GRAPH+AI
SUMMIT

organized by
TigerGraph

Getting started with
TigerGraph on GCP

Google Cloud

Speaker

Google Cloud

Bruce Hsu
Google - Customer Engineer

TigerGraph

Shuo Yang
TigerGraph - Head of Cloud

Agenda

- Google Cloud Infrastructure Overview
- Google Cloud for Database Hosting
- TigerGraph, a Scale Out Graph Analysis Engine
- Demo - Launch an Instance to Get Started

Google Cloud Infrastructure Overview

GCP Infrastructure Numbers

28 cloud regions (+10 announced regions*) [url](#)

85 zones [url](#)

146 edge locations [url](#)

100+ CDN locations [url](#)
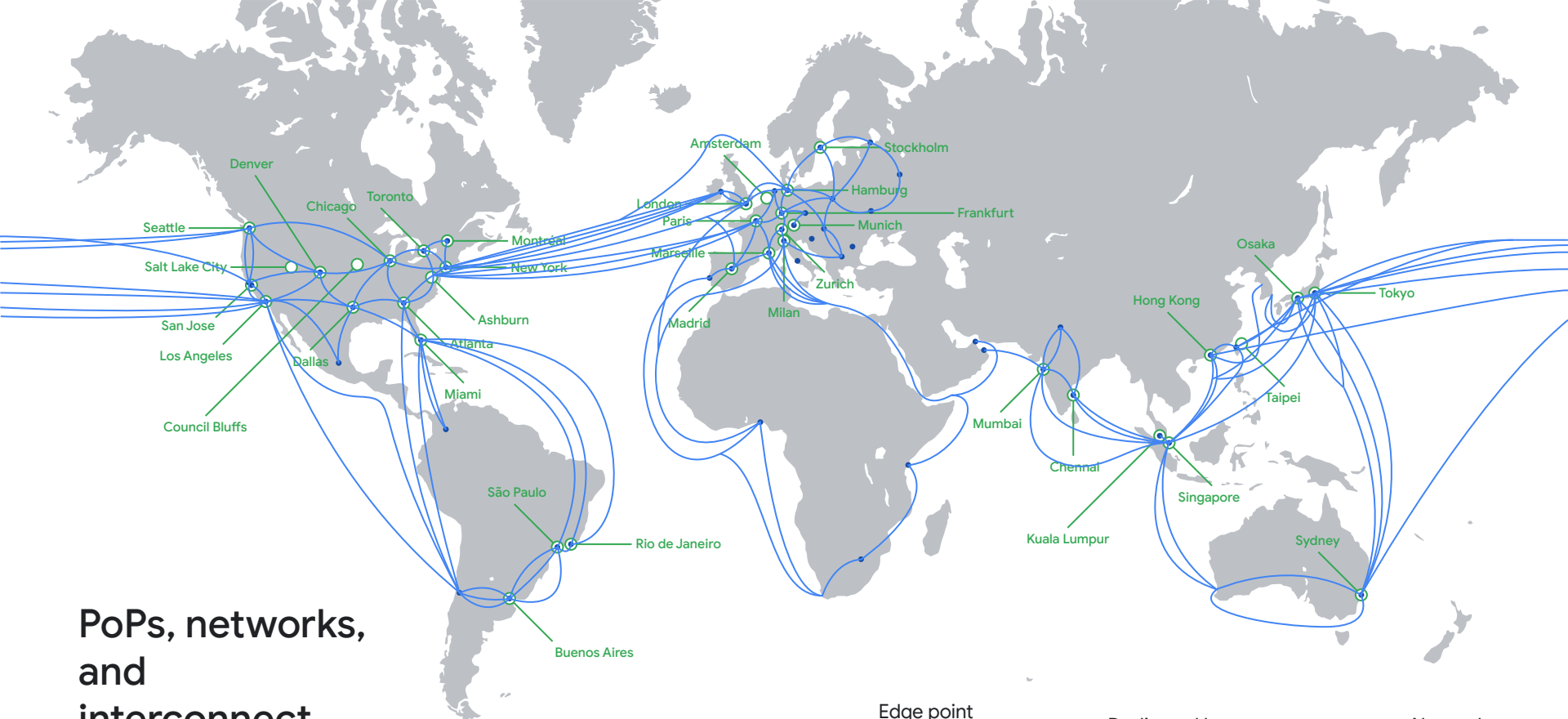
100+ Dedicated Interconnect locations [url](#)

20+ Google data centers [url](#)

50+ renewable energy project locations [url](#)

18 subsea cable investments [url](#)

In **2021** we've launched **4** new regions.

