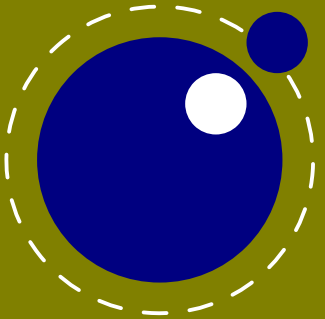
The follow up

LuaMetaTEX

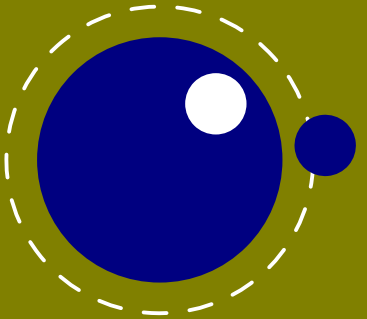
BachoTEX May 2019

Hans & Alan



- This talk is **not** about how we can use LuaTEX to control domotica applications. We already discussed that.
- This talk is **not** about how we can use ConTEXt in advanced rendering, for instance as part of web-based workflows. That's old news.
- This talk is **not** about how much fun it would be to have a Microsoft HoloLens and see what ConTEXt and LuaTEX could do with it. We just can't afford it.
- This talk is **not** about more complexity, but it is about keeping things simple. It's about turning a burden into a pleasure.
- To quote the Riverside[1] frontman: I hope you all leave here a bit younger than you felt when you came here. This talk is about turning lead into gold.

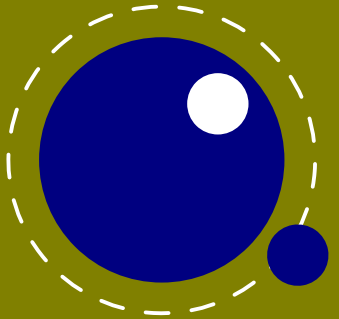
[1] A Polish progrock band I recently saw live in the Netherlands. A band related to Lunatic Soul.



LuaMetaTEX

From lead to gold

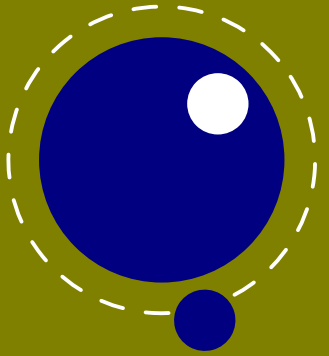
- We have the weight and experience of about 40 years of TEX and its usage on our shoulders.
- Good old TEX got extended: ε-TEX, Omega (Aleph), pdfTEX, XETEX, [e][u][p]TEX and LuaTEX (& LuajitTEX) showed up.
- The dvi output got complemented by pdf.
- Bitmap fonts were replaced by Type1 that itself got replaced by the container formats OpenType and TrueType. Variable fonts were introduced.
- Math got upgraded to OpenType math, thanks to Microsoft.
- Unicode got accepted and utf is nowadays the preferred input encoding.
- The community supported the development of many fonts that found their place in distributions.
- Alongside plain TEX the macro packages LATEX and ConTEXt both evolved into large collections of resources.



LuaMetaTEX

Where do we stand

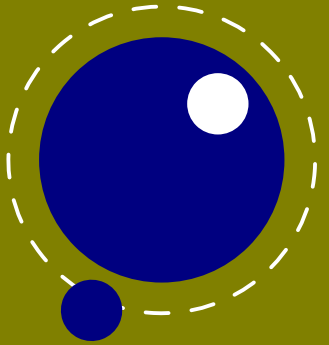
- There is no doubt that TEX is a success. We can find nice examples but also some horrible looking documents.
- A large distribution is no guarantee for quality and continuous success, nor is the number of incidental (forced) users.
- A ConTEXt user doesn't need that much: just the LuaTEX binary will do, plus a bunch of MkIV macros, completed by a reasonable set of fonts.
- Currently all that is embedded in a large ecosystem, although we always use only a small, reasonable subset.
- Getting the whole machinery up and running from scratch (source code) is not trivial.
- The source code base is rather large and compilation is complex: it builds on decades of being nice for all platforms and fulfilling all demands.
- What we consider gold could also be seen as lead in disguise. Some alchemy might be needed to go back to where we came from.



LuaMetaTEX

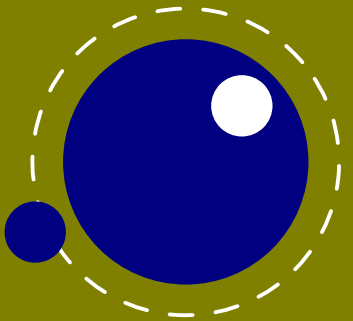
Are we good?

- At some point you need to stabilize and for LuaTEX, version 1.10 is that moment.
- But some ideas and experiments have been delayed because the engine was already in use, also outside of ConTEXt.
- Compatibility is a **big** issue in the TEX community (which is good) so we're in a sort of a deadlock (which is bad).
- And we wanted to take a next step in ConTEXt development. It's not strictly necessary to make drastic changes, but we need to adapt.
- The question is how we can guarantee users a long-term stability of the both macro package as well as the engine it runs on.



