DevDay 4

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Únete a las mujeres que desarrollan software grandioso

Visualizing Software Architecture

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What is software architecture?

Software Architecture Defined

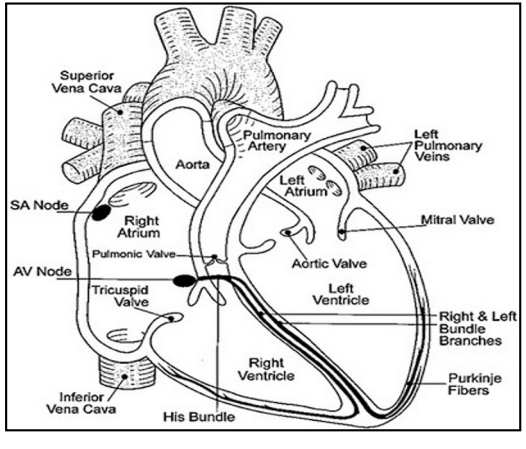
"The software architecture of a system is the ***set of structures*** *needed to* ***reason about the system****, which comprise* ***software elements, relations*** *among them, and* ***properties*** *of both."*

Len Bass, Paul Clements, and Rick Kazman.
Software Architecture in Practice (3rd ed.). Addison-Wesley Professional, 2012.

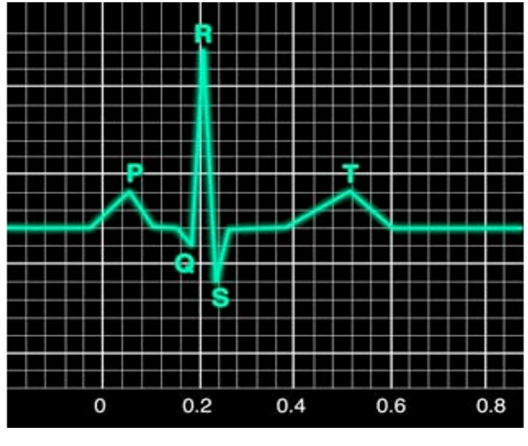
Structures …

Let's revise this analogy …

Human body comprised of multiple real structures

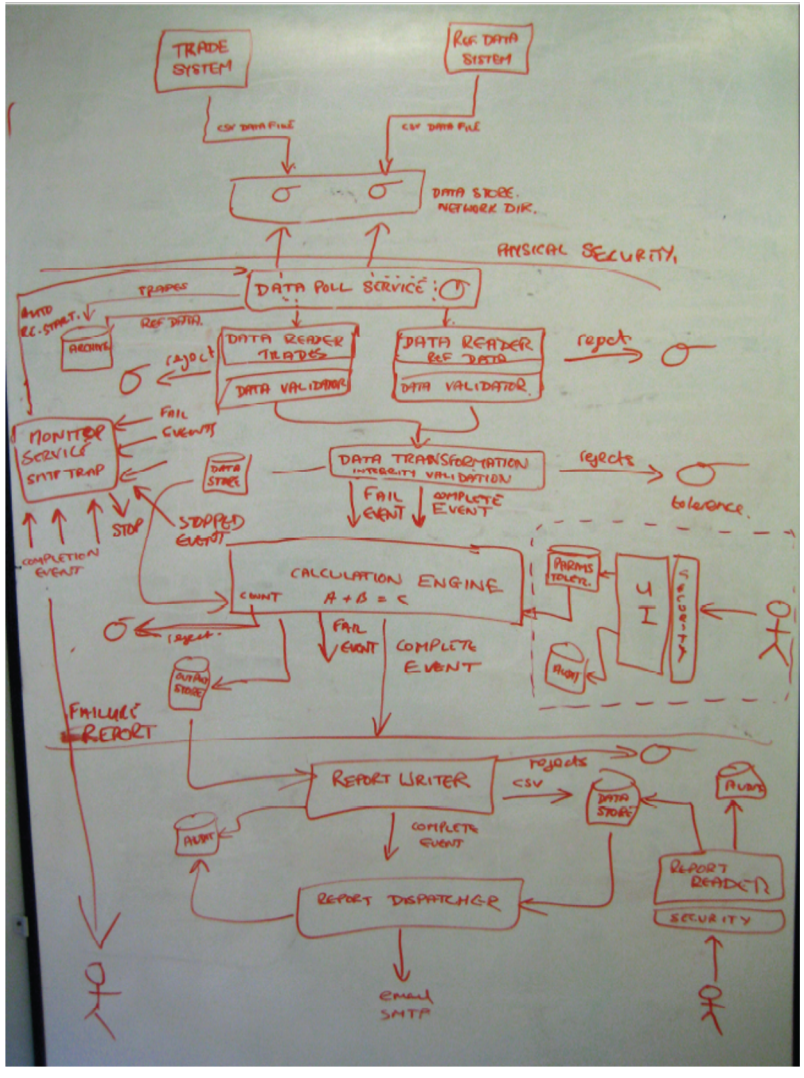


A **static view** of one human structure



A **dynamic view** of the same structure

It’s usually difficult to show **all structures**, from **all perspectives**, on a single representation



