한국정보과학회

프로그래밍언어연구회

겨울학교

SIGPL Winter School 2023

2023년 2월 22~24일

고려대학교

회상

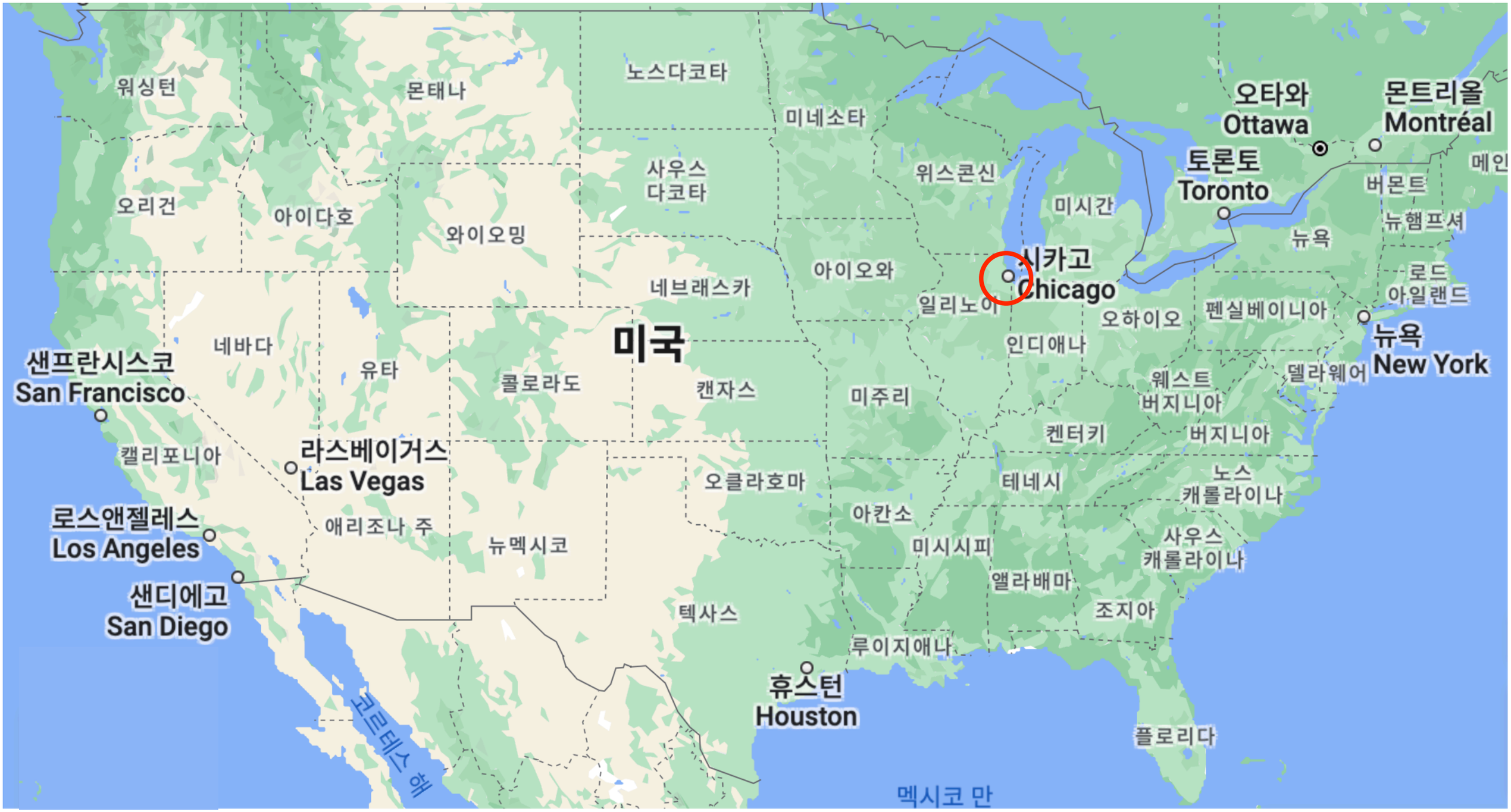
+

음악프로그래밍

한양대학교 ERICA

도경구

IE => CS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digital VAX 11/780

F

FORTRAN

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아칸소
미시시피
사우스
캐롤라이나

1984년 6월

IOWA STATE UNIVERSITY

Department of Computer Science

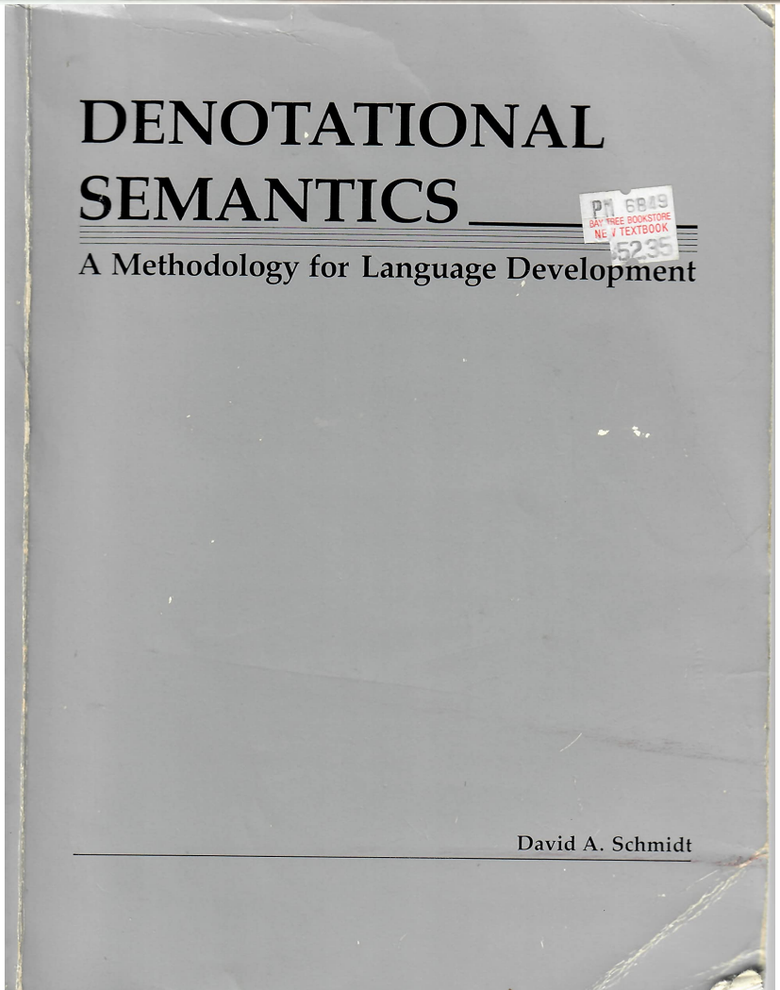
John Atanasoff

PASCAL

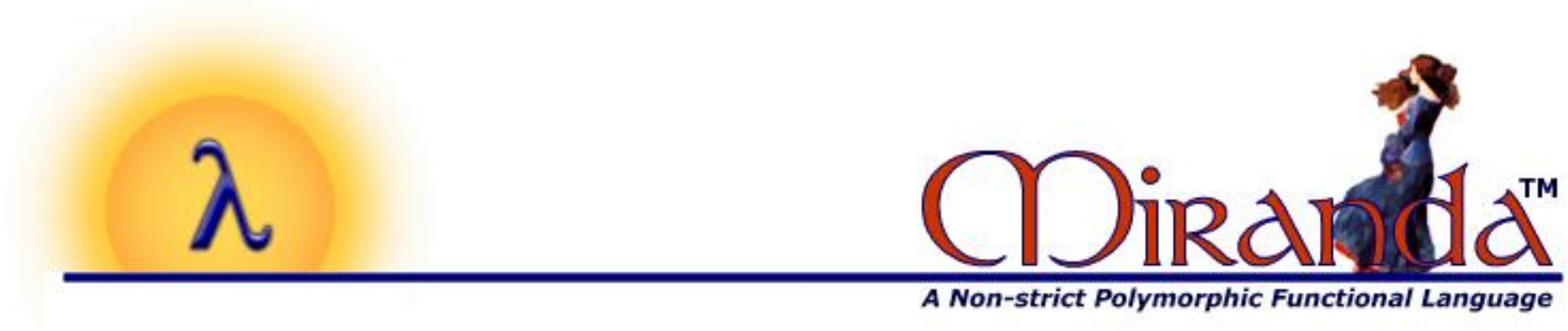

EC5274 SS/SD
СДЕЛАНО В БОЛГАРИИ
boedem
FLOPPY DISK
5.25 HD,DS
WRITE ENABLE
WRITE PROTECT

CS > PL

David A. Schmidt



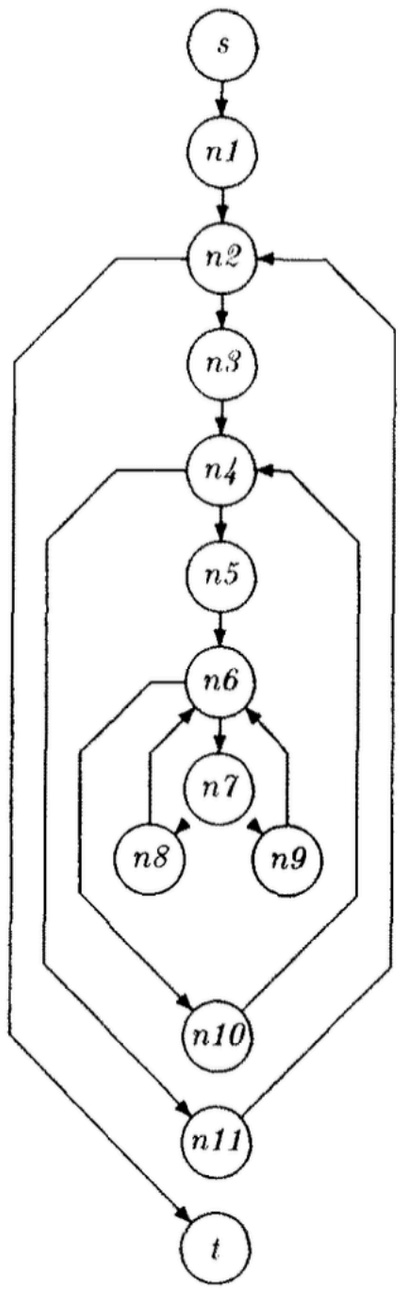
ML Interpreter by
Luca Cardelli



Master's Degree Report

Generating A Standard Representation From Pascal Programs

```
procedure Shellsort (var A: array[1..n] of integer );
var
   i, j, incr: integer;
begin
   incr := n div 2;
   while incr > 0 do begin
      for i := incr + 1 to n do begin
         j := i - incr;
         while j > 0 do
            if A[j] > A[j + incr] then begin
               swap(A[j], A[j + incr]);
               j := j - incr
            end
            else
               j := 0 (* break *)
      end;
