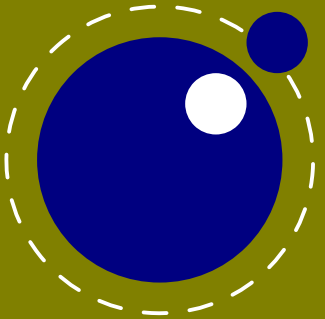
The follow up

LuaMetaTEX

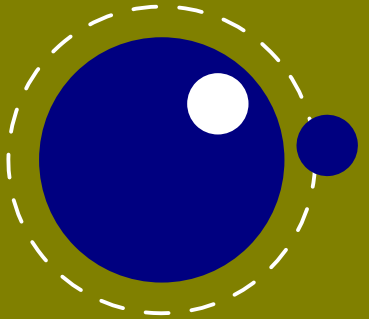
BachoTEX May 2019

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.

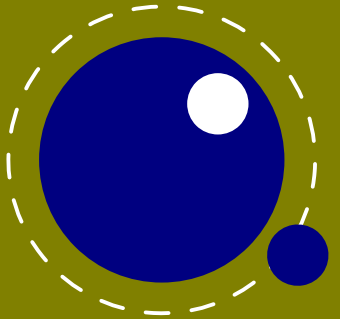
[1] A Polish progrock band I recently saw live in the Netherlands. A band related to Lunatic Soul.



LuaMetaTEX

From lead to gold

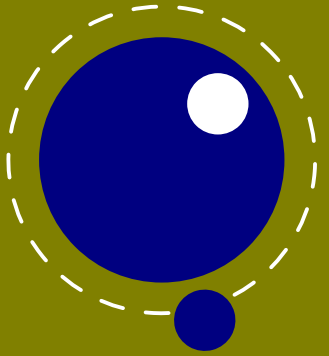
- We have the weight and experience of about 40 years of TEX and its usage on our shoulders.
- Good old TEX got extended: ε-TEX, Omega (Aleph), pdfTEX, XETEX, [e][u][p]TEX and LuaTEX (& LuajitTEX) showed up.
- The dvi output got complemented by pdf.
- Bitmap fonts were replaced by Type1 that itself got 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

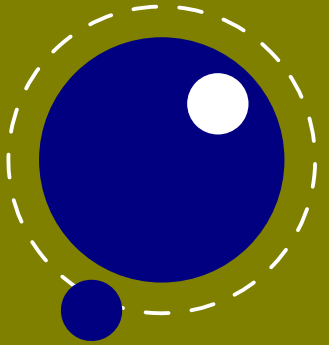
- There is no doubt that TEX is a success. We can find nice examples but also some horrible looking documents.
- A large distribution is no guarantee for quality and continuous success, nor is the number of incidental (forced) users.
- A ConTEXt user doesn't need that much: just the LuaTEX binary will 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.

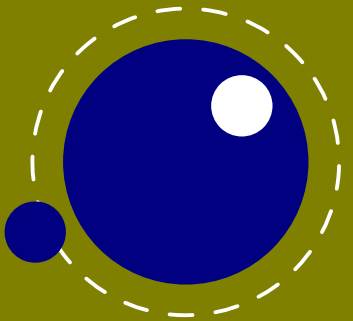


LuaMetaTEX

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.

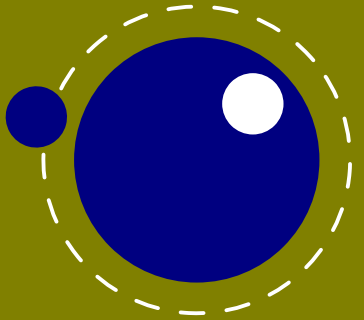




LuaMetaTEX

What Is Needed

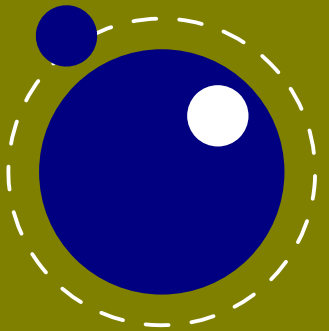
- For ConTEXt we want just one binary. We don't really need LuajitTEX for LuaJIT is not following Lua anyway.
- We don't want (for windows) a special stub binary. After all we already have the `context` job manager and `mtxrun` script manager. All platforms should be treated alike.
- Performance should 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

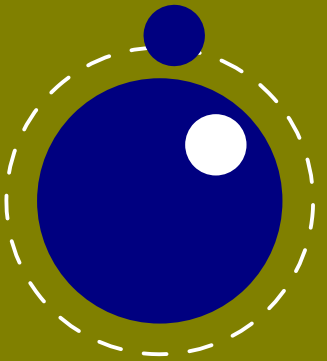
- Around the ConTEXt meeting I took LuaTEX 1.09.0 experimental as starting point and began stripping.
- Before that, I already had written some test code to see what could be replaced.
- Stepwise redundant components were removed. This took time because each (small) step was tested on real documents, 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!



- 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

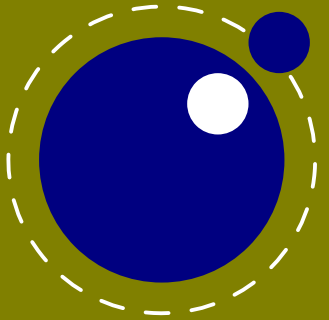
Where are we



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.)