

# Architectural Views

*Software Architecture*

Richard Thomas

February 26, 2024

*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

- C4 Model *[Brown, 2023]*
  - context, structure, behaviour, infrastructure

# Architectural Views

- C4 Model *[Brown, 2023]*
  - context, structure, behaviour, infrastructure
- 4+1 Views *[Kruchten, 1995]*
  - logical, process, development, physical, scenario

# Architectural Views

- C4 Model *[Brown, 2023]*
  - context, structure, behaviour, infrastructure
- 4+1 Views *[Kruchten, 1995]*
  - logical, process, development, physical, scenario
- Software Architecture in Practice *[Bass et al., 2021]*
  - module, component-and-connector, allocation



# Architectural Views

- C4 Model *[Brown, 2023]*
  - context, structure, behaviour, infrastructure
- 4+1 Views *[Kruchten, 1995]*
  - logical, process, development, physical, scenario
- Software Architecture in Practice *[Bass et al., 2021]*
  - module, component-and-connector, allocation
- NATO Architecture Framework *[Team, 2020]*
  - concepts, service, logical, physical resource, architecture foundation

# Architectural Views

- C4 Model *[Brown, 2023]*
  - context, structure, behaviour, infrastructure
- 4+1 Views *[Kruchten, 1995]*
  - logical, process, development, physical, scenario
- Software Architecture in Practice *[Bass et al., 2021]*
  - module, component-and-connector, allocation
- NATO Architecture Framework *[Team, 2020]*
  - concepts, service, logical, physical resource, architecture foundation
- The Open Group Architecture Framework (TOGAF)  
*[Forum, 2018]*
- ISO/IEC/IEEE 42010:2011 *[iso, 2011]*

# C4 Model

## Context

- How software system fits into broader *environment*

# C4 Model

## Context

- How software system fits into broader *environment*

## Structure – Containers, Components, Code

- *Levels* of detail

# C4 Model

## Context

- How software system fits into broader *environment*

## Structure – Containers, Components, Code

- *Levels* of detail

## Behaviour – Dynamic

- How elements *interact* to deliver features

# C4 Model

## Context

- How software system fits into broader *environment*

## Structure – Containers, Components, Code

- *Levels* of detail

## Behaviour – Dynamic

- How elements *interact* to deliver features

## Infrastructure – Deployment

- How system is *deployed* on computing platforms

## 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
- C4 – informal, simple structure *[Brown, 2023]*
- UML – formal, well-defined language *[uml, 2017]*
- You probably don't want to know about alternatives

*Reading...*

“Architectural Views” Notes<sup>1</sup> *[Thomas and Webb, 2023]*

---

<sup>1</sup>Remember, I said you had to read the notes.

## References

[iso, 2011] (2011).

*ISO/IEC/IEEE 42010:2011.*

ISO.

[uml, 2017] (2017).

*Unified Modeling Language.*

OMG, 2.5.1 edition.

<https://www.uml.org/>.

[Bass et al., 2021] Bass, L., Clements, P., and Kazman, R. (2021).

*Software Architecture in Practice.*

Addison-Wesley, 4th edition.

[Brown, 2023] Brown, S. (2023).

*The C4 Model for Visualising Software Architecture.*

Leanpub.

<https://leanpub.com/visualising-software-architecture>.

- [Forum, 2018] Forum, T. O. G. A. (2018).  
*The Open Group Architecture Framework Standard*.  
The Open Group, 9.2 edition.  
<https://pubs.opengroup.org/architecture/togaf9-doc/arch/index.html>.
- [Kruchten, 1995] Kruchten, P. (1995).  
Architectural blueprints — the ‘4+1’ view model of software architecture.  
*IEEE Software*, 12(6):42–50.  
<https://www.cs.ubc.ca/~gregor/teaching/papers/4+1view-architecture.pdf>.
- [Team, 2020] Team, A. C. (2020).  
*NATO Architecture Framework*.  
NATO, 4th edition.
- [Thomas and Webb, 2023] Thomas, R. and Webb, B. (2023).  
*Architectural views*.  
<https://csse6400.uqcloud.net/handouts/views.pdf>.