Calc Dependency & Performance Work

(mostly thanks to Kohei Yoshida)

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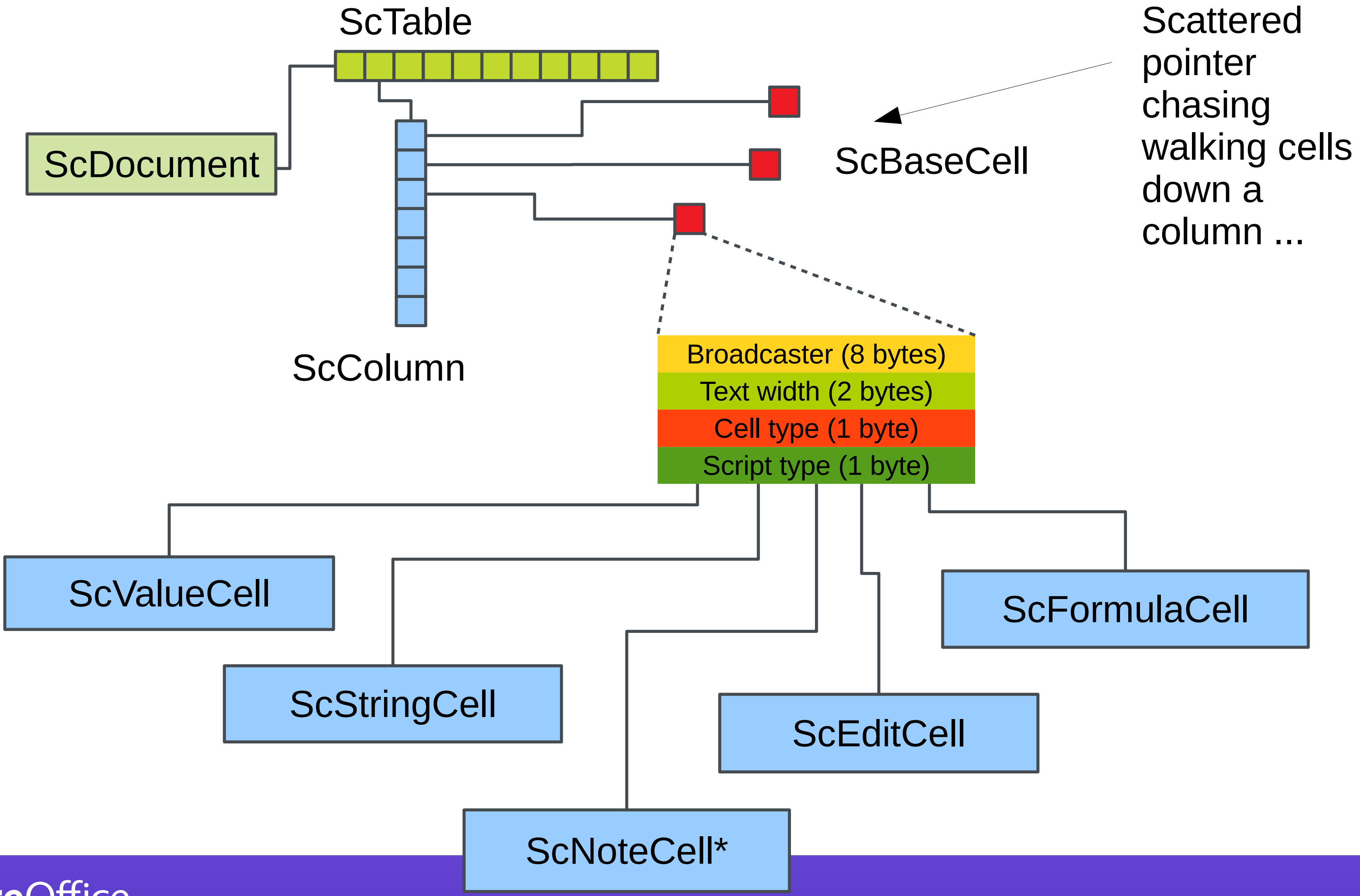
"Stand at the crossroads and look; ask for the ancient paths, ask where the good way is, and walk in it, and you will find rest for your souls..." - Jeremiah 6:16

Overview

- Calc – the ancient
- Calc – the modern: 4.3
- Calc – the latest: 4.4
    - Dependency rework
    - Chart performance
    - Export performance

