MASTER OF TECHNOLOGY
(INTELLIGENT SYSTEMS)

INSTALLATION & USER GUIDE

GROUP MEMBERS

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Contents

1.0 System Overview

The Enterprise Knowledge Graph System is an intelligent Web information system, which is designed to provide systematic and comprehensive representations of business structures. It is targeted to those internal stakeholders in enterprises, such as Enterprise Architects, Solution Designers, Business Analysts and staffs who are responsible for analysing and reasoning business operation process. Users can input keywords/ phrase to find out the optimized operation process and solution design strategies among the relationship of People, Process and Technologies.

2.0 Installation

2.1 Recommended Browsers

The system web UI supports the following Web browsers:

- Google Chrome Version 59 and above
- Microsoft Edge 44 and above
- Firefox 75 and above
- Safari Version 10 and above

2.2 Environment Requirement

The system deploys to any environment having Docker Engine installed. Optionally, public internet connection is recommended, in order to support all functionalities in the system.

2.3 Deployment

The system images are pulled from Docker Hub registry. In order to run the system, please ensure you have docker and docker-compose working on your laptop.

1. **Docker & Docker-Compose**

1) Download: https://docs.docker.com/get-docker/
   Note, if you have already installed Oracle VM VirtualBox on laptop, please download Docker Desktop/ Toolbox: https://docs.docker.com/toolbox/toolbox_install_windows/
2) Verify it installed successfully:

```
C:\Users\15229>docker -v
Docker version 19.03.8, build afacb8b
```

```
C:\Users\15229>docker-compose -v
docker-compose version 1.25.4, build 8d51620a
```

3) Check what images include in Docker:

```
C:\Users\15229>docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
```

2. Pull Docker Images and Start Application

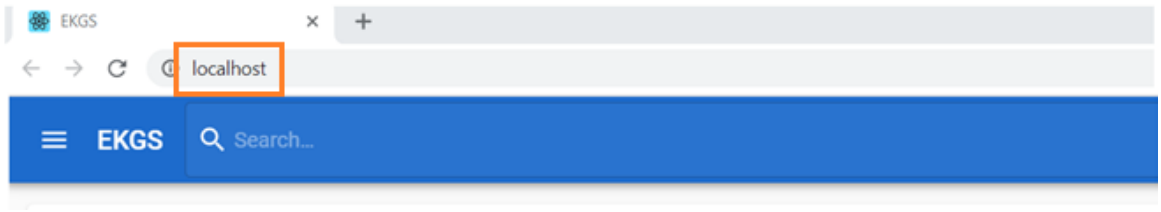
1) Download Docker Compose configuration (ekgs-compose.yml) to a local directory: https://github.com/IRS-3Y/Enterprise-Knowledge-Graph-System/blob/master/SystemCode/ekgs-compose.yml
2) (Optional) In case Dialogflow agent need be deployed to a new Google Cloud account, follow steps given in Appendix A and modify ekgs-compose.yml file accordingly before proceeding to next step.
3) Go to the local directory and execute the command on a terminal:
   docker-compose -p ekgs -f ekgs-compose.yml up -d

```
C:\Users\15229\Documents\SystemCode>docker-compose -p ekgs -f ekgs-compose.yml up -d
Creating network "ekgs_default" with the default driver
Creating volume "ekgs_neo4j_data" with default driver
Creating volume "ekgs_neo4j_logs" with default driver
Pulling graphdata (irs3y/ekgs-graphdata:)...
latest: Pulling from irs3y/ekgs-graphdata
c499e6d256d6: Pull complete
bf5e36ba3916: Pull complete
b3d82fb9640b: Pull complete
d19b80457d69: Pull complete
89f470f94f13: Pull complete
```

```
Digest: sha256:dac6174180c9b5cbe647f33223c7be45a0b2462c5d81aef0c246e07cf67d16c9
Status: Downloaded newer image for irs3y/ekgs-frontend:latest
Creating ekgs_graphdata_1 ... done
Creating ekgs_backend_1   ... done
Creating ekgs_frontend_1  ... done

C:\Users\15229\Documents\SystemCode>
```

4) EKGS application is now running and available on http://localhost



Note, if you installed Docker Toolbox, please execute the command on a terminal to get IP:
docker-machine ip
Then the application will show up on http://{DOCKER_HOST_IP}

```
D:\My Lab\EKGS>docker-machine ls
NAME      ACTIVE   DRIVER       STATE     URL                         SWARM   DOCKER     ERRORS
default   *        virtualbox   Running   tcp://192.168.99.100:2376           v19.03.5

D:\My Lab\EKGS>
```

3. Trouble-shoot Connection Problems

1) Network ports occupied

For application to startup successfully, it requires port 80 and 7687 are not pre-occupied by other system processes. In case either port is occupied, you may change the port mapping by modifying ekgs-compose.yml file in text editor (before start application).

To change web UI port, update the mapping for port 80
e.g. "80:80" => "8080:80", web UI will then be accessed via http://localhost:8080

To change Graph Data Service port, update the mapping for port 7687
e.g. "7687:7687" => "9687:7687", after application startup, port 9687 should also be updated in Application Settings page (refer to section 3.1of this guide)

2) Dialogflow service disconnected
The system connects to Google Dialogflow service via public internet connection. In case it's disconnected (and alert shown in landing page of web UI), check network settings of your laptop and Docker engine (especially when Docker is hosted in VM, check VM network settings as well).

