

Abstracting Module Views from Source Code *

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Abstract

We have investigated an approach for abstracting and visualizing software module views from source code: ArchView computes abstraction metrics that are used to filter and provide architectural elements and relationships of major interest. Source code views can, therefore, be reduced in detail and size resulting in more reasonable and comprehensible module views on software architectures. ArchView focuses on modules and their relationships: source level relationships such as inheritance, call structures, or includes are abstracted to a module level to show basic dependency relationships of modules.

1. Motivation

Views on the architecture of software systems aid engineers in maintaining and evolving software systems. However, abstracted views as obtained by existing reverse engineering techniques often are too low level and cluttered with information making them almost useless.

We address this problem and introduce ArchView—a view abstraction approach that concentrates on the abstraction and visualization of *condensed* architectural views. ArchView is based on the abstraction approach of Holt et al. [2]. A similar approach also has been presented by Feijs et al. in [1]. In extension to these approaches ArchView focuses on the computation of abstraction metrics that then are used to highlight interesting architectural elements and relationships and suppress information of minor interest.

2. ArchView Approach

The **abstraction** approach of ArchView uses binary relational algebra to abstract/lift information along a containe-

*This work is partially funded by the Austrian Forschungsförderungsfonds für die Gewerbliche Wirtschaft (FFF) and the European Commission under EUREKA 2023/ITEA-ip02009 'Fact-based Maturity through Institutionalisation Lessons-learned and Involved Exploration of System-family engineering (FAMILIES)'.

ment hierarchy as given by the underlying source code meta model. For example, a software module is implemented by package *A* which contains a number of sub-packages. Each package contains a set of classes that further contain methods and attributes. Using these *contains* relationships the algorithm first determines the set of entities (e.g. methods) contained by each module and next computes the relationships (e.g. invokes) between these entities. Whenever a relationship between the entities of module *A* and module *B* occurs an abstracted relationship of this type is established between module *A* and *B*.

The **visualization** technique used by ArchView is an extension of the technique presented by Lanza et al. in [3]. The extension is concerned with showing the weights of relationships and filtering mechanisms. Filtering is based on the abstraction metrics computed during the abstraction process. For instance, thresholds are used to filter minor entities and relationships. This yields to more condensed architectural views.

To demonstrate and validate the ArchView approach we applied it to the open source web browser Mozilla. The focus of the case study was to analyze source code related dependencies between a selected set of Mozilla's software modules. Initial results showed views that were cluttered with information. By applying the ArchView filter mechanisms we removed weak relationships which led to module views that were more condensed and therefore comprehensible.

References

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