
AWS
re:Invent
NOV. 28 – DEC. 2, 2022 | LAS VEGAS, NV

HYB202

AWS Local Zones: Building applications for a distributed edge

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Baptist Health South Florida

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Agenda

- What are AWS Local Zones?
- AWS supported services
- Why we built them?
- How it works?
- Customer use cases
- Q&A

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Cloud continuum – Extending the AWS Cloud

DELIVERING CLOUD ANYWHERE CUSTOMERS NEED IT

Global



AWS Regions

30 (+5)

Metro center edge



AWS Local Zones

25 (+27)

Operator 5G edge



AWS Wavelength

28

On-premises edge



AWS Outposts

65 countries and territories

Smart devices edge



AWS IoT Greengrass FreeRTOS

Rugged edge

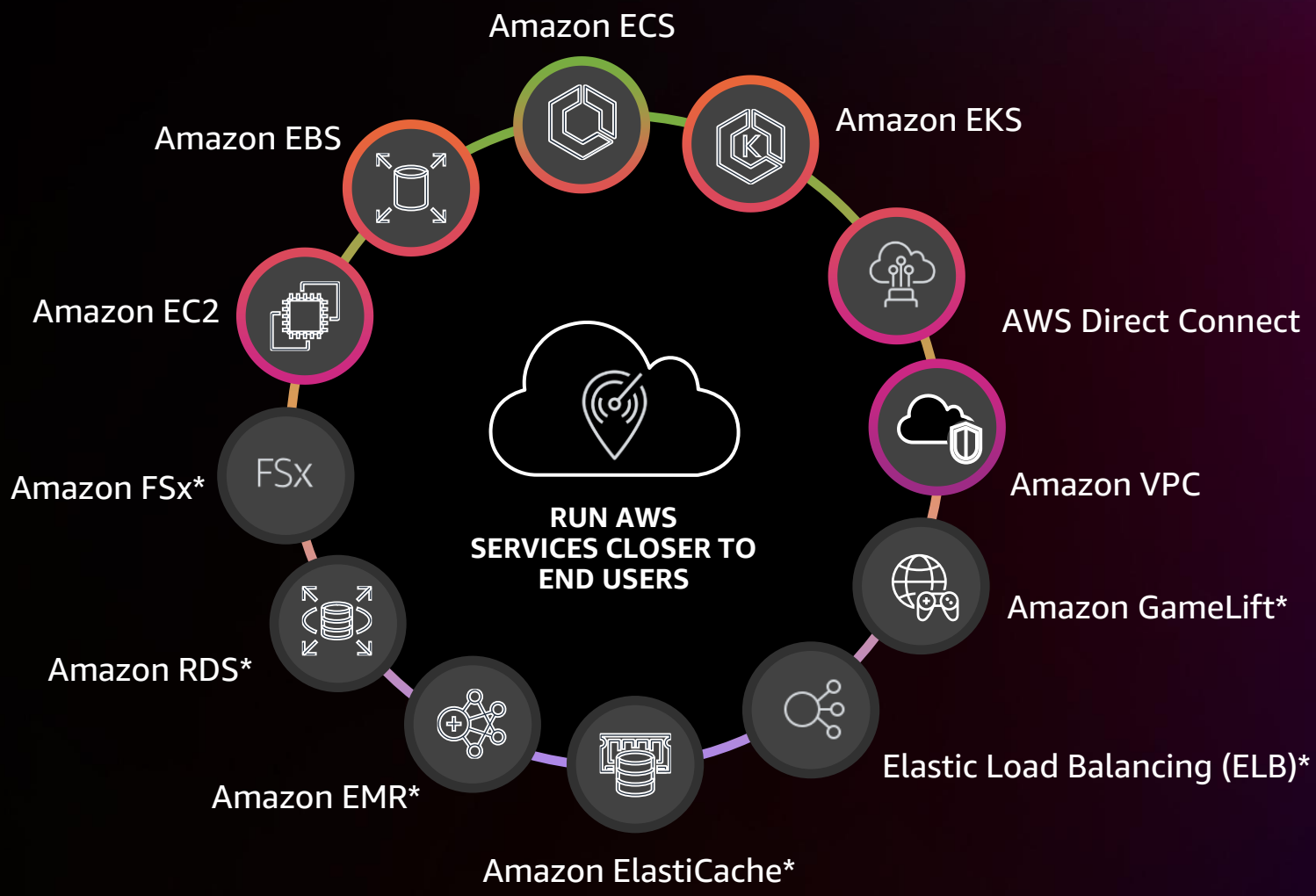


AWS Snow Family

Same infrastructure, services, APIs, and tools for a consistent experience

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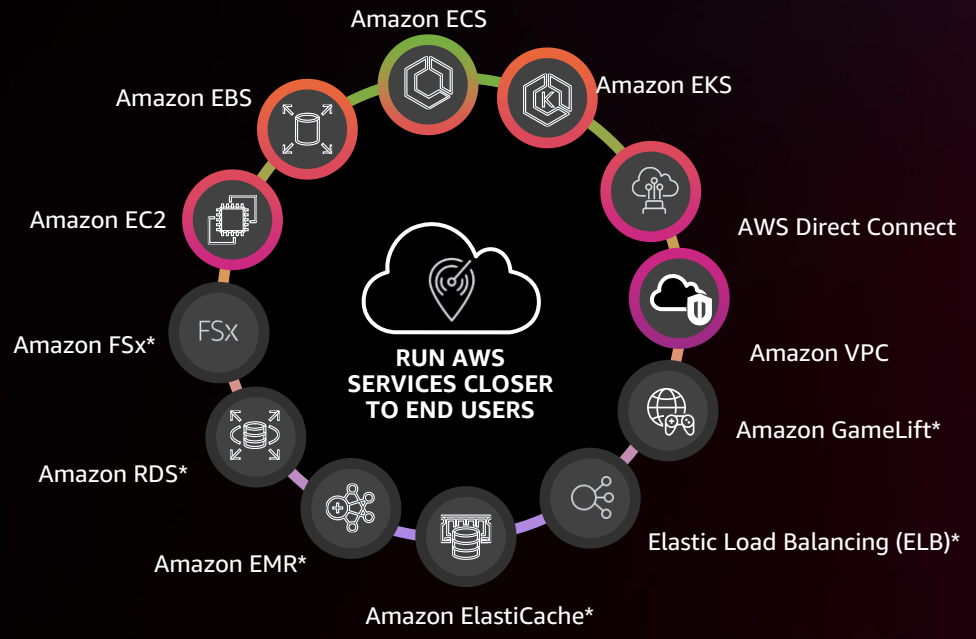
Services available in Local Zones



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* Some services only available in select Local Zones

Regional services fully integrated



AWS CloudTrail

AWS CloudFormation

Amazon EC2 Auto Scaling

Amazon CloudWatch

Amazon S3

Amazon DynamoDB

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Why Local Zones?

