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Implementation and use of an highly available and innovative IaaS solution: the Cloud Area Padovana

While in the business world the cloud paradigm is typically implemented purchasing resources and services from third party providers (e.g. Amazon), in the scientific environment there's usually the need of on-premises IaaS infrastructures which allow efficient usage of the hardware distributed among (and owned by) different scientific administrative domains. In addition, the requirement of open source adoption has leaded to the choice of products like OpenStack by many organizations.

We describe a use case of the Italian National Institute for Nuclear Physics (INFN) which resulted in the implementation of a unique Cloud service, called "Cloud Area Padovana", which encompasses resources spread in two different sites: the INFN Legnaro National Laboratories and the INFN Padova division.
We describe how this IaaS has been implemented, which technologies have been adopted, how services have been configured in high-availability (HA) mode.

We also discuss how identity and authorization management were implemented, adopting a widely accepted standard architecture based on SAML2 and OpenID: by leveraging the versatility of those standards the integration with authentication federations like IDEM was implemented.

We also discuss some other innovative developments, such as a pluggable scheduler, implemented as extension of the native OpenStack scheduler, which allows to allocate resources according to a fair-share based model and which provides a persistent queuing mechanism for handling user requests that can not be immediately served.

Tools, technologies, procedures used to install, configure, monitor, operate this Cloud service are also discussed.

Finally we present some examples that show how this IaaS infrastructure is being used.

Primary author: Dr DORIGO, Alvise (Universita e INFN (IT))

Co-authors: CRESCENTE, Alberto (INFN); AIFTIMIEI, Doina Cristina (INFN, on leave of absence from "Horia Hulubei" National Institute for Physics and Nuclear Engineering (IFIN-HH)); FRIZZIERO, Eric (INFN); FANZAGO, Federica (Unknown); COSTA, Fulvia (INFN); ZANGRANDO, Lisa (Universita e INFN (IT)); Dr VERLATO, Marco (Universita e INFN (IT)); BIASOTTO, Massimo (INFN Legnaro); Mr SGARAVATTO, Massimo (Universita e INFN (IT)); VENARUZZO, Massimo (Universita e INFN (IT)); GULMINI, Michele (Universita e INFN (IT)); MICHELOTTO, Michele (Universita e INFN (IT)); ANDREETTO, Paolo (INFN); FANTINEL, Sergio (INFN); TRALDI, Sergio (INFN); DAL PRA, Stefano (INFN); Dr BERTOCCO, sara (INFN-PD)

Presenter: DAL PRA, Stefano (INFN)

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