

# Case Study on Current Java Frameworks and Software Development Methodology of Java Programming Language

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**Abstract:** Java language is become very popular and research papers deal with improvement of the language or its run time behavior. In this paper I have discussed about the Development Methodologies and current frameworks in Java also demand in future of these frameworks. Quality along with time and within budget is always a major concern of every organization. Several Software Development Methodologies exist for the successful delivery of software. With advancement of technology using Java in current world, organizations are now finding best solutions for their operations. To this aim, this paper presents an automated frameworks that reduces the efforts and time of Java developers for developing software. Java has been able to maintain its position in the top three most popular languages for very long time because of the platform which it provides. The java platform consists of more than just a programming language. It also provides a large number of frameworks, which are ready-made code components that are used extensively by developers.

**Keywords:** Development Methodologies, Current Frameworks, Scrum, DevOps, Waterfall, RAD, Spring, Hibernate, Apache Struts, JSF, GWT

## I. INTRODUCTION

A software development in software engineering is a framework that is used to structure, plan, manage and control the process of developing in system. Java development methods are divided into four parts. First Practical Knowledge is base of the any development area of Java Programming Language. Second is Unique Logic, means think new idea and logic in any development area then you have to implement that logic through software. Third is New Techniques, that means your software using the new trends and techniques.

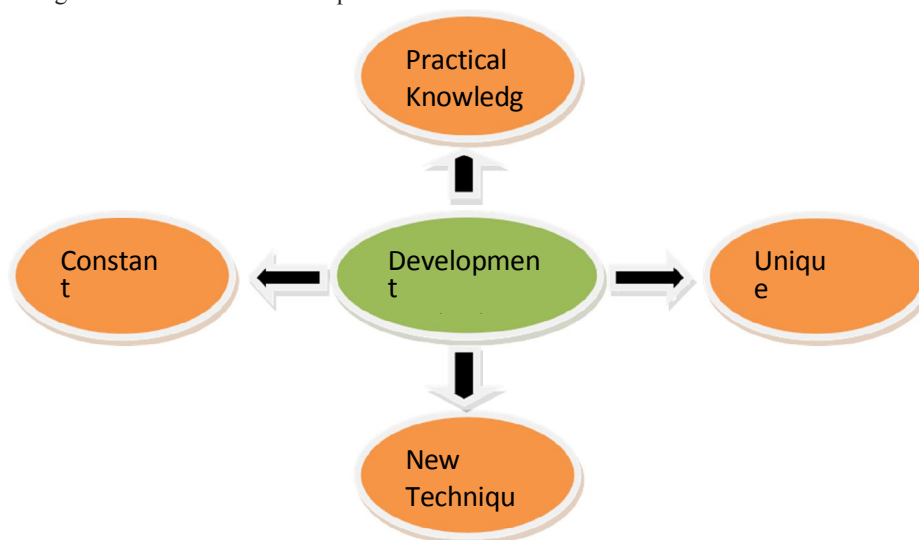


Fig. Java Development Methods.

Four constant practices / Room discussion is increasing the knowledge, discussion now Techniques and facing problems in your development area. Professional in industries started to work individually on new techniques to develop the new software that is developing by using new Frameworks and methodologies. The results of their developments were a set of new development methodologies and frameworks that have many common features.

## II. SOFTWARE DEVELOPMENT METHODOLOGIES

Successful projects are managed well. To manage a project efficiently, the manager or development teams must choose the software development methodology that will work best for the project at end. On time, within budget, with quality and rapid delivery of software is always a major concern of every developers and organization. Existence of many development models raises the need for appropriate selection of models or methodology to deliver successful software. The underlying review consider Waterfall, RAD, Scrum model and DevOps culture for software development. There are different types of methodologies that are using mostly in industries:

### 2.1 Scrum Model

The Scrum methodology emphasizes teamwork in project management. It is iterative progress towards a well-defined goal. Scrum is a part of Agile software development. Scrum as a framework by which you can implement agile development. Agile does not have a set of steps to follow, therefore scrum provides a means to apply agile to your project. There are many frameworks that you can use in agile development.

#### 2.1.1 Agile Development Methodology

This is the mostly using by all industries because of it minimize the risk (such as bugs, cost overruns, and changing requirements) when adding new functionality. In all agile methods, teams develop the software in iterations that contain mini-increments of new functionality.

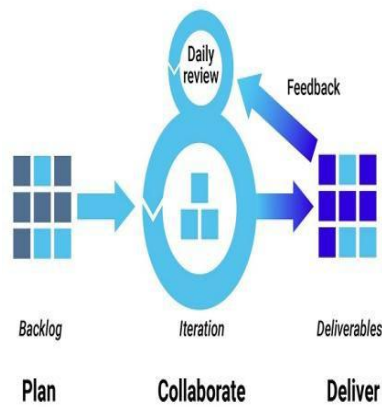


Fig. Agile Methodology Phases

### 2.2 DevOps Deployment Methodology

It is not just a development methodology but also a set of practices that supports an organizational culture. DevOps deployment centers on organizational change that enhances collaboration between the departments responsible for different segments of the development life cycle, such as development, quality assurance, and operations.

