Track 4 I **Cloud**

Building Serverless Platform on Private Cloud

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AGENDA

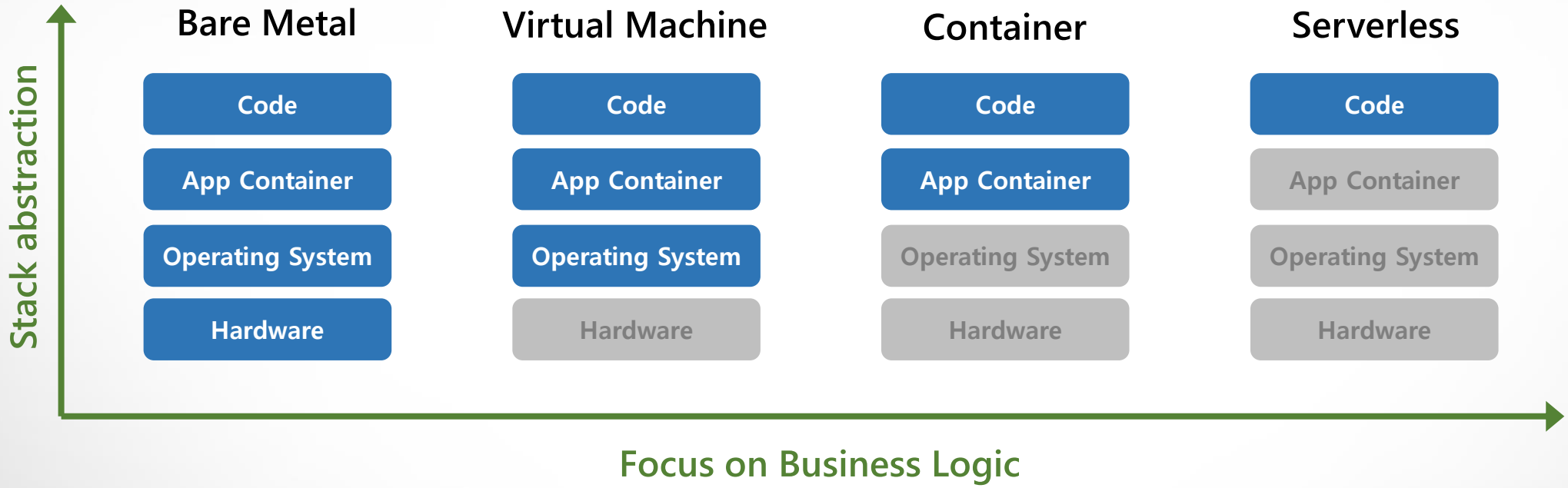
1. State of Serverless
2. Introducing Nuclio
3. Serverless Platform on Private Cloud

1

State of Serverless

The Evolution of Serverless

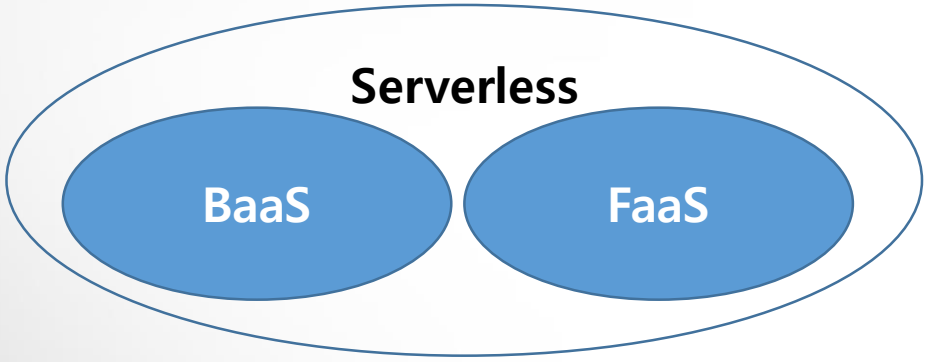
Allowing developers to focus on the business logic rather than the infrastructure



Serverless Architecture

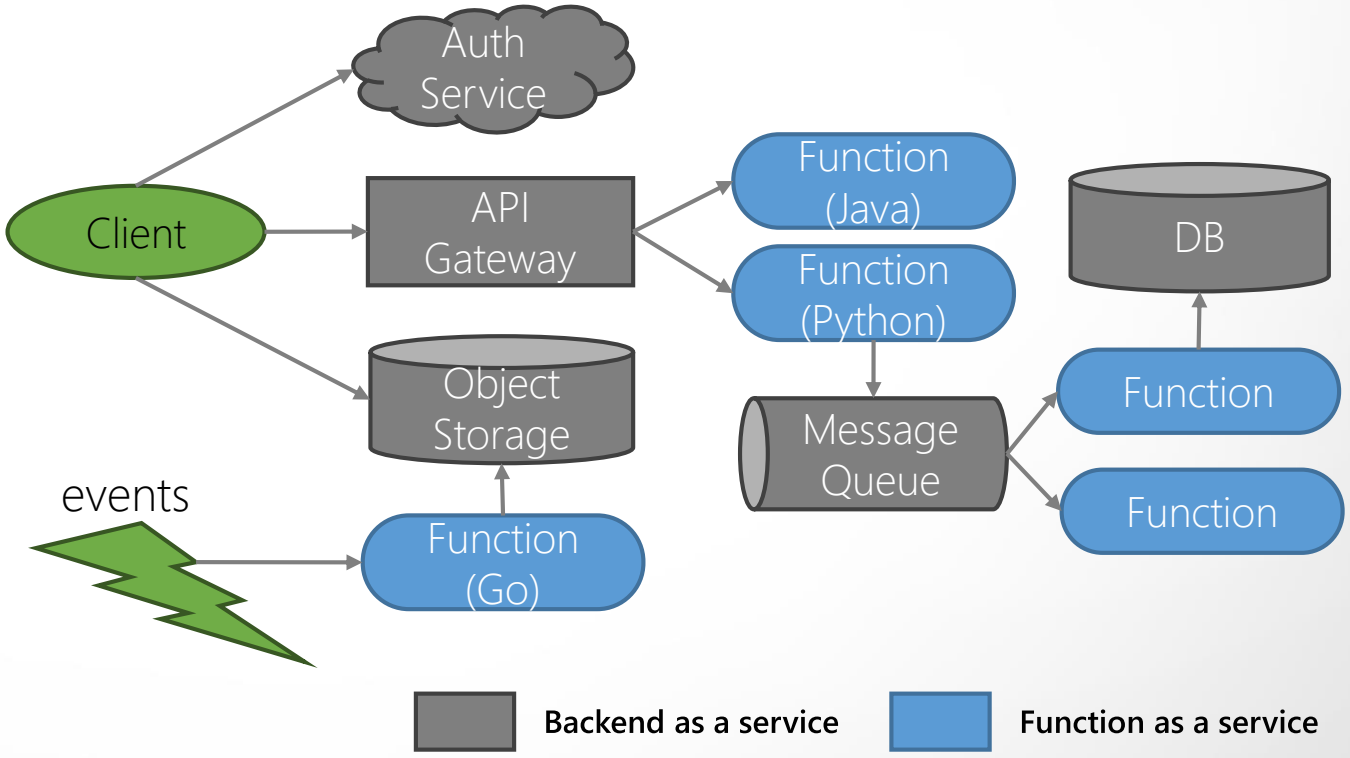
서비스 개발자가 인프라를 관리할 필요 없이 애플리케이션과 서비스를 구축하고 실행하는 방식

