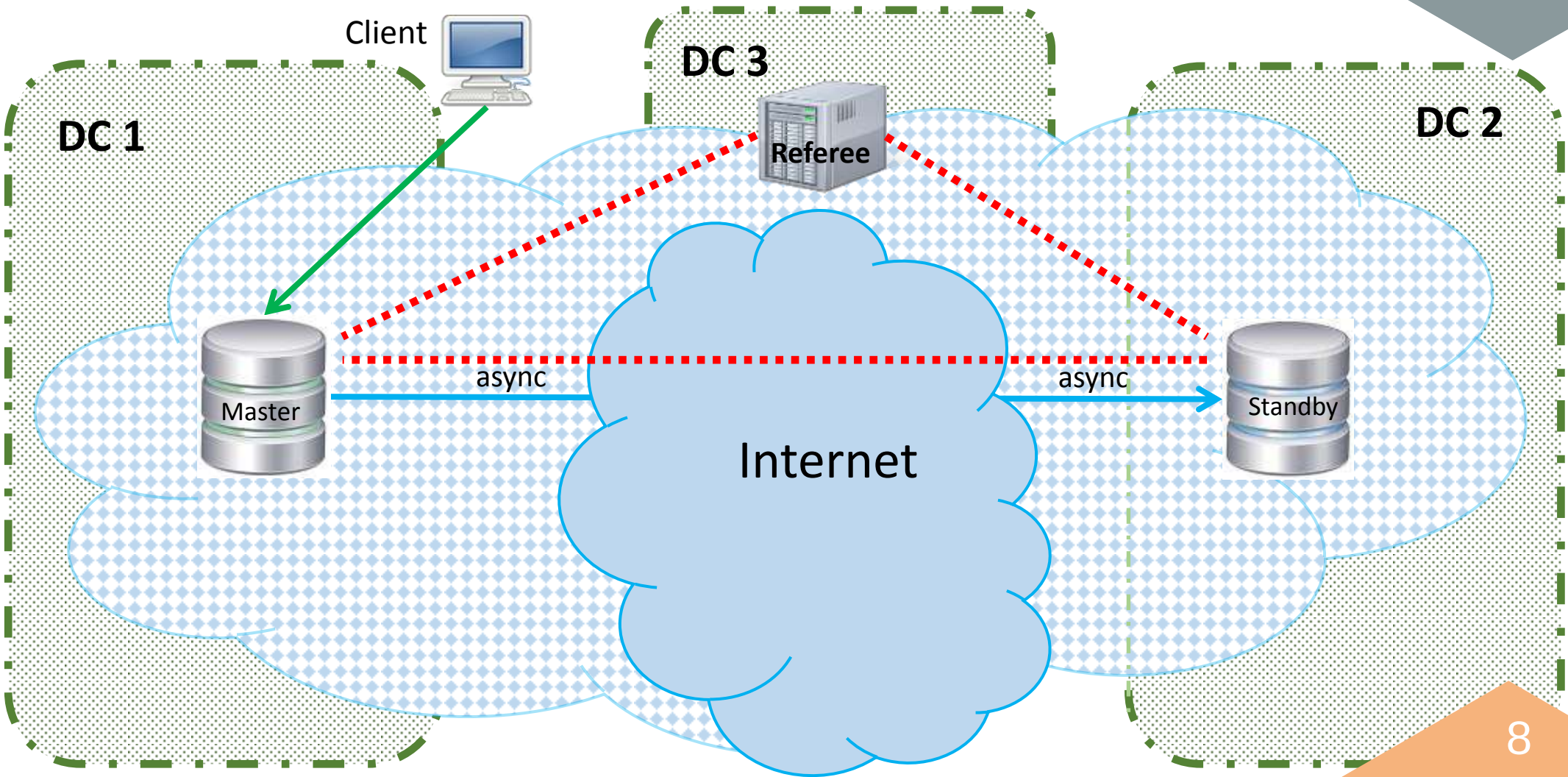
Disadvantages (-):

- Latency and performance degradation
- Timeout send/receive heartbeat packets, false failover
- L2VPN

