Architectural Development of E-Learning Application using Aspect-Oriented Programming (AOP) Principles

Pankaj Kumar
Department of Computer Science & Engineering
MU, Chittorgarh (Rajasthan) - 312901

S. K. Singh
Department of Computer Science & Engineering
GCET, Greater Noida (U. P.) – 201306

ABSTRACT
This paper explores the architectural improvement of e-learning applications utilizing standards of Aspect-Oriented programming framework Development (AOSD). This Model has been acquainted with give e-learning framework flexibility, extensibility, sustainability, design stability, configuration and modularity. The principle point is to supply the engineering outline underneath that various e-learning application modules might be produced and broadened. All through structural advancement, various administrations are known for e-learning applications, which are important through their work, understanding and specialized open doors. The design advancement is awed by MVC (model-view-controller) show. The information of the framework is delineated by the model, the view might be a visual representation of that information and furthermore the controller watches the client's remarks and translates the model for the alteration.

Keywords
AOP, AOSD, E-Learning, Extensibility, Configurability

1. INTRODUCTION
This is a decent arrangement for effectively participating in their learning technique with eye to eye talks for faculty members. Owing to this, learning action turns into a critical stride.

In the present scenario, e-learning is the most demanded rising innovation, which assumes a urgent part in giving a gathering to information in colleges and other partnered organizations. Its prime concentration is the use of information and aptitudes of employees without the limits of time and place. There ought to be an unmistakable perspective of the components of the usual e-learning framework and the connection between them. That is the reason; design is required, that characterizes a straightforward impression of the components and evident relations between them.

The e-learning architecture gives facilities that the stakeholders are expected to progress gather differed elements of e-learning. Here stakeholders mean all clients in framework creators, designers, essayists, students and overseers and so on [5, 6]. The framework is intended to talk about the reasonable necessities of each class of stakeholders; hence it can serve the unbiased amid an exceptionally compelling way. Designs are proposed, to fulfill partners' edges and common sense, which may later be trailed by the look of innovation foundation and work processes to inspire those capacities. Amid this paper, design structure is proposed for the e-learning framework to supply top quality training. The framework is at first proposed to utilize information. Identifying with the architectural objectives of the framework, comprehension of the structural needs of powerful correspondence and participation between creators, designers and partners are basic.

Aspect-oriented programming (AOP) gives a powerful to enhance the application's design and to actualize cross-cutting issues, enhance quality in frameworks or administrations, and utilize simple, a great deal of reusable applications [1, 2, 3, 4].

2. RELATED WORKS
Different online Learning Management Systems (LMSs) like Moodle [7] that is open supply for examine particularly have practical experience in architecture of those frameworks. It's a product bundle for the generation of net based for the most part courses and sites. It's a worldwide advancement extend; it's intended to help a social useful structure of instruction. Moodle has impediments, its parts and consents are limited. Moodle's plan is decent, that gives high focus and low coupling. Moodle incorporates a keen potential, however it's not been implemented. In this manner, there's a need of compositional structure that are simple, finished and entirely unexpected.

3. PROBLEM STATEMENT
When coming up with a new architectural framework, totally different challenges should be followed. The following queries should be answered for framework:

- How will we tend to build the e-learning system additional design stability and sustainability?
- What data is needed by the learner?
- Who wants entry within and outdoors the organization?
- Who must manage data inside and outdoors the organization?
- How can the knowledge be managed?
- How to produce a forum for a comprehensive domain of knowledge?
- How to separate the extent of advanced and extremely interactive content levels?
- To answer these queries a brand new architectural framework is shown in Figure 1 and is delineated in section IV.

4. PROPOSED ARCITECTURAL FRAMEWORK
The system is designed to understand however totally different components can work along. This field of architectural framework offers an easy and language-independent illustration. It describes the field of architectural scene as an entire in addition as component-wise.

4.1 Overview
The activities of the normal learning interface have to be compelled to be organized and therefore the parameters have to be compelled to be enforced before. The e-learning design framework has absolutely outlined its roles where it's liable for providing stable, flexible, and proved infrastructure. Thus,

understanding the aim of design and the way it helps to bring into operation and manage e-learning systems.