4. Stop Application

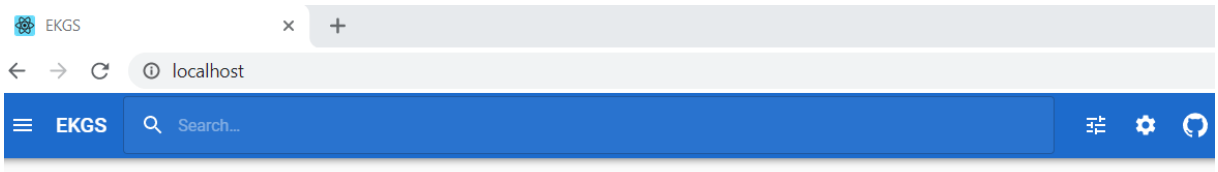
Execute the command on a terminal to stop the application:

```
docker-compose -p ekgs -f ekgs-compose.yml down -v
```

```
C:\Users\15229\Documents\SystemCode>docker-compose -p ekgs -f ekgs-compose.yml down -v
Stopping ekgs_frontend_1  ... done
Stopping ekgs_backend_1   ... done
Stopping ekgs_graphdata_1 ... done
Removing ekgs_frontend_1  ... done
Removing ekgs_backend_1   ... done
Removing ekgs_graphdata_1 ... done
Removing network ekgs_default
Removing volume ekgs_neo4j_data
Removing volume ekgs_neo4j_logs
```

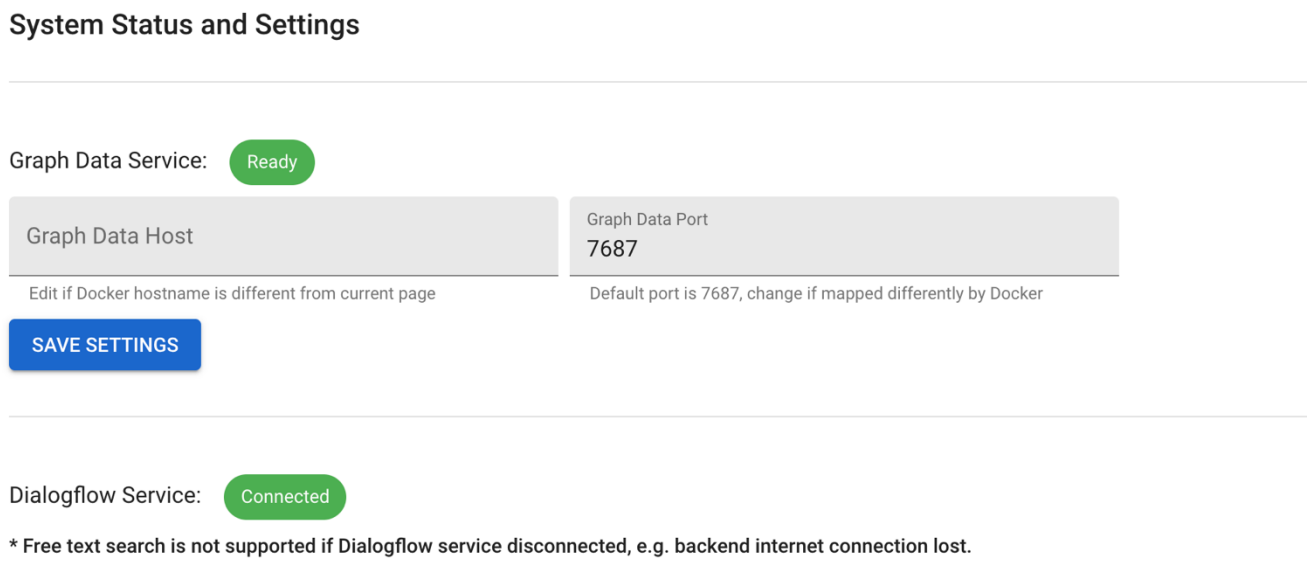
3.0 Web Settings & User Guide

Open up your preferred browser and go to the URL "http://localhost" or "http://192.168.x.x" as shown below:



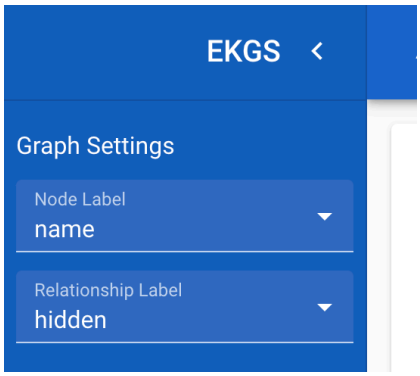
3.1 Application Status & Settings

Application Status & Settings page can be accessed by clicking 'settings' icon on toolbar. Dialogflow status indicates connectivity to Google Cloud. Graph Data Service status indicates the readiness of data loading during system start. And its connection setting should be changed if port mapping is different in ekgs-compose.yml



3.2 Graph Display Settings

As part of query result, the UI may render a Graph of nodes and relationships. To change displayed label in the Graph, update corresponding settings in the left-side menu.



3.3 Use Case #1 (360-degree Scan)

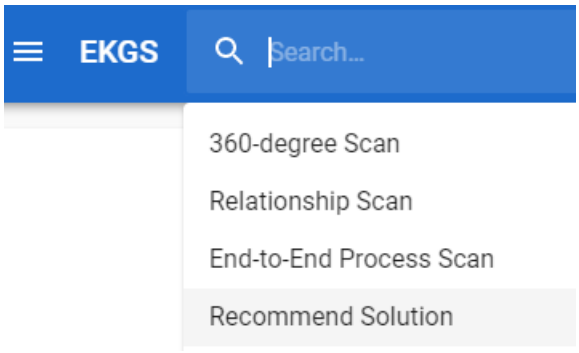
We designed 4 different use cases, please follow the step-to-step guide below to understand how the system works.

Tips: can input the first letters of keywords to find out the following phrases.