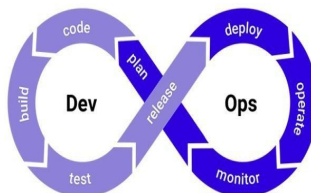


Fig. DevOps Methodology Phases

**2.3 Waterfall Development Method:**

It is considered as most traditional software development method. The waterfall method is a rigid linear model that consists of sequential phases (requirements, design, implementation, verification, maintenance) focusing on distinct goals. Each phase must be 100% complete before the next phase can start.

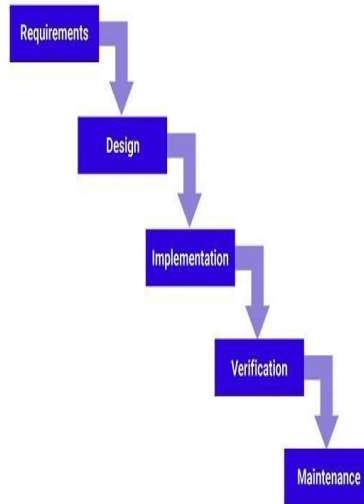


Fig. Waterfall Development Phases

**2.4 Rapid Application Development**

Rapid Application Development (RAD) is a condensed development process that produces a high-quality system with low investment costs.

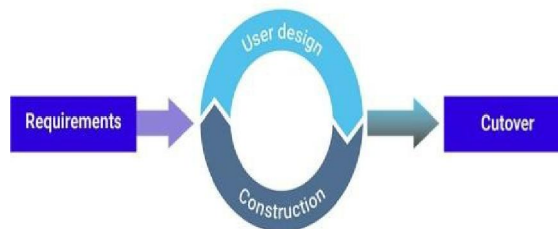


Fig. RAD Phases.

**III. JAVA NEW FRAMEWORKS IN TRENDS**

There are several problems that faced by Developers that we have to deal with in the process of developing software using Java Programming Language. But by using and introducing new technology and trends that is used by current world is the best way to deal with the problems that we facing in development. Java most new and trendy framework that is using many companies and professionals is Spring, Hibernate Framework, JSF (Java Server Faces), Struts Framework, GWT, etc. help in reducing code complexity and manual configurations. It saves time and cost for professionals. Below some new and advanced frameworks are mentioned which is mostly using by industries and will use in future also.

**3.1 Spring Framework**



Spring is an open source framework created to simplify the complexity of enterprise application development. Spring Framework is a collection of modules. Spring framework provides a layered architecture comprising of well defined modules, where each modules can be used independently to simplify some area of enterprise development. Spring has become the de facto framework for creating Java based enterprise applications. Because of these benefits of Spring Framework now a day's every professional & industries are using it. Over time the spring team has broken it down into several modules which can be used independently of each other. When I started working on Spring, it had seven modules. The basic idea of Spring framework is Dependency Injection. The spring container prepares all the beans and loads them for usage. Earlier you had to configure your XML for the beans and its dependencies. Now, you can write that in Java classes. The Spring framework provides the following functionality:

- Lightweight IoC container for lifecycle and dependency management of objects.
- Consistent abstraction layer, which provides integration with various standards like JPA (Java Persistence API), JDBC, JMS, and third party APIs like Hibernate, Top Link, JDO.
- MVC framework, which provides a highly configurable Model View Controller implementation via strategy interfaces and accommodates numerous view technologies including JSP, Portlets, Velocity, Tiles, iText, and POI. implementation.

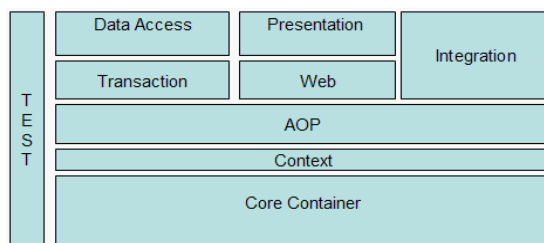


Fig. Components of Spring Framework.

### 3.2 Struts Framework



Apache Struts is a free, open-source, MVC framework for creating elegant, modern Java web applications. It favors convention over configuration, is extensible using a plugin architecture, and ships with plug-in to support REST, AJAX and JSON. It provide custom jsp tags for html which makes development easy. It is very simple to use and is based on Model- View-Controller design pattern. Even as it has evolved over time, it is still very simple to use and understand. Perfect for someone looking to build a website or product based on MVC design pattern. Struts provides you a tag library and you can write the Action classes to control what needs to go to the view, i.e. rendered on the JSPs/velocity/freemarker templates to render the dynamic data returned from the server. It is an alternative for the Servlets.

