

```
static void  
properties(GObjectClass  
*gobject_class)  
{  
    GParamSpec *pspec;
```

# LibreOffice

## Architecture, accessibility and QA

Jacobo Aragunde Pérez

[blogs.igalia.com/jaragunde](http://blogs.igalia.com/jaragunde)

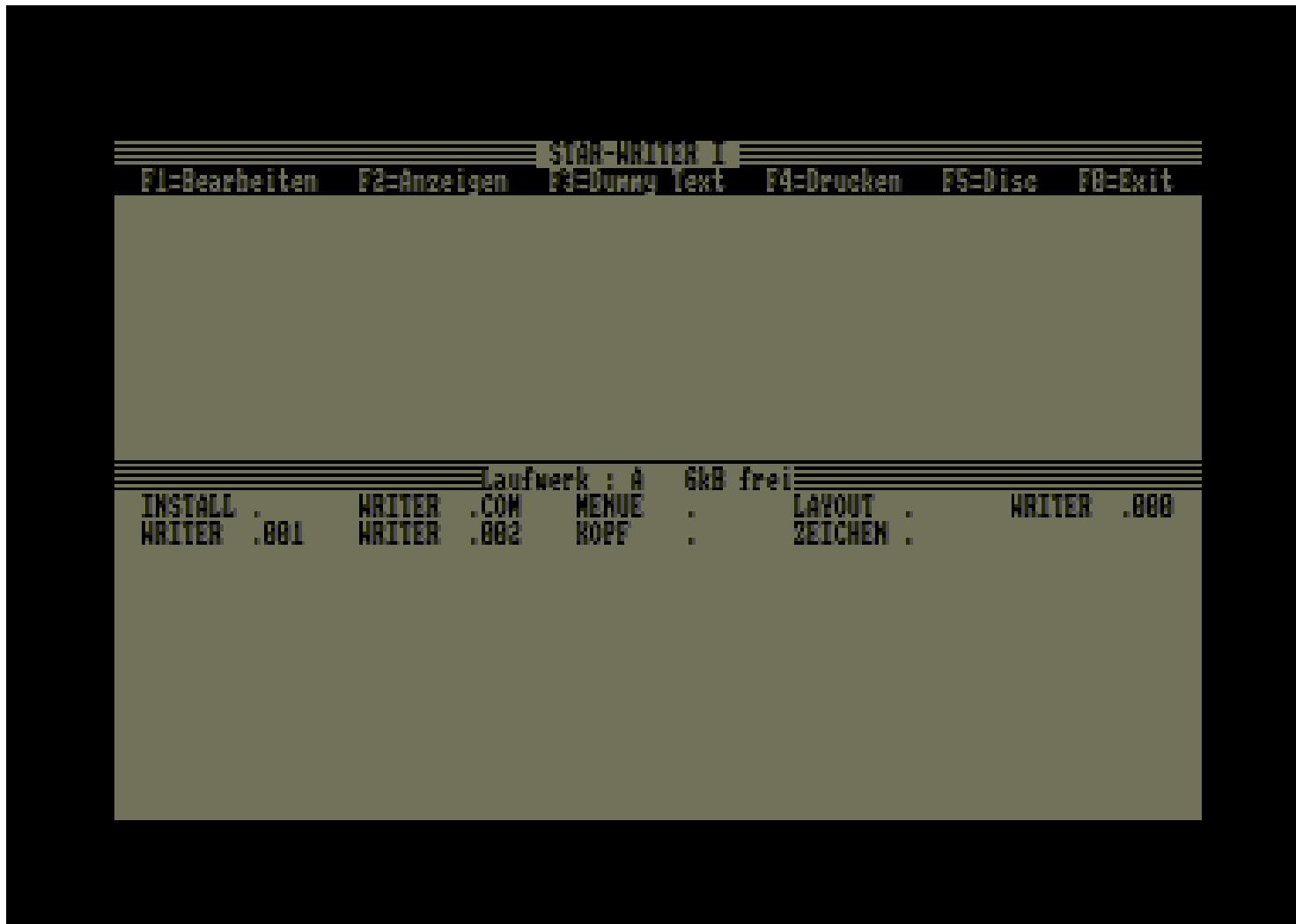


# The project

# Some history

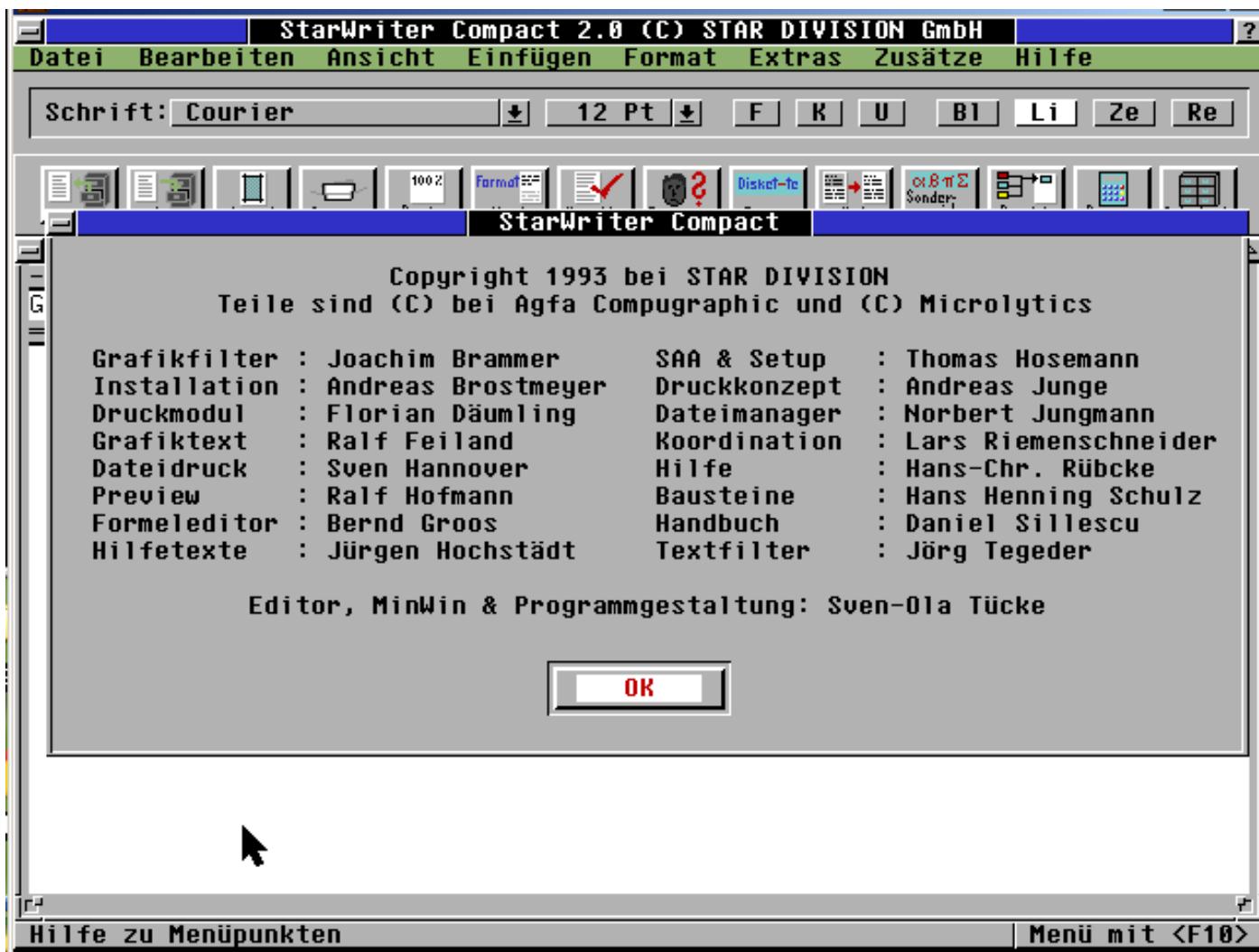
- 1985: StarWriter for Z80 micros
- 1986: StarDivision founded, StarOffice
- 1999: Sun Microsystems acquires StarDivision

# StarWriter 1.0, 1986



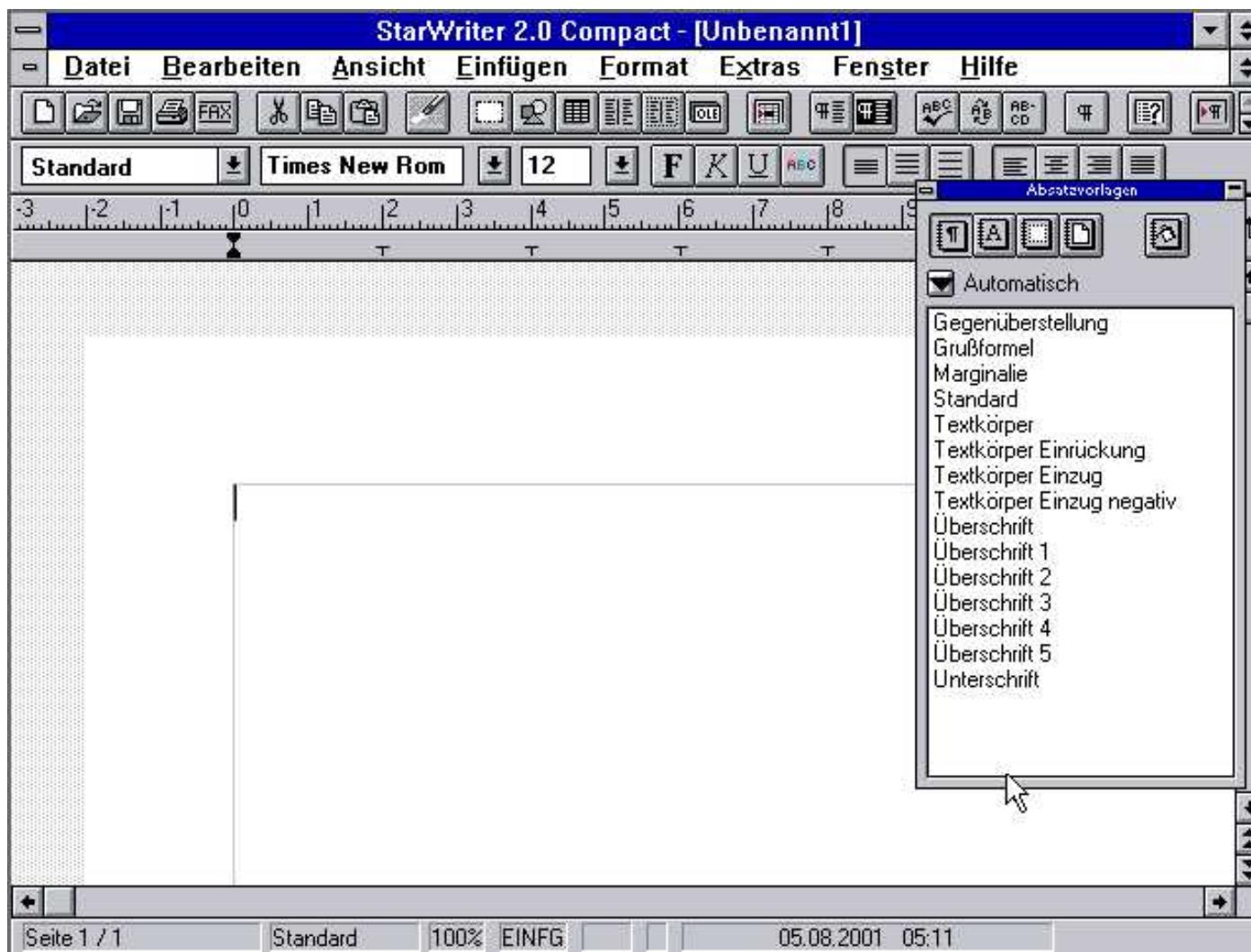
(source)

