



# LibreOffice

The Document Foundation

## On-Line and In your Pocket

*A glimpse into some futures ...*

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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*



# The message in a nutshell ...

- The challenge
  - Things you already know
- Some ways to get there ...
- Two Prototypes
  - Web Office
  - Android Office
- LibreOffice 3.5
  - how we're executing ...
- Conclusions

Lets think about the Future !

# A glimpse into the future:

“In the future, Cloud computing **will be**  
the **only** choice”

“Successful businesses may soon have  
no chief executive, no headquarters,  
and no IT infrastructure”

*The Telegraph [interviewing](#) Nick Martindale*

# Another glimpse into the future:

**“App Stores: the future of desktop apps ?”**

**“Over 300,000 iPhone and iPad apps and 10 billion downloads later, Apple has taken the concept to the desktop”**

*APC Mag*

# Mix and match client apps ...

- ▀ Web / SaaS / cloud-on-line everythings
  - ▀ solve the deployment problems nicely
  - ▀ often add **cool** collaborative features wiki-style
  - ▀ Major **regressions**; **WYSIWYG**, **off-line access** eg.
- ▀ App Stores
  - ▀ **wildly** popular: Apple, Intel, Amazon, Microsoft etc. ...
  - ▀ Apple: 5 million downloads per day (~2bn per year?)
  - ▀ We should do that on Linux ! - oh ...
- ▀ So just '**mash**' the two together !
  - ▀ Web App – App-Stores ...
  - ▀ I'm just 'installing' my Web-App etc. etc.

**Searching for the magic bullet !**  
(how we keep finding fakes)

# Have we found the magic bullet ?

*“you can easily realize a **ten-fold** productivity improvement just by using language:  
[insert: Lisp, Smalltalk, Java, C#, ...]”*

*“it will all be **so** simple that feral children  
and trained monkeys will write software for free !”*

*I also have some prime waterfront real-estate  
at an unbelievable price for you !*

# We have something similar ...

## CODE RE-USE ...

(you know, the thing no-one wants to do)

- ▀ The best line of code, is the one we didn't have to write.
- ▀ Free Software makes this **easy**
  - ▀ cf. Proprietary 'Components', version mgmt. etc. etc.
  - ▀ we actually get quite a lot of this right

**But** re-writing is such fun !  
Collaboration & re-use is boring !

# A quick history of (failed) Office re-writes ...

- ▀ MicroPro's WordStar vs. WordStar 2000
  - ▀ MicroPro – once biggest S/W company in the US !
  - ▀ WordStar - #1 Office suite in 1980's
  - ▀ killed the company by re-writing / duplicating their product
- ▀ Corel Office (in Java)
  - ▀ beautiful Java technology demonstration in 1997
  - ▀ never shipped final version, squandered cash & position
- ▀ Microsoft: Pyramid ... - wikipedia

*Word 6.0 was the second attempt to develop a common code base version of Word. The first, code-named **Pyramid**, had been an **attempt to completely rewrite** the existing product. It was **abandoned** when it was determined that it would take the development team **too long to rewrite** and then **catch up** with all the new capabilities that could have been added in the same time without a rewrite.*

**Not a terribly new idea:**

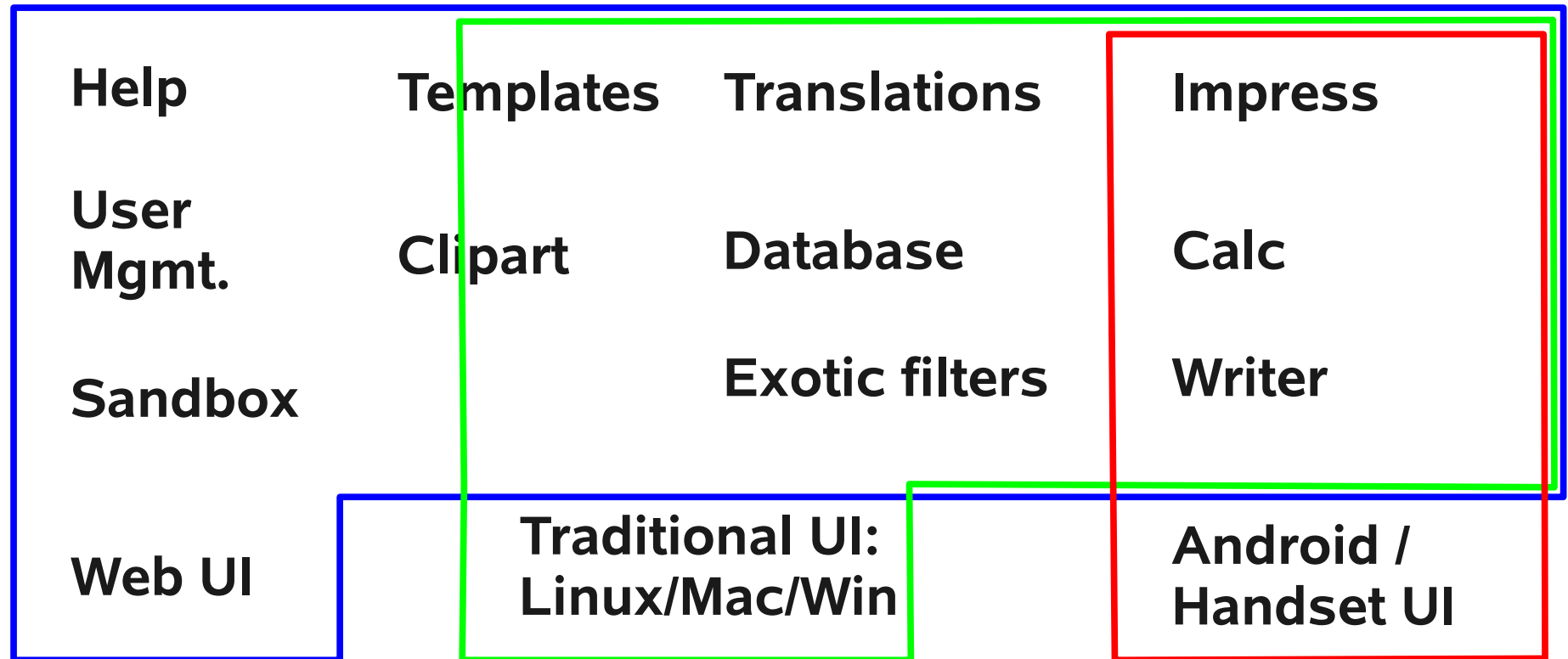
*“Every kingdom divided against itself  
will be **ruined**, and every city or  
household divided against itself **will  
not stand**” -Matthew 12 ~30AD*

# A different approach ...

- ▀ Re-write in Javascript message
  - ▀ Corel heard ~this before
  - ▀ ~10 million lines of type-unsafe JavaScript not a win.
    - ▀ perhaps you disagree, if so please go for it ... elsewhere.
- ▀ Telephone companies don't believe in themselves:
  - ▀ Where is your address book ?
  - ▀ How about your photos ?
  - ▀ WHAT ? You have a big whack of flash & a monster CPU in your (increasingly fat) phone ? Why ?
    - ▀ Your phone GPU has that many transistors !
  - ▀ Why is it not all 'in the cloud' ? - with your

# A design that re-uses code ...

- ▶ Cut one feature to share the rest: the off-line web app



- ▶ 95% of code shared, most featureful is the web app !

# What a crazy plan !?

- It is possible eg. Linux Kernel ...
  - Substantially the same code on your:
    - Phone
    - Super-Computers
    - Cluster of doom ...
- The joys of sharing a common code-base ...
  - Rendering bug fix → fixes everyone
  - Interoperability / import fix → every platform benefits
  - Performance wins for small devices:
    - Notice that 15%+ of CPU on startup is config parsing
    - And 20% of that config is 'Label descriptions' fix it!

# The joys of sharing a code-base

- ▀ Build / Debug 95%+ on the fastest hardware...
- ▀ Interoperability / import fix → every platform benefits
- ▀ UI improvements:
  - ▀ Touch usable / pretty style selection eg.
  - ▀ Mouse-wheel to zoom vs. pinch
- ▀ Device blurring:
  - ▀ Intel / Ultrabooks → now with touch screens ...
    - ▀ Sexy ultra-thin-ness etc.
  - ▀ Android tablets with detachable keyboards.
    - ▀ looking very much like netbooks ...

# More joys: Performance ...

- ▀ Android – can only cope with 96 shared libraries ...
  - ▀ This 'impress' - ~100 libO specific shared libraries.
  - ▀ Android has ~45 system libs we need to link.
  - ▀ Matus Kukan's – GSOC project ...
  - ▀ Faster linking for all, better, smaller code via LTO ...
- ▀ Performance wins for small CPU / devices:
  - ▀ Notice that 15%+ of CPU on startup is config parsing
  - ▀ And 20% of that config is 'Label descriptions' fix it!
- ▀ Full Page rendering for accelerated panning / Web Office

**LibreOffice on-line ...**  
(getting pixels to users)

# Cloud Office / HTML5 prototype ...

- ▀ Rendering using the **HTML5 Canvas** ...
- ▀ Communication using Web-Sockets (**now with v7**)
  - ▀ very simple plain-text event / control protocol
  - ▀ **compressed png** for screen updates ...
- ▀ Bandwidth usage **low** for simple tasks:
  - ▀ We can see what is re-rendered as we type:
  - ▀ But really as we type a character: only **this** is sent:
  - ▀ And that tiny rectangle is png compressed ...
  - ▀ CopyArea on the client for scrolling.

