LibreOffice from COLLABORA

Accelerated, Threaded XML Parsing

loading your documents quicker …

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Big data needs Document Load optimization

Parallelized Loading ...

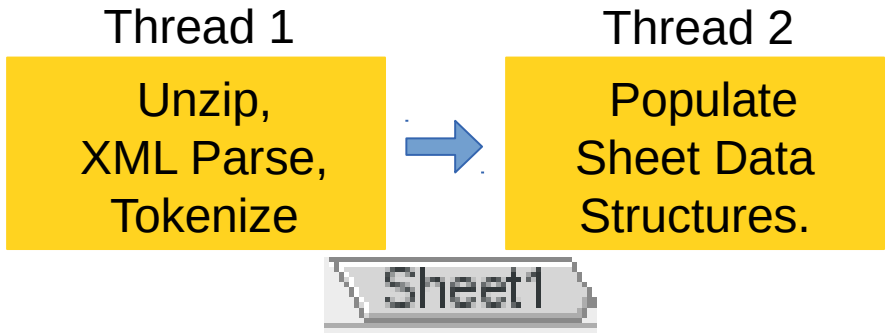
- Desktop CPU cores are often idle.
- XML parsing:
  - The ideal application of parallelism
  - SAX parsers:
  - “Sucking icAche eXperience” parsers
    - read, parse a tiny piece of XML & emit an event … punch that deep into the core of the APP logic, and return ..
    - Parse another tiny piece of XML.
  - Better APIs and impl's needed: Tokenizing, Namespace handling etc.
  - Luckily easy to retro-fit threading ...
  - Dozens of performance wins in XFastParser.

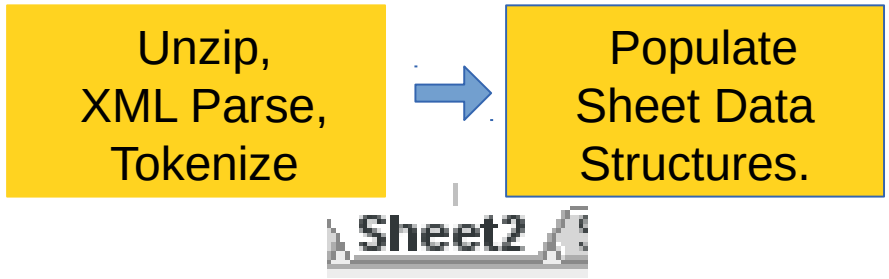
XML format lameness ...

- Spreadsheets have a great way of expressing repeated formulae:
  - R1C1 notation:
  - =SUM($A$1:$A$5)-A1
    - → =SUM(R1C1:R5C1)-R[-2]C[-1]
  - Looks ugly – but it's constant down a column.
  - Lunatic standardizers for ODF (& OOXML) ignored me on this ...
- Formulae hard and expensive to parse, so don't ...
  - Predictive generation down a column & comparison.
    - Removes tons of token allocations etc.

Parallelised load:
(boxes are threads).

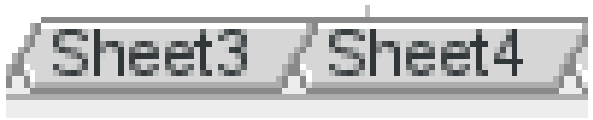
- Split XML Parse & Sheet populate
- Parallelised Sheet Loading ...
- Parallel to GPU compilation





