

Analyzing the Behaviour of Applying Agile Methodologies & DevOps Culture in e-Commerce Web Application

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Abstract—Agile and DevOps both can inspire IT industries with better means of achieving business goals. Agile is evolutionary, allowing teams to effectively prioritize work and feature and deliver a prototype that increases the visibility of the software development process. DevOps has cognitive adaptability in IT projects where rapid development of products is on an apical priority. It's a bunch of principles and practices having an objective to collaborate between Development and Operation teams. Due to these lucrative factors, agile and DevOps are trendy in IT industries nowadays. The project development through agile and DevOps may include any genre of software sphere ranging from traditional business software to web-based applications. Through this paper, some of the functional facets of agile methodologies and DevOps processes are acquainted in e-commerce application.

Keywords—agile; e-commerce; DevOps; git; jenkins

I. INTRODUCTION

While implementing DevOps in agile, it is essential that the development team must have continuous engagement with the operational team throughout the life cycle of particular software development. This practice increase understanding the business goals along with limitations and constraints of software [18] [19]. DevOps (development and operations) is a culture that combines principles and practices to bridge the gap between discrete teams of Development and IT Operations.

The main objective of this culture is to unify both the teams so that the rapid development of the software can be in practice. In DevOps, an individual group takes care of both; the development as well as operational tasks [2] [3]. It includes the software development process, deployment, and integration of numerous modules of a software product.

DevOps supports Agile's release cycle by communicating specifications and design documents together. The sharing of these documents is essential as it is mandatory to figure out the nuances of continuous development and continuous integration

of the product to speed up the entire process. In this paper, some of the practical aspects of applying DevOps to e-commerce web application based project using some of the DevOps tools are discussed. The actual name of the client has been changed for confidentiality purposes.

II. NEED, MARKET AND IMPORTANCE OF DEVOPS TOOLS

The DevOps engineers are highly demanded in the global market. This demand is increasing rapidly as most of the industries are ready to adopt DevOps culture due to its advantages.

The organization and IT industries those have to adopt DevOps culture as their business process is also getting tremendous success throughout the world. IT industries with such professionals are experiencing astounding returns.

These returns are noticeably higher than the industries which are still adopting traditional approaches of software development. Industries are getting a huge success rate due to its continuous development and continuous integration properties.

Although the required rate of such DevOps professional is very high it is also not so much easy to fulfill the industries' demand as an expert on DevOps [1]. These professionals must be well trained and qualified. This expertise only comes with acute efforts towards development and operations.

It is necessary for any e-commerce business to have customer satisfaction. In this competitive era, it is not an easy task. E-commerce service providers must update themselves so that customers may feel fresh and avail of the latest and featured services.

The prime challenge for any e-commerce application is to update it on a frequent basis [16]. This updation usually include new features of the application. To ensure this update on a regular basis, development teams are in need of continuous development and continuous integration. DevOps can help to a great extent to attain it.

III. APPLICATION OF DEVOPS IN E-COMMERCE PROJECT

A. Project Background

The project referred here is an e-commercial web application for a jewelry firm named "Moodag Jewellery". This web application is developed by applying agile methodology along with DevOps culture. In this application, different shops in different areas of a particular city will register themselves along with their products, over the web site so that people of that area able to overview the product online, onsite product view and can purchase that product online.

In this web application, there will be different payment modes. The most commonly used wallets facility is present in it for the payment. Scrum, one of the widely used agile frameworks will be applied for software development. In which numerous releases of the product are divided into 4 weeks sprints [6] [7]. The team is a cross-functional team in which different functional expertise working toward a common goal.

In practice, there are many agile frameworks that exist which are frequently used by organizations. Professionals at organizations, select the framework on the basis of many factors which may influence the entire work process of software development. These factors may include company size, available resources, team structure, and their capabilities, etc. However, Scrum is a framework which is applied by most of the professionals as they can handle complex problems much effective as compared to other frameworks [10] [17]. Professionals rely on the Scrum framework as it supports development teams to work collectively. Through which teammates can share and learn through ideas and experience sharing with each other.