Architectural View

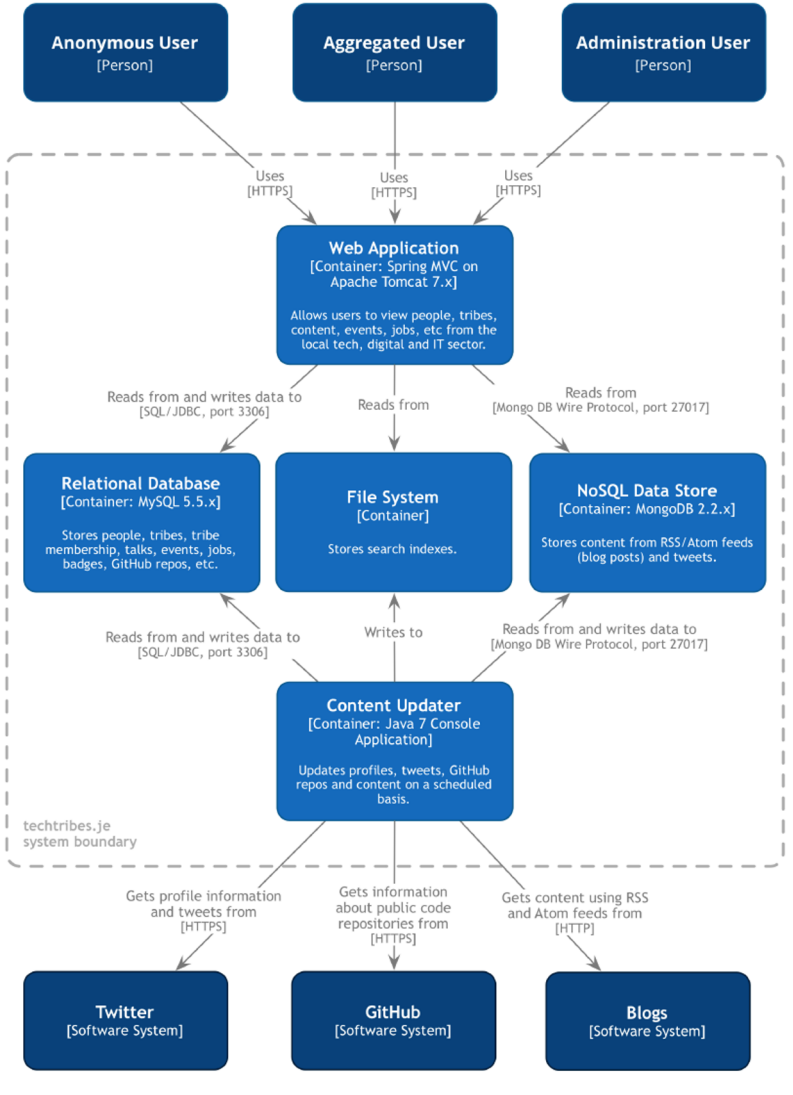
- A view is a diagram.
- A view is a abstract representation of one or more structures of an architecture that illustrates how the architecture addresses one or more architectural requirements.

Some well-known views are:

1. Static
2. Dynamic
3. Physical

Static View

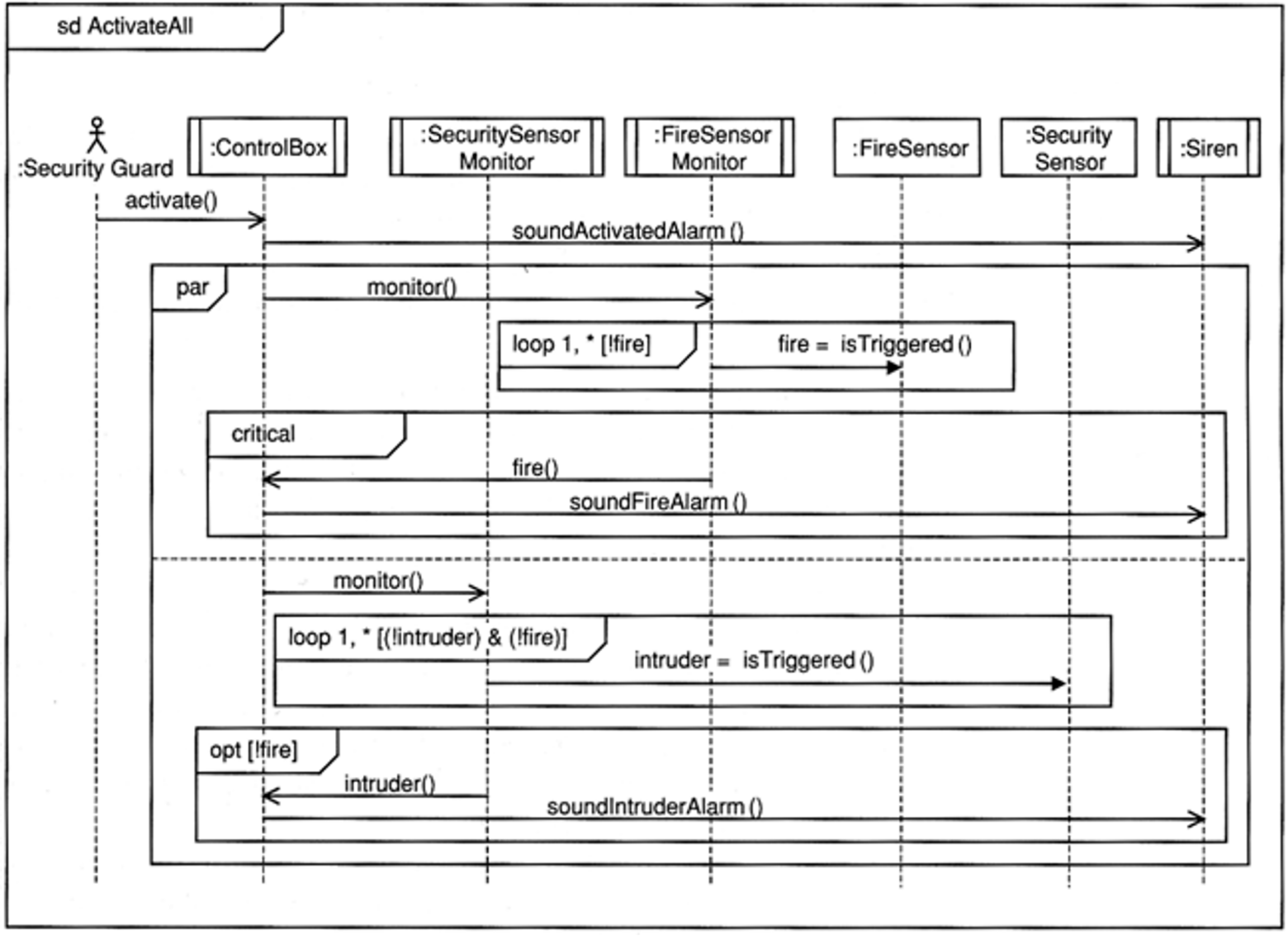
- A.k.a. Module, Logic View.
- Shows structures with elements and relationships that exist in development and correspond to implementation units.
- Shows the system partitioning and assignment of responsibilities.



