Course code : **CSE3009**
Course title : **No SQL Data Bases**
Module : **6**
Topic : **1**

Introduction to Graph DB

Objectives

This session will give the knowledge about

- Graph DB Introduction

What Is a Graph?

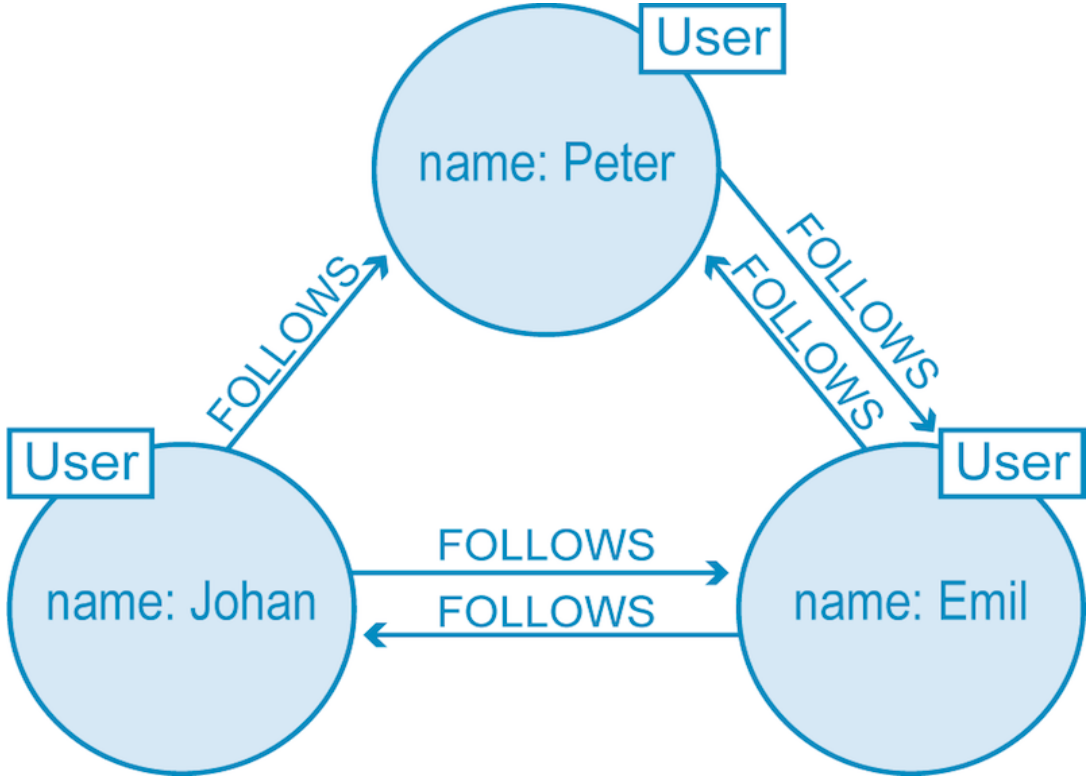
A graph is composed of two elements: a node and edges.

Each node represents an entity (a person, place, thing, category or other piece of data), and each edge represents how two nodes are associated.

Unlike other database management systems (DBMS), relationships take first priority in graph databases. In the graph world, connected data is equally (or more) important than individual data points

Graph Example

Twitter users represented in a graph database model.



Graph Example

Sales

Customer	Item	Time
0001	1A	20:34
0001	1A	21:15
0003	2A	21:16
0002	1A	21:16
0002	5C	