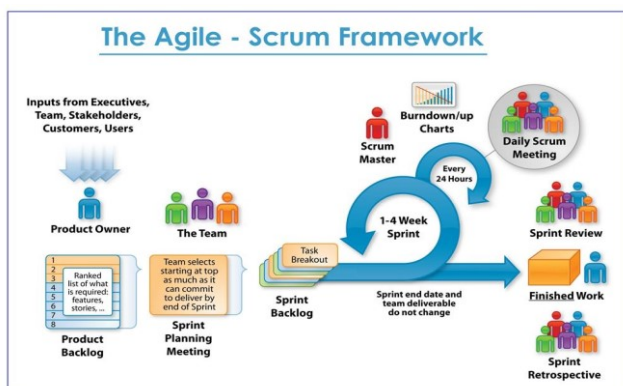


Fig. 1 Agile – Scrum Framework [10]

B. Project Development Methodology

As the requirements of the projects are expected to change frequently, involvement of the client(s) is high and comparatively fewer risks are involved, the team has decided that the model for software development should be Agile [4] and to ensure the rapid development of the product, DevOps culture will support the agile model.

To bridge the gap between development and operational tasks, team has adopted some of the prominent tools of DevOps such as Git and Jenkins.

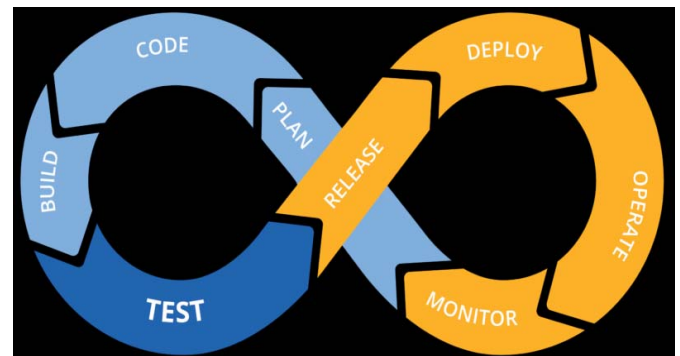


Fig. 2 DevOps architecture [11]

IV. DEVOPS TOOLS USED IN PROJECT

As IT industries and software technology increases, various DevOps tools have been developed. These tools ensure faster and easier development of software products. In the proposed work, some of the most popular tools used are enlisted here:

A. Jenkins

Continuous Integration and Continuous Delivery or Deployment (CI/CD) are the most crucial part of DevOps culture. CI/CD is actually an open-source server that allows professionals to automate different stages of the delivery pipeline. Jenkins, an open-source continuous integration server can automate the entire process of a software project [13].

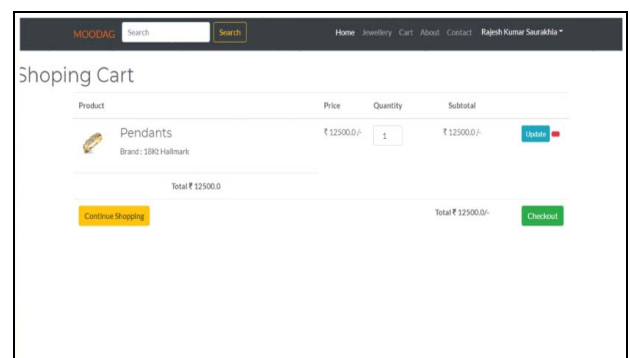


Fig. 3 CI/CD through Jenkin

The way by which this tool can enable pipeline access to its users is an amazing fact. In this proposed work, Jenkins is used to automatically commit code into the code repository, run test cases accordingly and also fetching the reports after performing testing.

B. Git

Git is one of the widely used version control systems in IT industries nowadays. It is now treated as a standard for version control. Through this system, professionals can change the code during developing software as well as permitted to keep track of development progress [13].

