

# Graph Data on K8s(Draft)

Nebula Graph's Operator implementation and application

WEY GU

DEVELOPER ADVOCATE @  vesoft



DoK  
Community

Live Streaming  
Sept. [tbd], 2021

# Wey Gu (Siwei)

- Software Engineer @ Shanghai
- Open Source Believer
- Developer Advocate of Nebula Graph
- Ex-OpenStacker



🐱 [wey-gu](#)

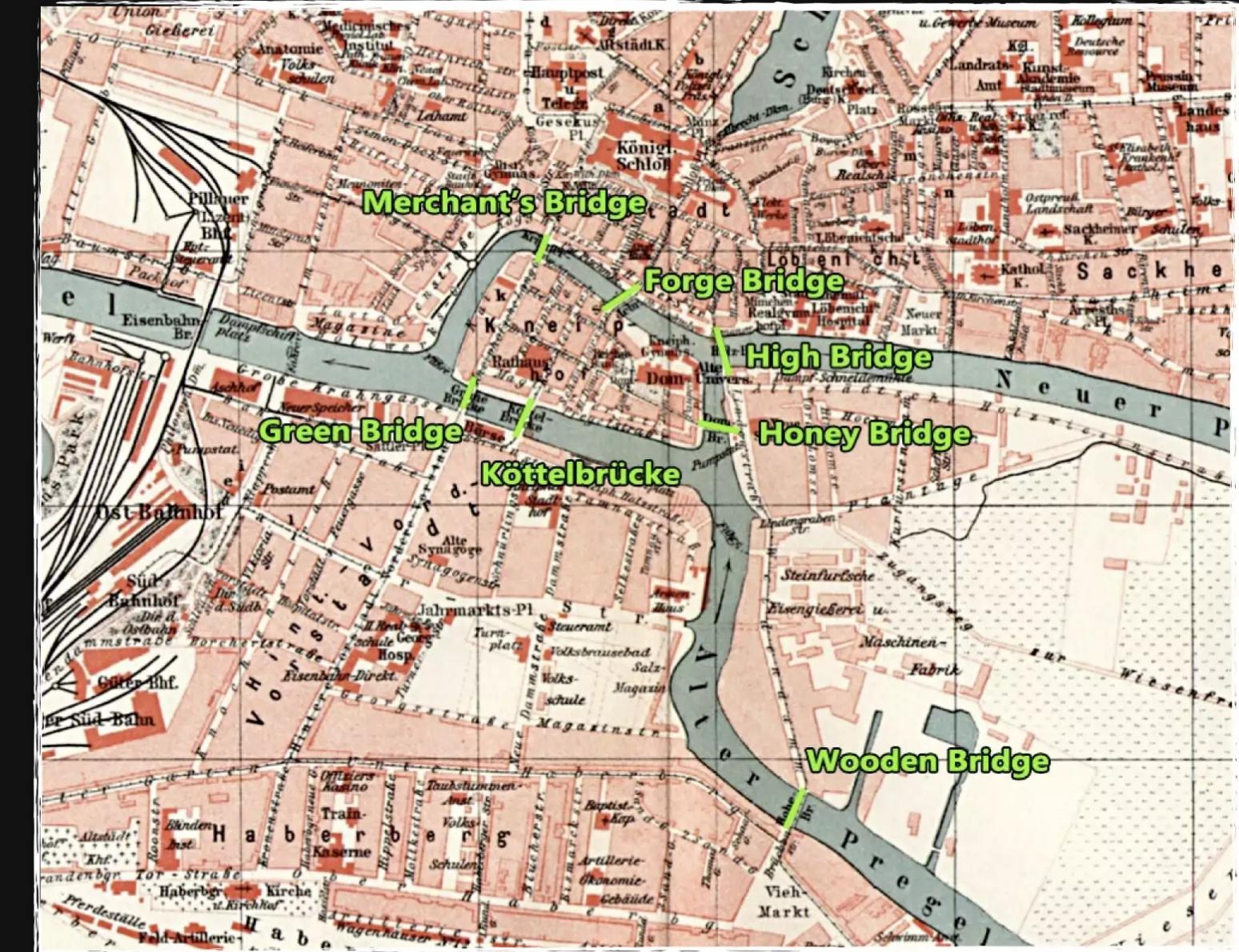
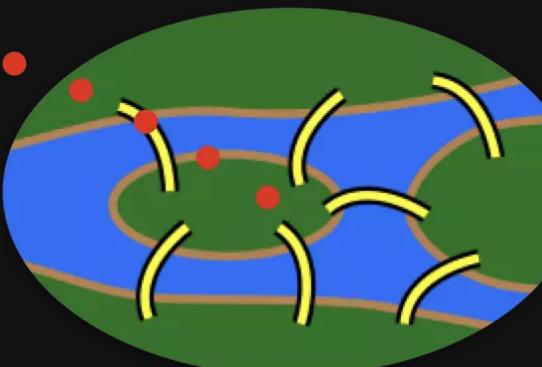
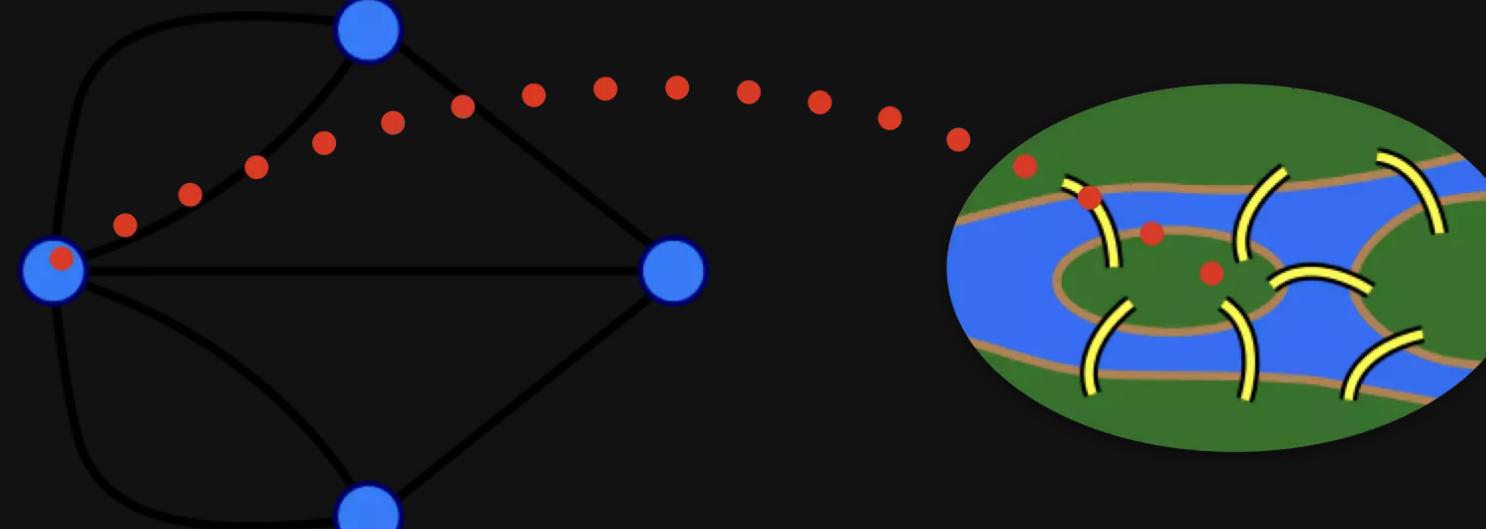
🐦 [wey\\_gu](#)

👤 [siwei.io/about](#)

# Graph Database

What is Graph? What is Graph DB? Why yet another DB?