Regions

Oregon
Salt Lake City
Los Angeles
Las Vegas
Iowa*
Columbus
Toronto
Montréal
N. Virginia
S. Carolina

São Paulo
Santiago

Finland
Netherlands
Berlin
London
Belgium
Paris
Frankfurt
Zurich
Turin
Milan
Madrid
Warsaw

Doha
Delhi
Mumbai

Seoul
Tokyo
Osaka
Hong Kong
Taiwan

Singapore
Jakarta

Sydney
Melbourne

Current region
with 3 zones

Future region
with 3 zones

GRAPH+AI
SUMMIT organized by TigerGraph

PoPs, networks, and interconnect

Edge point of presence   ○ Dedicated Interconnect   — Network

Nine cloud products with 5 Billion users each
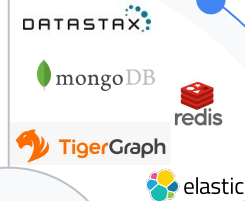
GCP Portfolio + Partner Solution
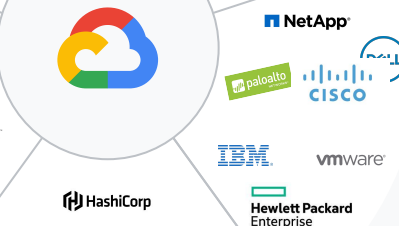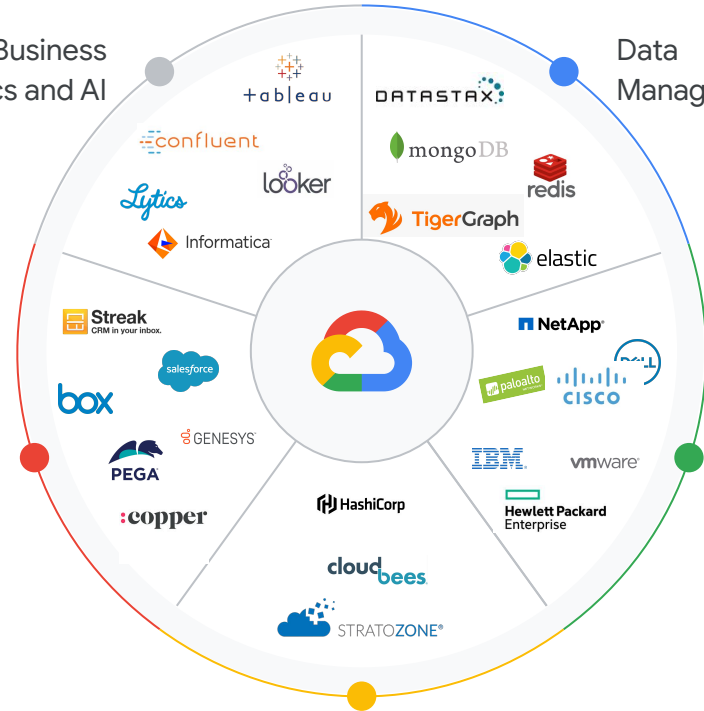
Google Cloud for Database Hosting

VM Families

General Purpose			Workload-Optimized		
• Web Serving • Steady-state LOB apps • Dev & Test environments	• Enterprise apps • Medium databases • Web & App Serving	• Scale-out workloads • Wide variety of workloads used in cloud-native deployments	• HPC (Compute) • EDA • High Performance Web Serving • Ad Serving • Gaming • Media Transcode • AI/ML	• SAP HANA • Largest in memory DBs • Real-time data analytics • In-memory cache	• HPC (GPU) • ML • Massive parallelized computation
Cost savings a priority	Flexible, Complete Feature Set	Best Perf/$ for scale out workloads	Highest performance CPUs	Most memory on Compute Engine	Highest performance GPUs
Cost Optimized (E2)	**Balanced (N2, N2D)**	**'Tau' Scale-out Optimized (T2D*)**	**Compute-Optimized (C2, C2D*)**	**Memory-Optimized (M2)**	**Accelerator-Optimized (A2)**

