



PERCONA
Performance Consulting Experts

Keep your MySQL backend online – no matter what

Date, time, place:

Froscon,
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Cologne, Germany
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Reporter:

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Percona

who I am?

- Lead engineer at a payment processor for a site in alexa top100 (livejasmin.com)
- Performance engineer at ustream.tv (alexa top500)
- Consultant at Percona
- Some less interesting jobs ..

Main area of experience:

- web / database over clocking :)

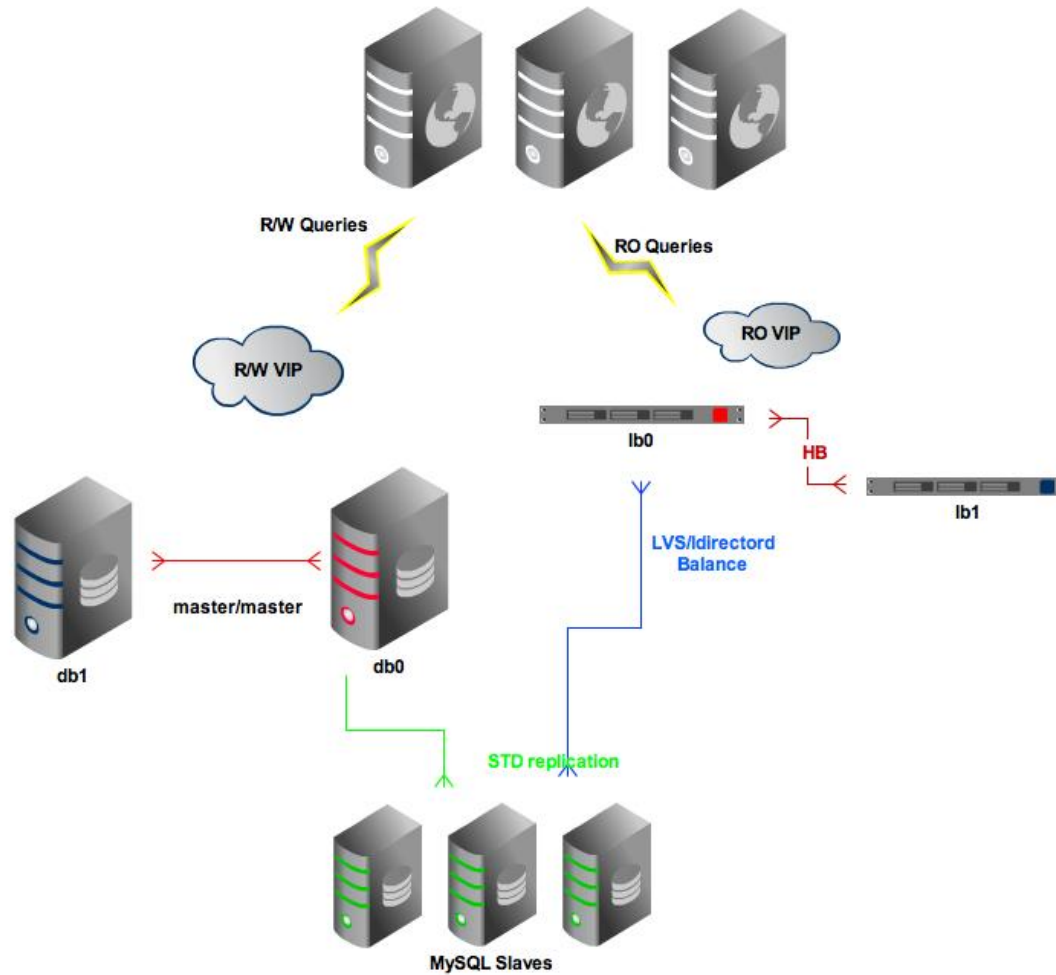
where the experience come from?

- Ustream.tv
 - Visitors online ::
 - Min: 9-10k
 - Peak: 60-200k
 - Max: 700k+
 - Web FE access / sec ::
 - min: ~1k, peak: ~10-15k
 - MySQL QPS ::
 - Master : min: ~1-2k/s, peak: ~6-12k
 - Slaves : min: ~2-3k/s, peak: ~6-10k
- livejasmin.com
 - I can confirm nothing. Very strict NDA.
 - Payment processor with very high traffic. No downtime was tolerated neither as any single bit of data loss.
 - Downtime was between 4 and 5 nines (<20 minutes) / year

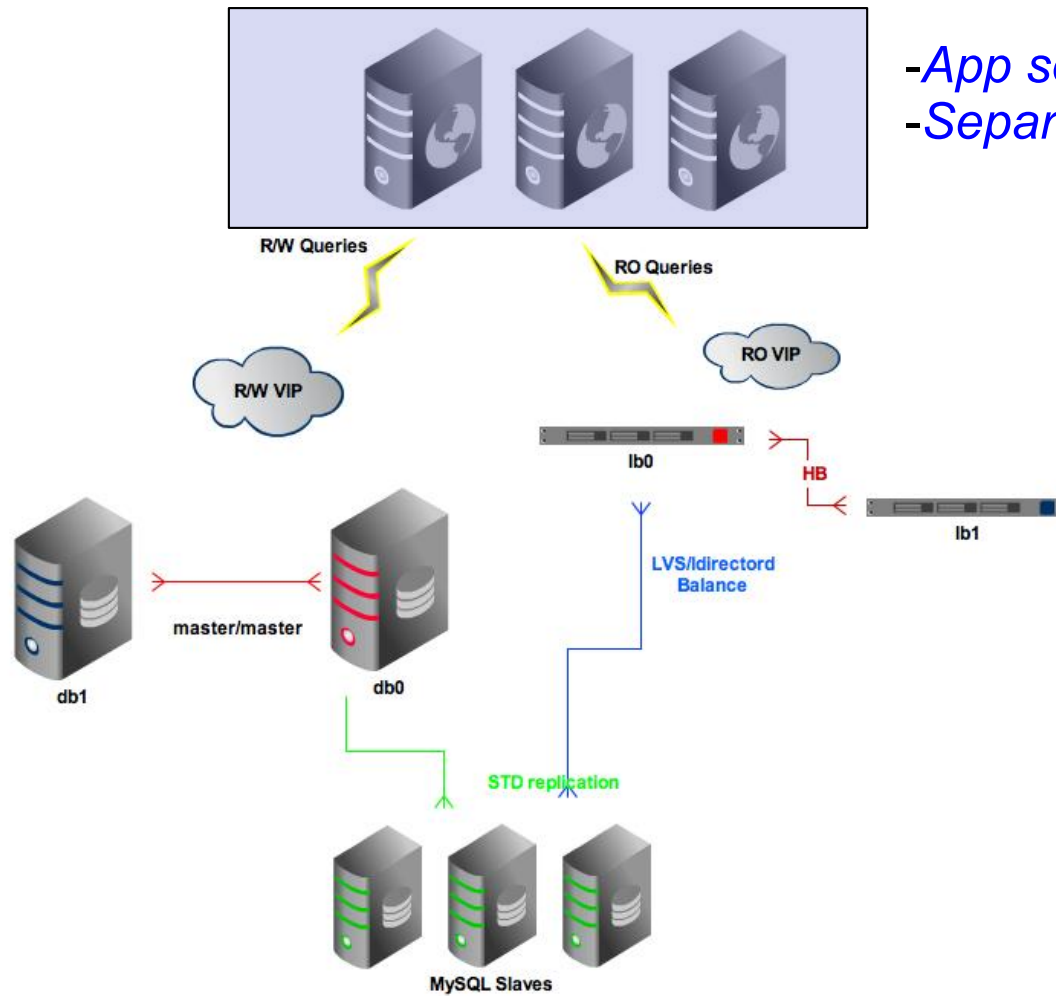
goals and requirements

- in general
 - Never go down (obviously :/)
 - Website must show up no matter what
 - Let the engineer sleep over the nights
- @livejasmin on payment (trust)
 - Never confuse any data in the DB (charge 2times or miss charging)
 - The site MUST show up!
 - Never loose any tracking records of the customer/visitor (fraud)
- @ustream (startup)
 - Stay online, show up the streams
 - As much performance as possible from the less resource as possible
 - Show must go on. (Michael Jackson's funeral, live event, you can't break the streaming)

how does it work?

