A Proposal for a Special Interest Group on Logic and Computation (SIGLOG) of the Association for Computing Machinery

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The purpose of this document is to propose the establishment of SIGLOG, a new ACM Special Interest Group on Logic and Computation. It is the aim of the group putting together the SIGLOG proposal to found a SIG with three major functions: (a) the organization of international conferences, (b) educating the wider community about the role and significance of logic in computation and (c) establishing major awards honouring those who have made substantial contributions to the field. SIGLOG would represent the entire community that participates in the quadrennial FLoC federated conferences. This includes LICS as well as several other conferences amounting to a community of well over two thousand people.

1 Background Information

During the past fifty years there has been extensive, continuous, and growing interaction between logic and computer science. In many respects, logic provides computer science with both a unifying foundational framework and a tool for modelling computing systems. In fact, logic has been called "the calculus of computer science", playing a crucial role in diverse areas such as artificial intelligence, computational complexity, distributed computing, database systems, hardware design, programming languages, and software engineering.

Over the years, several international conferences covering a broad spectrum of topics in logic and computation and in formal methods have been established and have been held successfully on an annual basis. Furthermore, five Federated Logic Conferences (FLoC), modeled after the Federated Computer Research Conference (FCRC), have been held every three or four years since 1996. The first FLoC conference was held at New Brunswick, New Jersey in 1996, the second at Trento, Italy in 1999, the third at Copenhagen, Denmark in 2002, the fourth one at Seattle, Washington in 2006 and the fifth at Edinburgh, Scotland in 2010.

The 2010 FLoC conference consisted of eight major conferences and 64 workshops as well as 5 other affiliated events. There were over twelve hundred participants. The 2006 FLoC conference consisted of six major conferences and over 40 workshops, attracting over 850 participants.

The eight conferences that participated in FLoC 2010 were:

- Conference on Computer-Aided Verification (CAV)
- International Conference on Logic Programming (ICLP)
- International Joint Conference on Automated Reasoning (IJCAR)
- IEEE Symposium on Logic in Computer Science (LICS)

- Conference on Rewriting Techniques and Applications (RTA)
- International Conference on Theory and Applications of Satisfiability Testing (SAT)
- Computer Security Foundations Symposium (CSF)
- Interactive Theorem Proving (ITP).

The first six were also part of FLoC 2006 while the last two were new that year. None of these conferences was an ACM conference at that time. In fact, until the recent reorganization of LICS as a joint ACM-IEEE conference, ACM had no conference dedicated to logic and computation, even though ACM has been publishing the ACM Transactions on Computational Logic since 2000. As stated in the scope of this journal, "For the purposes of ToCL, the field of computational logic consists of all uses of logic in computer science." There seems to be a gap in ACM's coverage of this research area that the proposed SIG would fill. This gap is illustrated by the fact that several ACM Fellows commented to us that they do not have a natural SIG to which they could belong.

The next FLoC conference is being organized in Vienna in 2014 and will be part of a month-long *Vienna Summer of Logic*. Overall we expect 2000-2500 participants in the Summer of Logic program. We expect 1500 or more participants in FLoC which gives us an estimate of the size of the community. It is clearly not a small subgroup of SIGPLAN or SIGACT. The conferences participating in FLoC 2014 are:

1. 26th International Conference on Computer Aided Verification (CAV)
2. 27th IEEE Computer Security Foundations Symposium (CSF)
3. 30th International Conference on Logic Programming (ICLP)
4. 7th International Joint Conference on Automated Reasoning (IJCAR)
5. 5th Conference on Interactive Theorem Proving (ITP)
6. Joint meeting of the 23rd EACSL Annual Conference on Computer Science Logic (CSL) and the 29th ACM/IEEE Symposium on Logic in Computer Science (LICS)
7. 25th International Conference on Rewriting Techniques and Applications (RTA) joint with the 12th International Conference on Typed Lambda Calculi and Applications (TLCA)
8. 17th International Conference on Theory and Applications of Satisfiability Testing (SAT).

In FLoC 2010 there were 64 workshops affiliated with the conferences, we have 75 workshops planned for FLoC 2014.