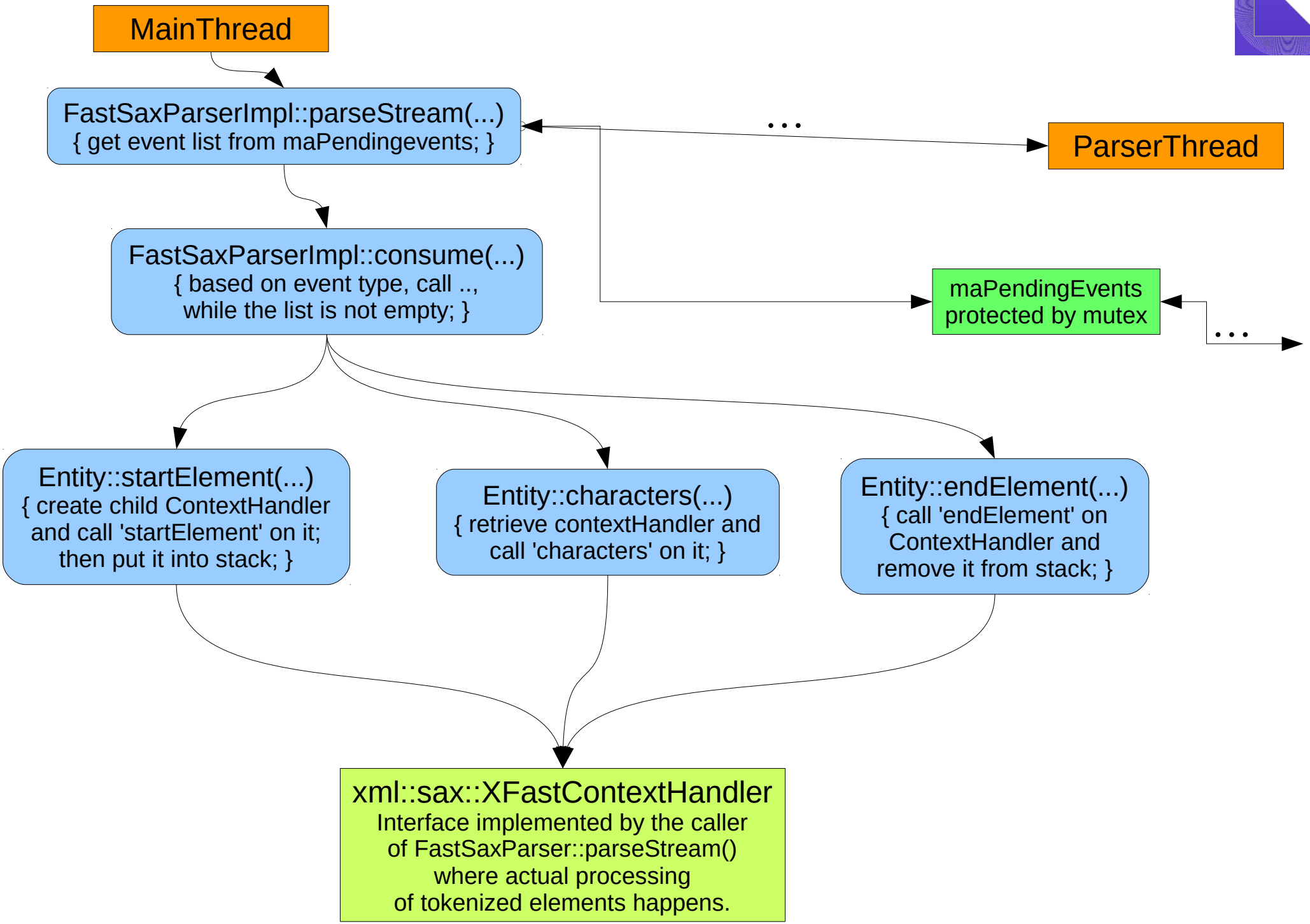
Progress bar thread

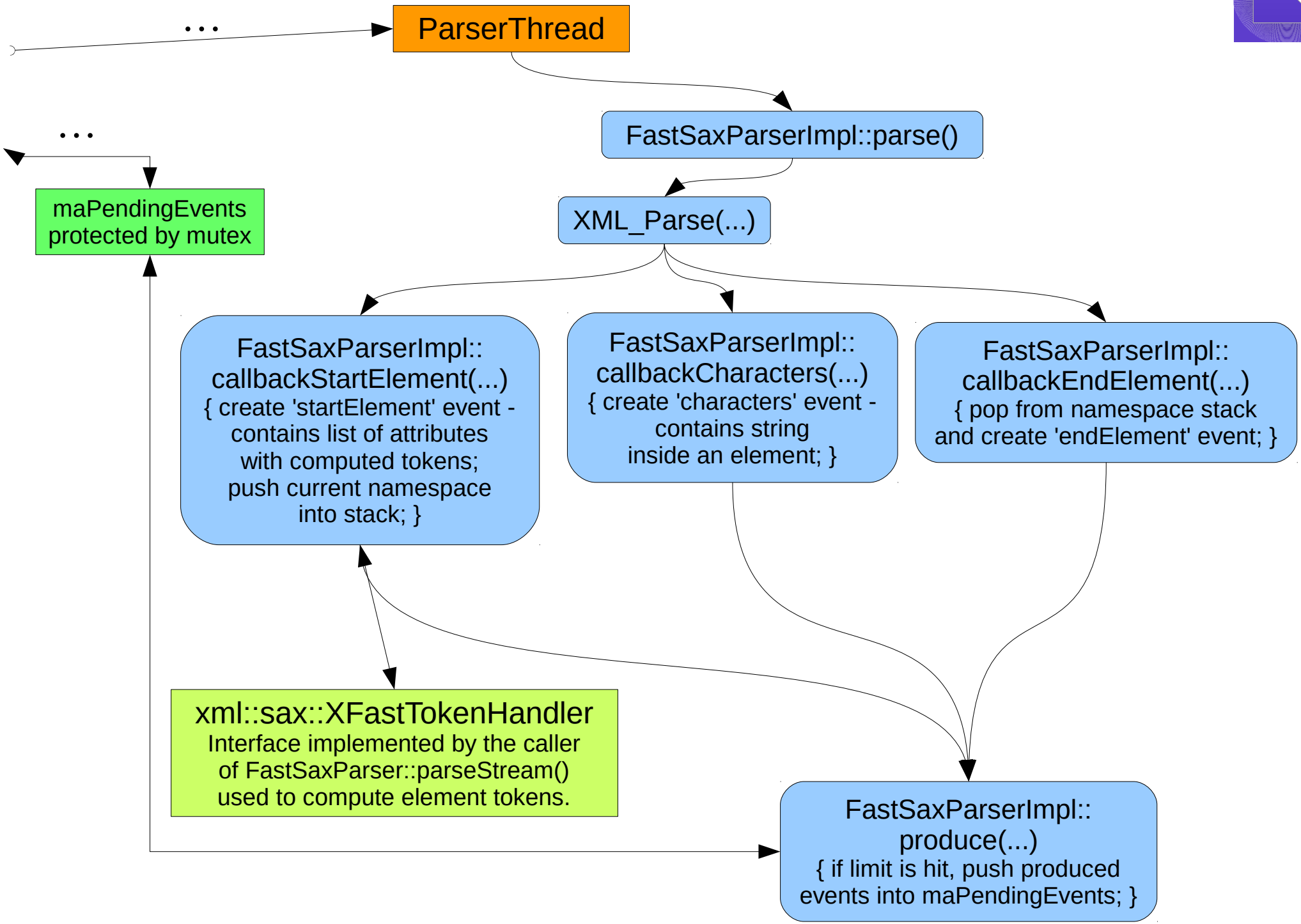
… etc.



=COVAR(A1:A300,B1:B300)
→ OpenCL code
→ Ready to execute kernels

Tools->Options->Advanced->”Experimental Mode” required for parallel loading


MainThread
FastSaxParserImpl::parseStream(...)
{ get event list from maPendingevents; }
...
ParserThread
FastSaxParserImpl::consume(...)
{ based on event type, call ..,
while the list is not empty; }
maPendingEvents
protected by mutex
...
Entity::startElement(...)
{ create child ContextHandler
and call 'startElement' on it;
then put it into stack; }
Entity::characters(...)
{ retrieve contextHandler and
call 'characters' on it; }
Entity::endElement(...)
{ call 'endElement' on
ContextHandler and
remove it from stack; }
xml::sax::XFastContextHandler
Interface implemented by the caller
of FastSaxParser::parseStream()
where actual processing
of tokenized elements happens.


