Project management for cloud computing development

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Abstract: *This article deals with the impact of employing cloud computing architectures in the field of software systems development. We analyze the individual influence of the cloud computing model characteristics on the project development process.*

Keywords: *Cloud computing, Project management*

1. Introduction

A cloud computing based development project is a temporary endeavour undertaken to create a unique system (both hardware and software) that will be running on a cloud computing architecture. High quality cloud computing based development projects deliver the required product within scope, on time and within budget. It is the project manager's duty to skilfully balance the competing demands for project quality, project duration and cost of resources in order to be able to deliver the system as planned.

At the top level view, cloud computing based development of e-

learning systems follows the same pattern as any other software development project

Namely, cloud computing development project management comprises of the following process groups (see figure 4):

- Project initiation
- Project planning
- Project execution
- Project monitoring and controlling
- Project closing

Subsequent sections of this article will go into great details of the project management process groups. More than this, a set of e-learning cloud computing performance metrics will be advanced for each of the following process groups.

Figure 1—Cloud computing project management

2. Project initiation process group

The initiation of an e-learning system development project using cloud computing architecture comprises of developing the project charter and the development of the preliminary project scope statement.

The project charter represents the document that formally authorizes the development project and endows project manager with the authority to employ organizational resources to project activities.

Preliminary project scope statement defines what needs to be accomplished, i.e. the functional specifications of the future e-learning system and the project objectives that have to be met.

At this stage special care should be given to the strong correlation between the project objectives and project scope. It is important to quantitatively measure the efficiency of the project objectives as they will have a crucial impact upon the efficiency of the future e-learning cloud computing system.

3. Project planning process group

The very nature of a cloud computing business model and of its technical architecture makes the planning of a cloud computing based project different than any other IT development project. Considering the cloud computing infrastructure will be rented from the service provider, the project manager's focus moves from choosing the right technology to choosing the right vendor. Instead of concentrating on the computing power of the architecture and the costs of scaling up the e-learning system, the project manager will be looking at such parameters as service availability, data security, backup and contingency plans the cloud computing vendor offers, etc.

The more business oriented and less technical nature of the cloud

computing based project activities can be immediately observed in the project scope planning, project work breakdown structure, activity identification and sequencing, activity duration estimation and schedule development. This is because the service provider takes on this initial burden and then offers on-demand virtualized processing power.

Cost estimation and cost budgeting project processes are highly biased because of the cloud computing architecture. The service supplier absorbs up-front costs and spreads the costs over a longer period and over several cloud computing customers. Thus, the initial capital expenditure of the project is converted to ongoing operational expenditure of the e-leaning system maintenance.

Using cloud computing instead of investments in datacenters (hardware and software licenses) will result in a shift from capital expenditure (CapEx) to operational expenditure (OpEx).

Quality planning project process involves creating test plans for the future e-learning system. The tests should take into consideration both intrinsic system features and performance testing on the cloud computing architecture.

Human resource planning entails allocating both legacy software development personnel and cloud computing engineers that are aware of the peculiarities of these platforms.

Communications planning means deciding what project processes and tools will be used for timely and appropriate generation, collection, distribution, storage and retrieval of project information. More exactly, this means setting up the reports that have to be generated, their content and frequency. Also, this implies setting up a bug tracking system for recording all the issues that arise during e-learning system development.

4. Project execution process group

Executing the project means directing and managing the project development and performing ongoing quality assurance. For a successful cloud computing based e-learning system to be developed, legacy software development techniques can be successfully employed. That is source control software, build scripts for building the deployment package and automated tests for regression testing. Project criticality analysis techniques can be easily employed in order to enhance the project development quality.

5. Project monitoring and controlling process group

The monitoring and controlling processes are performed during the entire project lifecycle in order to take preventive and corrective actions so as to meet the established project performance goals. Continuous monitoring gives the project management team insights regarding project health and identifies any areas that might need special attention.

The cloud computing based e-learning systems are no different than other software development projects. More exactly, monitoring and controlling processes are concerned with:

- Assessing project current performance.
- Comparing planned and actual project performance.
- Analyzing, tracking and monitoring identified project risks.
- Provide accurate information regarding project status report.
- Provide updated project costs and schedule information.
- Manage ongoing feature change requests.

Earned value management method is a valuable tool for monitoring

project progress and for anticipating and mitigating any problems the project may sustain.

6. Project closing process group

Project closing involves finalizing all project activities and performing the acceptance and delivery of the final e-learning system. During this stage the project scope is checked against the initial objectives, the e-learning system installation and maintenance is documented, the acceptance testing of the final product is performed and the formal closing of the project is executed.

Conclusions

The development of e-learning solution cannot ignore the cloud computing trends.

There are many benefits from using the cloud computing for e-learning systems. Also, there are some disadvantages that have to be taken into account.

Using cloud computing for e-learning solutions influences the way the e-learning software projects are managed. There are specific tasks that deal with finding providers for cloud computing, depending on the requirements (infrastructure, platform or services). Also, the cost and risk management influences the way the e-learning solutions based on cloud computing are managed.

A metrics system needs to be developed in order to measure the efficiency of cloud computing based e-learning solutions.

The Academy of Economic Studies from Bucharest uses a e-learning solution based on Moodle and it has its own datacenter that can be in the future a platform for cloud computing.

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