Source: Simon Brown. 2016. Software Architecture for Developers - Volume 2. Leanpub.

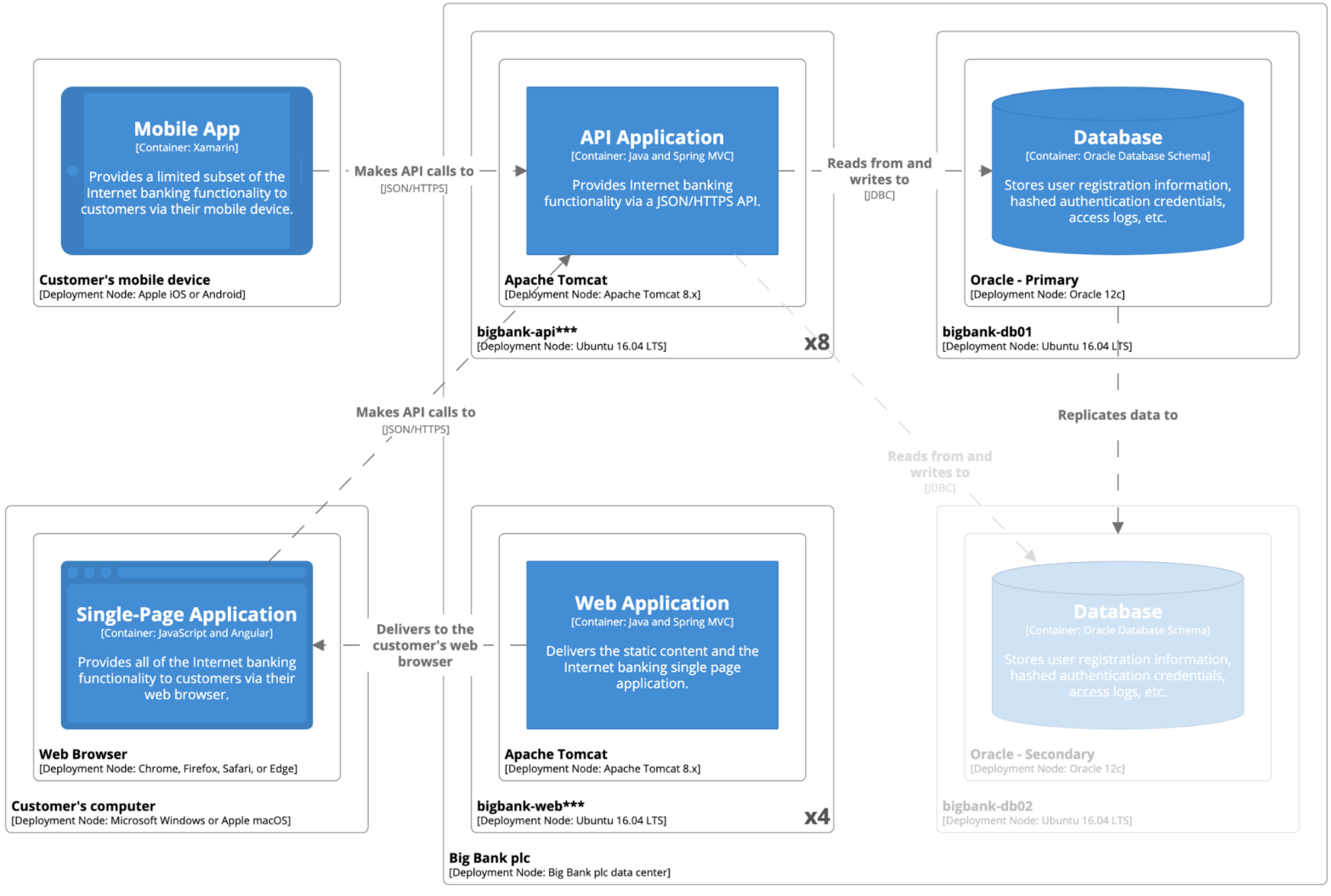
Dynamic View

- A.k.a. Components & Connectors View
- Shows structures with elements and relationships that exist in execution time.