# What is Graph?



Map of Königsberg with the seven bridges labeled, circa 1905

"A database that uses graph structures for semantic queries with nodes, edges, and properties to represent and store data

[wikipedia.org/wiki/graph\\_database](https://en.wikipedia.org/wiki/Graph_database)

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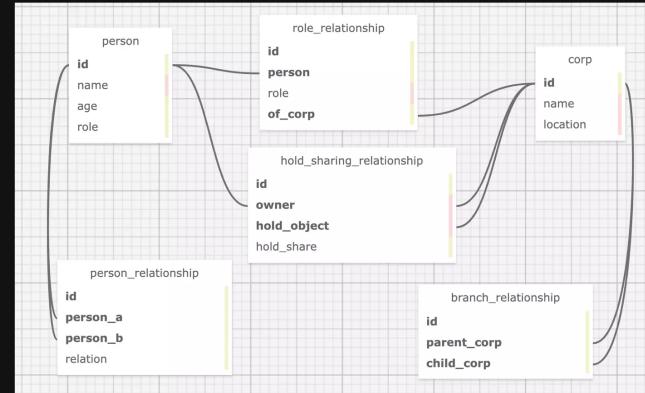
More on what a GDB is

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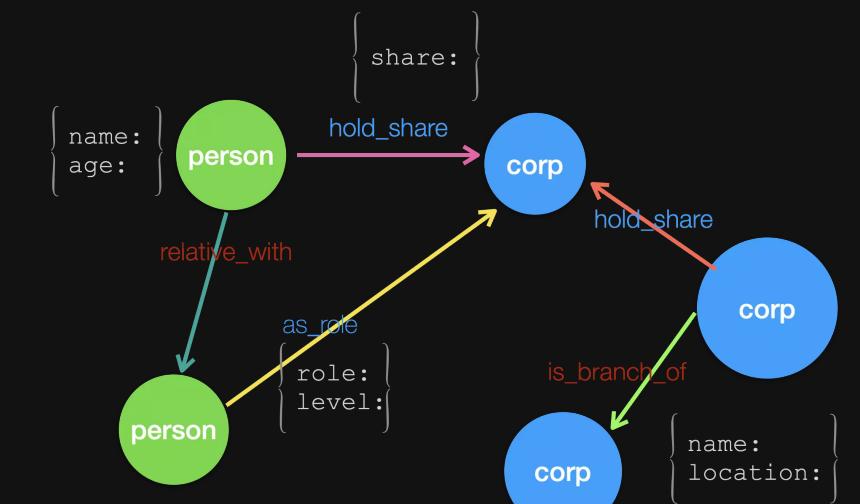
# Why Yet Another DB?

## Graph Schema

RELATIONAL DB



GRAPH DB



## Graph Semantic Queries

```
SELECT a.id, a.name, c.name
FROM player a
JOIN serve b ON a.id=b.player_id
JOIN team c ON c.id=b.team_id
WHERE c.name IN (SELECT c.name
FROM player a
JOIN serve b ON a.id=b.player_id
JOIN team c ON c.id=b.team_id
WHERE a.name = 'Tim Duncan')
```

```
GO FROM 100 OVER serve YIELD serve._dst AS Team | \
GO FROM $-.Team OVER serve REVERSELY YIELD $$ .player.name;
```

## Performance

	Designed Scenario	2-hop latency (~2.5K)	3-hop latency (~110K)	4-hop latency (~600K)
<b>Graph DB</b>	Relationship Walk	0.01 sec	0.168 sec	1.36 sec
<b>SQL DB</b>	Information retrieval	0.016 sec	30 sec	1544 sec