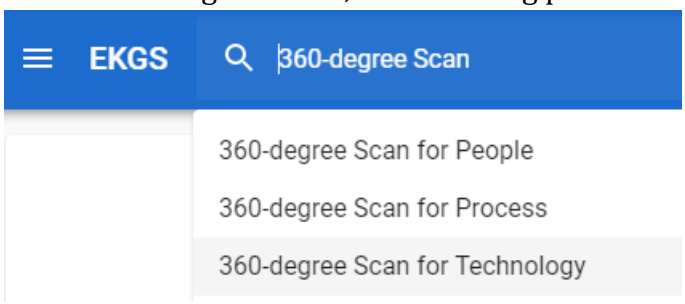
- 360-degree Scan
- Relationship Scan
- End-to-End Process Scan

- Recommend Solution

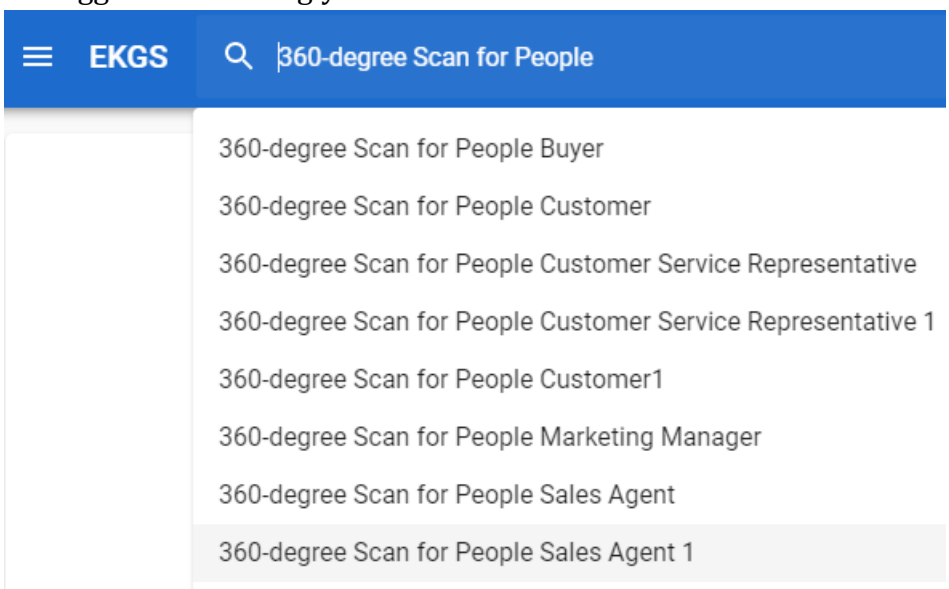
1) Click Search bar, 4 use cases can be auto listed.



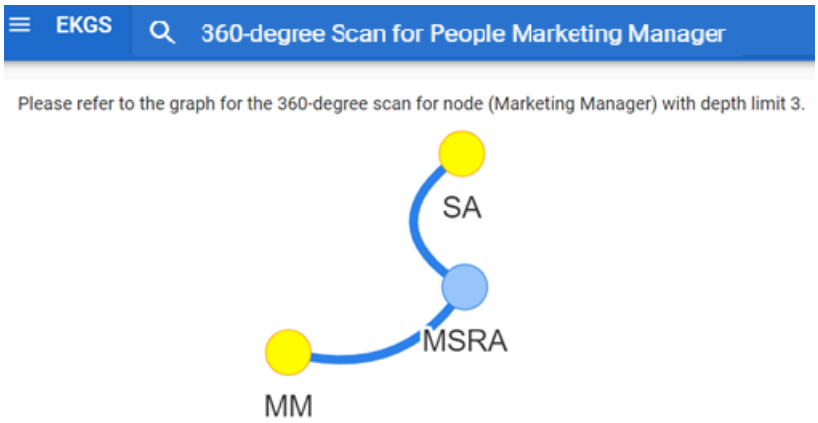
2) Select "360-degree Scan", the following phrase can be triggered accordingly.



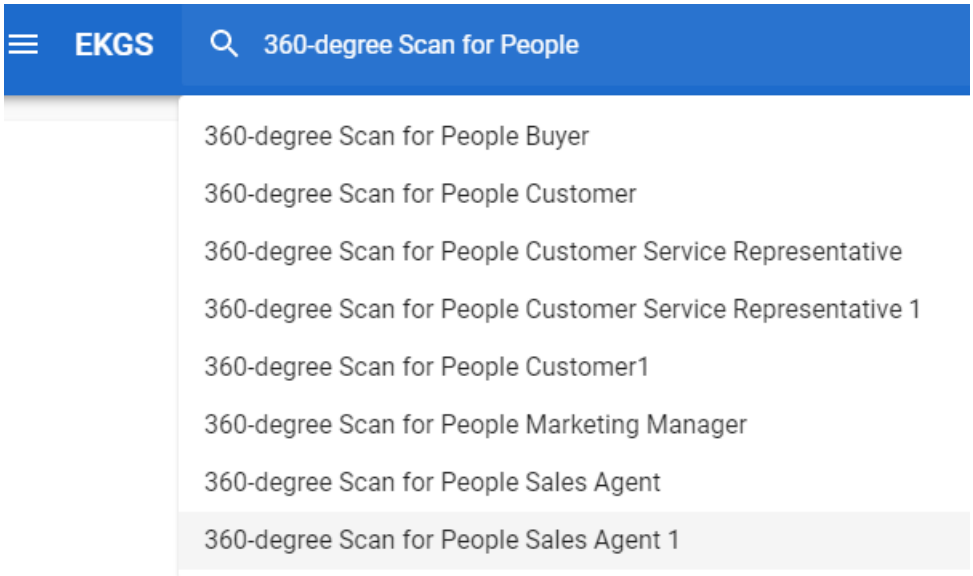
3) Select one of above phrases, such as "360-degree Scan for People", the following phrase can be triggered accordingly.



4) Continue to select one of above options, such as "360-degree Scan for People Marketing Manager", now the corresponding knowledge graph and brief text summary show up.



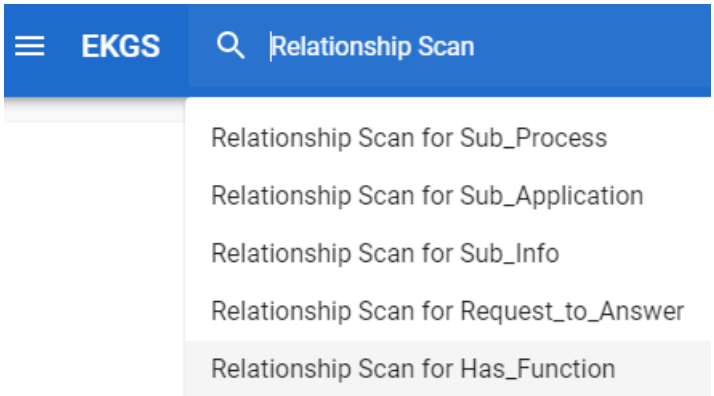
5) Click “X” cancel button to clear all inputs, then try to select other following options which you are interested in and have a look on the graph and text summary representation.



