

# ASTA HALKJÆR FROM

people.compute.dtu.dk/ahfrom

## CURRICULUM VITAE

andro.from@gmail.com

Google Scholar h-index: 8, ORCID: 0000-0002-3601-0804 (44 works), dblp.org/pid/214/1791 (27 records).

## EDUCATION

### PhD in Computer Science and Logic

1 February 2020 – 31 January 2023

Technical University of Denmark (DTU Compute).

(defense 21 April 2023)

Project title: *Formally Correct Deduction Methods for Computational Logic*.

Advisors: Jørgen Villadsen and Nina Gierasimczuk.

### MSc in Computer Science and Engineering (Honours Programme)

2018–2020

Technical University of Denmark (DTU Compute).

Thesis title: *Hybrid Logic*.

Thesis advisors: Jørgen Villadsen, Alexander Birch Jensen and Patrick Blackburn.

### Erasmus Exchange

Spring 2019

TU Wien, Vienna, Austria.

30 ECTS including work on the General Architecture for Proof Theory project advised by Stefan Hetzl.

## WORK EXPERIENCE

**Research Assistant** Programming. Technical University of Denmark, 21 hours/week. Aug–Dec 2017

**Teacher** *Hello World*, Copenhagen. MIT Scratch programming workshops for ages 9–12. 2017

## SKILLS

**Programming** Rust, Java, OCaml, JavaScript, Haskell, Lean, etc.

github.com/astahfrom

**Languages** Fluent in written and spoken English and Danish.

## AWARDS & GRANTS

**Distinguished Paper Award** For my CPP 2023 paper with Jannis Limperg on Lean 4 automation.

**Otto Mønsted Fonden Travel Grant** To participate at FLoC 2022 in Haifa, Israel (DKK 7,500).

**DTU Travel Grant** Awarded to me personally by DTU's Executive Board, February 2022, in recognition of my academic qualities and merits (DKK 25,000).

## ACADEMIC ACTIVITIES

**Co-chair** Logic and Computation track of the Student Session @ 32nd European Summer School in Logic, Language and Information (ESSLLI 2021).

**Reviewing** Journal of Logic and Computation (Dali 2020 special issue). *Subreviewing*: Dynamic Logic: New Trends and Applications (Dali 2020), Conference on Logic, Rationality and Interaction (LORI-VIII), Conference on Intelligent Computer Mathematics (CICM 2022).

**Participant** Satisfiability (SAT), Satisfiability Modulo Theories (SMT), and Automated Reasoning (AR) Summer School 2019, Lisbon, Portugal. Invited by speaker Laura Kovács (TU Wien).

## RESEARCH VISITS

**VU Amsterdam** *Lean Forward*: Proof automation for the Lean theorem prover. May 2022

**VU Amsterdam** *Lean Forward*: Proof automation for the Lean theorem prover. November 2022

**VU Amsterdam (remote)** Virtual research stay hosted by Jasmin Blanchette. May & June 2021.

## INVITED TALKS

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*A Naive Prover for First-Order Logic* at the Languages, Systems, and Data Seminar (LSD spring 2022). Invited by Lindsey Kuper (UC Santa Cruz), virtual.

*My PhD Journey* at kick-off event for new PhD students, fall 2021. Invited by Kim Knudsen, Head of PhD School, DTU Compute. Comwell Hotel, Holte.

## EXTERNAL TALKS

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*A Cute Trick for Calculating Saturated Sets* at Copenhagen Logic Gathering 2023, Copenhagen.

*Verifying a Sequent Calculus Prover for First-Order Logic with Functions in Isabelle/HOL* at Thirteenth Conference on Interactive Theorem Proving (ITP 2022), Haifa, Israel.

*On Termination for Hybrid Tableaux* at the Isabelle Workshop 2022, Haifa, Israel.

*Formalized Soundness and Completeness of Epistemic Logic* at 27th Workshop on Logic, Language, Information and Computation (WoLLIC 2021), virtual.

*Formalizing Axiomatic Systems for Propositional Logic in Isabelle/HOL* at 14th Conference on Intelligent Computer Mathematics (CICM 2021), virtual.