      incr := incr div 2
   end
end (* Shellsort *) ;
```




```
((Shellsort,⟨A⟩,{n}),
 ({(s,⟨⟩,⟨⟩,({},{}),
   (n1,⟨(incr,⟨n,2⟩)⟩,⟨⟩,
      ({(:=,1),(div,1),(;,1),(begin...end,1)}, {(n,1),(incr,1),(1,1) }) ),
   (n2,⟨⟩,⟨incr,0⟩, ({(while...do,1),(>,1)}, {(incr,1),(1,1)} )),
   (n3,⟨(i,⟨incr,1⟩)⟩,⟨⟩,
      ({(+,1),(begin...end,1), (for...to...do,1)}, {(incr,1),(i,1),(1,1)}) )
   (n4,⟨⟩,⟨i,n⟩, ({},{(n,1)}) ),
   (n5,⟨(j,⟨i,incr⟩)⟩,⟨⟩,
      ({(:=,1),(-,1),(;,1),(begin...end,1)}, {(i,1),(incr,1),(j,1)}) ),
   (n6,⟨⟩,⟨j,0⟩, ({(while...do,1),(>,1)},{(j,1)}) ),
   (n7,⟨⟩,⟨A,j,A,j,incr⟩,
      ({(if...then,1),([],2),(+,1),(>,1)}, {(j,2),(a,2),(incr,1)}) ),
   (n8,⟨(swap,⟨⟨A,j⟩, ⟨A,j,incr⟩⟩),(j,⟨j,incr⟩)⟩, ⟨⟩,
      ({(swap,1),((),1),([],2),(,,1),(+,1), (;,1),(:=,1),(-,1),(begin...end,1)},
      {(j,2),(a,2),(incr,1)}) ),
   (n9,⟨(j,⟨0⟩)⟩,⟨⟩,({(else,1), (:=,1)},{(j,1),(0,1)}) ),
   (n10,⟨(i,⟨i⟩)⟩,⟨⟩, ({},{}) ),
   (n11,⟨(incr,⟨incr,2⟩)⟩,⟨⟩, ({(:=,1),(div,1),(;,1)}, {(incr,2),(2,1)}) ),
   (t,⟨⟩,⟨⟩,({},{}))},
 {(s,n1),(n1,n2),(n2,n3),(n2,t),(n3,n4),
      (n4,n5),(n4,n11),(n5,n6),(n6,n7),
      (n6,n10),(n7,n8),(n7,n9),(n8,n6),
      (n9,n6),(n10,n4),(n11,n2)},
 s,
 t))
```