Service type



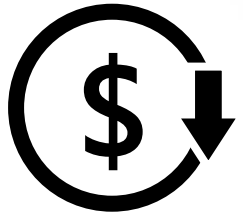
- **BaaS (Backend as a Service)**
  - Queue, DB, 인증 등 Backend 기능을 Service 로 제공
- **FaaS (Function as a Service)**
  - Function 형태의 애플리케이션을 개발하고 실행하는 환경을 서비스로 제공

Example of Serverless Architecture



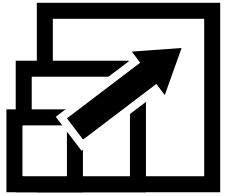
Why FaaS ?

Fully managed service

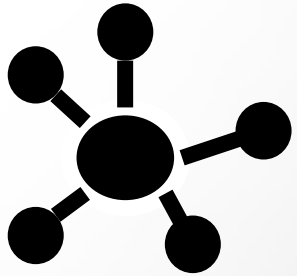


Only pay for
Resources you use

Enhance developer
productivity

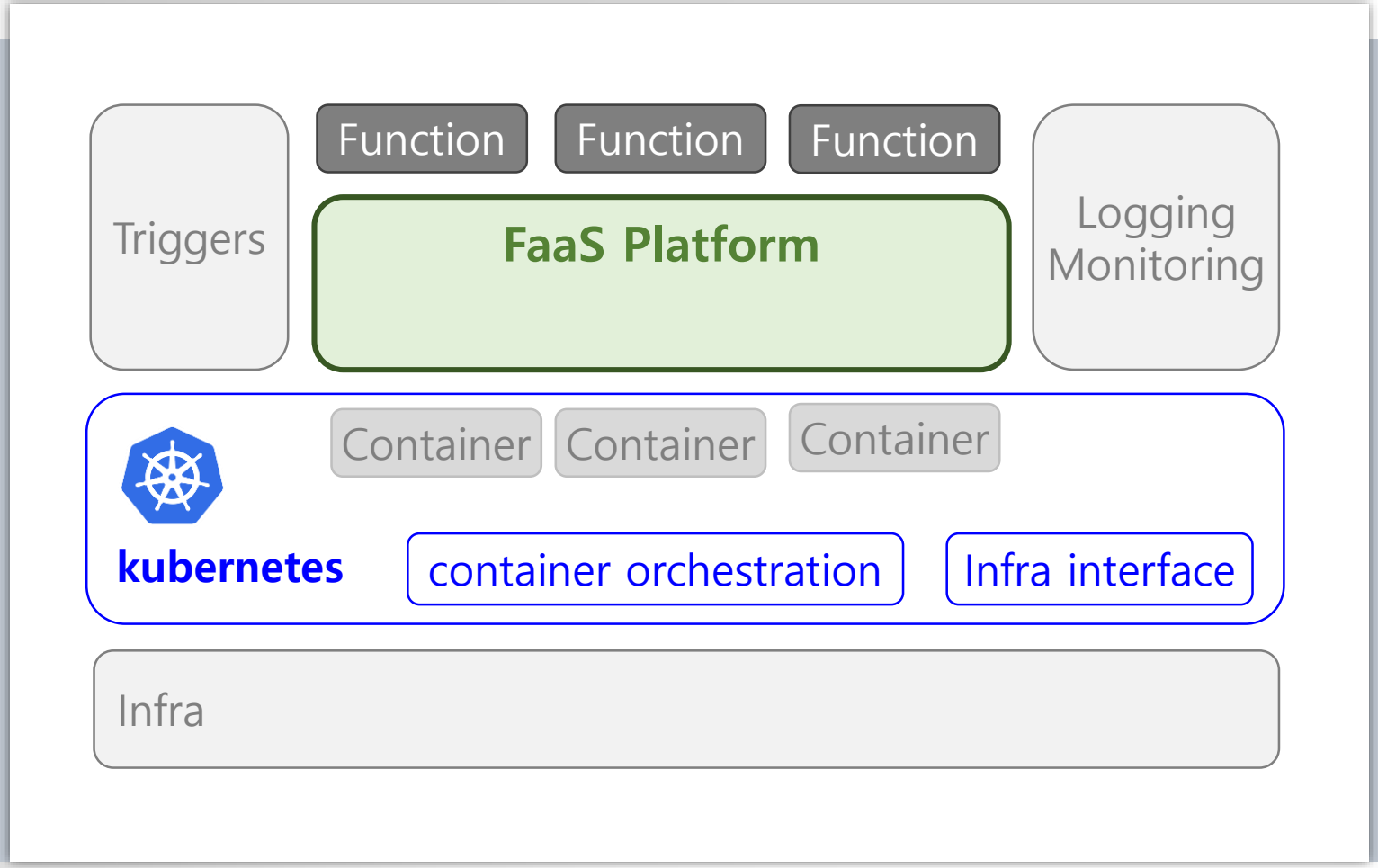


Scale flexibly



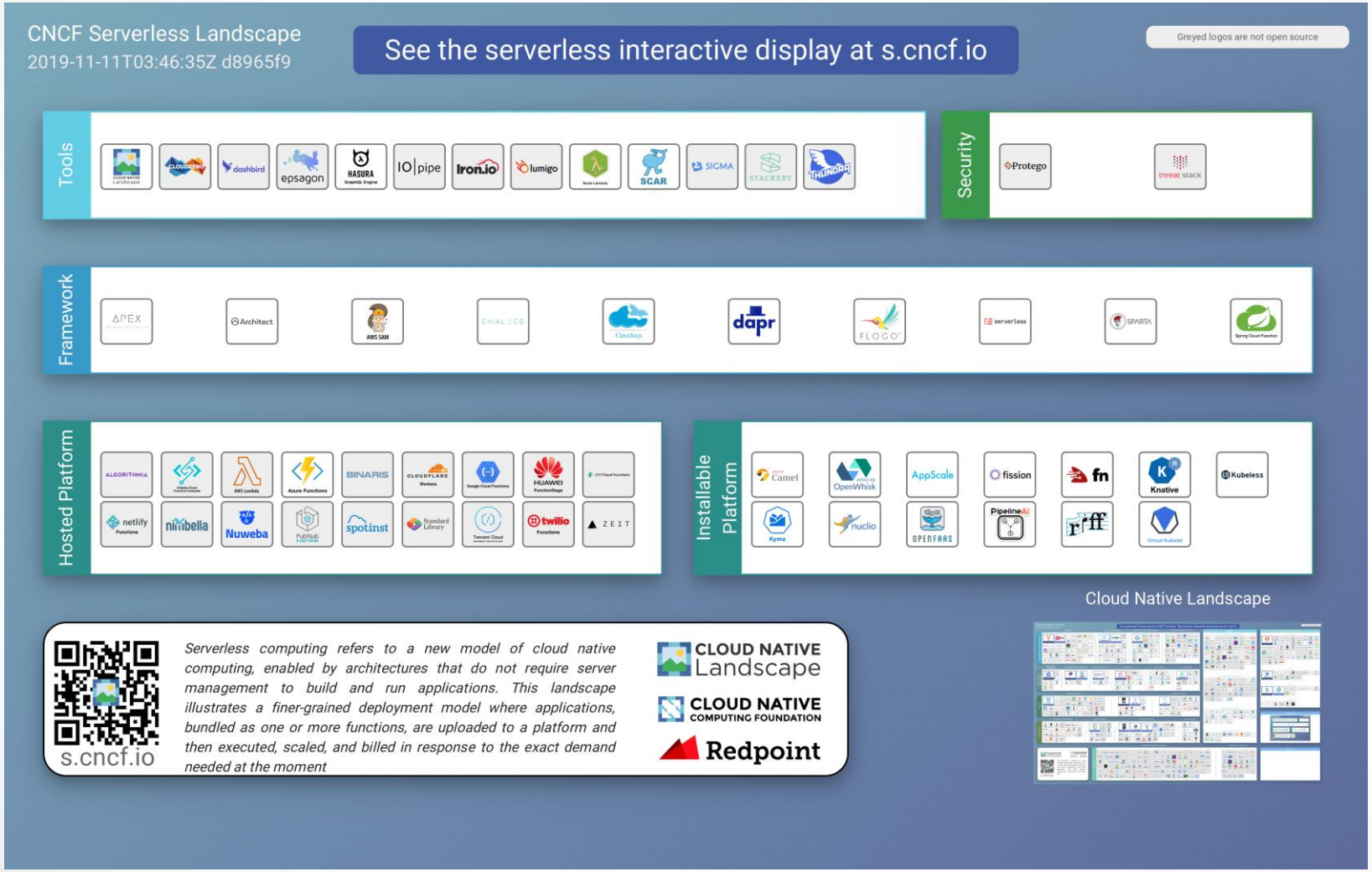
Seamless Integration

FaaS Platform on Kubernetes



- Kubernetes는 Platform을 위한 Platform
- Container orchestration
- Portability
- Kubernetes's scheduler, service discovery, networking, volume mount, ...
- Easy to Integrated with other Kubernetes based platform services

CNCF Serverless Landscape



2

Introducing Nuclio

Iguazio's Serverless Open Source Project

Introducing Nuclio
High Performance Serverless Framework:

- Fast
  - High concurrency
  - Low latency
- Open Source
  - https://nuclio.io/
    https://github.com/nuclio/nuclio
