Scala as a beginner language
– Experiences and plans at LTH

Björn Regnell

Dept. of Computer Science, LTH
Lund University, Sweden

2016 April 20

Agenda

1 Experiences with Scala as a beginner language at LTH
- Primary school activities at LTH Vattenhallen
- Turtle graphics in Scala with Kojo in Swedish

2 Future plans for Scala as a beginner language at LTH
- Potential pedagogical benefits and risks
- New course: EDAA45 "Introduction to programming"

Primary school activities at LTH Science Center Vattenhallen

- **Thousands of school kids** visiting Vattenhallen have done **programming experiements** using LTH's free teaching material in Scala and Kojo: www.lth.se/programmera/uppdrag **Try it yourself!**

- **Hundreds of teachers** have taken LTH's **programming courses for teachers**

- LTH is supporting **Skolverket** in dev of coming curricula. **AT LAST: Programming in school!!!**
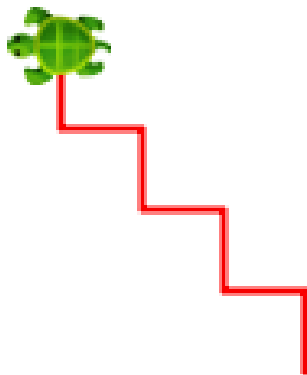
Programing for Kids in school

- **S**equence

- **A**lternative

- **R**epetition

- **A**bstraction

Scala for Kids: Turtle graphics in Kojo

- **S**equence

- **A**lternative

- **R**epetition

- **A**bstraction

Experiences with Scala for kids

- Good, evolving, easy-to-use IDE available:
  Kojo – try it yourself: www.kogics.net/kojo-download
- Fulfills three important criteria:
  - **Free** and open source; schools don't have to pay
  - Available **in Swedish**; identifyers with öåä
  - Programming "**for real**"; the sky is the limit...
- Avoids beginner-unfriendly boilerplate, e.g.:
  ```
  public static void main(String[] args)
  ```
- Flexible syntax and powerful language constructs that enbale creation of **simple** control structures:

  ```
  upprepa(10){ fram; höger }
  ```

- Concise syntax and low "cost" of **abstraction**

  ```
  def kvadrat = upprepa(10){ fram; höger }
  ```

On-going curicula development of CS courses

Four new courses for the CSE program (Datateknik):

- Introduction to computer programming (Scala+Java)
- Evaluation of software systems (R)
- Discrete structures in computer science (Clojure)
- Functional programming (Lang. TBD)

More information: http://cs.lth.se/education/
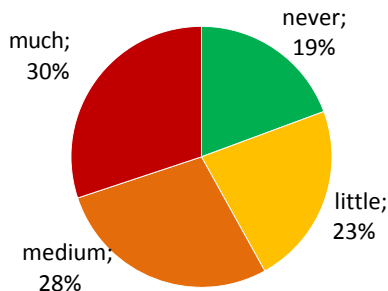
Why Scala?

Potential **benefits**:

- Regular semantics, e.g. no dicotomy btw primitive types & objects
- Concise, expressive syntax: don't get drowned in a "letter soup"
- Interactive learning through experiments in the Scala REPL
- Multi-paradigm, pragmatic: imperative, object-oriented, functional
- Rich semantics: can demonstrate many modern, advanced cs concepts
- New, modern, evolving language exciting for new students
- Also non-beginners get a challange
- Free, open source language and tools

Potential **risks**:

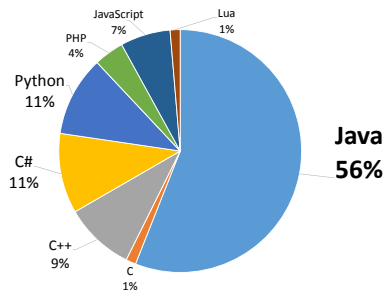- Tools not becoming mature fast enough?
- Lack of beginner-oriented teaching material?
- Future industrial relevance?
- Critical mass of community?

Course intro survey 2015, CSE (Datateknik)
EDA016 Programming, first course (Java)

Have programmed before?

What language?
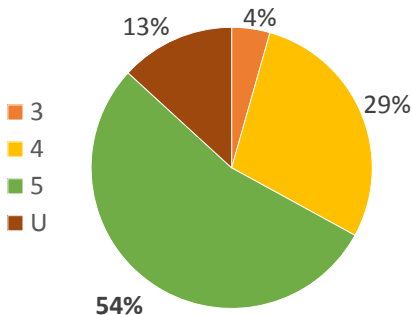
Course results 2015, CSE (Datateknik)
EDA016 Programming, first course (Java)

Grades D-program 2015

- 3
- 4
- 5
- U

4%
29%
13%
54%

Goal of 2016
To **increase** the
challenge level &
learning outcome
significantly.

New course: EDAA45 Introduction to programming using Scala and Java

W	Modul	Övn	Lab
W01	Introduktion	expressions	kojo
W02	Kodstrukturer	programs	–
W03	Funktioner	functions	irritext
W04	Objekt	objects	blockmole
W05	Klasser	classes	turtlegraphics
W06	Sekvensalgoritmer	sequences	shuffle
W07	Datastrukturer	data	pirates
KS	KONTROLLSKRIVN.	–	–
W08	Matriser, typparametrar	matrices	maze
W09	Arv	inheritance	turtlerace-team
W10	Mönster, undantag, likhet	patterns	chords-team
W11	Scala och Java	scalajava	lthopoly-team
W12	Sökning, sortering, ordning	sorting	survey
W13	Repetition, tentaträning, projekt	–	Projekt
W14	Extra: jämlöpande exekvering	threads	–
T	TENTAMEN	–	–

Student participation in teaching development through open sourcing of teaching material for Scala

https://github.com/lunduniversity/introprog

Anders Buhl,
Anna Palmqvist Sjövall,
Anton Andersson,
Casper Schreiter,
Cecilia Lindskog,
Christine Boghammar,
Emil Wihlander,
Emma Asklund,
Erik Bjäreholt,
Erik Grampp,
Erik Söderbarg,

Filip Stjernström,
Fredrik Danebjer,
Gustav Cedersjö,
Henrik Olsson,
Jacob Bohlin,
Jakob Hök,
Johan Ravnborg,
Jonas Danebjer,
Maj Stenmark,
Maximilian Rundgren,
Måns Magnusson,

Oscar Sigurdsson,
Oskar Berg,
Oskar Widmark,
Povel Larsson,
Sebastian Hegardt,
Stefan Jonsson,
Tom Postema,
Valthor Halldorsson,
Viktor Claesson

Contributions are welcome! mailto:bjorn.regnell@cs.lth.se

Scala as a beginner language
└─ Scala crash course for you!
   └─ Evening event by code@lth

Thank You!

Welcome to gasquesalen at 18:00 tonight for a Scala crash course with **code@lth**

Free pizza if you pre-register here:
http://goo.gl/forms/F2iME0j6Go