NIDAYS2009

The Exploding While-loop

"The importance of Software Architecture
and what we can learn from each other"

presenter: Arnoud de Kuijper, T&M Solutions

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What is the software architecture (SA)???

SA can be defined as a **high-level system design**

that '*describes the **sub-systems** and **components***

***relationships** between the components*'.

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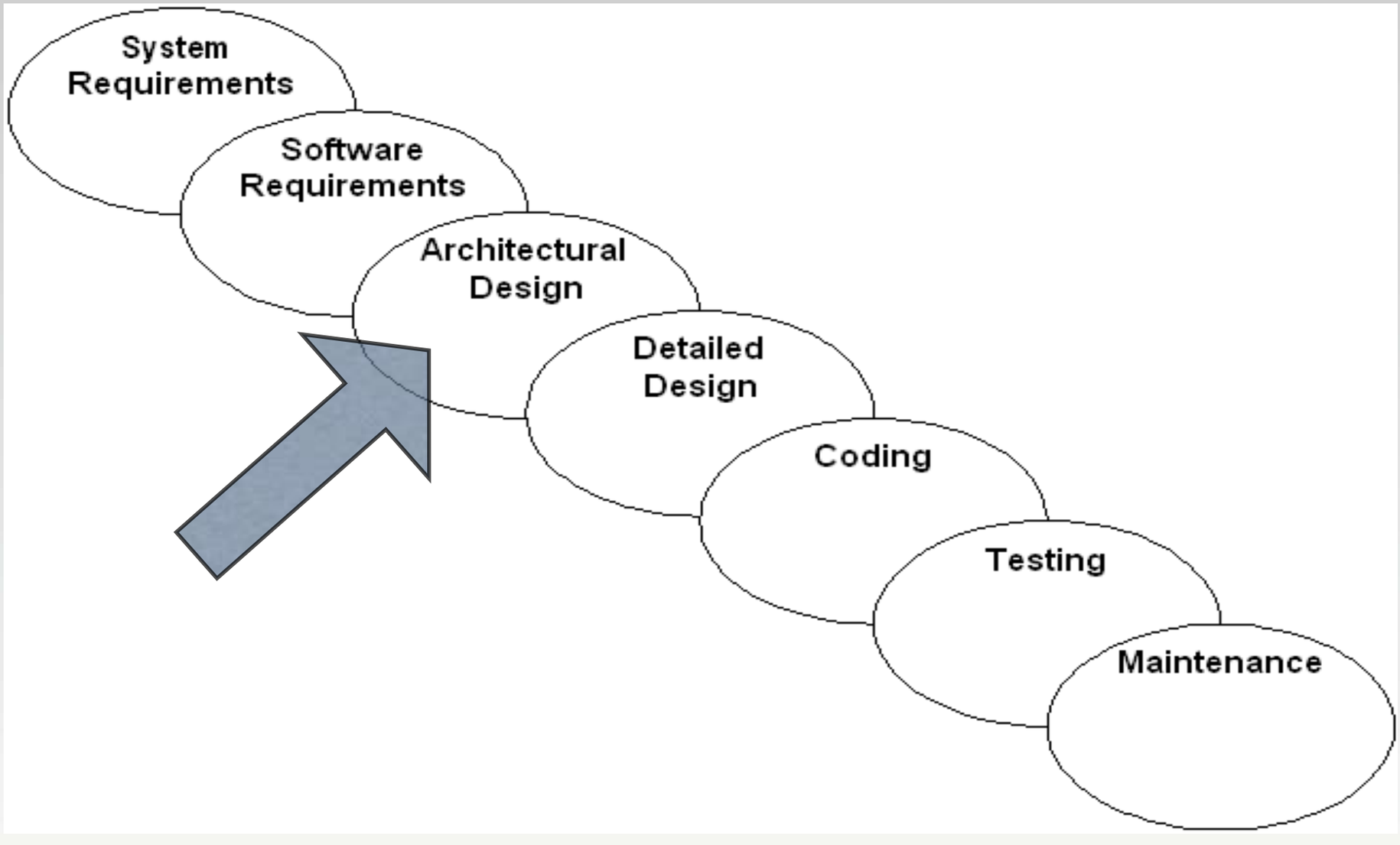
position of software architecture in the software development



