Architectural Views

CSSE6400

Richard Thomas

March 7, 2022

Interesting Software is Complex

Many aspects to the design of its architecture.

Architectural Design

Managing technical complexity.

Question

How do you describe a complex architecture, without making it too difficult to understand?

Question

How do you describe a complex architecture, without making it too difficult to understand?

Answer

Architectural Views

– Only consider one aspect at a time.

Architectural Views

- 4+1 Views [1]
  - logical, process, development, physical, scenario

Architectural Views

- 4+1 Views [1]
  - logical, process, development, physical, scenario
- Software Architecture in Practice [2]
  - module, component-and-connector, allocation

Architectural Views

- 4+1 Views [1]
  - logical, process, development, physical, scenario
- Software Architecture in Practice [2]
  - module, component-and-connector, allocation
- Rozanski and Woods [3]
  - context, building block, runtime, deployment

Architectural Views

- 4+1 Views [1]
  - logical, process, development, physical, scenario
- Software Architecture in Practice [2]
  - module, component-and-connector, allocation
- Rozanski and Woods [3]
  - context, building block, runtime, deployment
- NATO Architecture Framework [4]
  - concepts, service, logical, physical resource, architecture foundation

Architectural Views

- 4+1 Views [1]
  - logical, process, development, physical, scenario
- Software Architecture in Practice [2]
  - module, component-and-connector, allocation
- Rozanski and Woods [3]
  - context, building block, runtime, deployment
- NATO Architecture Framework [4]
  - concepts, service, logical, physical resource, architecture foundation
- The Open Group Architecture Framework (TOGAF) [5]
- ISO/IEC/IEEE 42010:2011 [6]

4+1 Views

Logical – *Structure* of how the software is implemented.

- components/classes, relationships, interactions

4+1 Views

Logical – *Structure* of how the software is implemented.

- components/classes, relationships, interactions

Process – *Dynamic* behaviour.

- concurrency & distribution, fault tolerance, process control, ...

4+1 Views

Logical – *Structure* of how the software is implemented.

- components/classes, relationships, interactions

Process – *Dynamic* behaviour.

- concurrency & distribution, fault tolerance, process control, ...

Development – *Organisation* of the software in the development environment.

4+1 Views

Logical – *Structure* of how the software is implemented.

- components/classes, relationships, interactions

Process – *Dynamic* behaviour.

- concurrency & distribution, fault tolerance, process control, ...

Development – *Organisation* of the software in the development environment.

Physical – *Map* executable software containers to hardware.

- address non-functional requirements
  - availability, reliability, scalability, throughput, ...

4+1 Views

Logical – *Structure* of how the software is implemented.

- components/classes, relationships, interactions

Process – *Dynamic* behaviour.

- concurrency & distribution, fault tolerance, process control, ...

Development – *Organisation* of the software in the development environment.

Physical – *Map* executable software containers to hardware.

- address non-functional requirements
  - availability, reliability, scalability, throughput, ...

Scenario – *Demonstrate* functionality delivered by architecture.

- use case details
  - *drive* functional design of architecture
  - *validate* design of architecture
  - *illustrate* purpose of architecture

Diagrams & Notation

- A *good* diagram is worth a thousand words.
  - A thousand diagrams is just confusing.

Diagrams & Notation

- A *good* diagram is worth a thousand words.
  - A thousand diagrams is just confusing.
- UML – formal, well-defined language [7]
- C4 – informal, simple structure [8]
- You probably don't want to know about alternatives.

Reading...

“Architectural Views” Notes[1] [9]

[1] Remember, I said you had to read the notes.

References

[1] Philippe Kruchten.
Architectural blueprints — the '4+1' view model of software architecture.
IEEE software, 12(6):42–50, 1995.
https://www.cs.ubc.ca/~gregor/teaching/papers/4+1view-architecture.pdf.

[2] Len Bass, Paul Clements, and Rick Kazman.
Software Architecture in Practice.
Addison-Wesley, 4th edition, August 2021.

[3] Nick Rozanski and Eóin Woods.
Software Systems Architecture: Working With Stakeholders Using Viewpoints and Perspectives.
Addison-Wesley, 2nd edition, 2012.

[4] Architecture Capability Team.
NATO Architecture Framework.
NATO, 4th edition, September 2020.

[5] The Open Group Architecture Forum.
The Open Group Architecture Framework Standard.
The Open Group, 9.2 edition, 2018.
https://pubs.opengroup.org/architecture/togaf9-doc/arch/index.html.

[6] *ISO/IEC/IEEE 42010:2011*.
ISO, 2011.

[7] *Unified Modeling Language*.
OMG, 2.5.1 edition, December 2017.
https://www.uml.org/.

[8] Simon Brown.
Software Architecture for Developers - Volume 2.
Leanpub, January 2022.
https://leanpub.com/visualising-software-architecture.

[9] Richard Thomas and Brae Webb.
Architectural views.
March 2022.
https://csse6400.uqcloud.net/handouts/views.pdf.