Anything But®F : a new tool in programming

Each programmer is thoroughly familiar with programs of the structure

$$\underline{\text{do}}\ v \neq N \rightarrow \ldots ; v := v+1\ \underline{\text{od}}$$

These programs are beloved because they are simply conceived and because they terminate very smoothly.

Each programmer is also thoroughly familiar with programs of the structure

$$\underline{\text{do}}\ v \neq N \rightarrow \ldots ; v := N; \ldots\ \underline{\text{od}}. \qquad (0)$$

These programs are even more beloved because they combine conceptual simplicity with ultrafast termination.

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Being fully aware of the high pressure imposed on programmers to get their programs as efficient as possible, we invented and developed the "Anything But" command to provide the symmetric counterpart of the beloved (0), viz.

$$\underline{\text{do}}\ v = N \rightarrow \ldots ; v :\neq N; \ldots\ \underline{\text{od}}. \qquad (1)$$

The command $v :\neq N$, saying that v becomes anything but N, precisely does what we expect it to do – about which more later – and as a result programs of the structure (1) also display

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the characteristic of ultrafast termination.

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The new command has, besides its typical use in constructs like (1), also some interesting applications in other fields of information technology such as in the construction of operating systems. Suppose, for example, that a process named p is not allowed to access a resource twice in succession. Furthermore assume that the access to the resource is controlled by a state variable turn pointing at the process having the next access rights. Then the above problem for process p is now simply solved by

access resource; turn : ≠ p .

One could argue that a classical assignment like turn := q , for some q ≠ p , could have done the job as well. However, turn : ≠ p frees the programmer from making the irrelevant choice for q and thus the new command has provided an augmented ability to use techniques of abstraction.

The Anything But command, in its capacity of giving another opportunity to make ultrafast programs and in its capacity to encourage the application of abstraction in the program design process, is a new indispensable tool in the framework of Disciplined Programming. It can now readily be embedded in most of such expert systems, because a software implementation is available for most of the current machines. For other machines there is a bootstrap procedure at hand. An integrated hardware implementation is

being developed. For more information Al B. Andon should be contacted.

Appendix

It is nowadays uncommon and not accepted to launch a new command without rigorously having defined what it does precisely (and the philosophy of Triple I T basically adheres to that principle).

It is well-known that the classical assignment is described by

$$\{R^{v}_{E}\}\ v := E\ \{R\}.$$

The Anything But command is described equally simple by

$$\{\neg R^{v}_{E}\}\ v :\neq E\ \{R\}. \qquad (2)$$

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Let us check that (2) indeed describes what the command really does.

For $v :\neq x\ \{v = x\}$ we expect the precondition to be false. Indeed, the precondition as prescribed by (2) is $\neg (v = x)^{v}_{x}$, which yields false.

For $v :\neq x\ \{v \neq x\}$ we expect the precondition to be true. Indeed, the precondition as prescribed by (2) is $\neg (v \neq x)^{v}_{x}$, which yields true.

An intuitively more complicated application is given by $v :\neq x\ \{v \neq y\}$. With (2) we find $\neg (x \neq y)$, i.e. $x = y$. To check whether

this holds suppose in the precondition $x = 3$ and $y = 4$. Then $v := \neq x$ makes v equal to anything but 3, so it could make v equal to 4, thus violating the postcondition $v \neq y$. So, indeed, rule (2) has provided the correct answer.

So much for the verification of (2).

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It has been pointed out to us by computing scientists that the description (2) would not satisfy the Law of the Excluded Miracle. We consider this as a minor point, because firstly we do not expect a so straightforward and natural command as Anything But is to face us with a miracle, and secondly - if it would - this would be in complete accordance with Triple I T's ideals.

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