In addition there are the following logic and AI meetings:

1. 14th International Conference on Principles of Knowledge Representation and Reasoning (KR)

2. 27th International Workshop on Description Logics (DL)

3. 15th International Workshop on Non-Monotonic Reasoning (NMR)

Another gap in ACM is the lack of a means for disseminating information about logic in computer science. SIGACT runs an excellent newsletter which is a model that we would like to emulate. The EATCS Bulletin is another venue where the European Theoretical Computer Science community can share information, conference news, book reviews and educational articles. There are no comparable forums for the dissemination of information relevant to the logic and computation community.

2 Primary Need, Focus, and Audience of SIGLOG

1. The establishment of a Special Interest Group on Logic and Computation will address the very basic need of having the area of logic and computation represented in ACM at the SIG level.

2. The aim is to establish SIGLOG as the premier international community for dissemination of knowledge in logic and computation, and in formal methods in computer science, broadly defined. Specific areas that fall in this spectrum include the following: automated deduction, categorical models and logics, constraint programming, description logics, logical decision procedures, domain theory, finite model theory, formal aspects of program analysis, higher-order logic, hybrid systems, knowledge representation and reasoning, lambda and combinatory calculi, linear logic, logical aspects of automata theory, logical aspects of computational complexity, logical aspects of database theory, logics in artificial intelligence, logics of programs, logic programming, modal and temporal logics, model checking, process calculi, programming language semantics, reasoning about security, rewriting, semantics of concurrency and distributed computation, specifications, type systems and type theory, and formal verification. Both fundamental aspects as well as applications are included in this scope.

3. Given that much of the activity in logic and computation is currently taking place outside North America, SIGLOG will have an international character. To this effect, SIGLOG will strive to establish a presence in all geographical regions. Moreover, it will cooperate with related organizations in Europe and elsewhere, including the European Association for Theoretical Computer Science (EATCS), the European Association for Computer Science Logic (EACSL), and the Association of Logic, Language and Information (FoLLI). We already have the President of EATCS and the Chair of EACSL on our proposed executive council.

4. The logic and computation community would like to maintain ties with other logic-related groups outside the computer science community. This is an important reason to have another SIG. The Vienna Summer of Logic being planned for 2014 is an example of the kind of activity that we have in mind. Neither SIGACT nor SIGPLAN would have this as a major focus.

5. The primary audience of SIGLOG will be professionals at all levels and graduate students interested in logic and computation. They include people in academia, research laboratories, and industry. It should be noted that computational logic and formal methods are widely used in such governmental organizations such as NSA and NIST, and in industrial organizations such as Intel, Microsoft, Motorola, Qinetiq, AMD, IBM, Deutsche Telekom, AT&T, NASA, Daimler Chrysler, Siemens, SAP, Airbus, Rockwell-Collins, Adelard, Praxis, Cadence, Synopsys, Cadence, Mentor Graphics, and Trusted Logic.

3 Initial Activity

The following initial activities will be undertaken:

1. A dedicated website will be developed and an electronic newsletter will be established.

2. An Education Committee will be set up which will be charged with developing expository materials for use on the website and dissemination through the newsletter and participating in the Wikipedia project.

3. An Awards Committee will be set up to propose the founding of major new awards and, in subsequent years, to solicit nominations and choose the award winners.

4. SIGLOG will not establish a new flagship conference. Instead, it will seek to become a joint sponsor of the annual ACM-IEEE Symposium on Logic in Computer Science (LICS), which is generally regarded as the most prestigious general annual conference in logic and computation. Negotiations with IEEE and ACM have been successfully concluded and LICS is now a jointly sponsored ACM-IEEE conference. Currently, this is a SIGACT conference but this was a temporary arrangement that was set up to cover the period while SIGLOG is still under discussion.

   In addition, SIGLOG will seek to become the sponsor of several conferences in the area of logic and computation that current lack a sponsoring organization, including ITP, RTA, SAT (mentioned above). Other conferences like International Conference on Concurrency Theory (CONCUR) and Mathematical Foundations of Programming Semantics (MFPS) could be affiliated with SIGLOG. Initial conversations with these conferences are underway.

5. SIGLOG will establish a number of standing committees, including the Education Committee and the Awards Committee mentioned above and in addition, a Conference Committee and a Membership Committee, as described in the proposed SIGLOG Bylaws.

6. SIGLOG will seek to advise ACM on the appointments to the Editorial Board of the ACM Transactions on Computational Logic (ToCL) this idea is supported by the former EiC of ToCL, Vladimir Lifschitz and the current EiC, Dale Miller.