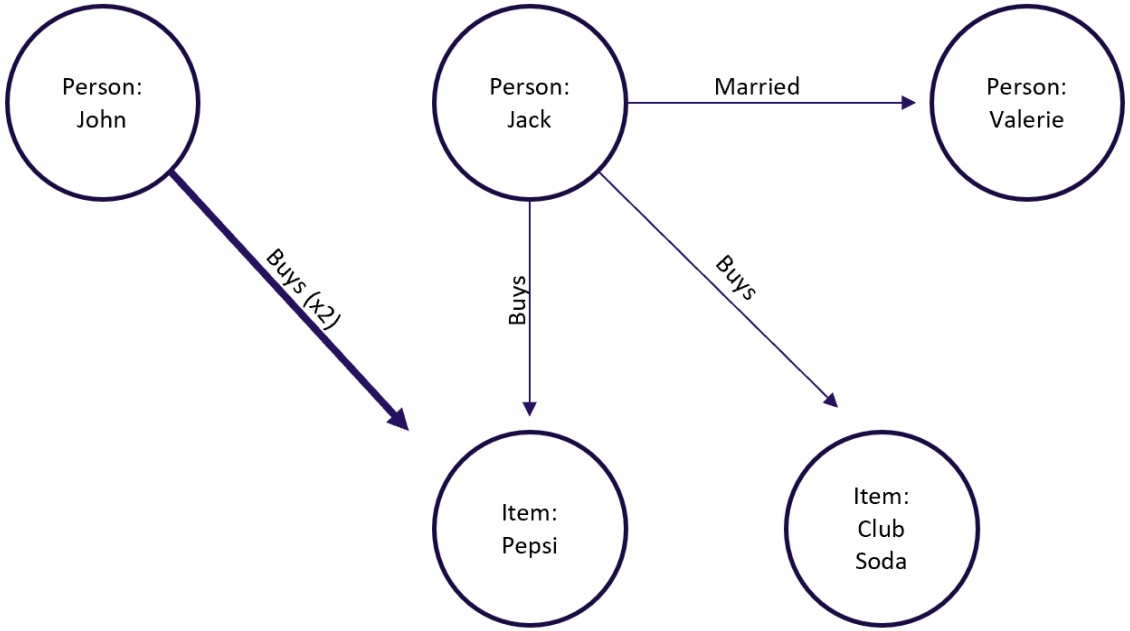
Inventory

Description	SKU
Pepsi	1A
Club Soda	2A
.	.
.	.
Diet Coke	5C

Customer

Name	CustID
John	0001
Jack	0002
Ted	0003
Ken	0004
Valerie	0005

Traditional database store data to efficiently store facts, but relationships must be rebuilt with JOINs and other inexact techniques.



Graph databases store both facts and the relationships between the facts, making certain types of analysis more intuitive.

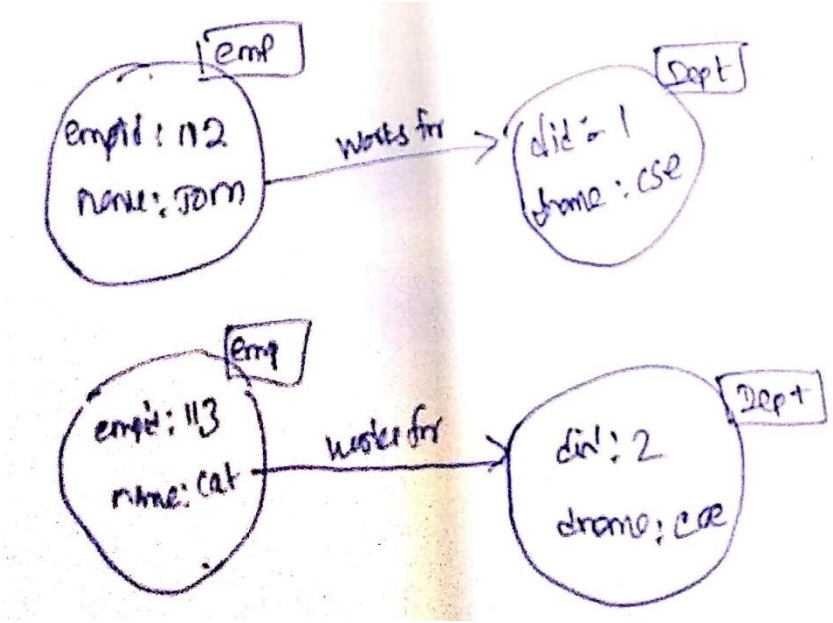
Graph Example

emp

Emp'id	name	salary	Dno
112	Tom	2000	1
113	Cat	3000	2

dept

Did	Dname
1	CSE
2	ece



Labelled Property Graph

- It contains nodes and relationships.
- Nodes contain properties (key-vaule pairs)
- Nodes can be labelled with one or more labels
- Relationships are names and directed, and always have a start and end node.
- Relationships also can contain properties.

