START:

<start> 🡪 def <function> <start> | <Class> <start> | <initialize> <start> | <exp> <start> | <For> <start> | <While> <start> | <If> <start> | <Try> <start> | <Del> <start> | €

INITIALIZATION STATEMENT:

<initialize> 🡪 <pointer> AccessModifier <static\_final> ID <initialize1>

<initialize1> 🡪 <initialize2> | <Class\_call>

<initialize2> 🡪 [<exp>] <arr\_dim> = < initialize4> | AsOp <exp> = < initialize4 > | AcOp <exp> = < initialize4> | (<arg\_list\_call>) = < initialize4> | <In> = < initialize4> | = < initialize4>

<initialize3> 🡪 <List> | <Dictionary>

<initialize4> 🡪 <exp> | <initialize3>

<static\_final> 🡪 static <s\_final> | final | €

<s\_final> 🡪 final | €

<id\_const> 🡪 ID | <const>

<const> 🡪 int\_const | float\_const | string\_const | char\_const | bool\_const

<Global> 🡪 global <initialize>

<pointer> 🡪 \* | €

EXPRESSION:

<exp> 🡪 <expAND> <exp\_OR>

<exp\_OR> 🡪 Or <expAND> <exp\_OR> | €

<expAND> 🡪 <expRELOP> <exp\_AND>

<exp\_AND> 🡪 And <expRELOP> <exp\_AND> | €

<expRELOP> 🡪 <expPM> <exp\_RELOP>

<exp\_RELOP> 🡪 RelOp <expPM> <exp\_RELOP> | €

<expPM> 🡪 <expMDM> <exp\_PM>

<exp\_PM> 🡪 PM <expMDM> <exp\_PM> | €

<expMDM> 🡪 <exp\_F> <exp\_MDM>

<exp\_MDM> 🡪 MDM <exp\_F> <exp\_MDM> | €

<exp\_F> 🡪 ID <ID\_rel> | <const> <In> | (<exp>) | Not <exp\_F> | <lambda>

<ID\_rel> 🡪 [<exp>] <arr\_dim> | AsOp <exp> | AcOp <exp> | (<arg\_list\_call>) | <In> | €

<arr\_dim> 🡪 [<exp>] <arr\_dim> | €

<In> 🡪 in <In\_>

<In\_> 🡪 ID | <List>

BODY:

<body> 🡪 <s\_st> <body> | pass

<s\_st> 🡪 break | continue | <initialize> | return <exp> | <For> | <While> | <If> | <Try> | <Del> | <Global>

<func\_body> 🡪 <S\_St> <func\_body> | pass

<S\_St> 🡪 <initialize> | <For> | <While> | <If> | <Try> | <Del> | <Global>

CLASS:

<Class> 🡪 class ID (<inherit>) : IndentInit <class\_body> IndentOut

<Inherit> 🡪 ID <inherit\_> | €

<inherit\_> 🡪 , ID | €

<class\_body> 🡪 <initialize> <class\_body> | def <class\_body1> | €

<class\_body1> 🡪 <constructor> <class\_body> | <function> <class\_body>

CLASS CALL:

<Class\_call> 🡪 ID <Class\_call1>

<Class\_call1> 🡪 = new ID ( <arg\_list\_call> ) | ( <arg\_list\_call> )

CONSTRUCTOR:

<constructor> 🡪 AccessModifier ID (<arg\_list>) : IndentInit <func\_body> IndentOut

<arg\_list> 🡪 <data\_type> ID <arg\_list1> | €

<arg\_list1> 🡪 , <data\_type> ID <arg\_list1> | €

<arg\_list\_call> 🡪 <exp> <arg\_list\_call1> | €

<arg\_list\_call1> 🡪 , <exp> <arg\_list\_call1> | €

FUNCTION:

<function> 🡪 <data\_type> AccessModifier <static\_final> ID (<arg\_list>) : IndentInit <body> IndentOut

<data\_type> 🡪 Datatype | String | Boolean

LOOPS:

