Danil Annenkov

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EDUCATION

PhD, University of Copenhagen, DIKU   November, 2014 - October, 2017

Graduated with distinction from Irkutsk State Technical University,
Faculty of Cybernetics, Department of Automated Systems (5 of 5 years)
(equivalent to a master's degree)   July, 2002

RESEARCH INTERESTS

Formal semantics of programming languages, functional programming, certified programming, type theory, homotopy type theory, formalisation of mathematics.

PUBLICATIONS AND PREPRINTS[1]

1. Danil Annenkov, Martin Elsman. Certified Compilation of Financial Contracts, accepted for publication at PPDP'18.
2. Martin Elsman, Troels Henriksen, Danil Annenkov, Cosmin Oancea. Static Interpretation of Higher-Order Modules in Futhark, accepted for publication at ICFP'18.
3. Danil Annenkov, Paolo Capriotti, Nicolai Kraus. Two-Level Type Theory and Applications. Submitted to ACM Transactions on Computational Logic (TOCL), May 2017.
   [arXiv e-print: https://arxiv.org/abs/1705.03307].
4. Danil Annenkov and Martin Elsman. Towards Certified Compilation of Financial Contracts. In *Proceedings of the 28th Nordic Workshop on Programming Theory (NWPT'16)*. Aalborg, DK. November 2016.
   [http://dannenkov.me/papers/NWPTPayoffLang.pdf]
5. Annenkov, D.V. , Cherkashin, E.A., Generation technique for Django MVC web framework using the Stratego transformation language. *36th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO)*, IEEE, pp. 1084 -1087, 2013.
6. Annenkov, D.V., Domain-specific languages as a foundation of the approach to software development. *Proceedings of conference with international participation "Vinerovskie chteniya"*, pp. 142-146 (in Russian), 2013.
7. Evgeny A. Cherkashin , Polina V. Belykh, Danil V. Annenkov, Christina K. Paskal A Document Content Logical Layer Induction on the Base of Ontologies and Processing Changes. *Proceedings of International Conference on Applied Internet and Information*

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[1] Publications [1,2,3] are the most relevant for the application. Corresponding PDF versions are attached to the application.

Technologies, University of Novi Sad Technical Faculty «Mihailo Pupin», Zrenjanin, Serbia, 2013. C. 252-257.

8. Cherkashin, E.A., Paramonov, V.V., Fedorov, R.K., Terehin, I.N., Pozdnyak, E.I., Annenkov, D.V., Information Systems Framework Synthesis on the Base of a Logical Approach. *Proceedings of International Conference on Applied Internet and Information Technologies*, October 26, Serbia, Zrenjanin. pp. 239-244, 2012.

9. Annenkov, D.V., Simulation and research of the securities market. *Bulletin of the Irkutsk State Technical University*, vol. 27, #3, pp. 68-71 (in Russian), 2006.

10. Annenkov, D.V., Petukhov, P.A., Torbeeva, A.S., Modeling the organization and functioning of the securities market, *Proceedings of conference "Vinerovskie chteniya"*, pp. 35-40, 2005.

PRESENTATIONS

1. *Nominal Techniques in Coq.* HIPERFIT Workshop 2018, University of Copenhagen, November 2017.
2. Formalisations Using Two-Level Type Theory (with Paolo Capriotti and Nicolai Kraus). HoTT/UF Workshop 2017 , Oxford, UK. September 2017.
3. *Towards Certified Compilation of Financial Contracts. Nordic Workshop on Programming Theory (NWPT'16)*. Aalborg, DK. November, 2016.
4. *Verifying the generation of payoff-language expressions.* HIPERFIT Workshop, Copenhagen, 2016
5. *Domain-specific languages as a foundation of an approach to the software development.* Conference with international participation "Vinerovskie chteniya", Irkutsk State Technical University, Russia, 2013
6. Annenkov, D.V., *Simulation as a set of methods and tools for analysis and synthesis of various systems (on the example of the securities market)*. Conference with international participation "Vinerovskie chteniya", Irkutsk State Technical University, Russia, 2005.

GRADUATE LEVEL COURSES

1. Semantics and Types.
Lecturer: Andrzej Filinski, Associate Professor at Department of Computer Science, University of Copenhagen.
2. Static Program Analysis and Language-based Security.
Lecturer: Thomas Jensen, Directeur de recherche INRIA, Rennes.

SUMMER SCHOOLS, SEMINARS

1. Type theory seminar at IT University of Copenhagen organised by Rasmus Møgelberg, February - May 2017.
Reading papers and discussing such topics as categorical models of type theory, type theory with guarded recursion, homotopy type theory. I contributed with a talk on definitions of equivalence in homotopy type theory.
2. Midlands Graduate School in the Foundations of Computing Science 2017, University of Leicester, Leicester, UK.

Following "Advanced Courses": higher-category theory, graphical linear algebra, coalgebras and Infinite Data Structures

3. Blockchain Summer School 2016, IT University of Copenhagen, Copenhagen, Denmark. Introduction to blockchain technology, distributed ledgers with hand-on experience with the Ethereum platform and Solidity smart contract programming language.
4. Midlands Graduate School in the Foundations of Computing Science 2016, University of Birmingham, Birmingham, UK.
   Following "Basic Courses": type theory, category theory, denotational semantics.
5. Oregon Programming Language Summer School 2015, University of Oregon, Eugene, US.
6. Reading group on data-parallel programming languages, 2015 -2016.
   Discussion of papers related to type systems, cost semantics, implementation and application of data-parallel programming languages.

