SPASS Input Syntax
Version 3.3

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Abstract

This document introduces the SPASS input syntax. It came out of the DFG syntax format that was thought to be a format that can easily be parsed such that it forms a compromise between the needs of the different groups. The language is partly more general than other popular exchange formats such as Otter or TPTP in allowing non-clausal and sorted formulae, modal logic, several proof formats as well as user-defined operators. The latter feature makes it also useful for non-classical logics.

1 Introduction

The language proposed in the following is intended to be a common exchange format for logic problem settings. It is thought to be a format that can easily be parsed such that it forms a compromise between the needs of the different groups. Therefore, it is kept *as simple as possible*, in particular, the grammar of the language can be easily processed by some automatic parser-generator.

In any case it will be necessary to provide tools that transform files from the present syntax into other standard formats (e.g., Otter [8] or TPTP [12]) and vice versa. Currently we can (partly) transform Otter input files to DFG-Syntax files and vice versa.

The DFG language was extended to modal logic and description logic formulae as well as formulae of Tarski's relational calculus. This language extension was first implemented in the theorem prover MSPASS [5, 6, 11] and incorporated into SPASS in December 2006.

2 Notation

For the grammar defining the syntax, terminals are always underlined while non-terminals and meta-symbols are not. Braces come in different variants and have the following meaning:

$\{\ \}$	optional
$\{\ \}^*$	arbitrarily often
$\{\ \}^+$	at least once

3 Problems

The unit of information we can describe are problems. A problem may not only contain formulae or clauses but also information on parameter settings.

```
problem  ::=  begin_problem(identifier).
              description
              logical_part
              {includes}*
              {settings}*
              end_problem.
```

Note that the description part as well as the logical part are mandatory.

4 Descriptions

The description part should help to understand what the problem is about. In particular, the logic part is mandatory, if non-standard quantifiers or operators are used.

```
description  ::=  list_of_descriptions.
                  name( {* text *} ).
                  author( {* text *} ).
                  {version( {* text *} ).}
                  {logic( {* text *} ).}
                  status(log_state).
                  description( {* text *} ).
                  {date( {* text *} ).}
                  end_of_list.
  log_state  ::=  satisfiable | unsatisfiable | unknown
```

5 The Logical Parts

Any non-predefined signature symbol used in a problem has to be defined in the declaration part. Then the logical part may provide a formulation of the problem by formulae as well as by some clause normal forms. In addition, proofs for the conjecture stated by the formulae (clauses) may be contained.

```
logical_part  ::=  {symbol_list}
                   {declaration_list}
                   {formula_list}*
                   {special_formula_list}*
                   {clause_list}*
                   {proof_list}*
```

As mentioned before, non-predefined signature symbols have to be declared in advance. Since the current scope of the syntax mainly covers first-order logic, we are concerned with function and predicate symbols and non-standard operators and quantifiers. The usual first-order operators and quantifiers are predefined. In addition, there is a unique symbol for equality, see below.

For modal logic and description problems it is sometimes necessary to to link the propositional symbols to their corresponding first-order predicate symbols. This can be done with a translpairs declaration. The first symbol in a pair must always be a nullary predicate symbol, while the second is usually a unary or binary predicate symbol.

```
symbol_list  ::=  list_of_symbols.
                  {functions[fun_sym | (fun_sym,arity)
                     {, fun_sym | (fun_sym,arity)}*].}
                  {predicates[pred_sym | (pred_sym,arity)
                     {, pred_sym | (pred_sym,arity)}*].}
                  {sorts[sort_sym {,sort_sym}*].}
                  {translpairs[(pred_sym , pred_sym)
                     {, (pred_sym , pred_sym)}*].}
                  end_of_list.
```

All declared symbols have to be different from each other and from all terminal and predefined symbols.

We support a rich sort language that may be introduced by a declaration part. We do not allow free variables in term declarations, but polymorphic sorts.

```
declaration_list  ::=  list_of_declarations.
                       {declaration}*
                       end_of_list.
     declaration  ::=  subsort_decl | term_decl | pred_decl | gen_decl
        gen_decl  ::=  sort sort_sym {freely} generated by func_list.
       func_list  ::=  [ fun_sym {,fun_sym}*]
    subsort_decl  ::=  subsort(sort_sym,sort_sym).
       term_decl  ::=  forall(term_list,term). | term.
       pred_decl  ::=  predicate(pred_sym{,sort_sym}+).
        sort_sym  ::=  identifier
        pred_sym  ::=  identifier
         fun_sym  ::=  identifier
```

Concerning the term declarations, we assume that all terms in `term_list` are variables or expressions of the form `sort_sym(variable)`.