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AWS global infrastructure



30 geographical Regions

96 Availability Zones

410+ POPs

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Unique challenges for some customers

Challenges



Low-latency workloads



Data residency

Solutions today



Self-managed

Complex

Costly

Customer feedback

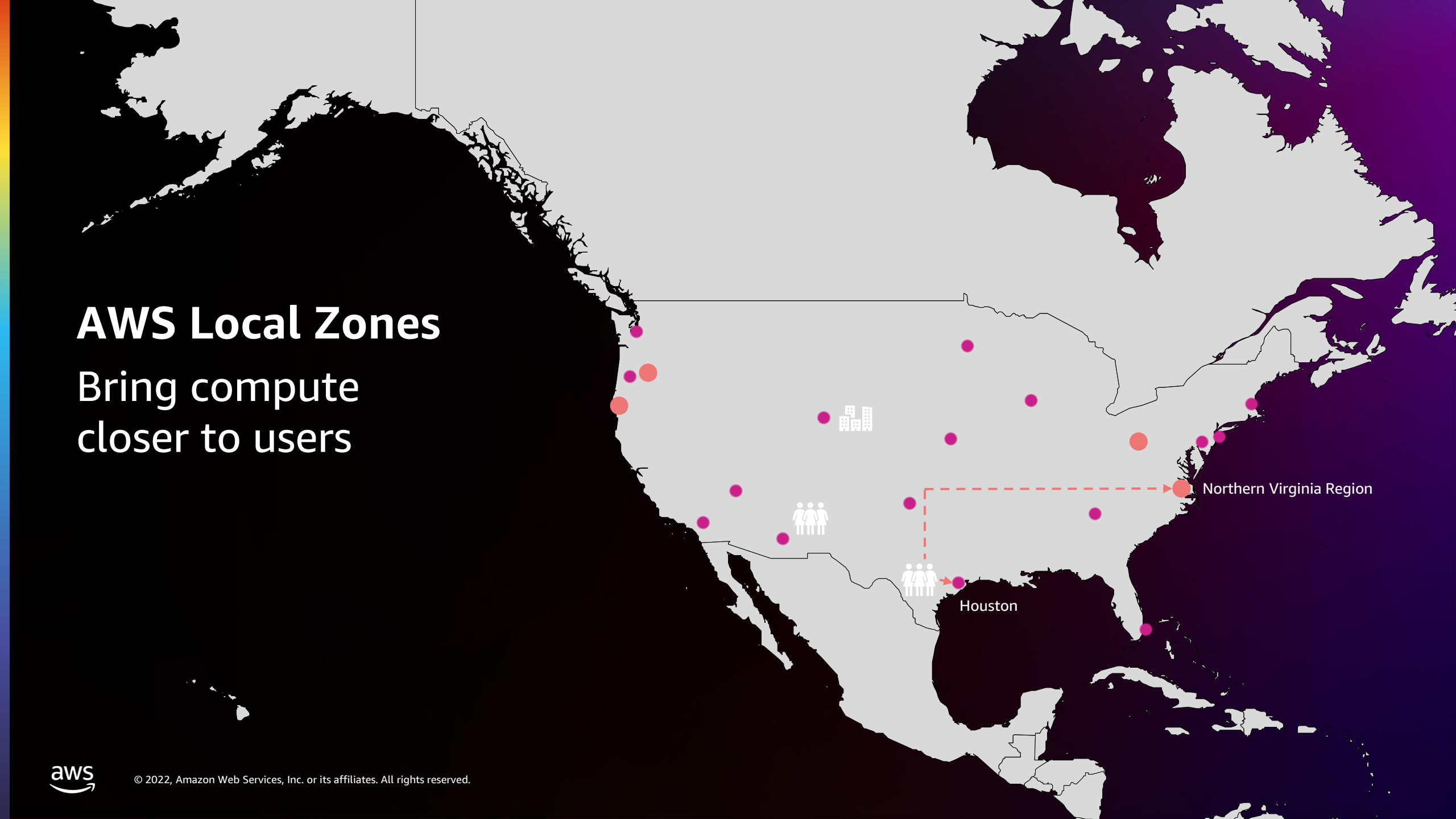


AWS services even closer to end users or data sources

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AWS Local Zones

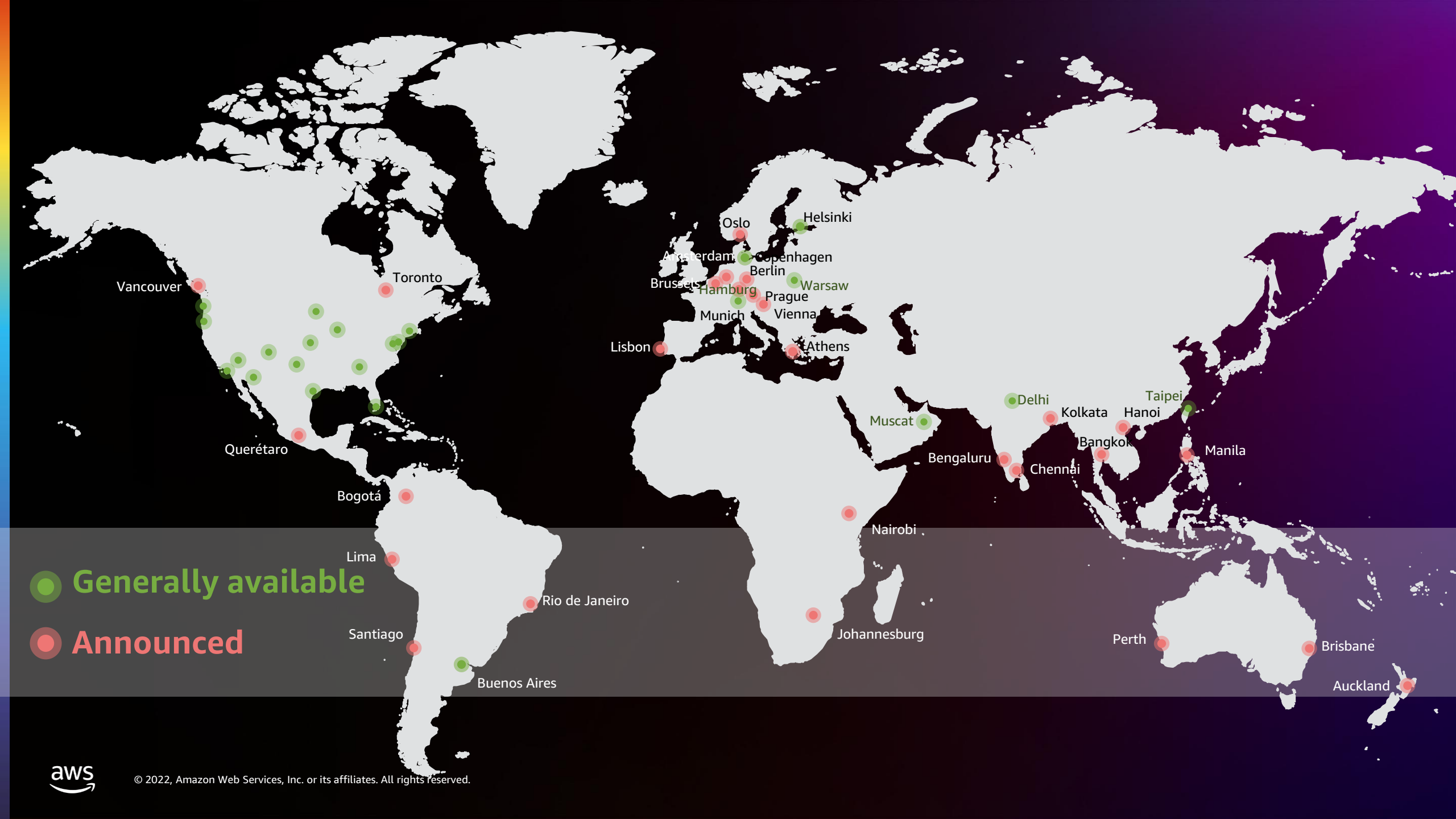
Bring compute
closer to users



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Where are Local Zones?

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How do Local Zones work?