Hello World this is me typi



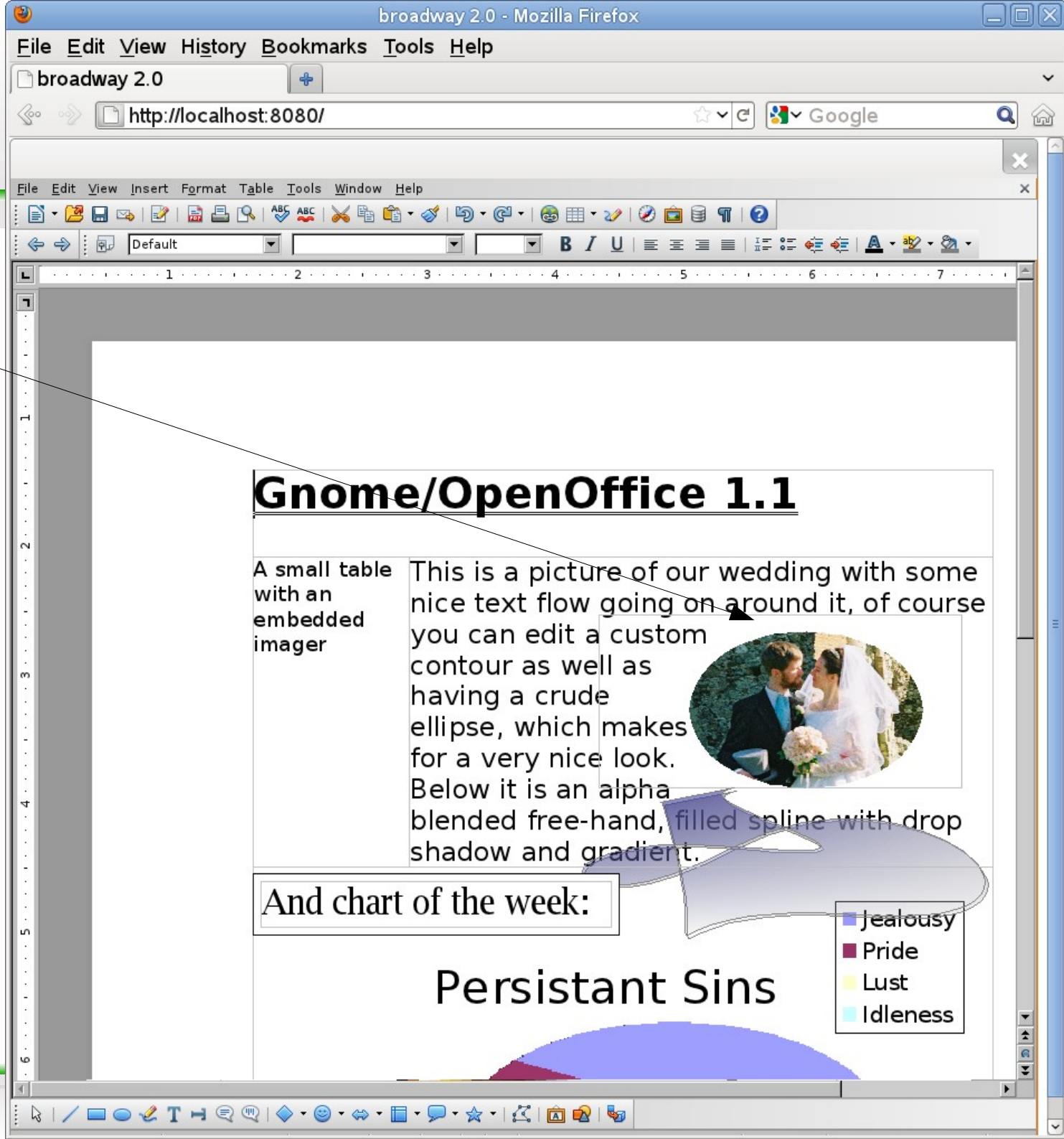
# Cloud Office ... technologies ...



- ▀ Uses gtk+ 3's / broadway backend to render (via some javascript shims) in the browser:
  - ▀ All intelligence and rendering on the 'server' app.
  - ▀ **broadway.js - < 3k LOC ...**
- ▀ **Still a prototype**
  - ▀ rendering performance improving, but lumpy in places.
- ▀ This approach allows a full-feature experience
  - ▀ ie. complex text-layout, large, complex spreadsheets, WYSIWYG (eg. edit your footnotes on the page), VBA macros, Pivot Tables etc.
- ▀ Also a number of challenges:
  - ▀ Good APIs for printing etc.

## Example:

Custom contoured  
picture, with text fill



## Example:

VBA macro driven  
spreadsheet button  
workflow that proves  
Novell costs you  
less :-)

broadway 2.0 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

broadway 2.0

http://localhost:8080/

Google

Insert Format Tools Data Window Help

Updated: March 5, 2004

Novell.

return on investment (ROI)  
calculator for Novell® Nsure™  
secure identity management solutions

Gartner Consulting was commissioned by Novell to conduct an unbiased, third-party assessment of the ROI of Novell Nsure secure identity management solutions. The objective of the study was to assess organizations who have demonstrated thought leadership, a positive impact on the business, and potential quantifiable financial savings as the result of a secure identity management deployment. This case study applied the Total Value of Opportunity (TVO) ROI methodology, designed by Gartner, to develop the results. The methodology-based results and their use by Novell should not be deemed an endorsement of any Novell product or service, data, or sales technique. Gartner disclaims all warranties, expressed or implied, of the fitness of results for a particular purpose. Methodology results should not be deemed as an industry average and may vary from published Gartner research.