# Nebula Graph!

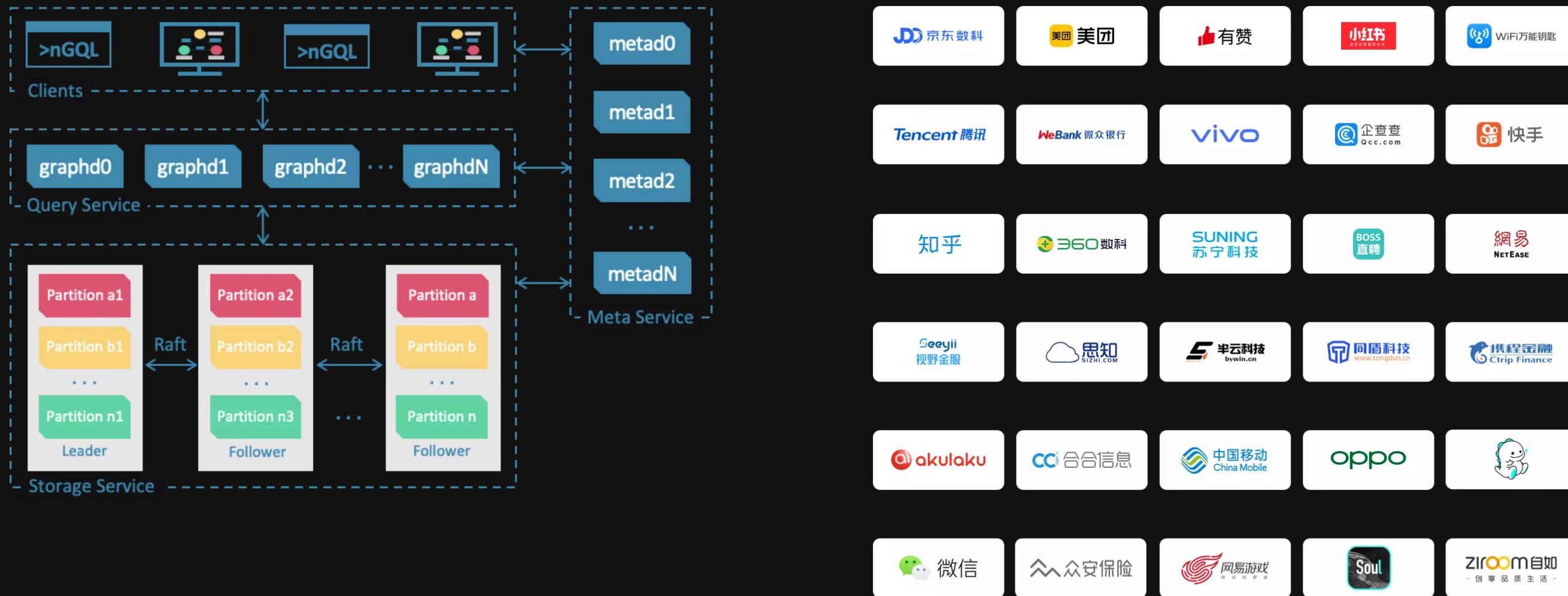
Features? Why Yet another Graph DB?

[nebula-graph.io/about/#why-nebula-graph](https://nebula-graph.io/about/#why-nebula-graph)



# Nebula Graph Introduced

A highly performant linearly scalable graph DB designed in a shared-nothing distributed model. It has been proven to beat the performance of competing graph databases by multiple times over in production.