The architectural framework conjointly defines the method model that consists of three layers, every of that has totally different responsibilities in every level. Layers are referred to as presentation layers, service levels, and resource layers. The presentation layer manages the interaction between stakeholders and applications. It'll work as a bridge and implementing services of stakeholders between stakeholders. It's chargeable for golf stroke solely obvious and significant marks / content on the web site. The stakeholder sends HTTP requests and receives the HTTP response. Service level includes authentication and authorization module that represents the service that every stakeholder wants access to the computer code. It conjointly controls the perform, communicates with the presentation layer and presents the results obtained to users. It includes e-learning systems; it provides the essential options of application for stakeholders. Facilities are provided by job the enforced services of elements as per stakeholder's request. A layer between the resource layer database and also the resource store server is chargeable for managing these level resources. JDBC / JDBC-ODBC driver is employed to form connections with the info.

4.2 Component Architecture

There are two fundamental segments (i.e. Authentication & Authorization and Functionality) and each has its exceptional responsibility to deal with a specific sort of task. In the accompanying subsections, the total design and usefulness of every segment is clarified in detail as takes after:

i. Authentication & Authorization

a) Functionality

With a specific end goal to give authentication & authorization to stakeholders, the framework ought to have the accompanying capacities:

- Provide the tools for client administration, in which the framework includes a component to deal with their parts and assignments together.
- For organizing log administration

b) Architecture

Figure 2 demonstrates the model of Authentication & Authorization module, which is outlined on the premise of previously stated capacities. It comprises of three sections:

- The Presentation Layer handles the communication amongst stakeholders and the Authentication & Authorization segment of the application. It is dependable to give a decent GUI to the client. It handles the connection with the clients, their parts and undertakings. Log administration part is additionally given by this application.

- The Service Layer comprises of Authentication & Authorization module, which speaks to the administrations that each client needs to get to E-Learning system. It deals with the benefits/right of stakeholders and furthermore controls the capacity and correspondence with the upper layer. The altered data of clients, their parts and assignment together with logs are spared consequently into database by means of this layer; the partners require not know how the data is put away. It is dependable to give validation and approval to favored stakeholders.
- The Resource Layer will give required assets to the upper layer from Authentication & Authorization archive. In this application, resource might be considered as an archive, picture or HTML page and so on.

ii. E- Learning System

a) Functionality

Keeping in mind the end goal to make a virtual learning environment, the framework ought to have the accompanying capacities:

- Provide proficient recovery system to seek learning materials.
- Provide a solitary intuitive sharing stage where Learners and Instructors can share their insight.

b) Architecture

Figure 3 demonstrates the Architecture of E-Learning System which comprises of three sections:

- The Presentation Layer handles the connection amongst stakeholders and the E-Learning System application. GUI ought to act naturally illustrative and importance full.
- The Service Layer comprises of Authentication & Authorization. It gives control system to the solicitations of the client and speaks with the upper layer. It is mindful to give learning materials as indicated by the selection of stakeholders.
- The Resource Layer will give information to the resources of the upper layer from the database. In this module, resources might be considered as address in organization of Audio, Video, PDF and Word and so forth.

The design as characterized above is simple, complete and has modularity, interoperability alongside solid parts and consent framework.

The accompanying events happen when the Client program issues a HTTP request.

- The ActionServlet gets the request.
- The struts-config.xml record contains the insights with respect to the Actions, ActionForms, ActionMappings and ActionForwards.
- During the execution of the ActionServelet peruses the struts-config.xml record and makes a database of configurable articles. Afterward while preparing the demand the ActionServlet settles on choice by alluding to this question.

At the point when the ActionServlet gets the demand it does the accompanying undertakings:

- Bundles the entire request esteems into a Enterprise JavaBean (EJB) class which expands Struts ActionForm class.
- Decides which action class to summon to process the demand
- Validate the information entered by the stakeholder.
- The action class forms the demand with the assistance of the model segment. The model associates with the database and process the demand.

- After finishing the demand handling the Action class restores an ActionForward to the controller.
- Based on the ActionForward the controller will summon the suitable view.
- The HTTP reaction is rendered back to the stakeholder by the view segment.

