



# Kogito

## Powering Business Automation in the Cloud

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# What are cloud-native applications?

*“Cloud native technologies empower organizations to build and run scalable applications in modern, dynamic environments such as public, private, and hybrid clouds. Containers, service meshes, microservices, immutable infrastructure, and declarative APIs exemplify this approach.*

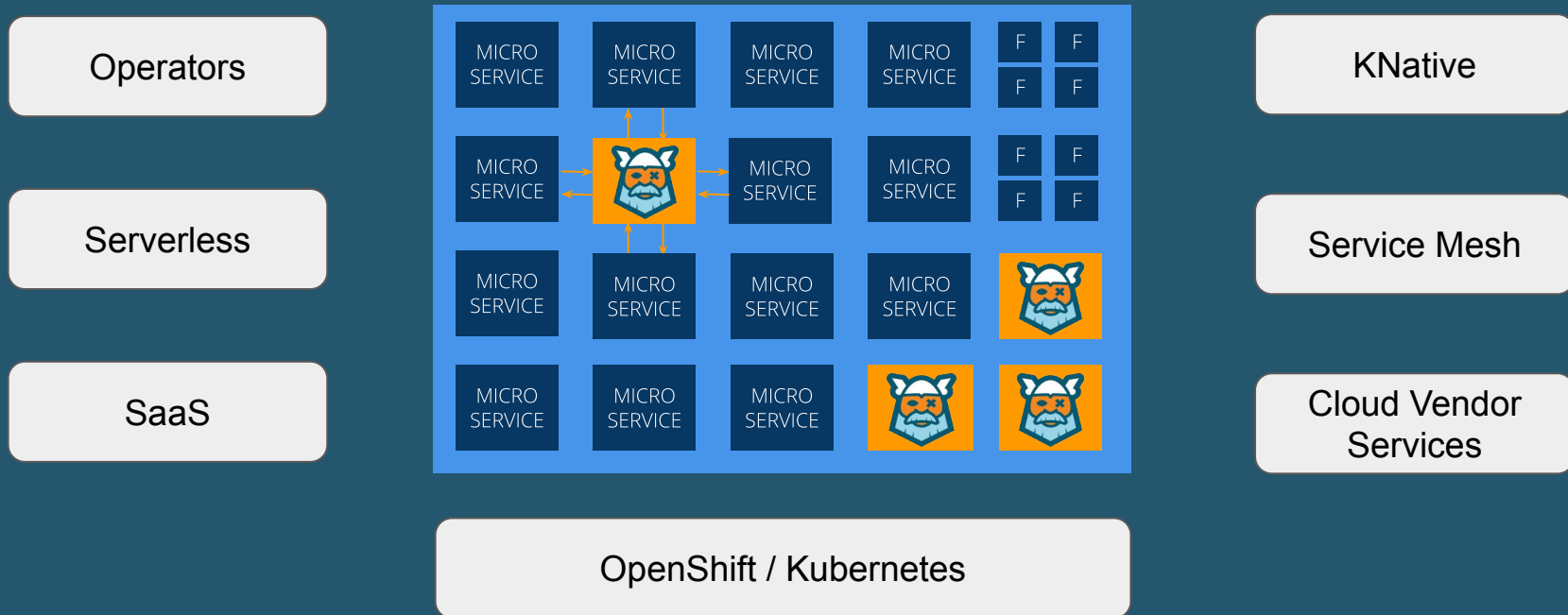
*These techniques enable loosely coupled systems that are resilient, manageable, and observable. Combined with robust automation, they allow engineers to make high-impact changes frequently and predictably with minimal toil.”*

*Cloud Native Computing Foundation (CNCF)*

# What are cloud-native applications?

- Small, independent, and loosely coupled services
  - Microservices
- Container based
- Allows rapidly iteration to deliver business value
- Private, public, and hybrid clouds
- Scalable, resource efficient

# Cloud Native Applications Architecture



# Kogito Cloud Native Building Blocks

- Runtimes
- Add-ons
- Services
- Operator





# Kogito Runtimes

# Automagically REST!

- Kogito resources
  - BPMN
  - DMN
  - Serverless Workflow
    - i. JSON
    - ii. YAML

GET	/travels
POST	/travels
GET	/travels/ConfirmTravel/schema
GET	/travels/VisaApplication/schema
GET	/travels/{id}
PUT	/travels/{id}
DELETE	/travels/{id}
GET	/travels/{id}/ConfirmTravel/{workItemId}
POST	/travels/{id}/ConfirmTravel/{workItemId}
DELETE	/travels/{id}/ConfirmTravel/{workItemId}
GET	/travels/{id}/ConfirmTravel/{workItemId}/schema
GET	/travels/{id}/VisaApplication/{workItemId}
POST	/travels/{id}/VisaApplication/{workItemId}
DELETE	/travels/{id}/VisaApplication/{workItemId}
GET	/travels/{id}/VisaApplication/{workItemId}/schema
GET	/travels/{id}/tasks



# Kogito Runtimes



Quarkus



Spring Boot





# Kogito Add-ons

# Kogito Runtimes - Add-ons

- Building blocks
  - Choose and pick the ones that are relevant to your service
- Maven dependencies
- Codegen integration
- Runtime specific dependencies:
  - Quarkus
  - SpringBoot

```
<dependency>  
  <groupId>org.kie.kogito</groupId>  
  <artifactId>kogito-cloudevents-quarkus-addon</artifactId>  
</dependency>
```



# Management add-on

- Retrieve process nodes
- Abort an active process instance
- Cancel or re-trigger a node instance, or trigger a new node instance
- Retrieve error details for a process instance, or skip or re-trigger a failed node instance

# Management add-on

**DELETE** /management/processes/{processId}/instances/{processInstanceId}

**GET** /management/processes/{processId}/instances/{processInstanceId}/error

**GET** /management/processes/{processId}/instances/{processInstanceId}/nodeInstances

**POST** /management/processes/{processId}/instances/{processInstanceId}/nodeInstances/{nodeInstanceId}

**DELETE** /management/processes/{processId}/instances/{processInstanceId}/nodeInstances/{nodeInstanceId}

**POST** /management/processes/{processId}/instances/{processInstanceId}/nodes/{nodeId}

**POST** /management/processes/{processId}/instances/{processInstanceId}/retrigger

**POST** /management/processes/{processId}/instances/{processInstanceId}/skip

**GET** /management/processes/{processId}/nodes

# Persistence add-ons

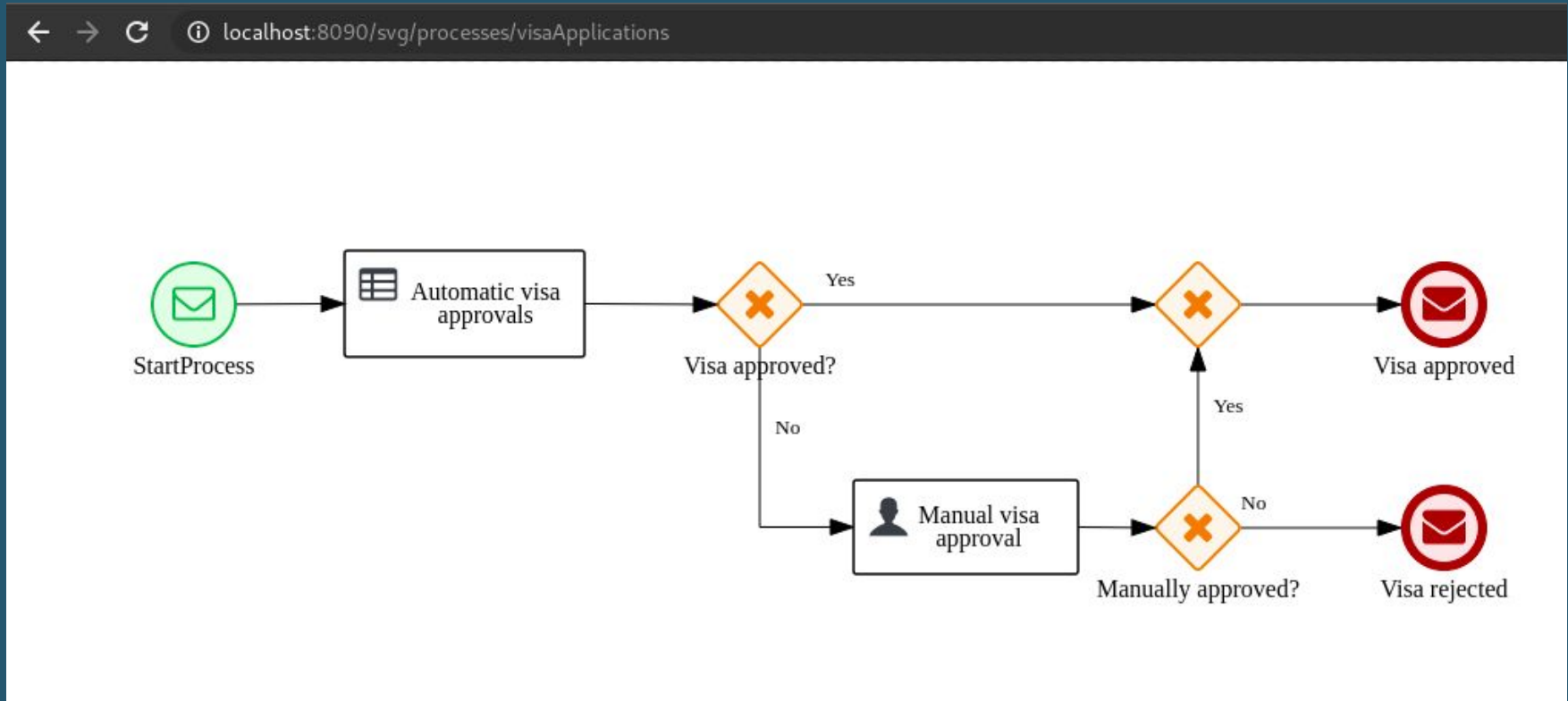
- Infinispan
  - MongoDB
  - File system
- 
- Disclaimer: Persist your process state while it is running!

