ENGF0002: *Design and Professional Skills*

Part 2: Scenario Project

Introduction

14 January 2019

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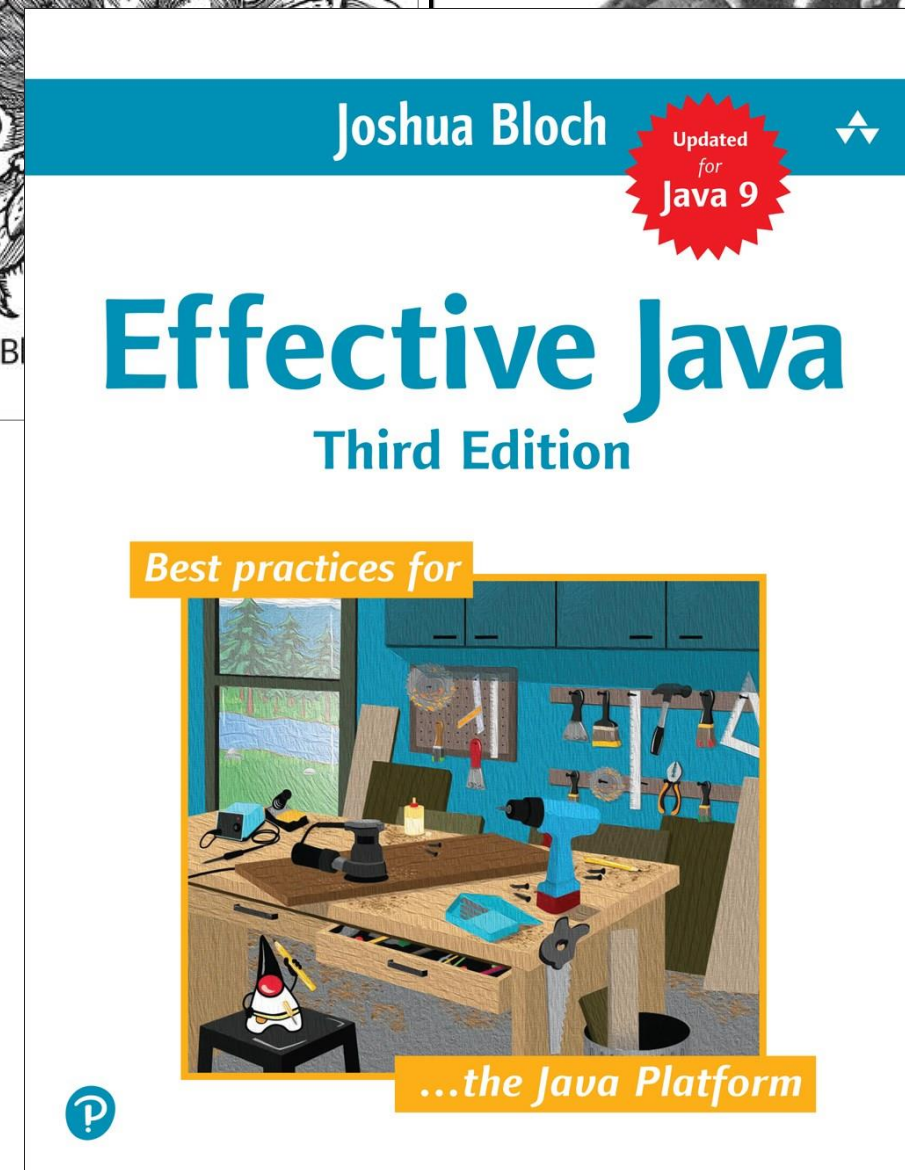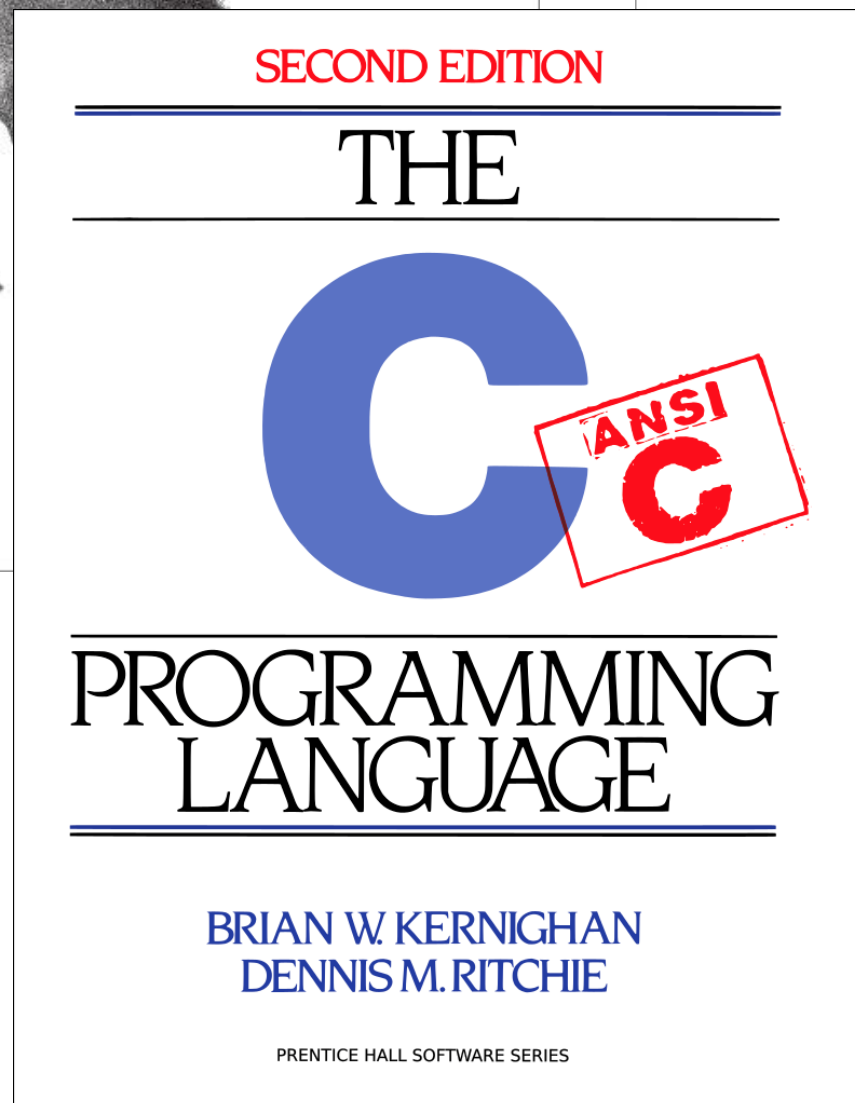
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IEP first year scenarios