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A short story ...

the problem to solve starts simple

architecture is no issue, just get it to work

features are added (spec changes)

development went fast, let's add functionality

no redesign of application/datatypes

'it just costs money and no direct profit'

increasingly harder to maintain

side effects of changes form bugs

solution spirlas out-of-control

we started solving a problem and we just pushed it 'down the road'...

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Suggestion 1

If you are working ad-hoc (meaning you are not using formal software engineering methods)

Rewrite your ‘core’ after initial testing. Think about reuse and put some extra effort in ‘the interface’.

This makes it (more) clear what is special about your ‘core’ and how it interacts with its environment.

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Why should I care about SA...
I just want to solve my probem !

Solving the problem is the most important part, but there are other issues ...

- future extensions / elaboration
- readability / documentation
- development efficiency
- multiple developers
- reuse of code
- minimize risc

€

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Suggestion 2

Think before you Act

Think about separation of concerns
Think about coupling and cohesion
Think about datatypes
Think about readability
Think about debugability
Think about ...

then Act smart, meaning minimize risc and documentation effort by re-using proven concepts (called design patterns)

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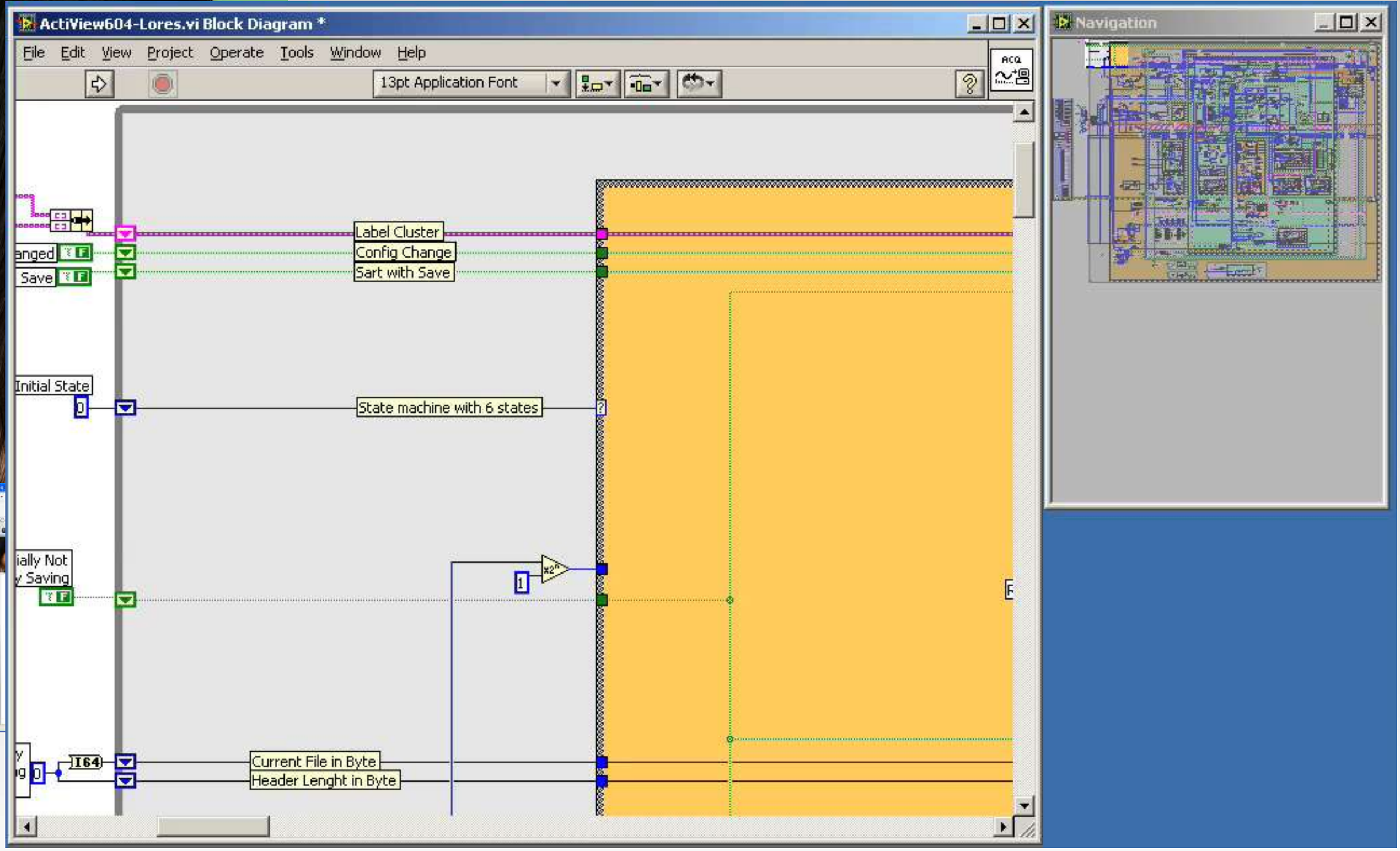
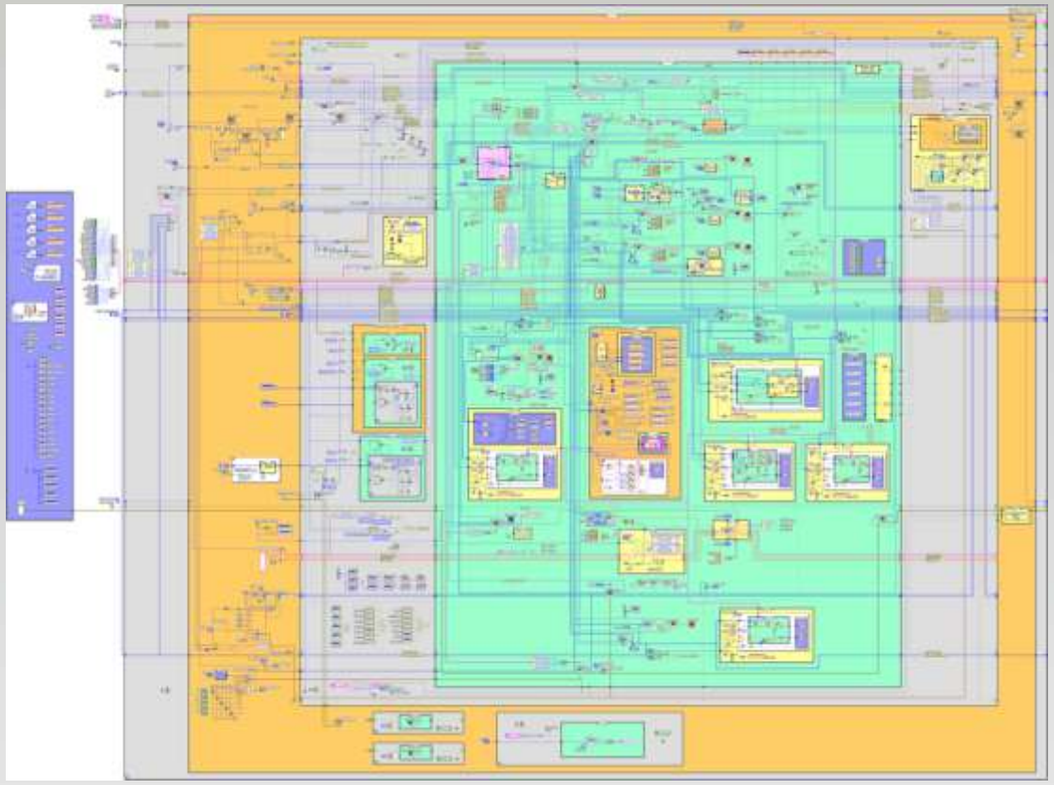
example
- the exploding while loop -

describes the continuous adding of code to a single while loop, until it reaches unmanageable proportions.

