Elastic cloud computing infrastructures in the Open Cirrus Testbed implemented via Eucalyptus

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During the last years due to government support grid computing evolved from a computer scientists' field of research to a common tool for scientists in different subjects like physics, medicine, meteorology and more. An upcoming trend in IT is cloud computing which aims at consolidating hard- and software-resources in large data centers. Cloud computing adapts the advantages and overcomes the restrictions of the grid concept. All resources are marketed by providers as a service over the Internet. Using cloud computing means that dynamically scalable (elastic) infrastructures can easily be created by the user. Only used resources are billed following the principle pay as you go. Cloud computing has the capability to radically change the IT landscape. Funding can be spent to support core business rather than spending it for IT infrastructure. Using the Cloud the users are free to run the operating systems, infrastructures, applications and programming languages of their choice. The flexibility of cloud computing has its origin in the combination of virtualization technologies (e.g. Xen) with web services. A promising approach to extend cloud computing to more fields of applications is Eucalyptus, a project from the University of California, which stands for "Elastic Utility Computing Architecture for Linking Your Programs To Useful Systems". Eucalyptus allows building and running a cloud computing infrastructure using clusters and/or server/workstation farms in open environments. Eucalyptus is an open-source software and its interface is compatible with Amazon's popular EC2 and S3 services. Therefore Eucalyptus is also a first step towards a standard for cloud computing interfaces. The integration of Eucalyptus into the Open Cirrus Cloud Computing Research Testbed is described and first figures of merit are shown. Open Cirrus is a collaboration of HP, Intel, Yahoo!, the University of Illinois, the Infocomm Development Authority in Singapore and the Karlsruhe Institute of Technology. The aim of the project is to develop a testbed for cloud systems research and cloud application development. The differences between cloud and grid computing will be discussed also as well as different cloud projects and efforts to integrate grid services into the cloud.