

## Chapter 5.3

# The Financial Clouds Review

**Victor Chang**

*University of Southampton and University of  
Greenwich, UK*

**Chung-Sheng Li**

*IBM Thomas J. Watson Research Center, USA*

**David De Roure**

*University of Oxford, UK*

**Gary Wills**

*University of Southampton, UK*

**Robert John Walters**

*University of Southampton, UK*

**Clinton Chee**

*Commonwealth Bank, Australia*

### ABSTRACT

*This paper demonstrates financial enterprise portability, which involves moving entire application services from desktops to clouds and between different clouds, and is transparent to users who can work as if on their familiar systems. To demonstrate portability, reviews for several financial models are studied, where Monte Carlo Methods (MCM) and Black Scholes Model (BSM) are chosen. A special technique in MCM, Least Square Methods, is used to reduce errors while performing accurate calculations. Simulations for MCM are performed on different types of Clouds. Benchmark and experimental results are presented for discussion. 3D Black Scholes are used to explain the impacts and added values for risk analysis. Implications for banking are also discussed, as well as ways to track risks in order to improve accuracy. A conceptual Cloud platform is used to explain the contributions in Financial Software as a Service (FSaaS) and the IBM Fined Grained Security Framework. This study demonstrates portability, speed, accuracy, and reliability of applications in the clouds, while demonstrating portability for FSaaS and the Cloud Computing Business Framework (CCBF).*

### 1. INTRODUCTION

The Global economic downturn triggered by the finance sector is an interdisciplinary research question that expertise from different sectors needs to work on altogether. There are different interpretations for the cause of the problem. Firstly,

Hamnett (2009) conducted a study to investigate the cause, and concluded unsustainable mortgage lending leads to out of control status and that the housing bubble and subsequent collapse were result of these. Irresponsible mortgage lending was the cause for Lehman Brother collapse that has triggered global financial crisis. Secondly, Lord Turner, Chair of the Financial Service Authority (FSA), is quoted as follows: “The problem, he said,

DOI: 10.4018/978-1-4666-0879-5.ch5.3

was that banks' mathematical models assumed a 'normal' or 'Gaussian' distribution of events, represented by the bell curve, which dangerously underestimated the risk of something going seriously wrong" (Financial Times, 2009). Thirdly, there are reports showing the lack of regulations on financial practice. Currently there are remedies proposed by several governments to improve on this (City A.M., 2010). All the above suggested possibilities contribute to complexity that caused global downturn. However, Cloud Computing (CC) offers a good solution to deal with challenges in risk analysis and financial modelling. The use of Cloud resources can improve accuracy of risk analysis, and knowledge sharing in an open and professional platform (Chang, Wills, & De Roure, 2010a, 2010c). Rationales are explained as follows. The Clouds provide a common platform to run different modelling and simulations based on Gaussian and non-Gaussian models, including less conventional models. The Clouds offer distributed high-performing resources for experts in different areas within and outside financial services to study and review the modelling jointly, so that other models with Monte Carlo Methods and Black Scholes Models can be investigated and results compared. The Clouds allow regulations to be taken with ease while establishing and reminding security and regulation within the Clouds resources.

## **2. LITERATURE REVIEW**

Literature review is presented as follows. Three challenges in business context and Software as a Service (SaaS) are explained. This paper is focused on the third issue, enterprise portability, and how financial SaaS is achieved with portability. Financial models with Monte Carlo methods and Black Scholes models are also explained.

### **2.1. Three Challenges in Business Context**

There are three Cloud Computing problems experienced in the current business context (Chang, Wills, & De Roure, 2010b, 2010c). Firstly, all cloud business models and frameworks proposed by several leading researchers are either qualitative (Briscoe & Marinos, 2009; Chou, 2009; Weinhardt et al., 2009; Schubert, Jeffery, & Neidecker-Lutz, 2010) or quantitative (Brandic et al., 2009; Buyya et al., 2009; Patterson et al., 2009). Each framework is self-contained, and not related to others' work. There are few frameworks or models which demonstrate linking both quantitative and qualitative aspects, and when they do, the work is still at an early stage.

Secondly, there is no accurate method for analysing cloud business performance other than the stock market. A drawback with the stock market is that it is subject to accuracy and reliability issues (Chang, Wills, & De Doure, 2010a, 2010c). There are researchers focusing on business model classifications and justifications for which cloud business can be successful (Chou, 2009; Weinhardt et al., 2009). But these business model classifications need more cases to support them and more data modelling to validate them for sustainability. Ideally, a structured framework is required to review cloud business performance and sustainability in systematic ways.

Thirdly, communications between different types of clouds from different vendors are often difficult to implement. Often work-arounds require writing additional layers of APIs, or an interface or portal to allow communications. This brings interesting research questions such as portability, as portability of some applications from desktop to cloud is challenging (Beaty et al., 2009; Patterson et al., 2009). Portability refers to moving enterprise applications and services, and not just files or VM over clouds.

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