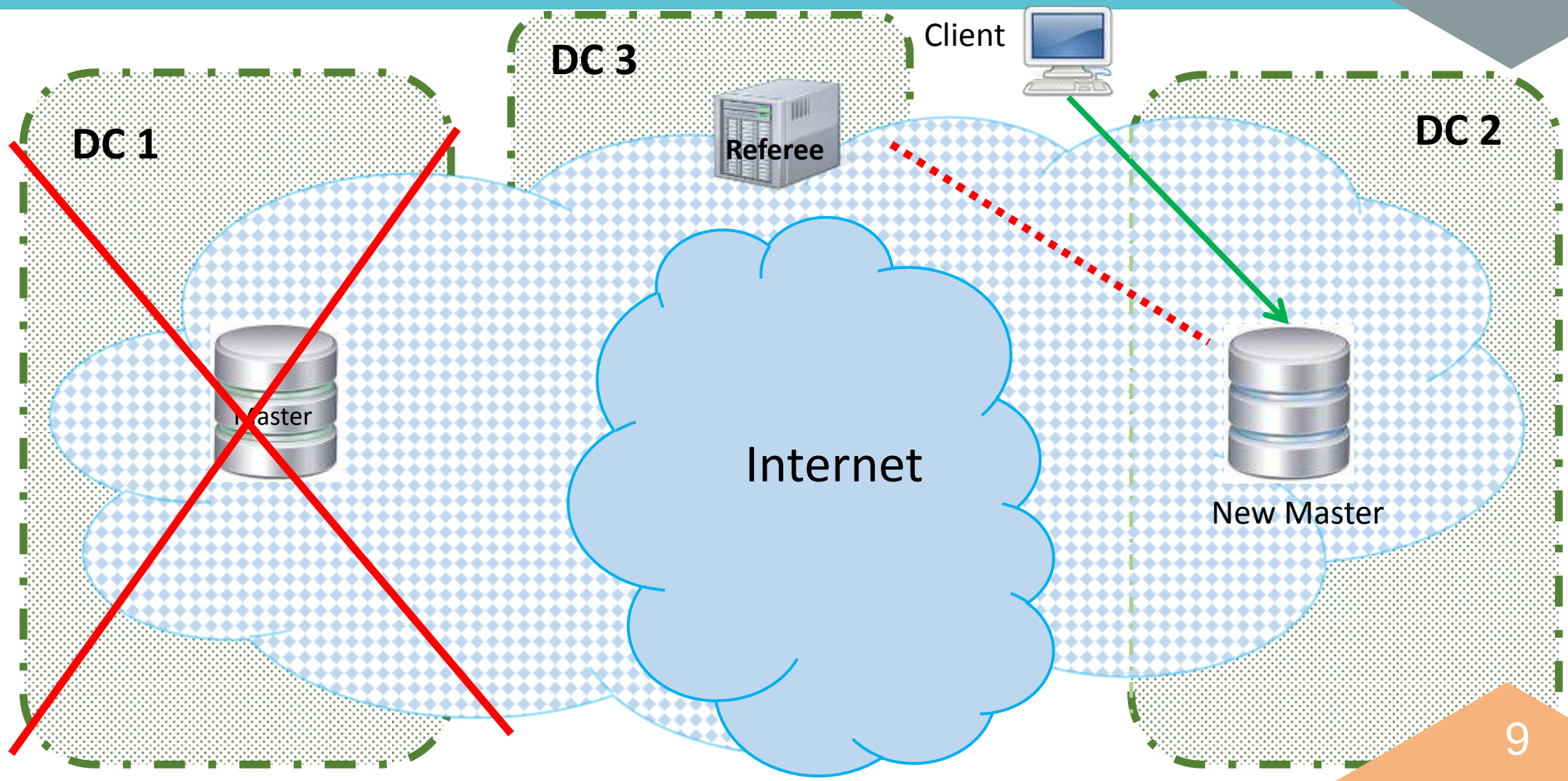
Latency and performance degradation



Extended HA-cluster as GEO-cluster with remote async Standby



Extended HA-cluster as GEO-cluster with remote async Standby



Advantages and disadvantages

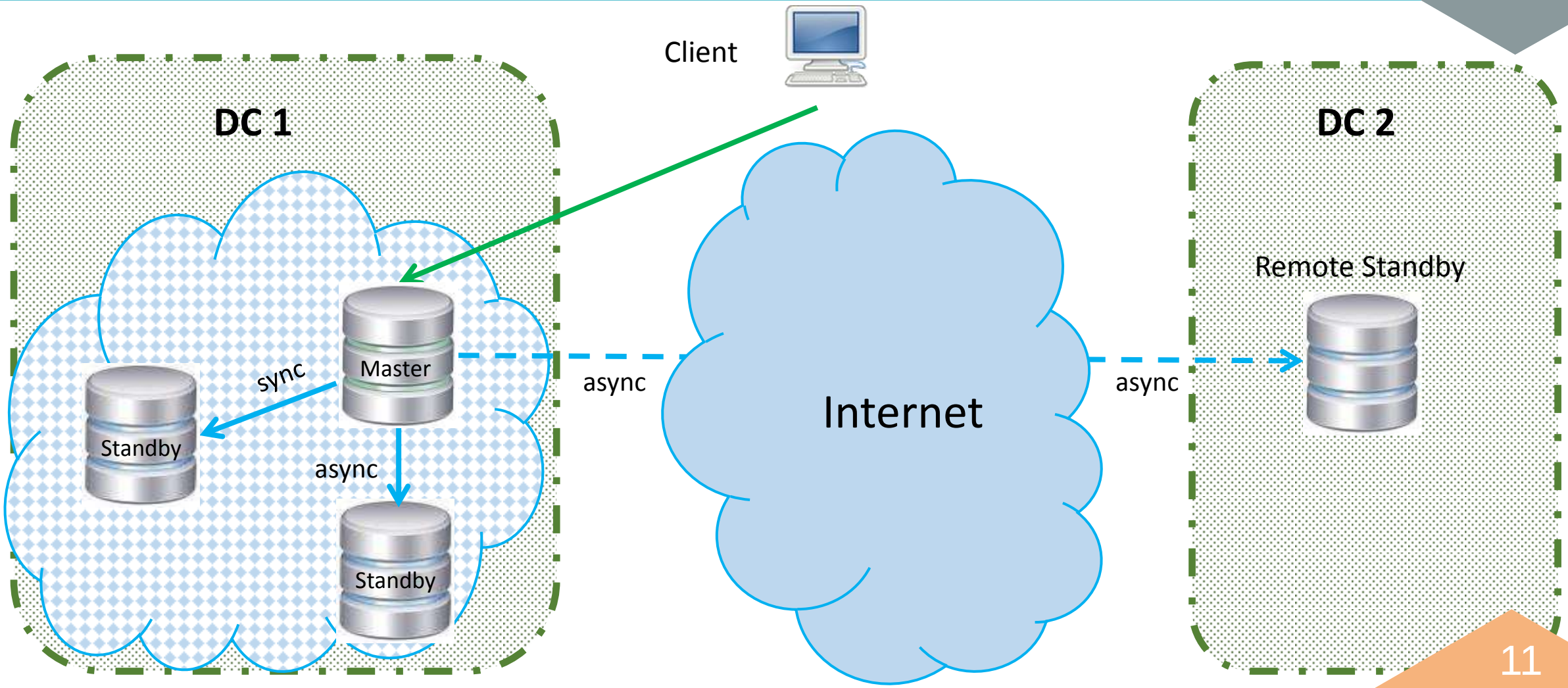
Advantages (+):