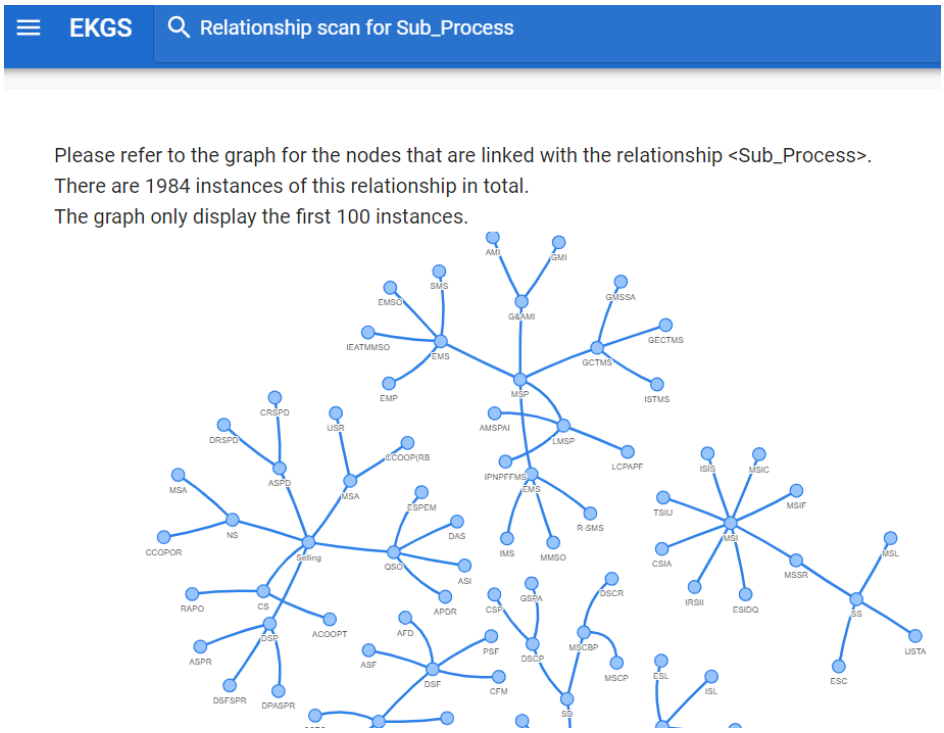
6) You may also try free-text input directly in search bar (subject to Dialogflow service connectivity). If the text matches a node name, it also triggers the 360-degree Scan action.

3.4 Use Case #2 (Relationship Scan)

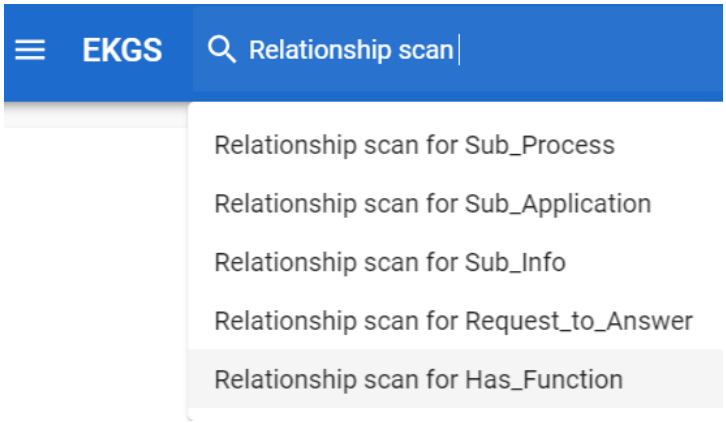
1) Select "Relationship Scan", the following phrase can be triggered accordingly.



2) Continue to select one of above phrases, such as "Relationship Scan for Sub_Process", now the corresponding knowledge graph and brief text summary show up.



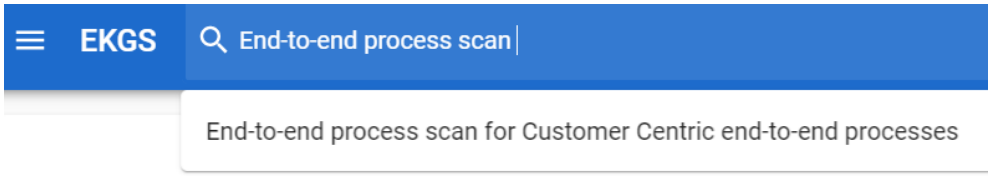
3) Click “X” cancel button to clear all inputs, then try to select other following options which you are interested in and have a look on the graph and text summary representation.