<For> 🡪 for ID in ID : IndentInit <func\_body> IndentOut

<While> 🡪 while (<exp>) : IndentInit <func\_body> IndentOut

IF\_ELIF\_ELSE:

<If> 🡪 if (<exp>) : IndentInit <body> IndentOut <Elif>

<Elif> 🡪 elif (<exp>) : IndentInit <body> IndentOut <Elif> | <Else>

<Else> 🡪 else : IndentInit <body> IndentOut | €

LIST/ARRAY:

<List> 🡪 <List2> | List ( <List1> )

<List1> 🡪 <List2> | ID

<List2> 🡪 [ <List3> ]

<List3> 🡪 <id\_const> <List4> | <List2> <List4>

<List4> 🡪 ,<List3> | €

DICTIONARY:

<Dictionary> 🡪 <Dictionary2> | dict (<Dictionary1>)

<Dictionary1> 🡪 ID | <Dictionary2>

<Dictionary2> 🡪 { <Dictionary3> }

<Dictionary3> 🡪 <id\_const> : <Dictionary4>

<Dictionary4> 🡪 <Dictionary5> | <Dictionary7>

<Dictionary5> 🡪 <id\_const> <Dictionary6>

<Dictionary6> 🡪 ,<Dictionary3> | €

<Dictionary7> 🡪 {<Dictionary3>}

DEL:

<Del> 🡪 del ID <Del\_>

<Del\_> 🡪 [<exp>] | €

TRY\_EXCEPT\_FINALLY:

<Try> 🡪 try : IndentInit <func\_body> IndentOut <Except>

<Except> 🡪 <Finally> | except (<Exception>) : IndentInit <func\_body> IndentOut <Except>

<Finally> 🡪 finally : IndentInit <func\_body> IndentOut

<Exception> 🡪 exception ID

LAMBDA:

