CLOUD COMPUTING ISSUES

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Cloud Computing refers to a large group connected in private or public networks systems in order to provide dynamically scalable infrastructure for data, file storage and application at reduced cost (billed by consumption). Available Cloud Service is of three categories: (i) Software as a Service (SaaS), (ii) Platform as a Service (PaaS), (iii) Infrastructure as a Service (IaaS). In SaaS, Cloud hosted Internet Applications are offered as services to the end users. In PaaS, customer can build applications on using development environment or platform provided in the cloud infrastructure. In IaaS, storage, database management and computing capabilities services are available on demand at pay per use model. Organizations may choose either Public Cloud (low cost, "pay-as-you-go" model with limited security protections and configuration), or Private Cloud (built for single enterprise with higher data security and control) or Hybrid Cloud (combination of Public and Private Cloud models with increased computing flexibility). As there is no need to purchase any infrastructure or to carry out maintenance the cloud computing provides benefits like *Reduced cost*. Other benefits include *Increased Storage* as provided by the Cloud Service Providers and *Flexibility* to meet the computing requirements in a changing business conditions.

The challenges in Cloud Computing include *Data Security, Data Availability & Recovery, Management of Cloud Platform& Infrastructure and*

Government Regulations & Compliance thereof. Enterprises have the fear of losing data to competition and the consumers' data confidentiality. Cloud operational teams need to manage service level agreements and maintenance of business applications along with supports to Data replication, System Monitoring, appropriate Clustering, Performance Monitoring, Capacity, Fail over, Disaster Recovery. Improvement of *Scalability and Load balancing* are real challenges in managing the cloud infrastructure.*Interoperability* among different cloud computing approaches (e.g., Google Approach to Cloud Computing, Amazon Approach to Cloud Computing, Microsoft Approach to Cloud Computing etc.) is also an upcoming challenge. None of the Cloud Computing approaches are suitable for all applications. Interoperability would help to share data among cloud computing applications that are running on various types of clouds. *Cloud reliability* is becoming a very important issue for long-running and mission critical applications. Cloud needs to continue to run even in the presence of faults in hardware and software. Use of *robust hardware* and *software-based Fault Tolerance techniques* would improve cloud reliability. Use of *Enhanced Single-Version Programming (ESVP), Enhanced Single-Version Scheme (ESVS)* [Saha'06, Saha'07] would be useful to develop low-cost fault tolerant robust cloud computing applications against transient bit errors. Cloud should have adequate *Security* and *Reliability* capabilities to deal with malicious attempts to access other users' files and denial of services to legitimate users.