

What specifically is the "principle of generality" that Roy's thesis mentions?

(too old to reply)

**Nick Gall**

14 years ago

### 2.3.3 Simplicity

The primary means by which architectural styles induce simplicity is by applying the principle of separation of concerns to the allocation of functionality within components. If functionality can be allocated such that the individual components are substantially less complex, then they will be easier to understand and implement. Likewise, such separation eases the task of reasoning about the overall architecture. I have chosen to lump the qualities of complexity, understandability, and verifiability under the general property of simplicity, since they go hand-in-hand for a network-based system. Applying the principle of generality to architectural elements also improves simplicity, since it decreases variation within an architecture. Generality of connectors leads to middleware [22]. [emphasis added]

He mentions the "principle of generality" several times in the thesis, and it clearly is a key constraint on issues like keeping the number of "verbs" to a minimum, but he never defines it. I googled the term and only came up with a definition from political theory.

I'm trying to flesh out my own theory/principle of generality and its relationship to loose coupling, and I'd rather not reinvent the wheel.

Thanks. -- Nick

**John D. Heintz**

14 years ago

Hi Nick,

I don't know if this is what Roy ment, but this is how I internalized it.

Generality is preferring generic/shared/common programming models instead of specific/unique/custom ones.

When I was learning to program OO I was fortunate to be mentored by some

smart people. One of them reviewed my code where I was doing very specific sub-typing and so on. When he helped me move things over to a generic style of programming the code got simpler and smaller. After I was astounded, I realized the special cases and custom types made things bigger and more complicated.

In the OO world abstract base classes, decorator pattern, and null object pattern promote this style.

In REST, uniform interface is obviously this, but also I think OPTIONS helps.

Just my \$.02

John Heintz

...

--

John D. Heintz  
Principal Consultant  
New Aspects of Software  
Austin, TX  
(512) 633-1198

**Alan Dean**

14 years ago

*Post by John D. Heintz*

I don't know if this is what Roy ment, but this is how I internalized it.

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+1

John is right.

When Roy says "Generality of connectors leads to middleware" I believe that he means, for example, that I can install an HTTP Cache intermediary and "it just works" because it doesn't need to know anything about the applications on the network - just the HTTP protocol.

Regards,

Alan Dean

<http://thoughtpad.net/alan-dean>

**Mark Baker**

14 years ago

*Post by John D. Heintz*

Hi Nick,

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+1, well said. That's how I always interpreted it.

Mark.

**Nick Gall**

14 years ago

*Post by Mark Baker*

*Post by John D. Heintz*

Hi Nick,

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*Post by John D. Heintz*

Generality is prefering generic/shared/common programming models

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*Post by Mark Baker*

+1, well said. That's how I always interpreted it.

Mark.

+1 as well. But let me clarify my original question. I am not seeking to understand what the "principle of generality" as Roy uses it might mean; I have my own interpretation of what I think it means and it is very much in line with these excellent comments. Rather, I am seeking to find out where Roy got the principle in the first place.

He uses the "principle of generality" and "generality principle" three times in the thesis:

1.4

Hence, the architectural constraint is a uniform component interface, motivated by the generality principle, in order to obtain two desirable qualities that will become the architectural properties of reusable and configurable components when that style is instantiated within an architecture.

2.3.3

Applying the principle of generality to architectural elements also improves simplicity, since it decreases variation within an architecture. Generality of connectors leads to middleware [22].

5.1.5

By applying the software engineering principle of generality to the component interface, the overall system architecture is simplified and the visibility of interactions is improved.

His use of the term (especially the 3rd use) seems to suggest he is merely citing an existing principle that he learned about from some source. What I am looking for is the source of this cite. Sorry I wasn't clearer originally.

Stop the Press! In trying to provide more context for this question, I think I answered it myself. In looking at how Roy used the word "principle" in the thesis, I found the following quote (thank god for Acrobat's search function, which acts as a dynamic concordance):

#### 1.4

Properties are induced by the set of constraints within an architecture. Constraints are often motivated by the application of a software engineering principle [58] to an aspect of the architectural elements. For example, the uniform pipe-and-filter style obtains the qualities of reusability of components and configurability of the application by applying generality to its component interfaces "constraining the components to a single interface type. Hence, the architectural constraint is "uniform component interface," motivated by the generality principle, in order to obtain two desirable qualities that will become the architectural properties of reusable and configurable components when that style is instantiated within an architecture.