Now there are two types of formulae: Axiom formulae and conjecture formulae. If the status of the problem (see below) states "unsatisfiable" it refers to the clause normal form resulting from the conjunction of all axiom formulae and the negation of the disjunction of all conjecture formulae. Of course, "satisfiable" means that the overall formula has a model.

```
formula_list  ::=  list_of_formulae(origin_type).
                   {formula({term}{,label}).}*
                   end_of_list.
 origin_type  ::=  axioms | conjectures
       label  ::=  identifier
```

We assume that all formulae are closed, so we do not allow free variables inside a formula expression.

Quantifiers always have two arguments: A term list and the subformulae. The term list is assumed to be a variable list (or a list of variables annotated with a sort) for the usual first-order quantifiers, however, one could easily imagine non-classical quantifiers, where "quantification" over real terms makes sense.

```
       term  ::=  quant_sym(term_list,term) | symbol |
                  symbol(term{,term}*)
  term_list  ::=  [term{,term}*]
  quant_sym  ::=  forall | exists | identifier
 arithm_sym  ::=  le | ls | ge | gs | plus | mult |
                  {-} number{.number} | npidentifier
     symbol  ::=  equal | true | false | or | and | not | implies |
                  implied | equiv | identifier
```

We support disjunctive normal form as well as clause normal form. Even clauses have to be written as their corresponding formulae, in particular all variables have to be bound by the leading quantifier. Our experience with problems stated by a set of clauses shows that this helps to detect flaws, e.g., if accidentally it was forgotten to declare some constant that would then be considered as a variable. Since free variables are not allowed, this case is detected in our syntax.

The arithmetic symbols le, ls, ge, gs, plus, mult, stand for "less or equal", "strictly less", "greater or equal", "strictly greater", "plus" and "multiply", respectively. There is no "minus" that can be written as a multiplication with -1. The constants npidentifier stand for parameters (constants) of the arithmetic sort that have to be declared in the declaration part. For an example problem with linear arithmetic formulas see Figure 6. Arithmetic is supported starting from SPASS 4.0.

```
     clause_list  ::=  list_of_clauses(origin_type,clause_type).
                       {clause({cnf_clause | dnf_clause | brief_clause
                       }{,label}).}*
                       end_of_list.
     clause_type  ::=  cnf | dnf
      cnf_clause  ::=  forall(term_list,cnf_clause_body) | cnf_clause_body
      dnf_clause  ::=  exists(term_list,dnf_clause_body) | dnf_clause_body
    brief_clause  ::=  term_ws_list || term_ws_list -> term_ws_list
 cnf_clause_body  ::=  or(term{,term}*)
 dnf_clause_body  ::=  and(term{,term}*)
    term_ws_list  ::=  term{ term}*{+}
```

In case of `cnf_clause_body` and `dnf_clause_body` we assume all subterms generated for `term` to be literals.

5.1 Special types of formulae

Modal logic or description logic problems are specified with special types of formulae, which include first-order formulae, propositional (or Boolean) type formulae and relational type formulae.

```
                          ::=  list_of_special_formulae(origin_type,special_type).
special_formula_list
                               {labelled_formula}*
                               end_of_list.
  labelled_formula        ::=  formula({term}{,label}) |
                               prop_formula_name({prop_term}{,label}) |
                               rel_formula_name({rel_term}{,label})
 prop_formula_name        ::=  prop_formula | concept_formula
  rel_formula_name        ::=  rel_formula | role_formula
      special_type        ::=  eml | dl
```

Propositional and relational type formulae can be constructed using familiar modal logic and description logic operators. The pre-defined logical operators include:

- the standard Boolean operators on propositional type and relational type formulae: true, false, not, and, or, implies (subsumed by), implied (subsumes), equiv,
- multi-modal operators with complex relational arguments: dia and box (synonyms are some and all), as well as domain and range,
- additional relational operators: comp (composition), sum (relative sum), conv (converse), id (the identity relation), div (the diversity relation), and
- test (test), domrestr (domain restriction) and ranrestr (range restriction).

```
prop_term   ::=  prop_symbol | prop_symbol(prop_term{,prop_term}*)
                 | prop_quant_sym(rel_term,prop_term) |
                 prop_quant_sym_unary(rel_term)
prop_symbol ::=  true | false | or | and | not | implies | implied |
                 equiv | identifier
prop_quant_sym ::= box | dia | all | some
               ::= domain | range
prop_quant_sym_unary

rel_term    ::=  rel_symbol | rel_symbol(rel_term{,rel_term}*)
                 | rel_prop_sym(rel_term,prop_term) |
                 rel_prop_sym_unary(prop_term)
rel_symbol  ::=  true | false | id | div | or | and | not | implies |
                 implied | equiv | comp | sum | conv | identifier
rel_prop_sym ::= domrestr | ranrestr
             ::= test
rel_prop_sym_unary
```

Note the symbols true and false have multiple interpretations. Apart from their usual interpretation in propositional logic and first-order logic, true and false may also be used as Boolean or relational formulae. true used as a Boolean type, represents the universal set, and used as a relational type it represents the universal relation. Similarly, false can be used as the bottom Boolean and relational type, representing the empty set and the empty relation.

6 Alphabet

The alphabet allowed to compose identifiers is restricted to letters, digits and the underscore symbol.

```
identifier     ::= {letter | digit | special_symbol}+
letter         ::= a-z | A-Z
arity          ::= -1 | number
number         ::= {digit}+
digit          ::= 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
special_symbol ::= _
```

6.1 Examples

We start with a complete description of Pelletier's [9] problem No. 57 that can be found in Figure 1. The syntax for the description part is explained in Section 4.

Our second example, Figure 2, uses the language features provided for the declaration of sorts.

Figures 3 to 5 give examples from modal logic, description logic and the relational calculus.

Finally, an example with linear arithmetic formulas.

7 Proofs

We also define a first, simple proof format. Basically a proof consists of a sequence of "simple" steps. The semantics of step is that the introduced formula is a logical consequence of the formulae pointed to by the list of parents.

We already have implemented some scripts that can be used to automatically check resolution proofs. Here, the idea is to be able to check complicated, tedious, long proofs found by some prover automatically by using a different prover.

```
begin_problem(Pelletier57).

list_of_descriptions.
name({* Pelletier's Problem No. 57 *}).
author({* Christoph Weidenbach *}).
status(unsatisfiable).
description({* Problem taken in revised form from the "Pelletier Collection",
      Journal of Automated Reasoning, Vol. 2, No. 2, pages 191-216 *}).
end_of_list.

list_of_symbols.
functions[(f,2), (a,0), (b,0), (c,0)].
predicates[(F,2)].
end_of_list.

list_of_formulae(axioms).
formula(F(f(a,b),f(b,c))).
formula(F(f(b,c),f(a,c))).
formula(forall([U,V,W],implies(and(F(U,V),F(V,W)),F(U,W)))).
end_of_list.

list_of_formulae(conjectures).
formula(F(f(a,b),f(a,c))).
end_of_list.

end_problem.
```

Figure 1: Pelletier's Problem No. 57

```
begin_problem(Sorts).

list_of_descriptions.
name({* Sorts and Plus *}).
author({* Christoph Weidenbach *}).
status(satisfiable).
description({* Defines plus over successor and zero.  *}).
end_of_list.

list_of_symbols.
functions[plus,s,zero].
sorts[even,nat].
end_of_list.

list_of_declarations.
subsort(even,nat).
even(zero).
forall([nat(x)],nat(s(x))).
forall([nat(x),nat(y)],nat(plus(x,y))).
forall([even(x),even(y)],even(plus(x,y))).
forall([even(x)],even(s(s(x)))).
forall([nat(y)],even(plus(y,y))).
end_of_list.

list_of_formulae(axioms).
formula(forall([nat(y)],equal(plus(y,zero),y))).
formula(forall([nat(y),nat(z)],equal(plus(y,s(z)),s(plus(y,z))))).
end_of_list.

end_problem.
```