4 Overlap Issues with Other ACM SIGs

There is some overlap with other ACM SIGs, but no broad overlap with any one of them. Specifically, SIGACT's topics include automata theory, computational complexity, program semantics, and program verification; SIGART focuses on artificial intelligence, and SIGPLAN deals with programming language semantics and type systems; and SIGSAC is also interested in reasoning about security. However, in these and other SIGs, logic is used as a tool, while logic is the unifying theme behind SIGLOG and provides the underlying science. It should be noted that the word "logic" does not appear in the description of any of the existing SIGs (http://www.acm.org/sigs/sigs). Moreover, none of the conferences that participated in FLoC 2010 is an ACM conference (in particular, none of these conferences is currently affiliated with a SIG).

5 The Educational Mission of SIGLOG

Perhaps the most pressing reason to found SIGLOG is the educational mission. One hears at every LICS that people outside a particular speciality have difficulty following talks of another speciality. This is partly to be expected in a wide ranging conference, but we feel that there is a need for a source of information that is accessible to the entire community that keeps everyone abreast of new ideas and trends. One obvious benefit is the prospect of enhanced synergy between research areas. So far there have been scattered tutorials at LICS, but while these have been very good they have not been recorded and do not constitute an easily accessible resource.

Specific tasks that the education committee would perform are: (a) solicit (or write!) expository articles, (b) maintain regular columns through the newsletter (c) organize tutorials at conferences and (d) for basic topics participate in the Wikipedia project. The last point may seem controversial, but it is a fact that many people turn to Wikipedia as their first point of inquiry. It is far more productive to participate in it and improve it than to criticize it. The educational mission is not only for the community but should serve as an entry point for others (for example SIGPLAN and SIGACT members) to become acquainted with developments in the field.

6 Awards

There have been some outstanding contributions in the area of logic and computation which have never been recognized by a major award. The Turing award is, of course, open to all fields and some members of the SIGLOG community (Robin Milner, C. A. R. Hoare, Amir Pnueli, Edmund Clarke, Allen Emerson, Joseph Sifakis, Dana Scott) have indeed been recognized. Others such as Edsger Dijkstra, Stephen Cook, E. F. Codd and John McCarthy also won Turing Awards for logic related work.

Nevertheless, there are other outstanding contributions (which it would not be appropriate to discuss here) that have never been recognized. Such awards serve an educational function apart from celebrating the person who wins the award. We are closely working with EATCS to establish an award, to be called the Church Award, to honour contributions to logic and computation.

7 Community Buy-In

Initial discussions on the establishment of SIGLOG started at FLoC'06 in Seattle. Representatives from all six participating conferences expressed strong support of the idea. The SIGLOG initiative was also discussed by the LICS Organizing Committee during the LICS meetings in 2007 and 2008. The LICS Organizing Committee decided to seek ACM joint sponsorship for LICS with the intention of making LICS a SIGLOG conference. Conversations with CONCUR, RTA, and SAT about becoming SIGLOG conferences are underway.

The feedback we received from the community regarding SIGLOG has been uniformly positive. The only issue that has been raised consistently is the desire not to have SIGLOG viewed as an "American" organization. We plan to address this concern by ensuring international diversity among the various SIGLOG officers and committee chairs and members. In addition, SIGLOG will have an Advisory Council, with representatives of existing organizations and conferences in the area of logic and computation to ensure broad involvement of the logic-and-computation community. We are now in discussions with about 30 organizations and conferences regarding their participation in the Advisory Council. We already have about 15 representatives on the Council.

8 Core Group of Volunteer Leaders

The initial slate of officers will be as follows:

