



DAT303

Oracle on AWS and Amazon RDS

Secure, Fast, and Scalable

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What to expect from the session

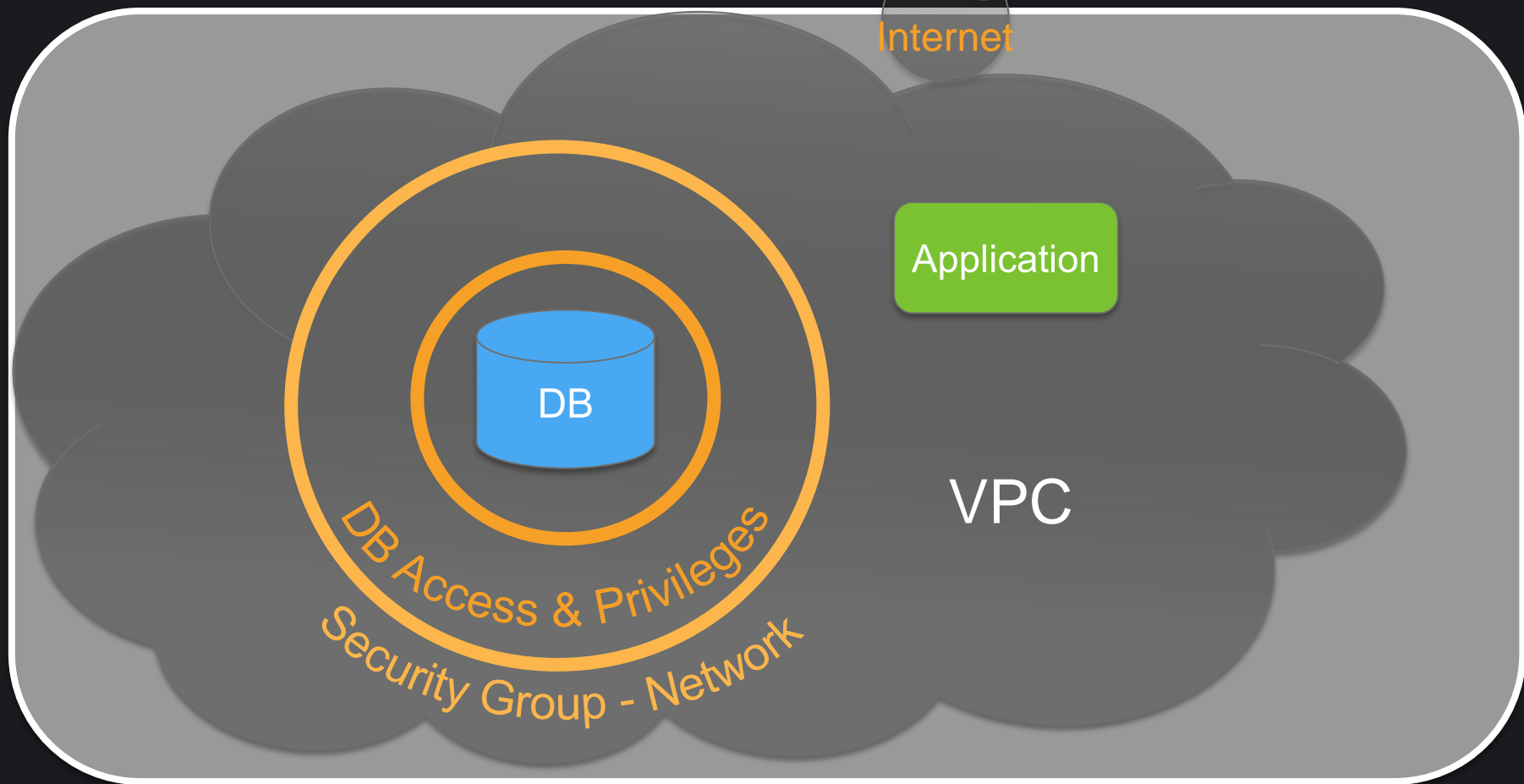
Learn how to

- Secure database environments on AWS and Amazon RDS
- Migrate Oracle databases into AWS
- Build fast, scalable workloads on Amazon RDS
- Build Oracle RAC on AWS

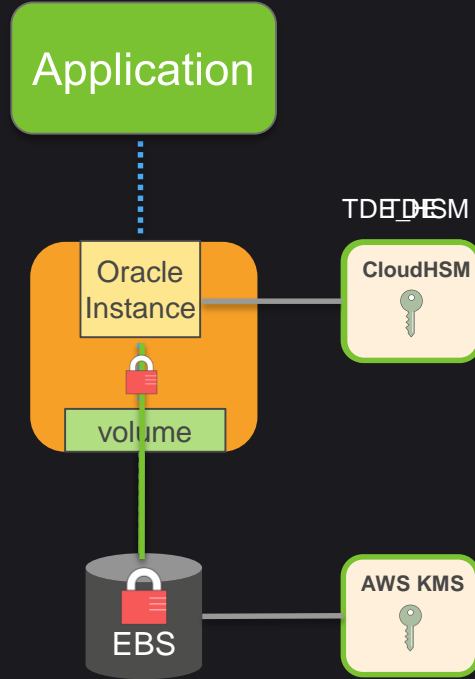


Setting up secure database environments on AWS and Amazon RDS

Control access



Encryption of data at rest




Amazon RDS for Oracle Now HIPAA-Eligible

PHI and Health Insurance Portability and Accountability Act (HIPAA)