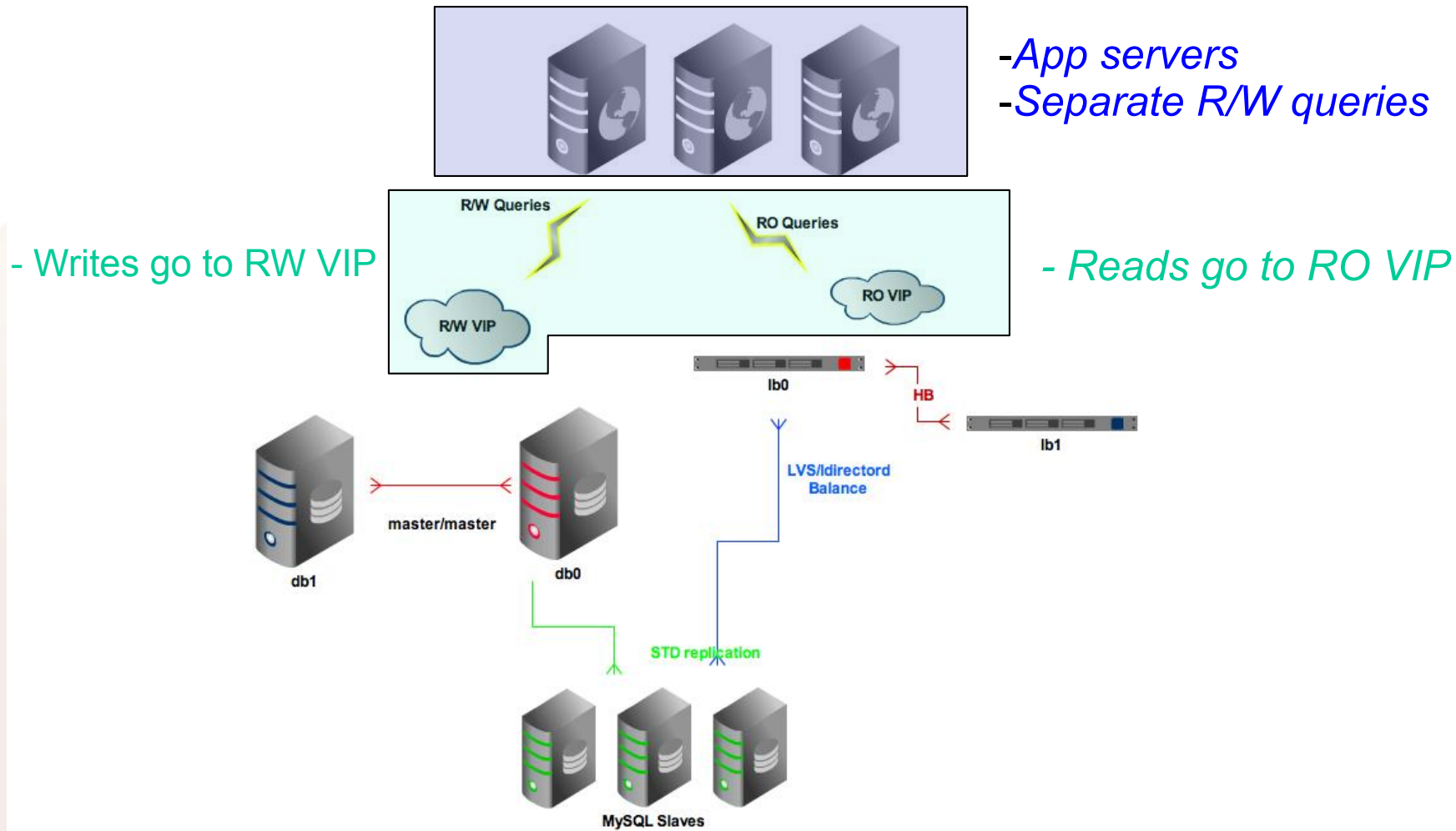


how does it work?