- No performance degradation
- Automatic failover

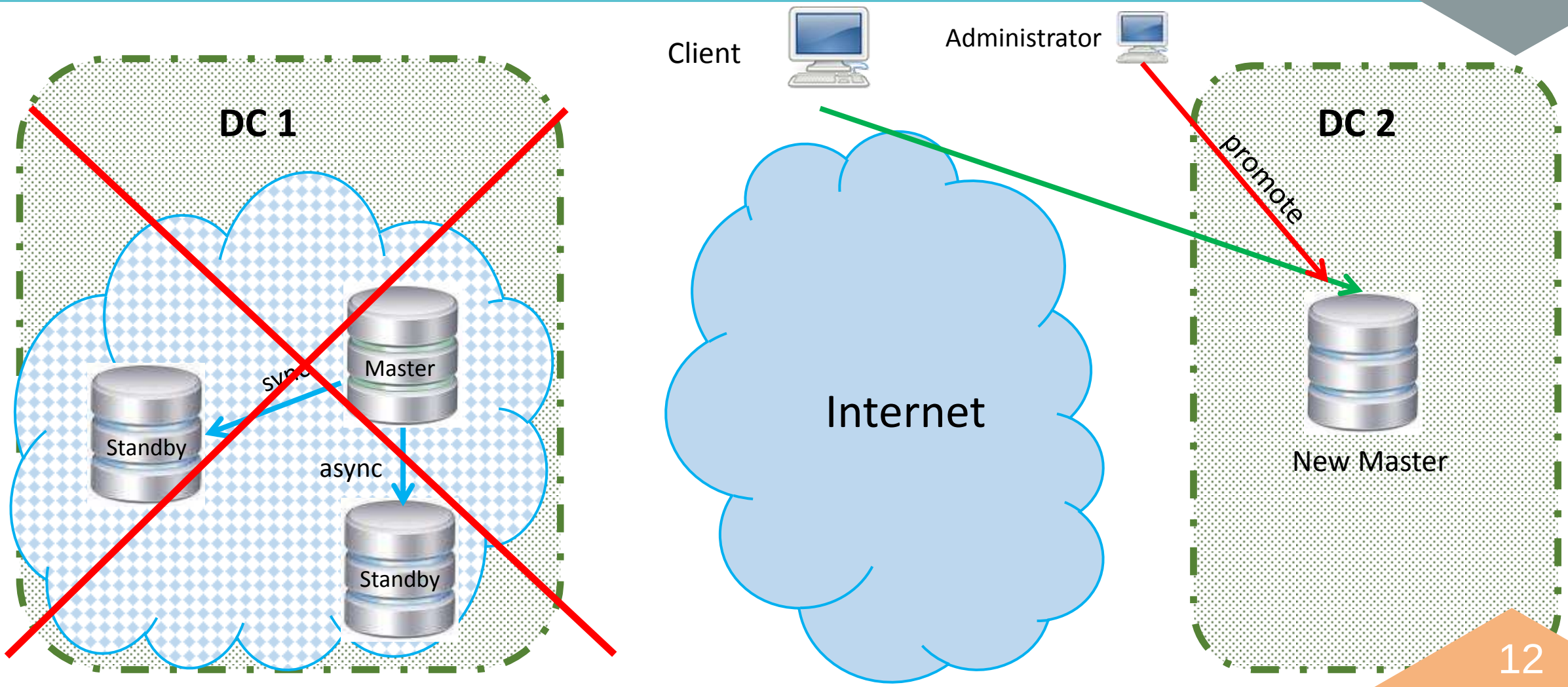
Disadvantages (-):

- RPO>0 (~5 min, when DC-1 is destroyed)
- Timeout send/receive heartbeat packets, false failover
- L2VPN

