

Chapter 6

Software Development Methodologies for Cloud Computing

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ABSTRACT

Cloud computing is recently taking a significant focus in the information technology fields as a possible future trend for how computer services and applications can be provided to users or businesses. Cloud computing is utilizing the recent large expansion of Internet and network technologies where the increase in the data size and transfer speed made it possible to make the Internet or the cloud a possible host for all or most users' applications and data. With this new technology, several changes are expected to occur in the information technology fields and systems to adapt to this field or technology. In this chapter, the author focuses on the possible impact on the way software companies will develop their software products. For example, the traditional client server system architecture is expected to be significantly impacted with cloud computing new framework. All software development concepts and activities will be revisited to discuss what things can be different in the cloud computing paradigm.

INTRODUCTION

Software development projects and process approaches are continuously evolving. They are affected by the type of the developed products, the nature of the project, and several other environmental factors. No software process development approach or model can work as the best for all types of projects. The time, budget and resources'

constraints played also a significant role in deciding the best way to proceed in developing a particular software. In this chapter a focus will be on how software projects can be developed in the cloud computing projects. Focus will be on evaluating the different aspects of cloud computing projects from three dimensions. The first dimensions are related to software project concerns: project, product, process and people, and the second dimension is

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related to the different types of cloud computing paradigms of service models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS). The third dimension is related to cloud computing deployment models: Public cloud, Community cloud, Hybrid cloud, and Private cloud. After presenting an introduction section for each one of those three dimensions, we will discuss possible future development approaches that can be suitable for software projects' developments for cloud computing.

In terms of software product models, the widely known and popular object oriented model is currently competed by possible alternatives. For the web and cloud computing, service oriented model and architecture (SOA) is seen to many as a possible successor of the object oriented paradigm. In SOA, focus and the main design abstractions are built around the concept of services. Systems are decomposed based on the number and type of services they are offered to clients or users. Services are expected to be designed, implemented and deployed in very agile flexible manners that can allow different types of users to call and use such services with the least amount of possible efforts. Some of the popular object orientation (OO) concepts such as abstraction and encapsulation can still be used and applied to good SOA design. Such concepts are seen now as good software design principles rather than OO design principles. In abstraction, it is always important to decompose the system to the right level and number of services in the right granularity. Each service should have the right and relevant attributes, methods, associations, etc. that can help minimize its coupling with other services. Similarly, to apply encapsulation, services should be offered in ways that can relieve the clients or users from any type of commitment or dependency in the implementation details of the service. This makes it easy to change the implementation details of such services with the least possible impact on clients. On the service side itself, encapsulation plays also an important role in separating the service representation or

interface from its detail implementation. This can make it easy to update and change such service without impacting its interface or service clients. In an alternative opinion, some software designers see SOA as a complement to OO and not a replacement where SOA works in a higher level of details in comparison to OO. This means that both software product architectures can be implemented simultaneously.

In SOA, focus is on Web services rather than Web applications. The major difference is in isolating service provider from user and in providing generic services that are not intended for specific users and that are themselves unaware of the nature of use in the client side.

CLOUD COMPUTING

A recently growing trend and IT service platform is what is called cloud computing. In cloud computing, companies may outsource all their IT department functionalities to a cloud host company. The service level that cloud companies offer varies based on the previously mentioned classification based on what they offer for businesses and based on the business need and options. The cloud company can offer providing a particular software for individuals or companies (SaaS). It means that users will not get a downloadable copy of the software on their machine. Rather, they need to access the cloud every time they need the software and use it as a service. Users can still have any local generated files of the application. However, they may need the application in future for modifications. Charge of such service can be usually based on the usage period or time.

Users or businesses can also choose to outsource also their hardware or infrastructure. For example, a company may need several routers, IP addresses, bandwidth, etc. Such option maybe very useful for starters in high risk companies where owners hesitate to pay at front a large investment. Pay per use in this case is similar to the case of

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