# Kogito Runtimes - Process SVG

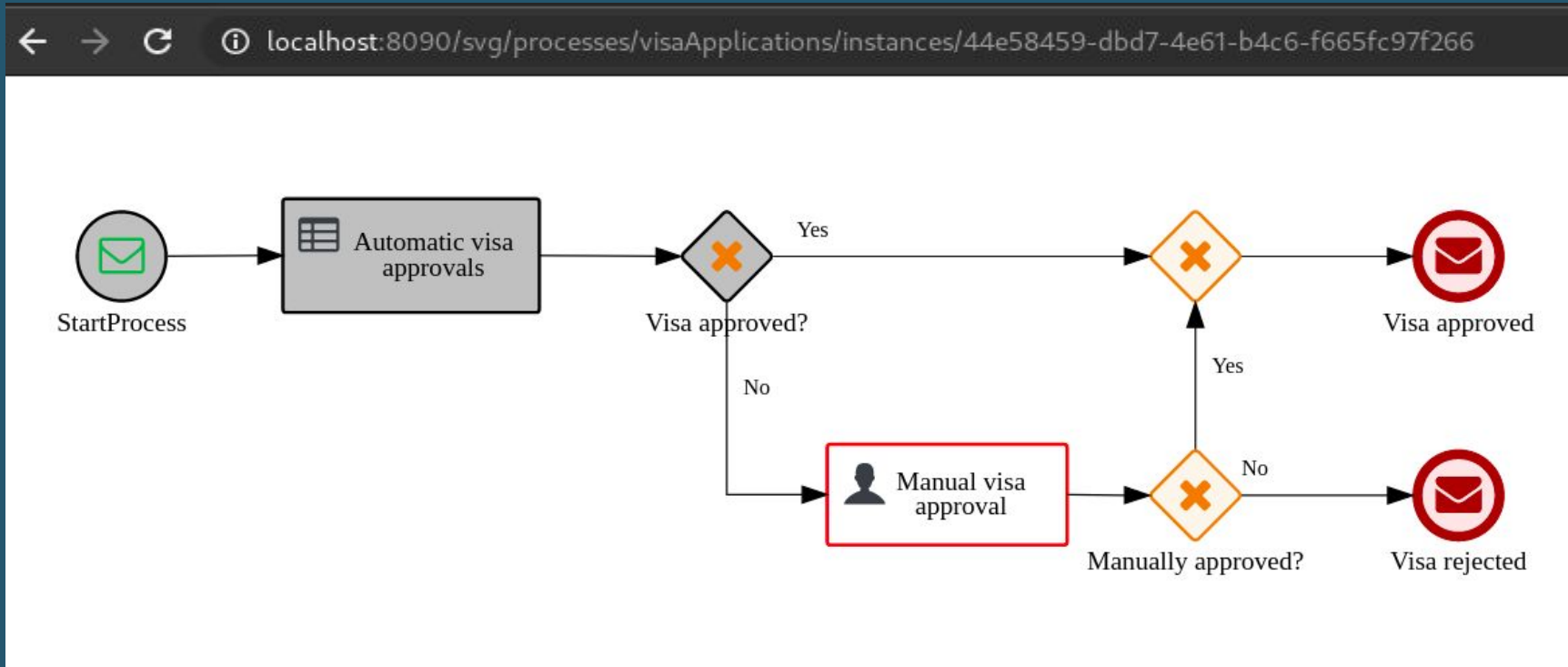
GET /svg/processes/{processId}

GET /svg/processes/{processId}/instances/{processInstanceId}

# Process SVG add-on



# Process SVG add-on





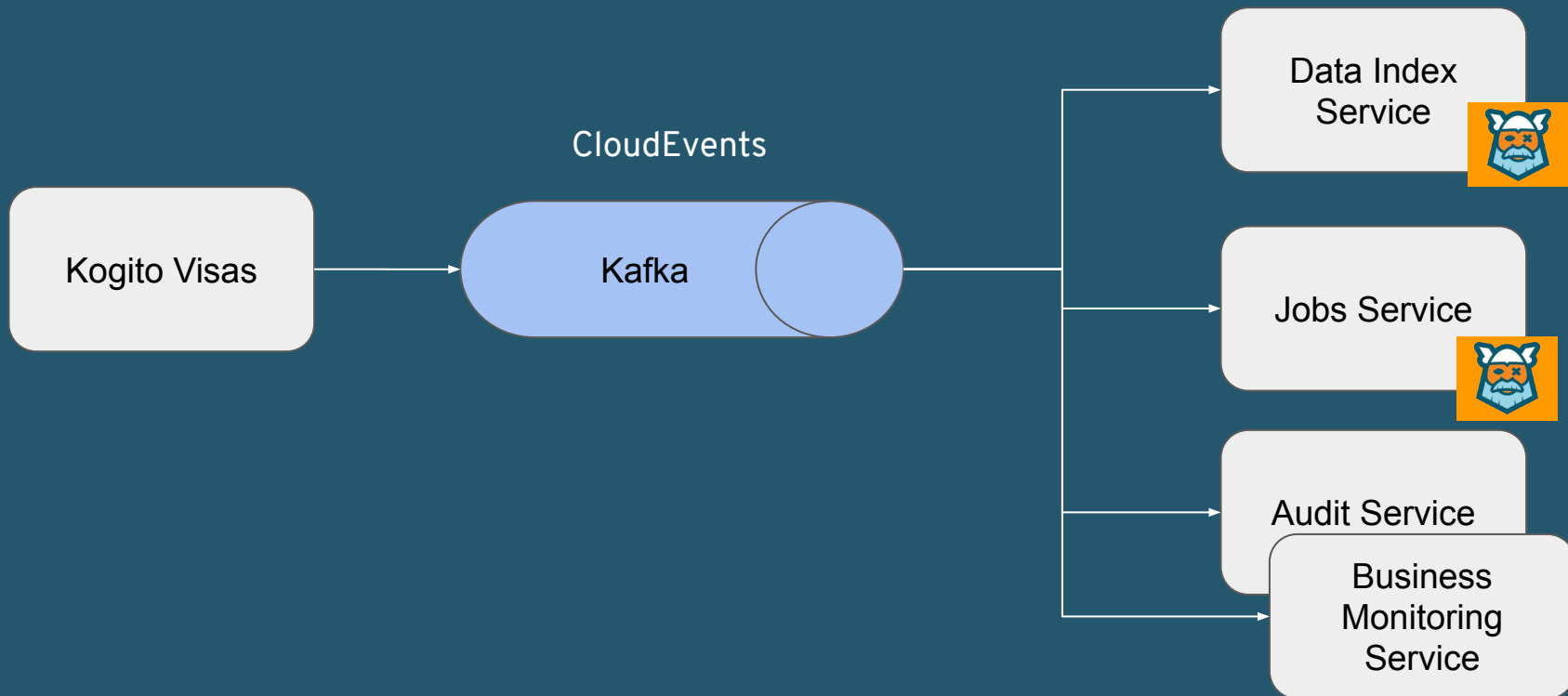
# Prometheus Monitoring add-on

← → ↻ ⓘ localhost:8080/metrics



```
# HELP kie_process_instance_running_total Running Process Instances
# TYPE kie_process_instance_running_total gauge
kie_process_instance_running_total{app_id="acme-travels",process_id="travels",} 1.0
# HELP drl_match_fired_nanosecond Drools Firing Time
# TYPE drl_match_fired_nanosecond summary
drl_match_fired_nanosecond_count{app_id="acme-travels",process_id="Brazilian citizens require visa to Australia",} 1.0
drl_match_fired_nanosecond_sum{app_id="acme-travels",process_id="Brazilian citizens require visa to Australia",} 1081153.0
# HELP drl_match_fired_nanosecond_max Drools Firing Time
# TYPE drl_match_fired_nanosecond_max gauge
drl_match_fired_nanosecond_max{app_id="acme-travels",process_id="Brazilian citizens require visa to Australia",} 0.0
# HELP kie_work_item_duration_seconds_max Work Items Duration
# TYPE kie_work_item_duration_seconds_max gauge
kie_work_item_duration_seconds_max{name="VisaApplication",} 0.0
# HELP kie_work_item_duration_seconds Work Items Duration
# TYPE kie_work_item_duration_seconds summary
kie_work_item_duration_seconds_count{name="VisaApplication",} 1.0
