LibreOffice from COLLABORA

Life after Calc Core Change

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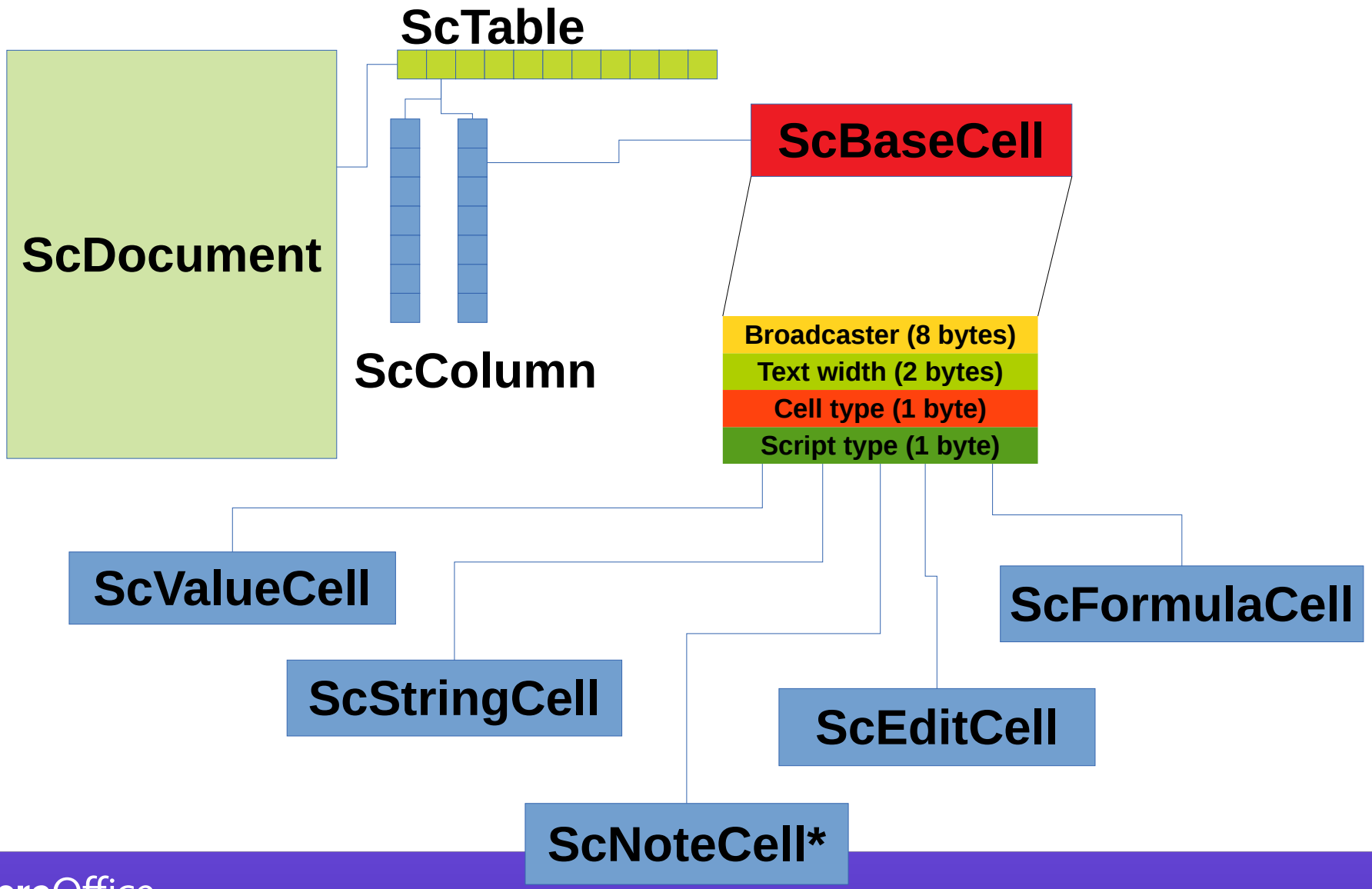
Topics

