HEPCloud

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What is HEPCloud - I

A collaboration between BNL and Fermilab

To leverage on expertise acquired independently by both labs in the areas of

- Workload management
- Virtualisation
- Cloud computing

To develop a common framework to access transparently large computing resources

What is HEPCloud - II

- Aiming at increasing synergies between the two laboratories
  - Single interface to access resources at both sites
  - Transparent management of accounting, …
  - Common development with clear and defined responsibilities

- A response to the tremendous computational needs of HEP future projects (High Luminosity LHC, Dune, ...)

- Targeting large potential resource providers in addition to institutional and OSG resources
  - Commercial clouds (first) and
  - HPCs

HEPCloud looking for large

HEPCloud : utilisation of large resources for large projects

- Restricted number of resources
- Restricted number of projects

Complexity comes from proliferation

HEPCloud a set of components

At the heart is the decision engine

Resource provisioning

Accounting and monitoring

Configuration tools

It is a modular automated toolkit that will accommodate specificities from various projects

HEPCloud a portal

HEPCloud a portal to diverse computing resources

The HEPCloud engine will route workflows

- To local or distant resources
- Own or rented resources

Based on

- Workflows requirements (CPU, memory, Inputs and destinations)
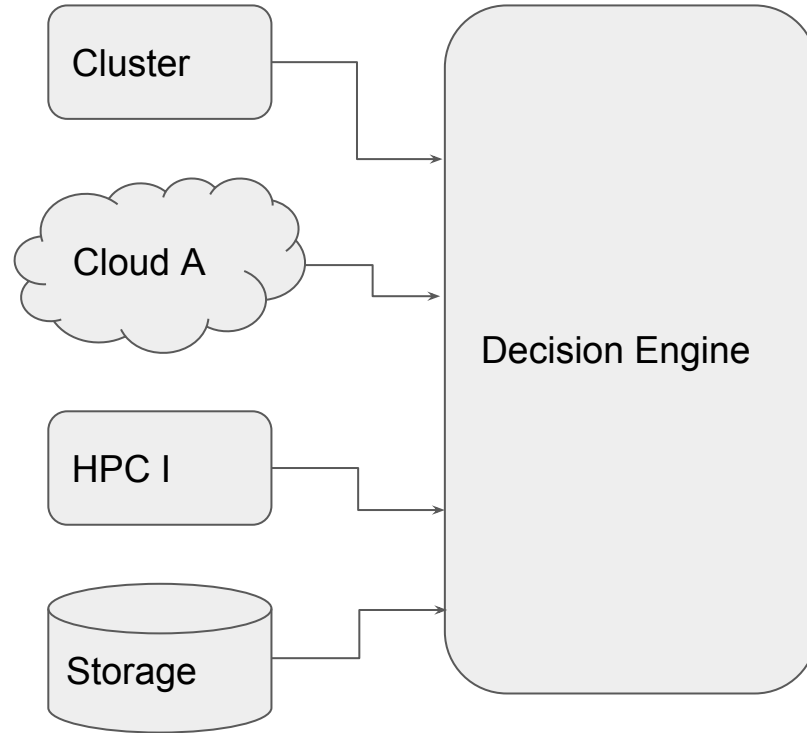- Cost (rental)
- Network

Decision Engine I

Get inputs from resources
- On-premises
- Remote (OSG, others)
- Clouds
- HPCs
- …

Inputs include
- Availability
- Costs
- Connectivity
- Storage
- CPU
- …

Resources can be of different nature (Compute, Storage, …)
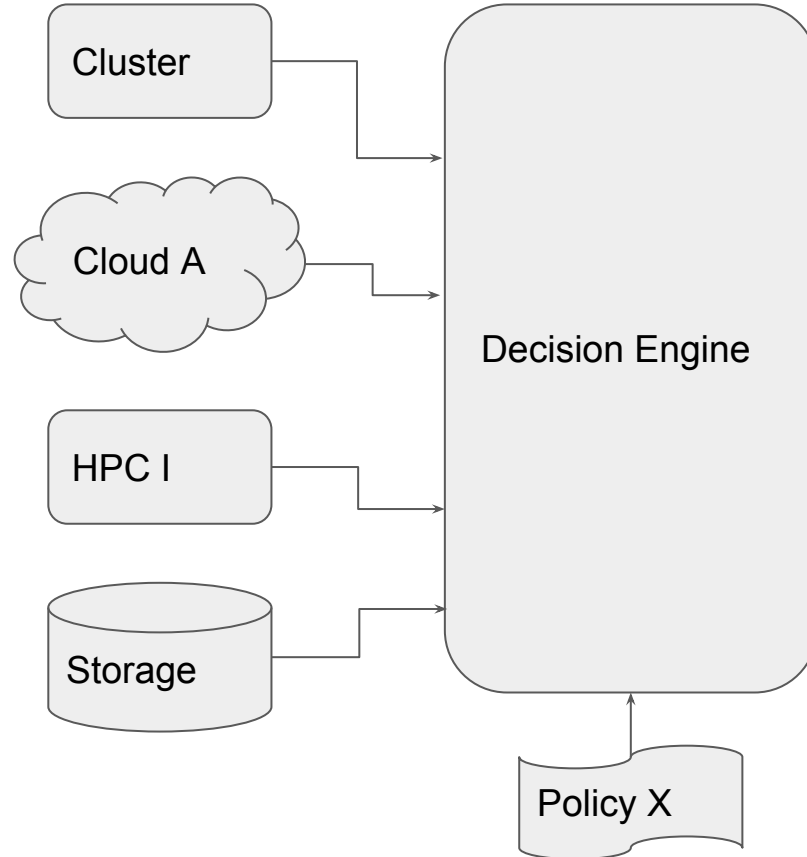
Cluster