kie_work_item_duration_seconds_sum{name="VisaApplication",} 11.533
# HELP kie_process_instance_started_total Started Process Instances
# TYPE kie_process_instance_started_total counter
kie_process_instance_started_total{app_id="acme-travels",process_id="travels",} 1.0
```

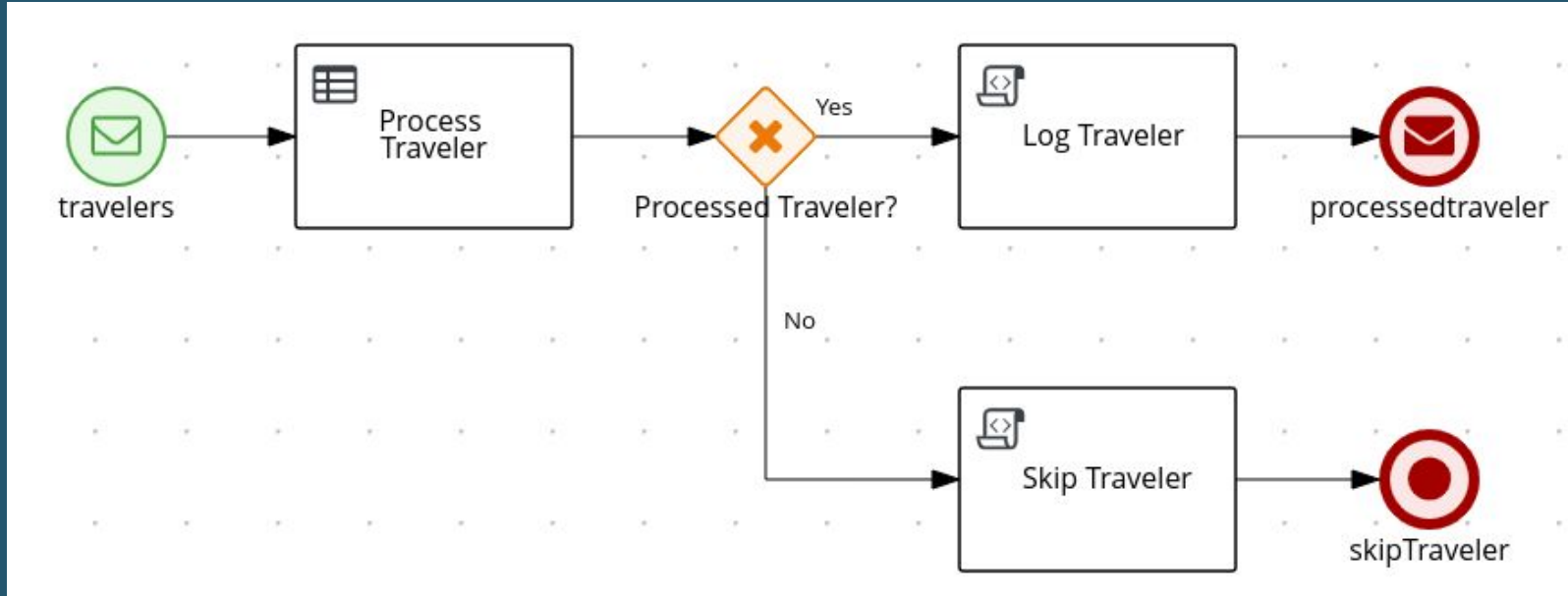
# Reactive Messaging add-on



# Kogito Runtimes - Reactive Messaging

- Events
  - Process Instance Event
  - User Task Event
  - Process Variables Event

# BPMN Messages and Cloud Events



# BPMN Messages and Cloud Events

The image shows a BPMN editor interface. A 'Task Data I/O' dialog box is open, displaying a table for 'Data Output and Assignment'. The table has columns for Name, Data Type, and Target. A single row is visible with 'event' as the Name, 'org.acme.travel.Tr' as the Data Type, and 'traveller' as the Target. There are '+ Add', 'Cancel', and 'Save' buttons. In the background, a BPMN task named 'Skip traveller' is visible, with a red bullseye icon indicating a cloud event. To the right, a configuration panel for the task is shown, with sections for General, Implementation/Execution, and Data Assignments. The 'General' section shows the Name 'travellers'. The 'Implementation/Execution' section shows the Message 'travellers'. The 'Data Assignments' section shows '1 data output'.

