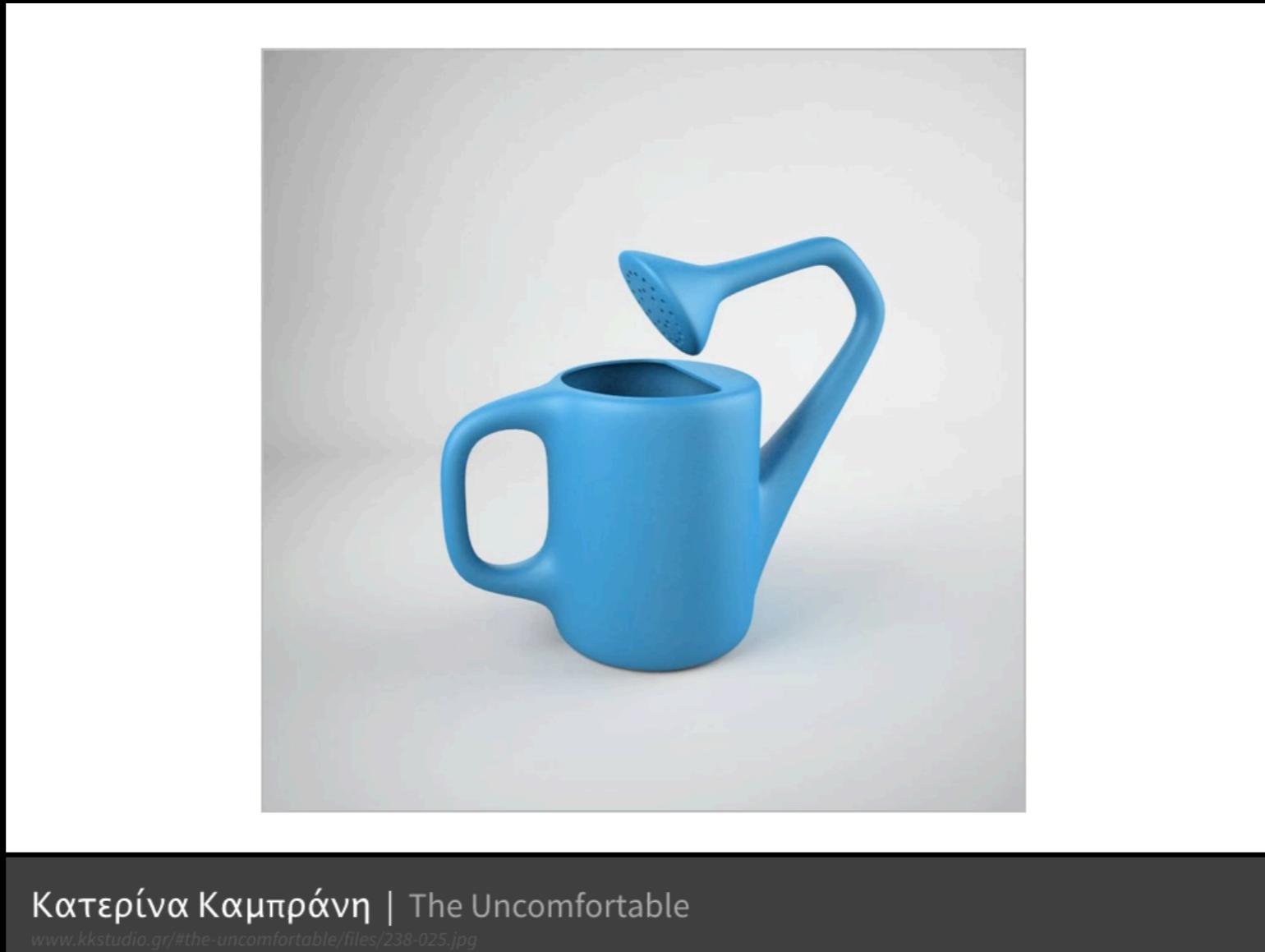


Domain-Specific Languages



Κατερίνα Καμπράνη | The Uncomfortable

www.kkstudio.gr/#the-uncomfortable/files/238-025.jpg

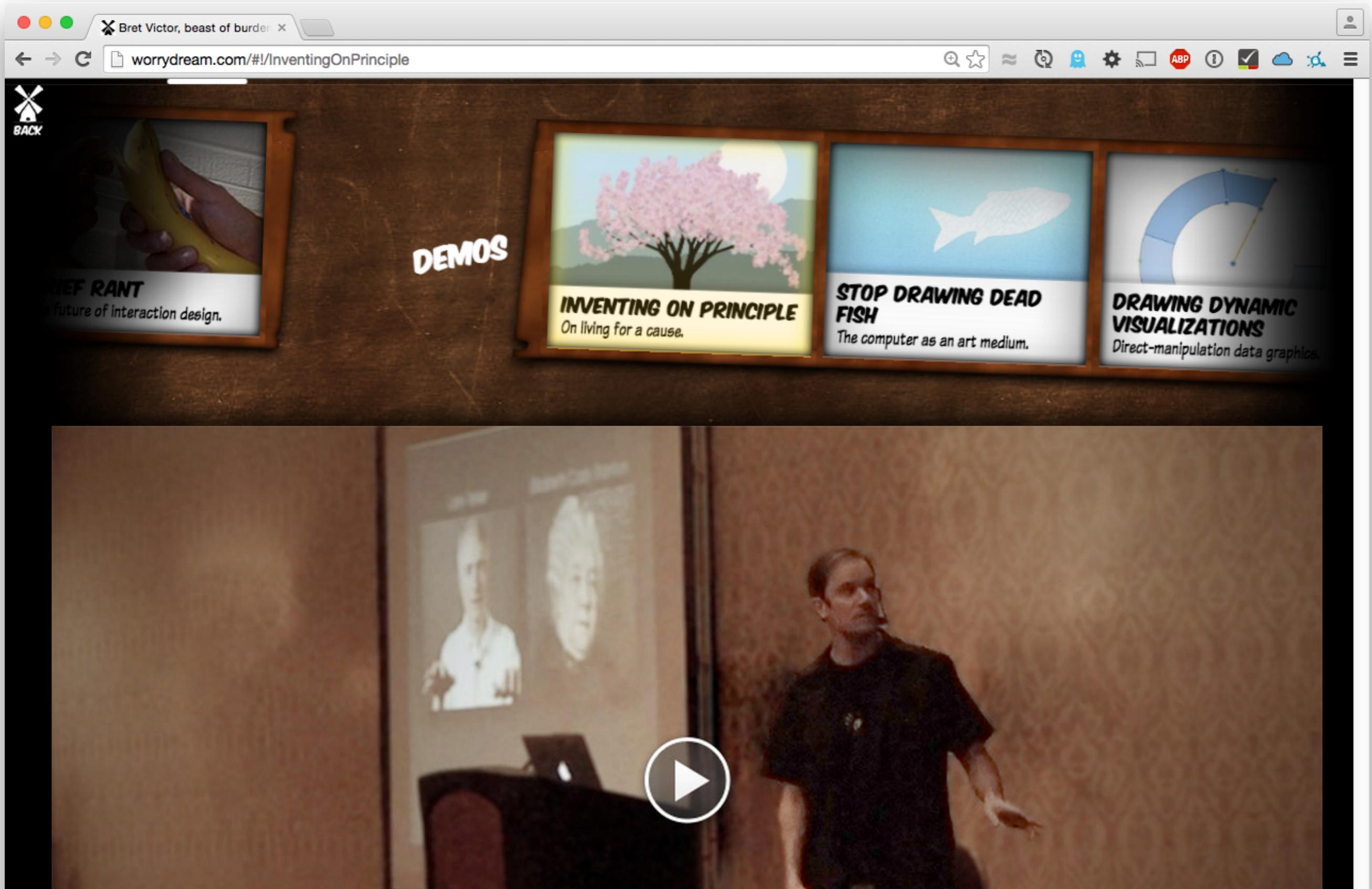
[T]he fundamental principles of designing for people: (1) provide a good conceptual model and (2) make things visible.
— The Design of Everyday Things , Donald A. Norman

[E]very large scale programming project involves the design, use, and implementation of a special-purpose programming language, with its own data concepts and primitive operations, specifically oriented to that particular project.

