The analysis and understanding of resources utilization in shared infrastructures, such as cloud environments, is crucial in order to provide better performance, administration and capacity planning.

CAOS (Control Application for OpenStack) is a tool which we have been implementing to collect, manage and present the data concerning resource usage of our OpenStack-based cloud infrastructures hosted at INFN-Padova cluster: the CloudVeneto and the INFN-PADOVA-STACK instance of the EGI Federated Cloud. By gathering data from both the Ceilometer service and OpenStack API, CAOS enables us to track resource usage at different levels (e.g. per project), in such a way that both current and past consumption of resources can be easily determined, stored and presented.

What is CAOS?
The collector gathers data at regular intervals from both the OpenStack API and the Ceilometer service. The data is then analyzed and pre-aggregated at coarser granularity (e.g. hourly), and metrics involving operations across different metrics are computed.

The backend provides a time series framework for writing and reading metrics. The data can be aggregated or downsampled at a given resolution or time range to provide resources accounting.

The dashboard allows the Cloud administrator to easily get resource usage information for a given time slot period.

Features
- Metrics aggregated per project and per compute node:
  - CPU time, Wall Clock time, CPU efficiency
  - Quotas
  - Instances
  - VCPUs
  - VRAM
- Support for different OpenStack releases:
  - Kilo
  - Mitaka
  - Newton
  - Ocata
- Support for both MongoDB and Gnocchi
- Docker enabled

Resources monitoring
The collected data can be used to monitor resources used and allocated to projects.

It’s also possible to monitor how the compute nodes have been used.

Accounting
Accounting information (e.g. wall clock time, CPU time, efficiency) can be displayed and aggregated for a selected time window for one or more projects.

Used resources can be analyzed for specific use cases (e.g. CPU intensive workload of clusters).