Custom Machine Type

Configure your own machine types, with average 19% savings

- Create a machine type with 1 vCPU and up to 96 vCPU
  - Or any even number of vCPUs in between

- Use Compute Engine stop/start feature
  - Move your workload to a smaller or larger Custom Machine Type instance or predefined configuration

- Priced by the resources they use (i.e. vCPU, memory)
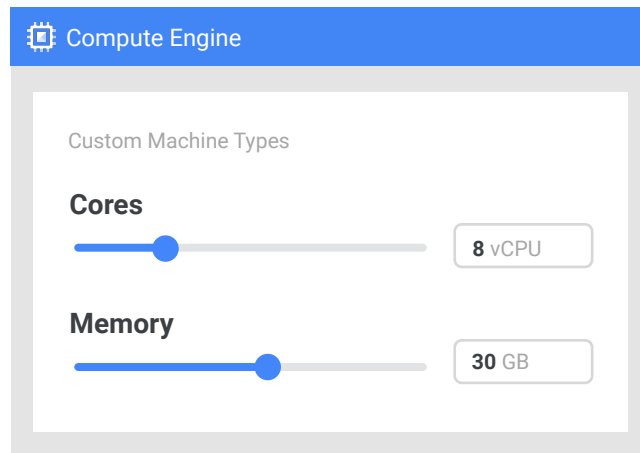
Predictably calculate the cost of Custom Machine Type shapes in any configuration.

Right Sizing Recommendations

- Get insights into your usage

- Compute Engine recommends the exact fit

- Optimize your cloud spend

- Avoid paying for idle and oversized resources

Pricing Advantage

Sustained Use Discounts (SUD):

- No upfront commitments
- Automatic Discounting
- Up to 30% discount

Committed Use Discounts (CUD):

- Purchase Aggregate Cores & RAM per region
- Flexible and Easy to manage
- Up to 70% discount

Rightsizing and Custom Machine Types:

- Deploy custom instances for your needs
- Recommendations based on utilization
- Average 20% savings (up to 40%) .

Live Migration

Manage your infrastructure while business continues as usual

- VM instances keep running when a host event occurs
  - Software or hardware update
  - Switch to new configurations
- Live migrates your running instances to another host in the same zone rather than requiring your VMs to be rebooted
- Perform maintenance to keep your infrastructure protected and reliable without interrupting any of your VMs.

Live migration
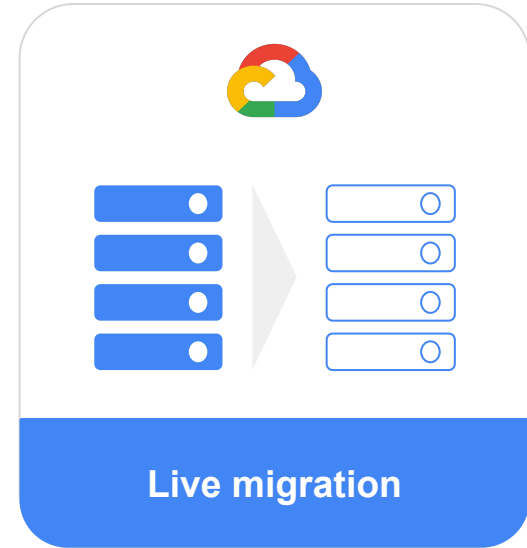
Storage Options

Google Cloud Storage
Exabyte-scale, feature-rich object storage
Automatically scaling throughput

Persistent Disk
High-performance, replicated block storage (HDD/SSD)
Up to 64TB per PD, Up to 1.2 GB/s per instance

Local Storage
Local SSD (NVMe), physically attached via PCIe
Up to 3TB per Local SSD, Up to 2.65 GB/s per instance

Cloud Filestore
Highly available, durable, POSIX-compliant shared storage
across tens of thousands of nodes

Partner, hybrid, and open-source
Storage solutions for NetApp, Elastifile, DDN, Lustre, and more