Sign Business Associate Agreement with AWS

Benefit from audits of operational and security processes





Migrating Oracle databases into AWS

Purposes of data migration

One-time data migration

Between on premises and AWS

Between Amazon EC2 and
Amazon RDS

Ongoing Replication

Replicate on premises to AWS

Replicate AWS to on premises

Replicate OLTP to BI

Replicate for query offloading

Ways to migrate data

Bulk Load

AWS Database Migration Service

Oracle Import/Export

Oracle Data Pump Network Mode

Oracle SQL*Loader

Oracle Materialized Views

CTAS / INSERT over dblink

Ongoing Replication

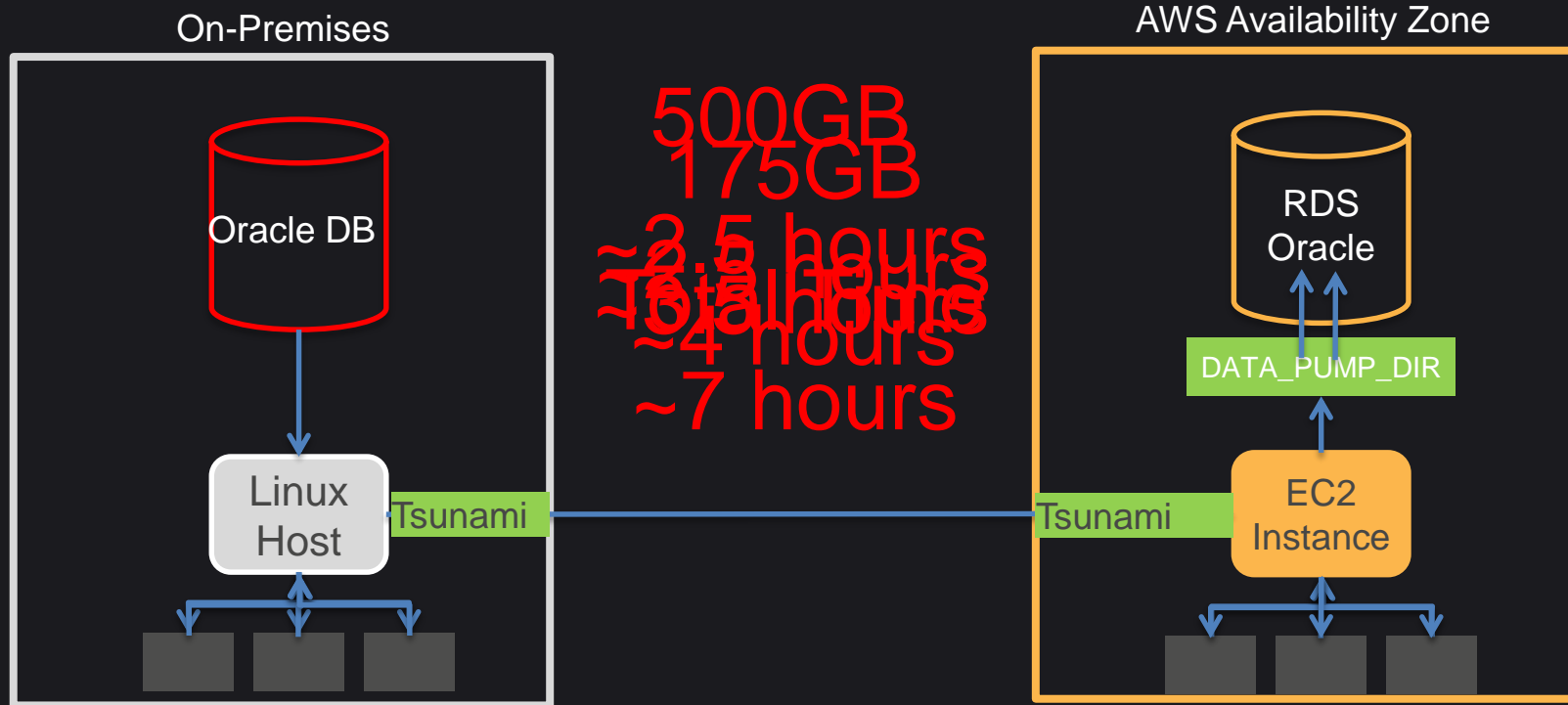
AWS Database Migration Service

Oracle Data Pump Network Mode

Oracle Materialized Views

Oracle GoldenGate

High-speed database migration prior to AWS DMS





AWS Database Migration Service

ORACLE®



PostgreSQL



Microsoft
SQL Server



Amazon
Aurora



Amazon
Redshift

Start your first migration in 10 minutes or less

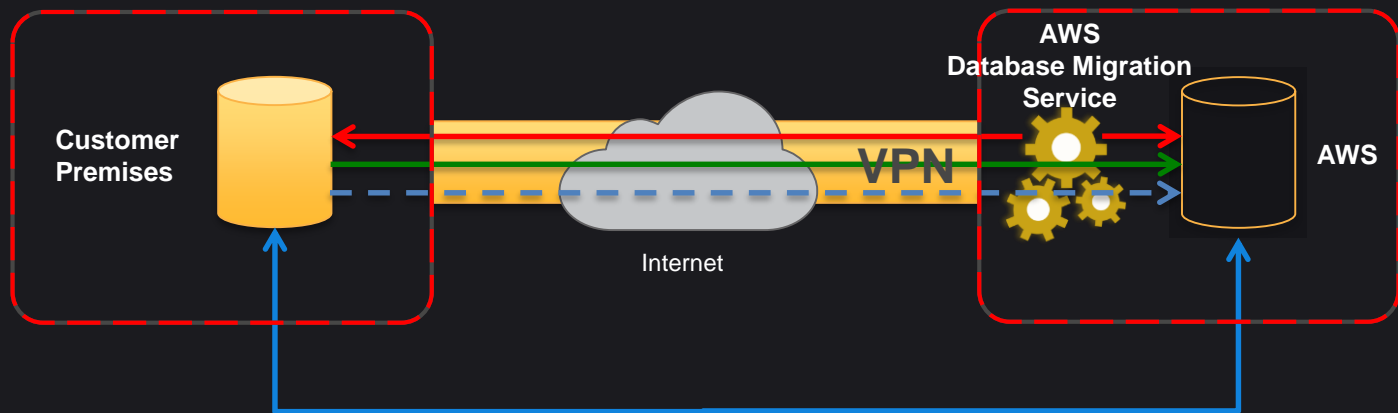
Keep your apps running during the migration

Replicate within, to, or from Amazon EC2 or RDS

Move data to the same or different database engine

Sign up for preview at aws.amazon.com/dms

Keep your apps running during data migration



Start a replication instance

Connect to source and target databases

Select tables, schemas or databases



Application Users

Let the AWS Database Migration Service create tables, load data and keep them in sync

