TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

EMCL STUDENT WORKSHOP 2010
11–12 FEBRUARY 2010

Thursday, 11/02/10	
9:00 –10:30	**Welcome** **Student talks, session 1**
	Simplification of Herbrand Sequents *Tsvetan Dunchev, Vienna University of Technology* **Abstract:** One of the most important results in mathematical logic is Herbrand's theorem, which says that a skolemized sequent $S = A_1, \ldots A_n \vdash C_1, ..., C_m$ is valid if and only if there exists a Herbrand sequent for S (i.e. a sequent consisting of instances of the A_i and C_j which is propositionally valid). Herbrand sequents which are extracted from an LK-proof are a very useful tool for summarizing and analyzing the essential mathematical information of the proof. In the CERES system (Cut-Elimination by Resolution) there exists an algorithm for Herbrand sequent extraction. But the extracted Herbrand sequent is not always the minimal one. It can be minimized in terms of formula occurrences, and minimization of the term complexity of formulas occurrences when a set of rewriting rules (for simplifying equations) is provided. The algorithm for simplification of already extracted Herbrand sequents is implemented within the CERES system as well. Simplifications are performed both on the level of formulas and on the level of terms. For term simplification a set of rewriting rules is used which can be extracted from a background theory specified by the user. The simplification of Herbrand sequents is important to the mathematical interpretations of the Herbrand sequents (obtained from proofs after cut-elimination) by humans and increases the quality of interactive proof analysis.
	Verification of Message Sequence Graphs *Clemens Dubslaff, Dresden University of Technology* **Abstract:** Message Sequence Charts (MSCs) provide an intuitive notation of communication systems and are used in early steps of requirement specification. The simplest form of MSCs considers only exchange of messages between several processes and its semantics is given by some partial order. Combining MSC scenarios can be conveniently done using MSC-graphs (MSGs). Since errors in early design steps have heavy impact to development costs and reliability, MSCs are popular subject of verification. Whereas model checking single MSCs is decidable, it is well known that it is undecidable for asynchronous semantics of MSG. We will present a transition system representation of MSC (and MSG) where the traces are equal to partial order linearizations. These transition systems allow us to employ model checking results for transition systems. In particular, we will employ the representation for showing decidability of the Model Checking Problem for bounded MSG.
	Modeling Job Shop scheduling problem for symmetry breaking and SMT solvers *Oana Tifrea, Free University of Bozen-Bolzano* **Abstract:** Job Shop scheduling problem (JSSP) has an important practical utilization in resource management but it has been proven that it is a NP complete problem. Approaches to solve this problem include the local search algorithms such as taboo search or combination of genetic algorithms with taboo search. However constraint programming remains a solution of choice, being more flexible to modifications. We will discuss some approaches of modeling JSSP, tools used in this modeling and results obtained. We will present results regarding symmetry breaking for this problem and some future work.

10:30 –11:00	Coffee Break
11:00 –12:30	**Student talks, session 2**
	A Translational Approach to Constraint Answer Set Solving *Christian Drescher, Vienna University of Technology* **Abstract:** We present a new approach to enhancing Answer Set Programming (ASP) with Constraint Processing techniques which allows for solving interesting Constraint Satisfaction Problems in ASP. We show how constraints on finite domains can be decomposed into logic programs such that unit-propagation achieves arc, bound or range consistency. Experiments with our encodings demonstrate their computational impact.
	Adaptive DPLL-Fwd Calculi for Knowledge Compilation, Model Counting and Projection/Forgetting *Fareed Arif, Dresden University of Technology* **Abstract:** Abstract Projection computation is a generalization of second-order quantifier elimination which permits to quantify upon an arbitrary set of ground liters instead on a given predicate symbol where knowledge complication is the transformation of formulas such that they meet a syntactic criteria which permit to execute operations like satisfiability, clausal entailment and model counting in linear time. On the basis of a unified view for projection computation and knowledge compilation, an LP-Tableau framework is realized. The LP-relation (Linkless Projection relation) constraint output formulas syntactically with respect to the link scope and semantically with respect to projection scope; there by defining, an abstract calculi which serves as the formal basis of our implementation. Rules for the construction of such a tableaux are introduced and bundled as DPLL-Fwd calculi such that the modern DPLL SAT solvers or knowledge compilers can be then modeled as instantiations of this calculi. The Tableau framework for projection elimination and its instantiation by DPLL-Fwd calculi by a successive rewrite system can served as a more generalized basis for a practically successful system. Thus by defining a more comprehensive view of projection/forgetting relation for second-order quantifier elimination, modeling counting and formula transformations for knowledge-based languages like: Binary decision diagram (BDD), Disjunctive negation Normal form (DNNF) and Shannon expansion for subformulas.
	Decomposition of Distributed Non-monotonic Multi-Context Systems *Seif El-Din Bairakdar, Vienna University of Technology* **Abstract:** This talk gives a brief overview of an ongoing research in the area of Multi-context systems (MCS), which are formalisms that enable the interlinkage of single knowledge bases, called contexts, via bridge rules. We present a decomposition technique for MCS which analyzes its topology. Based on this conceptual information, we apply topology pruning techniques to get economically small representations of context dependencies. Orthogonal to this, we characterize minimal interfaces for information exchange between contexts, such that data transmissions can be minimized.The effectiveness of the optimization techniques is demonstrated by a prototype implementation, which uses an off-the-shelf SAT solver and shows encouraging experimental results.
12:30 –14:00	Lunch
14:00 –15:00	**Computer Science Logic @ Vienna** *Prof. Thomas Eiter, Vienna University of Technology* **Abstract:** This talk gives a brief overview of Computer Science Logic and related areas in Vienna in general, and some ongoing research activities at the Vienna University of Technology in particular.
15:00 –16:00	Best thesis award
16:30 –19:00	Ice Skating (optional)

