INTRODUCTION

PRINCIPLES OF PROGRAMMING LANGUAGES

Norbert Zeh

Winter 2019

Dalhousie University

GOAL OF THIS COURSE

Encourage you to become better programmers

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($\neq$ Make you better programmers)

THIS COURSE IN A NUTSHELL

Programming paradigms

- Imperative vs functional vs logic programming

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Programming language abstractions

- Variable binding, parameter passing, lifetime of variables, ...

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What drives these design decisions

- Call stacks, closures, thunks, memory management, garbage collection, ...

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Compilation, interpretation, and formal languages

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Programming paradigms (1)

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Programming language abstractions (3)

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What drives these design decisions (3)

- Call stacks, closures, thunks, memory management, garbage collection, ...

Compilation, interpretation, and formal languages (2)

COURSE MATERIAL

Books:

- Michael L. Scott. *Programming Language Pragmatics*, 3rd ed. (required)
- Hopcroft et al. *Introduction to Automata Theory*. (optional)
- Tucker and Noonan. *Programming Languages*. (optional)
- More relevant books on course website. Some available online.

Slides:

- On website

Website:

- http://www.cs.dal.ca/~nzeh/Teaching/3136

Email:

- nzeh@cs.dal.ca

CLASS, OFFICE HOURS, AND TAS

Class:

- Mon, Wed, Fri: 3:30–4:30

Office hours:

- Mon, Wed, Fri 12:00–2:00
- Mona Campbell 4246

TAs:

- TBA

EVALUATION

(A)ssignments:

(M)idterm

(F)inal

EVALUATION

(A)ssignments:

- 8 assignments
- Each has equal weight

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- 8 assignments
  - 4 programming assignments
  - 4 theory assignments
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- 3 best programming assignments count, 3 best theory assignments count

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(F)inal

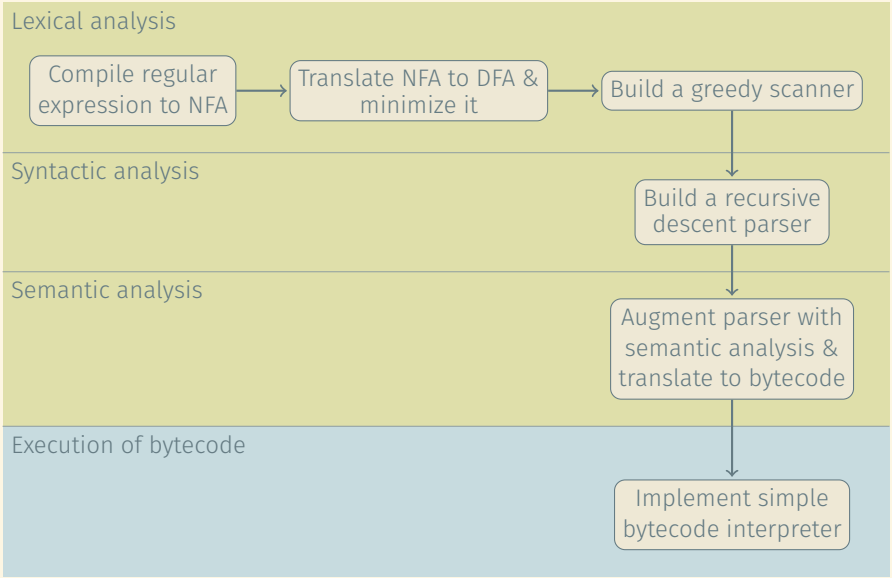
$$\text{Grade} = \max(40\% \cdot A + 20\% \cdot M + 40\% \cdot F, 40\% \cdot A + 60\% \cdot F)$$

THE GREAT INTERPRETER PROJECT OF 2019 (3 PROGRAMMING ASSIGNMENTS)

Implement a Scheme interpreter in Scheme

- Implementation language: Scheme R^6RS
- Language to implement: A subset of Scheme

THE GREAT INTERPRETER PROJECT OF 2019 (3 PROGRAMMING ASSIGNMENTS)



GROUP WORK ON ASSIGNMENTS

- Work in groups of up to 3 students (strongly encouraged!)
- Each group submits one joint assignment.
  Every group member gets the same marks.
- Group composition may change between assignments.
- No exchange of information between groups!

Late submissions:

- ... are not accepted.
- Exceptions: You were sick or agreed on an extension with me beforehand (e.g., if there's a wedding in the family)

Academic honesty:

- https://www.dal.ca/dept/university_secretariat/academic-integrity.html
- No exchange of information between groups on assignments.
- All reference material (book, web, ...) must be acknowledged.
- No need to reference material presented in class.
- Any suspected case of plagiarism is referred to the Academic Integrity Officer.

DALHOUSIE CULTURE OF RESPECT

- We believe that inclusiveness is fundamental to education and learning.
- Every person has the right to be respected and safe.
- Mysogyny and disrespectful behaviour on campus, in the wider community or on social media is not acceptable.
- We stand for equality and hold ourselves to a higher standard.
- Take an active role:
  - Be ready: Don't remain silent.
  - Indentify the behaviour, avoid labelling, name-calling or blame.
  - Appeal to principles, particularly with friends and co-workers.
  - Set limits.
  - Find an ally and be an ally, lead by example.
  - Be vigilant.

LANGUAGES YOU'LL NEED

Used extensively:

- Scheme
- Prolog

Mentioned:

- C/C++
- Python
- Java
- Scala
- Ruby
- Haskell
- ...