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SUJET DE THESE 2012-2013

Groupe de Recherche :MRS

Pôles :

*MINAS (*Micro et Nanosystèmes)	☐
*MOCOSY (*Modélisation, Optimisation et Conduite des Systèmes)	☑
*SINC (*Systèmes Informatiques Critiques)	☐
*RIA (*Robotique et Intelligence Artificielle)	☐

Mot(s)-clé(s) : personal computer ; cloud computing ; simulation ; load-balancing ; migration

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Titre : **Large-scale simulation and dynamic reconfiguration of cloud computing resources**

We are witnessing a convergence between mobile phones and personal computers. However there are still significant differences in the underlying business models. The current model in mobile telephony facilitates the access of inexperienced users to services/applications, with a business model based on the billing for the purchase or use. In contrast, for personal computers, the current model still assumes that the user is able to manage its computer in terms of operating system, to buy, install and update software modules, with the difficulties this may represent for a newbie. In a professional environment, it is of course possible to resort to specialists, but this requires substantial human resources. This is conducive to the emergence of a new business model for personal computers that is inspired by mobile telephony in terms of service and use. This new business model should be based on the incredible success of remote access models to software resources (SAAS, cloud computing), but also on the new possibilities offered by autonomic computing and virtual machines.

The project SOP aims at designing a hybrid model for personal computers, targeted both at indivual users and at professional users, and that is able to combine the advantages of a local installation/configuration of software tools with the advantages of the remote accesses to software services hosted by a “data center” or by the personnal computer of another user in a cycle-stealing mode.

The research of the PhD student will be done two parts. The first part will aim at modelling the global system using stochastic models based on queueing theory. The goal is to evaluate its performances when the number of users is in tens or hundreds of thousands. The second part of the thesis will be devoted to the design and mathematical analysis of distributed algorithms for dynamic load-balancing and virtual machine migration. This second part will be based on theoretical tools coming from non-linear optimization theory and game theory.