Friday, 12/02/10	
9:00 –10:30	**Student talks session 3**
	Polynomial and efficient query rewriting framework: open issues *Evgeny Sherkhonov and Nhung Ngo, Free University of Bozen-Bolzano* **Abstract:** We consider the problem of query answering in databases with ontologies. Recently there has been proposed the framework that allows rewrite a given query into a new query that is over the language of the database, provided that the initial query is Beth definable. Since the obtained query is defined over the database predicates, it can be easily evaluated using standard database technologies. We present the working framework for the case of Description Logic ontologies with DBoxes, where a DBox faithfully represents a database whose table names are the DBox predicates and the tuples are DBox assertions. Then we generalize the framework for arbitrary FOL ontologies and databases. And finally we address to open problems that we are going to work on.
	Efficient query answering on large medical ontologies *Julián Méndez, Dresden University of Technology* **Abstract:** Description logics are a family of formalisms, less expressive than first order logic. Each description logic is identified by its concept and role constructors. The lightweight description logic $\mathcal{EL}++$ has been proved suitable for several ontology applications, most notably from the life science domain. A medical ontology contains a unified medical terminology. It allows a consistent way to index, store, retrieve and exchange clinical data across different clinicians and organizations. Answering queries on large medical ontologies can be resource demanding. One technique that simplifies information retrieval is module extraction. Given a set of symbols considered relevant, it is possible to get a module with respect to those symbols. This module can be used to answer queries using considerably less time and less memory.
	Formalization for Natural Language Fuzzy Queries and Crisp Multi-Criteria Queries *Waheed Aslam Ghumman, Universidad Politécnica de Madrid* **Abstract:** It is common in real life to find Fuzzy information that comes from subjective judgments or the imprecision in measured data. Fuzzy approaches have been used to extend database systems in storing and updating imprecise information (data) and in processing imprecise queries. In this paper we present a general architecture for fuzzy (expressive) queries that can be particularized for implementation in variety of database platforms i.e. fuzzy web search, information systems supporting fuzzy data etc. Comparisons with former approaches as well as uniqueness of our architecture are discussed. This paper presents a state of the art model for fuzzy queries which not only makes the fuzzy query writing much simpler, easier and shorter than conventional query writing but also close to human like thinking due to its true fuzzy nature. We also provide an operational semantics for fuzzy query processing which can be followed for multiple data types i.e. numeric, text, graphics etc. Our approach supports fuzzy querying for not only fuzzy data but also for missing data; hence enabling us to get query results closer to human thinking and expectations. It is an expressive model that let to make human-like (i.e. fuzzy) consults, and our initial experimental study shows that this model has reasonable advantages in fuzzy databases.
10:30 –11:00	Coffee Break
11:00 –12:00	**Life after EMCL: do I want to do a PhD?** Talk *Evgeny Kharlamov, Free University of Bozen-Bolzano* Panel discussion with EMCL graduates *Tsvetan Dunchev, Vienna University of Technology* *Evgeny Kharlamov, Free University of Bozen-Bolzano* *Magdalena Ortiz, Vienna University of Technology* *Mantas Šimkus, Vienna University of Technology*
12:00 –12:30	**Questions & Answers Session with Representatives of Partner Universities**
12:30 –14:30	Lunch (free)
14:30 –16:30	City walk (optional)
20:00 –	Social Dinner