

Michael A. Wessel

Computer Scientist, Dipl. Inform. Dr. rer. nat.

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RESEARCH INTERESTS

Artificial Intelligence (AI). Primary interests and areas of expertise include logic-based knowledge representation, description logics, Semantic Web, question answering, and AI programming. Other interests include information systems and databases, software engineering and software architectures, and programming languages.

EDUCATION

- 04/2008 Doctoral degree (Dr. rer. nat.) in Computer Science (Summa Cum Laude).
Hamburg University of Technology (TUHH), Germany.
Thesis: Flexible, Configurable Software Architectures for Ontology-Based Information Systems.
Committee: Dr. Ralf Möller (advisor), Dr. Friedrich Mayer-Lindenberg, Dr. Dieter Gollmann.
- 04/1998 Diploma in Computer Science.
University of Hamburg, Germany.
Thesis: A Visual Language for the Definition of Spatial Concepts (in German).
Advisor: Dr. Volker Haarslev, Dr. Christian Freksa.

EMPLOYMENT HISTORY

- 10/2010 – **Computer Scientist**
Present *SRI International, Artificial Intelligence Center, Menlo Park, CA 94025*
Project involvements:
- ONISTT / RAVE: Maintenance and reengineering of an ontology visualization tool for a FLORA2 / XSB-Prolog based Semantic Web reasoner (called Sunflower). Extension of the tool with basic ontology editing operations.
 - AURA / HALO: A project funded by Vulcan Inc., aimed at realizing a knowledge-based electronic biology textbook with question answering capabilities. Responsible for the maintenance and extension of the backend of the knowledge representation system. Developed novel scalable algorithms for knowledge base storage and question answering, i.e., an efficient core-engine for answering conjunctive queries. Realized automatic translations of the knowledge base into standard formats such as OWL2 and TPTP. Developed an algorithm for semantic-based alignment of slot-value similarities of knowledge base objects.

09/2004 – **Teaching & Research Assistant**10/2010 *Hamburg University of Technology (TUHH), Institute for Software Systems (STS), Germany*

Project involvements:

- PRAESINT: A project funded by the German Research Foundation on probabilistic cognitive vision systems. Developed the back end for an agenda-based, event-driven cognitive architecture for high-level interpretation of multimedia streams by means of deductive and abductive reasoning methods. This work was based on the RacerPro description logic reasoner and “my” query and rule language, nRQL.
- BOEMIE: A project funded by the European Union on bootstrapping ontology evolution with multimedia information extraction. Implemented an abductive rule engine as an extension to the RacerPro query and rule language nRQL. Abductive facilities were used to hypothesize objects and relations in an interpretation scenario with incomplete information.
- TONES: A project funded by the European Union on “thinking ontologies”. Worked on programmatic extensions (i.e., lambda expressions and stored procedures) for Semantic Web query languages. Also worked on graphical interfaces for reasoners (RacerPorter).

Teaching:

- Teaching on the graduate level, i.e. exercises and lab classes on databases, electronic commerce, web services, description logics and Semantic Web.
- Designed and graded written exams.
- Supervision and co-supervision of bachelor and master students.

09/2004 – **Co-Founder, Consultant & Developer**12/2013 *Racer Systems GmbH & Co. KG, Hamburg, Germany*

At Racer Systems we have developed the influential RacerPro Semantic Web and description logic reasoner. RacerPro was the first reasoner to implement the Web Ontology Language, OWL, and is used by hundreds of commercial customers. It continues to be an important backbone for all kinds of academic and commercial research projects in the Semantic Web and description logic fields.

Projects and activities:

- Developed an influential Semantic Web and description logic query and rule language, nRQL.
- Developed the graphical interface for RacerPro, RacerPorter.
- Contributed significantly to the W3C member submission *OWLink*. Contributed and implemented the reference implementations for the functional and S-expression binding of OWLink.
- Developed the open-source ontology management framework OntoLisp.
- Consulted for DOCOMO EuroLabs over a period of 3 years. Involvement in the DO-COMO EU-funded projects ContextWatcher and IYouIt.
- Product presentation and invited talks about RacerPro, e.g. Semantic Days 2009 in Stavanger, European Common Lisp Meeting 2009 in Hamburg, and trade fairs, e.g. Semantic Web Days 2005 in Munich, a presentation at Stanford together with Racer’s partner company Franz Inc. in 2006, etc.
- Preparation of documentation (reference manual and user guide).

