**Implementation**

**Module description**

The modules are:

1.customer satisfaction module

2.M/M/m queuing model module

3.Service-Level Agreement module

4.Cloud Computing module

**customer satisfaction module**

Based on the definition of customer satisfaction level in economics, develop a calculation formula for measuring customer satisfaction in cloud.Analyze the interrelationship between customer satisfaction and profit, and build a profit optimization model considering customer satisfaction. A profit maximization model in which the effect of customer satisfaction on quality of service (QoS) and price of service (PoS) is considered. From an economic standpoint, two factors affecting customer satisfaction are QoS and PoS. The PoS is determined by cloud service providers. The QoS is determined by the service capacity of a cloud service provider which largely depends on its platform configuration. Under the given pricing strategy, the only way to improve the customer satisfaction level is to promote the QoS, which can be achieved by configuring cloud platform with higher service capacity. Doing so can affect a cloud service provider from two asides. On one hand, the higher customer satisfaction level leads to a higher market share, so the cloud service provider can gain more revenues. On the other hand, more resources are rented to improve the service capacity, which leads to the increase of costs. Hence, the ultimate solution of improving profit is to find an optimal cloud platform configuration scheme. In this paper, we build a customersatisfaction- aware profit optimization model and propose a discrete hill climbing algorithm to find the numeric optimal cloud configuration for cloud service providers.

**M/M/m queuing model**

In the M/M/m model, m is the number of servers, and all servers run at an identical speed s (measured by the number of instructions that can be executed in one unit of time). Assume that the interarrival times of service requests are independent and identically distributed (i.i.d.) exponential random variables, in other words, the arrival requests follow a Poisson process with arrival rate λ . The execution requirements of the tasks (measured by the number of instructions to be executed) are i.i.d. exponential random variables r with mean r. Since the server execution speed is s, the service times of the requests are also i.i.d. exponential random variables x = r/s with mean x = r/s. Hence, the average service rate, i.e., the average number of service requests that can be completed by a server with speed s in one unit of time, is μ = 1/x = s/r.

**Service-Level Agreement**

The QoS is affected by many factors such as the service time, the failure rate and so forth. However, in this paper, we measure the QoS of a request by its response time for two reasons. First, the service time is easily measured. Second, it gives customers an intuitive feeling of QoS. For customers, they do not care how failures are managed when failures occur. They only care whether the task can be completed successfully and how long it takes. The response times of requests are different from each other due to the changing system workload and limited service capacity, which leads to different QoS and QoS satisfaction. In general, each customer has a tolerable response time which is related to the execution requirement of its requests. We denote the tolerable response time of a request with execution requirement r by cr/s0, where s0 is be baseline speed of a server and c is a constant coefficient. If the response time of a request exceeds the tolerable value, the customer feels dissatisfaction about the service, which leads to the degrade of the overall customer satisfaction of the service provider.

**Cloud Computing**

Cloud computing describes a type of outsourcing of computer services, similar to the way in which the supply of electricity is outsourced. Users can simply use it. They do not need to worry where the electricity is from, how it is made, or transported. Every month, they pay for what they consumed. The idea behind cloud computing is similar: The user can simply use storage, computing power, or specially crafted development environments, without having to worry how these work internally. Cloud computing is usually Internet-based computing. The cloud is a metaphor for the Internet based on how the internet is described in computer network diagrams; which means it is an abstraction hiding the complex infrastructure of the internet. It is a style of computing in which IT-related capabilities are provided “as a service”, allowing users to access technology-enabled services from the Internet ("in the cloud")without knowledge of, or control over the technologies behind these servers.