# StarOffice 2.0, 1994



(source)

# StarOffice 2.0, 1994



(source)

# StarOffice 5.2, 2000

StarOffice 5.2 - [kupfer.sdw]

File Edit View Insert Format Tools Window Help

Standard Times 12 B I U  $\frac{1}{2}$   $\frac{3}{4}$   $\frac{5}{8}$   $\frac{7}{16}$   $\frac{9}{32}$   $\frac{11}{64}$   $\frac{13}{128}$  A A

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

**Kupfer**

Erzminerale

Chalkopyrit	CuFeS <sub>2</sub>	34,5% Cu	D=4,2–4,3
Chalkosin	Cu <sub>2</sub> S	80	5,7–5,8
Enargit	Cu <sub>2</sub> AsS <sub>3</sub>	48	4,4
Digenit	Cu <sub>2</sub> S <sub>3</sub>	78	5,7–5,8
Covellin	CuS	66	4,7
Cuprit	Cu <sub>2</sub> O	89	6,2
Malachit	Cu <sub>2</sub> (OH) <sub>2</sub> CO <sub>3</sub>	72	4

- Bauwurdig sind kleinere Kupferlagerstätten bei Gehalten von 3–5% im Erz, während sehr große. Im Tagbau gewinnbare Erzkörper ab 0,5%, bei Vorliegen weitere Metalle (Mo, Au, etc.) sogar ab 0,3 abgebaut werden. Sulfidische Kupfererze werden in der Regel durch Flotation zu Konzentraten mit 30 bis 60% Cu angereichert; diese werden durch metallurgische und elektrochemische Methoden zum Kathodenkupfer verarbeitet.
- Die Verwendung von Kupfer ist durch die hohe Leitfähigkeit des Metalls für Wärme und Elektrizität geprägt, so dass über 50% des Verbrauches diverse Produkte der Elektroindustrie betreffen. Weiter findet das Metall und seine Legierungen (Bronzen: Cu+Sn; Messing: Cu+Zn) durch günstige mechanische Eigenschaften sowie Verwitterungsbeständigkeit eine breite Anwendung in der Bauindustrie, im Maschinenbau und im Fahrzeugbau.
- 

Page 1 / 1 Standard 111% INSRT STD HYP

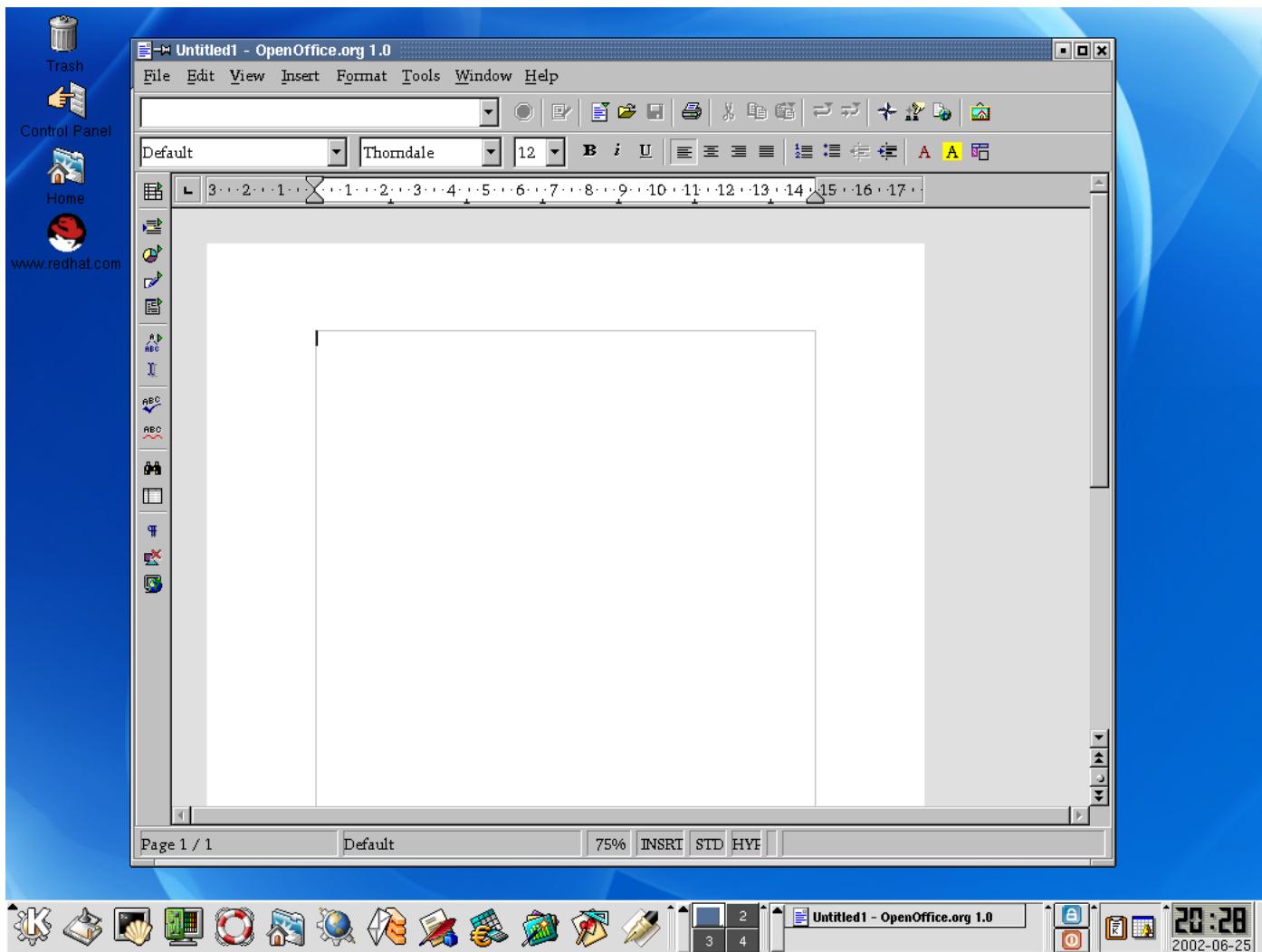
Start kupfer.sdw 22:37

(source)

# Some history

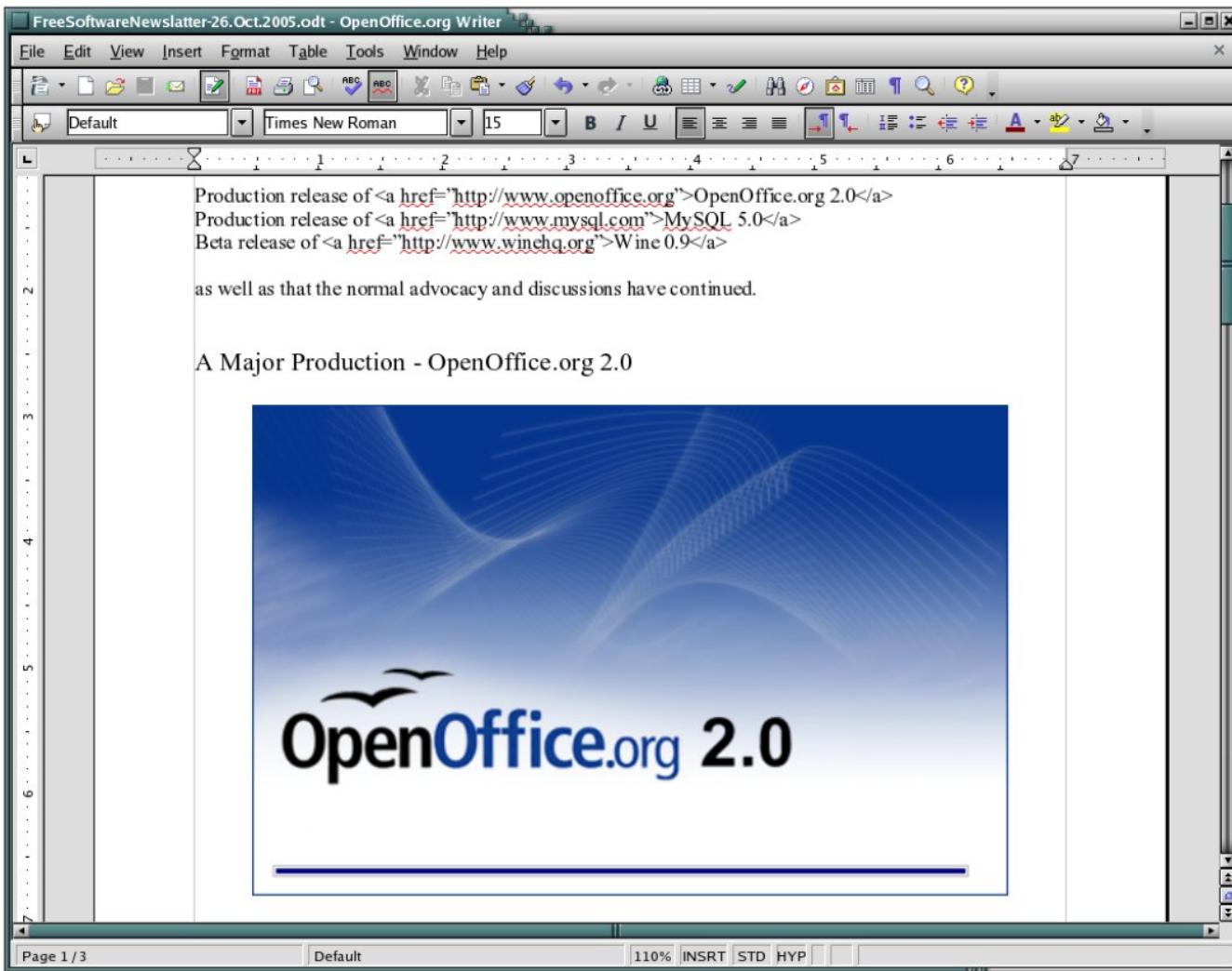
- 2000: OpenOffice becomes Free Software
- 2002: OpenOffice 1.0
- 2005: OASIS standard, OpenOffice 2.0