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Updated: Marc

Hel

LibreOffice

# It can't possibly perform!

- ▶ LibreOffice in-use in multi-user remote/X environments
- ▶ Load avg 0.05/0.3/0.34 for 73 live users in writer, and 10 in calc.
- ▶ 4 CPU Quad-Core estimated 200-300 concurrent users.
- ▶ If rented servers in the cloud are truly cheaper it should be cheap.

```
xterm (on linux-i3od)
top - 12:11:29 up 5:35, 2 users, load average: 0.05, 0.30, 0.34
Tasks: 693 total, 1 running, 687 sleeping, 0 stopped, 5 zombie
Cpu0  : 30.5%us, 4.4%sy, 0.0%ni, 63.8%id, 0.0%wa, 0.3%hi, 1.0%si, 0.0%st
Cpu1  : 1.3%us, 0.3%sy, 0.0%ni, 98.4%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu2  : 5.9%us, 1.3%sy, 0.0%ni, 92.8%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu3  : 2.3%us, 1.0%sy, 0.0%ni, 96.7%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu4  : 13.3%us, 2.3%sy, 0.0%ni, 84.1%id, 0.0%wa, 0.0%hi, 0.3%si, 0.0%st
Cpu5  : 0.7%us, 0.3%sy, 0.0%ni, 99.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu6  : 4.0%us, 1.0%sy, 0.0%ni, 95.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu7  : 0.3%us, 0.0%sy, 0.0%ni, 99.7%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu8  : 5.6%us, 1.0%sy, 0.0%ni, 93.5%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu9  : 0.3%us, 2.0%sy, 0.0%ni, 97.7%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu10 : 5.3%us, 2.6%sy, 0.0%ni, 92.1%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu11 : 1.0%us, 0.3%sy, 0.0%ni, 98.7%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu12 : 1.3%us, 0.3%sy, 0.0%ni, 98.3%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu13 : 0.3%us, 0.3%sy, 0.0%ni, 99.3%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu14 : 0.3%us, 0.0%sy, 0.0%ni, 99.7%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Cpu15 : 0.3%us, 1.6%sy, 0.0%ni, 98.0%id, 0.0%wa, 0.0%hi, 0.0%si, 0.0%st
Mem:  48394M total, 34196M used, 14198M free, 263M buffers
Swap: 20489M total, 0M used, 20489M free, 1845M cached

  PID USER      PR  NI  VIRT  RES  SHR  S  %CPU  %MEM     TIME+  COMMAND
 27496      20    0 631m 104m 68m  S   43   0.2   0:01.31 soffice.bin
26196      20    0 12.8g 1.6g 91m  S    5   3.4   2:28.24 soffice.bin
 2313      20    0 12.7g 238m 89m  S    4   0.5   0:13.94 soffice.bin
27547      20    0 160m 19m 10m  S    3   0.0   0:00.10 oodrunning.py
 412       20    0 12.8g 1.6g 85m  S    3   3.4   2:48.94 soffice.bin
27489      20    0 157m 19m 10m  S    3   0.0   0:00.09 oodlaunching.py
32029      20    0 12.8g 363m 92m  S    3   0.8   0:44.87 soffice.bin
13937      20    0 1069m 484m 91m  S    2   1.0   0:41.75 soffice.bin
27175      20    0 655m 122m 76m  S    2   0.3   0:03.40 soffice.bin
23915      20    0 13.0g 419m 96m  S    2   0.9   0:18.95 soffice.bin
15997      20    0 12.8g 451m 92m  S    1   0.9   1:47.29 soffice.bin
17200      20    0 12.7g 254m 87m  S    1   0.5   0:50.27 soffice.bin
18159      20    0 13.1g 561m 93m  S    1   1.2   9:23.87 soffice.bin
21149      20    0 12.9g 1.7g 108m S    1   3.6   2:55.13 soffice.bin
26885      20    0 653m 117m 73m  S    1   0.2   0:03.79 soffice.bin
32663      20    0 12.9g 353m 96m  S    1   0.7   1:19.61 soffice.bin
27434      20    0 8940 1672 852  R    1   0.0   0:00.39 top
 819       39   19    0    0    0  S    0   0.0   0:04.30 kpmio
 1677      20    0 12.8g 257m 90m  S    0   0.5   0:37.73 soffice.bin
2805      20    0 69968 4820 2772 S    0   0.0   0:14.48 cupsd
2813      20    0 12.8g 320m 82m  S    0   0.7   0:14.27 soffice.bin
2826      20    0 3840 516 372  S    0   0.0   0:08.05 nsod
 4783      20    0 12.8g 372m 81m  S    0   0.8   0:18.36 soffice.bin
5916      20    0 12.8g 327m 86m  S    0   0.7   0:23.40 soffice.bin
11116      20    0 12.7g 200m 87m  S    0   0.4   0:17.43 soffice.bin
12105      20    0 12.9g 331m 92m  S    0   0.7   0:14.43 soffice.bin
12279      20    0 662m 120m 69m  S    0   0.2   0:07.60 soffice.bin
12412      20    0 1098m 551m 86m  S    0   1.1   0:38.52 soffice.bin
19568      20    0 13.0g 1.7g 96m  S    0   3.6   2:06.37 soffice.bin
20246      20    0 12.8g 528m 82m  S    0   1.1   0:22.29 soffice.bin
21063      20    0 833m 292m 79m  S    0   0.6   0:32.10 soffice.bin
26972      20    0 13.2g 607m 99m  S    0   1.3   1:37.90 soffice.bin
27879      20    0 12.8g 382m 98m  S    0   0.8   1:32.71 soffice.bin
29839      20    0 690m 151m 80m  S    0   0.3   0:50.05 soffice.bin
32005      20    0 12.8g 420m 96m  S    0   0.9   1:05.29 soffice.bin
 1 root      20    0 8072 748 628  S    0   0.0   0:02.45 init
 2 root      15   -5    0    0    0  S    0   0.0   0:00.00 kthreadd
 3 root      RT   -5    0    0    0  S    0   0.0   0:00.01 migration/0
 4 root      15   -5    0    0    0  S    0   0.0   0:07.35 ksoftirqd/0
 5 root      RT   -5    0    0    0  S    0   0.0   0:00.00 watchdog/0
 6 root      RT   -5    0    0    0  S    0   0.0   0:00.02 migration/1
 7 root      15   -5    0    0    0  S    0   0.0   0:07.57 ksoftirqd/1
 8 root      RT   -5    0    0    0  S    0   0.0   0:00.00 watchdog/1
 9 root      RT   -5    0    0    0  S    0   0.0   0:00.05 migration/2
10 root      15   -5    0    0    0  S    0   0.0   0:02.41 ksoftirqd/2
11 root      RT   -5    0    0    0  S    0   0.0   0:00.00 watchdog/2
12 root      RT   -5    0    0    0  S    0   0.0   0:00.10 migration/3
13 root      15   -5    0    0    0  S    0   0.0   0:01.81 ksoftirqd/3
14 root      RT   -5    0    0    0  S    0   0.0   0:00.00 watchdog/3
15 root      RT   -5    0    0    0  S    0   0.0   0:00.10 migration/4
16 root      15   -5    0    0    0  S    0   0.0   0:03.08 ksoftirqd/4
17 root      RT   -5    0    0    0  S    0   0.0   0:00.00 watchdog/4
```

# Show me the code !

- ▀ Shipping out of the box in LibreOffice 3.5
  - ▀ Work continues on master; -plenty- to fix.
- ▀ To use a modern browser ie. v7 websockets
  - ▀ you need master gtk3+
  - ▀ or an update to openSUSE 12.1
- ▀ Otherwise – that's it:
  - ▀ `git clone git://anongit.freedesktop.org/libreoffice/core`
- ▀ Hacking help **very much** appreciated
  - ▀ Plenty of VCL/gtk3/rendering bugs
    - ▀ no browser required.
  - ▀ Funky – tunnelling Browser Javascript ↔ server UNO
  - ▀ Improved performance & page render / pushing

**Android ...**  
(something in your pocket)

# A pre-prototype ...

- ▀ I'm a fraud ! The real work & glory should be addressed to:  
**Tor Lillqvist's** hours of toil
- ▀ Cross compiling work originally for using MINGW → windows
  - ▀ Also useful for cross-compiling to Android, iOS etc. from Linux/Mac
- ▀ A staggering learning curve to climb
  - ▀ But we're getting there slowly ...
- ▀ Latest code in `feature/android` branch ...
- ▀ Dozens of calc unit tests running flawlessly, and ...





The man himself ...


File Edit View Tools Window Help


 LibreOffice 3


 Text Document

 Spreadsheet

 Presentation

 Open... ▼

 Drawing

 Database

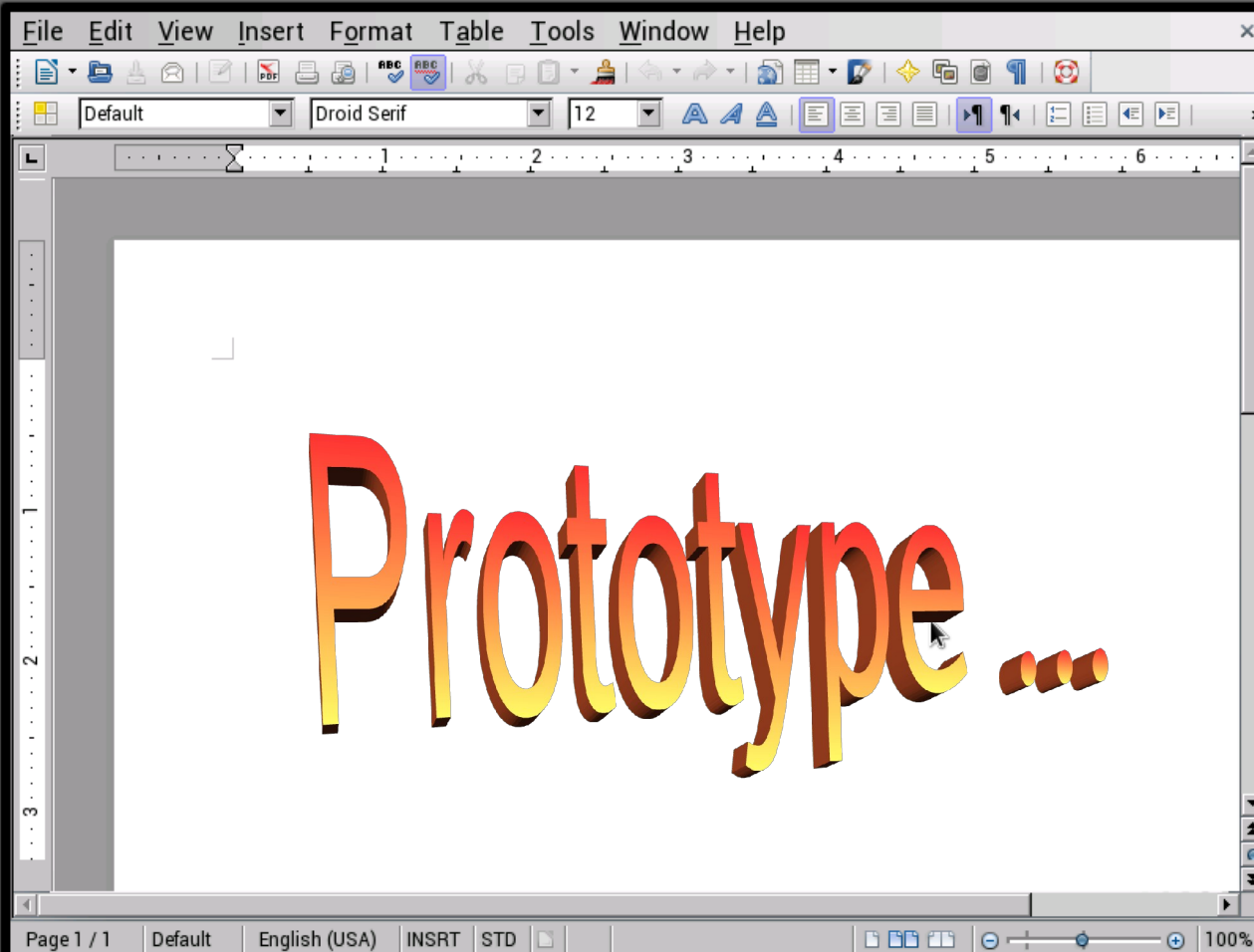
 Formula

 Templates...



