

jInfer Base Module Description

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Target audience: developers willing to extend jInfer.

Responsible developer:	Matej Vitásek
Required tokens:	none
Provided tokens:	none
Module dependencies:	none
Public packages:	cz.cuni.mff.ksi.jinfer.base.automaton cz.cuni.mff.ksi.jinfer.base.interfaces cz.cuni.mff.ksi.jinfer.base.interfaces.inference cz.cuni.mff.ksi.jinfer.base.interfaces.nodes cz.cuni.mff.ksi.jinfer.base.objects cz.cuni.mff.ksi.jinfer.base.objects.nodes cz.cuni.mff.ksi.jinfer.base.regex cz.cuni.mff.ksi.jinfer.base.utils org.apache.log4j.*

1 Introduction

This is the module containing data structures, interfaces and logic shared across the whole jInfer framework. Virtually every other module containing logic should in theory depend on *Base*.

2 Structure

Description of *Base* structure will partially mirror its JavaDoc documentation ([KMS⁺g]). For more detailed information, refer to it directly.

Base contains logic for Log4j ([log]) initialization in *Installer* class. Configuration of the overall logging granularity level (NetBeans options integration) is contained in `cz.cuni.mff.ksi.jinfer.base.options` package. Shared jInfer graphics is contained in the `cz.cuni.mff.ksi.jinfer.base.graphics` and `cz.cuni.mff.ksi.jinfer.base.graphics.icons` packages.

2.1 Data structures

Regular expression representation is contained in `cz.cuni.mff.ksi.jinfer.base.regex` package. Most important class is of course *Regex*, assisted by an enum of its type *RegexType* and representation of its interval *RegexInterval*. XML node representation is described by interfaces in `cz.cuni.mff.ksi.jinfer.base.interfaces.nodes` package and more-less concrete implementations in `cz.cuni.mff.ksi.jinfer.base.objects.nodes` package. Finite state automata representation is contained in the `cz.cuni.mff.ksi.jinfer.base.automaton` package. Refer to [KMS⁺a] to get an accurate description of all these representations.

Miscellaneous shared classes are contained in `cz.cuni.mff.ksi.jinfer.base.objects`. For example, *Input* is used to provide the *Initial Grammar Generator* with input data. *Pair* is a generic class binding two object together in a *pair*.

2.2 Interfaces

Apart from interfaces contained in already discussed `cz.cuni.mff.ksi.jinfer.base.interfaces.nodes` package, there is an important group of interfaces contained in `cz.cuni.mff.ksi.jinfer.base.interfaces.inference` package: the *inference* interfaces. They come in two flavours: the actual inference interface, and its callback. For a comprehensive description of them and their interaction refer again to [KMS⁺a].

There is one more package containing interfaces: `cz.cuni.mff.ksi.jinfer.base.interfaces`. There are a few groups of them.

- Module lookup support: `NamedModule` and `UserModuleDescription`.
- Inference support: `Capabilities`.
- Service provider definitions: `Expander`, `Processor` and `RuleDisplayer`.

2.3 Utility logic

Useful logic for the whole framework is focused in the `cz.cuni.mff.ksi.jinfer.base.utils` package. A few highlights from here follow.

- Testing whether a collection is empty: `BaseUtils.isEmpty()` - handles null and zero elements.
- Filtering a list based on a predicate: `BaseUtils.filter()`.
- Cloning a list N times in a row: `baseUtils.cloneList()` - e.g. from *abc*, 3 times creates *abcabcabc*.
- Deep cloning a grammar: `CloneHelper.cloneGrammar()`.
- Writing out a list separated by specified separator: `CollectionToString.colToString()` - accepts the list, operation to perform on each element and separator character. Separator is placed smartly, i.e. only between elements.
- XML element comparison while ignoring specified members: `EqualityUtils`.
- Module lookup/selection: `ModuleSelectionHelper`.
- Singleton class reporting on the currently running inference: `RunningProject`.
- Various utilities for JUnit tests: `TestUtils`.
- Topological sorting of grammar: `TopologicalSort`.