GEO-cluster with remote async Standby



GEO-cluster with remote async Standby



Advantages and disadvantages

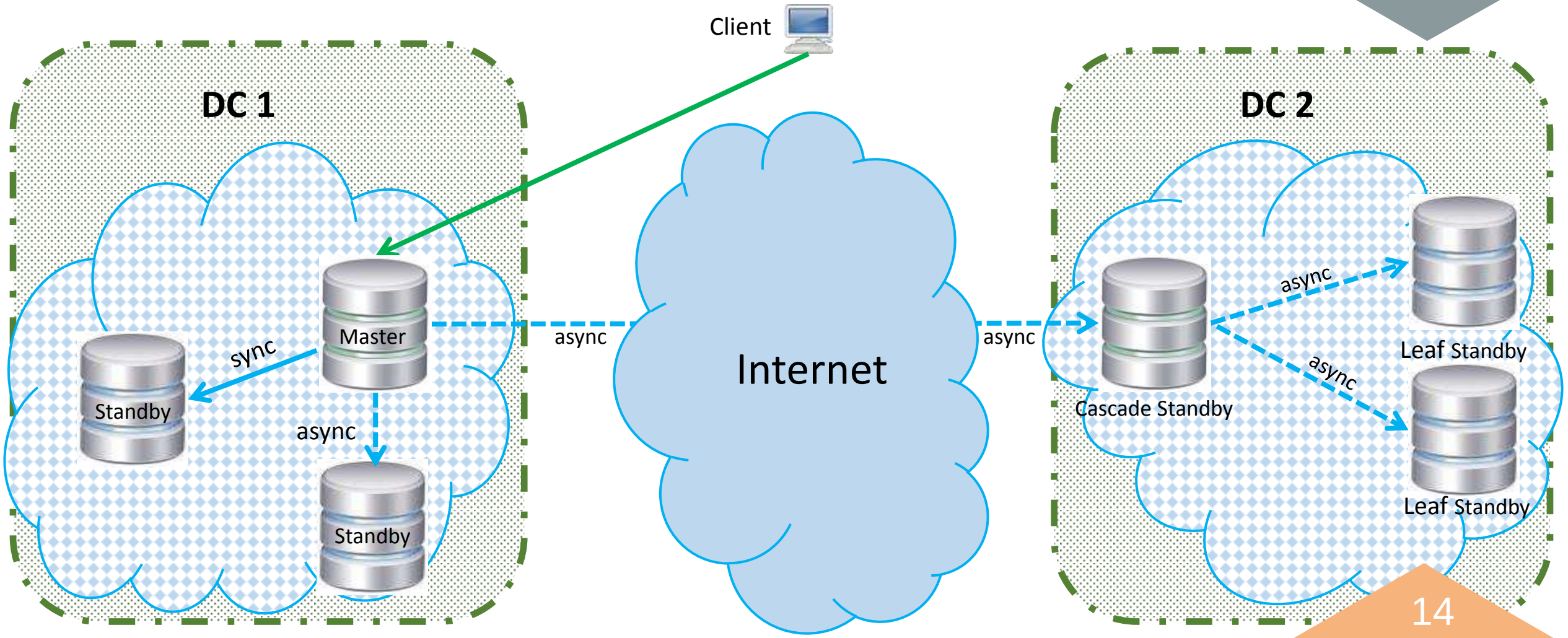
Advantages (+):

- No performance degradation
- No timeout send/receive heartbeat packets, no false failover
- No L2VPN
- High Availability within DC-1

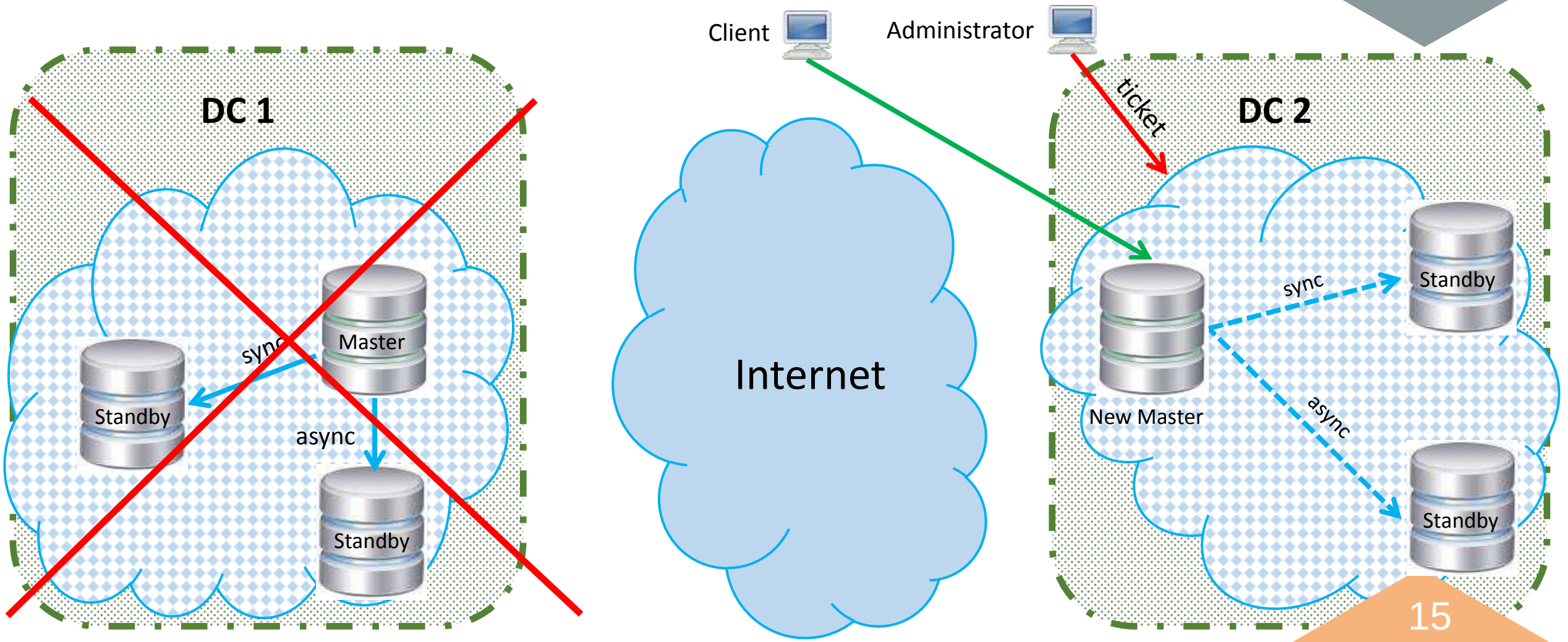
Disadvantages (-):