Prototype...

- ▶ So far – font rendering is a challenge
- ▶ Red to Orange debug funkiness comes by default !
- ▶ Fonts – confused ...
- ▶ But – more encouragingly  
Tor has scads of unit tests running ...



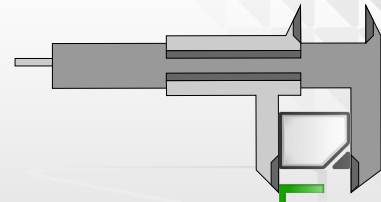
- ▶ This is a pre-prototype hack, with no ship date and is clearly highly sub-optimal
- ▶ Obviously the menu/toolbar/UI framework will need replacing for a new simple native experience.
- ▶ Hackers most welcome ...

# A pre-prototype ...

- ▀ Clearly this is not near the end point !
- ▀ A native UI / wrapper is required
- ▀ Potential plan:
  - ▀ Target a high-fidelity viewer first
  - ▀ Adding limited in-document editing
  - ▀ Improved shared UI controls for styles ?
  - ▀ your vision / hackery here ... ?
- ▀ There are more mobile / tablet platforms than Android: iOS, Tizen, WP7? etc. ...

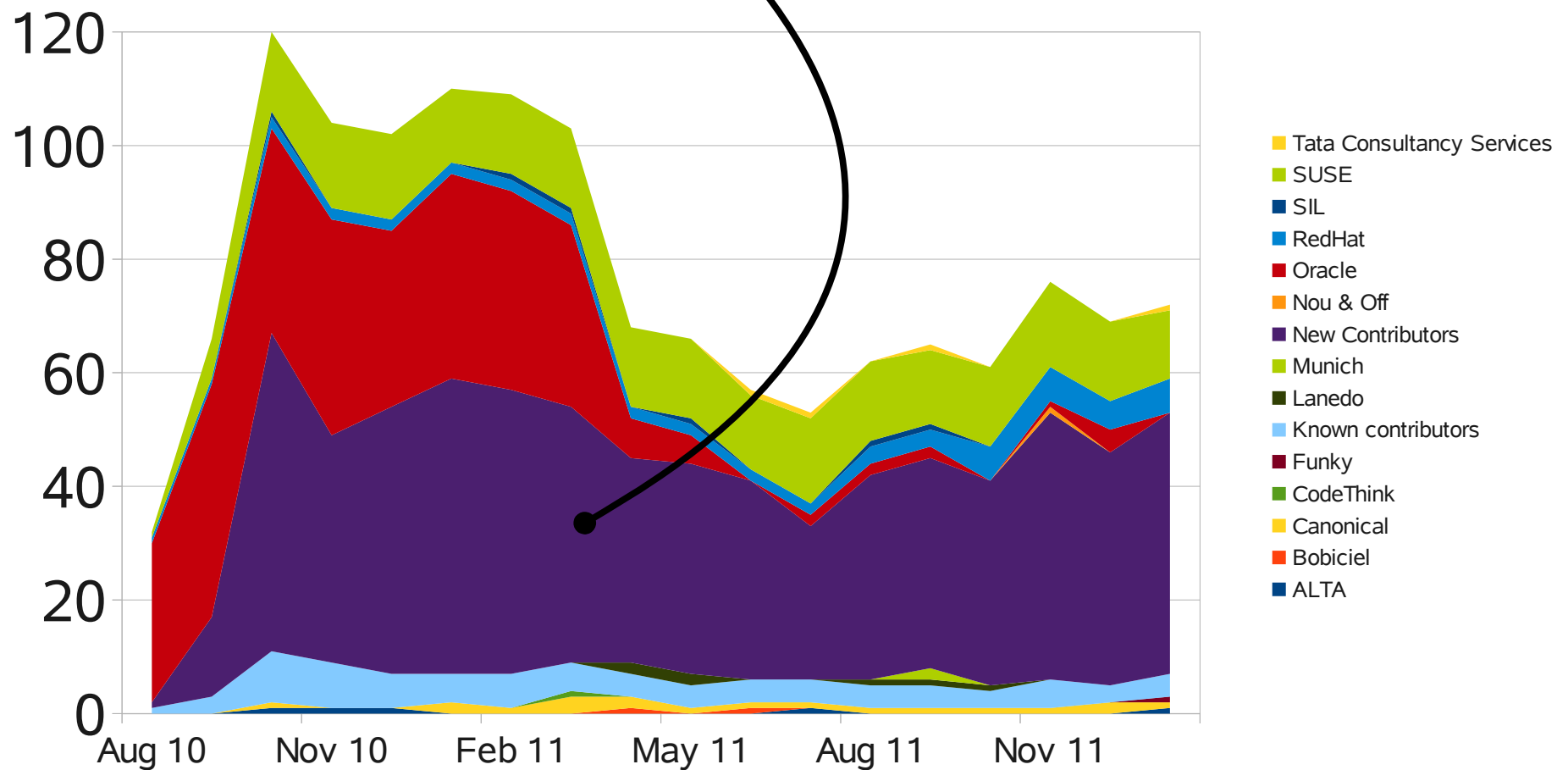
**LibreOffice 3.5.0 – out next week !**  
(powered by your volunteer effort)  
(a very incomplete sample)

# Including new contributors ...

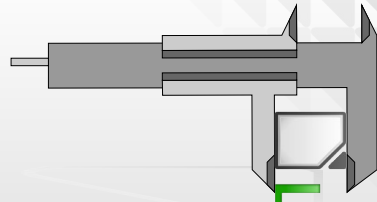


LibreOffice®

- Steadily diversifying and growing the team ...  
New guys since we launched

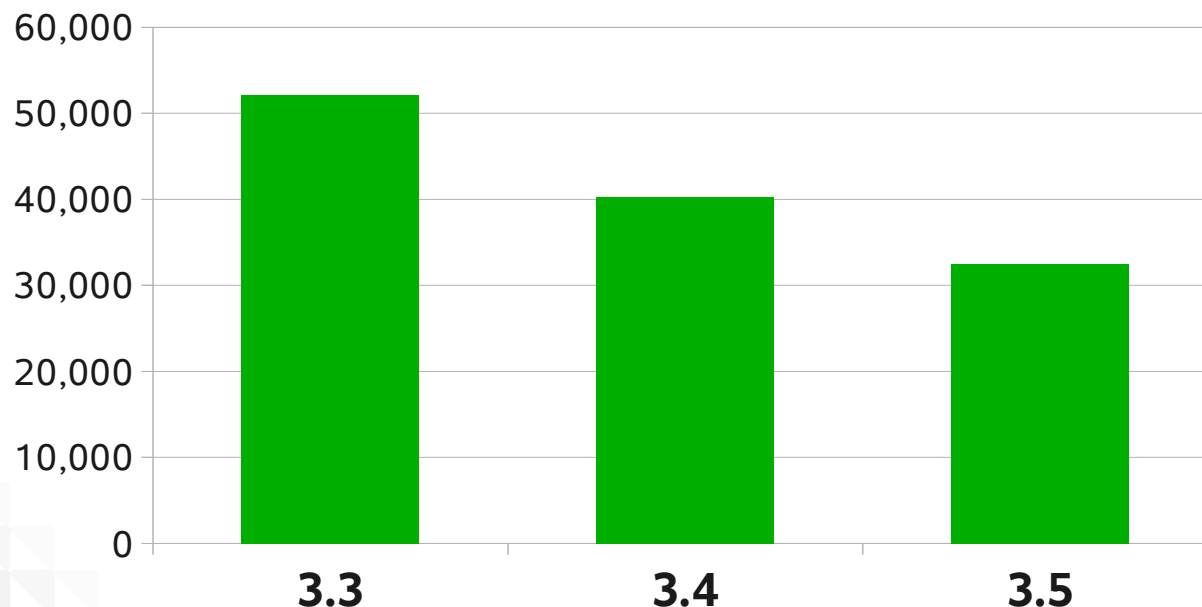


# Translating German Comments



- ▶ Making things **significantly** easier for non-Germans ...
- ▶ We removed or translated **~20k lines** of these so far
- ▶ We still have **32k to go**: done mostly by new guys ...
- ▶ **If you speak German – please help**