Encryption by default
at Google

At rest

In transit

Compliance, Regulations & Certifications

Global	Americas		Europe, Middle East & Africa		Asia Pacific	
ISO 27001	**USA**	CFTC Rule 1.31(c)-(d)	**Europe**	**Spain**	**Australia**	**Singapore**
ISO 27017	HIPAA	FINRA Rule 4511(c)	GDPR	Esquema Nacional de Seguridad	Australian Privacy Principles	MTCS Tier 3
ISO 27018	HiTrust		EU Model Contract Clauses			
SOC 1	FedRAMP	**Canada**		**UK**	Australian Prudential Regulatory Authority Standards	
SOC 2	FIPS 140-2	Personal Information & Electronic Documents Act	Privacy Shield	NCSC Cloud Security Principles		
SOC 3	COPPA		TISAX	NHS IG Toolkit	IRAP	
PCI DSS	FERPA					
CSA STAR	NIST 800-53	**Argentina**	**Germany**		**Japan**	
MPAA	NIST 800-171	Personal Data Protection Law	BSI C5		FISC	
Independent Security Evaluators Audit	Sarbanes-Oxley		**South Africa**		My Number Act	
	SEC Rule 17a-4(f)		POPI			

https://cloud.google.com/security/compliance

Unlock More Data Insight

Session: Transform with Vertex AI

Benazir Fateh
AI/ML Specialist

Same planet-scale core platform that powers all internal and Google Cloud observability

- *1.5 quadrillion metric points in memory*
- *>20 quadrillion metric points on disk*
- *13 million queries per second*
- *2.5 EB / month logs*

Built-in with zero config usage for all Google Cloud services
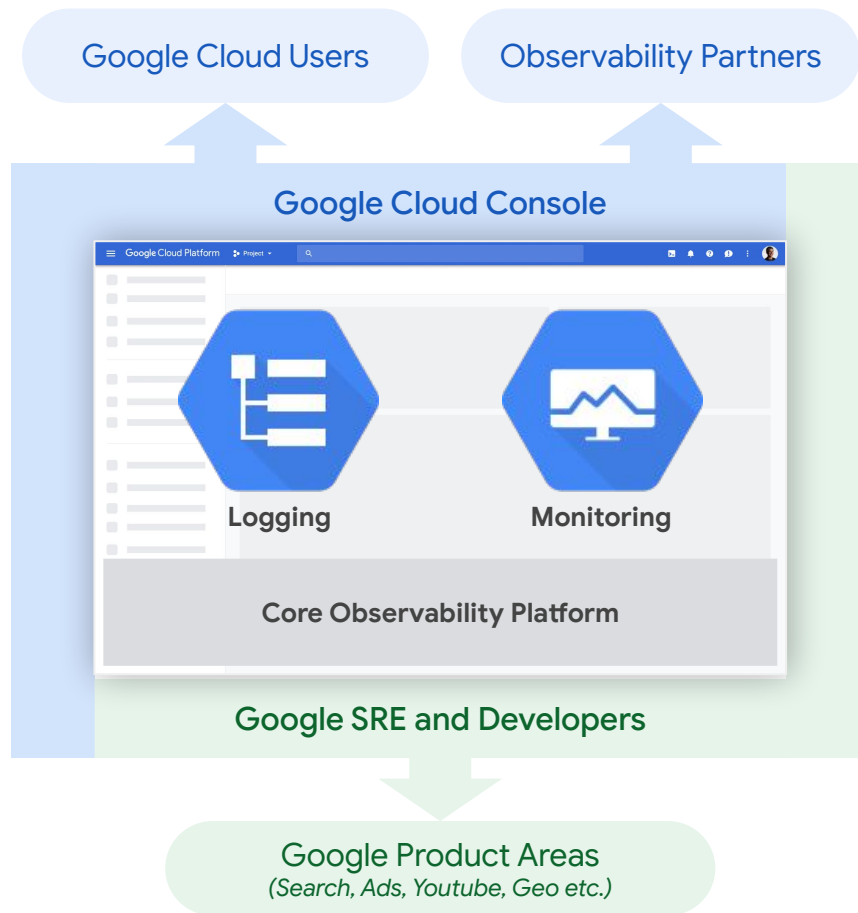
Powered by Google's SRE principles

Defacto platform logging + metrics provider

- *Powers partner services like Dynatrace, Datadog, NewRelic, etc.*

Day-zero observability support for new Google cloud services

Google Cloud Users

Observability Partners

Google Cloud Console

Logging

Monitoring

Core Observability Platform

Google SRE and Developers

Google Product Areas
(Search, Ads, Youtube, Geo etc.)