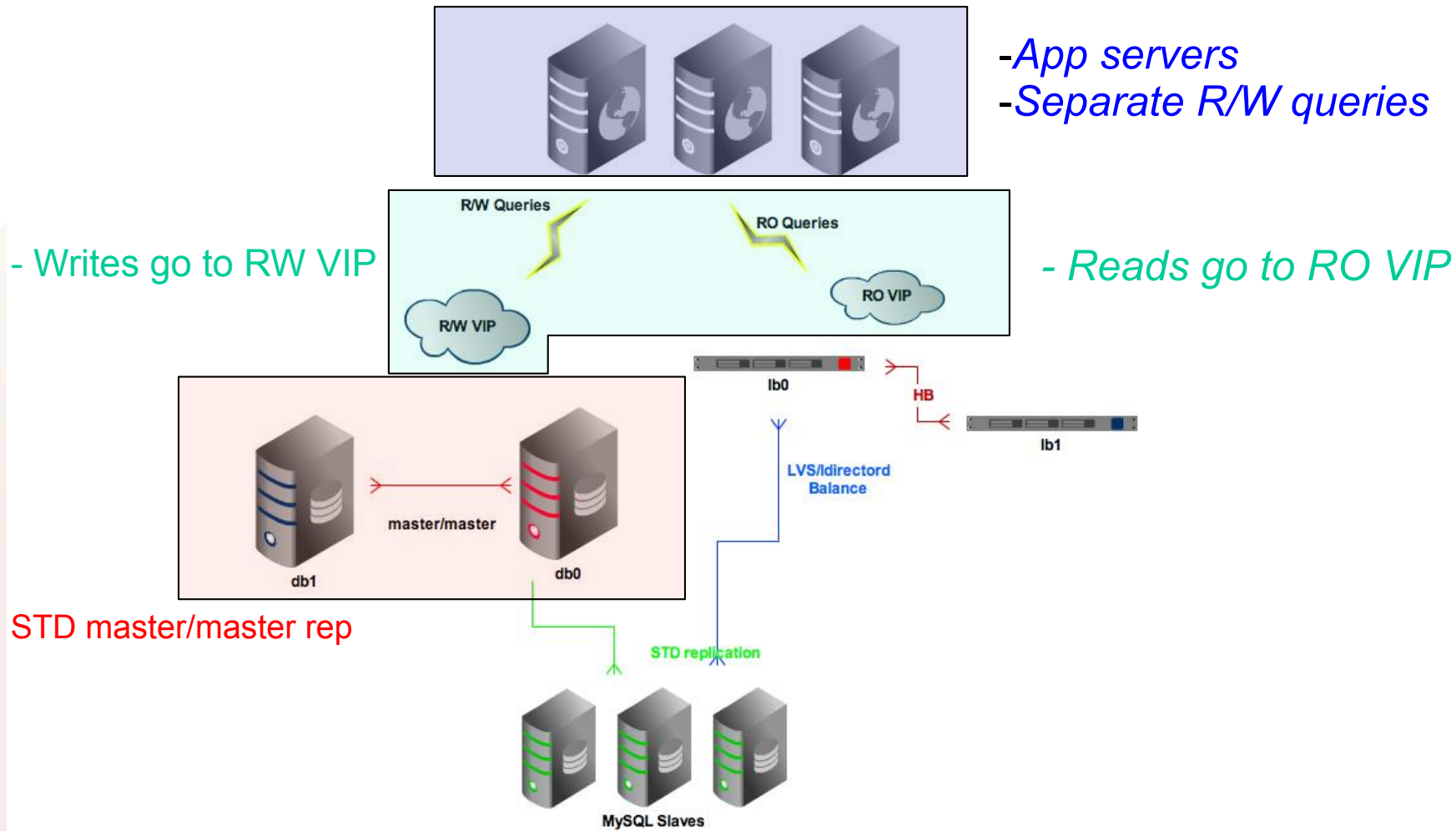


- App servers
- Separate R/W queries

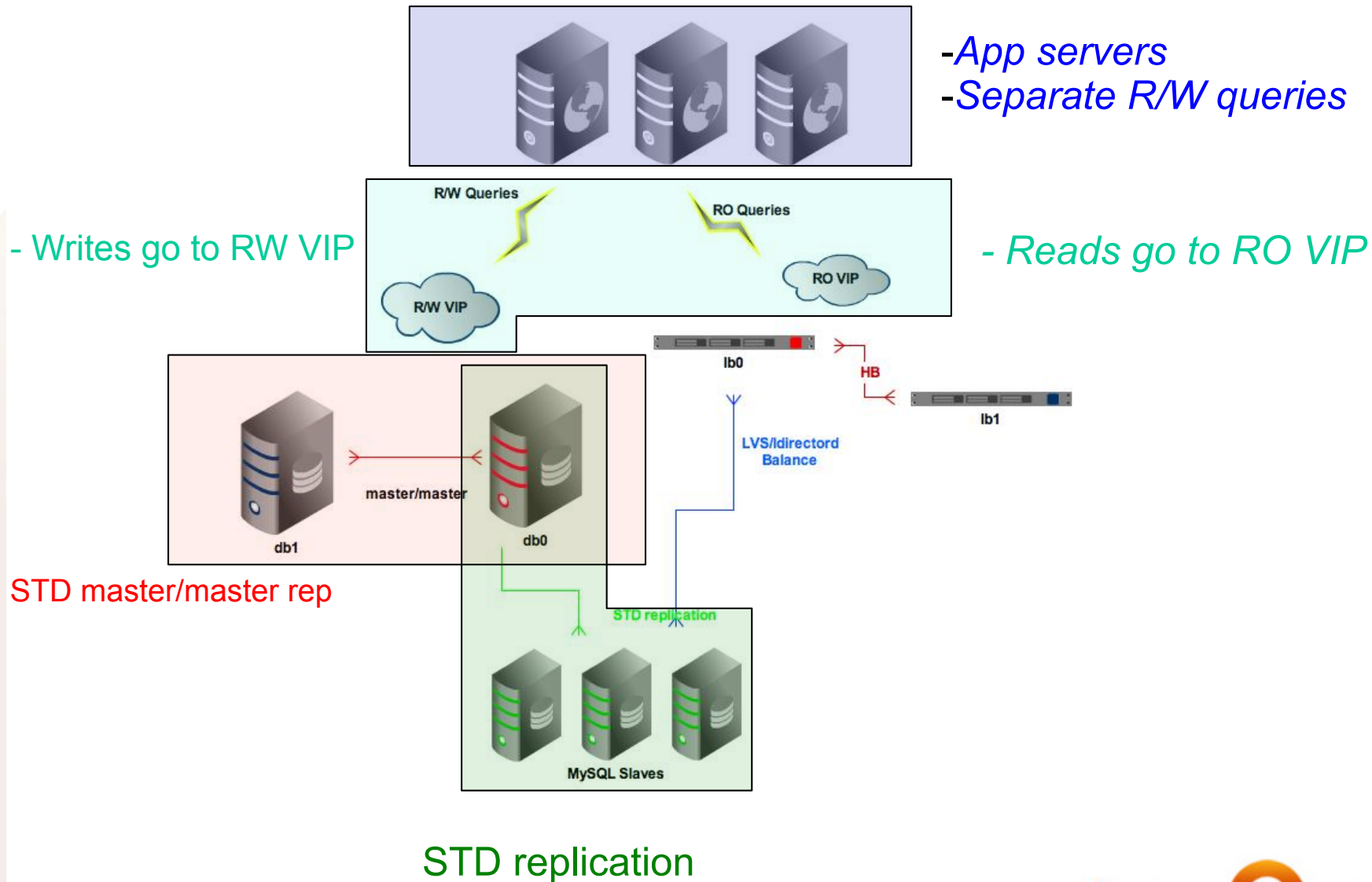
how does it work?



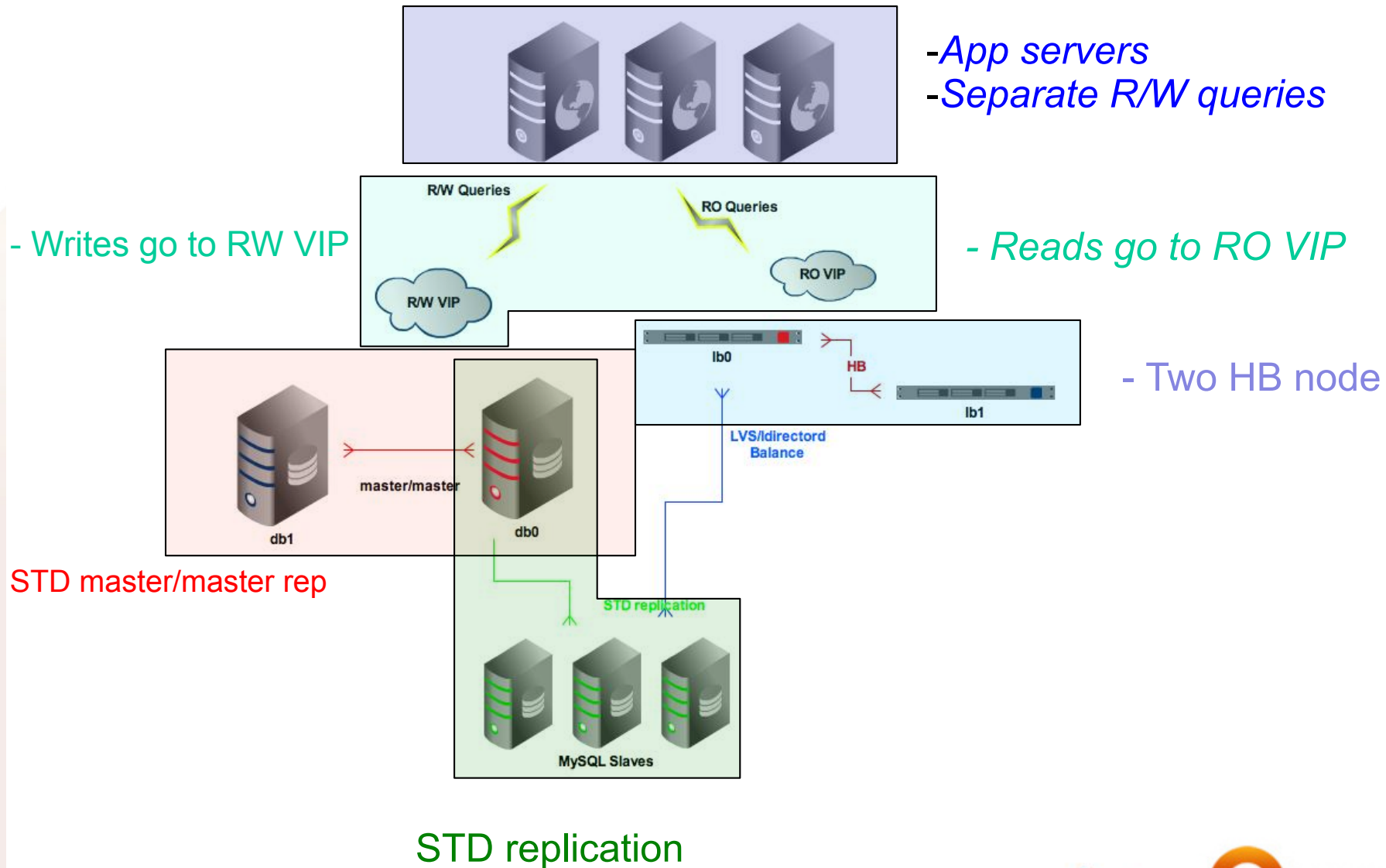
how does it work?