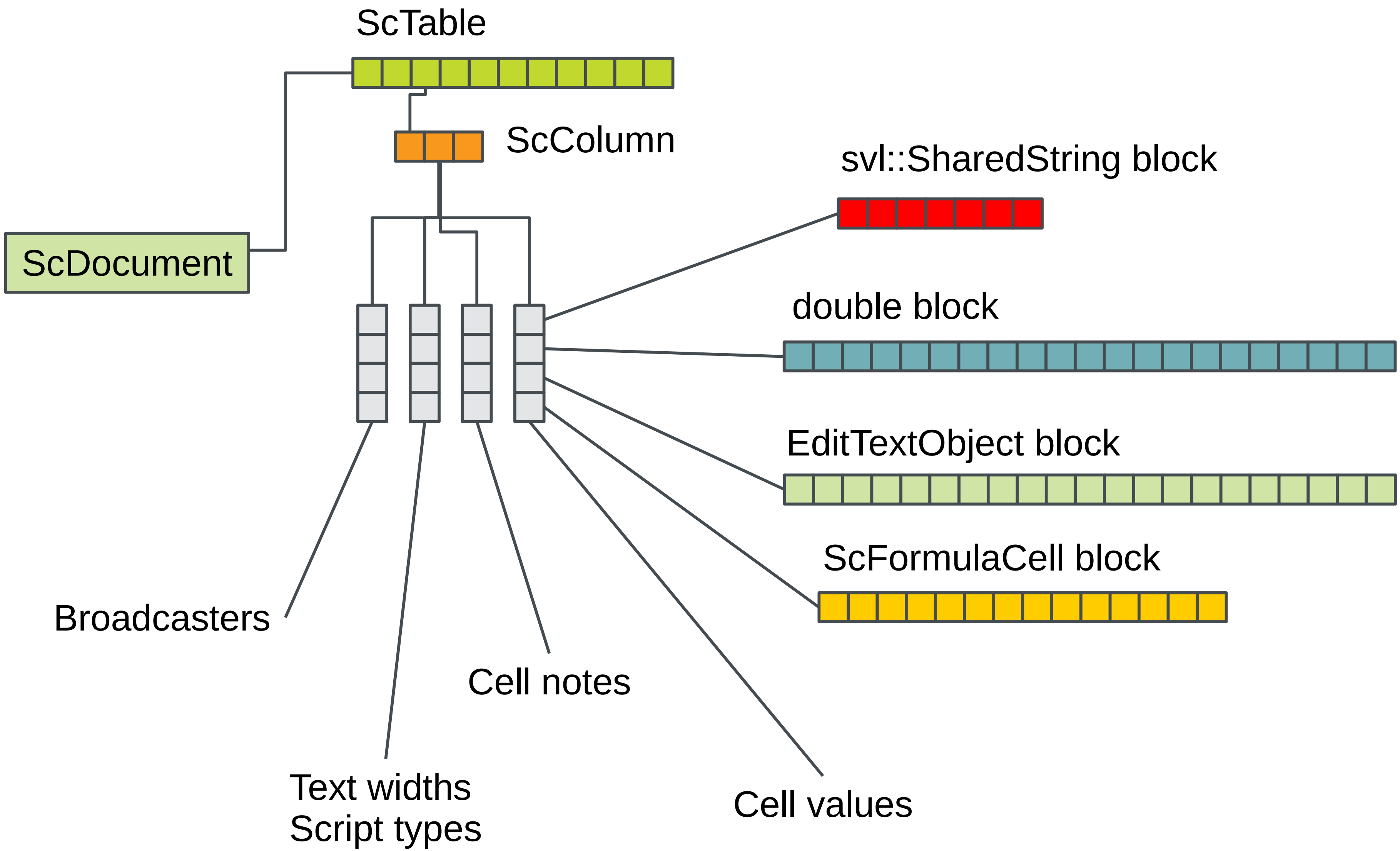
Baseline: state of play 1x year ago.

Ancient (ScBaseCell)



Scattered pointer chasing walking cells down a column ...

