

Essential AWS for PHP Applications

Longhorn PHP 2018

Michael Moussa

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<https://joind.in/talk/97b36>

Who am I?

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- Product Architect at Rackspace



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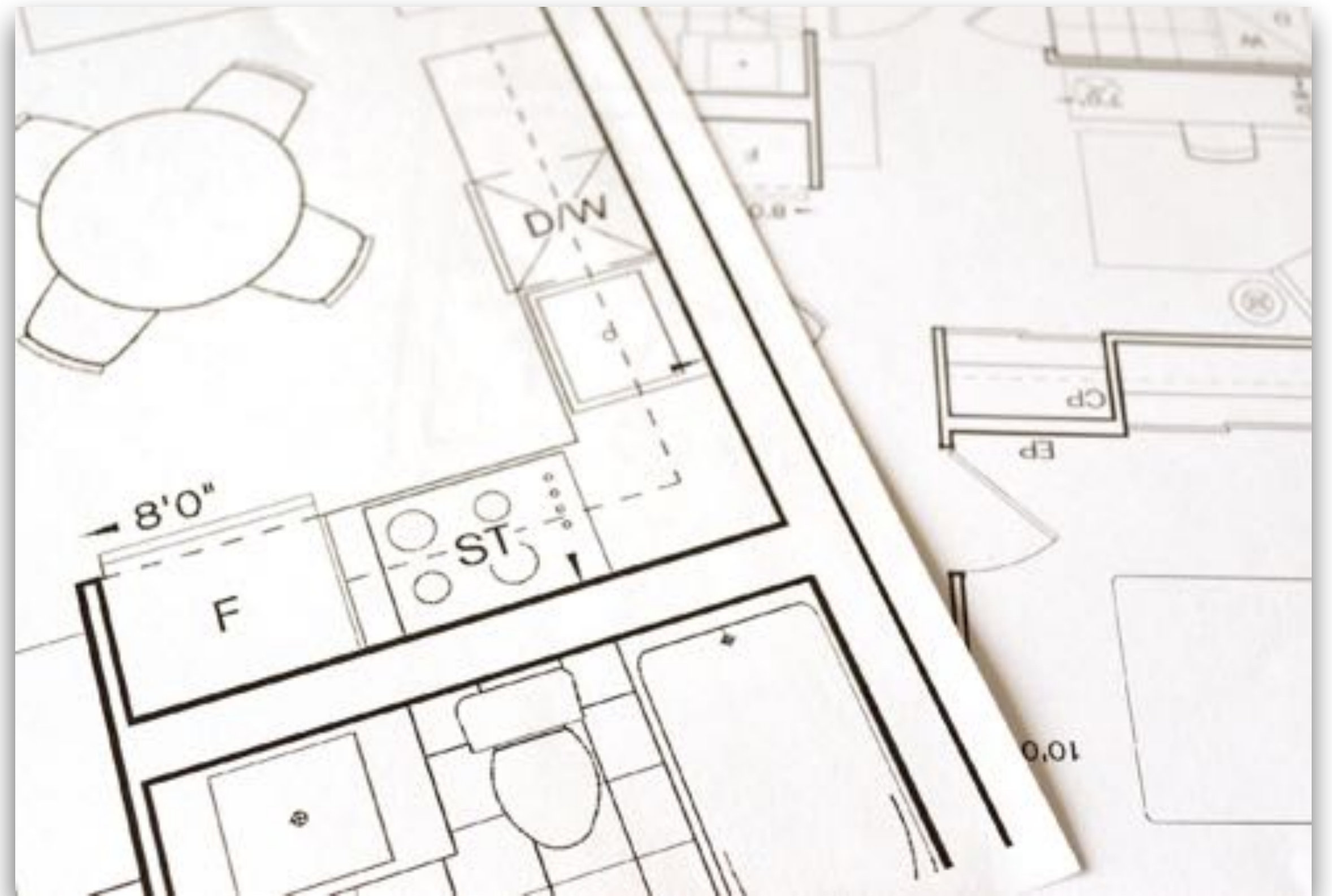
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- Product Architect at Rackspace
- 18 year PHP developer & DevOps engineer
- **AWS Certified Solutions Architect**



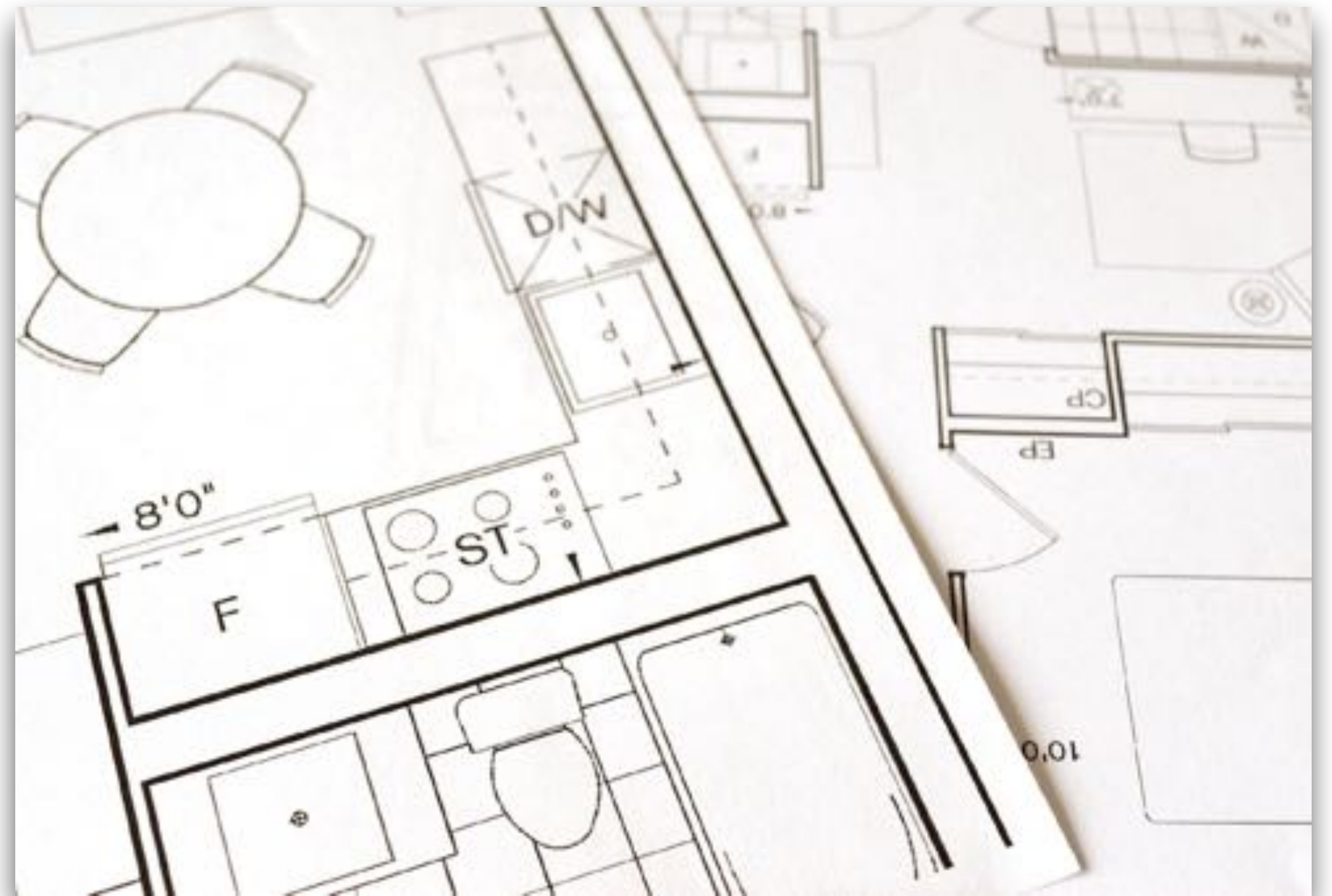
Sample environment requirements

- Run PHP applications



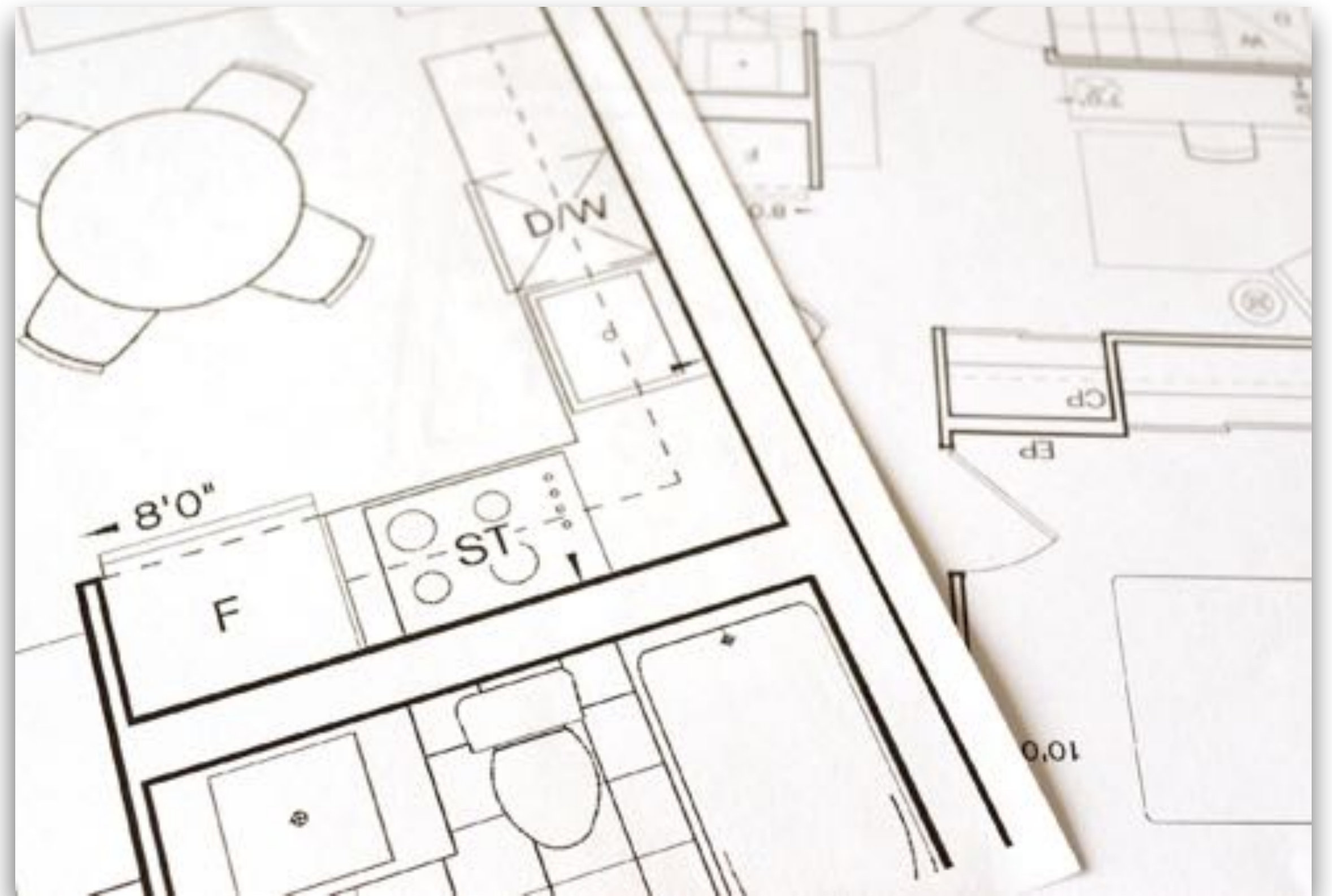
Sample environment requirements

- Run PHP applications
- Store information in a DB



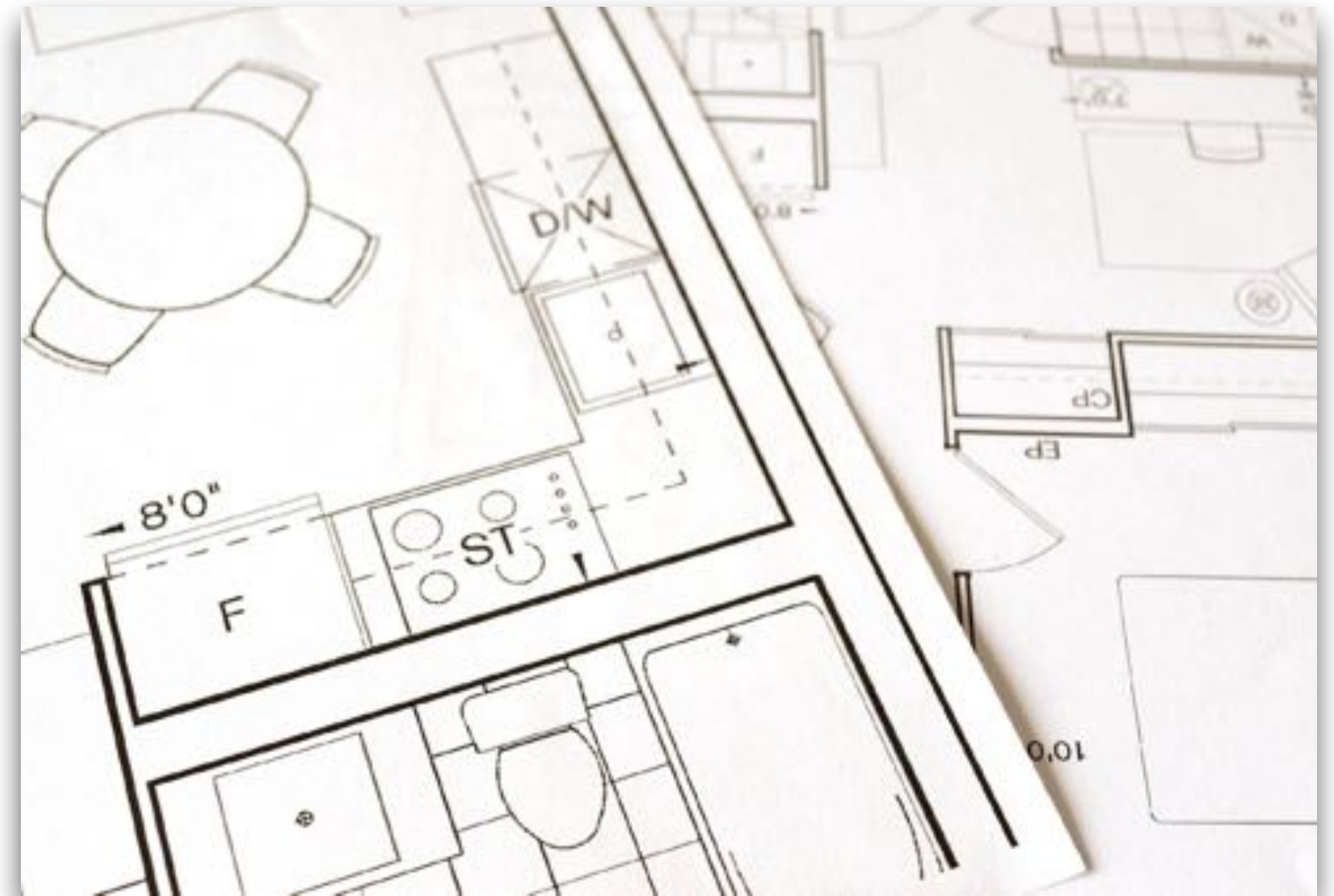
Sample environment requirements

- Run PHP applications
- Store information in a DB
- Upload and serve files



Sample environment requirements

- Run PHP applications
- Store information in a DB
- Upload and serve files
- Scale to handle many users with rare or nonexistent downtime



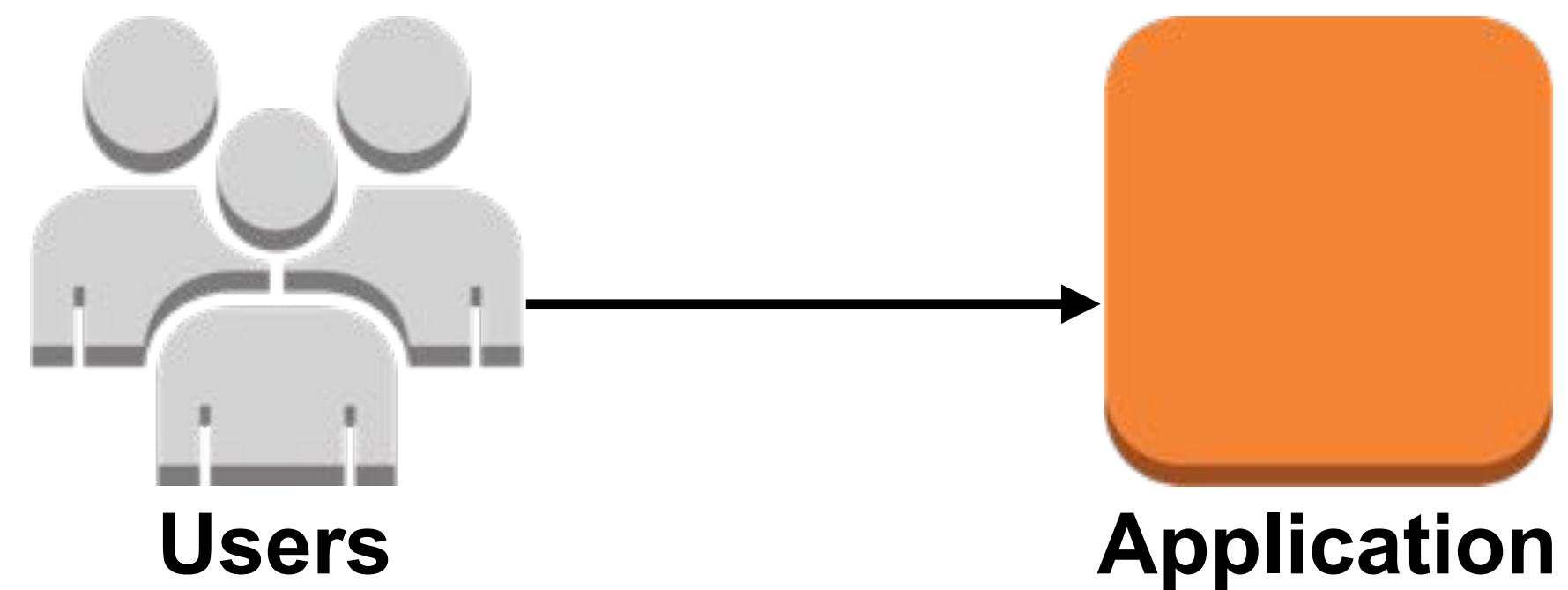
Elastic Compute Cloud (EC2)



Elastic Compute Cloud (EC2)



Elastic Compute Cloud (EC2)



Elastic Compute Cloud (EC2)



Launch Instance



Amazon Machine Image (AMI)



Amazon Machine Image (AMI)



- Template for launching EC2 instances



Amazon Machine Image (AMI)



- Template for launching EC2 instances
 - Operating system



Amazon Machine Image (AMI)



- Template for launching EC2 instances
 - Operating system
 - Applications



Amazon Machine Image (AMI)



- Template for launching EC2 instances
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 - Applications
 - **Libraries**



Amazon Machine Image (AMI)



- Template for launching EC2 instances
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 - **Configuration**



Amazon Machine Image (AMI)



- Template for launching EC2 instances
 - Operating system
 - Applications
 - Libraries
 - Configuration
 - **Data**

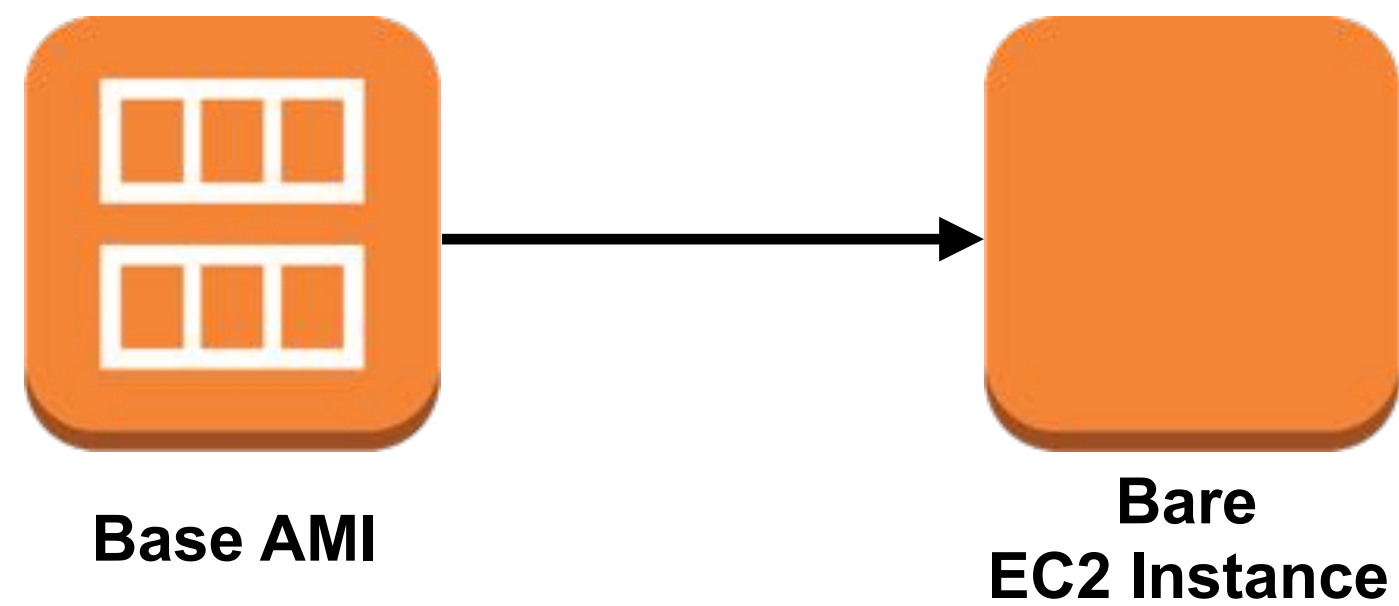


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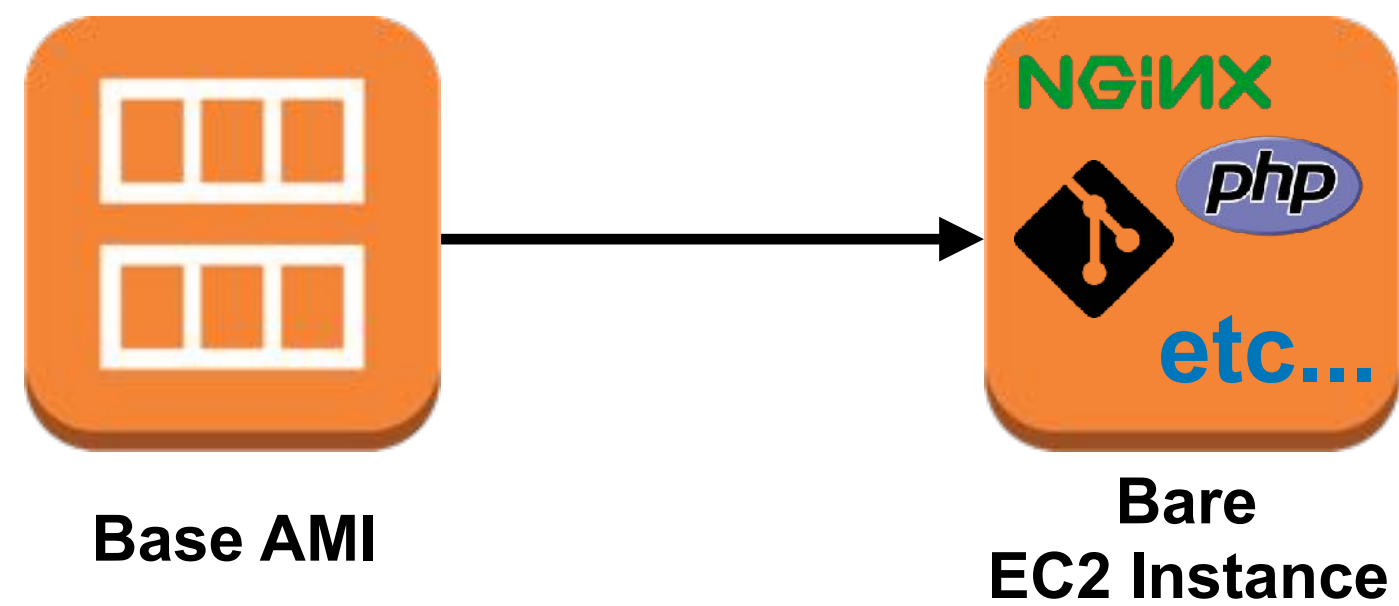


Base AMI

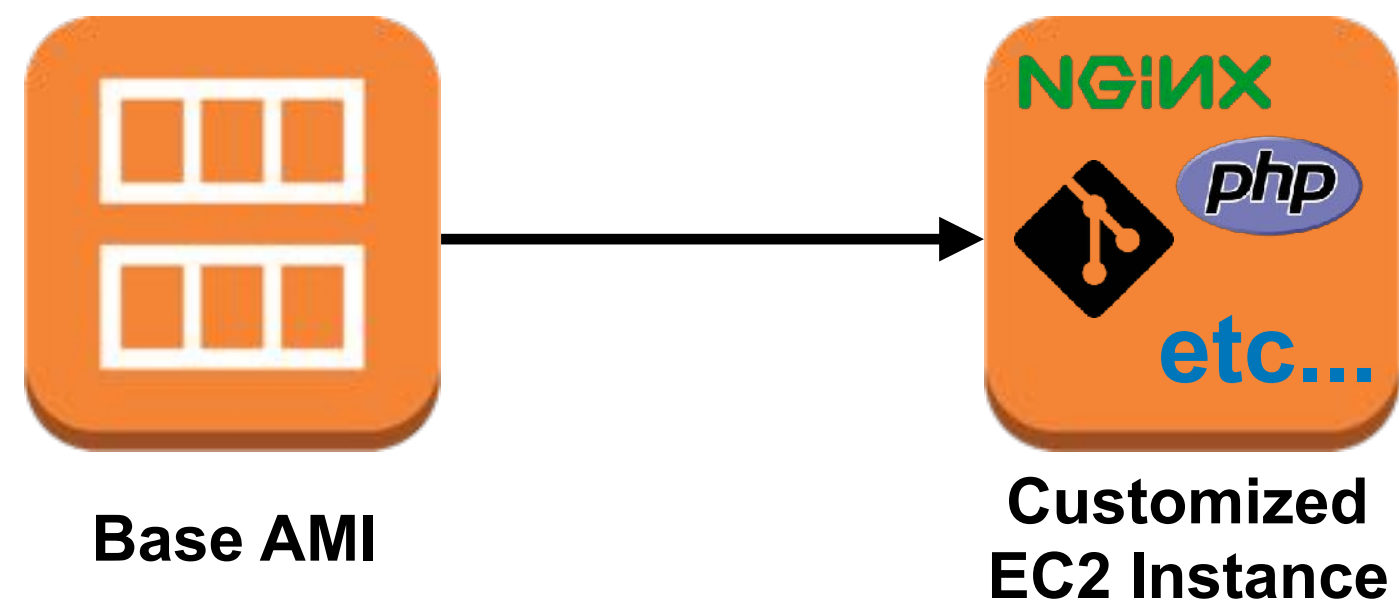
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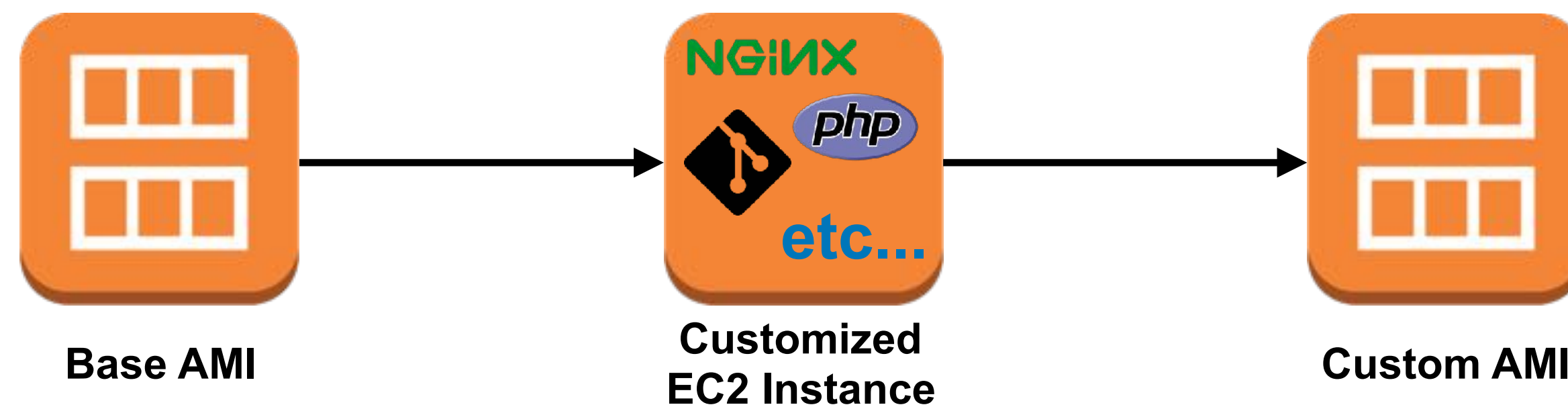
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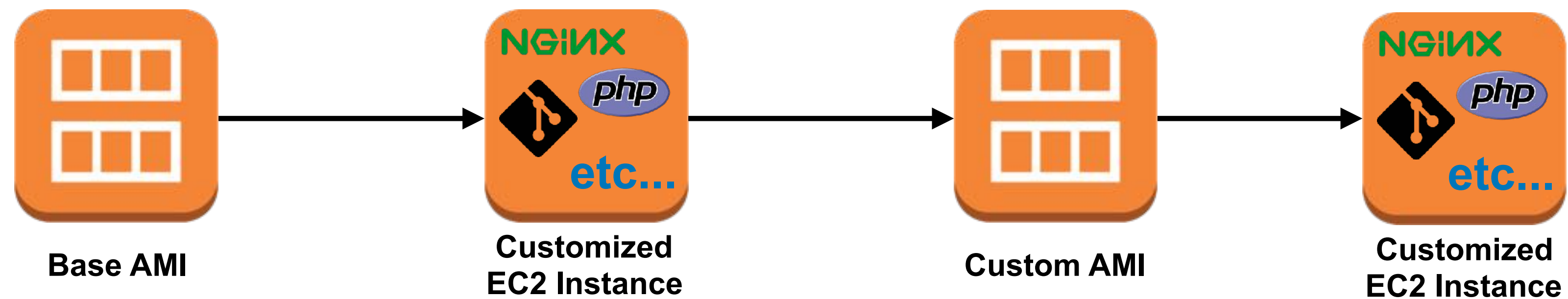
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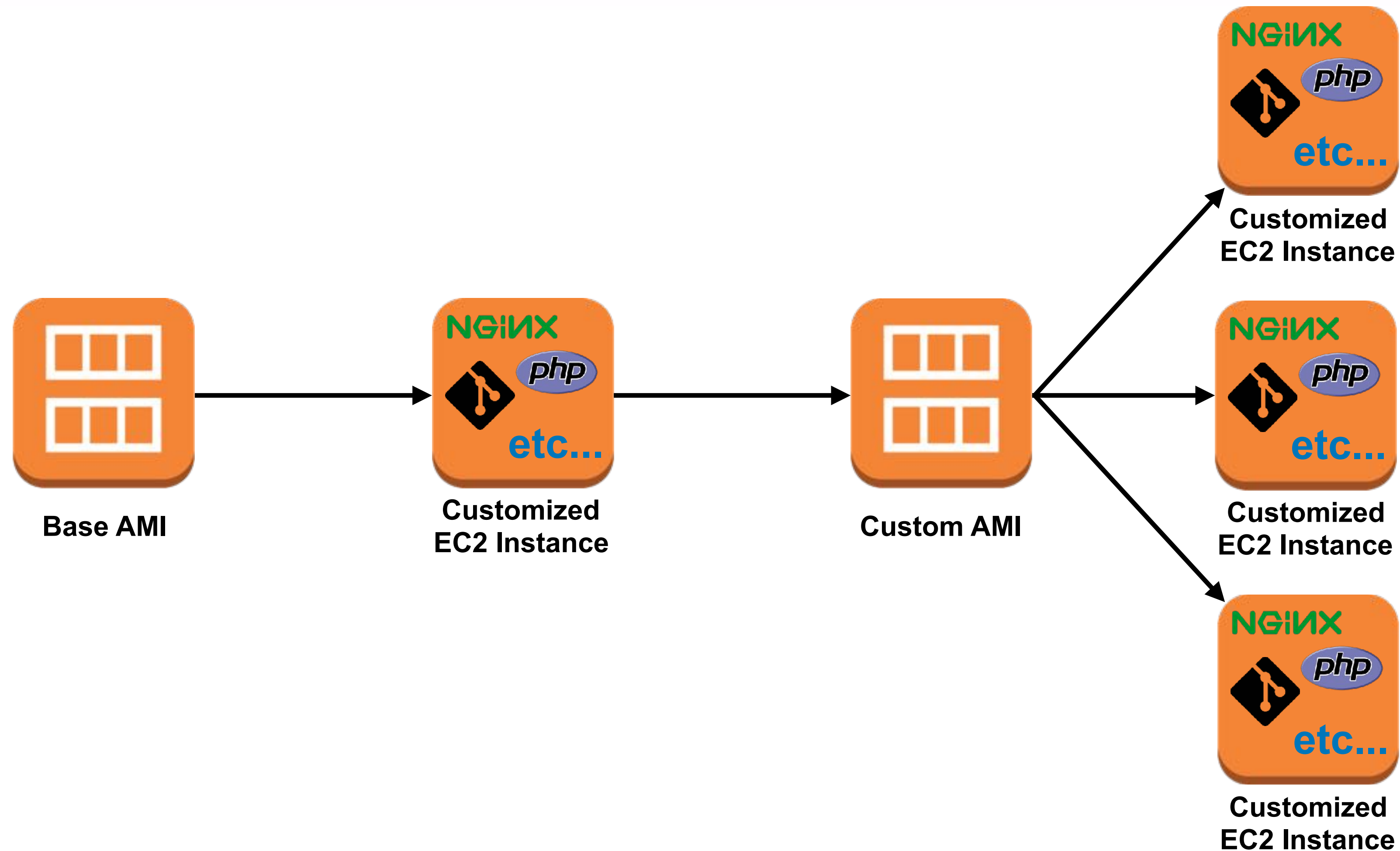
Amazon Machine Image (AMI)



Amazon Machine Image (AMI)



Amazon Machine Image (AMI)



EC2 Instance Classes



{family}{generation}.{size}

EC2 Instance Classes



c5.2xlarge

EC2 Instance Classes



c5.2xlarge

Compute-optimized

EC2 Instance Classes



c5.2xlarge

↑
5th generation

EC2 Instance Classes



c5.2xlarge

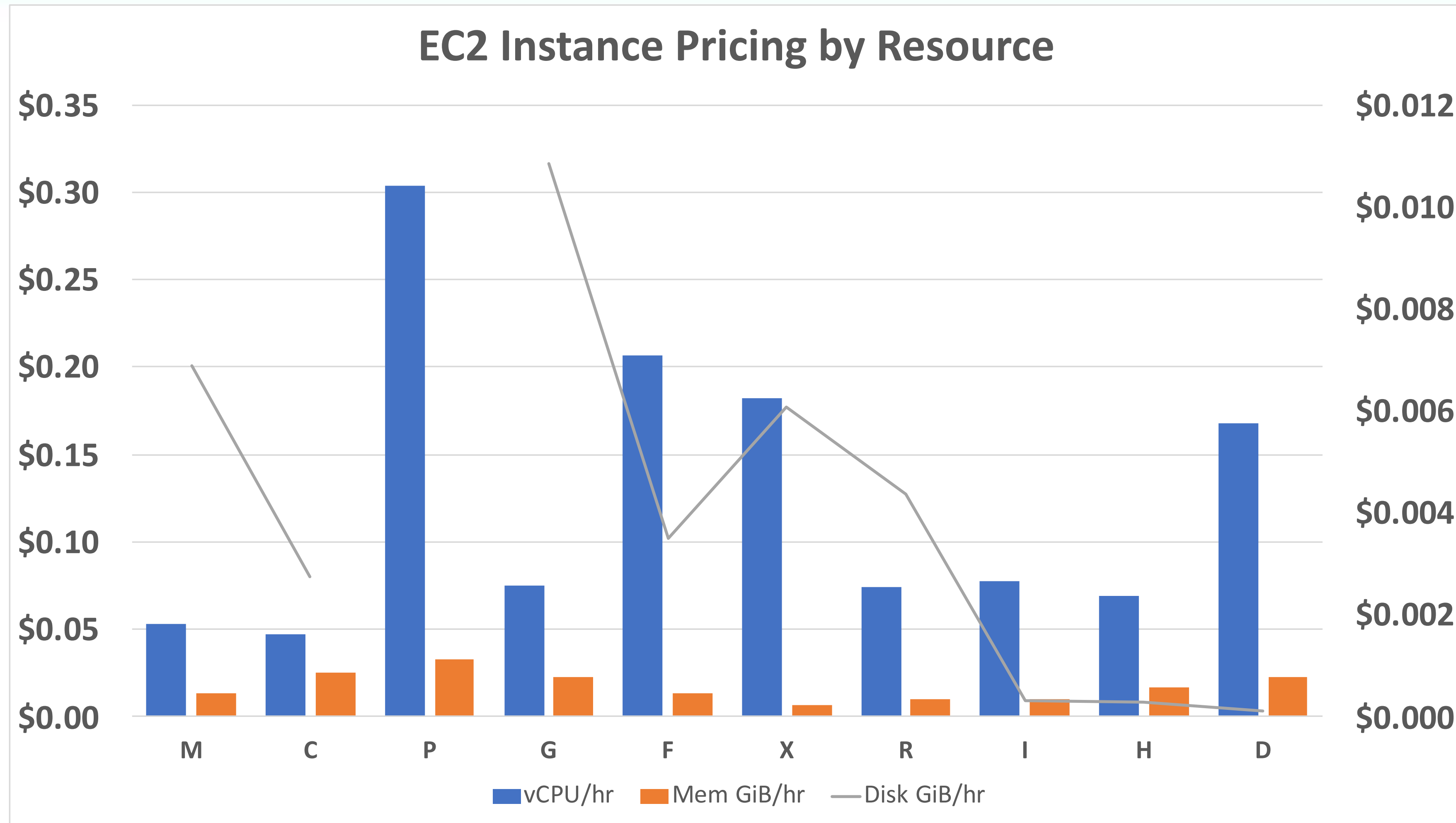
↑
twice the size of c5.xlarge
(also, generally twice the price)

EC2 Instance Families

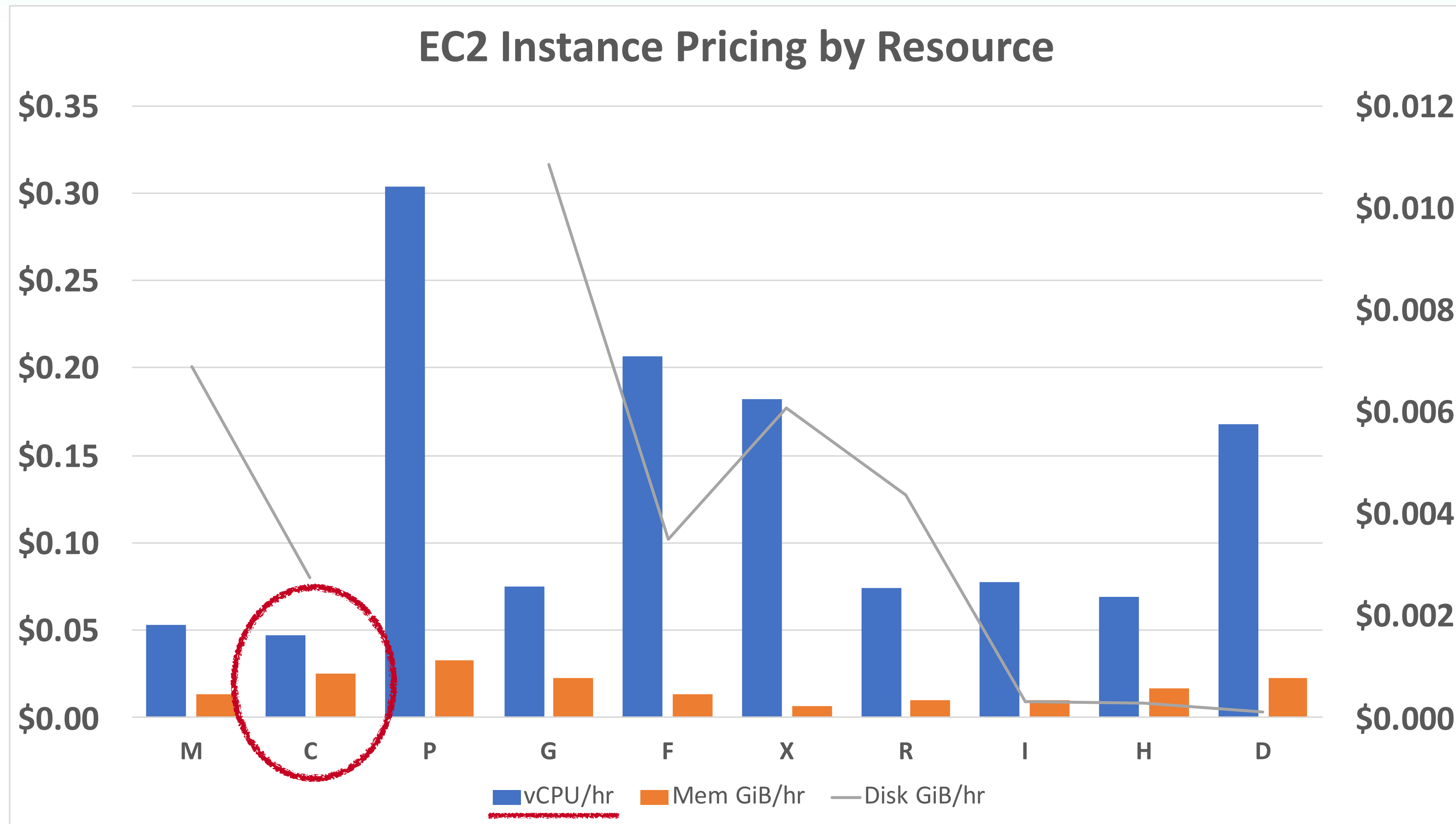


- General Purpose
- Compute Optimized
- Memory Optimized
- Storage Optimized
- Accelerated Computing (GPU)

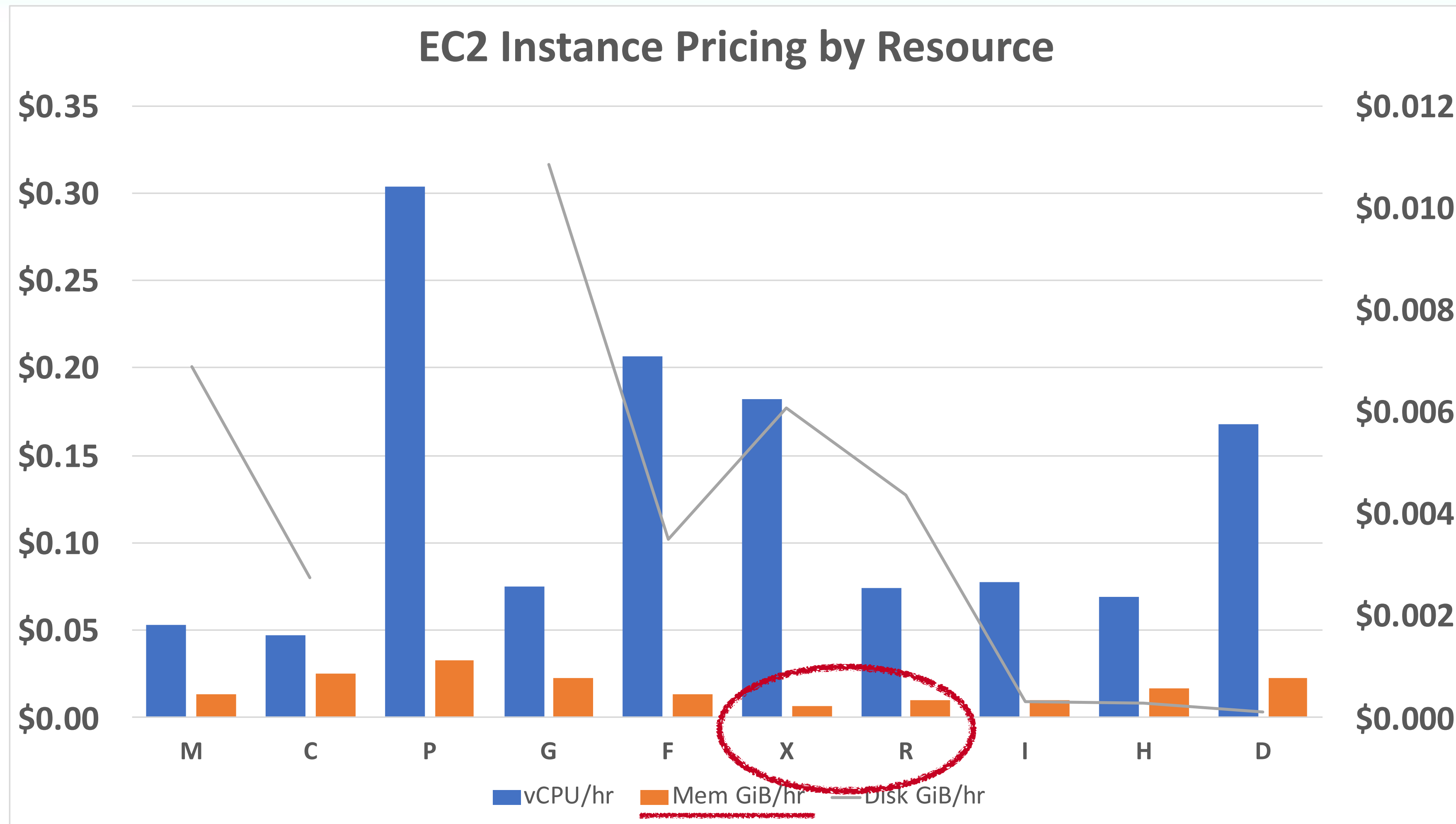
EC2 Instance Families



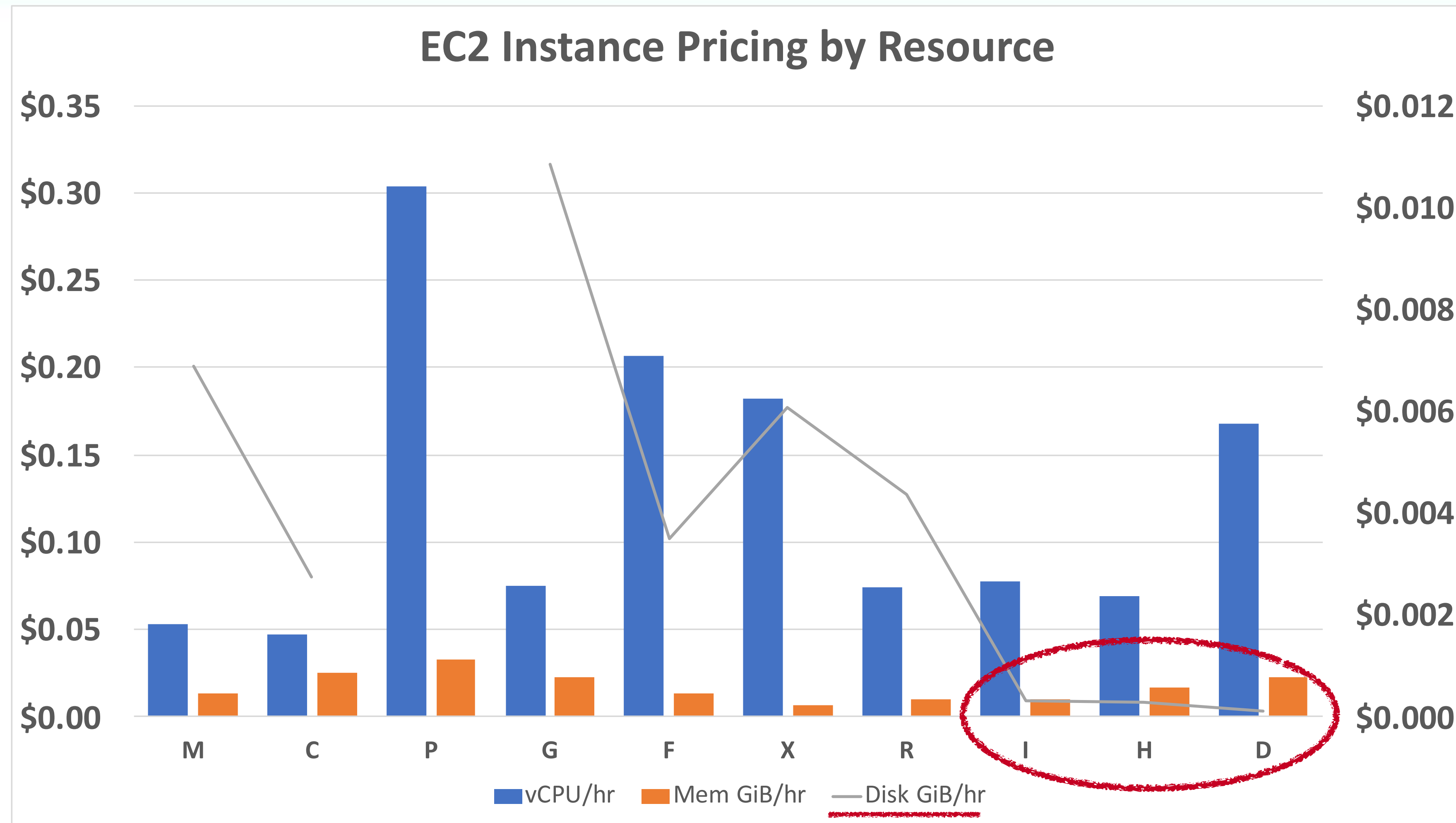
EC2 Instance Families



EC2 Instance Families



EC2 Instance Families



Elastic Compute Cloud (EC2)