sd ActivateAll
:Security Guard
:ControlBox
:SecuritySensor Monitor
:FireSensor Monitor
:FireSensor
:Security Sensor
:Siren
activate()
soundActivatedAlarm ()
par
monitor()
loop 1, * [!fire]
fire = isTriggered ()
critical
fire()
soundFireAlarm ()
monitor()
loop 1, * [(!intruder) & (!fire)]
intruder = isTriggered ()
opt [!fire]
intruder()
soundIntruderAlarm ()

Physical View

- A.k.a Allocation View
- Shows structures with elements and relationships that exist in deployment time.



Deployment diagram for Internet Banking System - Live

An example live deployment scenario for the Internet Banking System.
Workspace last modified: Wed Feb 05 2020 09:33:36 GMT+0100 (Central European Standard Time)

Abstractions

- Abstraction is about reducing detail; important characteristics are made more visible by leaving details aside.
- Abstractions help us reason about a big and/or complex software system

A common

set of abstractions/views

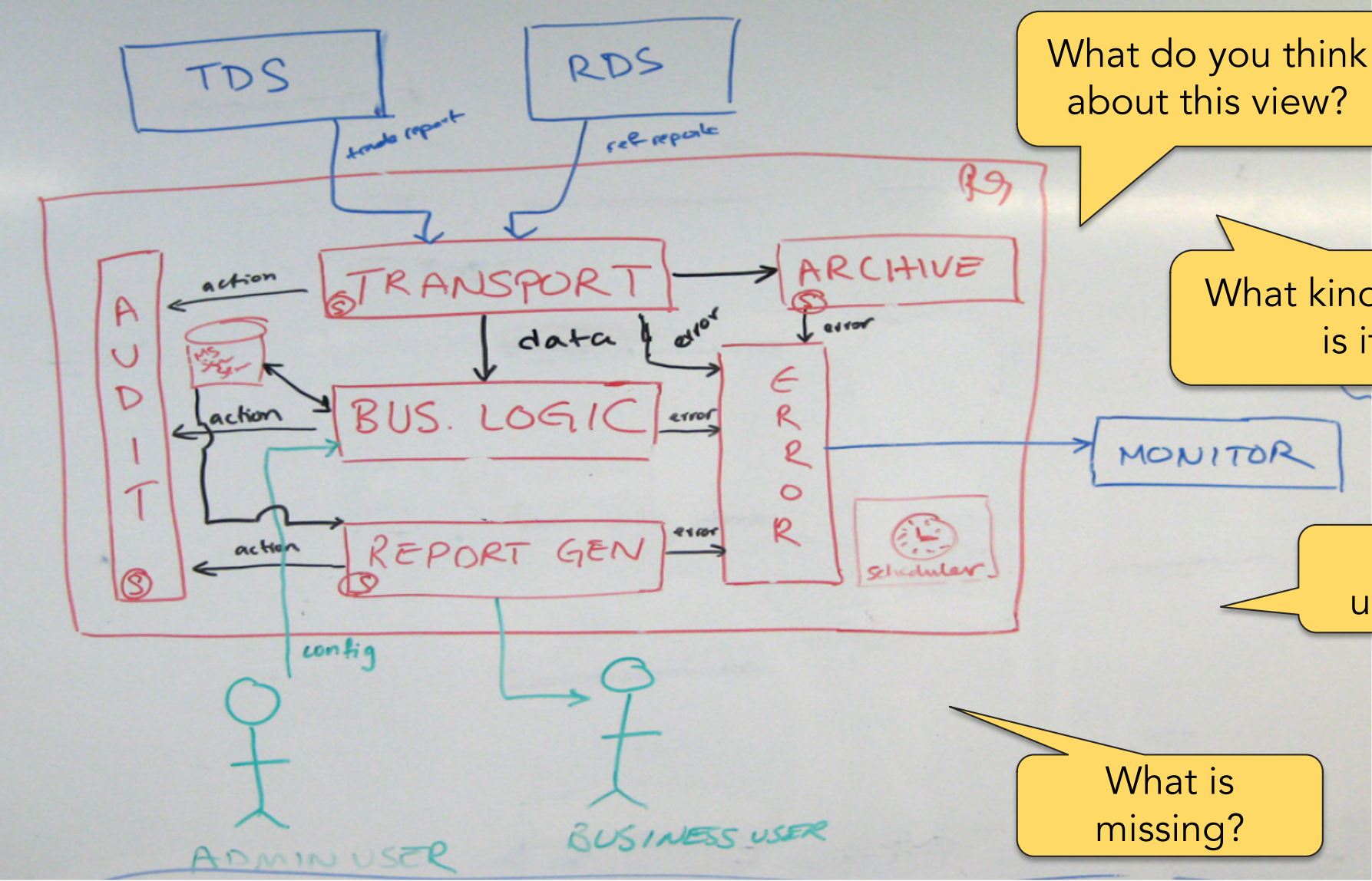
is more important

than a common notation

Simon Brown

Notations

- There are different notations for documenting architectural views
- Each notation has its benefits and shortcomings
- However, when using a notation for documenting a view, you must remember some important aspects ...