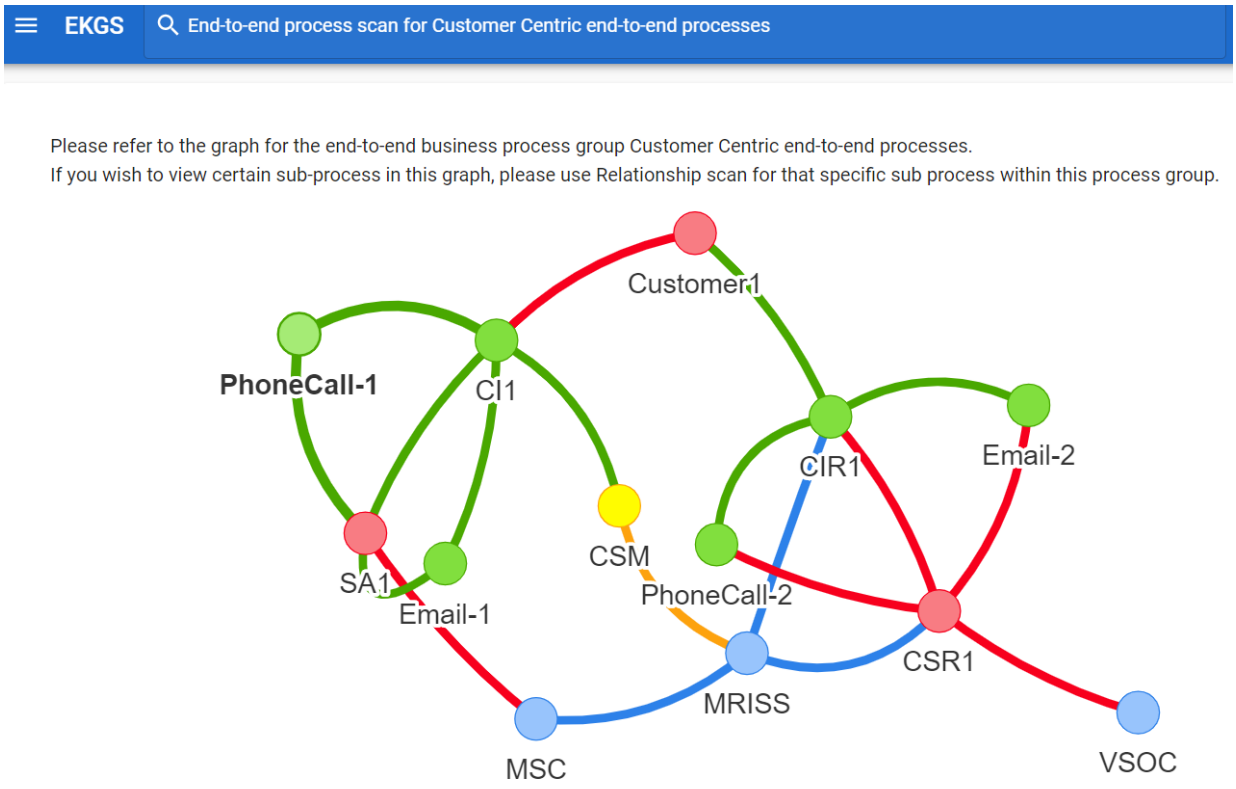
4) You may also try free-text input directly in search bar (subject to Dialogflow service connectivity). If the text has keyword ‘relationship’ and matches a relationship type, it also triggers Relationship Scan action.

3.5 Use Case #3 (End-to-End Process Scan)

1) Select "End-to-End Process Scan", the following phrase can be triggered accordingly.



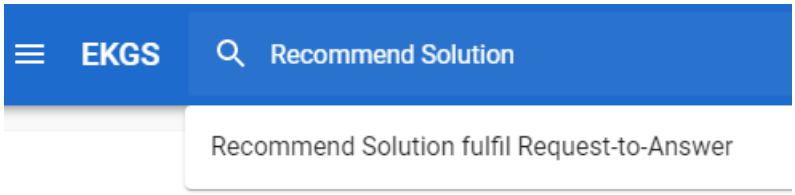
2) Continue to select the phrase "End-to-End Process Scan for Customer Centric End-to-End Processes", now the corresponding knowledge graph and brief text summary show up.



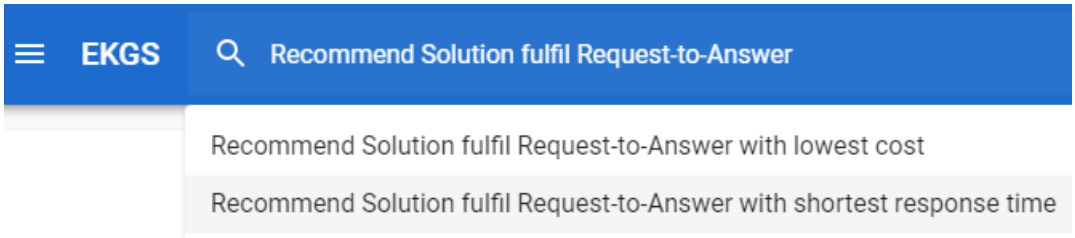
3) You may also try free-text input directly in search bar (subject to Dialogflow service connectivity). If the text has keyword 'process' and matches a process stream name, it also triggers End-to-End Process Scan action.

3.6 Use Case #4 (Recommend Solution)

1) Select "Recommend Solution", the following phrase can be triggered accordingly.



2) Select the phrase "Recommend Solution fulfil Request-to-Answer", the following phrase can be triggered accordingly.



3) Continue to select 1st above option " Recommend Solution fulfil Request-to-Answer with Lowest Cost", now the corresponding knowledge graph and brief text summary show up.

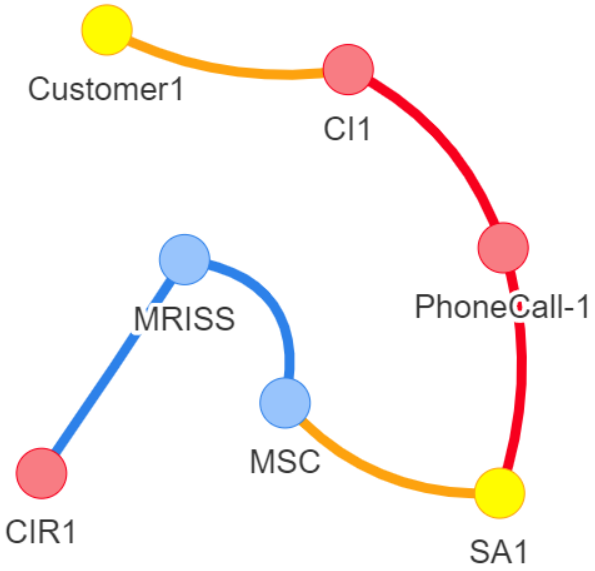
EKGS Recommend Solution fulfil Request-to-Answer with lowest cost

The following steps can fulfil the Request-to-Answer process with the lowest cost 14.00

Please refer to below table for the step cost summary

Node ID	Node Type	Name	Long Name	Step Cost	Step Description
3552	People	Customer1	Customer1	0.00	Customer 1
3555	Information	CI1	Customer Inquiry 1	0.00	Customer Inquiry 1
3559	Information	PhoneCall-1	PhoneCall-1	2.00	PhoneCall-1
3553	People	SA1	Sales Agent 1	4.00	Sales Agent 1
87	Process	MSC	Manage Sales Contact	9.00	Manage all sales contacts between potential or existing parties and the enterprise.
641	Process	MRISS	Manage Request (Including Self Service)	14.00	Manage all requests (inbound and outbound) made by potential and existing customers
3562	Information	CIR1	Customer Inquiry Response 1	14.00	Customer Inquiry Response 1

The following graph shows the end-to-end graph view about the optimized process flow.