Network



vpc-aded01d6 (default)



Elastic Compute Cloud (EC2)



Network ⓘ

?

vpc-aded01d6 (default) ⬆

Virtual Private Cloud (VPC)



Virtual Private Cloud (VPC)

- Isolated virtual network within AWS



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- Isolated virtual network within AWS
- Fully customizable to your needs:



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- Fully customizable to your needs:
 - IP address range, subnets, routing



Virtual Private Cloud (VPC)

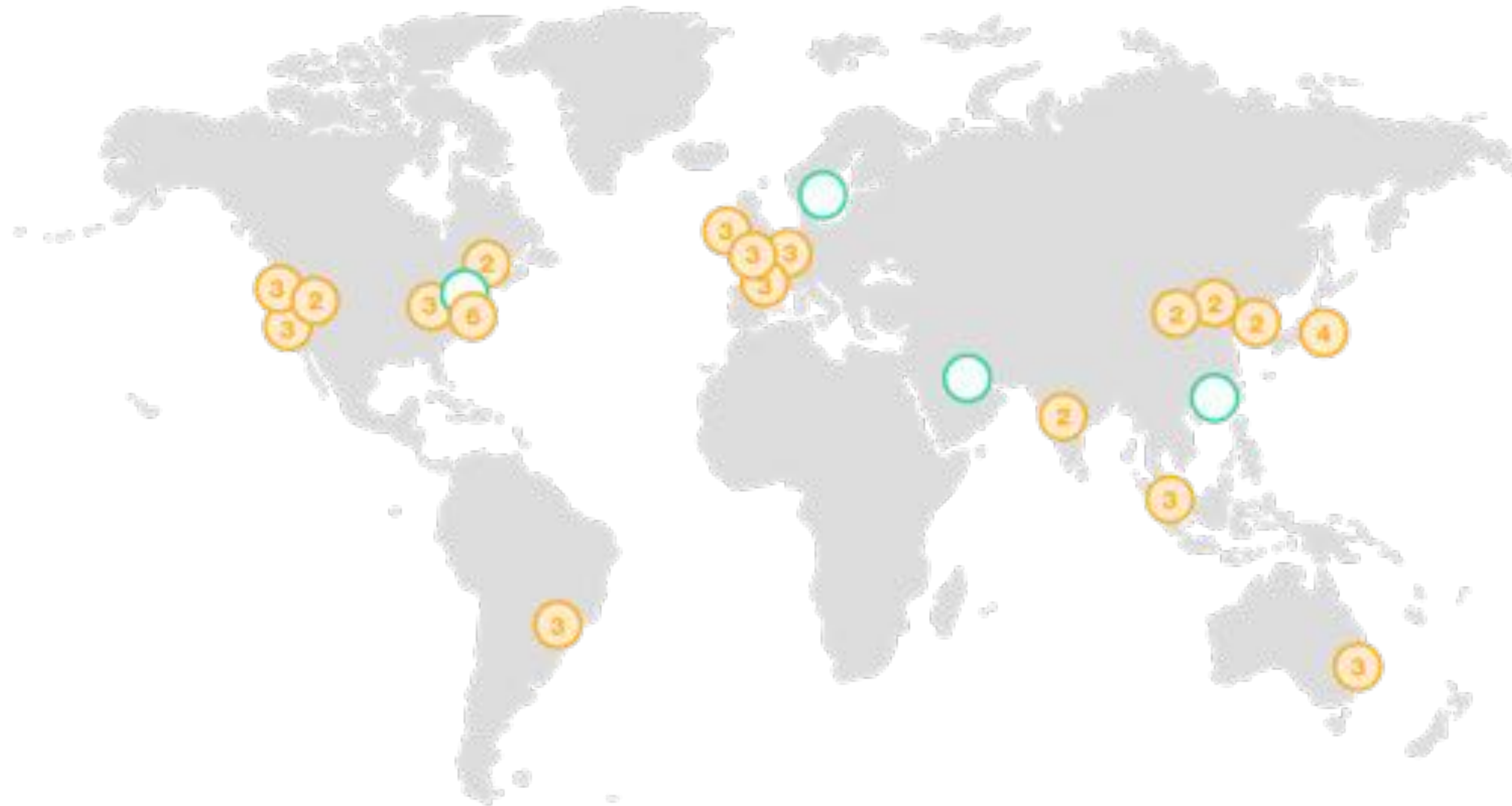
- Isolated virtual network within AWS
- Fully customizable to your needs:
 - IP address range, subnets, routing
 - Security groups, network access control lists, gateways, etc.



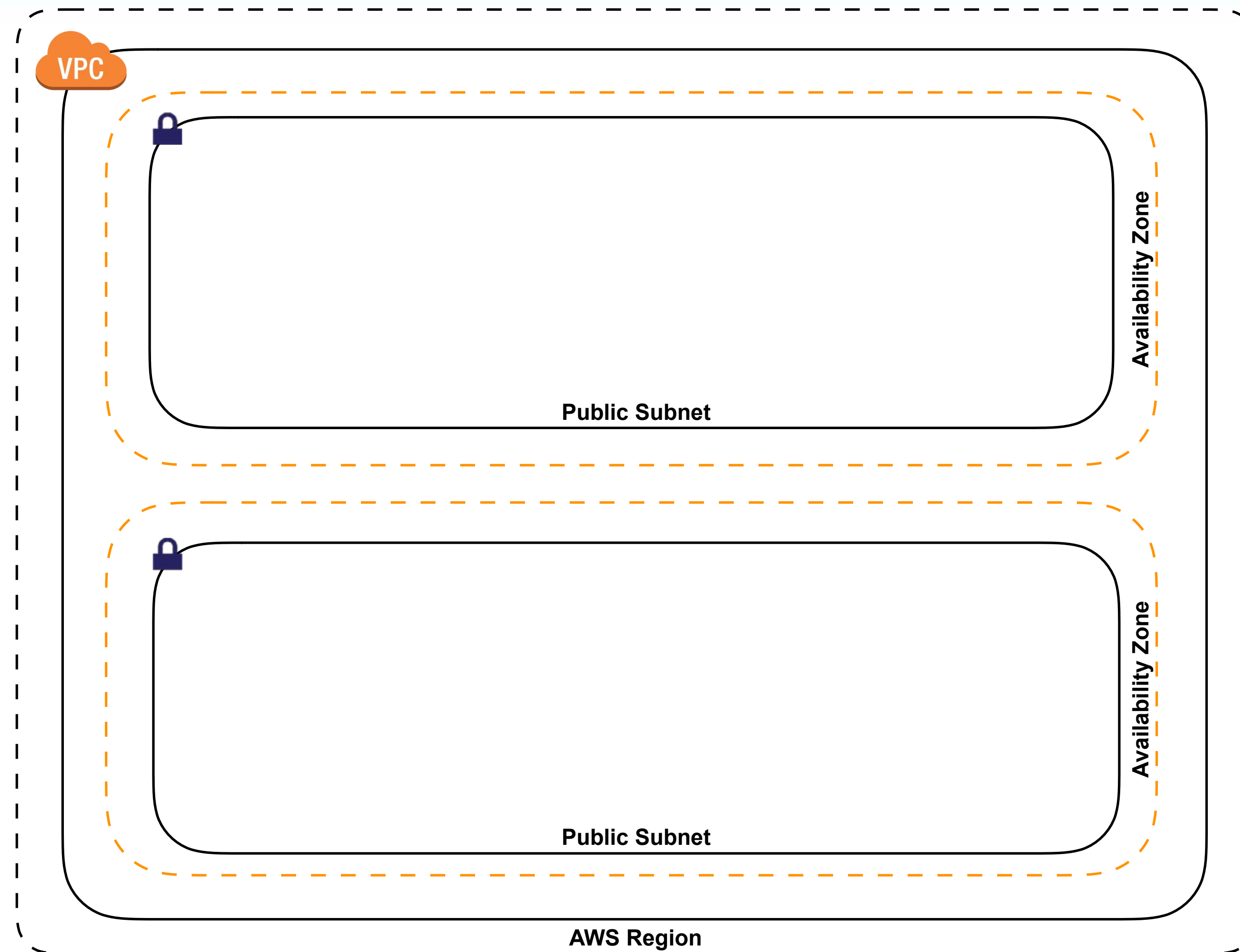
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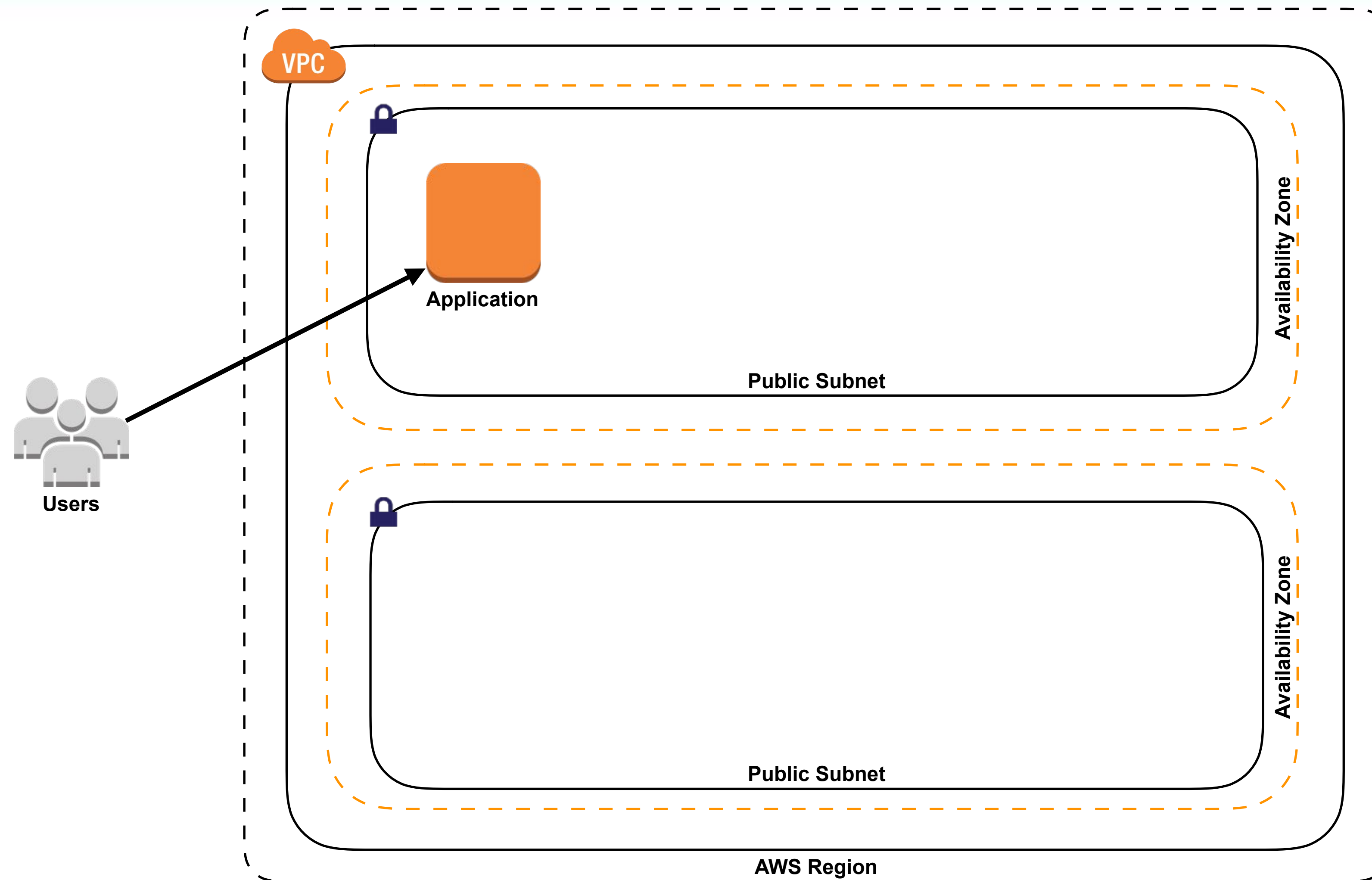
50+ Availability Zones across 18 Regions



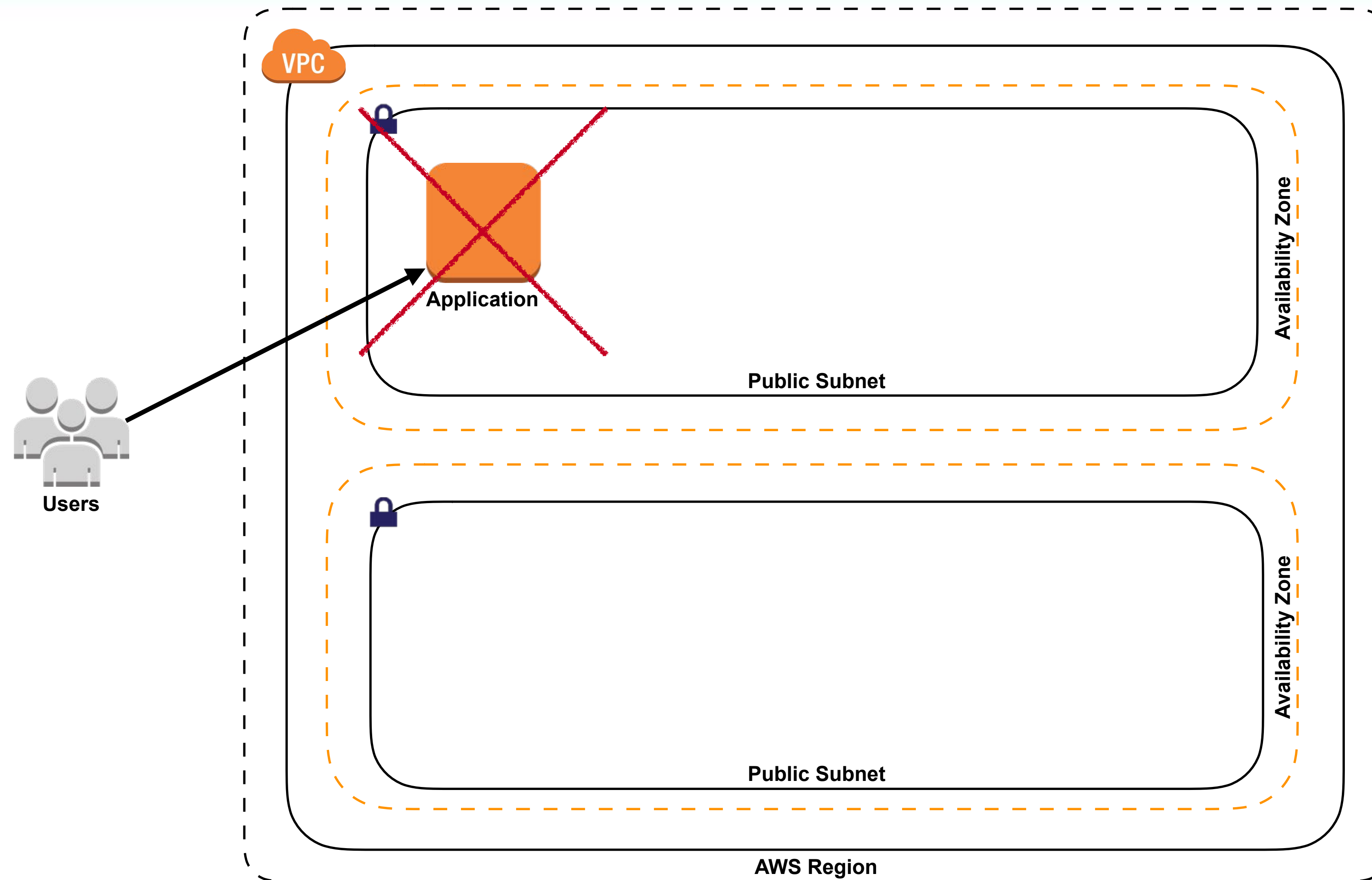
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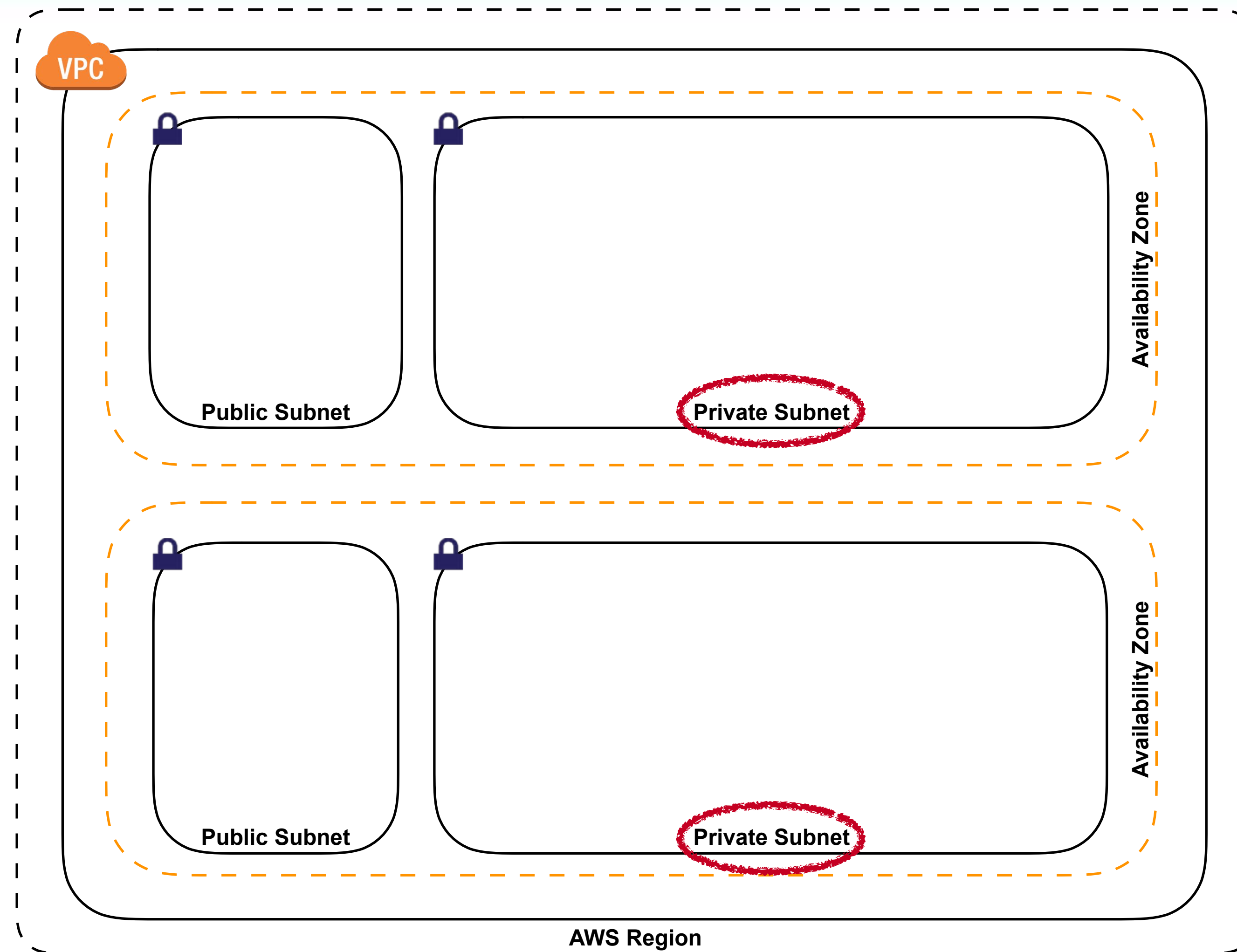
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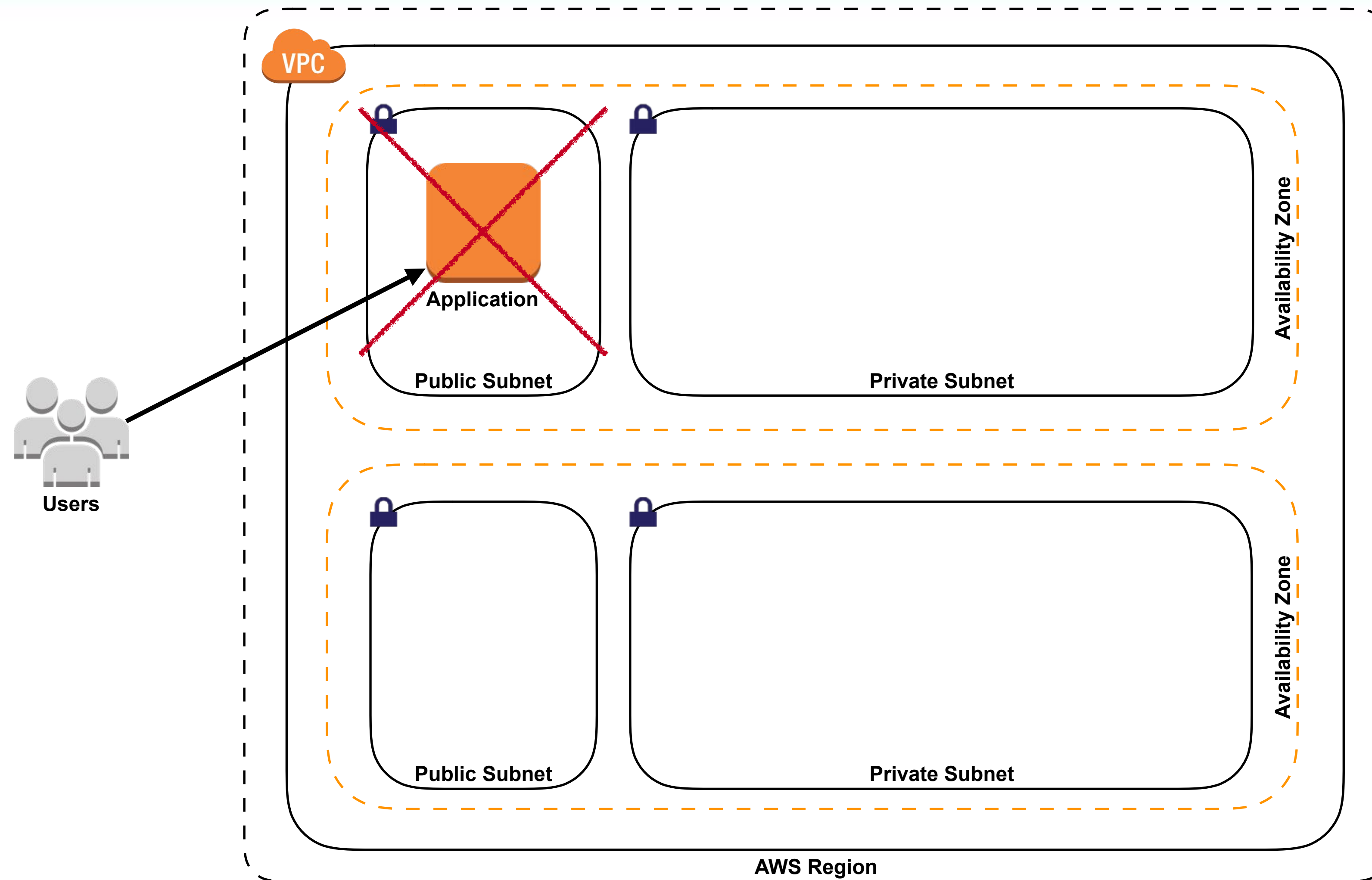
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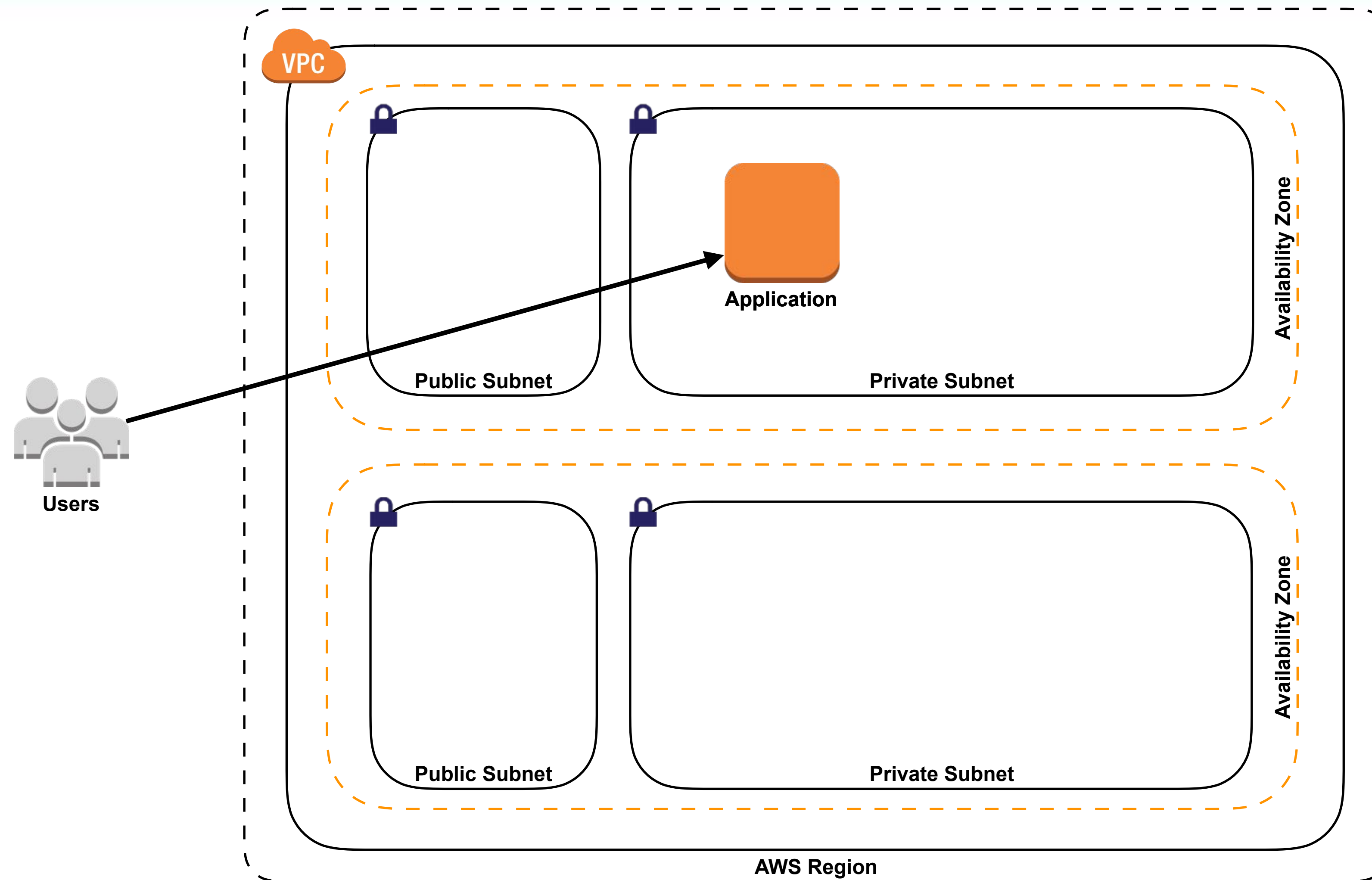
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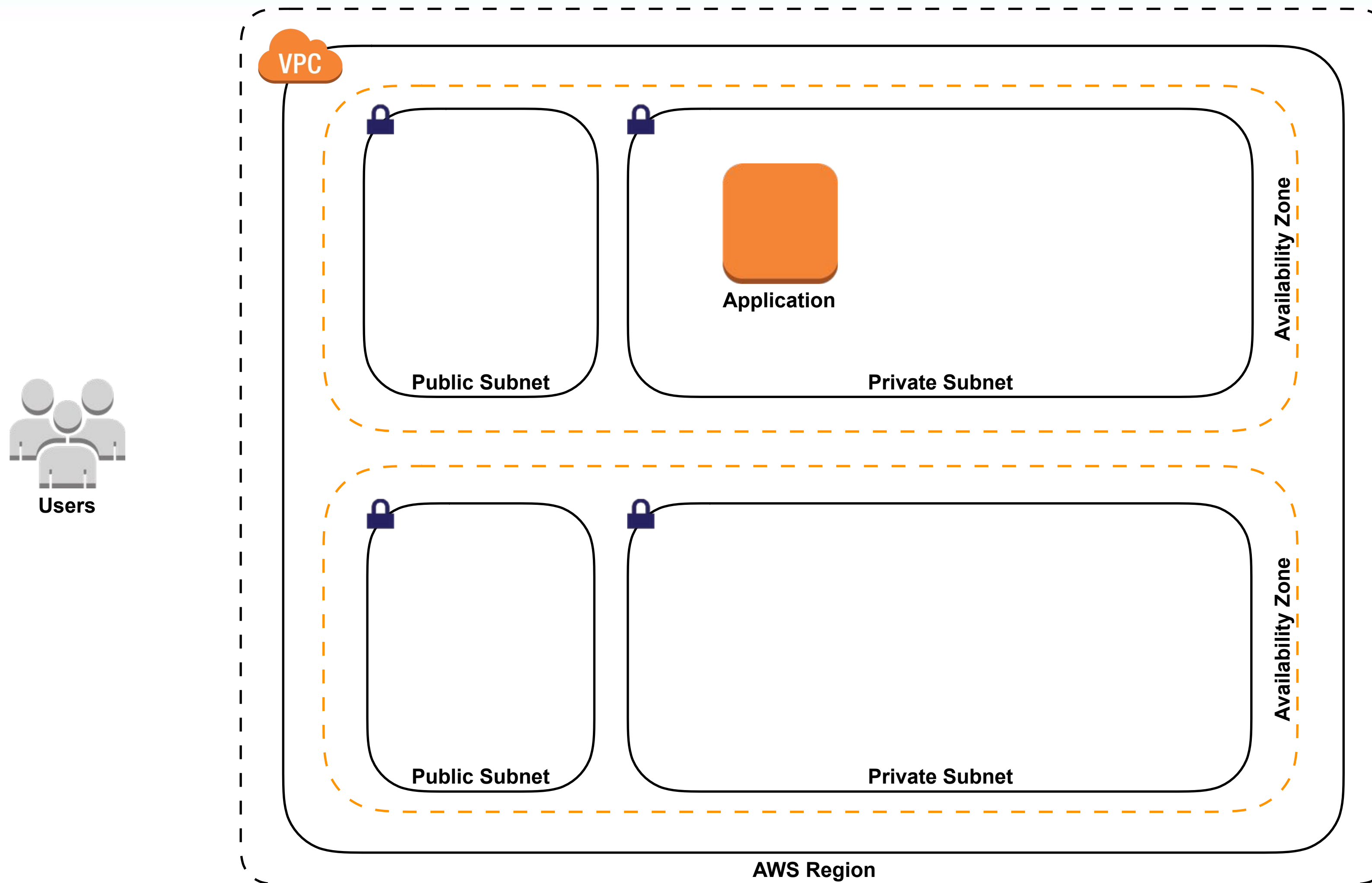
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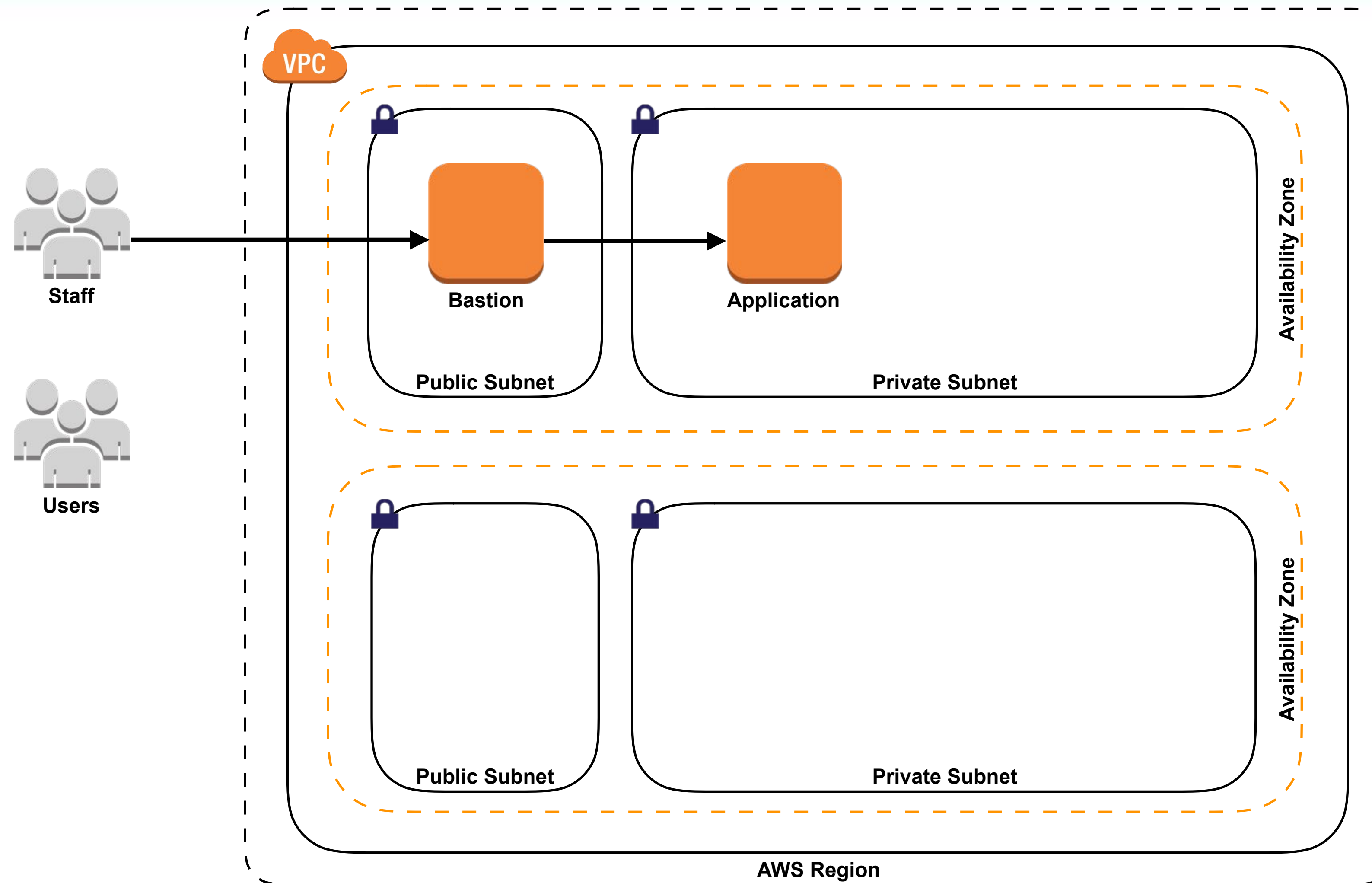
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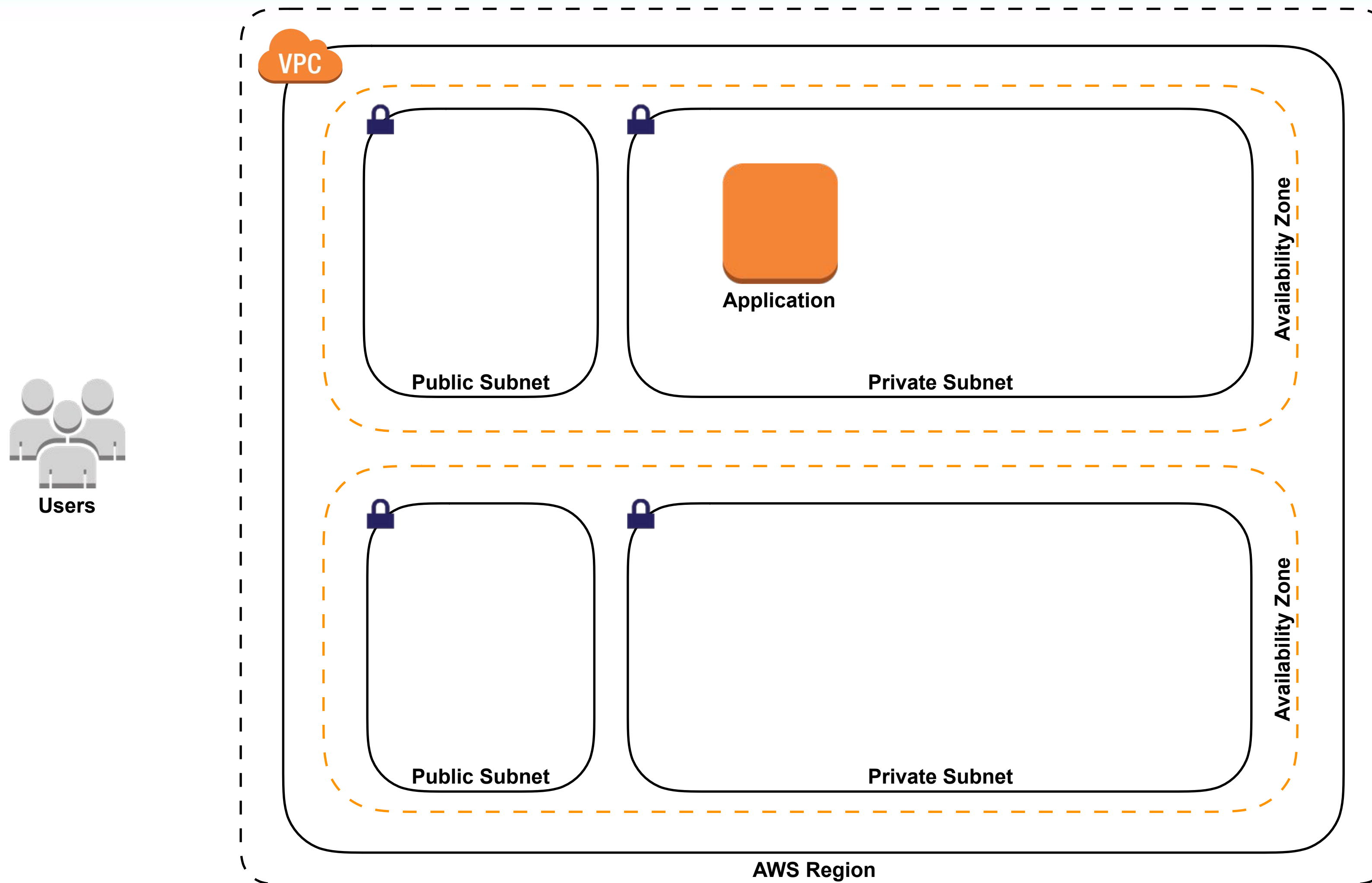
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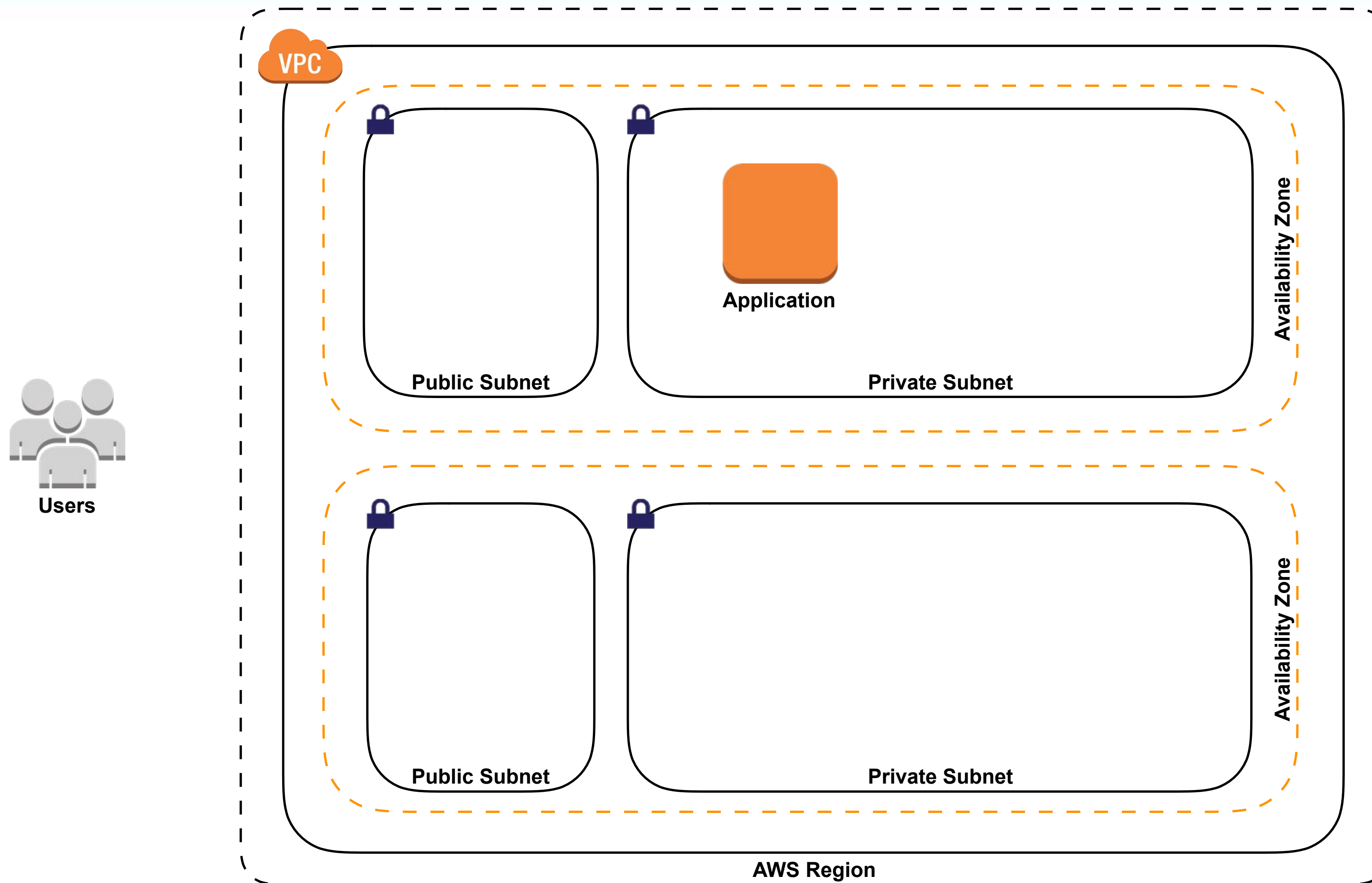
Virtual Private Cloud (VPC)