5. IMPLEMENTATION DETAILS OF PROTOTYPE

From the architectural perspective, the Model part (information layer) together with testing is finished. View part together with controller is as of now in advance. Innovation utilized is as per the following:

- Web Server Software: Apache-tomcat-6.0.17 Web Server will be utilized for organization.
- Java: Java gives stage freedom conduct to created applications.
- JSP/HTML/DHTML/CSS: To outline GUI we will utilize JSP/HTML/DHTML and CSS web advances.
- IDE: Eclipse-SDK-3.5 will be utilized for building up the product.
- AspectJ: Used to apply Aspect-Oriented Programming standards.

6. CONCLUSION

In this paper, a design structure arrangement is proposed for creating e-Learning System. A model to check and guarantee this plan is being built. A few difficulties might want to be managed to construct this outline more versatile, handy, interoperable, finish and standard. The proposed compositional system amid this paper can be essentially reached out to elective alternatives that might be extra.

7. REFERENCES

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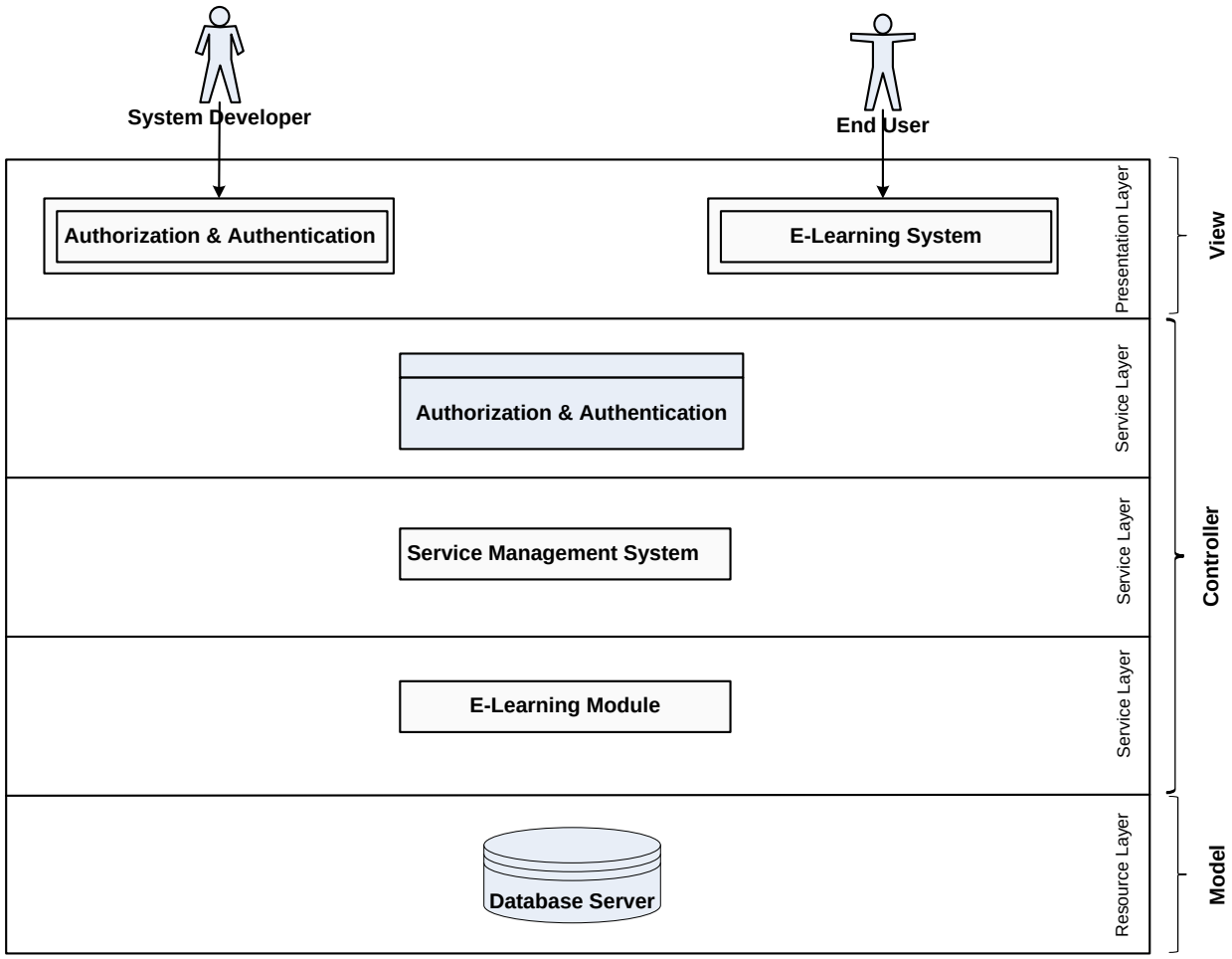

