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Title of the Thesis: A Study to Achieve Higher Degree of Automation by Structural Change in Model-View-Controller (MVC)

ABSTRACT

The web application has become increasing integrated with multifaceted business stratagem to transport the content and functionalities to a broad population of end-users. Therefore, the needs to build usable and adaptable systems grow importance. Since web applications evolve, change, and grow continuously, these systems shall be flexible enough to upgrade and maintain with minimum efforts. Design quality shall be exploited for such evolution robustness. An object oriented abstractions helps in the said pursuit. An object oriented solution tries to encapsulate those things that are likely to change in such a way that a change to one component has little impact on rest of the components. Inheritance, polymorphism and other conceptualization for class are used to achieve design quality of software.

However, many architects observed that object-oriented abstractions lack the sufficient elemental structures and hence may not provide necessary insight for development of all kinds of complex systems. Therefore, there is a need to integrate design pattern for deeper understanding of collaboration between objects. Design qualities achieved through design pattern is most beneficial in a sense that it is a design idea and is independent of concrete code and hence is more durable. As the design pattern is a form of solution intended to address problem of a context, it infuse object oriented thinking in developers by providing micro-architecture of the system that also helps in organising the classes to achieve higher design quality.

Model-View-Controller (MVC) is one of the most established design pattern and virtually the central feature in the object oriented paradigm for developing interactive and now for web applications although many other alternative exists. This is due to the inherent capability of MVC to promote orthogonality by isolating business logic

from presentation layer. The basic idea of orthogonality is that things not related conceptually should be separated so that a change in one component shall not cause a change in other. The outcome of it is the higher design qualities: reusability, maintainability and conceptual integrity.

The consensus among most of the researchers is that the expected benefits of MVC will be reflected in final product only if system based on MVC is realized properly; otherwise it can produce adverse effect. It is also due to the fact that realization of MVC is not easy as it is a coarse-grained design pattern and cannot specifically guide system design. That is why all the frameworks based on MVC have interpreted and implemented MVC differently that also is one of the reasons of emergence of too many misquotations. A developer must have excellent analysis and design ability if wants to bring in said design qualities of MVC into final product that generally comes with experience. The issues like finding the right level of abstraction in the form of Model, View and Controller, collaboration and partitioning of components to client and server address space for web application are the few among the list. The lack of expertise may produce bad design of MVC and further may lead to inflexible software.

So, there is a need to minimize the human factor by automation so that realization of MVC can be standardized and a developer with even moderate skill can implement it consistently. Automation reduce human factor by defining fixed rules, guidelines and by integrating separate elements of productive process as a unified whole.

The present research is an attempt to achieve higher degree of automation by defining fine-grained MVC for web application and by organizing inevitable complexity inherent in it with the help of factoring, design patterns and XML. Each component of MVC has been described with the help of different design patterns at micro-level. The micro-level description of MVC for web applications will help a novice developer to achieve expected and promised benefits of MVC in real sense.

Apart from the improvement in design quality, one important aspect of the present research is the implementation of the suggestions. The findings have been implemented with the help of Java technologies and further validated with the help of metrics for object-oriented design. Thus, the present research not merely provides the design guideline but also helps while implementing MVC.