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Distributed Transaction Processing Across Multiple Clouds with Kubernetes

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Meet the Speakers

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Agenda

+ What is multi-cloud?
+ Why multi-cloud for business critical apps?
+ Case study: deploying critical banking apps in the cloud
+ Live demonstration of a Kubernetes multi-cloud environment
+ About NuoDB
+ Q&A

What Is Multi-cloud?

+ Is not hybrid cloud!
+ Multi-cloud
  - Allows applications and their services to move more freely from one public cloud to another
  - Aims to eliminate the reliance on any single physical location and/or cloud provider

Why Multi-cloud for Business Critical Apps?

+ Distributing application and computing resources across different cloud environments maximizes Business Continuity and reduces vendor lock-in
+ As companies seek to increase application service-levels, multi-cloud is driving further the reality of true zero-downtime application deployments

Case Study: Deploying Critical Banking Apps in the Cloud

+ When deploying a multi-cloud strategy, in some industries (e.g. banking) regulatory requirements now mandate the use of heterogeneous public clouds. Why?
  - Major public cloud vendors regularly experience outages
  - Organizations lose availability, data, or both as a result
+ Multi-cloud tech enablers
  - The availability of Kubernetes orchestration, high-capacity networks, low cost computers, and container native storage (CNI) are making multi-cloud a reality

Case Study: Deploying Critical Banking Apps in the Cloud

+ Top reasons WeLab, a challenger bank in Hong Kong, has embraced a modern multi-cloud approach
  - (1) Highest levels of business continuity available (2) reduced operational costs, and (3) ease of management
+ Their environment
  - Multi-cloud comprised of AWS and Azure public clouds
  - Kubernetes deploying stateful applications with persistent storage
  - VPN tunneling and QoS using Megaport
  - Rancher Kubernetes Management
  - SQL banking application
  - NuoDB distributed SQL database

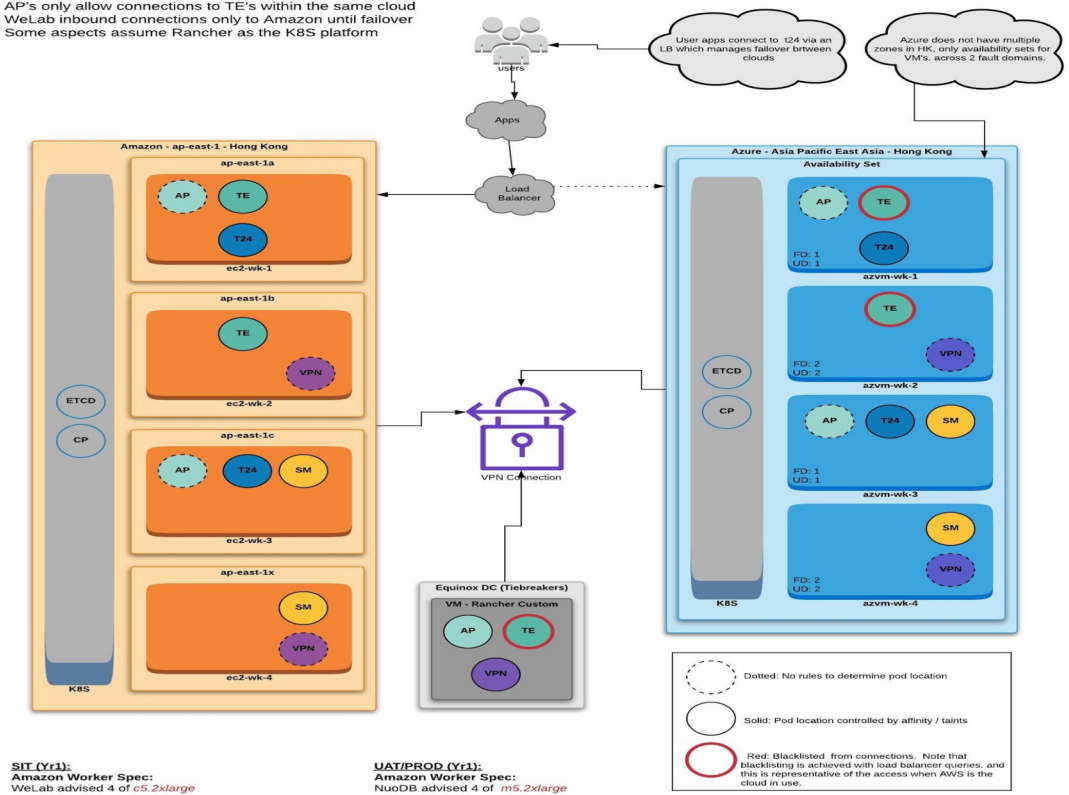
Case Study: Deploying Critical Banking Apps in the Cloud