Switch applications over to the target at your convenience

AWS Database Migration Service best practices

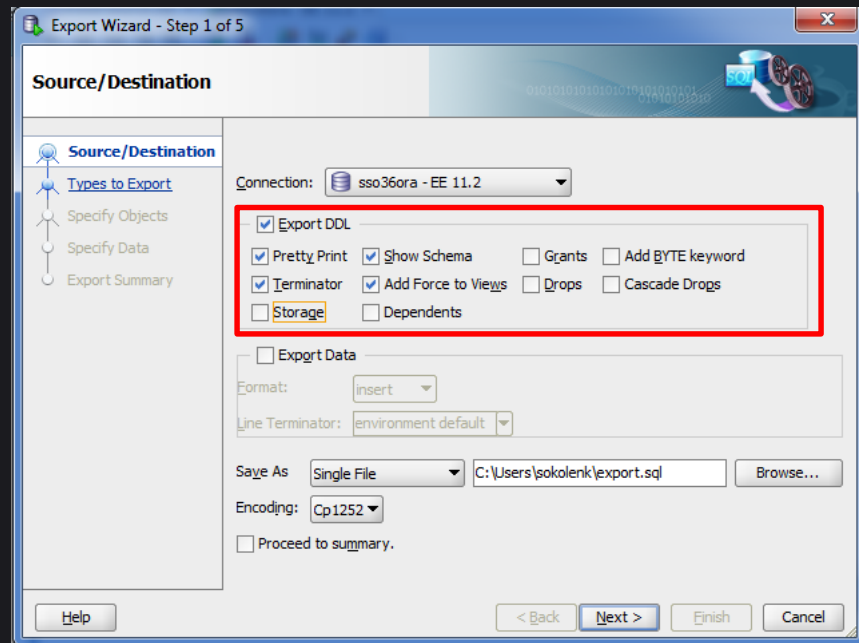
Use `dbms_metadata.get_ddl` or SQL Developer for schema

Divide schema DDL into 2 parts

Apply secondary indexes and triggers after data load

Choose bigger C4 instances

Optimize network path

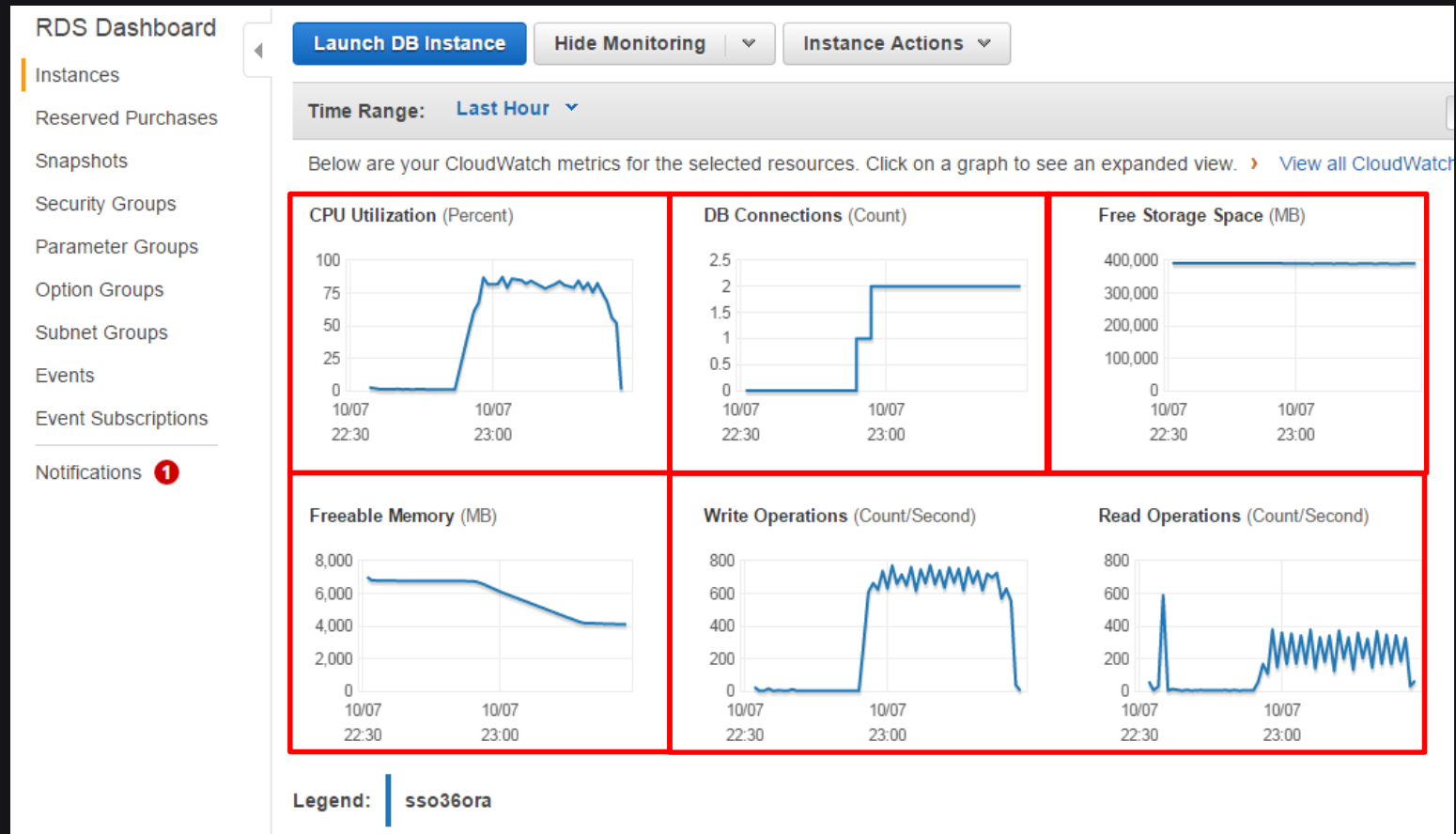




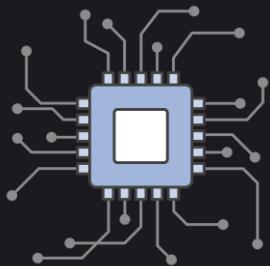
Building fast, scalable workloads on Amazon RDS

