Advanced Programming

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February 14, 2024

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Definition

- Non-trivial programming?

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- Programming using non-trivial languages?

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- Programming using non-trivial concepts?

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  - Introspection/Intercession

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  - Meta-programming

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  - Lazy evaluation

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- Programming without ChatGPT?

Example: The Julia Language (2012)

- MIT's language for scientific computing
- Dynamic type system
- First-class types
- Multiple dispatch
- Lisp-like macros and other metaprogramming facilities
- Designed for parallelism and distributed computation
- Coroutines
- User-defined types are as fast and compact as built-ins
- Automatic generation of efficient, specialized code
- Read-eval-print-loop

Example: The Verse Language (2022)

- Epic Games' language for the Metaverse
- Static type system
- First-class types
- Functional programming
- Logic programming
- Existential variables
- Unification
- Multiple values
- Transactional
- Lenient evaluation

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In Norman Meyrowitz, editor, *Proceedings of the 2nd Annual Conference on Object-Oriented Programming Systems, Languages and Applications (OOPSLA '87)*, pages 147–155, Orlando, FL, USA, October 1987. ACM Press.

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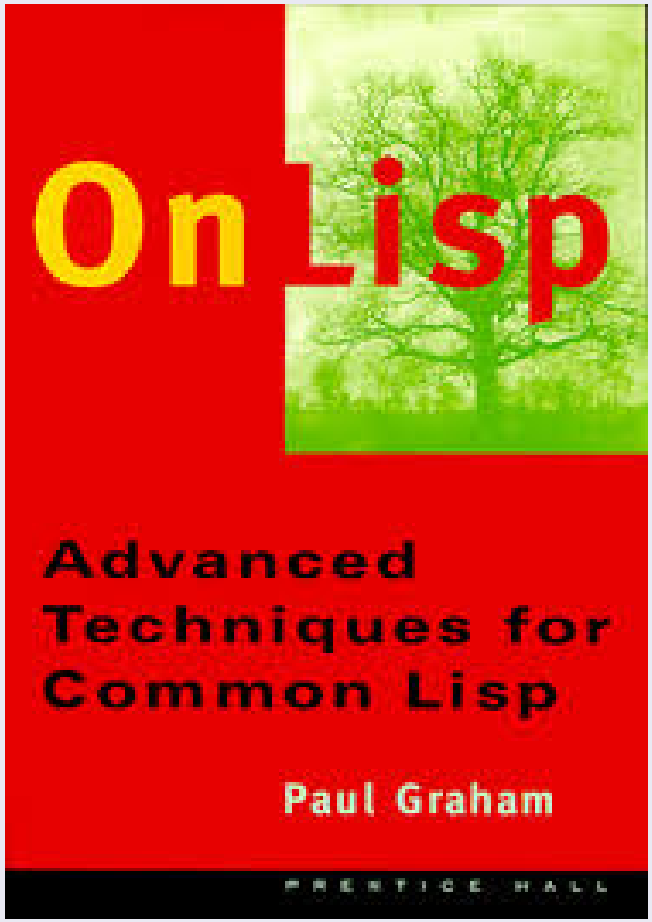

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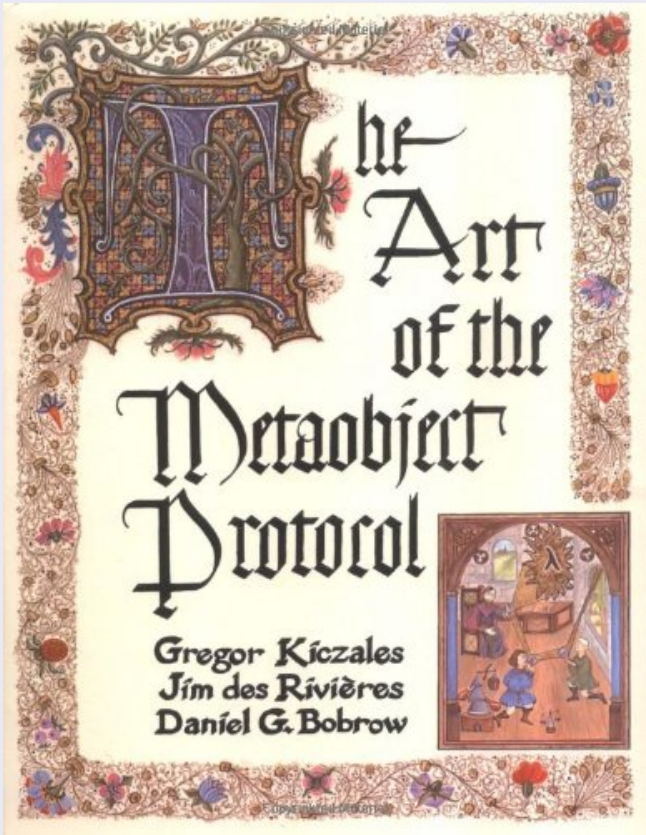

