

# A Smart Negotiable Agent Based Cloud System for Multilateral e-market

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## Abstract

Negotiation places a significant role in accomplishing an agreement in multiple interrelated e-markets. Multilateral negotiation is employed between consumer agents and broker agent. Smart negotiation, is employed between broker agent and provider agent. The negotiation outcomes in resource market between provider agent and broker agent influence the outcomes in service market between broker agent and consumer agent. In the existing approach it achieves higher utilities and success rates by contract strategy. Nonetheless there prevails a quality in achieving the coordination between the participants. Thus we tend to propose a parallel negotiation mechanism to deal with this quality and to enhance the negotiation outcomes.

## Keywords

Automated negotiation, bargaining, cloud resource allocation, complex negotiation, concurrent negotiation, negotiation agent

## I. Introduction

The objective of this paper is to devise and discuss about an agent based cloud system in multiple interrelated E-markets. An agent is a system or interface that is capable of independent actions. A multi agent system consists of many agents, which interact one another.

For smart agent system, agent require to cooperate, coordinate, and negotiate with one another. Cooperation is the process when several agents work together and collect their knowledge and capabilities to reach the goal. Coordination means reach the state in which every agent fit in well with each other. Negotiation is the process to achieve an agreement between the participants.

Some of the essential characteristics of cloud computing is resource pooling and resource sharing. Resource pooling and sharing involves combing the resources, mapping, scheduling, coordinating, and establishment of contract between the participants. Agent based cloud computing is to design and develop the software agents for discovering the cloud service, negotiation of service and composition of service..Agent based cloud computing devices the following three phases: first phase is, service requirement phase where consumer devises the functional, technical and budgetary requirements. Second phase is, service discovery where matching the searched cloud services with the three requirements (functional, technical and budgetary). Third phase is service composition phase, From multiple providers, a broker combines a set of services and delivers the services to the consumers.

### A. A Smart Negotiation in Cloud Computing

The Challenge in service negotiation is to define SLAs between broker and provider, and consumer and brokers. E-Commerce negotiation[3],[6],[11] devices two participants called buyers and sellers in only one market and participants not allowed to reach the contract, the problem occurred in complex negotiation[8] mechanism is somewhat complex because negotiation activity done by parallel among multilateral E-markets and participants are allowed to reach a contract by paying penalty fees.

### B. Multilateral e-markets and three types of Participants

Most of the bargaining models are designed by only one market and two types of participants called buyers and sellers. The smart negotiation mechanism supports concurrent negotiation activities

in interrelated E-markets. The negotiation outcomes in resource market between provider agent and broker agent influence the outcomes in service Market between broker agent and.

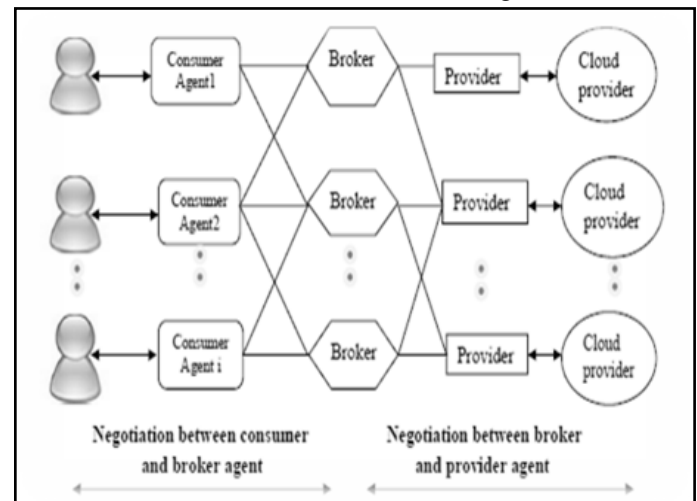


Fig. 1: Agent-based testbed

consumer agent The contribution of this work is showing that the smart negotiation mechanism can be used to simulate the negotiation activities. Whereas the negotiation strategies and the multiple interrelated protocols[12] for consumer and broker agents in a Cloud service market, and specifies the algorithms for defining contracts and coordinating parallel negotiations in multiple resource markets.

## II. Smart Negotiations in Multiple Resource Markets

Whereas the idea of "agent-based Cloud commerce," [4] proposed a market-oriented technique for managing Cloud resources by regulating their supply and demand. One of the Cloud resources described in consists of resource providers, consumers, and brokers. Many consumers send request to a broker, and multiple brokers accepts request from each consumer. Consumers, brokers, and providers are bound to their service contracts through SLAs. The SLAs specify the details of the agreed service by all Cloud participants and the penalties for offense the expectations. To combine a group of services from multiple suppliers, a broker needs to establish SLAs with multiple suppliers via synchronic negotiations, and customers have to be compelled to discuss with brokers to establish SLAs to utilize composed Cloud services.

### A. Agent-Based Cloud Market Model

The design of an agent-based architecture to simulate the Cloud resources. It consists of consumer and provider agents involve on behalf of consumers and resource providers, respectively, and many broker agents representing the brokers. Consumer agents send service requests to broker agents, provider agents provides resources, a collection of resources to satisfy consumer agents' requirements, then retain the service to consumer agents. To achieve an agreement, broker agents bring negotiation activities in two types of markets. The negotiation outcomes in resource market between provider agent and broker agent influence the outcomes in service market between broker agent and consumer agent.

### B. Smart Negotiation Mechanism

A smart negotiation mechanism that promote the negotiation activities between consumer and broker agents and broker and provider agents. Since multiple broker agent service receive request from each consumer agent and many consumer agent send service request to each broker agent, a many to many negotiation model[8] is pertinent for modeling the negotiation between consumer and broker agents.

