Curriculum Vitae: Niklas Holsti

General

Paul Niklas Holsti was born in 1952 in Helsinki, Finland and is a Finnish citizen. He is married and has two children.

Education

M.Sc. (Mathematics), 1975, University of Helsinki.
Lic.Phil. (Astronomy), 1977, University of Helsinki.
Ph.D. (Computer Science), 1990, University of Helsinki.

Languages

Native Finnish and Swedish speaker, fluent English (Cambridge Certificate of Proficiency), reading skills in French, Spanish and German.

Current position

Dr Holsti is currently Chairman of the Board and Head of Research and Development at Tidorum Ltd (http://www.tidorum.fi/), a small company that specialises in tools that statically analyse embedded software, on the machine-code level, to compute bounds on worst-case execution time and worst-case stack usage. The company is owned by Dr Holsti and his sons.

Tidorum was a partner in the Compilers and Timing Analysis Cluster within the ARTIST2 Network of Excellence (EU 6th FP) and an affiliated partner in the successor Network of Excellence, ArtistDesign (7th FP, http://www.artist-embedded.org/artist/). Tidorum performed a 4-year Marie-Curie industry-academia collaboration with Mälardalen University, Sweden, on Advanced Program Analysis for Real-Time Systems (APARTS), http://www.mrtc.mdh.se/-projects/aparts/.

In addition to running Tidorum, Holsti works as a consultant for embedded software development, in particular in the space domain, and occasionally takes part in technical and scientific international research projects in embedded systems, especially in timing analysis.

Professional experience

2016-19 **Consultant, Space Systems Finland Ltd** (http://www.ssf.fi/)

Design lead for the on-board SW for two of the three computers (the ROIC SW) in the Radio Occultation instruments (GNSS receivers for atmospheric tomography) on the Meteosat MetOp Second Generation polar-orbit satellites for operational meteorology.

2013-16 **Consultant, Space Systems Finland Ltd** (http://www.ssf.fi/)

Design lead for the on-board application SW in the Instrument Control Units for the two main scientific instruments (FCI and IRS) on the Meteosat Third Generation weather satellites.

2012 **Consultant, Space Systems Finland Ltd** (http://www.ssf.fi/)

Participation (part time, four months) in the testing of the on-board SW for the MIXS instrument on the Bepi-Colombo spacecraft which will orbit Mercury.

2011 **Consultant, OHB System AG**

Support (full-time, two months) for the schedulability analysis of the on-board SW for the Small-GEO satellite series.

2011 **Consultant, Space Systems Finland Ltd**

Participation (part time, four months) in the review, testing, and documentation of the two-processor version of the Platform Application Software in the GOCE satellite (http://www.esa.int/Our_Activities/Observing_the_Earth/GOCE). Participation (full time, one month) in a proposal for the Attitude and Orbit Control SW on the Solar Orbiter spacecraft.

2010 **Consultant, Space Systems Finland Ltd**

Participation (part time, one month) in a proposal for the PUS TC/TM subsystem SW for a Galileo operational satellite, based on reusing SW components developed at SSF for the GOCE and Herschel/Planck satellites.

2006-2009 **PM, ESA PEAL Project**

Project Manager for the ESA/ESTEC project "Prototype Execution-time Analyzer for LEON", in which Tidorum Ltd was prime contractor. Sub-contractors were Thales Alenia Space (France), Rapita Systems Ltd (UK), and the University of Padova (Italy).

2004-now **Tidorum Ltd**

See above, current position.

2002-2004 **Space Systems Finland Ltd**

Chief designer and project manager for the on-board application software for the European Space Agency's GOCE (Gravity and Ocean Current Explorer) satellite (http://www.esa.int/Our_Activities/Observing_the_Earth/GOCE). In charge of developing and marketing the Bound-T tool for static analysis of worst-case execution time, later a product of Tidorum (http://www.bound-t.com/).

2000-2002 **Space Systems Finland Ltd**

Chief designer and project manager for the development of a tool for static analysis of execution time (Bound-T prototype). Chief designer and project manager for the development of advanced FDIR (Fault Detection, Isolation and Recovery) software using Bayesian networks and other forms of automated deduction and inference (see https://www.researchgate.net/publication/228484215_Towards_Advanced_FDIR_Components). Provides technical consultancy and product assurance for on-board-software projects such as the MetOp Central Flight Software TC/TM subsystem.

1999-2000 **Space Systems Finland Ltd**

Head of SSF Skill Centre, managing R&D projects, process improvement, personnel training and computer infrastructure.

1996-1999 **Space Systems Finland Ltd**

Head of On-Board Systems department. Leads several projects developing on-board software, tools, methods and processes.

1995-1998 **Space Systems Finland Ltd**

Chief designer and project manager for the on-board Application Software for the GOMOS instrument flown on ENVISAT-1 by the European Space Agency. This project was developed by a team of 10 engineers in Ada on a MIL-STD-1750A processor using the ASTRES real-time kernel. ESA PSS-05 processes were followed. See https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/envisat/instruments/gomos.