Figure 2: Example with Sort Declarations

```
begin_problem(Halpern_Moses_branching_formula_1).
list_of_descriptions.
name({* Halpern and Moses (1992), Proposition 6.5 *}).
author({* Renate Schmidt *}).
status(satisfiable).
description({* Branching formulae of size O(m^2) satisfiable in a
     K-model with at least 2^m states.  From the proof of
     Proposition 6.5 of Halpern and Moses (1992).  m = 1.  *}).
end_of_list.

list_of_symbols.
predicates[ (R,2), (r,0), (p0,0), (p1,0), (d0,0), (d1,0), (d2,0) ].
end_of_list.

list_of_special_formulae(conjectures, EML).
prop_formula(
not( and( d0, not(d1),
     implies( d1, d0 ),
     implies( d2, d1 ),
     implies( d0, and( implies( p0, box(r, implies( d0, p0 ))),
     implies( not(p0), box(r, implies( d0, not(p0)))))),
     implies( d1, and( implies( p1, box(r, implies( d1, p1 ))),
     implies( not(p1), box(r, implies( d1, not(p1) ))))),
     implies( and( d0, not(d1) ),
     and( dia(r, and( d1, not(d2), p1 )),
     dia(r, and( d1, not(d2), not(p1) )))),
     box(r, and(
     implies( d1, d0 ),
     implies( d2, d1 ),
     implies( d0, and( implies( p0, box(r, implies( d0, p0 ))),
     implies( not(p0), box(r, implies( d0, not(p0)))))),
     implies( d1, and( implies( p1, box(r, implies( d1, p1 ))),
     implies( not(p1), box(r, implies( d1, not(p1)))))),
     implies( and( d0, not(d1) ),
     and( dia(r, and( d1, not(d2), p1 )),
     dia(r, and( d1, not(d2), not(p1) ))))))))).
end_of_list.

end_problem.
```

Figure 3: Modal logic example

```
begin_problem(Cheese_lovers_example).
list_of_descriptions.
name({* Cheese lovers example *}).
author({* Renate Schmidt*}).
status(unknown).
description({* A description logic example.  *}).
end_of_list.

list_of_symbols.
functions[ (adam,0), (bob,0), (cauliflower,0), (cheddar,0) ].
predicates[ (plant,0), (Plant,1), (cheese,0), (Cheese,1),
       (food,0), (Food,1), (person,0), (Person,1),
       (vegetarian,0), (Vegetarian,1), (cheese_lover,0), (Cheese_lover,1),
       (eat,0), (Eat,2), (sibling_of,0), (Sibling_of,2) ].
translpairs[ (plant,Plant), (cheese,Cheese), (food,Food),
       (vegetarian,Vegetarian), (cheese_lover,Cheese_lover),
       (eat,Eat), (sibling_of,Sibling_of)].
end_of_list.

list_of_special_formulae(axioms, DL).
% TBox
% Plants and cheese are food
concept_formula( implies( or( plant, cheese ), food ) ).
% Persons eat food
concept_formula( implies( person, some( eat, food ) ) ).
% Vegetarians eat only plants
concept_formula( implies( vegetarian,
     and( some( eat, plant ), all( eat, plant ) ) ) ).
% Cheese lovers eat every cheese
concept_formula( implies( cheese_lover, not( some( not(eat), cheese ) ) ) ).
% sibling_of is a symmetric relation
role_formula( implies( sibling_of, conv( sibling_of ) ) ).
% sibling_of is a transitive relation
formula( forall( [x,y,z],
     implies( and( Sibling_of(x,y), Sibling_of(y,z) ), Sibling_of(x,z)))).

% ABox
formula( Person( adam ) ).
formula( Person( bob ) ).
formula( Sibling_of( adam, bob ) ).
formula( Plant( cauliflower ) ).
formula( Cheese( cheddar ) ).
formula( Eat( bob, cauliflower ) ).
formula( not( Eat( bob, cheddar ) ) ).
end_of_list.

list_of_special_formulae(conjectures, DL).
formula( not( Cheese_lover( bob ) ) ).  % valid
% formula( Vegetarian( bob ) ).  % not valid
end_of_list.

end_problem.
```