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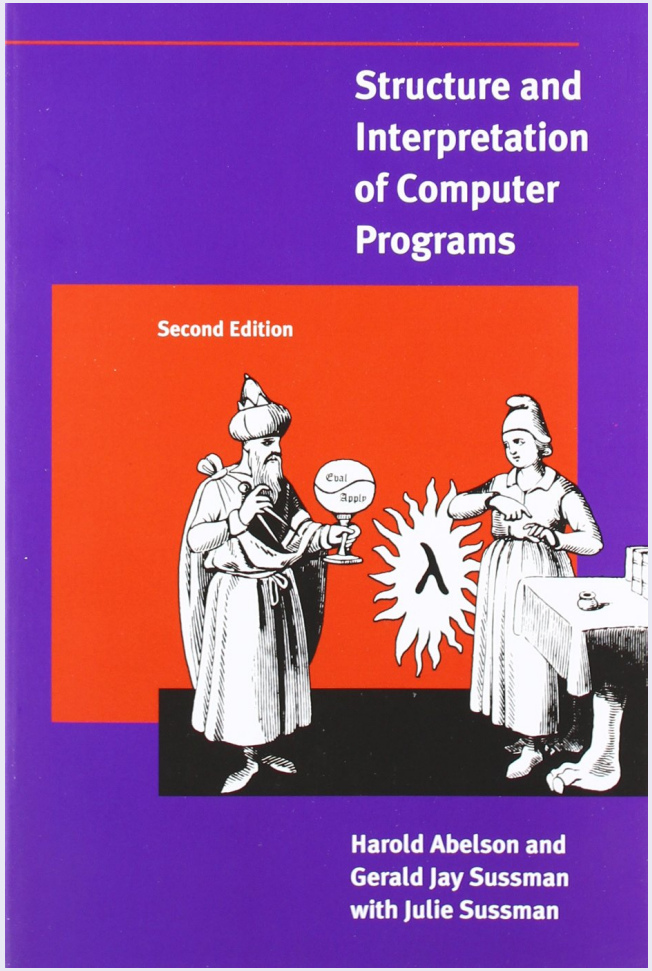

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Evaluation

Project

- One project
- 60%
- Groups of **three** or **four** students
- Weeks: 4, 5, 6, 7.
- With extensions, highest possible grade is 22.

Exam

- One exam
- 40%
- 2 hours

Projects

Examples

- Java Object Inspector
- Method Combination in Java
- AutoLisp in Scheme
- REPL for Java
- Common Lisp - Java Connection
- Scheme in Java
- Extensions to Java's Type System
- Multi-Methods in Racket
- Tracer for Java
- Debugger for Java
- Autoboxing profiler for Java
- Exception-handling in Julia
- Multiple-dispatch for Java
- Method combination in Julia
- Meta-Object Protocol for Julia

Projects

The singularity is near!

- An idea first proposed by Vernor Vinge in 1993 and popularized by Ray Kurzweil in 2005.
- When the development of AI reaches a point where it can improve and evolve on its own, without human intervention.
- This may lead to an acceleration in technological progress, leading to unprecedented and unpredictable changes in society.
- It already affected farmers, tourism operators, factory workers, etc, and is now affecting teachers, students, and programmers.

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Yeah, yeah, but

- Can I use ChatGPT/Copilot/Tabnine/Ghostwriter/etc to help me implement the PAva project?
- Yes, but be careful. Always check IST's *Code of Conduct*.

Finally

Questions?