MIGRATING A LIVE SITE ACROSS THE COUNTRY WITHOUT DOWNTIME

MOUNTAIN WEST RUBY CONFERENCE 2013

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I WORK AT CHARGIFY.COM

CHARGIFY.COM

- A service for managing your recurring revenue business
- We process transactions 24/7

A BUSINESS EXISTS TO MAKE MONEY

NO $$$ = NO BUSINESS!

THAT MEANS NO PLANNED OUTAGES!

BUT WE HAD A PROBLEM...

SO IT'S TIME TO SWITCH

"I hate sales"

“WHAT SERVER CONFIGURATIONS WILL YOU NEED THREE YEARS FROM NOW”

?????????

HOW 'ENTERPRISE' CALCULATES PRICE

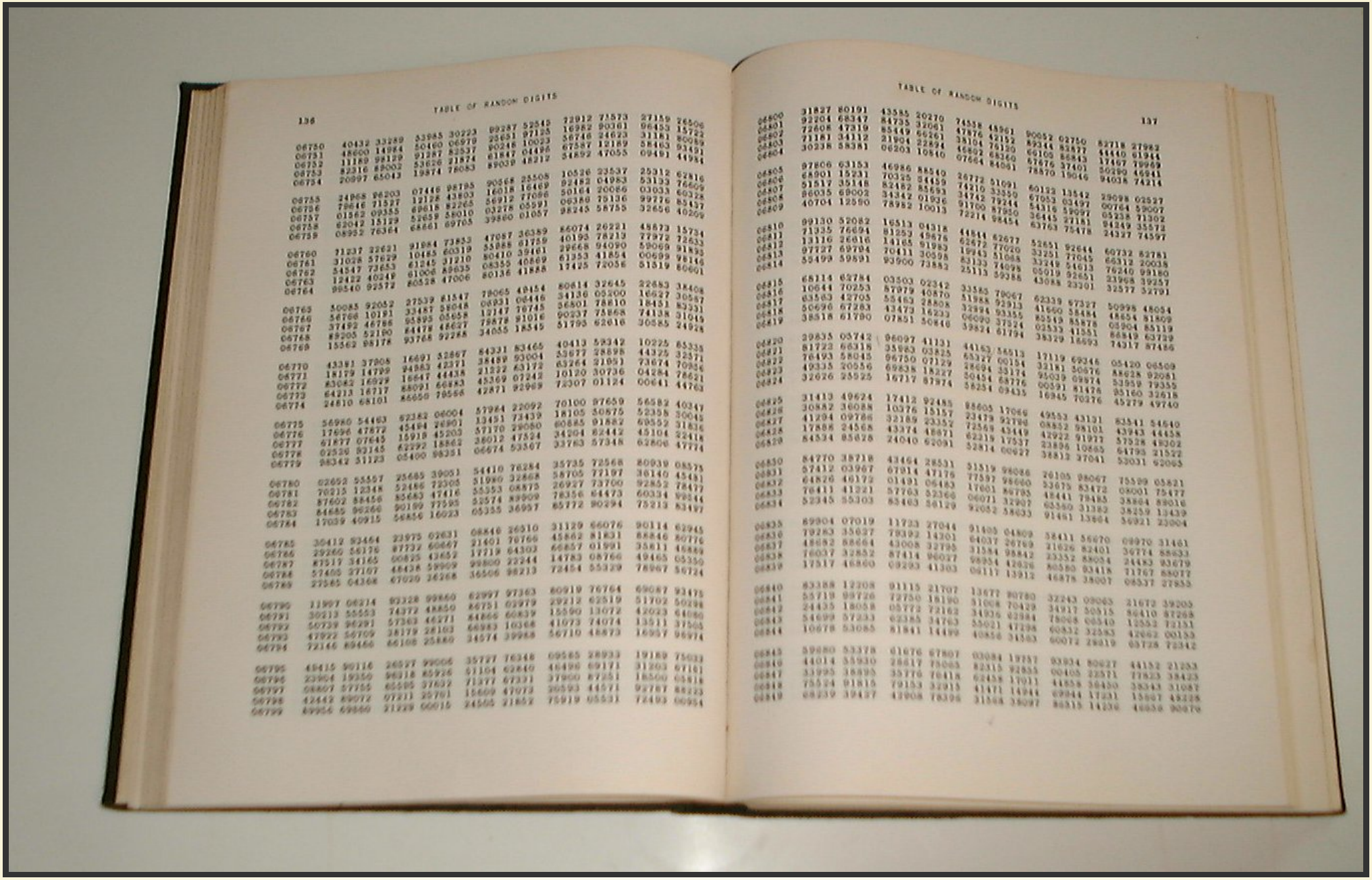

TABLE OF RANDOM DIGITS

136

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06767	37492	46786	95895	05658	12147	76745	36801	78810	18451	83331
06768	89205	52190	84478	48627	79878	91016	90237	75868	74138	31049
06769	15562	98178	93768	92288	34055	18545	51795	62616	30585	24928
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06772	83082	16929	16647	44438	21232	83172	83264	21093	73674	70936
06773	64213	16717	88091	66883	45369	07242	10120	30736	04284	78621
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06776	17696	47872	45494	26901	13451	73439	18105	50875	52358	30045
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06779	98342	51123	05400	98351	06674	53367	33783	57348	62806	47774
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06782	87602	88456	85683	47416	55353	08575	26927	73700	92852	78477
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TABLE OF RANDOM DIGITS