...
ParserThread
...
FastSaxParserImpl::parse()
maPendingEvents
protected by mutex
XML_Parse(...)
FastSaxParserImpl::
callbackStartElement(...)
{ create 'startElement' event -
contains list of attributes
with computed tokens;
push current namespace
into stack; }
FastSaxParserImpl::
callbackCharacters(...)
{ create 'characters' event -
contains string
inside an element; }
FastSaxParserImpl::
callbackEndElement(...)
{ pop from namespace stack
and create 'endElement' event; }
xml::sax::XFastTokenHandler
Interface implemented by the caller
of FastSaxParser::parseStream()
used to compute element tokens.
FastSaxParserImpl::
produce(...)
{ if limit is hit, push produced
events into maPendingEvents; }

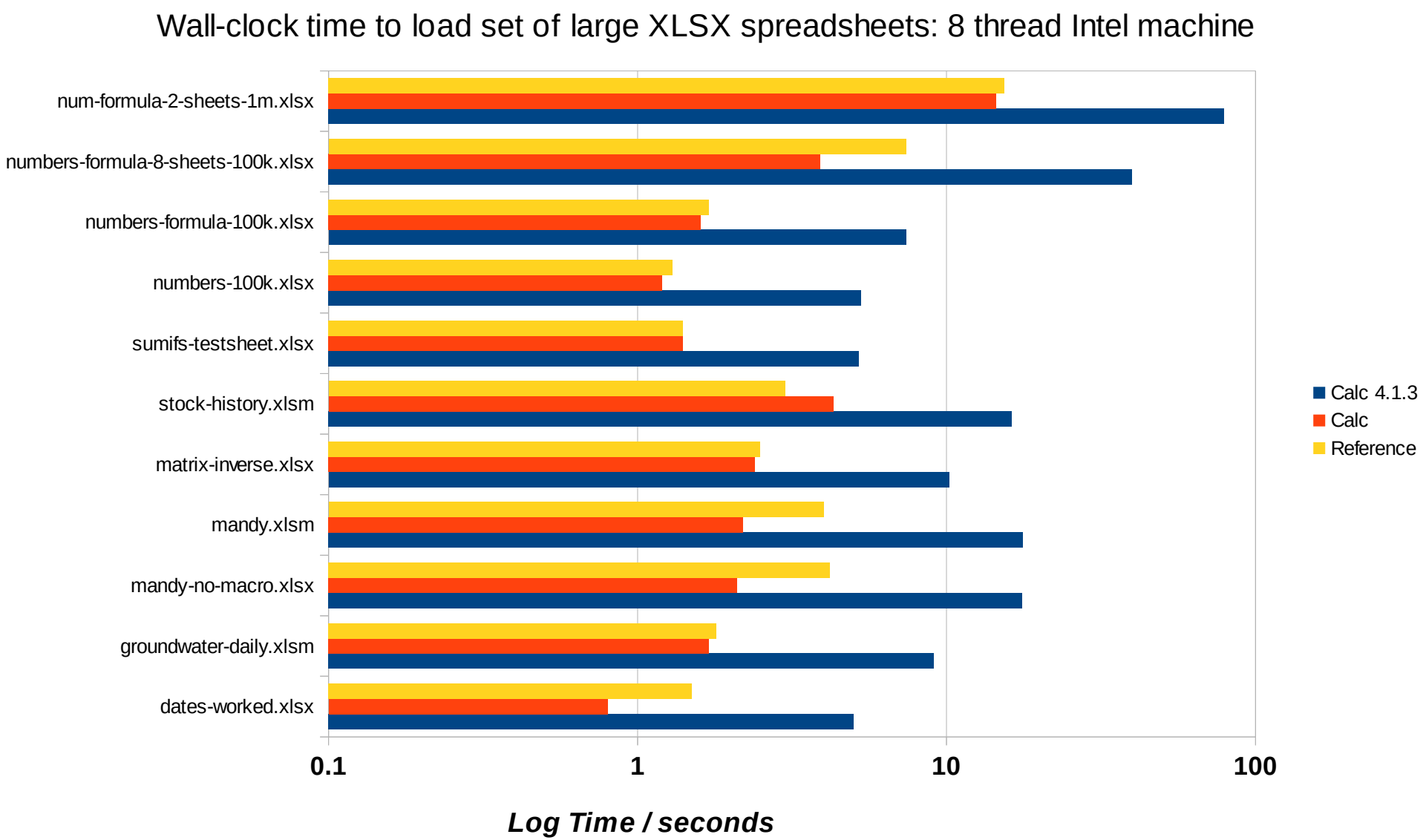
Code improvements

- We try hard to avoid any (de)allocations
  - FastSaxParserImpl::consume(EventList *pList) just processes the list of events without freeing any memory. pList is then pushed into mutex protected buffer and reused in FastSaxParserImpl::callbackFoo(...) functions.
  - commit “don't allocate uno::Sequences when we don't need to.”
    - Makes small strings reuse one sequence buffer
  - commit “FastAttributeList: avoid OStrings in attribute list; just use char buffer”
    - something like vector<char> wrt. allocations
    - easy to get attribute strings

Code improvements

- cache values
  - commit “fastparser: cache default namespace token for ooxml.”
  - commit “oox: special-case single-character a-z token mapping.”
    - 50% of OOXML tokens are primarily lower-case character, a-z
  - commit “fastparser: avoid std::stack::top() - cache it's results.”
    - amazingly std::stack::top() takes 146 pseudo-cycles to do not much, so instead cache the result in a single pointer in lieu of burning that code.