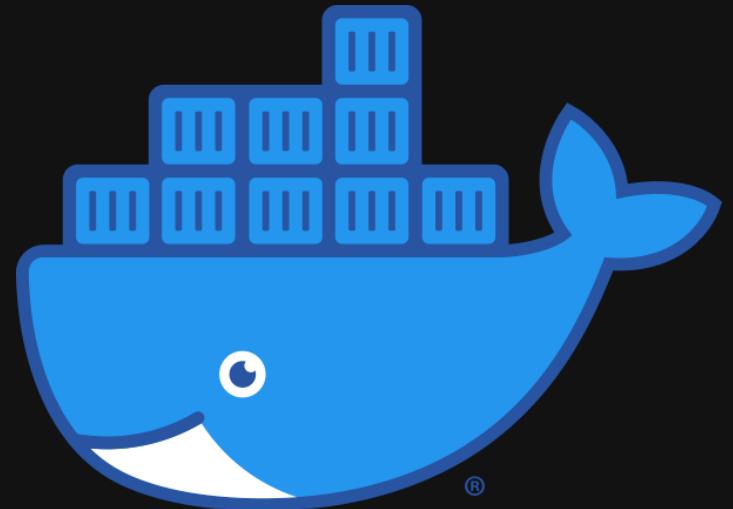
Nebula Arch.  
-----  
Use Cases



# GDB in the Cloud Native Era

# Containerization evolution

NEBULA DOCKER



NEBULA K8S



NEBULA OPERATOR



# Nebula Operator Implementation

## KUBEBUILDER SCAFFOLD

```
.  
├── apis  
..  
|   └── apps  
|  
└── cmd  
    ├── ngctl  
    └── controller-manager  
|  
└── config  
|  
    └── crd  
|  
└── pkg  
    ├── controller  
    ├── ngctl  
    ├── nebula  
    └── scheduler  
|  
└── hack  
|  
└── doc  
└── tests  
    └── e2e
```

## CRD

```
apiVersion: apps.nebula-graph.io/v1alpha1  
kind: NebulaCluster  
metadata:  
  name: nebula  
spec:  
  graphd:  
    resources:  
      requests:  
        cpu: "500m"  
        memory: "500Mi"  
    replicas: 3  
    image: vesoft/nebula-graphd  
    version: v2.5.0  
...  
  reference:  
    name: statefulsets.apps.kruise.io  
    version: v1  
  schedulerName: default-scheduler
```

## CONTROL LOOP

```
while True  
    actual_state = get_state(context)  
    expected_state = get_expected(context)  
    if actual_state == expected_state:  
        continue  
    else:  
        reconcile(context)
```

## CALLING NEBULA CLUSTER

```
func (s *storUpd) updPhase(mc nebula.MI) {  
    if err := mc.Balance(); err != nil {  
        return err  
    }  
    hostItem, err := mc.ListHosts()  
    if err != nil {  
        return err  
    }  
    if !mc.IsBalanced(hostItem) {  
        if err := mc.Balance(); err != nil {  
            return err  
        }
```

# Nebula Operator Roadmap

- Rolling Upgrade
- Auto Scaling
- Integration with other Services

Check out our Github Repo and contribute!  
[vesoft-inc/nebula-operator](https://github.com/vesoft-inc/nebula-operator)