- Built for Kubernetes
- Runs Everywhere
  - Cloud , On-Prem, Edge, Hybrid, Laptop

- Focus on your app, automate maint enance

Nuclio lets you focus on the business logic and not the infrastructure

Nuclio and Kubernetes : A Great Match

nuclio

- Abstraction, no Docker files or YAMLs
- Automated dev and ops flow
- Everything is a Kubernetes resource

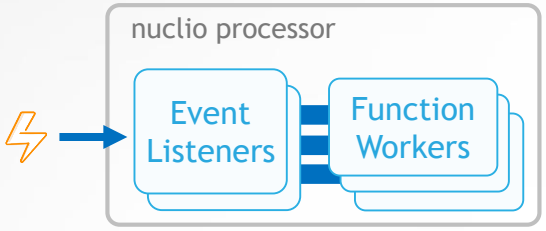
kubernetes

- Cloud independent APIs, on-prem, edge
- Auto-scaling + abstract infrastructure
- Fastest evolving features and community
- One platform for serverless and services

Introducing Nuclio – Iguazio's Serverless Project

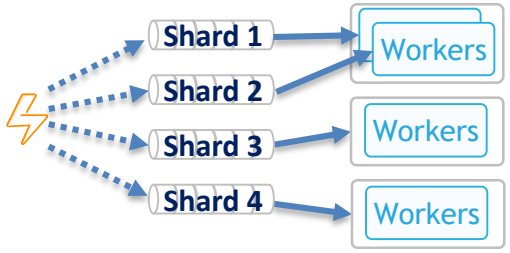
Taking Serverless to Data Intensive Applications

Extreme Performance



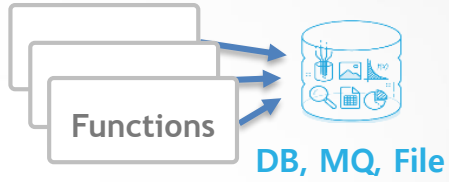
- Non-blocking, parallel
- Zero copy, buffer reuse
- Up to 400K events/sec/proc
- GPU optimizations

Advanced Data & AI Features



- Auto-rebalance, checkpoints
- Any source: Kafka, NATS, Kinesis, event-hub, iguazio, pub/sub, Rabbit MQ, Cron, ..
- Jupyter, NVIDIA Rapids integration