And although computer monitors become bigger and bigger, there should be a severe penalty for doing your development/ engineering like next example...

(example without modifications found on the web... and it’s still evolving !!!)





learn from example....
but not this one !!!

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Design Patterns

A good book was written by the Gang-of-Four (GoF) called ‘Design Patterns - Elements of Reusable Object-Oriented Software’.

This book describes some great design patterns, it describes what’s being solved and why... It will most probably not map 100% to LabVIEW, but it sure helps you to think about generic solutions for specific problems.

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Design Patterns (2)

master/slave
producer/consumer
state machine / QMH
...

facade
singleton
proxy
...

Your application most probably consists of many patterns working together, each having there own responsibility.

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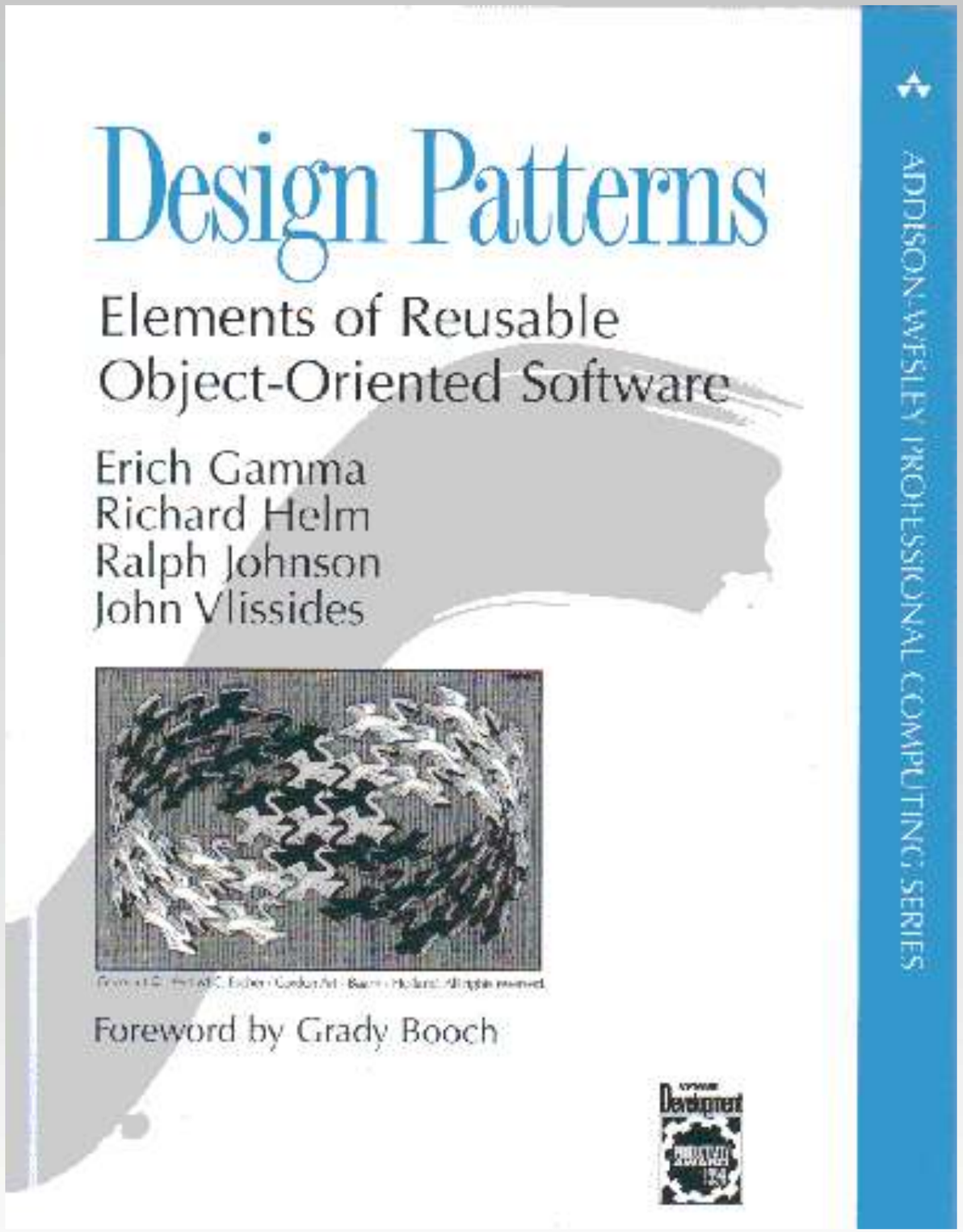