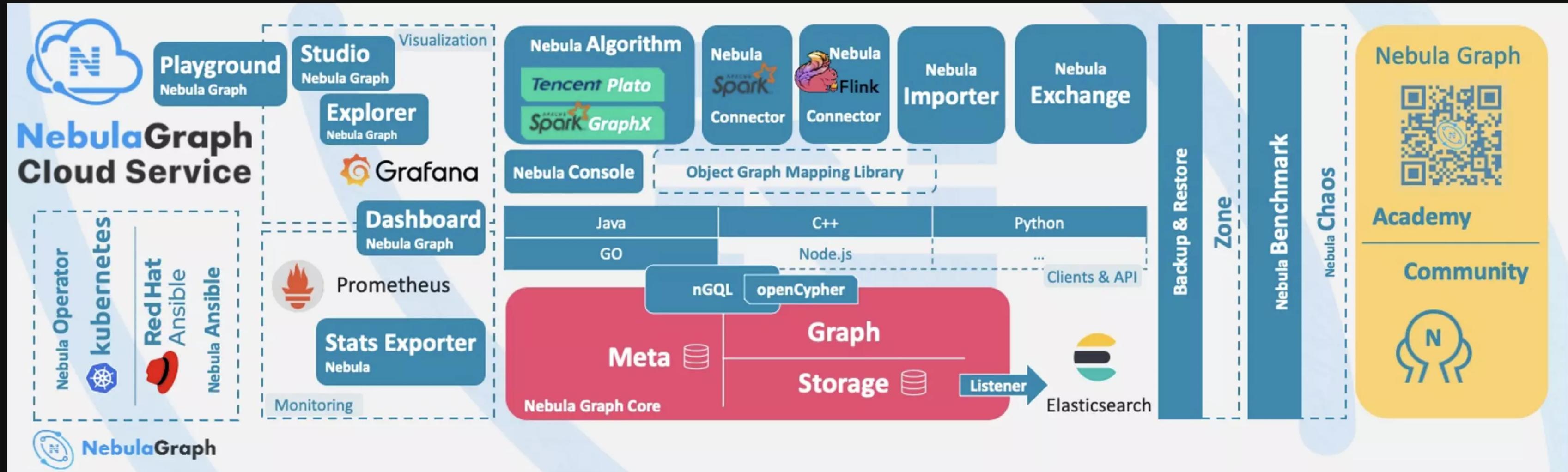
roadmap of **nebula-operator**



# Nebula Landscape

Nebula Community is rich in ecology and still expanding and exploring, welcome to join and contribute!

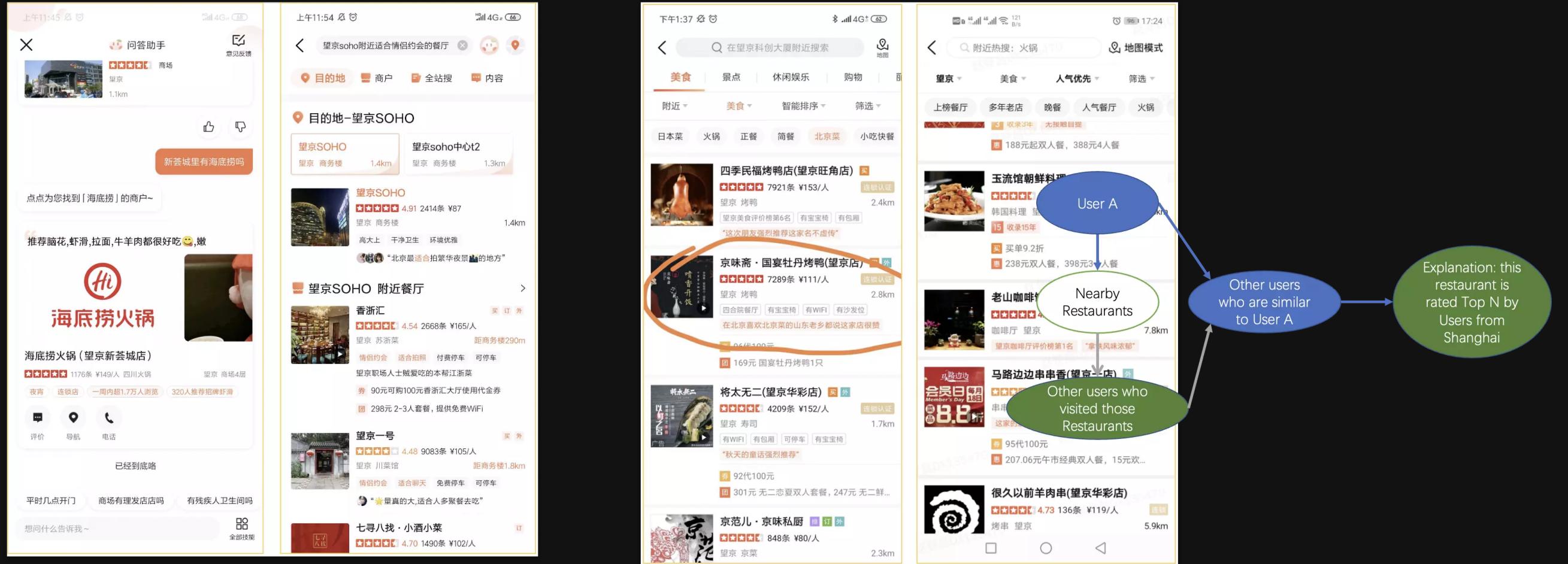
- Deployment, Monitoring
- Data Visualization
- Algorithm, Analytic
- Clients, Connectors, ETL



