# Scala as a beginner language
– Experiences and plans at LTH

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**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"

Scala as a beginner language
└─ Experiences with Scala at LTH
   └─ Scala at LTH Science Center Vattenhallen

# 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!!!**

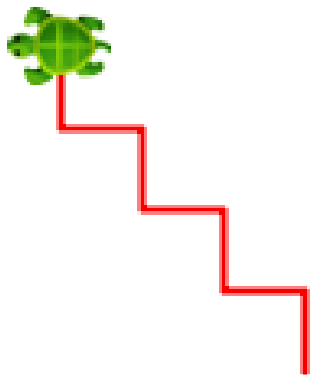# Programing for Kids in school

- **S**equence

- **A**lternative

- **R**epetition

- **A**bstraction

Scala as a beginner language
└─ Experiences with Scala at LTH
  └─ Turtle graphics in Scala with Kojo

# 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**

  ```scala
  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**:

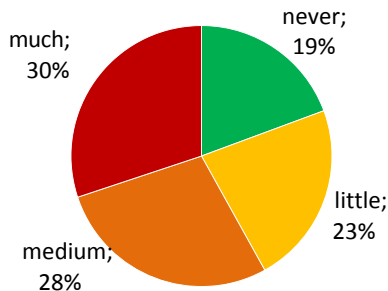- Tools not becoming mature fast enough?
- Lack of beginner-oriented teaching material?
- Future industrial relevance?
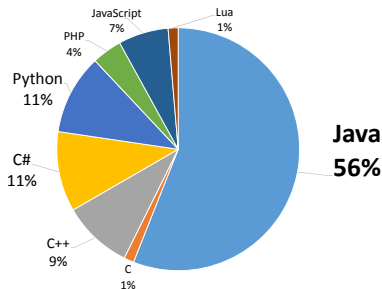- Critical mass of community?

Scala as a beginner language
└─ Plans for Scala at LTH
   └─ Potential pedagogical benefits and risks

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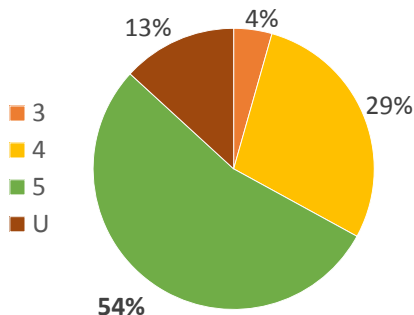# EDA016 Programming, first course (Java)

Have programmed before?

What language?

Scala as a beginner language
└ Plans for Scala at LTH
   └ Potential pedagogical benefits and risks

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

**Grades D-program 2015**



4%
13%
29%
54%

- 3
- 4
- 5
- U

**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 | Program och kontrollstrukturer | programs | – |
| W03 | Funktioner och abstraktion | functions | irritext |
| W04 | Objekt och inkapsling | objects | blockmole |
| W05 | Klasser och datamodellering | classes | – |
| W06 | Mönster och felhantering | patterns | blockbattle |
| W07 | Sekvenser och enumerationer | sequences | shuffle |
| KS | KONTROLLSKRIVN. | – | – |
| W08 | Nästlade och generiska strukturer | matrices | life |
| W09 | Mängder och tabeller | lookup | words |
| W10 | Arv och komposition | inheritance | snake0 |
| W11 | Kontextuella abstraktioner och varians | context | snake1 |
| W12 | Valfri fördjupning, Projekt | extra | Projekt0 |
| W13 | Repetition | examprep | Projekt1 |
| W14 | MUNTLIGT PROV | Munta | Munta |
| T | VALFRI TENTAMEN | – | – |

Scala as a beginner language
└─ Plans for Scala at LTH
   └─ New course: EDAA45 "Introduction to programming"

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

**https://github.com/lunduniversity/introprog**

| | | |
|---|---|---|
| Anders Buhl, | Filip Stjernström, | Oscar Sigurdsson, |
| Anna Palmqvist Sjövall, | Fredrik Danebjer, | Oskar Berg, |
| Anton Andersson, | Gustav Cedersjö, | Oskar Widmark, |
| Casper Schreiter, | Henrik Olsson, | Povel Larsson, |
| Cecilia Lindskog, | Jacob Bohlin, | Sebastian Hegardt, |
| Christine Boghammar, | Jakob Hök, | Stefan Jonsson, |
| Emil Wihlander, | Johan Ravnborg, | Tom Postema, |
| Emma Asklund, | Jonas Danebjer, | Valthor Halldorsson, |
| Erik Bjäreholt, | Maj Stenmark, | Viktor Claesson |
| Erik Grampp, | Maximilian Rundgren, | |
| Erik Söderbarg, | Måns Magnusson, | |

**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`