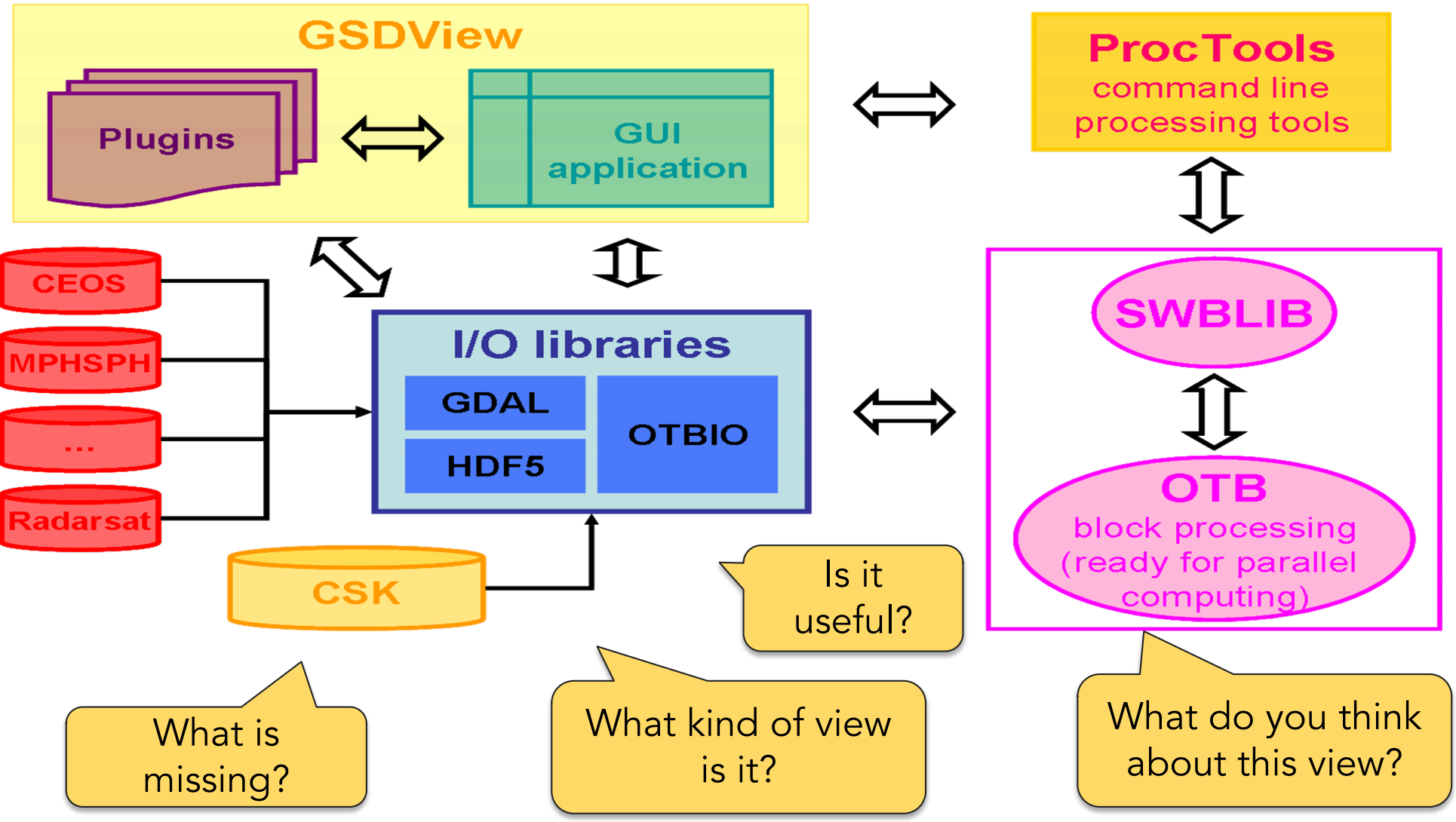


What do you think about this view?

What kind of view is it?

Is it useful?

What is missing?


GSDView
Plugins
GUI application
ProcTools
command line processing tools
CEOS
MPHSPH
...
Radarsat
CSK
I/O libraries
GDAL
HDF5
OTBIO
SWBLIB
OTB
block processing (ready for parallel computing)
Is it useful?
What is missing?
What kind of view is it?
What do you think about this view?