- RPO>0 (~5 min, when DC-1 is destroyed)
- Manual failover
- No High Availability within DC-2

GEO-cluster with independent HA-clusters and manual failover



GEO-cluster with independent HA-clusters and manual failover



Advantages and disadvantages

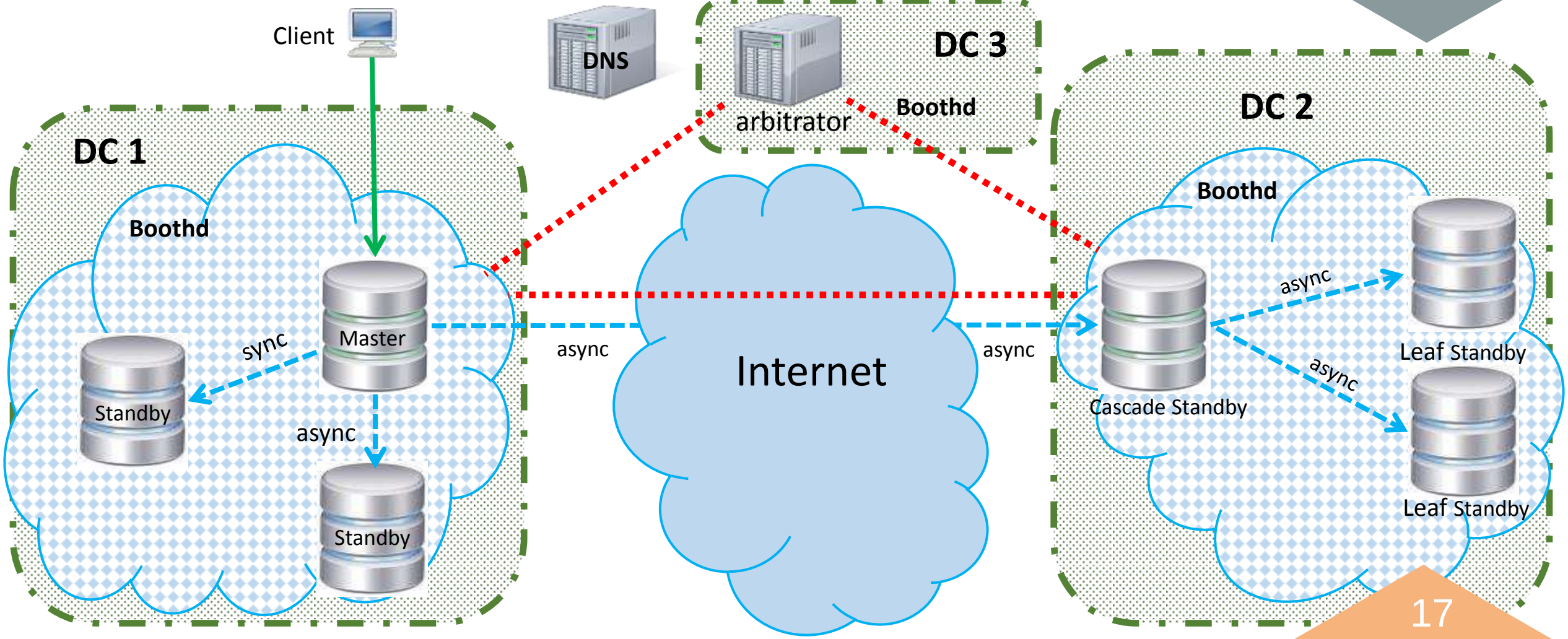
Advantages (+):

- No performance degradation
- No timeout send/receive heartbeat packets, no false failover
- No L2VPN
- High Availability within DC-1 & DC-2

Disadvantages (-):

