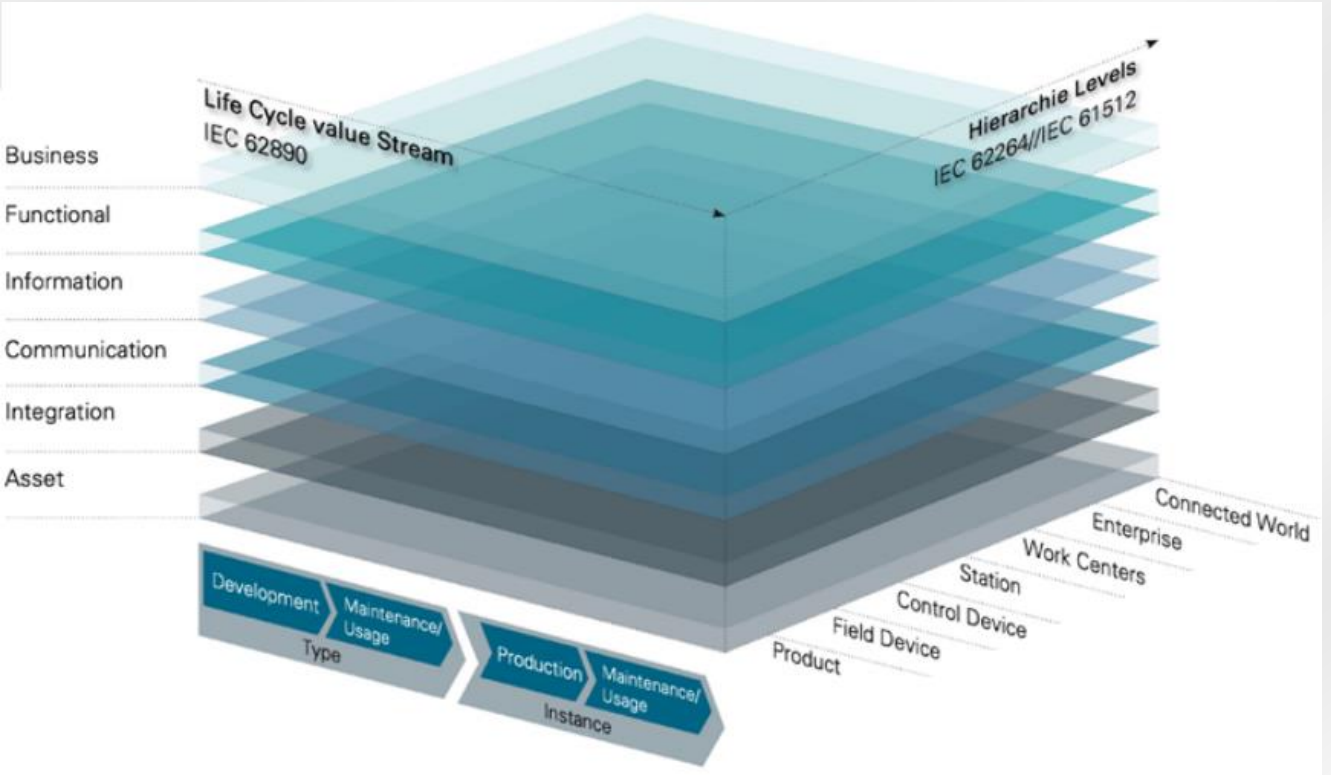
C4Model Documentation – Use case of DR Reporting Application

Design of abstraction layers resilient co-design process for software intensive systems.



IGT Infoglobaltech Inc

Serving the community through technology

Every technology resides in transformation; however, C4 Model Documentation is just a structured way of architectural design. It allows architectural visualization of abstract layers of details for developers, programmers, and architects.

C4 Model documentation describes application functionality, business goal of the project, at a glance. C4 Model Documentation supports co-development of requirement and architectural artefacts.

C4 Model Documentation is a proven approach to problem-solving and in particular for dealing with and managing complexity of hierarchical decomposition, separation of concern, categorization of requirements, requirements stability, traceability & rationales.

Once you want to start spanning and scaling across teams or you want to model your whole enterprise, your portfolio of systems needs at least a lot of duplication, and it becomes quite complicated.

You maintain a single model and the tool generates multiple diagrams automatically keeping all of them in sync whenever you change model. This works well for small systems, however for larger application landscapes, maintained by multiple development teams this leads to inconsistencies, across diagrams.