**Task Data I/O**

Data Output and Assignment

Name	Data Type	Target
event	org.acme.travel.Tr	traveller

Buttons: + Add, Cancel, Save

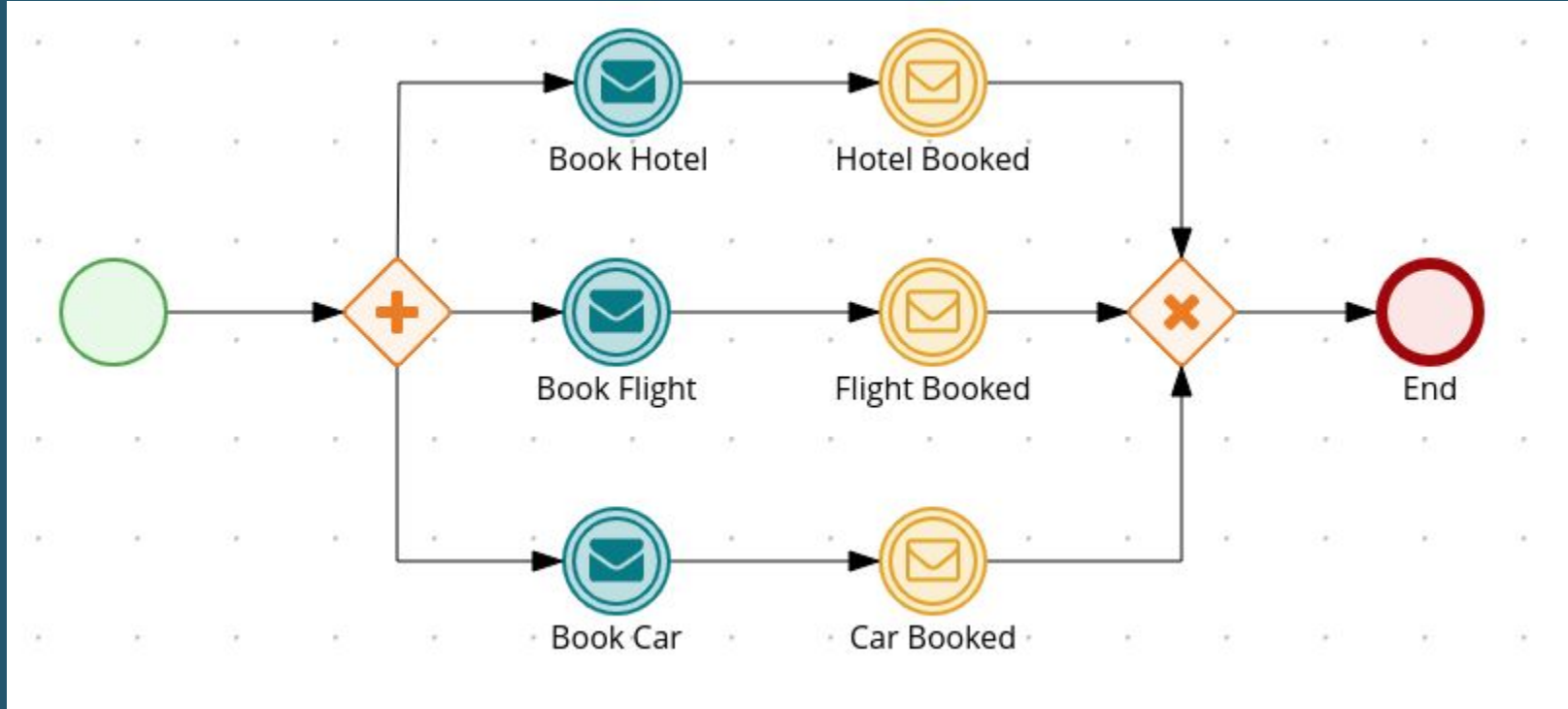
**Task Configuration Panel**

- General**
  - Name: travellers
  - Documentation:
- Implementation/Execution**
  - Message: travellers
  - SLA Due Date:
- Data Assignments**
  - Assignments: 1 data output

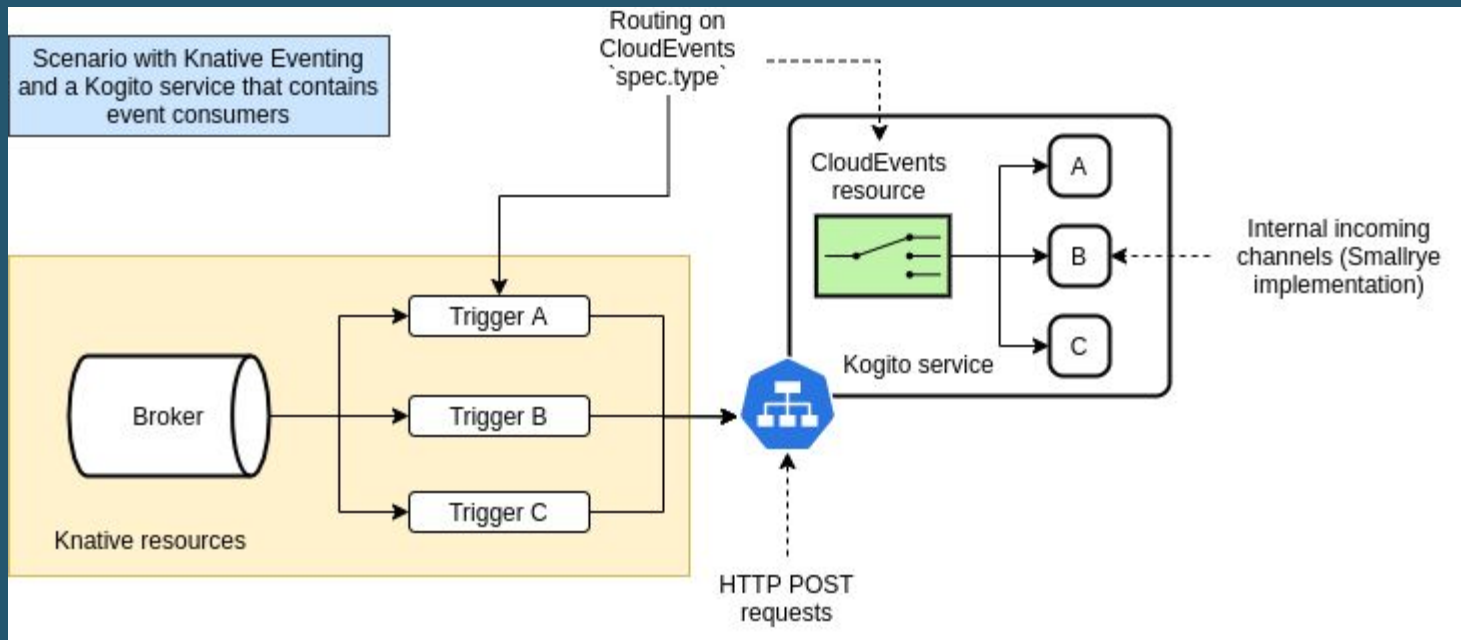
# Cloud Events add-on

- Route CloudEvent types to specific BPMN message events in the process
- Codegen glues producer and consumer code to specific node in the process
- Enabler for easily integrating with external systems.
  - Example: Using Kogito to orchestrate multiple services