- Chair: Prakash Panangaden, McGill University, Canada

  Prakash Panangaden received his undergraduate education at IIT Kanpur and graduate education at the universities of Chicago, Wisconsin-Milwaukee and Utah. He has worked primarily in concurrency theory with side interests in type theory, programming language semantics, epistemic logic and quantum computing. His early work was in the expressive power of indeterminate dataflow primitives. He worked on the semantics of concurrent constraint programming and for the last decade has been active in the theory of probabilistic transition systems. He began his academic career at Cornell University where he was an assistant professor in 1985-89 and since 1990 he has been at McGill University in Montreal, Canada. He is or has been on the steering committee of LICS, MFPS, FICS, PROBMIV and several workshops. He has been on numerous program committees including LICS, CONCUR, QEST, MFPS, FOSSACS, ICALP, CiE and has been PC chair of MFPS, LICS, QEST and FICS. He has been on the council of the ASL and is a member of the ACM. He has been an invited speaker at ICALP, CiE, CONCUR, PODC, MFPS, FSTTCS and many workshops. He is on the editorial boards of Logical Methods In Computer Science, The Journal of Logic and Algebraic Programming, Computability and Mathematical Structures in Computer Science. He was elected a Fellow of the Royal Society of Canada in 2013.

- Vice Chair: Luke Ong, University of Oxford, UK

Luke Ong is Professor of Computer Science and Fellow of Merton College, University of Oxford. He has held visiting positions at Ecole Normale Superieure, Paris; Bell Labs, Lucent Technologies; Newton Institute and Centre for Mathematical Sciences, University of Cambridge; and the National University of Singapore. He read Mathematics and Computer Science at Trinity College, University of Cambridge and holds a PhD from the University of London. He has served on the editorial boards of London Mathematical Society Journal of Computation and Mathematics, and of Logical Methods in Computer Science. He was programme committee chair of CSL 2005, LiCS 2007 and IFIP TCS 2008. He is currently a member of the LiCS Organizing Committee, EACSL Council, and the Steering Committee of ETAPS. He has played a leading role in the development of game semantics, and its applications to the semantics of programming languages. Other contributions include lambda calculus, type theory, linear logic and computational proof theory. He has recently been working on semantic methods for the verification of infinite structures.

- Secretary: Alexandra Silva, Radboud University, Nijmegen, Netherlands.

  Alexandra Silva is one of the young stars in the field of Logic and Computation. She is an expert in category theory and especially in the co-algebraic approach to transition systems. She obtained her Ph.D. in 2010 under the supervision of Jan Rutten at the C.W.I. (degree awarded by Radboud University). She was, most unusually, appointed as an Assistant Professor within a few months of completing her Ph.D. and has been tenured since 2012. She has published prolifically and has made important contributions to automata theory using powerful co-algebraic tools. Recently she has been active in the use of duality theory for reasoning about minimization. She has already been an invited speaker at international conferences and has been PC chair of workshops and PC member of major conferences like LICS. It is extremely valuable to have the perspective of a junior member of the community on the executive committee.

- Treasurer: N. Shankar, SRI

  Dr. Natarajan Shankar is a Staff Scientist at the SRI Computer Science Laboratory where he has been since 1989. He received his Ph.D. degree in computer science (under the supervision of Robert Boyer and J Moore) from the University of Texas at Austin in 1986. From 1986 to 1988, he served as a research associate at Stanford University (with John McCarthy) and he has also taught there at the graduate level.

  Natarajan Shankar is a Staff Scientist at SRI International. He has a Ph.D. in Computer Science from the University of Texas at Austin. His interests are in the study of formal methods for the specification and verification of hardware and software systems, automated deduction, and computational logic. He is the co-developer of several leading verification tools including PVS, SAL, and Yices. His recent research has focused on inference architectures, cyber-physical systems, probabilistic inference, natural language processing, and formal tool integration. His recent work includes the development of novel inference techniques for satisfiability modulo theories, software and hardware verification methods, tool integration frameworks, and probabilistic reasoning. Dr. Shankar is a past

chair of IFIP Working Group 2.3 on Programming Methodology, and leads the Verified Software Initiative, an international research effort aimed at making formal verification practical.

- Member: Catuscia Palamidessi, INRIA Saclay, Paris.

  Catuscia Palamidessi received her Ph.D. in Computer Science, from the University of Pisa in 1982 under the supervision of Giorgio Levi. She is currently Director of Research (DR1) at INRIA Saclay. She was one of the early pioneers of logic programming but branched out into related areas like concurrent constraint programming and concurrency theory in general. She is currently one of the world leaders in concurrency theory and especially in formal methods for security. She has been one of the pioneers in use of information theory techniques in reasoning about security. She has been the PC chair of 10 international conferences including the prestigious ICALP conference, CONCUR and MFPS. She is the chair designate for the upcoming 2015 LICS conference to be held in Japan. She is on numerous editorial boards and steering committees.