Start with metrics

M3.large (2 vCPU, 7.5GiB RAM) with 400GB storage



Scaling instance components



Compute
Capabilities
vCPUs



Memory
Capabilities
GB of RAM



Network
Performance
MB/s (Throughput)



Storage
Performance
I/O Throughput
Max Size



Instance Families: T1, M1, M2, M3

T2 and R3 instance support

T2.large support

Minimize unavailability during scaling

M3.large (2 vCPU, 7.5GiB RAM) >> M3.xlarge (4 vCPU, 15GiB RAM)

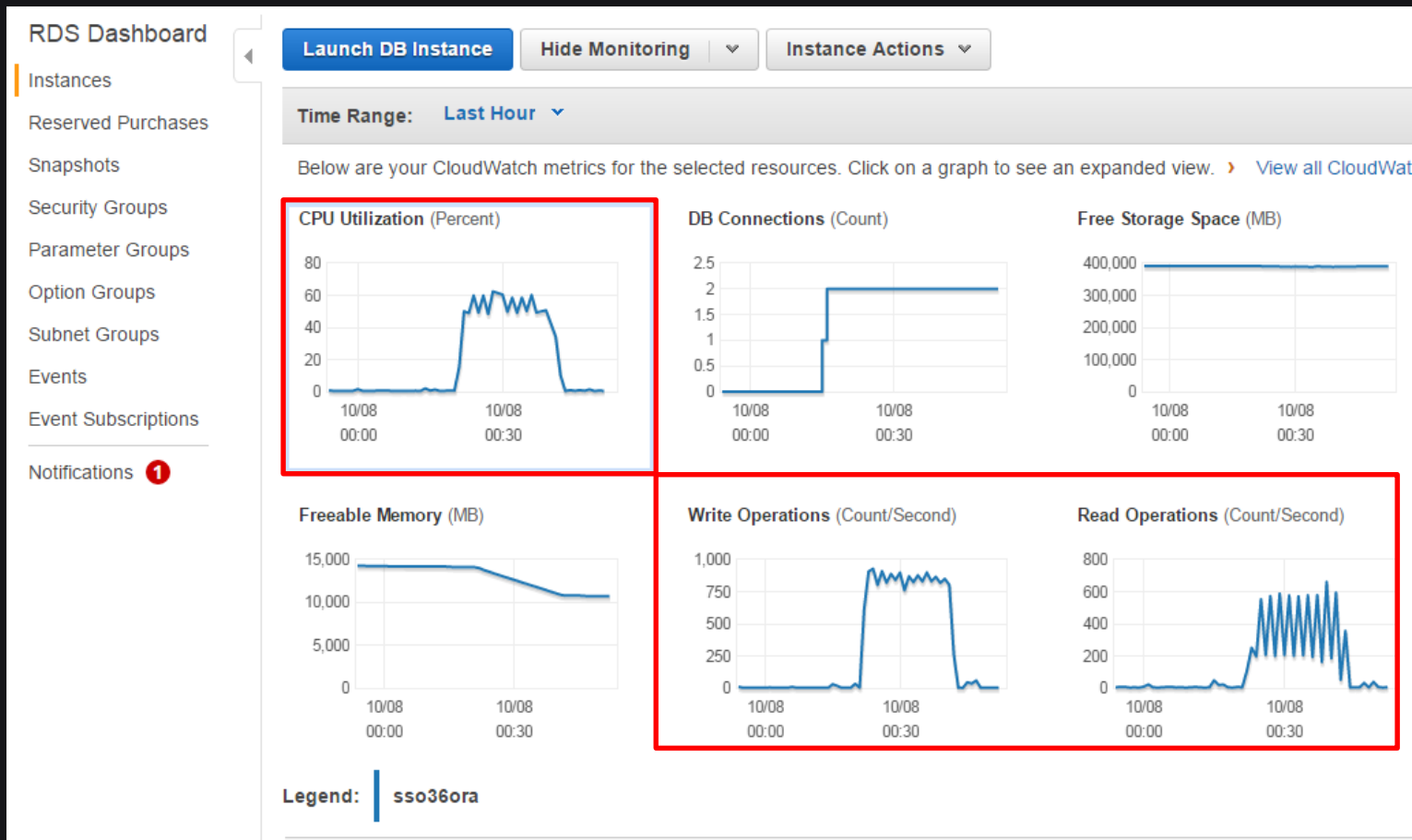
RDS Dashboard			
Instances			
Reserved Purchases			
Snapshots			
Security Groups			
Parameter Groups			
Option Groups			
Subnet Groups			
Events			
Event Subscriptions			

Filter: All			
Search DB Events			
X Viewing 33 of 33 Events			
Identifier	Type	Date	Event
sso36ora	Instances	October 7, 2015 at 4:56:17 PM UTC-7	Finished applying modification to DB instance class
sso36ora	Instances	October 7, 2015 at 4:45:16 PM UTC-7	DB instance restarted
sso36ora	Instances	October 7, 2015 at 4:44:56 PM UTC-7	Multi-AZ instance failover completed
sso36ora	Instances	October 7, 2015 at 4:43:31 PM UTC-7	Multi-AZ instance failover started
sso36ora	Instances	October 7, 2015 at 4:30:58 PM UTC-7	Applying modification to database instance class