*Formalized Soundness and Completeness of Epistemic Logic* at International Workshop on Logical Aspects in Multi-Agent Systems and Strategic Reasoning (LAMAS & SR 2021), virtual.

*Hybrid Logic in the Isabelle Proof Assistant: Benefits, Challenges and the Road Ahead* at Advances in Modal Logic (AiML 2020), virtual.

*Formally Correct Deduction Methods for Computational Logic* at 13th Conference on Intelligent Computer Mathematics (CICM 2020) doctoral session, virtual.

*Formalizing Henkin-Style Completeness of an Axiomatic System for Propositional Logic* at WeSSLLI + ESSLLI Virtual Student Session 2020, virtual.

*Formalizing a Seligman-Style Tableau System for Hybrid Logic* at International Joint Conference on Automated Reasoning (IJCAR 2020), virtual.

*A Concise Sequent Calculus for Teaching First-Order Logic* at the Isabelle Workshop 2020, virtual.

*Using the Isabelle Proof Assistant: Seligman-Style Tableau for Hybrid Logic* at The LogicS of Prior Past, Present, and Future 2019, Roskilde University, Denmark.

*Formalized Soundness and Completeness of Natural Deduction for First-Order Logic* at Scandinavian Logic Symposium 2018, University of Gothenburg, Sweden.

## LOCAL TALKS

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*Generic Epistemic and Public Announcement Logic Completeness Results* at Logic & AI @ AlgoLoG seminar, september 2022, DTU Compute, Kongens Lyngby.

*Verifying a Sequent Calculus Prover for First-Order Logic with Functions in Isabelle/HOL* at PhD Bazaar 2022, DTU Compute, Kongens Lyngby.

*A Naive Prover for First-Order Logic* as guest talk in the DTU course 02256 Automated Reasoning, DTU Compute, Kongens Lyngby.

*Hybrid Logic* at 3rd World Logic Day 2021, A Zoom on Logic, organized by DTU Compute, virtual.

*Belief Revision and Isabelle/HOL* at a seminar course 2020, DTU Compute, Kongens Lyngby.

*The Isabelle Proof Assistant and Hybrid Logic: Formalizing Seligman-Style Tableaux* at an AlgoLoG section seminar 2019, DTU Compute, Kongens Lyngby.

*Formalized Soundness and Completeness of Natural Deduction for First-Order Logic* at Local Isabelle Workshop 2018, DTU Compute, Kongens Lyngby.

*Magnolia — Implementing System F with Anonymous Sums and Products* at Workshop on Programs & Proofs 2018, DTU Compute, Kongens Lyngby.

*FIT — From's Isabelle Tutorial — Verification of Quicksort* at Proof Assistants and Related Tools 2017, DTU Compute, Kongens Lyngby.

## TEACHING ASSISTANT AT DTU COMPUTE

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<b>02287</b>	Logical Theories for Uncertainty and Learning	2020
<b>02102</b>	Introductory Programming	2020
<b>02256</b>	Automated Reasoning	2020
<b>02156</b>	Logical Systems and Logic Programming	2018 & 2019
<b>02180</b>	Introduction to Artificial Intelligence	2018
<b>02110</b>	Algorithms and Data Structures 2	2016
<b>02105</b>	Algorithms and Data Structures 1	2016 & 2017
<b>02101</b>	Introductory Programming	2015 & 2016

## CO-SUPERVISION AT DTU COMPUTE

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<b>MSc thesis</b>	Frederik Krogsdal Jacobsen, <i>Formalization of Logical Systems in Isabelle.</i>	2021
<b>BSc thesis</b>	Emmanuel André Ryom, <i>A Proof Tool for First-Order Logic.</i>	2021
<b>BSc thesis</b>	Simon Tobias Lund, <i>Prover Programming.</i>	2021
<b>Special Course</b>	<i>A Case Study in Computer-Assisted Meta-Reasoning.</i>	2021
<b>Special Course</b>	<i>Advanced Automated Reasoning.</i>	2021
<b>Special Course</b>	<i>Sequent Calculus Verifier.</i>	2021
<b>Special Course</b>	<i>Advanced Topics in Types and Programming Languages.</i>	2021
<b>Special Course</b>	<i>Advanced Theorem Proving in Isabelle.</i>	2020
<b>Special Course</b>	<i>Type Theory and Formal Proof.</i>	2020
<b>Special Course</b>	<i>Correctness proofs for distributed systems in Isabelle.</i>	2020
<b>Special Course</b>	<i>Fundamental Concepts in Algebraic Topology.</i>	2020
<b>Special Course</b>	<i>Visualization of proofs.</i>	2020