- Integrate and reflect on knowledge gained in your first year

- Meant to be project-like, but this module will be coursework-like

Goals for this module

- Technical material: understand the ways in which programming languages can differ in implementation

- Soft skills:

  - Debugging skills

  - Critical analysis of an unknown system

Powerful Object-Oriented Programming

5th Edition
Updated for 3.3 and 2.7

Learning

Python

O'REILLY®

O'REILLY®

Programming

Rust

FAST, SAFE SYSTEMS DEVELOPMENT

Jim Bl

Code You Can Believe In

Real World

Haskell

Bryan O'Sullivan,
erzen & Don Stewart

SECOND EDITION

THE

C ANSI C

PROGRAMMING LANGUAGE

BRIAN W. KERNIGHAN
DENNIS M. RITCHIE

PRENTICE HALL SOFTWARE SERIES

Joshua Bloch

Updated
for
Java 9

Effective Java

Third Edition

Best practices for

...the Java Platform

x == y

x	y	Python	JavaScript
"1"	1	FALSE	TRUE
""	0	FALSE	TRUE
{}	{}	TRUE	FALSE
[]	[]	TRUE	FALSE
[0]	[]	FALSE	TRUE
2	[2]	FALSE	TRUE

List/Array concatenation

Python

JavaScript

```
first_list = [1, 2, 10]
second_list = [5, 3]
first_list + second_list
```

```
var first_array = [1, 2, 10];
var second_array = [5, 3];
first_array + second_array;
```

[1, 2, 10, 5, 3]

"1, 2, 105, 3"

(appended as lists)

(appended as strings)

Variable Scope and Functions

Python

```python
def f():
    a = 10


a = 42
print (a)
f()
print (a)
```

JavaScript

```javascript
function f() {
  a = 10; return;
}


a = 42;
console.log(a);
f();
console.log(a);
```

Output:

42

42

42

10

This Project

Telling different languages apart

Mystery Languages (MLs)

- **Eight** different sets of languages with unspecified behaviour

- In each ML in a set, some language feature is implemented differently

- Examples of features:

  - Arithmetic operations, conditional statements, nested functions, mutable variables, scoping, records with mutable fields, etc.

