

Thomas Ball, Benjamin Zorn (Microsoft):
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Communications of the ACM, 58(3), 2015

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Second, would-be programmers (CS majors or non-majors) should be exposed as early as possible to functional programming languages to gain experience in the declarative programming paradigm. The value of functional/declarative language abstractions is clear: they allow programmers to do more with less and enable compilation to more efficient code across a wide range of runtime targets.

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First, computer science majors, many of whom will be the designers and implementers of next-generation systems, should get a grounding in logic, its application in design formalisms, and experience the creation and debugging of formal specifications with automated tools. . .

White House Report on Secure Software (Feb. 2024)

<https://www.whitehouse.gov/wp-content/uploads/2024/02/Final-ONCD-Technical-Report.pdf>

Experts have identified a few programming languages that both lack traits associated with memory safety and also have high proliferation across critical systems, such as C and C++.

Cybersecurity solutions should be using secure building blocks; specifically, adopting memory safe programming languages.

... the transition to memory safe programming languages has a demonstrably positive effect on cybersecurity. Industry analysis has shown ... up to 70 percent of security vulnerabilities in memory unsafe languages ... are due to memory safety issues.

Anwendung funktionaler Sprachen

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Facebook:

- ▶ Sigma: automatische regelbasierte Erkennung von Spam u.ä.
- ▶ wurde in Haskell neu implementiert
- ▶ verarbeitet mehr als eine Million Anfragen pro Sekunde

<https://code.facebook.com/posts/745068642270222/fighting-spam-with-haskell/>

WhatsApp: implementiert in Erlang

X/Twitter: verwendet funktionale Konzepte aus Scala

React: front-end JavaScript library with declarative programming

...

↪ Webseite zur Vorlesung

Anwendung logischer Sprachen

Anwendung logischer Sprachen

IBM:

- ▶ Watson: KI-Programm zur Beantwortung von Fragen in natürlicher Sprache
- ▶ Quizsendung Jeopardy (Feb. 2011): gewann gegen zwei menschliche Gegner
- ▶ Sprachverarbeitung mit Prolog

https://de.wikipedia.org/wiki/Watson_%28K%C3%BCnstliche_Intelligenz%29

<http://www.cs.nmsu.edu/ALP/2011/03/>

[natural-language-processing-with-prolog-in-the-ibm-watson-system](#)

Anwendung logisch-funktionaler Sprachen

Anwendung logisch-funktionaler Sprachen

Moduldatenbank des Instituts:

<https://moduldb.informatik.uni-kiel.de/>

- ▶ einfachere APIs zur Web-Programmierung
- ▶ typsichere Datenbankprogrammierung

Epic Games (Fortnite,...):

- ▶ Programmiersprache Verse (Sweeney, Peyton Jones,... 2023)
- ▶ entwickelt als Programmierbasis der Spieleplattform
- ▶ Vortrag: <https://www.youtube.com/watch?v=0Jv8rFap0Nw>

Nutzung von funktionaler Programmierung

Neil Savage: *Using Functions for Easier Programming*

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<https://dl.acm.org/doi/10.1145/3193776>