[58] is a cite to:

C. Ghezzi, M. Jazayeri, and D. Mandrioli. Fundamentals of Software Engineering <<http://www.infosys.tuwien.ac.at/se-book/>> . Prentice-Hall, 1991.

I googled the title and hit paydirt: slides for teaching with the book <<http://www.infosys.tuwien.ac.at/se-book/slides/>> . And indeed, Chapter 3 <<http://www.infosys.tuwien.ac.at/se-book/slides/Ch3.ppt>> deals with the following key "Software Engineering Principles":

- \* Rigor and formality
- \* Separation of concerns
- \* Modularity

- \* Abstraction
- \* Anticipation of change
- \* Generality
- \* Incrementality

In case you are interested (and don't want to download the ppt) here is the slide on Generality:

- \* While solving a problem, try to discover if it is an instance of a more general problem whose solution can be reused in other cases
- \* Carefully balance generality against performance and cost
- \* Sometimes a general problem is easier to solve than a special case

What I like about this description of the principle is that it highlights both the benefits (reuse and ease of solution), as well as the costs (performance and cost).

I'd only add one other benefit regarding generality (or extend the reuse benefit): serendipity. For an upcoming presentation on WOA I created the following slide:

#### SOA: Specific-Operation Architecture vs. Serendipity-Oriented Architecture

- \* Unexpected reuse is the value of the web
- \* Tim Berners-Lee
- \* Two of the goals of REST: independent evolvability and design-for-serendipity
- \* Roy T. Fielding
- \* Engineer for serendipity

\* Roy T. Fielding  
(The "Specific-Operation Architecture" is a thinly veiled knock on typical WS-\* based approach to SOA.)

The Internet and the Web are paradigms of Serendipity-Oriented Architectures. Why? Largely because of their simple generality. It is my belief that generality is one of the major enablers of serendipity. So here I immodestly offer Gall's General Principle of Serendipity: "Just as generality of knowledge is the key to serendipitous discovery, generality of purpose is the key to serendipitous (re)use."

-- Nick

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**Bill de hOra**

14 years ago

I am /not/ seeking to understand what the "principle of generality" as Roy uses it might /mean/; I have my own interpretation of what I think it means and it is very much in line with these excellent comments. Rather, I am seeking to find out where Roy got the principle in the first place.

Why don't you ask him?

cheers

Bill

**Roy T. Fielding**

14 years ago

*Post by Nick Gall*

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Why don't you ask him?

It would not have worked. I am currently working on the principle of vacation. Or should that be the constraint of vacation?

Congrats on finding the correct answer.

....Roy

**Walden Mathews**

14 years ago

Hmm, apparently hypermedia can also work as the engine of vacation state?

;-) wm

----- Original Message -----

From: "Roy T. Fielding" <\*\*\*@gbiv.com>

To: "Bill de hOra" <\*\*\*@dehora.net>

Cc: "Nick Gall" <\*\*\*@gmail.com>; "REST Discuss" <rest-\*\*\*@yahoogroups.com>

Sent: Saturday, June 09, 2007 12:29 AM

Subject: Re: [rest-discuss] Re: What specifically is the "principle of generality" that Roy's thesis mention

: On Jun 8, 2007, at 2:48 PM, Bill de hOra wrote:

: > Nick Gall wrote:

: >

: > > I am /not/ seeking  
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 :  
 : .....Roy  
 :  
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 :  
 : \_\_\_\_\_ NOD32 2320 (20070609) Information \_\_\_\_\_  
 :  
 : This message was checked by NOD32 antivirus system.  
 : <http://www.eset.com>  
 :

Continue reading on *narkive*:

SEARCH RESULTS FOR 'WHAT SPECIFICALLY IS THE "PRINCIPLE OF GENERALITY" THAT ROY'S THESIS MENTIONS?'  
 (NEWSGROUPS AND MAILING LISTS)

**20**

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[slony1-general@lists.slony.info](mailto:slony1-general@lists.slony.info)