When technology upgrades, updating the version is not a challenge, however, it eliminates hardware & software complexity. It calibrates system integration nodes which eliminates the necessity of one or more application / interfaces. This brings the need to update the model. This new model should be consistent with all SysML, UML diagrams and documentation. C4Model Documentation consolidates all these diagrams into 4 diagrams, easy to re-sketch, demonstrate, and upgrade. C4Model Documentation – DR Reporting application is a collaboration of elites Group enterprise architects, Software architects, Engineers, Business Analysts to create architecture view of DR Reporting Application.

DR Reporting application is one of the most vigilant software applications of JMMB Group having core dependencies (software systems, database, web services, .Net Windows Application). DR (Dominican Republic) Reporting application is C# .Net regulatory reporting software application of JMMB Group. For JMMB's programmers, developers, and architects to refer to (a document), while development process reduces functioning conflicts, application behavior, datasource misinterpretations. C4 Model Documentation from Context to Code assists these personnels with more than one functionality perspective of DR Reporting application.

JMMB Group (Jamaican Money Market Banking) has more than 46000 user-base, serving in Jamaica, Trinidad, Tobago, Dominican Republic. One of the most prominent feature of DR Reporting application is selecting, generating reports in a single click. It uses SMTP/ WDSL/ SOAP protocol to send reports using email system.

C4 Model refers to solution oriented architecture, provisions visually dynamic architecture view for developers and architects to refer to before diving deep into the source-code. C4 Model employs a hierarchy of four abstraction layers, in order to support management of a high system complexity. The highest layer (Context) considers the embedding of the system into its operational environment. The other layers focus on the logical decomposition of the system, the hardware/software partitioning of the system and the deployment of the system to a hardware/software platform.

Architecture designs guide through co-development of requirements. C4Model defines requirements artefacts (goals, scenarios, and solution-oriented requirements) and architectural artefacts for each abstraction layer and structures the development process of these artefacts into three co-design processes: the system layer co-design, function layer co-design, hardware/software (component) layer co-design. Each co-design process comprises five sub-processes: the development of an initial requirements specification, the development of an initial architecture, the assignment of responsibilities to architectural components and definition of component requirements, the consolidation of the requirements and architectural artefacts and the definition of detailed, solution-oriented requirements based on the consolidated requirements and architectural artefacts.

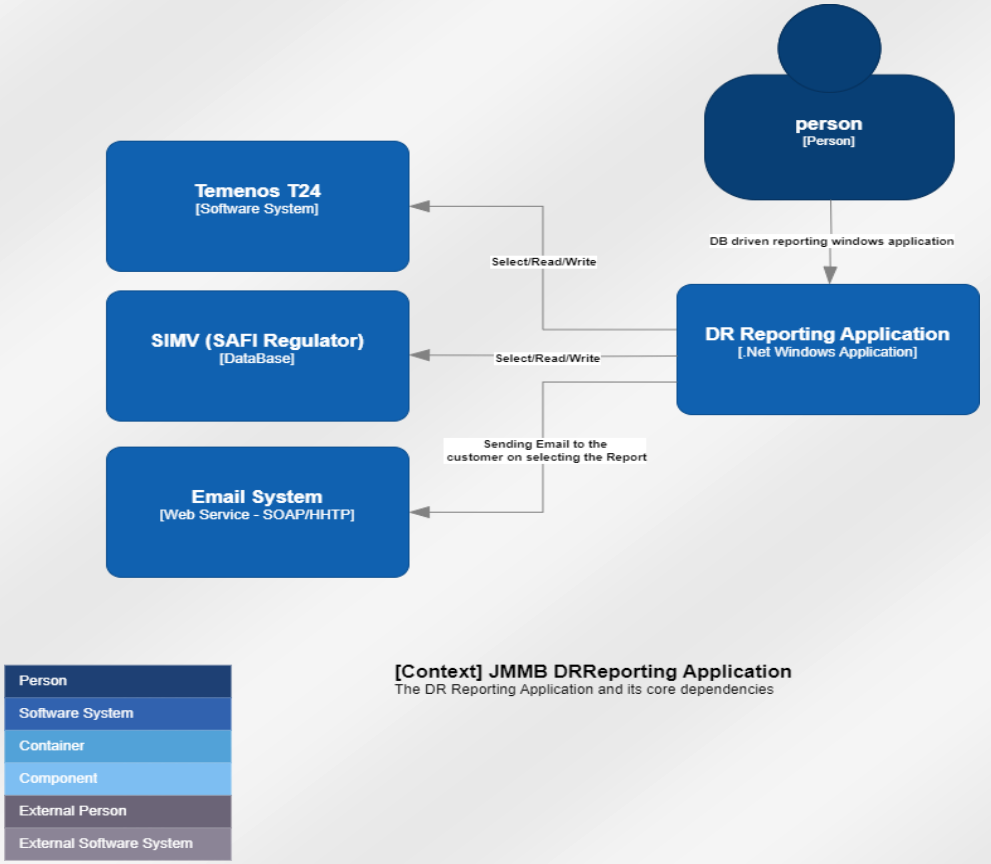
> "C4 Model - 'Diagram as code' is easy to author, define version control, collaborate and integrate into CI/CD etc."
>
> John Müirhead, Enterprise Architect - JMMB