— Hints on Programming Language Design, C. A. R. “Tony” Hoare

Inventing on Principle

Brett Victor



A studio is:

1. People
2. Process
3. Place

All work in progress is public.

Exercise: Set up our studio

(3 groups of 4 people) + Prof. Ben = 13 people

Discussion space

everyone can see each other's face

Discussion + presentation space

everyone can see each other's face

everyone (except presenter) can see the side screen and front board

Work space

space for each person to write or work on a computer

no need to see boards easily, but it might be nice to use the boards

Easy set-up and recovery

should take no more than two minutes for all of us to set-up / reset
(perhaps after some practice :))

The plan

This course is two half-courses

A tour of
DSL design &
implementation
techniques

Project

Spring 2016

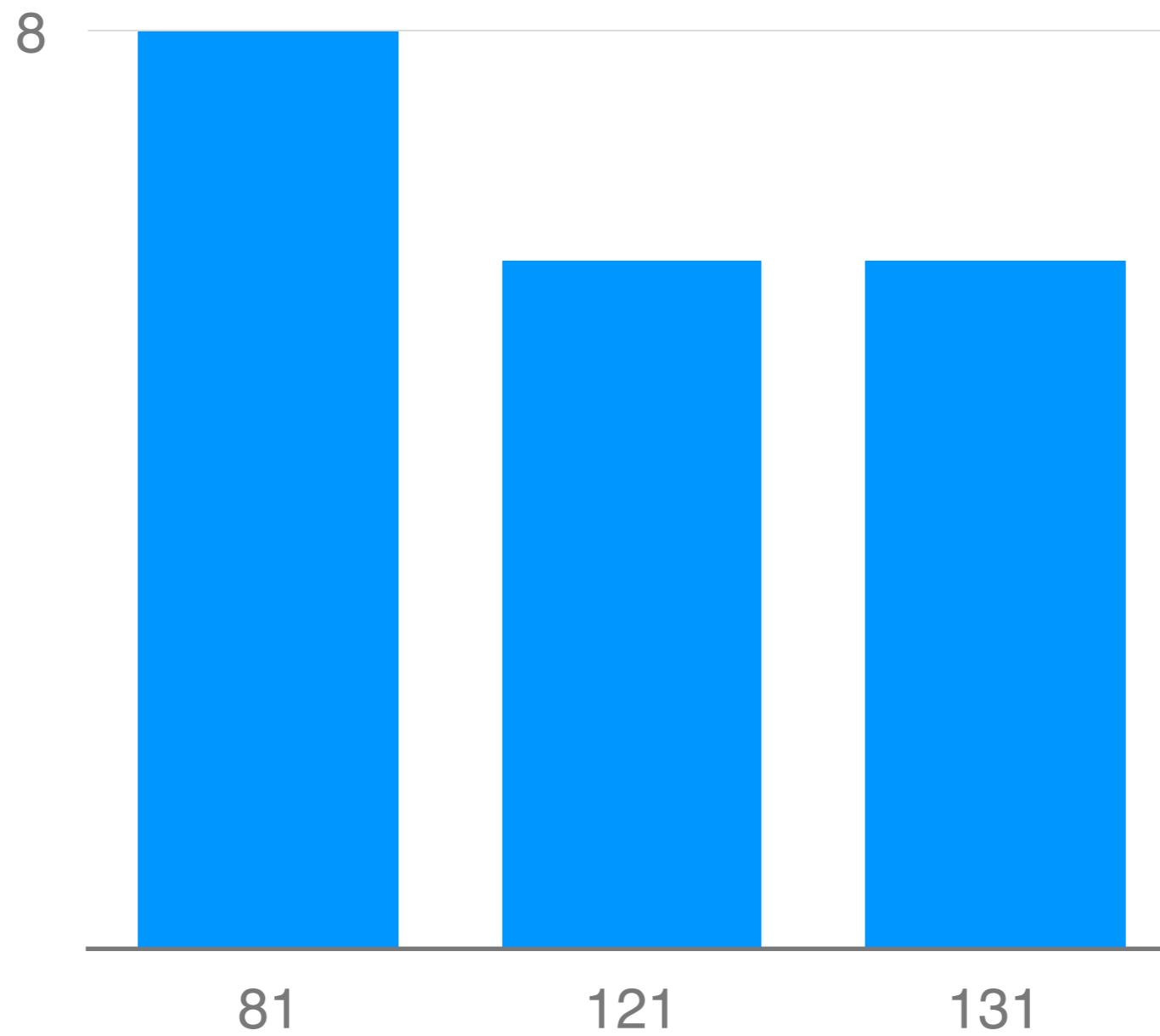
CS 111: Domain-Specific Languages

MW 1:15pm–2:30pm in SHAN 3425

Piazza · Syllabus · GitHub Repo · Wiki

	Monday		Wednesday			
(0)	01 · 18	(no class)		DSLs: What, why, and how?	01 · 20	What is a DSL? Due: Sunday 1/24 at 11:59pm Critique: Tuesday 1/26 at 11:59pm
(1)	01 · 25	What is a DSL? <i>writeup</i>		Mini-lab: library design <i>writeup</i>	01 · 27	Language design Due: Wednesday 2/3 at 11:59pm Critique: Friday 2/5 at 11:59pm
(2)	02 · 01	Scala intro <i>writeup</i>		Projects: interviews <i>writeup</i>	02 · 03	Practice Scala Due: Wednesday 2/10 at 11:59pm Critique: Friday 2/12 at 11:59pm
(3)	02 · 08	Functional Scala <i>writeup</i>		Lab: Internal control flow <i>writeup</i>	02 · 10	Project ideas Due: Wednesday 2/17 at 11:59pm Critique: Friday 2/19 at 11:59pm
(4)	02 · 15	Object-oriented Scala <i>writeup</i>		Extensibility: Traits <i>writeup</i>	02 · 17	Internal DSL Due: Wednesday 2/24 at 11:59pm Critique: Friday 2/26 at 11:59pm