137

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06804	30238	58381	06203	10840	67684	84081	67676	37401	50299	46941
06805	97806	63153	46986	88549	10526	23537	78870	19046	94038	74214
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06807	51517	35148	82482	85693	74910	33559	60122	13542	29098	02527
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06811	71335	76694	81253	49676	41544	62677	63763	75478	24327	74597
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06813	97727	69794	70411	30598	19943	51088	33251	77045	66312	20038
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06815	68114	62784	03503	02342	25113	59288	05019	92651	23968	39257
06816	10644	70253	87979	40870	33585	79067	43088	23201	32577	32791
06817	63583	42705	55463	28808	51968	92913	62339	67327	50995	48054
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06822	76493	58045	96750	07129	65327	00154	17119	69346	05420	06509
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06835	89904	07019	11723	27044			91461	13604	56921	22004
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06840	83388	12208	91115	21707	13672	90780	46878	38007	08537	27853
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06842	24435	18058	05772	72162	34936	62984	34917	50515	80410	87268
06843	54699	57233	62385	34763	55021	47298	78068	08540	12552	72151
06844	10678	53085	81841	14499	40856	34563	60832	32583	42062	00153
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06845	59880	53378	61676	67807	03084	19757	83834	80927	44152	21203
06846	44014	55930	28617	75063	82315	92855	00405	22571	77823	38423
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06848	75524	91815	79153	32915	41471	14944	69044	17231	15907	48228
06849	68239	39437	43908	78398	31568	38097	86315	14236	46858	90879

http://www.wps.com/J/million/images/million-random-digits-open.jpg

WHY EC2

- PCI
- Track record
- Support

THE PLAN

1. Introduce Chef into our old DC
2. Slave new DC as Disaster Recovery
3. Switching datacenters is really just a planned failover
4. Test the failover like crazy!

TESTING

- Complete copy of every system in the live site (both DCs)
- Exercise everything
- Generate fake traffic
- Log every error or anomaly

AUTOMATION

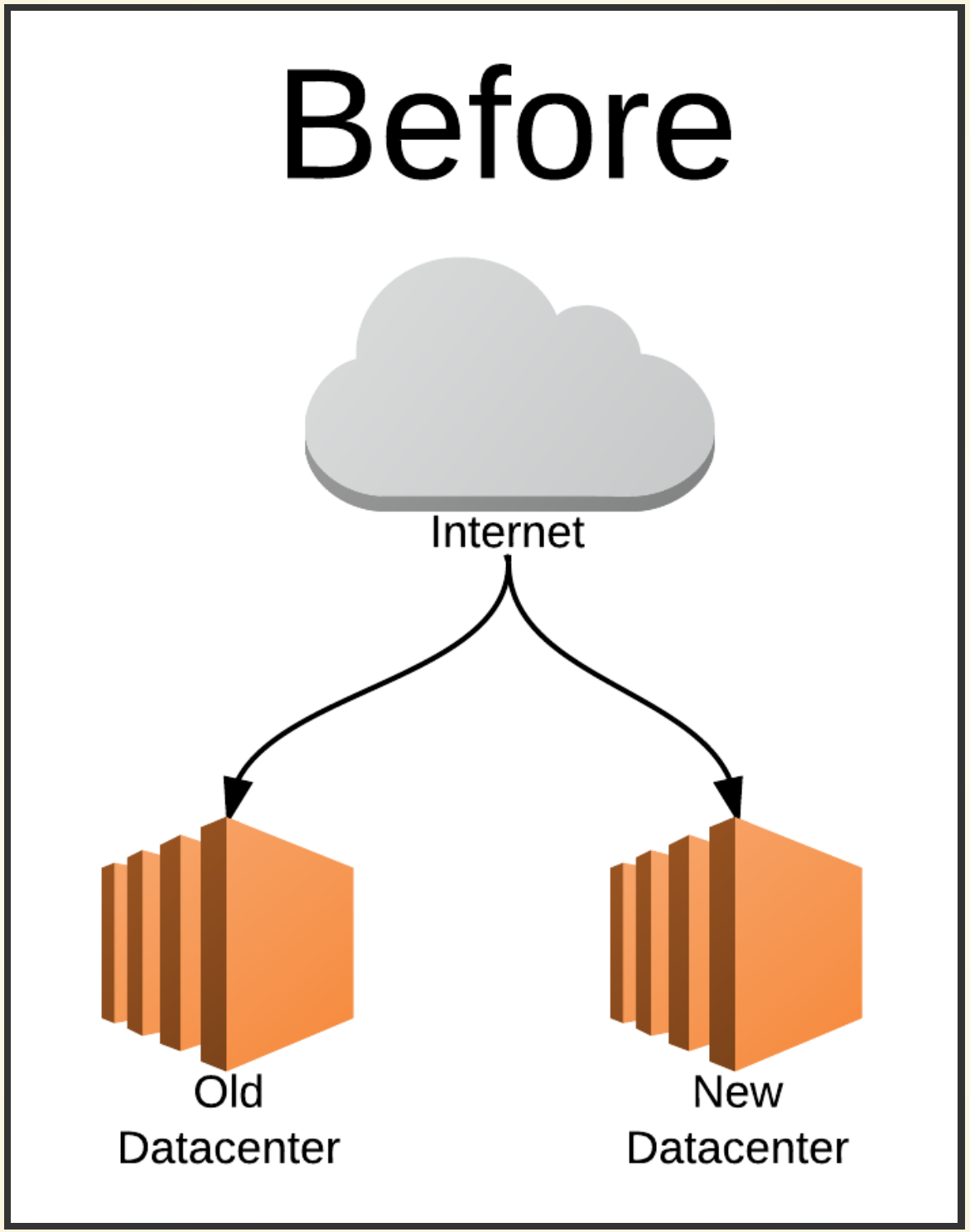
- Reproduceable
- Version controlled
- Faster
- Less error-prone