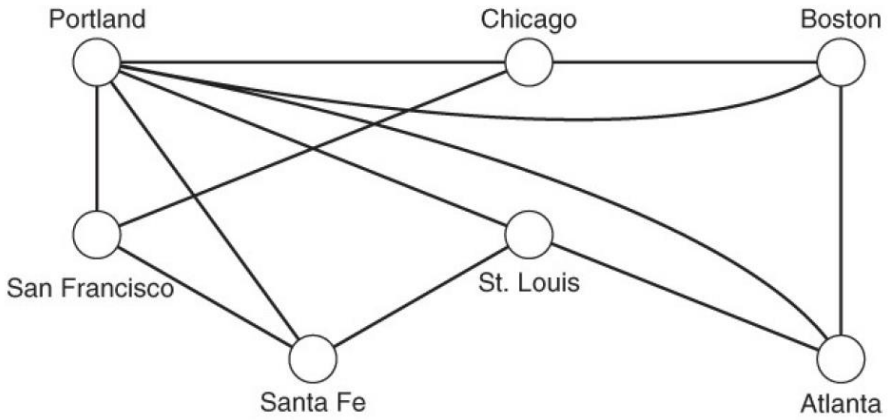
Elements of Graphs

Node

A Node represents an entity marked with a unique identifier - analogous to a row key in a column family database or a primary key in a relational database.

An Edge

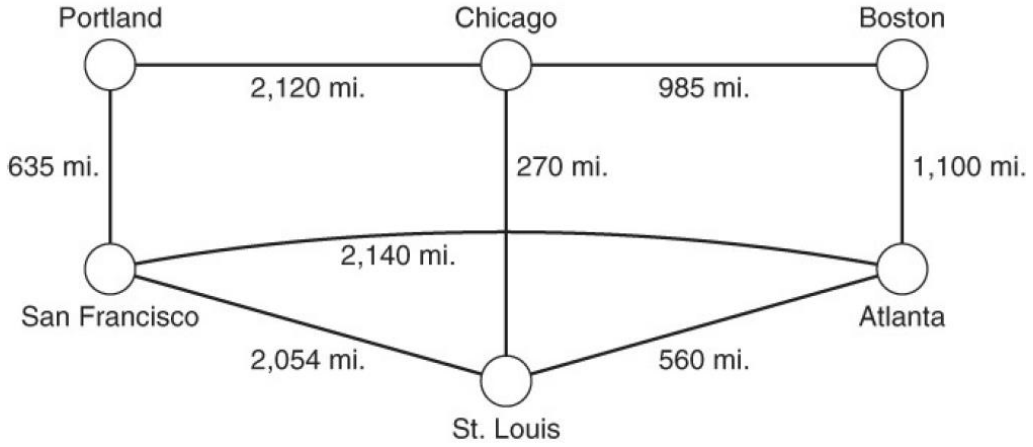
An edge, also known as a link or arc, defines relationships between nodes or objects connecting vertices



Elements of Graphs

Weighted Edge

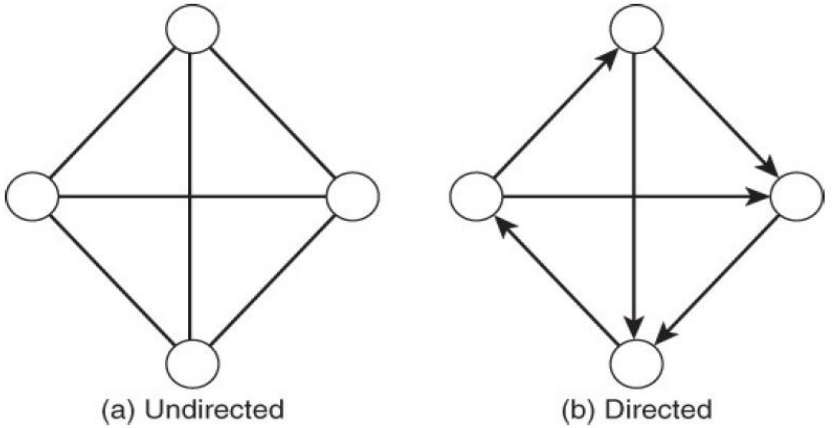
Weighted edges have a numeric property associated with them.



