

# Practical Guide To High-Level Design

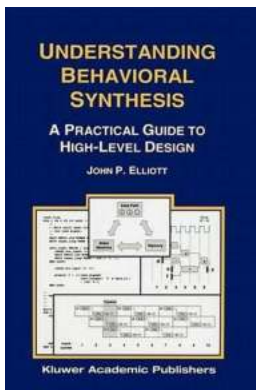


High-level design plays a crucial role in developing complex systems and ensuring their success. It provides a roadmap for developers, architects, and designers to create a scalable, maintainable, and efficient solution. In this practical guide, we will explore the key principles, steps, and best practices required to create a highly effective high-level design.

## Understanding High-Level Design

High-level design focuses on identifying the overall structure, architecture, and components of a system. It outlines the relationship between various subsystems, modules, and components, defining how they interact with each other to achieve the desired functionality. A well-designed high-level design provides clarity,

modularity, and flexibility, making it easier to implement and maintain the system in the long run.



## Understanding Behavioral Synthesis: A Practical Guide to High-Level Design

by John P. Elliott (1999th Edition, Kindle Edition)

★★★★★ 5 out of 5

Language : English  
File size : 32886 KB  
Text-to-Speech : Enabled  
Screen Reader : Supported  
Enhanced typesetting : Enabled  
Print length : 337 pages



### The Steps Involved in High-Level Design

- **Step 1: Requirements Analysis:** Understanding the project requirements, constraints, and scope is essential to create a suitable high-level design. This phase involves discussing with stakeholders, analyzing business needs, and documenting functional and non-functional requirements.
- **Step 2: System Architecture:** Defining the overall architecture is a crucial step in high-level design. This includes identifying subsystems, their interactions, and selecting appropriate technologies and frameworks.
- **Step 3: Component Design:** Breaking down the system into smaller components and designing their interfaces is done in this step. It involves defining the data structures, algorithms, and communication protocols necessary for each component.

- **Step 4: Integration Strategy:** Planning the integration of various components and subsystems is crucial to ensure smooth communication and interoperability. This step involves selecting integration techniques, defining APIs, and planning testing strategies.
- **Step 5: Performance Optimization:** Designing for performance is essential for any system. This step includes identifying potential bottlenecks, optimizing algorithms, considering scalability, and planning for resource utilization.
- **Step 6: Security Considerations:** In today's digital landscape, security is of utmost importance. This step involves identifying potential vulnerabilities, implementing security measures, and planning for data protection and access control.
- **Step 7: Documentation:** A well-documented high-level design helps future developers understand and maintain the system effectively. This step includes creating architectural diagrams, interface documentation, and code comments.

## Best Practices for High-Level Design

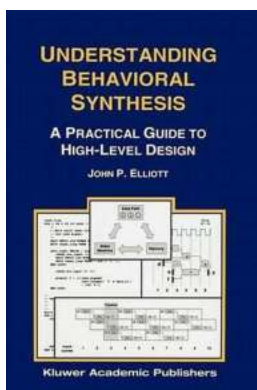
To create a highly effective high-level design, following these best practices can significantly improve the overall outcome:

1. **Modularity:** Breaking down the system into smaller, manageable components enhances reusability, maintainability, and testability.
2. **Scalability:** Designing for scalability ensures that the system can handle growing user demands and increased data volume without compromising performance.

3. **Usability:** Prioritizing user experience and designing intuitive interfaces enhances user satisfaction and decreases the learning curve.
4. **Flexibility:** Designing with flexibility in mind allows for easier modifications and adaptations to changing business requirements.
5. **Error Handling and Fault Tolerance:** Identifying potential errors and defining error-handling mechanisms ensures system stability and improves resilience.
6. **Code Review and Collaboration:** Encouraging code review and collaboration among team members helps detect potential issues and ensures adherence to design principles.

High-level design is a critical phase of the software development process. It sets the foundation for successful implementation and maintenance of a system. By following the principles, steps, and best practices outlined in this guide, developers can create robust, scalable, and efficient high-level designs. Investing time and effort in this phase will significantly contribute to the overall success of any project.

Are you ready to take your high-level design skills to the next level? Start implementing these practical tips today and witness the positive impact on your projects!



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Behavioral Synthesis: A Practical Guide to High-Level Design includes details on new material and new interpretations of old material with an emphasis on practical information. The intended audience is the ASIC (or high-end FPGA) designer who will be using behavioral synthesis, the manager who will be working with those designers, or the engineering student who is studying leading-edge design techniques.

Today's designs are creating tremendous pressures for digital designers. Not only must they compress more functionality onto a single IC, but this has to be done on shorter schedules to stay ahead in extremely competitive markets. To meet these opposing demands, designers must work at a new, higher level of abstraction to efficiently make the kind of architectural decisions that are critical to the success of today's complex designs. In other words, they must include behavioral design in their flow.

The biggest challenge to adopting behavioral design is changing the mindset of the designer. Instead of describing system functionality in great detail, the designer outlines the design in broader, more abstract terms. The ability to easily and efficiently consider multiple design alternatives over a wide range of cost and performance is an extremely persuasive reason to make this leap to a high level of abstraction. Designers that learn to think and work at the behavioral level will reap major benefits in the resultant quality of the final design.

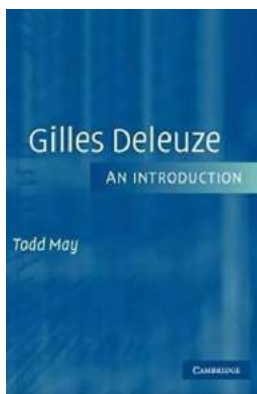
But such changes in methodology are difficult to achieve rapidly. Education is essential to making this transition. Many designers will recall the difficulty transitioning from schematic-based design to RTL design. Designers that were new to the technology often felt that they had not been told enough about how

synthesis worked and that they were not taught how to effectively write HDL code that would synthesize efficiently.

Using this unique book, a designer will understand what behavioral synthesis tools are doing (and why) and how to effectively describe their designs that they are appropriately synthesized.

CD ROM INCLUDED!

The accompanying CD-ROM contains the source code and test benches for the three case studies discussed in Chapters 14, 15 and 16.



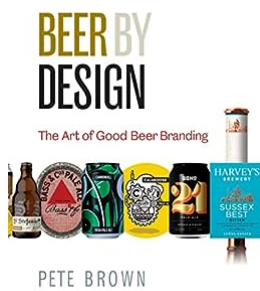
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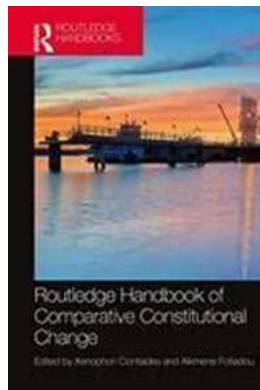
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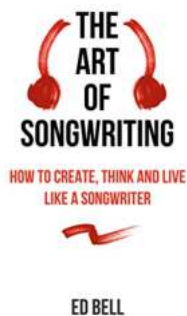
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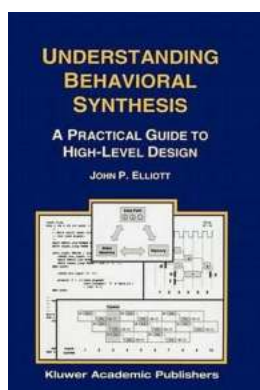
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