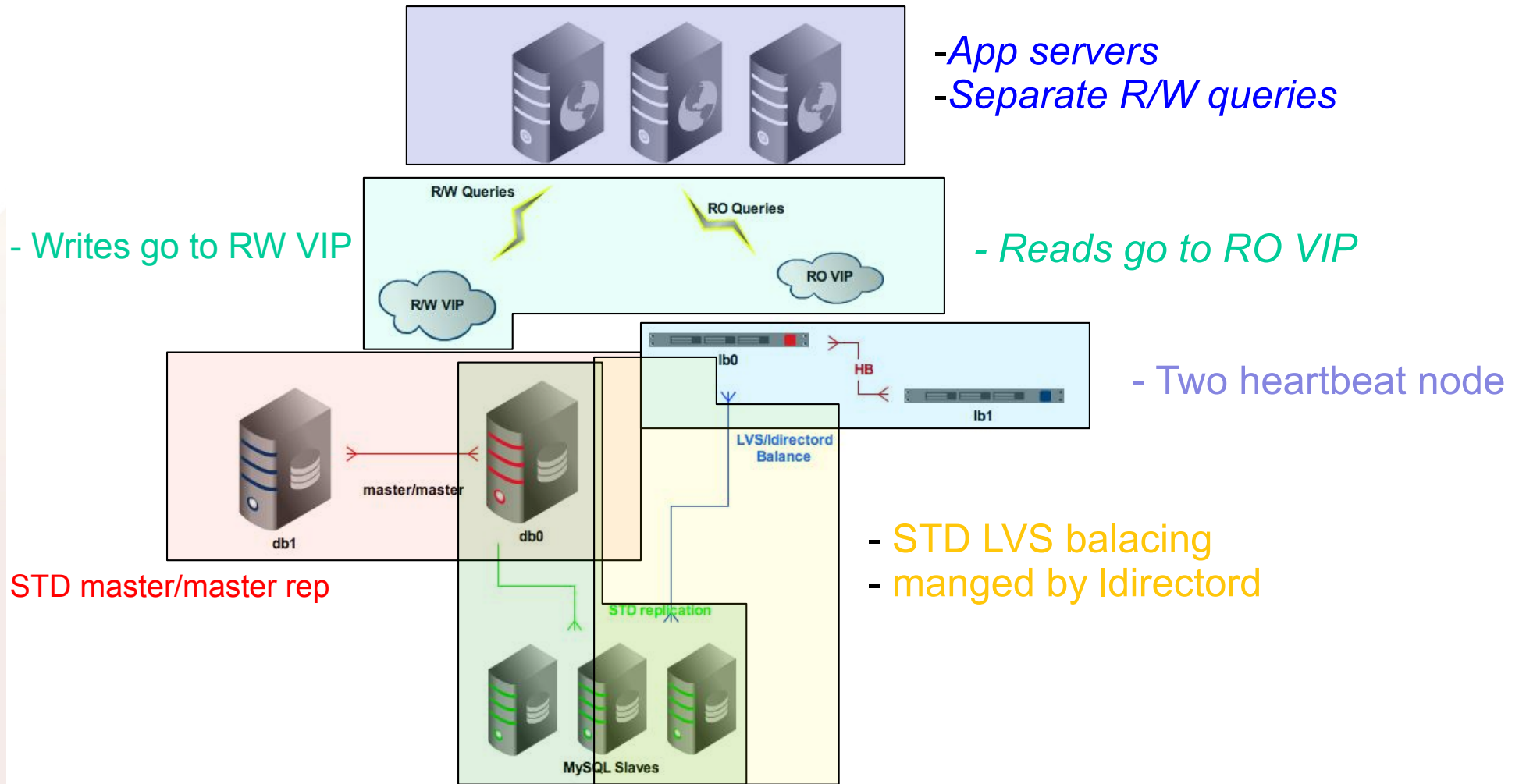
how does it work?



how does it work?



how does it work?



STD replication

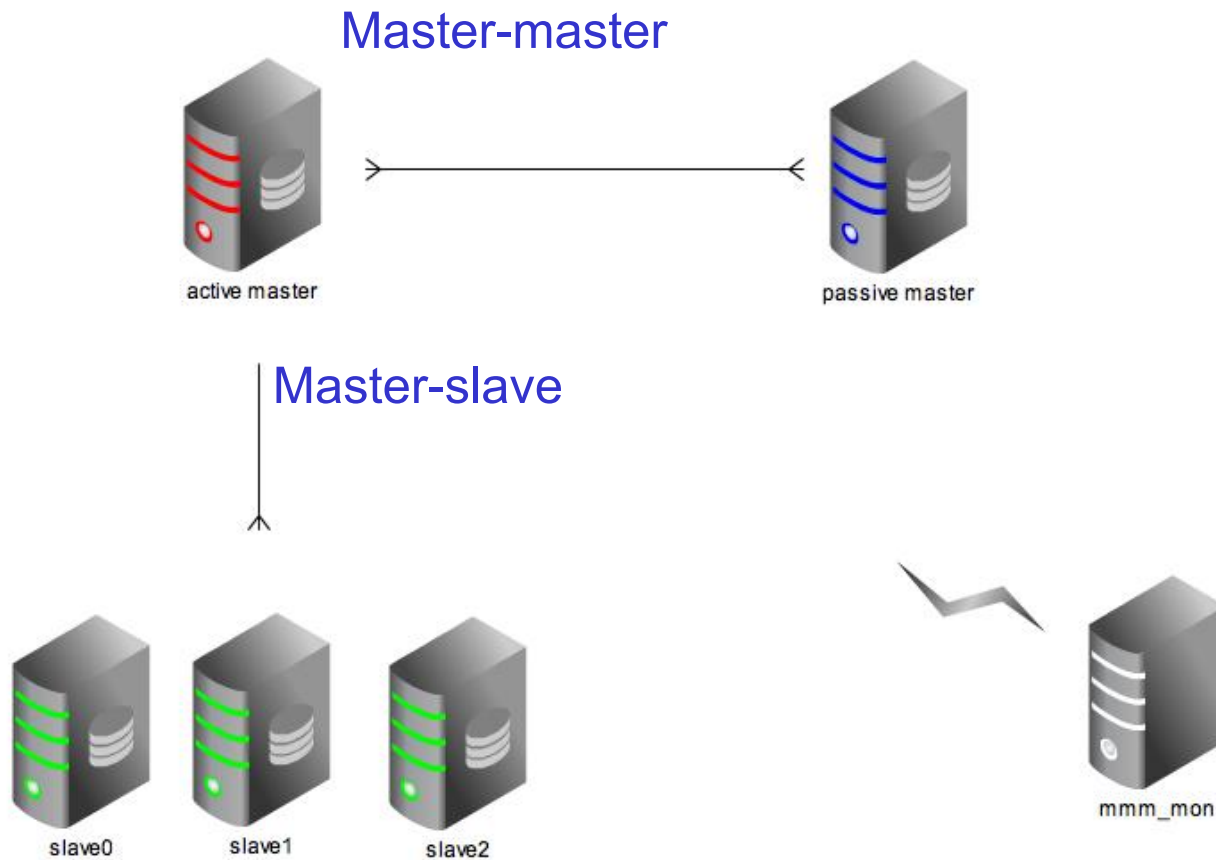
We need to ...