Detailed requirements often hide implicit design decisions and assumptions made by stakeholders during defining the requirements. C4 Model describes, the working, communication, security protocol of application upfront. C4 Model has something of interest in it for all development representative roles,

- Software architects
- Software developers
- Operations and Support system
- Testers
- Product Owners
- Product Managers
- Users
- Business Sponsors
- Potential Customers
- Potential investors
- Management

Context Diagram (Users, Systems, Dependencies)

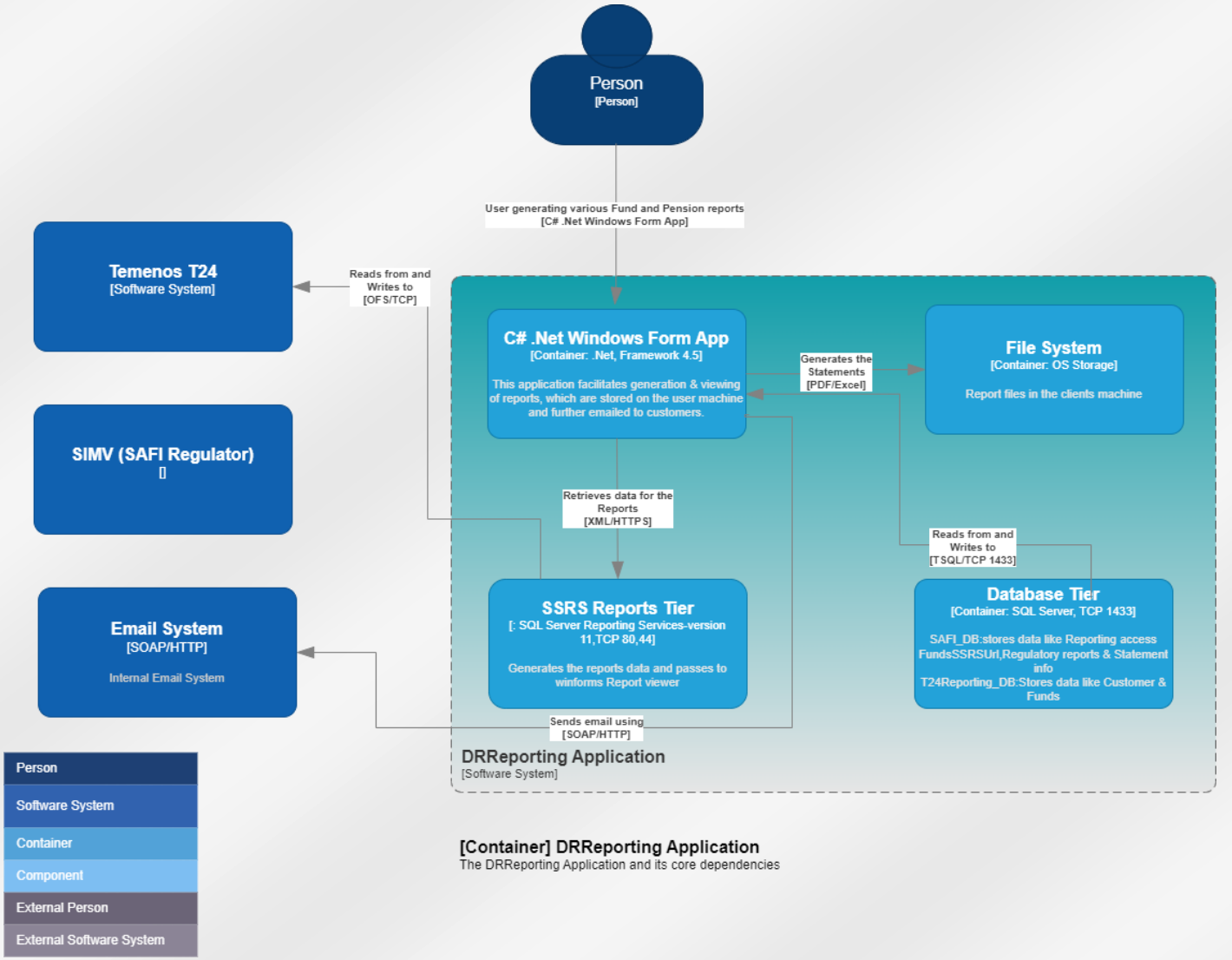
The topmost layer, the context layer defines the system to be developed. The system layer is concerned with the externally visible system functions and the interactions between the system and its environment. Context diagrams scope the software system for software developers.