Statefulness



- Data bindings
- Shared volumes
- Context cache

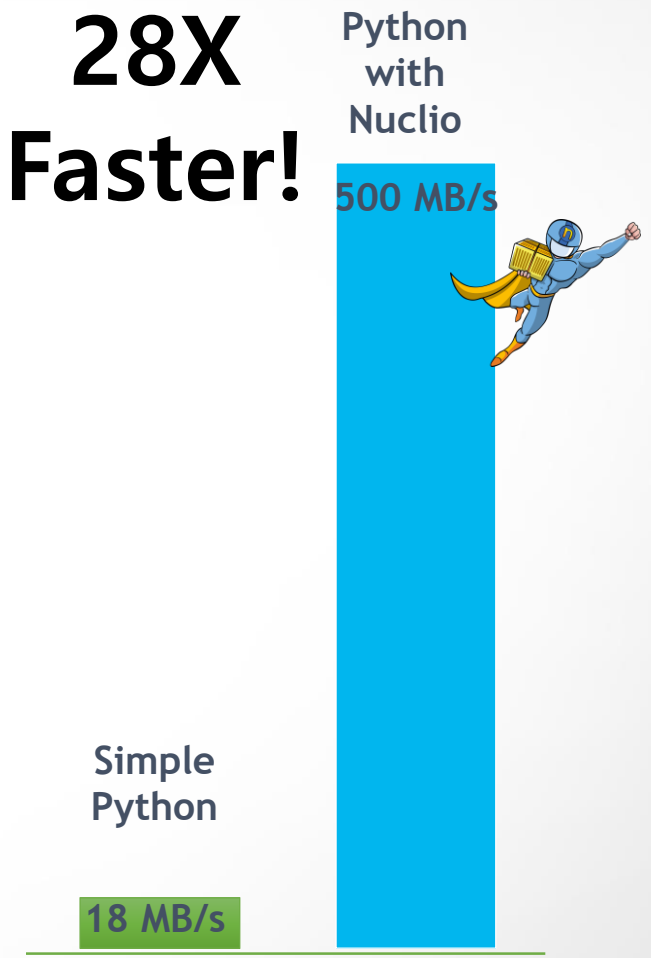
Join the Nuclio community at

https://nuclio.io/ https://github.com/nuclio/nuclio

Accelerate ETL and Streaming with Nuclio

Simple code, automated DevOps, any source!
(e.g. read JSON Stream + aggregate + dump to Parquet)

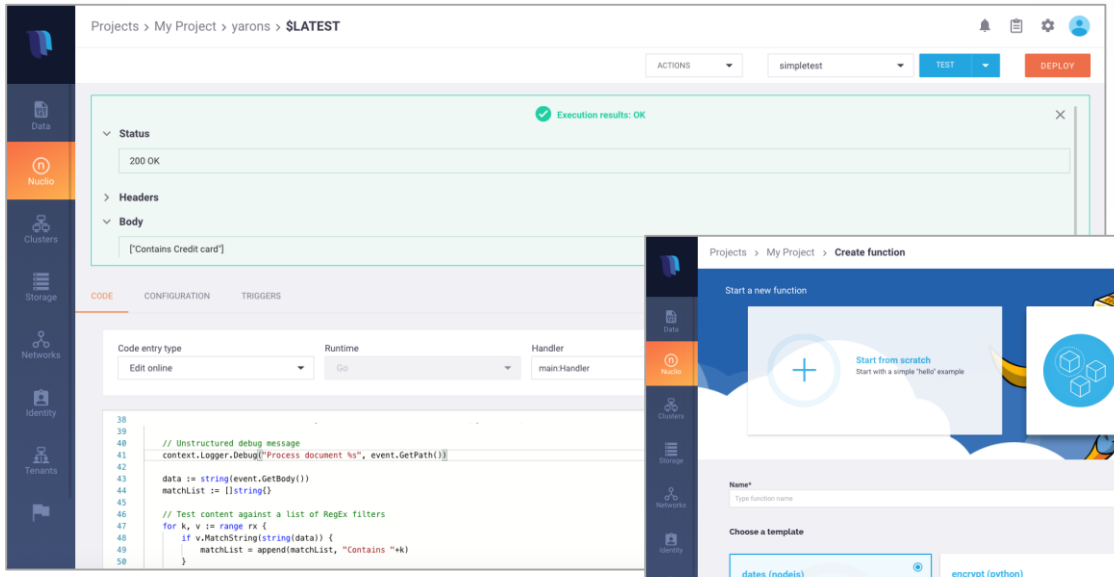
```
def init_context(context):
    os.makedirs(sink, exist_ok=True)

def handler(context, event):
    add_log_to_batch(context, event.body)

    if len(batch) > batch_len:
        df = _batch_to_df(context)
        if not df.empty:
            df = df.groupby(['log_ip']).agg({'feconn':'mean',
                                             'beconn':'mean',
                                             'time_backend_response':'max',
                                             'time_backend_response':'mean',
                                             'time_queue':'mean',
                                             'time_duration': 'mean',
                                             'time_request': 'mean',
                                             'time_backend_connect':'mean'
                                            })
        df_to_parquet(df)
        reset_batch()
```

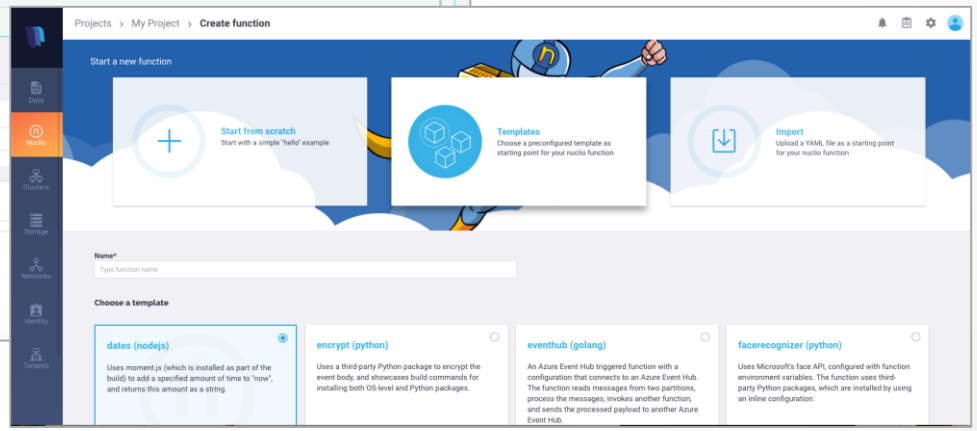


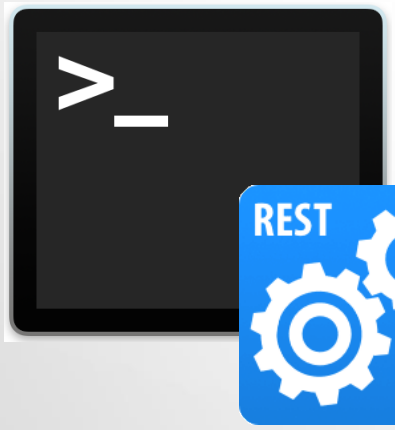
Simple Development and Operation Experience