Security is about layers

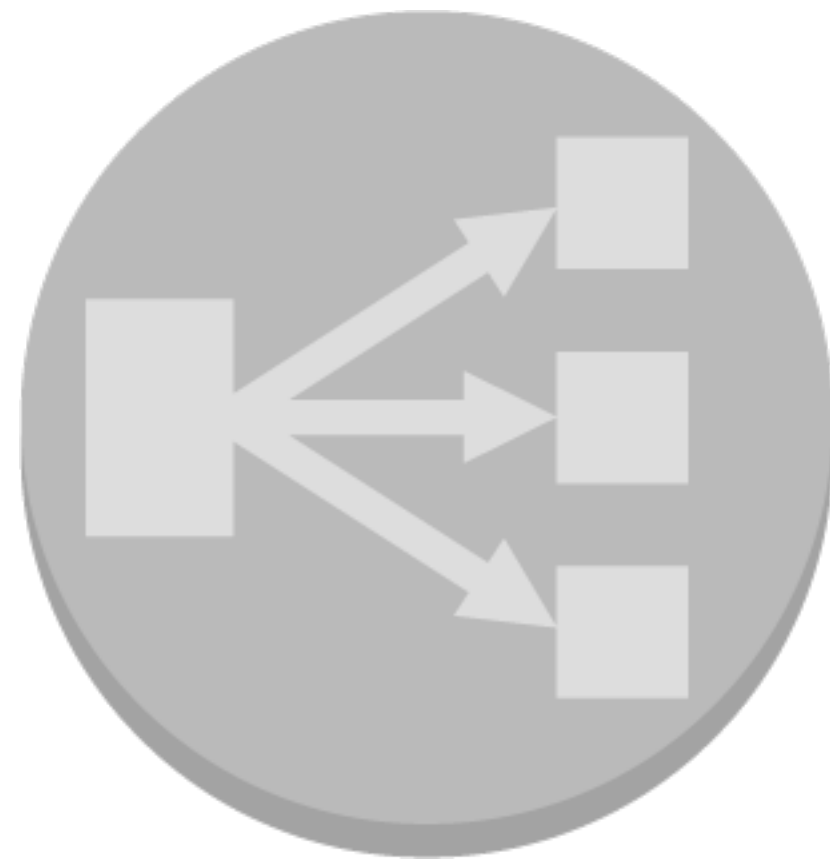
Virtual Private Cloud (VPC)



Elastic Load Balancing (ELB)



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Classic Load Balancer

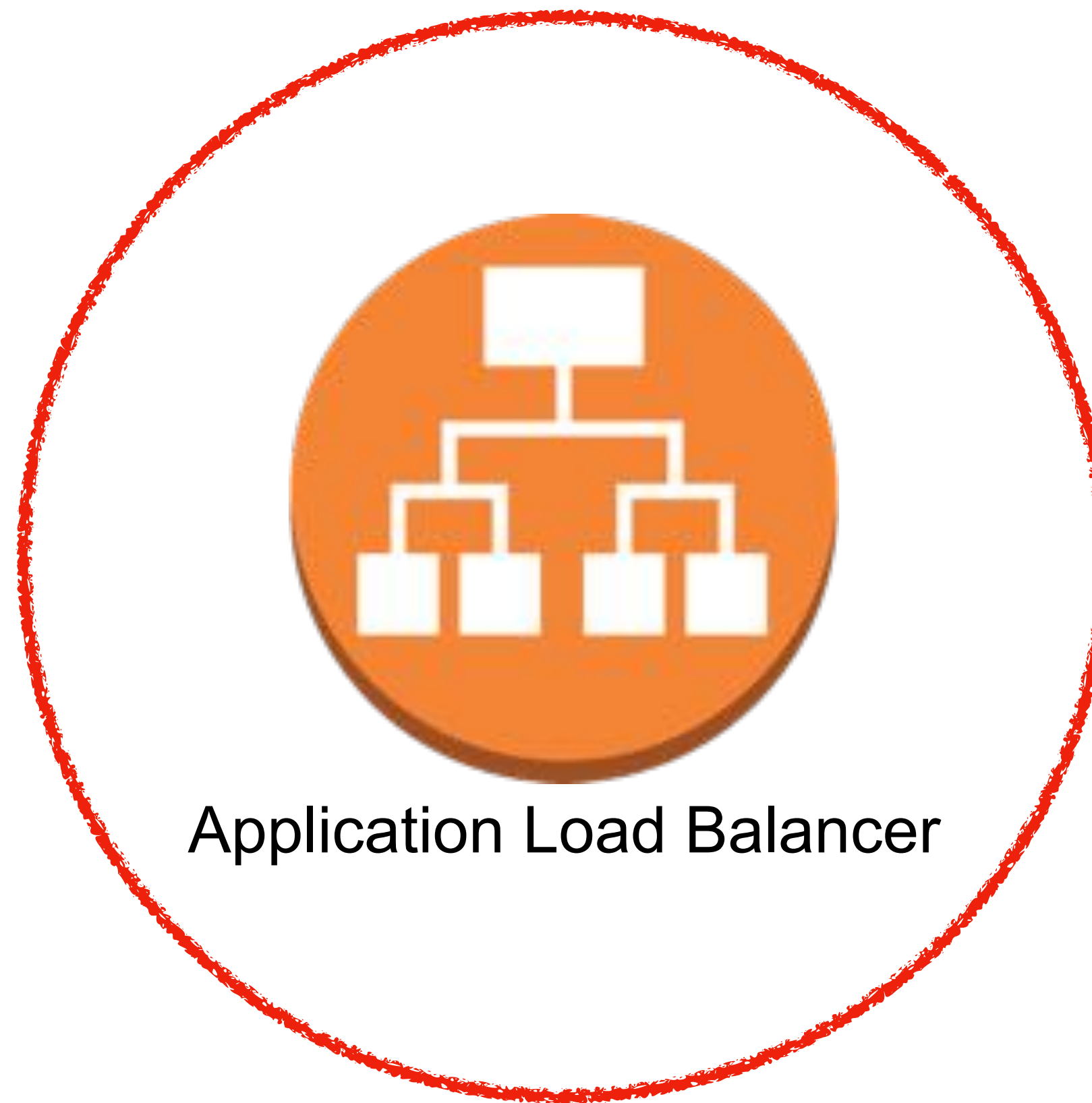


Application Load Balancer



Network Load Balancer

Elastic Load Balancing (ELB)



Application Load Balancer (ALB)



- Single source of user traffic



Application Load Balancer (ALB)



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- Listen for requests and distribute to registered targets



Application Load Balancer (ALB)



- Single source of user traffic
- Listen for requests and distribute to registered targets
- Scales to meet demand



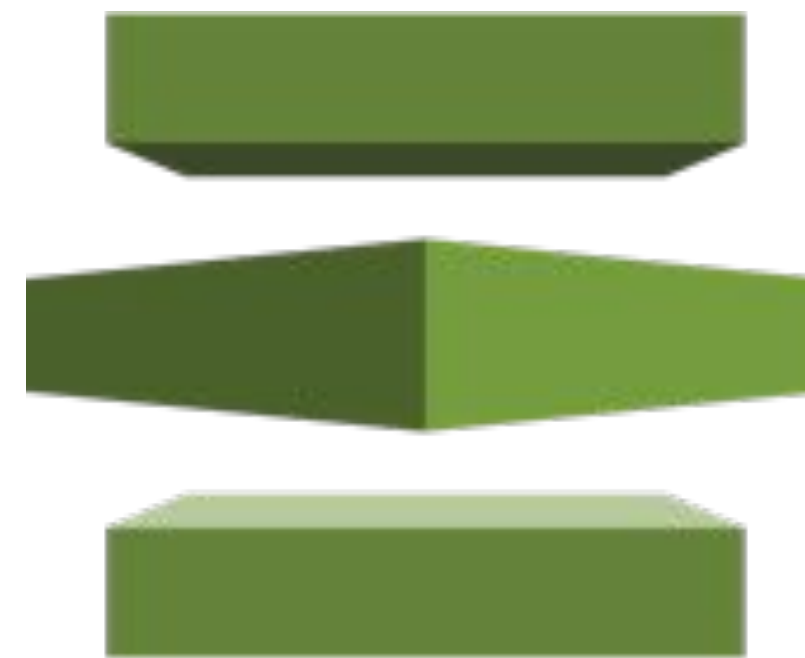
Application Load Balancer (ALB)



- Single source of user traffic
- Listen for requests and distribute to registered targets
- Scales to meet demand
- **SSL/TLS support**



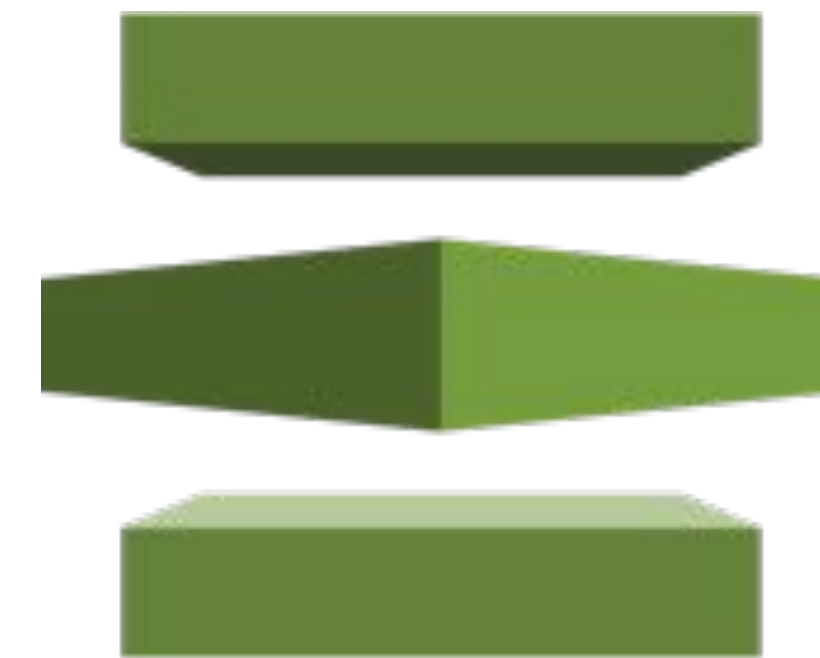
AWS Certificate Manager (ACM)



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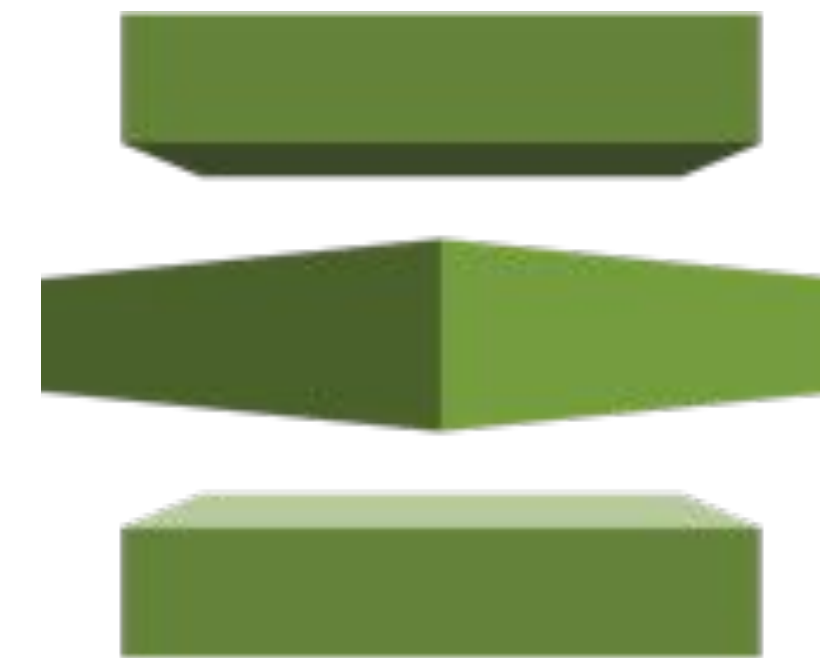
- SSL/TLS certificates for AWS services



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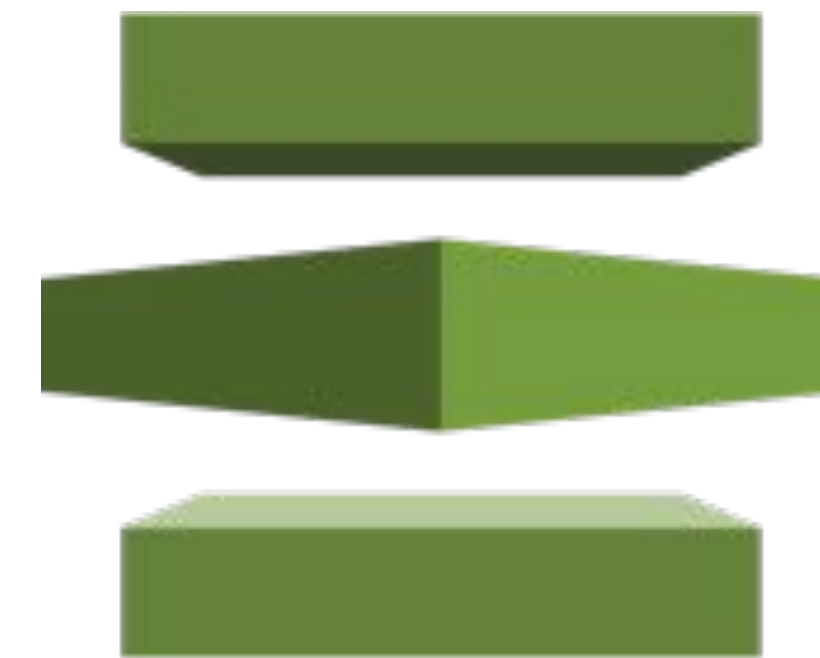
- SSL/TLS certificates for AWS services
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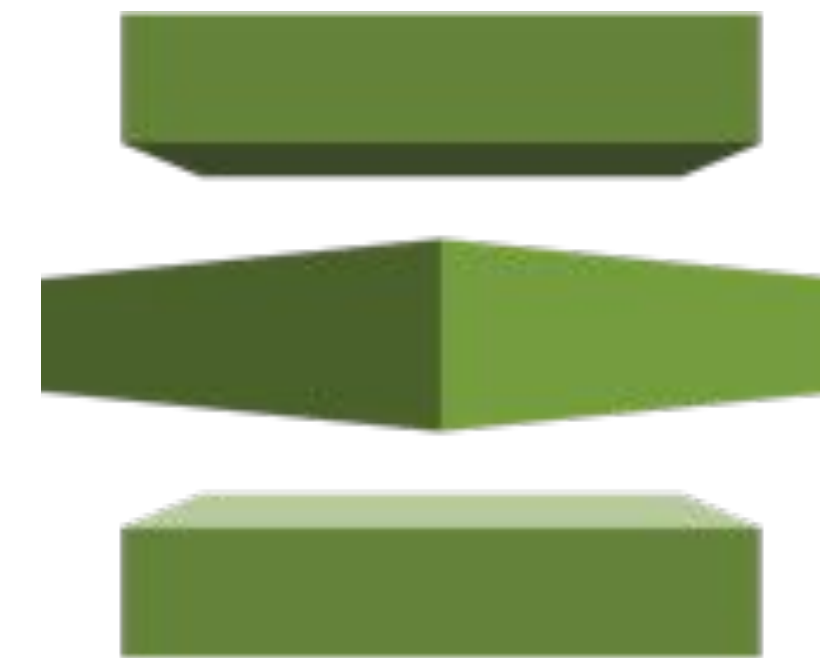
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- Easy to use



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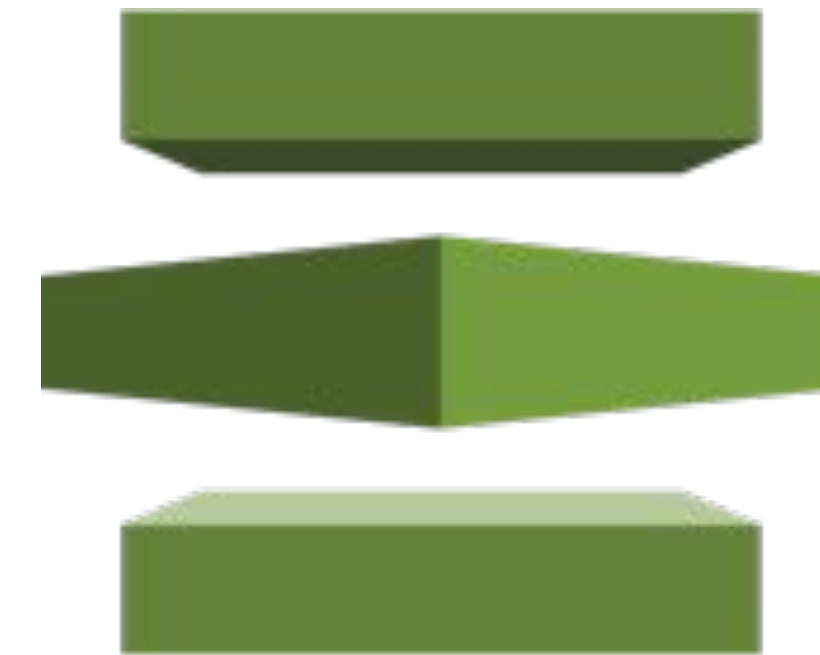
- SSL/TLS certificates for AWS services
- Create your own in seconds
- Easy to use
- Automatically renewed



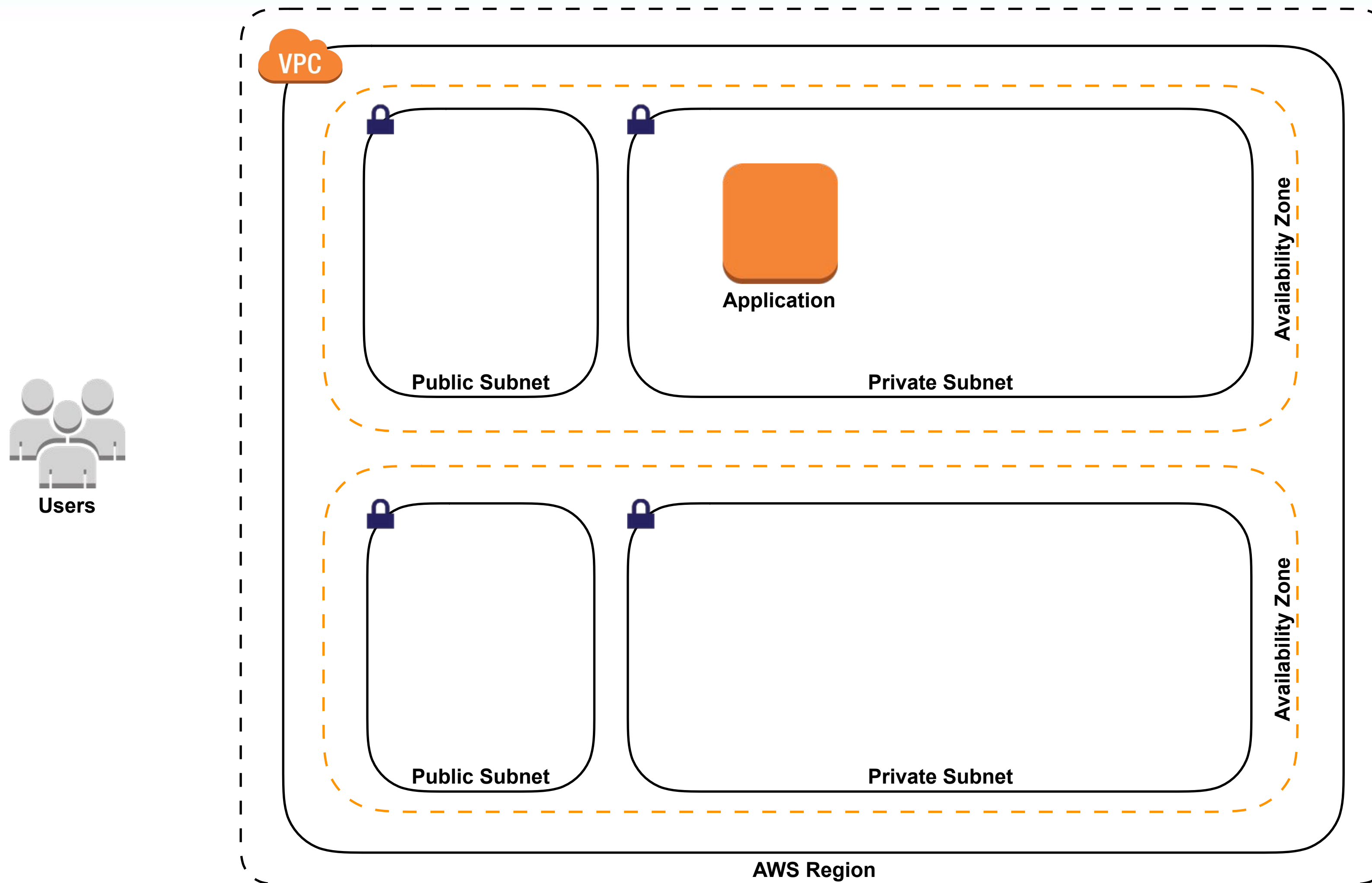
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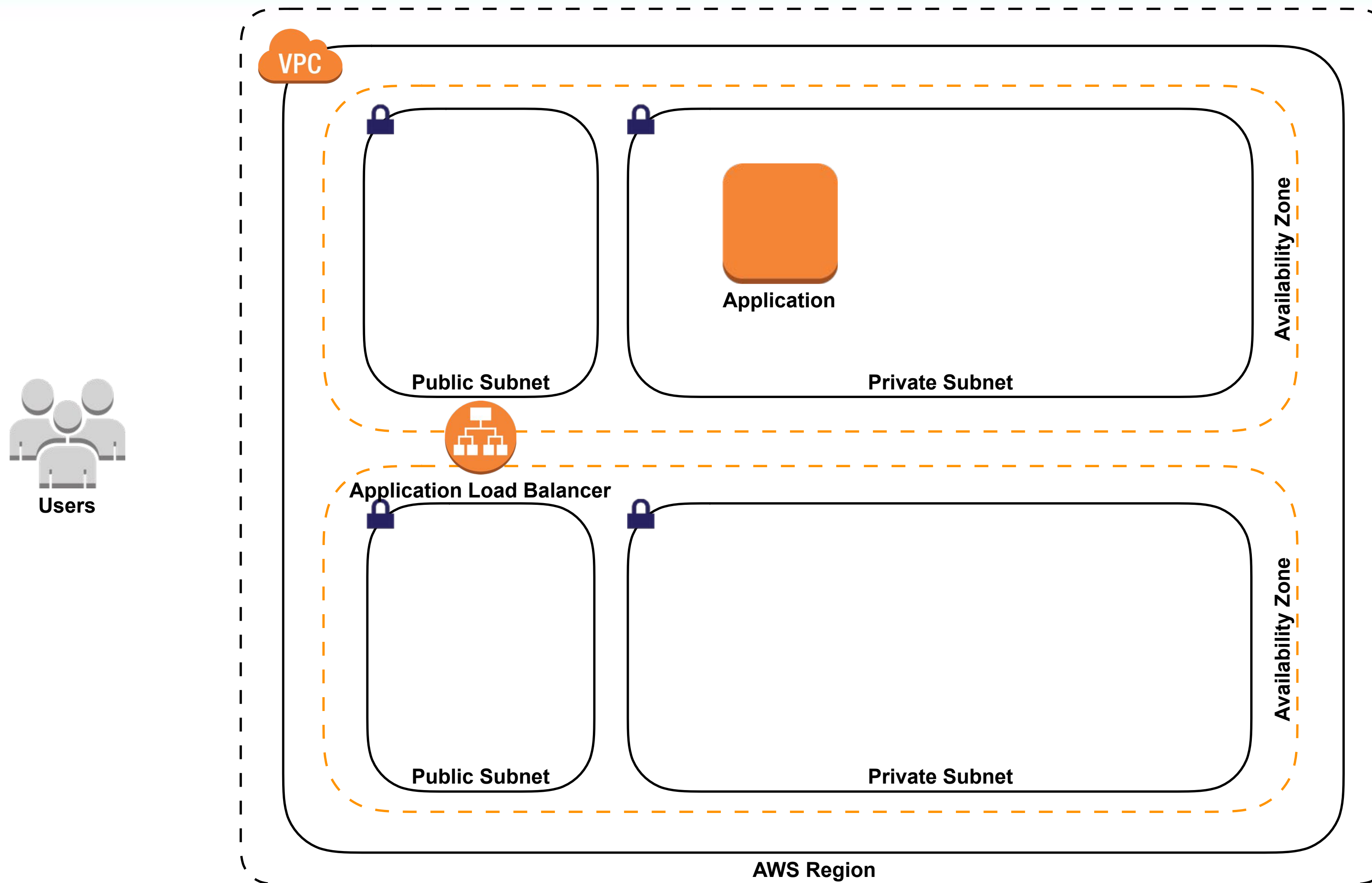
- SSL/TLS certificates for AWS services
- Create your own in seconds
- Easy to use
- Automatically renewed
- **Free!**



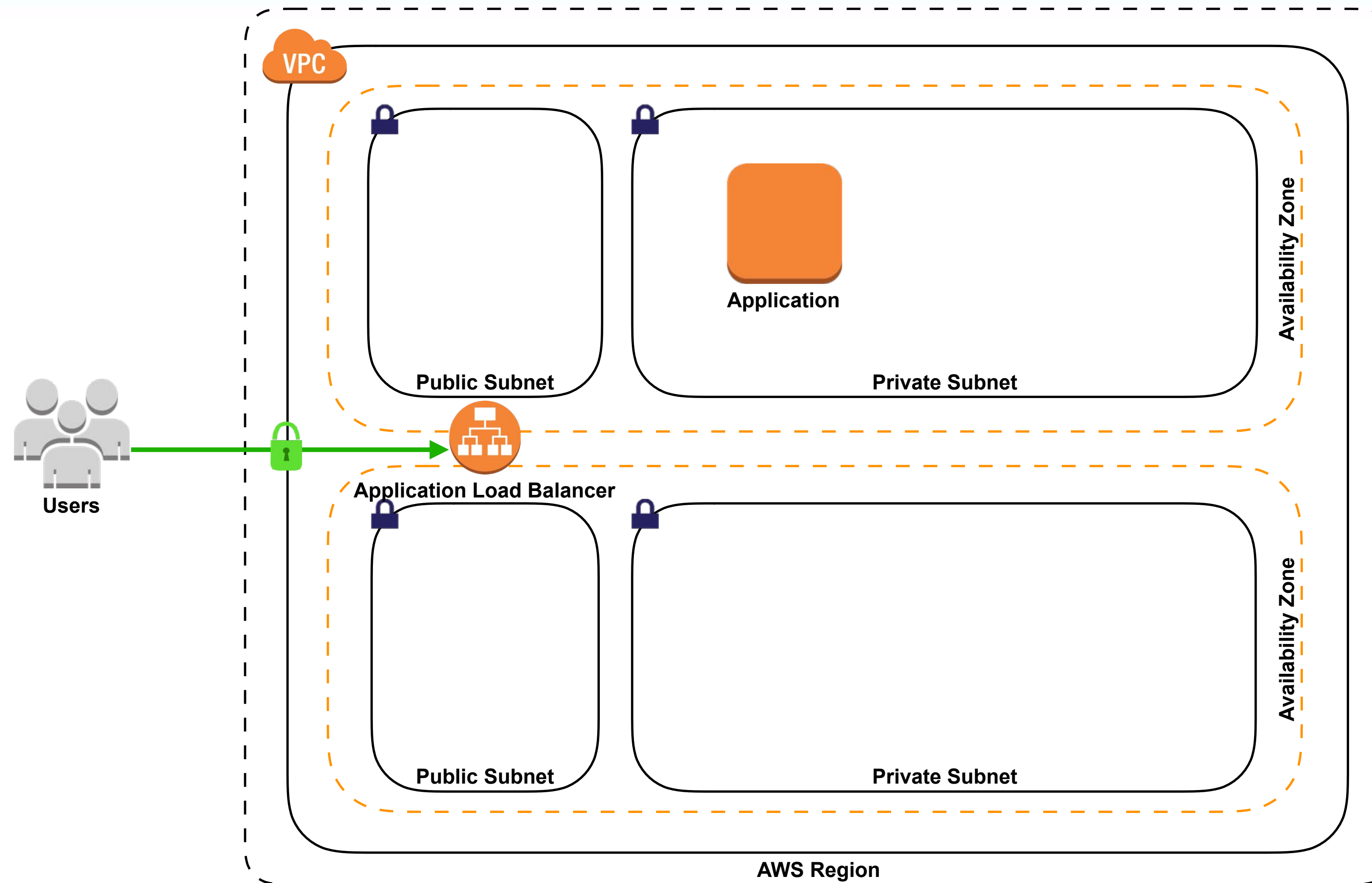
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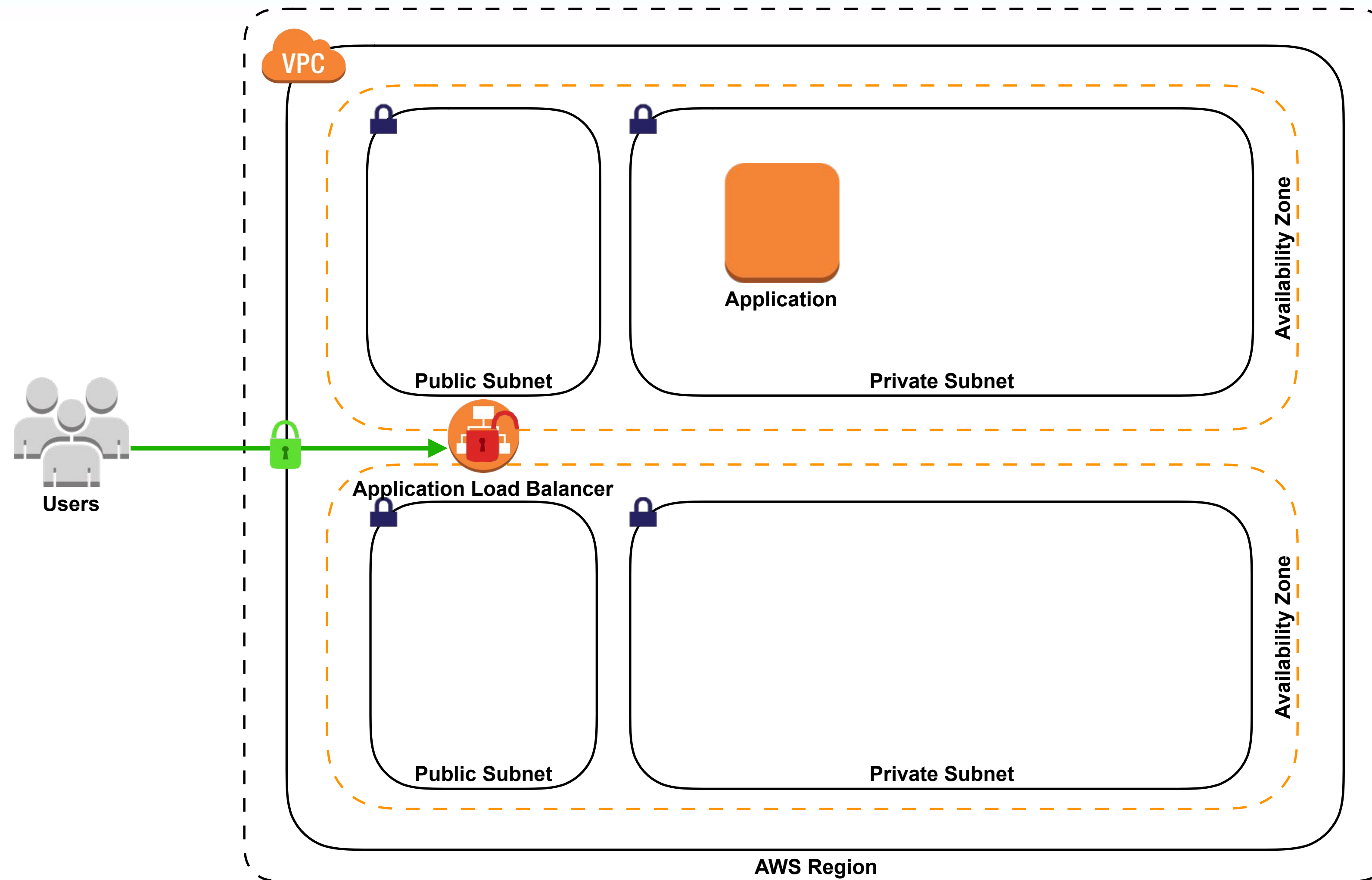
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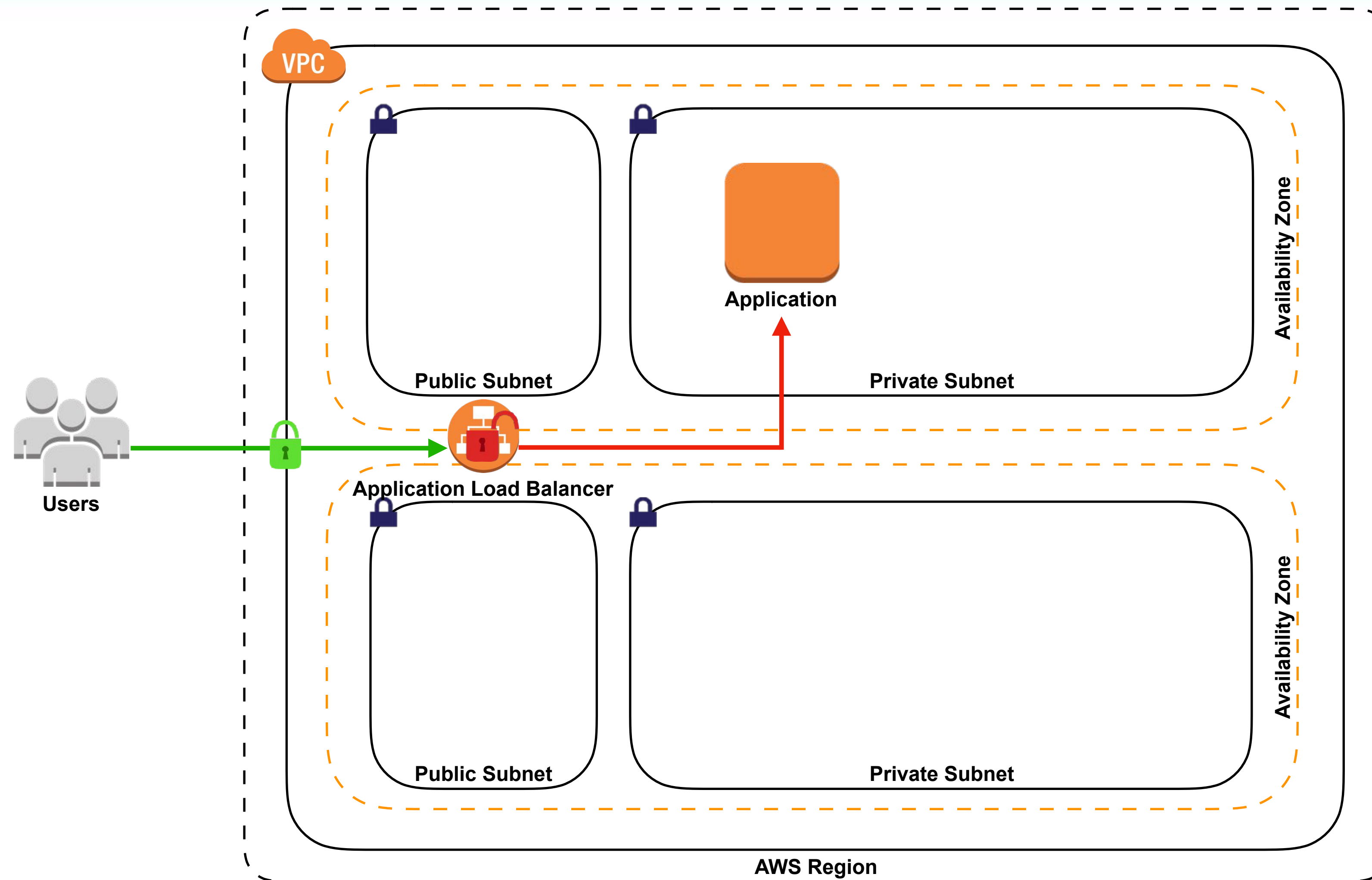
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Amazon Route 53



Amazon Route 53

- Highly-available, reliable DNS service



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- Public and private zones



Amazon Route 53

- Highly-available, reliable DNS service
- Public and private zones
- Flexible routing

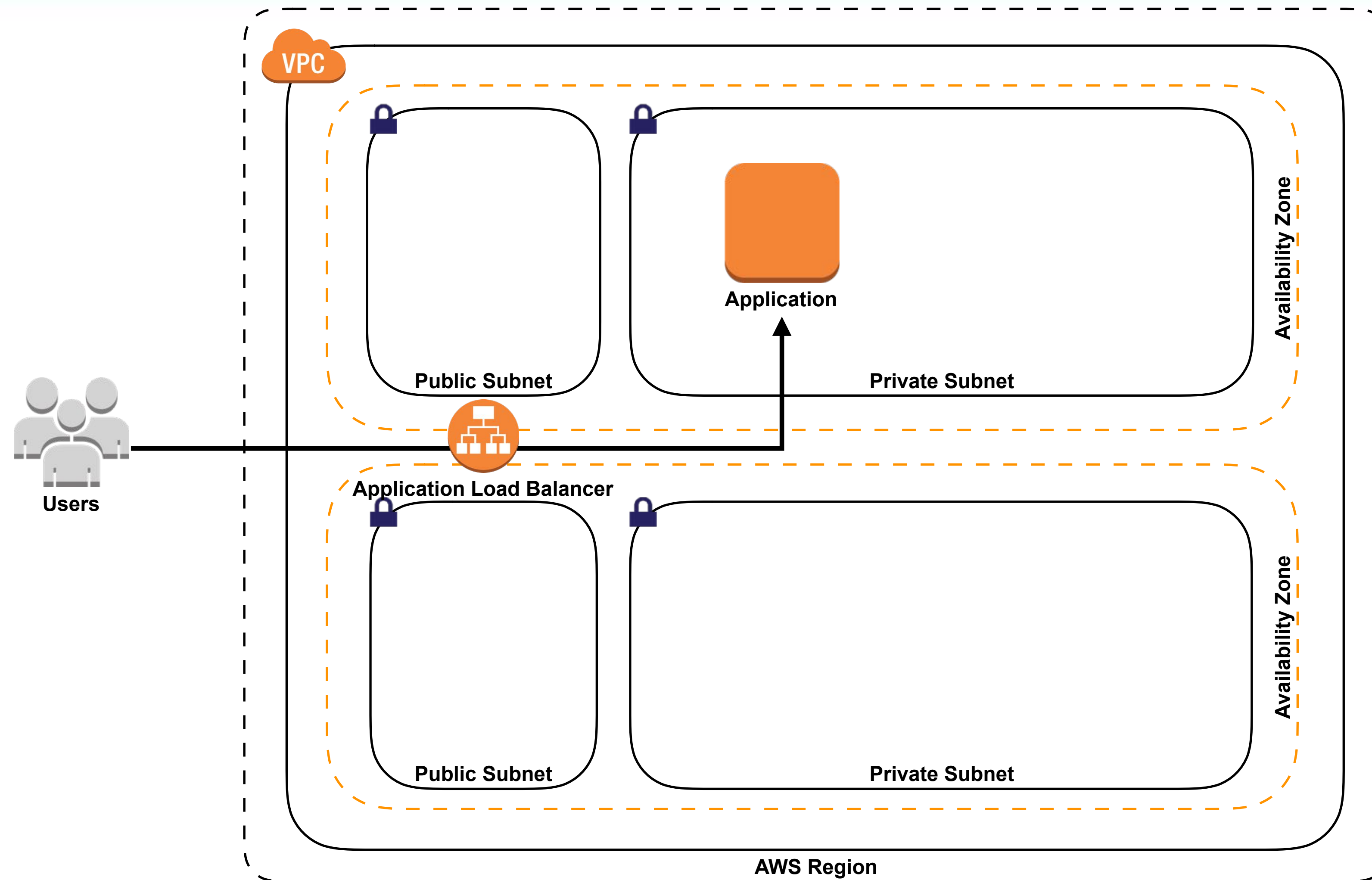


Amazon Route 53

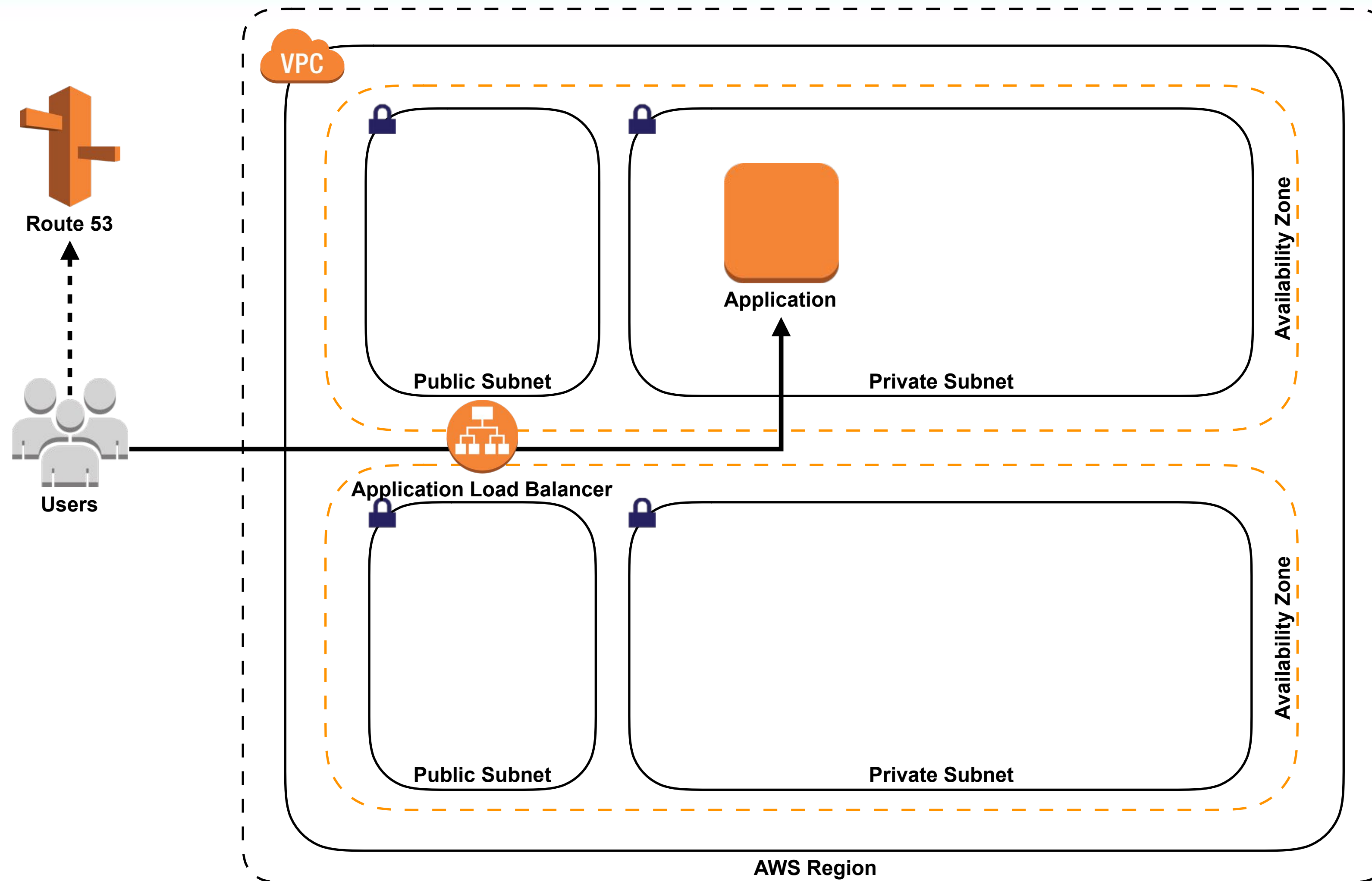
- Highly-available, reliable DNS service
- Public and private zones
- Flexible routing
- Well-integrated with other service offerings on AWS



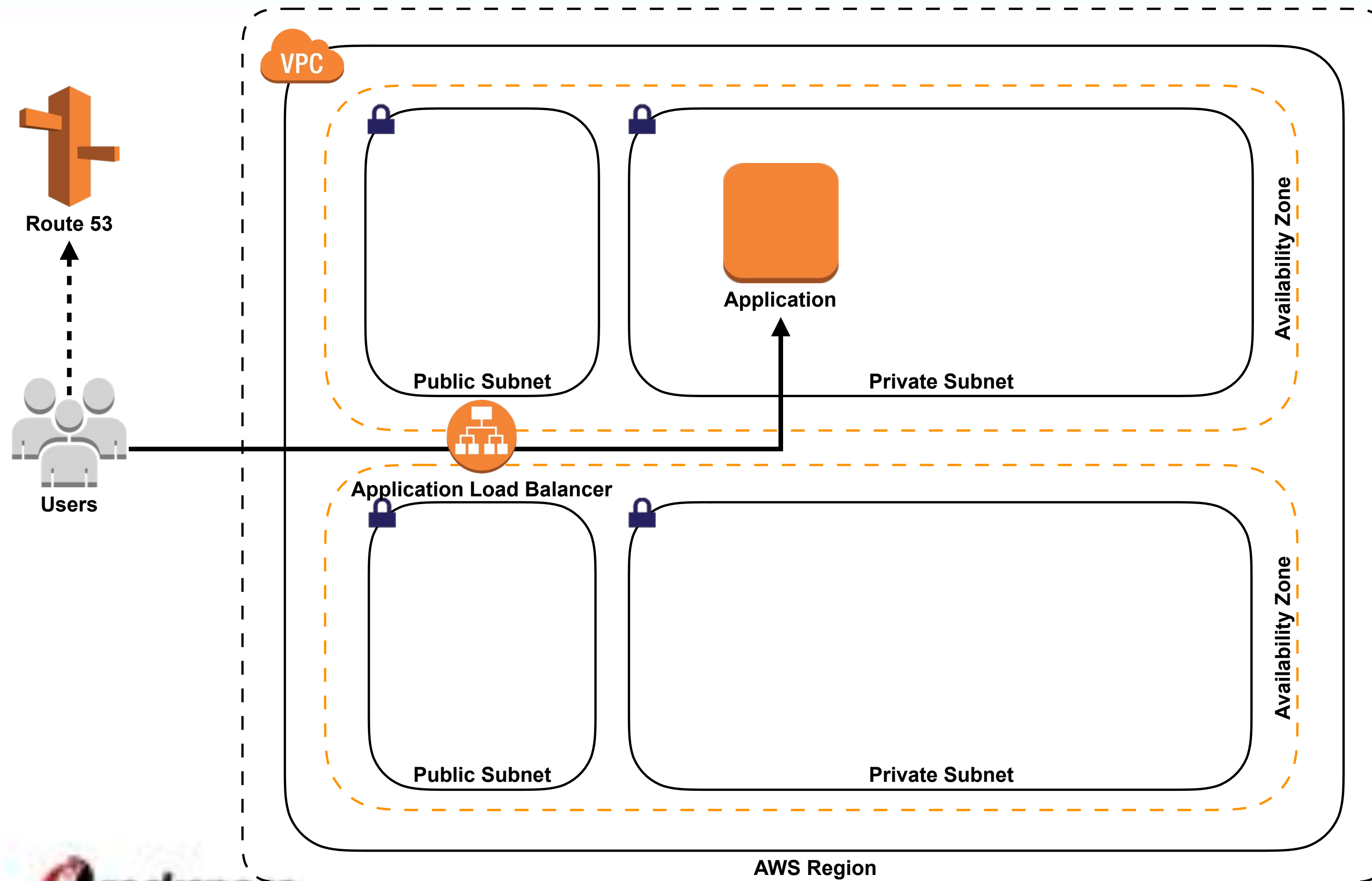
Amazon Route 53



Amazon Route 53



Checkpoint



- ❑ Highly-available
- ❑ Fault-tolerant
- ❑ Secure
- ❑ Scalable

High Availability

"How many nines?"