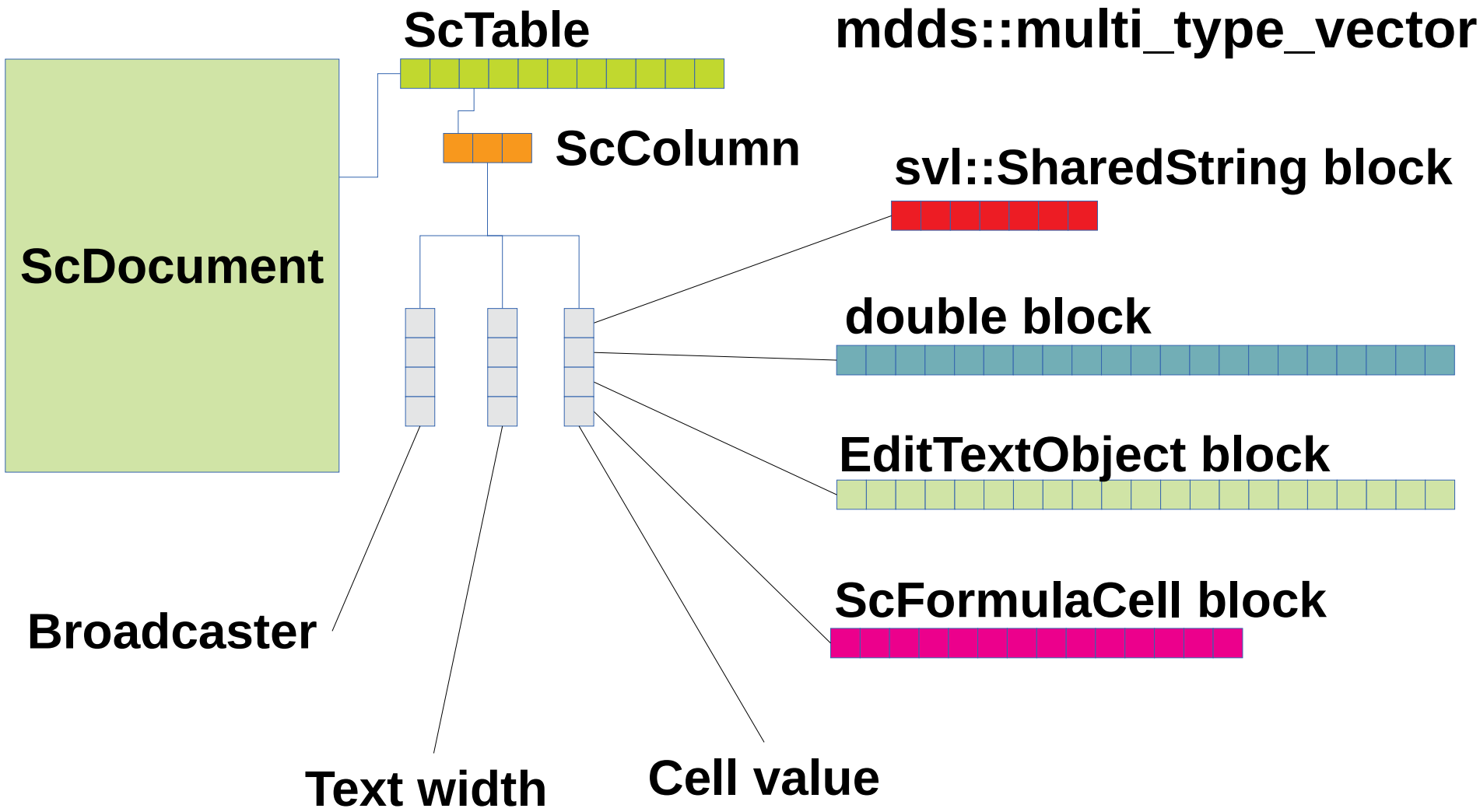
- What change was made in Calc core.
- Affected areas.
- Expectation vs reality.
- Going forward.

What change was made in Calc core.