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아칸소
미시시피
사우스
캐롤라이나


Kansas State University
Founded 1863

1987년 1월

Olivier Danvy

David A. Schmidt

George Strecker

Partial Evaluation

Denotational Semantics

Category Theory

Functional Programming

Type Theory

Static Analysis

The Mathematical Foundations of Programming Semantics

Semantics-Based Compiler Generation

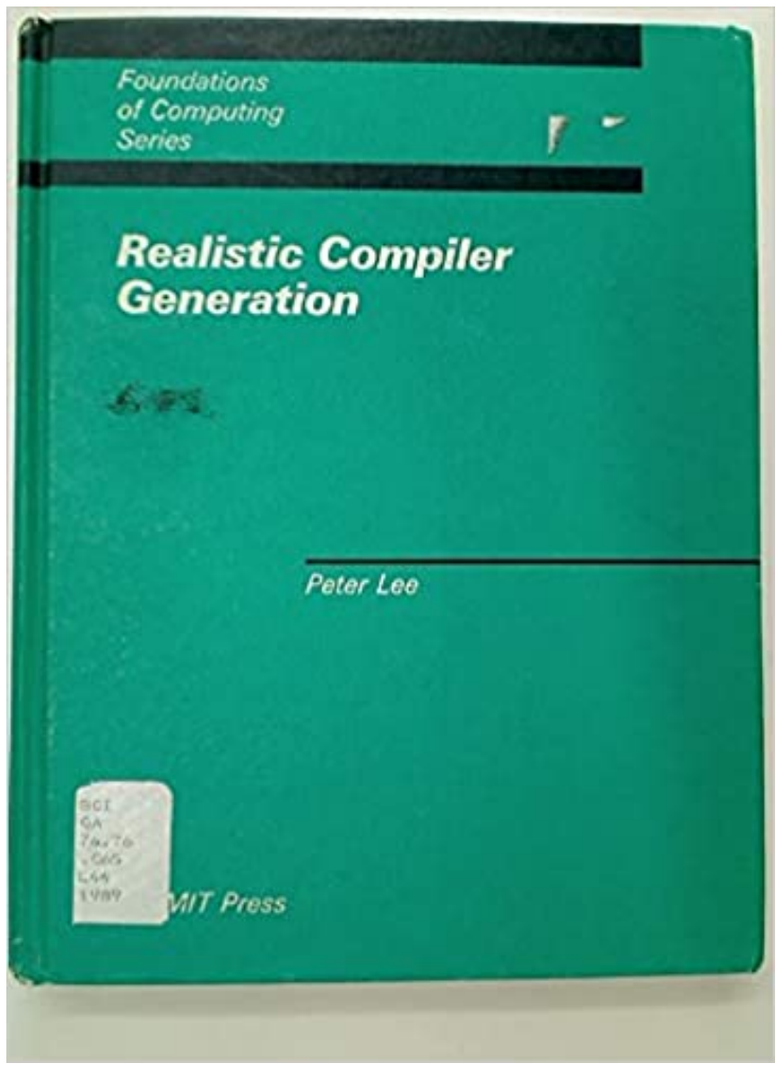
Neil D. Jones

David A. Schmidt

Compiler Generation from Denotational Semantics

Semantics-Based Compiler Generation

Peter Lee



Programming Language Designer’s Workbench

