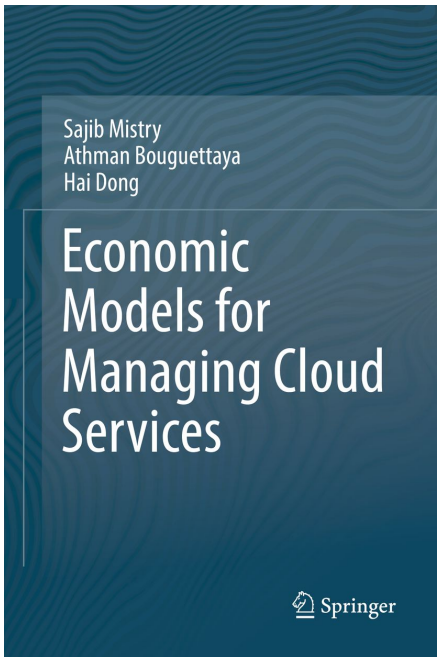

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Sajib Mistry, Athman Bouguettaya, Hai Dong

Economic Models for Managing Cloud Services

- One of the first books that develops a long-term cloud service composition framework from a provider's perspective
- The proposed framework provides significant momentum to the business of IaaS providers, especially small providers
- Explores innovative methodologies for wider adoption of the cloud services at a greater scale and faster pace
- Discusses the state-of-art technologies and composition framework to enable an economically viable cloud market

The authors introduce both the quantitative and qualitative economic models as optimization tools for the selection of long-term cloud service requests. The economic models fit almost intuitively in the way business is usually done and maximize the profit of a cloud provider for a long-term period. The authors propose a new multivariate Hidden Markov and Autoregressive Integrated Moving Average (HMM-ARIMA) model to predict various patterns of runtime resource utilization. A heuristic-based Integer Linear Programming (ILP) optimization approach is developed to maximize the runtime resource utilization. It deploys a Dynamic Bayesian Network (DBN) to model the dynamic pricing and long-term operating cost. A new Hybrid Adaptive Genetic Algorithm (HAGA) is proposed that optimizes a non-linear profit function periodically to address the stochastic arrival of requests. Next, the authors explore the Temporal Conditional Preference Network (TempCP-Net) as the qualitative economic model to represent the high-level IaaS business strategies. The temporal qualitative preferences are indexed in a multidimensional k-d tree to efficiently compute the preference ranking at runtime. A three-dimensional Q-learning approach is developed to find an optimal qualitative composition using statistical analysis on historical request patterns. Finally, the authors propose a new multivariate approach to predict future Quality of Service (QoS) performances of peer service providers to efficiently configure a TempCP-Net. It discusses the experimental results and evaluates the efficiency of the proposed composition framework using Google Cluster data, real-world QoS data, and synthetic data.