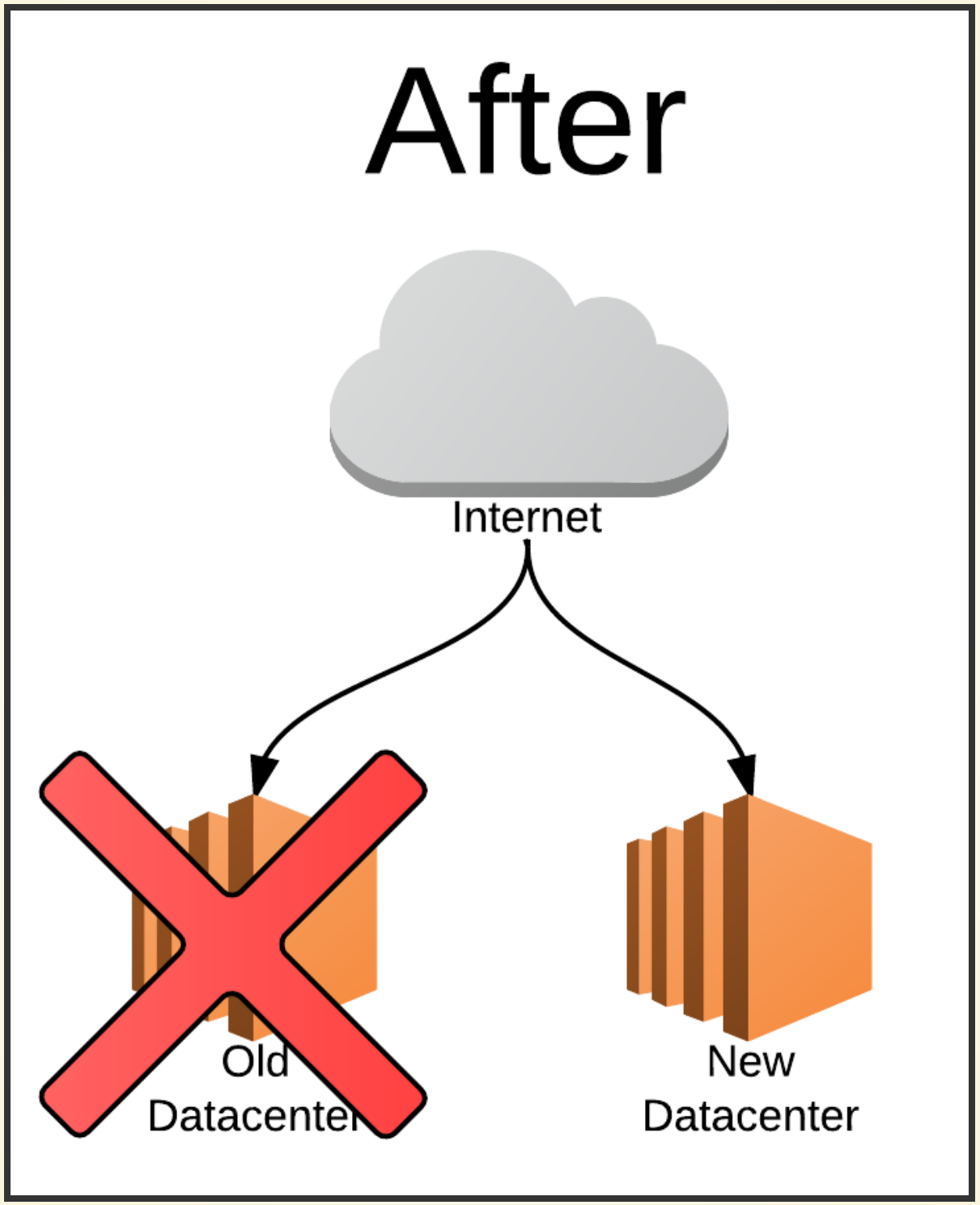
INTRODUCE CHEF

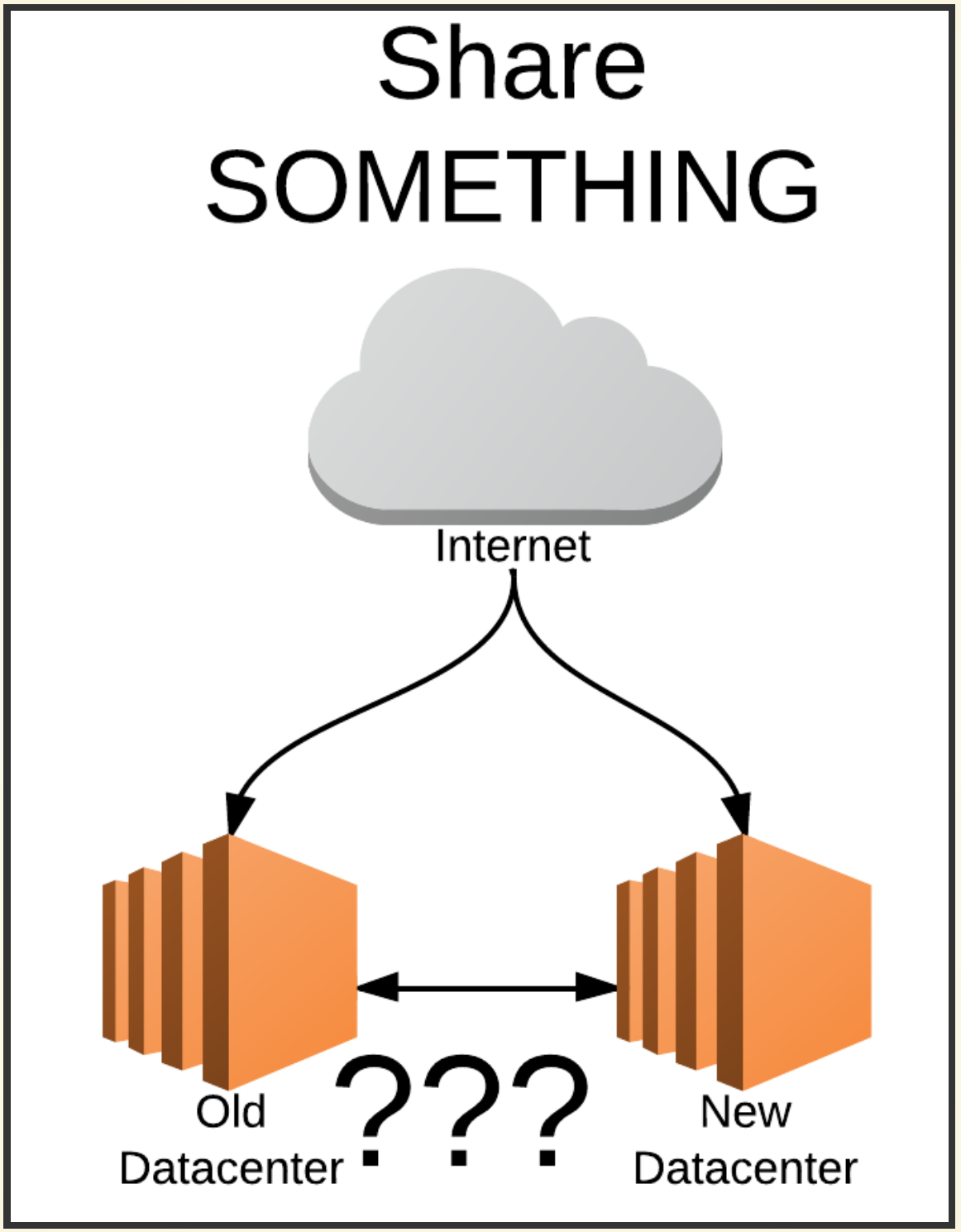
- Old = RHEL, New = Ubuntu
- One package / cookbook at a time!

THE THEORY

WHEN EVERYTHING IS REDUNDANT, YOU CAN RUN BOTH DATACENTERS AT ONCE, THEN JUST TURN OFF THE OLD STUFF!


Before
Internet
Old
Datacenter
New
Datacenter


After
Internet
Old
Datacenter
New
Datacenter


Share
SOMETHING
Internet
Old
Datacenter
???
New
Datacenter

CROSS DC COMMUNICATION & VPNS

- We already had the hardware
- Strongswan
- Easy communication
- Easy to synchronize systems
- Everyone thinks they're on the same network

THE BEAUTY OF VPC

NOW WITH THAT OUT OF THE WAY...

PAIN POINTS

- DNS
- Redis/Resque
- MySQL

DNS TROUBLE

