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DevOps for Enterprise ERM Application

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Abstract – *Expense and Reimbursement Management is an Enterprise application that caters to the full gamut of managing expenses and legal reports in a company. DevOps aids in end to end automation of business processes and delivery. DevOps has been a significant catalyst in improving the development and deployment velocity in companies and their adaptation of the agile framework. Quality delivery in short development iterations requires automation and DevOps enables this. In this paper, we attempt to cover the impact of DevOps on ERM applications and discuss the underlying key success factors.*

Key Words: **ERM, DevOps, Business Configuration, Business Objects, Agile methodology, Localization, Generic country version**

1.INTRODUCTION

DevOps represents a collaborative way of working between development, quality assurance, and IT operations. This approach helps to deliver value faster and continuously when compared to traditional siloed approaches [1]. DevOps practices have evolved rapidly and are quite effective in bridging the gap between traditional monolithic teams of development and operations. The culture of DevOps as a critical enabler has aided in accelerated product/solution delivery and significantly improved time to market. Limitations of traditional processes within an organization are overcome using the collaborative aspect of DevOps.

The efficacy of DevOps is enhanced by an appropriately defined Tool chain that cuts across the entire gamut of development, testing, and operations. With the ever-changing model of continuous delivery, there has been significant contributions to standardization of processes, and this has led to unification and agreement of objectives between teams. [2] Social factors determine the adaptation and acceptance of technology. Products that are dynamic in nature i.e. they cater to diverse thought process, paradigms, are the ones that benefit the most from the adoption of DevOps. DevOps has catalysed the revolution of software development methods by overcoming inadequacies and creating a wider outlook towards application development velocity. [3]

The complimentary nature of DevOps in agile development aids in its potency in the ever-changing software development world. ERM genre of applications requires a diverse workaround and here comes the role of DevOps.[4] Applications developed using DevOps have dynamic embraced to change, thus creating a stable environment for incremental development. It also aids in the integration of development, operations team investments into potent application workflows. [5]. The paper is organized as follows. Section II discusses the requirements of DevOps in ERM, Section III discusses the DevOps Architecture, Section IV presents testing in DevOps, Section V discusses about the advantages of DevOps followed by VI future work and VII conclusion.

2. ERM Compliant Modes

2.1 Country Localisation

This mode of deployment allows the application operators to provide custom feature sets based on country version. The varying laws governing countries serve as a primary consideration for developing the software interface. Business configurations developed is in compliance with the legal regulations eg: GST for India. DevOps is used to upgrade the infrastructure rapidly in sync with dynamically changing requirements at the country level. Incremental upgrades to the system provide a more holistic approach and is well tailored for adaptive changing systems. The concept of DevOps can be further extended to provide solutions for non-localized countries through generic country versions.

2.2 Enterprise Regulation

The transition from traditional monolithic application development methods to agile based frameworks require restructuring of the organization.

The advancement of any major product organization starts with eliminating the rather irrational separation between development and operations, and aiding their cohesive functioning. This serves as a basis in realizing the accelerated delivery of end user consumable user stories. The increase in velocity in a team reduces stress within and enhances efficiency and

engagement. Organizational mindset shift through structured agile enablement and coaching serves as the initializing element that drives alignment in key areas - teams to programs. This bring the teams closer and engaged with common agreements and aligned objectives.

The key emphasis of any organization is to merge the teams into DevOps and not overload the development teams. Organizations must resolve existing conflicts and avoid future ones. DevOps KPIs for Management ensure fewer conflicts between teams and streamlining of information levels below on a continuous learning basis.

2.3 Generic Country Version

For country where Business Configuration (BC) sets are not maintained, there exists a general template of implementation. This can be moulded according to country/enterprise requirements. Flexibility in the base model ensures ease of implementation without altering the core business logic. Generic version contains a wide range of functionality and thus serves as a good foundation for non-localized country. Cloud functionality serves as a one stop service for such variations. The updated version can be uploaded to the cloud from where other users can access.

3. DEVOPS ARCHITECTURE

For the construction and validation of the model - DevOps plays pivotal role in the automation of workflows. This functionality comes into full force when strategic planning is used for product development aided by customer inputs. Key focus areas during deployment includes:

- Security of deployment pipelines
- Key performance indicators for ERM
- Reduction in manual effort in expense reporting workflow
- Incremental development for Legal Reporting topics

Integration of DevOps is more often than not challenged due to complex nature of existing systems. DevOps aims at simplifying workflows using best in class paradigms and practices. To maximize throughput across versions microservice architecture (MSA) is used. MSA plays a pivotal role in development of lightweight services that are in line with the business needs [5]. MSA improves the agility, developer productivity, software scalability, robustness and maintainability of applications. [6] MSA architecture is ideal for changing requirements like those implemented using agile methods. The high level MSA architecture workflow is shown in figure 1.