Old model


ScTable
ScDocument
ScBaseCell
ScColumn
Broadcaster (8 bytes)
Text width (2 bytes)
Cell type (1 byte)
Script type (1 byte)
ScValueCell
ScStringCell
ScEditCell
ScFormulaCell
ScNoteCell*

New model


ScTable
mdds::multi_type_vector
ScDocument
ScColumn
svl::SharedString block
double block
EditTextObject block
ScFormulaCell block
Broadcaster
Text width
Script type
Cell value

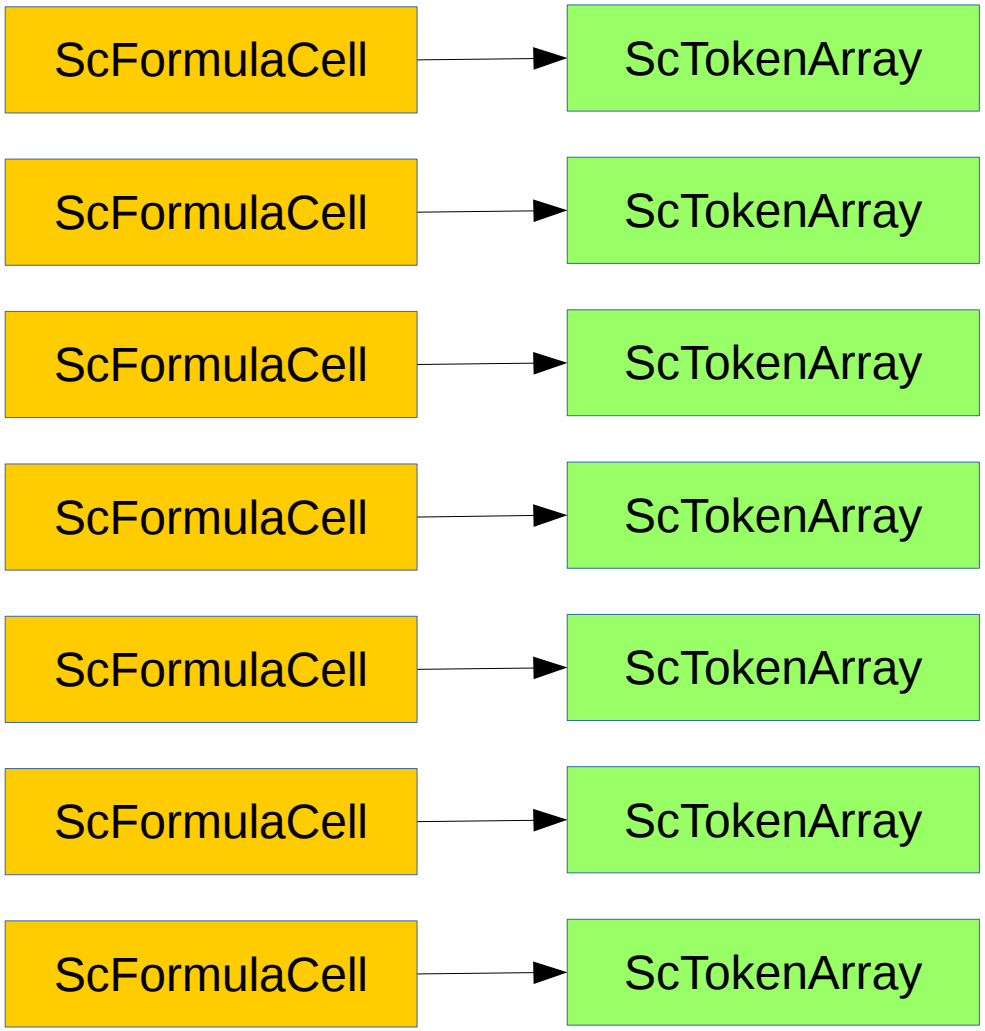
Iterating over cells (old way)

```
// Do something in all formula cells in a column.

for (SCSIZE i = 0; i < maItems.size(); ++i)
{
    // Check every single non-empty cells of all types.
    ScBaseCell* pCell = maItems[i].pCell;
    if (pCell->GetCellType() == CELLTYPE_FORMULA)
    {
        ScFormulaCell* pFCell =
            static_cast<ScFormulaCell*>(pCell);

        // Do something with this formula cell.
    }
}
```