- DNS changes aren't instant
- MUST be ready for traffic flowing to both datacenters

SOLUTION:

- Replace old web servers with HAProxy
- Transparent forwarding of traffic hitting the old servers
- Roundtrip time = **long** *but* Lost traffic = **none**

MIGRATING REDIS/RESQUE

- Redis failover is hard
- Lack of synchronized configuration
- Potential to write to both servers at once!

SOLUTION:

- Embrace the beauty of the queue!
- Don't slave across DC: two masters instead
- Old servers => old Redis, New servers => new Redis

“Once the switchover is complete, just drain the old queue!”

MYSQL

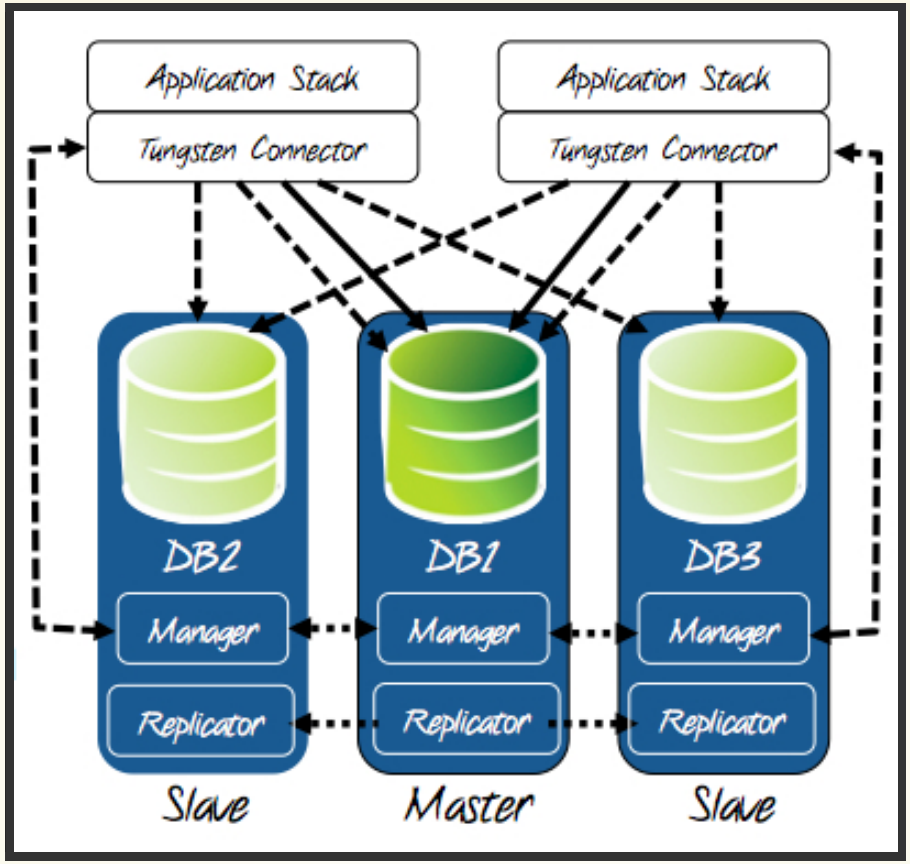
- Replication lag
- Switching masters
- Switching all systems to talk to the new master