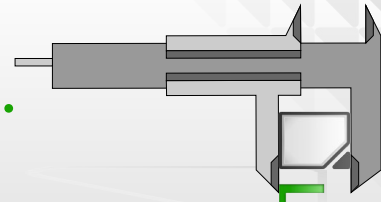
Detected lines of German comment



*With thanks to (recent translators):*

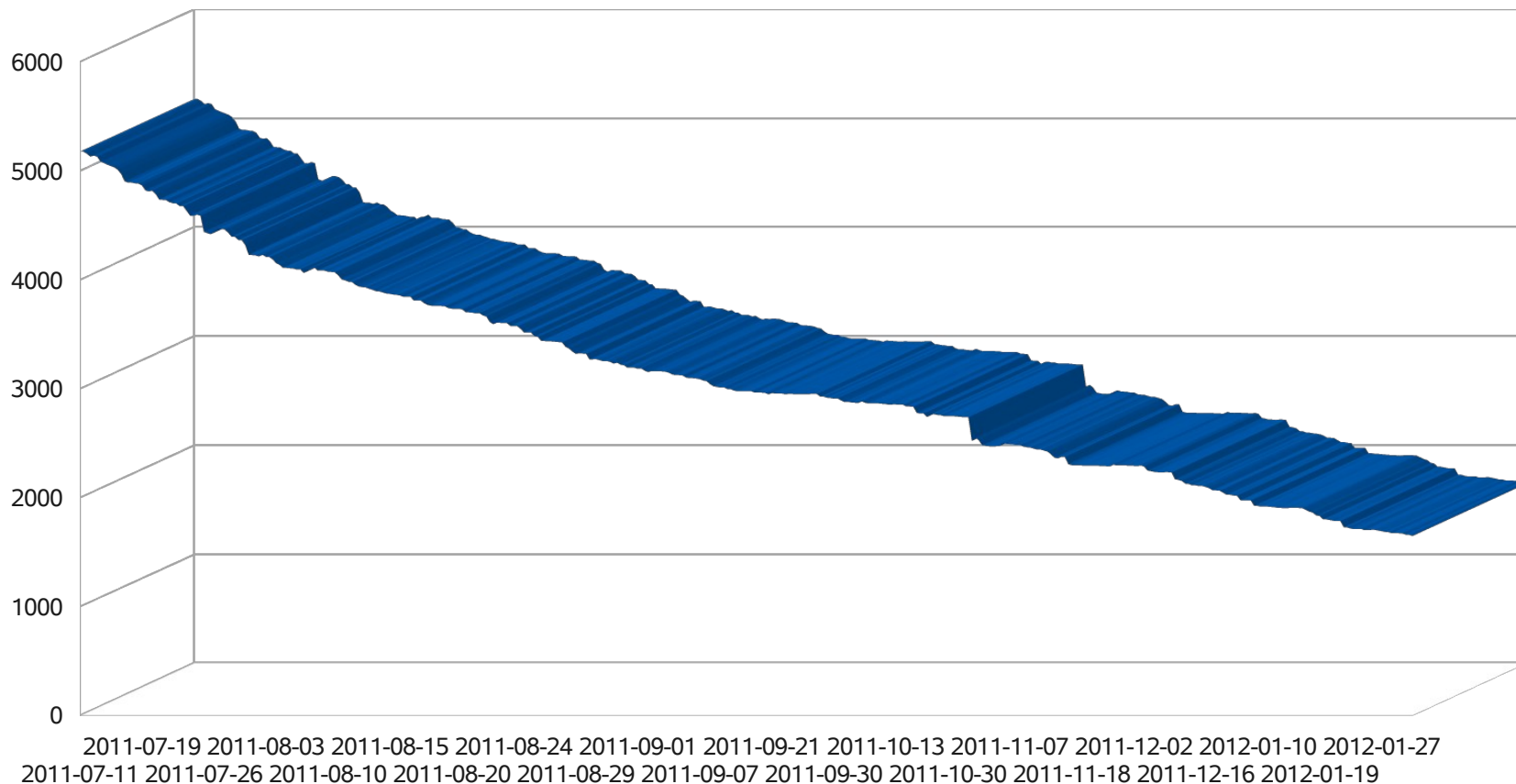
**Philipp Weissenbacher**  
**Luc Castermans**  
**Mike Whiteley**  
**Christina Rossmanith**  
**Winfried Donkers**  
**Michael Stahl**  
**Tim Hardeck**  
**Noel Grandin**  
**Matteo Casalin**  
**Cor Nouws**  
**and many more !**

# Removing totally unused code ...



- ▀ Shrinking the LibreOffice's bloat footprint
- ▀ making real progress ... 5000+ methods to ~1650

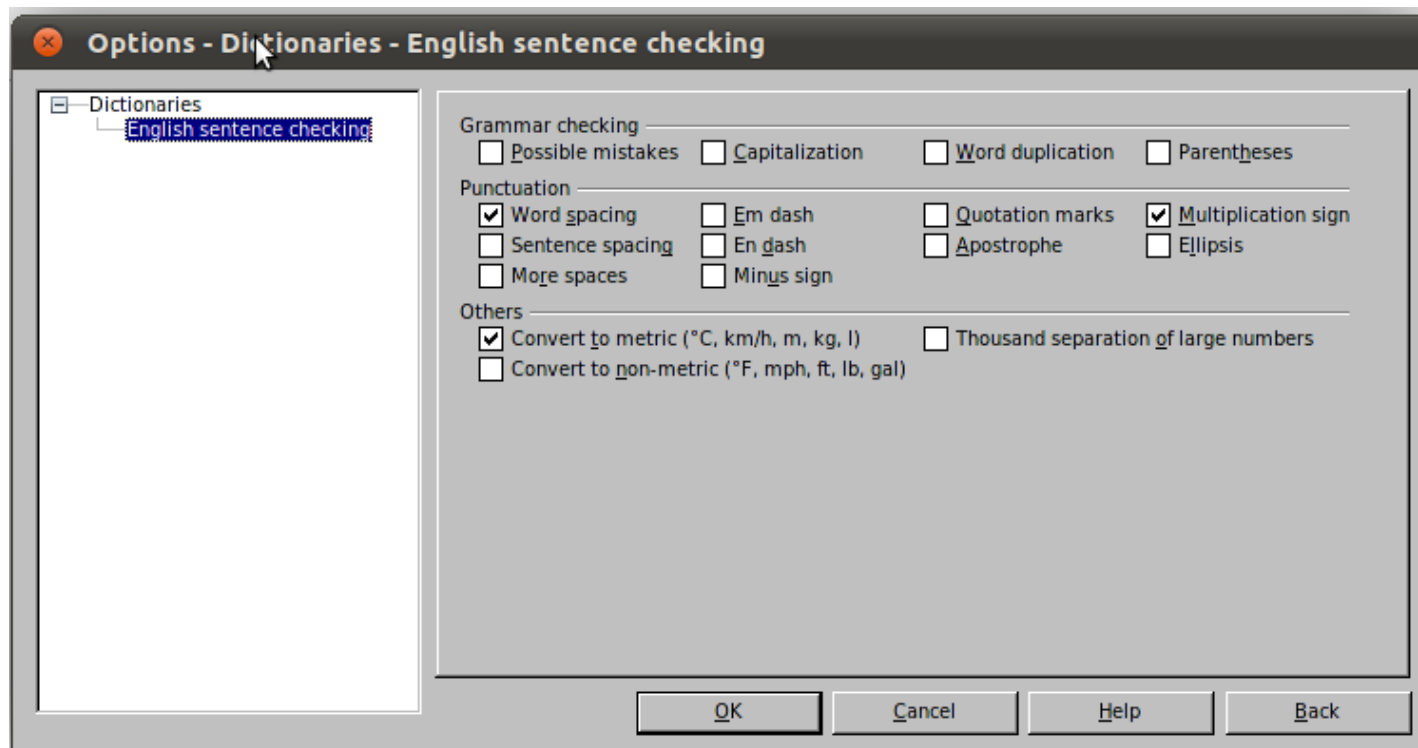
Remaining unused method count



# Volunteer features in 3.5 ...



- ▀ László Németh
  - ▀ bundled 'lightproof' (python) **grammar checker**
    - ▀ Avoids ~10 second Java bootstrap at bad times.
  - ▀ Sexy Linlibertine font features / typography wins



# Desktop publishing in LibreOffice

**TEREMTÉS KÖNYVE** Teljes képernyő

**EZDETKOR** **True small caps** az eget és a földet. <sup>4</sup>A föld puszta volt és üres, sötétség borította a mélységeket, és Isten lelke lebegett a vizek fölött. <sup>3</sup>Isten szólt: „Legyen világosság”, és világos lett. <sup>4</sup>Isten látta, hogy a világosság jó. Isten elválasztotta a világosságot a sötétségtől. <sup>5</sup>**Optical weighting (Caption)** A nevezte Isten, a sötétséget pedig éjszakának. Azután este lett és reggel: az első nap. <sup>6</sup>Isten újra szólt: **Language specific kerning** Alkald boltozat, és alkosson válaszfalat a vizek között.” Úgy is lett. <sup>7</sup>Isten megalkotta a szilárd boltozatot, és elválasztotta vele a boltozat fölötti és a boltozat alatti vizeket. <sup>8</sup>Isten a boltozatot égnek nevezte. Erre este lett és reggel: a második nap. <sup>9</sup>Isten ismét szólt: „Gyűljenek össze az ég alatti vizek egy helyre és emelkedjék ki a száraz.” Úgy történt. <sup>10</sup>**Proportional numbers** nevezte. az összefolv...

