

# Tarification robuste de ressources cloud en utilisant la théorie des jeux à champs moyen

## Mots clés :

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- **Co-encadrant(s)** :
- **Unité de recherche** : Laboratoire de recherche d'EURECOM
- **Ecole doctorale** : École Doctorale Informatique, Télécommunications, Électronique de Paris
- **Domaine scientifique principal**: Divers

## Résumé du projet de recherche (Langue 1)

Cloud computing has now become the main paradigm for computing, storage and many other applications, for both companies and individuals. An appropriate pricing schemes for cloud resources is therefore of great importance for cloud providers to maximize their revenue. Currently, cloud providers mostly use a fixed usage-based pricing, sometimes in association with a spot market to sell remaining resources through auctions. However, preliminary studies have shown that this pricing scheme may not be optimal [1]. This leaves open the crucial question of how to optimally price cloud resources. One of the main difficulties in designing a good pricing scheme is that optimizing the scheme's parameters generally requires knowledge of the variation of user demand with prices. Such information is very hard to estimate. Therefore, a key aspect of the designed pricing scheme considered in this PhD will be its robustness to mis-estimation of the users reaction to prices. To design a robust pricing scheme, a possible source of inspiration will be the concept of probabilistic pricing, recently proposed in [2,3], which was shown to exhibit interesting robustness properties in a different context.

## Résumé du projet de recherche (Langue 2)

The overall goal of the PhD work will be to design a good pricing mechanism for cloud resources and to analytically assess its performance using a game-theoretic model. The student will elaborate a model using the mean-field game method [4,5], which leverages the large number of users to simplify the analysis [3]. He/she will study the performance of the designed pricing scheme (and compare it to other schemes) under various scenarios: in stationary situation, with external dynamics, with iterative learning algorithms, etc. Although the main case study will be cloud computing, the PhD work is expected to bring general results on the design of robust pricing schemes for a shared resource in a dynamic environment with many users.