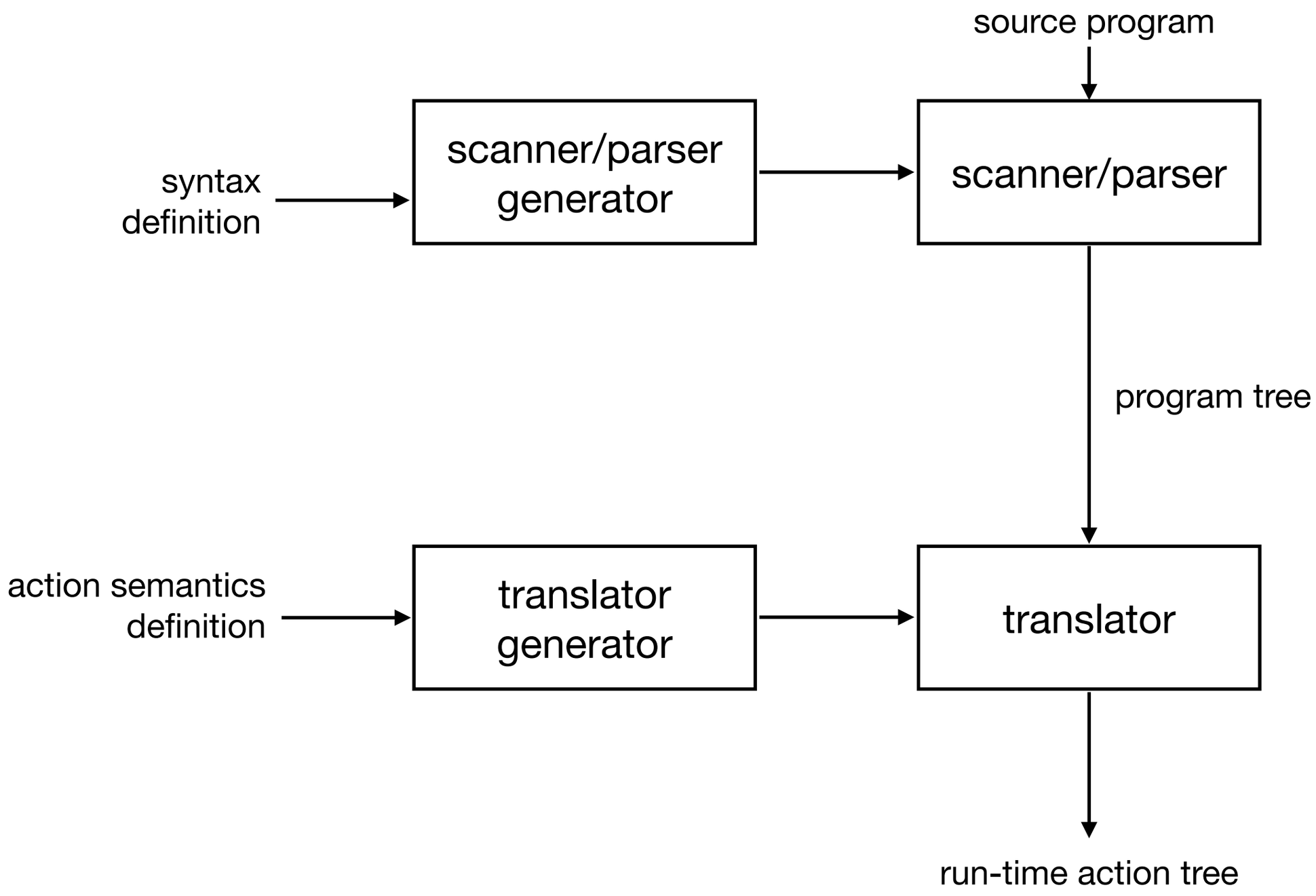
Semantics-Based Compiler Generation

Peter D. Mosses

Algebraic Semantic Algebra ⟶ **Action Semantics**

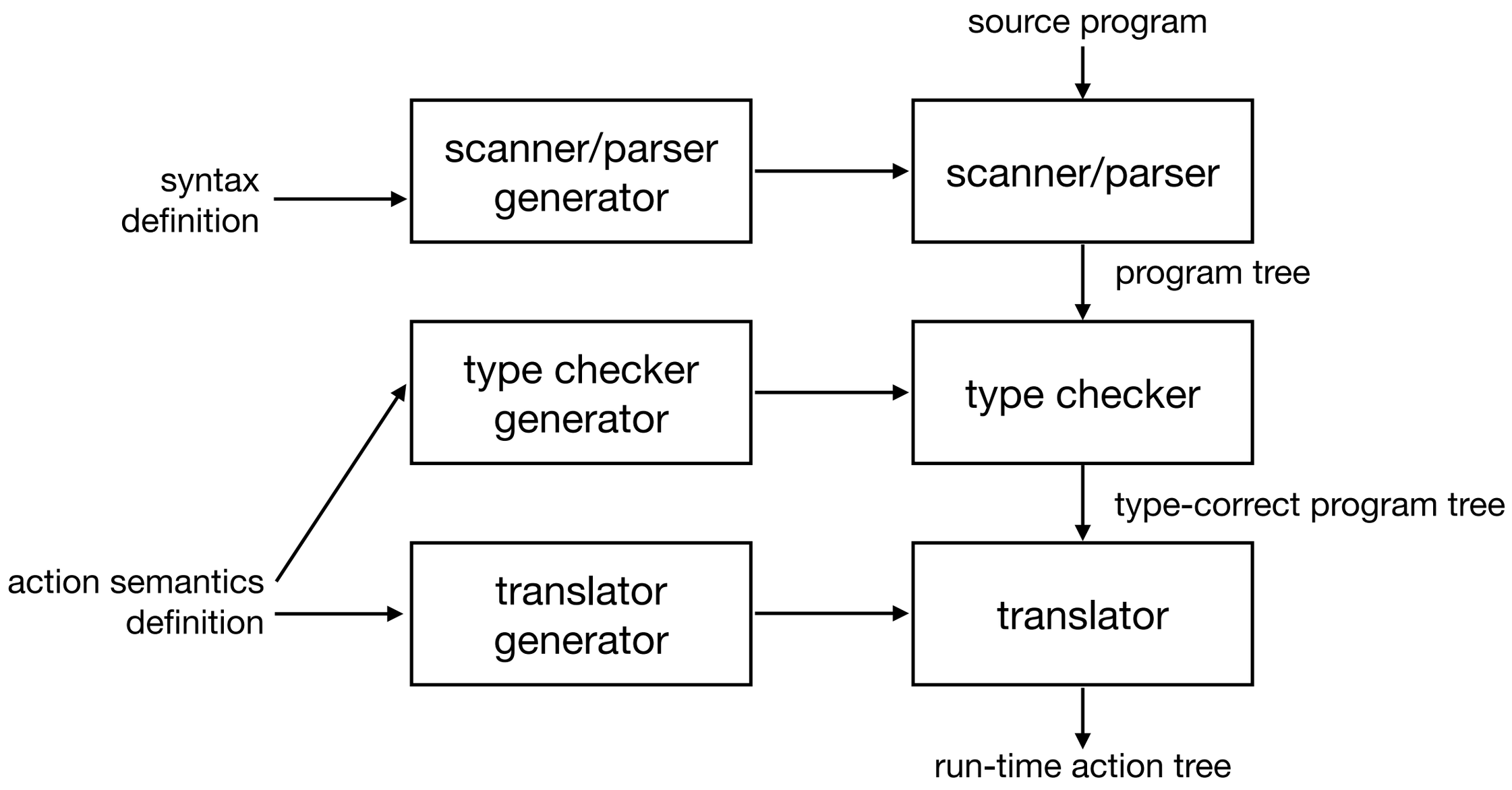
PhD Dissertation

Action Semantics-Directed Prototyping



PhD Dissertation

Action Semantics-Directed Prototyping



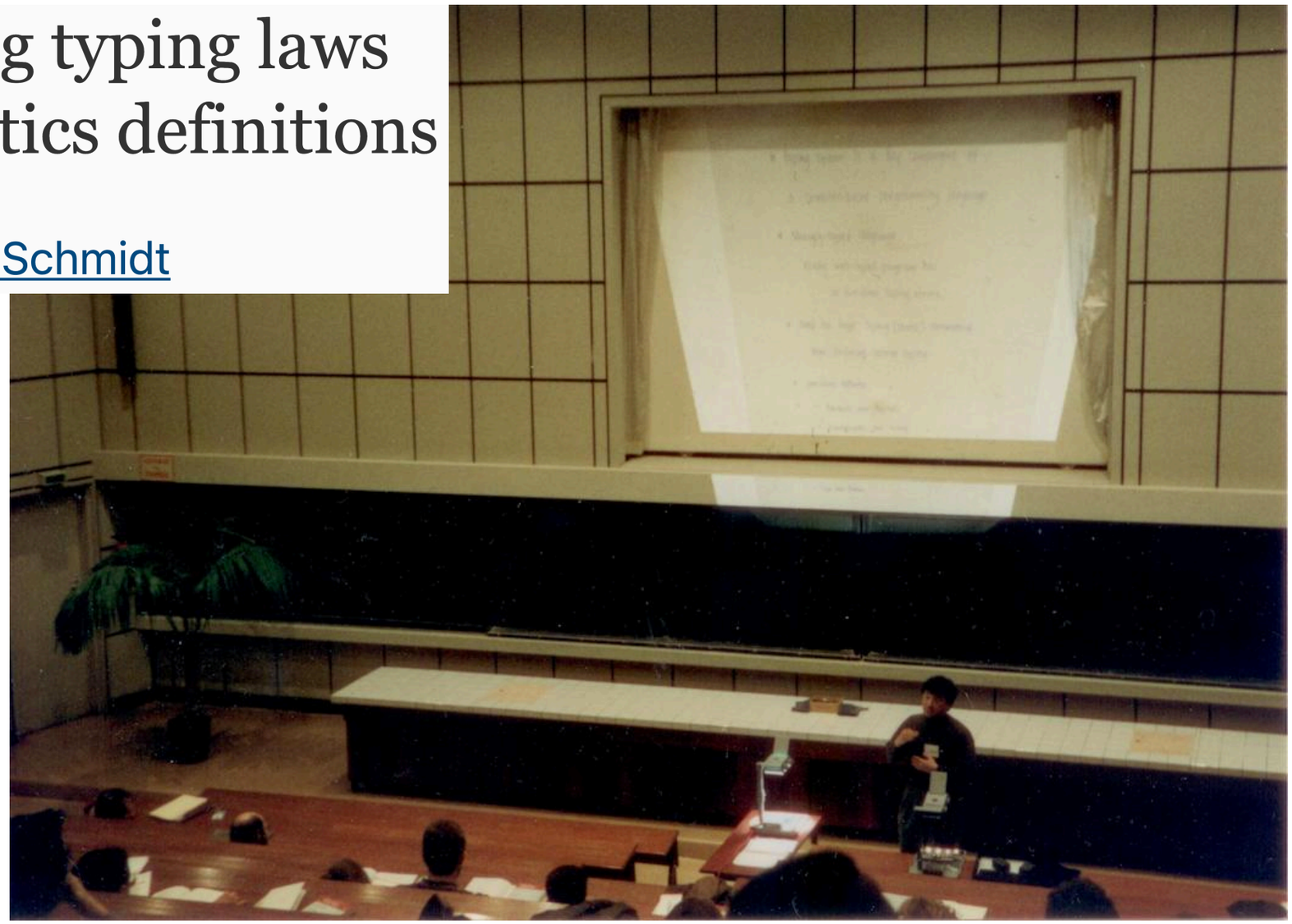
Conference proceedings | © 1992

ESOP '92

4th European Symposium on Programming, Rennes, France, February 26-28, 1992. Proceedings

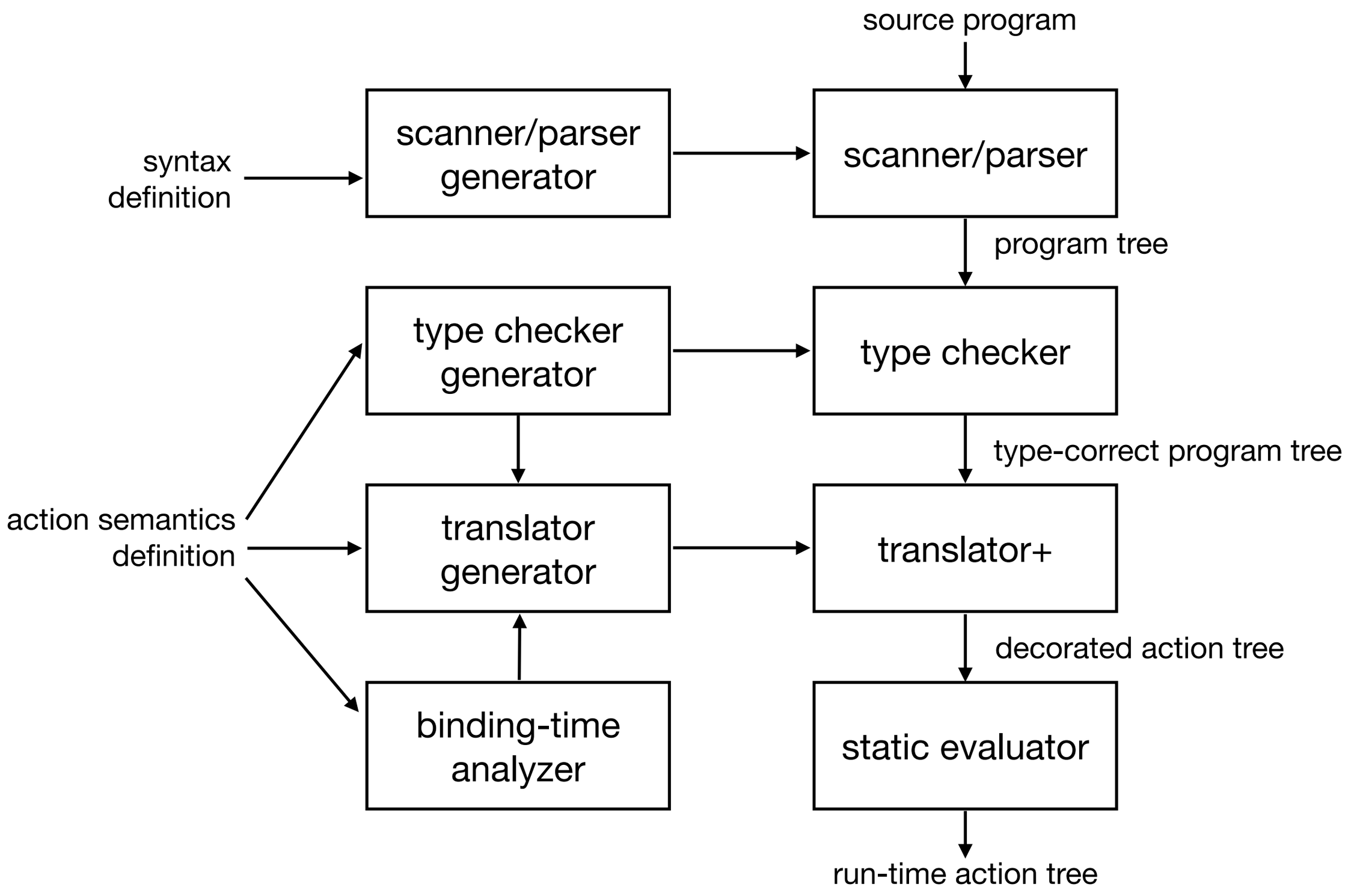
Extraction of strong typing laws from action semantics definitions