- Manage master-master + slaves with MMM

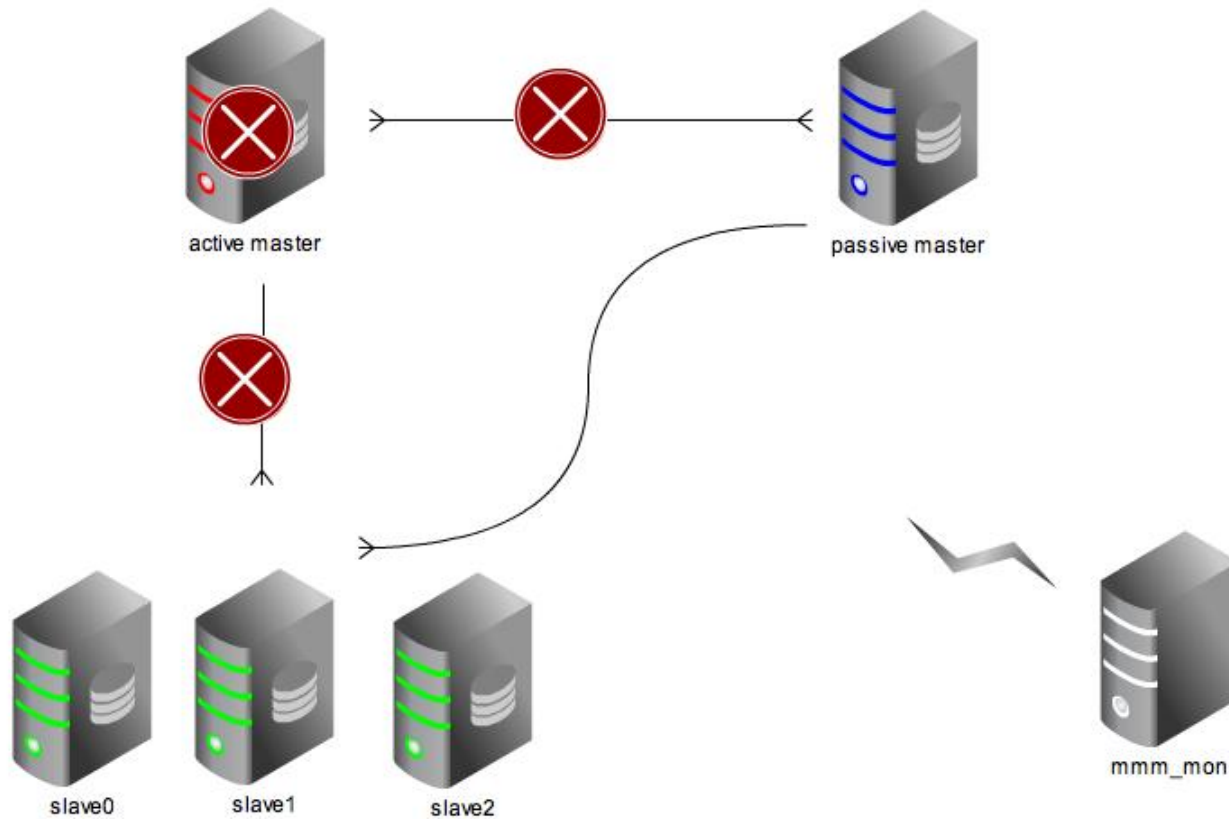
Manage master-master + slaves with MMM

- This is not a real master-master.
- MMM is a simple perl script collection
- It checks for the health of replication
- Can handle active master failure
- Weakness: it's based on the checking of the replication status

Manage master-master + slaves with MMM



Manage master-master + slaves with MMM



We need to ...

- Manage master-master + slaves with MMM
- Set up HB+LVS/ldirectord to do the balancing

HB+LVS/ldirectord

- HB is only responsible, to keep one of the two balancer online all the time (www.linux-ha.org)

haresources: lb1 192.168.1.10 ldirectord

- LVS is kernel level implementation of software based loadbalancing
- ldirectord is an application what manage the balancing

```
# MySQL  
virtual = 192.168.2.1:3306  
real=192.168.2.1:3306 gate 10  
real=192.168.2.2:3306 gate 10  
#passive master  
fallback=192.168.1.10:3306 gate  
request = "select * from mydb.loadbalance"
```

We need to ...

- Manage master-master + slaves with MMM
- Set up LVS/lldirectord to do the balancing
- Extend capabilities

Extend capabilities

- Split reads/writes from your application
- Prepare for replication delay

```
1 <?php
2
3 $my_writer = '192.168.1.1';
4 $my_reader = '192.168.2.1';
5
6 //build connection for insert
7 $writer_connection = mysql_connect($my_writer,"user","pass")
8 mysql_select_db("database", $writer_connection);
9
10 //build connection for select
11 $reader_connection = mysql_connect($my_reader,"user","pass")
12 mysql_select_db("database", $reader_connection);
13
14 //execute insert
15 $result_of_insert = mysql_query("insert into users (name, email, password) values ('Istvan', 'istvan.podor@percona.com', '*****', $writer_connection);
16
17 //execute select
18 $result_of_read = mysql_query("select name from users where `email` = 'istvan.podor@percona.com'", $reader_connection);
19
20 ?>
```

Extend capabilities

- Split read/writes from application
- Set fallback node to your passive master
- Set up Idirectord to check for a table if exists

MySQL

virtual = 192.168.2.1:3306

real=192.168.2.1:3306 gate 10

real=192.168.2.2:3306 gate 10

#passive master

fallback=192.168.1.10:3306 gate

*request = "select * from mydb.loadbalance" //Interacting with the balancer*

Extend capabilities

- Split read/writes from application
- Set fallback node to your passive master
- Set up Idirectord to check for a table if exists
- Manage read-only pool by yourself