The core dependencies for DR Reporting Application include T24 Temenos, SIMV [SAFI regulator], Email system. Context diagram helps us understand what the application is (.Net windows, a reporting application), it's main function (Selecting reports and sending to customer (using HTTP/SOAP protocol)) and required integration nodes.

Container Diagram

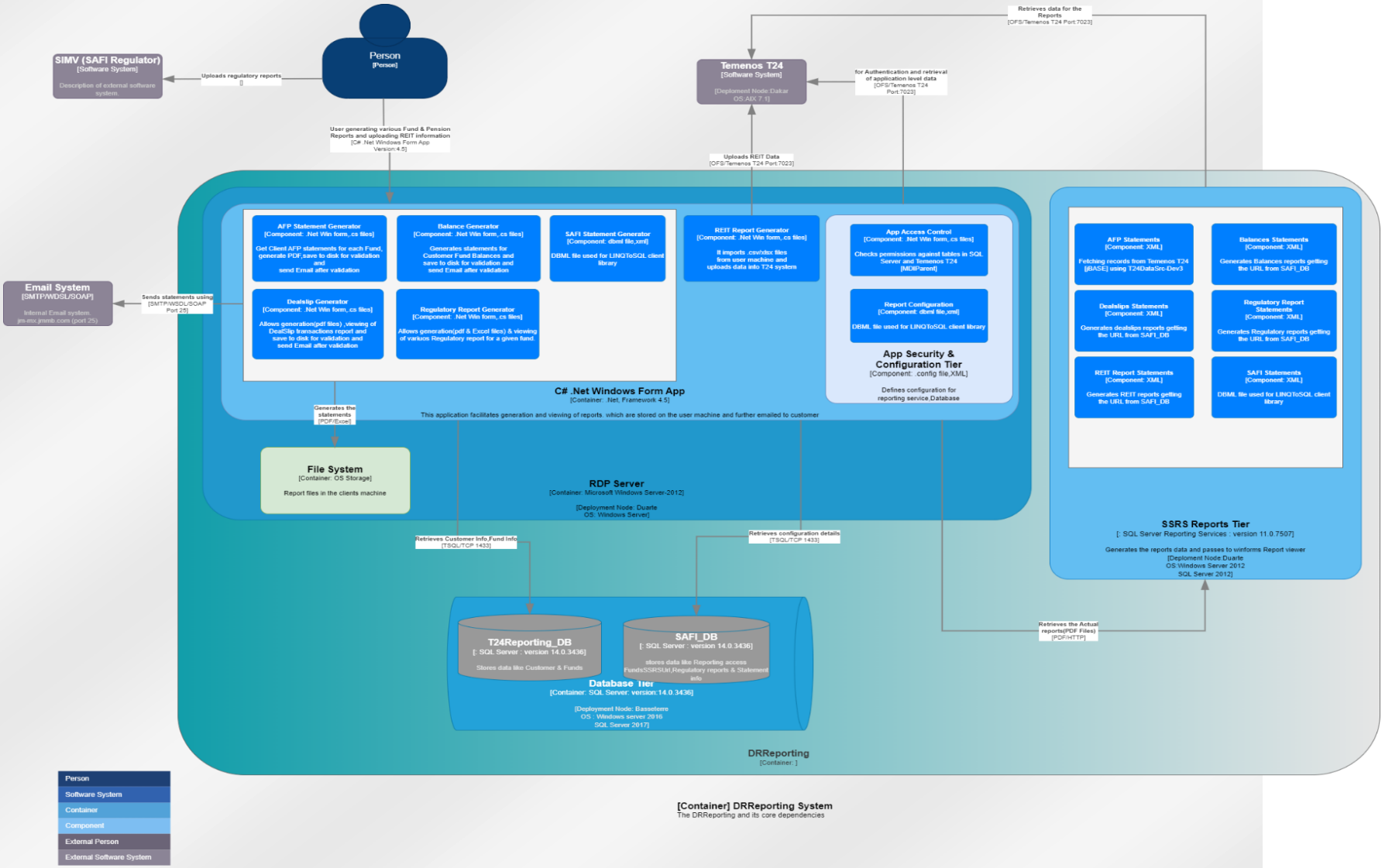
At Container layer, the system is decomposed into sub-system layer. Container diagram defines based on the interaction scenarios defined in system layer. Container diagram defines major building blocks for precise architecture decisions, how do they communicate? (OFS/TCP - HTTPS/XML), what are their responsibilities? With this overview it becomes easy to document specify functional requirements, expected behavior, data sources, interface needed and security protocol for system integration nodes.



