

The Granule Project

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Collaborators

Augusta University

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A Taste of Granule

Team Augusta

The Problem

Are graded languages expressive enough to be a framework for substructural type systems?

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Substructural type systems

Treat variables as resources and allow for their restriction according to resource-usage constraints in types.

Substructural type systems

Programming Languages

- More theorems for free!
- Aid in code refactoring
- Concurrent communication (Session Types)
- Garbage Collection
- Information-flow control
- And more more.

Substructural type systems

Verification

- Effectual programs (Separation Logic)
- Concurrency constraints
- Security constraints
- Formalized Mathematics

Substructural type systems

We need the following logics:

- Linear Logic
- Affine Logic
- Contractive Logic
- Graded Modal logics
- Separation Logic

Substructural type systems

We need the following logics to pull this out:

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- Separation Logic ?

Substructural type systems

Quantitative:

- Linear Logic
- Affine Logic
- Contractive Logic
- Graded Modal logics

Non-Quantitative:

- Separation Logic

The Problem

Is there a graded type system that supports quantitative logics and non-quantitative logics?

The Solution

Yes! We control what has access to what through the grades as a default, and then degenerate to quantitative tracking of resources.

Graded Dependent Types

Working to extend graded type systems to dependent types which answers a long standing open question of how to combine substructural typing and dependent types.

Graded Dependent Types

The grades can be used to control resource-usage in specifications and in programs.

Thanks!

Granule Project: <https://granule-project.github.io/>

Twitter: @heades

Website: metatheorem.org