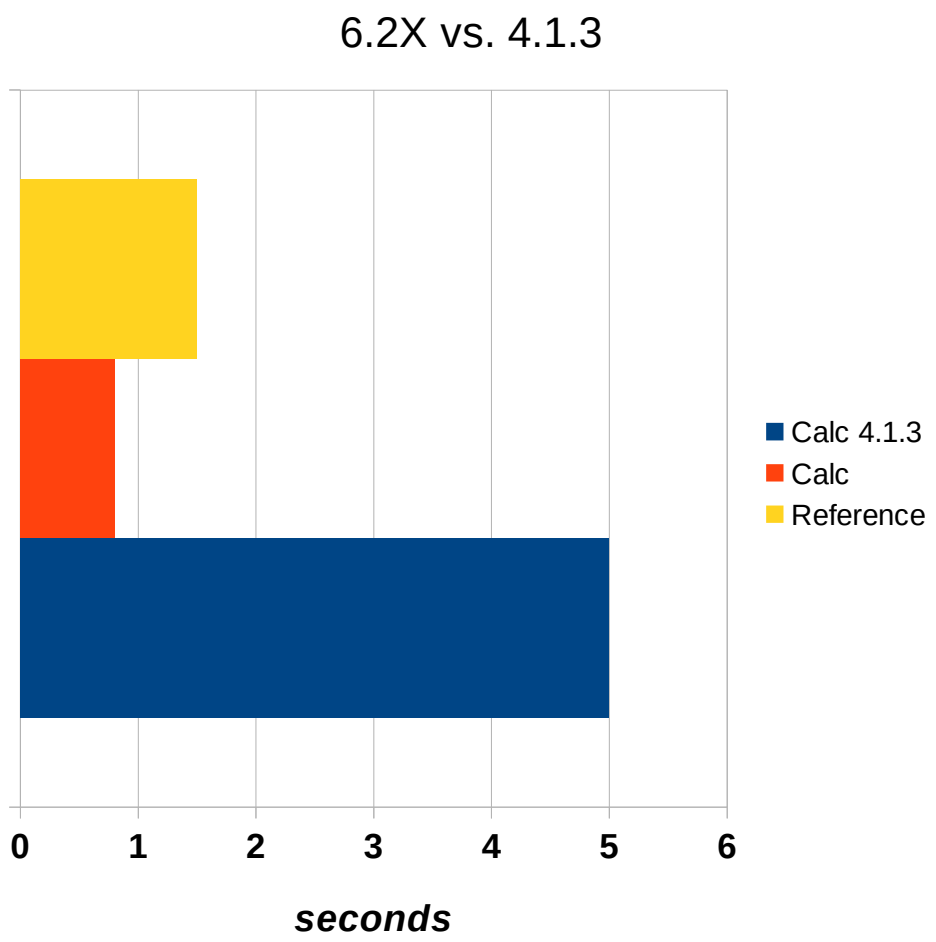
Does it work ? with GPU enabled



Apologies for another log scale: **Average 5X vs. 4.1.3**

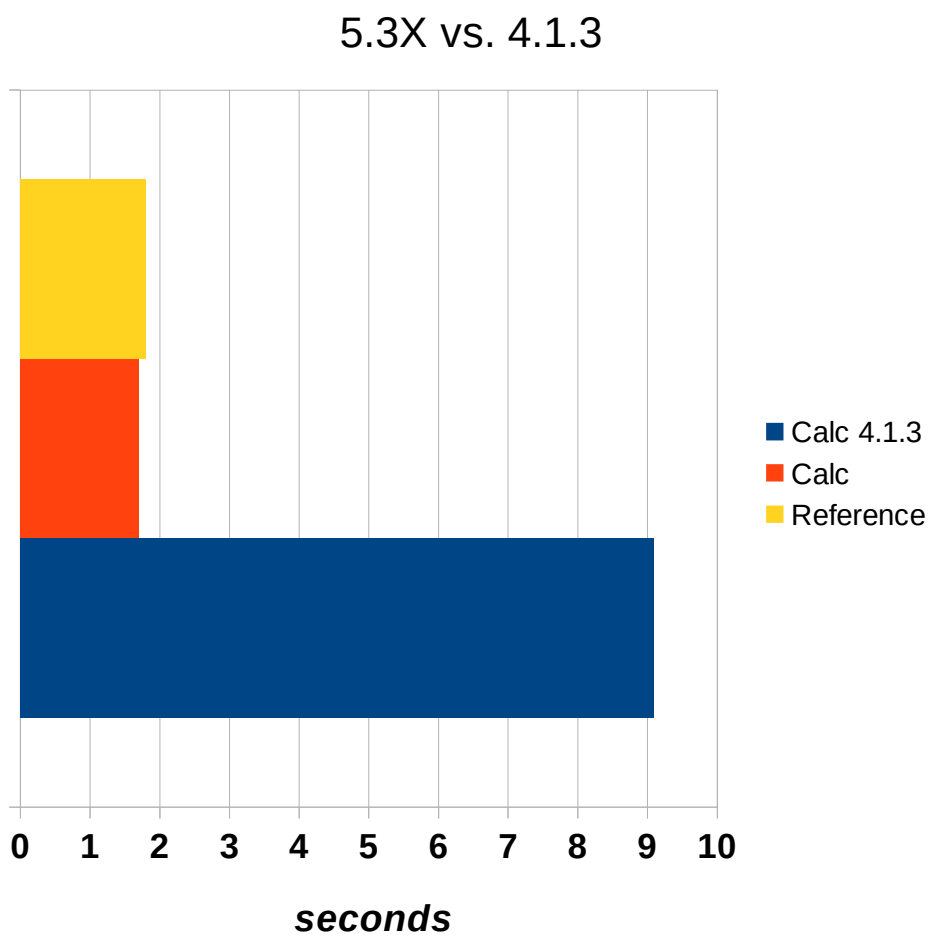
dates-worked.xlsx

- 1 sheet with half plain data and half formulas



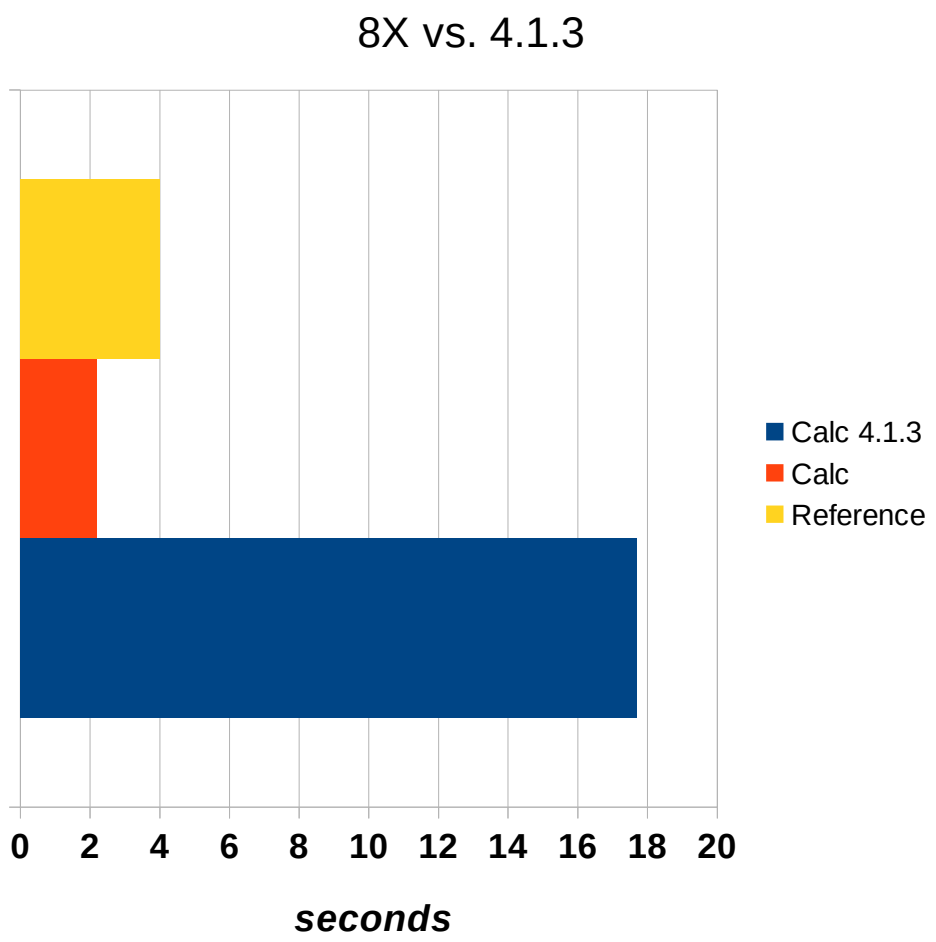
groundwater-daily.xlsm

