

What is T_EX ?

When I was invited to write a brief article entitled “What is T_EX ?”, I was delighted: the possibilities seemed endless. But when I tried to formulate all the ideas that were bubbling through my head, I found it *considerably* harder to encapsulate them in a single pithy phrase. In the end, I decided to use an analogy, and one with which I hope some readers at least will be familiar: T_EX is like a Meccano set, but with one *very* importance difference.

What does this mean? Well, let me explain to those unfamiliar with the term what a Meccano set is. It is (was) a construction kit for “children of all ages”, and was for many of us our first introduction to mechanical engineering. The simplest set was a “No. 1” (possibly known as an “Erector Set #1” in North America, a name far too open to misinterpretation for it ever to be used in the UK!), which consisted of a few metal rods, strips, plates, pulleys, and a hank of green cord. It also contained some nuts and bolts, the former being square- (rather than hex-) headed and therefore requiring a special spanner which was also supplied, as was a screwdriver since the “bolts” had slotted heads. With just these few basic bits and pieces, a child could build absolutely anything that came into his (or her) head: a crane, a lorry, a boat — the possibilities were endless but limited by the few parts (and fewer *types* of part) in a No. 1 set.

With his appetite whetted, a child with a No. 1 set was like an alcoholic at a “sip-and-spit” wine tasting: he just couldn’t get enough. His parents would be begged incessantly for a No. 1a (“but then I can build a *plane*, Mummy!”), and then a No. 2, a No. 3, and so on until finally (and for this he would have to promise to forgo all birthday and Christmas presents for the next five years), he would finally acquire the Holy Grail: a No. 10, in a solid oak case (lesser sets were supplied in cardboard boxes, although I believe that a No. 9 came in something a little special: I don’t know for sure, because my parents’ pockets became exhausted long before I was even half-way to Nirvana ...).

OK, enough of Meccano: what has this to do with T_EX? Well, to my mind T_EX is like a No. 10 Meccano set: there is *nothing* that you can’t build with it, given enough time and patience. “Why ‘build’?”, I hear many of you ask. Well, T_EX is also rather like a newborn child: it knows very little, but it has an almost infinite capacity to learn. In order to get the most out of T_EX (in fact, to get anything worthwhile out of T_EX at all), it is necessary to invest a not inconsiderable amount of intellectual energy. You can, of course, take the easy way out and allow others to invest that energy for you (by using, say, L_AT_EX or ConT_EXt), but to be honest, why would you want

to? The greatest joy in using T_EX (to my mind) is the joy of persuading it to do *exactly* what you want. This is hard enough using T_EX itself, but it is virtually impossible once you allow format writers (such as Messrs Lamport, Mittelbach, Hagen, *et al.*) to act as intermediaries on your behalf. Only by using T_EX as God (oops, Knuth) intended, with an absolute minimum of intervention at the format level, will you ever be able to coerce it into satisfying your every whim.

OK, so T_EX is naïve, and needs a fair amount of work in order to coerce it into doing something worthwhile. So are many other systems, yet they don’t have the cult following of T_EX. What is it that sets T_EX apart from the crowd? And what is it, for that matter, that makes T_EX so *very* different from the Meccano set analogy that I have been using so far? Well, imagine (if you will) a No. 10 Meccano set, taken out of its box and carefully arranged on a very large table with each set of identical pieces separated from every other set. Look at it carefully, and what stands out (apart from the uniform reds and greens in which everything that doesn’t rotate is coloured)? Nothing! There is no one set of identical pieces that is in some way *fundamentally different* to all of the others. Each has its rôle, none is central (apart, perhaps, from the nuts-and-bolts and maybe the hank of string ...).

Now perform the same experiment on T_EX (it will have to be a *Gedankenexperiment*, I am afraid). What do we see? Well, one pile consists of primitives: commands built into T_EX itself which have a *a priori* meanings. We have another pile consisting of macro-related bits and pieces (that is, facilities for defining commands in terms of other commands). We have a third pile related to command *execution* (that is, what happens when a command finally reaches T_EX’s innermost core). And finally we have a black box, on the outside of which is printed “typesetting engine: unauthorized opening will invalidate all warranties, express or implied”. And it is this black box that makes T_EX unique, and to which everything else is peripheral.

So now we can really answer the question: “What is T_EX?”. It is a typesetting system *par excellence*. It is capable of producing printed copy which equals or excels in quality that produced by any of its peers, whether they be public domain, shareware, or incredibly expensive bespoke systems. Surrounding this are a number of peripheral units that can be changed in any way that the user thinks fit. Let me give you just one example. Suppose you don’t like T_EX’s syntax: you find backslashes and braces ugly and inelegant. You are used to writing web pages, and you find angle brackets and CSS notation intuitive and easy to use. *Then implement it!* There is *nothing*

in T_EX that says you must use Knuth's original syntax: you are free to implement any other syntax that you choose.

To conclude, T_EX is anything that you want it to be. At its heart is a superb typesetting engine, surrounded by a flexible and powerful interface that you, the user, can tailor in any way that you wish. You can use T_EX to produce anything,

from a one-page letter to your bank manager to a multi-volume work on the world's writing systems. Ask not what T_EX can do for you: ask rather whether there is anything that you *cannot* do with T_EX!

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