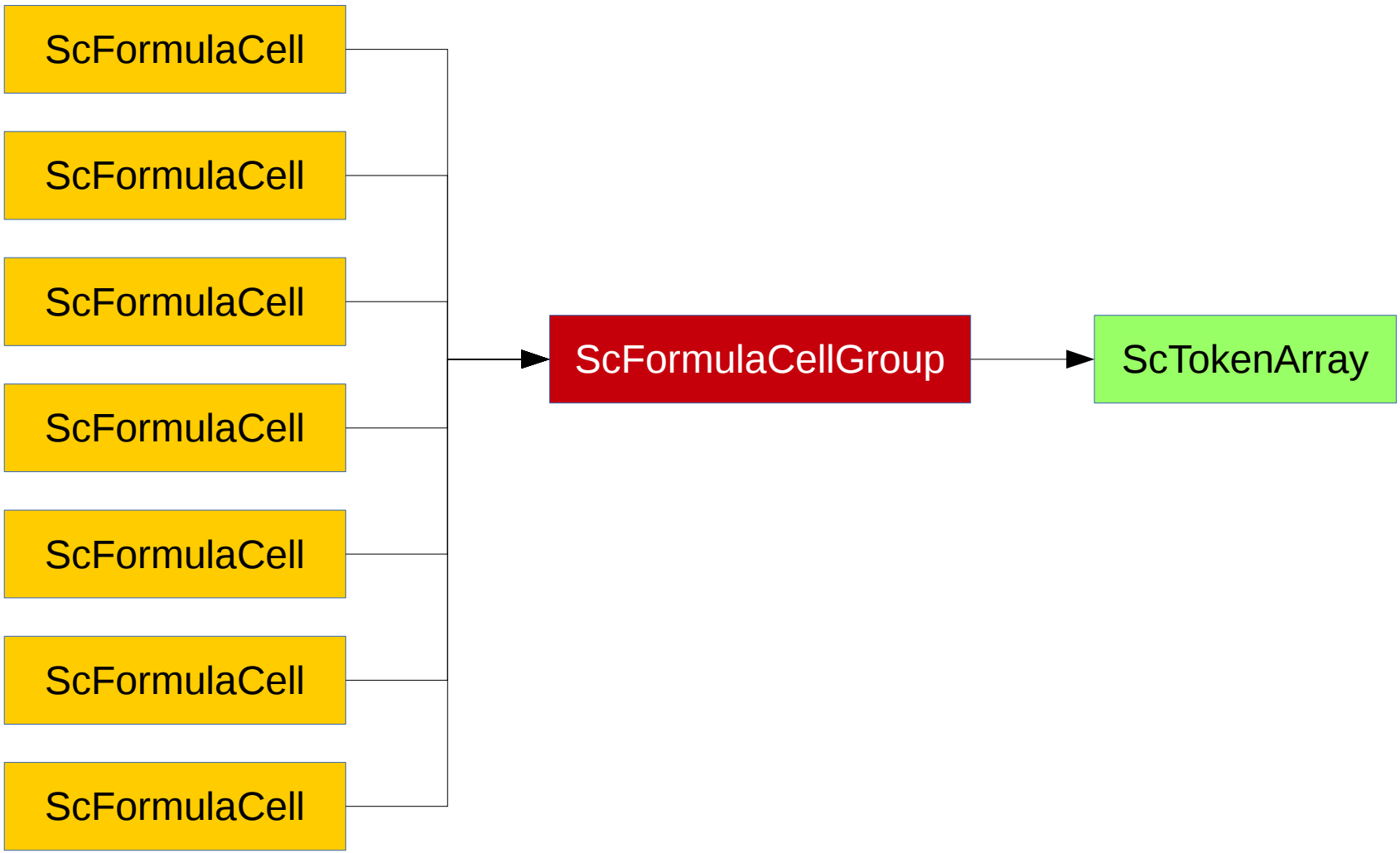
Iterating over cells (new way)

```
// Do something in all formula cells in a column.

struct MyFormulaHandler
{
    void operator() (size_t nRow, ScFormulaCell* pCell)
    {
        // Do something with this formula cell.
    }
};

// ...

// Only inspect formula cell blocks and skip
// all the other blocks.
MyFormulaHandler aFunc;
sc::ProcessFormula(maCells, aFunc);
```