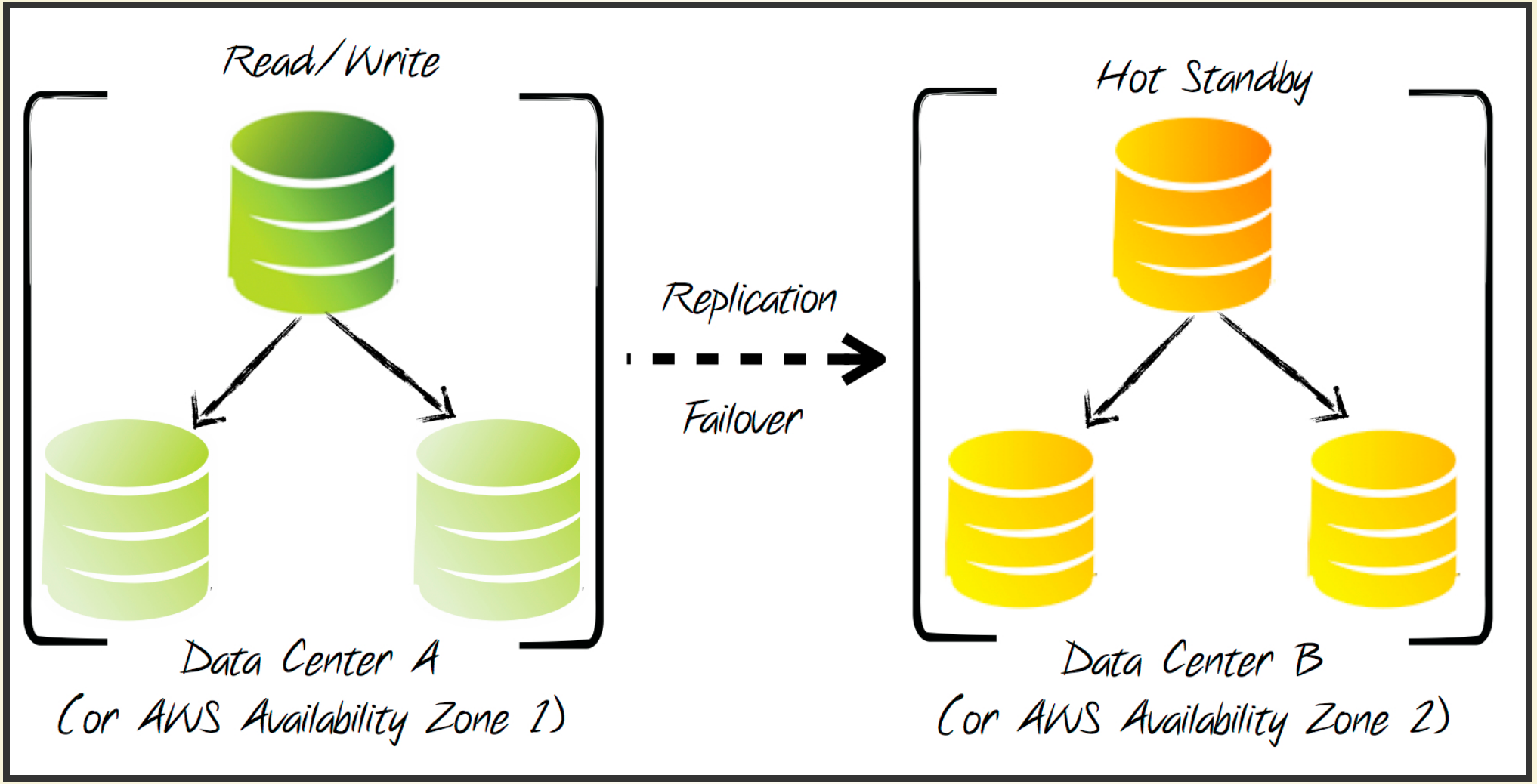
SOLUTION:

CONTINUENT TUNGSTEN

CONTINUENT TUNGSTEN

- Replication replacement
- Cluster manager
- Understands SQL
- 'Holds' queries during switchover


Application Stack
Tungsten Connector
Application Stack
Tungsten Connector
DB2
DB1
DB3
Manager
Manager
Manager
Replicator
Replicator
Replicator
Slave
Master
Slave


Read/Write
Replication
Failover
Hot Standby
Data Center A
(or AWS Availability Zone 1)
Data Center B
(or AWS Availability Zone 2)

