CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION TO AUTOMATION

Today in IT sector there is a very tough competition in every domain. None of the company wants to lag behind with any respect to any domain. Say its time, cost or effort. Each day a new problem comes up for the customer and the need for immediate solutions has posed enormous challenges to the IT professionals who have to come up with good solutions to the customers problems. The requirements of the customer keep changing every day and the demand to full fill that requirement is heavy. At the same time the companies and the people who are capable enough to fulfil those demands are also plenty in numbers. Hence there is a wide range of choice for the customers to choose the right vendor who can solve their problems and fulfil their requirements in the most efficient and cost effective manner.

The needs of the customers have been getting complex in every manner and there is enormous pressure on the vendors to deliver the right solution at the right time and in the right manner. Since there is a wide range of choice for the customer to choose the service vendor he wants the companies have been trying to come up with their own methods to prove themselves superior in every aspect in order to grab the attention of the customer and to win his trust. The customer is in search of a vendor who can deliver good solutions in quick time.

Hence the concept of automation came up and the companies have tried implementing the concept of automation in every possible way to fasten their software production process and to speed up the process of delivery to the customer. A company which delivers faster and good products is always preferred over any other company. The development stage of a product is just one phase of any project and the processes that follow the development stage are equally or more important to make sure that the product that we have developed is stable, correct and caters to the needs of the customer in the way it is intended to do so. If we can automate the processes like software testing, building, packaging, deployment, delivery and maintenance then a lot of time will be saved and the process of delivering the right solution or service to the customer automatically gets faster and easier. Customers always come up with changes in their requirements and if we have an automated system then it becomes easier for the IT professionals to bring in the changes in the system that the customer has asked for.

If we have to look at it from the aspect of the resources that are needed to complete any software project. We can say that a lot of human resource is required when it comes to software testing, deployment, delivery and maintenance. The cost and time taken to marshal these human resources in enormous. Whereas in the concept of automation of the software delivery process these resources will get cut down in size and the aspect of human interaction will get reduced. Hence the overhead of marshalling and keeping the human resources occupied can be written off. The machine in itself takes care of the processes that were once possible only with the help of direct human interaction.

Automationsaveslotsoftimeintheracetofasterdeliveryofsoftwareproducts.More over the concept of automation will help the IT professionals involved to deliver faster and in a more efﬁcient way. Automated testing can help them save time and we can expect faster results of the test which in turn will help the software professionals in proceeding with the next task.

**1.2 CONCEPT OF DEVOP**

In order to achieve the enormous task of implementing the automation process of software delivery we need to adapt to or incorporate a certain set of practices in our routine that will help us to achieve the goal of automation in a more effective and efficient manner. Hence we incorporate the DEVOPS model in our project to make sure that there is a pattern or model that must be followed religiously to get better results.

DevOps is a combination of "software DEVelopment" and "information technology OPerationS"). It is used to refer to a set of practices that emphasize the collaboration and communication of both software developers and information technology (IT) professionals while automating the process of software delivery and infrastructure changes. It establishes a culture where development, testing, software release can happen rapidly, frequently and in a more reliable and controlled manner and both the Developers and the Operations team work together. They have to be in tandem to make sure that the operations go on smoothly and that the IT professionals know how the code works with the help of the developers.

We need to carry out a lot of installations and configurations of all the tools and services that will be used in the software project and it is our task to automate all these tools and services to achieve complete automation. Our mission is to automate all the manual installations for the release and deployment of the software. There will be the usage of various tools and software’s like Git (Repository), Jfrog (Binary repository), Jenkins, Jira, Maven, Cobertura, Nagios (Monitoring tool), Zabbix, and Sonarqube. These tools cover the aspects of development, storage, integration, project management, system monitoring and testing. As far as automation is concerned we need to first integrate all these tools manually and then we will be using a tool called as Puppet that serves the purpose of automation of the entire system. Puppet is used to provide all the automation of all the tools and services that are running in the entire system and make them run in an order and correct manner just with the click of a single button. Since the aim of any company is to make sure that the product or service is stable and available all the time we need to create a mechanism that take care of the concept of high availability. High availability means that the service is available to the customer at all times and to any number of customers. Due to an overload the service should not go down and should manage the load and cater to all the customer who are requesting for the service. To achieve this we use a toll called as Razor that will be used for bare metal provisioning.

**1.3 DEVOPS CHAIN**

The devops chain is a collection of tools that are part of the devops model because the IT professionals use these tools to achieve the required tasks. The developers develop the code as well as work around with these tools in their projects. Hence the devops tools are an essential part of the devops model.

DevOps is a cultural shift and collaboration (between development, operations and testing), there is no single "DevOps tool". It is rather a set of tools or a chain called as "DevOps toolchain", consisting of multiple tools. Generally, DevOps tools fit into one or more of these categories, which is reflective of key aspects of the software development and delivery process. The following are the types of DevOps tools that can be integrated in the devops chain.

1. Code -> Code development and review, version control tools, code merging
2. Build ->  Continuous integration tools, build status
3. Test -> Test and results determine performance
4. Package -> [Artifact repository](https://en.wikipedia.org/wiki/Binary_repository_manager" \o "Binary repository manager), application pre-deployment staging
5. Release -> Change management, release approvals, release automation
6. Configure -> Infrastructure configuration and management, Infrastructure as Code tools
7. Monitor -> Applications performance monitoring, end user experience

Automated testing saves a lot of time and we can complete the tasks related to the project quickly. The use of monitoring tools helps us to keep track of all the components in the system and we can easily troubleshoot and find out solutions to problems with the help of these monitoring tools. The build tools will automatically generate the pom.xml file and we need not do the build process by ourselves and hence this too saves a lot of cost and time.

**1.4 INTRODUCTION TO AGILE METHODOLOGY**

Agile software development describes a set of principles for software development where the requirements and solutions evolve through the collaborative work of different teams. It encourages adaptive planning, evolutionary development, early delivery, and continuous improvement, and it encourages rapid and flexible response to change. The engineers follow the concepts of continuous integration and continuous deployment and delivery of the software product.

In the agile model the requirements can change at any time and the changes to the system need to be made immediately after due diligence. The changes are made rapidly as soon as the requirements keep changing. The system needs to be integrated continuously and the deployment process also takes place continuously until the point where the requirements are brought to a freeze.

The use of agile also fasten the process of product delivery since the changes can be made at any point in time. At the end of each cycle of development in this methodology there is a fully functional working module that can be deployed. The use of agile has been extended to this automation process and will help us to achieve more efficienct