1991-1994 **Department of Computer Science, University of Helsinki**

Laboratory Engineer participating in Unix application maintenance and user assistance. Gave three lecture courses on “Unix applications programming” and supervised a number of Master's Theses and undergraduate programming projects. Research on string processing algorithms (under Prof. Esko Ukkonen). Advised and assisted in moving a research project (on formal analysis of data communications protocols) from Modula-2 to Ada.

1989-1991 Nordic Optical Telescope, La Palma, Canary Islands

Software Engineer. Primary responsibility for telescope control and user-interface software for an alt-azimuth mounted advanced optical telescope (2.5 m mirror diameter) housed in a computer-controlled rotating building. Pascal and 68k assembly language were used in a distributed cluster with four processors. http://www.not.iac.es/.

1985-1989 Department of Computer Science, University of Helsinki

Teaching Assistant and other similar positions. Teaching duties included introductory Pascal programming, Fortran programming, Ada and principles of programming languages. Participated in a graduate student program in 1986-89, culminating in a Ph.D. on user interface programming based on reversible parsing and command interpretation with case studies in Ada, Pascal, and Fortran.

1982-1985 Metsähovi Radio Research Station, Kylmälä, Finland

Software design and implementation for observations of continuum radio sources (Sun, quasars) with a computer-controlled precision microwave radio telescope (14.7 m diameter, https://www.aalto.fi/fi/metsahovin-radiotutkimus-asema). Also wrote programs for on-line and off-line data reduction and analysis. Assisted with transition from earlier programming languages (BASIC, Algol, HP2100 assembler) to Ada.

1974-1984 Observatory and Astrophysics Laboratory, University of Helsinki

Research Assistant. Designed and implemented software for the analysis of photographic stellar spectra (Burroughs Extended Algol). Designed and implemented software and some electronics for the control of an Acousto-Optical Radio Spectrometer and its associated data handling in a heterogeneous cluster of three computers using Remote Procedure Call protocols (Zilog Z80 assembler and a local PL-M level language, HP Algol, Modcomp Classic assembler, Fortran).

Professional tasks and responsibilities

2014 Member of Program Committee, 14th International Workshop on Worst-Case Execution Time Analysis (WCET 2014).

2012 Member of Program Committee, WCET 2012.

2010 Member of Program Committee, WCET 2010.

2009 Chair, WCET 2009.

2008 Member of Program Committee, WCET 2008.

2006 Member of Program Committee, WCET 2006.

Publications in computing

Several of these publications are available in PDF form from the Tidorum website at http://www.tidorum.fi/bound-t/reports/.

2012 "**Verifying real-time properties of model-based and event driven on-board SW for SGEO**", Andreas Wortmann, Gordon Machel, and Niklas Holsti. Accepted for DASIA 2012, Dubrovnik, Croatia, 2012-05-14..16.

2011 "**Fully Bounded Polyhedral Analysis of Integers with Wrapping**", Stefan Bygde, Björn Lisper, and Niklas Holsti. Third International Workshop on Numerical and Symbolic Abstract Domains (NSAD 2011), Venice, Italy, 2011-09-13.

2008 "**Attacking the Sources of Unpredictability in the Instruction Cache Behavior**", Enrico Mezzetti, Niklas Holsti, Antoine Colin, Guillem Bernat, and Tullio Vardanega. 16th International Conference on Real-Time and Network Systems (RTNS 2008), Rennes, France, 2008-10-18.

"**Computing Time as a Program Variable: A Way Around Infeasible Paths**", Niklas Holsti. 8th International Workshop on Worst-Case Execution Time Analysis (WCET'2008), Prague, Czech Republic, July 1, 2008.

"**WCET Tool Challenge 2008: Report**", Niklas Holsti, Jan Gustafsson, Guillem Bernat (eds.), Clément Ballabriga, Armelle Bonenfant, Roman Bourgade, Hugues Cassé, Daniel Cordes, Albrecht Kadlec, Raimund Kirner, Jens Knoop, Paul Lokuciejewski, Nicholas Merriam, Marianne de Michiel, Adrian Prantl, Bernhard Rieder, Christine Rochange, Pascal Sainrat, Markus Schordan. 8th International Workshop on Worst-Case Execution Time Analysis (WCET'2008), Prague, Czech Republic, July 1, 2008.

"**The Worst-Case Execution Time Problem - Overview of Methods and Survey of Tools**", Reinhard Wilhelm, Jakob Engblom, Andreas Ermedahl, Niklas Holsti, Stephan Thesing, David Whalley, Guillem Bernat, Christian Ferdinand, Reinhold Heckmann, Tulika Mitra, Frank Mueller, Isabelle Puaut, Peter Puschner, Jan Staschulat, Per Stenström. ACM Transactions on Embedded Computing Systems, Volume 7, Issue 3 (April 2008), pp. 36:1-36:53.