Kyung-Goo Doh & David A. Schmidt



PhD Dissertation

Action Semantics-Directed Prototyping



Computer Languages
Volume 19, Issue 4, October 1993, Pages 213-233

Action semantics-directed prototyping ☆

Kyung-Goo Doh [1], David A Schmidt [2]

Abstract

We present a methodology for compiler synthesis based on Mosses-Watt's action semantics. Each action in action semantics notation is assigned specific "analysis functions", such as a typing function and a binding-time function. When a language is given an action semantics, the typing and binding-time functions for the individual actions compose into typing and binding-time analyses for the language; these are implemented as the type checker and static semantics processor, respectively, in the synthesized compiler. Other analyses can be similarly formalized and implemented. We show a sample language semantics and its synthesized compiler, and we describe the compiler synthesizer that we have developed.

첫 직장

1993년 4월

Language Processing Laboratory

Harvey Abramson

David Wei

Toshiyasu Kunii

귀국

1995년 9월

ACM Transactions on Programming Languages and Systems

ARTICLE

OPEN ACCESS

January 1985

A new analysis of LALR formalisms

Joseph C.H. Park, K. M. Choe, C. H. Chang

ACM Transactions on Programming Languages and Systems (TOPLAS), Volume 7, Issue 1 • Jan. 1985, pp 159–175 • https://doi.org/10.1145/2363.2527

The traditional LALR analysis is reexamined using a new operator and an associated graph. An improved method that allows factoring out a crucial part of the computation for defining states of LR(0) canonical collection...

ACM Transactions on Programming Languages and Systems

ARTICLE

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ACM Transactions on ages and Systems (TOPLAS), V n. 1985, pp 159–175 • https://doi.org/

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프로그래밍언어연구회
정기총회 및 학술대회

1996년 11월

홍익대학교

PL2401

과학재단 목적기초

프로그램 안전성을 위한 정형증명 기술

2000.9~2003.8

정주희(책임), 도경구, 배민오, 변석우, 최진영

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+

이광근, 신승철

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+

이광근, 신승철

↓

LiComR

날짜	행사명	장소
2023.02.22-24	**SIGPL Winter School 2023**	서울특별시 고려대학교
2022.08.22-24	**SIGPL Summer School 2022**	광주광역시 전남대학교
2022.02.12-14	**SIGPL Winter School 2022**	제주 더그랜드섬오름호텔
2019.08.26-28	**SIGPL Summer School 2019**	평창 휘닉스파크
2019.02.18-20	**SIGPL Winter School 2019**	경성대학교
2018.08.20-22	**SIGPL Summer School 2018**	동국대학교
2018.02.19-21	**SIGPL Winter School 2018**	충남대학교
2017.02.8-10	**SIGPL Winter School 2017**	KAIST
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2015.08.19-22	**SIGPL Summer School 2015**	동아대학교
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2010.02.19	**SIGPL Winter School 2010**	성신여자대학교
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2006.6.23	**SIGPL Summer School 2006**	용평리조트
2006.2.13-15	**SIGPL Winter School 2006**	보광휘닉스파크
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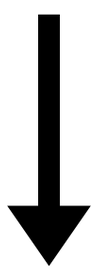
2008.1.30-2.1	**SIGPL Winter School 2008**	KAIST 전산학동
2007.2.8-10	**SIGPL Winter School 2007**	천안 국립중앙청소년수련원
2006.6.23	**SIGPL Summer School 2006**	용평리조트
2006.2.13-15	**SIGPL Winter School 2006**	보광휘닉스파크
2005.7.8	**SIGPL Summer School 2005**	보광휘닉스파크
2005.2.17-19	**SIGPL Winter School 2005**	순천향대학교
2004.8.11-13	**SIGPL Summer School 2004**	부산대학교
2004.2.11-13	**LiComR Winter School 2004**	만리포해양연수원
2003.8.18-21	**LiComR Summer 2003**	송광사

과학재단 목적기초

프로그램 안전성을 위한 정형증명 기술

2000.9~2003.8

정주희(책임), 도경구, 배민오, 변석우, 최진영



Software Security

과학재단 목적기초

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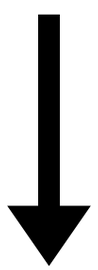

Detection of information leak by data flow analysis

Authors: Kyung Goo Doh, Seung Cheol Shin Authors Info & Claims

ACM SIGPLAN Notices, Volume 37, Issue 8 • August 2002 • pp 66–71 • https://doi.org/10.1145/596992.597005

과학재단 목적기초

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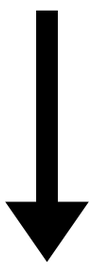
정주희(책임), 도경구, 배민오, 변석우, 최진영



KCI 등재

명령형 프로그램의 핵심부분에 대한 정보흐름 보안성의 데이타 흐름 분석

Data Flow Analysis of Secure Information-Flowin Core Imperative Programs

정보과학회논문지 : 소프트웨어 및 응용

2004, vol.31, no.5, pp. 667-676 (10 pages)

신승철 [1], 변석우 /Sugwoo Byun [2], 정주희 [3], 도경구 /Doh， Kyung-Goo [4]

[1]동양대학교

[2]경성대학교

[3]경북대학교

[4]한양대학교

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정주희(책임), 도경구, 배민오, 변석우, 최진영

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[2]경성대학교

[3]경북대학교

[4]한양대학교

Sindoh 가헌신도재단

가헌학술상

한국정보과학회 Korean Institute of Information Scientists and Engineers

PL Designer's Workbench 연구 계속

정보통신부 대학기초 (1996.7~1999.6)
과학재단 핵심전문 (1997.3~1999.2)

Science of Computer Programming

Volume 47, Issue 1, April 2003, Pages 3-36

Composing programming languages by combining action-semantics modules

Kyung-Goo Doh [a 1], Peter D. Mosses [b 2]