Self-Service UI

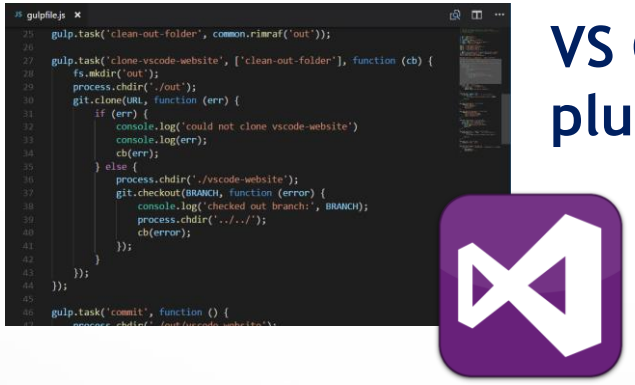
- Code, debug
- Configure
- Manage
- App market







CLI and REST API

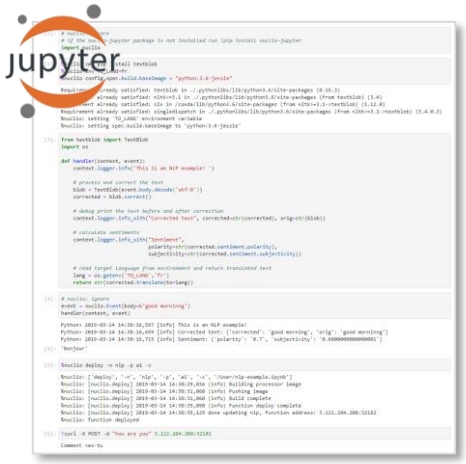


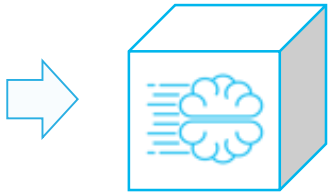
VS Code plug-in

Central Logging and Monitoring

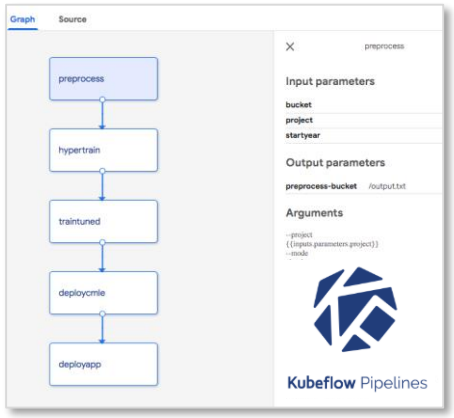
Prometheus

Nuclio: Fast Serverless for Data Science & RT Analytics





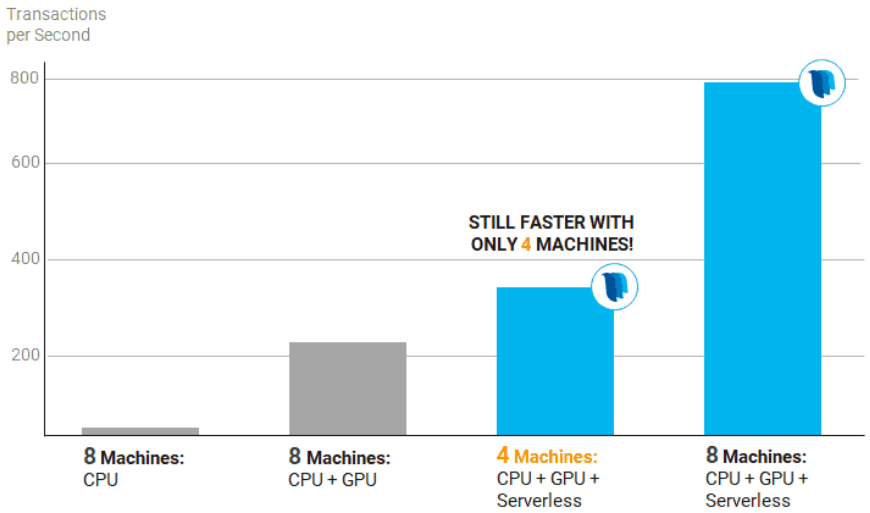
magic commands from no tebook to function



Extending ML Pipelines from batch:

1. **Parallel** processing
2. Code **build**/deployment
3. **Stream** processing
4. API/Model **Serving**

High-performance IO and Computation + GPU Optimizations



Code + DevOps Automation:

1. Auto-scaling (to zero)
2. Automated logging & monitoring
3. Security hardening
4. Auto-build and CI/CD
5. Workload mobility (cloud/edge/..)

iguazio

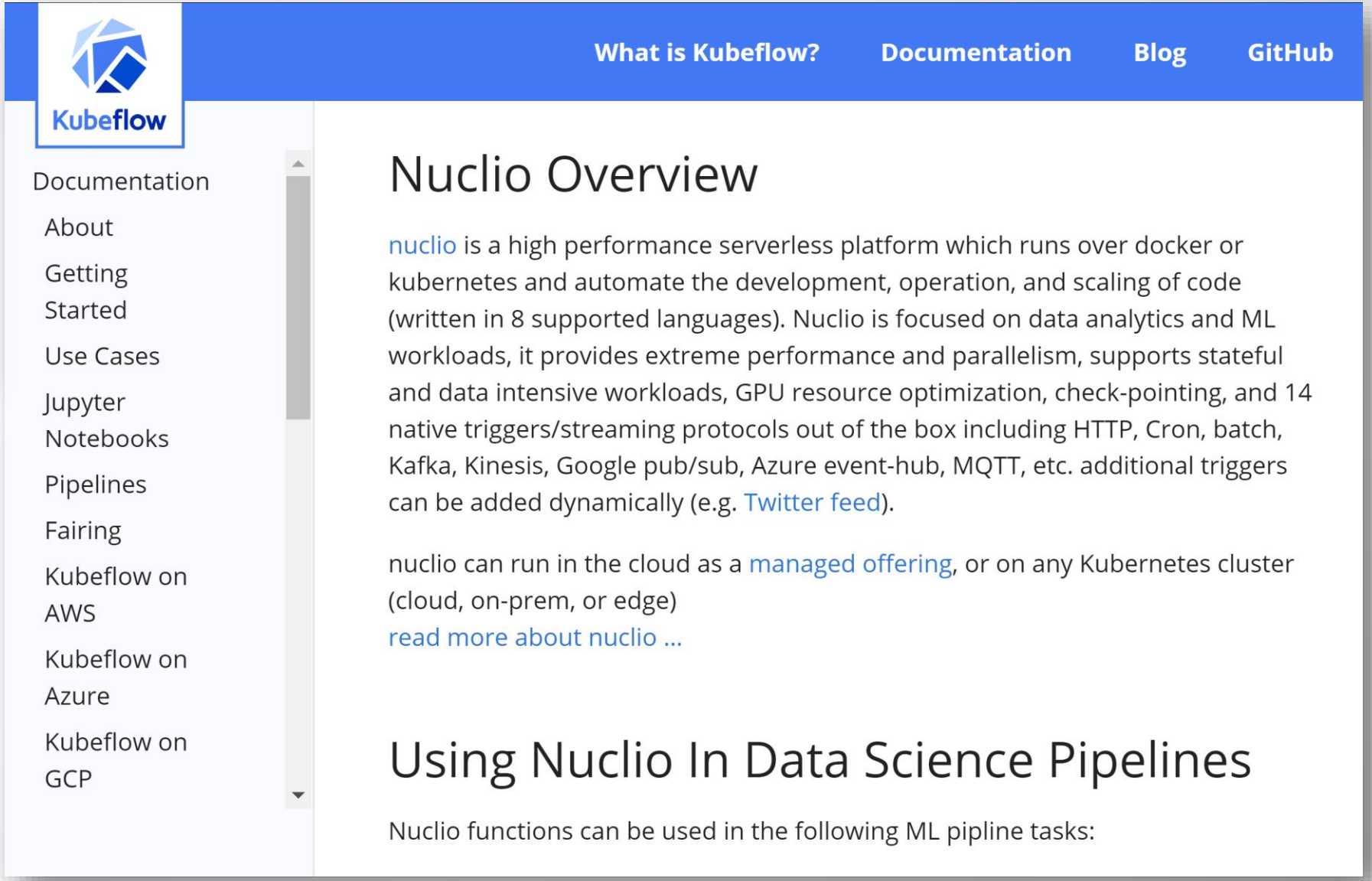
Kubeflow – ML Pipelines Portability on Kubernetes

