BNF for the Gryph Programming Language

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Contents

1 General structure

1.1 Program

$$\begin{aligned} \langle \text{program} \rangle &\models \langle \text{program-unit} \rangle \mid \langle \text{program-unit} \rangle \langle \text{program} \rangle \\ \langle \text{program-unit} \rangle &\models \langle \text{stmt} \rangle \; ; \mid \langle \text{subprog-decl} \rangle \end{aligned}$$

1.2 Statements

$$\begin{aligned} \langle \text{stmt-list} \rangle &\models \langle \text{stmt} \rangle \; \langle \text{stmt} \rangle \langle \text{stmt-list} \rangle \\ \langle \text{stmt-block} \rangle &\models \{ \; \langle \text{stmt-list} \rangle \; \} \\ \langle \text{block-or-matched} \rangle &\models \langle \text{stmt-block} \rangle \mid \langle \text{matched-stmt} \rangle \\ \langle \text{com-stmt} \rangle &\models (\langle \text{read-stmt} \rangle \mid \langle \text{print-stmt} \rangle \mid \langle \text{var-decl-stmt} \rangle); \\ \langle \text{stmt} \rangle &\models \langle \text{matched-stmt} \rangle \mid \langle \text{unmatched-stmt} \rangle \\ \langle \text{matched-stmt} \rangle &\models \langle \text{matched-if-else} \rangle \mid \langle \text{com-stmt} \rangle \\ \langle \text{unmatched-stmt} \rangle &\models \langle \text{if-stmt} \rangle \mid \langle \text{unmatched-if-else} \rangle \end{aligned}$$

1.2.1 IO

$$\begin{aligned} \langle \text{read-stmt} \rangle &\models \text{read} \; \langle \text{ident} \rangle \\ \langle \text{write-stmt} \rangle &\models \text{print} \; \langle \text{ident} \rangle \mid \text{print} \; \langle \text{string-lit} \rangle \end{aligned}$$

1.2.2 Variables

⟨ident-begin-stmt⟩ ⊨ ⟨ident-list⟩⟨ident-list-post⟩
⟨ident-list-post⟩ ⊨ :⟨type⟩⟨var-decl-stmt⟩ | ⟨var-attr-stmt⟩
⟨var-decl-stmt⟩ ⊨ λ | ⟨var-attr-stmt⟩
⟨var-attr-stmt⟩ ⊨ =⟨expr-list⟩

1.3 Subprograms

1.3.1 Declaration

1.3.2 Call

⟨subprog-call⟩ ⊨ ⟨ident⟩(⟨expr-list⟩)

2 Control Structures

2.1 If-else statements

⟨if-expr⟩ ⊨ if (⟨b-exp⟩)
⟨if-stmt⟩ ⊨ ⟨if-expr⟩ ⟨stmt⟩;
⟨unmatched-if-else⟩ ⊨ ⟨if-expr⟩ ⟨matched-stmt⟩; else ⟨unmatched-stmt⟩;
⟨matched-if-else⟩ ⊨ ⟨if-expr⟩ ⟨block-or-matched⟩ else ⟨block-or-matched⟩ | ⟨if-expr⟩ ⟨stmt-block⟩

3 Types

⟨type-list⟩ ⊨ ⟨type⟩,⟨type-list⟩ | ⟨type⟩
⟨type⟩ ⊨ ⟨native-type⟩ | ⟨user-type⟩
⟨native-type⟩ ⊨ ⟨primitive-type⟩ | ⟨composite-type⟩
⟨primitive-type⟩ ⊨ int | float | char | string
⟨composite-type⟩ ⊨ [⟨type⟩] | |⟨type⟩| | (⟨type⟩,⟨type-list⟩) | ⟨graph-type⟩
⟨graph-type⟩ ⊨ <⟨type⟩> | <⟨type⟩,⟨type⟩>
⟨user-type⟩ ⊨ ⟨upper-letter⟩⟨alpha-num-list⟩

Observations

- The maximum size of tuples depends on the language implementation, though, in the BNF description above, it may assume any value.