Modern (4.2/4.3) (mdds::multi_type_vector)



ScTable

ScColumn

ScDocument

svl::SharedString block

double block

EditTextObject block

ScFormulaCell block

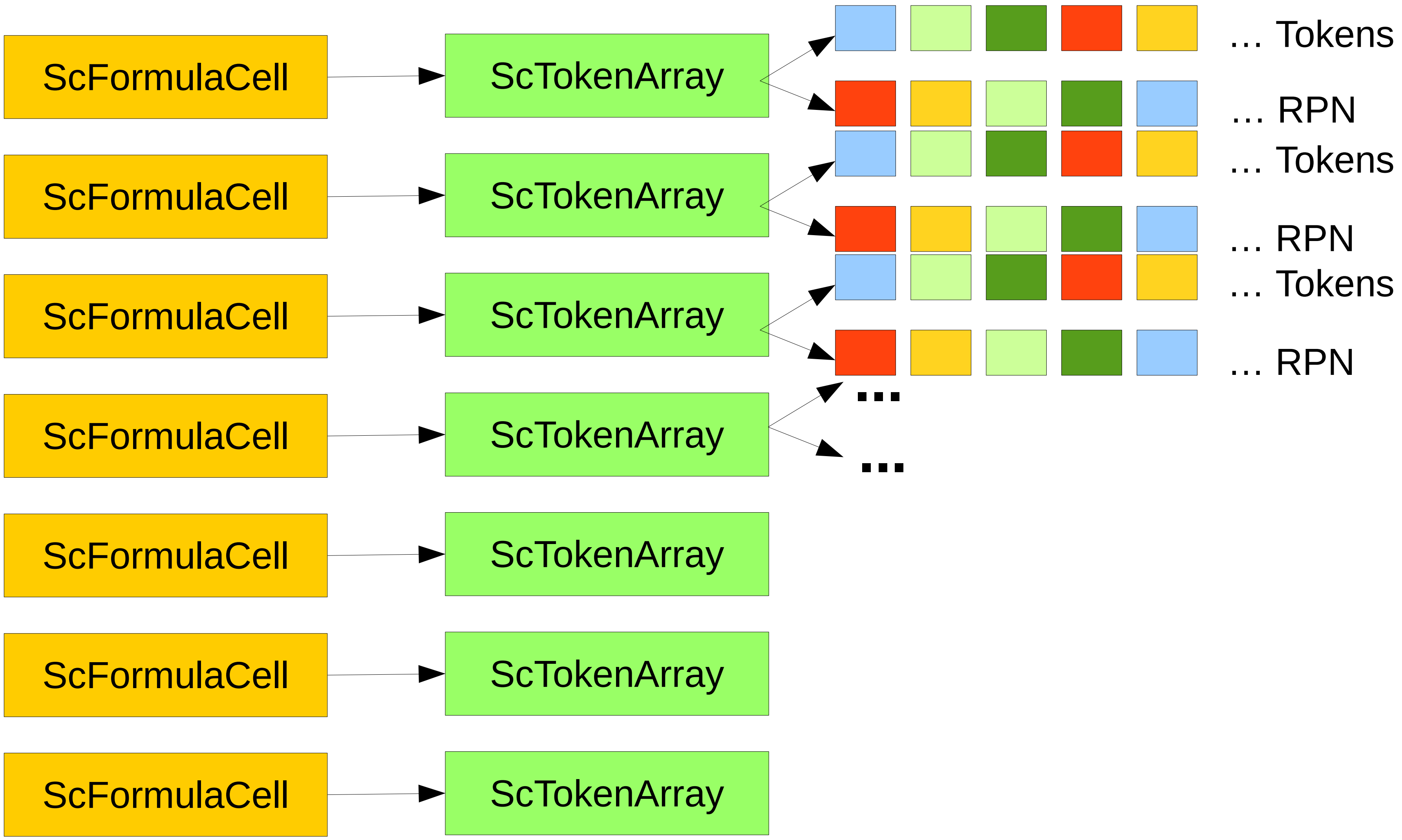
Broadcasters

Cell notes

Text widths
Script types

Cell values

Ancient: pre 4.2



ScFormulaCell → ScTokenArray → … Tokens, … RPN

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ScFormulaCell → ScTokenArray → …, …