산업자원부 + IC카드연구조합 + 효성(주) + 아이티플러스(주) + …

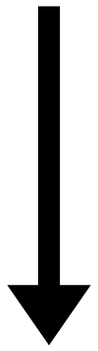
IC카드를 활용한 개방형 전자화폐시스템

(1997)~1999~2004

산업자원부 + IC카드연구조합 + 효성(주) + 아이티플러스(주) + …

IC카드를 활용한 개방형 전자화폐시스템

(1997)~1999~2004



아이티플러스(주)

String Analysis

2003.10~2008.11

Universal String Analyzer 특허

String Analysis

Asian Symposium on Programming Languages and Systems

↳ APLAS 2006: **Programming Languages and Systems** pp 374–388 | Cite as

A Practical String Analyzer by the Widening Approach

Tae-Hyoung Choi, Oukseh Lee, Hyunha Kim & Kyung-Goo Doh

Abstract Parsing

International Static Analysis Symposium

↳ SAS 2009: **Static Analysis** pp 256–272 | Cite as

Abstract Parsing: Static Analysis of Dynamically Generated String Output Using LR-Parsing Technology

Kyung-Goo Doh, Hyunha Kim & David A. Schmidt

International Static Analysis Symposium

↳ SAS 2013: **Static Analysis** pp 194–214 | Cite as

Static Validation of Dynamically Generated HTML Documents Based on Abstract Parsing and Semantic Processing

Hyunha Kim, Kyung-Goo Doh & David A. Schmidt

과학기술부 특정기초

유비쿼터스 컴퓨팅을 위한 프로그래밍 환경 연구

2006.3~2009.2

창병모(책임), 도경구, 안준선

International Conference on Embedded and Ubiquitous Computing

↳ EUC 2006: **Emerging Directions in Embedded and Ubiquitous Computing**
pp 650–659 | Cite as

A Policy Description Language for Context-Based Access Control and Adaptation in Ubiquitous Environment

Joonseon Ahn, Byeong-Mo Chang & Kyung-Goo Doh

A programming environment for ubiquitous computing environment

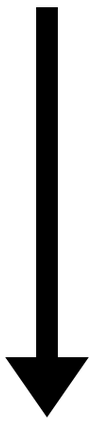
Authors: Minkyoung Oh, Jiyeon Lee, Byeong-Mo Chang, Joonseon Ahn, Kyung-Goo Doh

ACM SIGPLAN Notices, Volume 42, Issue 4 • April 2007 • pp 14–22

아이티플러스(주)

Security Analysis

2006.9~2007.8



행정안전부 정보시스템 보안성강화체계 구축 사업 (KISA)

정보보호학회 소프트웨어보안연구회, 지티원, 파수닷컴

소프트웨어 취약성 점검도구 및 보안성 강화 지원시스템 개발

2009.9~2010.12

한근희, 최진영, 오세만, 도경구, 이광근, 창병모, 안준선, 한경숙, 신승철, …

교육과학기술부 ERC

소프트웨어 무결점 연구센터

ROSAEC

센터장 **이광근** 교수

2008.9~2014.2

교육

SW특성화대학 · 2012~2016

소프트웨어융합대학 신설 · 2017~

SW중심대학 · 2018~

교육

SW특성화대학 · 2012~2016

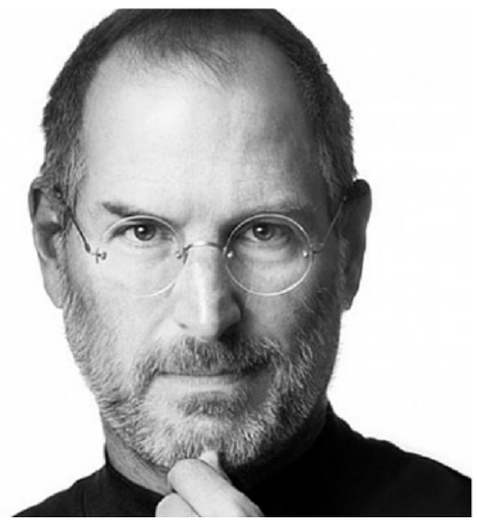
소프트웨어융합대학 신설 · 2017~

SW중심대학 · 2018~

Forbes /

NOV 30, 2011 @ 01:58 PM 50,625 VIEWS

Now Every Company Is A Software Company



Everybody in this country should learn to program a computer, because it teaches you how to think