# Hands on GraphDB

Nebula on K8s - Demo

# Use Case Explained



SNS

Risk Control

Public Security

Knowledge Graph

ML

Biopharmacy

IoT

Blockchain

Data Lineage

AIOps



[tech.meituan.com/2021/04/01/nebula-graph-practice-in-meituan.html](https://tech.meituan.com/2021/04/01/nebula-graph-practice-in-meituan.html)



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# KinD + Nebula Graph

```
curl -sL nebula-kind.siwei.io/install.sh | bash
```

```
$ kubectl get svc nebula-graphd-svc-nodeport
NAME                  TYPE      CLUSTER-IP      EXTERNAL-IP      PORT(S)          AGE
nebula-graphd-svc-nodeport   NodePort  10.233.62.198  <none>        9669:32669/TCP,19669:32001/TCP  3m57s
$ kubectl edit svc nebula-graphd-svc-nodeport
service/nebula-graphd-svc-nodeport edited
$ ~/.nebula-kind/bin/console -u root -p password --address=192.168.8.137 --port=32669
2021/09/01 20:38:39 [INFO] connection pool is initialized successfully
Welcome to Nebula Graph!
```

```
(root@nebula) [(none)]> show hosts
+-----+-----+-----+-----+
| Host           | Port | Status | Leader count | Leader dist |
+-----+-----+-----+-----+
| "nebula-storaged-0.nebula-storaged-headless.default.svc.cluster.local" | 9779 | "ONLINE" | 0           | "No valid pa
+-----+-----+-----+-----+
| "nebula-storaged-1.nebula-storaged-headless.default.svc.cluster.local" | 9779 | "ONLINE" | 0           | "No valid pa
+-----+-----+-----+-----+
| "nebula-storaged-2.nebula-storaged-headless.default.svc.cluster.local" | 9779 | "ONLINE" | 0           | "No valid pa
+-----+-----+-----+-----+
| "Total"         |      |        | 0           |           |
+-----+-----+-----+-----+
```