How many nines?

Uptime %	"Nines"	Downtime per day	Downtime per year
90%	1 nine	2.4 hours	36.5 days
99%	2 nines	14 minutes	3.65 days
99.9%	3 nines	86 seconds	8.76 hours
99.99%	4 nines	8.6 seconds	52.6 minutes
99.999%	5 nines	0.86 seconds	5.25 minutes
99.9999%	6 nines	8.6 milliseconds	31.5 seconds

Fault Tolerance

A fault-tolerant system will continue to function properly despite failure of one or more of its components.

High Availability vs. Fault Tolerance

	HA	Not HA
FT	Brakes	
Not FT	Wheels	Steering wheel

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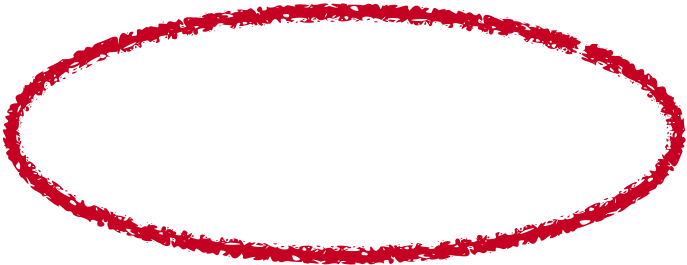
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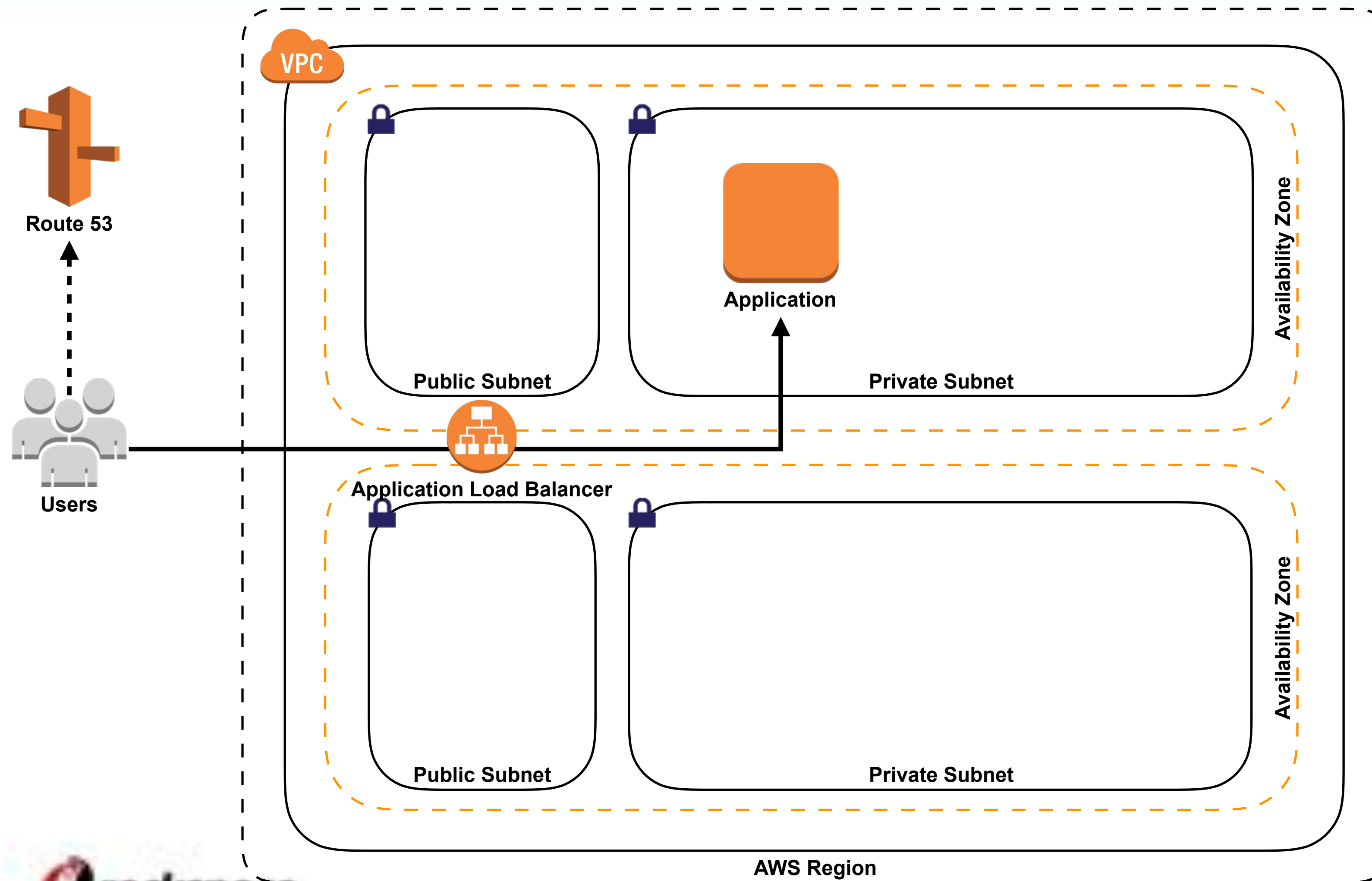
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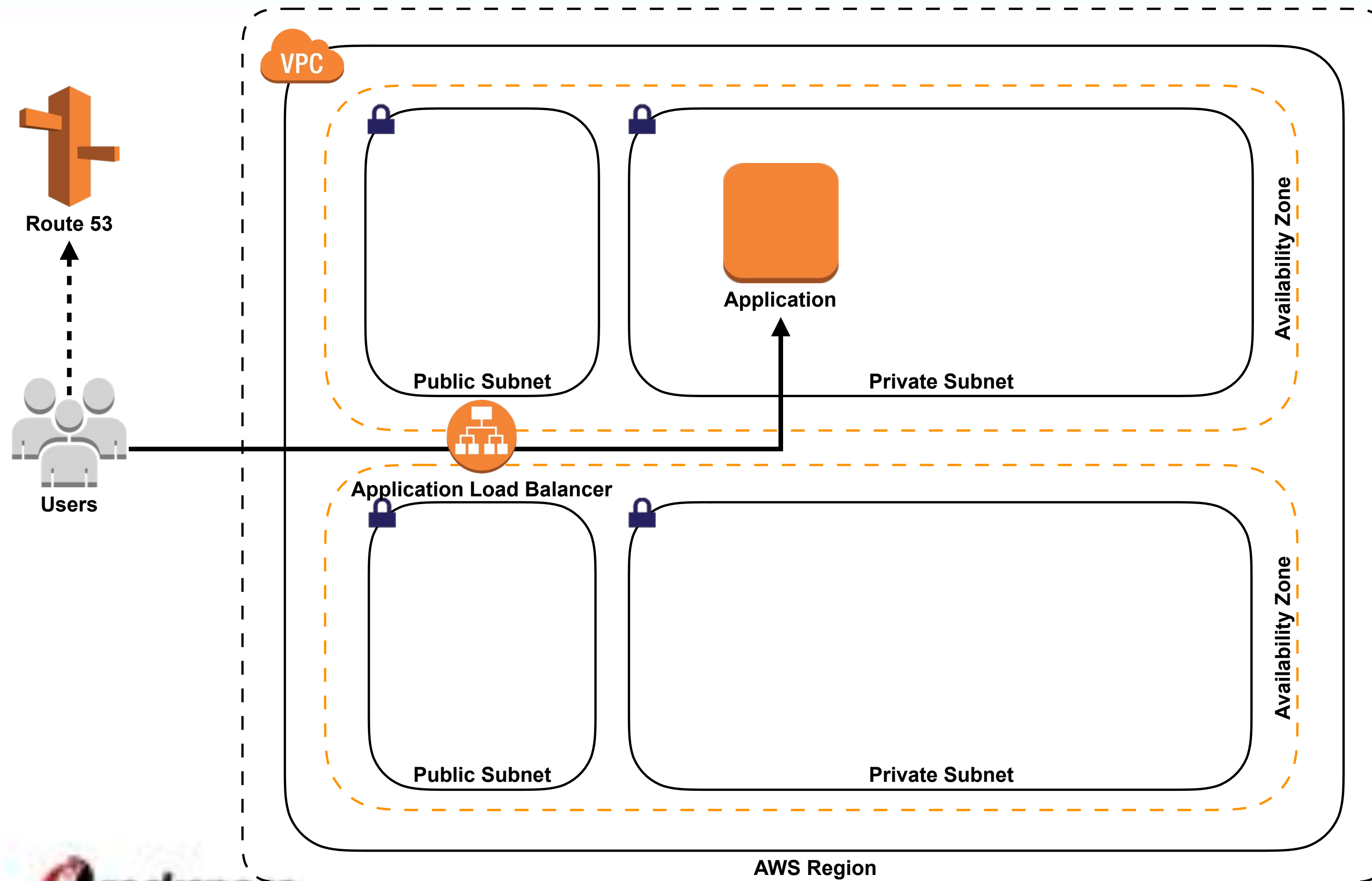
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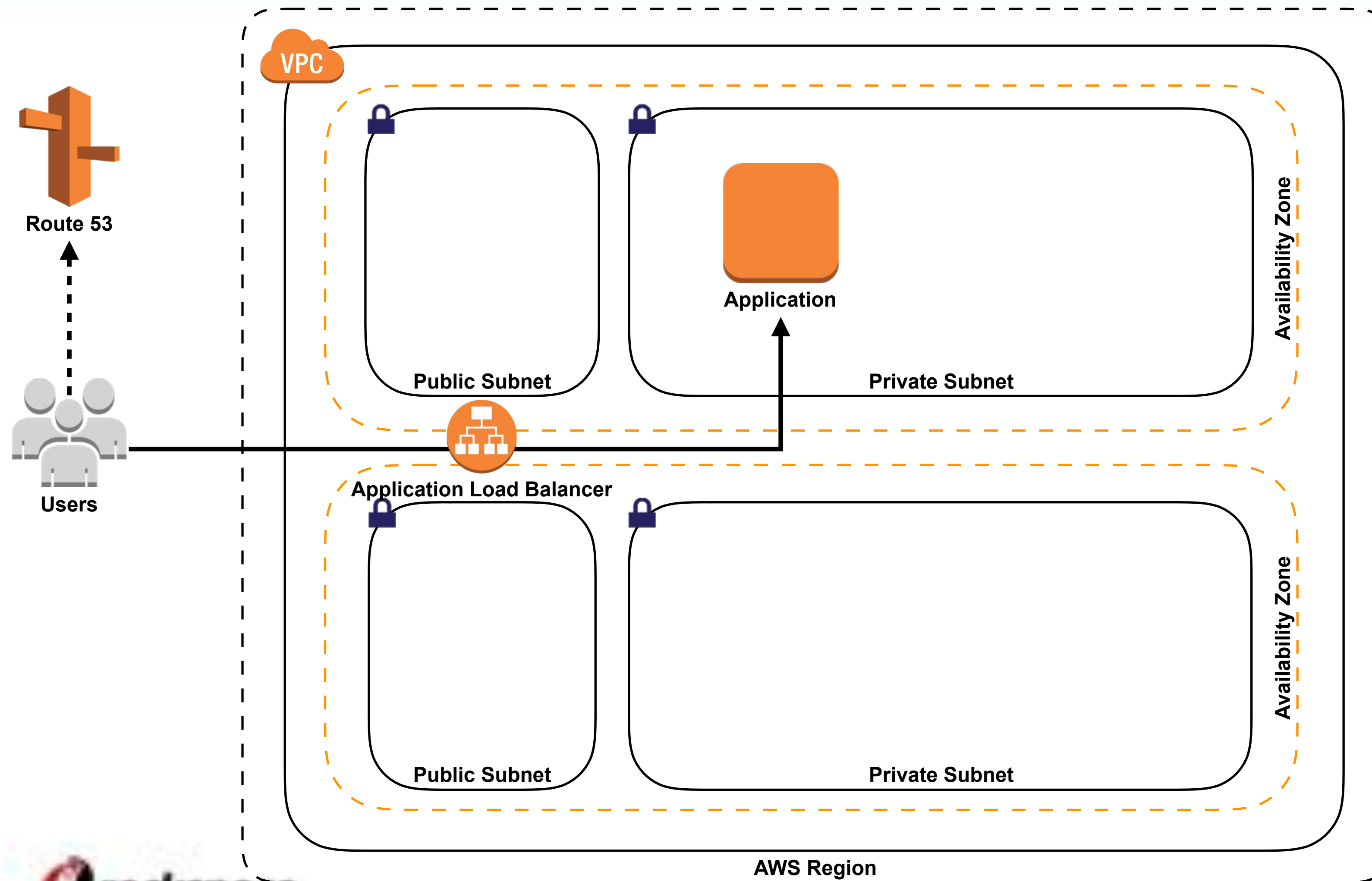
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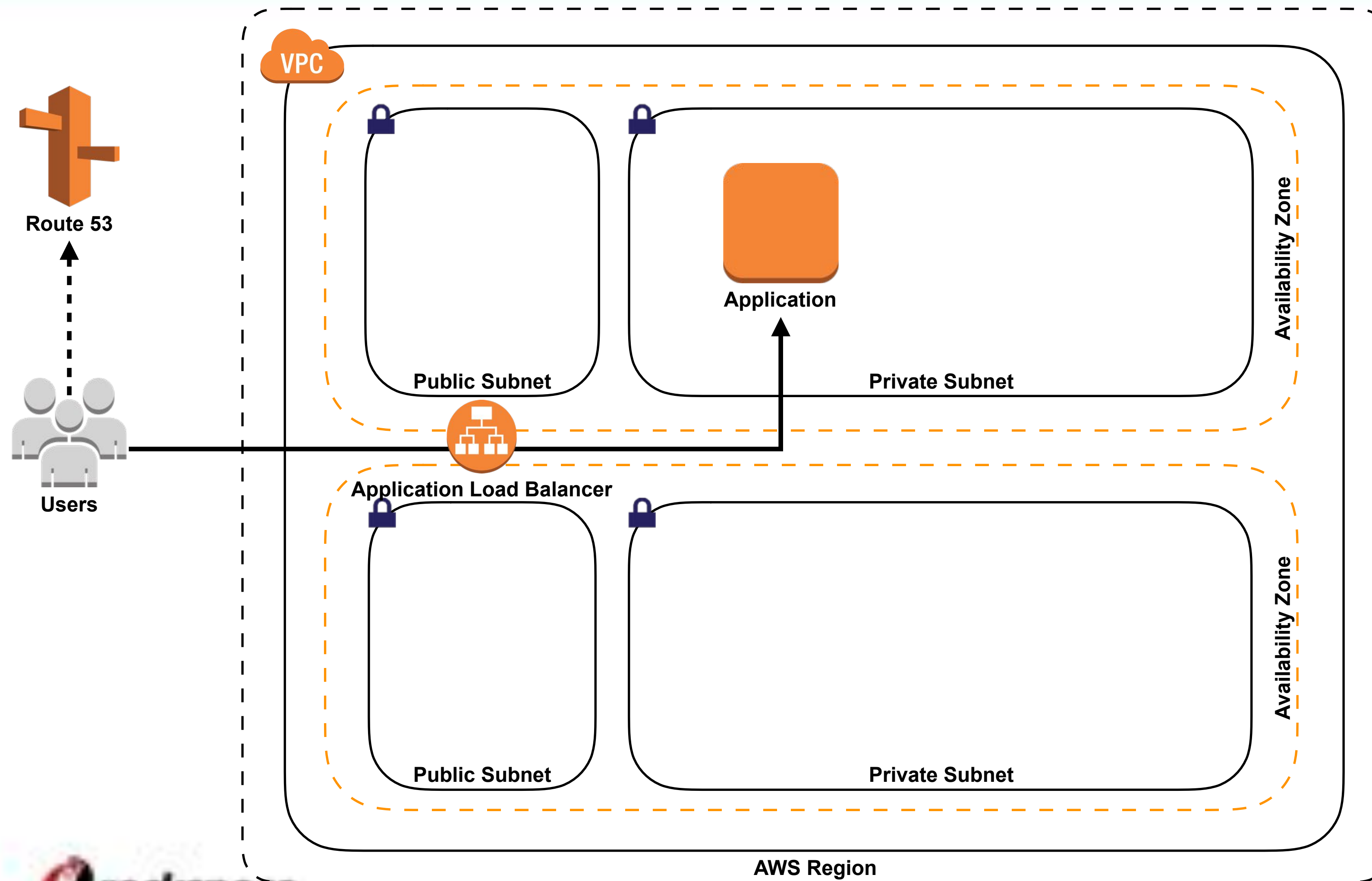
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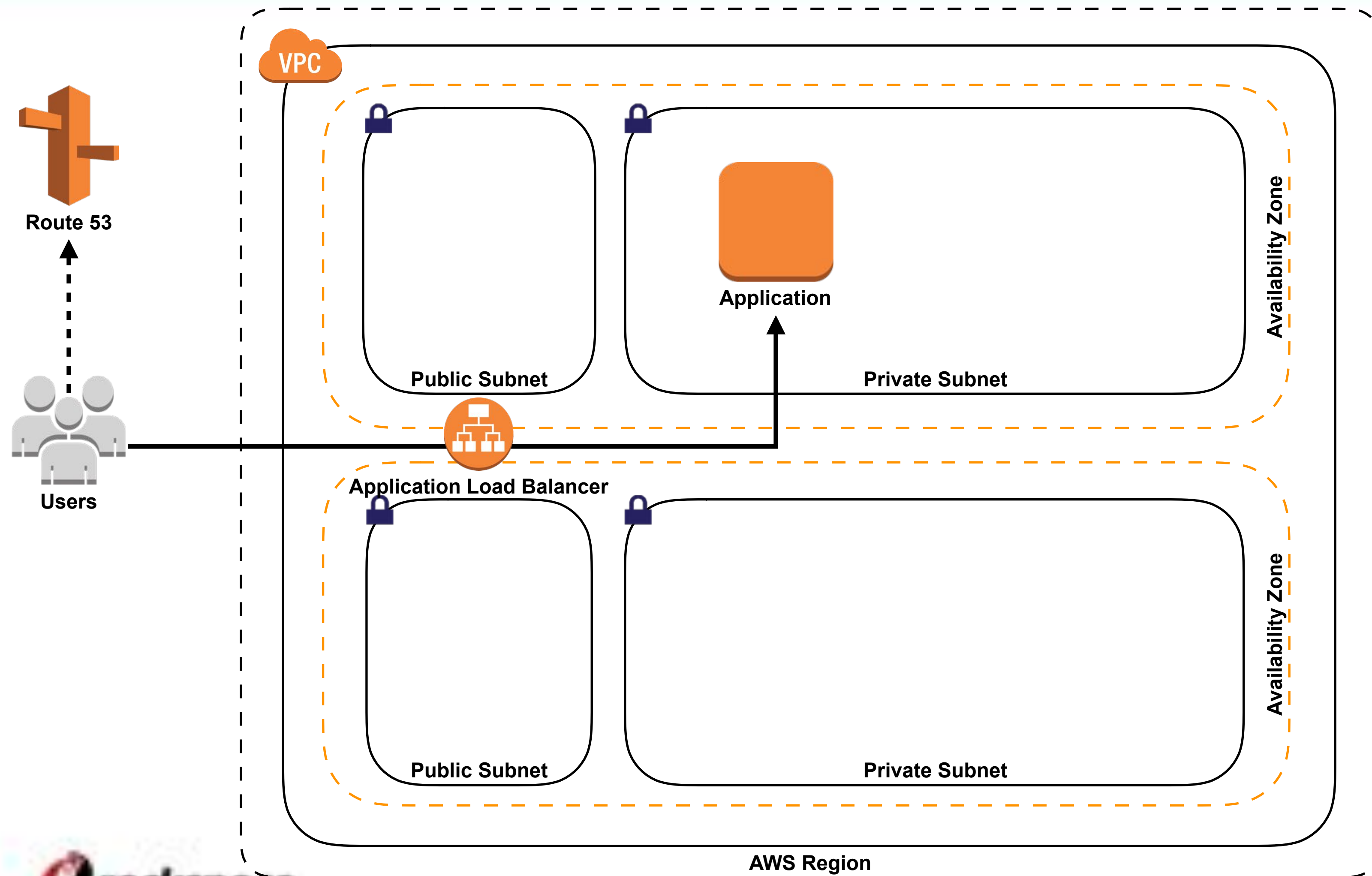
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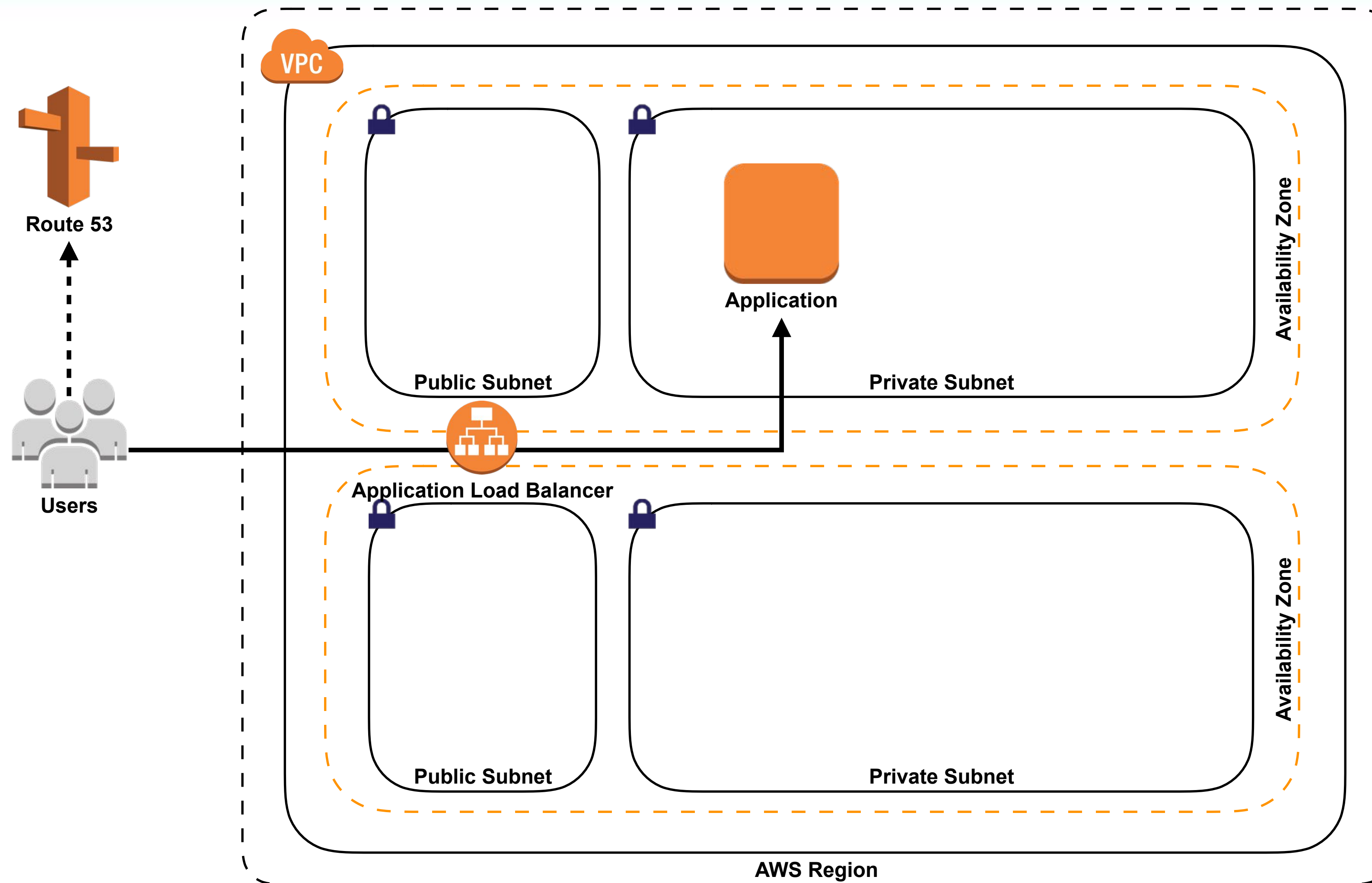
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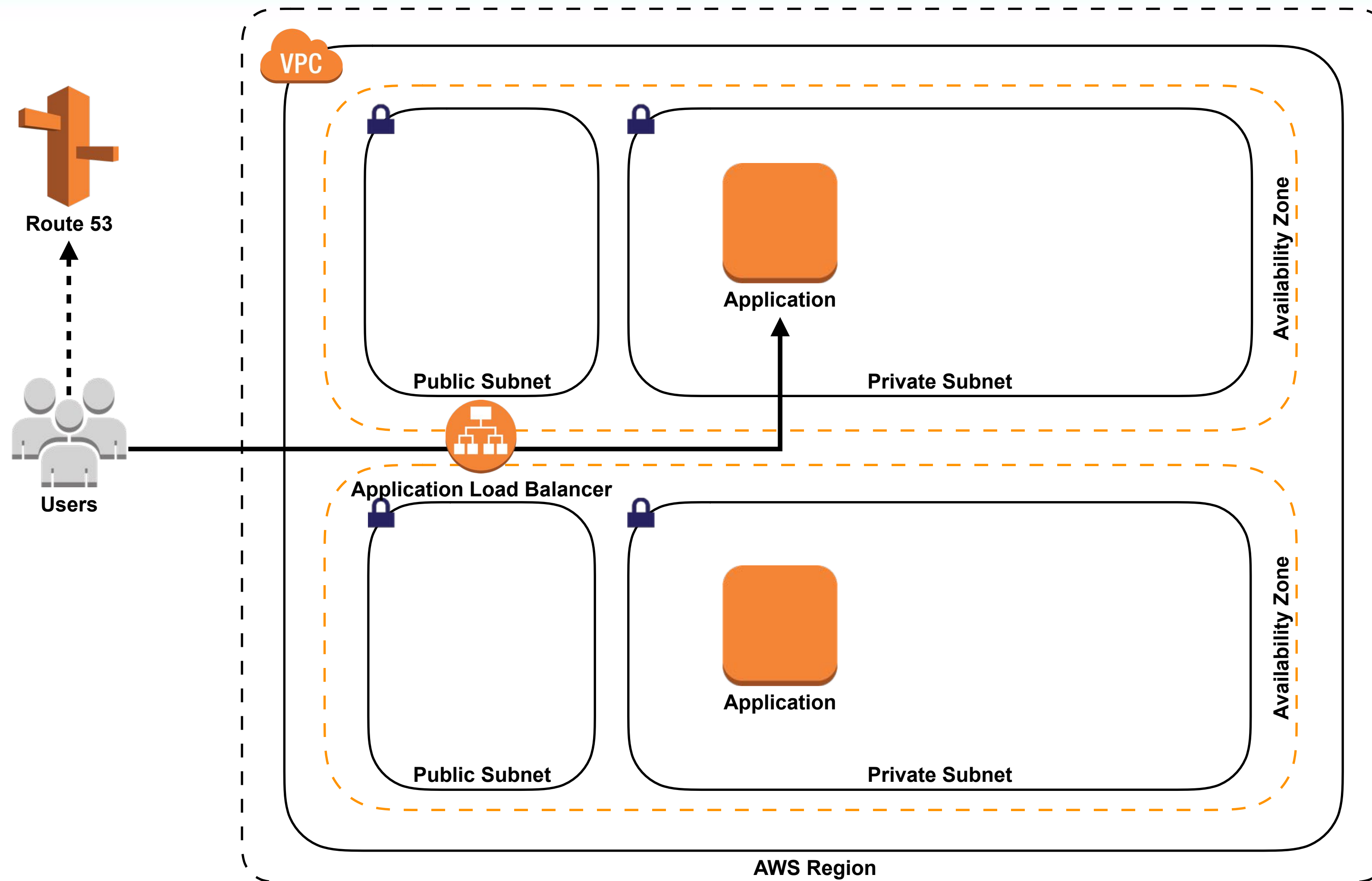


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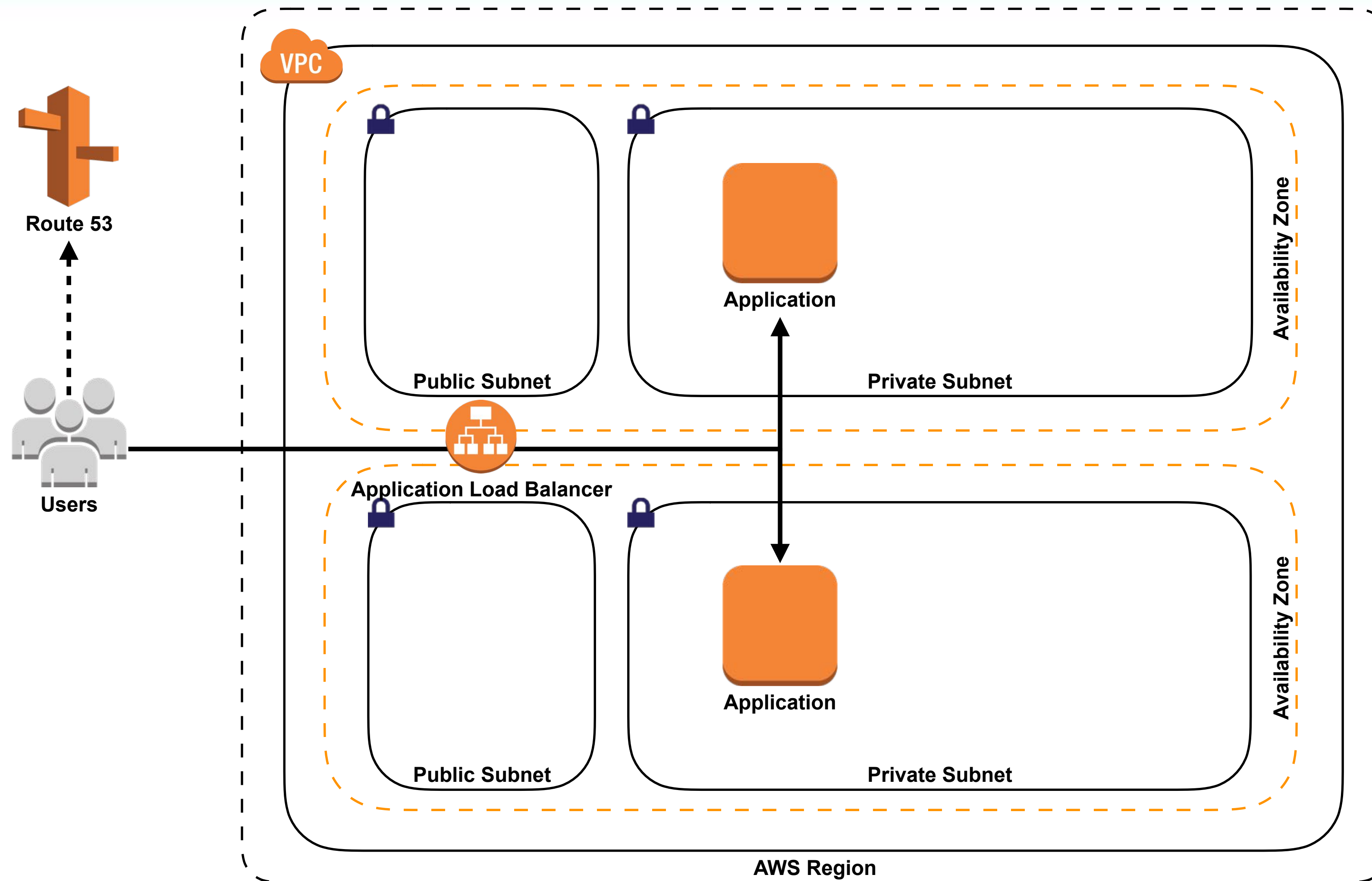
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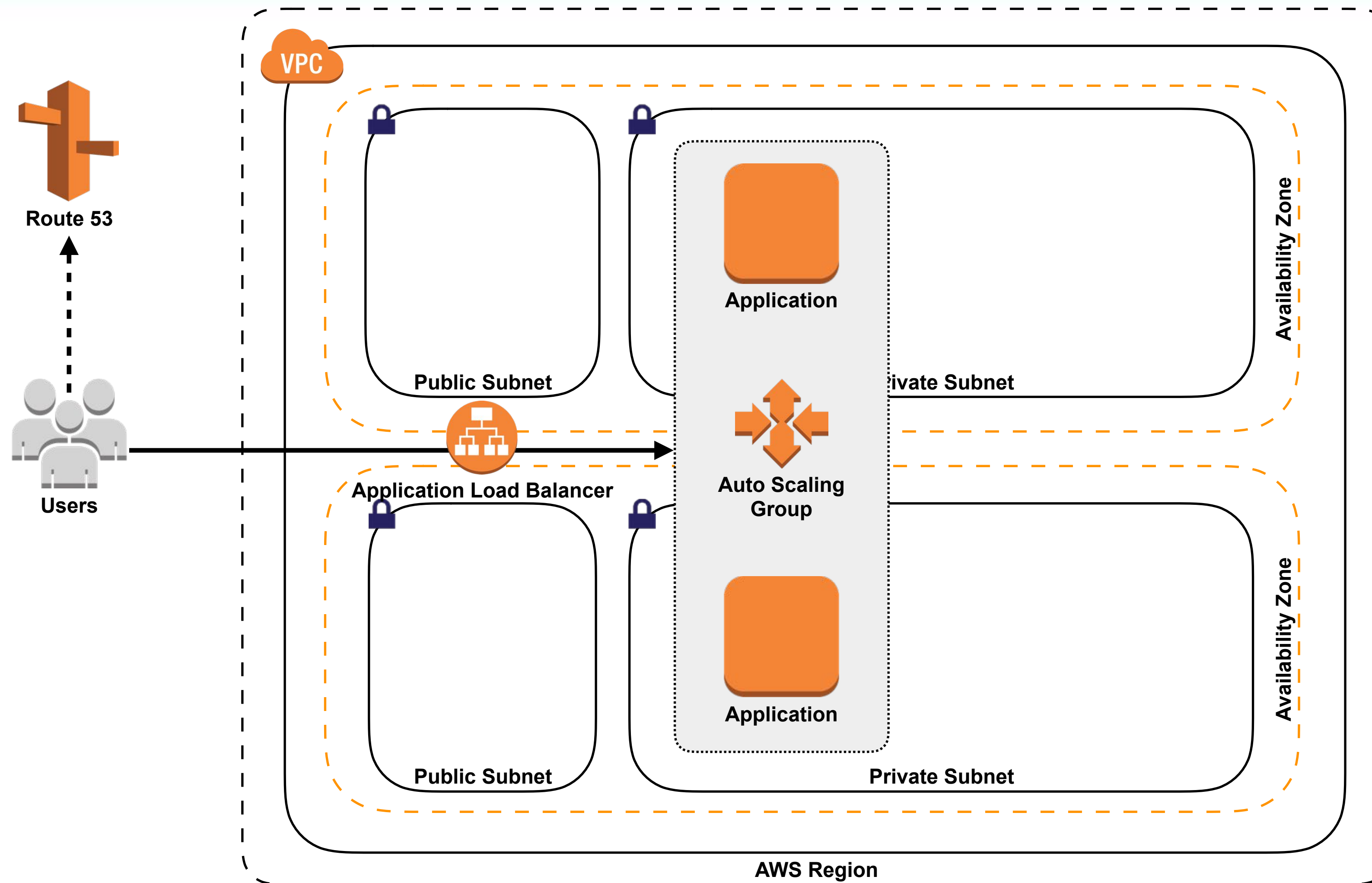
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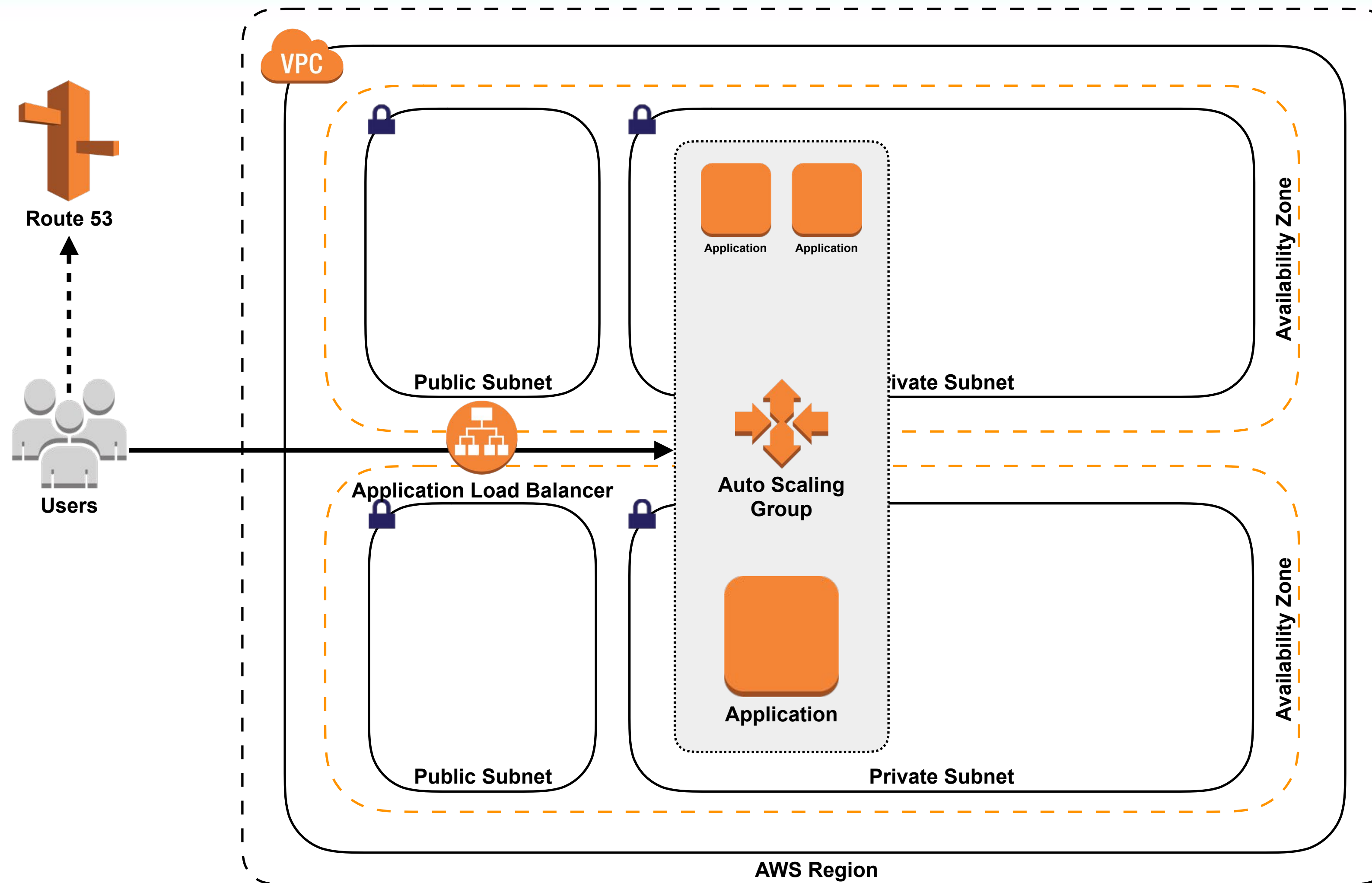
Auto Scaling Group (ASG)