- Steve Jobs -

음악 프로그래밍

ChucK

Strongly-timed,
Concurrent,
On-the-fly
Music Programming Language

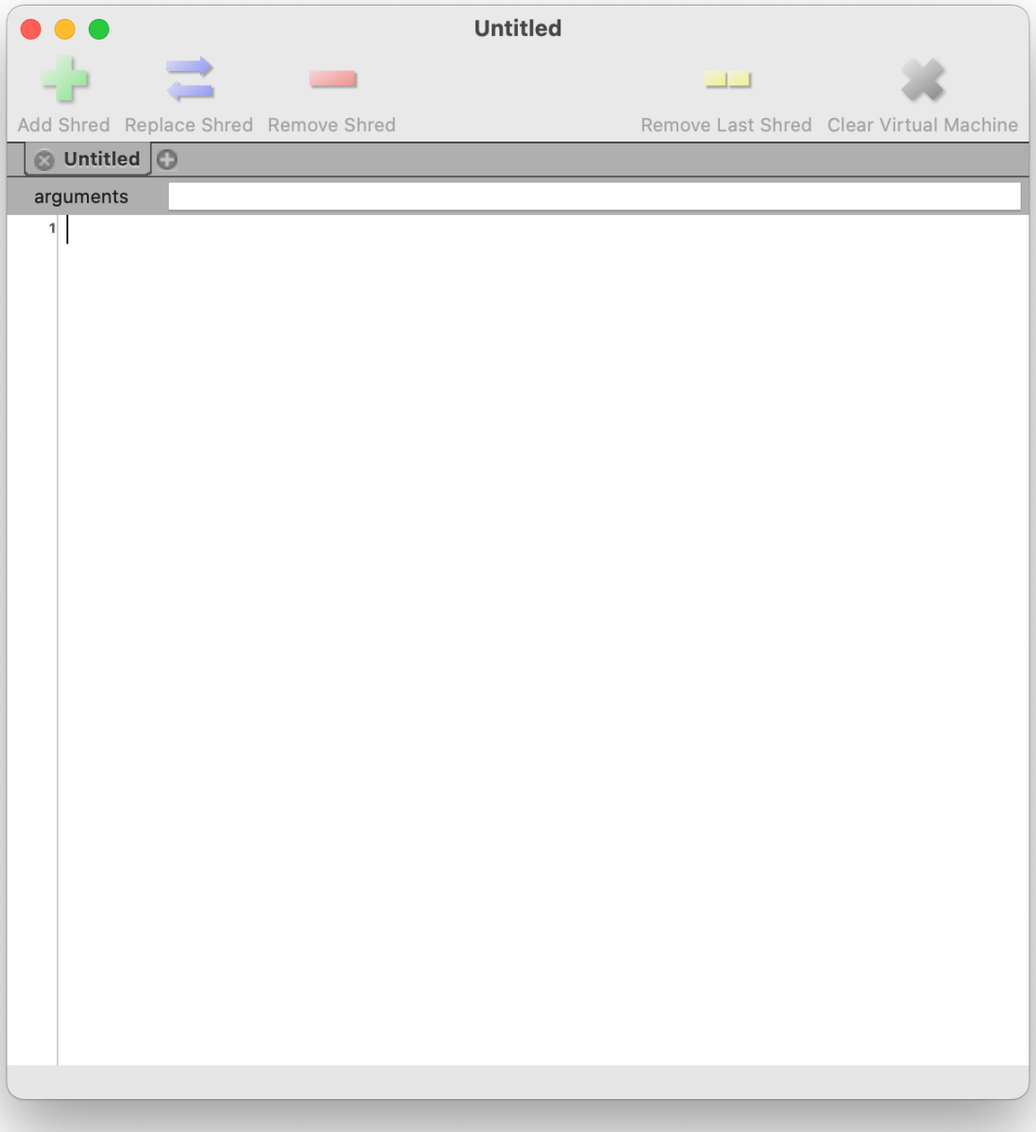
Perry R. Cook

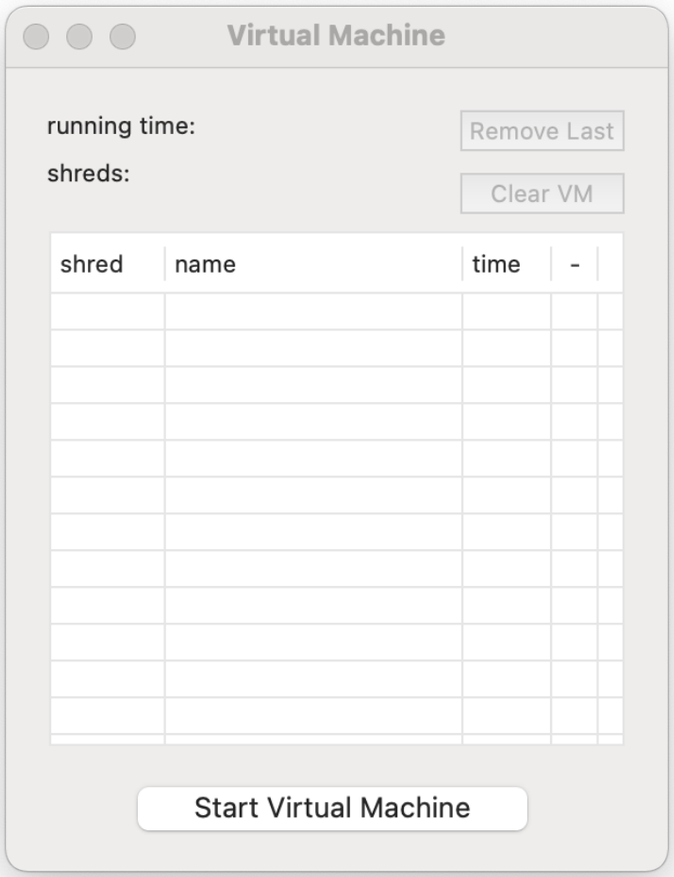
Ge Wang

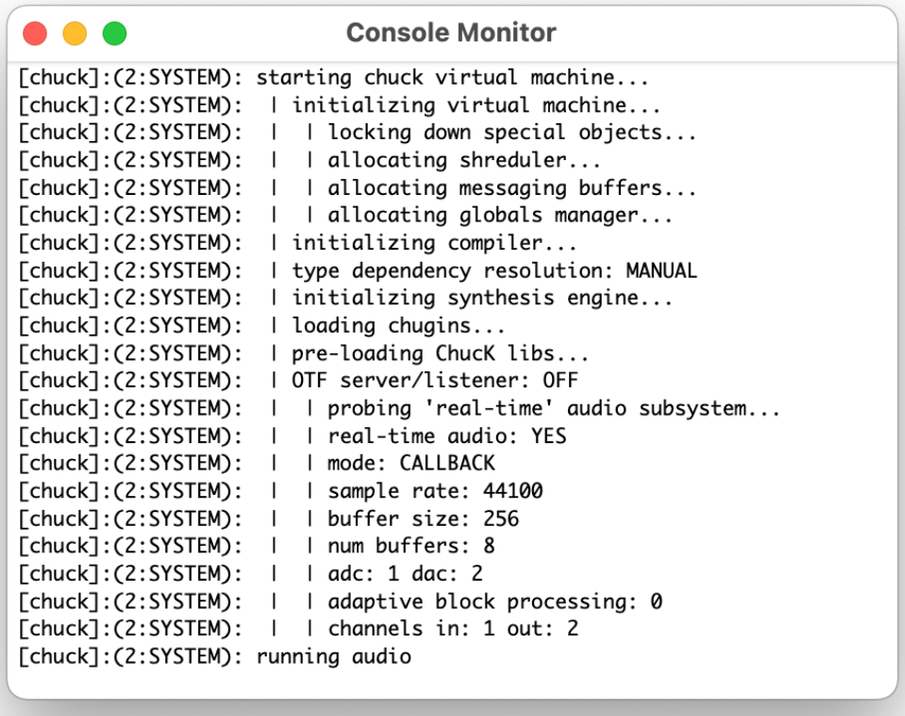
miniAudicle

version 1.4.1.0 (gidora)
git: 9f6ee78
Copyright (c) Spencer Salazar

ChucK: version 1.4.1.0 (numchucks) 64-bit
Copyright (c) Ge Wang and Perry Cook
http://chuck.cs.princeton.edu/

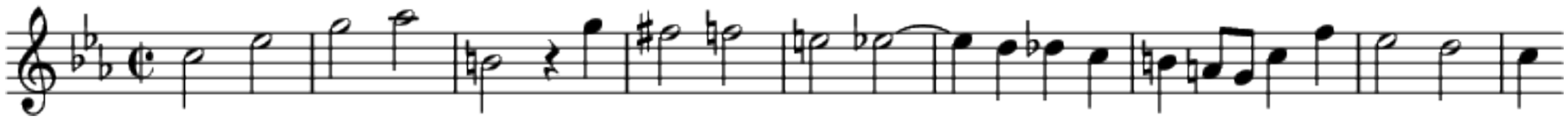

Untitled
Add Shred
Replace Shred
Remove Shred
Remove Last Shred
Clear Virtual Machine
Untitled
arguments
1


Virtual Machine
running time:
shreds:
Remove Last
Clear VM
shred
name
time
-
Start Virtual Machine

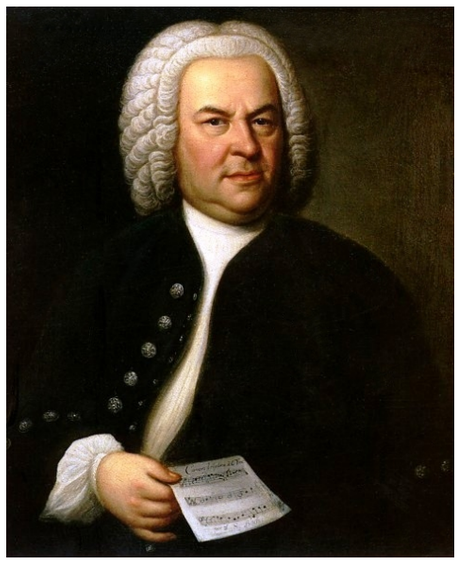

Console Monitor
[chuck]:(2:SYSTEM): starting chuck virtual machine...
[chuck]:(2:SYSTEM): | initializing virtual machine...
[chuck]:(2:SYSTEM): | | locking down special objects...
[chuck]:(2:SYSTEM): | | allocating shreduler...
[chuck]:(2:SYSTEM): | | allocating messaging buffers...
[chuck]:(2:SYSTEM): | | allocating globals manager...
[chuck]:(2:SYSTEM): | initializing compiler...
[chuck]:(2:SYSTEM): | type dependency resolution: MANUAL
[chuck]:(2:SYSTEM): | initializing synthesis engine...
[chuck]:(2:SYSTEM): | loading chugins...
[chuck]:(2:SYSTEM): | pre-loading ChucK libs...
[chuck]:(2:SYSTEM): | OTF server/listener: OFF
[chuck]:(2:SYSTEM): | | probing 'real-time' audio subsystem...
[chuck]:(2:SYSTEM): | | real-time audio: YES
[chuck]:(2:SYSTEM): | | mode: CALLBACK
[chuck]:(2:SYSTEM): | | sample rate: 44100
[chuck]:(2:SYSTEM): | | buffer size: 256
[chuck]:(2:SYSTEM): | | num buffers: 8
[chuck]:(2:SYSTEM): | | adc: 1 dac: 2
[chuck]:(2:SYSTEM): | | adaptive block processing: 0
[chuck]:(2:SYSTEM): | | channels in: 1 out: 2
[chuck]:(2:SYSTEM): running audio