# Cloud Events add-on

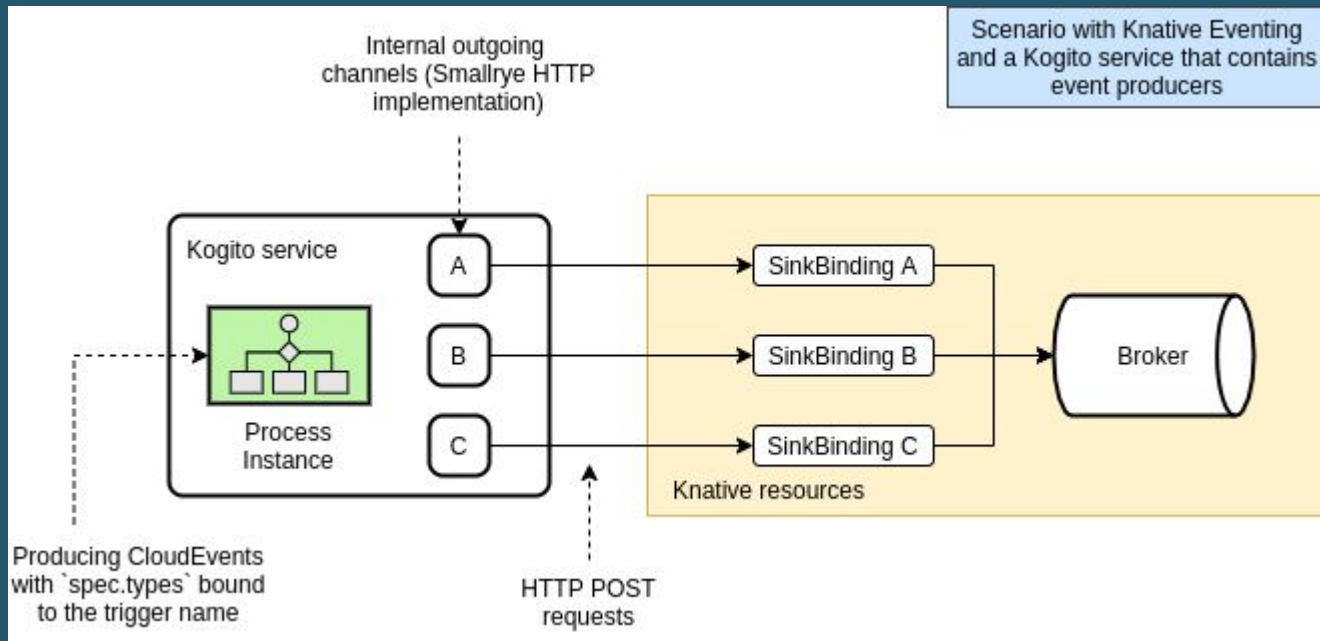


# KNative Eventing add-on





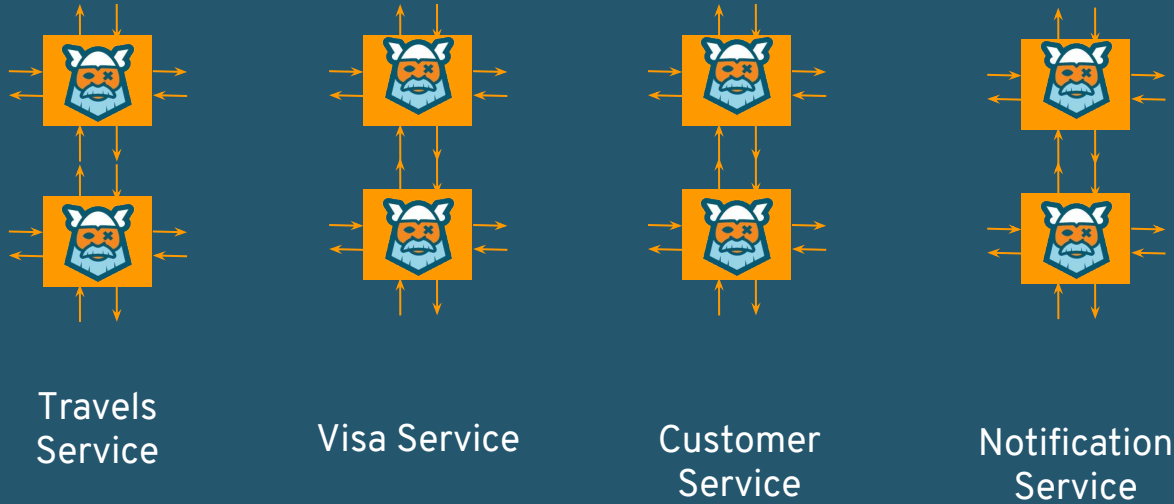
# KNative Eventing add-on





# Kogito Services

# Kogito - Scaling to multiple services



# Data Index

- Distinct focus on domain data
- Flexible data structure
- Distributable and cloud-ready format
- Infinispan-based persistence support
- Message-based communication with Kogito runtime (Apache Kafka, CloudEvents )
- Powerful querying API using GraphQL

# Data Index - GraphQL

GraphiQL

▶

Prettify

Merge

Copy

History

```
1 {
2   Travels(where: {traveller: {firstName: {equal: "Cristiano"}}}) {
3     traveller {
4       email
5       firstName
6       lastName
7       nationality
8     }
9     trip {
10      begin
11      city
12      country
13      end
14      visaRequired
15    }
16    metadata {
17      userTasks {
18        name
19      }
20    }
21  }
22 }
23 }
```

QUERY VARIABLES

1
---

```
{
  "data": {
    "Travels": [
      {
        "traveller": {
          "email": "cristiano.nicolai@gmail.com",
          "firstName": "Cristiano",
          "lastName": "Nicolai",
          "nationality": "Brazilian"
        },
        "trip": {
          "begin": "2020-12-01T08:00:00.000+10:00",
          "city": "Brisbane",
          "country": "Australia",
          "end": "2020-12-31T08:00:00.000+10:00",
          "visaRequired": true
        },
        "metadata": {
          "userTasks": [
            {
              "name": "VisaApplication"
            }
          ]
        }
      }
    ]
  }
}
```

< Schema Query X

🔍 Search Query...

No Description

FIELDS

ProcessInstances(  
 where: ProcessInstanceArgument  
 orderBy: ProcessInstanceOrderBy  
 pagination: Pagination  
) : [ProcessInstance]

UserTaskInstances(  
 where: UserTaskInstanceArgument  
 orderBy: UserTaskInstanceOrderBy  
 pagination: Pagination  
) : [UserTaskInstance]

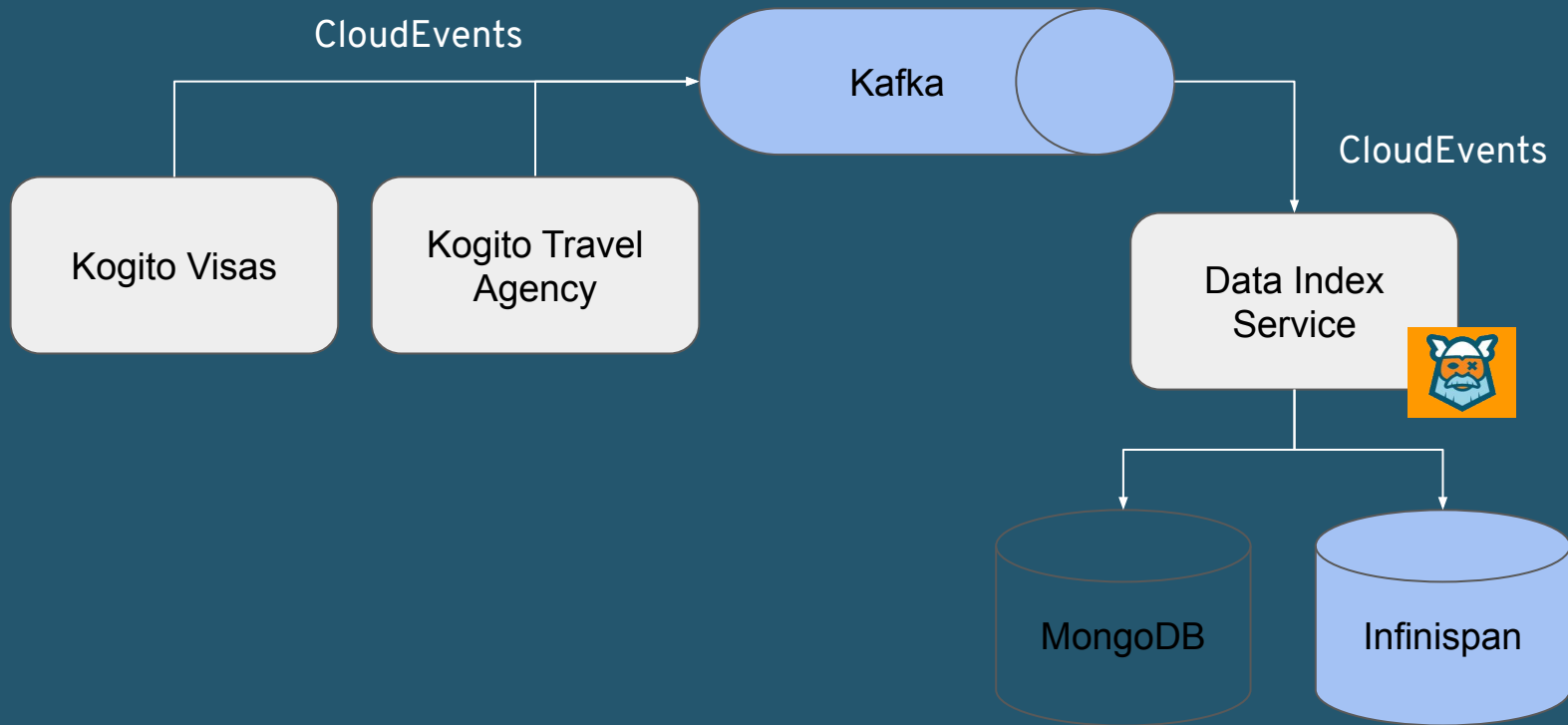
Jobs(  
 where: JobArgument  
 orderBy: JobOrderBy  
 pagination: Pagination  
) : [Job]

Travels(  
 where: TravelsArgument  
 orderBy: TravelsOrderBy  
 pagination: Pagination  
) : [Travels]

VisaApplications(  
 where: VisaApplicationsArgument  
 orderBy: VisaApplicationsOrderBy  
 pagination: Pagination  
) : [VisaApplications]