**Optical weighting (Display)** gyümölcsöt érlel, hogy táplavadjainak, az ég madarainak mozog és lélegzik, minden zö...  
Úgy is történt. <sup>31</sup>Isten látta, h...  
alkotott. Este lett **Ligatures** a...

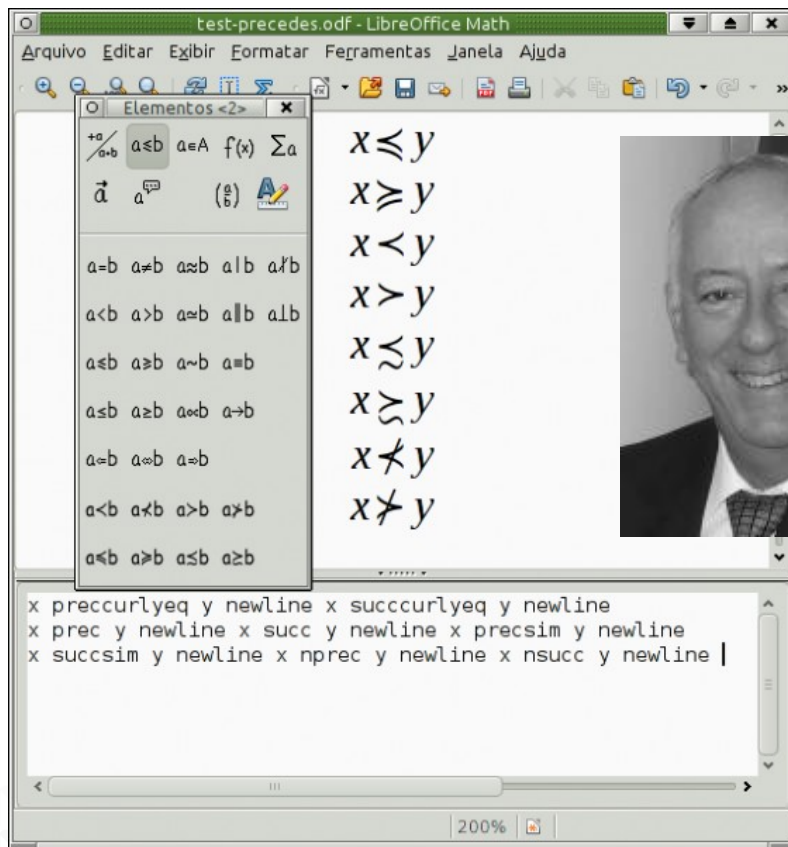
2 <sup>1</sup>Így készült el a föld és a...  
együtt. <sup>2</sup>Isten a hetedik napon...  
tott. A hetedik napon meg...  
végzett. <sup>3</sup>Isten megáldotta és...  
pot, mert azon megpihent eg...  
<sup>4</sup>Ez a története az ég és a föld...  
folyt. <sup>4</sup>Azon a napon, amiko...  
még nem v...

**Hanging punctuation**

# Pretty volunteer features #2 ...

*Olivier Hallot*

Game theory bits



*Khaled Hosny*

Much improved RTL widget theming support

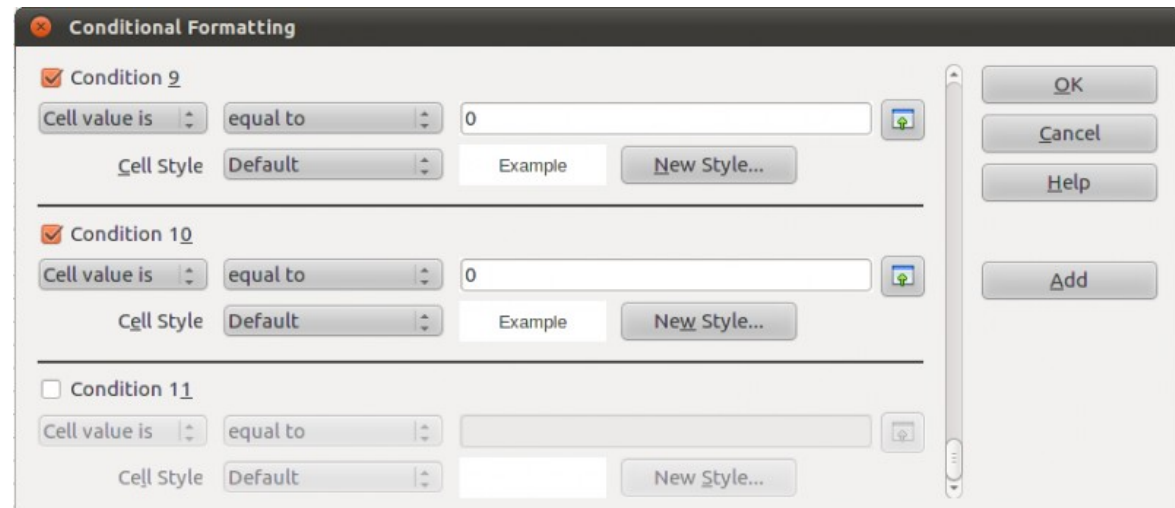


3.4

3.5

# Pretty volunteer features #3 ...

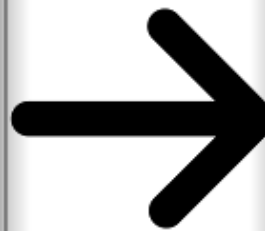
Unlimited rules for  
conditional formatting:  
*Robert Dargaud*



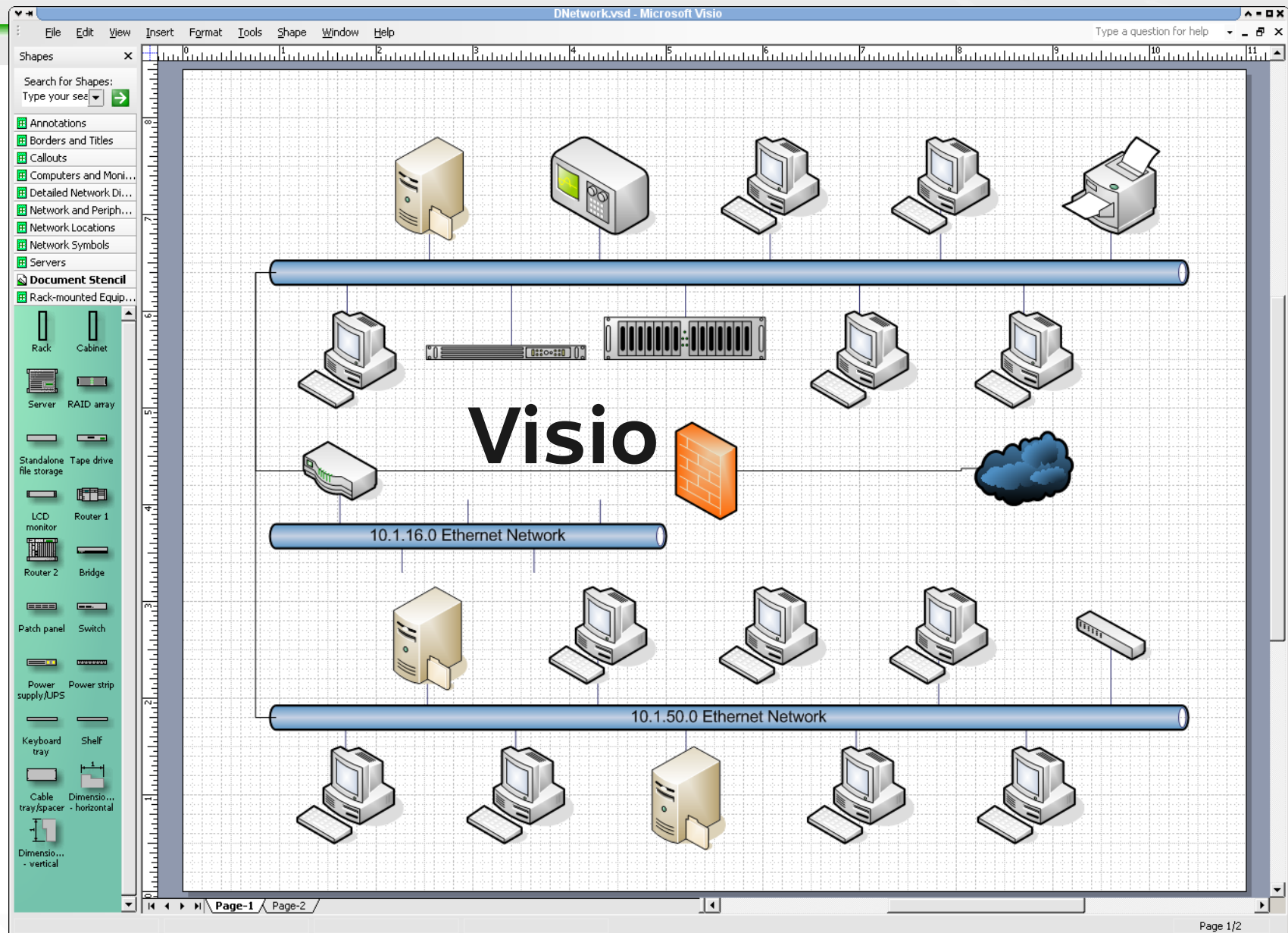
Non sucking “Save As”  
*Josh Heidenreich, Andras Timar, William Gathoye*

