COPY RIGHT

Title Qualitative Study of Impact of DevOps on Automation Process in Educational Institutions

Paper Authors

D.Venkateshwarlu, T.Virajee

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

Qualitative Study of Impact of DevOps on Automation Process in Educational Institutions

D.Venkateshwarlu*, T.Virajee[1]

*Associate Professor in Department of Computer Science & Engineering, Vidya Jyothi Instituteof Technology, Aziz Nagar, Hyderabad.
venkateshwarlud@vjit.ac.in

[1]Software Engineer – TechMahindra Ltd, Infocity - Special Economic Zone, Hi-tech City, Madhapur, Hyderabad - 500081 (Telangana) India
tv00822064@techmahindra.com

Abstract:

DevOps is end-to-end automation in development of software and delivery of the product to the client. DevOps is the tech- word creating buzz in the field of Information Technology with different interpretation for different people. "DevOps is the software development strategy that bridges the gap between the development and operational team". DevOps increases the speed of deployment with maximum quality.

The new automation process DevOps is a mixture of various developments and operational acitivty ramifications in Software industries because of which it attracted the interest of many researchers. DevOps adoption for an organization provides with multiple benefits with not only includes the quality but also with the challenges faced by the organization.

This paper is about analyzing the implications of DevOps on the quality of software and also presents the systematic mapping of DevOps on the quality of software's used.

Rapid development of Internet, educational institutions became much more aligned by giving best education with the support of better institutional management.

However, there are limitations of the systems which are ignored considering the growth in the systems. The paper shows the practice of DevOps for the education institution using the concepts: CI (Continuous Integration), CD(Continuous Deployment), management of student logs & quality.

1. Introduction

With the development of Information technology, each educational institute has developed their own educational Information Management system which improves managing the data of students. There is a constant improvement of the educational policies which are changing fast with the new era of Big Data. The old management system had many points which had difficulties to handle the Data.

1. Changeable Features and needs

Rules of the systems are different and there functional needs alter. Students have different requirements depending on the level of education they are undergoing. Some students opt for engineering where there is a lot of need for practical knowledge with projects requirements. In some patterns of Literature, Arts and Sociology, students need to focus on the culture and lifestyle of society. So, the institutions need to frame a proper management with perfect student's log which has the continuous deployment of all the particulars of the student with the latest updating.

The educational institutes must have the ability to respond on time, implement and quickly return modified functional changes, and deploy without any downtime.

Students obtain the latest datawithout any defects with the shortest time. The software and services to be offered by the educational institutions should be with the shortest downtime with all the latest data logs.

2) Sudden transactions

There is a sudden data inflow of the students during the starting of the year. New admissions happen in the institute where there is lot of data to be added to each student coming for different courses in the institute. There is also need to update the information of the students promoting to the next level.

There are few students which move away from the institute during the course, for which the data needed to be updated and then transferred to the other institute withthe latest updations of the student.

So, there are large numbers of functional updates which happen at the same time having big data flow. Therefore, the educational institutes much have higher reliability, with higher scalability to handle such Big Data tasks.

2) Log collection and data analysis

With the continuous improvement of pedagogy, institutes are now moving to the developing direction to meet the sudden drastic changes and adapt with the Big Data. Intuitional level Information & Management systems need to build with a comprehensive Log Analysis Platform.

The log platform will collect the data on various needs, such as daily information and interaction to the management systems forming a data log. The logs are provide the opinions and suggestions for optimization ofthe institutional system.

3) Code inspection & analysis

With the constant development of Information, the functional requirements for the data saving have increased gradually. To meet the functionality changes the need for engineering code has grown by drawing the need of coding styles of developers which affects the efficiency of development which has high risk of code bugs. The code bugs can be resolved manually with different reviews which has low level of quality. In order to overcome such manual fixing of bugs, need to discover with the potential problems in code development before testing for delivery and resolve the problems, which improves the quality of the code.

Now, the institute management need to divide the system into sub-projects with simultaneous development with code level quality analysis. The code level analysis analyses the quality of code finding the loopholes in the code with the risk of the code implementation and the needed changes can be introduced. This improves the efficiency in code writing with ensure the quality of code which improves the institution information system.

To overcome with the pain of the institution management system, there is need of introduction of the concept of DevOps in the institute Management system to have a continuous development and integration of the data to the management portal.

Introduction of DevOps

DevOps is the combination of Operations and Maintenance. DevOps can handle the continuous deployment with continuous delivery with most effective method improving the output with the service delivery capabilities/ DevOps brought a huge change in the traditional development in Information Technology.

DevOps is abbreviated as Combination of Development and Operations. It connects among development, operation and maintenance.

DevOps mainly inherent the automated process for development of product, testing and release of product with ease. DevOps adopts micro services as the base

architecture that ensures the quick update of software systems.

With the development in software technologies such as Internet, Big Data, Artificial Intelligence and Machine Learning, Educational institutions are also showing interest in applying these technologies for processing the data of the students. Keeping in view with the pain points along with reliability, availability and scalability the new technology, DevOps has been implemented in educational institutions.

Introduction to Technical specifications for the new instutional systems with DevOpsimplementation is of four aspects:
1. Continuous Integration – Git
2. Continuous Deployment – Jenkins
3. Log Management – ELK
4. Code Quality Analysis – SonarQube.

3. CI (Continuous Integration)
There is a drastic change in the educational management system which needs continuous deployment of student's data. This paper mainly contributes on the application and practice of DevOps in continuous integration.

