



Quo Vadis ASP or: Tweety is gone, now what?

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Fundamental issues in ASP

- ASP for masses
- Progress needed in Theory
- Progress needed in Implementation
- Progress needed in Knowledge Representation
- Progress needed in Software Engineering

The first step, ASP for masses

- Masses: potential users
- Main impediment: It is hard to explain stable semantics
- What to do?
 - go beyond 20 or so definitions of stable models that the community produced so far, and find some definition suitable for the “programmer from the street”, **or**
 - find a class of problems that is so much better solved with ASP that the same programmer will pay attention.

Issues in Theory

- We need a better *proof theory* for ASP. There is no comparison to the situation at SAT
- We do not have classes such as *Pigeon-hole*, we do not know what are *truly hard* islands in the ASP landscape
- Finding them (I believe this will be done via suitable proof-theory) will bring us to the understanding of *lower bounds* for processing with ASP
- We do not have a real understanding of the issue of *symmetries* in ASP
- We do not know what kind of *back-doors* could be in ASP

Issues in Theory, cont'd

- Unrelated, but still theoretical issue is the question of *random ASP programs*
- We do not have generally accepted model of such programs (despite the work by Lin and Zhao, Schlipf and Truszczynski, and others)
- We do not even know what such programs should help us to explain
- and what kind of behavior they should have.

Issues in Implementation

- Better grounders needed
- The old dream of non-ground solving still not realized (there is some progress, viz Misha's work)
- Better solvers are always needed, and may require progress in Theory
- Better local-search solvers needed

Issues in Knowledge Representation

- It is clear that ASP is years ahead of SAT in Knowledge Representation, but somehow this does not translate into propagation of use of ASP
- In spite of years of work, we still do not really understand the correct relation of ASP and constraints
- Stable semantics is not really well-understood in the context of constraints, and the native approximation (well-founded semantics) is not really agreed upon

Issues in Software Engineering

- Programming in ASP is easier than in SAT, but still primitive
- Lack of support for strings is a serious applications
- Lack of Database support (dlv is, of course, an exception)
- Very limited WWW support (but they are working on it in Vienna)
- Lack of support for *abstract data types*
- Lack of support (but this may be just my ignorance) for incremental execution of ASP programs

Conclusions

- Early on, when I started to work with Anil Nerode and Jeff Remmel, Anil told us “We need to kill *Tweety*, otherwise nonmonotonic logic will never make it”
- The issue was: “how to move from commonsense examples to mathematics and then to computer science”
- The tool for this move was forged by Misha and Vlad
- Many of us present here: Ilkka, Marc, Nicola, Mirek, Thomas, Torsten and many others were plucking the feathers
- We certainly moved far away from *Tweety* and its flock