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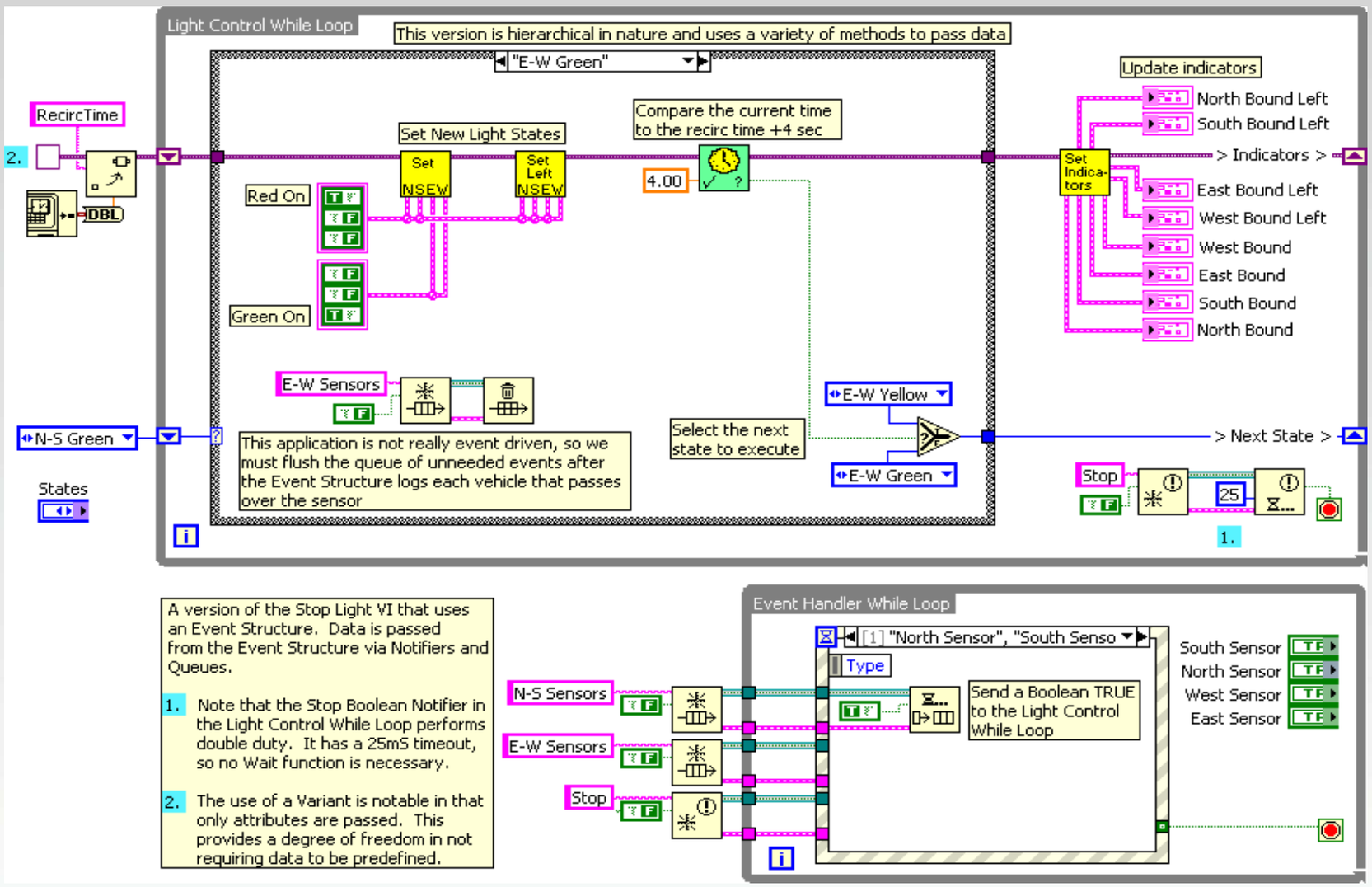
re-factoring and using standard solutions makes better code !