<Lambda> 🡪 lambda ID : <exp>

|  |  |  |  |
| --- | --- | --- | --- |
| Non-Terminal | First set | Follow Set | Selection Set |
|  |  |  |  |
| <start> | Def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, € | ~ | Def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~ |
| <initialize> | \*, AccessModifier | Def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut | \*, AccessModifier |
| <initialize1> | [, AsOp, AcOp, (, in, =, ID | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut | [, AsOp, AcOp, (, in, =, ID |
| <initialize2> | [, AsOp, AcOp, (, in, = | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut | [, AsOp, AcOp, (, in, = |
| <initialize3> | [, List, {, dict | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut | [, List, {, dict |
| <initialize4> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, [, List, {, dict | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, [, List, {, dict |
| <static\_final> | Static, final, € | ID | Static, final, ID |
| <s\_final> | Final, € | ID | Final, ID |
| <id\_const> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const | ,, ], :, } | ID, int\_const, float\_const, string\_const, char\_const, bool\_const |
| <const> | int\_const, float\_const, string\_const, char\_const, bool\_const | ,, ], :, }, in | int\_const, float\_const, string\_const, char\_const, bool\_const |
| <Global> | global | break, continue, \*, AccessModifier, return, for, while, if, try, del, global, pass | global |
| <pointer> | \*, € | AccessModifier | \*, AccessModifier |
| <exp> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda |
| <exp\_OR> | Or, € | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) |
| <expAND> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda | Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda |
| <exp\_AND> | And, € | Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) |
| <expRELOP> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda | And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda |
| <exp\_RELOP> | RelOp, € | And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) |
| <expPM> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda | RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda |
| <exp\_PM> | PM, € | RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | PM, RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) |
| <expMDM> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda | PM, RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda |
| <exp\_MDM> | MDM, € | PM, RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | MDM, PM, RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) |
| <exp\_F> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda | MDM, PM, RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda |
| <ID\_rel> | [, AsOp, AcOp, (, in, € | MDM, PM, RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | [, AsOp, AcOp, (, in, MDM, PM, RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) |
| <arr\_dim> | [,€ | =, MDM, PM, RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | [, =, MDM, PM, RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) |
| <In> | In | =, :, MDM, PM, RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], ,, ) | in |
| <In\_> | ID, [, List | =, :, MDM, PM, RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], ,, ) | ID, [, List |
| <body> | break, continue, \*, AccessModifier, return, for, while, if, try, del, global, pass | IndentOut | break, continue, \*, AccessModifier, return, for, while, if, try, del, global, pass |
| <s\_st> | break, continue, \*, AccessModifier, return, for, while, if, try, del, global | break, continue, \*, AccessModifier, return, for, while, if, try, del, global, pass | break, continue, \*, AccessModifier, return, for, while, if, try, del, global |
| <func\_body> | \*, AccessModifier, for, while, if, try, del, global, pass | IndentOut | \*, AccessModifier, for, while, if, try, del, global, pass |
| <S\_St> | \*, AccessModifier, for, while, if, try, del, global | \*, AccessModifier, for, while, if, try, del, global, pass | \*, AccessModifier, for, while, if, try, del, global |
| <Class> | class | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~ | class |
| <Inherit> | ID, € | ) | ID, ) |
| <Inherit\_> | ,, € | ) | ,, ) |
| <class\_body> | \*, AccessModifier, def, € | IndentOut | \*, AccessModifier, def, IndentOut |
| <class\_body1> | AccessModifier, Datatype, String, Boolean | IndentOut | AccessModifier, Datatype, String, Boolean |
| <Class\_call> | ID | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut | ID |
| <Class\_call1> | =, ( | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut | =, ( |
| <constructor> | AccessModifier | \*, AccessModifier, def, IndentOut | AccessModifier |
| <arg\_list> | Datatype, String, Boolean, € | ) | Datatype, String, Boolean, ) |
| <arg\_list1> | ,, € | ) | ,, ) |
| <arg\_list\_call> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, € | ) | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, ) |
| <arg\_list\_call1> | ,, € | ) | ,, ) |
| <function> | Datatype, String, Boolean | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, IndentOut | Datatype, String, Boolean |
| <data\_type> | Datatype, String, Boolean | ID, AccessModifier | Datatype, String, Boolean |
| <For> | For | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass | for |
| <While> | While | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass | while |
| <If> | If | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass | if |
| <Elif> | elif, else, € | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass | elif, else, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass |
| <Else> | else, € | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass | Else, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass |
| <List> | [, List | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, =, :, MDM, PM, RelOp, And, Or, ], ,, ) | [, List |
| <List1> | [, ID | ) | [, ID |
| <List2> | [ | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, =, :, MDM, PM, RelOp, And, Or, ], ,, ) | [ |
| <List3> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, [ | ] | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, [ |
| <List4> | ,, € | ] | ,, ] |
| <Dictionary> | {, dict | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut | {, dict |
| <Dictionary1> | ID, { | ) | ID, { |
| <Dictionary2> | { | ) | { |
| <Dictionary3> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const | } | ID, int\_const, float\_const, string\_const, char\_const, bool\_const |
| <Dictionary4> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, { | } | ID, int\_const, float\_const, string\_const, char\_const, bool\_const, { |
| <Dictionary5> | ID, int\_const, float\_const, string\_const, char\_const, bool\_const | } | ID, int\_const, float\_const, string\_const, char\_const, bool\_const |
| <Dictionary6> | ,, € | } | ,, } |
| <Dictionary7> | { | } | { |
| <Del> | Del | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass | Del |
| <Del\_> | [ | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass | [ |
| <Try> | try | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass | try |
| <Except> | finally, except | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass | finally, except |
| <Finally> | finally | def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass | finally |
| <Exception> | exception | ) | exception |
| <Lambda> | lambda | MDM, PM, RelOp, And, Or, def, class, \*, AccessModifier, ID, int\_const, float\_const, string\_const, char\_const, bool\_const, (, Not, lambda, for, while, if, try, del, ~, break, continue, return, global, pass, IndentOut, ], =, ,, ) | lambda |