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How it works



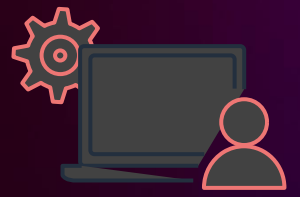
AWS Local Zones



Opt in to AWS Local Zones location from console or API endpoint



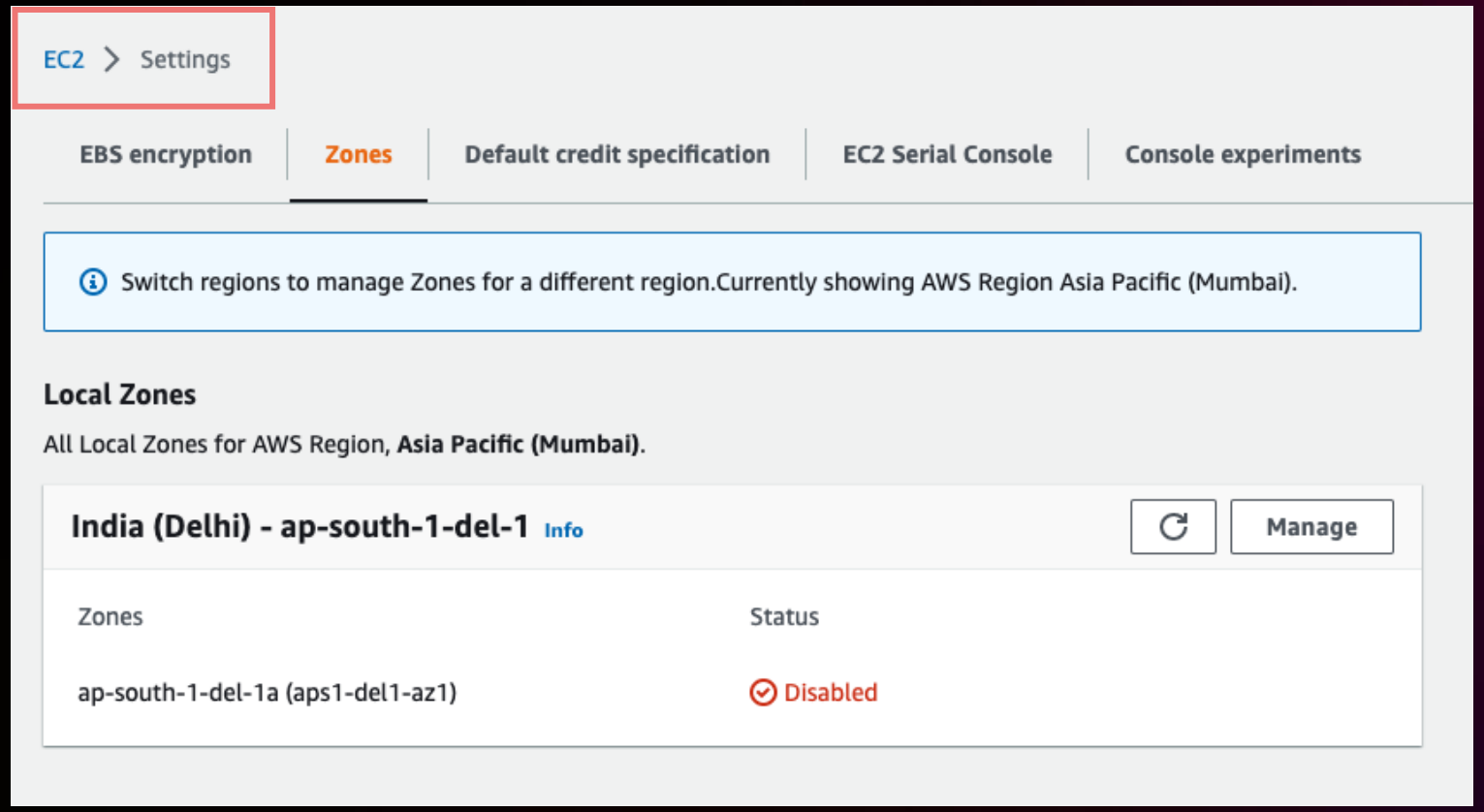
Extend your Amazon VPC to the AWS Local Zone



Build and run your low-latency applications in the AWS Local Zone

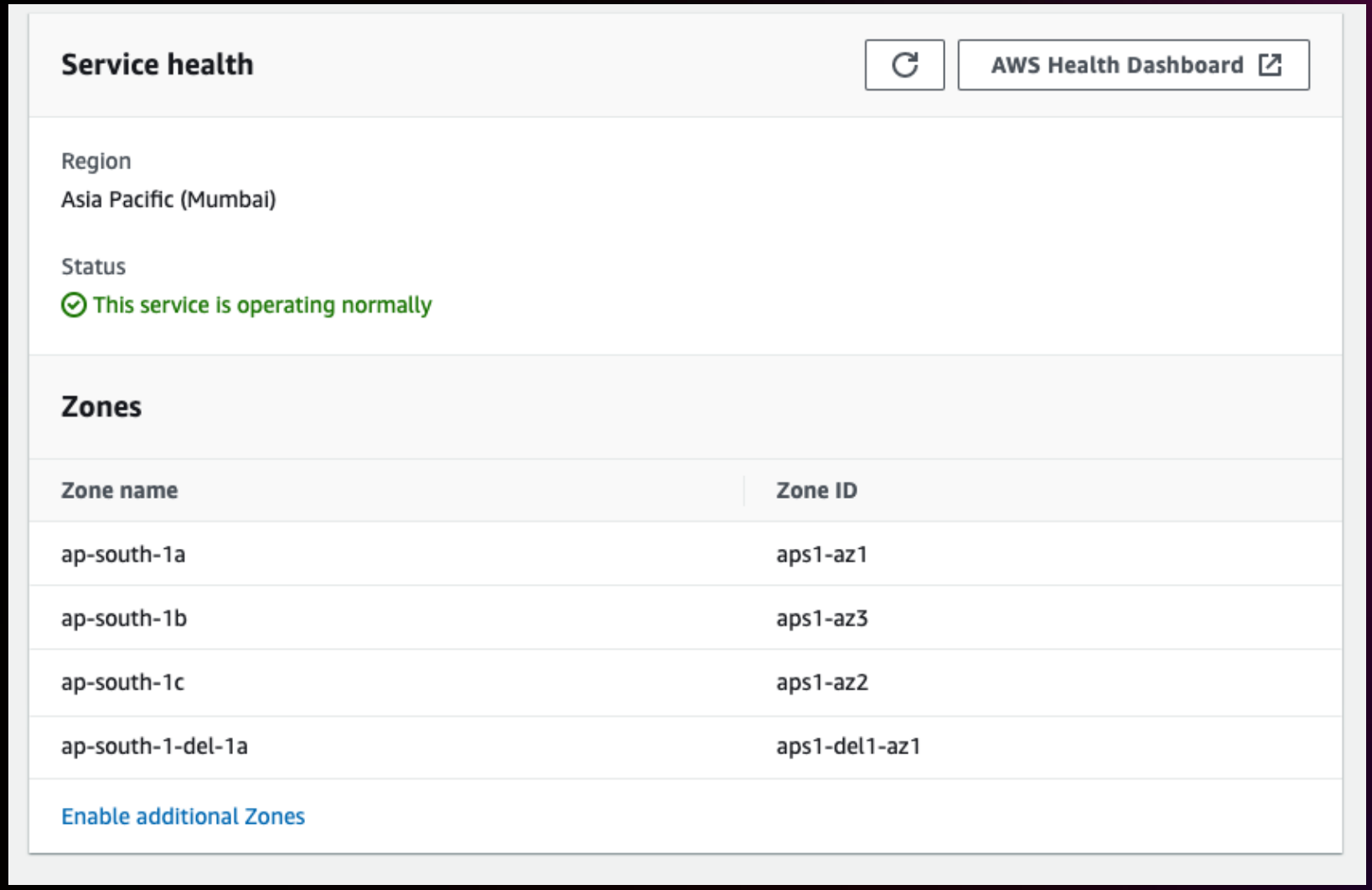
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Opt in to Local Zones from console or API endpoint