# OpenOffice.org 1.0, 2002



(source)

# OpenOffice.org 2.0, 2005



(source)

# Some history

- 2010: Oracle acquires Sun
- 2010: LibreOffice and The Document Foundation
- 2011: Apache OpenOffice

# LibreOffice 3.3, 2010

LibreOffice 3.3.odt - LibreOffice Writer

Archivo Editar Ver Insertar Formato Tabla Herramientas Ventana Ayuda

Cuerpo de texto Liberation Serif 12 A A A

Buscar

LibreOffice

LibreOffice es una [suite ofimática libre](#), bifurcada de [OpenOffice.org](#) y creada por [The Document Foundation](#). Está disponible bajo licencia [GNU Lesser General Public License \[3\]](#). La compra de [Sun Microsystems](#) (líder del desarrollo de OpenOffice.org) por [Oracle](#) ha desencadenado esta bifurcación.

Dispone de un [procesador de texto](#) (Writer), un editor de [hojas de cálculo](#) (Calc), un creador de [presentaciones](#) (Impress), un [gestor de bases de datos](#) (Base), un [editor de gráficos vectoriales](#) (Draw), y un [editor de fórmulas matemáticas](#) (Math).

## Historia

El 28 de septiembre de 2010, algunos miembros del proyecto [OpenOffice.org](#) formaron un nuevo grupo llamado [The Document Foundation](#), poniendo a disposición una [bifurcación](#) de [OpenOffice.org](#) al que llamaron LibreOffice. La bifurcación fue creada ante temores de que [Oracle Corporation](#), después de comprar a [Sun Microsystems](#), anterior patrocinador de OpenOffice.org, descontinuara la suite, como hizo con [OpenSolaris](#). Se esperaba que el nombre «LibreOffice» fuera provisional, puesto que Oracle fue invitada a convertirse en miembro de The Document Foundation y se le pidió que donara la marca OpenOffice.org al proyecto.[\[4\]](#)

Oracle, en lugar de ello, rechazó el proyecto y exigió que todos los miembros del directorio de OpenOffice.org involucrados renunciaran, alegando un conflicto de intereses. A finales de octubre de 2010, 33 voluntarios alemanes, no involucrados con el desarrollo, dejaron OpenOffice.org y se trasladaron a The Document Foundation para apoyar a LibreOffice.[\[5\]](#)

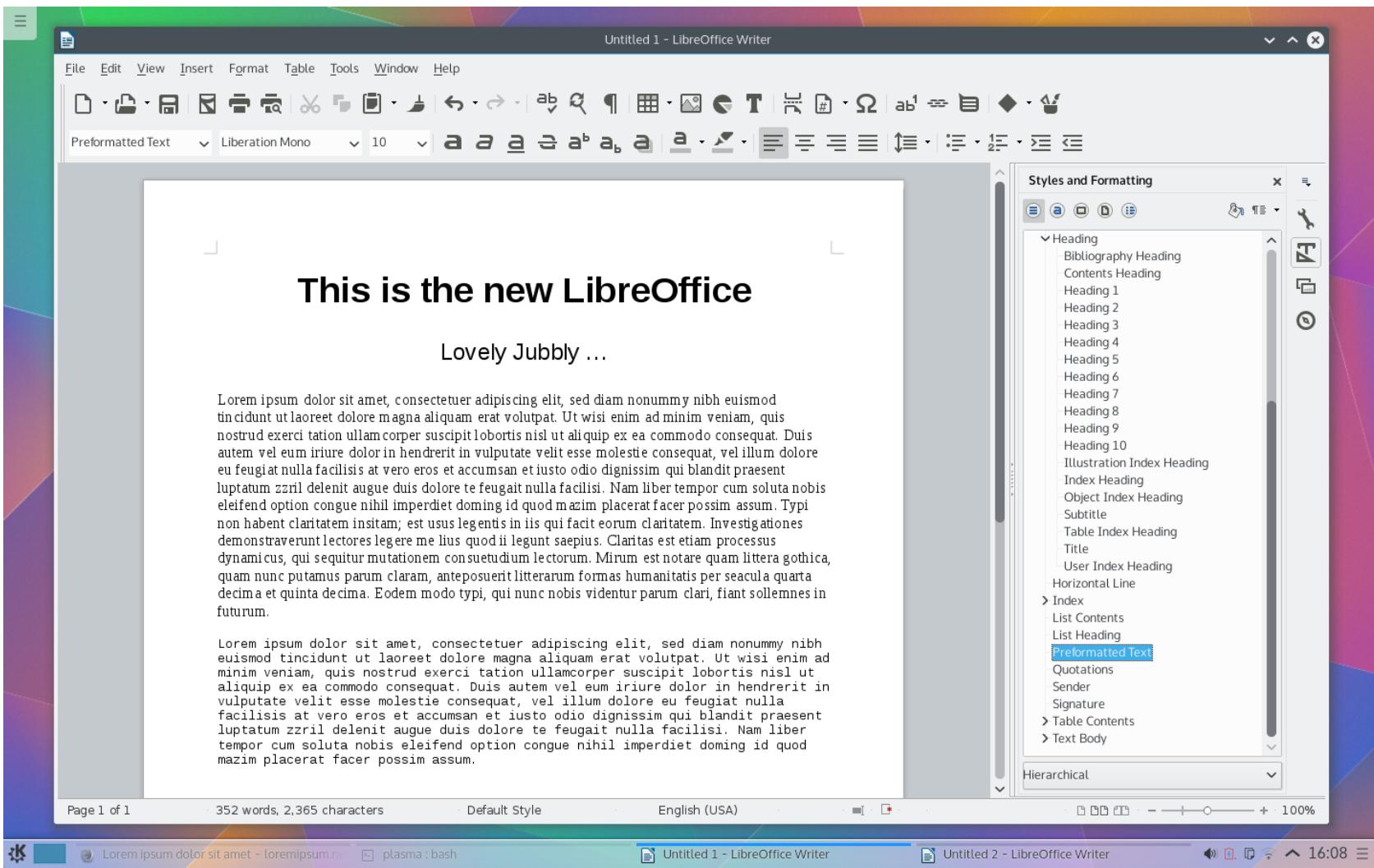
The Document Foundation recibió apoyo de parte de la antigua comunidad de OpenOffice.org, incluyendo entre ellas las empresas [Novell](#), [Red Hat](#), [Canonical](#) y [Google](#). El objetivo es producir una suite ofimática independiente de cualquier proveedor, con soporte [ODF](#) y sin ninguna obligación de atribución de la autoría del código a Sun u Oracle.[\[6\]](#)

El proyecto [Go-oo](#) fue descontinuado a favor de LibreOffice.[\[7\]](#) Las mejoras que [Go-oo](#) realizó están fusionándose en LibreOffice. Asimismo, se espera que otros proyectos se unan también a LibreOffice,[\[8\]](#) [\[9\]](#)

Página 1 / 3 | Predeterminado | Español (Venezuela) | INSERT STD | bodyContent | 100%

(source)

# LibreOffice 5.0, 2015



(source)

# LibreOffice 5.3, 2017

tdf-migrationwhitepaper1.pdf - LibreOffice Writer

File Edit View Insert Format Styles Table Tools Window Help

B I U T<sub>1</sub> Autore Liberation Se 12

Properties

Styles: Autore

Character: Liberation Serif 12 B I U A A<sup>b</sup> A<sub>b</sub>

Paragraph: Spacing: Indent:

0,12 " 0,00 " 0,00 "