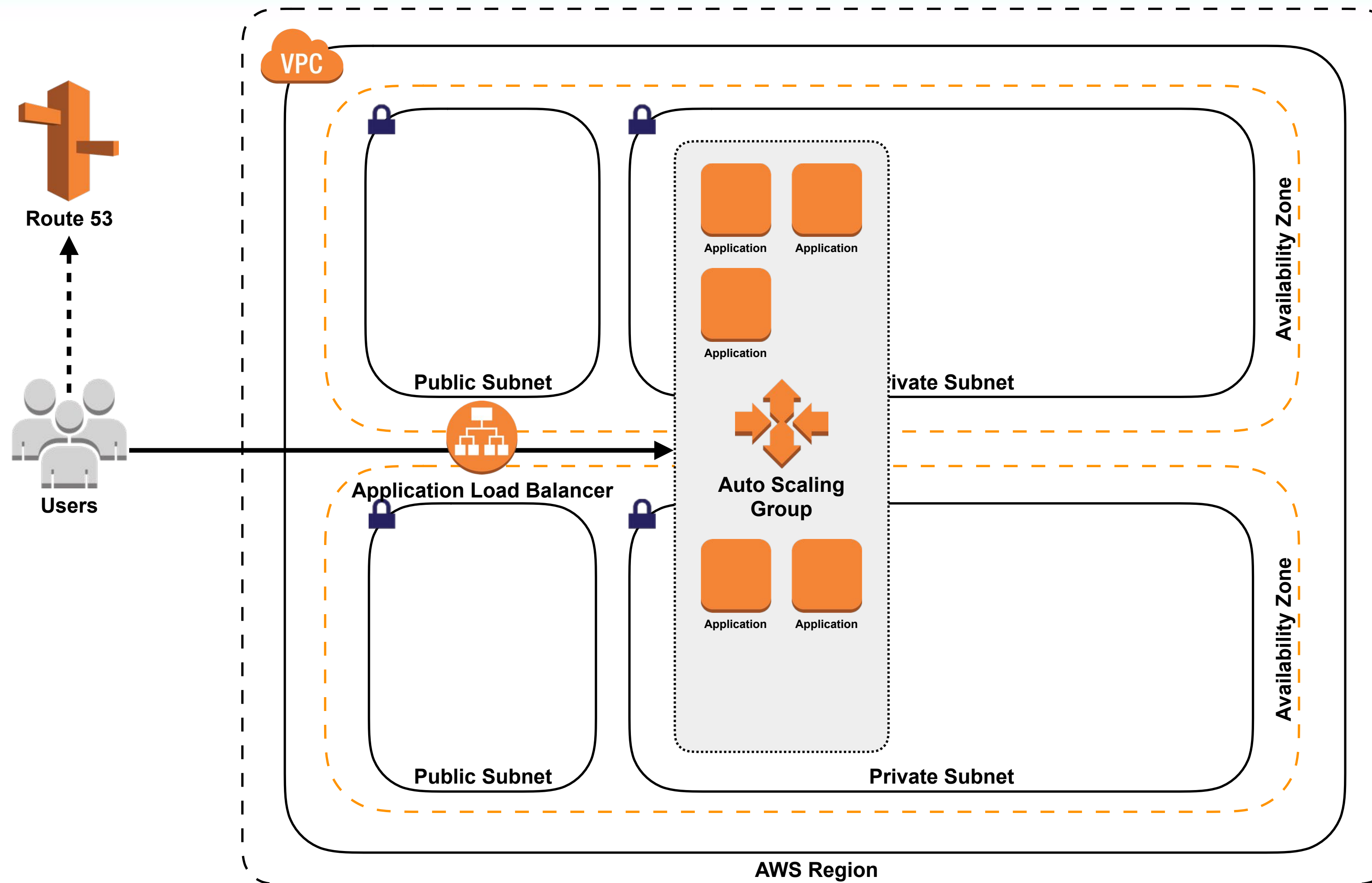
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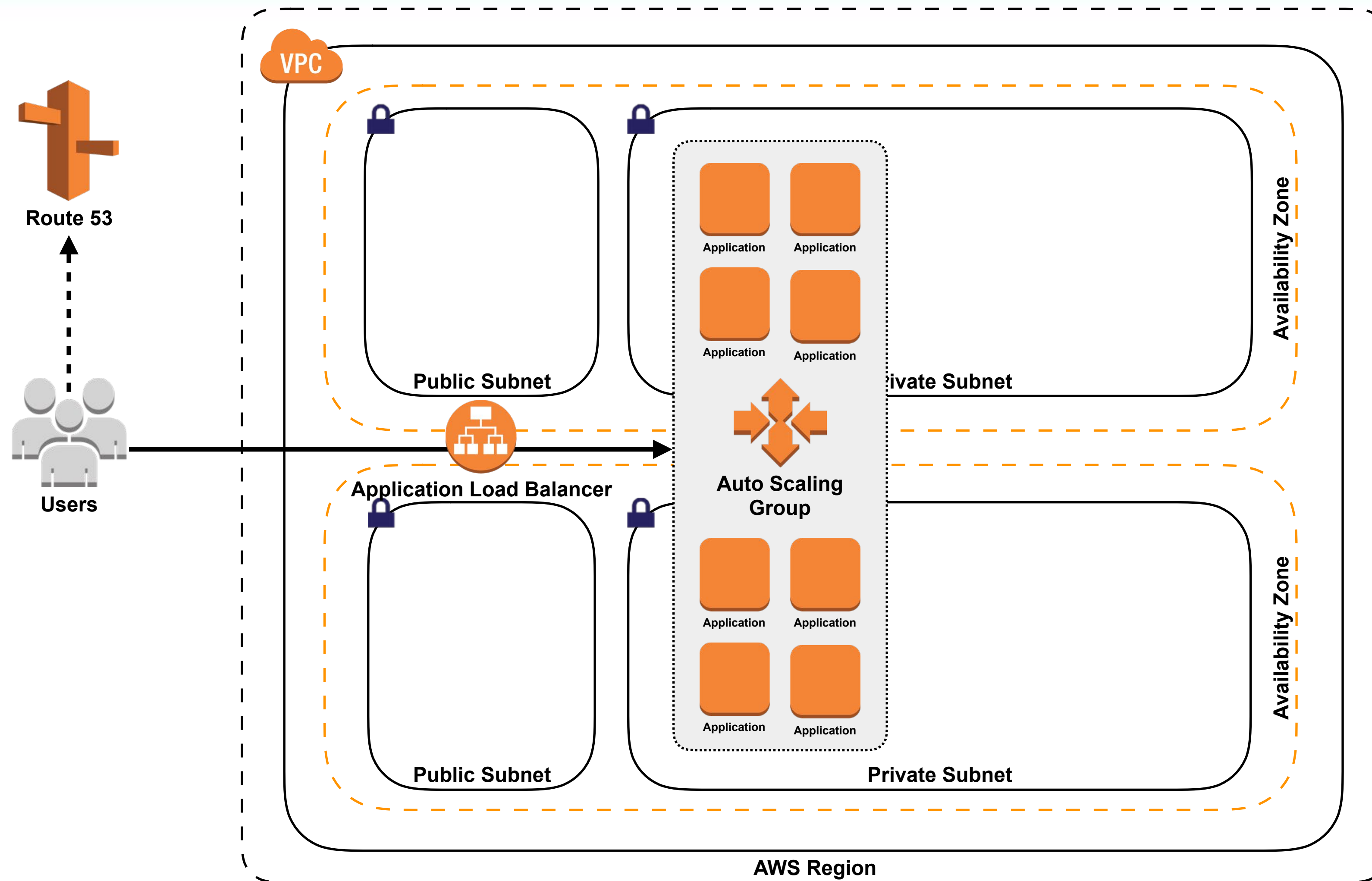
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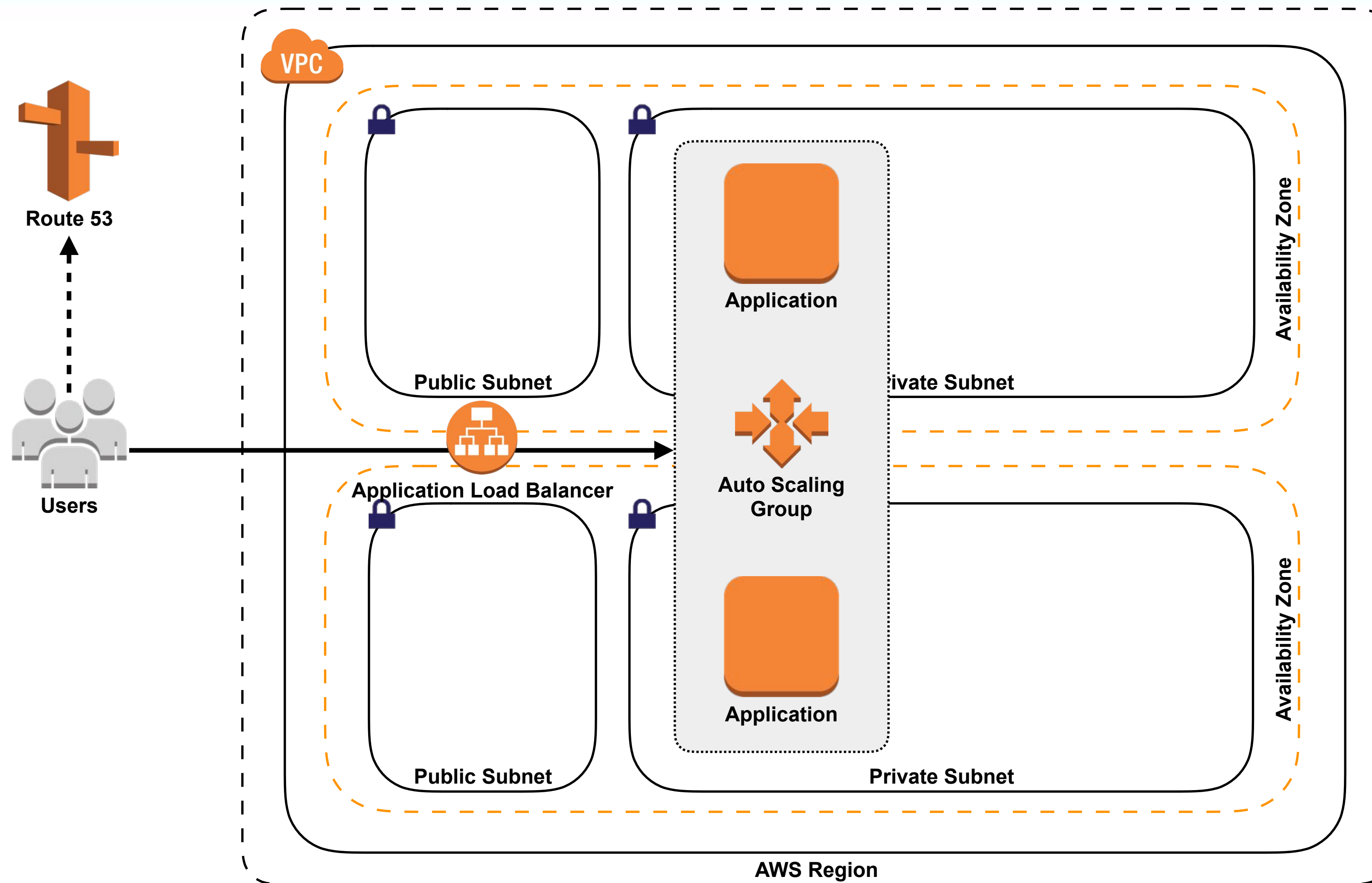
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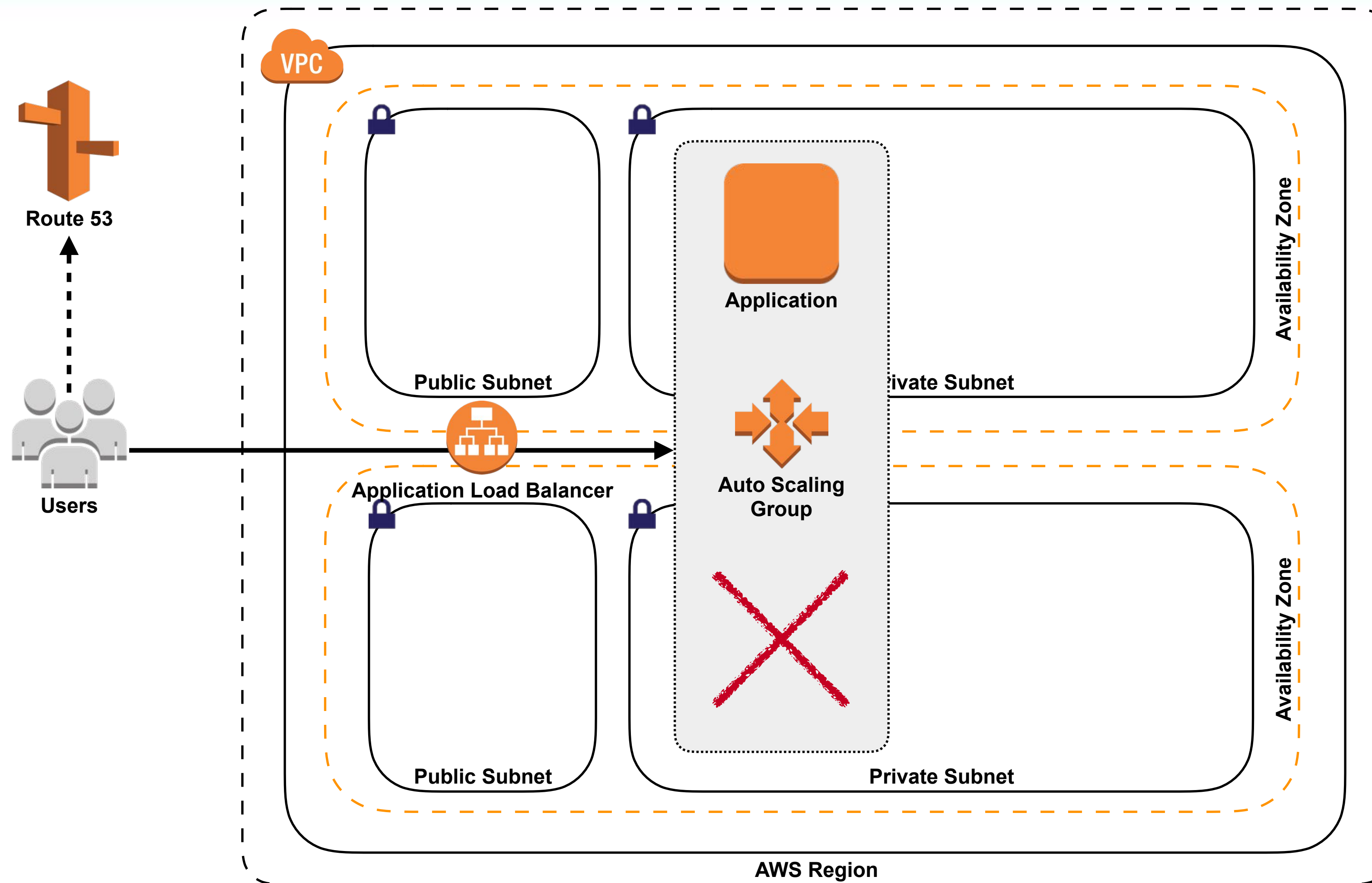
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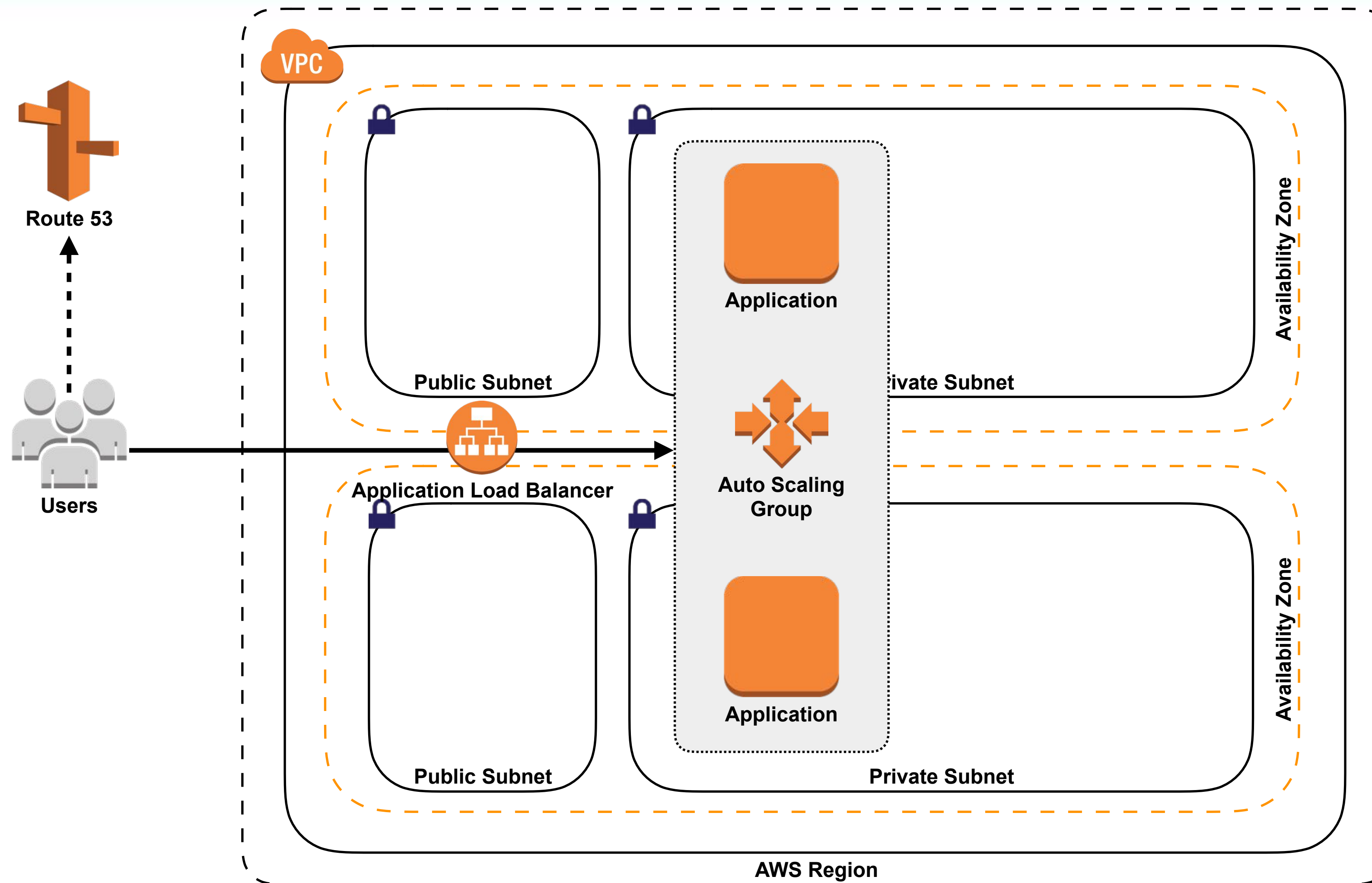
Auto Scaling Group (ASG)



Auto Scaling Group (ASG)



Auto Scaling Group (ASG)



Auto Scaling Group (ASG) - Scale out



CPU-AddCapacity

Policy type:	Step scaling
Execute policy when:	AddCapacity-CPU-Utilization breaches the alarm threshold: CPUUtilization $\geq$ 50 for 300 seconds for the metric dimensions AutoScalingGroupName = myapp-asg
Take the action:	Add 2 instances when $50 \leq \text{CPUUtilization} < 75$ Add 4 instances when $75 \leq \text{CPUUtilization} < +\text{infinity}$
Instances need:	300 seconds to warm up after each step

Auto Scaling Group (ASG) - Scale out



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Auto Scaling Group (ASG) - Scale in



CPU-RemoveCapacity

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Take the action: Remove 4 instances when $75 \geq \text{CPUUtilization} > 50$
Remove 2 instances when $50 \geq \text{CPUUtilization} > -\text{infinity}$

Auto Scaling Group (ASG) - Scale in



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Execute policy when:

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Auto Scaling Group (ASG) - Scale in



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Take the action

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Amazon CloudWatch



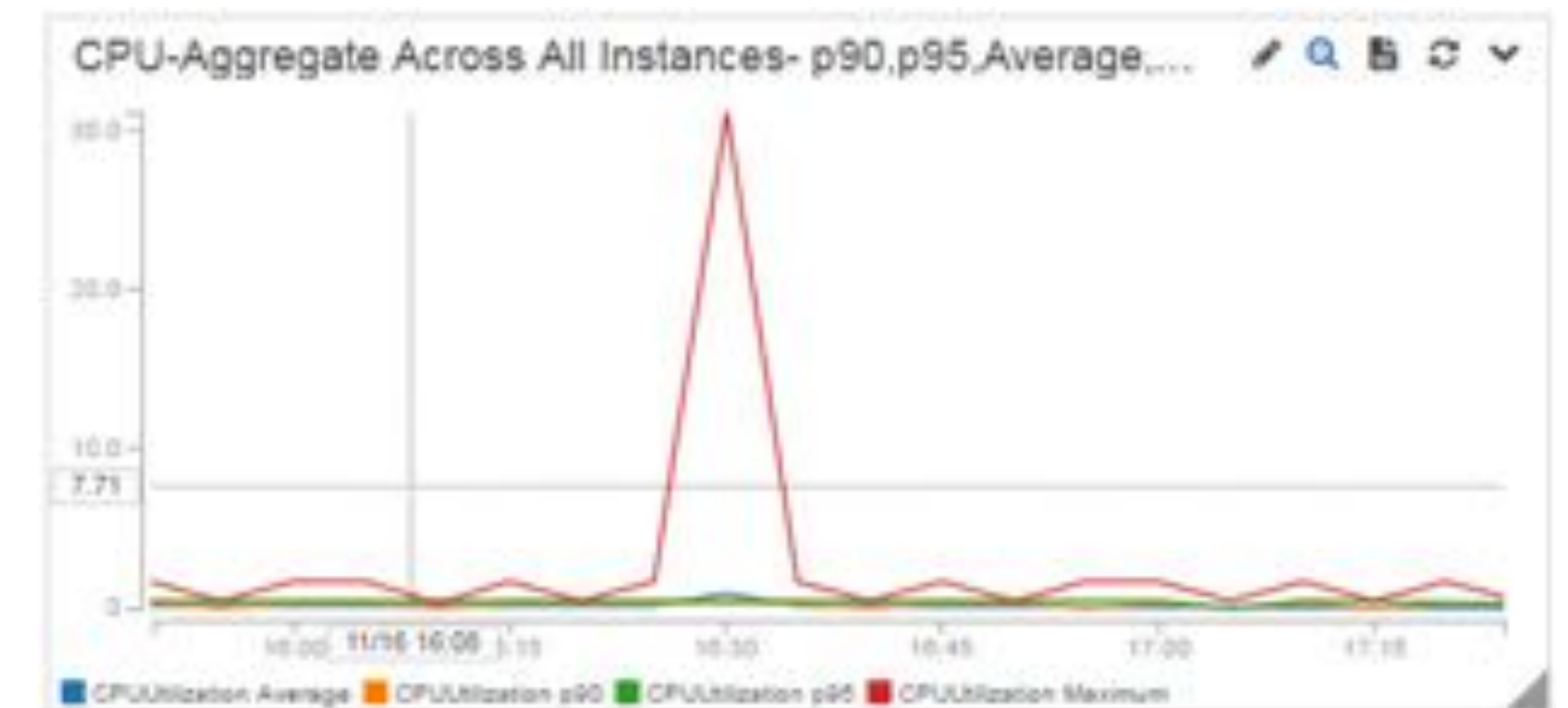
Amazon CloudWatch

- Monitoring service



Amazon CloudWatch

- Monitoring service
- Collect and display metrics



Amazon CloudWatch

- Monitoring service
- Collect and display metrics
- Alarms

Create Alarm

[1. Select Metric](#) [2. Define Alarm](#)

Alarm Threshold

Provide the details and threshold for your alarm. Use the graph on the right to help set the appropriate threshold.

Name:

Description:

Whenever: CPUUtilization

is:

for: 1 1 datapoints ⓘ

Additional settings

Provide additional configuration for your alarm.

Treat missing data as: ⓘ

Actions

Define what actions are taken when your alarm changes state.

Notification Delete

Whenever this alarm:

Send notification to: [New list](#) [Enter list](#) ⓘ

+ Notification

+ AutoScaling Action

+ EC2 Action

Amazon CloudWatch

- Monitoring service
- Collect and display metrics
- Alarms

Create Alarm

1. Select Metric 2. Define Alarm

Whenever: CPUUtilization

is:

for: 1 out of datapoints

for: 1 out of datapoints

Additional settings

Provide additional configuration for your alarm.

Notification Delete

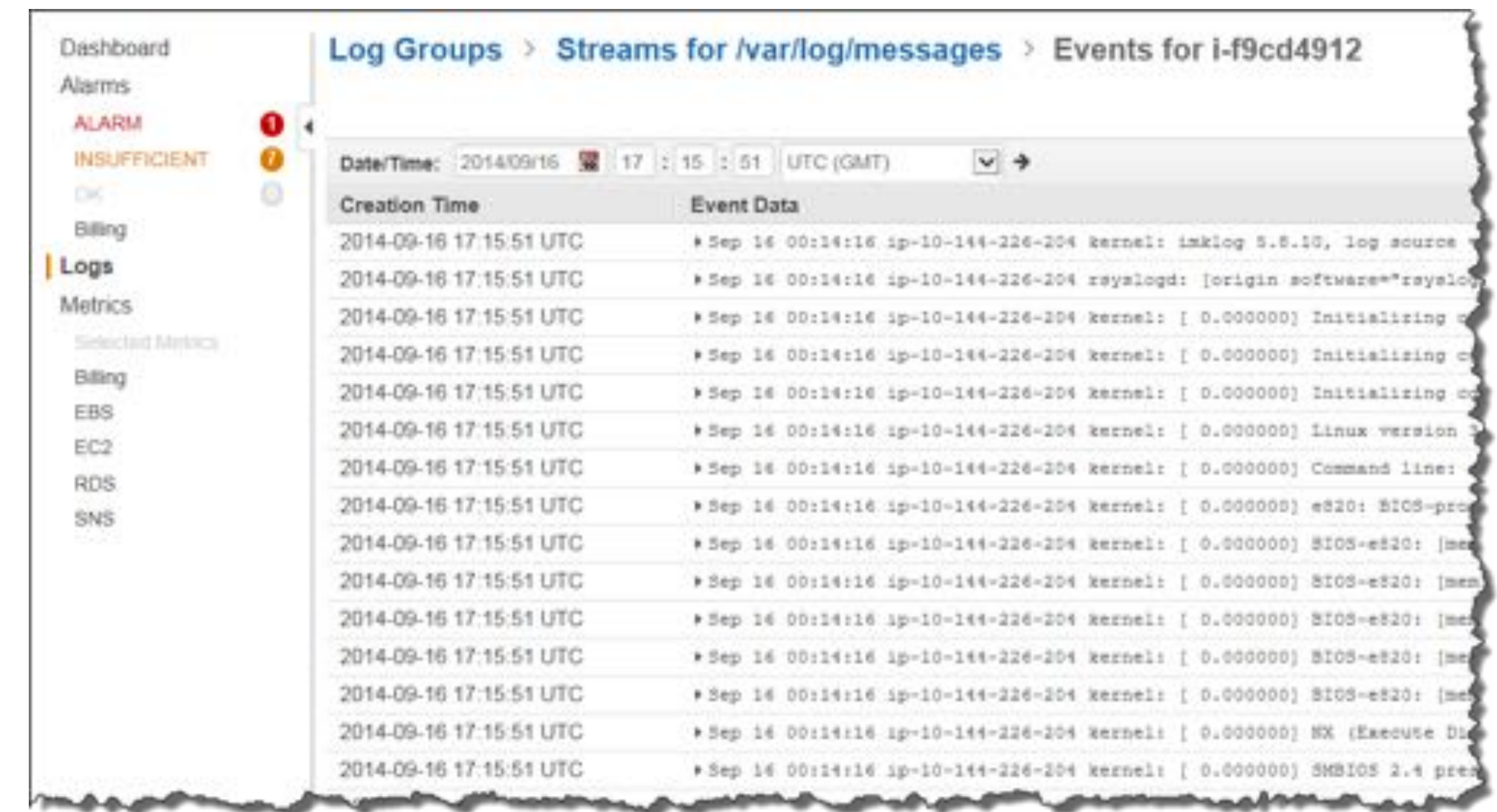
Whenever this alarm:

Send notification to: New list Enter list

+ Notification + AutoScaling Action + EC2 Action

Amazon CloudWatch

- Monitoring service
- Collect and display metrics
- Alarms
- Gather and store server logs with `awslogs` agent



The screenshot shows the Amazon CloudWatch console interface. On the left is a navigation menu with options: Dashboard, Alarms, Logs, Metrics, Billing, EBS, EC2, RDS, and SNS. The 'Logs' option is selected. The main panel displays 'Log Groups > Streams for /var/log/messages > Events for i-f9cd4912'. At the top of the main panel, there's a date/time filter set to '2014/09/16 17:15:51 UTC (GMT)'. Below this is a table with two columns: 'Creation Time' and 'Event Data'. The table contains 15 rows of log events, all with a creation time of '2014-09-16 17:15:51 UTC'. The event data includes kernel messages, syslog entries, and BIOS-related information.

Creation Time	Event Data
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: inklog 5.8.10, log source
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 rsyslogd: [origin software="rsyslog
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] Initializing c
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] Initializing c
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] Initializing c
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] Linux version 3
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] Command line:
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] e820: BIOS-pro
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] BIOS-e820: [me
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] BIOS-e820: [mem
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] BIOS-e820: [me
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] BIOS-e820: [me
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] BIOS-e820: [me
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] BIOS-e820: [me
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] NX (Execute Di
2014-09-16 17:15:51 UTC	▶ Sep 16 00:14:16 ip-10-144-226-204 kernel: [0.000000] SMBIOS 2.4 pre

Auto Scaling Group (ASG) - Target tracking



Maintain-CPU-at-40

Policy type:	Target Tracking scaling
Execute policy when:	As required to maintain Average CPU Utilization at 40
Take the action:	Add or remove instances as required
Instances need:	300 seconds to warm up after scaling
Disable scale-in:	No

Auto Scaling Group (ASG) - Target tracking



Maintain-CPU-at-40

Policy type:	Target Tracking scaling
Execute policy when:	maintain Average CPU Utilization at 40
Take the action:	Add or remove instances as required
Instances need:	300 seconds to warm up after scaling
Disable scale-in:	No

Auto Scaling Group (ASG) - Scheduling



Name	WeekendTraffic		
Auto Scaling Group	myapp-asg		
Provide at least one of Min, Max and Desired Capacity			
Min	8		
Max	16		
Desired Capacity			
Recurrence	Every week ▾ (Cron) 0 12 * * Fri		
Start Time	2018-02-09	12 : 00	UTC Specify the start time in UTC The first time this scheduled action will run
End Time	2018-02-12	06 : 00	UTC Specify the end time in UTC Cancel

Auto Scaling Group (ASG) - Scheduling



Name

Auto Scaling Group

Provide at least one of Min. Max and Desired Capacity

Min

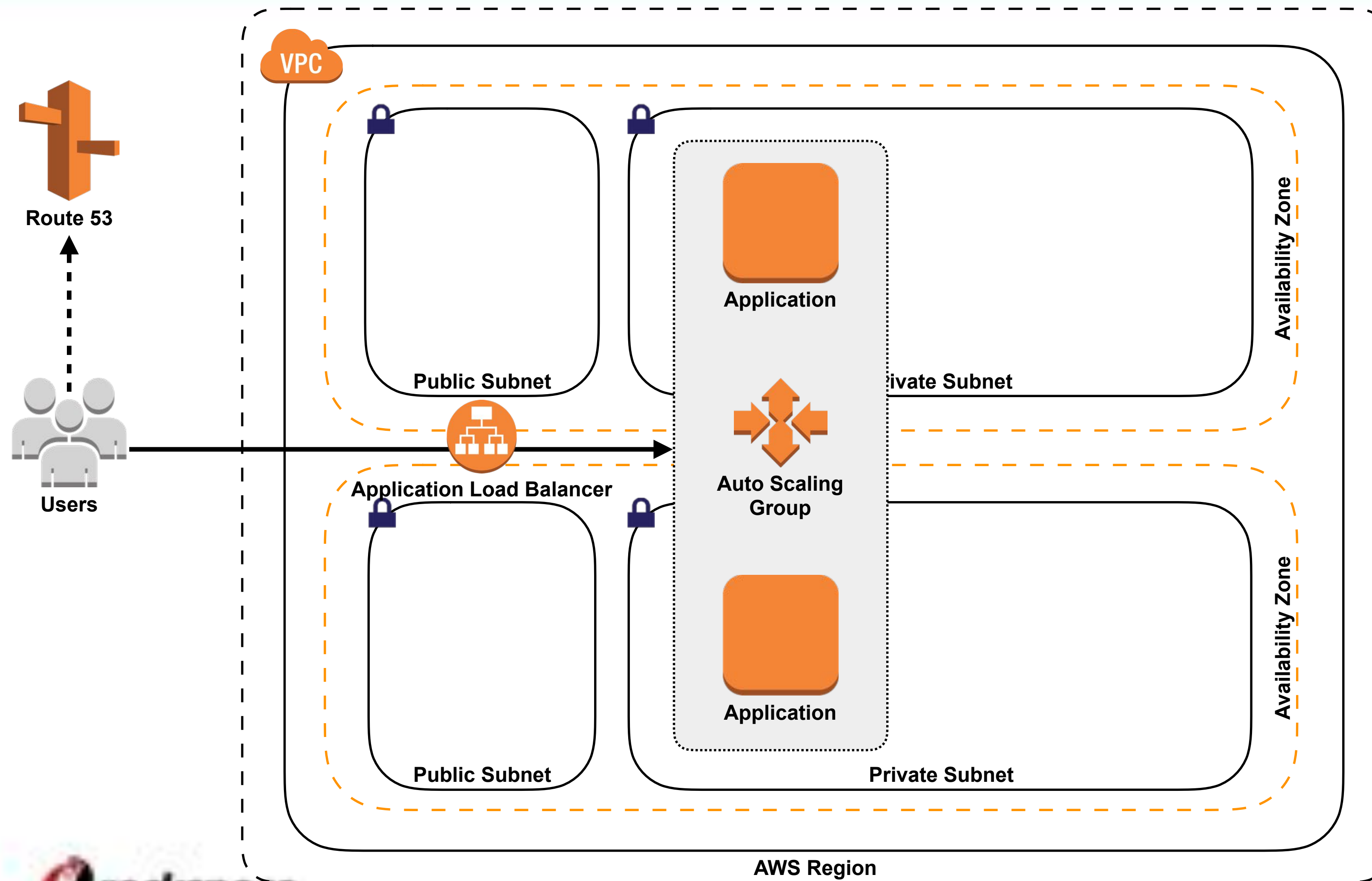
Recurrence 
(Cron) 0 12 * * Fri

Start Time **UTC**
The first time this scheduled action

End Time **UTC**

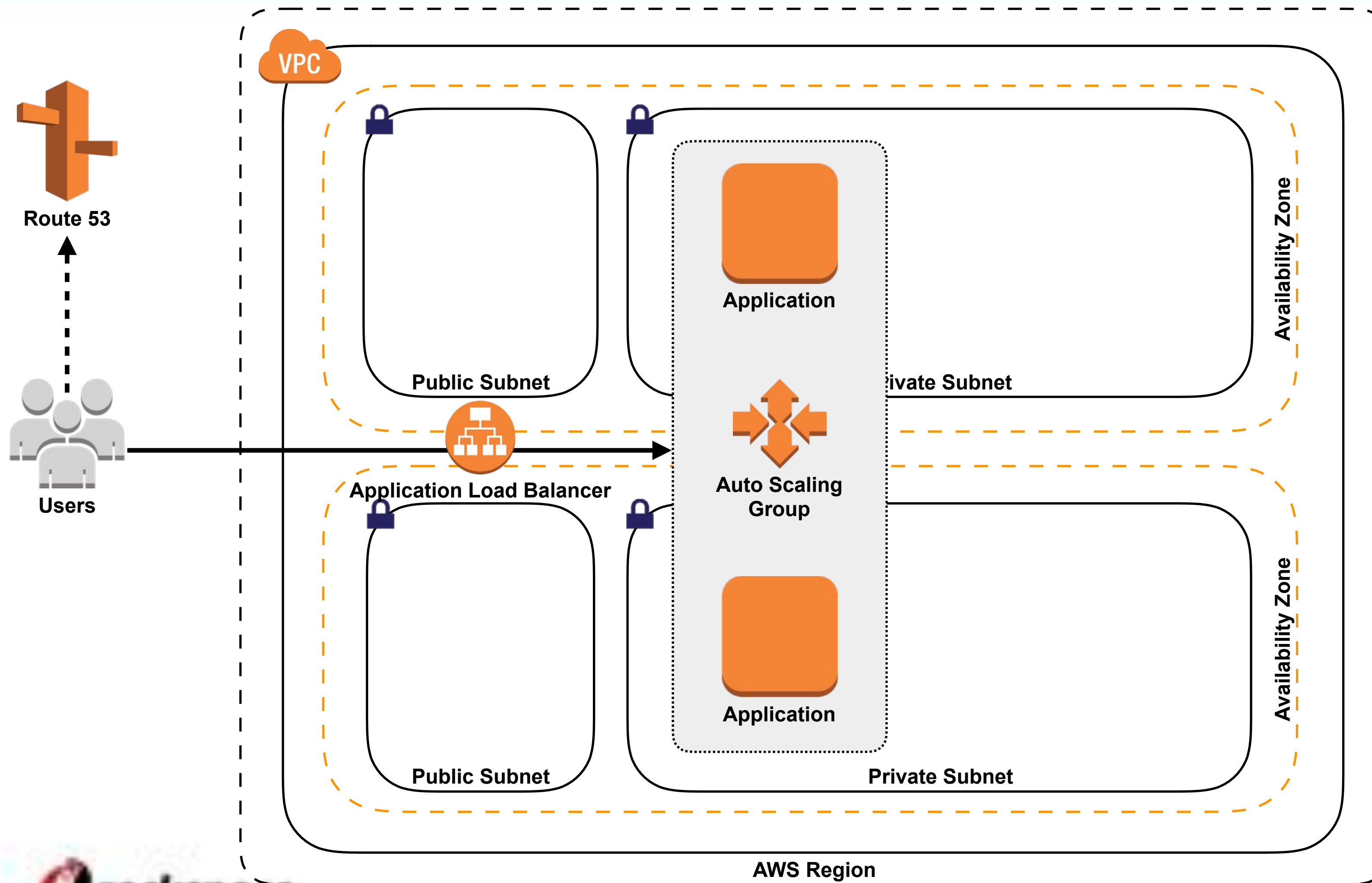
[Cancel](#)

Auto Scaling Group (ASG)



- ❑ Highly-available
- ❑ Fault-tolerant
- ❑ Secure
- ❑ Scalable

Auto Scaling Group (ASG)



- ✓ Highly-available
- ✓ Fault-tolerant
- ✓ Secure
- ✓ Scalable

Relational Database Service (RDS)



Relational Database Service (RDS)

- RDBMS as a service



Relational Database Service (RDS)

- RDBMS as a service
- Automated setup and patching

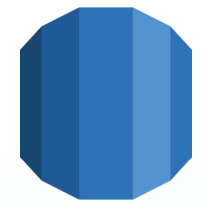


Relational Database Service (RDS)

- RDBMS as a service
- Automated setup and patching
- Managed backups



Managed backups



RDS > Snapshots

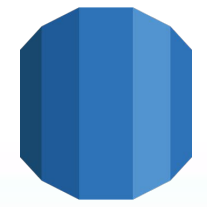
Snapshots (1)

Owned by Me Snapshot Actions Create snapshot

Filter snapshots

☐	Snapshot	DB Instance or Cluster	Snapshot Creation Time	Status	Type	Engine
☐	rds:mytestdb-2017-12-31-00-37	mytestdb	Mon Dec 31 19:38:55 GMT-500 2017	available	automated	MySQL
☐	rds:mytestdb-2018-01-01-00-37	mytestdb	Tue Jan 01 19:38:55 GMT-500 2018	available	automated	MySQL
☐	rds:mytestdb-2018-01-02-00-37	mytestdb	Wed Jan 02 19:38:55 GMT-500 2018	available	automated	MySQL
☐	rds:mytestdb-2018-01-03-00-37	mytestdb	Thu Jan 03 19:38:55 GMT-500 2018	available	automated	MySQL
☐	rds:mytestdb-2018-01-04-00-37	mytestdb	Fri Jan 04 19:38:55 GMT-500 2018	available	automated	MySQL
☐	rds:mytestdb-2018-01-05-00-37	mytestdb	Sat Jan 05 19:38:55 GMT-500 2018	available	automated	MySQL
☐	rds:mytestdb-2018-01-06-00-37	mytestdb	Sun Jan 06 19:38:55 GMT-500 2018	available	automated	MySQL

Managed backups



RDS > Snapshots

Snapshots (1)

Filter snapshots

Snapshot	DB Instance
rds:mytestdb-2017-12-31-00-37	mytestdb
rds:mytestdb-2018-01-01-00-37	mytestdb
rds:mytestdb-2018-01-02-00-37	mytestdb
rds:mytestdb-2018-01-03-00-37	mytestdb
rds:mytestdb-2018-01-04-00-37	mytestdb
rds:mytestdb-2018-01-05-00-37	mytestdb
rds:mytestdb-2018-01-06-00-37	mytestdb

Snapshot Creation Time

- Mon Dec 31 19:38:55 GMT-500 2017
- Tue Jan 01 19:38:55 GMT-500 2018
- Wed Jan 02 19:38:55 GMT-500 2018
- Thu Jan 03 19:38:55 GMT-500 2018
- Fri Jan 04 19:38:55 GMT-500 2018
- Sat Jan 05 19:38:55 GMT-500 2018
- Sun Jan 06 19:38:55 GMT-500 2018

Snapshot Actions

Create snapshot

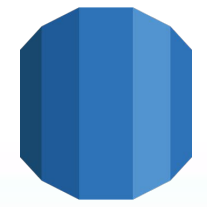
	Type	Engine
Table	automated	MySQL
Table	automated	MySQL
Table	automated	MySQL
Table	automated	MySQL
Table	automated	MySQL
Table	automated	MySQL
Table	automated	MySQL

Relational Database Service (RDS)

- RDBMS as a service
- Automated setup and patching
- Managed backups
- Point-in-time snapshots



Point-in-time snapshots



RDS > Instances > mytestdb > Restore to point in time

Launch DB Instance

You are creating a new DB instance from a source DB instance at a specified time. This new DB instance will have the default DB security group and DB parameter groups.
This feature is currently supported for InnoDB storage engine only. If you are using MyISAM, refer to details [here](#).

Restore time

Point in time to restore from

☐ Latest restorable time
January 6, 2018 at 12:18:32 PM UTC-5

☒ Custom
Specify a custom date and time to restore from

Custom Date Custom Time

MMMM d, y 00 ▼ : 00 ▼ : 00 ▼ UTC-5



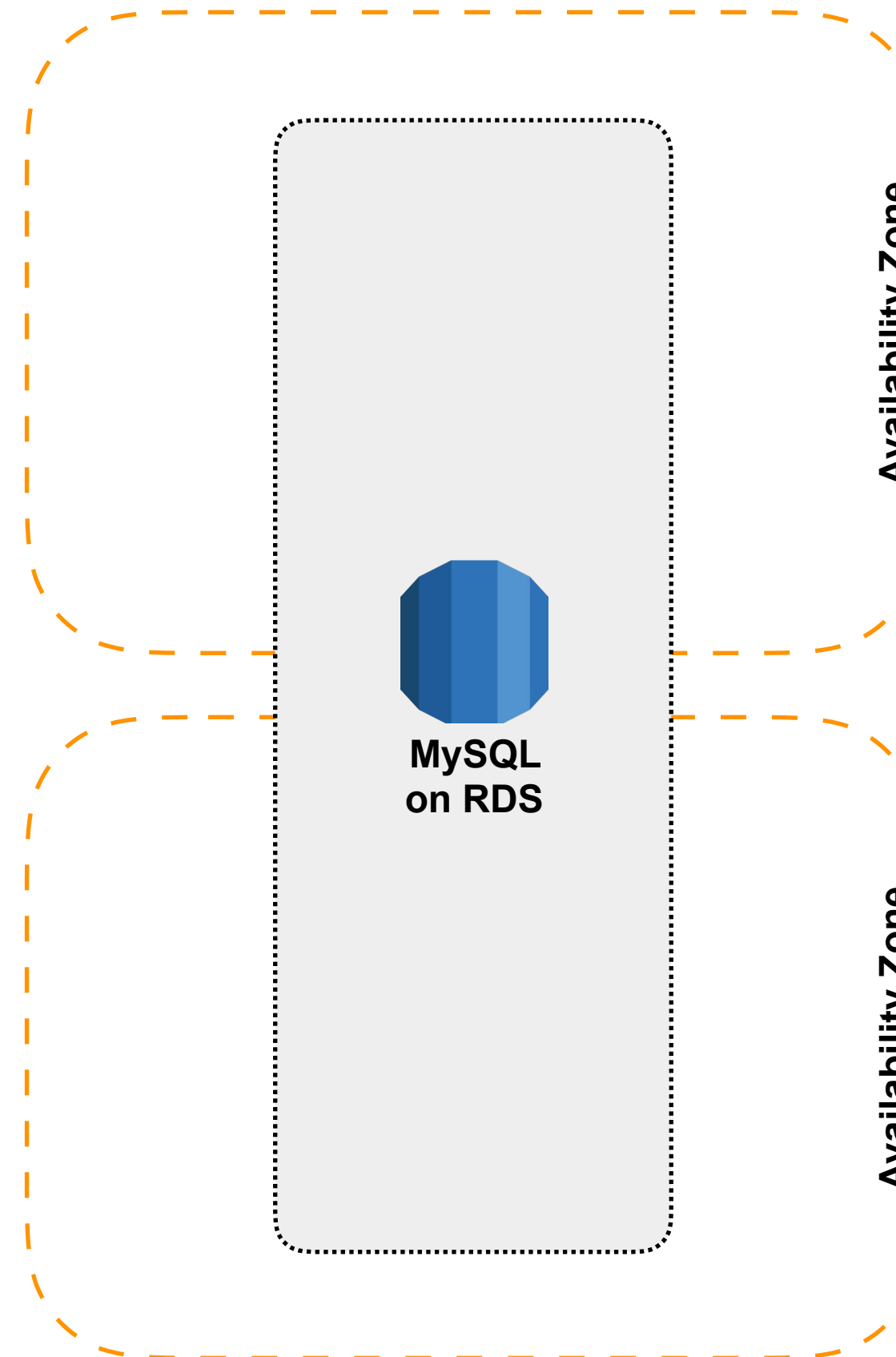
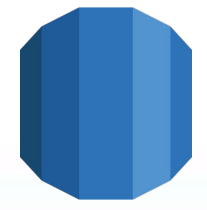
the #1 managed cloud company

Relational Database Service (RDS)

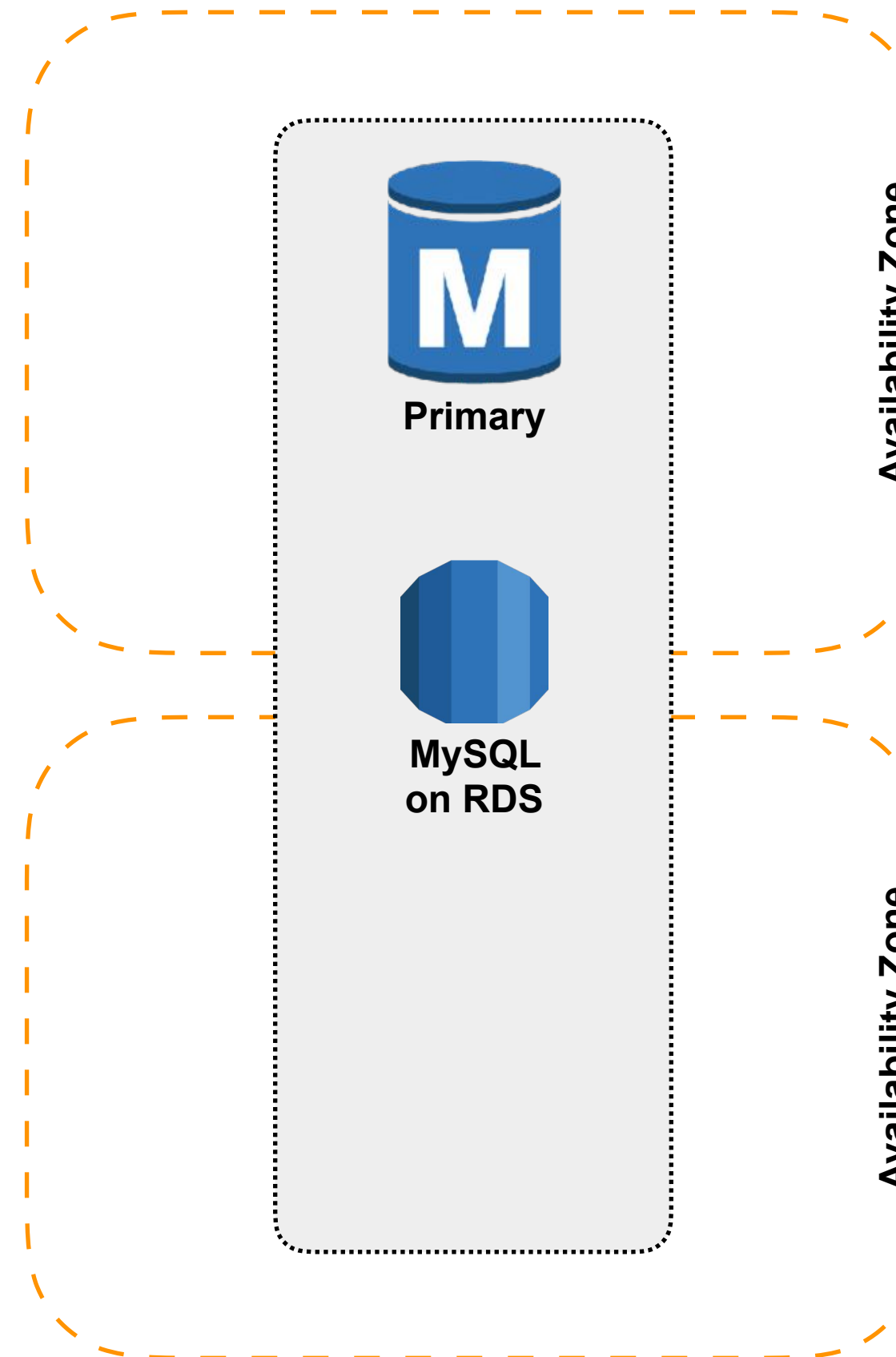
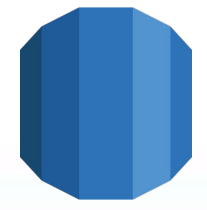
- RDBMS as a service
- Automated setup and patching
- Managed backups
- Point-in-time snapshots
- Zero downtime scaling and fast recovery from outages