2007 "**Analysing Switch-Case Tables by Partial Evaluation**", Niklas Holsti. 7th International Workshop on Worst-Case Execution Time Analysis (WCET'2007), Pisa, Italy, July 3, 2007.

2005 "**Using a WCET Analysis Tool in Real-Time Systems Education**", Samuel Petersson, Andreas Ermedahl, Anders Pettersson, Daniel Sundmark, and Niklas Holsti. Fifth International Workshop on Worst-Case Execution Time Analysis, Palma de Mallorca, July 2005.

2003 "**Challenges in Calculating the WCET of a Complex On-Board Satellite Application**", Manuel Rodríguez, Nuno Silva, João Esteves, Luis Henriques, Diamantino Costa, Niklas Holsti and Kjeld Hjortnæs. 3rd International Workshop on Worst-Case Execution Time (WCET) Analysis (WCET'2003), Porto, July 2003. Jan Gustafsson (ed.), Mälardalen Real-Time Research Centre, ISSN 1404-3041, ISRN MDH-MRTC-116/2003-1-SE, pp. 11-15.

"**Compiler Support for WCET Analysis: a Wish List**", G. Bernat and N. Holsti. 3rd International Workshop on Worst-Case Execution Time (WCET) Analysis (WCET'2003), Porto, July 2003. Jan Gustafsson (ed.), Mälardalen Real-Time Research Centre, ISSN 1404-3041, ISRN MDH-MRTC-116/2003-1-SE, pp. 65-69.

"**Impact of a Restricted Tasking Profile: The Case of the GOCE Platform Application Software**", Niklas Holsti and Thomas Långbacka. Reliable Software Technologies -- Ada-Europe 2003. Proceedings of the 8th Ada-Europe International Conference on Reliable Software Technologies. J-P. Rosen and A. Strohmeier, eds., ISBN 3-540-40376-0. Lecture Notes in Computer Science, Vol. 2655, Springer Verlag.

2002 "**Status of the Bound-T WCET Tool**". Niklas Holsti and Sami Saarinen. 2nd International Workshop on Worst-Case Execution Time Analysis, Technical University of Vienna, Austria, June 2002.

2001 "**Space Systems Finland and the Bound-T Tool**". Niklas Holsti. (1st) International Workshop on Worst-Case Execution Time Analysis, Technical University of Delft, June 2001.

"**Towards Advanced FDIR Components**", Niklas Holsti, Matti Paakko. DASIA 2001 : DAta Systems In Aerospace, 28 May - 1 June 2001, Nice, France. ftp://ftp.estec.esa.nl/pub/wm/wme/Web/DASIA_2001_Towards%20Advanced%20FDIR%20Components.pdf.

"**Bayesian Networks for Advanced FDIR**", Matti Paakko, Petri Myllymäki, Niklas Holsti, Henry Tirri. ESA Workshop on "On-Board Autonomy", 17-19 October 2001, ESTEC, Noordwijk, The Netherlands. ftp://ftp.estec.esa.nl/-pub/wm/wme/Web/ESA_On_Board_Auto_WS_SSF_Artic_2.pdf.

2000 "**Worst-Case Execution Time Analysis for Digital Signal Processors**", Niklas Holsti, Thomas Långbacka and Sami Saarinen. European Conference on Signal Processing 2000 (EUSIPCO 2000), Tampere, September 2000.

"**Using a Worst-Case Execution Time Tool for Real-Time Verification of the DEBIE software**", Niklas Holsti, Thomas Långbacka and Sami Saarinen. Data Systems in Aerospace 2000 (DASIA 2000), EUROSPACE, Montreal, 22-26 May 2000.

1998 “**Evaluation of the ObjectGEODE Methodology**”, P. Kumara, K. Suihkonen, N. Holsti, M. Paakko and T. Ihme. Data Systems in Aerospace '98 (DASIA'98), EUROSPACE, Athens, May 1998.

“**CASE Tool Evaluation**”, T. Ihme, N. Holsti, P. Kumara, M. Paakko and K. Suihkonen. Data Systems in Aerospace '98 (DASIA'98), EUROSPACE, Athens, May 1998.

1997 “**GOMOS Instrument Pointing Control Software**”, Niklas Holsti and Timo Pastila. Data Systems in Aerospace '97 (DASIA'97), EUROSPACE, Seville, 26-29 May 1997.

1989 “**A session editor with incremental execution functions**”. Software-Practice and Experience 19, 4 (April 1989), 329-350.

“**Script editing for recovery and reversal in textual user interfaces**” (Ph.D. Thesis). Report A-1989-5, Department of Computer Science, University of Helsinki, Finland.

— Several technical reports and conference presentations on Ph.D. thesis work, one as co-author on string algorithms (approximate pattern matching) and one as co-author on computer learning (learning decision trees from examples).

Publications in astronomy

— Around 10 research reports, in collaboration with astronomers, describing observing instruments, software and observational results both in optical and radio astronomy. Co-author in three journal papers on such subjects. Several technical reports on astronomical software.