Figure 1: Architectural Development Framework

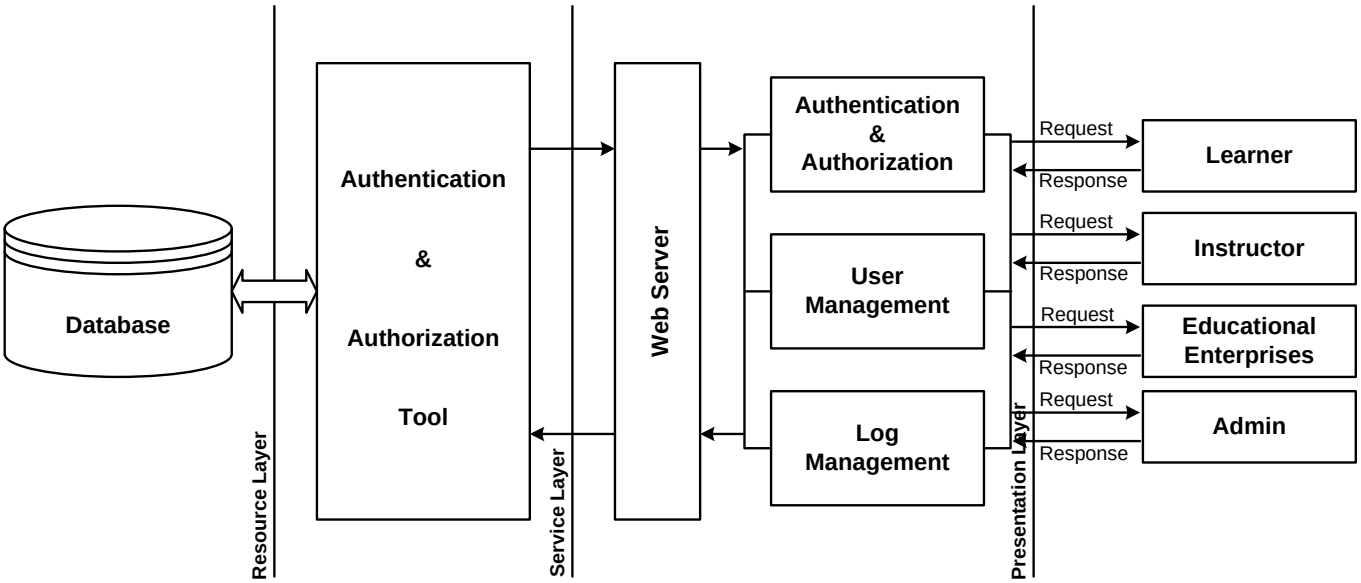

Figure 2: Architectural Framework of Authentication and Authorization

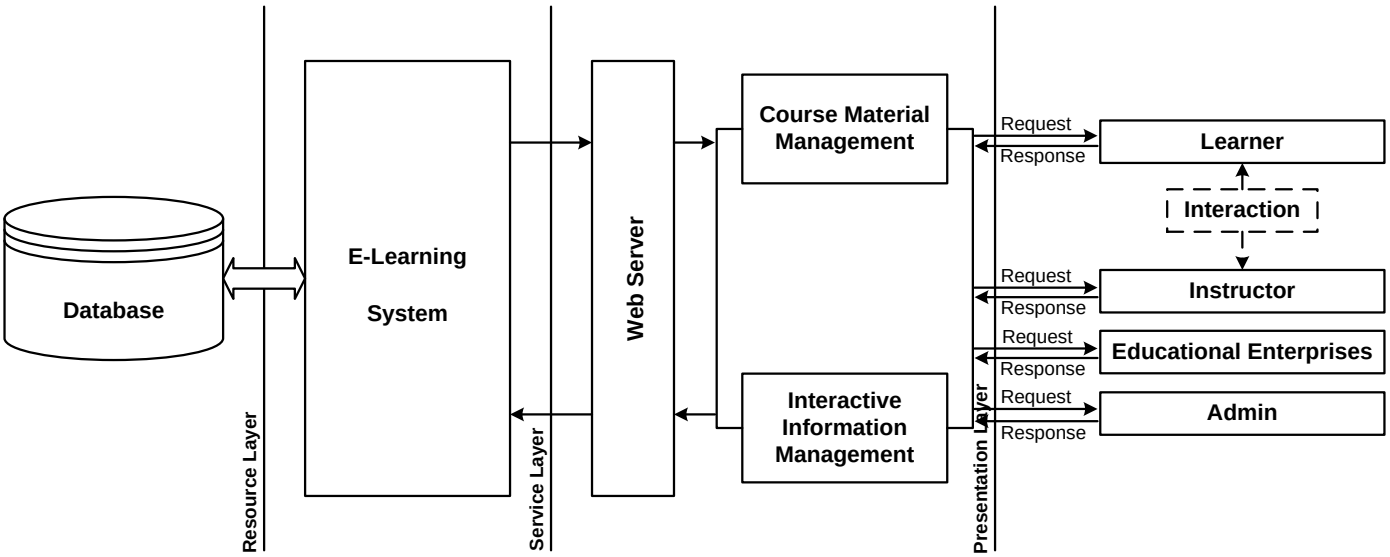