Figure 1: Microservices Architecture workflow

4. TESTING IN DEVOPS

The High quality of the product delivered is a key goal of the test-driven approach in DevOps. This is done by continuous quality and test checks for user stories. User story is considered complete only when the delivery meets the standard Definition of done (DoD). DoD is framed in accordance to the application software engineering standards, coding guidelines, and acceptance criteria defined by the product owner. Unit testing and SIT (system integration testing) are implemented on the ERM application, within the overarching umbrella of shift left and automation.

Agile teams require to collaborate in automating the build and testing process. Jira tool is used to speed up the process and quality of deployment. Zephyr is an advanced test management tool using which test cases are built. Requirement synchronization is done across DevOps pipelines. This integrated tool ecosystem serves best of both worlds i.e. DevOps and Agile. Jenkins, Bamboo are used for continuous integration and Selenium is used for automation. All of the above referenced tools are part of the DevOps Toolchain for the ERM application.

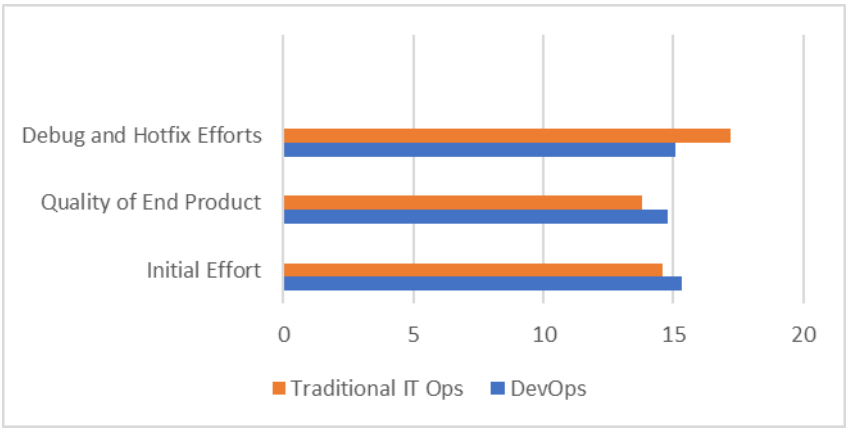

Figure 2: QA estimation of Traditional Systems and DevOps Mode of Deployment

5. ADVANTAGES OF DEVOPS

The DevOps paradigm provides a very simple and real-time solution to the productivity, speed, and collaboration challenges of traditional software development methods. The benefits of implementing DevOps, according to our experience include the following:

- Faster time to market - number of features delivered in the ERM application
- Improved velocity in the delivery of quality user stories
- Stable operating environment aided by regular and continuous QA activities
- Continuous software delivery using agile practices with transparency, visibility
- Faster and innovative solutions to problems
- Decrease in complexity in the management of systems
- Increase in communication, collaboration, and team engagement
- Greater team throughput and productivity and increased customer satisfaction

The graphic below compares and contrasts the old and new methods.

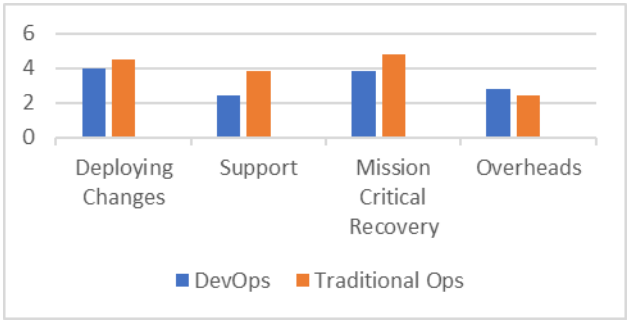

Figure 3: Total workweeks: Enterprise DevOps vs Traditional IT Ops

6. FUTURE WORK

Practical applicability of DevOps in ERM is increasing day by day. Automation is currently implemented in a controlled environment. Automation of business processes like expense reporting plays a crucial role in revenue realization for many organizations. The increase in automation has to be balanced with security concerns.

What is next in store? AIOps is the future of DevOps. AIOps enhance IT operations through generating greater insights by combining big data, machine learning, and visualization. AIOps systems determines and implements decisions without human intervention. A human can be in the loop, but only until you can trust the system to run by itself. AIOps systems run continuously, and they become a standard part of your delivery.

The transition to AIOps is still in its early days, but the R&D efforts and expectations are skyrocketing. The possibilities of this domain are exciting, to state the least.

7. CONCLUSIONS

DevOps was adopted to overcome the shortcomings of the traditional siloed approach, and accelerate value delivery. Agile based development practices work as a foundation in improving the overall quality of the product. DevOps is a force multiplier suitable for compliance driven cloud based ERM applications. The use of microservice architecture for development of light weight processes was discussed.

The architecture of the system along with insights into testing is discussed. The paper further elaborates on the advantages of DevOps in the software development life cycle. Nimble companies leveraged DevOps, and cloud to break down the silos between operations and development and embraced agile development for faster cycle times to create strategic advantage and surge ahead of the competition. The unified and aligned teams of engineers across the application lifecycle - from development and testing to deployment and operations and created new roles requiring a range of skills not limited to a single function. Then, they pushed the envelope even further with CI/CD and DevOps to automate pipelines for even faster delivery.

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