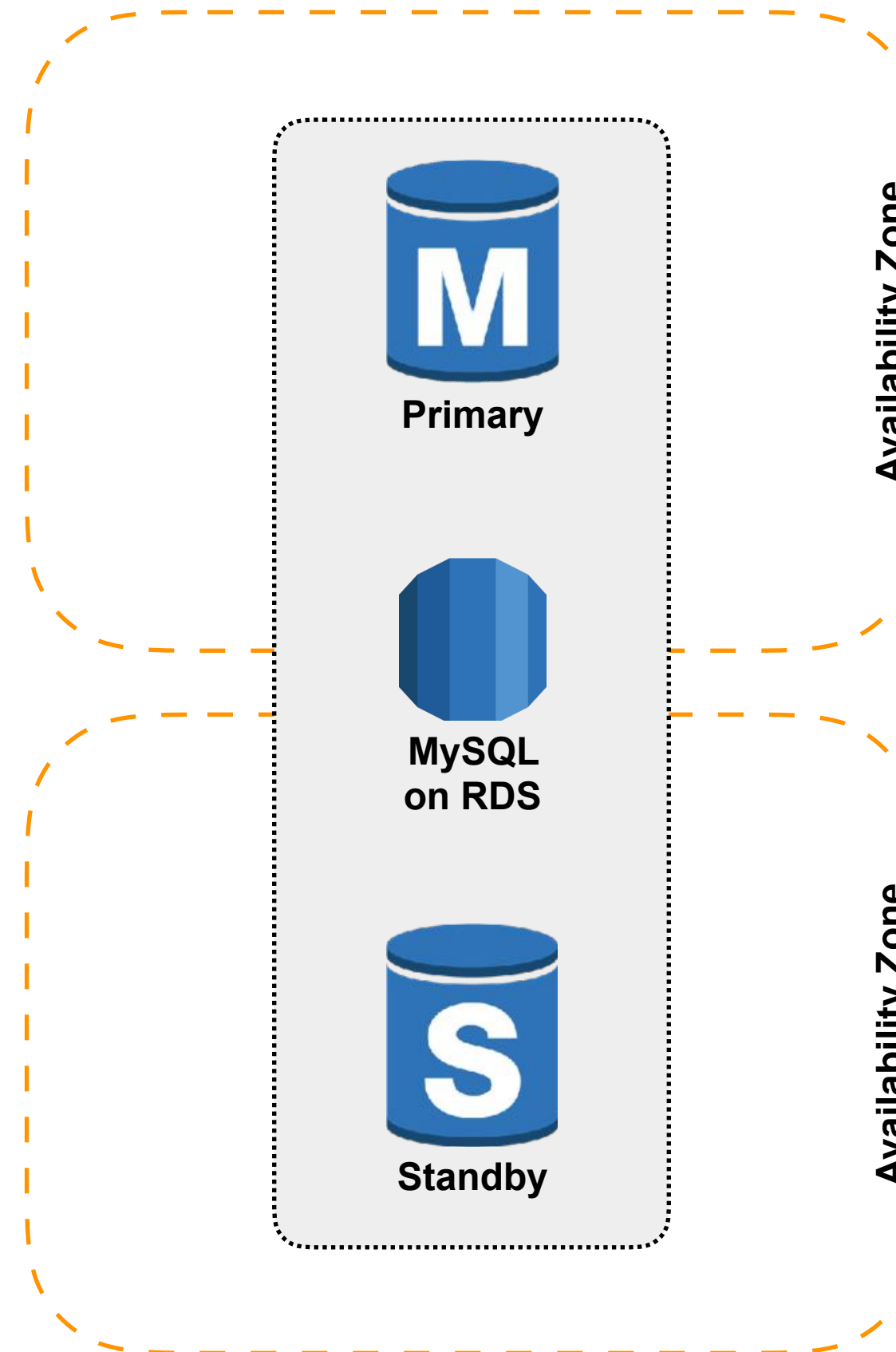
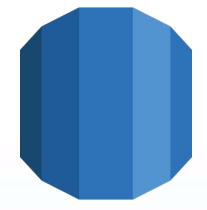
Zero downtime scaling and fast recovery



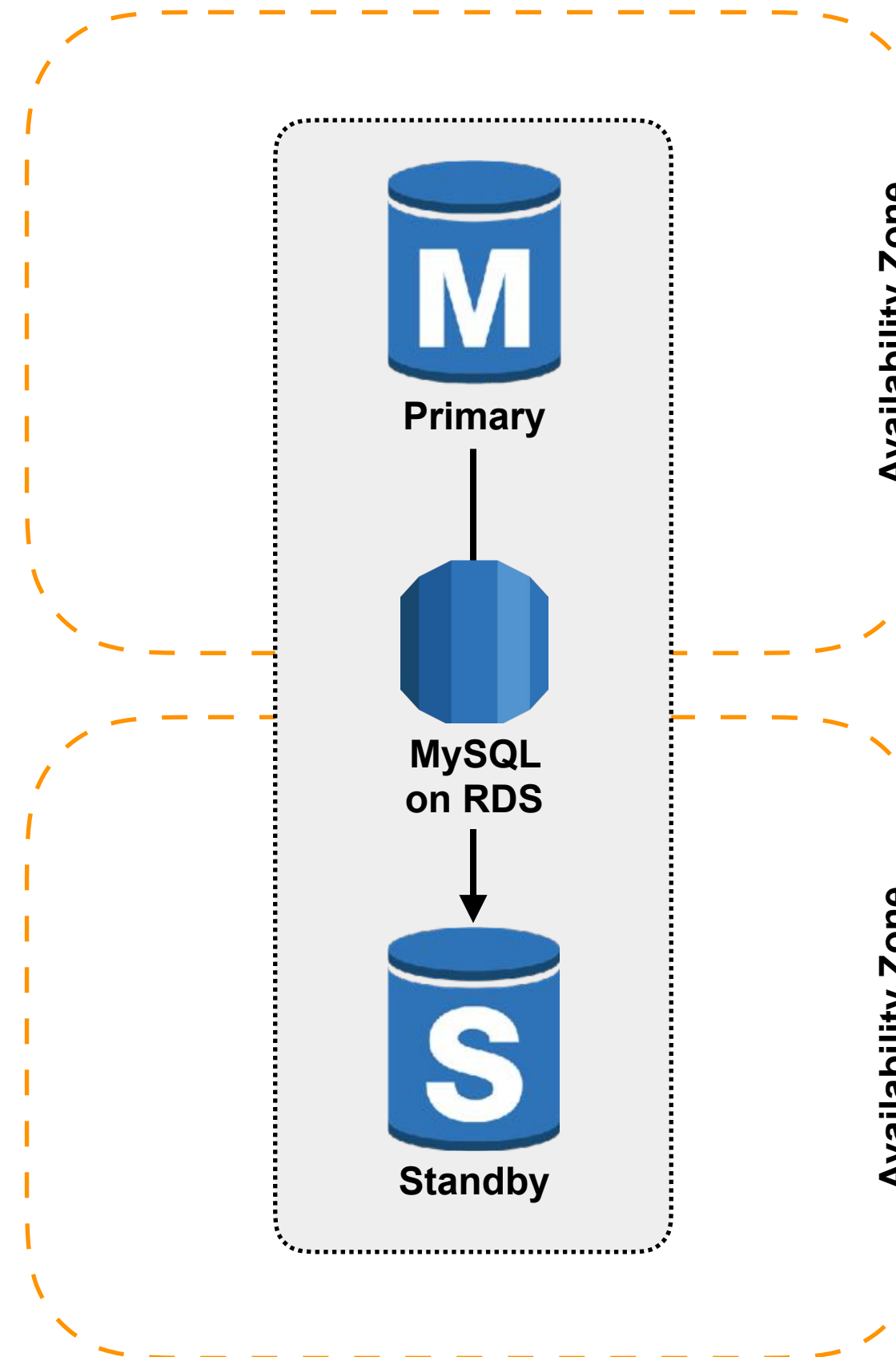
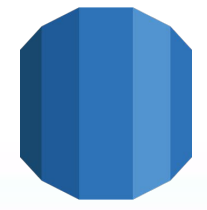
Zero downtime scaling and fast recovery



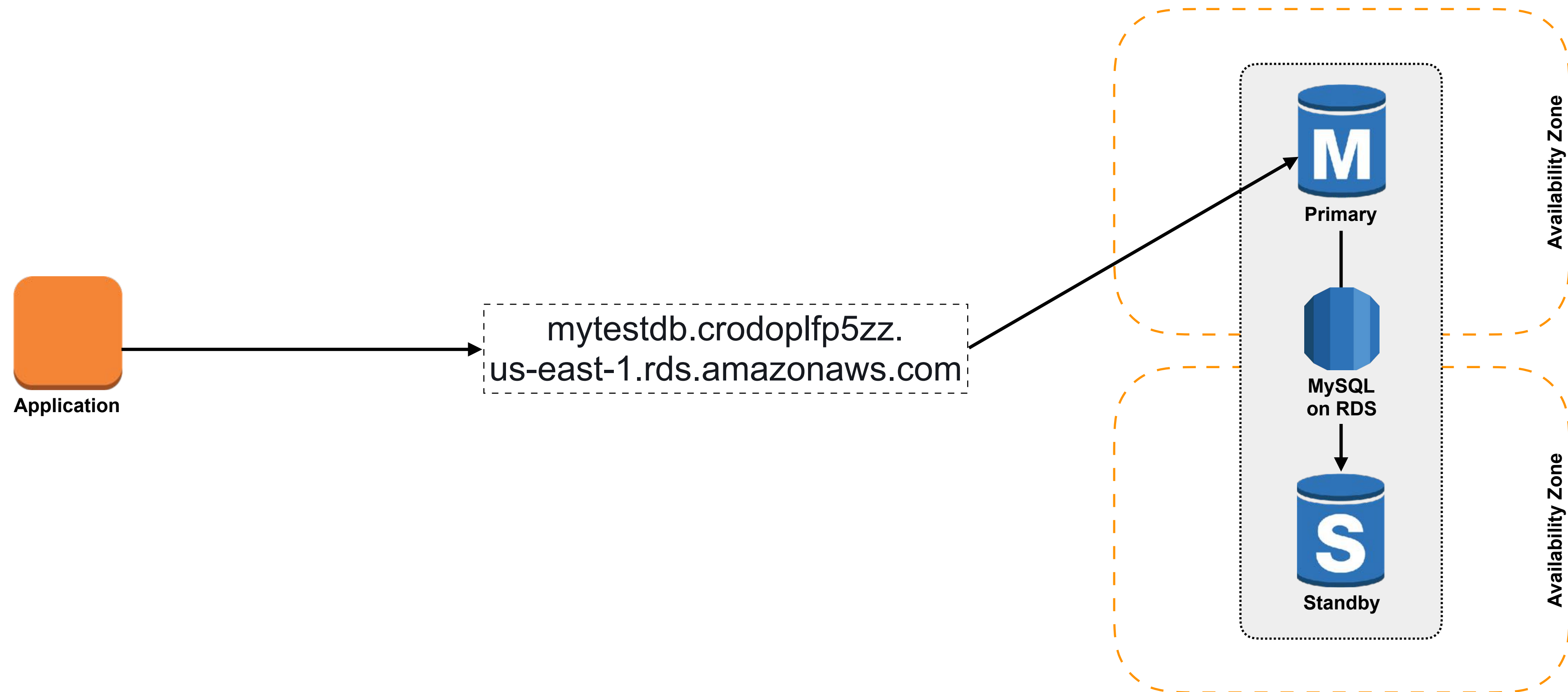
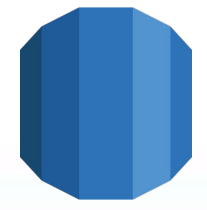
Zero downtime scaling and fast recovery



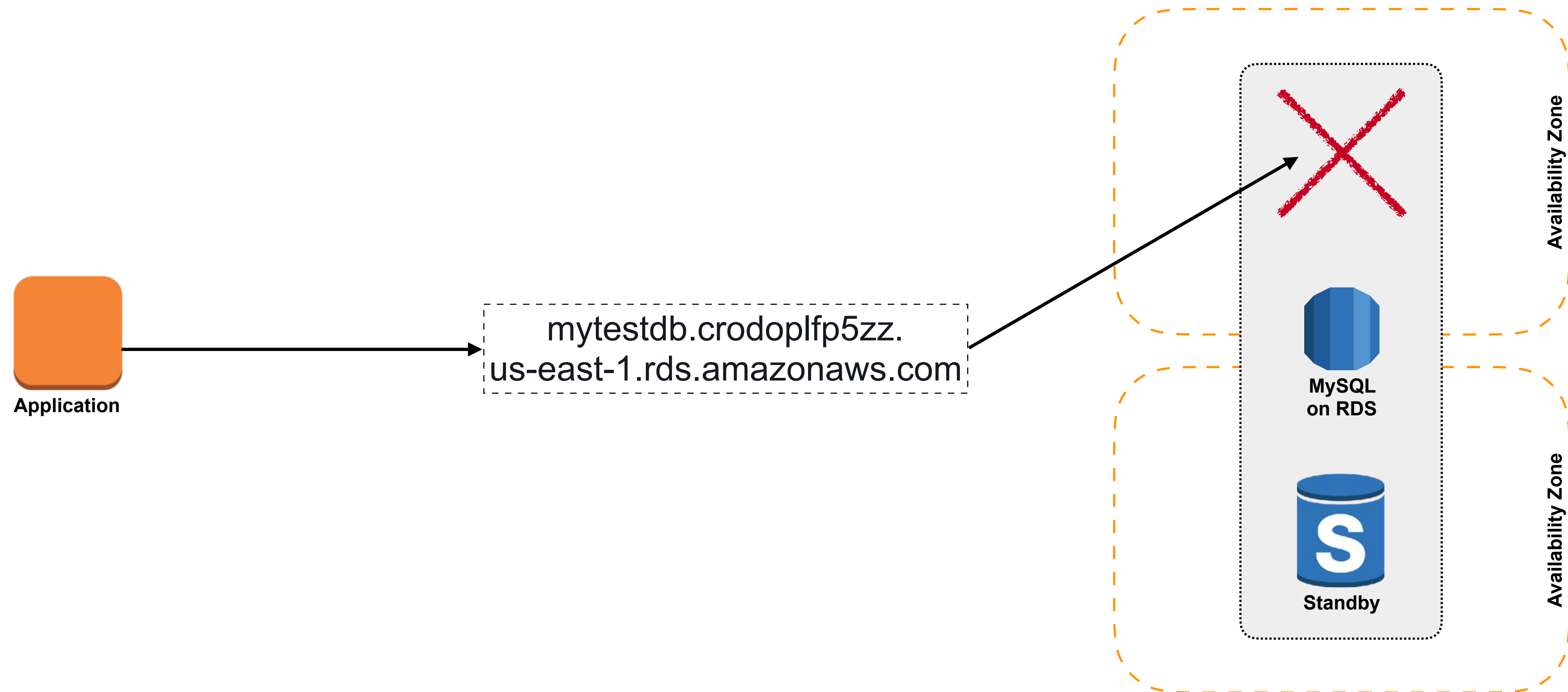
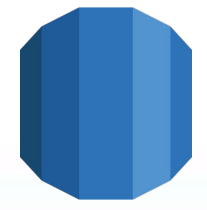
Zero downtime scaling and fast recovery



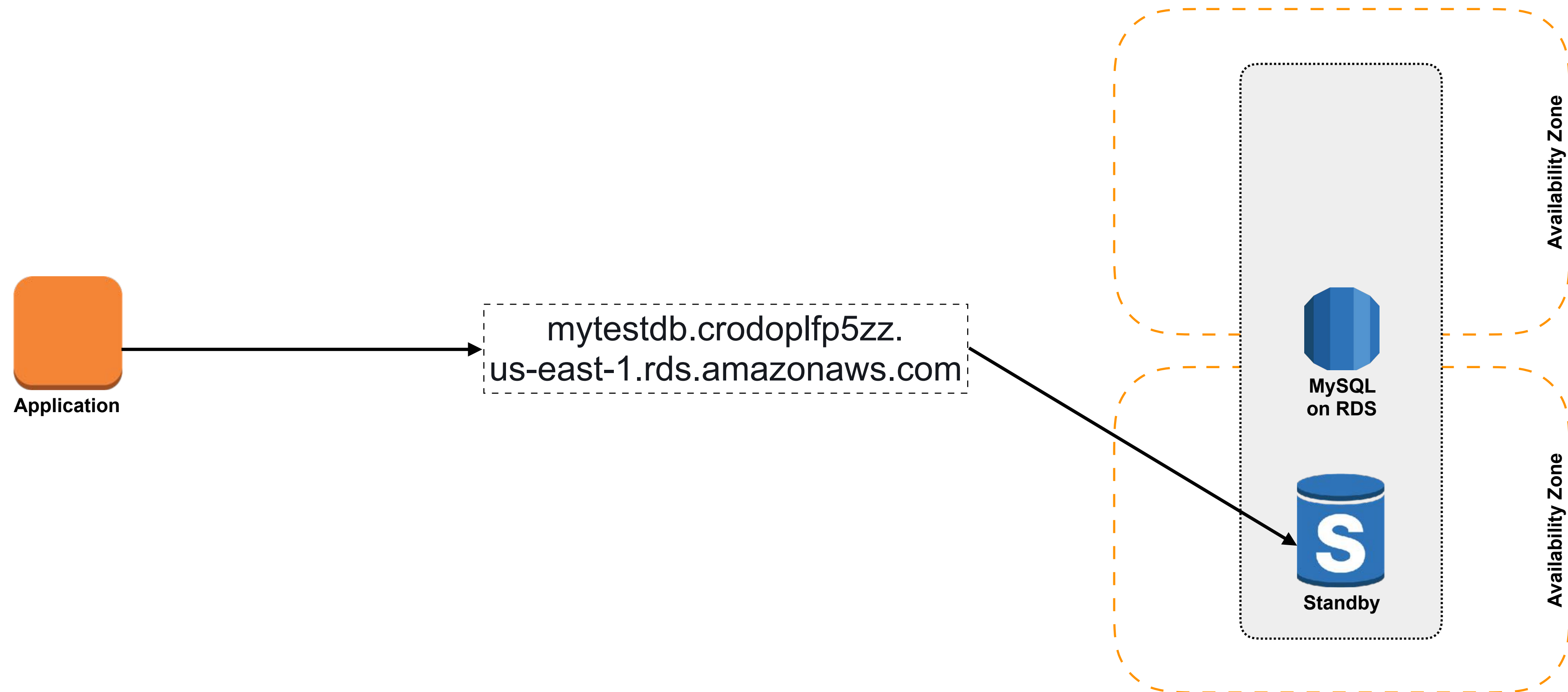
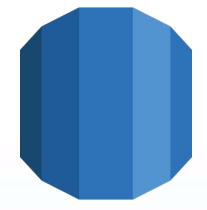
Zero downtime scaling and fast recovery



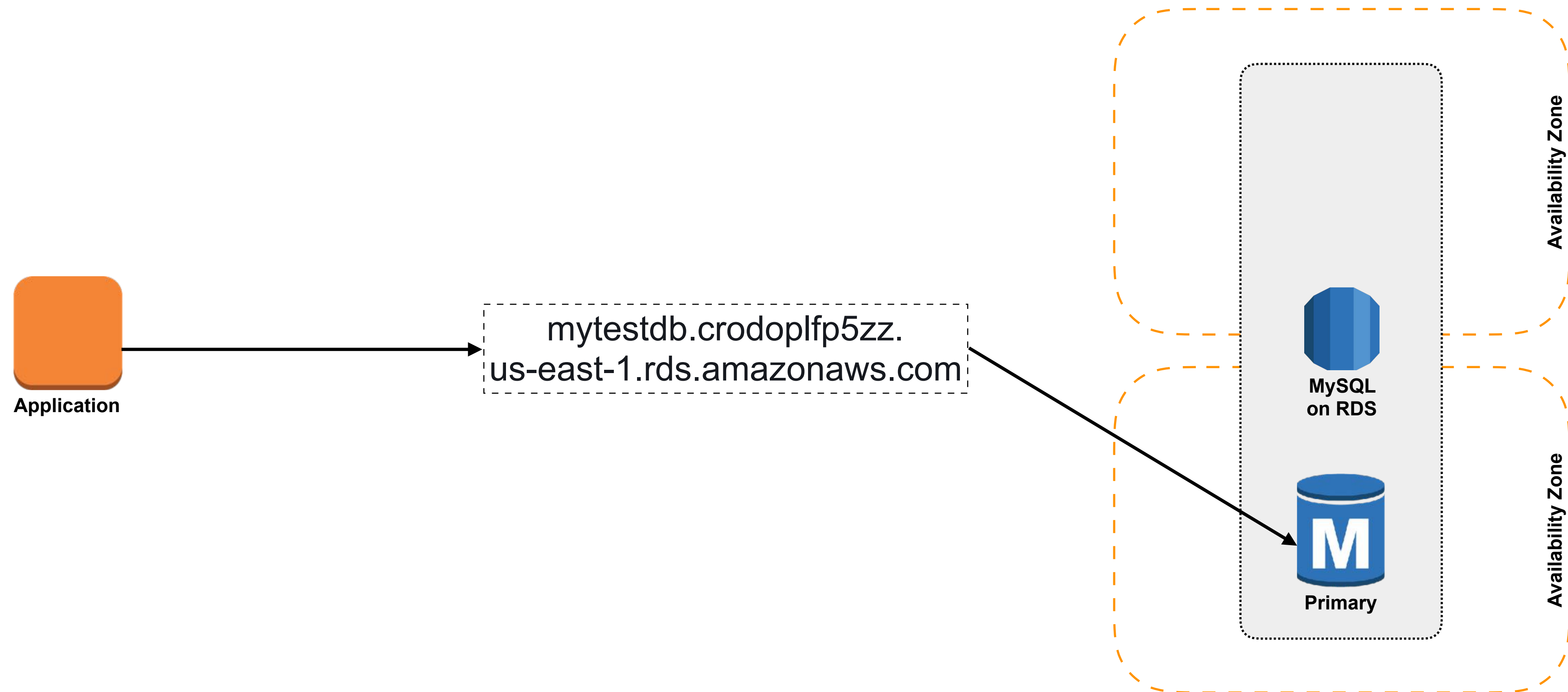
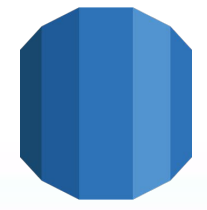
Zero downtime scaling and fast recovery



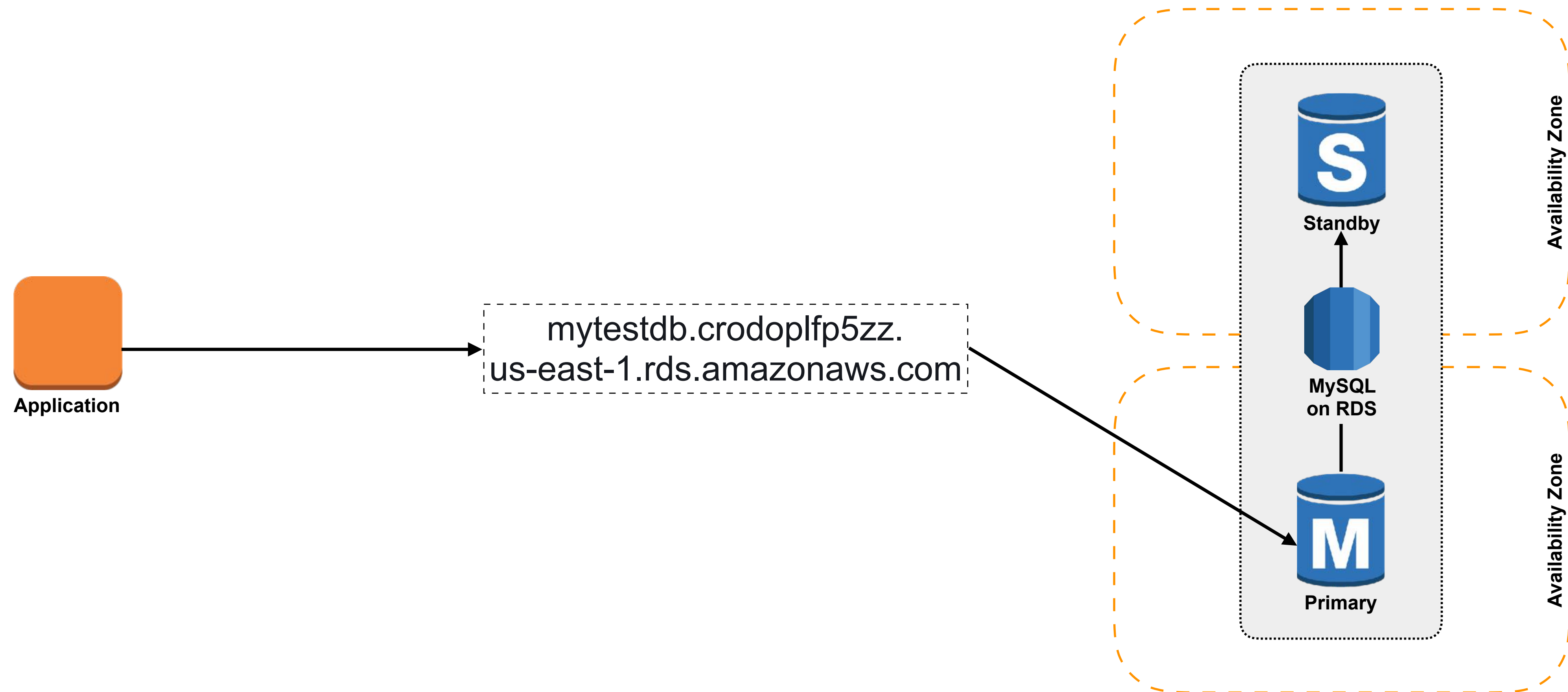
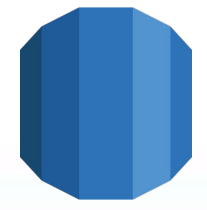
Zero downtime scaling and fast recovery



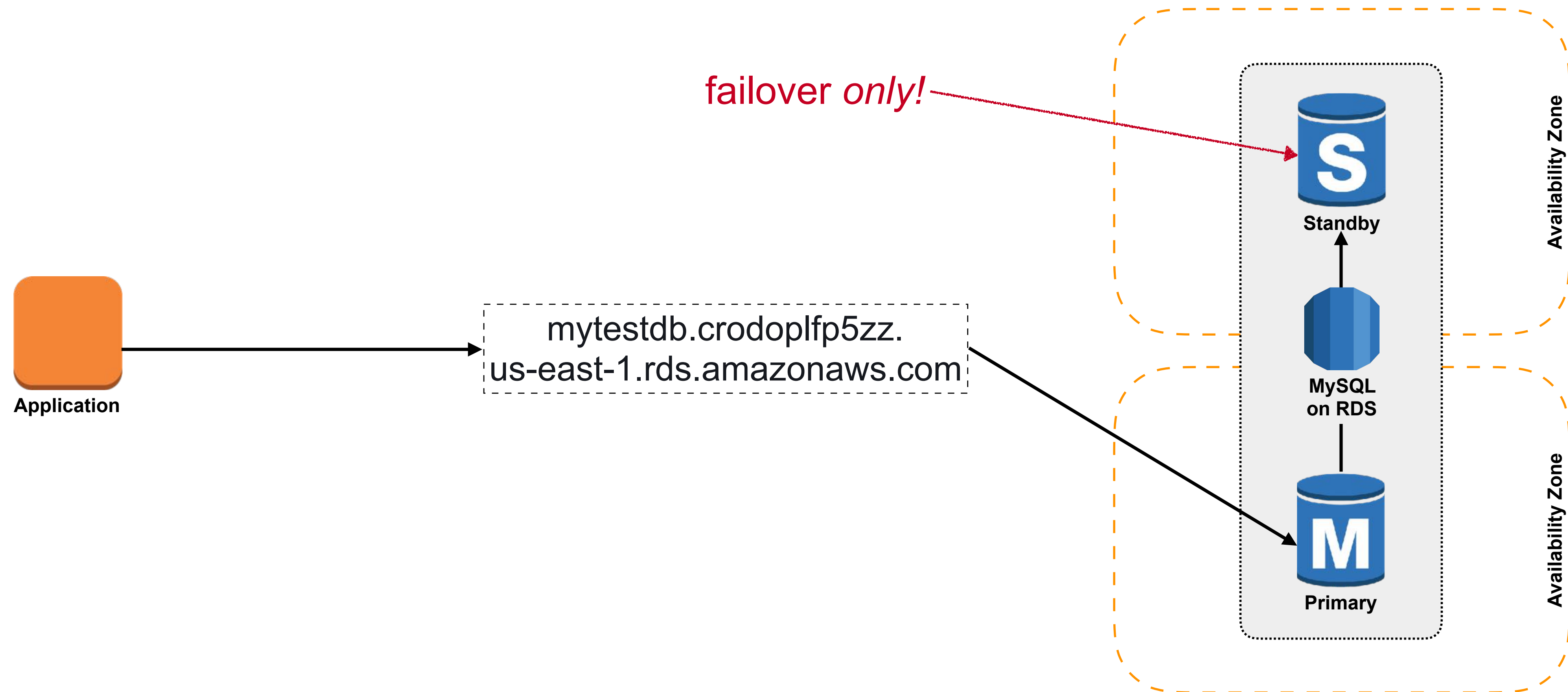
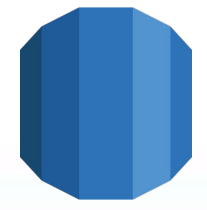
Zero downtime scaling and fast recovery



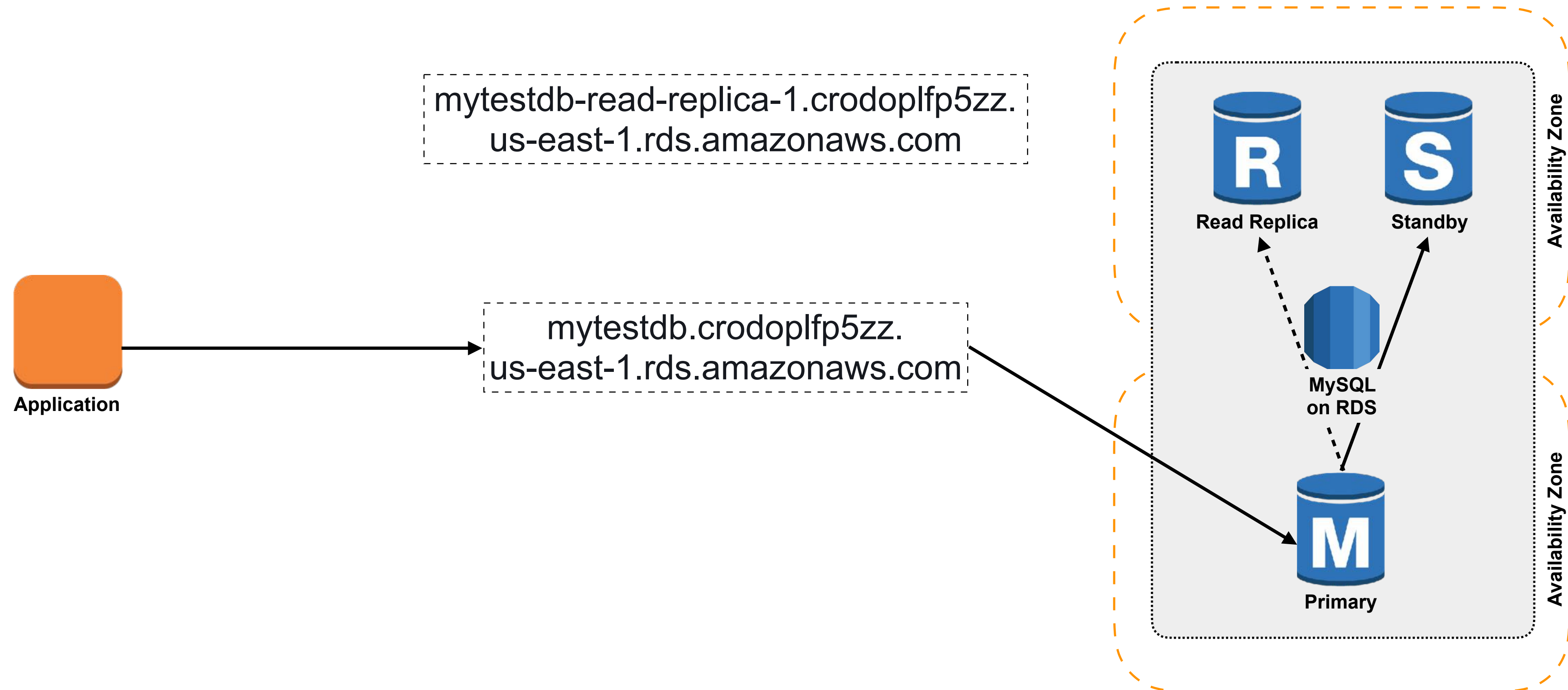
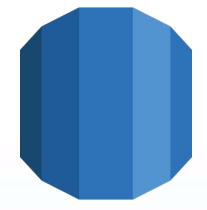
Zero downtime scaling and fast recovery



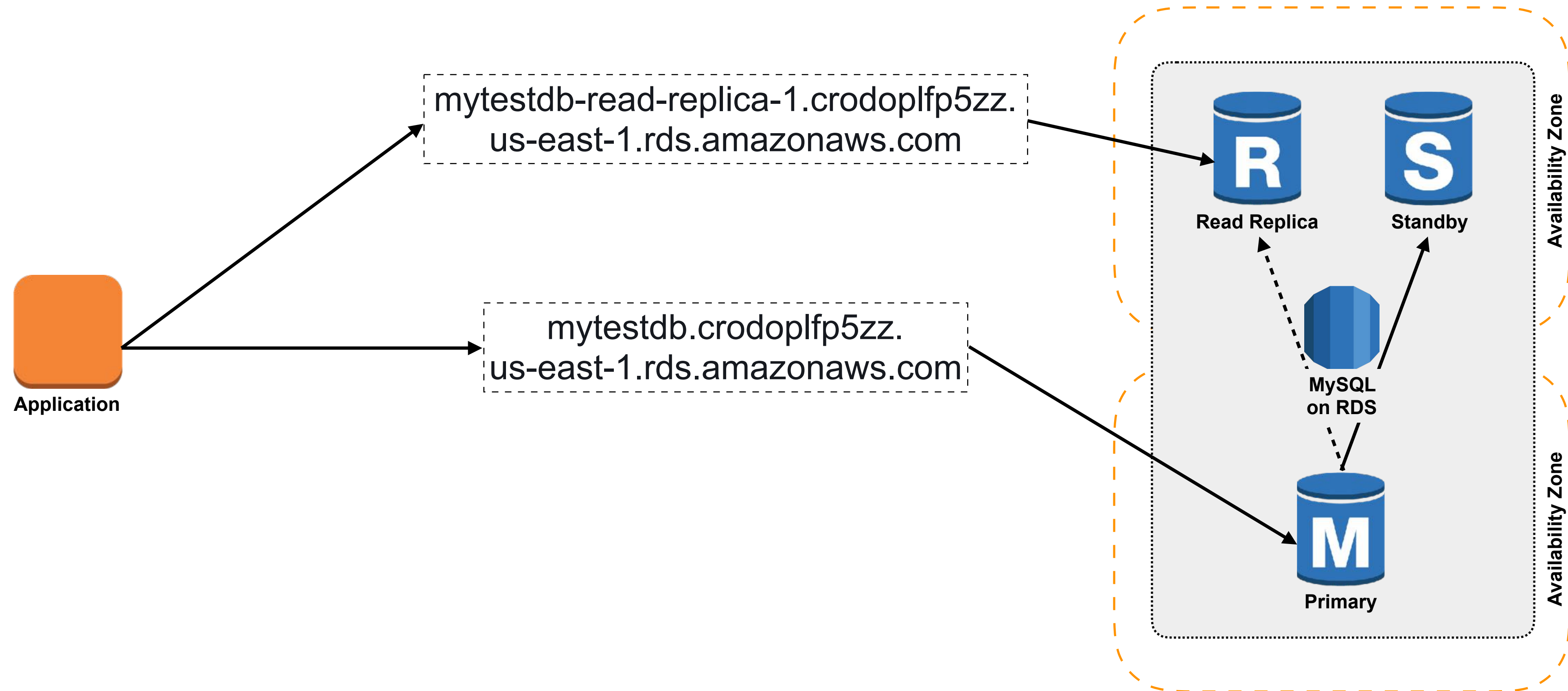
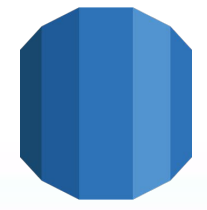
Zero downtime scaling and fast recovery



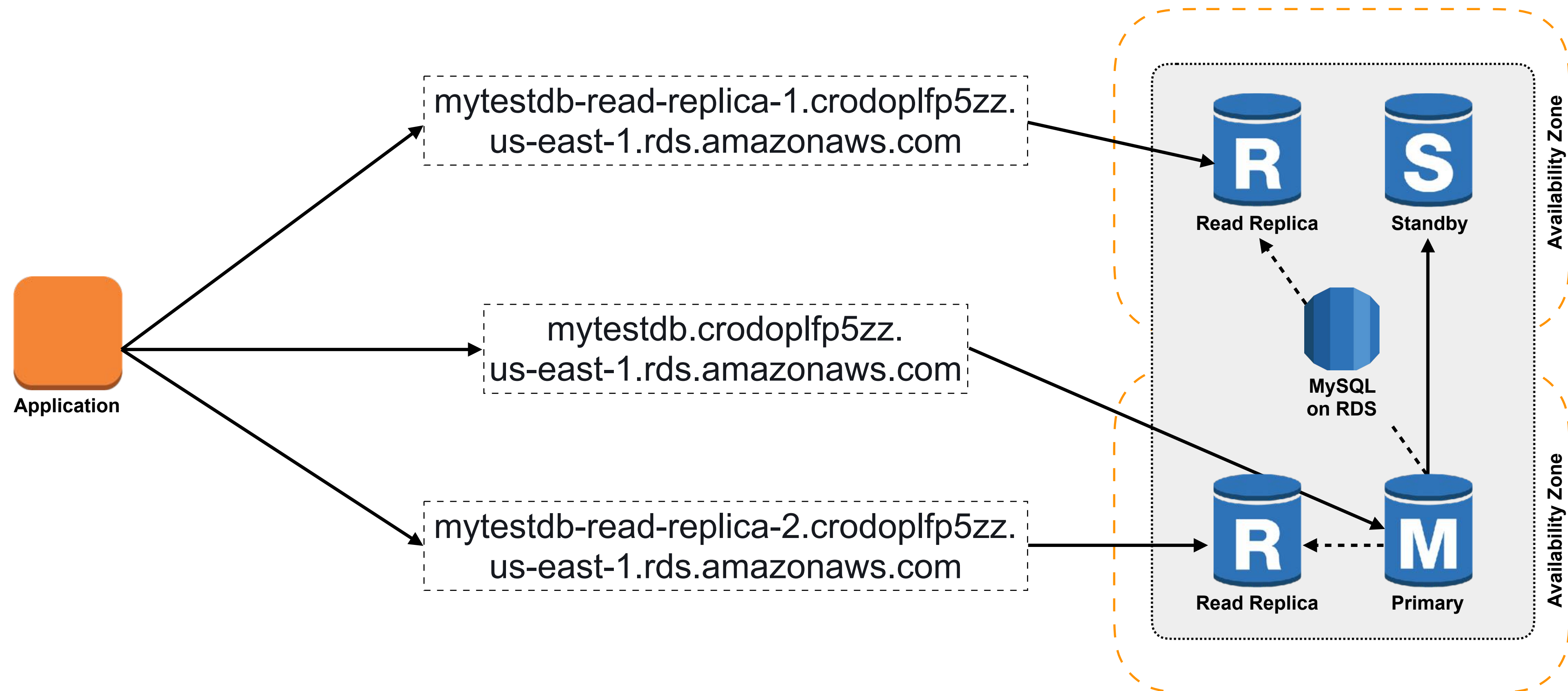
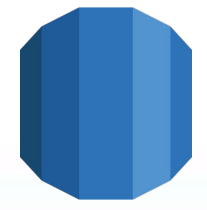
Zero downtime scaling and fast recovery



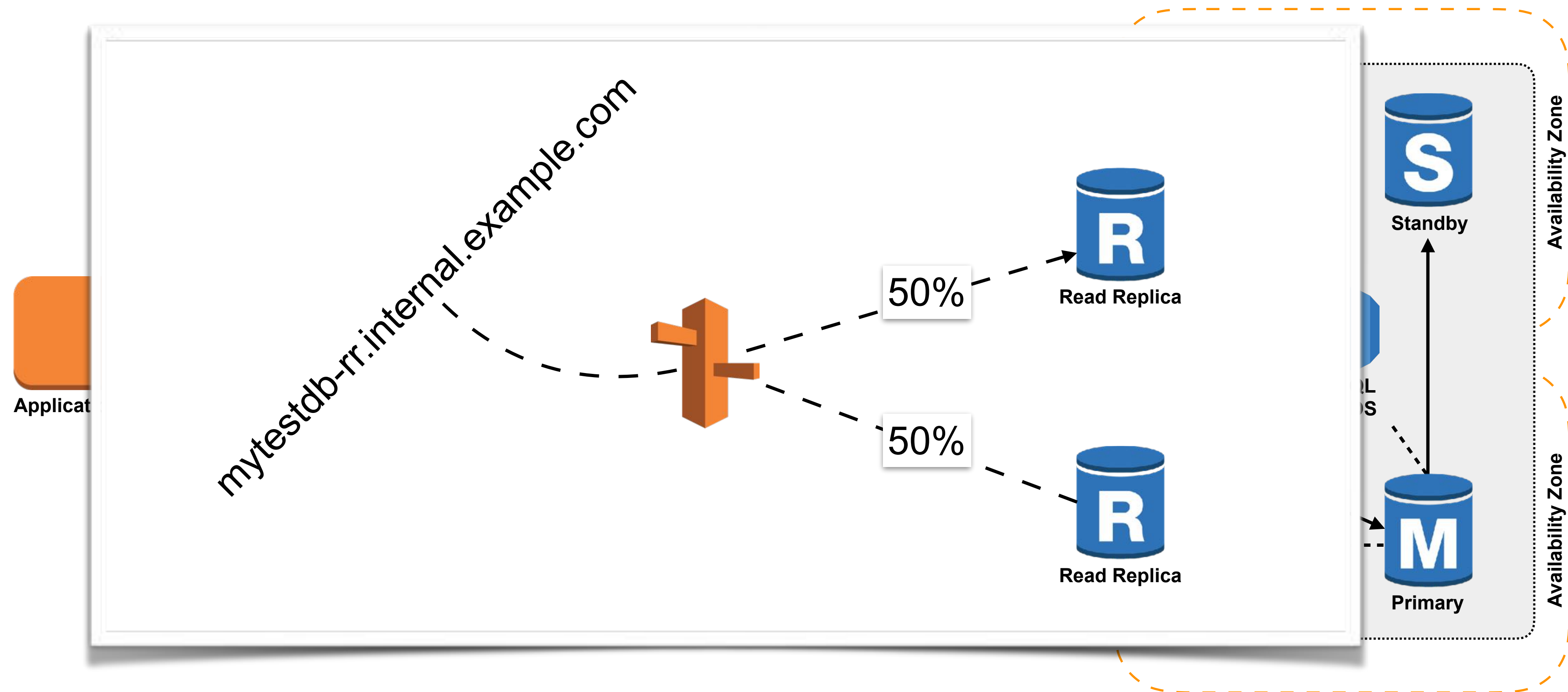
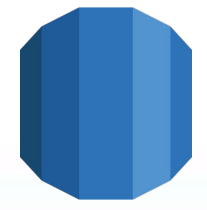
Zero downtime scaling and fast recovery



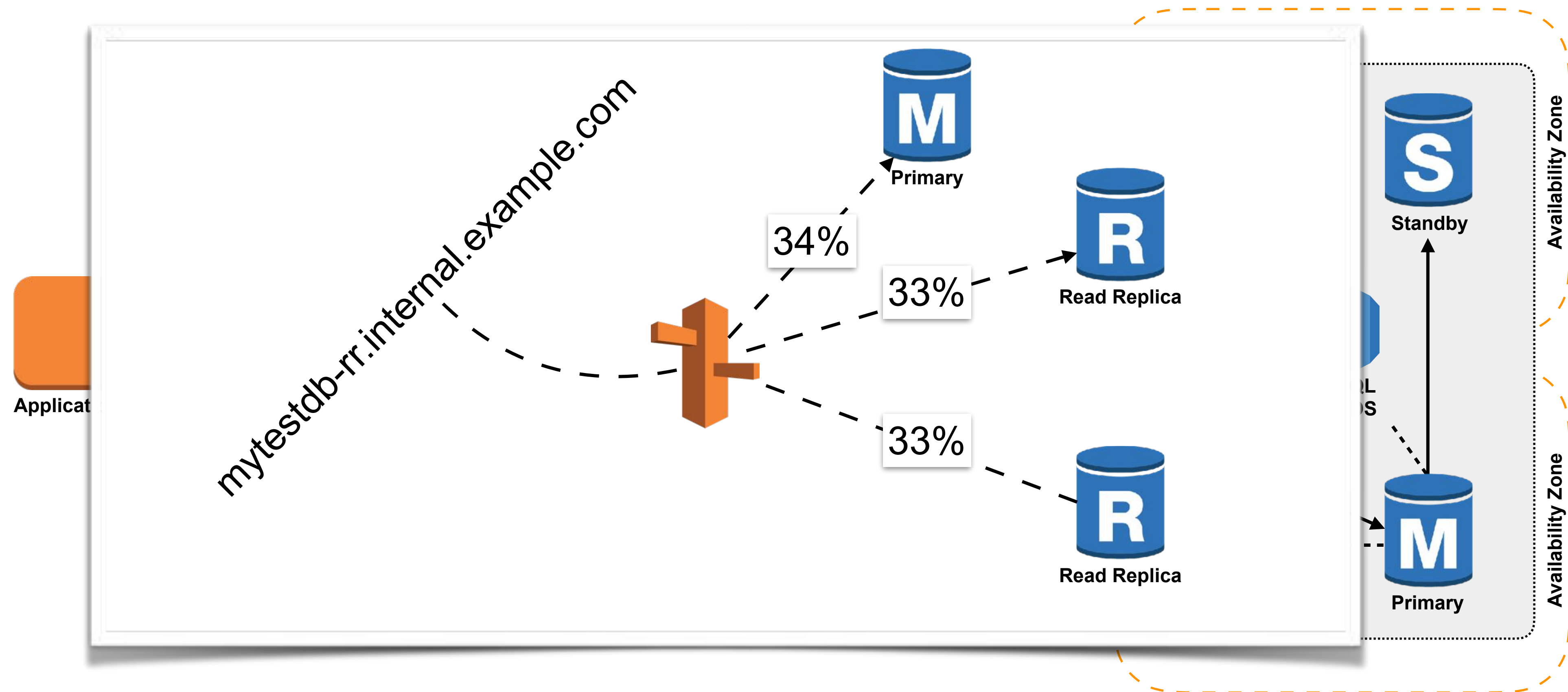
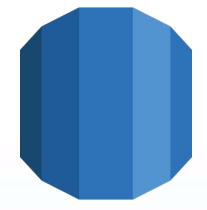
Zero downtime scaling and fast recovery



Zero downtime scaling and fast recovery



Zero downtime scaling and fast recovery



Relational Database Service (RDS)

- RDBMS as a service
- Automated setup and patching
- Managed backups
- Point-in-time snapshots
- Zero downtime scaling and fast recovery from outages



Relational Database Service (RDS)

Amazon Aurora

- MySQL and PostgreSQL compatible



Relational Database Service (RDS)

Amazon Aurora

- MySQL and PostgreSQL compatible
- Pay-as-you-go on-the-fly storage



Relational Database Service (RDS)

Amazon Aurora

- MySQL and PostgreSQL compatible
- Pay-as-you-go on-the-fly storage
- Up to 15 read replicas for failover