Figure 4: Description logic example

```
begin_problem(Relational_calculus_example).
list_of_descriptions.
name({* Relational calculus example *}).
author({* Renate *}).
status(unknown).
description({* Demonstrating the syntax of relational formulae *}).
end_of_list.

list_of_symbols.
predicates[(r,0), (s,0)].
end_of_list.

list_of_special_formulae(axioms, EML).
% r is a subrelation of s
rel_formula(implies(r,s)).

% r is transitive
rel_formula(implies(comp(r,r),r)).

% r is reflexive
rel_formula(implies(id,r)).

% r is symmetric
rel_formula(implies(r,conv(r))).
end_of_list.

list_of_special_formulae(conjectures, EML).
rel_formula(implies(id,s)).     % valid

%rel_formula(implies(comp(s,s),s)).     % not valid
end_of_list.

end_problem.
```

Figure 5: Relational calculus example

```
begin_problem(Arithm).

list_of_descriptions.
name({* Arithmetic *}).
author({* Christoph Weidenbach *}).
status(unknown).
description({* Problem to show syntax for arithmetic expressions*}).
end_of_list.

list_of_symbols.
functions[(npa,0)].
predicates[(S0,2),(S1,2),(S2,2),(S3,2),(S4,2)].
end_of_list.

list_of_formulae(axioms).
formula(forall([x,y],implies(and(S0(npa,y), ge(npa,200)),S1(npa,y)))).
formula(forall([x,y],implies(and(S0(x,y), le(x,200)),S3(x,y)))).
formula(forall([x,y,z],implies(and(S1(x,y), le(z,40),ge(z,0)),S2(x,z)))).
formula(forall([x,y,z],implies(and(S3(x,y), le(z,40),ge(z,0)),S4(x,z)))).
formula(forall([x,y,z],implies(and(S2(x,y), equal(z,plus(plus(x,y),-40))),
  S0(z,y)))).
formula(forall([x,y,z],implies(and(S4(x,y), equal(z,plus(x,y))), S0(z,y)))).
end_of_list.

list_of_formulae(conjectures).
formula(implies(forall([x,y], implies(le(x,160),S0(x,y))),
   exists([u,v],and(S0(u,v), ge(u,240))))).
end_of_list.

end_problem.
```

Figure 6: Example with Arithmetic Formulas

```
     proof_list  ::=  list_of_proof{(proof_type{,assoc_list})}.
                      {step(reference,result,rule_appl,parent_list{,assoc_list}).}*
                      end_of_list.
      reference  ::=  term | identifier | user_reference
         result  ::=  term | user_result
      rule_appl  ::=  term | identifier | user_rule_appl
    parent_list  ::=  [parent{,parent}*]
         parent  ::=  term | identifier | user_parent
     assoc_list  ::=  [key:value{,key:value}*]
            key  ::=  term | identifier | user_key
          value  ::=  term | identifier | user_value
     proof_type  ::=  identifier | user_proof_type
```

All `user_` non-terminals of the grammar must be compatible with the already defined non-terminals. For example, a `user_key` must be a `term` or an `identifier`.

7.1 SPASS Proofs

Here is the instantiation of the general proof schema for SPASS style proofs that are supported by our proof checker.

```
 user_reference  ::=  number
    user_result  ::=  cnf_clause
 user_rule_appl  ::=  App | SpL | SpR | EqF | Rew | Obv | EmS | SoR |
                      EqR | MPm | SPm | OPm | SHy | OHy | URR | Fac |
                      Spt | Inp | Con | SSi | UnC | Ter | Res | CRW |
                      AED | MRR | Def
    user_parent  ::=  number
user_proof_type  ::=  SPASS
       user_key  ::=  splitlevel
     user_value  ::=  number
```

The association list is used to indicate the split level. Figure 7 shows an example for a DFG-problem together with a SPASS style resolution proof. The rule application identifiers name the SPASS inference/simplification/reduction rules general resolution (`Res`), superposition left (`SpL`), superposition right (`SpR`), general factoring (`Fac`), rewriting (`Rew`) and matching replacement resolution (`MRR`). Clauses are labelled with numbers and references inside of proof steps refer to these numbers.

Other rule application identifiers are: clause deletion (`App`), empty sort (`EmS`), sort resolution (`SoR`), equality resolution (`EqR`), equality factoring (`EqF`), merging paramodulation (`MPm`), paramodulation (`SPm`), ordered paramodulation (`OPm`), simple hyper-resolution (`SHy`), ordered hyper-resolution (`OHy`), unit resulting resolution (`URR`), splitting (`Spt`), input (`Inp`), contextual rewriting (`CRw`), condensing (`Con`), assignment equation deletion (`AED`), obvious reduction (`Obv`), sort simplification (`SSi`), unit conflict (`UnC`), expansion of atom definitions (`Def`) and terminator (`Ter`).