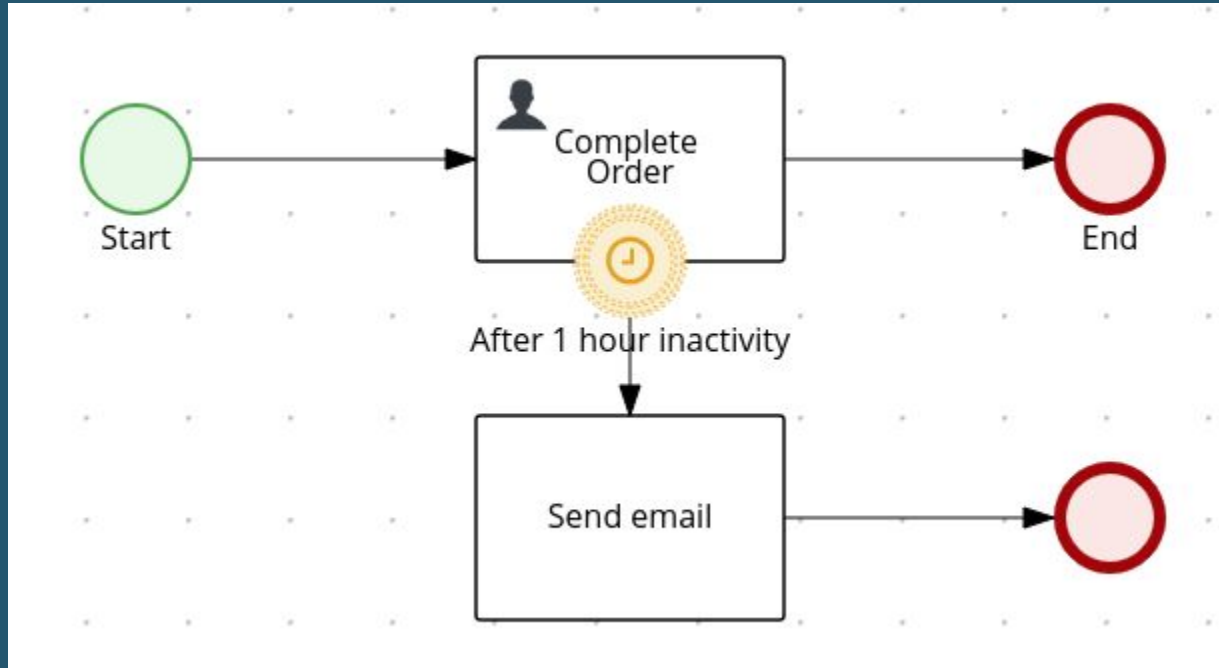
# Data Index - Architecture



# Data Index - Summary

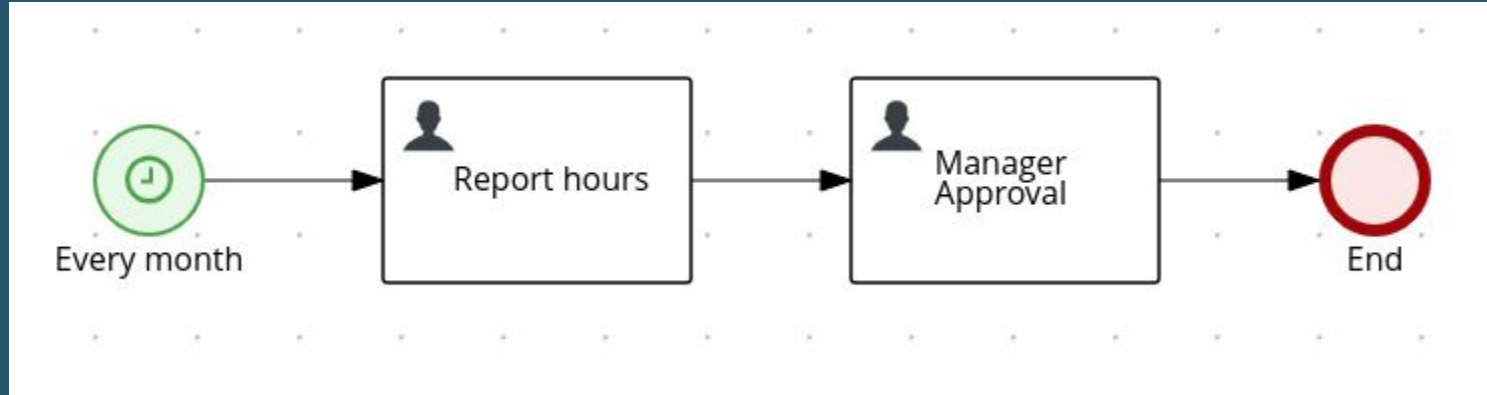


# Jobs Service

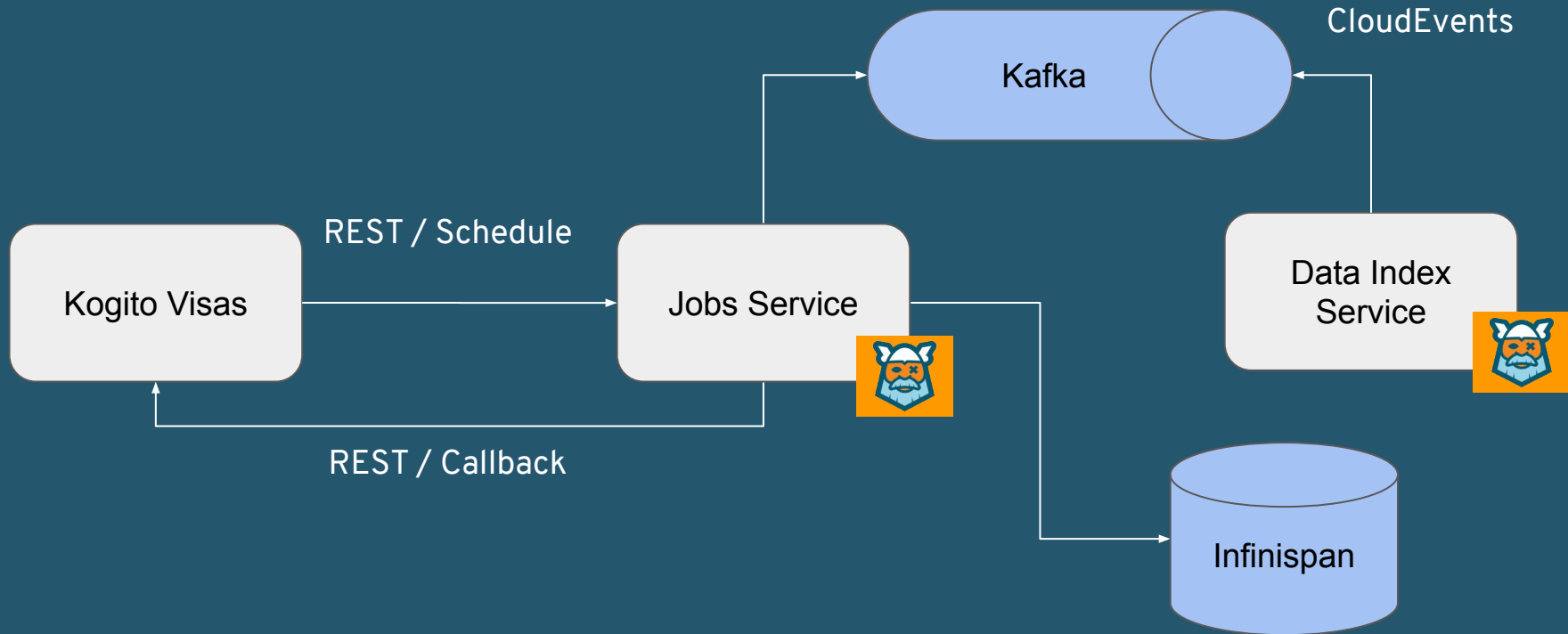




# Jobs Service



# Jobs Service - Architecture



# Jobs Service - Summary



- Distributions
  - Quay.io image
  - Runner JAR
  - Operator





# Process Management


- How to support process operation?
- Bring visibility about status?
- Have an overview about all runtimes deployed?
- Tooling to support fixing any issues during the execution of the process?

# Management Console

- List process instances
  - Search by status and business key
  - Agregation by parent process
  - Bulk Operations
    - Abort/Skip/Retry
- View process details
  - Abort instance
  - Navigation between parent/child processes
  - Re/Trigger a node in the process
  - Timeline
    - View nodes in error
      - Retry or Skip
- Jobs management
- Domain Explorer
  - View and find processes based on domain data
  - Allows for creating domain specific views to easily find related processes

# Management Console - Process Details

 Management Console

 john

## Process Details

[Home](#) > [Process Instances](#) > [ProcessVisaApplications](#)

### ProcessVisaApplications 44e58

Save

Abort

#### Details

**Name**  
ProcessVisaApplications

**State**  
Active

**Id**  
44e58459-dbd7-4e61-b4c6-f665fc97f266

**Endpoint**  
<http://localhost:8090>

**Start**  
a few seconds ago

**Last Updated**  
a few seconds ago

#### Process Variables

```
{ 1 item
  "visaApplication" : { 8 items
    "firstName" : string "Cristiano"
    "lastName" : string "Nicolai"
    "city" : string "Brisbane"
    "country" : string "Australia"
    "duration" : int 150
    "passportNumber" : string "12312312"
    "nationality" : string "Brazilian"
    "approved" : bool false
  }
}
```

#### Timeline

- Manual visa approval  
Active
- ✓ Visa approved?  
a few seconds ago
- ✓ Automatic visa approvals  
a few seconds ago
- ✓ StartProcess  
a few seconds ago



#### Node Trigger


Select a node from the process nodes list and click Trigger to launch it manually.