06/1998 – **Teaching & Research Assistant**08/2004 *University of Hamburg, Informatics Department, Cognitive Systems Group (KOGS), Germany*

Project involvements:

- DLS: Description Logics and Spatial Reasoning. Investigated novel ways to combine description logics and qualitative spatial reasoning methods. Investigated decidability and complexity of extended description logics.
- Tangram: A Tangram-playing Lisp program.
- VISCO: A visual spatial querying system for geographic information systems. This was an internal research project based on my diploma thesis work.

Teaching:

- Teaching on the undergraduate level: exercises and tutorials for freshman classes on computer science, i.e. functional, logical, and object-oriented programming in Scheme, Prolog, and Java. On special occasions I could also teach on user interfaces, knowledge representation, and AI.
- Co-supervision of bachelor and master students.
- Assistant examiner (“Beisitzer”) in oral exams.

HONORS

07/1999 – Scholarship from the University of Hamburg (“Grundstipendium”).

06/2001

PROFESSIONAL SERVICES

- Program committee member: Deep Knowledge Representation Challenge Workshop, 2011.
- Program committee member: Ontologies, Reasoning and Modularity, 2008 (WORM-08).
- Reviewer for a couple of workshops and conferences, including Description Logics, KR, ESWC, ISWC, AAI, ECAI, Lisp conferences, etc.

I have reviewed for the following international journals:

- Semantic Web Journal
- Knowledge and Information Systems (I have received a Springer reviewer certificate)
- Computer Science and Information Systems
- Journal of Computer Science and Technology (I have a certificate)
- ACM Transactions on the Web
- International Journal on Artificial Intelligence Tools

COMPUTER SKILLS

Lisp and dialects, Logic Programming (Prolog, Datalog), Java, JavaScript, AJAX, Z80 Assembler, Modula 2, Borland Pascal 7.0, C/C++, OWL, RDF(S), SPARQL, SQL, XML, XML Schema, XML DDT, XQuery, NoSQL databases such as AllegroGraph, MapServer + OpenLayers, TCP/IP network programming, SOAP + WSDL, Linux, Bash, Windows, Mac, L^AT_EX, HTML, CSS, Office Software (Word, Excel), BASIC, ...

SELECTED PUBLICATIONS

“Automatic Strengthening of Graph-Structured Knowledge Bases”, Vinay Chaudhri, Nikhil Dinesh, Stijn Heymans, and Michael Wessel, *3rd International Workshop on Graph Structures for Knowledge Representation and Reasoning, 2013*

“KB Bio 101: A Challenge for OWL Reasoners”, Michael Wessel, Vinay Chaudhri, and Stijn Heymans, *The OWL Reasoner Evaluation Workshop, 2013*

“Object-Oriented Knowledge Bases in Logic Programming”, Vinay K. Chaudhri, Stijn Heymans, Michael Wessel, and Son Cao Tran, *Technical Communication of International Conference in Logic Programming, 2013*

“KB Bio 101: A Repository of Graph-Structured Knowledge”, Vinay K. Chaudhri, Michael Wessel and Stijn Heymans, *Exploiting Large Knowledge Repositories, 2012*

“The RacerPro Knowledge Representation and Reasoning System”, Volker Haarslev, Kay Hidde, Ralf Möller, and Michael Wessel, *Semantic Web, 03 / 2012*

“Flexible Software Architectures for Ontology-Based Information Systems”, Michael Wessel and Ralf Möller, *Journal of Applied Logic – Special Issue on Empirically Successful Systems, 01 / 2009*

“OWLlink”, Thorsten Liebig, Marko Luther, Olaf Noppens, and Michael Wessel, *Semantic Web, 01 / 2011*

“What Happened to Bob? Semantic Data Mining of Context Histories”, Michael Wessel, Marko Luther, and Ralf Möller, *International Workshop on Description Logics, 2009*.

“Software Abstractions for Description Logic Systems”, Michael Wessel and Ralf Möller, *European Lisp Workshop, 2008*

“Flexible und konfigurierbare Software-Architekturen für datenintensive ontologiebasierte Informationssysteme”, Michael Wessel, *PhD Thesis (in German), ISBN 978-3-8325-2162-2, Logos-Verlag, Berlin*

“Towards a Media Interpretation Framework for the Semantic Web”, Sofia-Espinosa Peraldi, Atila Kaya, Sylvia Melzer, Ralf Möller, and Michael Wessel, *IEEE/WIC/ACM International Conference on Web Intelligence, 2007*

“Design Principles and Realization Techniques for User Friendly, Interactive, and Scalable Ontology Browsing and Inspection Tools”, Michael Wessel and Ralf Möller, *International Workshop on OWL: Experiences and Directions, 2007*

