The Language act

BNF-converter

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This document was automatically generated by the *BNF-Converter*. It was generated together with the lexer, the parser, and the abstract syntax module, which guarantees that the document matches with the implementation of the language (provided no hand-hacking has taken place).

The lexical structure of act

Identifiers

Identifiers ⟨*Ident*⟩ are unquoted strings beginning with a letter, followed by any combination of letters, digits, and the characters `_ '`, reserved words excluded.

Literals

Integer literals ⟨*Int*⟩ are nonempty sequences of digits.

String literals ⟨*String*⟩ have the form `"`x`"`, where x is any sequence of any characters except `"` unless preceded by `\`.

Reserved words and symbols

The set of reserved words is the set of terminals appearing in the grammar. Those reserved words that consist of non-letter characters are called symbols, and they are treated in a different way from those that are similar to identifiers. The lexer follows rules familiar from languages like Haskell, C, and Java, including longest match and spacing conventions.

The reserved words used in act are the following:

```
End         address     all
and         behaviour   bool
bytes       bytes32     else
false       for         if
iff         in          int
int126      int256      int8
interface   of          or
range       returns     storage
then        true        uint
uint126     uint256     uint8
where
```

The symbols used in act are the following:

```
(     )     =>
|->   .     [
]     ==    =/=
<=    <     >=
>     +     -
*     /     %
^     _     ++
..    :     =
,
```

Comments

Single-line comments begin with `//`.
Multiple-line comments are enclosed with `/*` and `*/`.

The syntactic structure of act

Non-terminals are enclosed between ⟨ and ⟩. The symbols ::= (production), | (union) and ϵ (empty rule) belong to the BNF notation. All other symbols are terminals.

⟨*Act*⟩ ::= ⟨*ListHeader*⟩

⟨*Header*⟩ ::= `behaviour` ⟨*Ident*⟩ `of` ⟨*Ident*⟩
| `interface` ⟨*Ident*⟩ `(` ⟨*ListDecl*⟩ `)`
| `for all` ⟨*ListTDecl*⟩
| `iff` ⟨*ListBExp*⟩
| `iff in range` ⟨*Type*⟩ ⟨*ListIExp*⟩
| `if` ⟨*ListBExp*⟩
| `storage` ⟨*ListUpdate*⟩
| `where` ⟨*ListFuncDef*⟩
| `returns` ⟨*IExp*⟩

⟨*Update*⟩ ::= ⟨*Storage*⟩ => ⟨*IExp*⟩
| ⟨*Storage*⟩
| ⟨*Storage*⟩ |-> ⟨*Exp*⟩ => ⟨*Exp*⟩
| ⟨*Storage*⟩ |-> ⟨*Exp*⟩

⟨*Storage*⟩ ::= ⟨*Ident*⟩ ⟨*ListLookup*⟩
| ⟨*Storage*⟩ `.` ⟨*Ident*⟩

⟨*Lookup*⟩ ::= `[` ⟨*Exp*⟩ `]`

⟨*Exp*⟩ ::= ⟨*IExp*⟩
| ⟨*BExp*⟩
| ⟨*BYExp*⟩

⟨*BExp*⟩ ::= ⟨*BExp*⟩ `and` ⟨*BExp*⟩
| ⟨*BExp*⟩ `or` ⟨*BExp*⟩
| ⟨*IExp*⟩ == ⟨*IExp*⟩
| ⟨*IExp*⟩ =/= ⟨*IExp*⟩
| ⟨*IExp*⟩ <= ⟨*IExp*⟩
| ⟨*IExp*⟩ < ⟨*IExp*⟩
| ⟨*IExp*⟩ >= ⟨*IExp*⟩
| ⟨*IExp*⟩ > ⟨*IExp*⟩
| `(` ⟨*BExp*⟩ `)`
| `true`
| `false`
| ⟨*Ident*⟩ `(` ⟨*ListExp*⟩ `)`