## ENTRIES IN THE ISABELLE ARCHIVE OF FORMAL PROOFS

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<i>Synthetic Completeness</i>	2023
<i>Soundness and Completeness of Implicational Logic</i> (with J. Villadsen)	2022
<i>A Naive Prover for First-Order Logic</i>	2022
<i>A Sequent Calculus Prover for First-Order Logic with Functions</i> (with F. K. Jacobsen)	2022
<i>Soundness and Completeness of an Axiomatic System for First-Order Logic</i>	2021
<i>Public Announcement Logic</i>	2021
<i>Formalizing a Seligman-Style Tableau System for Hybrid Logic</i>	2019
<i>A Sequent Calculus for First-Order Logic</i>	2019
<i>Epistemic Logic: Completeness of Modal Logics</i>	2018

## PAPERS UNDER SUBMISSION

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A. H. From. “A Naive Prover for First-Order Logic: A Minimal Example of Analytic Completeness”. In: *28th International Conference on Types for Proofs and Programs, TYPES 2022, June 20-23, 2022, Nantes, France*. LIPIcs. Under submission. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2022.

A. H. From. “Formalized Soundness and Completeness of Epistemic and Public Announcement Logic”. In: *Journal of Logic and Computation — Special Issue from the 27th Workshop on Logic, Language, Information and Computation (WoLLIC 2021)* (2022). Accepted for publication.

A. H. From, A. Schlichtkrull, and J. Villadsen. “A Sequent Calculus for First-Order Logic Formalized in Isabelle/HOL”. In: *Journal of Logic and Computation — Special Issue from the 36th Italian Conference on Computational Logic (CILC 2021)* (2022). Accepted for publication.

A. H. From. “Formalizing Henkin-Style Completeness of an Axiomatic System for Propositional Logic”. In: *Web Summer School in Logic, Language, and Information - ESSLLI 2020 Student Session, Brandeis University, USA, July 11-17, 2020, Selected Papers 2019-2020*. Ed. by A. Pavlova and M. Y. Pedersen. Lecture Notes in Computer Science. Accepted for publication. Springer, 2020.

## PUBLICATIONS

A. M. Eschen, A. H. From, and J. Villadsen. “More Formalized Axiomatic Systems for Propositional Logic in Isabelle/HOL”. In: *Logic and Artificial Intelligence*. Ed. by S. Cojocaru et al. Chisinau: Vladimir Andrunachievici Institute of Mathematics and Computer Science, 2023, pp. 7–22. ISBN: 978-9975-68-484-2. URL: <https://slai2022.islai.org/proceedings/>.

J. Limperg and A. H. From. “Aesop: White-Box Best-First Proof Search for Lean”. In: *Proceedings of the 12th ACM SIGPLAN International Conference on Certified Programs and Proofs, CPP 2023, Boston, MA, USA, January 16-17, 2023*. Ed. by R. Krebbers et al. ACM, 2023, pp. 253–266. DOI: 10.1145/3573105.3575671.

A. H. From and F. K. Jacobsen. “Verifying a Sequent Calculus Prover for First-Order Logic with Functions in Isabelle/HOL”. In: *13th International Conference on Interactive Theorem Proving, ITP 2022, August 7-10, 2022, Haifa, Israel*. Ed. by J. Andronick and L. de Moura. Vol. 237. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2022, 13:1–13:22. DOI: 10.4230/LIPIcs.ITP.2022.13.

A. H. From, S. T. Lund, and J. Villadsen. “A Case Study in Computer-Assisted Meta-reasoning”. In: *Distributed Computing and Artificial Intelligence, Volume 2: Special Sessions 18th International Conference*. Ed. by S. R. González et al. Vol. 332. Lecture Notes in Networks and Systems. Cham: Springer International Publishing, 2022, pp. 53–63. ISBN: 978-3-030-86887-1. DOI: 10.1007/978-3-030-86887-1\_5.

