Cloud computing: Opportunities and Challenges

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Cloud computing is the new way of Internet-based computing to deliver services and resources for the user what ever are needed. Services are applications which are realized by software. Therefore, we regard the software applications as "software as a service (SaaS)". The resources are servers working as computing engines, data storages, networks etc. The cloud computing conceals the complexity of the whole infrastructure used within the system. In comparison to the traditional business computing centres, it is in many cases not necessary to operate voluminous IT departments and data centres with office space, power, cooling, bandwidth, networks, servers, storage, and software licences. Service Oriented Architecture (SOA) is a set of principles and methodologies for building distributed systems. So, the cloud computing is a style of computing in which IT-related capabilities are provided "as a service". Cloud computing is a better way to run the business processes. Cloud computing attracts more and more attention from computer science researchers, too. The main contents of this course are summarized as follows:

- Principles of Cloud Computing architectures, including the definitions, history, pros and cons of cloud computing, comparison with related technologies, such as grid computing, utility computing, distributed computing, etc.
- Innovative technologies to support cloud computing, including methods, algorithms, load balanced resources, redundant storage conceptions, security aspects, etc.
- Programming in cloud computing, including the installation and configuration of Hadoop and Hbase open source projects.
- Application in cloud computing, including the distributed search engine and distributed data mining in the cloud and the examination of the known applications like Google's bigTable, DFS and MapReduce, Amazon's (key, value) pair storage and Microsoft's Azure infrastructure, etc.

In this tutorial, the principle of cloud computing, its philosophy, methods, benefits, advantages and disadvantages will be discussed. Definition, architectures, taxonomy and components of Cloud Computing are further subjects of the training. It will then also illustrate how the solution can be leveraged in context of different applications to identity business, strategic, technical, and implementation challenges and find solutions for private and public clouds.