ScFormulaCell → ScTokenArray

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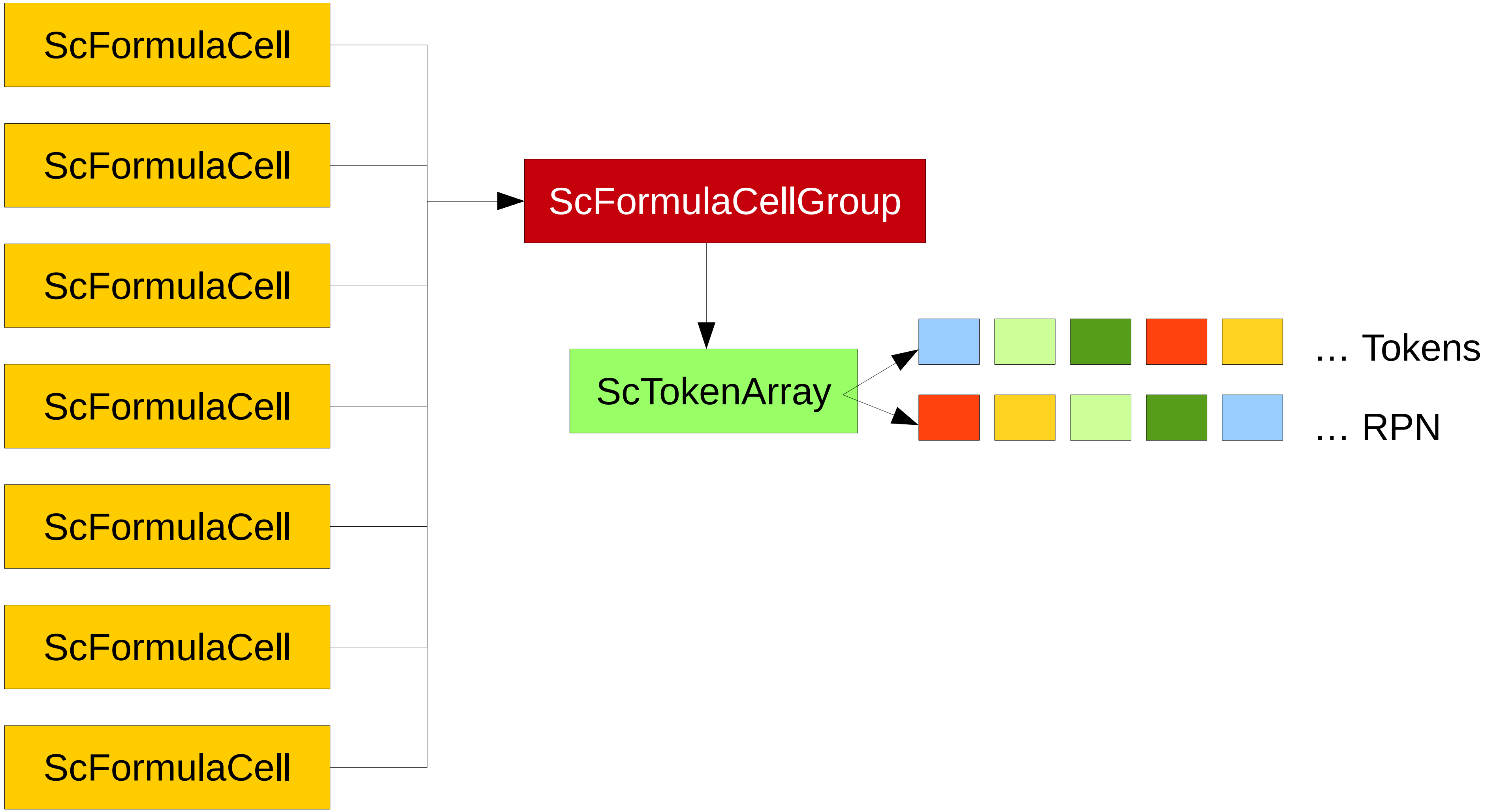
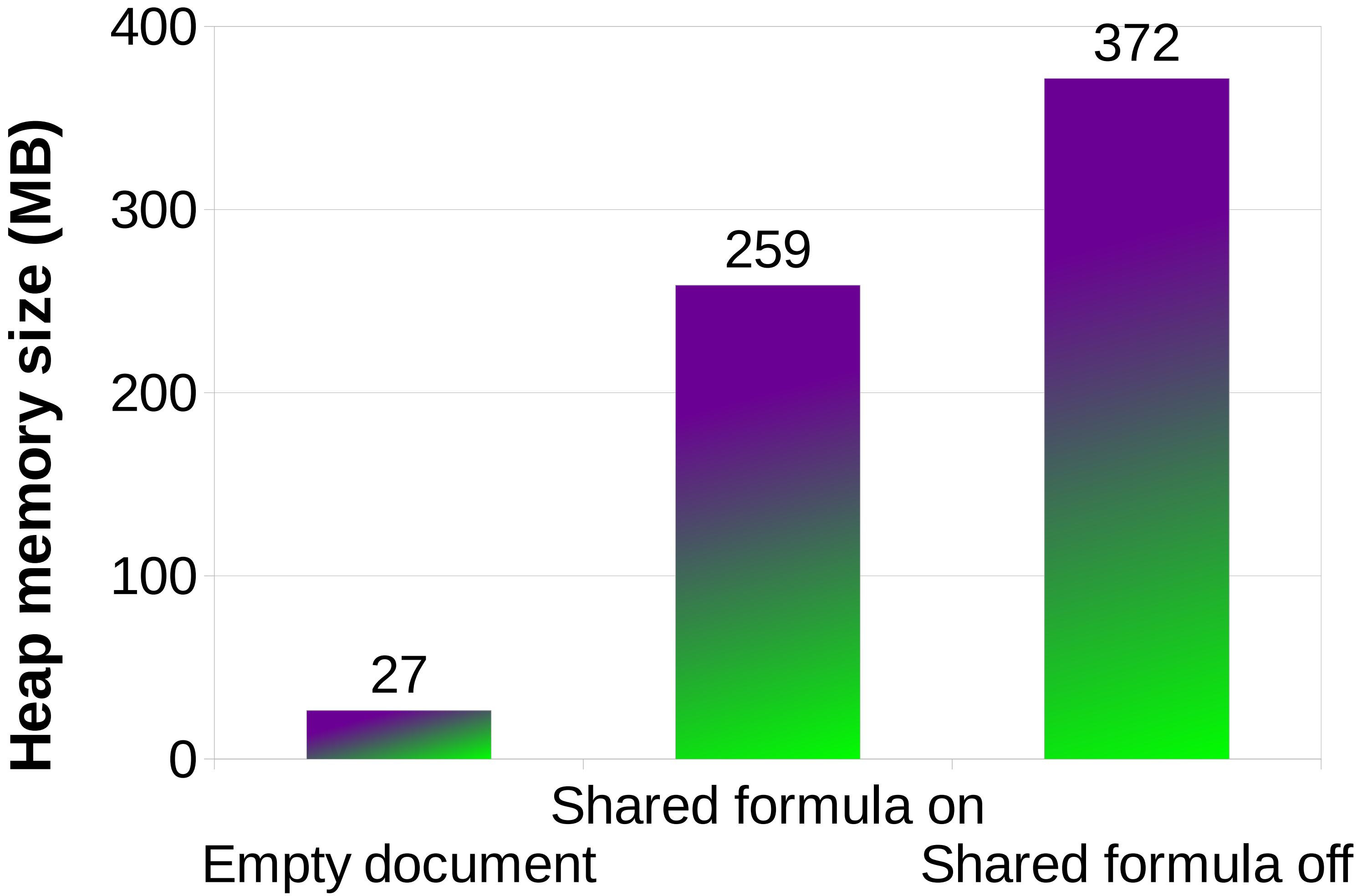
ScFormulaCell → ScTokenArray

