Project Proposal

Concepts of Program Design

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1 Background

- Reversible Computation

- Janus

- other languages

- a bit of theory

2 Problem

- Experiment

- Extensions

  - Data structures (trees/sets/maps/ADTs)
  - Prelude
  - Syntactic sugar

- Applications

  - Reverse Debugging
  - Graph search
  - Encoder-Decoder
  - Text editor
  - Reversible Interpreter

- Benchmarking

- – Janus vs rFun
- – LOC metrics
- Formal verification
  - – Reversibility
  - – Verifying pre/post-conditions
  - – r-Turing Completeness

3 Methodology

- Template Haskell [1]
  - – Embedding Janus
  - – Compile-time guarantees
    - ∗ Type-checking
    - ∗ Variable usage
- GHC Profiling
  - – Criterion package [2]
- Liquid Haskell [3]
  - – Theorem proving

4 Planning

- Milestones
- Division of labour

[1] https://wiki.haskell.org/Template_Haskell
[2] http://hackage.haskell.org/package/criterion)
[3] https://ucsd-progsys.github.io/liquidhaskell-blog/)