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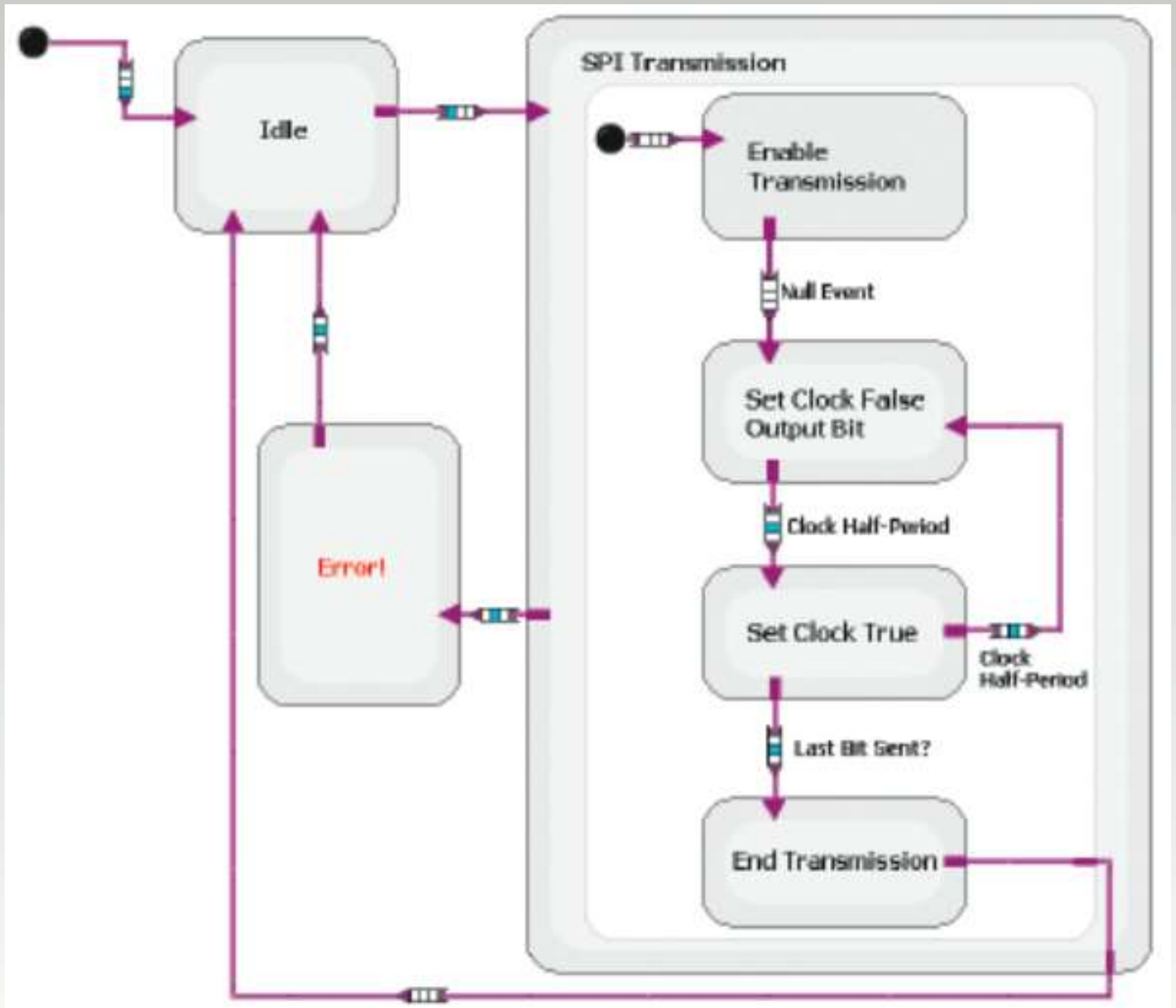
SA - using recent additions