(5)	02 · 22	Extensibility: The Expression Problem <i>writeup</i>		Language architecture & parser combinators <i>writeup</i>	02 · 24	Language design: Piconot Due: Wednesday 3/4 at 11:59pm Critique: Friday 3/6 at 11:59pm
(6)	02 · 29	Models of computation <i>writeup</i>		Lessons and plans <i>writeup</i>	03 · 02	
(7)	03 · 07	Language features, part 1		Language features, part 2	03 · 09	Project: description and plan & Repository Due: Friday 3/11 at 11:59pm Critique: Tuesday 3/22 at 11:59pm
(8)	03 · 14	Spring Break (no class)		Spring Break (no class)	03 · 16	
(9)	03 · 21	<i>critique</i>		studio	03 · 23	Project: design and implementation Due / notebook: Sunday 3/27 at 11:59pm Critique: Tuesday 3/29 at 11:59pm
(10)	03 · 28	<i>critique</i>		studio	03 · 30	Notebook: Sunday 4/3 at 11:59pm Critique: Tuesday 4/5 at 11:59pm
(11)	04 · 04	<i>critique</i>		studio	04 · 06	Project: prototype Due / notebook: Sunday 4/10 at 11:59pm Critique: Tuesday 4/12 at 11:59pm
(12)	04 · 11	<i>critique</i>		studio	04 · 13	Project: preliminary evaluation Due / notebook: Sunday 4/17 at 11:59pm Critique: Tuesday 4/19 at 11:59pm
(13)	04 · 18	<i>critique</i>		studio	04 · 20	Project: demo / presentation Due / notebook: Sunday 4/24 at 11:59pm Critique: in class
(14)	04 · 25	Presentations		Presentations	04 · 27	Project: final product and writeup Due / notebook: Friday 4/29 at 11:59pm

$$111 = \frac{1}{3} \bullet (81 + 121 + 131)$$



Skills

Scala
GitHub
Testing
Build system (sbt)

The Future of Coding and Its Impact on Developers and API Providers

THE FUTURE OF CODING AND ITS IMPACT ON DEVELOPERS AND API PROVIDERS

Patricio Robles, Contributing Writer

Aug. 19 2015, 02:19PM EDT

With tech booming and job openings for developers every year, it has seemingly never been a better time. But environments can vary considerably from program to program.