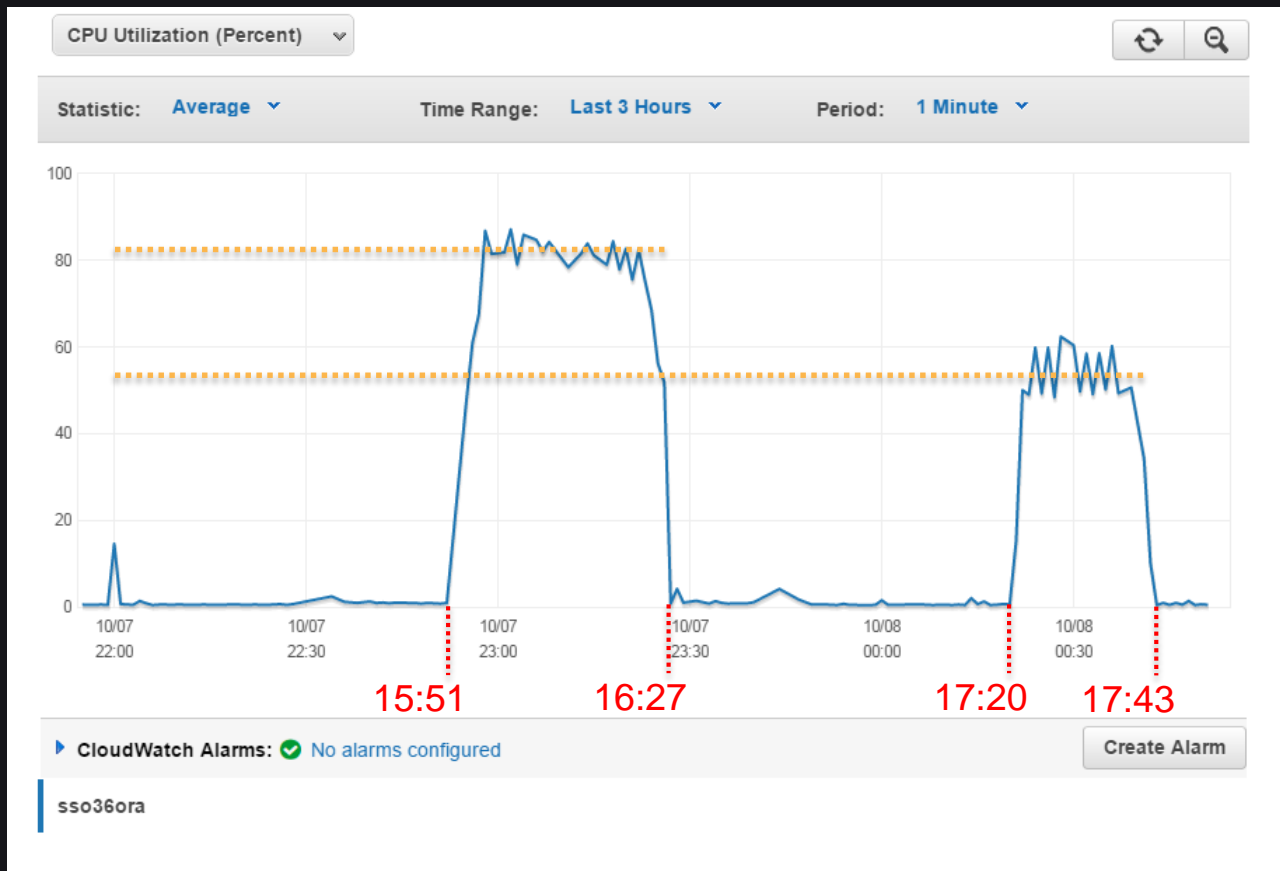
4:30:58 PM ... 4:56:17 PM : 25 minutes

4:43:31 PM ... 4:45:16 PM : 105 seconds

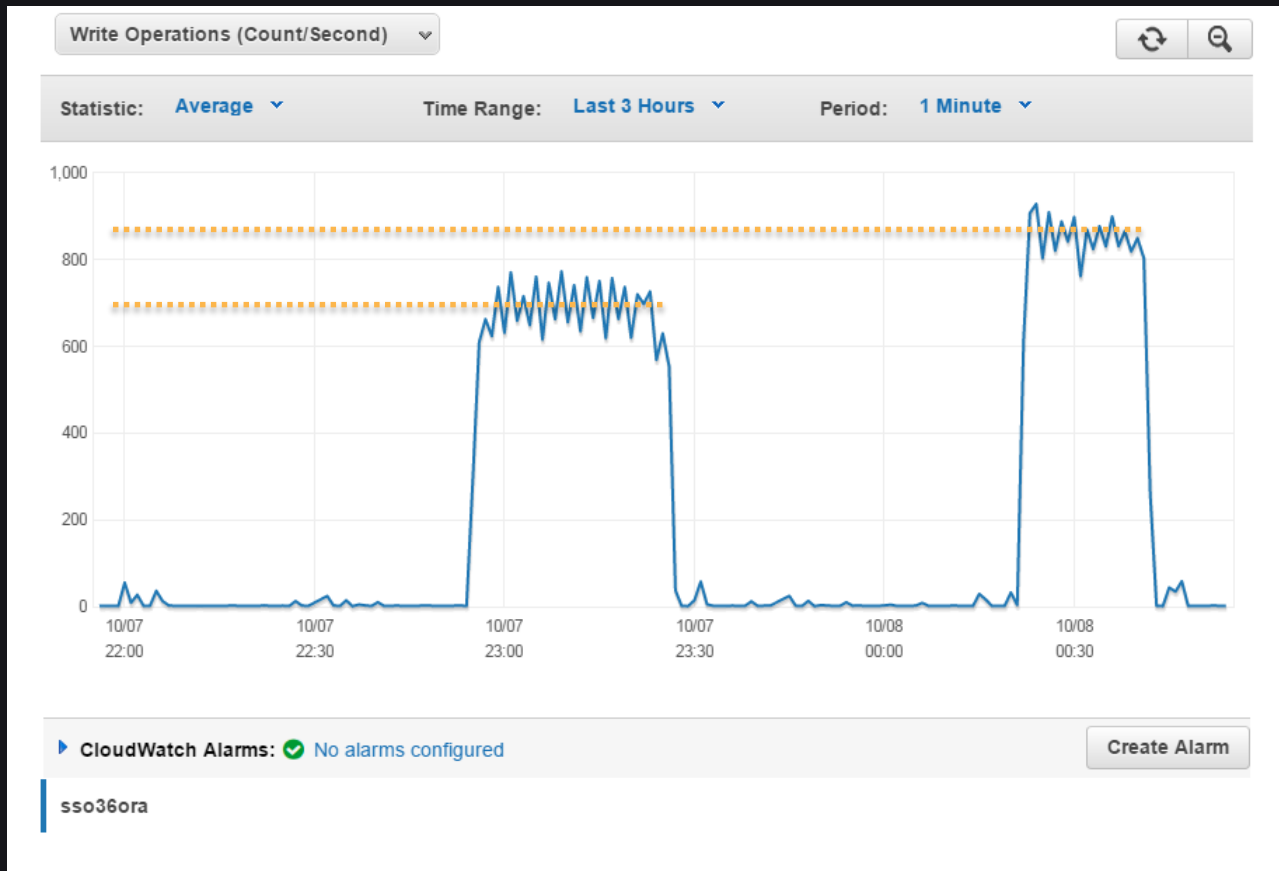
Performance after instance scaling



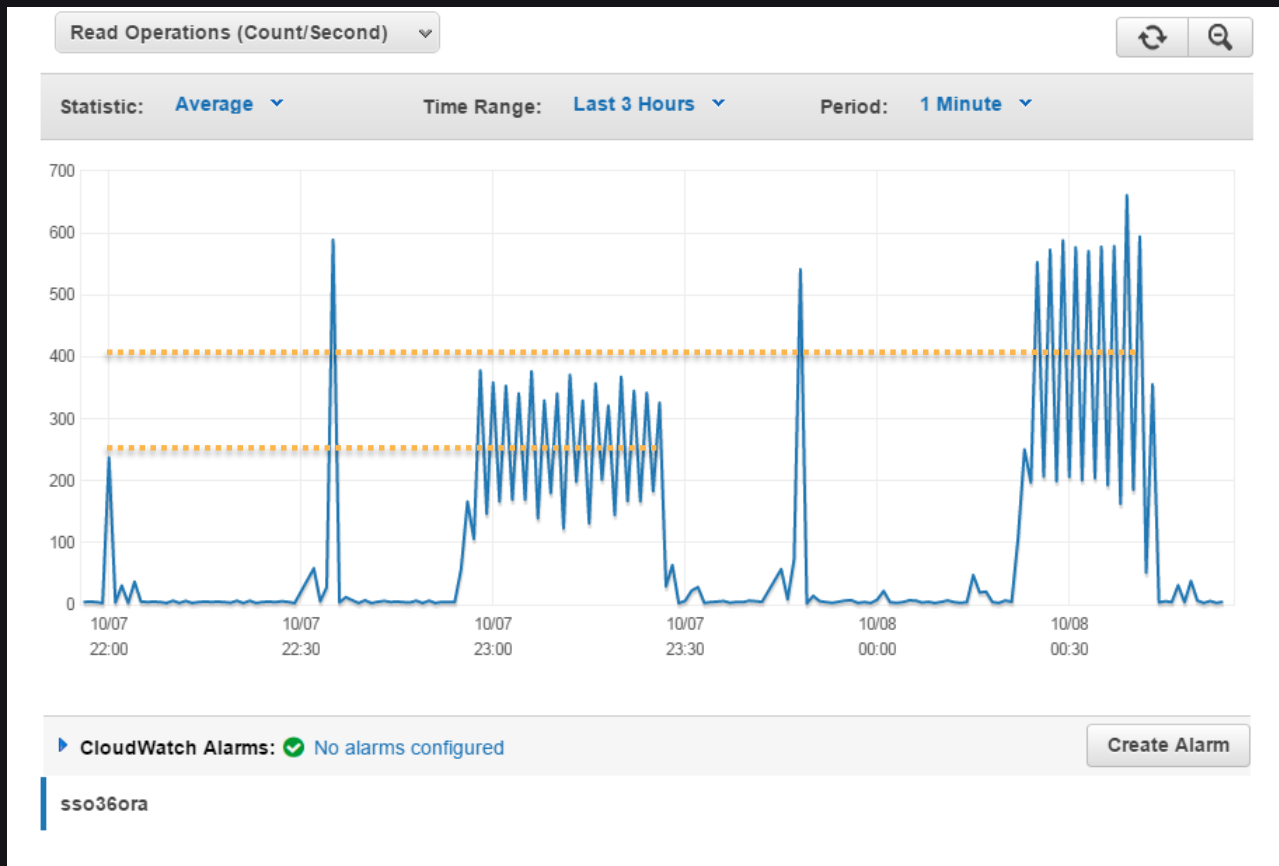
Performance after scaling: duration and CPU



Performance after scaling: writes



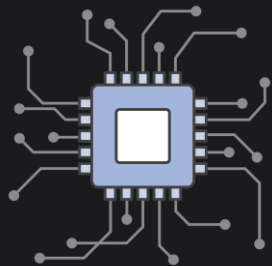
Performance after scaling: reads



Performance after scaling: comparison

	Before: m3.large	After: m3.xlarge
Duration	36 min.	23 min.
Avg CPU	82%	53%
Avg Write Operations (/Sec)	690	850
Avg Write Throughput (MB/Sec)	10.4	16.0
Avg Read Operations (/Sec)	270	400
Avg Read Throughput (MB/Sec)	9.0	14.0

Scaling instance components



Compute
Capabilities
vCPUs



Memory
Capabilities
GB of RAM



Network
Performance
MB/s (Throughput)



Storage
Performance
I/O Throughput
Max Size



Instance Families: T1, M1, M2, M3

T2 and R3 instance support

T2.large support



6 TiB Max Size

Storage system I/O performance

Type	Size	Performance	Burst Capacity	Pricing Model
Magnetic Storage	10 GiB–3 TiB	~100 IOPS	Yes, several hundred IOPS	Allocated storage; I/O operations
General Purpose (SSD)	10 GiB–6 TiB (min. 100 GiB recommended)	3 IOPS/GiB	Yes, up to 3000 IOPS, subject to credits	Allocated storage
Provisioned IOPS (SSD)	100 GiB–6 TiB	10 IOPS/GiB, up to max. 30,000 IOPS	No, fixed allocation	Allocated storage; Provisioned IOPS
Instance Storage	<i>not available</i>		n/a	Included in instance type

Amazon RDS for Oracle I/O best practices

1

Amazon RDS **maximum channel**

bandwidth: 1000 Mbps each direction

= ~105MiB/s per direction and ~210MiB/s for a 50% read/50% write balanced workload