20

TigerGraph, a Scale Out Graph Analysis Engine

Distributed Native Graph Storage

Data of different components are split into segments.
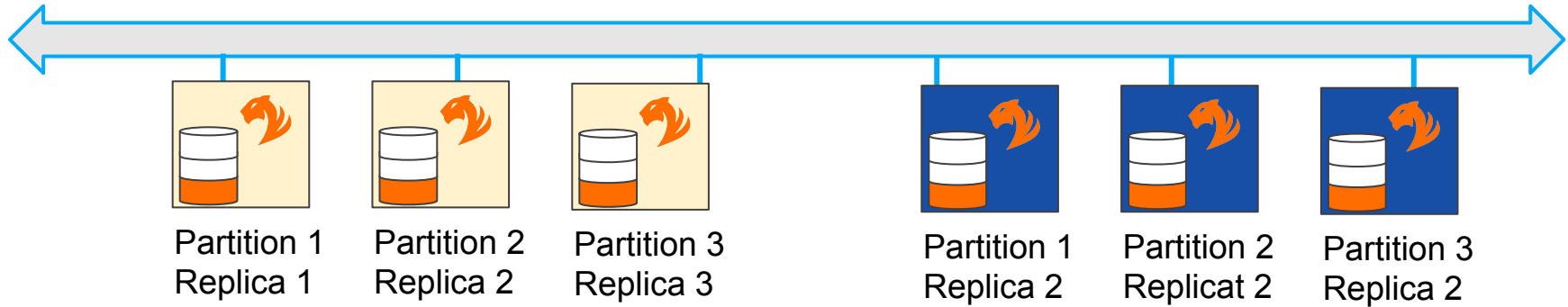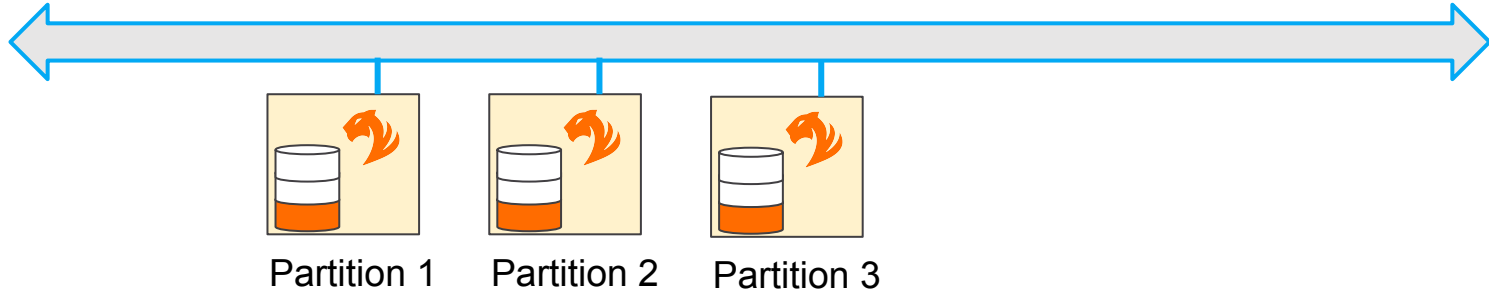
1392273