- In each of the eight tasks, your goal is to provide a set of *classifiers*: small test programs allowing to tell different MLs apart.

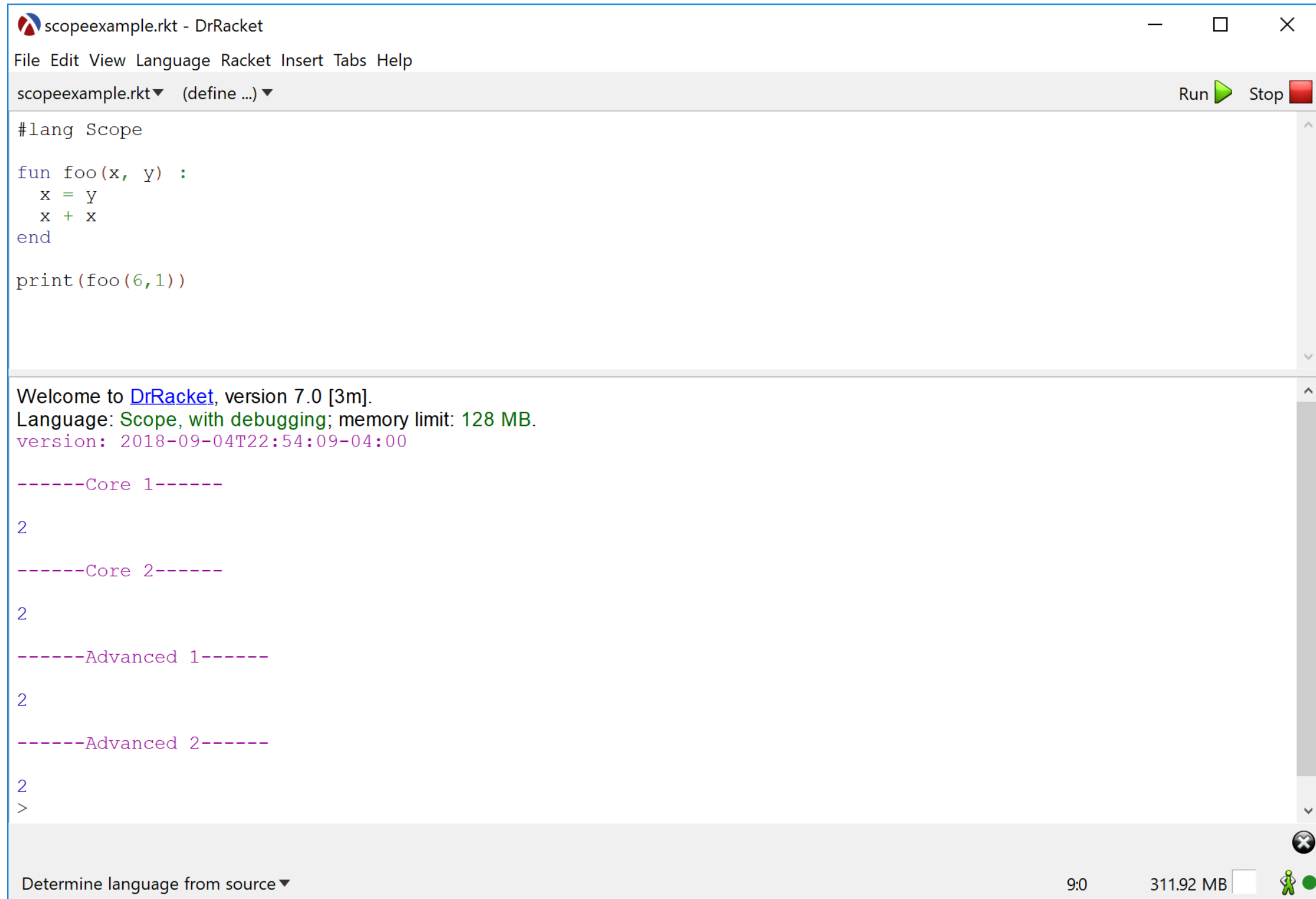# Proto-language: Pyret

`https://www.pyret.org`

- Similar to Python in syntax of functions and iterations

- Python-style dictionaries

- Runs in your browser

```
fun to-celsius(f):
  (f - 32) * (5 / 9)
end

for each(str from [list: "Ahoy", "world!"]):
  print(str)
end
```