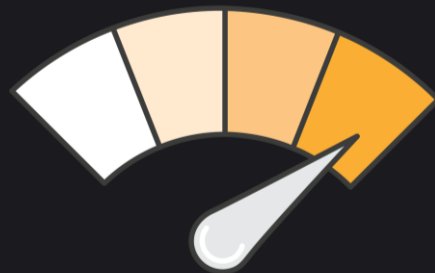
2

First touch penalty for network-attached RDS storage

3

Small general purpose SSD

Storage sizes (~30Gb) deliver low baseline I/O throughput





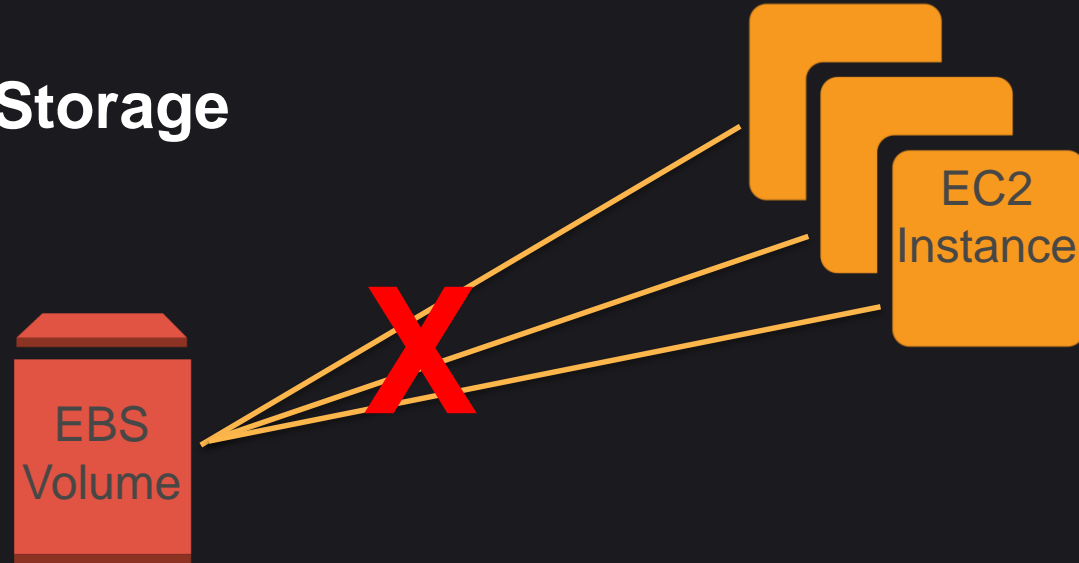
Building Oracle RAC on AWS

RAC on Amazon EC2 would be useful

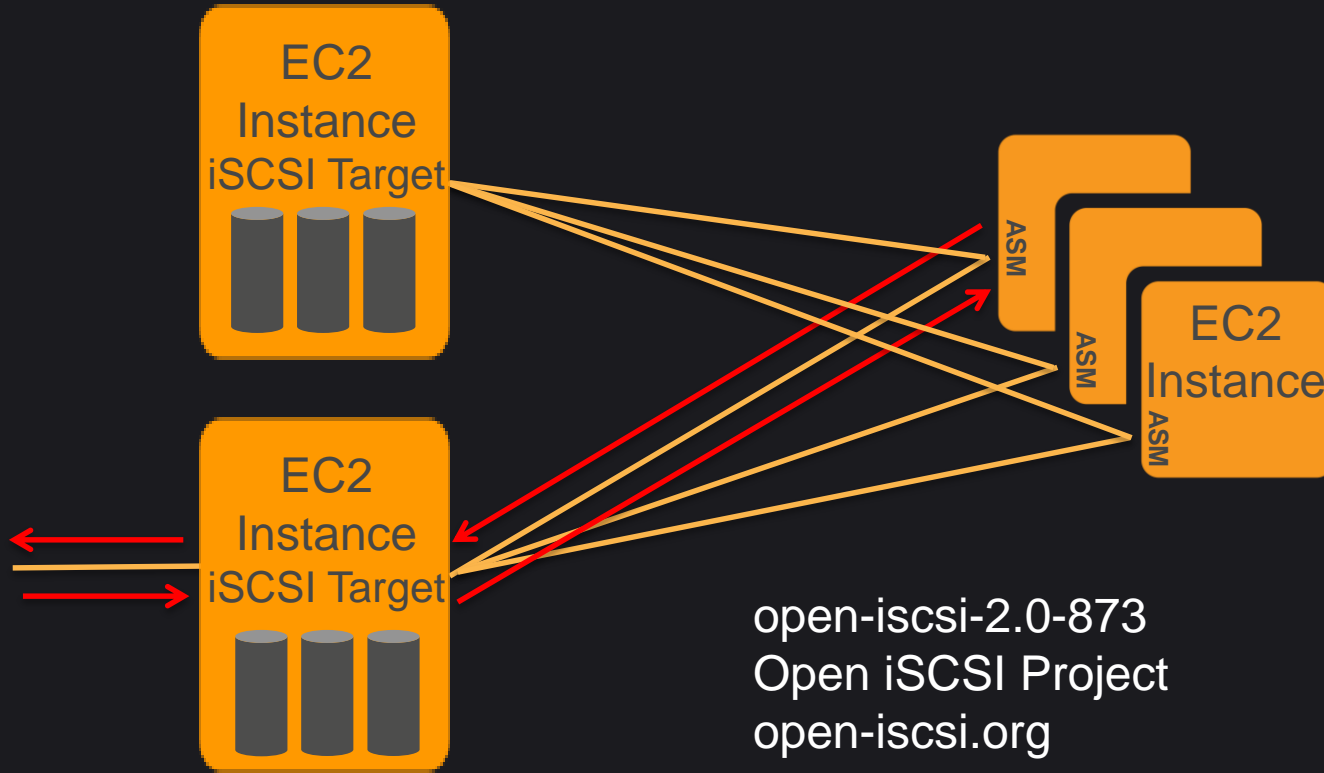
- Test / dev / non-prod; allow testing to cover RAC-related regression cases
- Scale out and back elastically; a good match for the cloud
- Scale beyond the largest instances
- High-RTO redundancy at the host/instance level; App continuity for near zero downtime
- Test scaling limits; a given workload scales only to n nodes on RAC
- Some applications “require” RAC
- Some customers don’t want to re-engineer everything just to move to AWS
- Customers want it!

