SeaLion: An Eclipse-based IDE for ASP with Advanced Debugging Support

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Motivation

Answer-Set Programming:

- Elegant declarative problem solving approach
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- Successful applications in areas like bioinformatics, planning, music composition, Linux package configuration, Semantic-Web reasoning, ....

One obstacle for a wider acceptance:

- Lack of tools for supporting the development of ASP programs

In 2009, we started a research project @ Vienna University of Technology:

- The mission: explore methods and methodologies for developing answer-set programs
- Topics: debugging, testing, programming methodologies, ...
- A major goal: make project results accessible in tools that are incorporated in an Integrated Development Environment (IDE) for ASP
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SeaLion

The Integrated Development Environment for Answer-Set Programming
SeaLion (ctd.)

*SeaLion*, an integrated development environment for ASP

- Supports the *major ASP languages* (Gringo and DLV)
- implemented as plugin of the popular *Eclipse platform*
- modular design: can be extended by other Eclipse plugins
- publicly available (GPL 3.0)
SeaLion (ctd.)

Important features:

▶ source-code editors for the languages of the most prominent ASP solvers Gringo/Clasp and DLV
▶ syntax highlighting, syntax checking, visual program outline, refactoring
▶ support for launching solvers
▶ debugging features (stepping, ouroboros)
▶ visualisation of answer sets (Kara-plugin)
▶ LANA annotations and documentation generation
▶ UML class diagrams for ASP domain modelling, UML objects diagrams for answer-set visualisation
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Other IDEs for ASP: APE (Sureshkumar et al., 2007), ASPIDE (Febbraro, Reale, and Ricca, 2011), iGROM (Koziarkiewicz, 2011)
SeaLion is the first IDE for ASP with debugging features that work for real-world answer-set programs:

- implements stepping-based debugging (Oetsch, Pührer, and Tompits 2011)
Step-by-step execution is popular in procedural programming.

- programmer gets insight in actual behaviour of the program
- stepping is a central debugging feature of many integrated development environments (IDEs)
Stepping in ASP

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We devised a framework that allows for

- building an answer set the user has in mind by
- stepwise adding further active rules: a rule is *active* if its body is satisfied
Stepping in ASP (ctd.)

Stepping *emulates a bottom-up computation* of an interpretation:

- user serves as an oracle, choosing rules considered to be active
- atoms in the rule are added to the interpretation or remembered to be false
- considered interpretation grows monotonically
- computation results in an answer set of is guaranteed to get stuck
- bugs can be found when computation deviates from expectations
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Two ways to extend a computation:

- **Steps**: considering a further single ground active rule
- **Jumps**: considering multiple rule at once (to quickly considering rules that are not of interest)
Live demo
Summary and Outlook

We presented SeaLion, a comprehensive IDE for ASP

- compatible with major solvers
- support for stepping-based debugging
  - intuitive debugging approach
  - approach has been studied also for DL-programs (Oetsch, Pührer, and Tompits 2012)

Future Work:

- further automate stepping
- research into representation refactoring
Finally

→ Visit our website: http://www.sealion.at!