Cloud A

HPC I

Storage

Decision Engine

Decision Engine II

Get inputs from pluggables policies
- Budget (allocation and $)
- Price ranges
- Priorities
- …
-

Automatic interpretation of policies

Cluster
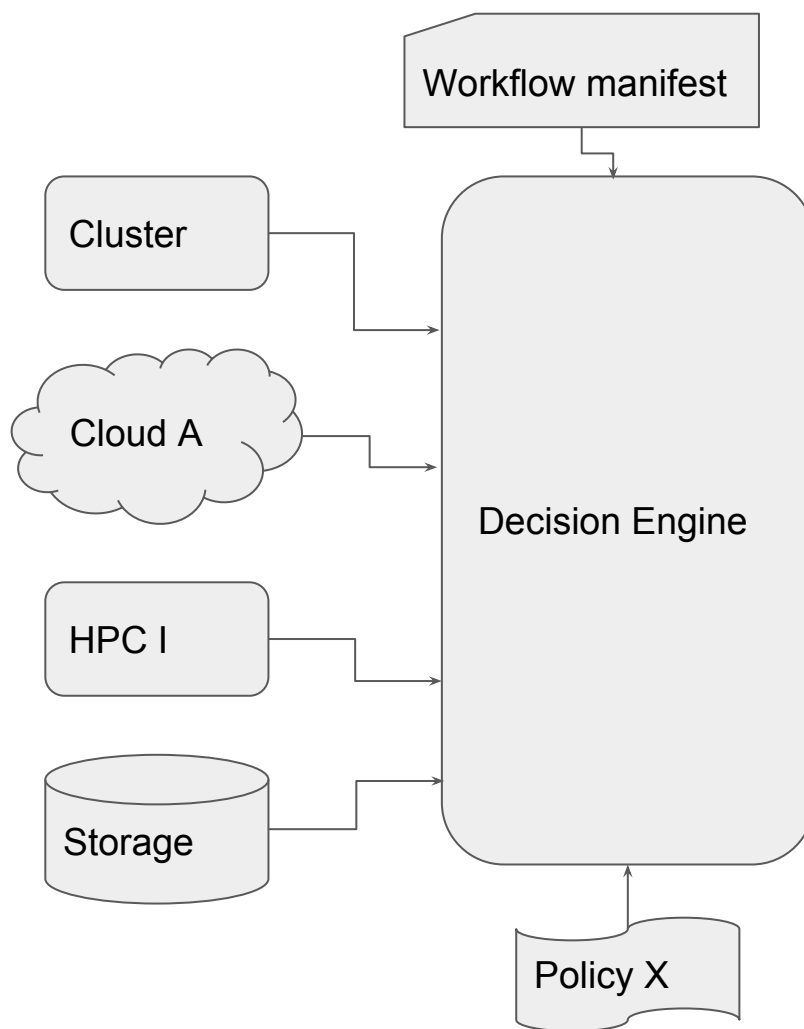
Cloud A

HPC I

Storage

Decision Engine

Policy X

Decision Engine III

Get inputs from workflow manifests

- Budget (allocation and $)
- Input and output destination requirements
- Resource requirements
  - Memory
  - Number of core
  - ....
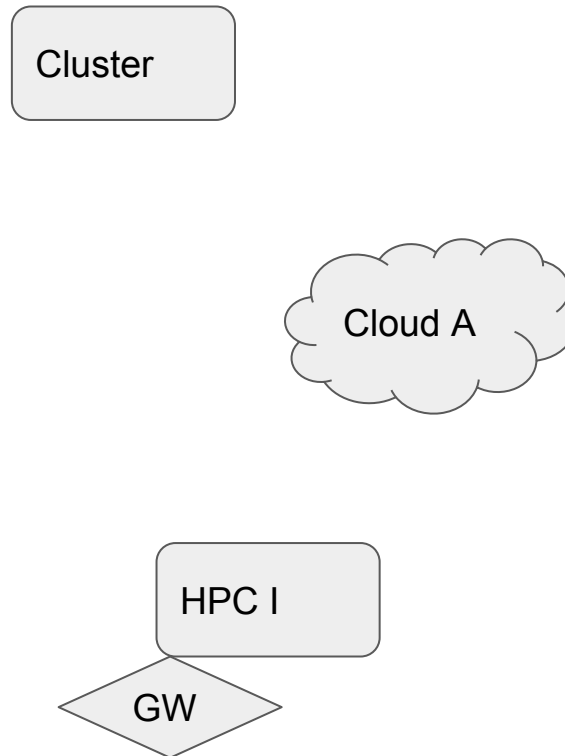- Time to completion
- ...

Automatic interpretation of manifests

Connection to CPU resources

Components from associated projects

- Clusters & clouds
  - Condor
  - OASIS (OSG implementation of CVMFS)
- HPCs
  - Condor (ssh)
  - Standardised **gateway** to perform software installation and data transfers

Cluster

Cloud A

HPC I

GW

Standard gateway for all HPC resources

HEPCloud a toolkit

HEPCloud an **automated** and **flexible** toolkit

Easy integration of different kind of

- Resources
- Policies
- Workflows

HEPCloud a facilitator

HEPCloud in collaboration to leverage tools and experiences from

- OSG (WLCG)
- HTCondor
- Existing projects (ATLAS, CMS,...)

HEPCloud in collaboration to satisfy and meet requirements from

- Developments in existing projects (ATLAS/CMS and HL-LHC)
- Future projects (Dune,...)

HEPCloud next steps

Collect requirements and informations from existing projects

One day event will be organised with ATLAS, CMS (likely after CHEP)

- To gather requirements in view of HL-LHC
- Identify areas of common interest and potential collaborators

Fall 2016 : draft proposal

Proposal to be submitted to DOE early 2017