According to Computer Science Zone, the most popular job openings are Java, JavaScript, C# and Python. While Java and JavaScript might be growing in buzz, particularly in the mobile space, Python is still the most concerned, their buzz has not translated into job openings.

LANGUAGE	JOB OPENINGS*	SALARY
SQL	211,017	\$55,000
Java	148,216	\$84,000
Javascript	88,013	\$80,000
C#	58,923	\$79,000
Python	56,635	\$85,000
Perl	46,217	\$81,000
Visual Basic	27,804	\$78,000
Ruby	24,045	\$85,000
PHP	24,045	\$77,000
MATLAB	16,289	\$71,000

Image Credit: computerguidezone.org

* December 2014

readwrite

CODE BUILD STRUCTURE CONNECT LEAD FUND OPERATE GROW

HACK

Don't Rely On Salary Data To Pick A Programming Language To Learn

Current demand says nothing about earnings potential.

MATT ASAY · NOV 28, 2014

Read Next

Concepts

Language design
Parsing
Semantic models
Software engineering
Extensibility

...

Skills

Scala
GitHub
Testing
Build system (sbt)

Philosophies

People first
Programming as language design
How does language influence thought?
The end of PLs

Concepts

Language design
Parsing
Semantic models
Software engineering
Extensibility

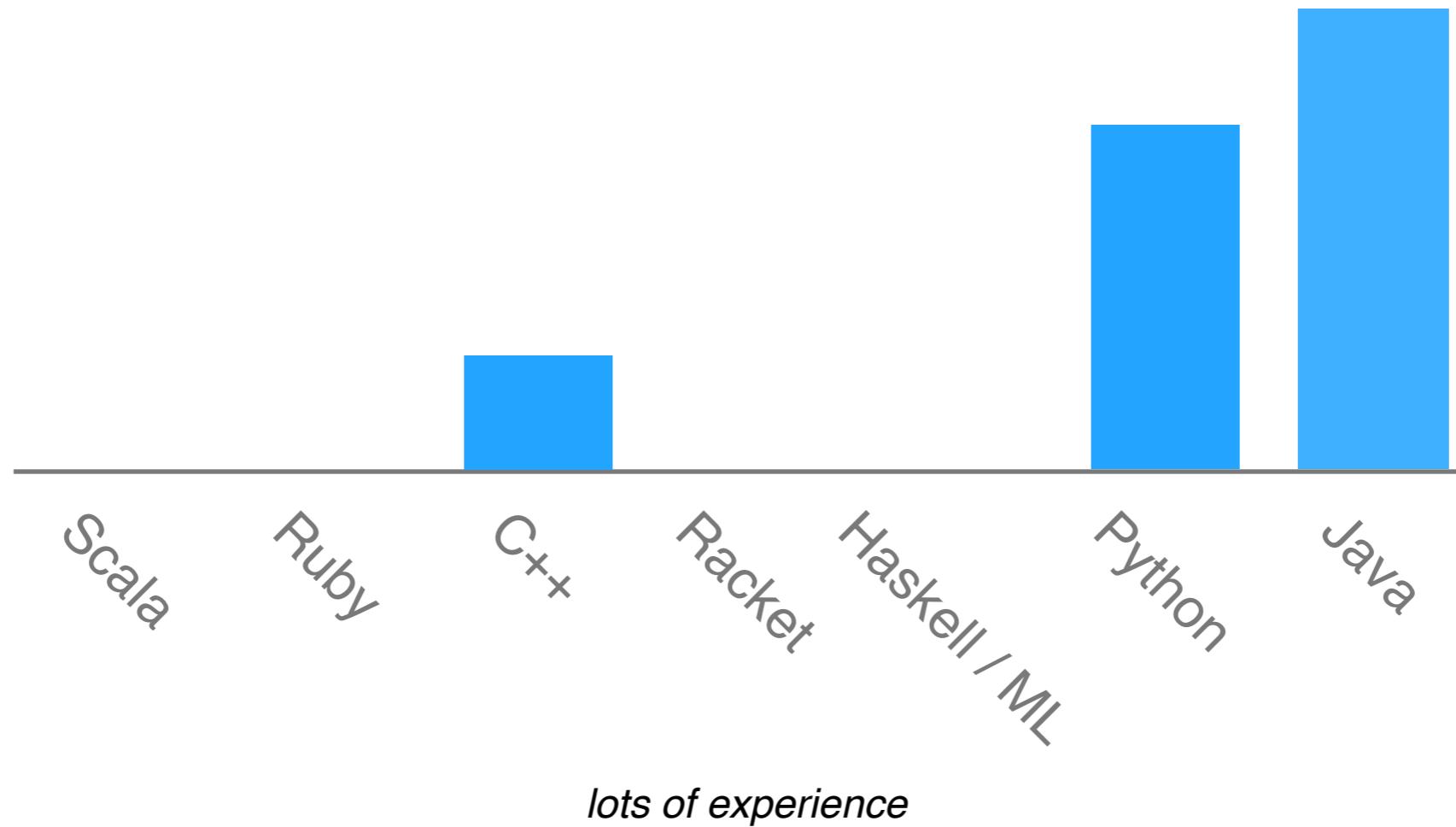
...