- 4 sheets with both data and formulas



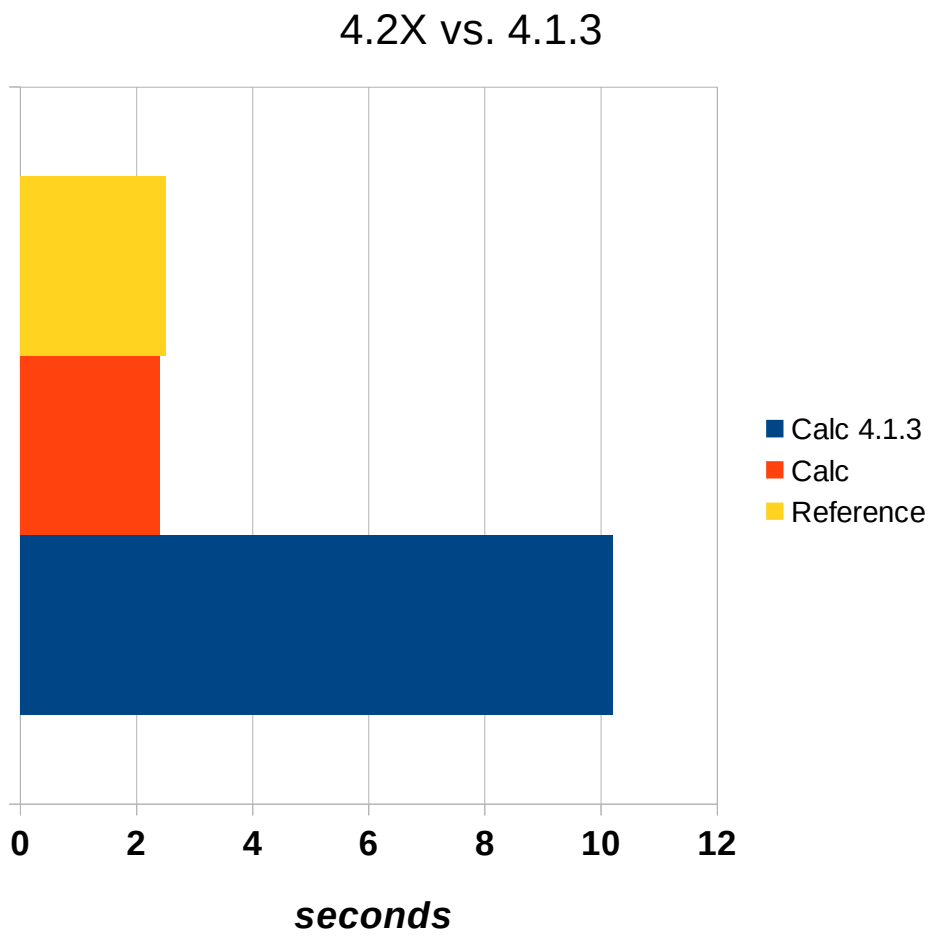
mandy.xlsm

- 4 sheets of formulas



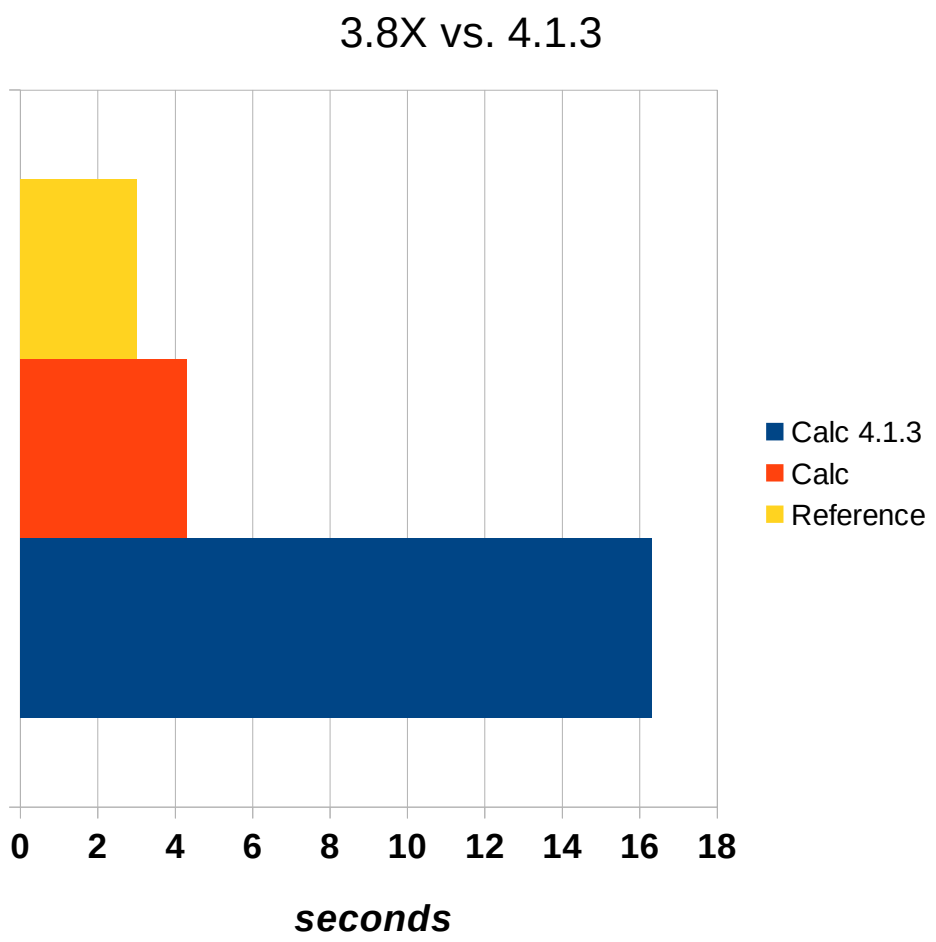
matrix-inverse.xlsx

- Mostly just 1 sheet with numbers



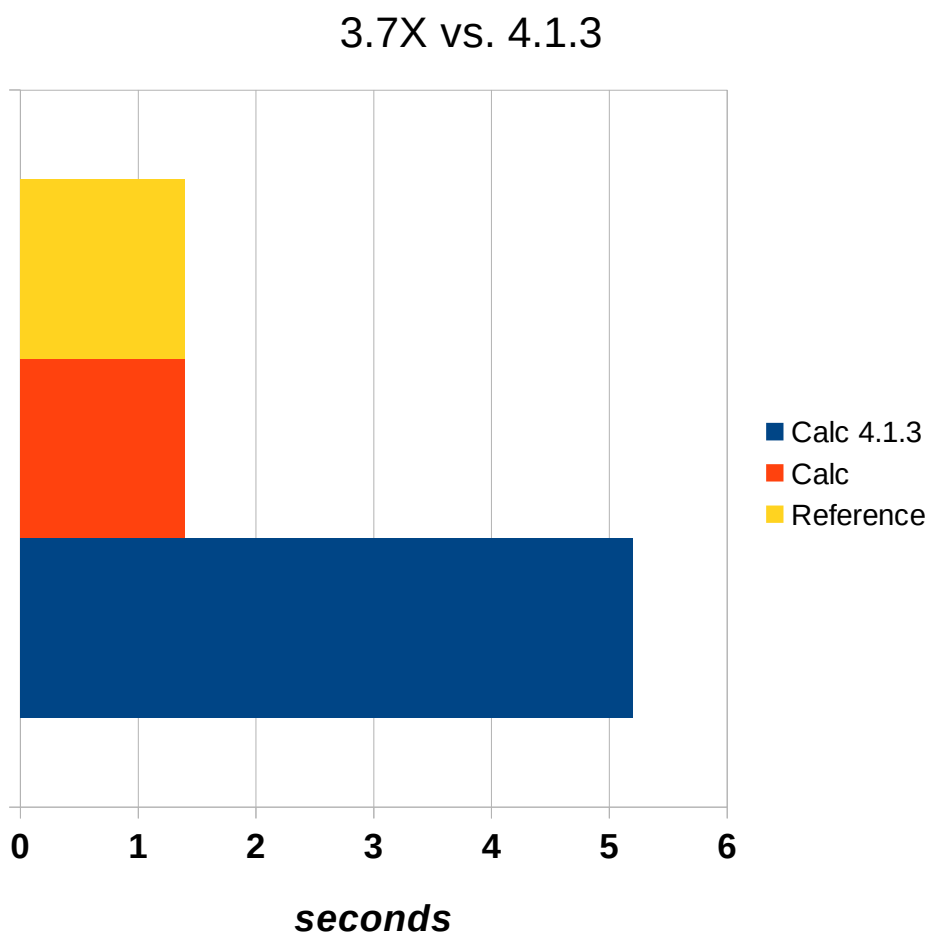
stock-history.xlsm

- Mostly 2 sheets with both data and formulas



