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Abstraction as a Tool for Software Engineering

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Abstract: The flow from the architecture definition process to actually designing and implementing code is a significant problem generator in large software-intensive systems because it is extremely difficult to comprehend across macro-scale and micro-scale boundaries. Assuming an accurate definition of the underlying problem with sufficient requirements analysis, use case analysis, critical risk analysis of functional and non-functional requirements, and accurate model development, the critical design issues (and many remediations) fall into the code implementation phase. As systems grow in size, the complexity of the various development aspects including testability, readability, and reusability and therefore understandability and maintainability can very quickly grow beyond manageable thresholds unless certain design principles are adopted and followed. One major objective is to optimize the use of “abstraction” to achieve appropriate levels of functionality partitioning in order that the underlying system complexity remains manageable regardless of how the system evolves or how large it becomes. To achieve this, we as software experts must adopt a design approach that spans a multi-paradigm perspective; otherwise abstraction becomes a tool to merely hide complexity, which can potentially result in a system that is even more complex because it appears that magic is happening.

Bio: Mike Corley is a Senior Software Architect for Quanterion Solutions, Inc. He is associated with the DACS (Data Analysis Center for Software) and the Air Force Research Laboratory (AFRL) in Rome NY. He has more than 10 years of professional experience providing technical R&D support to AFRL in areas including signal processing, computer/network and cyber security, and applications requiring complex software system architecture design and programming best practices. Mr. Corley is a recently admitted Ph.D. candidate at Syracuse University.

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