⟨*IExp*⟩ ::= ⟨*IExp*⟩ + ⟨*IExp1*⟩
| ⟨*IExp*⟩ − ⟨*IExp1*⟩
| `(` ⟨*IExp*⟩ `)`
| `if` ⟨*BExp*⟩ `then` ⟨*IExp*⟩ `else` ⟨*IExp*⟩
| ⟨*Ident*⟩ `(` ⟨*ListExp*⟩ `)`
| ⟨*IExp1*⟩

⟨*IExp1*⟩ ::= ⟨*IExp1*⟩ `*` ⟨*IExp2*⟩
| ⟨*IExp1*⟩ `/` ⟨*IExp2*⟩
| ⟨*IExp1*⟩ `%` ⟨*IExp2*⟩
| ⟨*IExp1*⟩ `^` ⟨*IExp2*⟩
| ⟨*IExp2*⟩

⟨*IExp2*⟩ ::= `_`
| ⟨*Ident*⟩
| ⟨*Integer*⟩
| `(` ⟨*IExp*⟩ `)`

⟨*BYExp*⟩ ::= ⟨*BYExp*⟩ ++ ⟨*BYExp*⟩
| ⟨*Ident*⟩ `(` ⟨*ListExp*⟩ `)`
| ⟨*BYExp*⟩ `[` ⟨*Integer*⟩ `..` ⟨*Integer*⟩ `]`
| ⟨*BYExp1*⟩

⟨*BYExp2*⟩ ::= ⟨*String*⟩
| ⟨*Ident*⟩
| ⟨*BYExp3*⟩

⟨*BYExp3*⟩ ::= `(` ⟨*BYExp*⟩ `)`
| `(` ⟨*BYExp*⟩ `)`

⟨*BYExp1*⟩ ::= ⟨*BYExp2*⟩

⟨*Decl*⟩ ::= ⟨*Type*⟩ ⟨*Ident*⟩

⟨*TDecl*⟩ ::= ⟨*Ident*⟩ `:` ⟨*Type*⟩

⟨*FuncDef*⟩ ::= ⟨*Ident*⟩ `(` ⟨*ListIdent*⟩ `)` = ⟨*Exp*⟩

⟨*Type*⟩ ::= `uint`
| `int`
| `bytes` ⟨*Length*⟩
| `bytes`
| `uint256`
| `int256`
| `uint126`
| `int126`
| `uint8`
| `int8`
| `address`
| `bytes32`
| `bool`

⟨*Length*⟩ ::= `[` ⟨*Integer*⟩ `]`

⟨*ListIdent*⟩ ::= ϵ
| ⟨*Ident*⟩
| ⟨*Ident*⟩ `,` ⟨*ListIdent*⟩

⟨*ListDecl*⟩ ::= ϵ
| ⟨*Decl*⟩
| ⟨*Decl*⟩ `,` ⟨*ListDecl*⟩

⟨*ListExp*⟩ ::= ϵ
| ⟨*Exp*⟩
| ⟨*Exp*⟩ `,` ⟨*ListExp*⟩

⟨*ListTDecl*⟩ ::= ⟨*TDecl*⟩
| ⟨*TDecl*⟩ ⟨*ListTDecl*⟩

⟨*ListFuncDef*⟩ ::= ⟨*FuncDef*⟩
| ⟨*FuncDef*⟩ ⟨*ListFuncDef*⟩

⟨*ListLookup*⟩ ::= ⟨*Lookup*⟩
| ⟨*Lookup*⟩ ⟨*ListLookup*⟩

⟨*ListBExp*⟩ ::= ⟨*BExp*⟩
| ⟨*BExp*⟩ ⟨*ListBExp*⟩

⟨*ListIExp*⟩ ::= ⟨*IExp*⟩
| ⟨*IExp*⟩ ⟨*ListIExp*⟩

⟨*ListUpdate*⟩ ::= ⟨*Update*⟩
| ⟨*Update*⟩ ⟨*ListUpdate*⟩

⟨*ListHeader*⟩ ::= ⟨*Header*⟩
| ⟨*Header*⟩ ⟨*ListHeader*⟩
| ϵ
| ⟨*Header*⟩ `End` ⟨*ListHeader*⟩