Modern: 4.2 / 4.3+

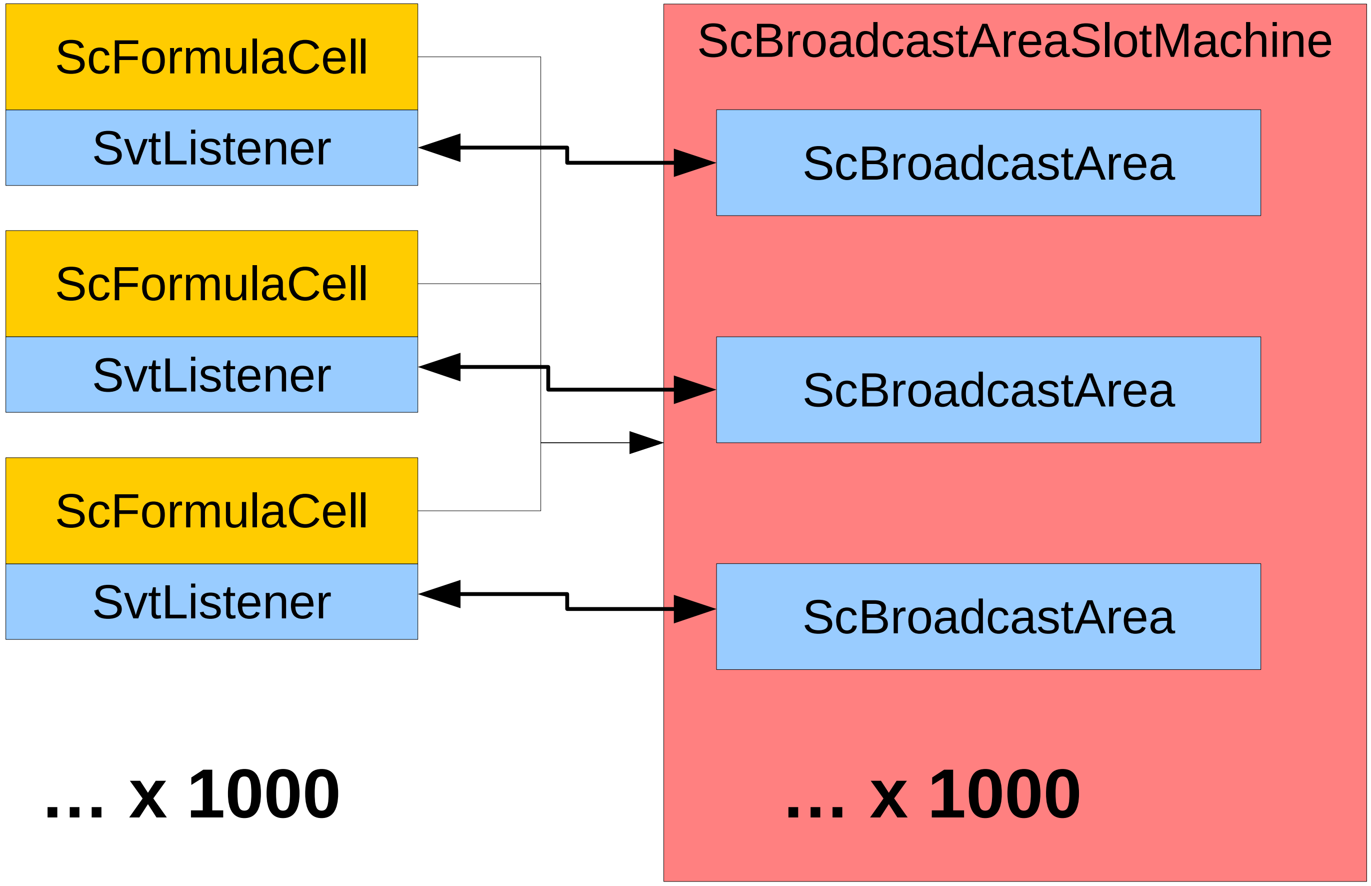

ScFormulaCell
ScFormulaCell
ScFormulaCell
ScFormulaCell
ScFormulaCell
ScFormulaCell
ScFormulaCell
ScFormulaCellGroup
ScTokenArray
… Tokens
… RPN

Memory usage



Test document used:
http://kohei.us/wp-content/uploads/2013/08/shared-formula-memory-test.ods