J. Villadsen et al. “Interactive Theorem Proving for Logic and Information”. In: *Natural Language Processing in Artificial Intelligence — NLPinAI 2021*. Ed. by R. Loukanova. Vol. 999. Studies in Computational Intelligence. Cham: Springer International Publishing, 2022, pp. 25–48. ISBN: 978-3-030-90138-7. DOI: 10.1007/978-3-030-90138-7\_2.

A. H. From. “A Succinct Formalization of the Completeness of First-Order Logic”. In: *27th International Conference on Types for Proofs and Programs, TYPES 2021, June 14-18, 2021, Leiden, The Netherlands (Virtual Conference)*. Ed. by H. Basold, J. Cockx, and S. Ghilezan. Vol. 239. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2021, 8:1–8:24. DOI: 10.4230/LIPIcs.TYPES.2021.8.

A. H. From. “Formalized Soundness and Completeness of Epistemic Logic”. In: *Logic, Language, Information, and Computation - 27th International Workshop, WoLLIC 2021, Virtual Event, October 5-8, 2021, Proceedings*. Ed. by A. Silva, R. Wassermann, and R. J. G. B. de Queiroz. Vol. 13038. Lecture Notes in Computer Science. Springer, 2021, pp. 1–15. DOI: 10.1007/978-3-030-88853-4\_1.

A. H. From, A. M. Eschen, and J. Villadsen. “Formalizing Axiomatic Systems for Propositional Logic in Isabelle/HOL”. In: *Intelligent Computer Mathematics - 14th International Conference, CICM 2021, Timisoara, Romania, July 26-31, 2021, Proceedings*. Ed. by F. Kamareddine and C. S. Coen. Vol. 12833. Lecture Notes in Computer Science. Springer, 2021, pp. 32–46. DOI: 10.1007/978-3-030-81097-9\_3.

A. H. From, F. K. Jacobsen, and J. Villadsen. “SeCaV: A Sequent Calculus Verifier in Isabelle/HOL”. In: *Proceedings 16th Logical and Semantic Frameworks with Applications, LSFA 2021, Buenos Aires, Argentina (Online), 23rd - 24th July, 2021*. Ed. by M. Ayala-Rincón and E. Bonelli. Vol. 357. EPTCS. Open Publishing Association, 2021, pp. 38–55. DOI: 10.4204/EPTCS.357.4.

A. H. From, A. Schlichtkrull, and J. Villadsen. “A Sequent Calculus for First-Order Logic Formalized in Isabelle/HOL”. In: *Proceedings of the 36th Italian Conference on Computational Logic, Parma, Italy, September 7-9, 2021*. Ed. by S. Monica and F. Bergenti. Vol. 3002. CEUR Workshop Proceedings. CEUR-WS.org, 2021, pp. 107–121. URL: <http://ceur-ws.org/Vol-3002/paper7.pdf>.

J. Villadsen, A. H. From, and P. Blackburn. “Teaching Intuitionistic and Classical Propositional Logic Using Isabelle”. In: *Proceedings 10th International Workshop on Theorem Proving Components for Educational Software, ThEdu@CADE 2021, (Remote) Carnegie Mellon University, Pittsburgh, PA, United States, 11 July 2021*. Ed. by J. Marcos, W. Neuper, and P. Quaresma. Vol. 354. EPTCS. Open Publishing Association, 2021, pp. 71–85. DOI: 10.4204/EPTCS.354.6.