Since a Cloud service may be effectively poised using multiple types of Cloud resources, negotiation outcomes in resource market between provider agent and broker agent influence the outcomes in service market between broker agent and consumer agent. Hence, a smart one-to-many negotiation mechanism is adopted to model the concurrent negotiation activities between broker agents and different provider agents.

### III. Multilateral Negotiations in a Service Market

A Multilateral negotiation strategy is adopted for the many-to-many negotiation between consumer agents and broker agents. Empirically compared with the negotiation strategy[1] using smart negotiation.

#### A. Negotiation Protocol

The following negotiation protocol is used for specifying the multilateral negotiation activities between consumer and Broker agents:

- Negotiation progressed in a number of rounds.
- A pair of consumer and broker agents negotiates by making schemes in alternate rounds.
- Multiple consumer and broker agent can negotiate compromise simultaneously.
- When an agent makes a scheme, it proposes a deal from their space of possible scheme. An agent proposes its most preferred deal initially.
- If no agreement is achieved, negotiation proceeds to the next round. At each and every round, an agent establishes its amount of concession using the strategy defined below.
- Negotiation between two agents terminates by 1) when an agreement is reached, or 2) with a conflict when the shorter deadline of the negotiation is reached.

#### B. Contracting

The following negotiation protocol is used for specifying the contract negotiation activities between consumer and broker agents:

Algorithm 1: Contract Negotiation

At each negotiation round, do the following:

1. Estimate the default probability of each provider agent

2. Calculate the expected utility of each provider agent's proposal
3. Determine if each provider agent is acceptable
4. If there are proposals that are acceptable then
  - i. the broker agent sends a request for contracts to all corresponding provider agents
  - ii. Provider agent send the confirmation of contract
5. If the broker agent receives one or more confirmation of contracts then the broker agent accepts the contract that generates the Highest expected utility

Else

The broker agent revises its proposal by making concession using the negotiation strategy.

### C. Coordination

An agent always prefers higher utility when it can assure a high success rate. The negotiation outcomes in resource market between provider agent and broker agent influence the outcomes in service market between broker agent and consumer agent. Coordination [14],[10] of the smart negotiation activities generally consists of 1) predicting the change in expected consequence in each one-to-many negotiation, and 2) deciding whether the broker agent should proceed or terminate the entire concurrent negotiation.

### IV. Evaluation and Empirical Results

To evaluate the smart negotiation mechanism, two types of experiments were carried out to simulate the negotiation activities between consumer and broker agent and broker and provider agent. The negotiation outcomes in resource market between provider agent and broker agent influence the outcomes in service market between broker agent and consumer agent.



Fig. 4: Average Performance of Consumer and Broker Agents

Agent based cloud computing devices the following three phases: first phase is, service requirement phase where consumer devises the functional, technical and budgetary requirements. Second phase is, service discovery where matching the searched cloud services with the three requirements (functional, technical and budgetary). Third phase is service composition phase, From multiple providers, a broker combines a set of services and delivers the services to the consumers.

### V. Related Works

The literature in Negotiation strategy establishes a better result. Since this work devises a Smart negotiation and parallel negotiation

activity among three participants in different market conditions, this section only discuss closely related works on cloud service discovery, concurrent negotiation and parallel negotiation.

### A. Cloud Service Discovery

K.M.Sim et al proposed an Agent based cloud search engine. Cloudle is the first search engine for cloud service provider in cloud computing. Agent based cloud computing devices the following three phases: first phase is, service requirement phase where consumer devises the functional, technical and budgetary requirements. Second phase is, service discovery where matching the searched cloud services with the three requirements (functional, technical and budgetary). Third phase is service composition phase, From multiple providers, a broker combines a set of services and delivers the services to the consumers.

### B. Concurrent Negotiation

K.M.Sim et al proposed concurrent negotiation activity. Most of the bargaining models are designed by only one market and two types of participants called buyers and sellers. The novelty of this work is devising a smart negotiation mechanism [4],[6],[14],[15] to support two kinds of negotiation activities 1) the multilateral negotiation between consumers and brokers and 2) smart negotiations between brokers and resource providers. Whereas the negotiation strategies and the multiple interrelated protocols for consumer and broker agents in a Cloud service market, and specifies the algorithms for defining contracts and coordinating the coordination strategies are not suitable to be applied to coordinating concurrent multiple one-to-many negotiations for multiple Cloud resources parallel negotiations in multiple resource markets. The coordination between the participants should be good.

### C. Parallel Negotiation

K.M.Sim et al proposed parallel negotiation mechanism [3],[5],[10],[12] that promotes the negotiation activities between consumer and broker agents and broker and provider agents. Since multiple broker agent service receive request from each consumer agent and many consumer agent send service request to each broker agent, a many to many negotiation model is pertinent for modeling the parallel negotiation between consumer and broker agents. Since a Cloud service may be effectively poised using multiple types of Cloud resources, negotiation outcomes in resource market between provider agent and broker agent influence the outcomes in service market between broker agent and consumer agent. Hence, a smart one-to-many negotiation mechanism is adopted to model the concurrent negotiation activities between broker agents and different provider agents.

### VI. Conclusion

An organization might participate in several parallel negotiations. Every negotiation might end with the acceptance of a contract that will automatically reduce the available resources and it will modify the context for the remaining negotiations. The negotiation outcomes in resource market between provider agent and broker agent influence the outcomes in service market between broker agent and consumer agent. The negotiation outcomes in resource market between provider agent and broker agent influence the outcomes in service market between broker agent and consumer agent. thus we have a tendency to propose a sensible negotiation mechanism to deal with this quality and to enhance the negotiation outcomes.

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