Dependencies 4.3



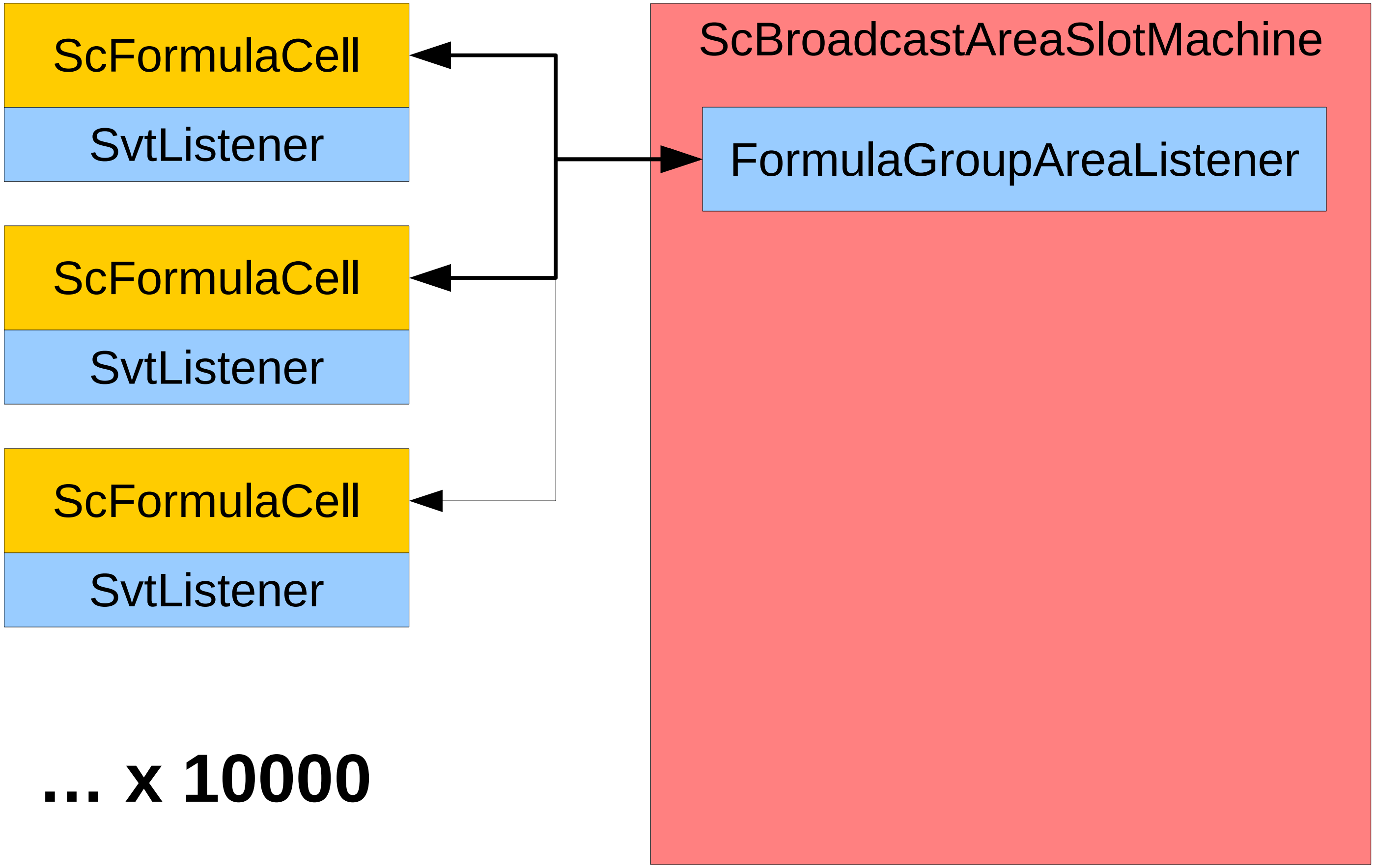
Column D:
=SUM(A1:C1)
Filled down 100x …

Area data structure is somewhat complex, and packed with data, consider eg.

=SUM(A1:A10)
Filled down 100x …
This produces a large number of intersecting / overlapping dependency ranges.

New things: Stuff you get in 4.4.

Dependencies 4.4



A single entry for the area slot machine; and a single listener.

No large SvtListener / Broadcaster linked lists – explicitly notifies cells it knows.

Time & Space savings.