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AWS Local Zones in console



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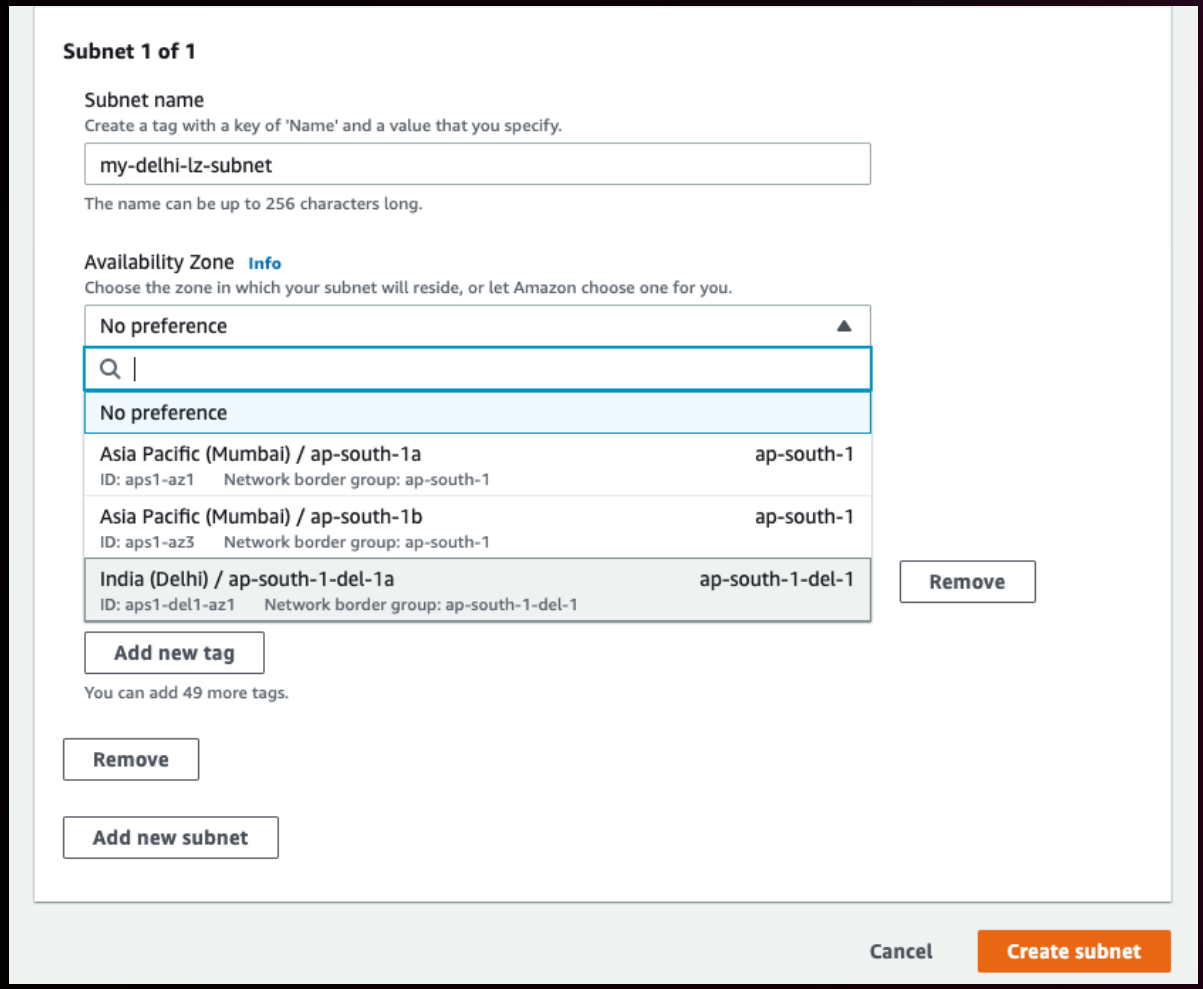
AWS Local Zones – API/CLI experience

```
> aws ec2 describe-availability-zones --all-availability-zones --region ap-south-1

{
    "AvailabilityZones": [
        {
            "ZoneName": "ap-south-1-del-1a",
            "ZoneId": "aps1-del1-az1",
            "ZoneType": "local-zone",
            "GroupName": "ap-south-1-del-1",
            "State": "available",
            "OptInStatus": "opted-in",
            "Messages": [],
            "NetworkBorderGroup": "ap-south-1-del-1",
            "RegionName": "ap-south-1",
            "ParentZoneName": " ap-south-1c",
            "ParentZoneId": "aps1-az3"
        },
```

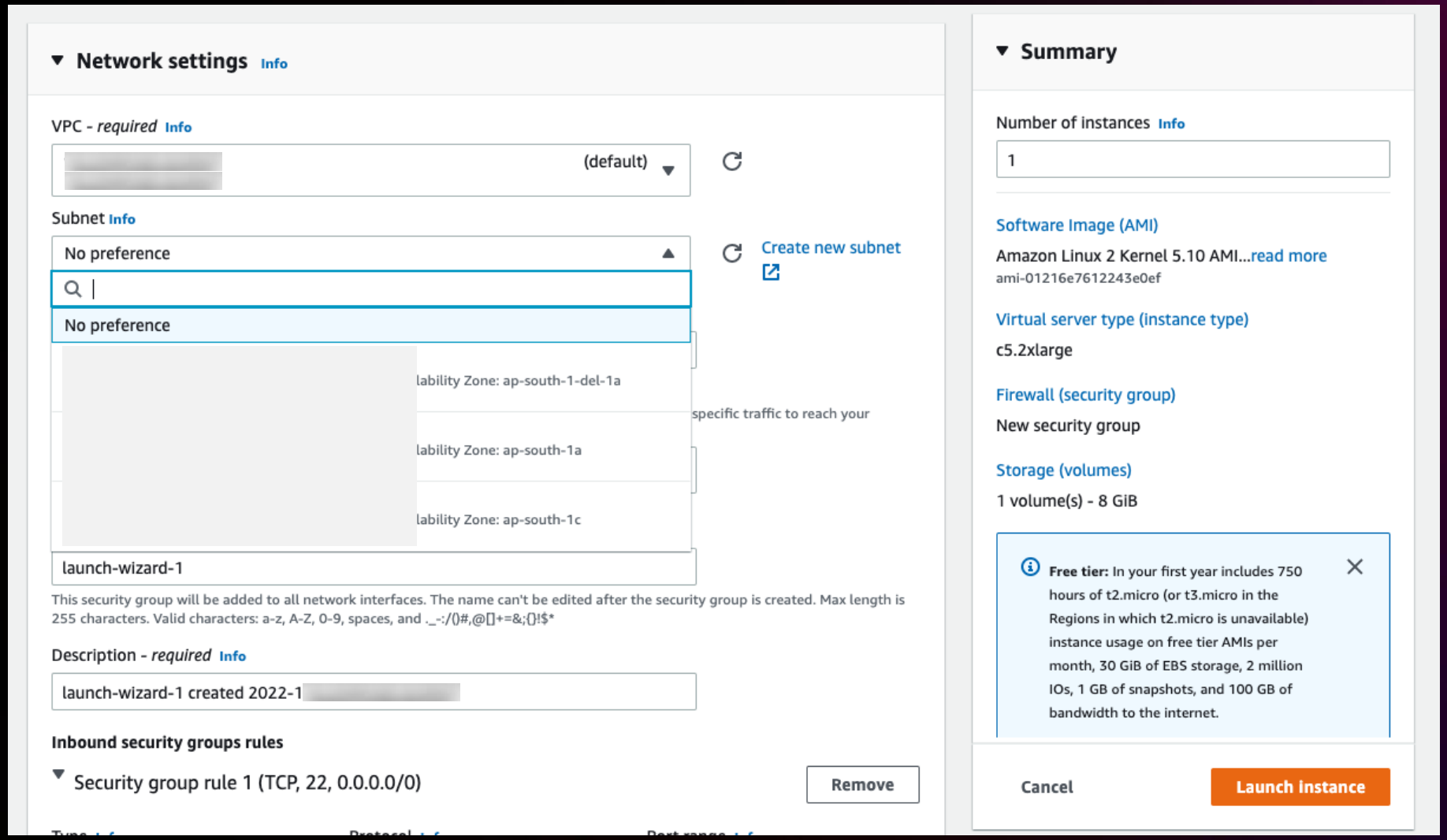
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Extend your VPC to AWS Local Zones



