openEO: an open API for cloud-based big Earth Observation processing platforms

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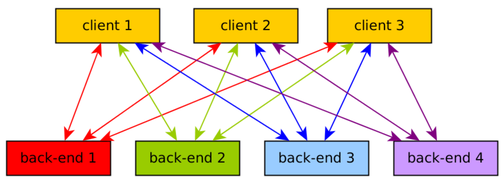
Objectives

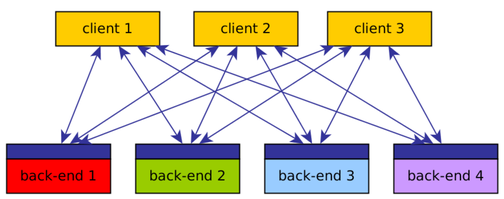
openEO develops an open API to connect R, Python and JavaScript clients to big Earth Observation cloud back-ends in a simple and unified way.

Why an API?

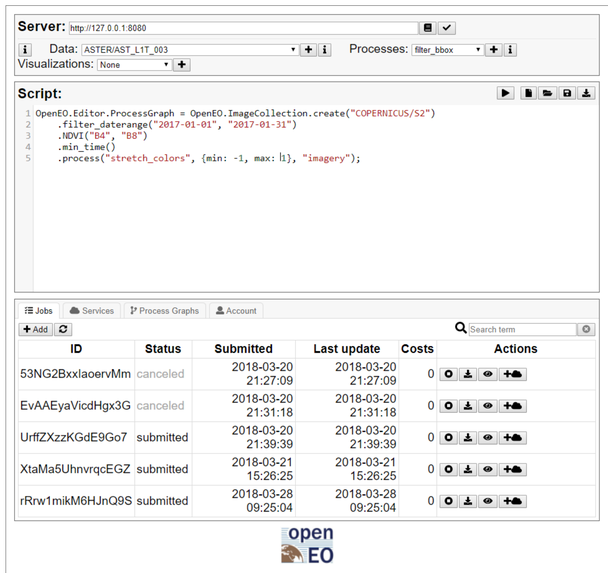
Cloud-based EO data processing engines spring up like mushrooms. Each of them has it's own storing and processing architecture, and accounting scheme. How will users be able to choose, and find a good offering? Will it be easy to verify that back-ends return identical results from identical tasks?
Without a common API, each client would need to support every back-end:

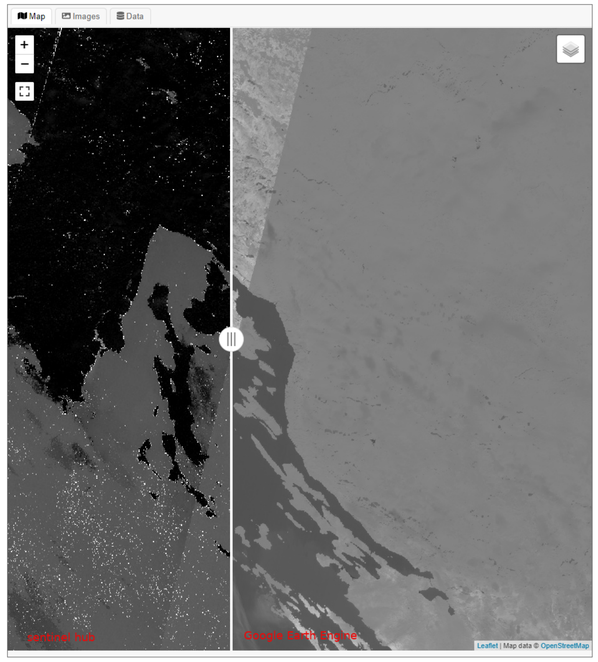


When supporting a common API, each client automatically supports all back-ends:



Processing tasks are encoded in a process graph.





Process graph example

```
{ "process_id":"min_time",
  "args":{
    "imagery":{
      "process_id":"/user/custom_ndvi",
      "args":{
        "imagery":{
          "process_id":"filter_daterange",
          "args":{
            "imagery":{
              "process_id":"filter_bbox",
              "args":{
                "imagery":{
                  "product_id":"S2_L2A_T32TPS_20M"
                },
                "left":652000,
                "right":672000,
                "top":5161000,
                "bottom":5181000,
                "srs":"EPSG:32632"
              }
            },
            "from":"2017-01-01",
            "to":"2017-01-31"
          }
        },
        "red":"B04",
        "nir":"B8A"
      }
    }
  }
}
```

Cube view

File-agnostic access to EO imagery through a data cube view boosts usability of EO data. In openEO:

- spatial dimensions are complemented with other dimensions such as the temporal or spectral dimensions
- researchers can directly filter, aggregate, or map functions over dimensions of a user-defined cube without being concerned about how the data in the processing platform is organised (granules, collections, coverages, ...)
- raster and vector data cubes are integrated.

Proof of Concept

The Month 6 proof of concept involved:

- coupling 3 clients (Python, R, JavaScript web-editor: figure left) to 7 back-ends (Sentinel Hub, GRASS GIS, EODC OpenStack, WCPS, Python GeoPySpark / GeoTrellis, Google Earth Engine, R) for
- 3 use-cases with band indexes, time series, aggregation over polygons, and user-defined (Python) functions
- source code and API docs on GitHub
- P.o.C. demo videos on the project web site

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Get involved!

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- https://github.com/Open-EO/
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