

Mnemosyne

A Functional Systems Programming Language

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What is Mnemosyne?

A functional systems programming language with compile-time memory management.

- ▶ But what does that mean?

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- ▶ **Functional programming** models computation as the evaluation of functions [3, 6]
- ▶ Focus on:
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 - ▶ Purity
 - ▶ Function composition

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- ▶ Focus on:
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 - ▶ Purity
 - ▶ Function composition
- ▶ Advantages:
 - ▶ Expressiveness [2, 3]
 - ▶ Modular (easy to test and parallelize) [2, 3]
 - ▶ Safe

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 - ▶ Language runtimes
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- ▶ High quality systems are necessary for high quality applications.
- ▶ But there are some significant challenges in this field [1, 5]

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- ▶ We'll discuss this in a moment
- ▶ First, some background

References



Jim Blandy. *Why Rust?* 1st ed. 1005 Gravenstein Highway North, Sebastopol, CA 95472.: O'Reilly Media, Inc, Sept. 2015. ISBN: 978-1-491-92730-4.



Paul Hudak and Mark P. Jones. *Haskell vs. Ada vs. C++ vs. Awk vs. ... An Experiment in Software Prototyping Productivity*. Research Report YALEU/DCS/RR-1049. New Haven, CT: Department of Computer Science, Yale University, 1994.



John Hughes. “Why functional programming matters”. In: *The Computer Journal* 32.2 (1989), pp. 98–107.



Thomas Narten. “Systems Programming”. In: *Encyclopedia of Computer Science*. Chichester, UK: John Wiley and Sons Ltd., pp. 1739–1741. ISBN: 0-470-86412-5.



Jonathan Shapiro. “Programming Language Challenges in Systems Codes: Why Systems Programmers Still Use C, and What to Do About It”. In: *Proceedings of the 3rd Workshop on Programming Languages and Operating Systems: Linguistic Support for Modern Operating Systems*. PLOS '06. San Jose, California: ACM, 2006. ISBN: 1-59593-577-0. DOI: 10.1145/1215995.1216004.



David S. Wise. “Functional Programming”. In: *Encyclopedia of Computer Science*. Chichester, UK: John Wiley and Sons Ltd., pp. 736–739. ISBN: 0-470-86412-5.