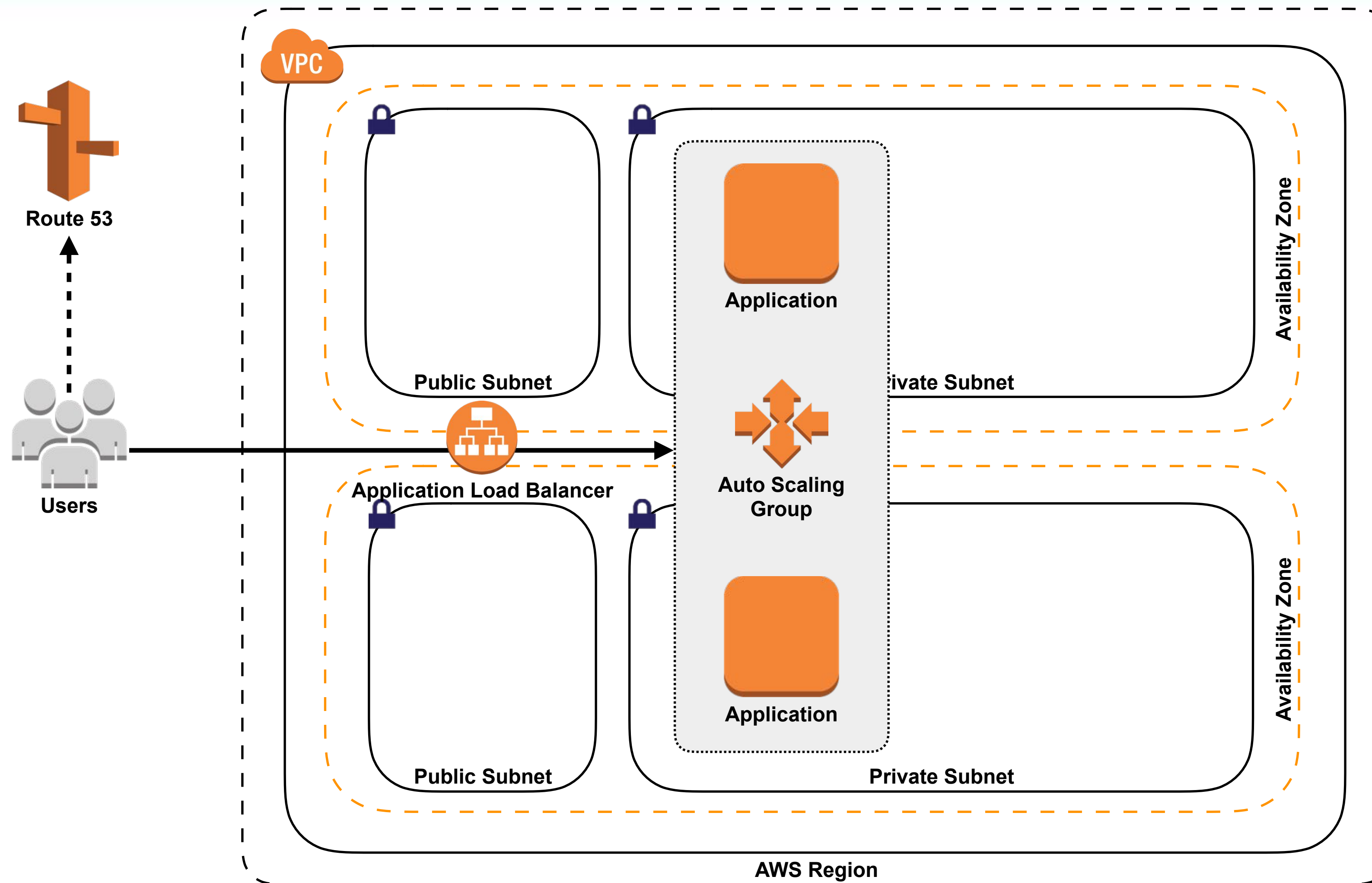
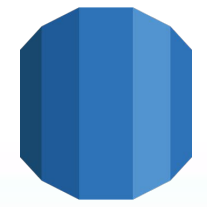
Relational Database Service (RDS)

Amazon Aurora

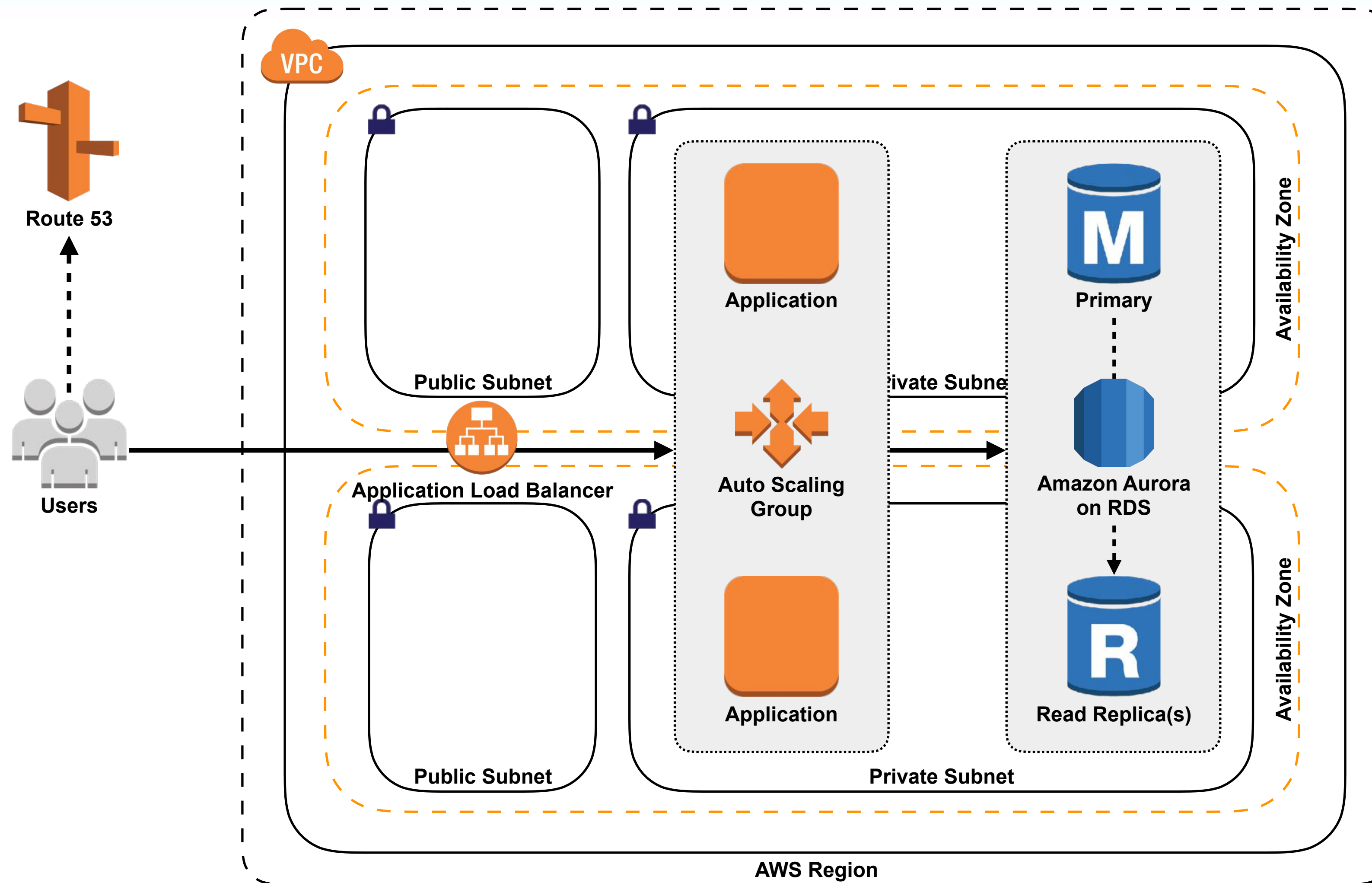
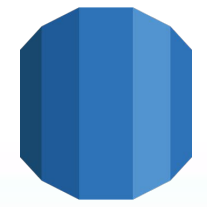
- MySQL and PostgreSQL compatible
- Pay-as-you-go on-the-fly storage
- Up to 15 read replicas for failover
- **Very low replication lag**



Relational Database Service (RDS)



Relational Database Service (RDS)

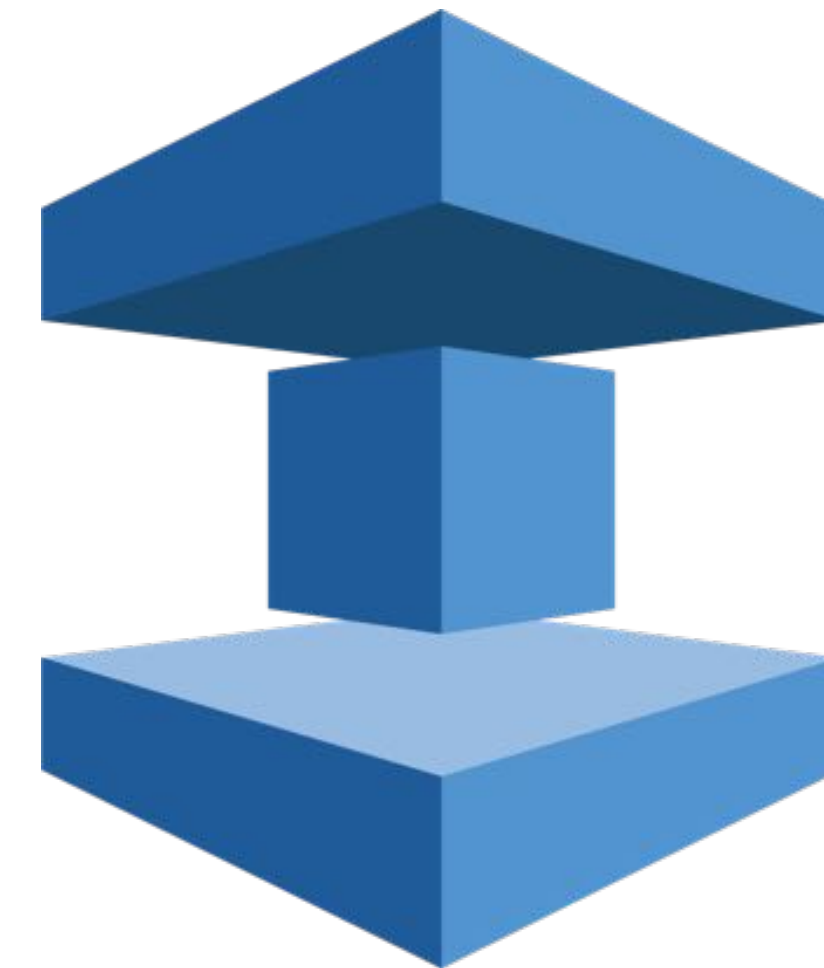


Amazon ElastiCache



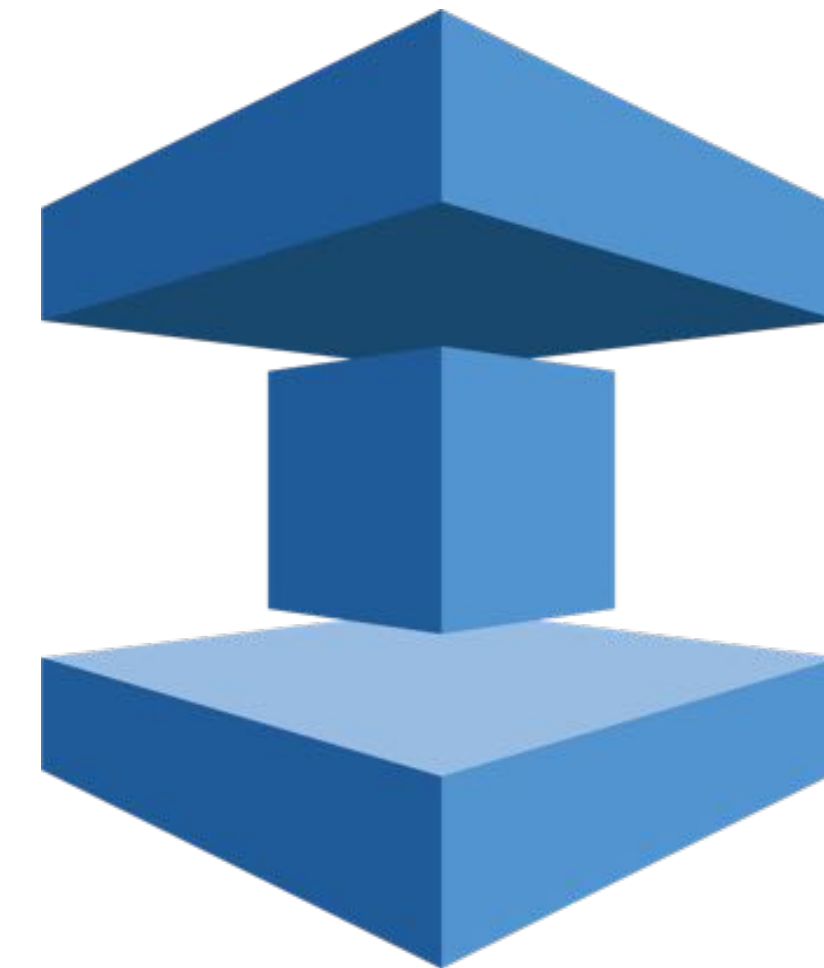
Amazon ElastiCache

- In-memory cache as a service



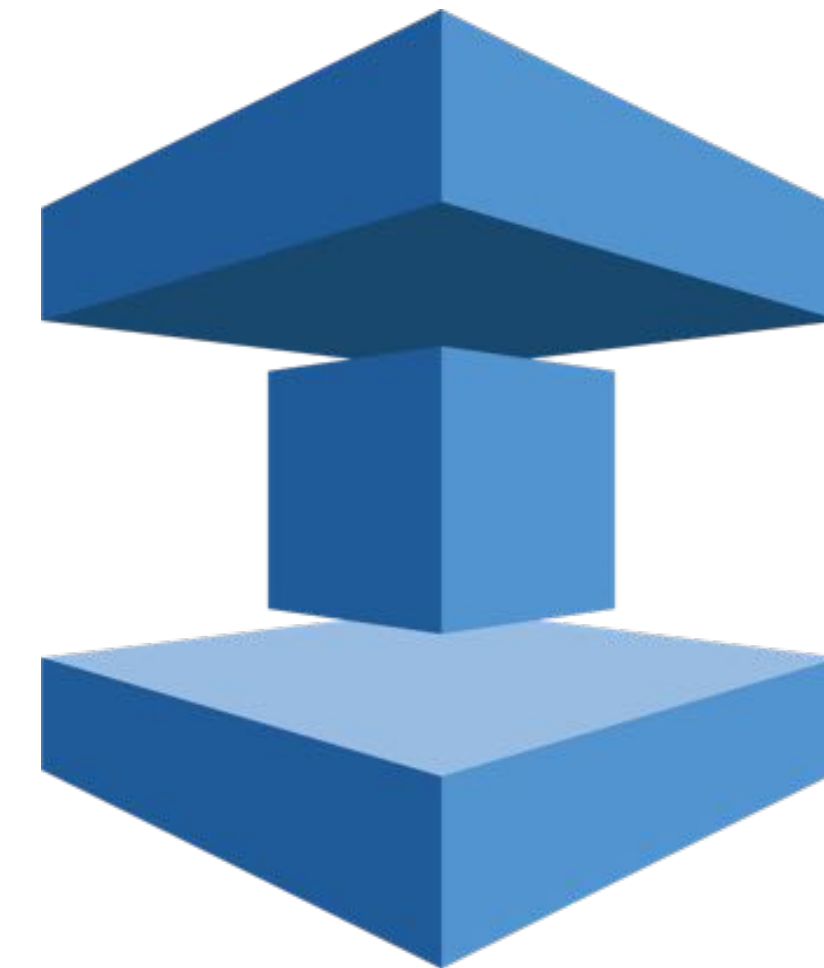
Amazon ElastiCache

- In-memory cache as a service
- Automated setup and patching



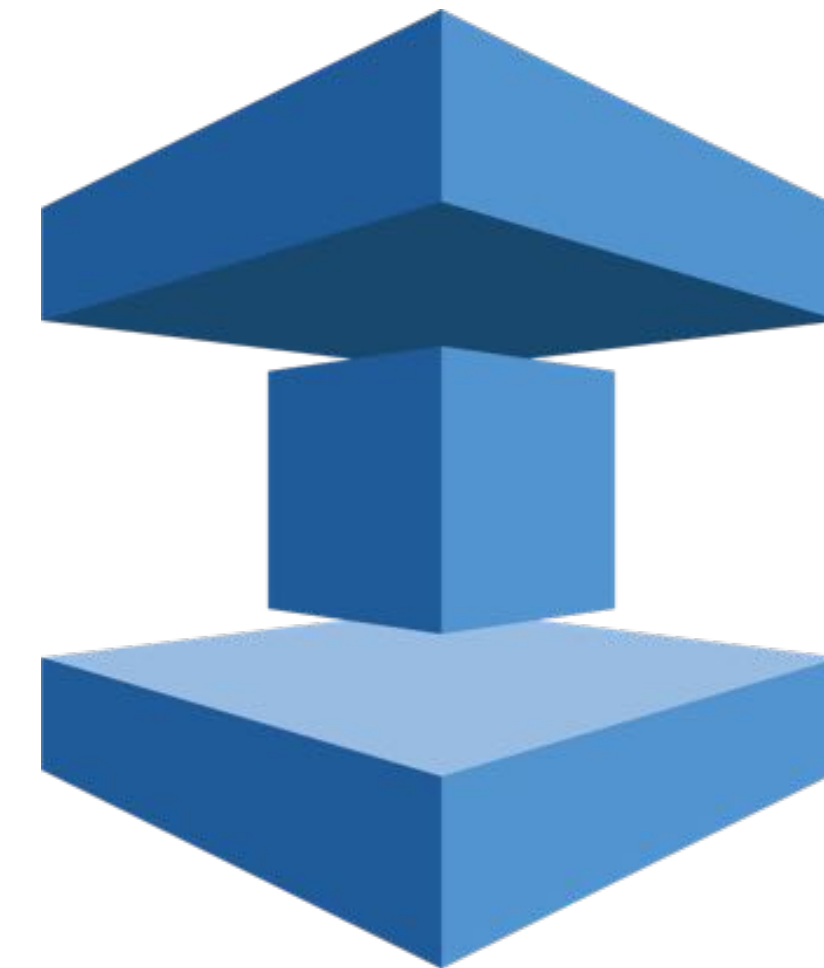
Amazon ElastiCache

- In-memory cache as a service
- Automated setup and patching
- Memcached or Redis



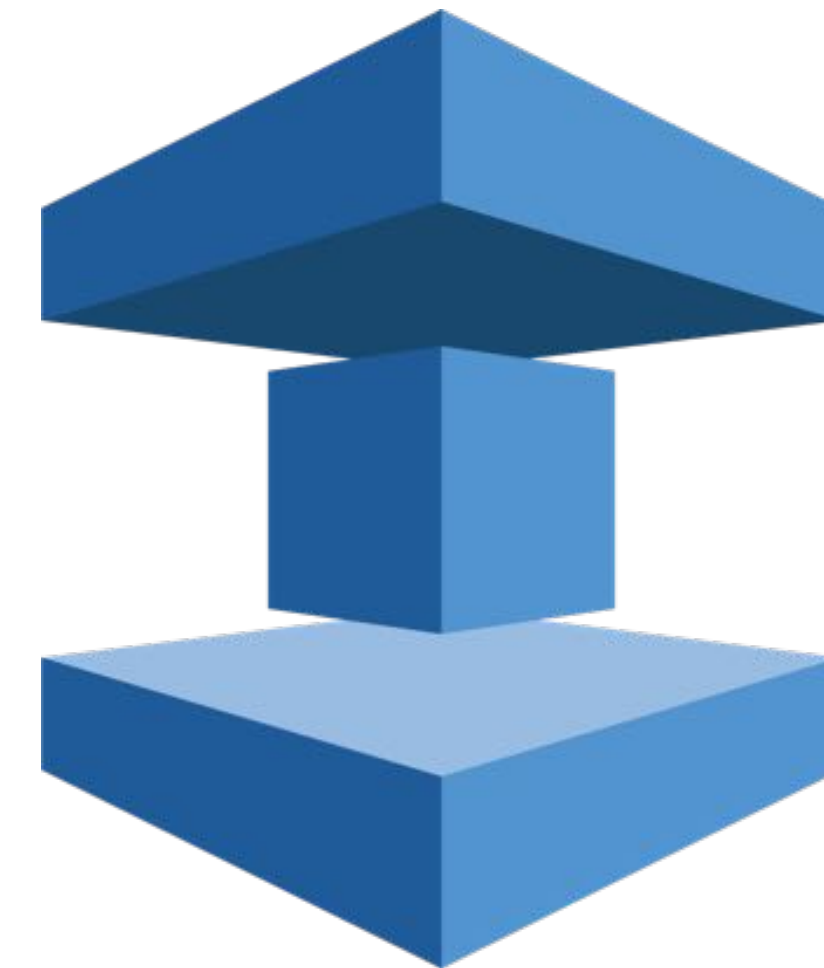
Amazon ElastiCache

- In-memory cache as a service
- Automated setup and patching
- Memcached or Redis
- **Fast!**

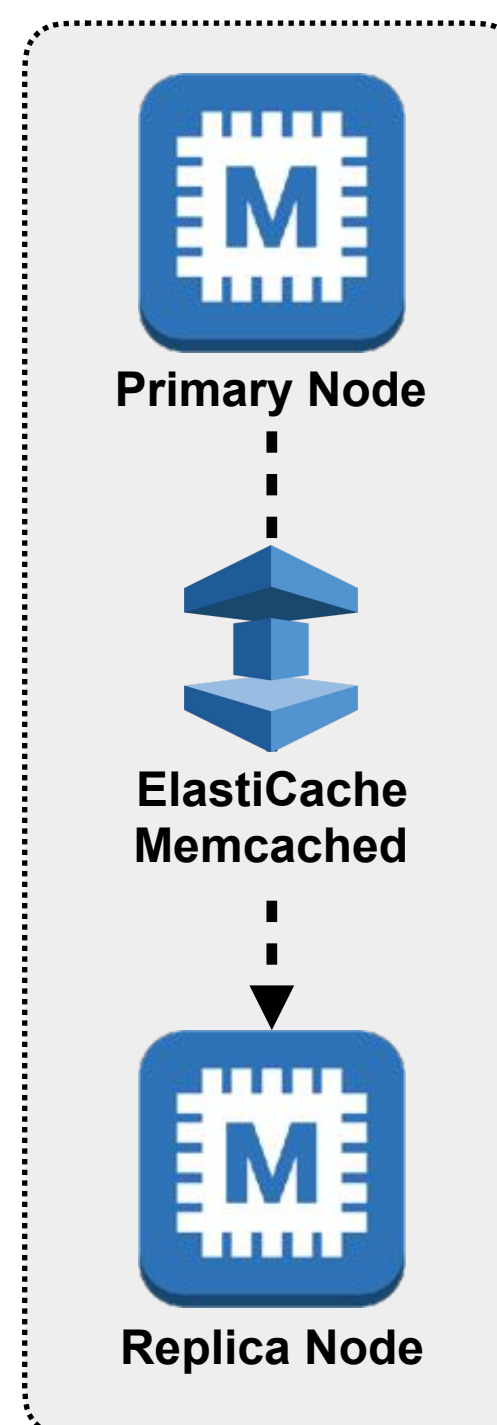


Amazon ElastiCache

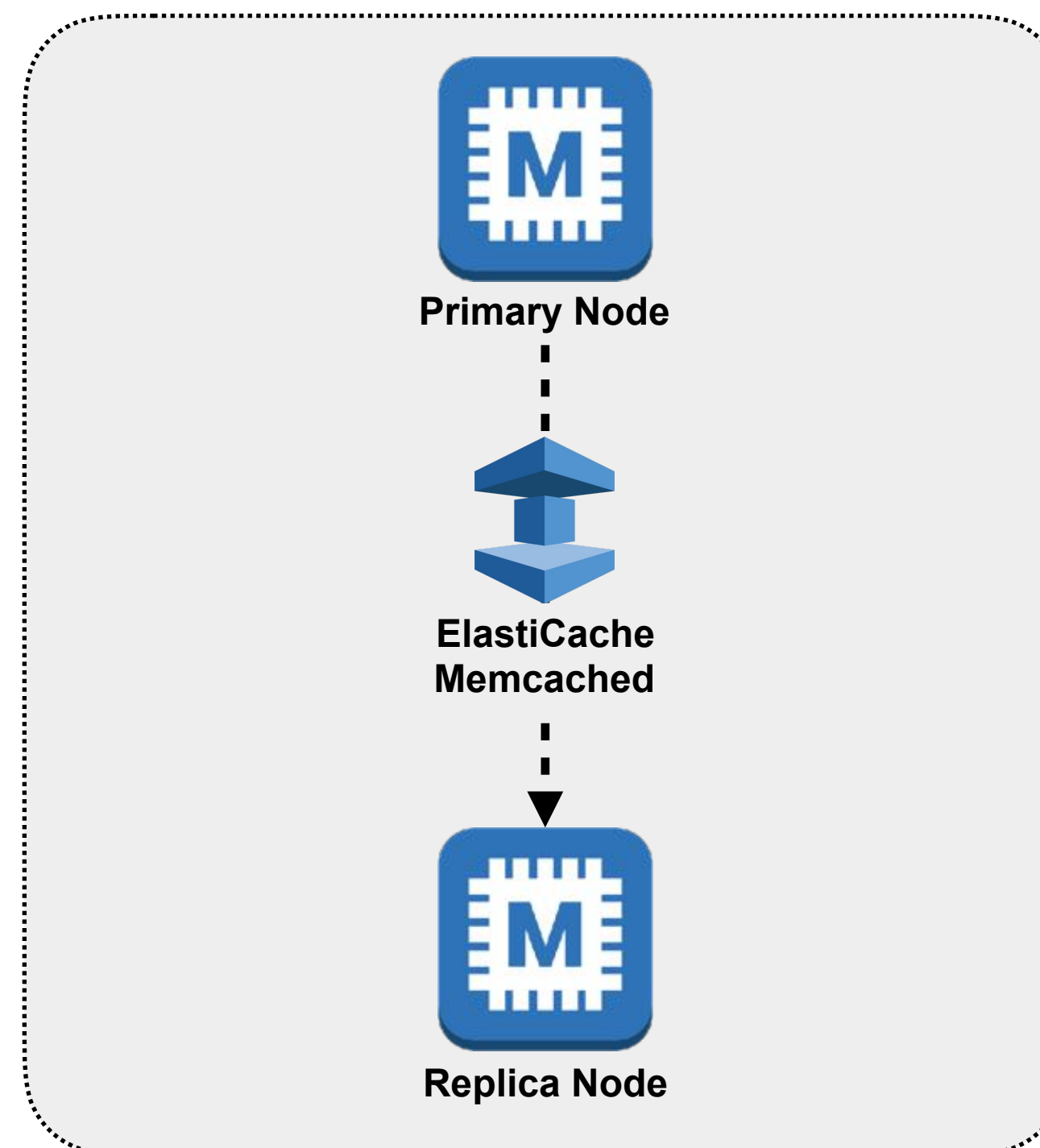
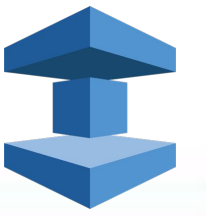
- In-memory cache as a service
- Automated setup and patching
- Memcached or Redis
- Fast!
- Easily scalable



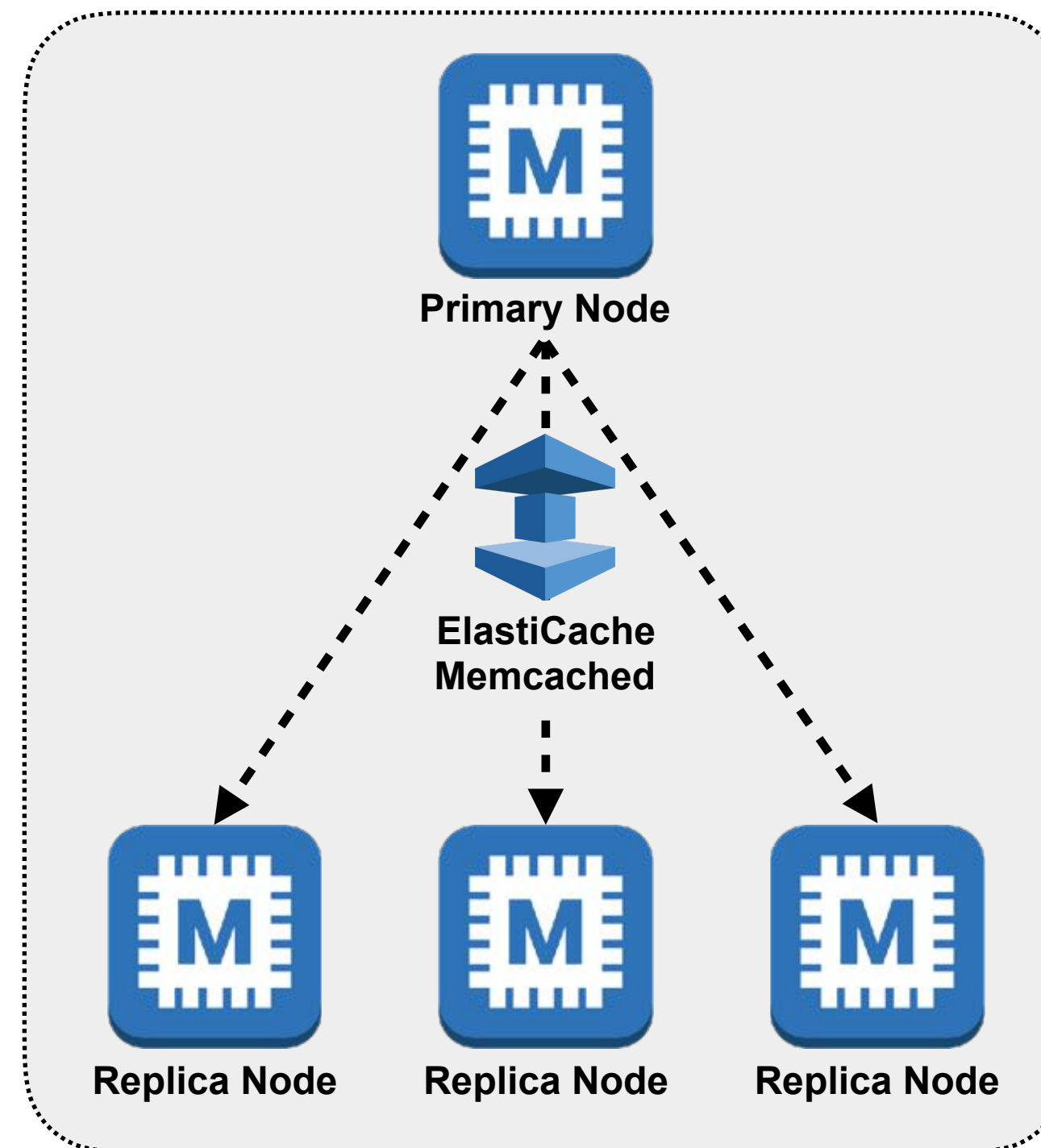
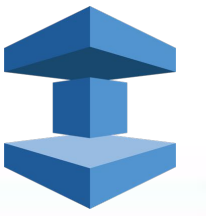
Easily scalable



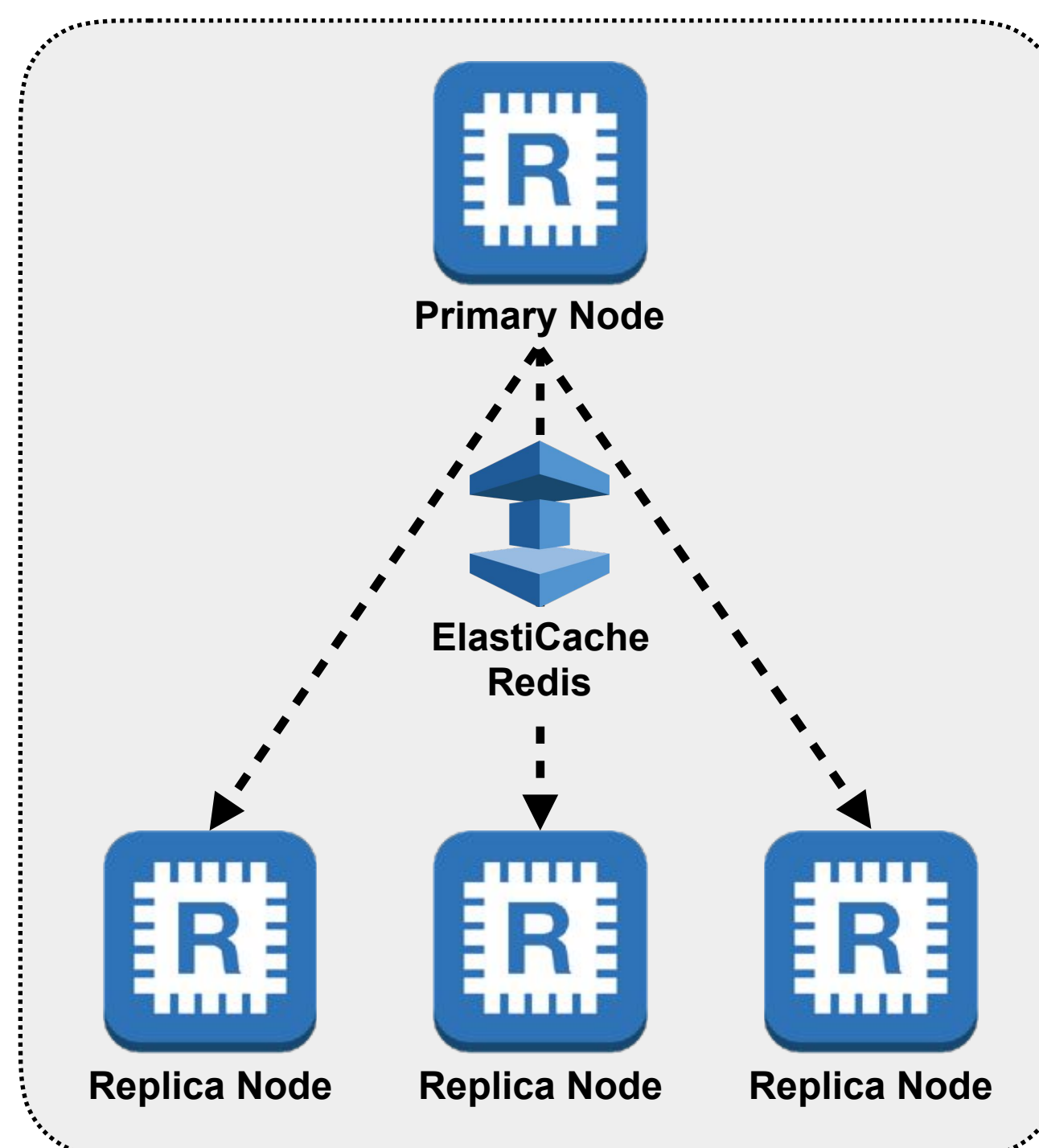
Easily scalable



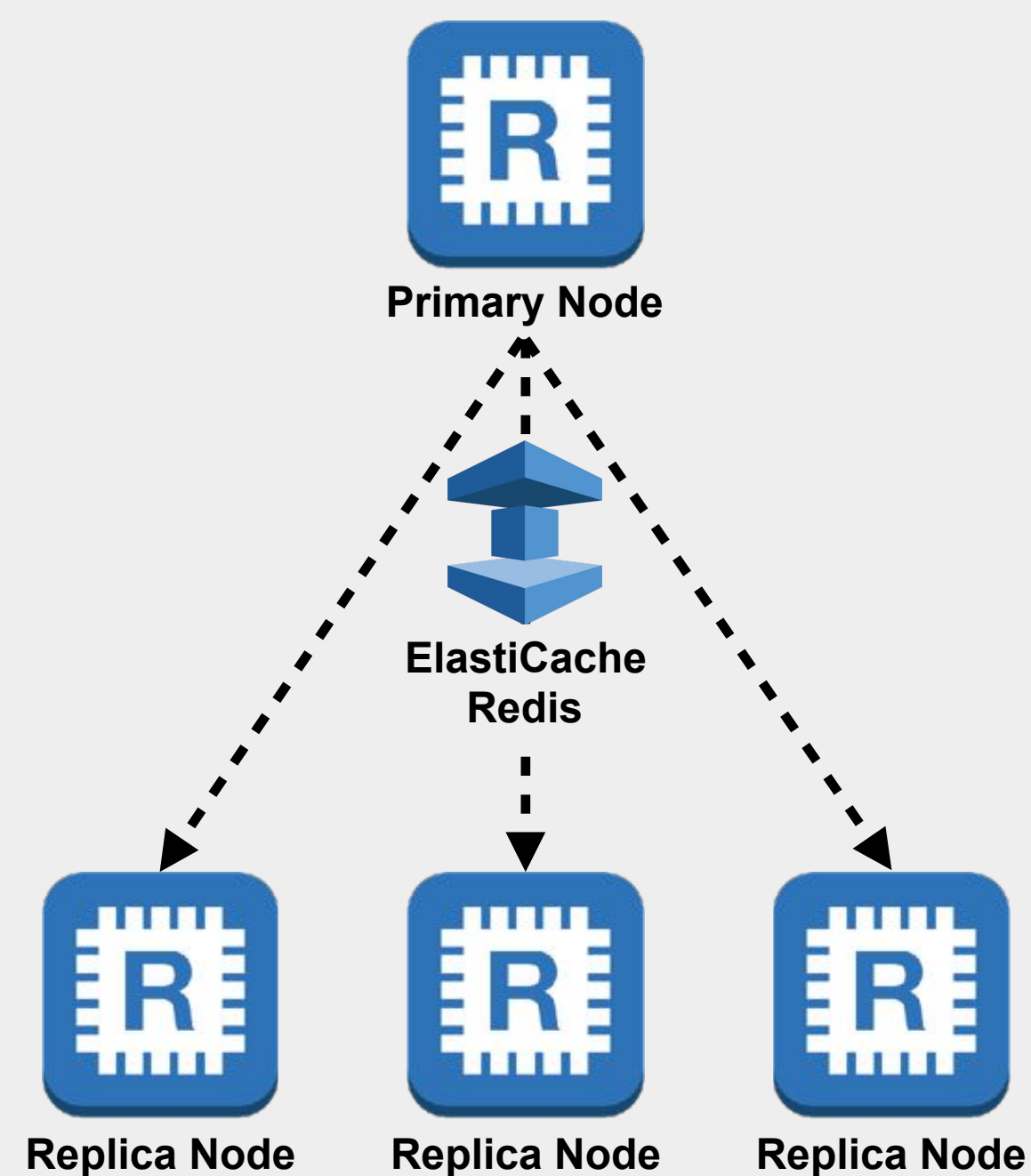
Easily scalable



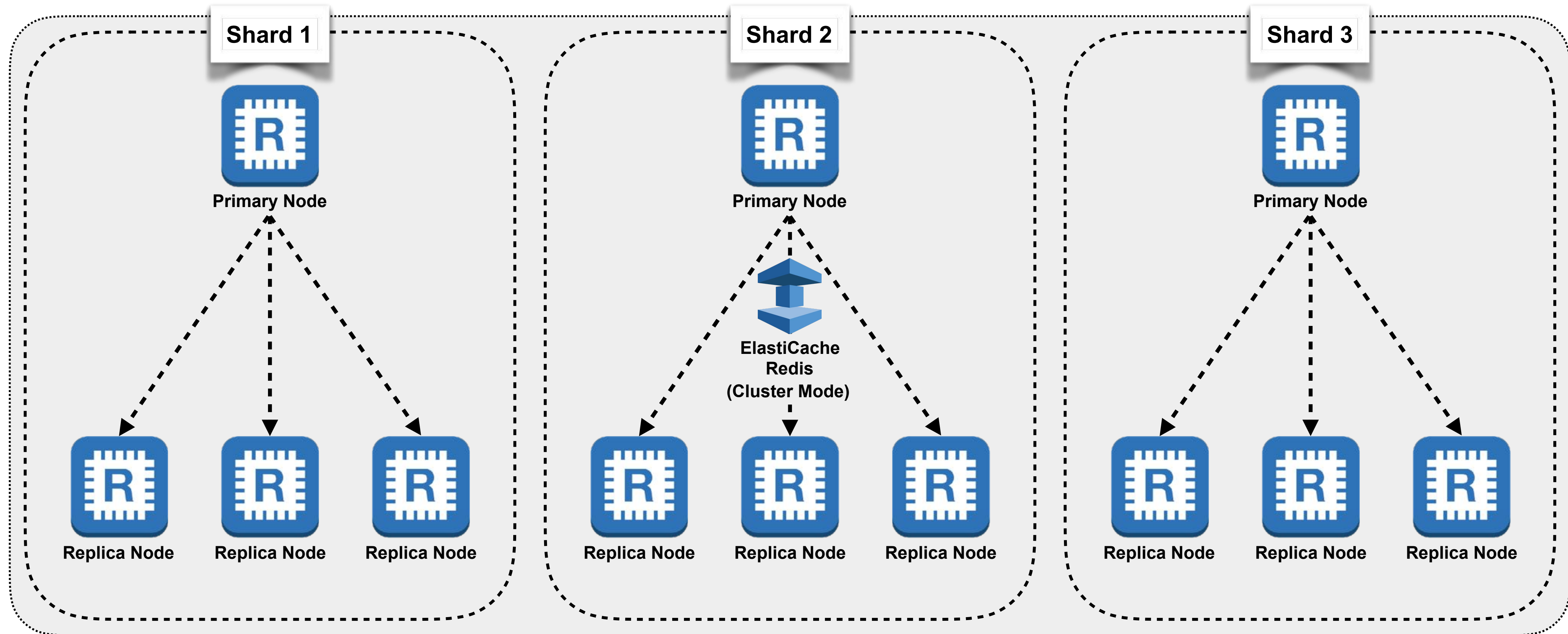
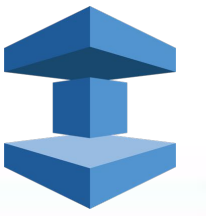
Easily scalable



Easily scalable

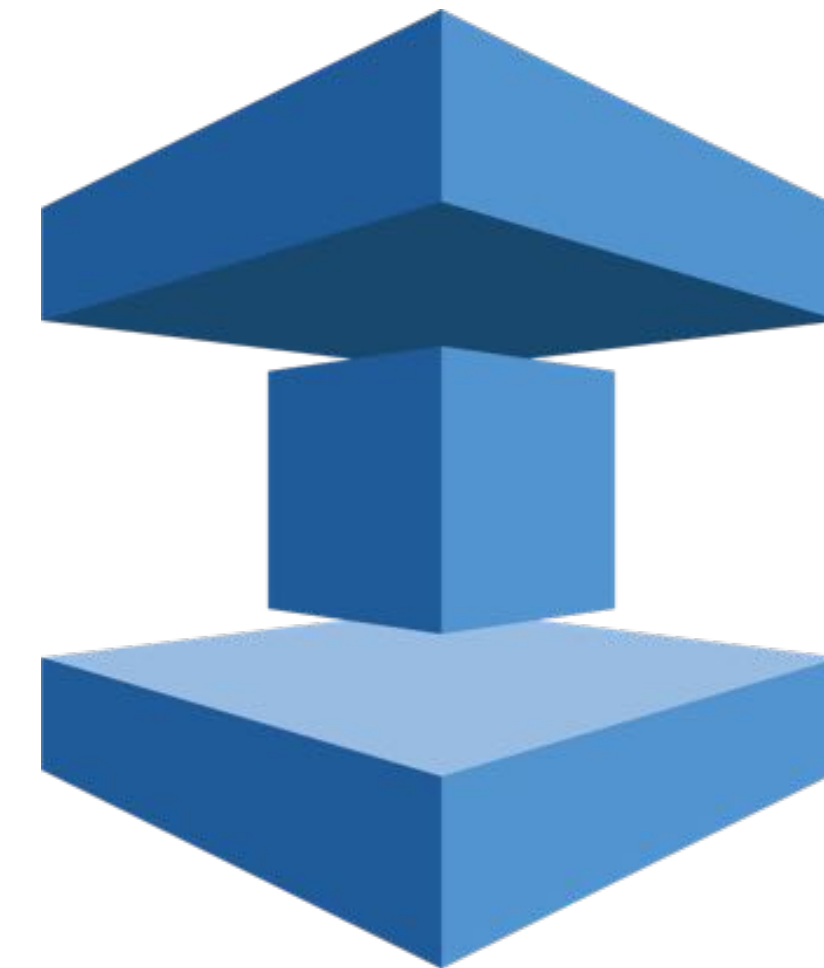


Easily scalable

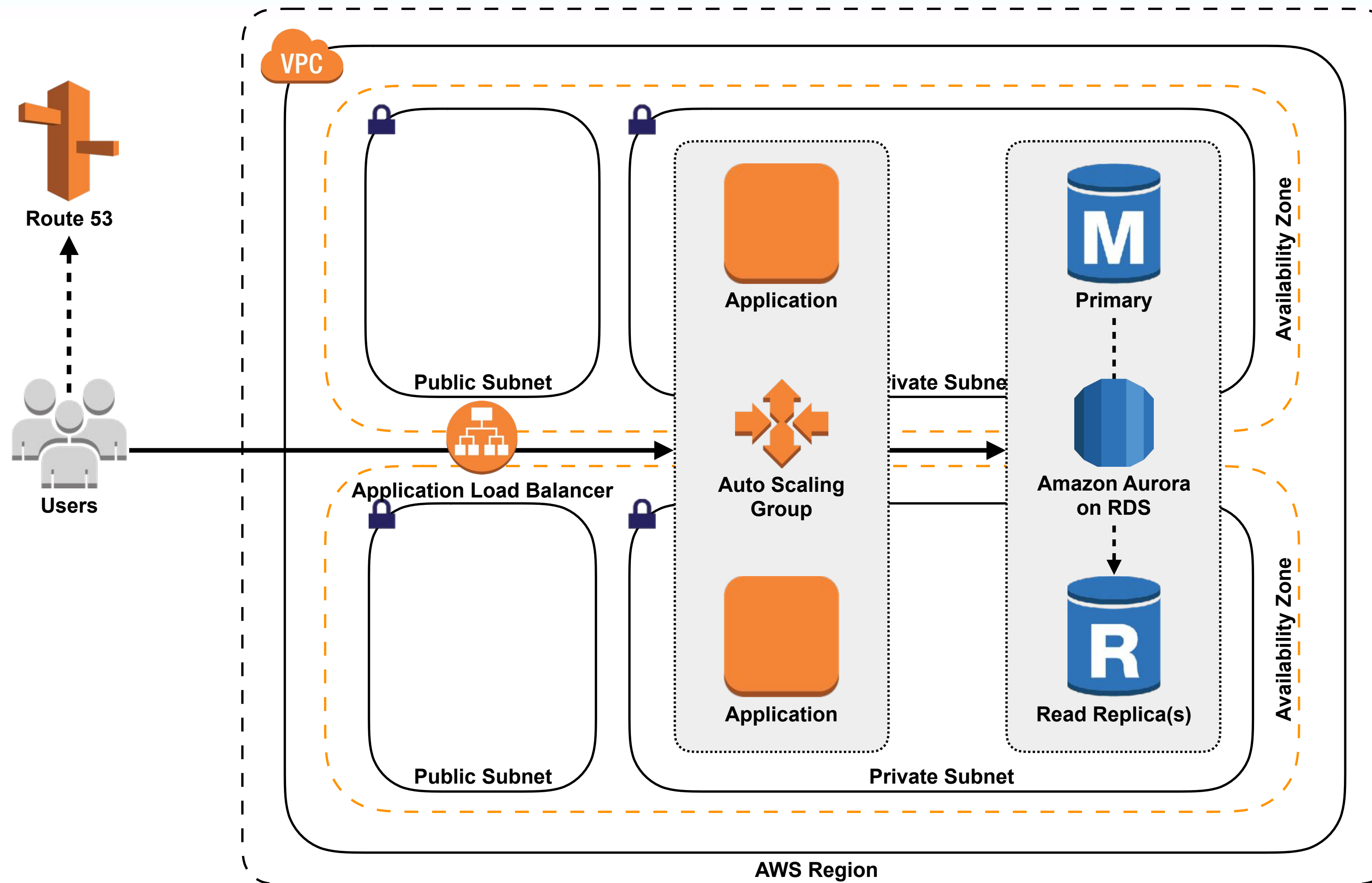
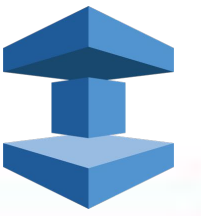