Figure 3: Architectural Framework of E-Learning System

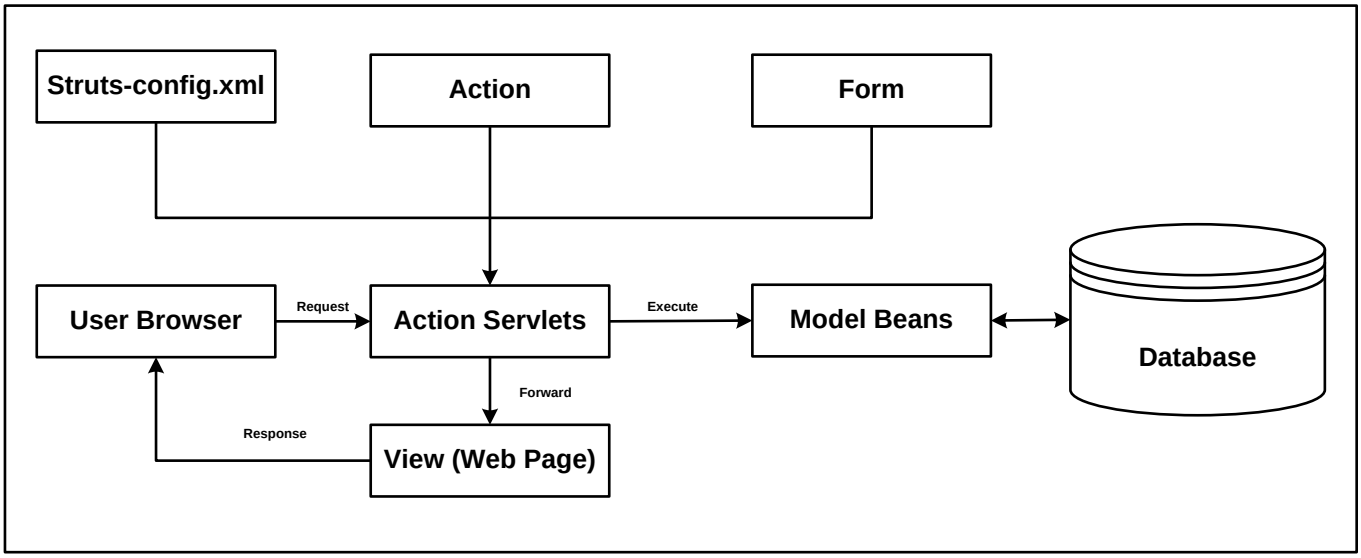

Figure 4: Architectural Framework of Client browser issuing an HTTP request