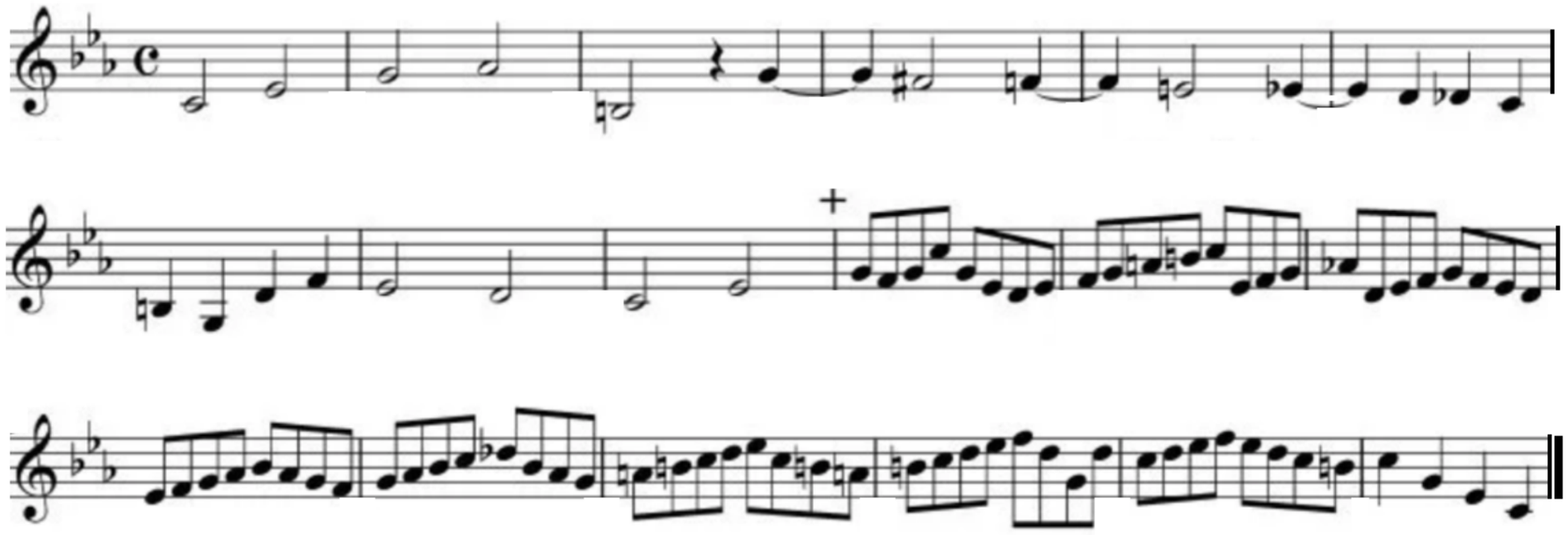
Demo

King Frederick
The Royal Theme



Johann Sebastian Bach
Musical Offering, BWV 1079
Canones diversi super thema regium: Canon a 2
“Crab Canon”





Algorithmic Music Composition

컴퓨터를 악기로 ~

교육

SW특성화대학 · 2012~2016

소프트웨어융합대학 신설 · 2017~

SW중심대학 · 2018~

Forbes /

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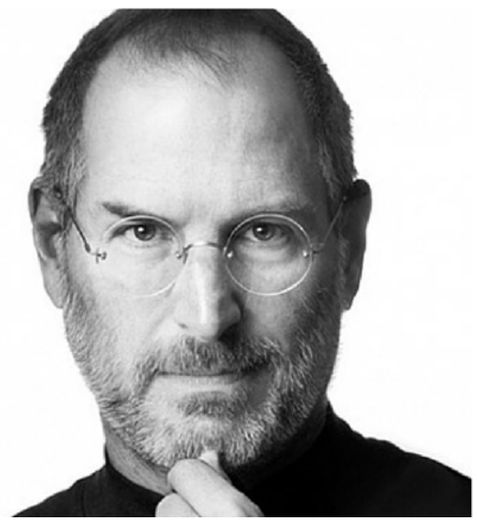

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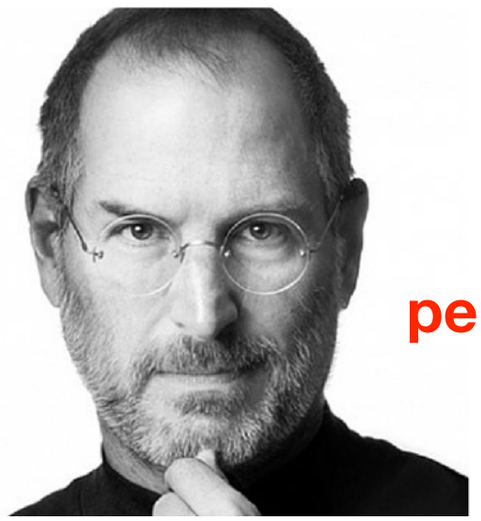

Everybody in this country should learn to ~~program~~ **use** a computer, ~~because it teaches you how to think~~ **period!**

- Steve Jobs -

교육

SW특성화대학 · 2012~2016

소프트웨어융합대학 신설 · 2017~

SW중심대학 · 2018~

소프트웨어는
안전하고
견고하고
신뢰할 수 있는
명품 이어야 한다.
제대로 훈련받은 재능있는
명인 만이 명품을 만들 수 있다.

↓

Domain-Specific Language Designer

Abstract Parsing + Security Analysis

POPL 2012

Defining Code-injection Attacks

Donald Ray Jay Ligatti

ISC 2014

Defining Injection Attacks

Donald Ray and Jay Ligatti

Abstract Parsing + Security Analysis

The Secure Injection Principle

Suppose that an application program is written to dynamically generate an output in language L. Then the secure injection principle for defensive programming is suggested as follows:

(1) When an input is injected to become all or part of a string literal in the output, any character can be injected *verbatim* except some special-purpose characters that should be sanitized as follows:
- the character ' is escaped to be \' if it is used as a string delimiter,
- the character " is escaped to be \" if it is used as a string delimiter, and
- the character \ is escaped to be \\ if it becomes the final character of an assembled string literal.

(2) When injected elsewhere, an input should be a *syntactically legal and fully evaluated term* in L and only injected to be an *expression*.

Abstract Parsing + Security Analysis

The Secure Injection Principle

Suppose that an application program is written to dynamically generate an output in language L. Then the secure injection principle for defensive programming is suggested as follows:

(1) When an input is injected to become all or part of a string literal in the output, any character can be injected *verbatim* except some special-purpose characters that should be sanitized as follows:
   - the character `'` is escaped to be `\'` if it is used as a string delimiter,
   - the character `"` is escaped to be `\"` if it is used as a string delimiter, and
   - the character `\` is escaped to be `\\` if it becomes the final character of an assembled string literal.

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Theorem

Injection attacks defined in Ray and Ligatti's papers [1, 2] are all incapacitated when the output-assembling program is written fully in compliance with the secure injection principle.

Abstract Parsing + Security Analysis

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Goal

to separate functional logic from security logic in writing programs

Abstract Parsing + Security Analysis

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Goal

to separate functional logic from security logic when writing programs

Automatic Fortification of Web Applications Against Injection Attacks

감사합니다!

SIGPL과 함께 한
그동안의 여정이
행복했습니다!

SOFTOPIA