ACADEMIC/TEACHING EXPERIENCE

Postdoc, INRIA Nantes   Since February, 2018

Teaching assistant, co-teacher   2015-2017
University of Copenhagen, DIKU.
Courses:
Advanced Java (concurrency, java generics, testing, RPC over HTTP, working with databases)
Advanced Computer Systems (concurrency control - serializability, two-phase locking; database recovery protocols, consensus protocols in distributed systems).
Co-supervision of Bachelor's projects

Part-time Lecturer   September, 2010 - 2012
Irkutsk State Technical University, Faculty of Cybernetics
Taught the following courses: Web Programming, Technology of Programming.

Teacher   July, 2010 - March, 2011
International Education Centre Aptech-ISTU
  ● Java Programming Language course.

Teacher   September, 2002 - 2007
Irkutsk State Technical University, Faculty of Cybernetics
  ● Courses taught: Algorithmic Programming Languages, Organization of Databases, Operating Systems.
  ● Developed new program for the "Technology of Programming" course.

Research Assistant   September, 2002 - 2006
Irkutsk State Technical University, Faculty of Cybernetics
  ● Stochastic modelling of financial time series.
  ● Development of tools for generation of random numbers with given properties.

FACULTY ACTIVITIES

Organizing committee member of the annual regional programming contest   2003 - 2005
Organizing committee member of the conference "Vinerovskie chteniya"   2004

PROFESSIONAL EXPERIENCE

Founder of Software Development Company   2009 - 2014

Web-based enterprise solutions
(CRM, Service Department Information System, e-Commerce)

Python/Javascript Developer   September 2013 - January 2014

Exploriana Inc.

Member of guidemore.com development team.

Guidemore.com is a internet service for creation travel guides for mobile devices.

Programmer   2004 - 2005

Railroad Clinical Hospital, Irkutsk, Russia

Deployment of a medical information system

SKILLS

10+ years of programming experience (both industry and academic).

Programming languages

Java, Python, Javascript, Scala, Haskell, Racket (Lisp dialect), Stratego/XT.

Proof assistants

Coq, Lean, Agda (some experience)

Markup languages

XML, HTML, Markdown, reStructuredText

Version control systems

Svn, Git, Mercurial

Team Leadership

Led team of developers (3-4 persons).

LANGUAGES

Russian - native

English - advanced, IELTS score 7.0 in 2014.

PROJECTS

1. **Forcing translation in Template Coq**

   Implementation of the CBN forcing translation using typed meta-programing facilities of Template Coq. Based on the OCaml forcing translation plugin (by Jaber, Pédrot, Sozeau, Lewertowski and Tabareau). Current implementation uses the version of Coq supporting definitinal proof-irrelevance (by Gaëtan Gilbert).
   Project repository: https://github.com/CoqHott/template-coq-forcing/tree/sprop

2. **Two-level type theory**

   An implementation of two-level type theory in the Lean proof assistant. Two-level type theory is a version of Martin-Löf type theory (MLTT), which consists of two fragments: the fibrant fragment (Homotopy Type Theory) and the strict fragment (MLTT with uniqueness of identity proofs).
   Project repository: https://github.com/annenkov/two-level

3. **Contract DSL**

   Some extensions of the original Contract DSL (Patrick Bahr, Jost Berthold, Martin Elsman. Certified Symbolic Management of Financial Multi-Party Contracts, ICFP'2015) and

compilation to the intermediate Payoff language implemented in Coq proof assistant.
Project repository: https://github.com/annenkov/contracts

4. **Simply-Typed Lambda-calculus in Coq**

   The projects includes:
   - The proof of normalization of the Call-by-Value Simply-Typed Lambda Calculus (STLC) using Tait's method in Coq.
   - Implementation of nominal sets with applications to STLC (nominal set of lambda terms, definition of alpha-equivalence, proof of equivariance of the typing relation)

   Project repository: https://github.com/annenkov/stlcnorm

5. **The HIPERFIT Portfolio Management Prototype**

   Web-based system that integrates the Contract DSL and the HIPERFIT parallel pricing engine (FINPAR). The system is written in Haskell and features automatic web-form generation on base of Haskell data types along with OpenCL code generation for payoff functions.
   Project repository: https://github.com/HIPERFIT/prototype

6. **Stratego-SLL**

   An interpreter and minimal positive supercompiler for first-order functional language (M_0 language from the Morten Sørensen's Master Thesis) written in Stratego transformation language (part of the Spoofax language workbench).
   Project repository: https://github.com/annenkov/stratego-sll

7. **Unmix project ported to Racket**

   Unmix was originally developed by Sergei A. Romanenko (Keldysh Institute of Applied Mathematics, Russian Academy of Sciences, Moscow, Russia)
   Unmix is a program specializer (based on partial evaluation) for a subset of Scheme.
   Project repository: https://github.com/annenkov/unmix

8. **Entity Model DSL**

   Simple textual DSL for modelling entities with Python code generation.
   Project repository: https://bitbucket.org/ib_soft/entity-model/

9. **Some bioinformatics algorithms in Haskell**

   Implementation of brute-force Regulatory Motifs Finding algorithm (formulated as a Median String problem) with two branch-and-bound strategies.
   Project repository: https://bitbucket.org/ib_soft/haskell-samples