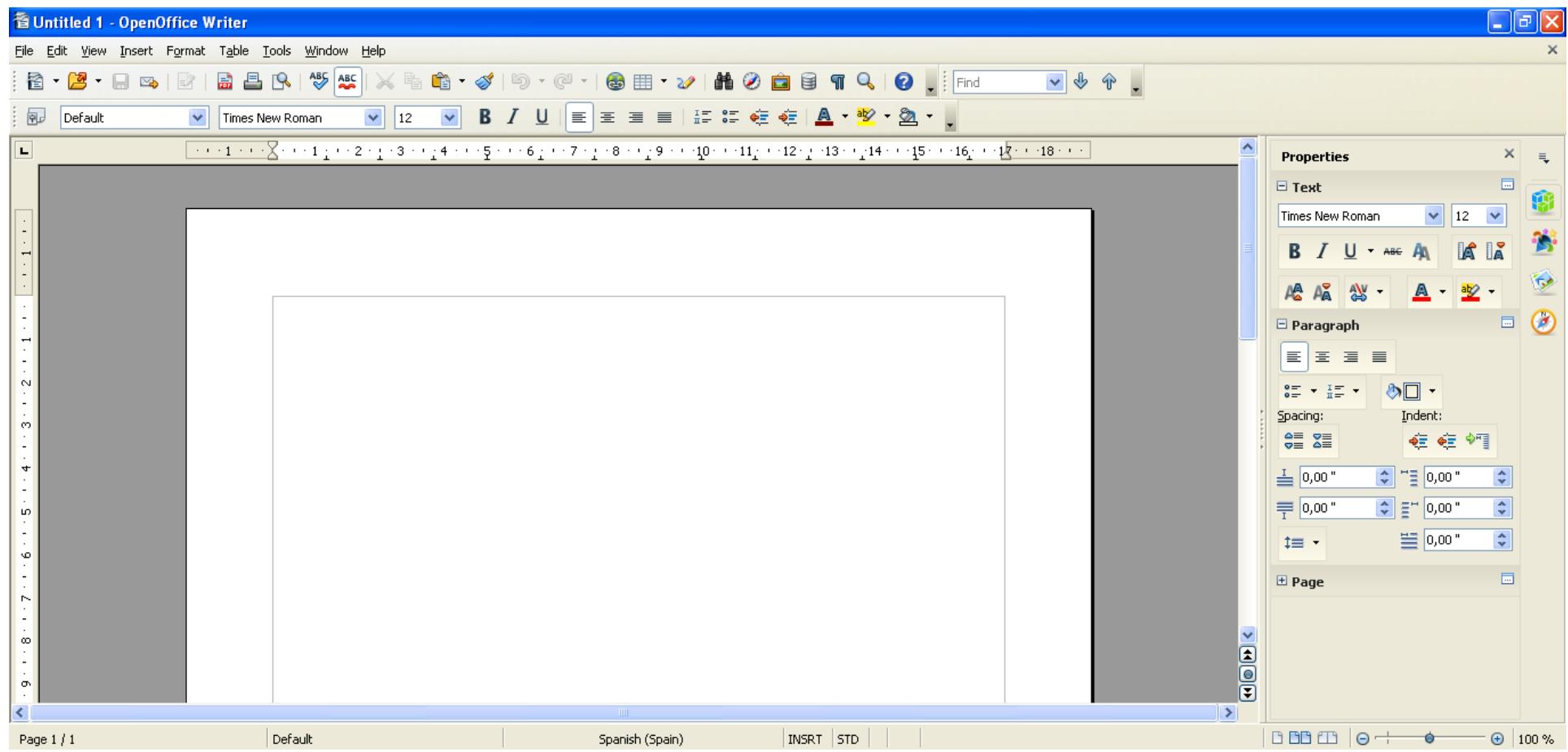
0,00 " 0,00 "

0,00 "

Page 1 of 8 3,462 words, 21,803 characters Default Style English (USA) 120%

The screenshot shows the LibreOffice Writer application interface. The title bar reads "tdf-migrationwhitepaper1.pdf - LibreOffice Writer". The menu bar includes File, Edit, View, Insert, Format, Styles, Table, Tools, Window, and Help. The toolbar features various icons for file operations, text styling (B, I, U), and document layout. The main content area displays a white paper template with the LibreOffice logo and the title "White Paper". The text "Migrating to LibreOffice to promote Software and Document Freedom" is present. The right side of the screen shows the "Properties" panel, which is expanded to show the "Styles" section containing the "Autore" style, and the "Character" and "Paragraph" sections for the selected text. The "Character" section shows font settings (Liberation Serif, 12pt) and styles (Bold, Italic, Underline). The "Paragraph" section shows spacing and indent options. The status bar at the bottom provides document statistics (3,462 words, 21,803 characters) and language information (English (USA)).

# Apache OpenOffice 4.1.4, 2017



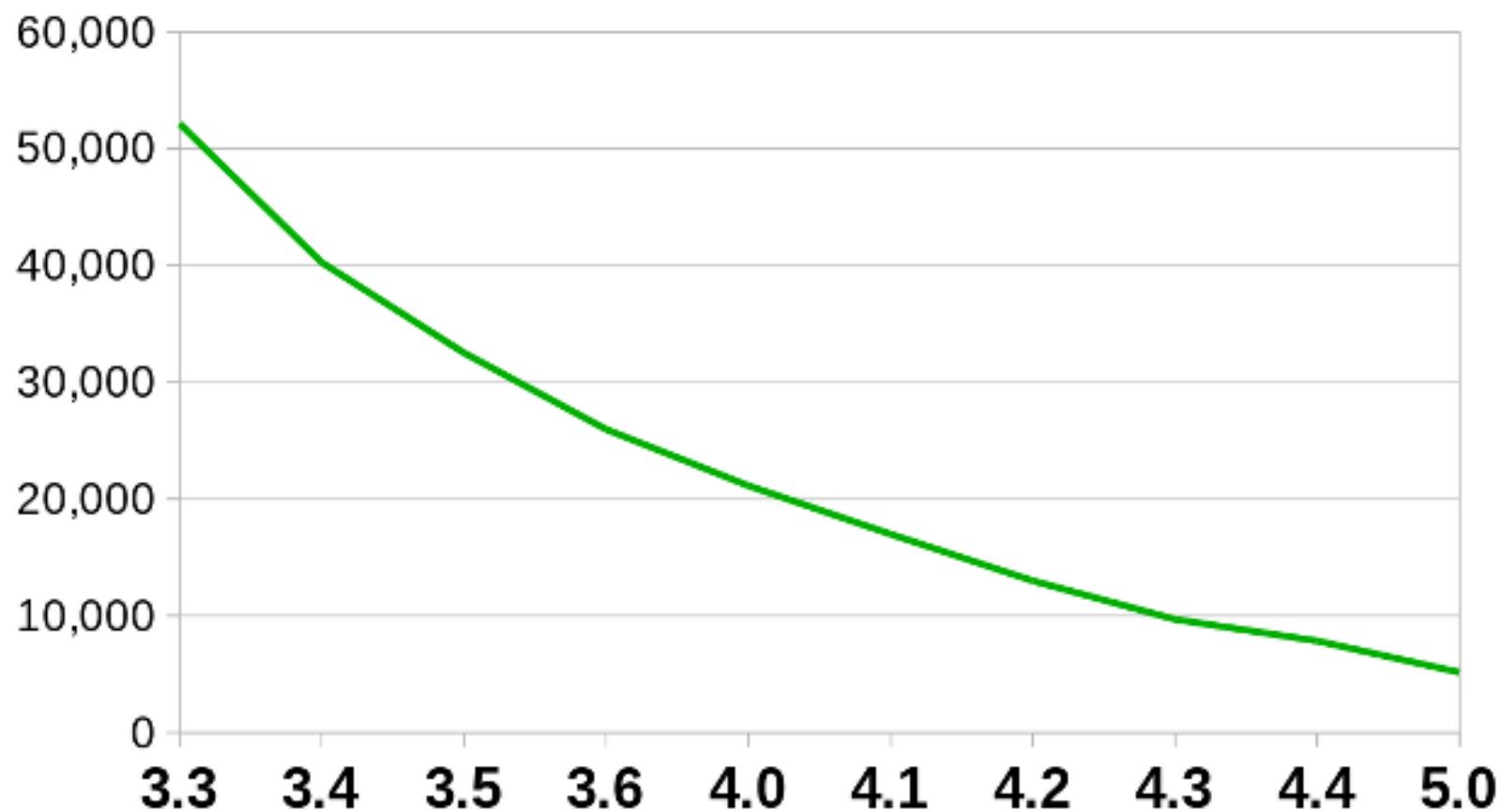
# LibreOffice today

- Around 80 monthly committers and 1600 commits
- 7M lines of code
- ~27 years of history

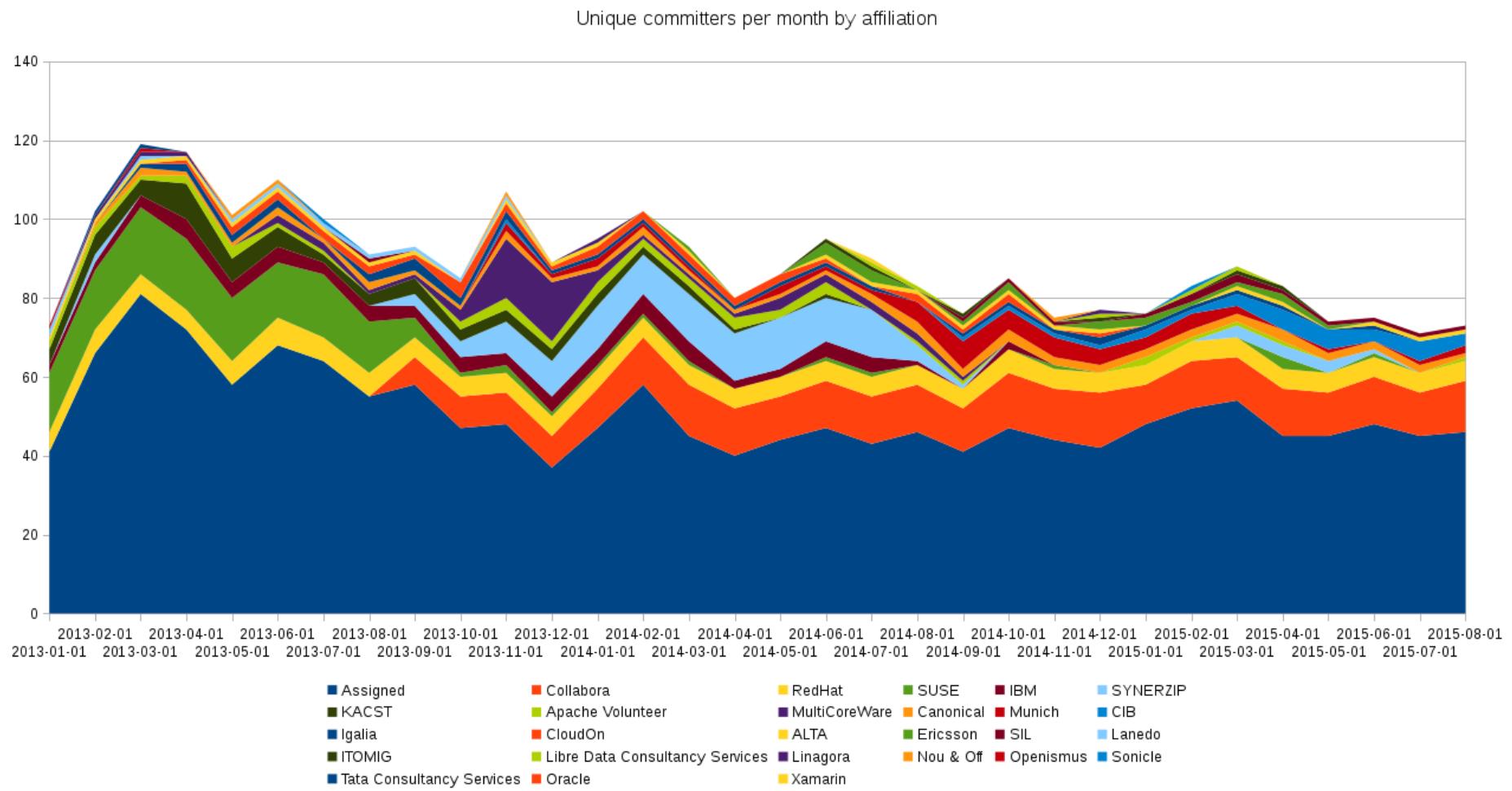
“Exact history was lost before Sept. 18th, 2000, but old source code comments show that Writer core dates back until at least November 1990.”
- 5000 lines of German code comments!