LuaMetaTEX

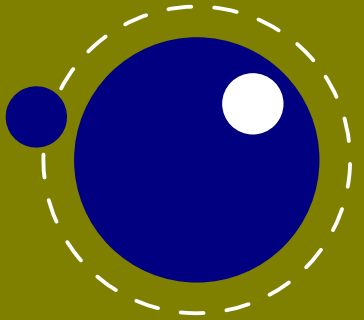
The Status Quo



LuaMetaTEX

What Is Needed

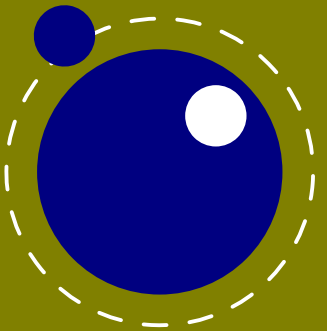
- For ConTEXt we want just one binary. We don't really need LuajitTEX for LuaJIT is not following Lua anyway.
- We don't want (for windows) a special stub binary. After all we already have the `context` job manager and `mtxrun` script manager. All platforms should be treated alike.
- Performance should be stable and not influenced by code added to the binary. In fact, performance should constantly improve!
- The engine should not depend on libraries that are floating, get updated frequently, and can come from places out of our control (versions).
- The memory footprint should be acceptable for running in containers (or small virtual machines). Energy consumption matters too.
- The binary should be kept small because it also serves as the Lua interpreter.



LuaMetaTEX

How It Went

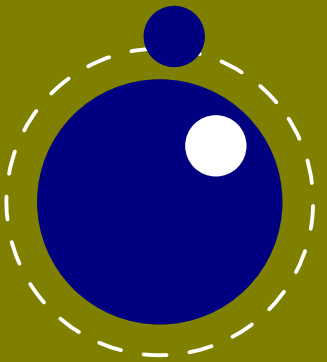
- Around the ConTEXt meeting I took LuaTEX 1.09.0 experimental as starting point and began stripping.
- Before that, I already had written some test code to see what could be replaced.
- Stepwise redundant components were removed. This took time because each (small) step was tested on real documents, the test suite, etc.
- `...` maybe some examples & `/install-lmtx/*` `...`
- I played with some ideas that were put on hold, some were accepted and some were rejected and more and more got in the mood.
- Also LuaJIT was dropped, but its removal was compensated by large performance boosts in other areas.
- The build was simplified (it took some time to find what was irrelevant) and compilation now is about half a minute, or less!



LuaMetaTEX

Where are we

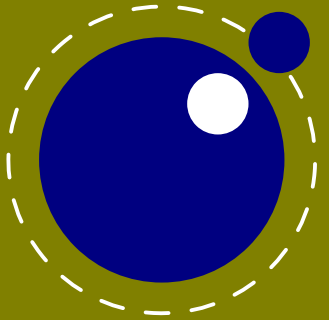
- We have an experimental new installer for ConTEXt lmtx (the new name). It uses http: and just the engine for fetching data. Updating goes fast.
- The lmtx distribution is MkIV only and much smaller than the full installation.
- Eventually (soon) the source code of the used engine will be in the distribution so that we have a self contained package. Users on new or unique systems can compile.
- The development of the engine is under control of the ConTEXt developers: that way there is no danger that things break. We like to have a playground.
- Extensions can make it into LuaTEX once found useful and stable as long as they don't break LuaTEX upward compatibility (unlikely on the short term).



LuaMetaTEX

Some highlights

- There is no backend code. We generate the pdf output in Lua (this was already the case for much of it.)
- There is no bitmap image inclusion code present. All is done in Lua.
- There is no font loading code present. This already happened mostly in Lua anyway.
- Some libraries have been removed and some have been simplified. A few experimental helper libraries were added (like math). The dependencies are minimal.
- The code is undergoing some restructuring but it might take some years before I've reached the (informal) goals.
- Alan and I are exploring new possibilities that this setup gives (especially in combining TEX, MetaPost and Lua. Stay tuned.



LuaMetaTEX

The agenda

- As of April 1, 2019, users can test the experimental distribution. A few were already in the loop.
- It looks like there are no big issues, and speed gains can be impressive.
- As a consequence we can start dropping in replacement code in regular MkIV some day soon too.
- Around the next ConTEXt meeting the source code will become part of the regular distribution (given that I'm satisfied with it).
- Before that we hope to have the compile farm up and running for LuaMetaTEX.
- From that moment on, the ConTEXt users will have a self contained, archival, independent, lean and mean installation available, which will become the default.
- Because LuaMetaTEX is a subset of LuaTEX, there are no plans right now for supporting plain TEX. We'll see. (I might come up with generic backend code some day.)