Directed and Undirected

Directed and undirected edges further refine properties of relationships

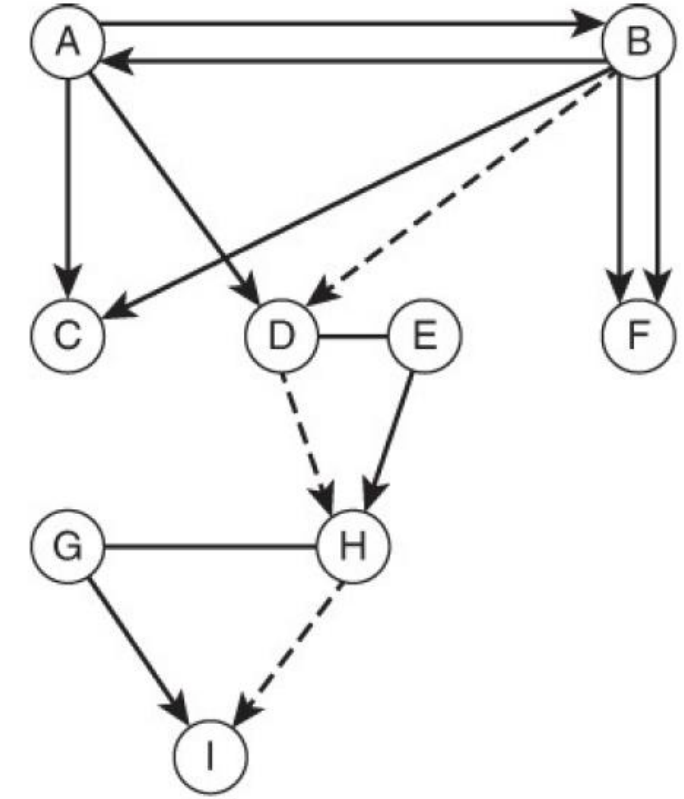
between vertices by capturing directionality.



Elements of Graphs

Path

A path through a graph is a set of nodes along with the edges between those nodes Directed and Undirected