1. Challenges faced
    a. Latency between clouds
    b. Pod to pod connectivity between k8s clusters
    c. Connectivity from outside to inside a VPN
    d. Domain & database stability, differences in performance between heterogeneous clouds
2. And how they were resolved
    a. VPN QoS, both HK DCs, keep client connections local to one cluster
    b. Many options, many complexities (CNI like Istio, Cilium, host networking); NuoDB internal VPN was simple, effective, and allows the solution to remain flexible
    c. NuoDB has multiple connection options - TE direct allows us flexibility to work with the VPN, in combination with k8s services
    d. NuoDB has many tunable options; these were used to help counteract problems introduced by slower to respond cloud features such as volume provisioning time

A Look Under the Hood…

The WeLab multi-cloud SQL app deployment utilizing the NuoDB SQL database

NuoDB Domain Layout
- Both clouds run a full suite of engines.
- AP's only allow connections to TE's within the same cloud
- WeLab inbound connections only to Amazon until failover
- Some aspects assume Rancher as the K8S platform



SIT (Yr1):
Amazon Worker Spec:
WeLab advised 4 of *c5.2xlarge*
4 * 8 CPU, 16Gb
Total 32 CPU, 64Gb

Azure Worker Spec:
TBC

NuoDB:
AP: 1 CPU, 1Gb
TE: 4 CPU, 6GB
SM: 2 CPU, 8GB
TieBreaker TE: 1CPU, 1Gb
TieBreaker AP: 1CPU, 1Gb
VPN: 2CPU, 1Gb

T24:
Web: 2 CPU, 4Gb
App: 6 CPU, 18Gb

UAT/PROD (Yr1):
Amazon Worker Spec:
NuoDB advised 4 of *m5.2xlarge*
4 * 8 CPU, 32Gb
Total 32 CPU, 128Gb

Azure Worker Spec:
TBC

NuoDB:
AP: 1 CPU, 1Gb
TE: 4 CPU, 12GB
SM: 2 CPU, 16GB
TieBreaker TE: 1CPU, 1Gb
TieBreaker AP: 1CPU, 1Gb
VPN: 2CPU, 1Gb

T24:
Web: 2 CPU, 4Gb
App: 6 CPU, 18Gb

Multi-Cloud Demo

+ Live demonstration of a Kubernetes multi-cloud environment

… and video links for later review

Part 1: Multi-cloud configuration

Part 2: Running in multi-cloud

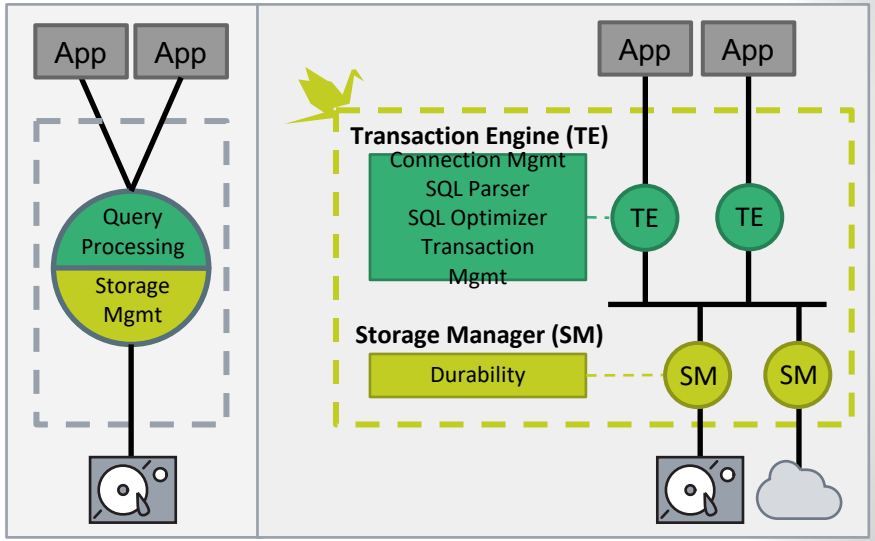
Multi-cloud, When to and When Not to...