# Stats: German comments

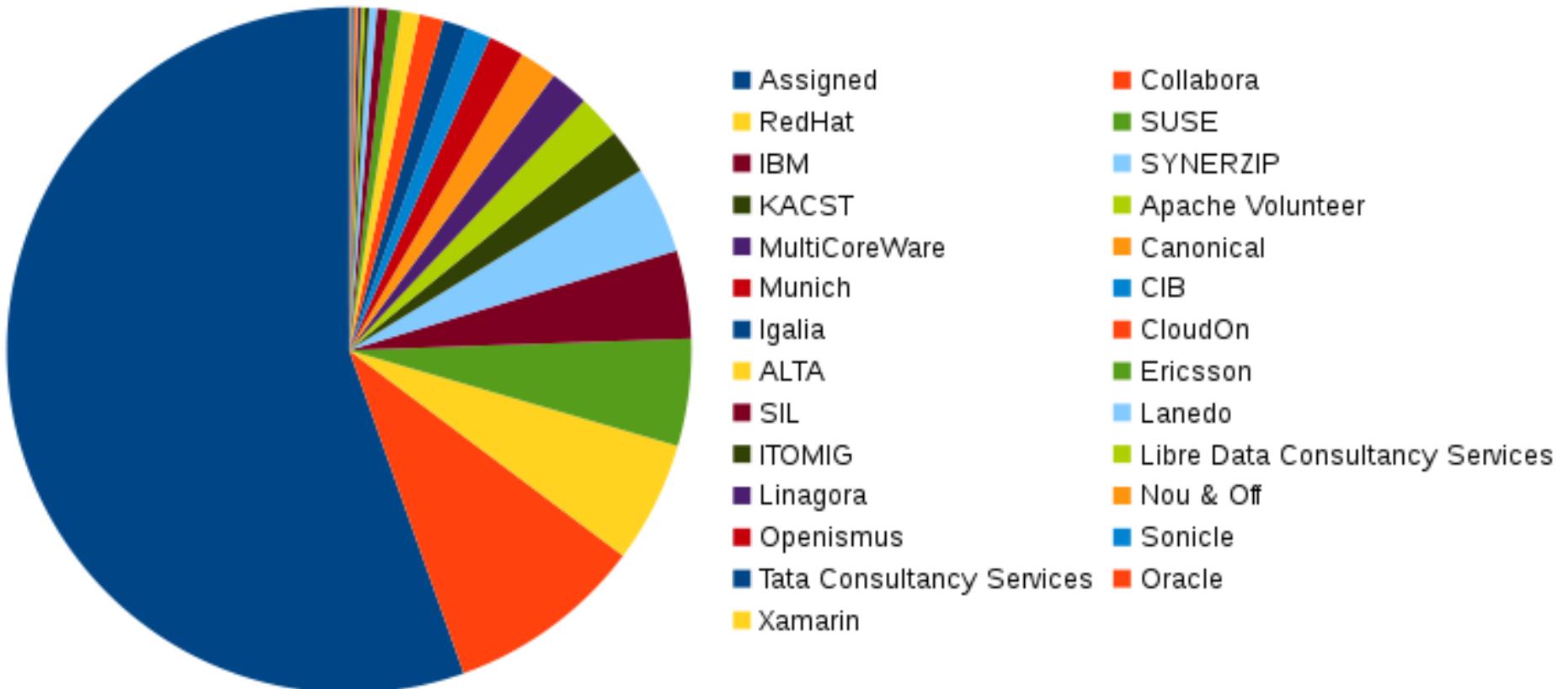
**Detected lines of German comment**



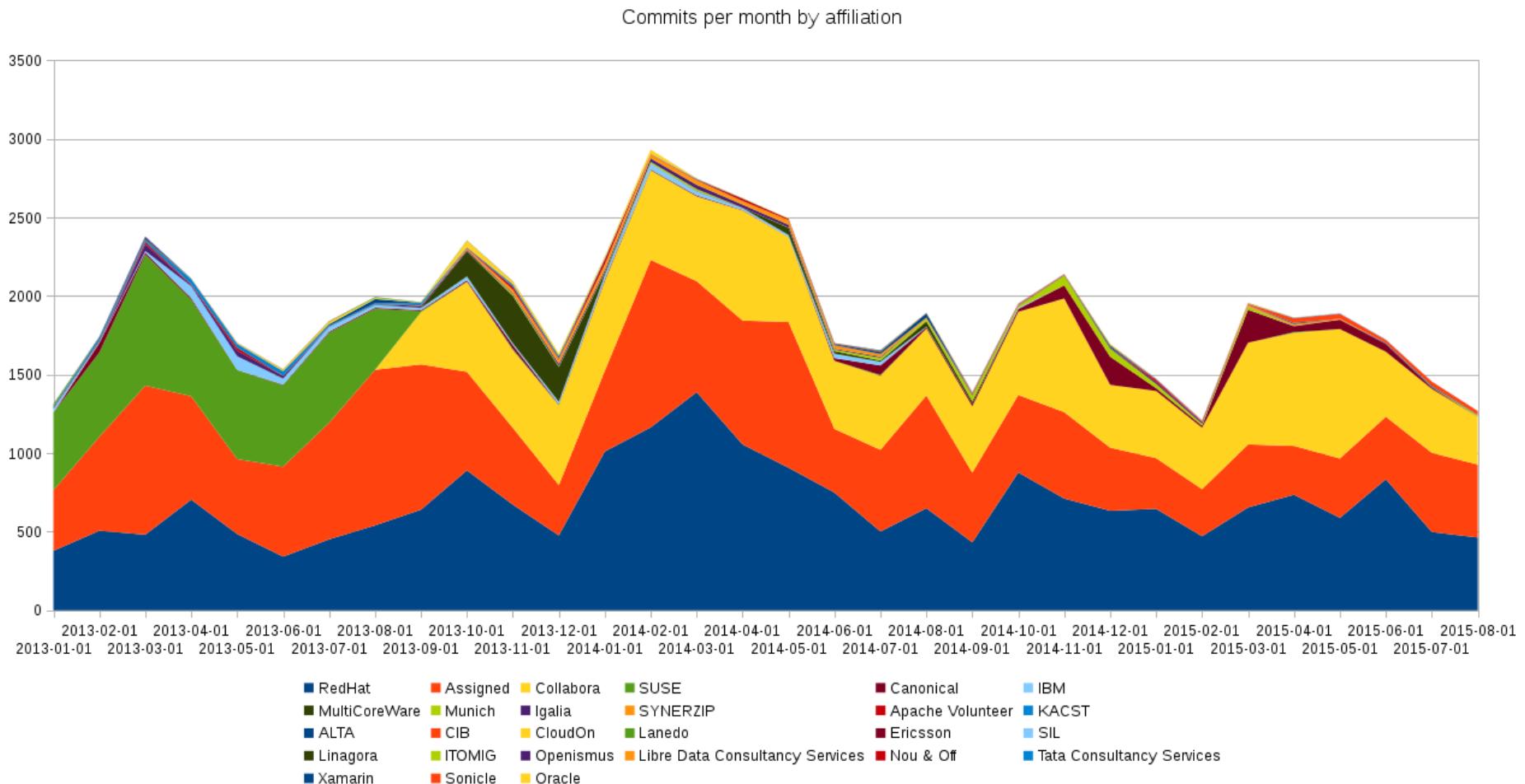
# Stats: contributors



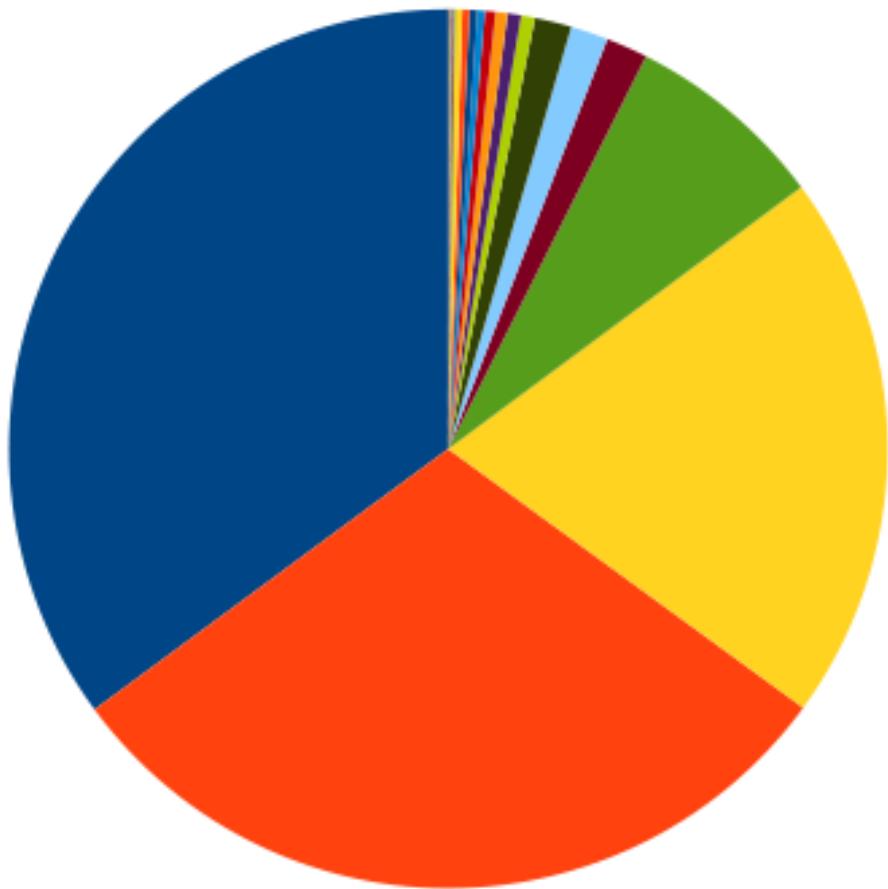
# Stats: contributors



# Stats: commits



# Stats: commits



RedHat	Assigned
Collabora	SUSE
Canonical	IBM
MultiCoreWare	Munich
Igalia	SYNERZIP
Apache Volunteer	KACST
ALTA	CIB
CloudOn	Lanedo
Ericsson	SIL
Linagora	ITOMIG
Openismus	Libre Data Consultancy Services
Nou & Off	Tata Consultancy Services
Xamarin	Sonicle
Oracle	

# Release calendar

- *Release early, release often*
- Major release every six months (5.3.0)
  - Brings new features
- Minor release ~ every month (5.3.1, etc.)
  - Bugfixing only
- End of life: 9 months
- Always two versions coexisting
  - Right now: 5.3.7 and 5.4.2

# Release calendar

- Plan for 5.0
  - <https://wiki.documentfoundation.org/ReleasePlan>

release	freeze	publishing
5.0.0	Week 21 , May 18, 2015 - May 24, 2015	Week 31 , Jul 27, 2015 – Aug 2, 2015
5.0.1	Week 31 , Jul 27, 2015 - Aug 2, 2015	Week 35 , Aug 24, 2015 - Aug 30, 2015
5.0.2	Week 36 , Aug 31, 2015 - Sep 6, 2015	Week 39 , Sep 21, 2015 - Sep 27, 2015
5.0.3	Week 41 , Oct 5, 2015 - Oct 11, 2015	Week 44 , Oct 26, 2015 - Nov 1, 2015
5.0.4	Week 48 , Nov 23, 2015 - Nov 29, 2015	Week 51 , Dec 14, 2015 - Dec 20, 2015
5.0.5	Week 3 , Jan 18, 2016 - Jan 24, 2016	Week 6 , Feb 8, 2016 - Feb 14, 2016
5.0.6	Week 15 , Apr 11, 2016 - Apr 17, 2016	Week 18 , May 2, 2016 - May 8, 2016
End of Life	May 29, 2016	

# Organizing a community

- The Document Foundation umbrella
  - Owns trademarks