select a node

Trigger

# Management Console - Domain Explorer

 Management Console


 john

## Domain Explorer

[Home](#) > [Domain Explorer](#) > [Travels](#)

Select a field ▼ operator ▼ value

Apply Filter

Manage columns 

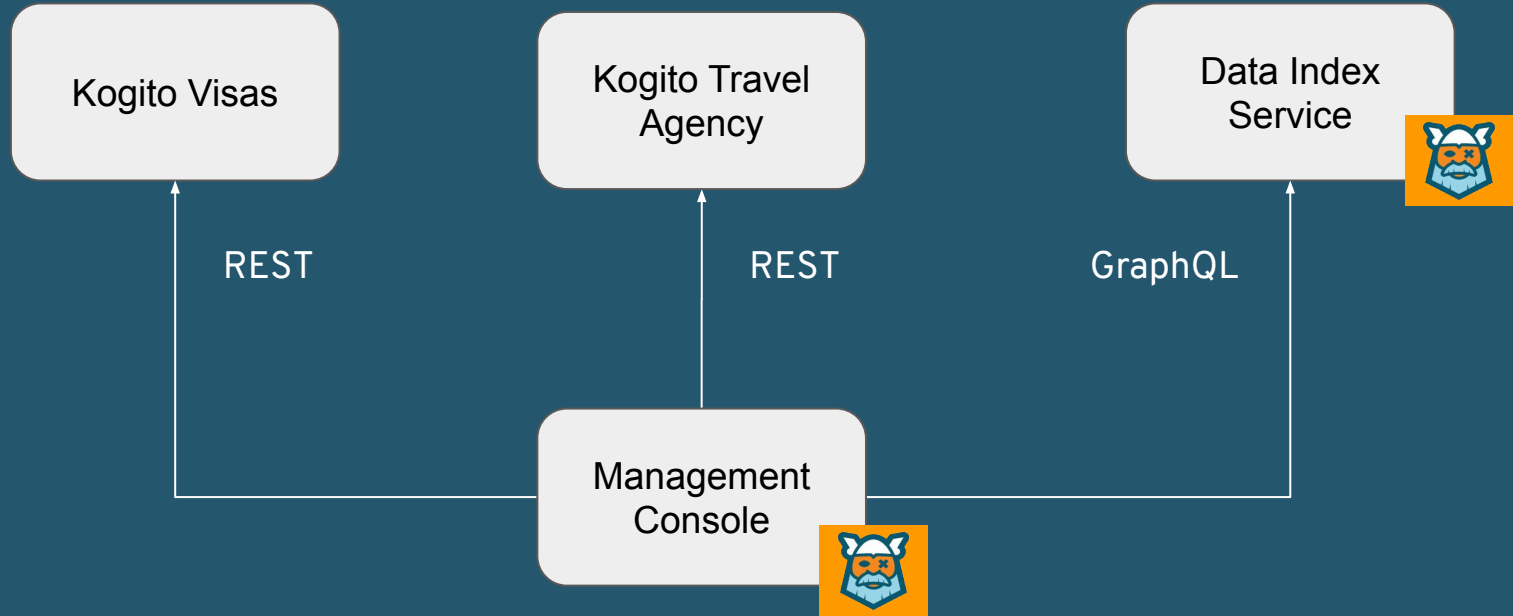
Filters

metadata / processin... ✕

Reset to default

traveller / firstName	traveller / email	traveller / lastName	traveller / nationality	trip / country	trip / city	trip / visaRequired
> Cristiano	cristiano.nicolai@gmail.com	Nicolai	Brazilian	Australia	Brisbane	true

# Management Console - Architecture





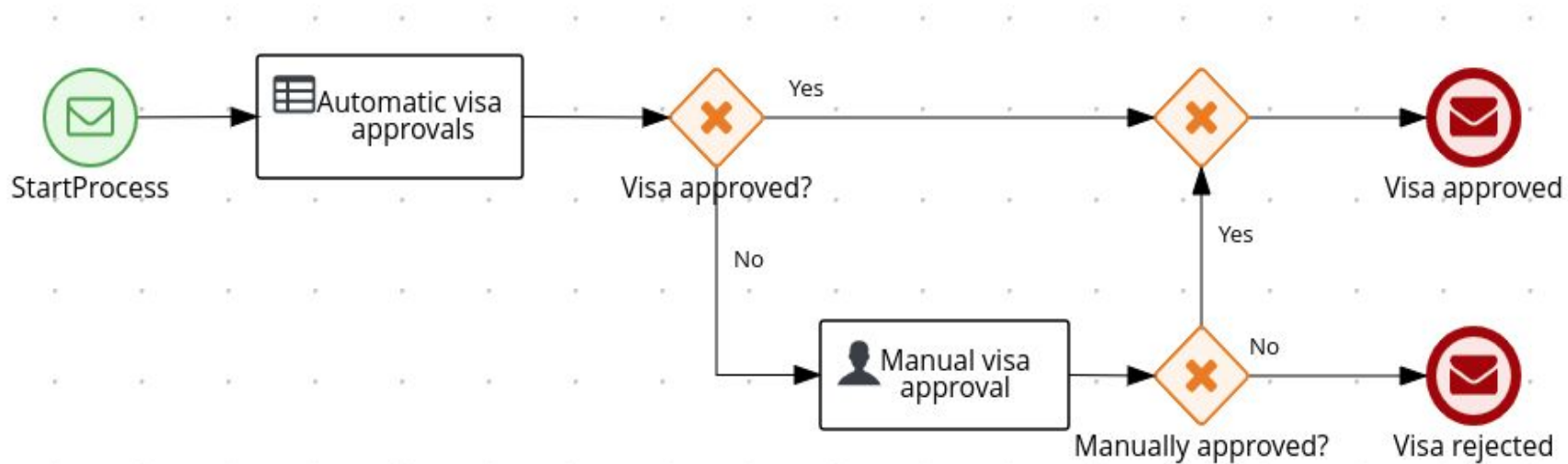
# Management Console



- Distributions
  - Quay.io image
  - Runner JAR
  - Operator




# Kogito - User Tasks



# Task Console

- Out of the box Task Inbox experience
- Forms generated dynamically
  - Based on JSON Schema format
- Keycloak/SSO integration
- Task Management ( coming soon )
  - Delegate tasks