- Member: Anuj Dawar, University of Cambridge, U.K.

  Anuj Dawar received his Ph.D. from the University of Pennsylvania in 1993 under the supervision of Scott Weinstein. He is currently Professor of Logic and Algorithms in the Computer Laboratory, University of Cambridge. He is an expert in finite model theory, complexity theory, the expressive power of logical formalisms and games. He has been the PC chair of major conferences such as Computability in Europe and CSL. He is on the editorial board of the ACM Transactions on Computational Logic and also the new journal Computability. He is the president of the European Association of Computer Science Logic and will be a valuable link between that organization and the present group.

- Member: Luca Aceto, Reykjavik University, Iceland.

  Luca Aceto is a professor of computer science at Reykjavik University. Previously he was at Aalborg University in Denmark. He obtained his Ph.D. from Sussex University in 1991 under the supervision of Matthew Hennessy. He is one of the leaders in the area of concurrency theory and process algebra. He is especially noted for his deep contributions to equational and algebraic reasoning for concurrent processes starting from his award-winning doctoral dissertation. He has been on over 60 program committees over the course of his career. He is on the editorial board of several journals including Journal of Algebraic and Logic Programming and Acta Cybernetica. He is currently President of EATCS and will be an invaluable connection between our group and EATCS.

- Advisory Council: Moshe Y. Vardi, Rice University

  Moshe Y. Vardi is the George Professor in Computational Engineering and Director of the Ken Kennedy Institute for Information Technology at Rice University. He chaired the Computer Science Department at Rice University from January 1994 till June 2002. Prior to joining Rice in 1993, he was at the IBM Almaden Research Center, where he managed the Mathematics and Related

Computer Science Department. His research interests include database systems, computational-complexity theory, multi-agent systems, and design specification and verification. Vardi received his Ph.D. from the Hebrew University of Jerusalem in 1981. He is the author and co-author of over 300 technical papers, as well as two books, "Reasoning about Knowledge" and "Finite Model Theory and Its Applications", and the editor of several collections.

Vardi is the recipient of three IBM Outstanding Innovation Awards, a co-winner of the 2000 Goedel Prize, a co-winner of the 2005 ACM Kanellakis Award for Theory and Practice, a co-winner of the 2006 LICS Test-of-Time Award, a co-winner of the 2008 ACM PODS Mendelzon Test-of-Time Award, a winner of the 2008 ACM SIGMOD Codd Innovations Award, a recipient of the 2008 Blaise pascal Medal for Computer Science by the European Academy of Sciences, a 2008 ACM Presidential Award and the 2012 EATCS Award. He holds honorary doctorates from the University of Saarland, Germany, and the University of Orleans, France. Vardi is an editor of several international journals, and Editor-in-Chief of the Communication of ACM. He is Guggenheim Fellow, as well as a Fellow of the Association of Computing Machinery, the American Association for the Advancement of Science, the Association for the Advancement of Artificial Intelligence, and the Institute for Electrical and Electronic Engineers. He was designated Highly Cited Researcher by the Institute for Scientific Information, and was elected as a member of the US National Academy of Engineering, the European Academy of Sciences, and the Academia Europea. He recently co-chaired the ACM Task Force on Job Migration.

- Editor-in-Chief, Transactions on Computational Logic: Dale Miller, INRIA Saclay, Paris.

  Dale Miller received his Ph.D. in Mathematics from Carnegie Mellon in 1983 and is currently a Director of Research at INRIA-Saclay, France. He has been a professor at the University of Pennsylvania, the Pennsylvania State University, and the Ecole Polytechnique of France and has held visiting academic positions at the universities of Aix-Marseille, Siena, Genoa, Pisa, Glasgow, and Edinburgh. Miller is editor-in-chief of the ACM Transactions on Computational Logic and has editorial duties on five other journals.

  Miller has graduated 14 PhD students in the general area of computational logic. Miller has been on the program committee of over 70 international conferences and workshops. In particular, he has served on the program committees of each of the following conferences as least three times: CADE, CSL, LICS, LPAR, as well as being on the program committee of POPL and nine different international logic programming conferences. Miller has also been the PC chair for two international conferences (ILPS93, ACM PPDP03) and several international workshops. He is one of the PC co-chairs of the upcoming joint LICS-CSL conference to be part of FLoC 2014.