- A. H. From. “Hybrid logic in the Isabelle Proof Assistant: Benefits, Challenges and the Road Ahead”. In: *Short Papers: Advances in Modal Logic (AiML)*. Ed. by N. Olivetti and R. Verbrugge. 2020, pp. 23–27. URL: <https://archive.org/details/aiml2020shortpapers.pdf>.
- A. H. From. “Synthetic Completeness for a Terminating Seligman-Style Tableau System”. In: *26th International Conference on Types for Proofs and Programs, TYPES 2020, March 2-5, 2020, University of Turin, Italy*. Ed. by U. de’Liguoro, S. Berardi, and T. Altenkirch. Vol. 188. LIPIcs. Schloss Dagstuhl - Leibniz-Zentrum für Informatik, 2020, 5:1–5:17. DOI: 10.4230/LIPIcs.TYPES.2020.5.
- A. H. From, P. Blackburn, and J. Villadsen. “Formalizing a Seligman-Style Tableau System for Hybrid Logic (Short Paper)”. In: *Automated Reasoning - 10th International Joint Conference, IJCAR 2020, Paris, France, July 1-4, 2020, Proceedings, Part I*. Ed. by N. Peltier and V. Sofronie-Stokkermans. Vol. 12166. Lecture Notes in Computer Science. Springer, 2020, pp. 474–481. DOI: 10.1007/978-3-030-51074-9\_27.
- A. H. From, J. Villadsen, and P. Blackburn. “Isabelle/HOL as a Meta-Language for Teaching Logic”. In: *Proceedings 9th International Workshop on Theorem Proving Components for Educational Software, ThEdu@IJCAR 2020, Paris, France, 29th June 2020*. Ed. by P. Quaresma, W. Neuper, and J. Marcos. Vol. 328. EPTCS. Open Publishing Association, 2020, pp. 18–34. DOI: 10.4204/EPTCS.328.2.
- A. H. From et al. “Teaching a Formalized Logical Calculus”. In: *Proceedings 8th International Workshop on Theorem Proving Components for Educational Software, ThEdu@CADE 2019, Natal, Brazil, 25th August 2019*. Ed. by P. Quaresma, W. Neuper, and J. Marcos. Vol. 313. EPTCS. Open Publishing Association, 2019, pp. 73–92. DOI: 10.4204/EPTCS.313.5.
- A. Schlichtkrull, J. Villadsen, and A. H. From. “Students’ Proof Assistant (SPA)”. In: *Proceedings 7th International Workshop on Theorem proving components for Educational software, ThEdu@FLoC 2018, Oxford, United Kingdom, 18 July 2018*. Ed. by P. Quaresma and W. Neuper. Vol. 290. EPTCS. Open Publishing Association, 2018, pp. 1–13. DOI: 10.4204/EPTCS.290.1.
- J. Villadsen, A. H. From, and A. Schlichtkrull. “Natural Deduction Assistant (NaDeA)”. In: *Proceedings 7th International Workshop on Theorem proving components for Educational software, ThEdu@FLoC 2018, Oxford, United Kingdom, 18 July 2018*. Ed. by P. Quaresma and W. Neuper. Vol. 290. EPTCS. Open Publishing Association, 2018, pp. 14–29. DOI: 10.4204/EPTCS.290.2.
- J. Villadsen, A. Schlichtkrull, and A. H. From. “A Verified Simple Prover for First-Order Logic”. In: *Proceedings of the 6th Workshop on Practical Aspects of Automated Reasoning co-located with Federated Logic Conference 2018 (FLoC 2018), Oxford, UK, July 19th, 2018*. Ed. by B. Konev, J. Urban, and P. Rümmer. Vol. 2162. CEUR Workshop Proceedings. CEUR-WS.org, 2018, pp. 88–104. URL: <http://ceur-ws.org/Vol-2162/paper-08.pdf>.
- J. Villadsen et al. “Multi-Agent Programming Contest 2016 — The Python-DTU Team”. In: *International Journal of Agent-Oriented Software Engineering* 6.1 (2018), pp. 86–100. DOI: 10.1504/IJAOSE.2018.10010604.
- J. Villadsen et al. “Multi-Agent Programming Contest 2018 — The Jason-DTU Team”. In: *The Multi-Agent Programming Contest 2018 — Agents Teaming Up in an Urban Environment*. Ed. by T. Ahlbrecht, J. Dix, and N. Fiekas. Vol. 11957. Lecture Notes in Computer Science. Springer, 2018, pp. 41–71. DOI: 10.1007/978-3-030-37959-9\_3.
- J. Villadsen, A. H. From, and A. Schlichtkrull. “Natural Deduction and the Isabelle Proof Assistant”. In: *Proceedings 6th International Workshop on Theorem proving components for Educational software, ThEdu@CADE 2017, Gothenburg, Sweden, 6 Aug 2017*. Ed. by P. Quaresma and W. Neuper. Vol. 267. EPTCS. Open Publishing Association, 2017, pp. 140–155. DOI: 10.4204/EPTCS.267.9.

