Language Specification for Unbin

A Simple Programming Language Based on Unary and Binary Operators

1. Overview.

Unbin is a very simple line-oriented programming language. Lines that are not blank (i.e., those that have only white space once comments are removed) assign an expression to a variable. Each such assignment to an expression can take one of three forms:

* [Single term] id = t # Text from a pound sign to the end of the line are commented out.
  + For example, "x = 7", "gravity = 32.0", or "width = height".
* [Unary operator] id = op1 t
  + For example, "root = sqrt 25.0".
* [Binary operator] id = tLeft op2 tRight
  + For example, "c = a + b"

where

* id is an identifier
* t, tLeft, and tRight are single terms (such as x, height, or 7.0)
* op1 is a unary operator
* op2 is a binary operator

The name "Unbin" comes from the fact that the operators are **UN**ary or **BIN**ary.

1. Files.

* By convention, Unbin filenames end with the suffix "unb", as in "escape\_velocity.unb".
* There must be white space on each side of the equality operator, and on each side of each operator.

1. Supported types of numeric terms.
   * All numeric terms in Unbin are floats.
2. Supported unary operators.
   * Unbin supports only one unary operator, "sqrt", which returns the square root of its argument.
3. Supported binary operators.
   * Unbin supports four binary operators: +, -, \*, /. They each have their standard function.
4. Running an Unbin script.

Unbin scripts are run by an Unbin interpreter. If the interpreter is called unbin.py, then the command to run an Unbin script called escape\_velocity.unb would be:

python unbin.py escape\_velocity.unb

The Unbin interpreter evaluates every line of the script in sequence.

* Per-line output.

For each blank line of the script, the interpreter prints

linenum: <empty>

where linenum is the line number of the script, with numbering starting at 1.

For each non-blank line of the script, the interpreter prints

linenum: id = value

where id is the identifier from line #linenum, and value is the value of the expression to the right of the equality operator.

* + Final result.

Once each line of the script has been evaluated and the per-line results printed, the Unbin interpreter prints one final line.

* + If there are any assignments in the script, then the final line printed is

Final result = value

* + If there are no assignments in the script, then the final line printed is

No final result

1. Sample Unbin script (name=h\_at\_5\_eq\_3.unb)

# After a ball is thrown upward at t = 0 (seconds),

# from an initial height of 5 feet, and an upwards velocity of 40 (feet/sec),

# find the height of a ball at t = 3 (seconds).

#

# Use the formula h(t) = (1/2) \* g \* t\*\*2 + v\_0 \* t + h\_0

h\_0 = 5 # feet

v\_0 = 50 # feet/sec

g = -32 # gravity (negative = downward)

t = 3

half\_g = g / 2

t\_squared = t \* t

h\_acc = half\_g \* t\_squared

h\_vel = v\_0 \* t

h\_acc\_vel = h\_acc + h\_vel

h\_at\_t\_eq\_3 = h\_acc\_vel + h\_0

1. Output of sample script

1: <empty>

2: <empty>

3: <empty>

4: <empty>

5: <empty>

6: h\_0 = 5.000000

7: v\_0 = 50.000000

8: g = -32.000000

9: t = 3.000000

10: <empty>

11: half\_g = -16.000000

12: t\_squared = 9.000000

13: h\_acc = -144.000000

14: <empty>

15: h\_vel = 150.000000

16: <empty>

17: h\_acc\_vel = 6.000000

18: h\_at\_t\_eq\_3 = 11.000000

Final result = 11.000000