Making deployments of ML workflows on Kubernetes simple, portable and scalable

Strong industry momentum

Already integrated in
Iguazio Data Science Platform

Kubeflow Adopts Nuclio for Serverless ML Pipelines



New Capabilities in Nuclio

Extending Nuclio Beyond Functions

Nuclio Serverless Applications

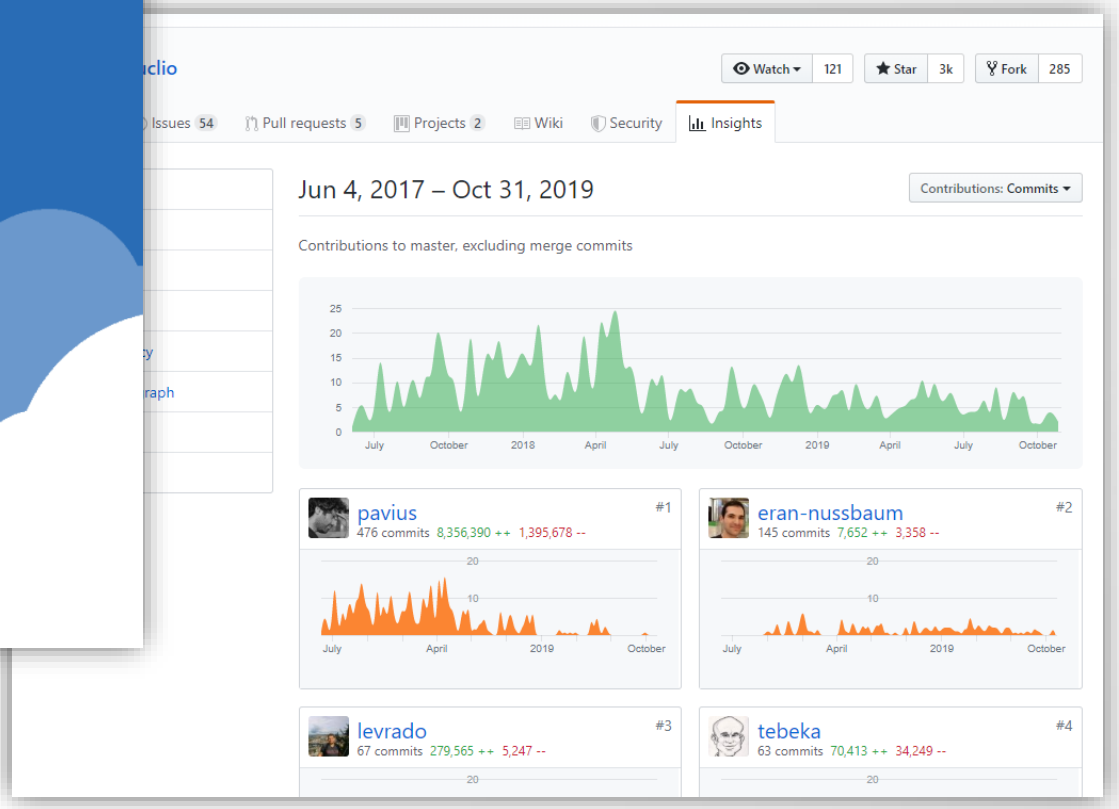
Adding Nuclio ML Jobs

- Extending Nuclio architecture to support elastic ML Jobs (Spark, Dask, Horovod, ..)
- Zero DevOps from code to deployment
- Maximum performance and scalability
- Integrated logging, monitoring, templates, ..
- Glue-less integration with KubeFlow & Iguazio DB