Skills

Scala
GitHub
Testing
Build system (sbt)

Scala as a lens

7



Soundbite syllabus

or is it “soundbyte”?

The screenshot shows a web browser window for 'CS 111 — Spring 2016' at <https://hmc-cs111-spring2016.github.io>. The page title is 'Spring 2016 CS 111: Domain-Specific Languages'. It lists the schedule: 'MW 1:15pm–2:30pm in SHAN 3425' and links to 'Piazza', 'Syllabus', 'GitHub Repo', and 'Wiki'. Below the title is a weekly schedule grid:

	Monday	Wednesday	
(o)	01 · 18 (no class)		
(1)	01 · 25 What is a DSL? <i>writetup</i>	DSLs: What, why, and how? 01 · 20	<p>What is a DSL? Due: Sunday 1/24 at 11:59pm Critique: Tuesday 1/26 at 11:59pm</p> <p>Language design Due: Wednesday 2/3 at 11:59pm</p>

- One-stop shop: www.cs.hmc.edu/cs111
schedule, assignments, repository, syllabus, etc.
- All course communication happens on Piazza
- Come to class and participate fully.
- Concentrate more on problems than solutions

A typical week

6-9 hours / week
outside of class

Class on Monday and Wednesday

we'll need a scribe each day — sign up on the Wiki

Assignment due Wednesday at 11:59pm

Critique due Friday at 11:59pm

treat your critique partner as your collaborator

New assignment available no later than Wednesday evening

Office hours in the LAC

Mondays 10:30–noon & Tuesdays 2:45–4:30pm

Grading

More details next week

Participation: 20%

critiques • in-class discussion • class writeup(s)

Assignments: 40%

Project: 40%

there will be milestones, but it's mostly on you

Key point

The primary responsibility is
yours.

Music Maker

Emily Blatter — DSLs Fall 2014

A screenshot of a Microsoft Excel spreadsheet titled "batman.xls". The spreadsheet contains musical lyrics in the cells. The lyrics are:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	
1																														
2																														
3																														
4																														
5																														
6																														
7																														
8	na	na					na	na								na	na													
9			na	na			na	na								na	na													
10			na	na												na	na													
11																														
12																														
13																														
14																														

The lyrics are: baaaat maaaaaaaaan, na na, na na.

Construct

Alex Ozdemir — DSLs Fall 2015

```
ben:construct ben$ sbt 'runMain construct.ConstructGREPL'  
[info] Loading global plugins from /Users/ben/.sbt/0.13/plugins  
[info] Set current project to Construct (in build file:/Users/ben/Documents/work/teaching/courses/DSLs/fall15/projects/construct/)  
[info] Running construct.ConstructGREPL  
Construct $ █
```



Before Monday

- Activate your Piazza account
 - use Piazza (or GitHub)—not email—for course communication
- Join our GitHub organization
- Assignment 1
 - submission due Sunday
 - critique due next Tuesday
 - all the details are in the assignment
 - ask questions on Piazza!
- Sign up to scribe a class
- Restore the room