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## OTHER ARTICLES

- A. H. From. “On Termination for Hybrid Tableaux”. Isabelle Workshop 2022. 2022. URL: [https://files.sketis.net/Isabelle\\_Workshop\\_2022/Isabelle\\_2022\\_paper\\_13.pdf](https://files.sketis.net/Isabelle_Workshop_2022/Isabelle_2022_paper_13.pdf).
- A. H. From, A. B. Jensen, and J. Villadsen. “Formalized Soundness and Completeness of Epistemic Logic”. LAMAS & SR 2021, accepted abstract. 2021. URL: <https://lamassr.github.io/editions/2021/papers/Formalized-Soundness.pdf>.

- A. H. From and J. Villadsen. “On the Use of Isabelle/HOL for Formalizing New Concise Axiomatic Systems for Classical Propositional Logic”. TYPES 2021, accepted abstract. 2021. URL: <https://types21.liacs.nl/download/on-the-use-of-isabelle-hol-for-formalizing-new-concise-axiomatic-systems-for-classical-propositional-logic/>.
- A. H. From and J. Villadsen. “Teaching Automated Reasoning and Formally Verified Functional Programming in Agda and Isabelle/HOL”. 10th International Workshop on Trends in Functional Programming in Education (TFPIE 2021) — Presentation Only/Online Papers. 2021. URL: [https://wiki.tfpie.science.ru.nl/images/a/a6/TFPIE\\_AHF\\_JV.pdf](https://wiki.tfpie.science.ru.nl/images/a/a6/TFPIE_AHF_JV.pdf).
- A. H. From and J. Villadsen. “A Concise Sequent Calculus for Teaching First-Order Logic”. Isabelle Workshop 2020. 2020. URL: [https://files.sketis.net/Isabelle\\_Workshop\\_2020/Isabelle\\_2020\\_paper\\_6.pdf](https://files.sketis.net/Isabelle_Workshop_2020/Isabelle_2020_paper_6.pdf).
- A. H. From. “Formalized soundness and completeness of natural deduction for first-order logic”. Scandinavian Logic Symposium 2018, accepted abstract. 2018. URL: [https://scandinavianlogic.org/assets/attachments/book\\_of\\_abstracts\\_sls2018.pdf#page=11](https://scandinavianlogic.org/assets/attachments/book_of_abstracts_sls2018.pdf#page=11).
- A. H. From, H. Hatteland, and J. Villadsen. “Teaching first-order logic with the natural deduction assistant (NaDeA)”. Scandinavian Logic Symposium 2018, accepted abstract. 2018. URL: [https://scandinavianlogic.org/assets/attachments/book\\_of\\_abstracts\\_sls2018.pdf#page=11](https://scandinavianlogic.org/assets/attachments/book_of_abstracts_sls2018.pdf#page=11).
- A. H. From, A. Schlichtkrull, and J. Villadsen. “Drawing Trees”. Isabelle Workshop 2018. 2018. URL: [https://files.sketis.net/Isabelle\\_Workshop\\_2018/Isabelle\\_2018\\_paper\\_7.pdf](https://files.sketis.net/Isabelle_Workshop_2018/Isabelle_2018_paper_7.pdf).
- A. H. From et al. “Substitutionless First-Order Logic: A Formal Soundness Proof”. Isabelle Workshop 2018. 2018. URL: [https://files.sketis.net/Isabelle\\_Workshop\\_2018/Isabelle\\_2018\\_paper\\_3.pdf](https://files.sketis.net/Isabelle_Workshop_2018/Isabelle_2018_paper_3.pdf).
- J. Villadsen, A. Schlichtkrull, and A. H. From. “Code Generation for a Simple First-Order Prover”. Isabelle Workshop 2016. 2016. URL: [https://web.archive.org/web/20220121022845/https://www21.in.tum.de/~nipkow/Isabelle2016/Isabelle2016\\_12.pdf](https://web.archive.org/web/20220121022845/https://www21.in.tum.de/~nipkow/Isabelle2016/Isabelle2016_12.pdf).