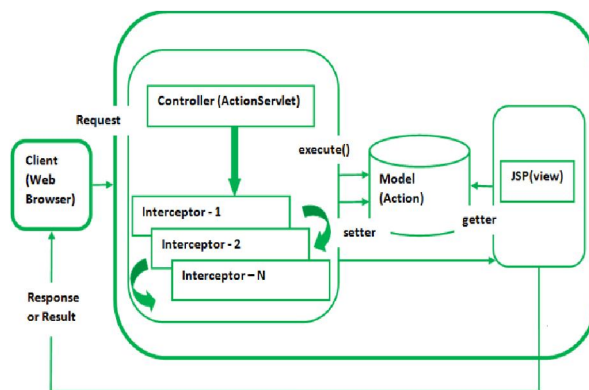


Fig. 4.2 Working Flow of Struts

### 3.3 Hibernate Framework



Hibernate is an ORM (Object-Relational Mapping) framework. It maps your database tables to the Java classes, i.e., the entities. It internally uses JDBC. It provides you with the flexibility of changing the database, if needed. For instance, you might start with mysql and at a later point you may want to switch to oracle or Postgres or any other database. Since all of your code is in Java and the queries are all in HQL. Native queries will still require to be updated as per the database. Nowadays, JPA is used with Hibernate or any other ORM like EclipseLink, Toplink, etc.

### 3.4 Java Server Faces (JSF)



Java Server Faces is a java framework which can be used for developing component based user interfaces for web applications. It was formalized as a standard through the Java Community Process being part of the Java Platform, Enterprise Edition. Based on the MVC architectural pattern, JSF simplify the construction of user interfaces (UI) for server based applications with the usage of reusable UI components in a page.

#### Advantages of Java Server Faces (JSF):

- A variety of tools are offered by it to create elegant User Interfaces.
- It is an integral part of Java EE.
- Existing backend Java code can be extended with a web interface using JSF without having to change the base application by introducing a new framework.

### 3.5 Google Web Toolkit (GWT)



Google Web Toolkit has been developed by Google. It can be used to create elegant internet Java applications. The ability of GWT to convert Java code into JavaScript code – that too custom code based on the browser is one of the features which makes it stand out compared to another Java Frameworks.

A number of Google products, like AdSense, Google Wallet, and Blogger have been developed using the Google Web Toolkit.

#### Advantages of GWT

- The usage of Google APIs is made simpler using the Google Web Toolkit.
- Code reusability for common web development tasks is supported by the Google Web Toolkit.
- Features like internationalization, UI abstraction and cross browser are also provided by the Google Web Toolkit.

#### **IV. LITERATURE REVIEW**

[1] In “New Software Development Methodology for Student of Java Programming Language By Author Tejinder Singh and Jhunjhunu Rajasthan” only mentioned the methods for implementing Java based applications. But there are many development methodologies which currently used by organizations like Scrum model, Waterfall, DevOps, Rapid Application Development

[2] In “An Automated Framework for Migrating Java Applications to Ethereum Solidity Applications By Authors A. M. Fajge; S. Thakur; R. Kumar; R. Halder” suggested the frameworks which can be used for blockchain based systems but now a day’s many new frameworks came which can we use for any software development.

#### **V. RESEARCH METHODOLOGY**

The research starting with the preparation of data to relevant with my research paper. Then study different researchers paper to gather the information. Also I discussed with people who have been directly working in Java development and have experience in Java frameworks and Software Development Methodologies. The study also gives me knowledge of current frameworks and methodologies which are in trends.

#### **VI. OBJECTIVES**

- Java is a multi-purpose programming language and platform independent.
- Because of having a runtime environment (JRE) and API, Java programming language is used as a platform.
- Most web and app developers choose it as a programming language because it is easy to learn. Because of its versatile qualities, Java language has been a favorite choice of the majority of enterprises for enterprise-scale web apps development.
- The easy availability of Java Frameworks experts further supports its adoption for creating a range of web- based applications.
- New frameworks are collections of components so it reduces the efforts and time of developers.
- Automatically configurations help to minimize the defects and errors in code.
- It also allows you to create reusable code and modular programs.

#### **VII. SCOPE**

- Java remained a primary platform in 2021 for a range of enterprise app development required by businesses to stay competitive, growing, and profit making.
- Java sets fit in micro-service architecture.
- Java is everywhere, in laptops, gaming consoles, mobile phones, etc.
- There are 9 million Java developers in the world.
- This lets you know the demand of Java and its evolution in software development in future.

#### **VIII. CONCLUSION**

My research paper emphasizes on development methodologies and current frameworks for developing Java based applications. Java provides new API information and etc. A future we can say that enhance the techniques of developing for developer in Java.

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