[Container] DRReporting Application
The DRReporting Application and its core dependencies

Component diagram (Describes logical components, boundaries and interaction within containers)

At Component layer, the subsystems are decomposed into components. At component layer, the grouping sub-systems, processes, functional code (c#, Java, .NET their datastores, the technology main application is built with and system integration nodes is seen. It provides a quick reference for developers to know business objective that system must fulfil, through this knowledge, code writing process un-doubted becomes hassel-free.



At component layer DR Reporting Application's purpose, goals is grouped based on scripting language they are written in, into,
- REIT Report statements
- SAFI Statements
- DealSlips Statements
- Balances Statements
- Regulatory Reports
- AFP Statements
- T24Reporting_DB
- SAFI_DB

Code Diagram

The relationship between the architecture model and source code is complicated. The difference between them is model-code gap. It is mostly a refinement relationship, where the extensional elements in the architecture model are refined into extensional elements in source code. However, intentional are not refined into corresponding elements in source code. As we go top to bottom we include more & more details that help software developers navigate a large and/or complex database. C4 Model is Notation independent i.e use of UML, SysML, color coding, line style is not restricted.

For C4 Model diagram, a documenting activity was carried out describing DR Reporting application with process flow, sequence flow, class, entity relation diagram, to define low-level granularity of details. Number of SysML diagrams, data diagram, configuration details description in Code layer, for JMMB representatives assisted with co-development process.