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The StateChart not only implements, but also documents !

Precisely how to best use statecharts still needs to be figured out by the LabVIEW community...

- There are multiple ways to do the same,and sure there will be drawbacks...
- Where can you benefit from statecharts?
- Learn more about this model of computation examples, documentation, missing functionality)

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LabVIEW Style

Apart from architecture(style) your programming style can help you write better understandable (=manageable) code...

Start thinking about **your** style, and why do you do what you do...

Read a book about style to help you...
You may disagree with the style from others, but **it's better to have a persistent style then no style at all**!!!

hint: be a pragmatic, not a purist.

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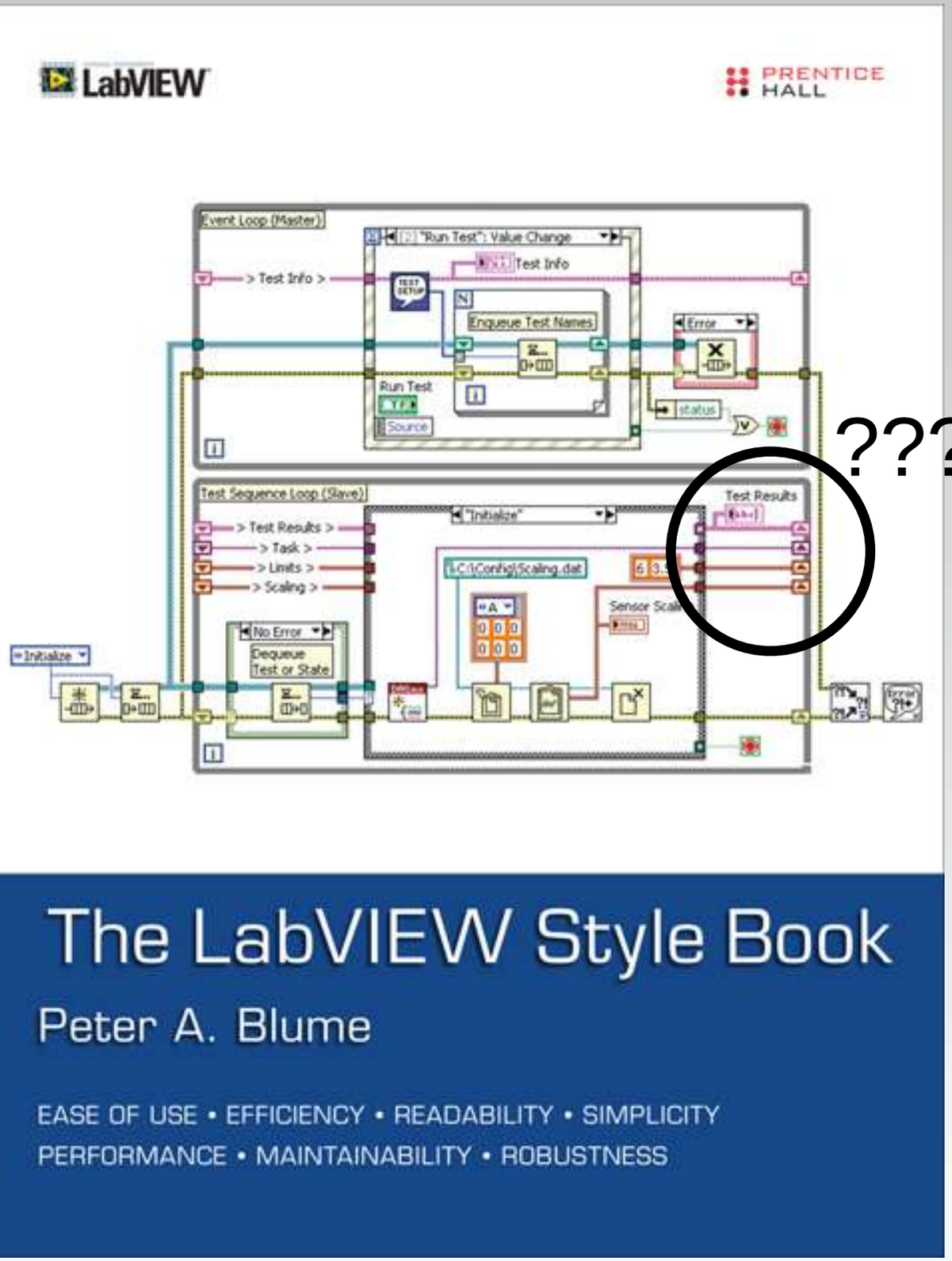