Addressing The Entire Lifecycle of ML Pipelines with Serverless

Join the Nuclio Open Source Serverless Community

https://nuclio.io/



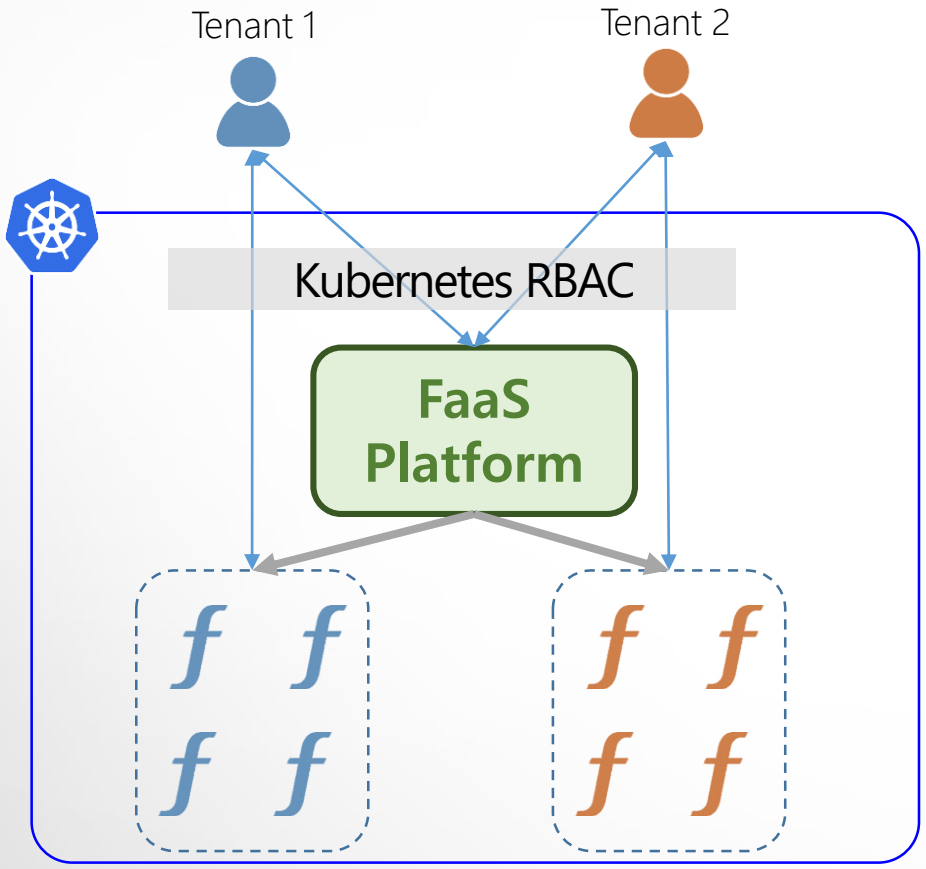
https://github.com/nuclio/nuclio

3

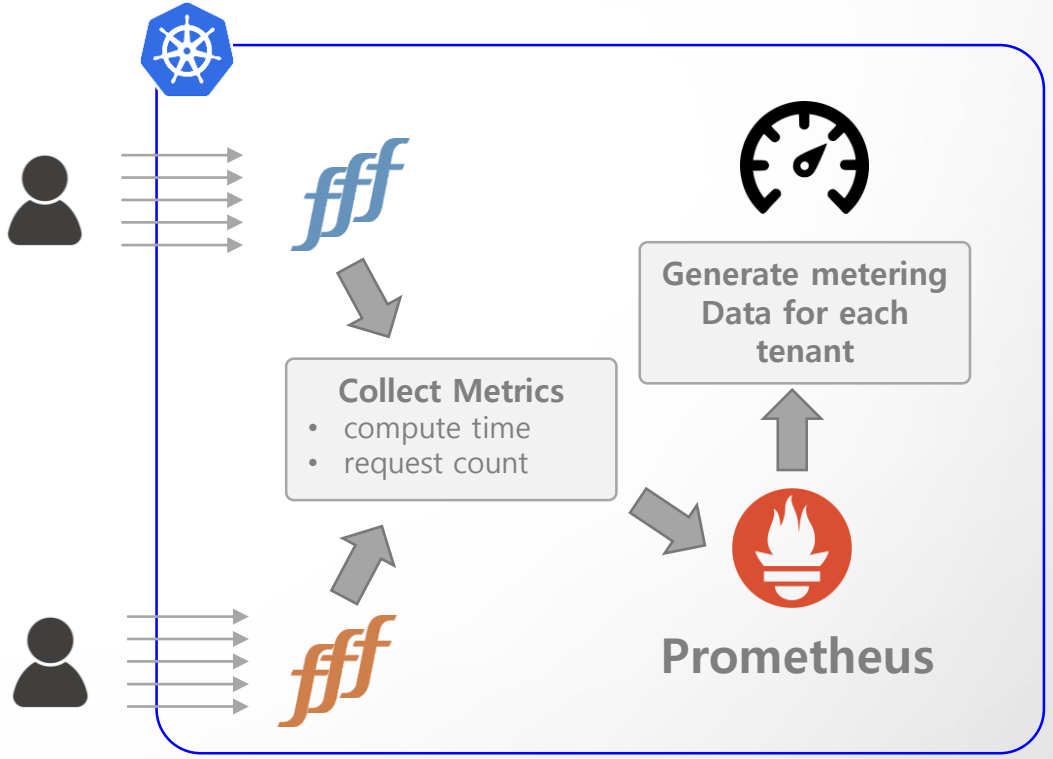
Serverless Platform on Private cloud

Challenges – On Private Cloud

1. Multi-tenancy

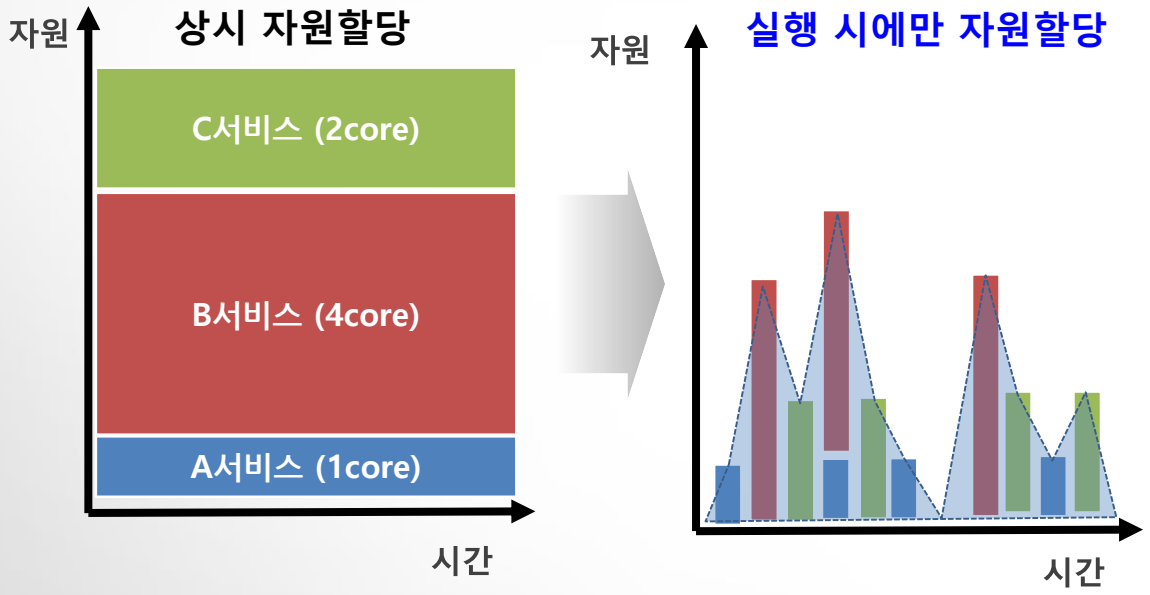


2. Metering



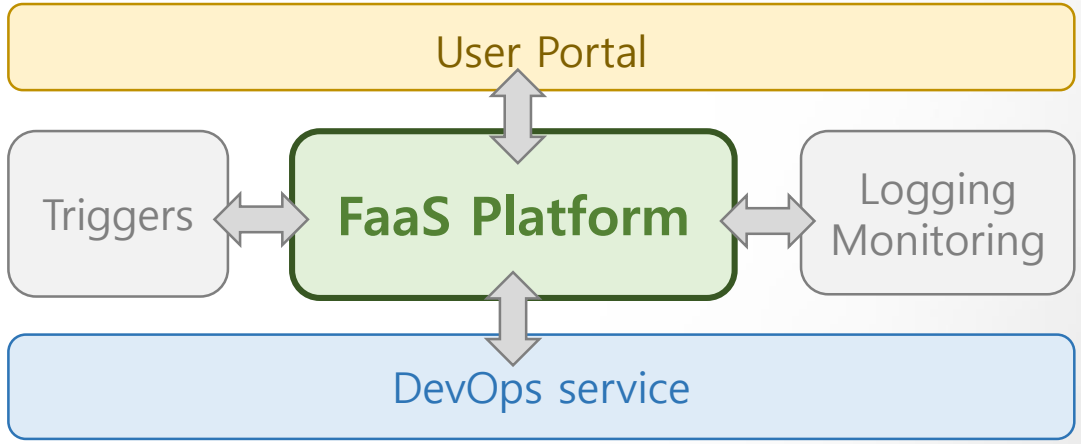
Challenges – On Private Cloud

3. Advanced Scheduling



- Usage based scale (cap setting required)
- Scale to zero when idle (cold start ?)

4. Integrate with existing system



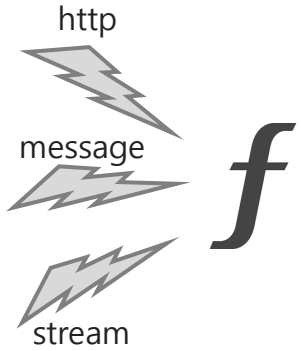
- Air-gapped environment
- Portal integration for self-service

SDS Functions