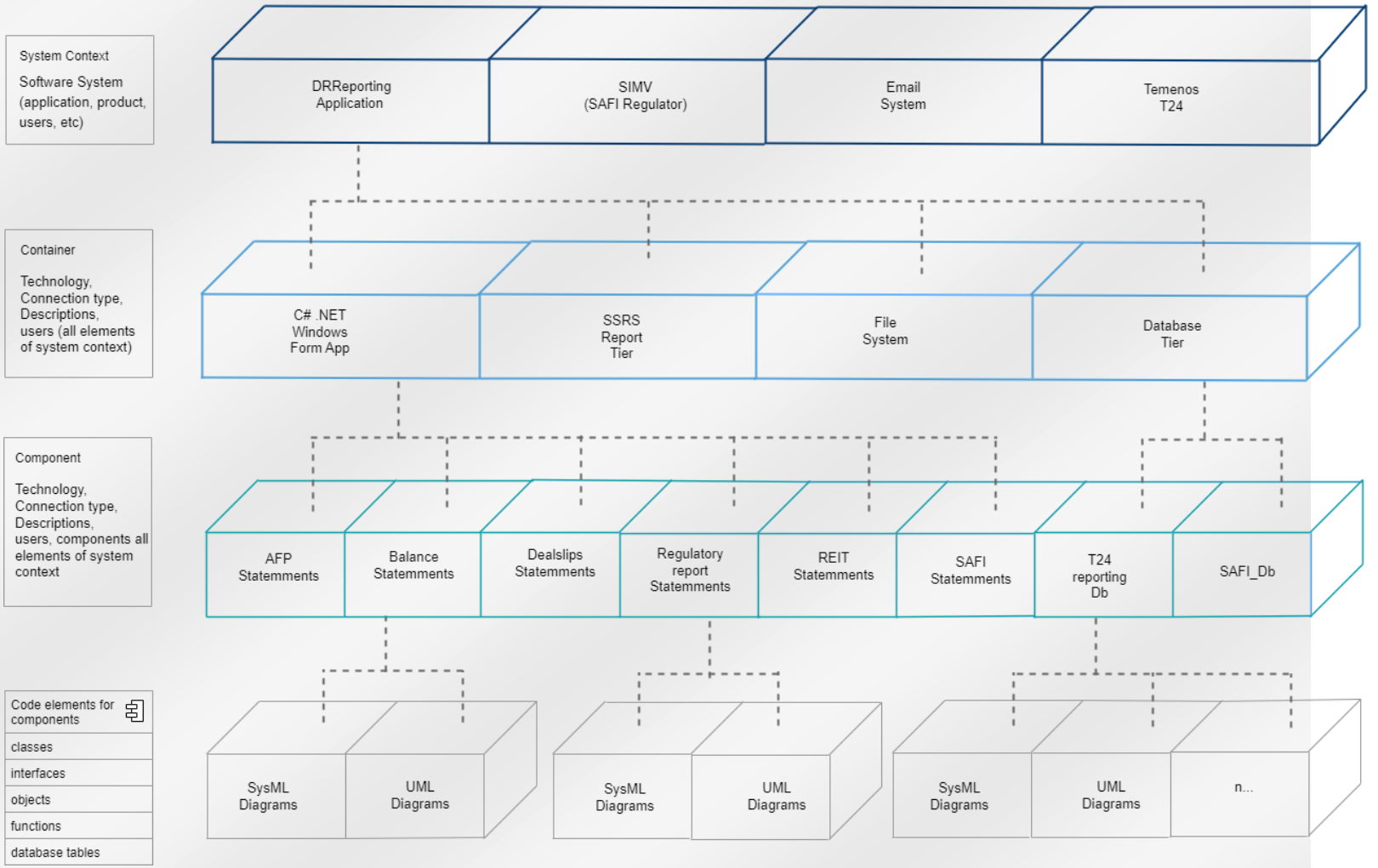
> "C4 Model Documentation is an architectural decision benefiting modeling, scaling and scoping. To integrate C4 Model macros to PlantUML is our second step towards this decision."
>
> Jeff Schappert, Delivery Director - JMMB

Customer and market needs demands software interrelations between the functions. C4 Model provides an architecture view that realizes these functions. The requirements for 'such' systems are defined at different levels of granularity. Requirements pertaining to system usage (by persons or other systems) are typically assigned to system layer whereas requirements pertaining to individual hardware or software pertaining to hardware/ software components are assigned to component layer.

C4 Model addresses two prominent challenges for making better architecture decisions.
Challenge 1: To clearly demonstrate hierarchy of clearly defined abstraction layers
Challenge 2: Dealing mutual influences between requirement and architectural artefacts

Role of IGT in DRReporting C4Model Documentation, was to analyze the functionality from code lines, classes and data structures for developers and engineers of JMMB, to make available technical reference document through this, some inputs were made available for the questions like, Is that what we're going to build? Is it going to work?

IGT's role was to assist JMMB with co-development process, document, fulfil the requirements, to specify functional requirements, behavior of the DR Reporting application. IGT in-acted C4Model to enable "Architecture Centric Requirement Elicitation" (ACRE).



IGT's role was to add a starting point through C4 Model documentation, list of libraries, Architecture design document, to identify and mitigate client's highest priority risks.

IGT's role was to provide C4Model - Hierarchical set of abstraction, documentation to representative role for concurrent co-development of requirement solution process.

Why to have a C4 Model Documentation from source code to system context?
C4 Model provides an Upfront design C4 Model assist, architecture decision making at primitive steps to help

✓ You understand the significant architectural drivers (requirements, quality attributes, constraints).	✓ You understand the context and scope of what you're building.
✓ You understand the significant design decisions (i.e technology, modularity, etc.)	✓ You have a way to communicate your technical vision to other people.
✓ You are confident that your design satisfies the key architectural drivers.	✓ You have identified, and are comfortable with, the risks associated with building the software

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