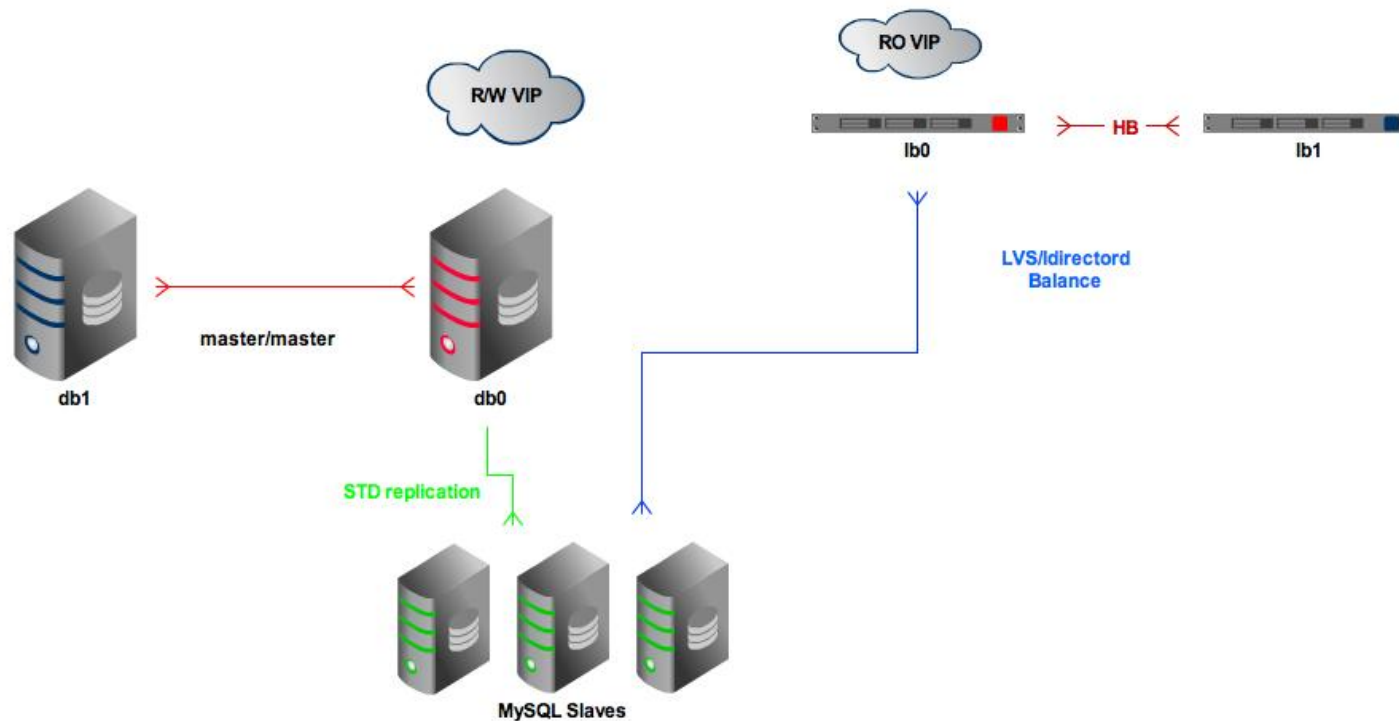
Balancer mgmt script

- Simple (bash/php/perl) script on your slaves
- Check for slave health
- Manipulate balancing by renaming the `loadbalance` table
- http://istvanpodor.ath.cx/froscon/slave_mgmt.sh

We need to ...

- Manage master-master + slaves with MMM
- Set up LVS/ldirectord to do the balancing
- Extend capabilities
- At this point, we should know what happens if something fail :)

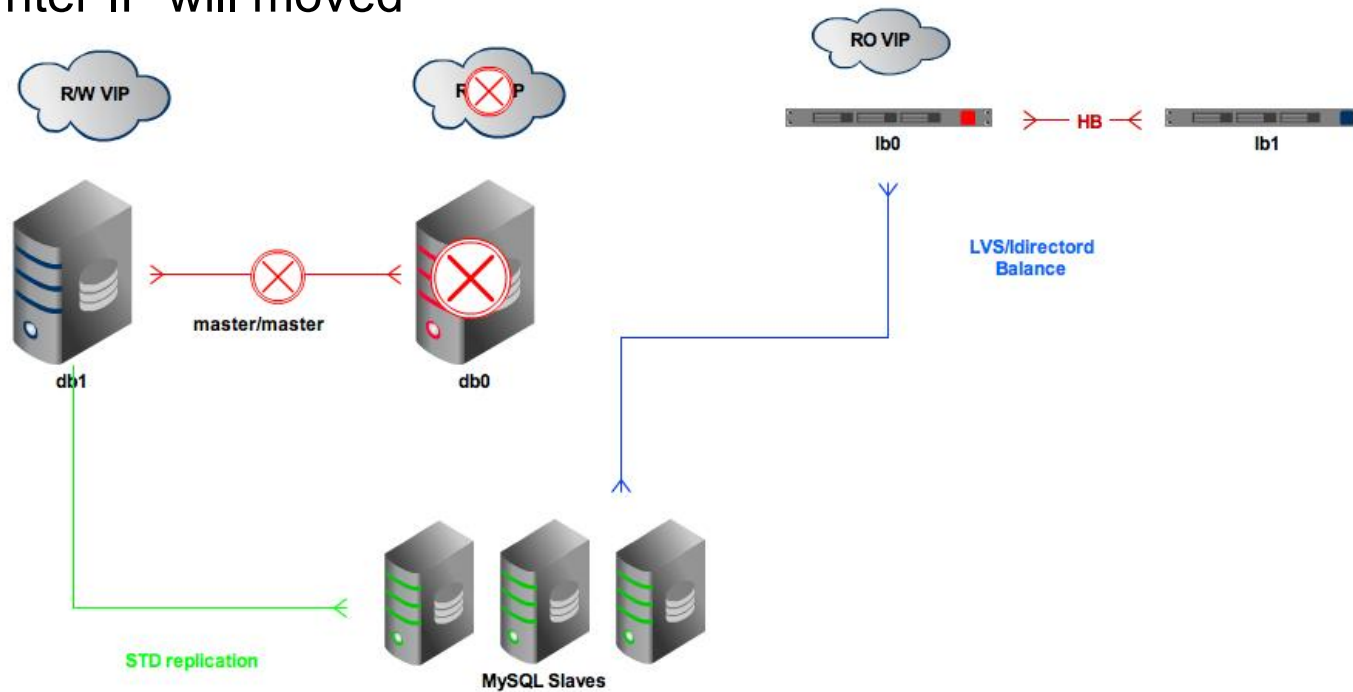
Lets brake things ..



create and share your own diagrams at gliffy.com

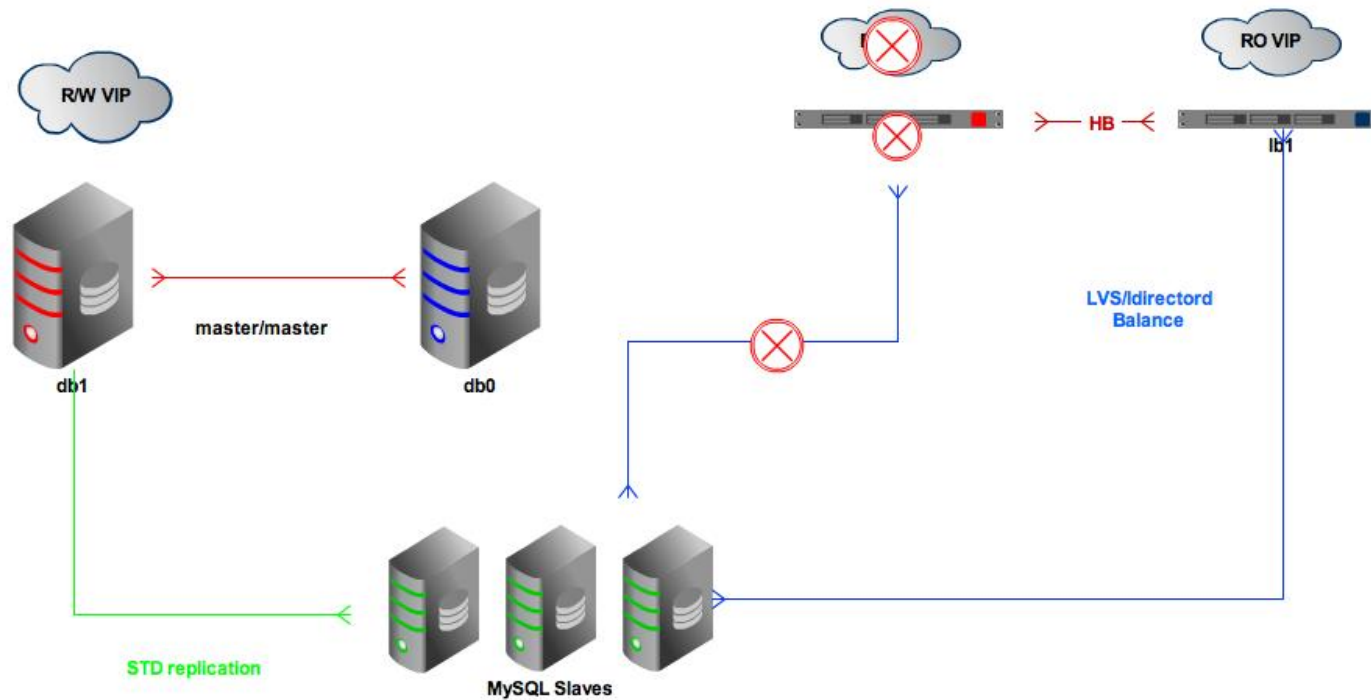
Lets brake things ..

