Ten Common Misconceptions about Software Architecture

Philippe Kruchten
Contact info

Philippe Kruchten
Director of Process Development
Rational Vancouver
240-10711 Cambie Road
Richmond, B.C.  V6X3G5
Canada
pbk@rational.com
+1 (604) 231 9877
We all know that ...

- Architecture and design are the same thing
- Architecture and infrastructure are the same thing
- `<my favourite technology>` is the architecture
- A good architecture is the work of a single architect
- Architecture is flat, one blueprint is enough
- System architecture precedes software architecture
- Architecture cannot be measured and validated
- Architecture is a Science
- Architecture is an Art
1 Architecture is Design

- Yes, but there is more in design than just architecture.

- “Do not dilute the meaning of the term architecture by applying it to everything in sight.” (Mary Shaw)

- Architecture is about making decisions, it is about the how, not just the what.

- Architecture is one aspect of the design, focusing on major elements, elements that are both structurally important, but also those that have a more lasting impact on the performance, reliability, cost, adaptability, etc.
2 Architecture is Infrastructure

- Yes, but no.
- Yes, the infrastructure is an integral and important part of the architecture, but there is more in architecture than just infrastructure.
- A too narrow view on architecture may lead to a very nice infrastructure, but the wrong infrastructure for the problem at hand.
3 <my favourite technology> is the architecture

- No, rarely.

- This is the same as the previous one, but stated from the point of view of a given specialty
  - The Network is architecture
  - The database is architecture
  - The transaction server is architecture
  - CORBA is the architecture
  - etc.

- Architecture is more than just technology watch

- Balance
A good architecture is the work of a single architect

- No, a team is usually a better solution
- Fred Brooks (1975), but Fred Brooks (1995)
- Architecture team as a team
  - not a committee
  - not a problem clearinghouse
  - not an ivory tower
- Mix of specialties, better balance, avoid 2 issues above
- Need a clear leader
- Flexibility in composition and structure
  - Circulate people so as not to get their skill stale
5 Architecture is Flat

- No, except for very trivial cases
- Same issue with ADL (?)
- Single blueprint to represent all or most of architecture are a semantic mess.
- Multiple stakeholders, multiple concerns lead to multiple views, multiple blueprints
- “4+1 view model”, eight years later
The “4+1 View” Model

- **Logical View**
  - Classes
  - Tasks
  - Performance
    - Scalability
    - Throughput

- **Component View**
  - Modules

- **Use Case View**
  - End-user Functionality

- **Process View**
  - Software management
    - Programmers

- **Deployment View**
  - Topology
    - System integration
    - Telecommunication

Copyright © 1998 by Rational Software Corp.
6 System architecture precedes software architecture

- Not in a strict sequence
- The two have to be interleaved
- Software has a longer life than hardware
- Cut opportunity for large scale reuse
7 Architecture cannot be measured and validated

- Wrong
- Build a skeletal architecture, using targeted technology, to:
  - Mitigate technical risks
  - Improve learning
  - Break down and reduce integration risks
  - Set up right level of expectations
  - Run-in development environment, toolset
  - Jump start testing effort
- Architecture is not just sketchy top-level design.
- A key aspect of the Rational Objectory Process
Objectory Process: Architecture

Inception | Elaboration | Construction | Transition

Iteration #1 | Iteration #2 | Iteration #n+1 | Iteration #m+1

Iteration #2 | Iteration #n+1 | Iteration #m+1 | Iteration #m+2

Copyright © 1998 by Rational Software Corp.
8 Architecture is a Science

- Not yet
- Scientific, analytical methods hard to apply
- No proof, few quantitative criteria, over-constrained problem
- Timeliness is the essence
- “The life of a software architect is a long and rapid succession of design decisions taken partly in the dark.”
- Experience counts.
9 Architecture is an Art

- Let us not fool ourselves!
- The “artsy” part is rare, or minimal.
- Most of what architects do is copy solutions that have worked, assemble them in different combinations, with very modest incremental improvements.
- An architectural process can be set up, with definite steps, prescribed artifacts, taking advantage of heuristics which start to be better understood (see E. Rechtin & M. Maier).
- Body of knowledge starts to be codified: architectural patterns.
10 These were the top ten misconceptions...

- Wrong!
- My misconceptions are your certitudes.
- My certitudes are your misconceptions.
- Misconceptions in software architecture are in the eye of the beholder.
At a Turning Point

Software Components

Architecture

Process

Tools