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# A New Visual Analytics toolkit for ATLAS Computing

**Visual Analytics** is the science of analytical reasoning facilitated by visual interactive interfaces

## Use-cases:

- ❑ Analysis of jobs execution process (search for non-trivial jobs execution process parameters)
- ❑ Analysis of computing sites performance and robustness
- ❑ Analysis of network performance

## The main project objectives:

- ❑ Facilitating of computing performance analysis
  - ❖ Development of interactive visual tools to support the sense-making process of the analysis
  - ❖ Increasing the domain-experts involvement in the analysis process
  - ❖ Enhancing statistics, Machine Learning methods with the use of visual interaction with the initial data and with the underlying algorithms as well

## Motivation:

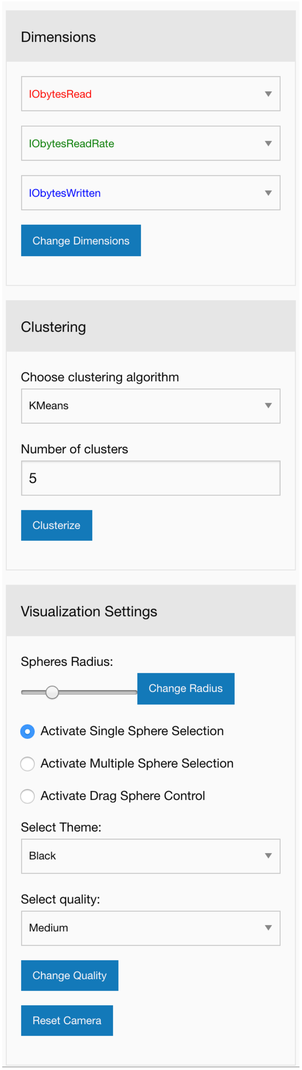
The volumes of data and metadata in many domains (including ATLAS Computing) is constantly growing, and the data/metadata processing workflows become more and more complicated. Interactive visualization can help to understand how the software/ hardware is performing and decrease the operational workload.

## Near-term plans of InVEx development:

- ❑ Saving operations history
- ❑ Dynamic 3D visualization
- ❑ Level-of-Detail Generator
- ❑ Integration with metadata sources
- ❑ Integration with ATLAS BigPanDA monitor

