Fortgeschrittene funktionale Programmierung

LVA 185.A05, VU 2.0, ECTS 3.0
SS 2013

– Vorbesprechung –

(Stand: 01.03.2013)

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Course Objectives

...advanced concepts and principles of functional programming, applications and implementation issues of functional programming languages.

- Functional data structures and algorithms
- Combinator libraries and embedded domain-specific languages
- Programming with streams, programming with monads
- Testing and verification, equational reasoning
- Monadic and combinator parsing, pretty printing
- Functional vs. logical programming
- Parallelism in functional languages
- Functional reactive systems
- ...

Goals

- Overview and insight into advanced concepts of functional programming and their application in practice
- Profound understanding of the foundations of functional programming
- Insight in advantages and limitations of a purely functional style of programming

Accounts for

- Elective course (Wahlfach) within the Master program 066 937 Software Engineering&Internet Computing (3.0 ECTS)
- Elective course (Wahlfach) within the Master program 066 931 Computational Intelligence (3.0 ECTS)
- Elective course (Wahlfach) within the Master program 066 950 Informatikdidaktik (3.0 ECTS)
- Examination course (Prüfungsfach) towards the Erasmus-Mundus Master program 066 011 DDP Computational Logic (Erasmus-Mundus) (3.0 ECTS)

Prerequisites

- Completed Bachelor program
- Basic knowledge of the functional programming style as imparted e.g. in the course LVA 185.A03 Funktionale Programmierung, VU 2.0, ECTS 3.0

Organization and Assessment

- Lectures (usually once a week)
- (Programming) assignments to be solved by teams of 2 (or 3) students (usually once a week)
- Final oral examination (assignments and course material)

Important Web Ressources

- Haskell Homepage: `www.haskell.org/`
- Haskell Tutorial: `www.haskell.org/tutorial/`
- Hugs Interpreter: `www.haskell.org/hugs`

Recommended Reading: Basics

1. Jens Knoop. Slides and companion material of the course LVA 185.A03 Funktionale Programmierung. Institute of Computer Languages, TU Vienna, 2012/2013.
2. Richard Bird. Introduction to Functional Programming using Haskell. 2nd edition, Prentice-Hall, 1998.
3. Simon Thompson. Haskell: The Craft of Functional Programming. 3rd edition, Addison-Wesley/Pearson, 2011.
4. Peter Pepper. Funktionale Programmierung in OPAL, ML, Haskell und Gofer. 2. Auflage, Springer-V., 2003.
5. Peter Pepper, Petra Hofstedt. Funktionale Programmierung. Springer-V., 2006.
6. ...

Recommended Reading: Advanced

1. Lectures on Advanced Functional Programming. International Summer Schools 1995, 1996, 1998, 2002; published by Springer-V. as LNCS volumes 925, 1129, 1608, 2638.
2. Jeremy Gibbons, Oege de Moor. The Fun of Programming. Palgrave Macmillan, 2003.
3. Chris Okasaki. Purely Functional Data Structures. Cambridge University Press, 1999.
4. Simon L. Peyton Jones. The Implementation of Functional Programming Languages. Prentice-Hall, 1987.
5. Andrew W. Appel. Modern Compiler Implementation in ML. Cambridge University Press, 1998.
6. Ravi Sethi. Programming Languages: Concepts and Constructs. 2nd edition, Addison-Wesley, 1995.
7. ...

Further Reading

More specific reading recommendations will be provided chapter for chapter on-the-fly of the course.

Registration, Accounts, and Passwords

- Registration:
  - Via the electronic registration management system of AB E185.1 on or before 15 March 2013
  - For further information visit the homepage of the course: `www.complang.tuwien.ac.at/knoop/ffp185210_ss2013.html`
- Account creation (including account name and password):
  - Automatically in the course of registration.
- Cancelling of registrations:
  - On or before 31 March 2013; also via the electronic registration management system
- In case of questions&problems regarding the registration procedure:
  - David Flamme (`studass@complang.tuwien.ac.at`)

Lectures, Assignments

- Lectures (block style): usually each Thursday from 4.15 p.m. to 5.45 p.m., seminar room on the ground floor of the Institutsgebäude at Argentinierstr. 8; first course meeting today on 7 March 2013.
- Assignments: Usually each Tuesday; starting on 12 March 2013; in total about 7 to 9 assignments.
- Submissions: Automatically collected and checked a week after publication at 3.00 p.m.; must be stored in the home directory of your group account.
- Second submission after bug fixing: Another week later.
- Last but not least: Assignments and lecture slides available on the homepage of the course.

Usage of Computers

- Server: `g0.complang.tuwien.ac.at`
- Terminals for course usage: Lab on the ground floor of the Institutsgebäude at Argentinierstr. 8
- Usage of other computers is encouraged (e.g. at home)
- Required software: Hugs (available free of charge)
- Solutions of assignments must be delivered on server `g0.complang.tuwien.ac.at`

Assessment

- Based on final examination and grades on assignments
- Positive grade only, if all parts are positive
- Final oral examination
- Points (pts) for solutions: max. 100 pts/assignment, about 7 to 9 assignments in total
- Minimum 50% in total of the points for an positive overall grade on assignments
- Half of the points for second deliveries of assignments

Information Sources / Questions and Problems

- Course homepage:
  `www.complang.tuwien.ac.at/knoop/ffp185210_ss2013.html`
- E-mail: `knoop@complang.tuwien.ac.at`
- Further team members:

  Ulrich Neumerkel

  David Flamme (`studass@complang.tuwien.ac.at`)

A Perfect Add-On

...this term:

- Prof. Dr. Andreas Frank
  Institut für Geoinformation und Kartographie

  LVA 127.008 VU 2.0, ECTS 3.0
  Haskell-Praxis: Programmieren mit der Funktionalen Programmiersprache Haskell
  Tue, 3.00 p.m. to 4.30 p.m.
  Seminar room 127, 3rd floor, Gußhausenstr. 25-29

  (The course will be held in English.)

Interested in Studying Abroad?

The Erasmus/LLP-Programme of the European Union offers a plenty of exciting opportunities, e.g.

- Universidade do Minho, Braga, Portugal
- Technical University of Lissabon, Portugal
- The University of Copenhagen, Denmark
- Universität Halle-Wittenberg, Germany
- Universität Paderborn, Germany
- Universidad Politècnica de València, Spain
- ...

For further information please visit:
`http://www.complang.tuwien.ac.at/knoop/erasmus`

Ich wünsche Ihnen

...viel Erfolg bei dieser Lehrveranstaltung und dass Sie auch über die unmittelbare Veranstaltung hinaus davon profitieren!

Nicht zuletzt:
Vorlesung und Übung leben mit Ihnen! Ihre Rückmeldungen, Anregungen, Verbesserungsvorschläge sind willkommen!
Natürlich auch Hinweise, wenn Ihnen etwas gut gefallen hat!