ALSO CHECK OUT

https://github.com/37signals/mysql_role_swap

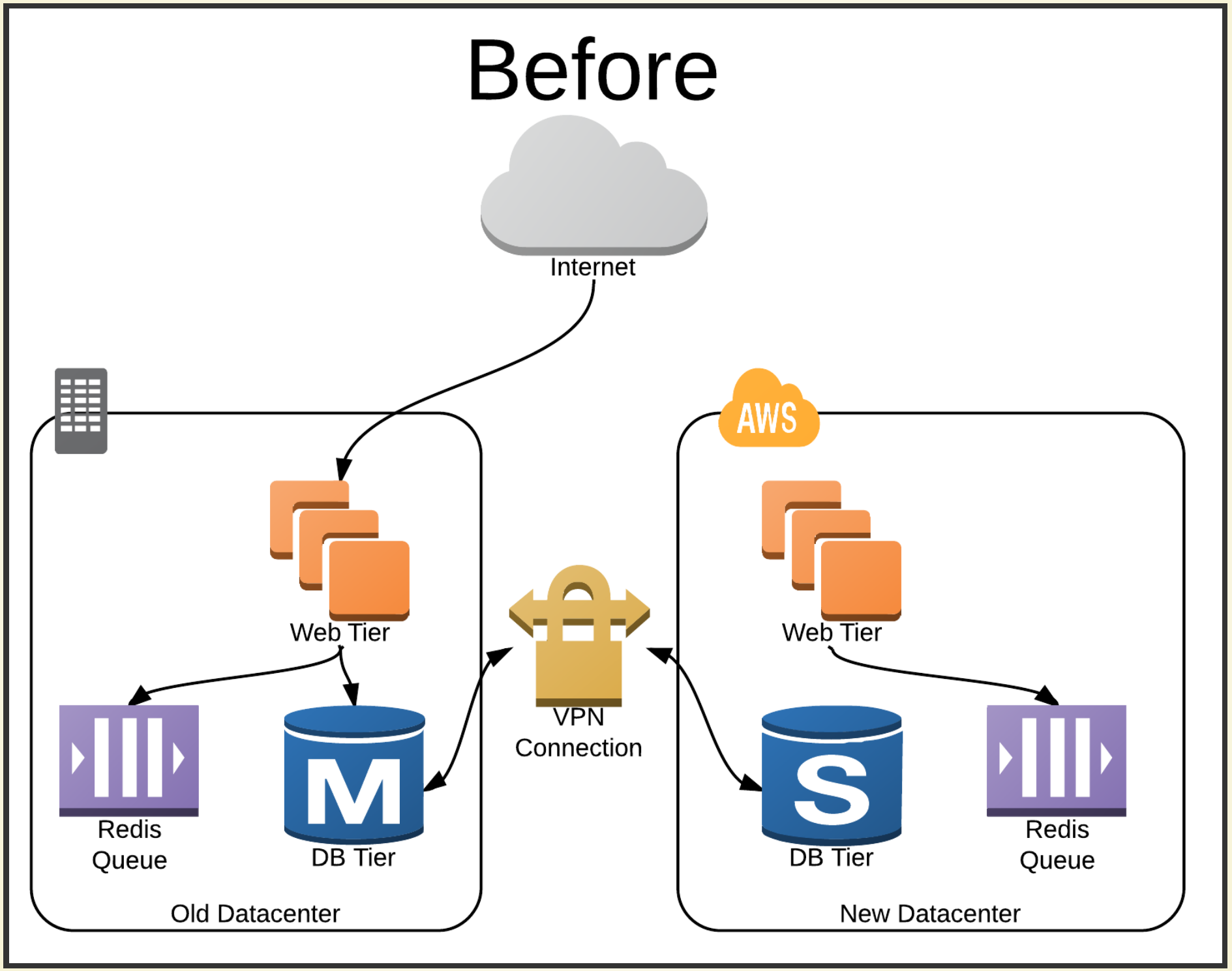
https://github.com/37signals/intermission

BEFORE THE BIG DAY

- Lower DNS TTL (5 minutes)
- Test test test!

THE BIG DAY

1. Stop all non-essential processes
2. Switch master DB to new DC
3. Switch on HAProxy in old DC
4. Switch DNS
5. Restart non-essential processes
6. Clear out old queue


Before
Internet
AWS
Web Tier
Web Tier
VPN
Connection
Redis
Queue
M
DB Tier
S
DB Tier
Redis
Queue
Old Datacenter
New Datacenter

