

"null" Units in Grid Graphics

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"null" units are used in layouts in Grid to indicate “relative” widths and heights of columns and rows. For example, `grid.layout(ncol=2, widths=unit(1:2, "null"))` says that column two will be twice the width of column one.

This is pretty simple to understand, but two situations have arisen which have forced a decision about how to handle "null" units in situations other than the simple one described above:

1. What do "null" units mean outside of layouts ?
2. What do "null" units mean in combination with other unit types ?

"null" units outside of layouts

I have decided that "null" units should basically have an “identity” value outside of layouts. That means:

1. A "null" unit on its own has a value of zero.
2. A "null" unit added to or subtracted from any other unit *or* multiplied by a scalar also has a value of zero.
3. A "null" unit being compared with other unit values to find the maximum has a value of `min-val`.
4. A "null" unit being compared with other unit values to find the minimum has a value of `max-val`.

"null" units in combination with other units in layouts

There is a reasonable interpretation for such expressions as `max(unit(c(1, 1), c("inches", "null")))` when used as, for example, the width of a layout column. It could be taken to mean that the column should be 1 inch wide *or* whatever width it would take based on the "null" value, if it wasn't 1 inch.

Unfortunately, this sort of interpretation is very difficult to calculate (at least in the way I currently resolve layout widths and heights) especially in the general case when there might be arbitrarily complex arithmetic expressions involving "null" and non-"null" units (and this can very easily happen in "frame" grobs).

On the other hand, arbitrarily complex arithmetic expressions *only involving* "null" units are straightforward to calculate.

So for now I have the following rule: if the layout width/height only involves "null" units then evaluate the total value and treat the result as the specification of a relative width/height, *but* if there are any non-"null" units in the width/height expression then evaluate the "null" units as if they are outside of the layout.

Some examples:

- `unit(1, "null")` inside a layout, specifies a relative width/height; outside a layout is zero.
- `unit(1, "null") + unit(2, "null")` inside a layout, specifies a relative width/height; outside a layout is zero.
- `unit(1, "inch") + unit(1, "null")` both inside and outside a layout, has a value of `unit(1, "inch")`.