Commercial cloud services for HEP computing

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CERN tender for cloud resources

CERN intends to place one contract for IaaS cloud resources consisting of a baseline resource of 1000 simultaneous VMs and associated cluster storage for a duration of 90 consecutive days. Prior to the delivery, CERN requires that the wide area network connectivity is established.

The VMs will host three distinct types of payload internally classified as "simulation", "reconstruction" and "analysis" workloads. The first is solely CPU bound with little network and storage requirements while the two latter require both CPU, storage capacity and network bandwidth.

VMs and Storage requirements

VMs

- Each VM shall consist of at least 4 vCPUs.

- Each VM shall have at least 2 GB of memory per vCPU.

- Each VM shall have 100 GB of primary local storage.

- **Each VM shall be accessible remotely by all WLCG sites over the Internet via a public IPv4 address**.

Storage

- The usable storage capacity shall be at least 500TB.

- **The clustered storage shall be accessible remotely by all WLCG sites over the Internet via public IPv4 addresses.**

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WAN connectivity requirements

- Use of NAT is only permitted for a 1:1 address translation, where each external address is assigned to exactly one internal address. Use of Port Address Translation (PAT) is not permitted.

- To provide IP connectivity, the contractor's site from where the IaaS cloud resources will be made available shall be connected to or peering with at least one of the following:
  - **a. an NREN, which can provide the contractor with transit to CERN;**
  - **b. GEANT or NORDUnet;**
  - **c. an IXP which CERN is also connected to (currently CIXP).**

- The total reserved peak bandwidth available between CERN and VMs through the contractor's connection shall be at least **10Gbps**.

Lesson learnt so far

1000 public IPv4 addresses not easy to get. NAT 1:N may be considered for batch nodes. Storage may be dropped in future tenders

Network concepts like "peering", "transit", "AS" not easy to grasp for many cloud engineers. Difficult to get to the network expert (if any)

Use of public IPv4 customer addresses allowed on the private side. Tunnels may be considered if performance are satisfactory

CERN PoC Environment – Amsterdam PoC (concept)

CERN Consumer
Customer network

CERN Management
Customer network

Internet

VPN

VPN concentrator

1Gbit shared bandwidth

Public Network

Out of Band Management Network

Private Network

FCR

public VLAN

Public Transit

Gateway Appliance

Private Transit

PoP

Test Server 1
IPMI

Test Server 2
IPMI

Test Server ...
IPMI

private VLAN (10.x.x.x/26)

BCR

Connect over the private back bone to any other Datacenter

Services Network

Storage services | Provisioning services | Patch & Update svc. | Backup svc. | Monitoring services

Legend

Public Network (outgoing traffic metered)

Private Network (un-metered traffic)

Mgmnt network (un-metered traffic)

Front- Or Back-end Customer Router

Vyatta Gateway appliance

IPMI — Inteligent Platform Management Interface

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