  - Collects donations
  - Provides services to community
  - Organizes events
  - Occasionally funds development

# Organizing a community

- Communication channels
  - Mailing lists
  - IRC
  - Bug tracker and code review
- Committees and teams
  - Engineering Steering Committee
  - Design team
  - QA team

# Organizing a community

- Ultimately, individuals and companies define the project priorities by providing effort

# Current lines of work

- Mobile and cloud versions
  - LibreOfficeKit API
- Support more document types
  - Document Liberation Project
  - OOXML in particular
- GTK+ 3, Wayland, KDE Plasma
- UX improvements (design team)
- Polish

# Architecture

# Frame-Controller-Model

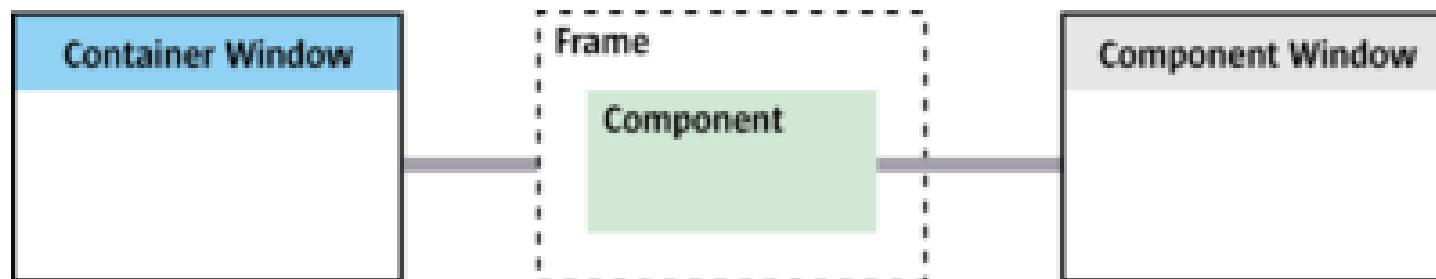
- Model
  - Represents an object from the document
    - Text, shapes, spreadsheet cells
- Controller
  - Interaction between the screen and the model
  - Observes the model
  - Manipulates the presentation but not the model
- Frame
  - Bridge between the controller and window objects
  - Bidirectional communication between controller and UI

# Other elements

- Component
  - Common interface between controller and frame
  - Hierarchical organization
- Desktop
  - Root frame
- Window
  - Area with painting and interaction capabilities
  - Not necessarily a system window

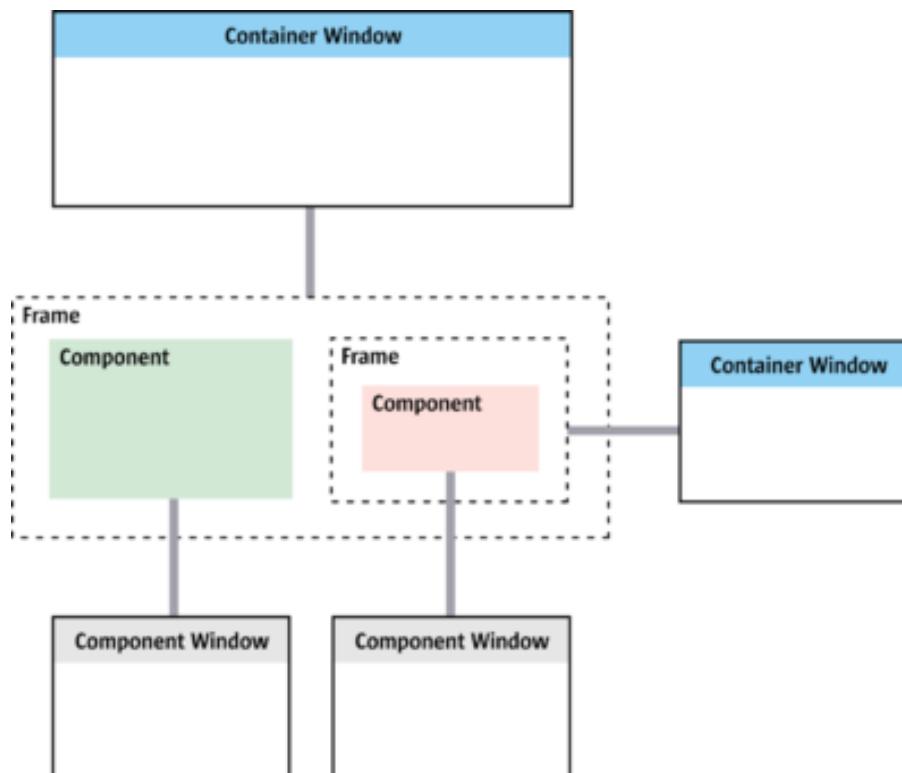
# Components and windows

- A frame attaches a component with two windows
  - Component window
    - Component painting area
    - Receives user interaction
  - Container window
    - Event broadcast
    - Interaction with other windows