| IDS |
| VERTEX |
| EDGE |
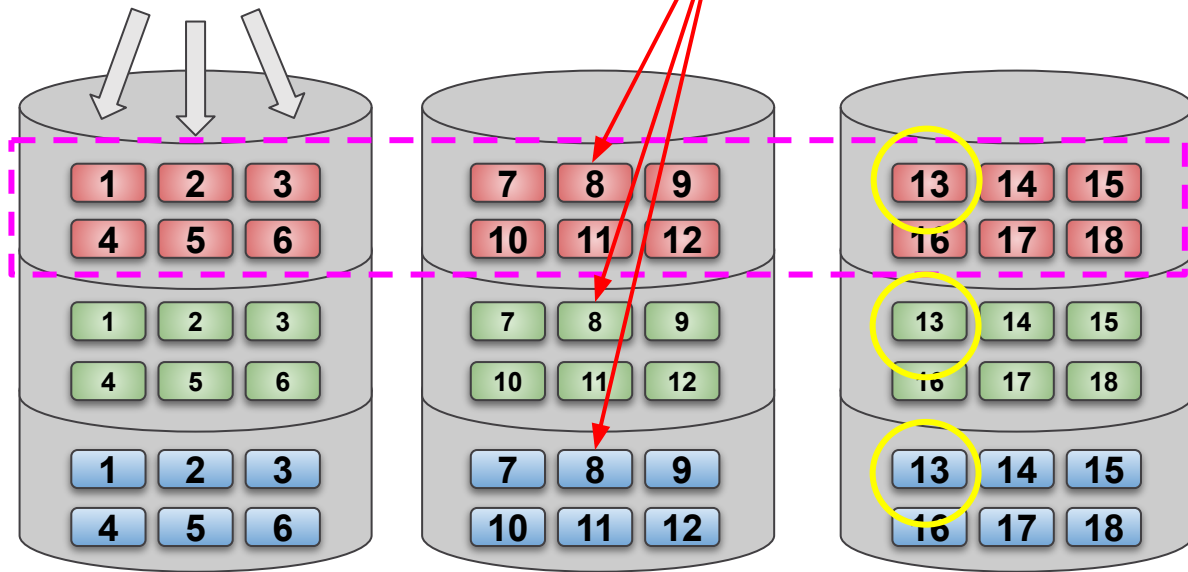
The segments are stored distributedly across the cluster.
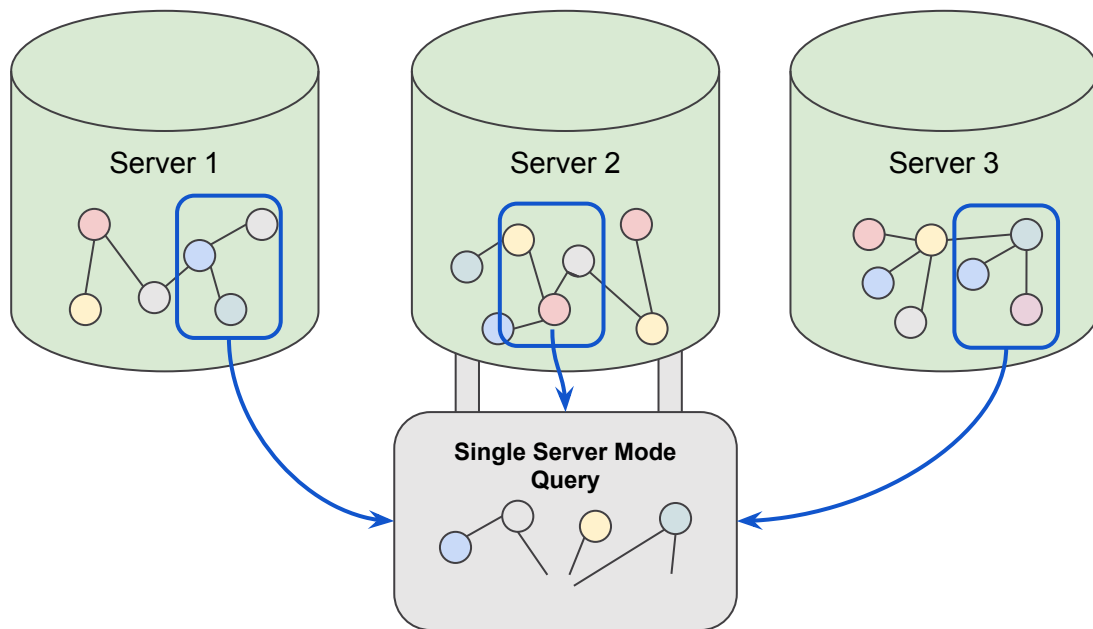
The segments of different components with same ID stores data for the same set of vertices under the same vertex type.

The location of a vertex can be calculated based on its internal ID

Partition and Replication

Partition 1   Partition 2   Partition 3

Partition 1   Partition 2   Partition 3
Replica 1   Replica 2   Replica 3

Partition 1   Partition 2   Partition 3
Replica 2   Replicat 2   Replica 2

Query - Single Server mode

Single Server Mode

- The cluster elects one server to be master for that query.