SDS Function 서비스는 클라우드에서 함수 형태의 애플리케이션을 빠르게 만들어 실행하기 위한 솔루션으로, **Python, Java, Javascript, Shell** 개발 언어를 지원하며, 코드를 실행하기 위해 필요한 자원이 동적으로 할당하고 규모에 따라 유연하게 확장됨

코드 업로드

- Function 코딩/빌드/배포를 위한 콘솔
- 재활용 가능한 Function Template 제공
- Python, Java, Shell, Javascript



이벤트 설정
(Function 실행조건)

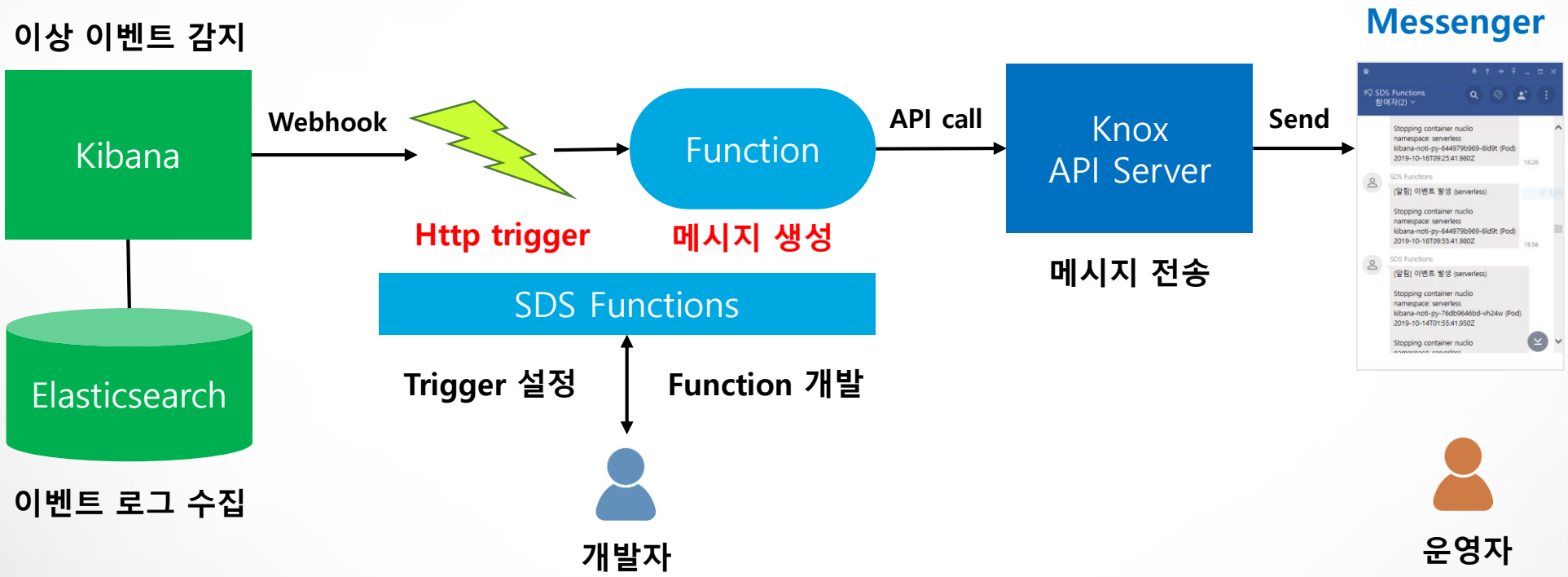
- Http, RabbitMQ, MQTT, NATS
- Kafka, Cron

Function 실행
(규모에 따라 확장)

- Auto-scaling
- Support Cold start

이벤트 알림 서비스

사내 메신저 연계 **template** 을 활용 컨테이너 운영 시 이상 이벤트를 메신저로 알림



Road map

Knative

cloudevents

cloudevents spec version 1.0
(Oct 25,2019)

Knative build integration

Serverless ML Pipeline

Kubeflow + nuclio

Enhance Monitoring, Logging

Monitoring

Prometheus ⟺ f ⟺

Logging

elasticsearch

Integrate with other platform services

API G/W

Queue

DB

events → f

Thank You

Q & A

Partner Disrupt Foresee