

CAS 703 Term Project: Validated General-Purpose Calculators

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Contents

1	Introduction	2
1.1	Objective	2
1.2	Tooling	2
2	Modelling	3
3	Integrated Development Environment	4
4	Model Validation	5
5	Model Management Operations	6
6	Reflection and Concluding Thoughts	7
	References	8

1 Introduction

For our term project in CAS 703 [1], we decided to build a language for describing calculation schemes. The descriptions should be mostly understandable to anyone who has worked with Excel [2] or has used any kind of calculation software. We aim to validate the coherence¹ of the calculator descriptions. Additionally, through generative techniques, we hope to decrease the barrier to entry (as much as we can) of basic software development of calculator programs by defining a transformation of the calculator descriptions to various programming languages².

1.1 Objective

We aim to:

1. design a metamodel for describing calculator programs (Section 2),
2. build a concrete syntax for the metamodel, and an Integrated Development Environment (IDE) for said concrete syntax (Section 3),
3. design a set of rules that define “coherence” rules of the metamodel and audit instances of the metamodel for coherence (Section 4), and
4. define a transformer that converts the calculator description into programs and corresponding documentation (Section 5).

1.2 Tooling

We will use the tooling shown in 703, namely: Eclipse Epsilon [3] and the languages it contains, and Xtext [4].

¹“Coherence” defined by an unambiguous set of constraints and rules.

²Notably, Java programs.

2 Modelling

3 Integrated Development Environment

4 Model Validation

5 Model Management Operations

6 Reflection and Concluding Thoughts

References

- [1] Richard Paige. *CAS 703 - Software Design*. A course at McMaster University during the Winter 2023 semester. 2023 (cit. on p. 2).
- [2] Microsoft Corporation. *Microsoft Excel*. 2023. URL: <https://www.microsoft.com/en-ca/microsoft-365/excel> (cit. on p. 2).
- [3] Eclipse Foundation, Inc. *Eclipse Epsilon*. 2023. URL: <https://github.com/eclipse/epsilon> (cit. on p. 2).
- [4] Eclipse Foundation, Inc. *Xtext*. 2023. URL: <https://github.com/eclipse/xtext> (cit. on p. 2).