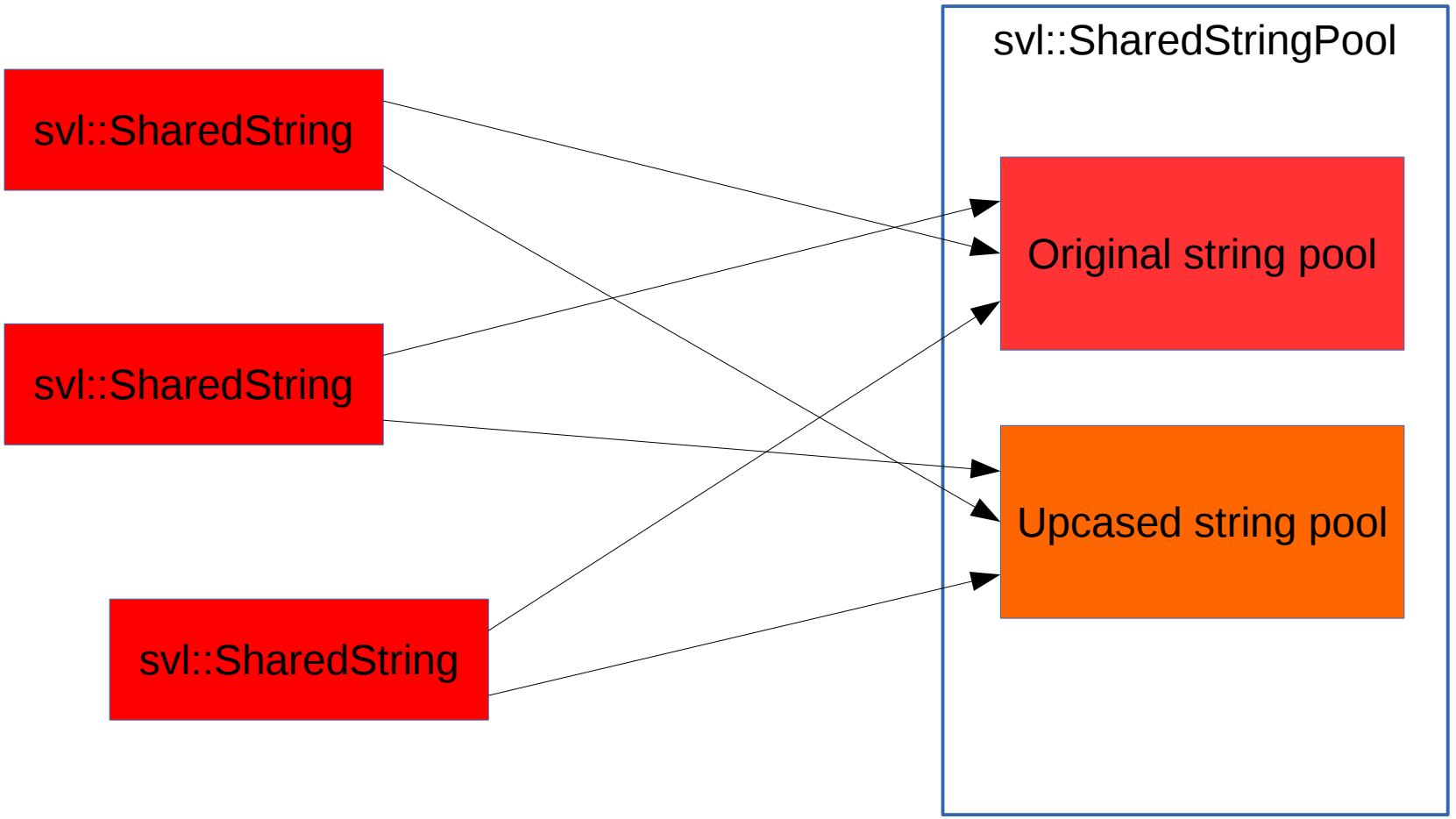
Before shared formula



After shared formula



Shared string concept



String comparison (old way)

```
utl::TransliterationWrapper* pTransliteration = NULL;
OUString aStr1, aStr2;

if (bCaseSensitive)
    // Case sensitive transliterator.
    pTransliteration = ScGlobal::GetCaseTransliteration();
else
    // Case insensitive transliterator.
    pTransliteration = ScGlobal::GetpTransliteration();

// Parse both strings to check equality.
bool bEqual = pTransliteration->isEqual(aStr1, aStr2);
```

String comparison (new way)

```
svl::SharedString aStr1, aStr2;

const rtl_uString* p1;
const rtl_uString* p2;

if (bCaseSensitive)
{
    // Get pointers to original strings in the pool.
    p1 = aStr1.getData();
    p2 = aStr2.getData();
}
else
{
    // Get pointers to upcased strings in the pool.
    p1 = aStr1.getDataIgnoreCase();
    p2 = aStr2.getDataIgnoreCase();
}

// Compare pointer values.
bool bEqual = p1 == p2;
```

Bottom line...

- Largest refactoring effort in Calc code.
- Most critical parts of Calc code have changed.
  - **Shared formula** - ScFormulaCell no longer owns ScTokenArray at all times.
  - **Shared string** - all string objects need to be pooled.
  - Random access to cell array is no longer O(1).

Affected areas

Calc

95 %

Non-scientific estimate

Affected by core change

What features are affected?

Undo / Redo

Formula Dependency	Reference Updates	Copy & Paste
Sorting	Live Spellcheck	ODS Import / Export
Find & Replace	Excel Import / Export	Named Range
Database Range	Cell Editing	Content Rendering
Cell Comment	Conditional Formatting	SYLK Import / Export
VBA API Layer	Chart Data Provider	DBF Import / Export
HTML Import / Export	Cell Validation	CppUnit Test