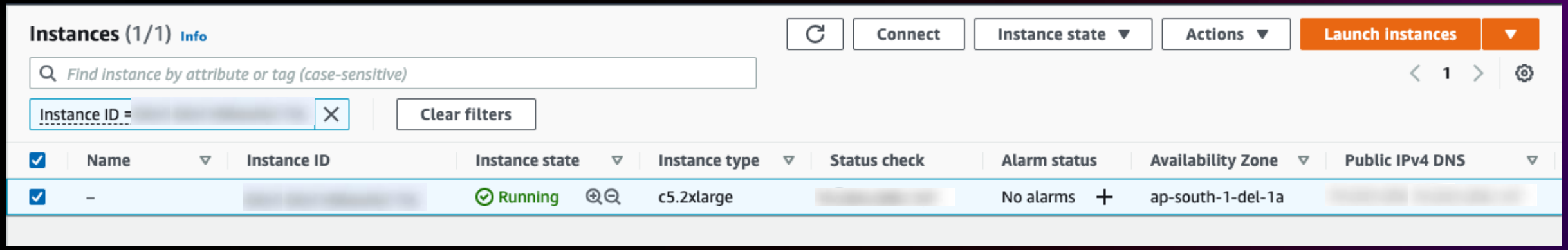
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Launch EC2 instance in Local Zones



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Launch EC2 instance in Local Zones



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Why and how are customers using Local Zones?

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1. Latency

Multiple locations

Distributed edge

dish wireless · Norton · SUPERCELL

Select locations

Hybrid migration

Baptist Health · MINDBODY · NETFLIX

2. Regulatory

Data residency

FANDUEL · RUSH STREET INTERACTIVE

aws

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1. Latency

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Multiple locations

Select locations

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Data residency

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NortonLifeLock use case

Lei Gu

Senior Technical Director/Architect
NortonLifeLock

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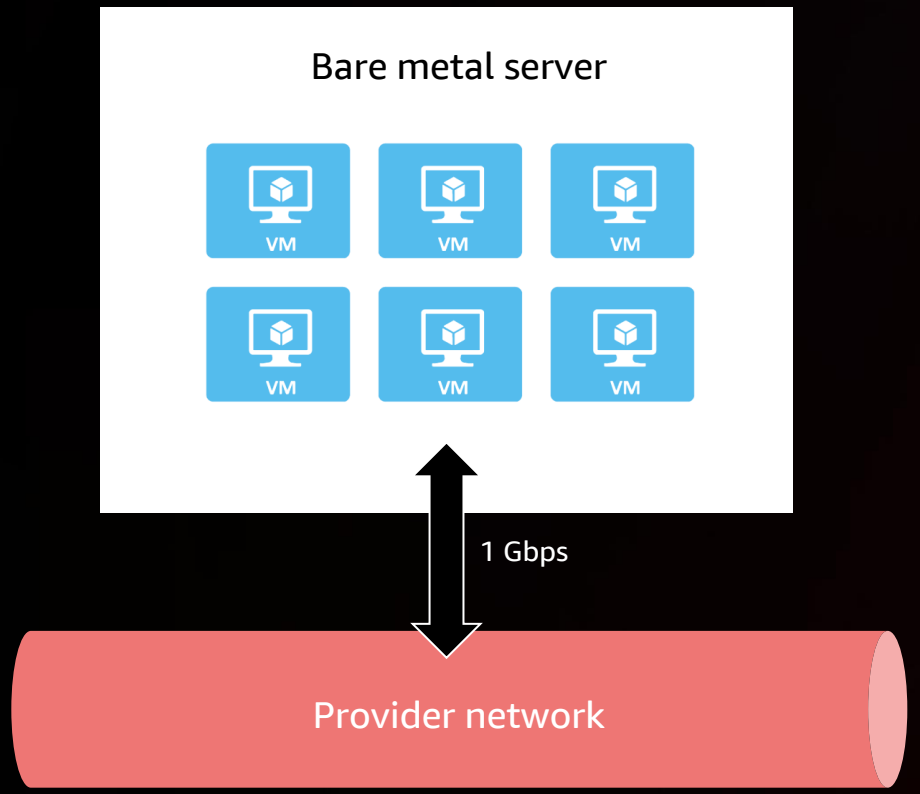
Norton Secure VPN

- NortonLifeLock, the largest cyber safety/consumer protection company
- Norton Secure VPN part of Norton 360 suite, also a standalone product
- Tens of millions of customers
- Millions of daily active users
- Thousand of edge VPN servers
- On a daily basis, petabytes of data transferred through AWS network

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Prior to AWS migration

VPN server deployment



User experience



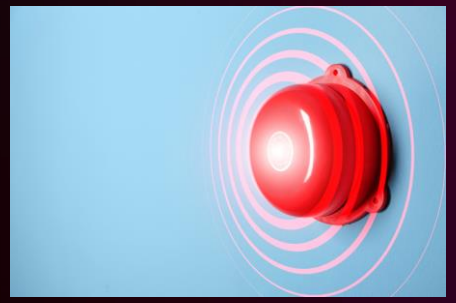
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Prior to AWS migration

