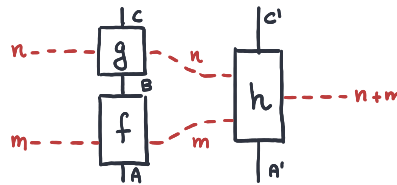


Timing processes

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Consider the process interpretation of monoidal categories, where morphisms are regarded as processes. Imagine we want to clock processes and keep track of how much time they need for completion; so that two processes can be put on parallel if and only if they take the same time to be completed. We can model this with a double category.



Let \mathbf{C} be a monoidal category. The time every process needs to be completed is encoded on a functor $T: \mathbf{C} \rightarrow \mathbb{N}$ to the monoid of the natural numbers. Functoriality ensures that a sequentially composed process takes exactly as much time as the sum of the times of its components. Now we define a double category where

- there is a unique 0-cell,
- the loose 1-cells are the objects of the monoidal category,
- the tight 1-cells are the monoid of the natural numbers.
- the transformations are the morphisms of the monoidal category, with the time indicated on both sides.