4 Expressions

⟨expression⟩ ⊨ ⟨logical-xor-expr⟩
⟨logical-xor-expr⟩ ⊨ ⟨logical-or-expr⟩ | ⟨logical-or-expr⟩⟨logical-xor-expr-aux⟩
⟨logical-xor-expr-aux⟩ ⊨ xor ⟨logical-or-expr⟩ | xor ⟨logical-or-expr⟩⟨logical-xor-expr-aux⟩
⟨logical-or-expr⟩ ⊨ ⟨logical-and-expr⟩ | ⟨logical-and-expr⟩⟨logical-or-expr-aux⟩
⟨logical-or-expr-aux⟩ ⊨ or ⟨logical-and-expr⟩ | or ⟨logical-and-expr⟩⟨logical-or-expr-aux⟩
⟨logical-and-expr⟩ ⊨ ⟨equality-expr⟩ | ⟨equality-expr⟩⟨logical-and-expr-aux⟩

⟨logical-and-expr-aux⟩ ⊨ and ⟨equality-expr⟩ | and ⟨equality-expr⟩⟨logical-and-expr-aux⟩
⟨equality-expr⟩ ⊨ ⟨rel-expr⟩ | ⟨rel-expr⟩⟨rel-expr-aux⟩
⟨equality-expr-aux⟩ ⊨ ⟨equality-op⟩ ⟨rel-expr⟩ | ⟨equality-op⟩ ⟨rel-expr⟩⟨equality-expr-aux⟩
⟨rel-expr⟩ ⊨ ⟨add-expr⟩⟨rel-expr-aux⟩
⟨rel-expr-aux⟩ ⊨ ⟨rel-op⟩⟨add-expr⟩ | ⟨rel-op⟩⟨add-expr⟩⟨rel-expr-aux⟩
⟨add-expr⟩ ⊨ ⟨mult-expr⟩ | ⟨mult-expr⟩⟨add-expr-aux⟩
⟨add-expr-aux⟩ ⊨ ⟨add-op⟩⟨mult-expr⟩ | ⟨add-op⟩⟨mult-expr⟩⟨add-expr-aux⟩
⟨mult-expr⟩ ⊨ ⟨exp-expr⟩ | ⟨exp-expr⟩⟨mult-expr-aux⟩
⟨mult-expr-aux⟩ ⊨ ⟨mult-op⟩⟨exp-expr⟩ | ⟨mult-op⟩⟨exp-expr⟩⟨mult-expr-aux⟩
⟨exp-expr⟩ ⊨ ⟨cast-expr⟩ | ⟨cast-expr⟩⟨exp-op⟩⟨exp-expr⟩
⟨cast-expr⟩ ⊨ ⟨unary-expr⟩ | ⟨unary-expr⟩⟨cast-expr-aux⟩
⟨cast-expr-aux⟩ ⊨ @⟨type⟩ | @⟨type⟩⟨cast-expr-aux⟩
⟨unary-expr⟩ ⊨ ⟨unary-op⟩⟨cast-expr⟩ | ⟨postfix-expr⟩
⟨postfix-expr⟩ ⊨ ⟨primary-expr⟩ | ⟨ident⟩|expression| | ⟨ident⟩<expression> | ⟨ident⟩[expression] | ⟨ident⟩{⟨ident⟩} | ⟨ident⟩.⟨expression⟩
⟨primary-expr⟩ ⊨ (⟨expression⟩) | ⟨ident⟩ | ⟨subprogcall⟩ | ⟨constant⟩
⟨constant⟩ ⊨ ⟨int-lit⟩ | ⟨float-lit⟩ | ⟨string-lit⟩ | ⟨bool-lit⟩ | ⟨list-lit⟩ | ⟨graph-lit⟩
⟨rel-op⟩ ⊨ > | < | <= | >=
⟨equality-op⟩ ⊨ == | !=
⟨unary-op⟩ ⊨ + | -
⟨add-op⟩ ⊨ + | -
⟨mult-op⟩ ⊨ * | / | % | ++ | **
⟨exp-op⟩ ⊨ ^

4.1 Literals

⟨list-lit⟩ ⊨ [⟨expression-list⟩]
⟨tuple-lit⟩ ⊨ (⟨expression-list⟩)
⟨dict-entry⟩ ⊨ ⟨expression⟩?⟨expression⟩
⟨dict-entry-list⟩ ⊨ ⟨dict-entry⟩ | ⟨dict-entry⟩, ⟨dict-entry-list⟩
⟨dict-lit⟩ ⊨ |⟨dict-entry-list⟩|