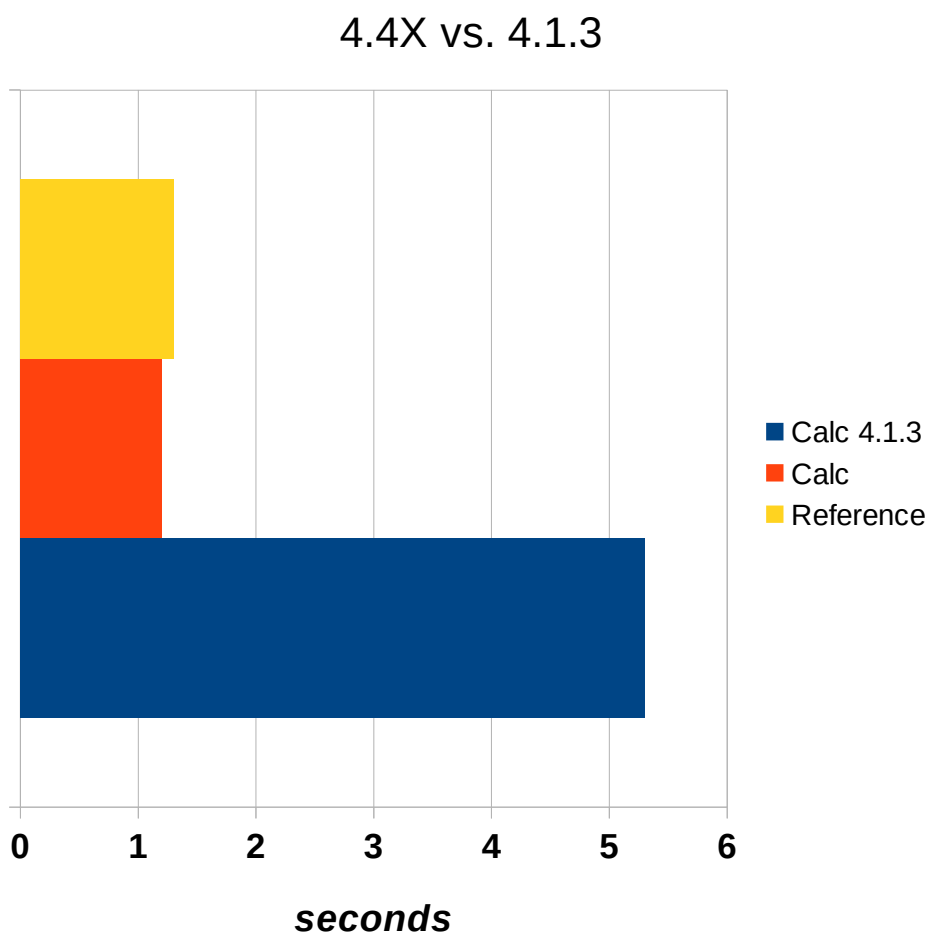
sumifs-testsheet.xlsx

- 1 sheet with a lot of numbers + 1 sheet with some formulas and diagrams



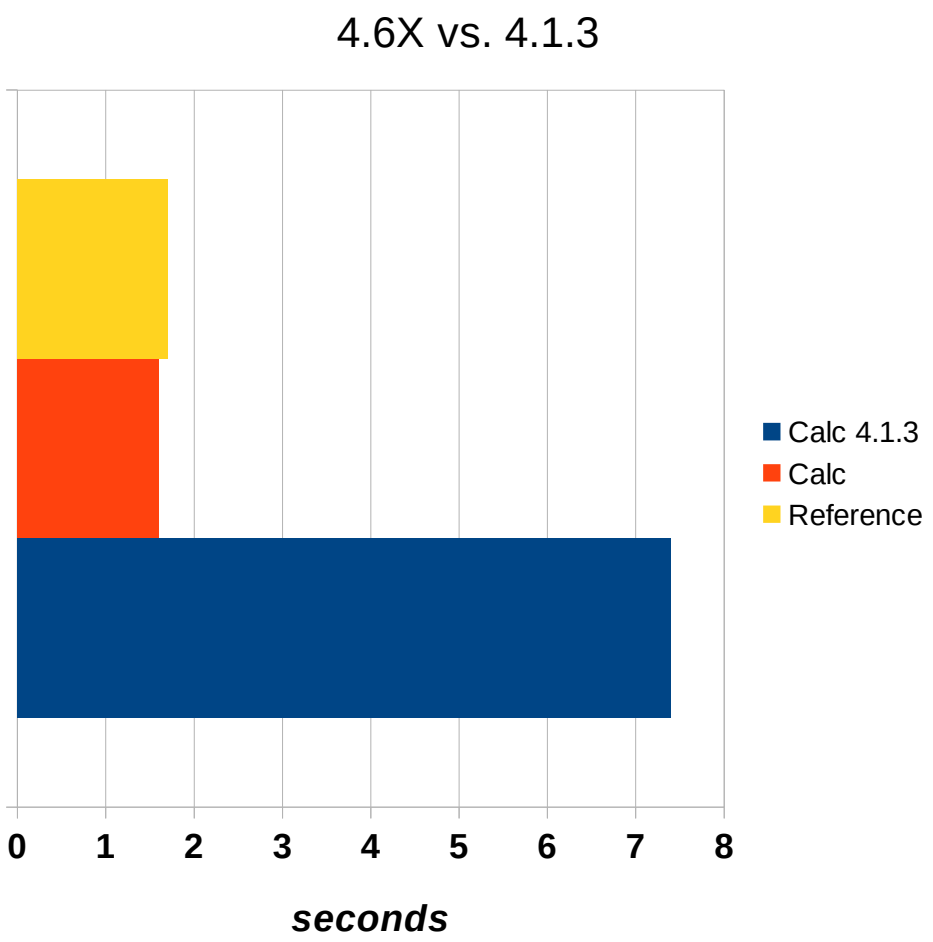
numbers-100k.xlsx

- 1 sheet with 100k numbers



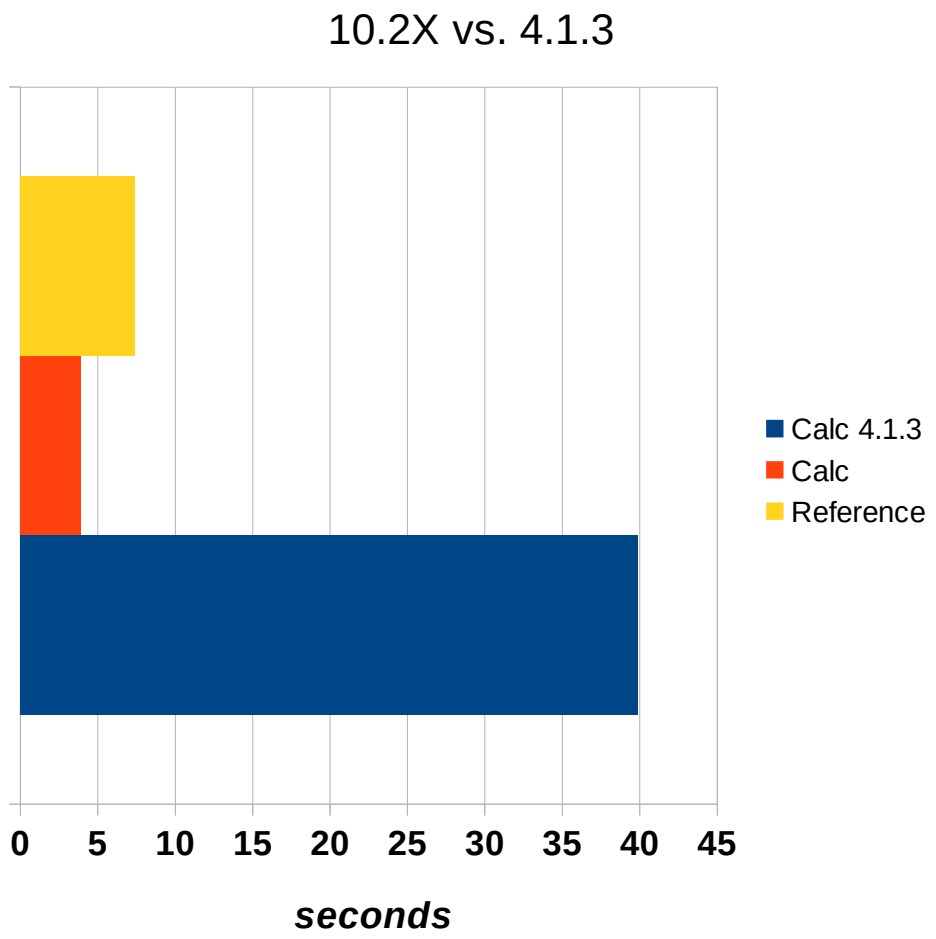
numbers-formula-100k.xlsx

- 1 sheet with 100k numbers and 100k formulas