STEP 1

Stop all non-essential processes

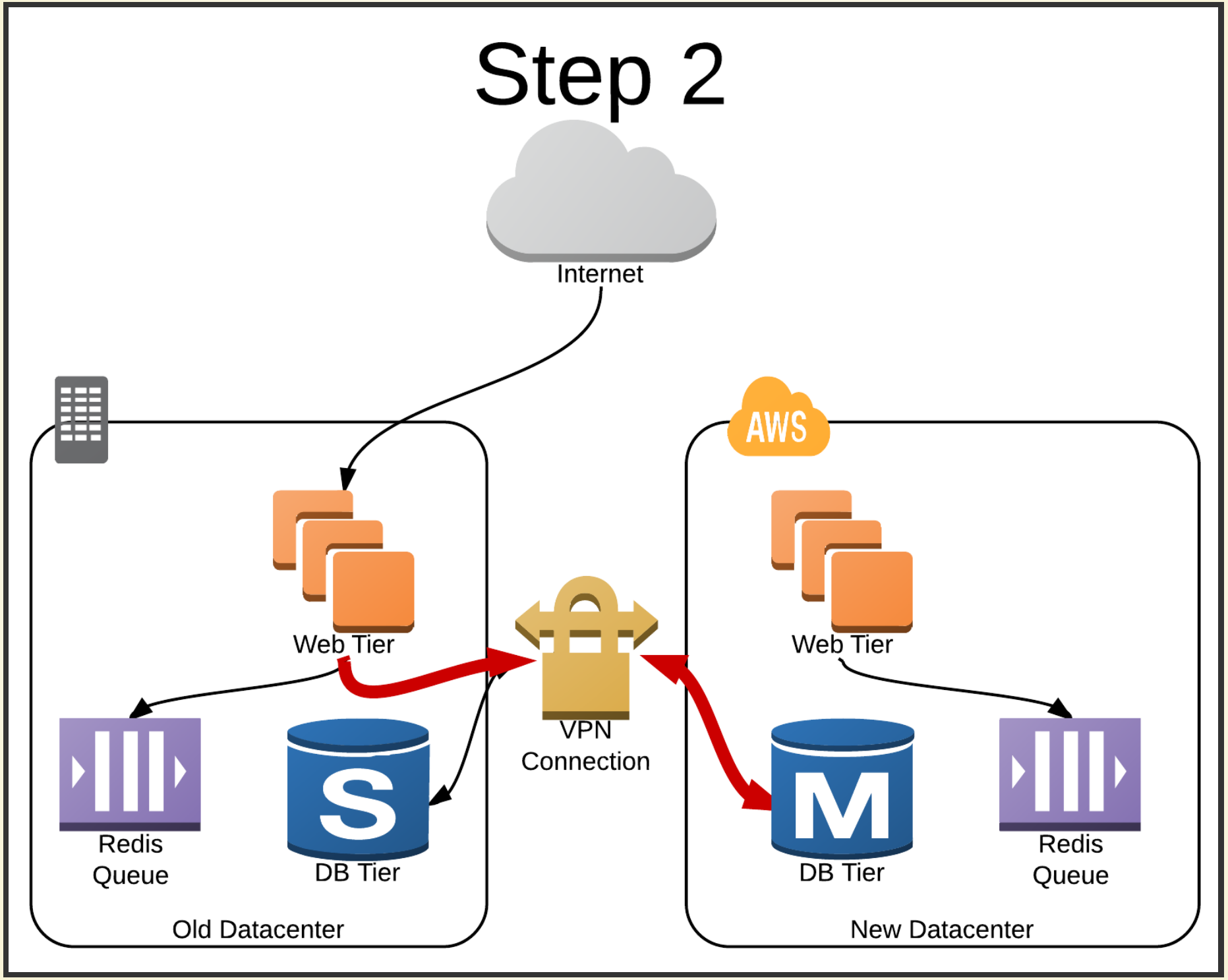
- Background workers
- Cron

Old queue full, new queue empty

STEP 2

SWITCH MASTER DB TO NEW DC

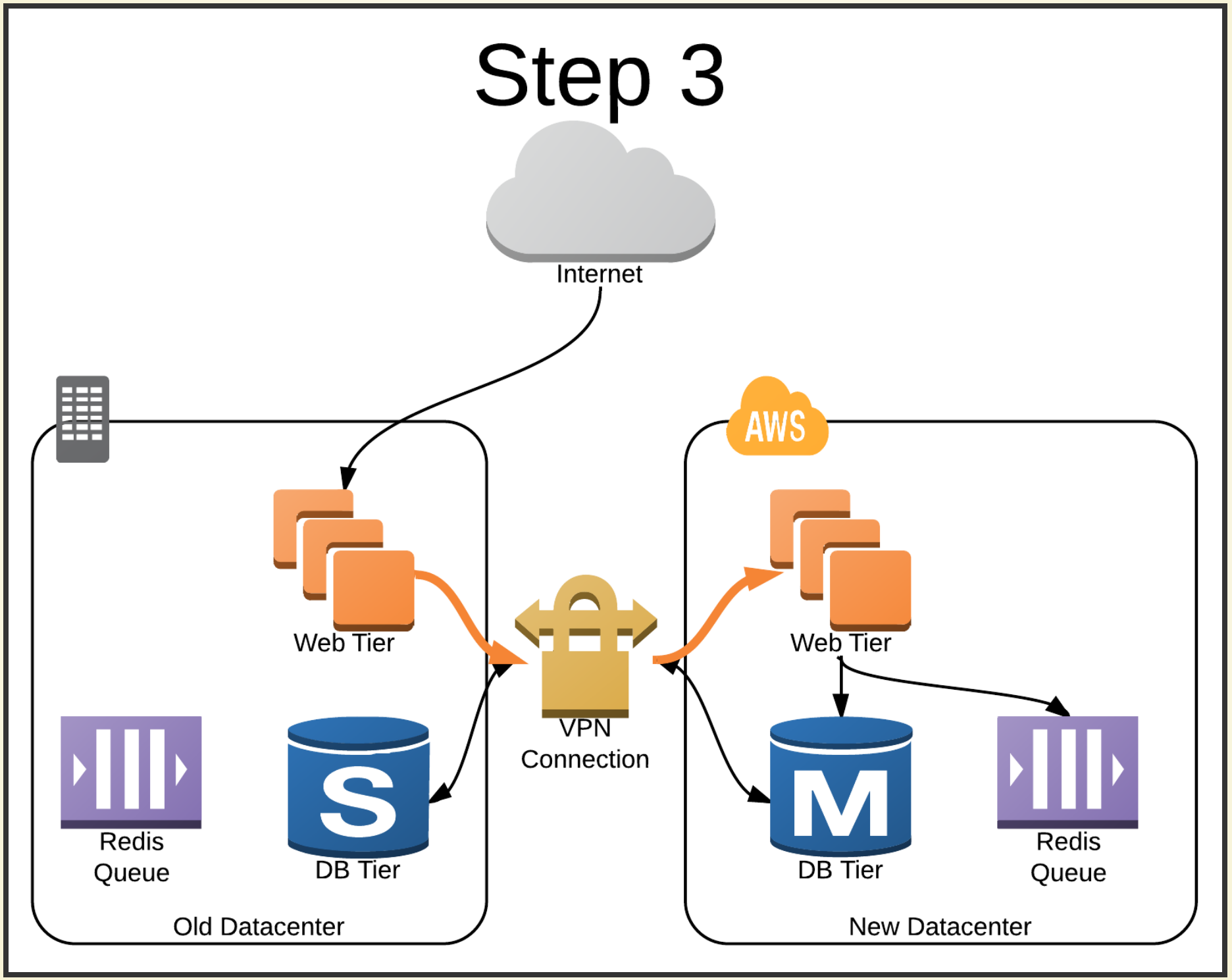
- Heavy cross-VPN load for all DB queries
- 10 synchronous queries = 10 round-trips!