Writer IP will moved



Change master on slaves

Lets brake things ..

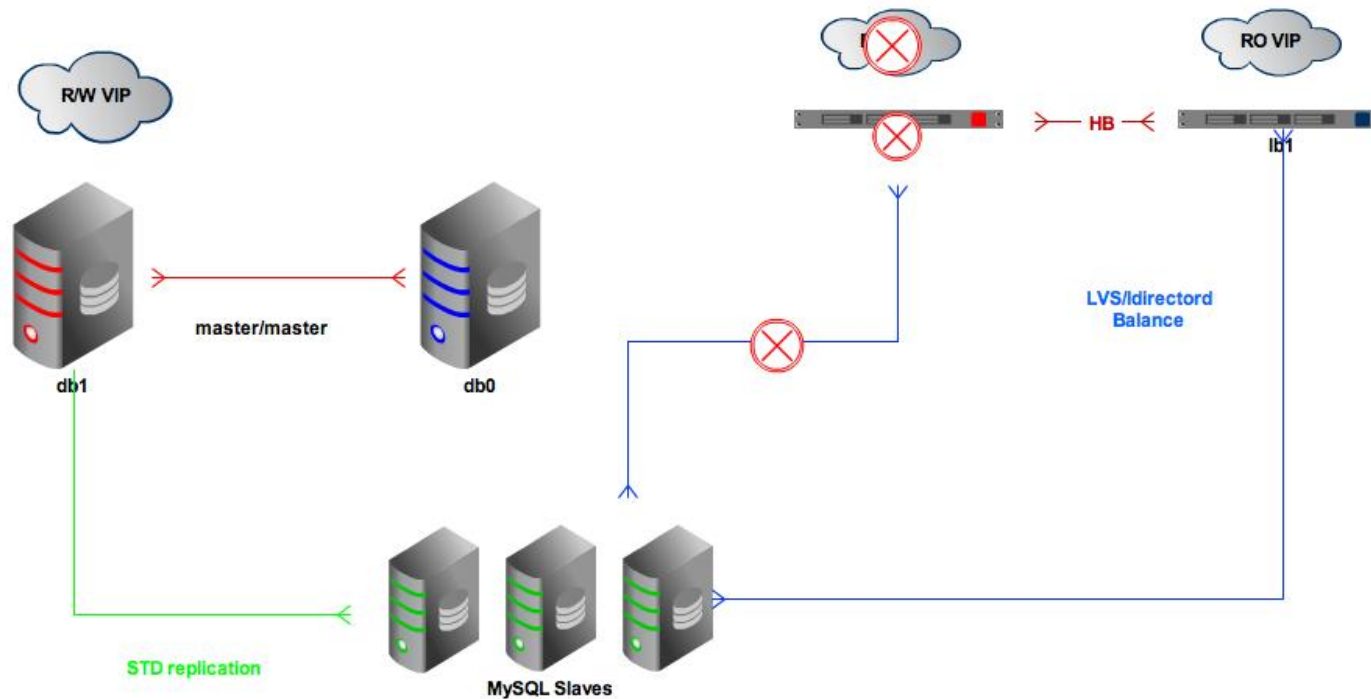


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Lets brake things ..

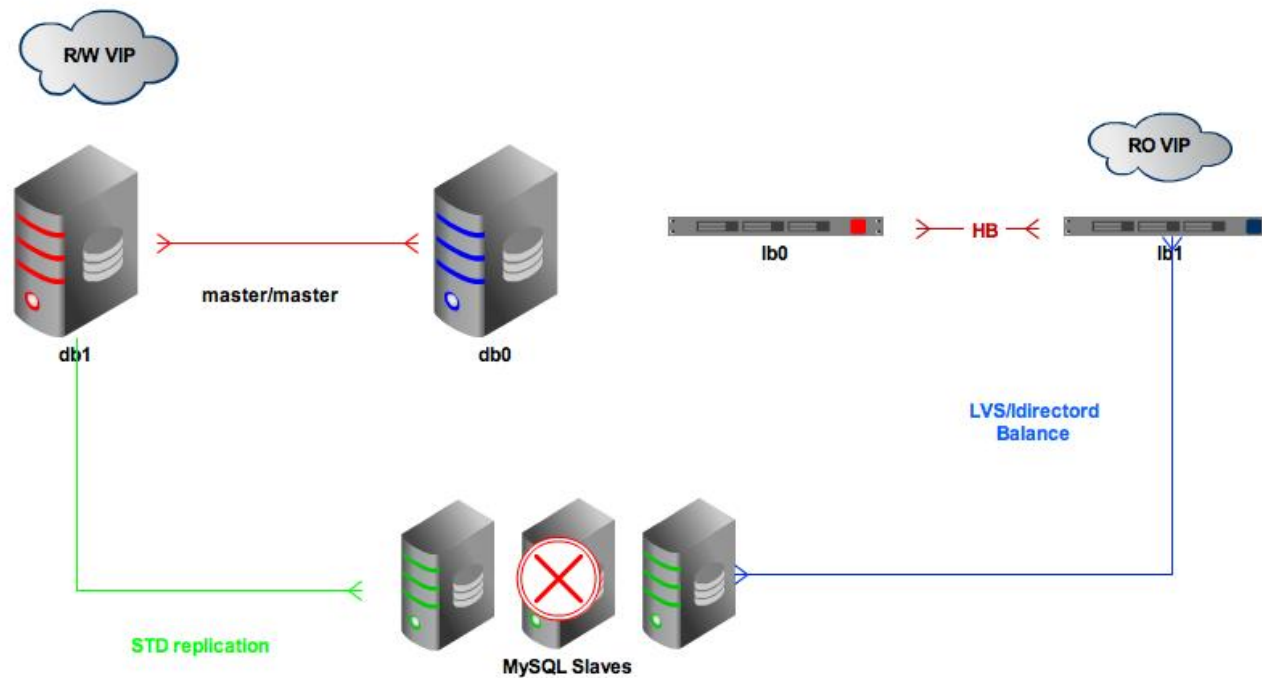
Passive HB node will take over
move the IP, startup Idirectord



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Lets brake things ..