3 Data flow

This is not an inference module and there is no real data flow in it. Refer to [KMS⁺a] to understand the inference process described by interfaces from `cz.cuni.mff.ksi.jinfer.base.interfaces.inference` package.

4 Extensibility

From one point of view, extensibility of *Base* means creating service providers implementing inference or other interfaces. This is described in the documentation for respective modules that use these interfaces.

On the other hand, if there is a need to share data structures, interfaces or logic across multiple developed modules (for example between custom schema generator and simplifier), it is advised to create a module similar to *Base* instead of changing it directly.

References

- [Aho96] H. Ahonen. *Generating grammars for structured documents using grammatical inference methods*. PhD thesis, Department of Computer Science, University of Helsinki, Series of Publications A, Report A-1996-4, 1996.
- [Bou] Ronald Bourret. Dtd parser, version 2.0. <http://www.rpbouret.com/dtdparser/index.htm>.
- [HMU01] John E. Hopcroft, Rajeev Motwani, and Jeffrey D. Ullman. *Introduction to Automata Theory, Languages, and Computation (2nd Edition)*. Addison-Wesley, 2001.
- [HW07] Yo-Sub Han and Derick Wood. Obtaining shorter regular expressions from finite-state automata. *Theor. Comput. Sci.*, 370(1-3):110–120, 2007.
- [jun] Java universal network/graph framework. <http://jung.sourceforge.net/>.
- [KMS⁺a] Michal Klempa, Mário Mikula, Robert Smetana, Michal Švirec, and Matej Vitásek. *jInfer Architecture*.
- [KMS⁺b] Michal Klempa, Mário Mikula, Robert Smetana, Michal Švirec, and Matej Vitásek. *jInfer AutoEditor automaton visualization and editor module*.
- [KMS⁺c] Michal Klempa, Mário Mikula, Robert Smetana, Michal Švirec, and Matej Vitásek. *jInfer Base Module Description*.
- [KMS⁺d] Michal Klempa, Mário Mikula, Robert Smetana, Michal Švirec, and Matej Vitásek. *jInfer BasicDTDExporter Module Description*.
- [KMS⁺e] Michal Klempa, Mário Mikula, Robert Smetana, Michal Švirec, and Matej Vitásek. *jInfer BasicIGG Module Description*.
- [KMS⁺f] Michal Klempa, Mário Mikula, Robert Smetana, Michal Švirec, and Matej Vitásek. *jInfer BasicRuleDisplayer Module Description*.
- [KMS⁺g] Michal Klempa, Mário Mikula, Robert Smetana, Michal Švirec, and Matej Vitásek. *jinfer javadoc*. <http://jinfer.sourceforge.net/javadoc>.
- [KMS⁺h] Michal Klempa, Mário Mikula, Robert Smetana, Michal Švirec, and Matej Vitásek. *jInfer TwoStep simplifier design and implementation*.
- [log] Apache log4jTM. <http://logging.apache.org/log4j/>.
- [loo] org.openide.util.class lookup. <http://bits.netbeans.org/dev/javadoc/org-openide-modules/org-openide/modules/doc-files/api.html>.
- [mod] Module system api. <http://bits.netbeans.org/dev/javadoc/org-openide-modules/org-openide/modules/doc-files/api.html>.
- [Nor] Theodore Norvell. A short introduction to regular expressions and context free grammars. <http://www.engr.mun.ca/~theo/Courses/fm/pub/context-free.pdf>.
- [VMP08] Ondřej Vošta, Irena Mlýnková, and Jaroslav Pokorný. Even an ant can create an xsd. In *DASFAA'08: Proceedings of the 13th international conference on Database systems for advanced applications*, pages 35–50, Berlin, Heidelberg, 2008. Springer-Verlag.
- [wik] Regular expression. http://en.wikipedia.org/wiki/Regular_expression.