Software Architecture Defined

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Aspects to remember

General

- ❑ The view has a title
- ❑ It is clear the type of the view
- ❑ It is clear the scope of the view
- ❑ The view has a key/legend

Aspects to remember

Elements

- ❑ Every element has a name
- ❑ It is clear the type of every element? (e.g. software system, component, etc)
- ❑ It is clear what the element does
- ❑ Where applicable, it is clear the technology choices associated with every element
- ❑ It is clear the meaning of all acronyms and abbreviations
- ❑ It is clear the meaning of all shapes/icons
- ❑ It is clear the meaning of all border styles (e.g. solid, dashed, etc)
- ❑ It is clear the meaning of all element sizes (e.g. small vs large boxes)

Aspects to remember

Relationships

- ❑ Every line has a label describing the intent of that relationship
- ❑ Where applicable, it is clear the technology choices associated with every relationship? (e.g. protocols for communication)
- ❑ It is clear the meaning of all acronyms and abbreviations used
- ❑ It is clear the meaning of all colours used
- ❑ It is clear the meaning of all arrowheads used
- ❑ It is clear the meaning of all line styles (e.g. solid, dashed, etc)

Aspects to remember

Other

- ❑ Each view fits on one page
- ❑ Do not mix runtime and static elements in the same diagram
- ❑ There is more than one view to describe the whole system
- ❑ Keep structural and semantic consistency across diagrams

Notations

There are three main notations:

1. Informal
2. Semi-formal
3. Formal

c4model.com

Actualizar

The C4 model for visualising software architecture

Context, Containers, Components, and Code

In a hurry? Read the Wikipedia page and the 5 minute introduction to the C4 model at InfoQ

The C4 model for software architecture

O modelo C4 de documentação para Arquitetura de Software

用于软件架构的C4模型

ソフトウェアアーキテクチャのためのC4モデル

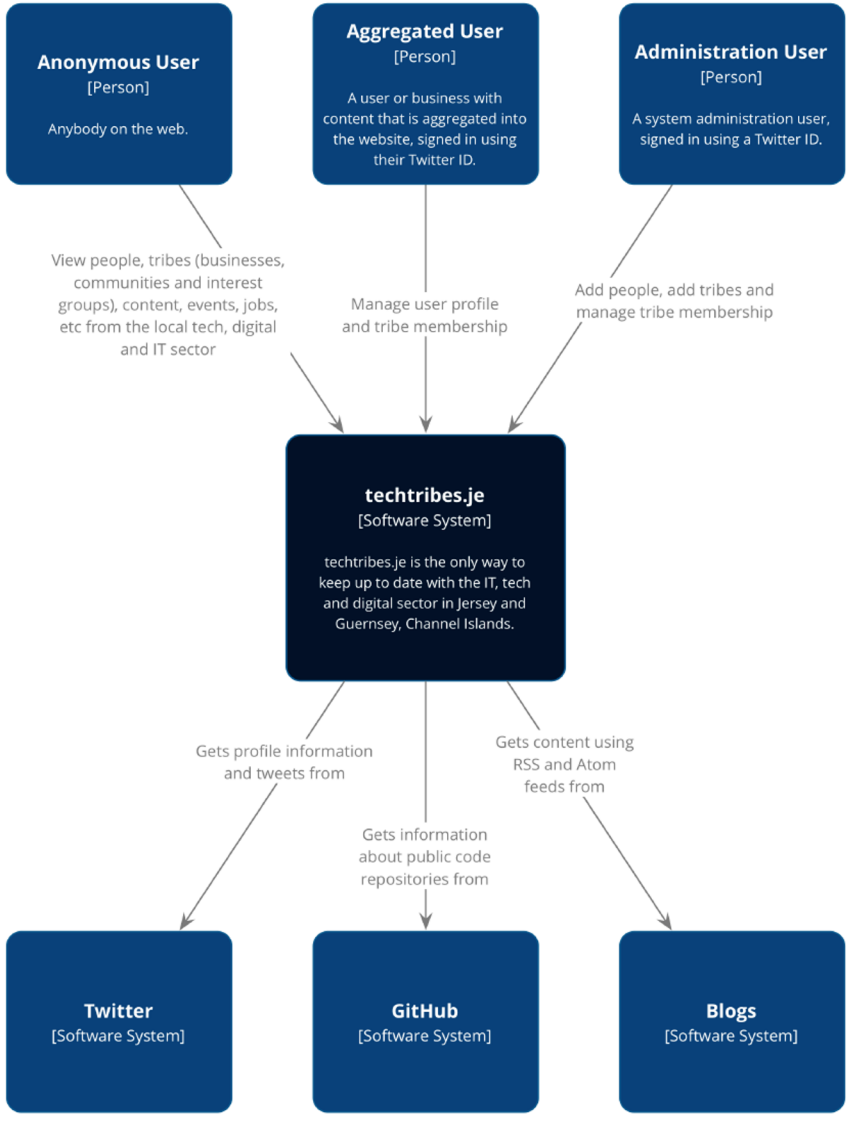
Uses and benefits

The C4 model is an easy to learn, developer friendly approach to software architecture diagramming. Good software architecture diagrams assist with communication inside/outside of software development/product teams, efficient onboarding of new staff, architecture reviews/evaluations, risk identification (e.g. risk-storming), threat modelling (e.g. STRIDE/LINDDUN), etc.