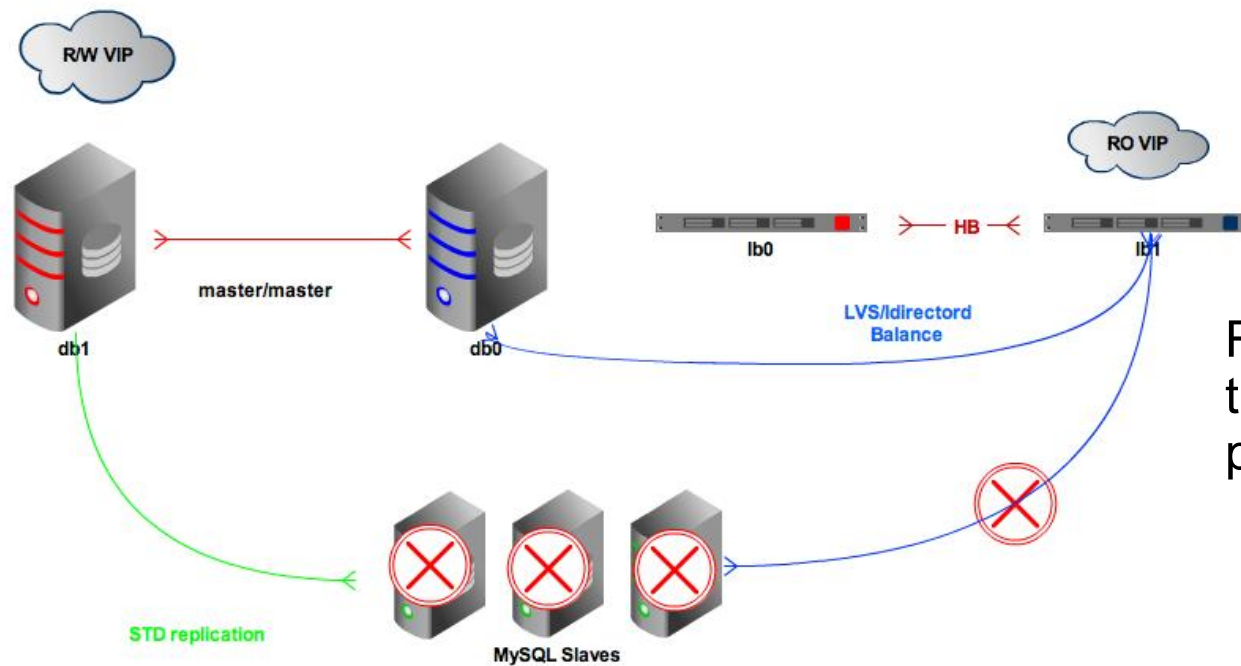


Slave fail or fall behind

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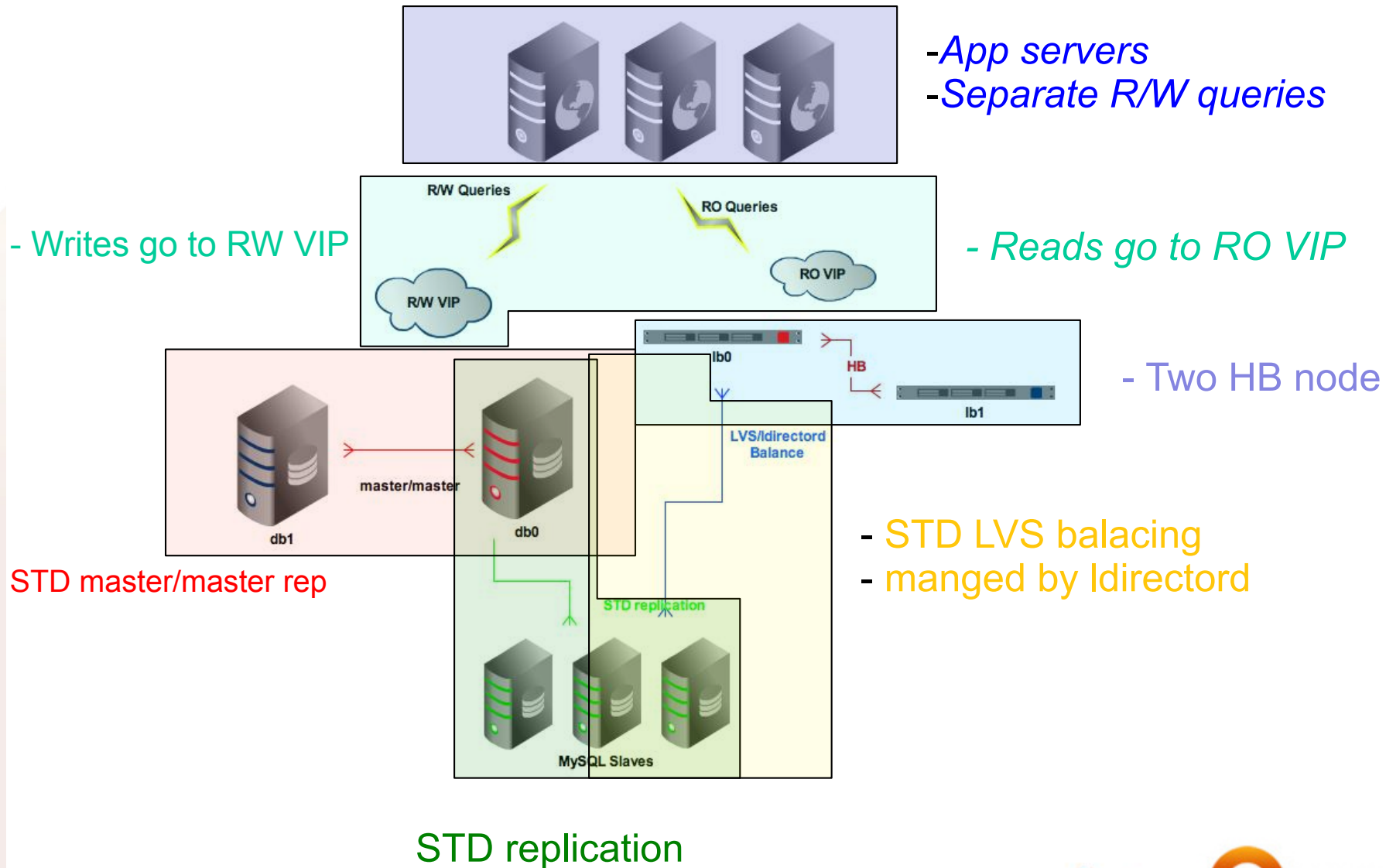
Lets brake things ..



Read queries will transmitted to your passive master

All slave fail (wrong query)

Better?



What could go wrong?

- One or more servers fail (no problem)
- Somebody/something broke replication
- MMM won't work (manual fail over)
- Load balancer goes down
- Data inconsistency
 - Wait, what do you mean, inconsistency?
 - mk-checksum daily
 - mk-sync-table on demand

So we won?

- In some cases, yes. If the show must go on.
- If we can have a relatively small backend for our website/mission critical application and store other data elsewhere (datamining, logging etc)
- Useful for altering large tables, making larger upgrades/updates
- Best win: once a netop pulled out the uplink from a whole rack with 24 servers, all the active nodes. We felt over to the other rack without anyone realizing it.

Any questions?

- Links:
 - www.percona.com
 - www.maatkit.org
 - www.linux-ha.org
 - www.mysql-mmm.org
 - [http://www.linuxvirtualserver.org/docs/ha/heartbeat Idirectord.html](http://www.linuxvirtualserver.org/docs/ha/heartbeat%20directord.html)
 - Istvan.podor@percona.com