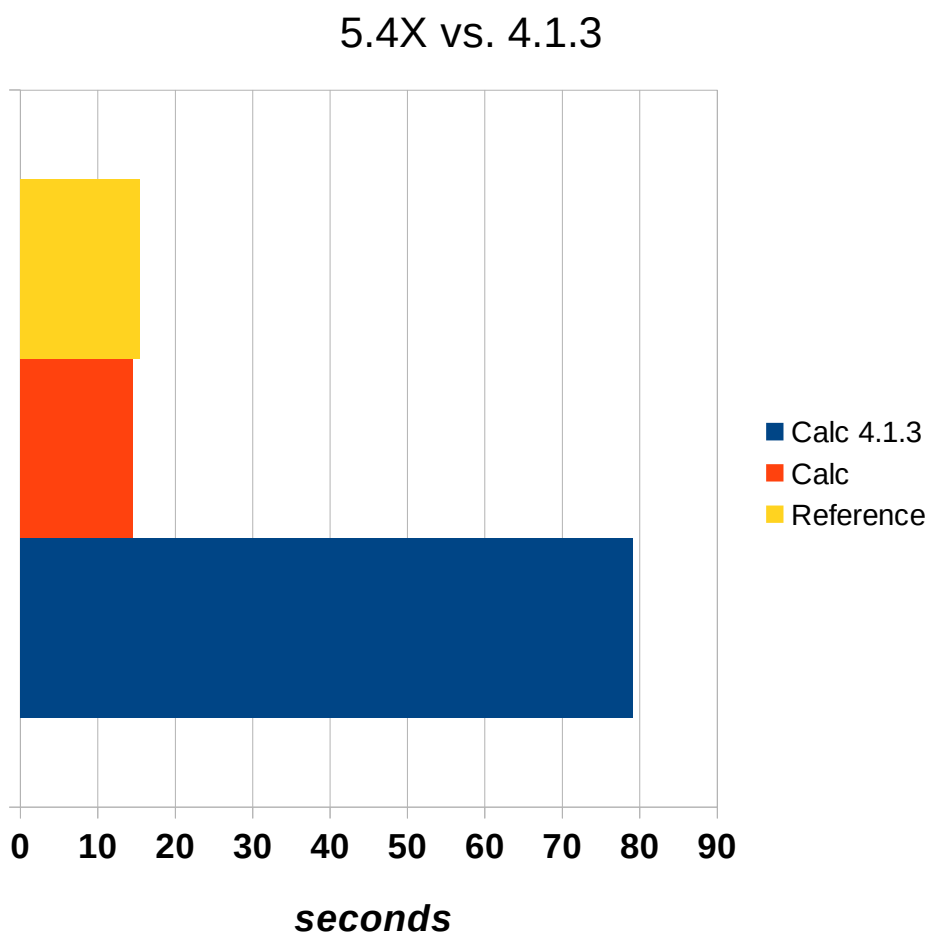
numbers-formula-8-sheets-100k.xlsx

- 8 sheets with 100k numbers and 100k formulas



num-formula-2-sheets-1m.xlsx

- 2 sheets with 1m numbers and 1m formulas each



Quick demo & questions on Calc / threaded loading bits ?

Threaded XML Parsing

- LibreOffice is innovating:
  - Threaded parsing is just one example
    - a new, elegant, efficient means to parse XML with SAX
- Plenty more to do
  - Next steps are porting more code to use XFastParser
  - AutoCorrection: huge dictionaries & slow parsing
  - ODF filters
  - XFastSerializer needs love etc.
- Thanks for all of your help and testing !
- Questions ?