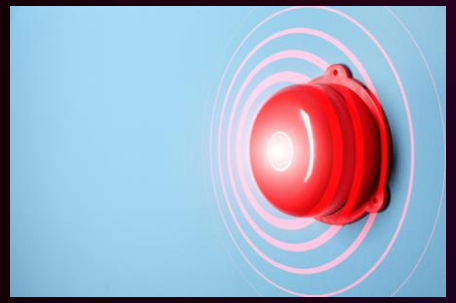
Engineer at 9 AM team standup



2 AM – Server is down



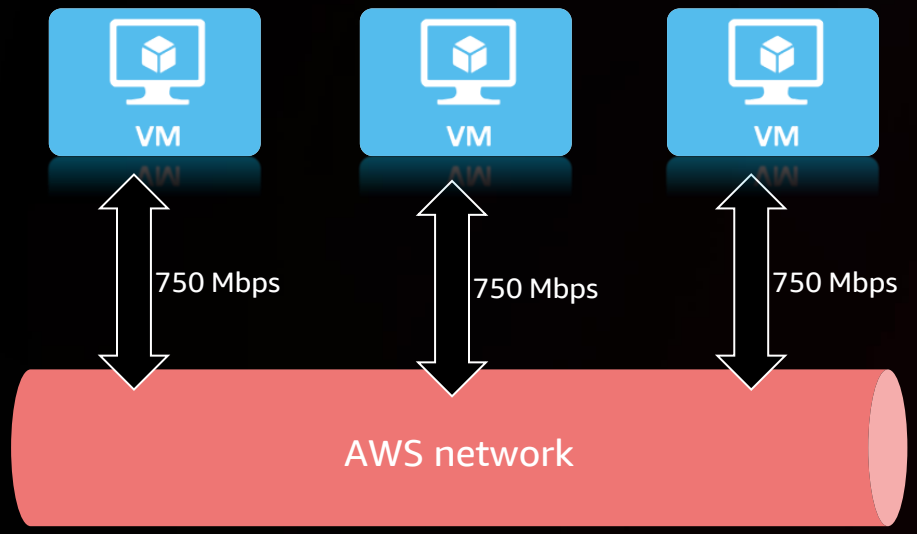
5 AM – Server is down



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After AWS migration

VPN server deployment



User experience



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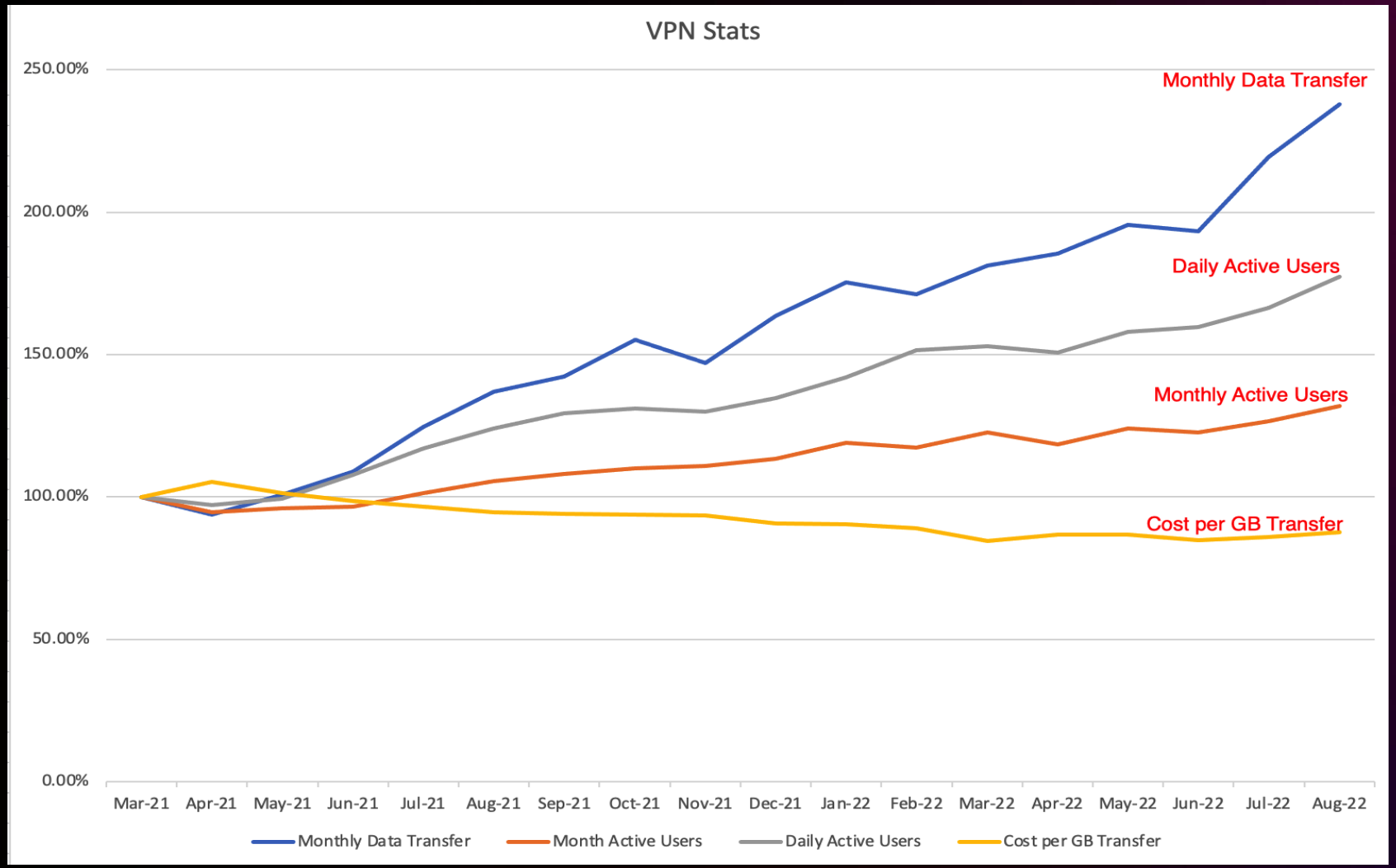
After AWS migration





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Growth after AWS migration



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Why should you consider Local Zones?

Improve user experience

- Latency to edge and to content provider
- Initial connection time
- Upload and download speed
- Shortest and quickest path to enter AWS network

Boost third-party reviews

- Latency
- Initial connection time
- Upload and download speed
- Number of regions
- Server count

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Why Local Zones are the perfect solution

- Place edge servers closer to customers
- Shortest and quickest path to enter AWS network
- Require compute and network only
- Metrics and logging fully integrated with Amazon CloudWatch
- Existing monitoring dashboard and alert continue to work

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Local Zones vs. regional deployment

Local Zones

- Edge servers
- End-user stats collectors
- Traffic redirectors (to closest edge server)

Regional zone

- Serverless microservices
- Managed services
- Data stores
- Analytics ingestion

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Lessons learned

Configuration

- Automate Local Zone creation and configuration
- Plan subnet ranges carefully
- Don’t run out of subnet IPs
- Check for bugs related to region count
- Leave room for future growth

Deployment

- Ready for heterogeneous instance types
- Anticipate ununiform instance creation experience
- Performance benchmarking based on new instance types
- Capacity planning with your AWS account team
- Be patient and work with support

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After rolling out Local Zones

Client Region	Median Latency Improvement	Median Distance Improvement
CO	63.04%	5.99%
FL	50.49%	73.47%
IL	54.31%	90.50%
MA	49.24%	94.62%