Two directions for technical explanations in continuous Integration: Source code management of Information system and continuous integration process during the process of development. Source Code management of information system is supported by version control tool GIT, which increases the back up of code by decreasing the risk of loss of code. Developers can also work on offline on their local repository and then commit the changes to the master.
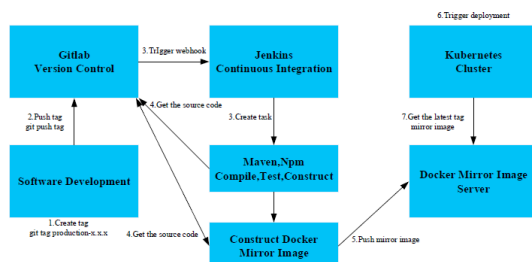

Fig 1.Continuous Integration Process

Git divides the code into many files for Git locally and then committed and shared. Git in local development converts the file into different stages: Modified, Stage & Committed. Work is done on the locally and the code is checked from the local repository using git checkout commands with the changes are recorded to the master. The changes on the local are recorded into the tree structure and then updated to the files and metadata.

3. CD (Continuous Deployment)
Many sudden changes and improvements come into the student data with need to be updated at an instance and need to be deployed. There is a need of data availability and stability of the process, the educational institutes accept the new development of continuous Deployment. Kuberenetes and the functions related to Kuberenetes are mainly used for the process of Continuous Deployment for business system deployment, upgrading and recovery of failure data.

4. Log management
With the continuous improvement in educational institution adapting to the constant developing pedagogy and big data, there is a need of log analysis for the system.This part of paper mainly emphasis on the log management platform in the new educational system. During the process of coding and deployment there are scenarios in error debugging, analysis of performance and users.

In the process, micro service architecture is used which increases number of services and instances for each service.As the work volume increases the operations become complicated. To overcome this complications, a centralized information management ELK is introduced.
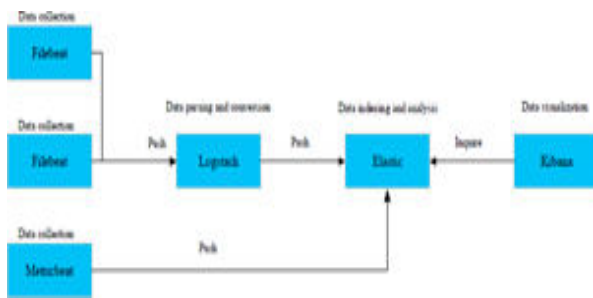
Fig 2: Log Management Architecture

ELK is an open source log management system with

ELASTICSEARCH, LOGSTASH &

KIBANA which is JSON format with provide the display analysis.

3. Code quality analysis

The continuous improvement in Information system, there is an increase in required functional changes, the code and inconsistent code styles for different developers lead to problems with lower rate of efficiency and increasing code bugs.

SonarQube, is an open platform for code quality management which is used to know the Java source code quality. SonarQube is plugged-in mechanism, integrating different testing tools, analysis of code tools and CI tools in Jenkins.

After successfully establishment of SonarQube, we can scan and evaluate the project code. SonarQube, helps to detect the duplicate codes in the project, code specifications, potential bugs, security vulnerabilities.

Conclusions

With the implementation of DevOps in the educational institutions, there is a drastic change in the deployment of the student data with all the security vulnerabilities. Continuous Integration , increases the emerging of the student data in to the GIt from the local and then committed into the master and then deployed when required.

Items	Old system	New system
The time of update version	20-30min	2-3min
The time of bug discovery	More than 20 min	3-5min
Update version without downtime	No	Yes
Code risk prediction	No	Yes
Log management function	No	Yes
Data analysis function	No	Yes

Table: comparison between old version systems withNew Version system

Continuous deployment, there is a continuous updating with the data of students and easily reverted when it is needed.

Log management, gives the bugs in the code during the implementation of the of the DevOps into the educational institutions.

References:

1. Debois, P. DevOps Days Ghent, DevOps Days, 2009.

2. Debois, P. Devops: a software revolution in the making? Cutter IT Journal, 24, 8 (2011)

3.Keyworth B. Where is IT operations within DevOps? Cutter IT Journal 2011; 24(12):12–17.

4. Susarla A, Barua A, Whinston AB. A transaction cost perspective of the" software as a service" business model. Journal of Management Information Systems 2009;26(2):205–240.

5. Feitelson DG, Frachtenberg E, Beck KL. Development and deployment at Facebook. IEEE Internet Computing 2013; 17(4):8–17, doi:10.1109/MIC.2013.25.

6.Gill, Asif Qumer; Loumish, Abhishek; Riyat, Isha; et al. (2018) "DevOps for information management systems." Vine Journal of Information and Knowledge Management Systems, 48 (1): 122-139.

7. Jabbari, Ramtin; bin Ali, Nauman;

Petersen, Kai; et al. (2018) "Towards a benefits dependency network for DevOps based on a systematic literature review", Journal of Software-Evolution and Process, 30 (11), Article Number: e1957.

8. Welder Pinheiro Luz,Gustavo Pinto,Rodrigo Bonifácio.(2019) "Adopting DevOps in the real world: A theory, a model, and a case study[J] ". The Journal of Systems & Software, 157.

9. Laukkarinen, Teemu; Kuusinen, Kati; Mikkonen, Tommi. (2018) "Regulated software meets DevOps." Information and Software Technology ,Volume: 97,Pages: 176-178.

10. Farid, Ahmed Bahaa; Helmy, Yehia Mostafa; Bahloul, Mahmoud Mohamed. (2017) "Enhancing Lean Software Development by using DevOps Practices." International Journal of Advanced Computer Science and Applications, 8 (7): 267-277.