- All query computation takes place on query master.

- Vertex and edge data are copied to the query master as needed.

- **Best for queries with one or a few starting vertices.**

- **If your query starts from all vertices, don't use this mode.**

Query - Distributed mode
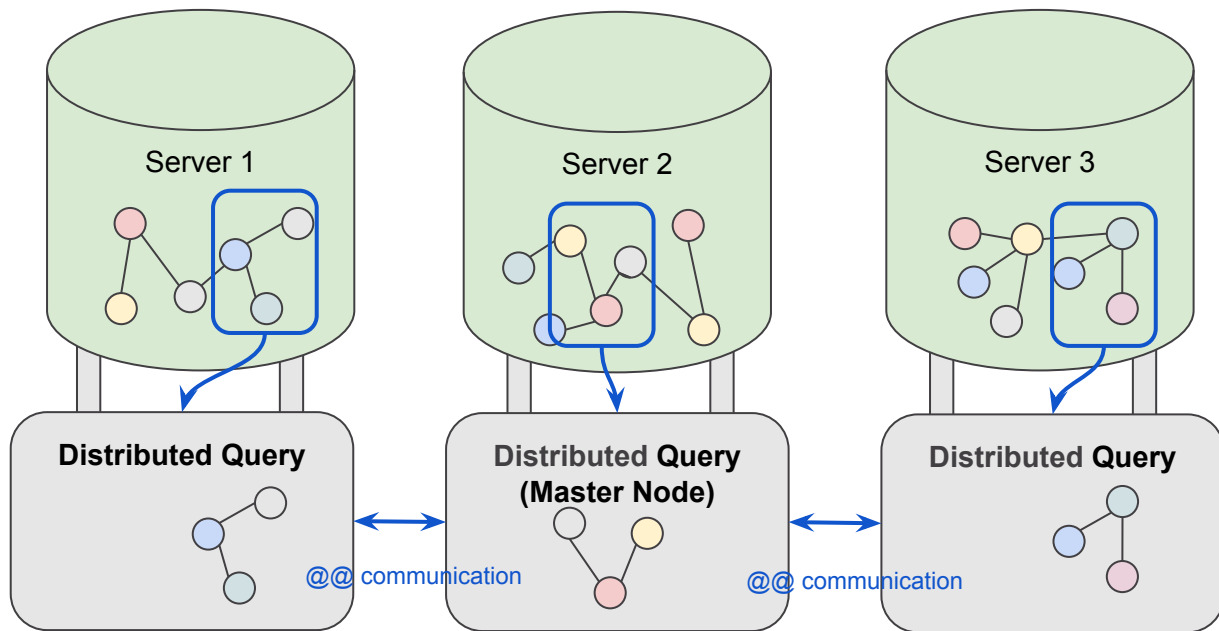
Distributed Mode

- The server that received the query becomes the master.

- Computation executes on **all** servers in parallel.

- Accumulators are transferred across the cluster.

- **If your query starts from all or most vertices, use this mode.**

Benchmark: LDBC-SNB Schema (twitter like)