Or watch "Visualising software architecture with the C4 model"

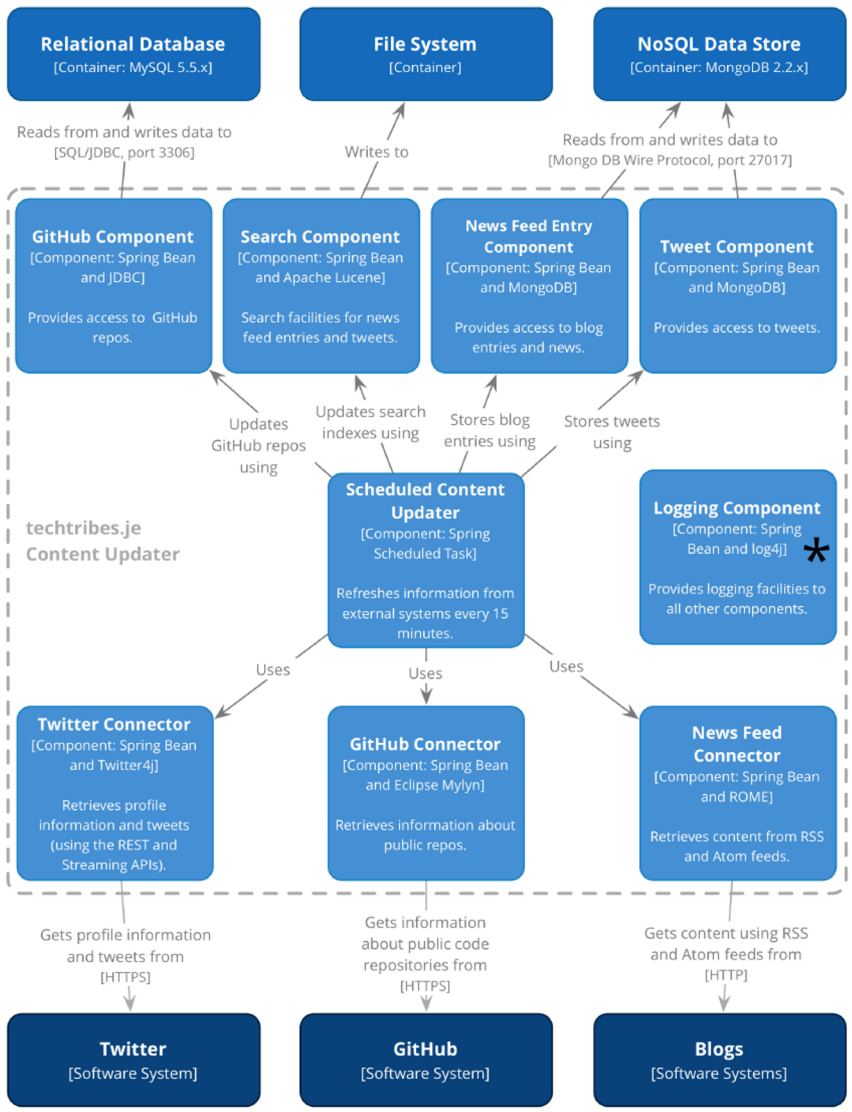
C4 Model

- Context: A high-level diagram that sets the scene; including key system dependencies and actors.
- Container: A container diagram shows the high-level technology choices, how responsibilities are distributed across them and how the containers communicate.
- Component: For each container, a component diagram lets you see the key logical components and their relationships.
- Classes: This is an optional level of detail and I will draw a small number of high-level UML class diagrams if I want to explain how a particular pattern or component will be (or has been) implemented.



