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Engineering application on university private cloud

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Overview

At present, it is common to access content across the Internet independently without reference to the underlying hosting infrastructure. This infrastructure consists of data centres that are monitored and maintained around the clock by content providers. Cloud computing is an extension of this paradigm wherein the capabilities of different applications are exposed as sophisticated services that can be accessed over a network. The cloud can be provided as software service and infrastructure service. We focus on Software as a Service level to enhance accessibility of engineering software ANSYS and implement "use on demand" principle for our local users.

Impact

Enterprise level software for computing intensive engineering applications are usually deployed as HPC solution (Abaqus, Ansys etc.). But there are lot of software for engineers that are running in sequential way on desktop (Solidworks, Bentley, Adams, etc.). Computing intensive applications usually occupy all PC resources and prevent running other user's applications. Such kind of software has some licensing restrictions as well and confines mobility of the user. We suggest running that kind of application on cloud that features flexible management of resourses.
We have choose ANSYS as testbed software, because it is popular software among local users but limited licenses. ANSYS has HPC solution, but most of the local users prefer to use desktop version. Cloud computing solution provided for local users improved accessibility of ANSYS software and utilization of the available resources. Now users can choose required VM image and necessary amount of resources for their problem solving. It also affects better exploitation of software within the same number of licenses. The mobility of the users is also increased, because software is accessible on Internet. The developed cloud computing solution is flexible and will be applied for other engineering applications in the near future.

Description of the work

Private cloud infrastructure was build based on Eucalyptus open source solution at Vilnius Gediminas Technical University (VGTU). XEN hypervisor was employed for hardware virtualization, while Rocks Clusters platform was used for cluster deployment and management. Java Typica framework and JetS3t Toolkit for Amazon's S3 online storage service were used to develop the flexible interface to user's software. User friendly resource management tool was developed where user can manage VM's. VNC and SSH connection to the VM was implemented for users. Java based File manager for Walrus storage was developed to simplify the file transfer to and from user's desktop.
ANSYS is considered as an interesting and promising case of user software. ANSYS is a finite element software widely used for modelling of structural, electrical, fluid dynamics and various couple field problems. It is one of the most popular numerical modelling software at VGTU. User requirements how to improve usage

of ANSYS were collected and analyzed. Corresponding functionalities of the service were defined and cloud computing principle was chosen as the technological solution for service implementation. Several different virtual machine images with ANSYS installation are prepared. ANSYS can be launched on single node or on VM cluster. The developed resource management tool provides ANSYS users with a flexible way of selecting required resources and launching the software. The File Manager saves human resources providing easy and intuitive means for convenient transfer of computed results.

Conclusions

Cloud computing is a promising paradigm delivering IT services as computing utilities. The architecture and software was developed to provide engineering application as a service within private cloud. Moreover, the flexible user interface was developed for resource and application management. The easy and useful file manager for S3 storage was developed as well. It is planned to continue ongoing work and to provide more applications on our private cloud.

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