Alan Creak
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THE U-BIX* OPERATING SYSTEM

(* - U-BIX is NOT a trademark of Bell laboratories. So far as I know.)

> It is suggested that the combined expertise of the Computer Science department should be more than a match for the U-Bix copier. It is further suggested that the nature of the machine - it is a device which performs discrete operations on a (fairly) finite world in accordance with instructions chosen from a well defined instruction set - make it a peculiarly appropriate object of study for the said department. It is yet further suggested that to do so might be (a) instructive and (b) entertaining.

INTRODUCTION

I can usually manage to accomplish easy tasks, like making five copies of a single sheet of material, on the U-Bix machine without undue difficulty, provided that whoever used it last has left it in a reasonably normal state. I can usually manage more complicated tasks too, but I agonise over just which of many possibilities is the best way to do it.

For example : to make a single backed copy of two pages of material, you use the "Duplex" button, and the machine holds the copy of the first page in its internal buffer for you. That works for up to 50 copies. But if you want 500 copies, it's probably easier to do 500 copies of the first page, then to transfer the pile back to the input hopper and copy the second page. Or you may prefer to begin by making 10 interleaved copies of your original pair of sheets (probably using the sorter), then using those as the originals for a straight run through of 50 copies duplex. If your original extends to many pages, and you only want a few backed copies, it might be quicker to do it like that anyway, because the machine takes such a long time to switch over from front page to back page. If the original is backed, you can't use the "Duplex" button anyway; then you have to use the batch method - but then you have to use the "inverted copy" button to get the first output pile in the right order.

When you also take into consideration the sort-and-group mechanism, and the possible requirements to enlarge or reduce the original, it can become quite difficult to decide on the best way to proceed. The system is (more or less) well defined; all the problems to be solved are finite; there must be a best way. But how do you go about finding it ?

ELABORATION

Let us attack the problem systematically, and attempt a top-down approach. The first level of decomposition looks something like this :

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Use U-bix:
    Describe the problem;
    Find the solution.
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That makes it look respectable - and also homely, because in order to "Describe the problem" we need to define a language, whereupon "Find the solution" becomes something done by an optimising compiler, and both of these are very proper preoccupations for computists.

After that, of course, we just go on as usual subdividing tasks until we end up with things we believe we can handle without further simplification. Here's another step to think about :

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Describe the problem:
    Describe the source documents;
    Describe the desired result.
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Some sort of specification language is needed - one could imagine something along these lines, but better :

3pages A4loose, 4pagesA4backed, 1pageA5book, 2pagesA4loose
-> 250copiesA4backed.

Such a language should also include ways of describing operations like copying two originals side by side onto the same output page. On rare occasions, I've even wanted to copy originals superimposed on the same output page.

OPERATORS

The operators available correspond roughly to the buttons on the control panel, together with a few additional manual operations. The control panel functions can all be done in parallel, as if they were separate fields in a microcode word; the manual operations are separate. Here's a list :

Panel buttons :

Duplex	for backed output.
Image shift	for displaced margins on backed output.
Magnification	0.65 to 1.41.
How many copies.	
Auto/manual	automatic or manual input.
Cassette	paper size.
Inverted copy	copies upside down.
Sort/group	controls the sorter.

Manual operations :

Move contents of output tray/sorter to input cassette/ automatic document feed/the real world.

NOTES

There are some constraints on what you can do :

•   The automatic document feeder will only hold about 50 copies.
•   The output tray will hold only about 300 copies (depends on the paper thickness).
•   You can produce at most 20 copies when sorting.
•   You can produce at most 50 copies when grouping.

There are several possible ways of combining the operations. The obvious approach (obvious to me, that is) is to alternate automatic steps controlled by combinations of the panel buttons with manual steps in which the last operation's output is moved to one of the input positions. For example, one could use a first run to prepare a good set of masters, followed by the "real" run to make the desired final product.

I haven't considered the timing at all.

INVITATION

Interesting contributions to the solution of the U-Bix problem are invited. There is no prize, but think of the glory. Don't waste your summer lazing on the beach - waste it on trivial intellectual pursuits !

Should any contributions actually materialise, I'll try to think of something to do with them.