Overall 20% improvement in download speed

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1. Latency

Multiple locations

Distributed edge



Select locations

Hybrid migration

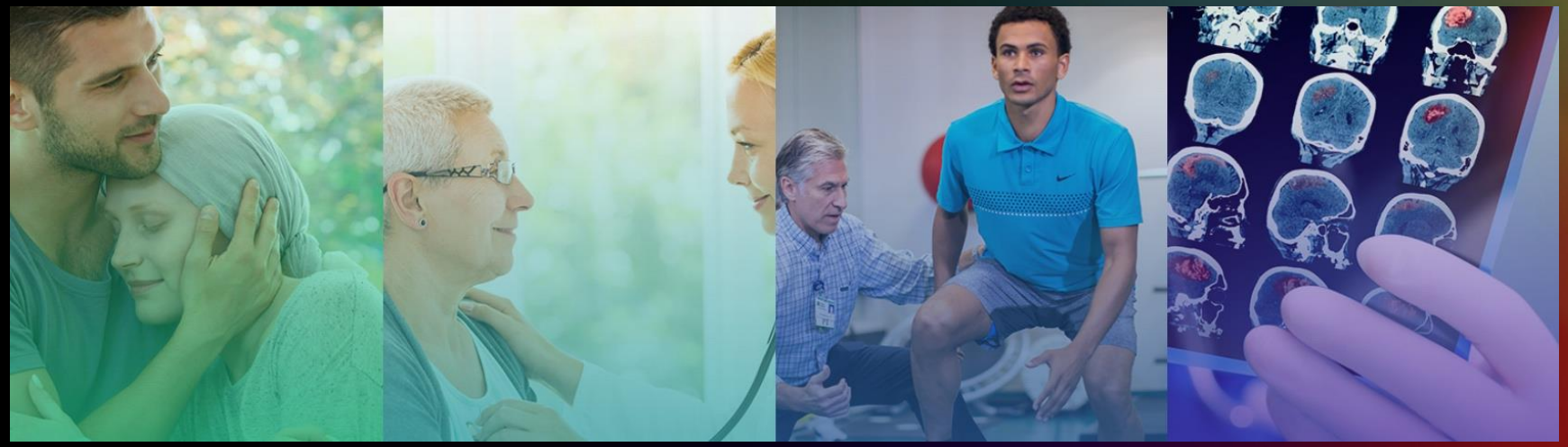


2. Regulatory

Data residency



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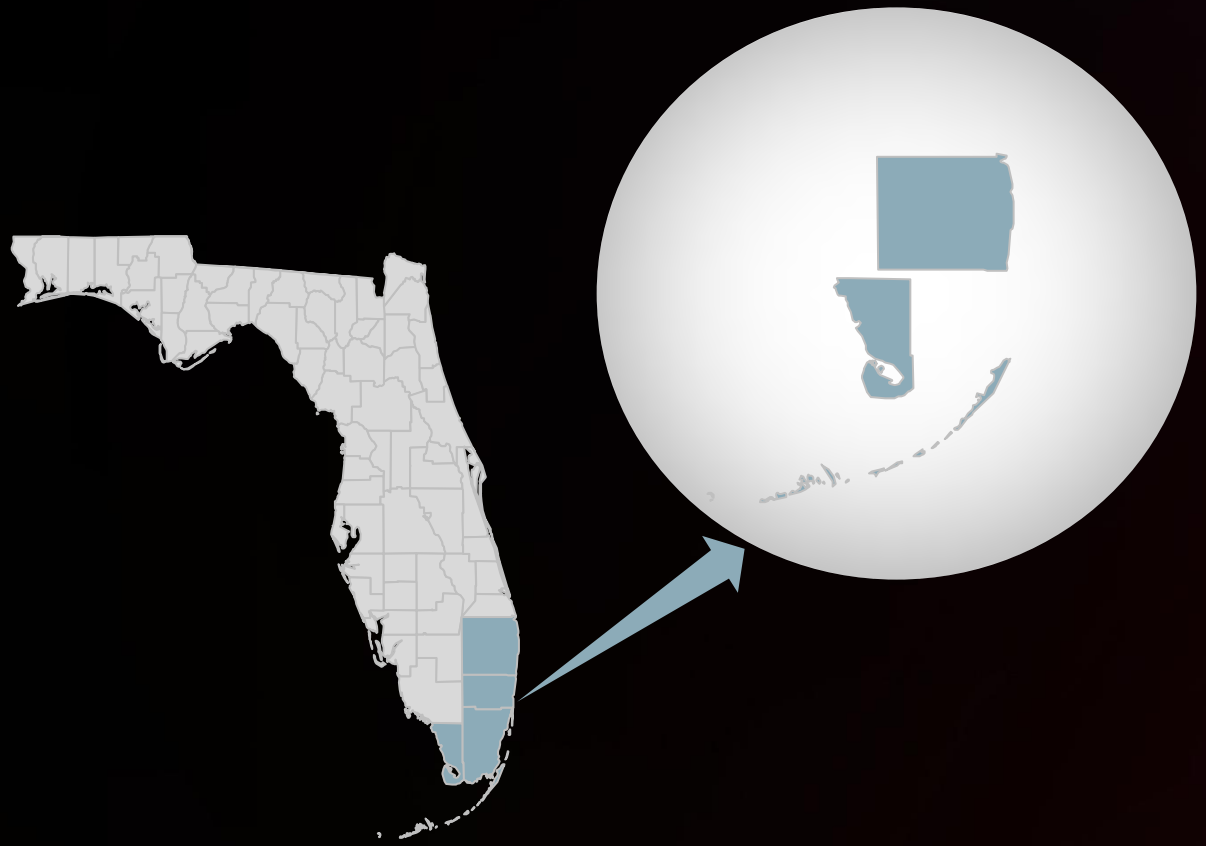
BHSF use case

Deepu Kumar

Vice President and Chief Technology Officer
Baptist Health South Florida

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BHSF – Who we are



Baptist Health South Florida

- Largest regional not-for-profit healthcare provider in South Florida
- 11 hospitals and over100 outpatient centers
- 26,000 employees
- 4,000+ physicians
- More than 1.5 million patient visits per year
- Listed in Fortune 100 Best Places to Work for 21 years
- Currently undergoing digital transformation

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BHSF – Cloud journey

3 data centers

450+ applications



2 data centers

Cloud RA

60% applications migrated

Cloud-first deployment

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Why Local Zones?

Mission-critical healthcare apps

Research studies

Sub-millisecond latency needs

Data-intensive applications

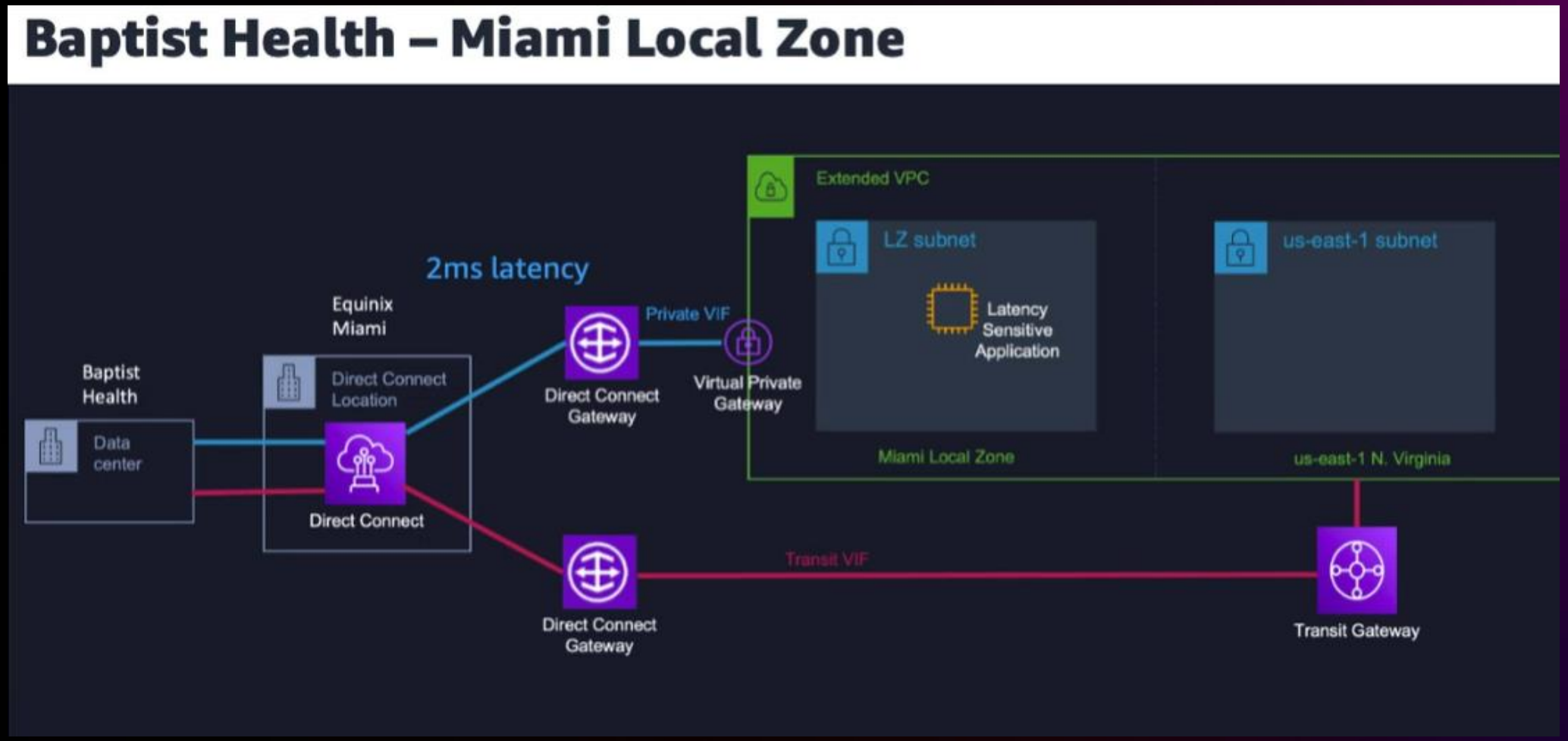
- Miami is local for Baptist Health South Florida
- Applications with low-latency response time
- Data residency and local data processing
- Same ease of AWS core services and developer experience
- Secure and fast integration with AWS East Regions
- Pay-as-you-go pricing and AWS Savings Plans extension



