PROGRAMMING LANGUAGES

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In this assignment, you will be given an informal specification of a language, which you have to formalize as an unambiguous grammar and code it up using ML-Yacc/ocaml-yacc.

You need to generate Abstract Syntax Trees (ASTs) as the output of the parser, which will be encoded as a (collection of) datatypes in ML/Ocaml. The assignment includes designing and defining this data type. You will also need to define functions to display values in this data type, and compute some obvious functions on them -- such as set of variables in an AST, or the height of an AST, or the size of an AST.

Please budget at least 10 days to plan and complete this assignment properly. We will make many extensions and variations to this front end.

1. A PROGRAM is a (possibly empty) sequence of STATEMENTS;
2. STATEMENT is either a FACT or a RULE; A STATEMENT is terminated by a DOT.
3. A FACT is a LITERAL.
4. A RULE consists of a HEAD and a BODY, separated by the token ":-" (read as "IF").
5. The HEAD is a LITERAL.
6. The BODY is a non-empty sequence of LITERALs, separated by COMMAs.
7. A LITERAL consists of a NAME, or of a NAME followed by a TUPLE of TERMS.
8. A TUPLE of TERMS begins with a LEFT PARENTHESIS,
then has a non-empty sequence of TERMS separated by COMMAs, and ends with a RIGHT PARENTHESIS.
9. A TERM is a NAME or a VARIABLE or a NAME followed by a TUPLE of TERMS.
10. A NAME is an alphanumeric identifier -- possibly with underscores in the middle -- beginning with a small letter. (as in Assignment 1).
11. A VARIABLE is an alphanumeric identifier -- possibly with underscores in the middle -- beginning with a Capital letter. (as in Assignment 1).

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