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where do you learn it...

Courses

New User	Experienced User	Advanced User
LabVIEW Basics I LabVIEW Basics II	LabVIEW Intermediate I LabVIEW Intermediate II	LabVIEW Advanced I
Skills learned: • LabVIEW environment navigation • Basics application creation using LabVIEW • Basics of data acquisition and instrument control	Skills learned: • Modular application development • Structured design and development practices • Inter-application communication and connectivity techniques	Skills learned: • Large application design • Advanced development techniques • Implementing multideveloper projects

Certifications

Certified LV Associate Developer Exam	Certified LabVIEW Developer Exam	Certified LabVIEW Architect Exam
Skills tested: • LabVIEW environment knowledge	Skills tested: • LabVIEW application development expertise	Skills tested: • LabVIEW application development mastery

ni.com/training

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Suggestion 3

Don’t be afraid to ask questions or advice. You are not only helping yourself, it’s a good reminder for all of us (programmers) to keep focus on issues like style, design, ways to debug and better use tools from NI

choose a forum that best serves you:

- LVUG: entry level, focus NL, **nederlands**
- LAVA: advanced
- NI: general purpose, very diverse

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My final thoughts...

There are many books, papers and presentations about design patterns, go search and learn... Tell others about your journey

Try to use good style, talk about it and tune it.

LabVIEW continuously evolves, maybe incorporate new primitives or language constructs to replace ‘tricks’ and ‘work-arounds’. (at least write down your tricks and workarounds ;-)

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Where to go from here - >

-reference designs can components can be found at ni.com - >search: **refdesign**

Try searching on:
-design patterns
-application patterns
-software architecture design

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Future discussion directions...

Application templates
Object orientation
Queued message handlers
LabVIEW StateChart module
Project cloning
Decoupling user interface

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Questions ?

examples and additional links will be made available at LVUG.NL (dutch language only)

The forum area is ideal for questions/discussions about SA, style, patterns

tell me and I will forget
show me and I might remember
*involve me and **we** will understand !*

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