8 Includes

Includes can be used to split a big problem into more than one file, and maintain them separately. This might be, for example, helpful when multiple problems share a common set of axioms.

```
     includes  ::=  list_of_includes. {include_entry}* end_of_list.
include_entry  ::=  include( filename {, fla_selection } ).
     filename  ::=  ' text '
fla_selection  ::=  [ identifier {, identifier}* ]
```

```
begin_problem(ProofDemo).

list_of_descriptions.
name(*test.dfg*).
author(*SPASS*).
status(unsatisfiable).
description(*File generated by SPASS containing a proof.*).
end_of_list.

list_of_symbols.
functions[(skf1, 1)].
predicates[(P, 2)].
end_of_list.

list_of_clauses(conjectures, cnf).
clause(forall([U],or(P(U,skf1(U)))),1).
clause(forall([U],or(not(P(skf1(U),U)))),2).
clause(forall([V,U,W],or(equal(U,V),equal(V,W),equal(W,U))),3).
end_of_list.


list_of_proof(SPASS).
step(28,forall([V,U,W],or(equal(U,skf1(V)),equal(W,U),P(V,W))),SpR,[3,1],[splitlevel:0]).
step(57,forall([V,U],or(equal(U,skf1(skf1(V))),equal(V,U))),Res,[28,2],[splitlevel:0]).
step(65,forall([V,U],or(equal(U,V),P(skf1(U),V))),SpR,[57,1],[splitlevel:0]).
step(80,forall([V,U],or(not(P(U,skf1(V))),equal(V,U))),SpL,[57,2],[splitlevel:0]).
step(107,forall([V,U],or(equal(U,skf1(V)),equal(V,skf1(U)))),Res,[65,80],[splitlevel:0]).
step(111,forall([U],or(equal(skf1(U),U))),Fac,[107,107],[splitlevel:0]).
step(152,forall([U],or(P(U,U))),Rew,[111,1],[splitlevel:0]).
step(153,forall([U],or(not(P(U,U)))),Rew,[111,2],[splitlevel:0]).
step(190,or(false),MRR,[153,152],[splitlevel:0]).
end_of_list.

end_problem.
```

Figure 7: A SPASS Style Resolution Proof

Each of the files recognized in the `include_entry` is opened and its content is loaded in the memory (along with the file just being loaded). Included files can also contain other includes, so that inclusions are followed recursively.

File can be specified either by a full path or a relative one. If the latter is the case, the file is first sought relative to `SPASSINPUT` environment variable, and only if not found a second attempt is made to find the file in the current directory.

If `fla_selection` is not omitted, it contains a list of formula names. Only formulas of those names will be included from the specified file.

It is considered an error if an included file contains a `settings` section (see 9).

9 Settings

The idea to include settings into the problem file format is to enable people to reproduce specific proofs that depend on particular input settings of the respective prover.

```
      settings  ::=  list_of_general_settings {setting_entry}+ end_of_list.
                     |
                     list_of_settings(setting_label). {* text *} end_of_list.
 setting_entry  ::=  hypothesis[label {,label}*].
 setting_label  ::=  KIV | LEM | OTTER | PROTEIN | SATURATE | 3TAP |
                     SETHEO | SPASS
```

The labels name the following systems: KIV [10], LEM [4], OTTER [8], PROTEIN [1], SATURATE [3], $_3T^AP$ [2], SETHEO [7], SPASS [13]. For example, to specify the precedence for SPASS and to direct SPASS to print a proof, we include the following settings:

```
list_of_settings(SPASS).
{*
   set_flag(DocProof,1).
   set_precedence(a,b,c,f,F).
*}
end_of_list.
```

10 Miscellaneous

10.1 Comments

After the `%` symbol the rest of line is ignored. The comment symbols `{*` and `*}` are only allowed at the places defined above.

10.2 Conventions

We suggest the following conventions concerning suffixes of file names:

`.dfg`	For general problem files, including formulae, clauses, proofs at the same time.
`.cnf`	For problem files containing at least lists of clauses in conjunctive normal form.

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