# Task Console

 Task Console




john

Task Inbox

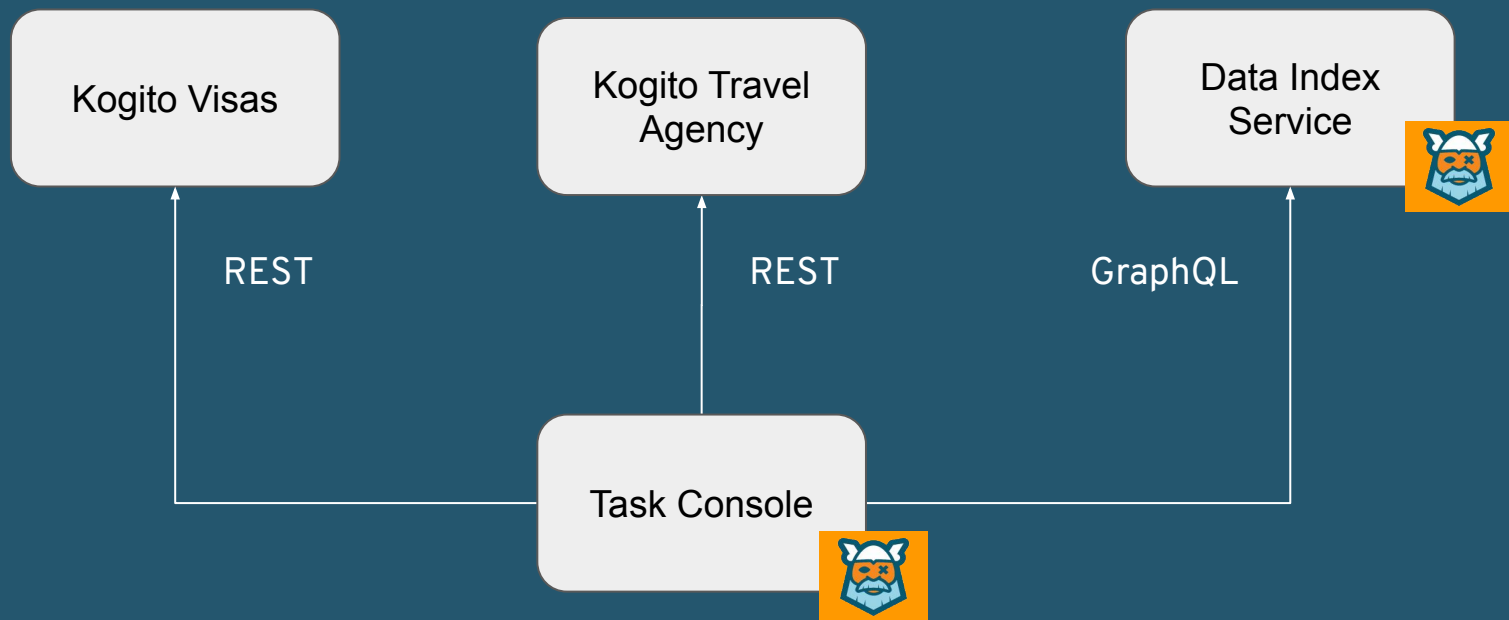
## Task Inbox

Status 2 Filter by name Apply Filter 

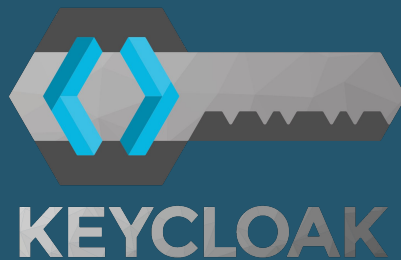
Status Ready X Reserved X Reset to default

Name	Process	Priority	State	Started	Last update
<a href="#">Apply for visa 45a73</a>	travels	1	 Ready	8 months ago	8 months ago
<a href="#">Confirm travel (Submit fails) 047ec</a>	travels	1	 Ready	8 months ago	8 months ago
<a href="#">Apply for visa (Submit fail) 841b9</a>	travels	1	 Ready	2 months ago	2 months ago

# Task Console - Architecture



# Task Console



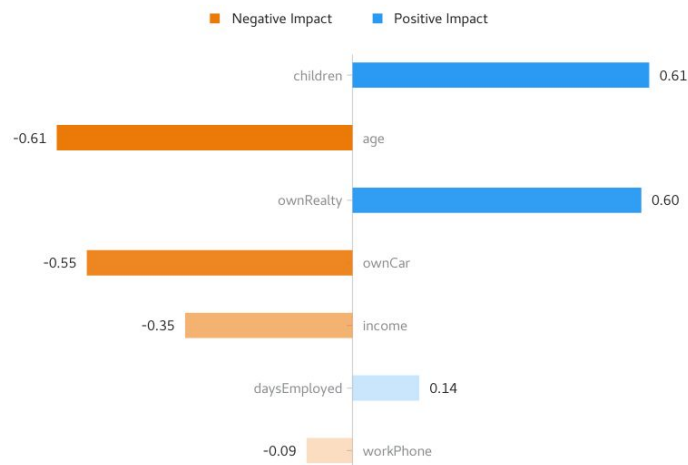
- Distributions
  - Quay.io image
  - Runner JAR
  - Operator

# Trusty AI

- Runtime Monitoring Service
- Tracing and Accountability Service
- Explanation Service

## Explanation

Features Score Chart



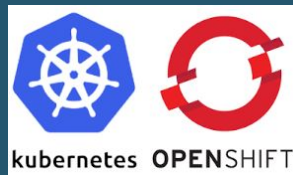
# Kogito Services Distribution

- Quay.io container image
- Runner JAR

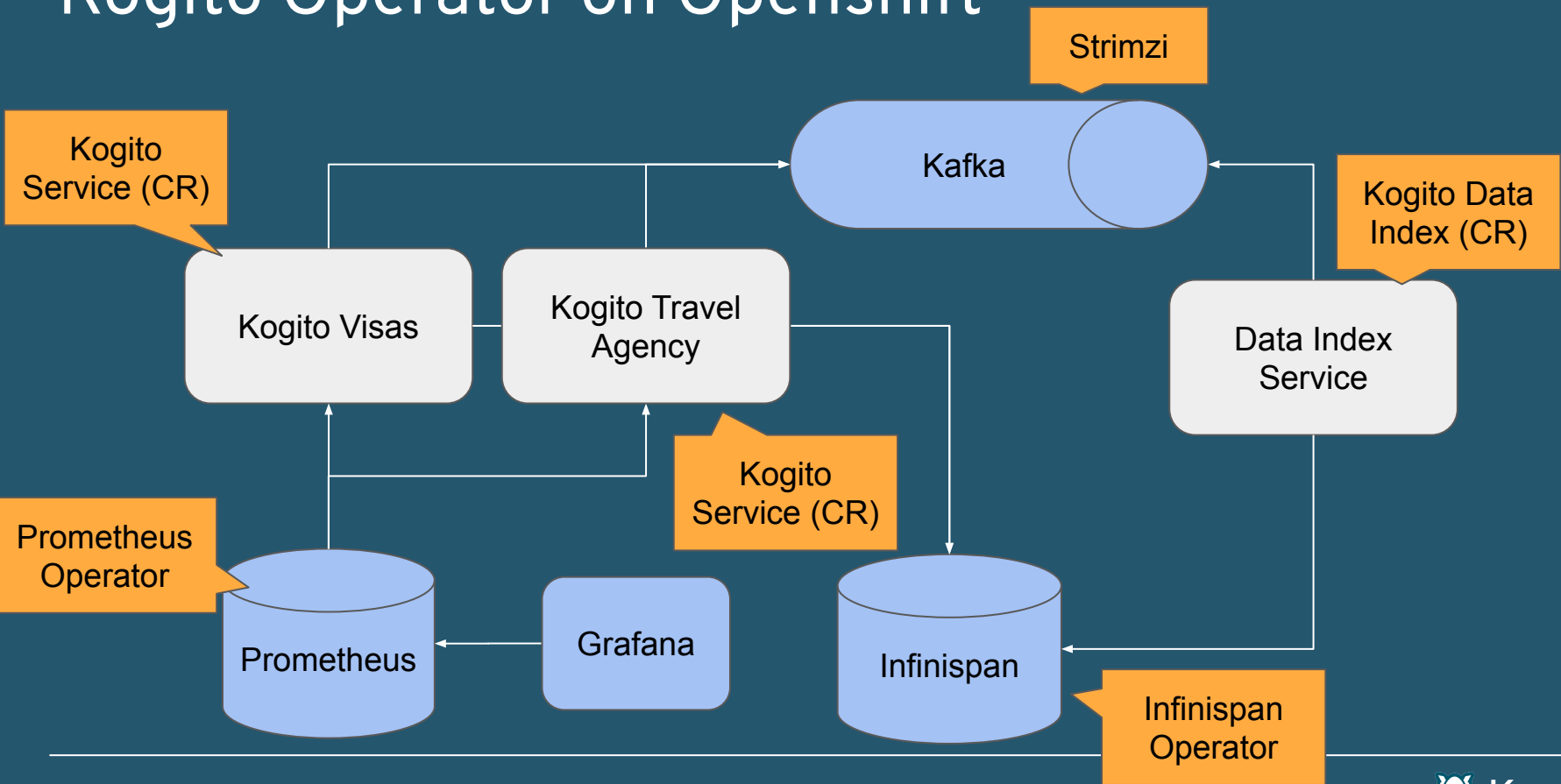


# Kogito Operator

- Deploy Kogito runtimes into OpenShift and Kubernetes
- Build runtimes from source (only on OpenShift)
- Connect every piece of infrastructure that the services and runtimes might need
- Dependency management



# Kogito Operator on Openshift



# Kogito.Next

- Addons
  - Kafka persistence ( experimental ) - Quarkus
  - SVG process image - Spring Boot
  - OpenTracing
  - Monitoring using Micrometer
- Services
  - Automatic Task Assignment using Optaplanner

# Thank you!



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[@kogito\\_kie](#)  
[@rhdevelopers](#)



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# Resources

- <https://kogito.kie.org/>
- <https://blog.kie.org>
- <https://github.com/kiegroup/kogito-runtimes/blob/master/CONTRIBUTING.md>
- <https://operatorhub.io/operator/kogito-operator>
- <https://serverlessworkflow.io>
- <https://github.com/kiegroup/kogito-examples>
- <https://quarkus.io/>
- <https://quay.io/repository/kiegroup>