4) Try to select 2nd above option "Recommend Solution fulfil Request-to-Answer with shortest response time", now the corresponding knowledge graph and brief text summary show up.

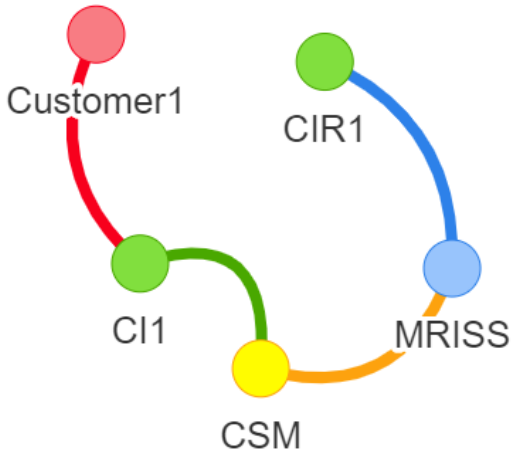
EKGS Recommend Solution fulfil Request-to-Answer with shortest response time

The following steps can fulfil the Request-to-Answer process with the shortest response time 3.00

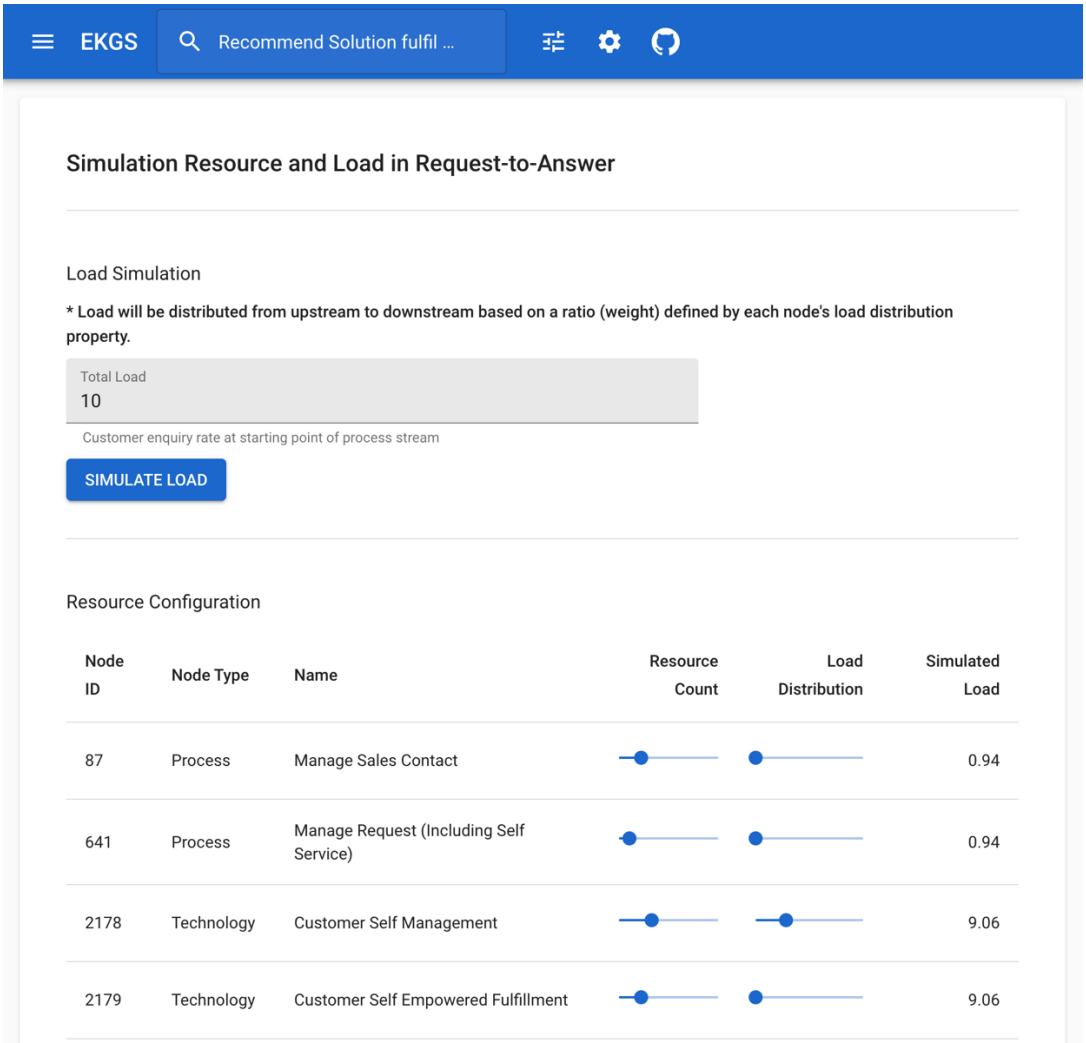
Please refer to below table for the step cost summary

Node ID	Node Type	Name	Long Name	Step Cost	Step Description
3552	People	Customer1	Customer1	0.00	Customer 1
3555	Information	CI1	Customer Inquiry 1	0.00	Customer Inquiry 1
2178	Technology	CSM	Customer Self Management	1.00	Customer Self Management
641	Process	MRISS	Manage Request (Including Self Service)	2.00	Manage all requests (inbound and outbound) made by potential and existing customers
3562	Information	CIR1	Customer Inquiry Response 1	3.00	Customer Inquiry Response 1

The following graph shows the end-to-end graph view about the optimized process flow.



5) To change resource settings and simulate transaction load in process stream, click the 'resource simulation' icon in toolbar and modify those settings in the simulation page.