Amazon ElastiCache

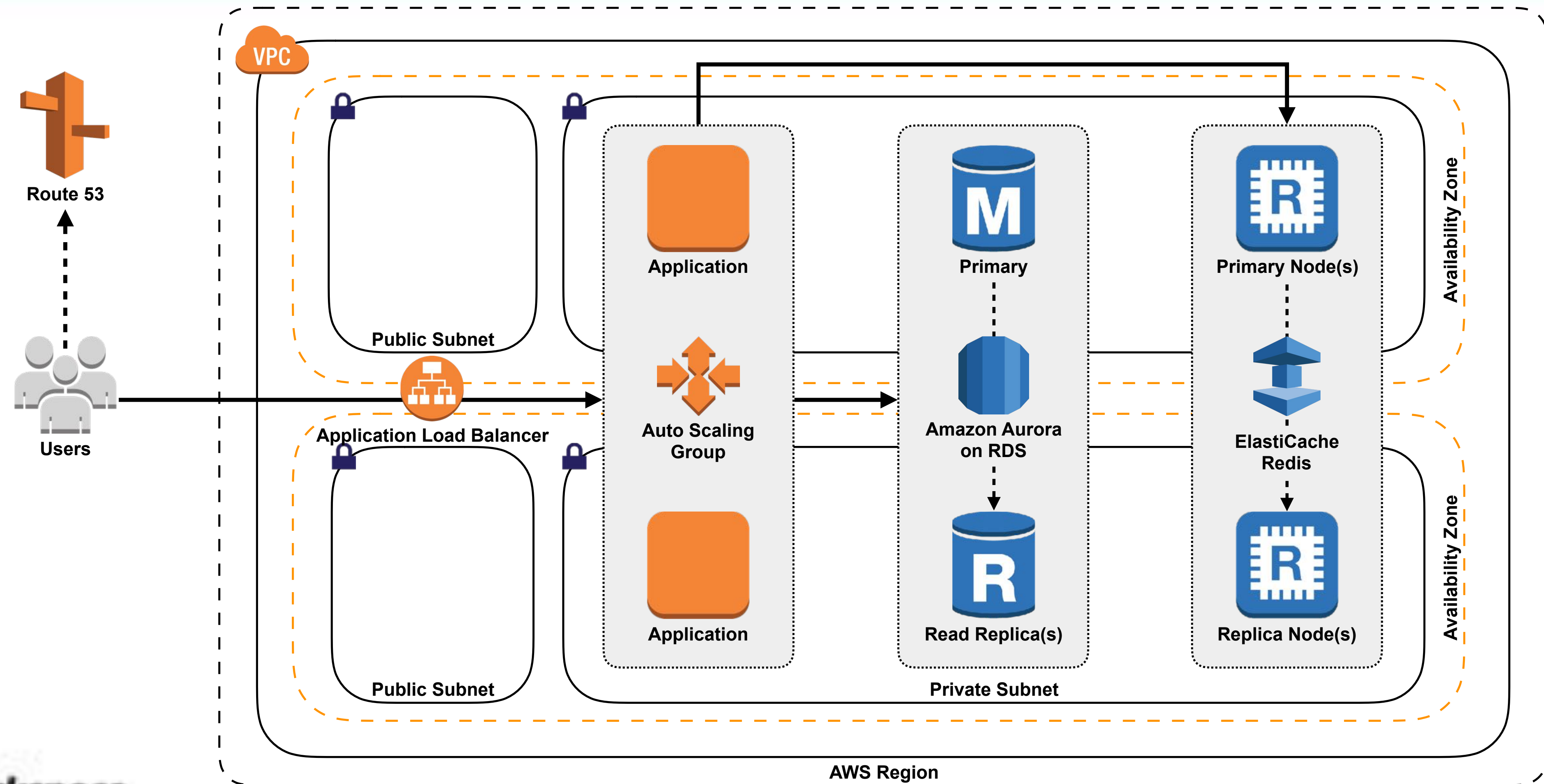
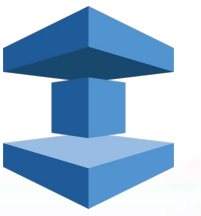
- In-memory cache as a service
- Automated setup and patching
- Memcached or Redis
- Fast!
- Easily scalable



Amazon ElastiCache



Amazon ElastiCache



Simple Storage Service (S3)



Simple Storage Service (S3)



- Pay-as-you-go object storage



Simple Storage Service (S3)



- Pay-as-you-go object storage
- 5 TB per bucket with files up to 5 GB



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- 99.999999999% (11 nines) durability



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- 99.999999999% (11 nines) durability
- **File versioning**



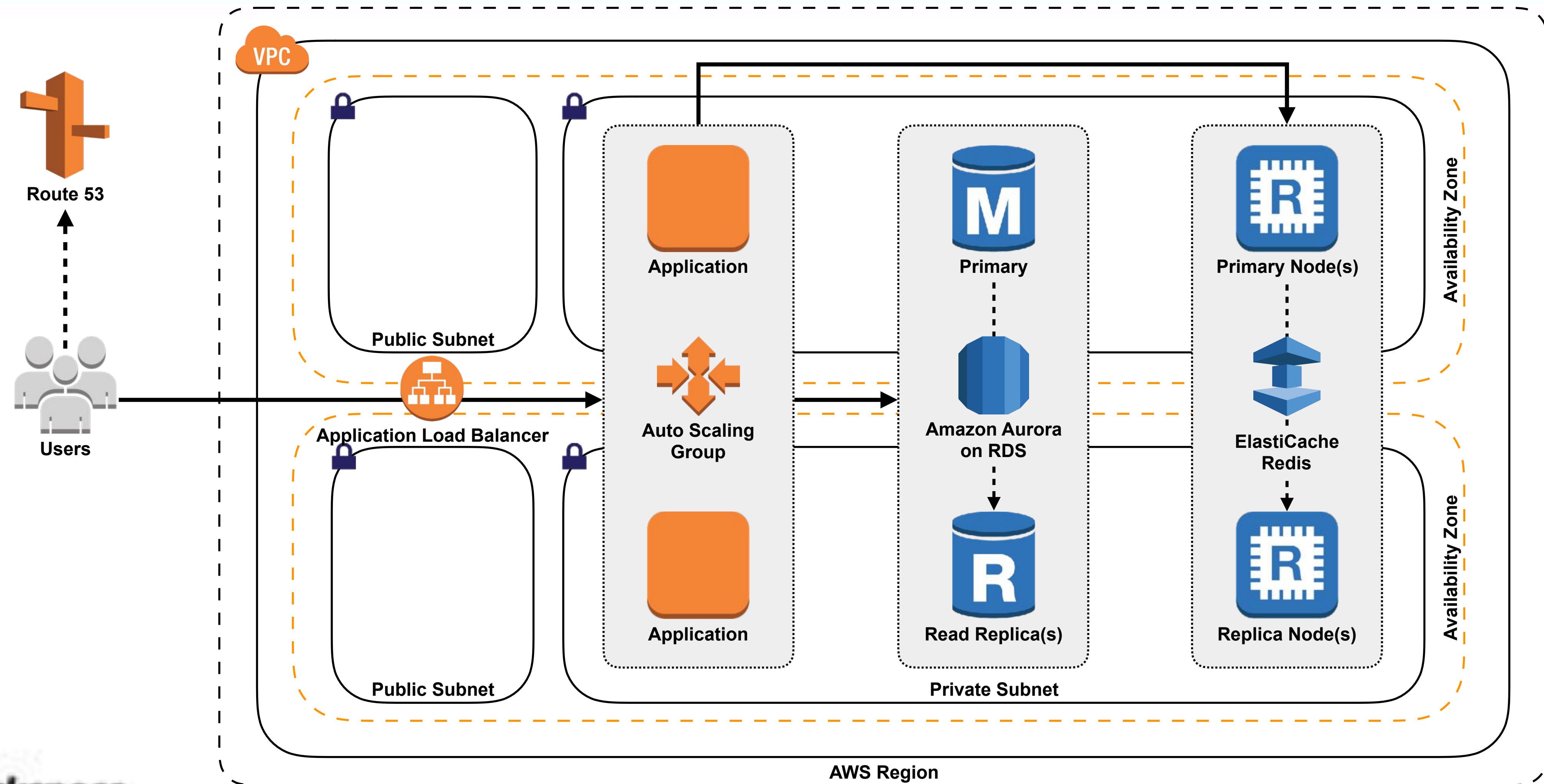
Simple Storage Service (S3)



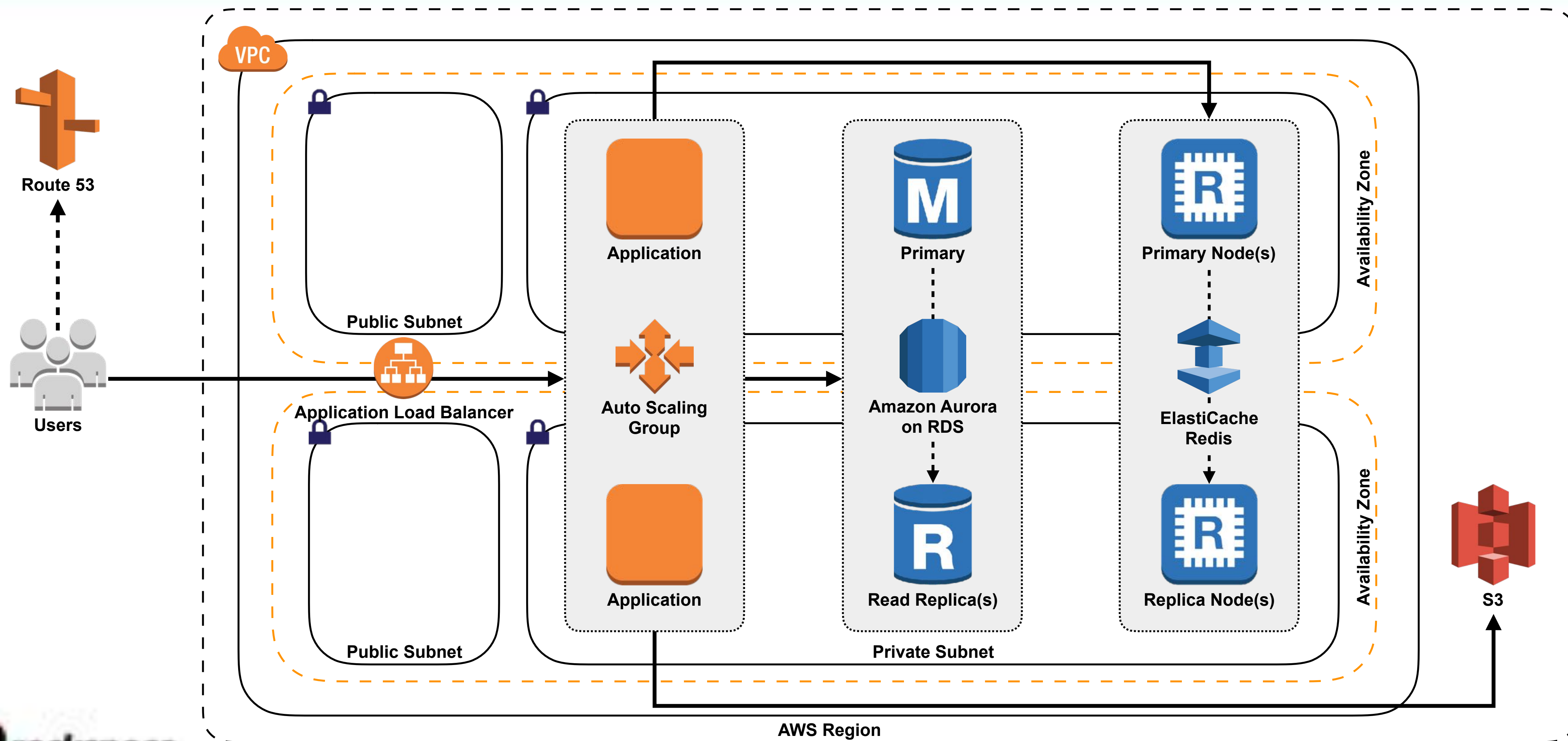
- Pay-as-you-go object storage
- 5 TB per bucket with files up to 5 GB
- 99.999999999% (11 nines) durability
- File versioning
- Static website hosting



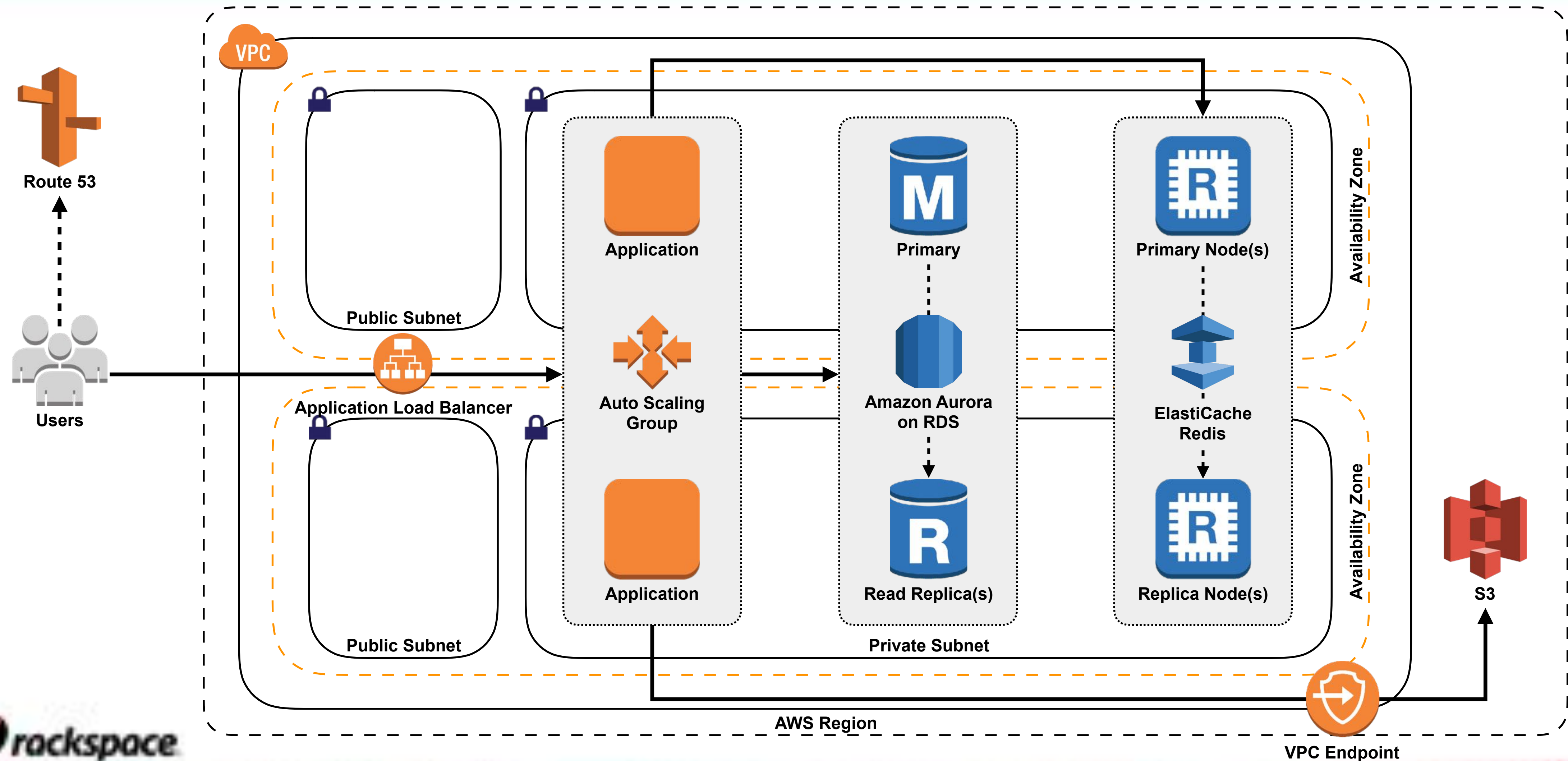
Simple Storage Service (S3)



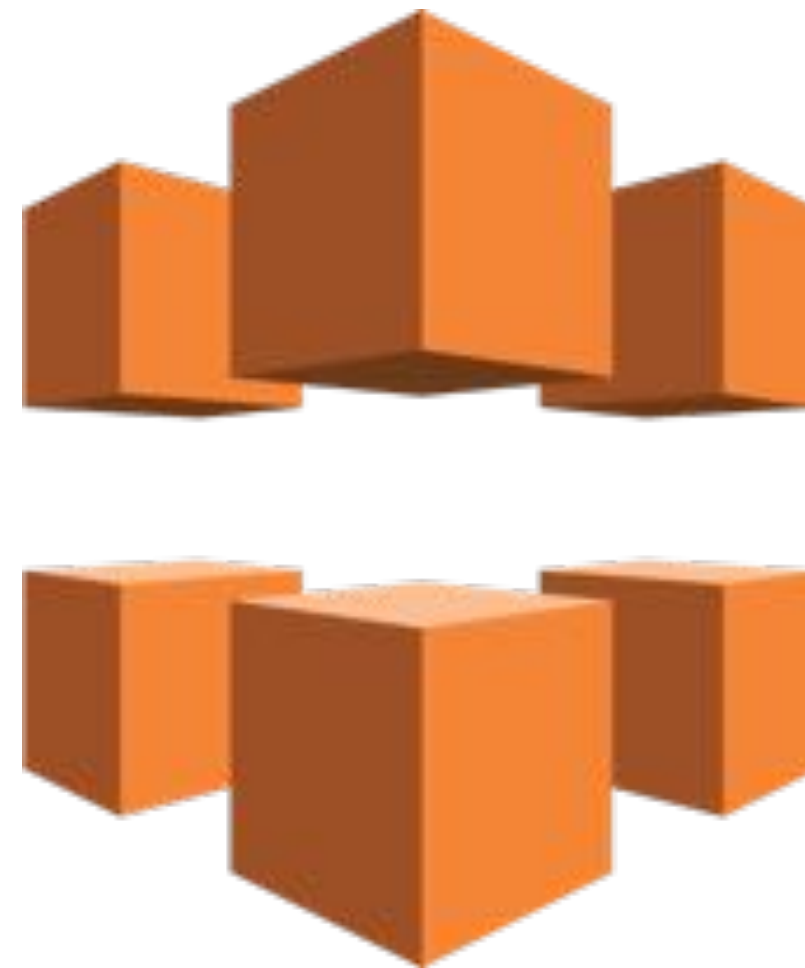
Simple Storage Service (S3)



Simple Storage Service (S3)

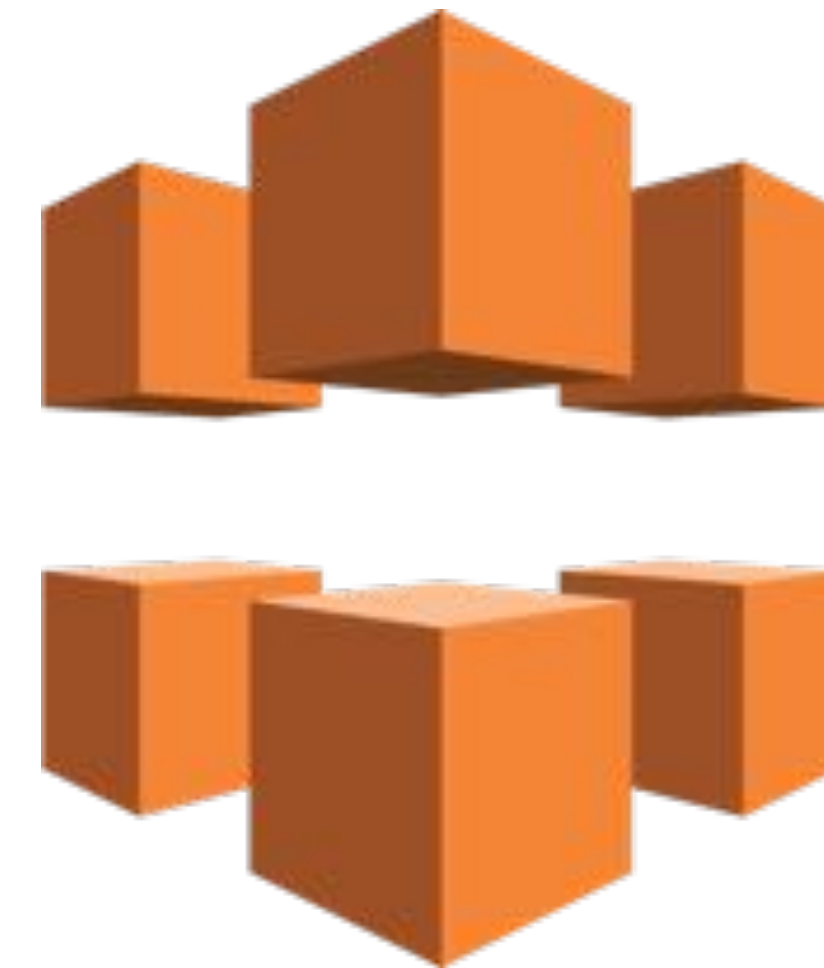


Amazon CloudFront

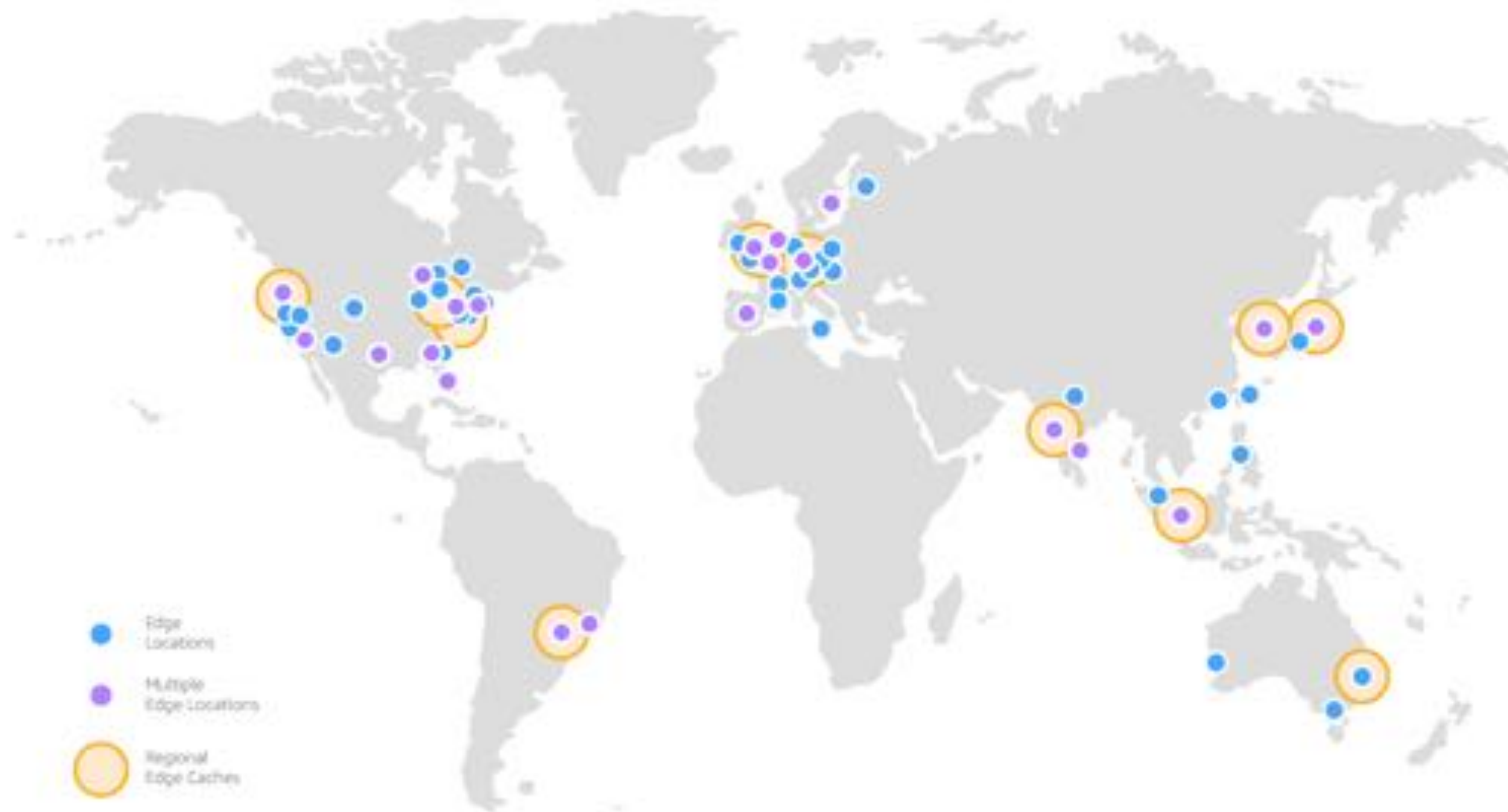
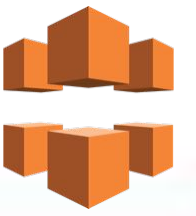


Amazon CloudFront

- Global content delivery network (CDN)

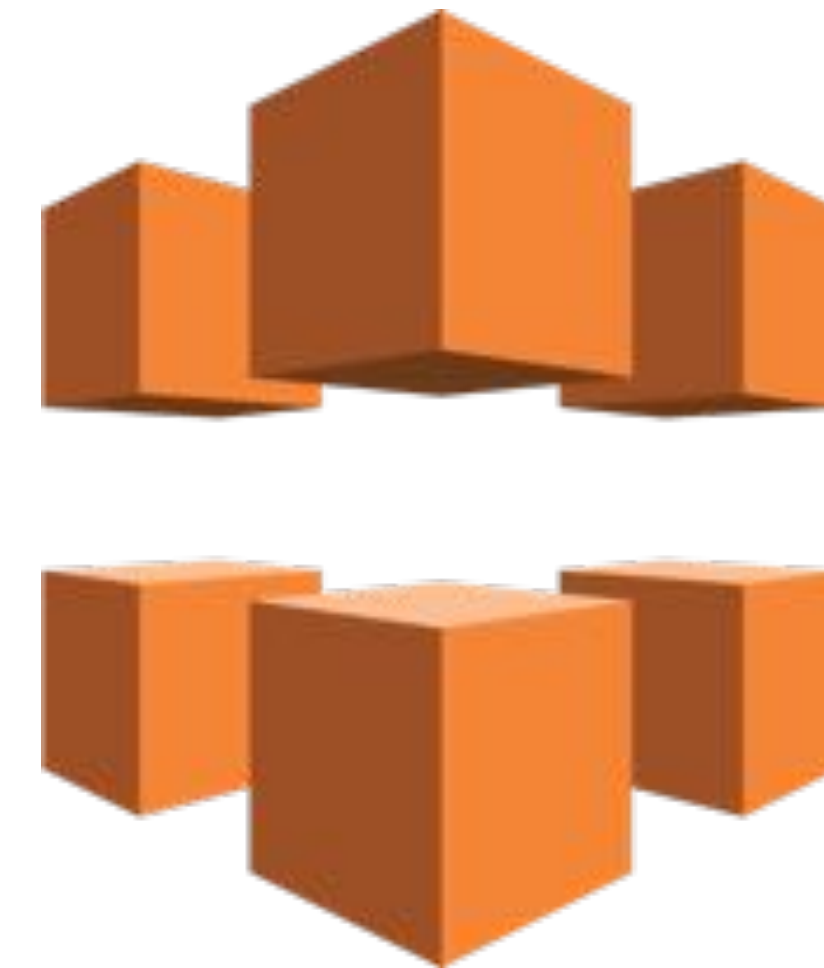


100+ Edge Locations across 24 countries



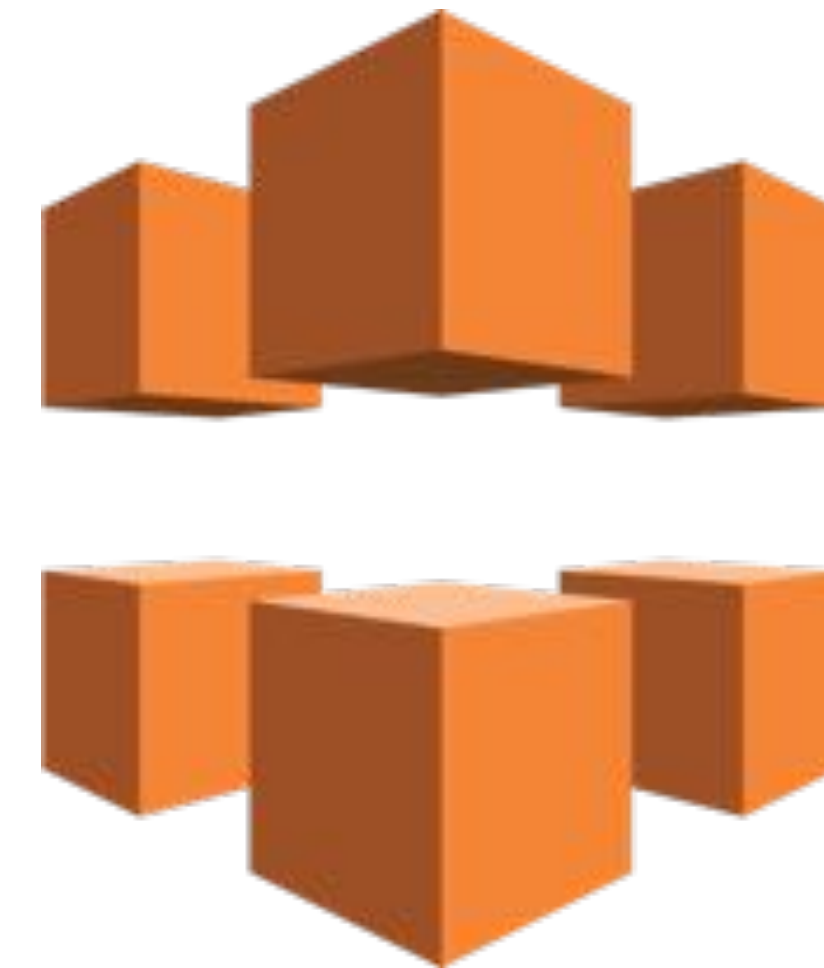
Amazon CloudFront

- Global content delivery network (CDN)
- Deep integration with EC2, ELB, and S3



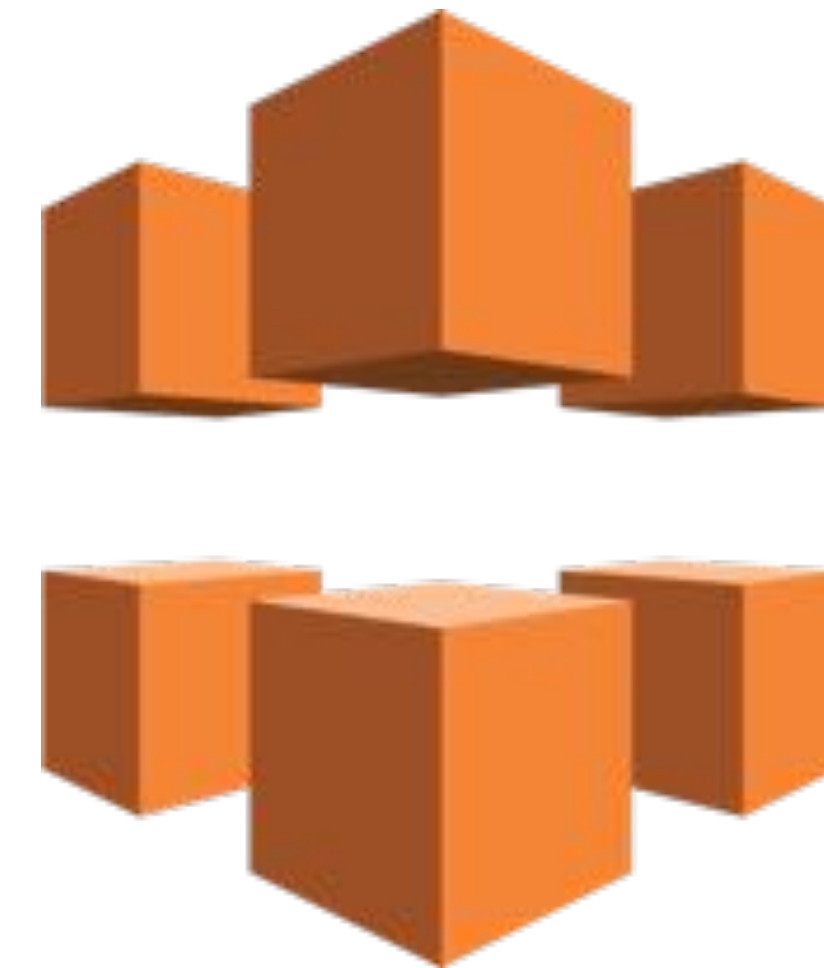
Amazon CloudFront

- Global content delivery network (CDN)
- Deep integration with EC2, ELB, and S3
- **SSL/TLS available**

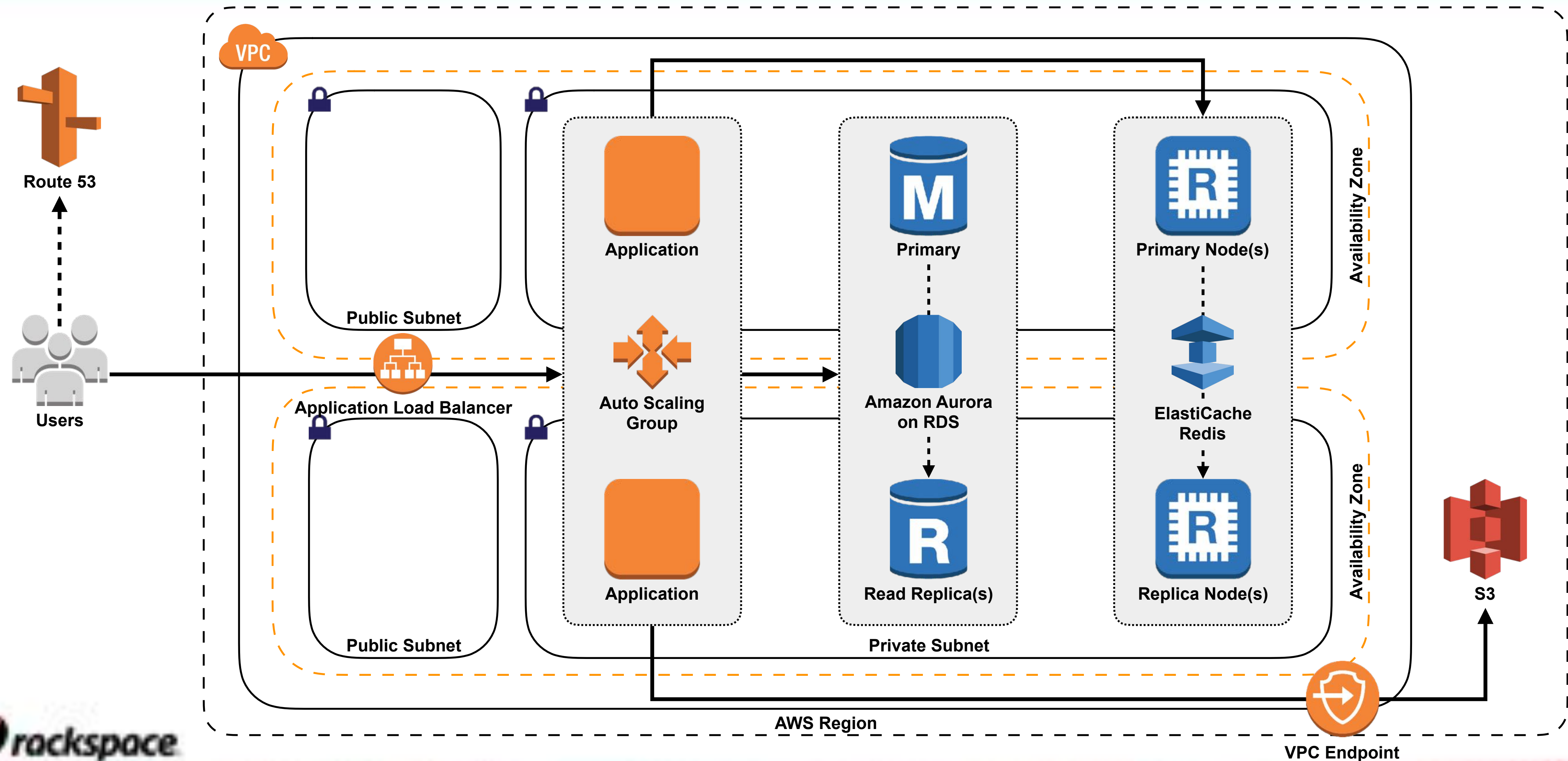
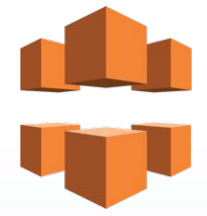


Amazon CloudFront

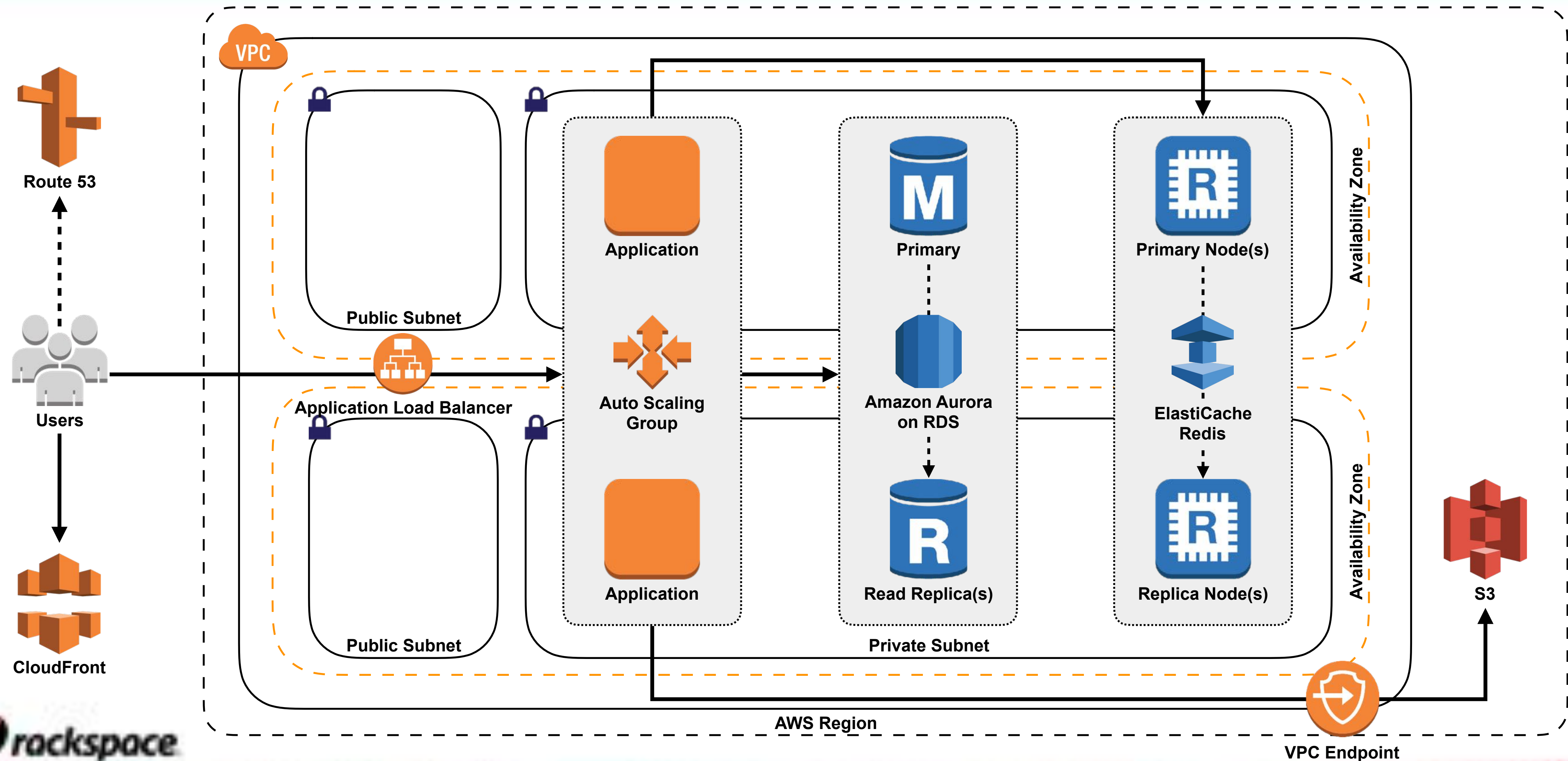
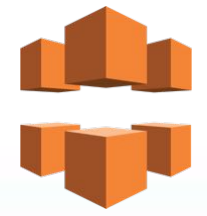
- Global content delivery network (CDN)
- Deep integration with EC2, ELB, and S3
- SSL/TLS available
- Private content support



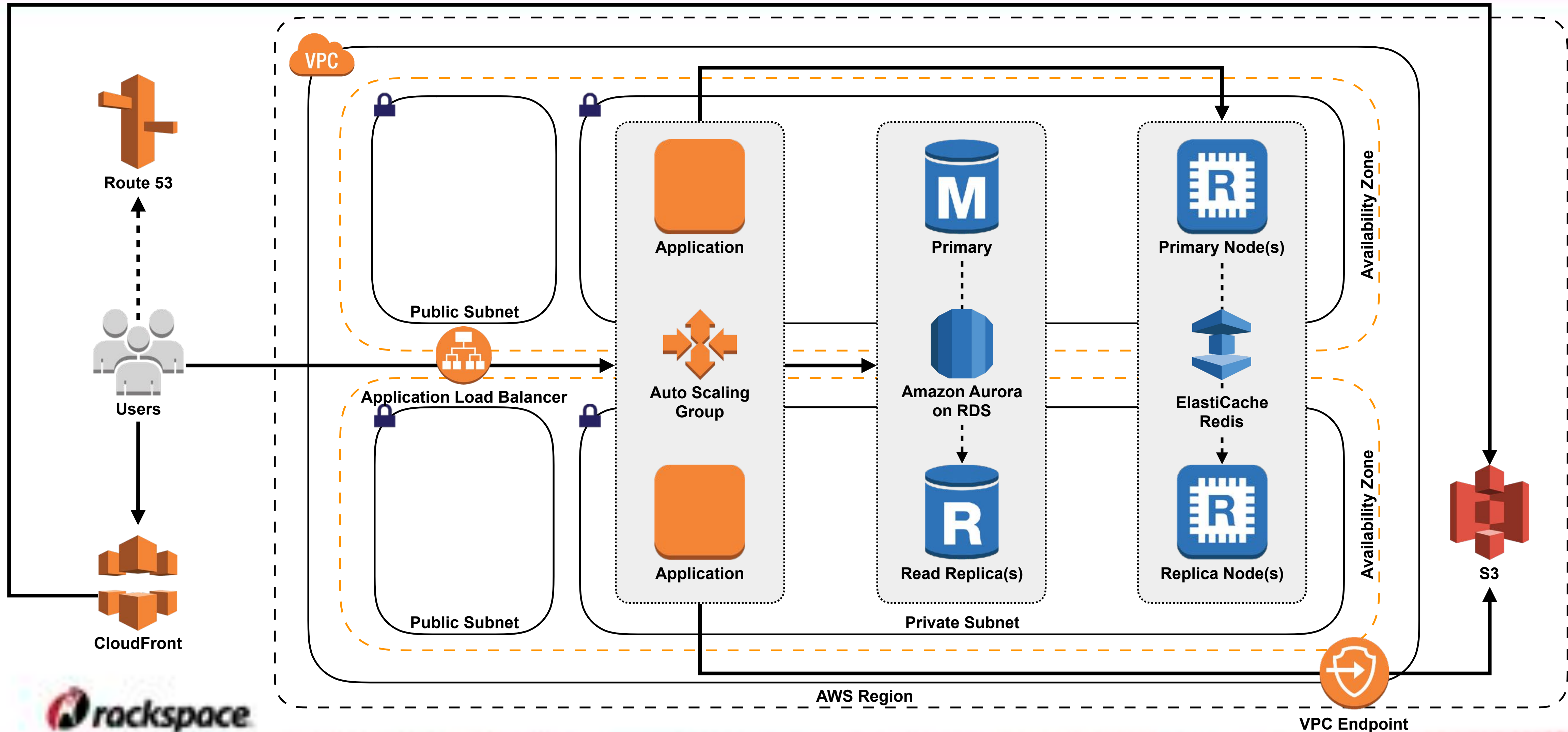
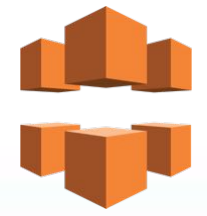
Amazon CloudFront



Amazon CloudFront



Amazon CloudFront



<https://joind.in/talk/97b36>

Thanks!

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