EAGE

HPC06

HPC Cloud for O&G

D. Klahr* (Total)

Summary

This paper presents an evaluation of HPC Cloud offers for O&G pure HPC workflows (Reservoir Simulation and Seismic Imaging).

Introduction

Adoption of Cloud solutions to replace traditional IT needs is already taken in account in all the industry. The offers from the Cloud provider are growing very fast with fully integrated solutions (Saas) that are completely reliable and economically viable compared to on premises underused servers

In parallel of this classical market there is more and more buzz on HPC in the cloud but things are not so simple and behind HPC the workflows and the usages depends a lot of the industry that uses HPC systems.

O&G companies want to focus on Geosciences not spending time and money with IT operations but is the Cloud offer are ready for our workflow and algorithms ?

In a first part, we will remind the different offers we can find on the cloud.
In a second phase, we will analyse the way we currently use on premises HPC in Total.
In a third phase, we will present the different tests we made in the Cloud.
And to conclude, we will give an overview of our vision for O&G HPC next generation.

Method and/or Theory

Today in the Cloud, we have mainly three different offers :
- Software as a Service
- Platform as a Service
- Infrastructure as a Service

Classically these offers are well designed for companies that
- don't have a heavy flat workload on their system (less than 50%)
- can share systems with other companies
- use common software stacks

HPC in Total EP is mainly used for Reservoir Simulation and Seismic Imaging.
In both domain we have a growth of the needs :
- To be able to take in account more and more physic phenomena
- To deal with more and more data to process
- To run multi scenarios approach

To achieve those Métiers needs we develop in house applications which are optimized for our infrastructure in terms of parallelism, I/O and compute.

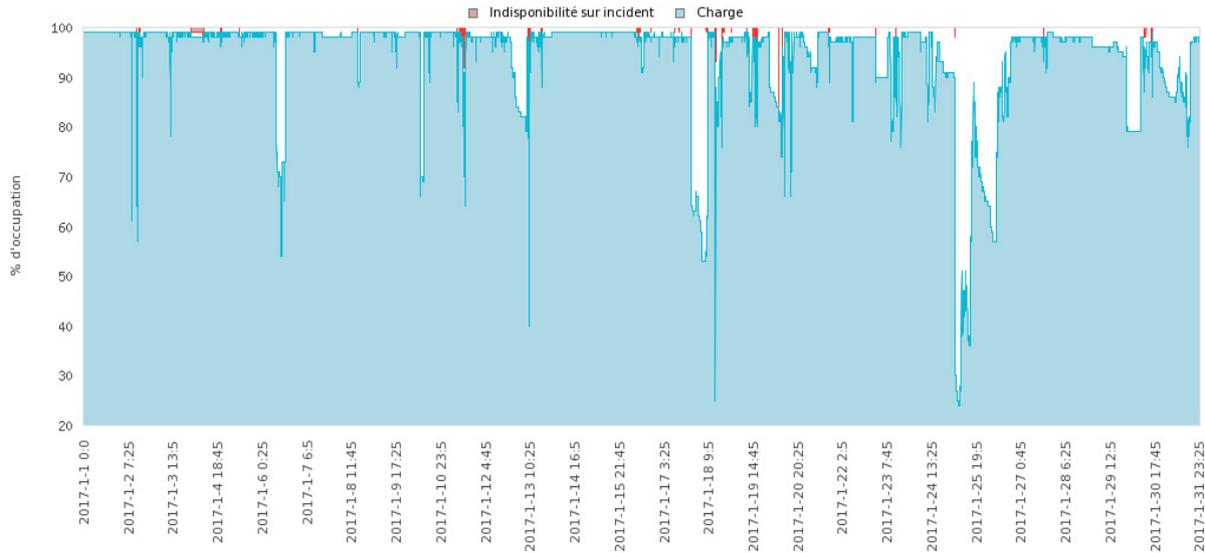On the other hand, our current workload is quite flat and high as shown in the following picture.

Figure 1 *This is typical workload of our system.*

However we decided to evaluate the cloud capabilities for our future HPC evolutions.

For that, we setup different POC for Reservoir Simulation and Seismic imaging.
The idea was to know exactly how we could use this kind of resources from a software point of view itself but also in terms of workflow.

The different studies were focused on
- Data transfer
- Containment impact
- Global usability

Conclusions

Today HPC Cloud is not fully ready in terms of functionalities nor on an economical point of view for O&G companies.

But we have to be aware of this technology and to adapt our code and workflows to be able in a near future to use Cloud for example as a burst buffer.

It also proposes a different approach in terms of deployment of a system and can bring a kind of reconfigurability "on the fly" that could help us for emergent use of HPC.