1 Net sales

This example is as discussed at LogicBlox: we have sales, costs, and net sales. Each are lists, and the sales are the pointwise sum of the net sales and the costs. To begin with, we have three repositories; throughout this document, we'll label repository states with capital letters. Thus:

$$S = [110, 220, 330, 440]$$
$$C = [100, 200, 300, 400]$$
$$N = [10, 20, 30, 40]$$

These are our original, synchronized repositories.

For updates to the net sales N or the costs C, it seems fairly clear what should happen.

$$N' = [10, 20, 30, 50] \to (S, C) \Rightarrow S' = [110, 220, 330, 450]$$
$$C' = [100, 200, 500, 400] \to (S, N) \Rightarrow S' = [110, 220, 530, 440]$$

However, if we update $S' = [110, 220, 450, 440]$, there seem to be more choices. Perhaps one natural choice is to scale N and C together:

$$N' = [10, 20, \frac{450}{300}30, 40]$$
$$C' = [100, 200, \frac{450}{300}300, 400]$$

However, we could also imagine shifting everything into N or into C:

$$N' = [10, 20, 180, 40]$$

or:

$$C' = [100, 200, 450, 400]$$

or distribute the extra evenly:

$$N' = [10, 20, 105, 40]$$
$$C' = [100, 200, 375, 400]$$

Perhaps each of these is reasonable at different times.

2 GUI

We might imagine designing a text editor, which has three widgets: a text buffer, the displayed text, and a scroll bar state containing the current chunk being displayed and the total number of chunks.

$$A = [some, long, text]$$
$$B = long$$
$$C = (2, 3)$$

For some updates, it is clear what to do

- If we set $C' = (3, 3)$ (scrolling down), we should update $B' = text$.
- If we set $B' = short$, we should update $A = [some, short, text]$.
- If we update $A' = [no, long, text]$, B and C may remain as-is.
- If we update $A' = [some, very, long, text]$, we should update $C' = (3, 4)$.

However, if A' is radically different from A, we have some choices to make that require heuristics. Choices include keeping the current line number, jumping to the beginning, jumping to the end, and keeping the current "percentage of document".

Moreover, it's not at all clear that these are the right data structures at all: for example, it's not clear how to delete a line from A just from the B widget.