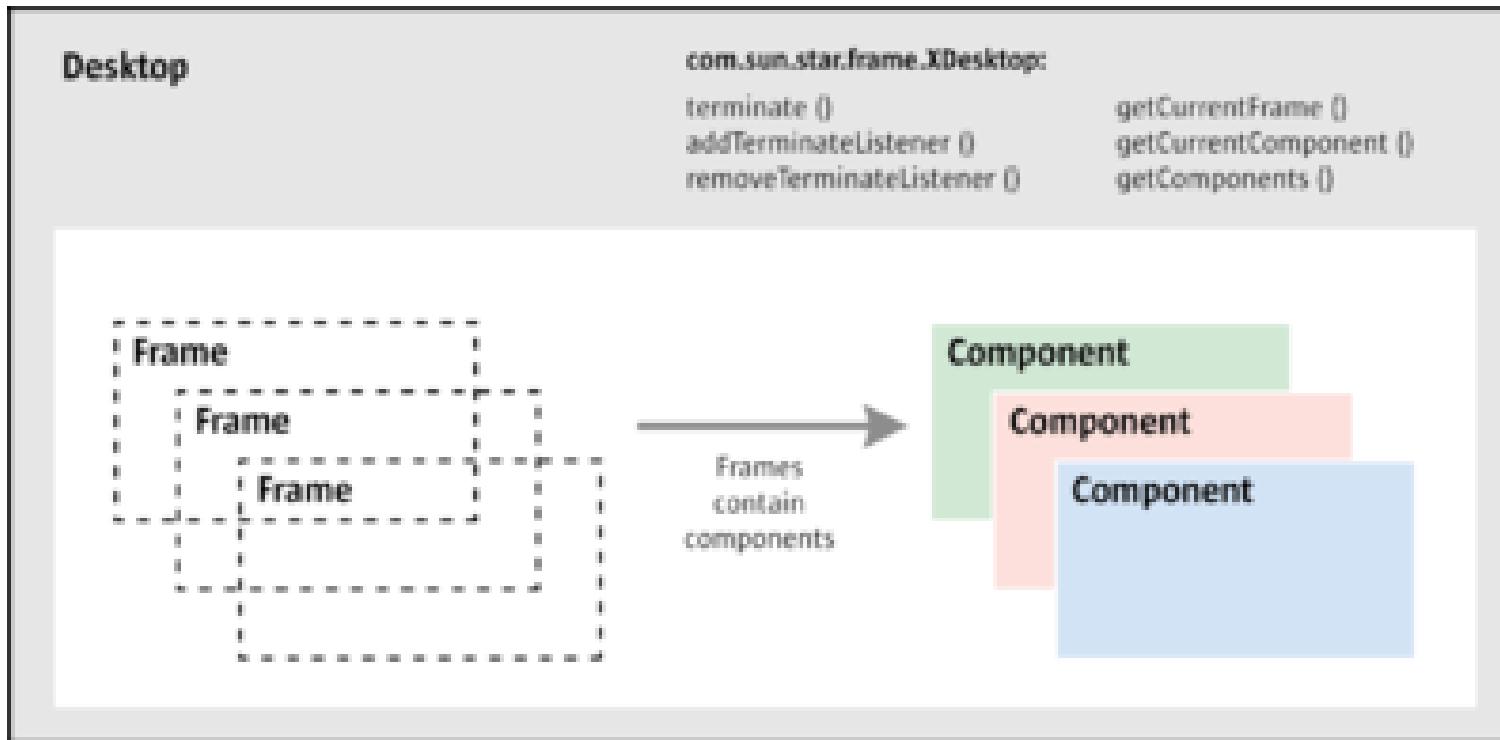
# Component hierarchy

- A frame can contain several components
- Sub-frame: dependent window
  - Floating text, dockable window...



# Desktop

- Hierarchy root frame
- Specific interface



# Dispatch framework

- Communication interfaces between components and UI
- Commands expressed by a URL
- Implemented in frames and controllers
- Responsibility chain
  - Traverse the hierarchy until reaching the one implementing the command

# Other considerations

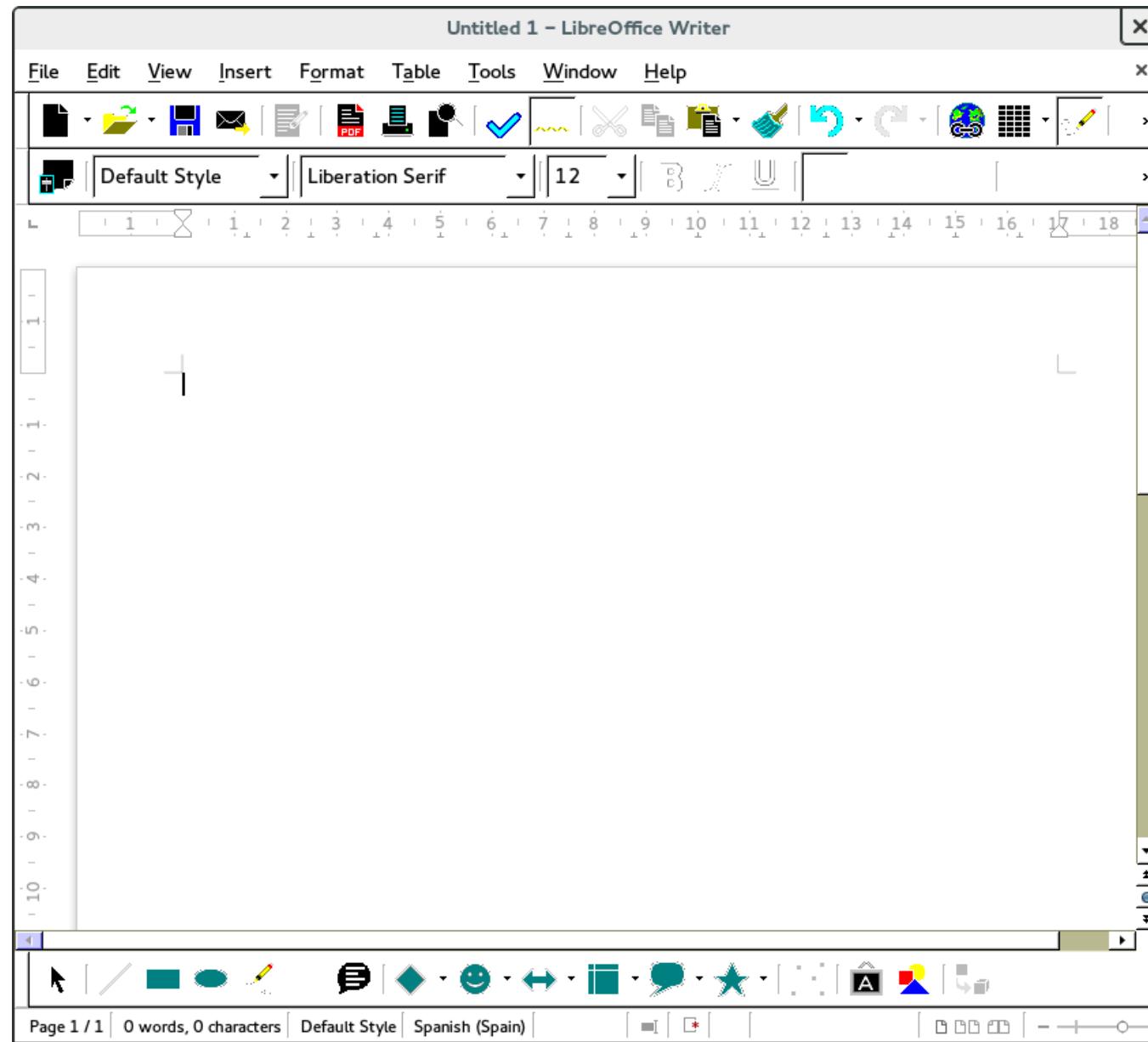
- Sometimes, interfaces expose this architecture but the implementation does not match
  - Historical reasons: architecture was engineered over an existing code base
- Not a global, application-wide design; large parts of LibreOffice don't follow this pattern
  - Filters
  - VCL (visual components library)

# LibreOffice accessibility

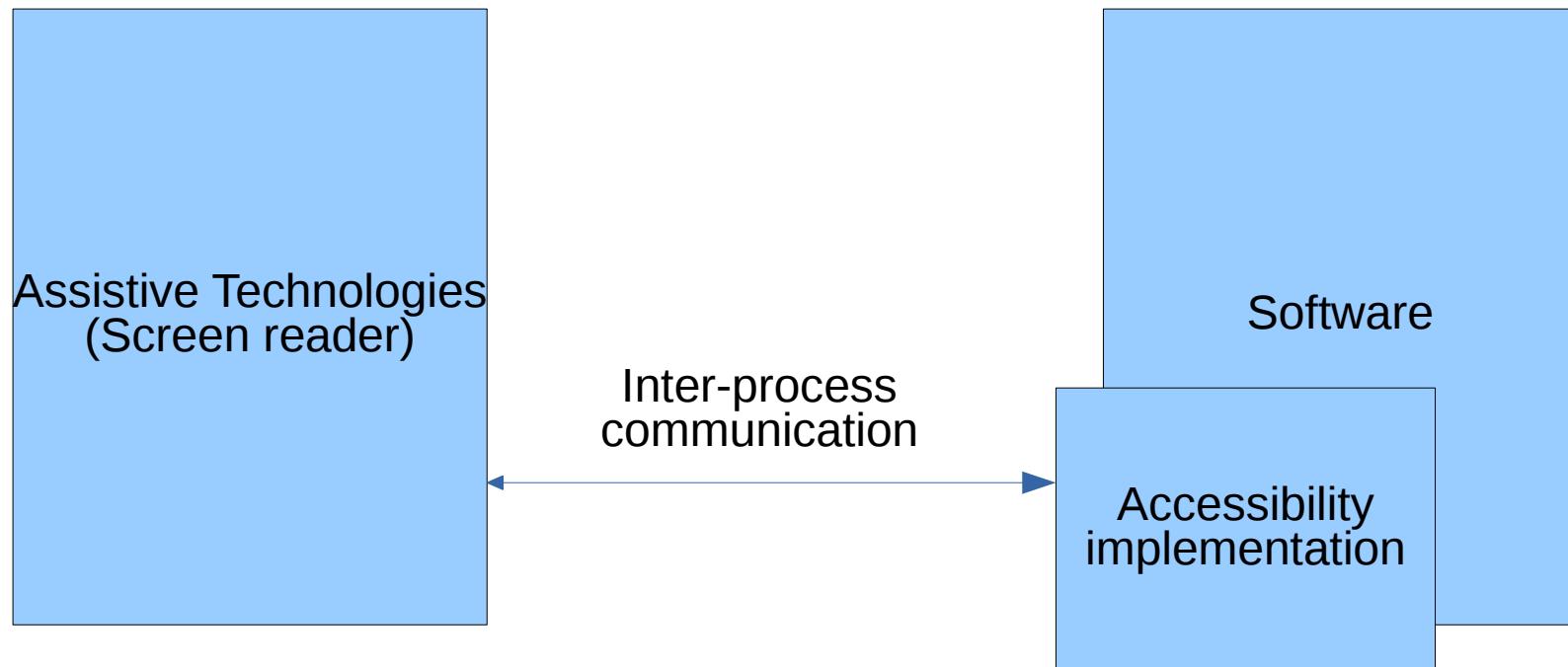
# Some assistive technologies

- Hardware ATs
  - Adaptive input devices
- Software ATs
  - Magnifier
  - High contrast
  - Screen reader