Why no RAC on EC2?

Shared Storage



Shared storage with iSCSI



Why no RAC on EC2?

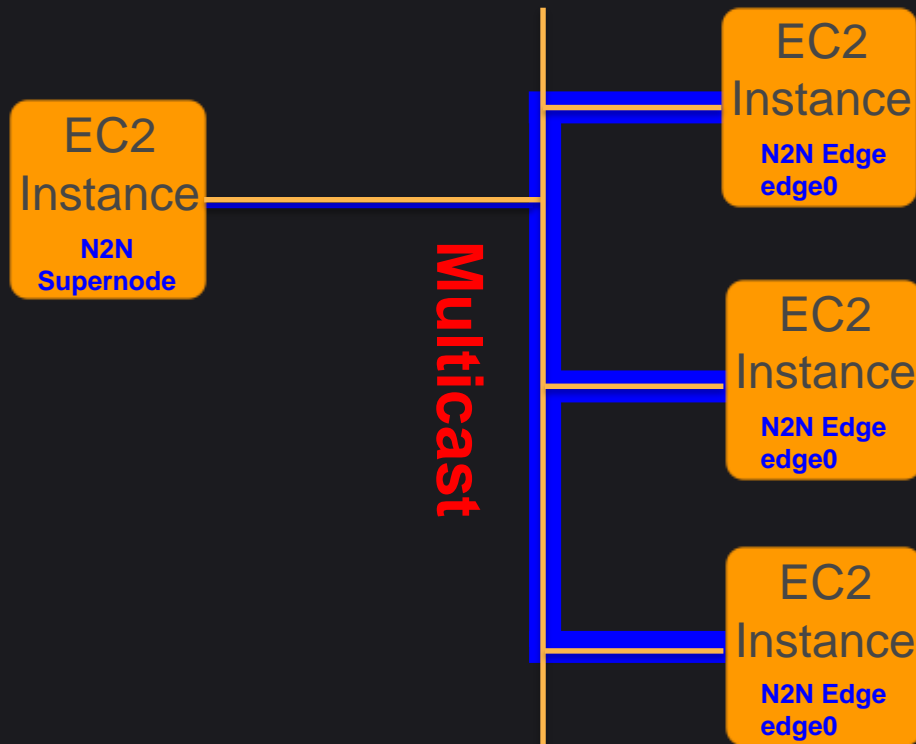
Multicast Network

~~Multicast~~



Multicast on EC2

N2n VPN
ntop
ntop.org/n2n

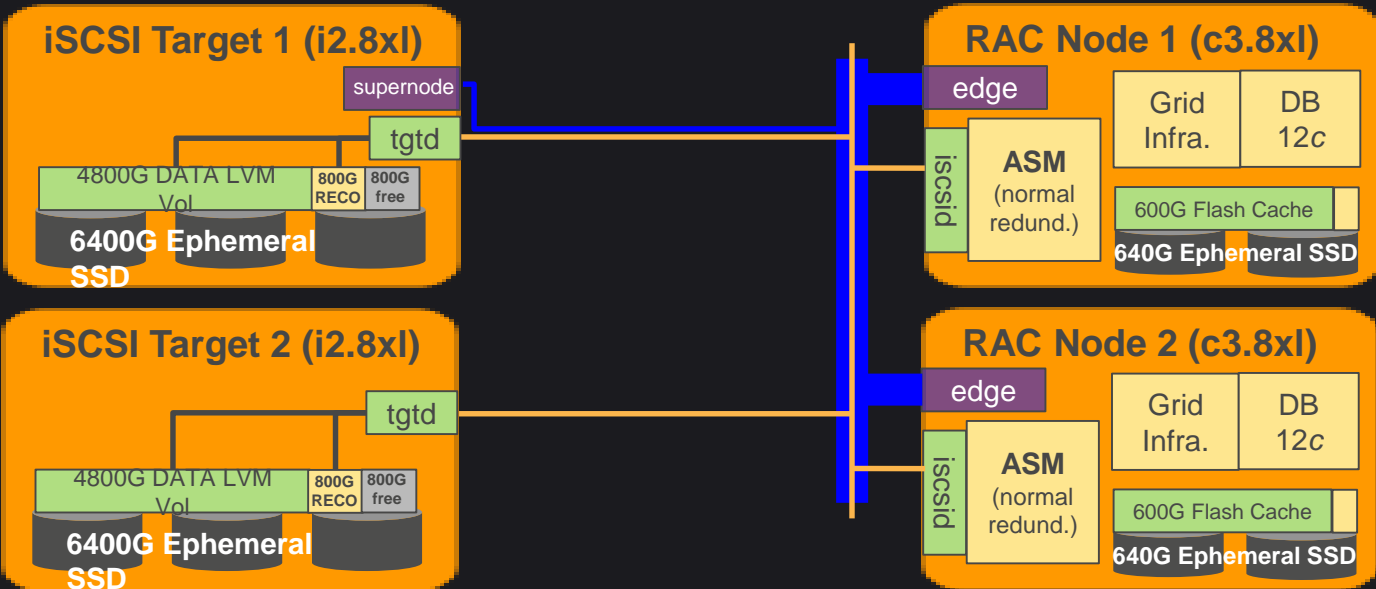


RAC on EC2 prototype: aws.amazon.com/articles

VPC

Subnet

Placement Group (dedicated instances)



Route

53

Private Hosted Zone

- DNS
- SCAN
- VIPs
- Etc.

What you've learned today

- Securing database environments on AWS and Amazon RDS
- Migrating Oracle databases into AWS

Preview AWS Database Migration Service aws.amazon.com/dms

- Building fast, scalable workloads on Amazon RDS
- Building Oracle RAC on AWS

Review RAC article aws.amazon.com/articles



Thank you!



**Remember to complete
your evaluations!**



Q & A



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