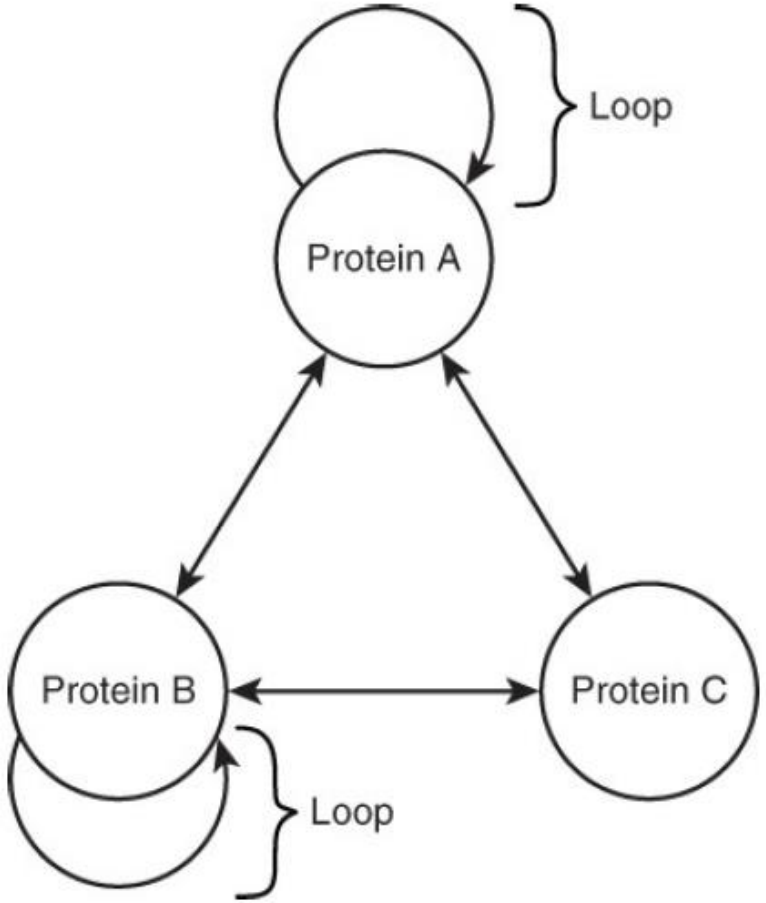


I → H → D → B Ancestor Path

Elements of Graphs

Loop

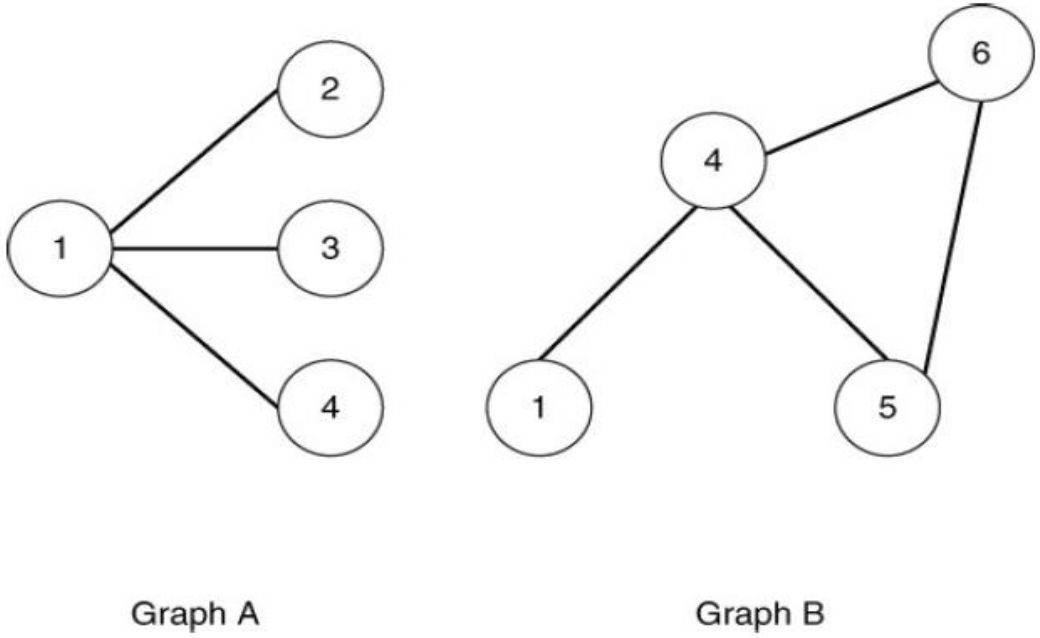
A loop is an edge that connects a vertex to itself



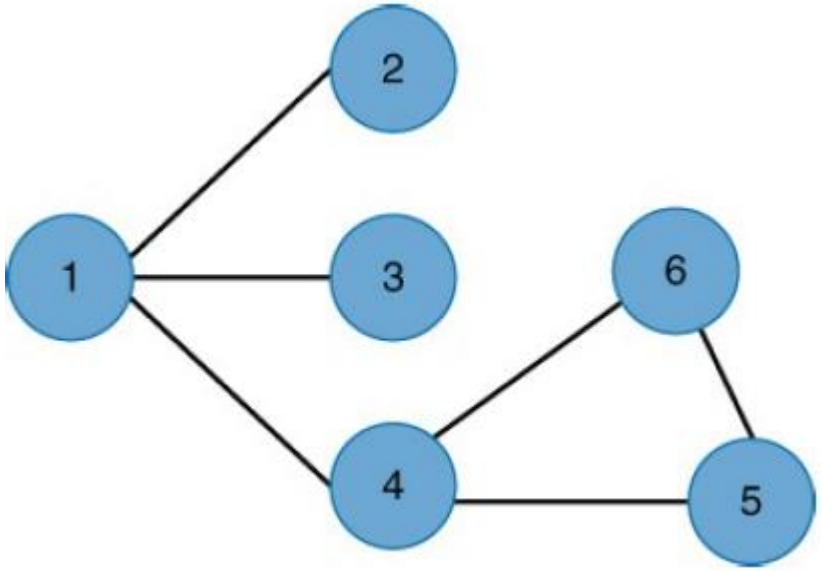
Operations on Graphs

Union of Graphs

The union of graphs is the combined set of vertices and edges in a graph.