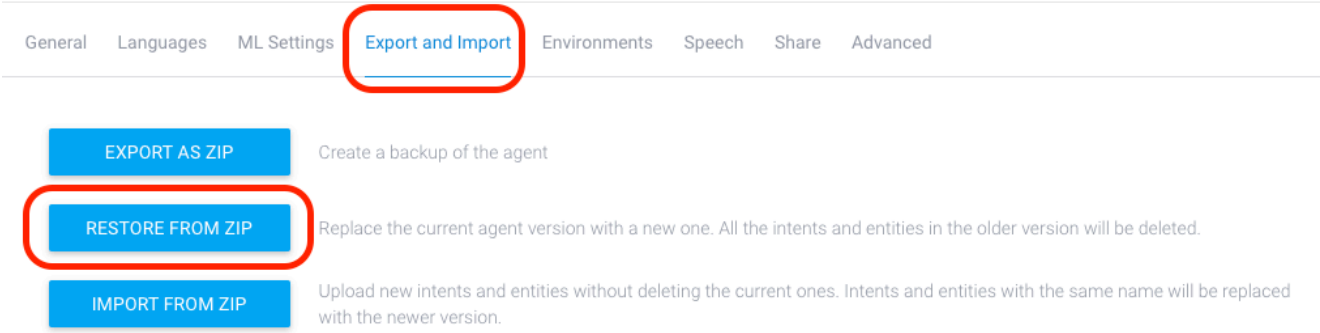


Appendix A – Deploy Dialogflow agent to new Google Cloud account

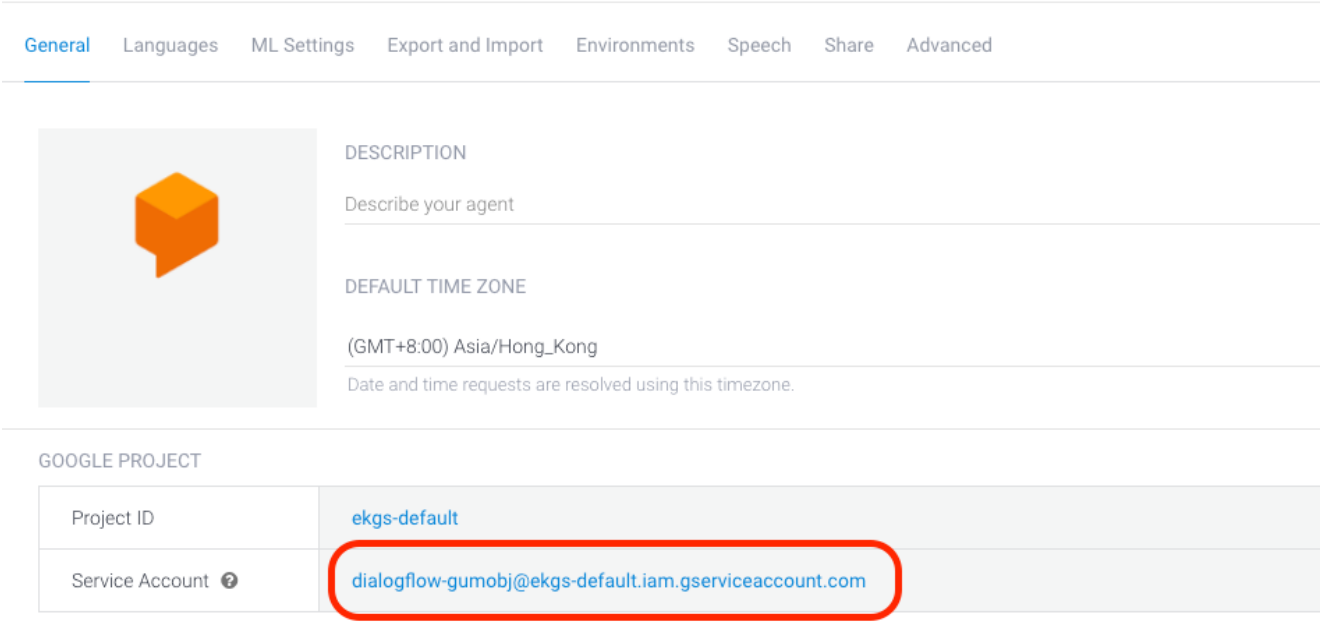
EKGS application has default configuration to connect with a pre-deployed Dialogflow agent, so that it works out-of-box without any Dialogflow deployment being performed by the user. However, in situation whereby the agent should be re-deployed to a new Google Cloud account, follow below steps to deploy it, export service account key and configure EKGS Docker Compose file.

1) Download the Dialogflow agent ZIP from our GitHub repository's "Miscellaneous" folder. https://github.com/IRS-3Y/Enterprise-Knowledge-Graph-System/blob/master/Miscellaneous/Dialogflow-Agent-EkgsBot.zip

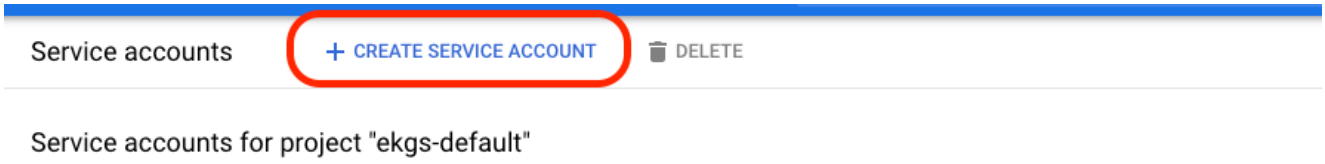
2) Go to the project settings of the target Dialogflow project (created with your own Google account). Under "Export and Import" tab, click "Restore from ZIP" button and select the agent file downloaded in previous step.