- RPO>0 (~5 min, when DC-1 is destroyed)
- Manual failover

GEO-cluster with independent HA-clusters and automatic failover



Booth, ticket, arbitrator, DNS

Booth - cluster ticket manager

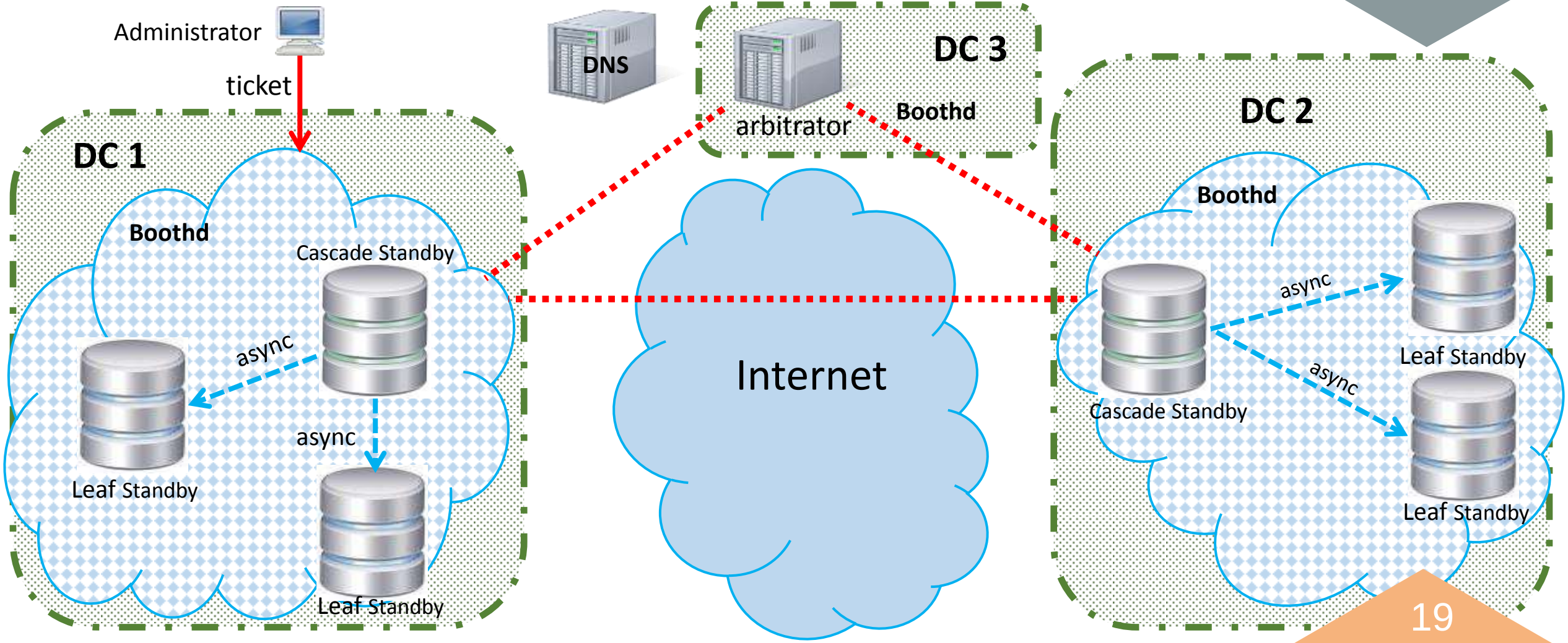
Ticket - allowing Resources to Start:

- Single Resource
- Resources Set

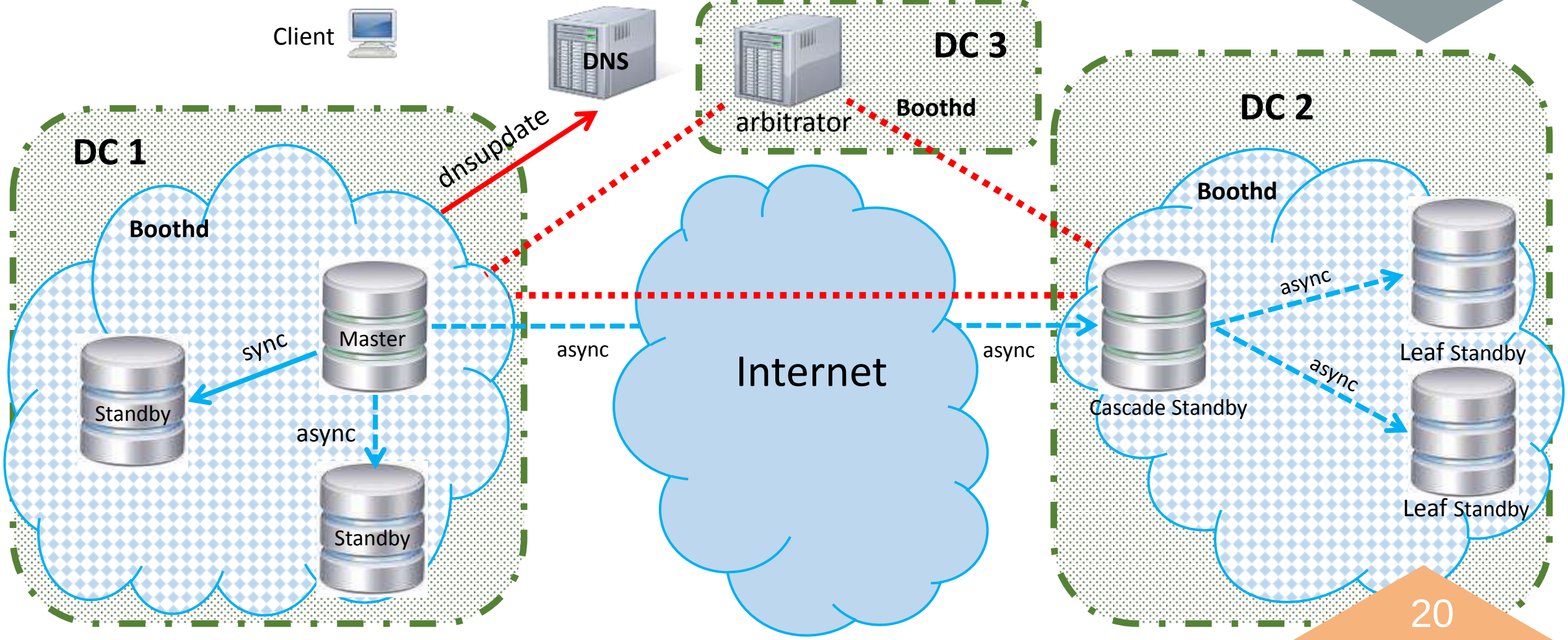
Arbitrator - provides consensus and quorum for case of network failure between DC 1 and DC 2