- **70B** vertices, **533B** edges
  - **Number of machines**: 40
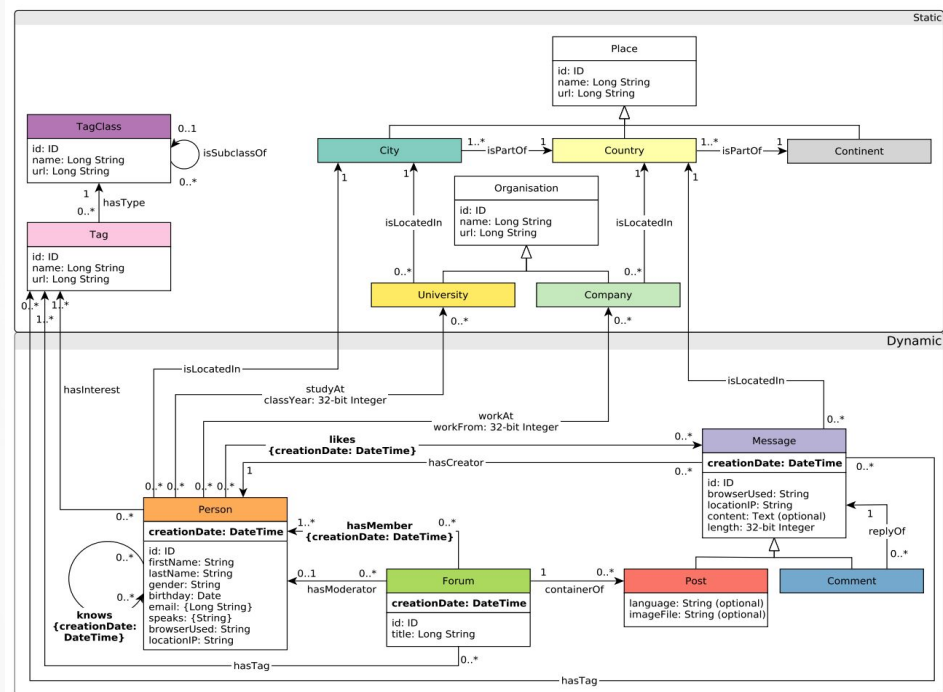 - **Machine:** m1-ultramem-40

Figure 3.1: UML class diagram-style depiction of the LDBC SNB graph schema. Note that the knows edges should be treated as undirected (but are serialized only in a single direction). The cardinality of the hasModerator edge has changed between version 0.3.x (where it was exactly 1) and version 0.4.x (where it is 0..1).
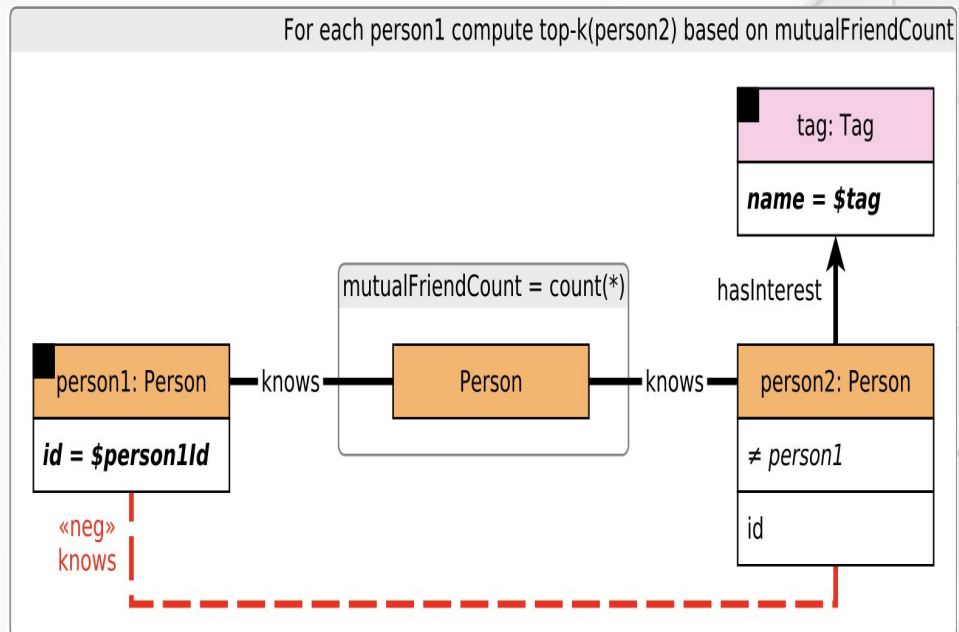
Benchmark: LDBC-SNB Schema (twitter like)

Recommend new friends to a specific person

- Who is associated to in a specific tag (e.g., living in a specific country)
- Rank by the number of mutual friends

Query time: 7 seconds

[More details to be published here](#)

For each person1 compute top-k(person2) based on mutualFriendCount

tag: Tag
name = $tag

mutualFriendCount = count(*)

person1: Person — knows — Person — knows — person2: Person

id = $person1Id

hasInterest

≠ person1

id

«neg» knows

[LDBC-SNB: Friends recommendation](#)

TigerGraph

Demo - Get started with TigerGraph Cloud

Please try TigerGraph cloud www.tgcloud.io

Or visit from Google Marketplace