Copying large formula groups: ~2x as fast over perfwork5 lifetime to 4.4

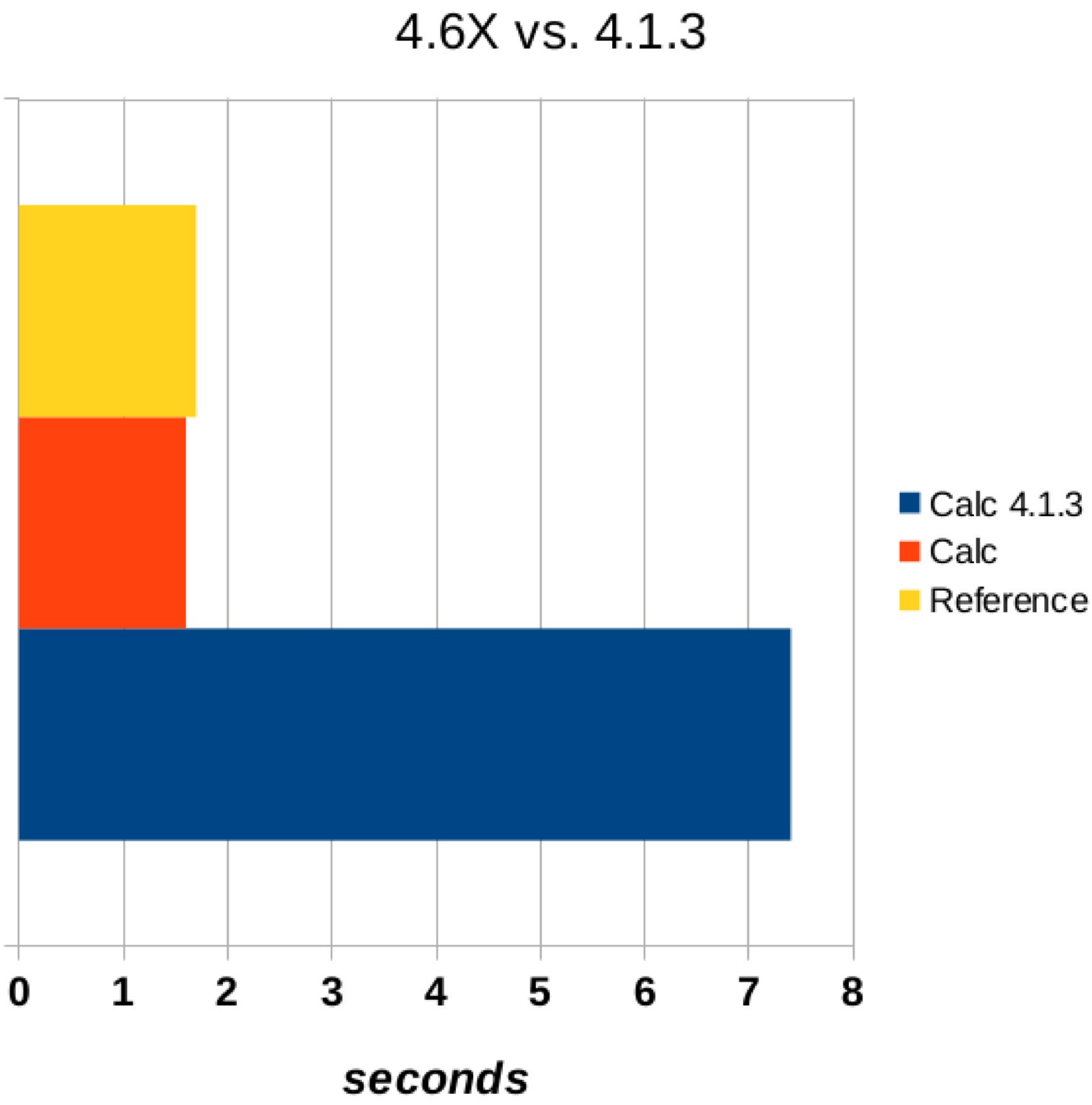
Other big wins:

- Script-Type optimizations
  - Asian, Complex, Latin, etc.
  - Determines fonts → sizing → row heights → we cache it.
    - Preserving this across copy/paste
    - Accelerated calculation down row-spans based on type.
- Chart Optimizations
  - Don't re-construct charts for every change to a range they depend on.
  - Wait until they become visible ….

FastParser : in 4.2 /4.3 ...

Matus Kukan:

- 1 sheet with 100k numbers & 100k formulae
- Significant wins: threaded parsing
- “Fast” a mis-nomer:
  - uno::Sequence ...



LibreOffice from COLLABORA

Export in 4.4

- FastSerializer: *Matus Kukan*
  - Similar complete nonsense in the Serializer: individual sys-calls for "<" "table" ":" "table-cell" … (ono) for

    "<table:table-cell …"
  - Added: buffering, reduced allocation, improved stringification → finally ~fast.
- Zip parallelism: *Matus Kukan*
  - We build a lot of streams, then compress 1x by one – instead parallelize all stream compression (off by default in 4.4)
  - Avoid wasteful image re-compression: big ODP/PPTX saving. ~20% win for some presentations: a better way to get compression parallelism.
- XclExpRow – row / column style calculation: now threaded.
- deque → vector conversion removal ~20%

Questions ...

- Calc Performance
  - Continues to improve ...
  - Major code re-factors and representation improvements
- Plenty more to do ...
  - Poke me to get involved.
- Many thanks to all who support LibreOffice
  - We can't do it without you ...
  - Thanks to Kohei too for the great work here.

Oh, that my words were recorded, that they were written on a scroll, that they were inscribed with an iron tool on lead, or engraved in rock for ever! I know that my Redeemer lives, and that in the end he will stand upon the earth. And though this body has been destroyed yet in my flesh I will see God, I myself will see him, with my own eyes - I and not another. How my heart yearns within me. - Job 19: 23-27