 LibreOffice 3.4

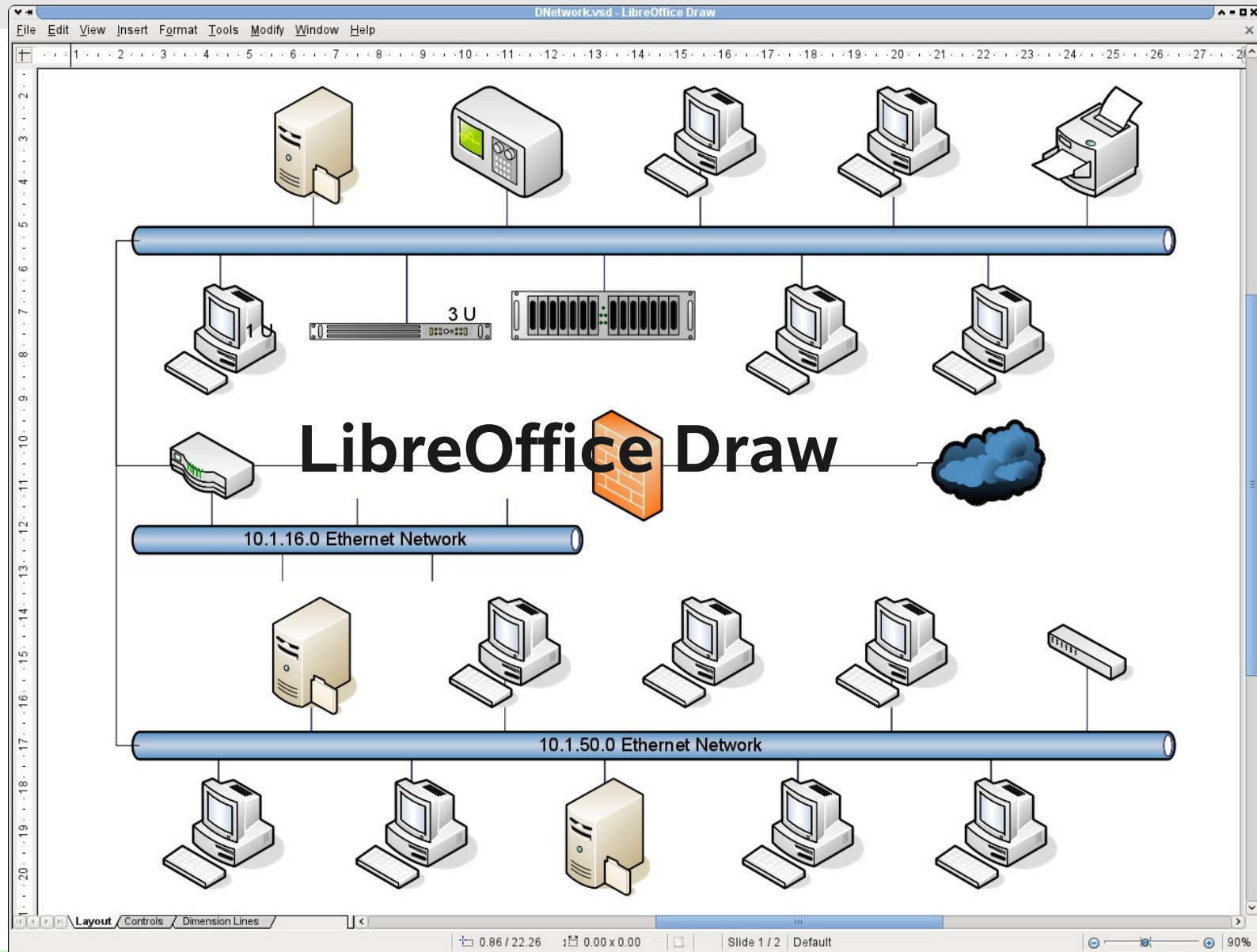
 LibreOffice 3.5



# Pretty ~volunteer features #...



# Pretty ~volunteer features #...



# Visio – thanks to ...

Left to right:  
*Valek Filippov*  
*Fridrich Strba*  
*Tibbylickle*

Here pictured  
hacking on it in  
Paris at a party.

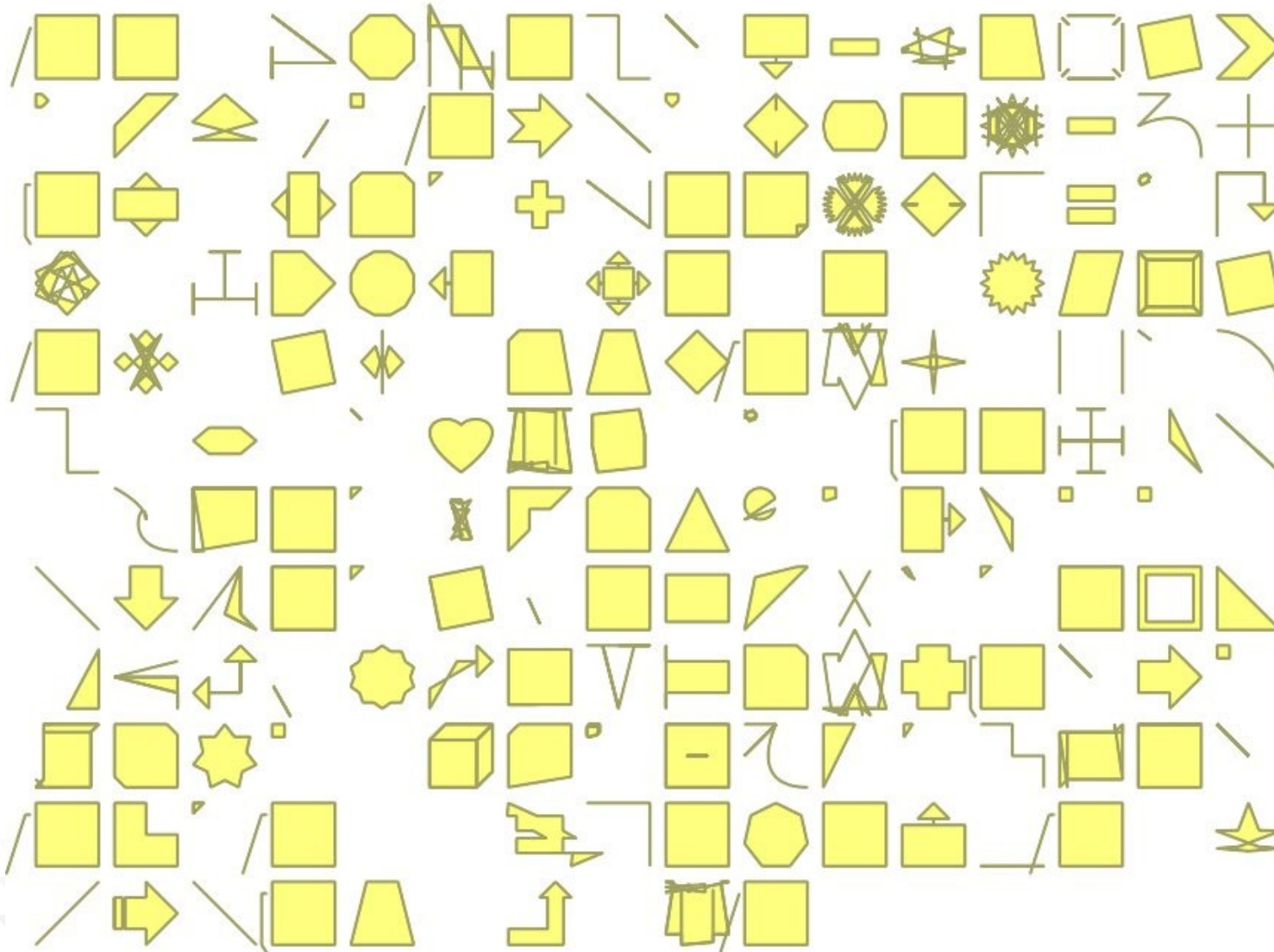


# Other notable heroics in 3.5 ...

- ▶ Lionel Elie Mamane
  - ▶ Volunteer 'Base' maintainer
  - ▶ Fixed dozens of critical bugs with help from
    - ▶ Julien Nabet, Korrawit Pruegsanusak, Thomas Arnhold
- ▶ Markus Mohrhard
  - ▶ Not satisfied with improving calc performance
  - ▶ Worked indomitably at expanding our unit test framework
  - ▶ Thanks to Markus, we have thousands of tests, exercising calc, impress, writer
  - ▶ We import, calculate and check spreadsheet formula during the build (and re-test all our CVEs docs), and much more.
  - ▶ Ran every calc bug document through valgrind prior to 3.5.0

