Zooming Out: The importance of UML diagrams

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Introduction

Goal: To create a visual representation of pieces of knowledge to aid in our understanding of how they are connected in **Drasil**.

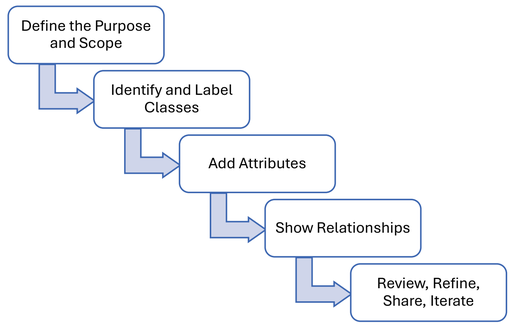
What I did: Created a hierarchy diagram to show how the **Chunks** relate to each other and the information they carry.

Background

What is **Drasil**? Drasil is a software framework written in Haskell that generates all software artifacts (requirements, design, code, tests, build scripts, documentation) based on a single specification in a domain-specific language (DSL).[1]

What is a **Chunk**? A Chunk is a fragment of knowledge that stores information. Chunks serve as building blocks in a hierarchical system, where each Chunk can be progressively "wrapped" with additional information to create more complex structures.

Design Process



How is it helpful?

Use: It allowed us to see the bigger picture. Made us re-think many of our assumptions about how the chunks are related to each other.

Benefits: Visual Representation: Provides a high-level overview of a system's design. Communication: Helps communicate the structure of the software to developers and stakeholders. Documentation: Serves as documentation for the system's architecture and design.

Diagram

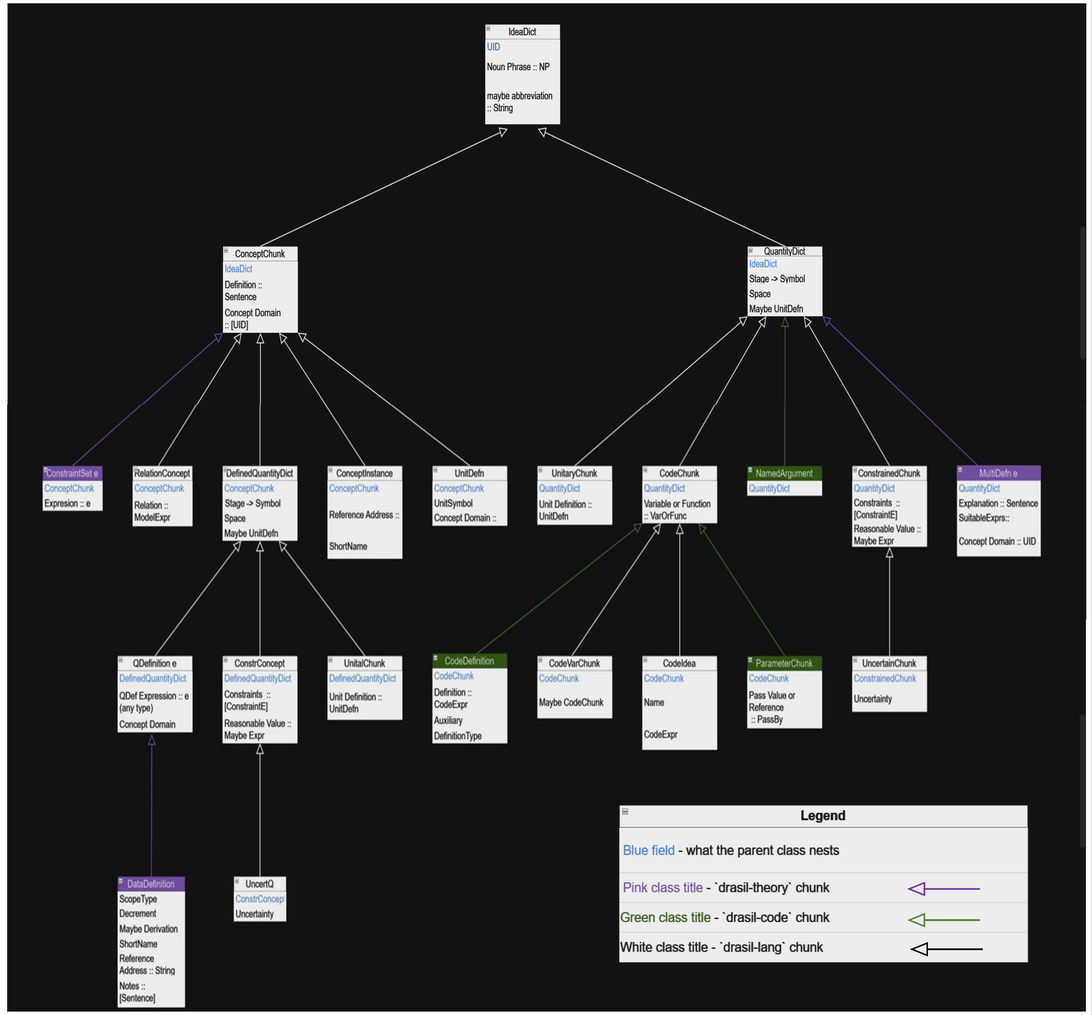


Figure 1: UML class diagram illustrating the Chunk hierarchy

What are the results?

- Changes:
  - Replaced ConceptInstance: Introduced an Abbreviations chunk instead.
  - Renaming:
    - IdeaDict -> Idea
    - ConceptChunk -> IdeaDef
  - Inheritance and Type System:
    - Removed QuantityDict, moved all inheritance to DefinedQuantityDict, and renamed it to Variable.
    - Added a type variable for the type system used.
  - Simplification:
    - Removed Stage -> Symbol from DefinedQuantityDict/Variable.
    - Removed Maybe UnitDefn from Variable.
    - Removed UnitalChunk completely.

Conclusion and Future Work

- The diagram helped to uncover issues within our project which has sparked new ideas for a re-design of our current Chunk hierarchy.
- The diagram aid used in an issue of the naming convention of our Chunks.
- Figure 2 shows one of the potential redesigns.

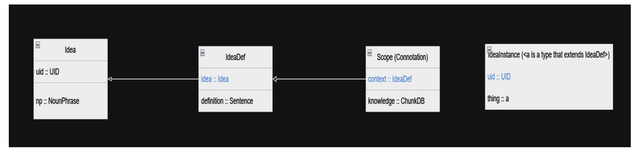


Figure 2: UML class diagram illustrating possible redesign of Chunk hierarchy

References

[1] D. Szymczak, S. Smith and J. Carette, "POSITION PAPER: A Knowledge-Based Approach to Scientific Software Development," 2016 IEEE/ACM International Workshop on Software Engineering for Science (SE4Science), Austin, TX, USA, 2016, pp. 23-26

Acknowledgements

Acknowledgements: I want to acknowledge the support of Dr. Carette and Dr. Smith in making this opportunity available to me and being available for guidance throughout the summer. I would like to acknowledge Jason Balaci for his guidance, for taking the time to help get me up to speed and for providing day–to–day advice and assistance. Lastly, I would like to thank the Dean of Engineering for a portion of my funding this summer