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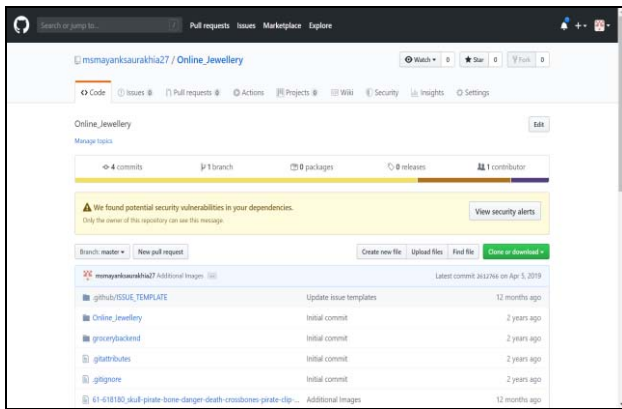


Fig. 4 Implementing Project through Git

Git can also provide liberty to the professional as they can use it in a distributed manner. By accessing Git distributed, one can access code repository remotely. This repository can be accessed in offline mode as well. Once the work is committed locally, then a copy of the repository is synchronized with the copy residing at the server end. Due to its flexibility and popularity, Git is used in our project for version control.

C. Gradle

Gradle is originally designed for multi-system development methodology [13]. Gradle is an open-source automation system which is written in Java programming language. Gradle supports Continuous integration through iterations. In our project, Gradle is applied to ensure and accelerate developer productivity. It is used by eclipse software while developing project.

D. Maven

Maven is a project management automation tool that enables developers to build the framework of the software product. It provides easiness for coding the wireframe infrastructure of the product in almost the entire lifecycle of the software with less time consumption. Maven is used for Java-based projects primarily but it can also manage projects effectively written in other programming languages such as Scala, Ruby, C#, etc. [15].

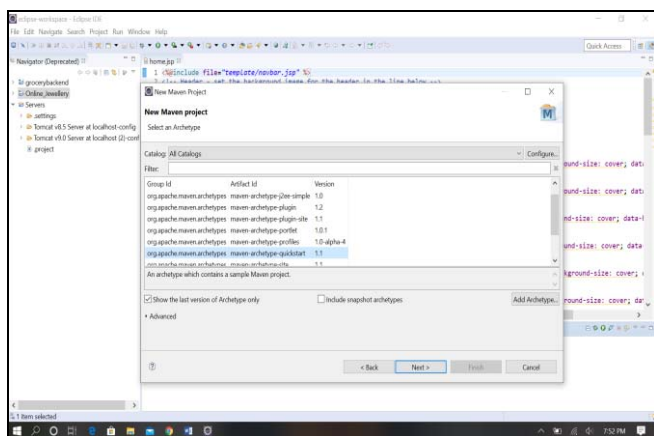


Fig. 5 Preparing Wireframe for Project through Maven

In the proposed work, Maven is also used to set up the methods. Through Maven reports, checkpoints building and automation testing of code are developed precisely.

E. Nagios

Nagios is also an open-source software tool. This tool is widely used for continuous monitoring of the software products. This continuous monitoring of software products includes monitoring of applications, networks, systems, business processes, recovery processes in DevOps culture [14].

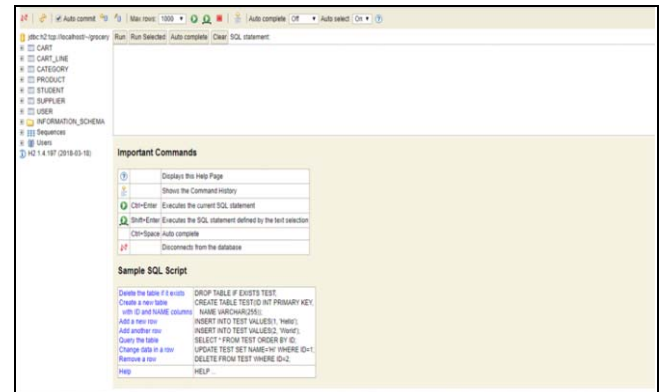


Fig. 6 Continuous Monitoring through Nagios Software Tool.

