
Self-replicating macros

Victor Eijkhout and Ron Sommeling

The problem of writing a program that gives its source as its output is one of the oldest conundrums of computer science. (An extended discussion can for instance be found in [1].) The basic idea of any solution is probably to write (in meta-language):

```
Initial_operations;
Print_Twice(Initial_operations;
Close_off;);
Close_off;
```

Of course there is the problem that the procedure 'Print_twice' has to be defined, and its call printed, but that's a minor point ...

Here are two solutions to this problem in plain T_EX, first one that prints itself, in typewriter type, on an otherwise blank page.

```
\output{} \def\do#1{\catcode'#112}\def\t{\dospecials\obeylines\tt~}
\def~#1^^:~#1#1^^:\end}\t
\output{} \def\do#1{\catcode'#112}\def\t{\dospecials\obeylines\tt~}
\def~#1^^:~#1#1^^:\end}\tz
```

The following solution is a variation on the original theme: it gives the source as message on the screen.

```
\catcode 13=12 \newlinechar 13
\def \a #1{\let \#\relax \let \a \relax \newlinechar 13\immediate \write 16{#1
\catcode '\#=12 \a {#1}}\end }
\catcode '\#=12 \a {\catcode 13=12 \newlinechar 13
\def \a #1{\let \#\relax \let \a \relax \newlinechar 13\immediate \write 16{#1
\catcode '\#=12 \a {#1}}\end }}
```

The reader may enjoy coming up with more variations, for instance a L^AT_EX document that produces itself, or a plain T_EX document that produces its L^AT_EX source, or ...

References

[1] Douglas Hofstadter, Gödel, Escher, Bach, an eternal golden braid. New York 1979.

- ◊ Victor Eijkhout
Department of Computer Science
University of Tennessee
104 Ayres Hall
Knoxville, Tennessee 37996, USA
eijkhout@cs.utk.edu
- ◊ Ron Sommeling
Centrum voor Wiskunde en
Informatica
Kruislaan 413
1098 SJ Amsterdam
the Netherlands
ron@cwi.nl