Reliability of Data Centers

Modern internet applications are geographically distributed, with application sites (i.e., data centers) serving clients across the globe. To provide robustness against rare but critical events such as site outages and natural disasters, or even worse, software and hardware error and malicious attack, applications call for geo-replicated fault tolerance. Existing fault tolerance protocols are not suitable for deployment in wide area network because of its expensive cost, or cannot support strong semantics. To release the geo-replicated application developers from handling faults and concurrency problems, this thesis aims to research robust and efficient fault tolerance mechanisms among data centers. To achieve this goal, we will investigate different fault tolerance levels, consistent semantics of data storage, as well as typical geo-applications. To evaluate our mechanisms, we will deploy our prototypes and applications in a globally distributed platform such as Amazon EC2.