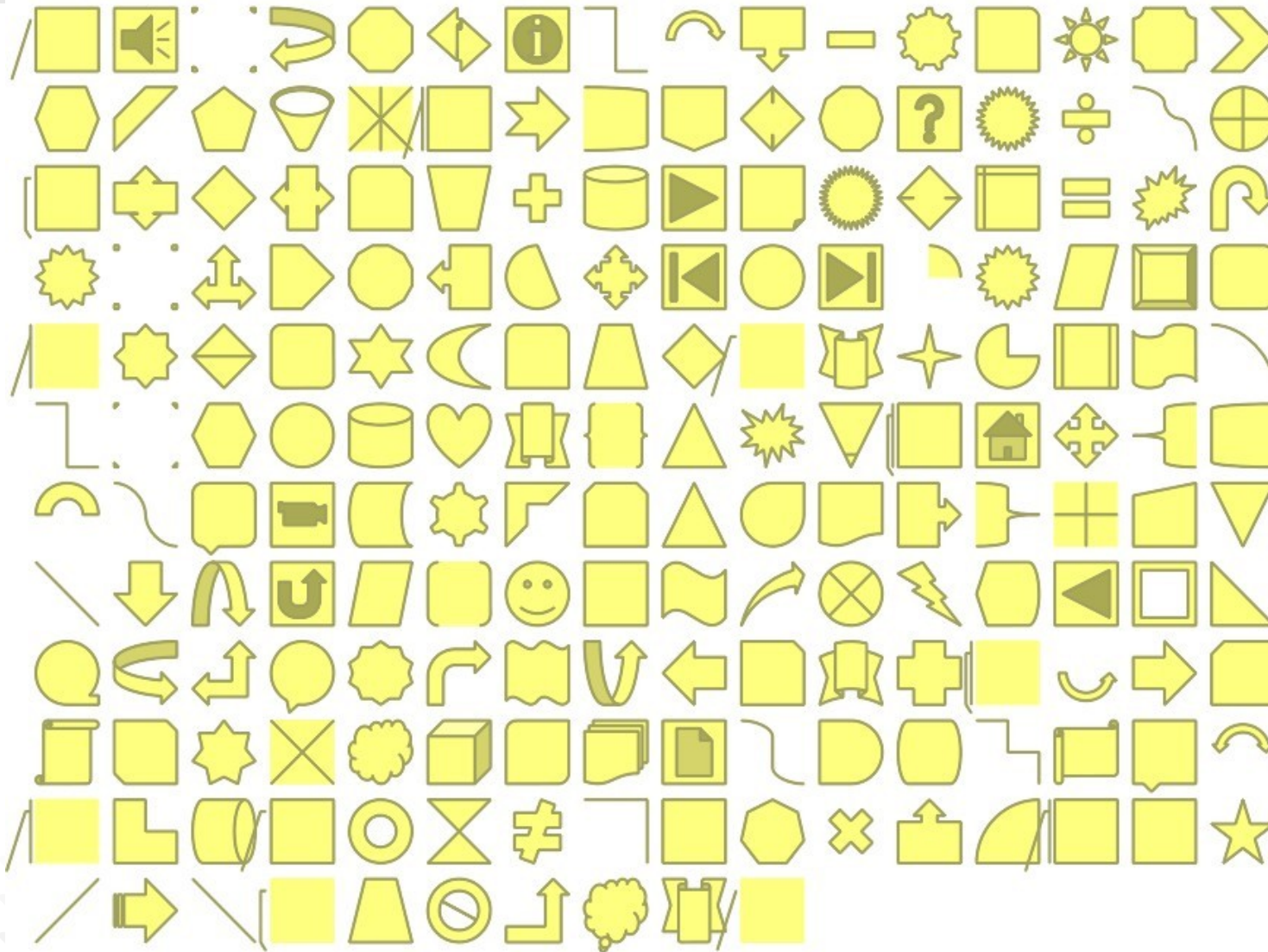


# New Custom Shapes import ...



Before  
(in 3.4)

# New Custom Shapes import ...



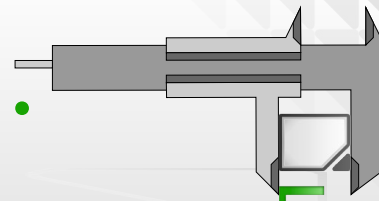
After  
(in 3.5)  
How it  
should  
look !  
Thanks to  
Radek  
Doulik !

# Applying that to SmartArt ...

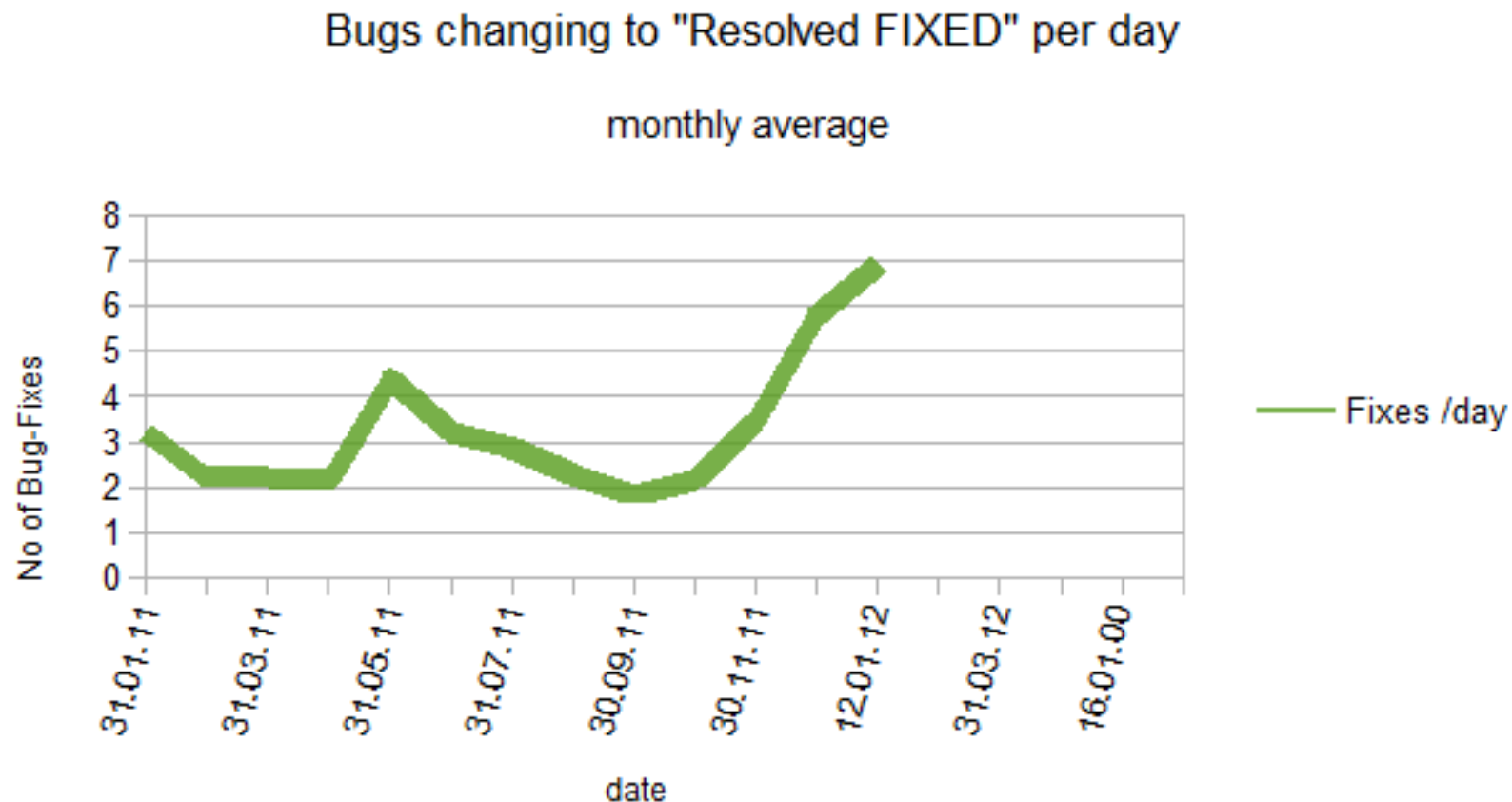
Thanks to Muthusuba Subramanian



# QA / Bug fixing – release time ...



- ▶ Rainer Bielefeld & team doing great work ...
- ▶ Open bug count starting to plateau / grow more slowly



## Conclusions ...

# LibreOffice Conclusions



- ▶ **Code Sharing is nearly the silver bullet**
  - ▶ Re-writing a huge Office suite is a pointless waste
- ▶ **LibreOffice is improving rapidly**
  - ▶ It's a fun place to hack and make a real difference ...
  - ▶ strike a dis-proportionate blow for freedom here
  - ▶ On-line & Android ports are coming along nicely.
- ▶ **Thanks for all of your help and support !**
  - ▶ **we rely on you**, to prove the power of Freedom with us.
  - ▶ to get people **excited** about Free Software they use ...
- ▶ **Please do get involved** and help us ...

*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*