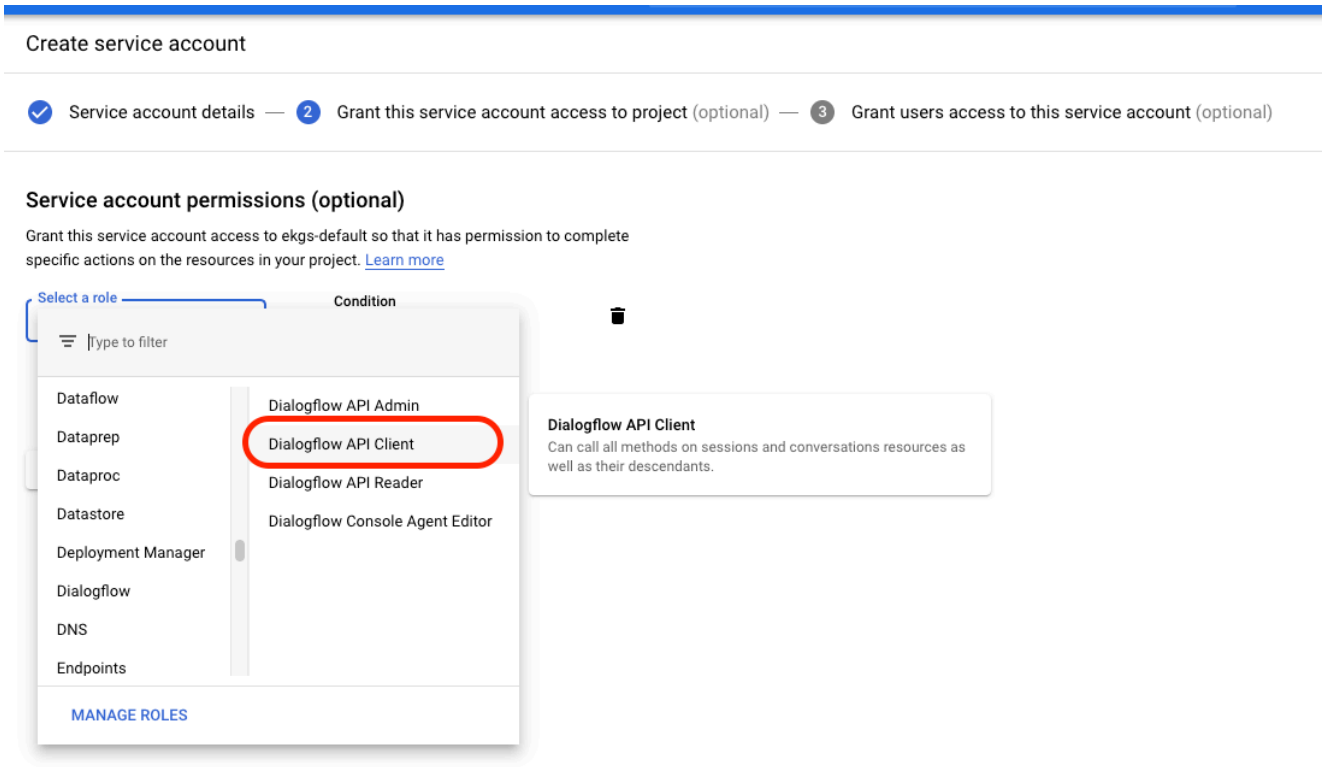
3) From project settings "General" tab, click "Service Account" link to open Google Cloud project's setting page.



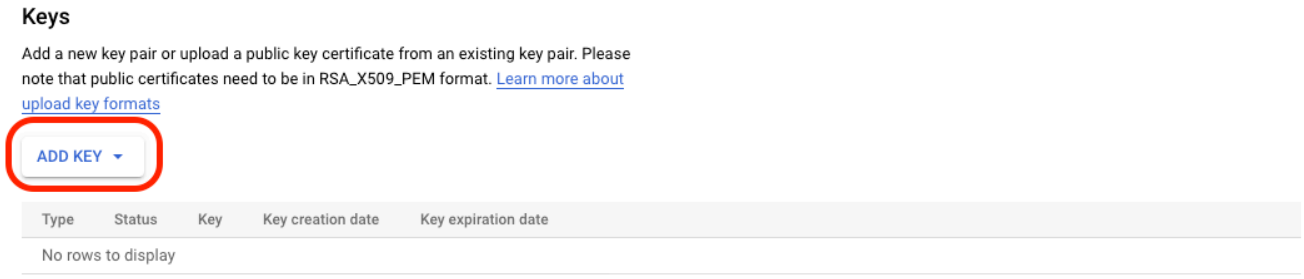
4) Click "Create Service Account" button.



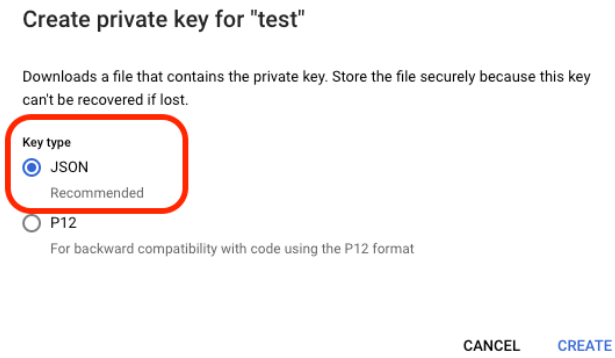
5) Fill in account details based on your own preferences and create the account. In the second page “Service account permissions”, select “Dialogflow API Client” role for this account.



6) Once created, the new service account appears in your project’s “Service Accounts” list. Click the new service account’s name for adding key to it.



7) Select “JSON” as key type and click “Create”. It will prompt to download the key file. Save it to your local machine (e.g. <DownloadFolder>/your-project-key.json)



8) Use below shell commands to create a Docker volume holding the service account key file (JSON file saved in previous step <DownloadFolder>).

```
docker volume create ekgs_config
docker run -d --rm --name dummy -v ekgs_config:/root alpine tail -f /dev/null
docker cp <DownloadFolder>/your-project-key.json dummy:/root/ your-project-key.json
docker stop dummy
```

9) Update ekgs-compose.yml volume mapping and environment variable to use the new service account key. Edit lines highlighted below.

```
volumes:
  ekgs_config:
    external: true
services:
  backend:
    environment:
      - "GOOGLE_APPLICATION_CREDENTIALS=/ekgs-config/your-project-key.json"
```