dnsupdate - updates the DNS zone

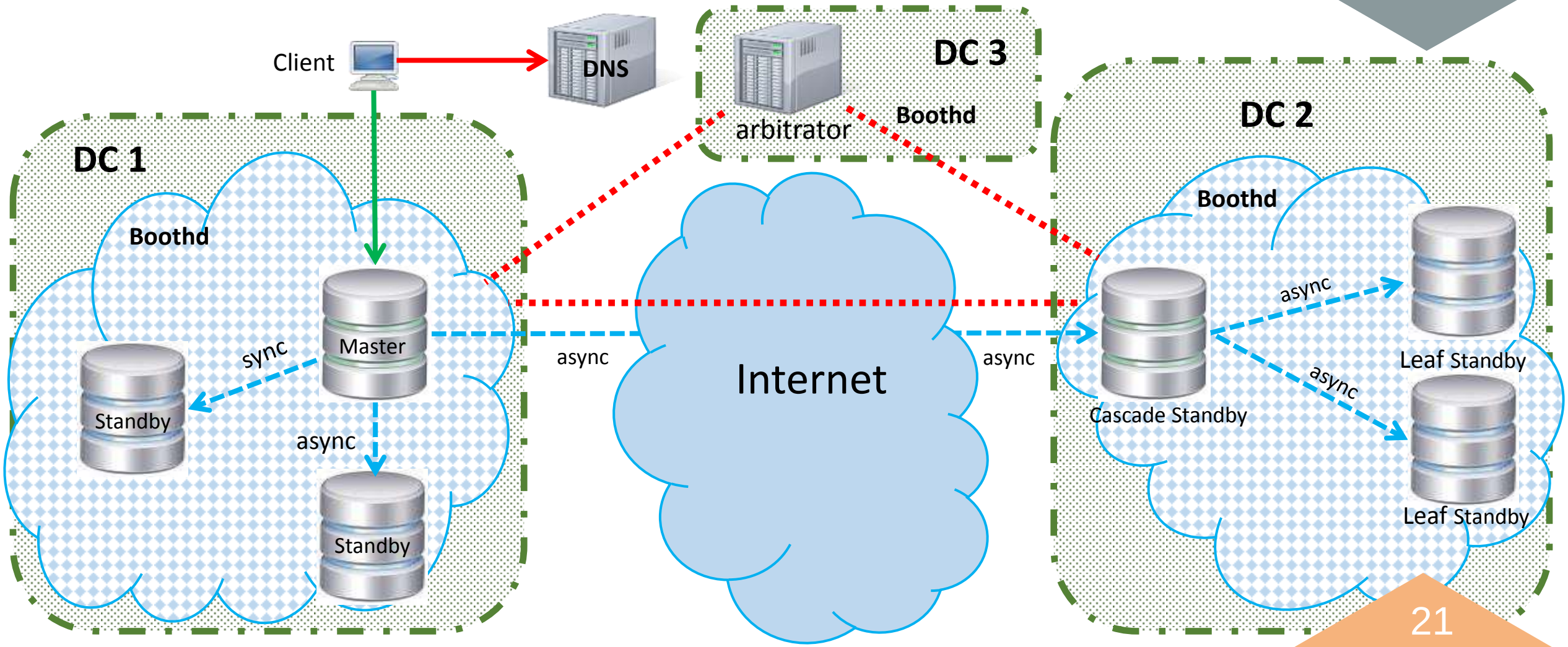
Geo-cluster startup
Step 1



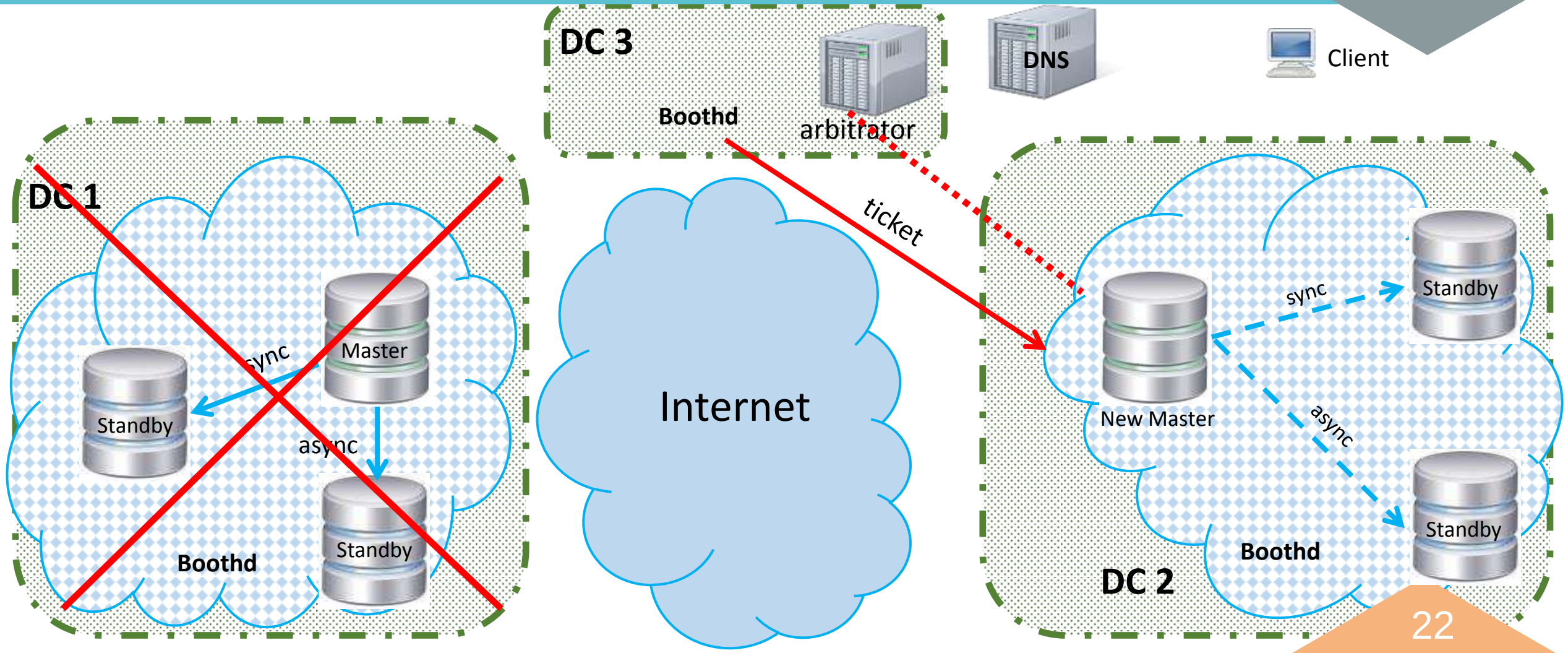
Geo-cluster startup
Step 2



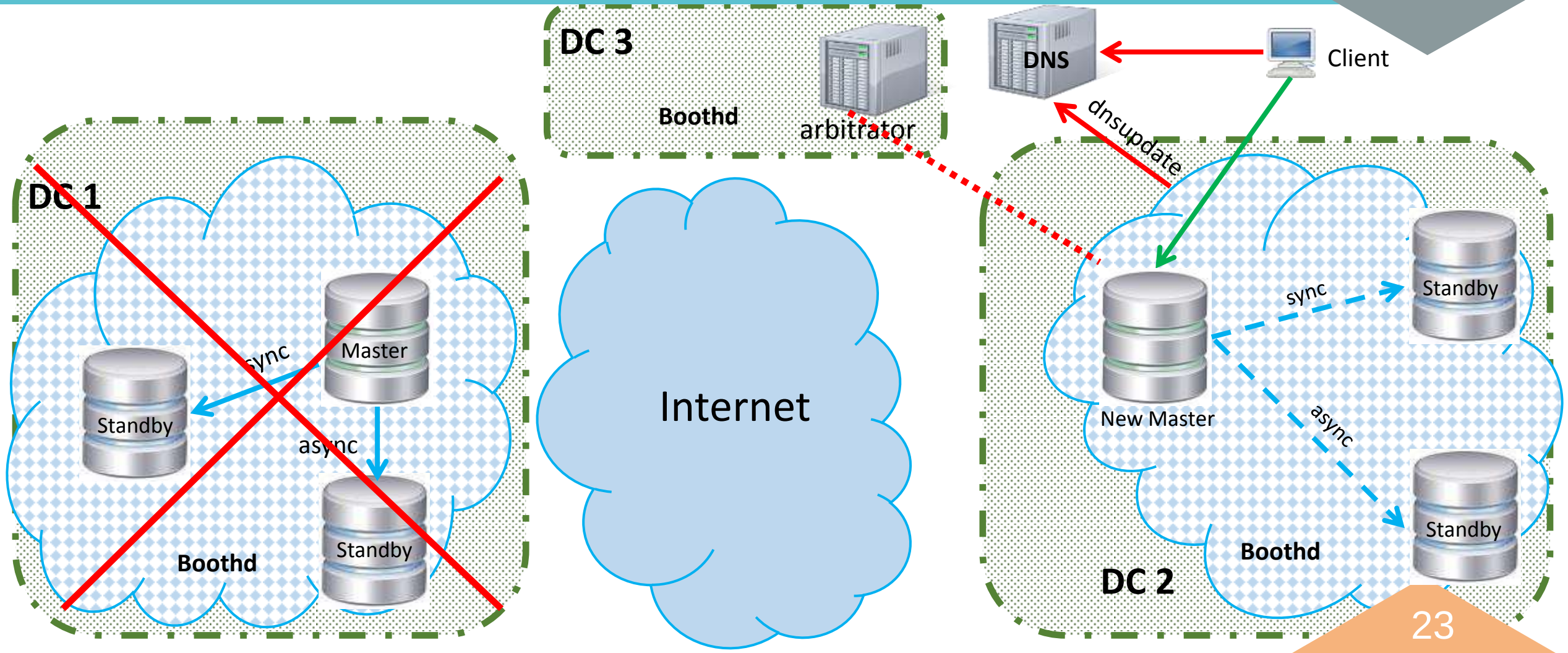
Geo-cluster startup
Step 3



DC 1 failure
Step 1



DC 1 failure
Step 2



Advantages and disadvantages

Advantages (+):

- No performance degradation
- No timeout send/receive heartbeat packets, no false failover
- No L2VPN
- High Availability within DC-1 & DC-2
- Automatic failover
- Switchover

Disadvantages (-):

- RPO>0 (~5 min, when DC-1 is destroyed)

Useful links

- Postgres Pro https://postgrespro.ru/docs
- ClusterLabs https://clusterlabs.org/doc/
- SUSE Linux Enterprise High Availability Extension Documentation https://documentation.suse.com/sle-ha/15-SP1/html/SLE-HA-all/

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