Step 2
Internet
AWS
Web Tier
Web Tier
VPN
Connection
Redis
Queue
DB Tier
DB Tier
Redis
Queue
Old Datacenter
New Datacenter

STEP 3

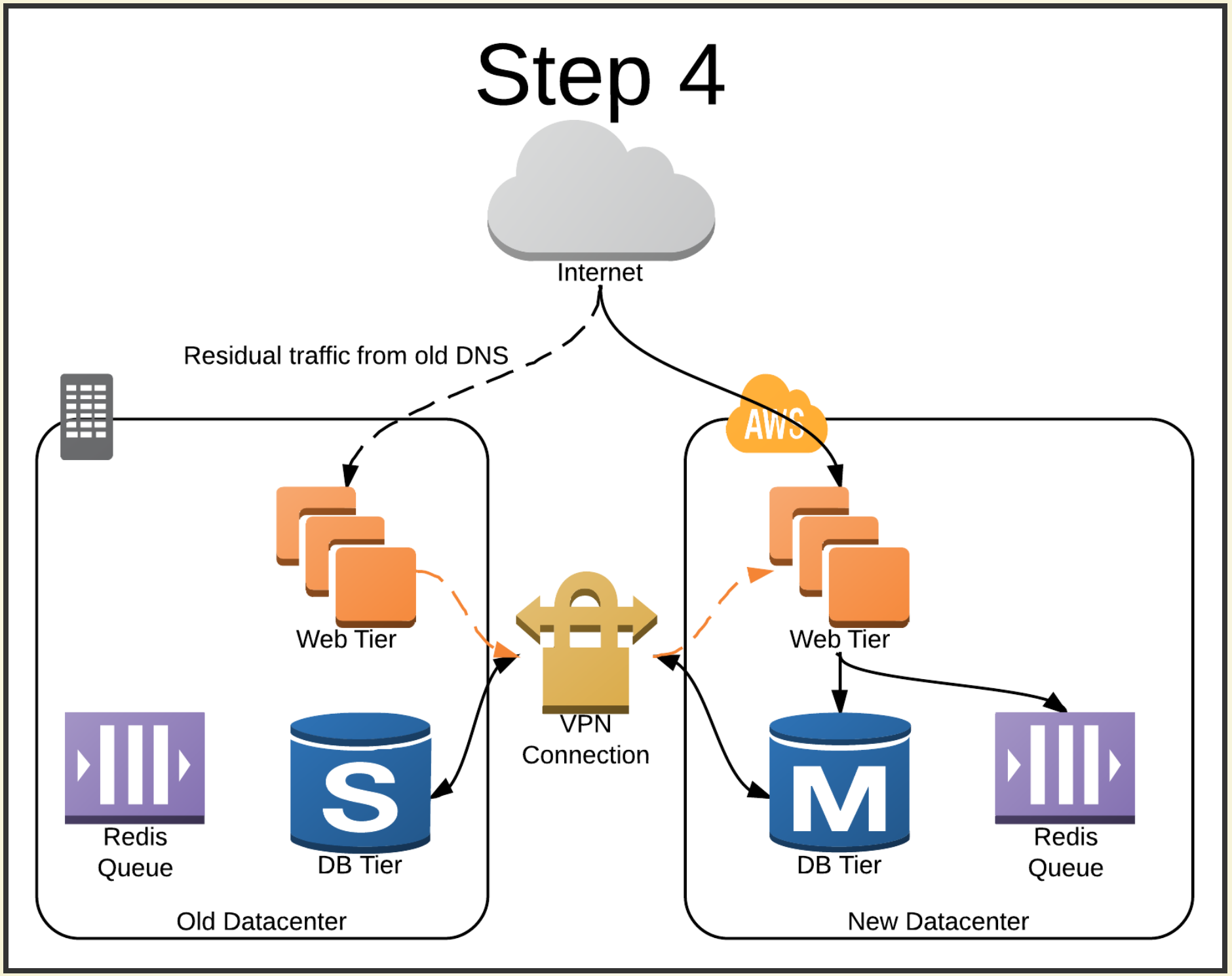
SWITCH ON HAPROXY IN OLD DC

- Moderate cross-VPN load for web traffic
- 1 extra round-trip


Step 3
Internet
AWS
Web Tier
Web Tier
VPN
Connection
Redis
Queue
DB Tier
DB Tier
Redis
Queue
Old Datacenter
New Datacenter

STEP 4

SWITCH DNS


Step 4
Internet
Residual traffic from old DNS
AWS
Web Tier
Web Tier
VPN
Connection
Redis
Queue
DB Tier
DB Tier
Redis
Queue
Old Datacenter
New Datacenter

STEPS 5 & 6

1. Restart non-essential processes
2. Clear out old queue

SUCCESS!

WHAT'S NEXT?

- The work we put in isn't lost!
- We maintain a complete hot copy of our running environment
- We test failing-over to it regularly

WHAT WOULD WE DO DIFFERENTLY?

- Synchronize configuration: Zookeeper/Doozer
- More elaborate load testing

MISC ADVICE

- Think through every step
- Write everything down
- Avoid dependencies
- Simulate everything
- Test it again and again and again!

QUESTIONS?

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