Modeling Web Applications with ArgoUWE

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The increasing complexity of Web applications requires mainly processes and tools supporting the development of Web-based systems. ArgoUWE is a tool with this objective. The main features of ArgoUWE are the support of visual modeling, UML conformance, and open-source characteristic. The design of the application is performed according to the UML-based notations and the steps defined by the UML-based Web Engineering (UWE [6]) methodology.

The UWE methodology provides a systematic approach for the development of Web applications. UWE is based on a conservative extension of the UML [7] and comprises the separate modeling of the conceptual, navigational and presentational aspects of Web applications. The CASE tool ArgoUWE [5] supports the design phase of the UWE development process. It is implemented as a plugin module of the open source ArgoUML [1] modeling tool. ArgoUWE fully integrates the UWE metamodel and provides an XMI extension. The construction process of Web applications is supported by incorporating the semi-automatic UWE development steps as well as the OCL well-formedness rules of the UWE metamodel that allow the designer to check the consistency of the UWE models during editing. ArgoUWE is part of the OpenUWE tool environment for model-driven generation of Web applications.

UWE is an UML-based, object-oriented, iterative, and incremental approach for the development of Web applications. In a single iteration, a use case model, a conceptual model, a navigational model, and a presentation model are built or refined. The use case model reflects the requirements on the Web application and the conceptual model comprises the entities the Web applications is based on. The navigational model builds on the conceptual model, presenting the navigation structure of the Web application between the different entities and offering means for accessing the entities through querying, menu selection, &c. The presentation model refines the navigational model by adding the layout. All these models of a Web application are supported by convenient UWE notations. The UWE process defines the development steps for building Web applications and, in particular, includes semi-automatic task for generating the navigational model from the conceptual model and the presentation model from the navigational model.

ArgoUWE supports the structural modeling tasks of UWE. On the one hand it offers tailored editors for the UWE notations used for conceptual, navigational, and presentation modeling of Web applications. On the other hand, ArgoUWE provides several semi-automatic model transformations that occur in the UWE process. As these model transformations are UWE-metamodel-based, both consistency between the different models and integrity of the overall Web application model with respect to UWE's OCL constraints are ensured by the tool. In particular, in a conceptual model classes can

be marked for navigation and the annotated conceptual model can be turned into a navigational model by creating navigation classes and associations for marked conceptual classes. In the navigational model, ArgoUWE can add automatically access primitives, like queries and menus, between navigation classes that refine the navigational structure. Finally, ArgoUWE can infer a presentation model from a navigation model automatically. Consistency of models is not enforced during modeling, but can be triggered any time by the user thus supporting and not constraining the developer in creating models.

ArgoUWE is implemented as a plugin into the open-source UML modeling tool ArgoUML. ArgoUWE reuses the UML-metamodel-based modeling techniques of ArgoUML. The support of ArgoUML for UML's standard model interchange format XMI is put to use by an extension of XMI by the Web modeling profile of UWE. ArgoUML being an open-source tool with an active developer community, plugin developers have to face rapid version changes and a sometimes poor documentation. However, the interest of availability and the possibility to adapt ArgoUWE, which again is open-source, to user-specific needs outweigh these disadvantages.

In contrast to the Web application development tool VisualWADE, which is based on the Web engineering method OO-H [4]), UWE and ArgoUWE use the UML throughout the development process. Furthermore, ArgoUWE does not rely on proprietary standards, like the Web modeling language WebML [2] that is used in the WebRatio tool. ArgoUWE is complemented by, e.g., the work by Conallen [3] focusing on the technological aspects of Web applications.

ArgoUWE is part of the OpenUWE tool environment for model-driven generation of Web applications. ArgoUWE is used for the design of Web applications wheres UWEXML is employed for semi-automatic generation of Web applications from the design model.

References

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