Installation instructions

https://cs.brown.edu/courses/cs173/2018/web/mysteries/mystery-setup.xml

DrRacket

Setup

- Make sure to install **DrRacket 7.0**

- You may provide more than one classifier for each task

  - That is, *all classifiers combined* should be able to distinguish all MLs in a task.

Submitting your Solutions

| CE Scenario 1 | CE Scenario 2 | CS Resources | CS Scenario | EEE Resources | EEE Scenario 1 | EEE Scenario 2 | ME Resources |

ME Scenario 1 | ME Scenario 2 | ME Careers Sessions | Student Resources | Staff Room

A Scenario Project for the Computer Science Department

Not available unless: You belong to **Computer Science** (hidden otherwise)

The goal of this scenario project is to make you understand that approaching a new programming language requires a security mindset. It won't be about computer security per se, but it will be the mindset that comes with it: of probing, asking questions, looking for ways in which things might not fit together, etc.

Intro lecture: Friday 19 January, 10.00am

Location: Wilkins Building (Main Building) Gustave Tuck LT

Ensure you give yourself enough time to get to here as you are required to be on time.

Attendance to this lecture is **COMPULSORY.**

Scenario Materials

🌐 Mystery Languages

A web page with setup instructions and ML tasks.

Submit your solutions here

Remember that a solution for each task (ML 1-8) is an archive named **NNN.zip**:

- **NNN** is your student ID number (e.g., **17102667**);
- The archive should contain one or more test files named **1, 2, 3**, … each should contain one classifier program (without the **#lang …** line)
- The archive should also contain a text file named theory that provides a short (500 words or less) description of the essential differences between different versions of an ML in a task.

📄 ML 1: Numbers

Deadline: 2 February 2018

Deliverables

- A solution for each ML-based task is an archive named **NNN.zip**:

  - **NNN** is your student ID number (e.g., 17102667);

  - The archive should contain one or more test files named $1, 2, 3, \ldots$ each should contain one classifier program (without the `#lang` … line)

  - The archive should also contain a text file named **theory** that provides a short (500 words or less) description of the essential differences between different versions of an ML in a task.

- Submit your individual solutions on Moodle

  - There should be *exactly one zip-archive* with classifiers and theory submitted for each task.

Assessment

- This project counts as **30%** of your overall ENGF0002 grade

- Each task will be graded out of maximal 10 points (i.e., 80 in total)

- The quality of a solution will consider the number of *equivalence classes* provided by all classifiers together for a task instance

  - more classes is better (max = number of MLs in a task)

  - the classifiers will amount for 6-7 points per task

- The **theory explanation** will count for 3 or 4 points

Deadlines (Firm!)

#	ML Task	Deadline
ML 1	Numbers	27 January 2019, 23:59
ML 2	Conditionals	27 January 2019, 23:59
ML 3	Named Functions	17 February 2019, 23:59
ML 4	Scope	17 February 2019, 23:59
ML 5	Function Calls	3 March 2019, 23:59
ML 6	Anonymous Functions	3 March 2019, 23:59
ML 7	Mutable Variables	17 March 2019, 23:59
ML 8	Mutable Structures	17 March 2019, 23:59

Lectures

#	Date	Location
1	28 January 2019, 09:00	Medical Sciences 131 AV Hill LT
2	18 February 2019, 09:00	Anatomy G29 JZ Young LT
3	4 March 2018, 09:00	Anatomy G29 JZ Young LT
4	18 March 2018, 09:00	Anatomy G29 JZ Young LT

Additional Reading

Programming and Programming Languages

by Shriram Krishnamurthi, Benjamin S. Lerner, Joe Gibbs Politz

- Available at http://papl.cs.brown.edu/2018/

- Uses Pyret as a main language

- Lots of examples

Helpdesk and Q&A

- Yuzuko Nakamura (y.nakamura@ucl.ac.uk)
  - Office hours: Thursday, 14:00-15:00, MPEB 4.13A