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BHSF – Cloud journey



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Benefits of Local Zones

- Consistent tools and processes
- Low network latency
- Reduced on-premises footprint
- Improved migration speed
- Consistent security posture
- Flexibility and agility of cloud

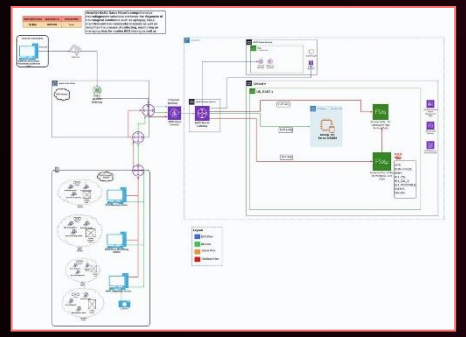
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Local Zones – Use cases

EEG, LTM, ICU, sleep, and research studies

- 80 TB – Infrequent use
- 10 TB – Live data
- Video streams captured by devices
- Doctors play back (20x speed) to monitor
- 1 Gbps throughput

AWS Virginia Region



Network latency = **27** ms

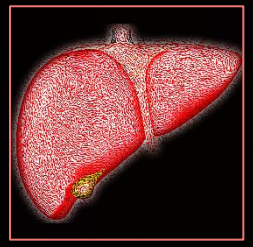
Migrated

AWS Local Zone Miami



Network latency= **2** ms

Liver and tumor segmentation

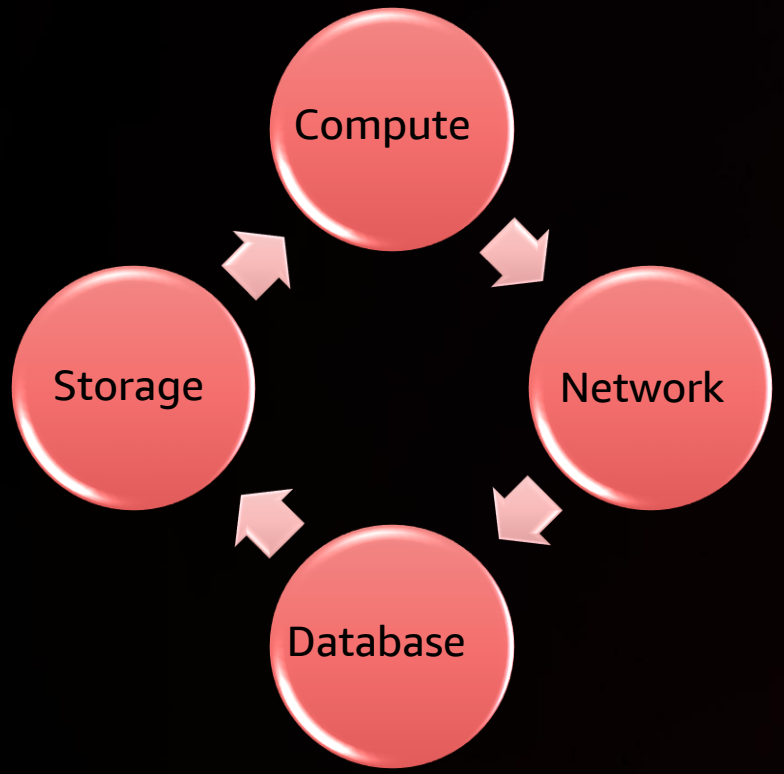


Mammography information system



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AWS services and features used in Local Zones



AWS Foundational Services

GitLab

Terraform

IAM role

AWS CloudTrail

AWS Identity and Access Management (IAM)

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1. Latency

Multiple locations

Distributed edge



Select locations

Hybrid migration



2. Regulatory

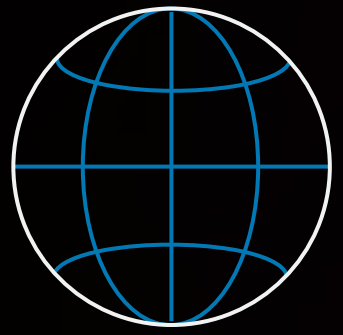
Data residency



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Data residency use cases



Residency

Where regulations dictate that data and infrastructure reside in specific countries

Where contracts specify where applications are deployed

Where enterprises are not ready to move to AWS Regions for information security or other reasons

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Accelerate expansion while meeting data residency requirements

The challenge

Rapidly expand to approved locations in the United States while adhering to strict data residency requirements and delivering an excellent customer experience.

Solution

Migrated betting platforms from OpenStack and VMware to AWS Local Zones. Offloaded day-to-day infrastructure and hardware management to AWS and let engineers focus on building apps that delight customers. Worked with state regulators to understand data residency requirements and deliver a compliant product.

Business outcome

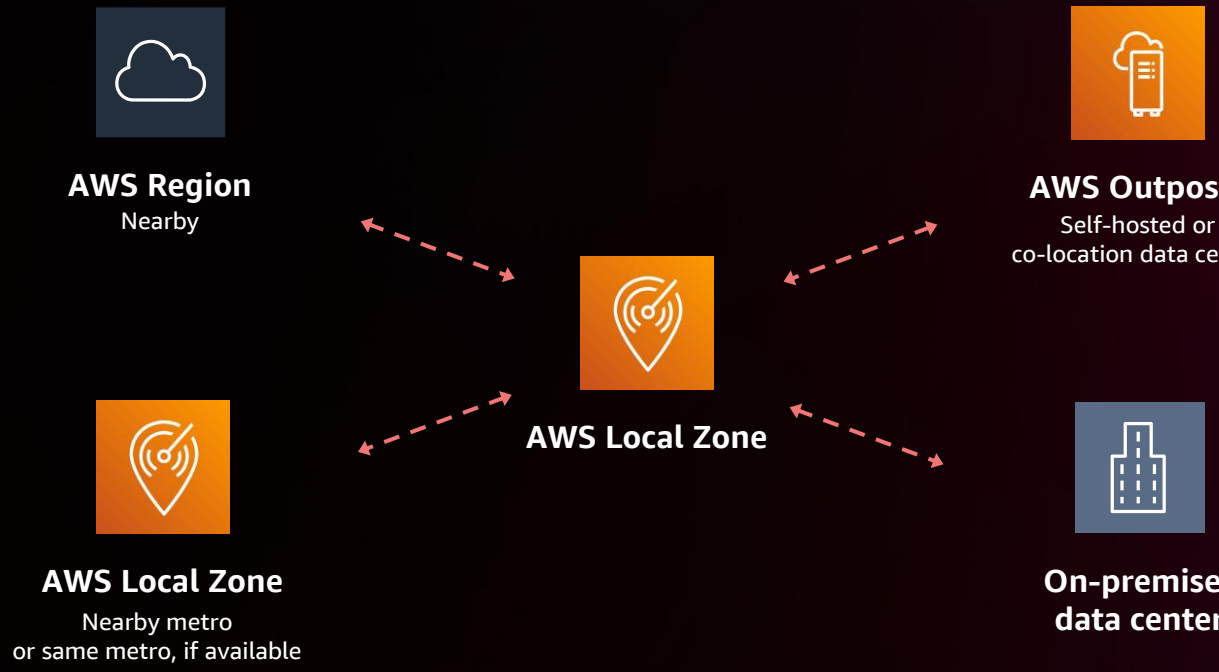
Increased overall productivity
Decreased time to market
Reduced latency
Realized operational savings by spending less time managing infrastructure
Compliant with state regulations for data residency



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Architecting for higher availability



Care must be taken when engineering to meet data residency and fault domain considerations

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