“On the Scalability of Description Logic Instance Retrieval”, Ralf Möller, Volker Haarslev, and Michael Wessel, *29. German Annual Conference on Artificial Intelligence, 2006*

“A High Performance Semantic Web Query Answering Engine”, Michael Wessel and Ralf Möller, *International Workshop on Description Logics, 2005*

“Querying the Semantic Web with Racer + nRQL”, Volker Haarslev, Ralf Möller, and Michael Wessel, *KI-2004 International Workshop on Applications of Description Logics, 2004*

“Some Practical Issues in Building a Hybrid Deductive Geographic Information System with a DL Component”, Michael Wessel, *International Workshop on Knowledge Representation meets Databases, 2003*

“Obstacles on the Way to Spatial Reasoning with Description Logics – Some Undecidability Results”, Michael Wessel, *International Workshop on Description Logics, 2001*

“Terminological Default Reasoning About Spatial Information: A First Step” Ralf Möller and M. Wessel, *International Conference on Spatial Information Theory COSIT*, 1999.

“Towards Computer Vision with Description Logics: Some Recent Progress” Ralf Möller, Bernd Neumann, and Michael Wessel, *Integration of Speech and Image Understanding*, 1999

“VISCO: Bringing Visual Spatial Querying to Reality” Michael Wessel and Volker Haarslev, *IEEE Symposium on Visual Languages*, 1998.

“GenEd - An Editor with Generic Semantics for Formal Reasoning about Visual Notations”, Volker Haarslev and Michael Wessel, *IEEE Symposium on Visual Languages*, 1996

Google Scholar:

<http://scholar.google.com/citations?user=hAweuA0AAAAJ>

Research Gate:

http://www.researchgate.net/profile/Michael_Wessel/publications/

Microsoft Academic Search:

<http://academic.research.microsoft.com/Author/1419292/michael-wessel>

TABULAR CV

Elementary School Burgunderweg, Hamburg-Niendorf, Germany		
From	To	Description
09/10/1977	06/29/1981	Elementary School
Gymnasium (High School) Ohmoor, Hamburg-Niendorf, Germany		
From	To	Description
08/08/1981	07/09/1990	Highschool, Abitur: 06/14/1990
Allgemeines Krankenhaus Ochsenzoll, Hamburg, Germany		
From	To	Description
09/1990	09/1991	Civil Services (Station 15d)
University of Hamburg (Major Informatics / Computer Science, Minor Physics), Germany		
From	To	Description
10/01/1991	07/18/1998	Diploma (Master) in Informatics (Minor: Physics): 04/24/1998
University of Hamburg, Informatics Department, Cognitive Systems Lab (KOGS), Germany		
From	To	Description
06/16/1998	06/30/1999	Full Position, Research & Teaching Assistant
07/01/1999	06/30/2001	Scholarship (Grundstipendium)
07/01/2001	03/31/2002	Half Position, Researcher, DFG-funded project DLS
04/01/2002	08/15/2004	Full Position, Researcher, DFG-funded project DLS
Technical University of Hamburg-Harburg (TUHH), Institute for Software Systems, Germany		
From	To	Description
09/01/2004	06/30/2006	Full Position, Research & Teaching Assistant TUHH Dissertation: 04/14/2008. Grade: "Ausgezeichnet" (Summa Cum Laude / Excellent / with Highest Honors)
04/01/2009	05/31/2009	Full Position, Researcher, EU-funded projects CASAM & BOEMIE
07/01/2009	09/30/2010	Full Position, Researcher, DFG-funded project PRAESINT
Racer Systems GmbH & Co. KG, Hamburg, Germany		
From	To	Description
10/01/2004	12/31/2013	Co-Founder and Developer
10/06/2005	10/07/2005	Exhibitor at the Semantic Web Days in Pullach by Munich
07/01/2006	07/31/2007	Full-Time Developer & User Support for Racer Systems
08/23/2006	09/01/2006	Visit at Franz Inc. in Oakland, CA, USA
12/15/2006	03/15/2007	Consulting for DOCOMO EuroLabs
04/01/2007	04/04/2007	European Lisp Conference in Cambridge
07/20/2007	12/19/2007	Consulting for DOCOMO EuroLabs
Work as an Independent Consultant (Freiberufler)		
From	To	Description
07/01/2006	12/20/2006	BOEMIE
08/01/2007	06/30/2008	TONES
07/01/2008	02/28/2009	BOEMIE
07/02/2008	10/31/2008	Consulting for HiTech Uni HH, Product Modeling with DLs
SRI International, Menlo Park, CA, USA		
From	To	Description
10/18/2010	today	Computer Scientist, projects: AURA (HALO), ONISTT & RAVE