## InVEx (Interactive Visual Explorer)

**Control Panel**




Fast interactive switching among the 3D projections

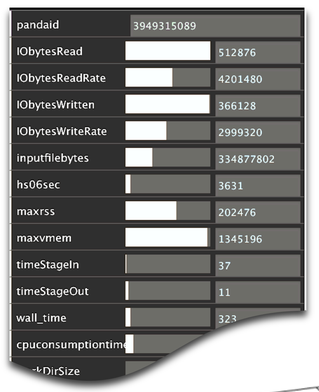
### Supervised Clusterization

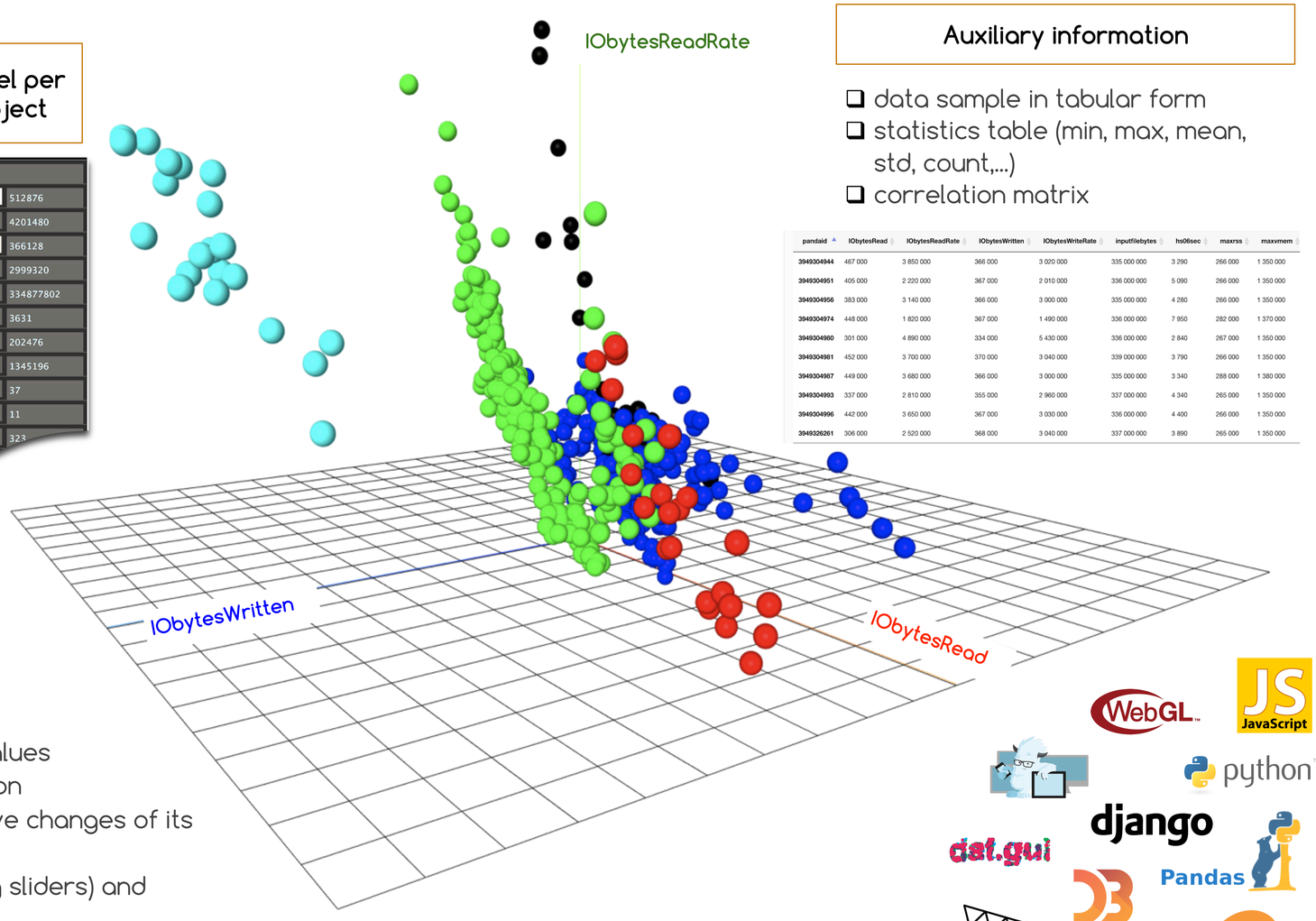
- ❑ Choose clustering algorithm
  - ❖ K-means
  - ❖ DBSCAN
- ❑ and tune its configuration
- ❑ spheres are coloured based on their clusters

### Interactive Visualization

- ❑ rotation, moving
- ❑ change camera position
- ❑ change the scale
- ❑ change spheres size
- ❑ select visualization theme (black/white)
- ❑ select the visualization quality
- ❑ click the sphere to observe its feature values
- ❑ select multiple spheres = self-clusterization
- ❑ move the sphere on 3D scene and observe changes of its feature values
- ❑ change the sphere features values (using sliders) and recalculating of its cluster

**Features Panel per Selected Object**




**Auxiliary information**

- ❑ data sample in tabular form
- ❑ statistics table (min, max, mean, std, count,...)
- ❑ correlation matrix

| pandaid | IObytesRead | IObytesReadRate | IObytesWritten | IObytesWriteRate | inputfilebytes | hs06sec | maxrss | maxvmem |
|---|---|---|---|---|---|---|---|---|
| 3949304944 | 467 000 | 3 850 000 | 366 000 | 3 020 000 | 335 000 000 | 3 290 | 266 000 | 1 350 000 |
| 3949304951 | 405 000 | 2 220 000 | 367 000 | 2 010 000 | 336 000 000 | 5 090 | 266 000 | 1 350 000 |
| 3949304956 | 383 000 | 3 140 000 | 366 000 | 3 000 000 | 335 000 000 | 4 280 | 266 000 | 1 350 000 |
| 3949304974 | 448 000 | 1 820 000 | 367 000 | 1 490 000 | 336 000 000 | 7 950 | 282 000 | 1 370 000 |
| 3949304980 | 301 000 | 4 890 000 | 334 000 | 5 430 000 | 336 000 000 | 2 840 | 267 000 | 1 350 000 |
| 3949304981 | 452 000 | 3 700 000 | 370 000 | 3 040 000 | 339 000 000 | 3 790 | 266 000 | 1 350 000 |
| 3949304987 | 449 000 | 3 680 000 | 366 000 | 3 000 000 | 335 000 000 | 3 340 | 288 000 | 1 380 000 |
| 3949304993 | 337 000 | 2 810 000 | 355 000 | 2 960 000 | 337 000 000 | 4 340 | 265 000 | 1 350 000 |
| 3949304996 | 442 000 | 3 650 000 | 367 000 | 3 030 000 | 336 000 000 | 4 400 | 266 000 | 1 350 000 |
| 3949326261 | 306 000 | 2 520 000 | 368 000 | 3 040 000 | 337 000 000 | 3 890 | 265 000 | 1 350 000 |

The project "Visual analytics framework to monitor workflow management systems behavior in exascale era" is supported by RSCF grant №18-71-10003 for 2018-2021 years.

National Research Centre Kurchatov Institute · National Research Nuclear University MEPhI · Tomsk Polytechnic University · Brookhaven National Laboratory