The proposed work use Nagios as well. By applying Nagios, it monitors and control the server related performance issue effectively. One of the main advantages of using Nagios tool is that it also provides assistance in detecting all types of network(s) so that communication should be established in less time.

V. BENEFITS OF USING AGILE AND DEVOPS TOGETHER

DevOps and agile are two of the most popular mechanism that organizations must adopt to stay ahead and competitive in the IT industry. Combining together these two approaches has amazing benefits for businesses. Through these two mechanisms, employee engagement and customer satisfaction can be achieved up to a higher and notable degree. Undoubtedly it is the primary and crucial demand of the business nowadays.

As per the report [8], approximately 75% of respondents reported improved employee recruitment and retention when using agile with DevOps, compared to 30% who only used agile. This is not the mere fact. IT industries witnessed approximately 45% hike in terms of productivity of professionals along with approximately 30% tremendous increment in customer satisfaction towards services they get.

In today's IT business scenarios, Agile requires a DevOps culture to achieve the timely delivery of software products. It is also worthy to mention that DevOps culture is not successful without agile.

VI. CHALLENGES OF USING AGILE AND DEVOPS TOGETHER

In today's era of globalization; customers' satisfaction is at the top of business needs. This satisfaction usually include timely delivery of the product, welcome of requirements changes (even at later stages), minimum complexity, product within the budget, the product having the latest technologies, etc. Business houses understand that they have to produce the results quickly as they also want to achieve a higher degree of customer satisfaction. So organizations are frequently moving towards Agile and DevOps as the solution. Agile and DevOps can surely increase the speed and efficiency, but they also present new challenges. Some of the major challenges may be as follows [9]

A. *The link between development and business solution is more crucial then ever.*

The most common challenge for organizations is to link DevOps practices with business solutions [5]. By adopting agile methodologies, professionals can have a better development process but this approach is not naturally linked to the business metrics in all cases [12]. The organizations adopting DevOps culture are supposed to connect the results from rapid releases with business metrics.

B. *DevOps is not just a methodology, It's a culture.*

DevOps is a culture where thoughts, experiences, and processes are shared among developers and operational professionals. This sharing of processes enhances the development and integration of the software system. An effective CI/CD is an outcome of transparency, communication, and collaboration across development and operations [12].

C. *Development moves faster, but compliance standards are still demanding.*

In agile and DevOps [12], reporting requirements at regular intervals is a topmost priority, but many organizations are facing challenges to proper compliance of this practice. Professionals must ensure the collaborations with the agile and DevOps teams that the new releases must satisfy regulatory standards.

D. *Well preparation is the key to success.*

Adopting DevOps cannot guarantees the rapid releases of the software products. There are many factors involved behind timely delivery of products. Automation the DevOps processes, continuous integration and automation testing plays vital role in rapid releases. Professionals at the operational teams must ensure to avoid bottleneck as well as delay situations in the internal processes. Well preparation and prefetching can raise the chances of rapid releases [12].

VII. CONCLUSION AND FUTURE SCOPE

Agile is an iterative and incremental approach that targets collaboration among cross-functional teams, customer reviews and feedbacks and rapid releases at regular intervals. On the other hand, DevOps is a culture of combining development and

operational teams together so that constant testing and delivery can take place. The proposed model have tried to maintain the right balance of agile methodologies and DevOps tools to get efficient outcomes with optimum efforts of development and operations. Various benefits and challenges are highlighted in a way that a team can encounter while combined these two demanded approaches.

The development of the "Moodag Jewellery" project prompts many areas of improvement. This project has a wide scope to implement it on all office workstations, replacing the current management system. All customer and goods data can be converted into the new software from the upcoming financial year i.e. 2020-21. Some parts of the project are incorporated, which were still uncompleted as online payment, a process to analyze customer's feedback and a module to interact with customers online.

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