# Nebula Graph Data Import

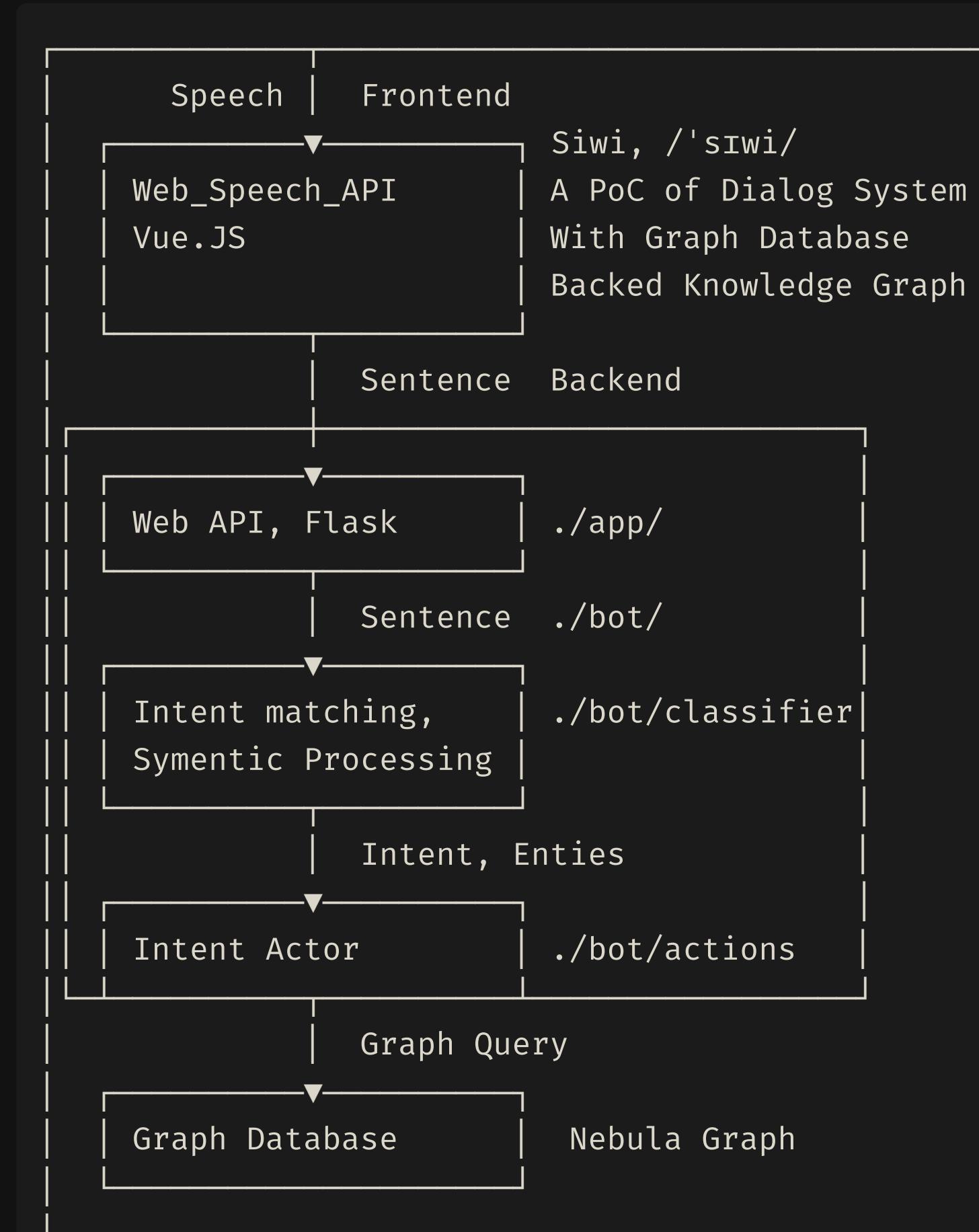
```
$ wget https://docs.nebula-graph.io/2.0/basketballplayer-2.X.ngql
$ ~/.nebula-kind/bin/console -u root -p password --address=192.168.8.137 --port=32669 -f basketballplayer-2.X.ngql
...
(root@nebula) [basketballplayer]> insert edge serve(start_year,end_year) values "player150"->"team213":(2018, 2019);
Execution succeeded (time spent 946/1091 us)
Wed, 01 Sep 2021 20:47:58 UTC
```

```
[root@wey wey.gu]# ~/.nebula-kind/bin/console -u root -p password --address=192.168.8.137 --port=32669
(root@nebula) [(none)]> show spaces
+-----+
| Name |
+-----+
| "basketballplayer" |
+-----+
(root@nebula) [(none)]> use basketballplayer
(root@nebula) [basketballplayer]> show tags
+-----+
| Name |
+-----+
| "player" |
+-----+
| "team" |
+-----+
```

# Siwi, the voice agent

Siwi (/sIwi/) is a PoC of Dialog System With Graph Database Backed Knowledge Graph.

## ARCH



## CODE

```
.├── README.md  
├── src  
│   ├── siwi  
│   │   ├── app  
│   │   └── bot  
│   │       ├── actions  
│   │       ├── bot  
│   │       ├── classifier  
│   │       └── test  
│   └── siwi_frontend  
│       ├── README.md  
│       ├── package.json  
│       └── src  
│           ├── App.vue  
│           └── main.js  
└── wsgi.py
```



[wey-gu/nebula-siwi](https://github.com/wey-gu/nebula-siwi)

# Live Demo

Siwi on K8s



[katacoda.com/wey/scenarios/siwi-kgqa](https://katacoda.com/wey/scenarios/siwi-kgqa)

# Recap

- Graph, Graph DB introduced
- Nebula Graph!
- Nebula Operator
- GDB on K8s
- Siwi, a KBQA system based on GDB
- Nebula-Siwi on FaaS on KubeSphere

👤 [wey-gu](#)

🐦 [wey\\_gu](#)

👤 [siwei.io](#)



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