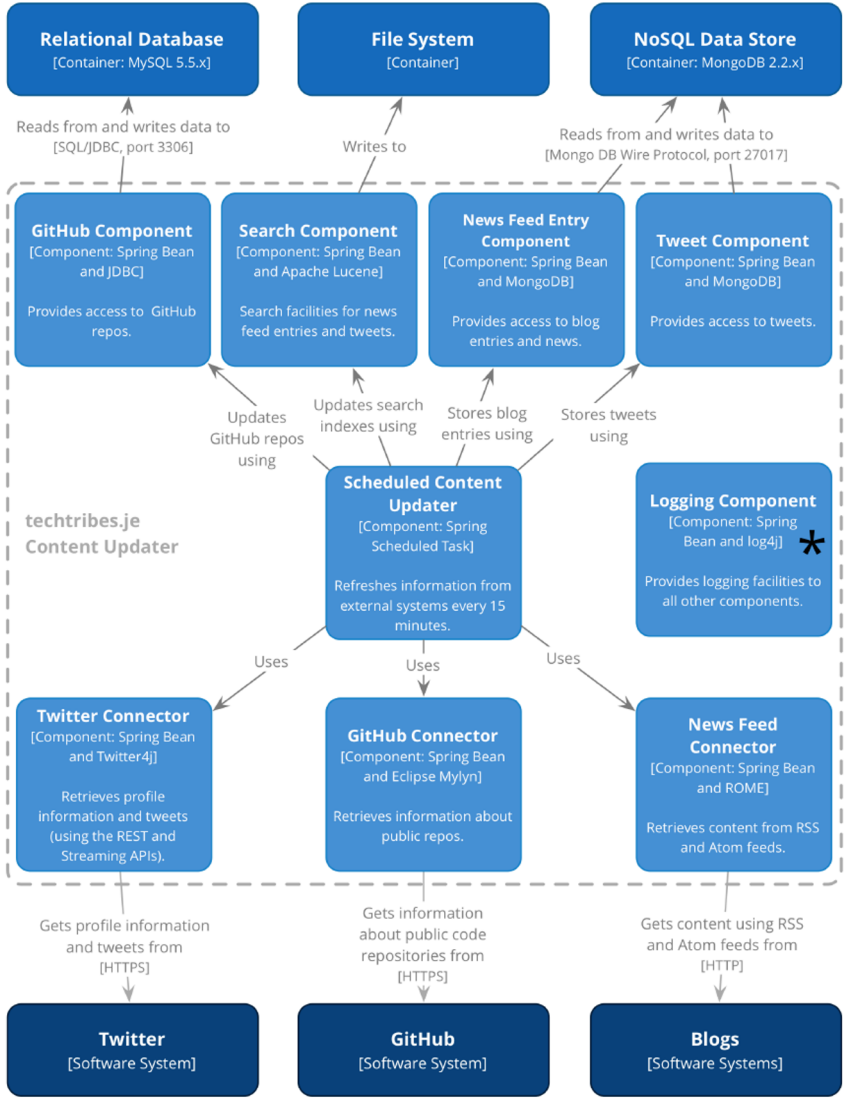
Context

Source: Simon Brown. 2016. Software Architecture for Developers - Volume 2. Leanpub.



Containers

Source: Simon Brown. 2016. Software Architecture for Developers - Volume 2. Leanpub.



Components

Source: Simon Brown. 2016. Software Architecture for Developers - Volume 2. Leanpub.

{name}
[Person]

{description}

{name}
[Software System]

{description}

{name}
[Container: {technology}]

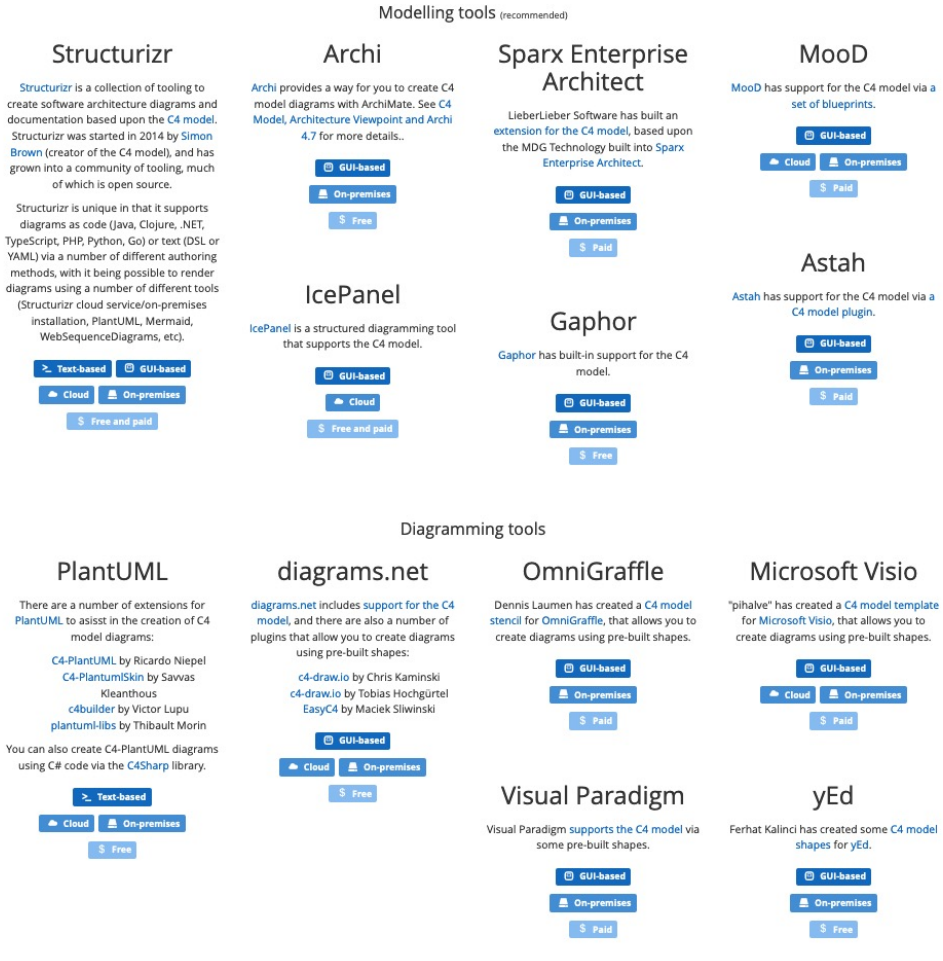
{description}

{name}
[Component: {technology}]

{description}

Tooling

For design sessions, you might find a whiteboard or flip chart paper better for collaboration, and iterating quickly. For long-lived documentation, the following modelling and diagramming tools can help create software architecture diagrams based upon the C4 model.



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“

Communication **works** for those who work at it ”

Speakers Dev Day 4 Women

DevDay 4 <WOMEN>

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Profesora @ Universidad Autónoma de Zacatecas

Visualización de la arquitectura del software