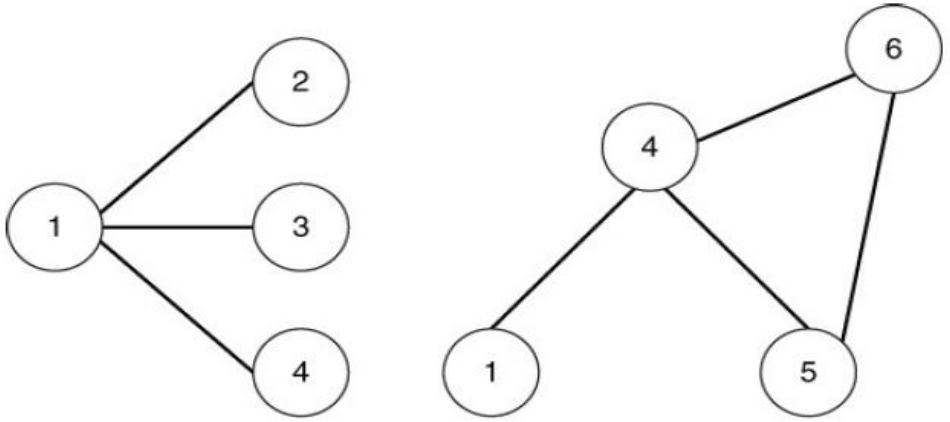
Graph A Graph B



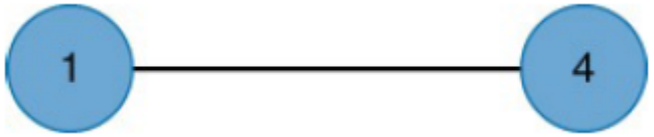
Operations on Graphs

Intersection of Graphs

The intersection of a graph is the set of vertices and edges that are common to both graphs



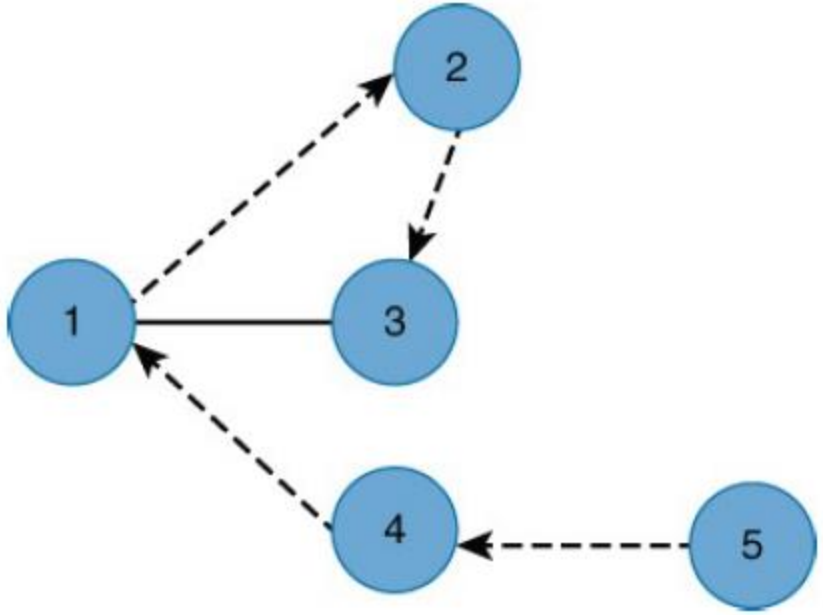
Graph A Graph B



Operations on Graphs

Graph Traversal

Graph traversal is the process of visiting all nodes in a graph in a particular way



Graph Databases Unique Feature

A lot of databases have similar characteristics, but graph databases have a few things that make them unique.

Graph storage

- Some graph databases use native graph storage that is specifically designed to store and manage graphs – from bare metal on up. Other graph technologies use relational, columnar or object-oriented databases as their storage layer.

- Non-native storage is often slower than a native approach because all of the graph connections have to be translated into a different data model.

Graph Databases Unique Feature

Graph processing

- Native graph processing (a.k.a. index-free adjacency) is the most efficient means of processing data in a graph because connected nodes physically point to each other in the database.
- Non-native graph processing engines use other means to process Create, Read, Update or Delete (CRUD) operations that aren’t optimized for handling connected data.

Leading companies using Graph Data store

- Walmart (recommendation engine)
- eBay (artificial intelligence)
- Pitney Bowes (master data)
- NASA (knowledge graph)
- Other Fortune 500 financial services customers (fraud detection)

Leading Graph Data stores

- Neo4j
- GraphDB Lite
- OrientDB
- HypherGraphDB
- MapGraph
- Titan
- BrightStarDB
- Neptune

Summary

This session will give the knowledge about

- Graph DB Introduction