CSV Import / Export	Formula Calculation	DIF Import / Export
External Reference	Formula Tokenization	Case Conversion
UNO API Layer	RTF Import	Quattro Pro Import
Autofilter	Change Tracking	...

Expectation vs Reality

Check #1

20 to 50% of the code change would cause regressions.

Almost all code changes caused regressions in some form. Some did more than others.

Check #2

The worst part is behind us. We just need to fix trivial bugs.

The worst part was yet to come. Lots of medium-to-large follow-up refactoring ensued.

Check #3

Just focus on regressions during the 4.2 releases, and go back to normal for the 4.3.

We did fix the worst ones in the 4.2 cycle. But many still remain.

Check #4

We already wrote a lot of unit tests for Calc core prior to the change. They should keep us safe.

We ended up doubling the amount of unit tests for Calc during the 4.2 period. We still don’t have enough.

Check #5

As a responsible coder, I will fix all the bugs my change caused.

Calc’s core is too large for one coder to handle. We need multiple people who can handle bugs in Calc core.

Going forward

Challenges we face

- Squash remainder of regressions caused by the core change. The number still too high.
- Gather more people becoming comfortable handling bug fixes in Calc core.
- Build the culture of writing unit test for each and every bug fix.

Unit test is key

- One unit test is worth 20 future bug fixes.
- A bug fix does not finish until you write a test.
- Writing unit test is courtesy for your fellow developers.
- We really don’t have a choice.

Unit test is key (repeated)

- A bug fix without a unit test ***WILL GET BROKEN AGAIN*** in the next release.
- A bug fix with a unit test ***WILL REMAIN FIXED FOREVER***.

Which one will be your choice?

THANKS!