

Scala as a Beginner's First 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!!!



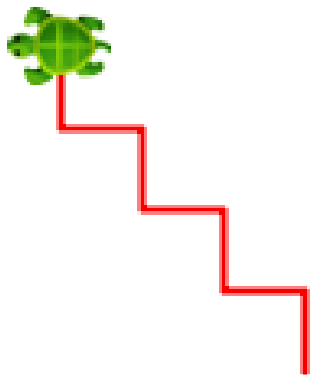
Programing for Kids in school

- **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**; identifiers 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 enable creation of **simple** control structures:

```
upprepa(10){ fram; höger }
```

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

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

On-going curricula 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**:

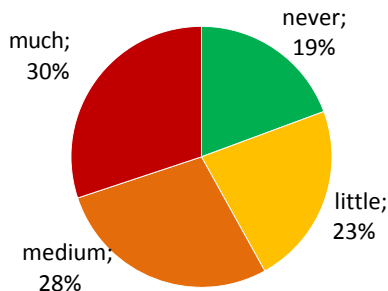
- Regular semantics, e.g. no dicotomy btw primitive types & objects
- Concise, expressive syntax: don't get drowned in a "letter soup"
- Interactive learning through experiments in the Scala REPL
- Multi-paradigm, pragmatic: imperative, object-oriented, functional
- Rich semantics: can demonstrate many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

Potential **risks**:

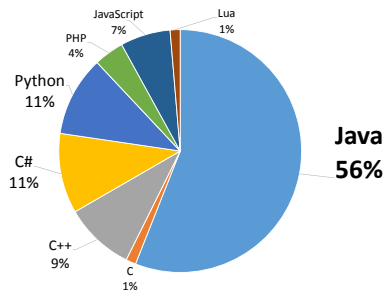
- Tools not becoming mature fast enough
- Lack of beginner-oriented teaching material
- Future industrial relevance and critical community mass

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

Have programmed before?

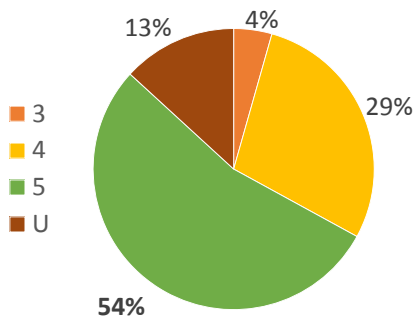


What language?



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

Grades 2015



Goal 2016

To **increase** the
challenge level &
learning outcome
significantly.

New course: EDAA45 Introduction to programming using Scala and Java

<i>W</i>	<i>Modul</i>	<i>Övn</i>	<i>Lab</i>
W01	Introduktion	expressions	kojo
W02	Kodstruktur	programs	–
W03	Funktioner, Objekt	functions	simplewindow
W04	Datastrukturer	data	textfiles
W05	Sekvensalgoritmer	sequences	cardgame
W06	Klasser, Likhet	classes	shapes
W07	Arv, Gränssnitt	traits	turtlerace-team
KS	KONTROLLSKRIVN.	–	–
W08	Mönster, Undantag	matching	chords-team
W09	Matriser, Typparametrar	matrices	maze
W10	Sökning, Sortering	sorting	surveydata-team
W11	Scala och Java	scalajava	scalajava-team
W12	Trådar	threads	life
W13	Design	Uppsamling	Inf.Uppg.
W14	Tentaträning	Extenta	–
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>

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>