+ When to consider a multi-cloud deployment
  - A multi-cloud architecture is suitable for the **most critical business applications** that must remain available 24x7x365
+ When not to consider a multi-cloud deployment
  - Not *all* applications require this level of availability

About NuoDB

Modern cloud-native, cloud-agnostic distributed SQL database for high throughput transactional workloads

+ On-demand scale out and scale in
+ Continuous availability protection against planned and unplanned outages for HA & DR
+ Hybrid or multi-cloud deployments in any public or private cloud and on physical, virtual, and containerized environments
+ ANSI SQL interface and delivers ACID transactional properities



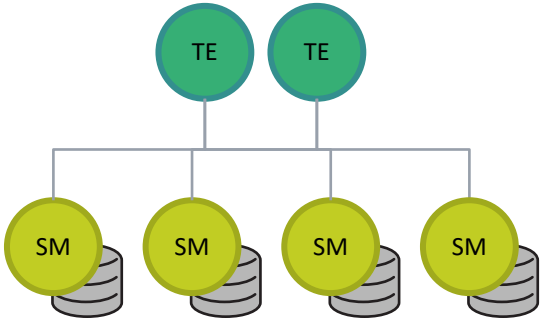
Traditional RDBMS Architecture

NuoDB Architecture

Multi-Tier Scalability

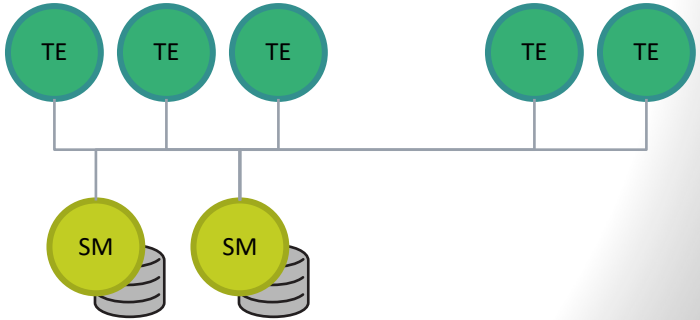
Logging Application

- Insert dominated
- IO bound
- Large data size
- Solution: **Scale-out Storage Tier**



HTAP Application

- Mixed read/insert/update/delete
- Compute & IO bound
- Medium/High concurrency
- Resource contention
- Solution: **Dedicated Analytical Nodes**



Benefits

Distributed Architecture

Modern architecture separating compute and storage

Active-Active

Zero failover time (RTO=0) for always on protection

Scale Out

Address dynamic performance requirements with on-demand scale out and scale in

Automated Ops

Automated deployment and operations using Kubernetes Operators

Dynamic Caching

Optimize performance/cost trade offs with dynamic memory caching

Summary

+ The rapidly maturing capabilities of multi-cloud infrastructure, Kubernetes, and network resiliency enable deployments we only dreamed of a few short years ago.
+ Running critical apps and a single logical distributed SQL database across a Kubernetes managed multi-cloud demonstrates new possibilities as companies pursue zero-downtown business continuity.

Next Steps

+ Video demos
  - NuoDB / Rancher Part 1: Multi-Cloud Configuration Overview
  - NuoDB / Rancher Part 2: Auto-Recovery & Transaction Scale Out
+ Kubernetes & Multi-cloud - InfoWorld
+ Download Community Edition
+ Check out www.nuodb.com

Questions?