SWAN Microservices

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https://swan.web.cern.ch

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Introduction

Proposed solution: microservice platform
  - Jupyter Kernel Gateway
  - Microservices prototype
  - Live demo:
    - Basic example and generated apidocs
    - Example for machine learning inference
  - IBM/Jupyter Enterprise Gateway
  - Questions
Introduction

- Some progress has been made in the area of *Automation of notebook transformation and deployment*
- In particular, the following points have been investigated:
  - Conversion of a notebook into a Python module
  - Publication of notebooks as microservices
  - Annotation of notebooks with apiDocs that can be extracted and published
- Here we present a proposal of a technology that provides the aforementioned features: *Jupyter Kernel Gateway*

Minutes from last meeting (June 14th)
Jupyter Kernel Gateway

- Jupyter [Kernel Gateway](#) is a web server that provides headless access to Jupyter notebook kernels
- Allows to publish Jupyter notebooks as microservices
- Clients communicate with the kernels remotely, through REST calls and Websockets rather than ZeroMQ messages
- There are no provisions for editing notebooks through the Kernel Gateway
We have developed a PoC microservices architecture, with two basic components:

- **MicroServices Publication Server**
  - Flask server
  - Accepts requests for publication of new microservices from Jupyter notebooks
  - Generates apiDocs by parsing text cells of a notebook
  - Contacts the kernel gateway for microservices deployment

- **Kernel gateway**
  - Library that deploys microservices from notebooks on request
  - Tagged notebook cells have their own endpoint accessible via REST

A prototype of the architecture above can be found at [https://gitlab.cern.ch/ozapatam/swanms](https://gitlab.cern.ch/ozapatam/swanms), containing:

- A submit application that sends notebooks to the Publication Server
- A Publication Server that waits for notebook publication requests
- A parsing library that allows to generate apiDocs documentation from notebooks
- A Kernel gateway library used by the Publication Server to deploy microservices
Microservices Prototype: Architecture
Demo
The IBM/Jupyter Enterprise Gateway is an evolution of the current Jupyter Kernel Gateway.

Some new features:
- Provides the functionality of our current Publication Server
- Publication is not only local, but can also exploit clusters (e.g. with Kubernetes)
- Secure communication from client to kernels
- Multi-tenant capabilities

It is available online (open source): https://developer.ibm.com/open/projects/jupyter-enterprise-gateway

To be investigated!
Thanks