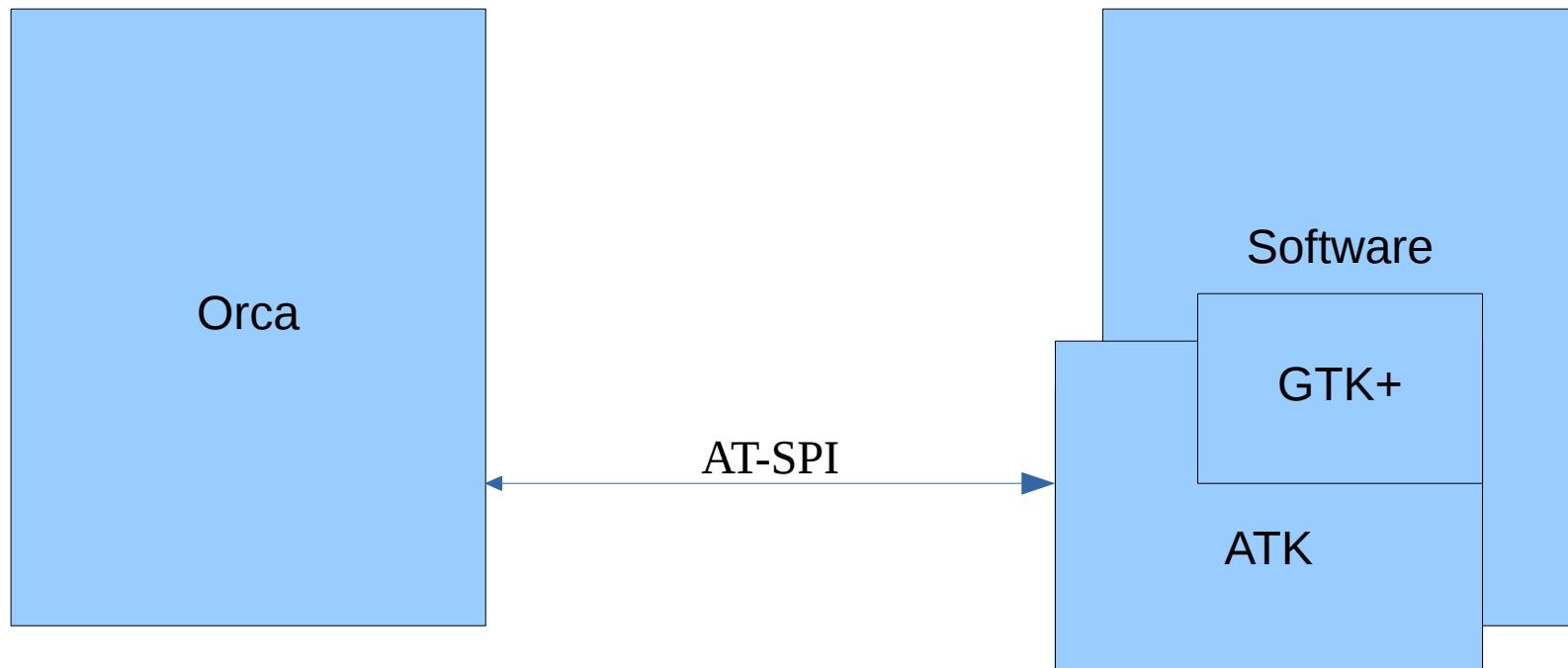
# High contrast



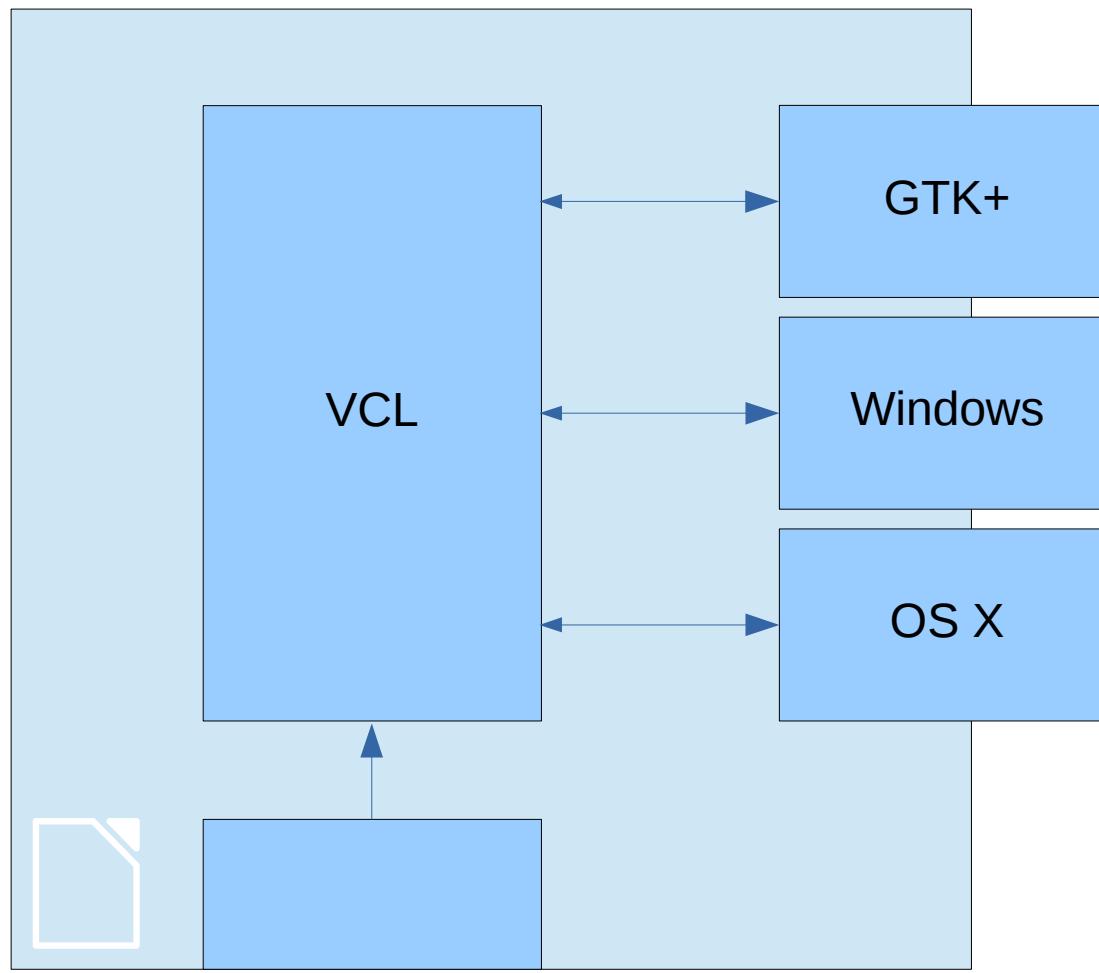
# Screen reader



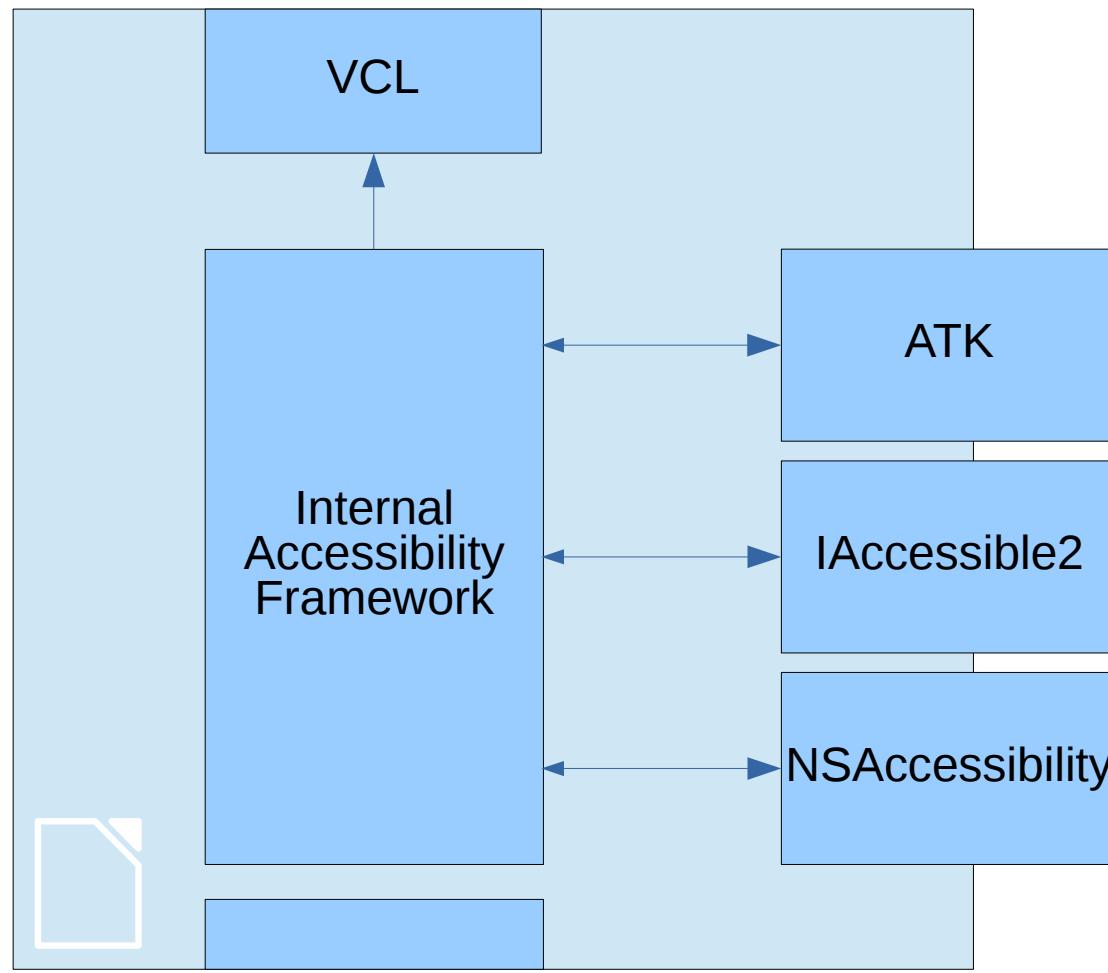
# Screen reader (GNOME)



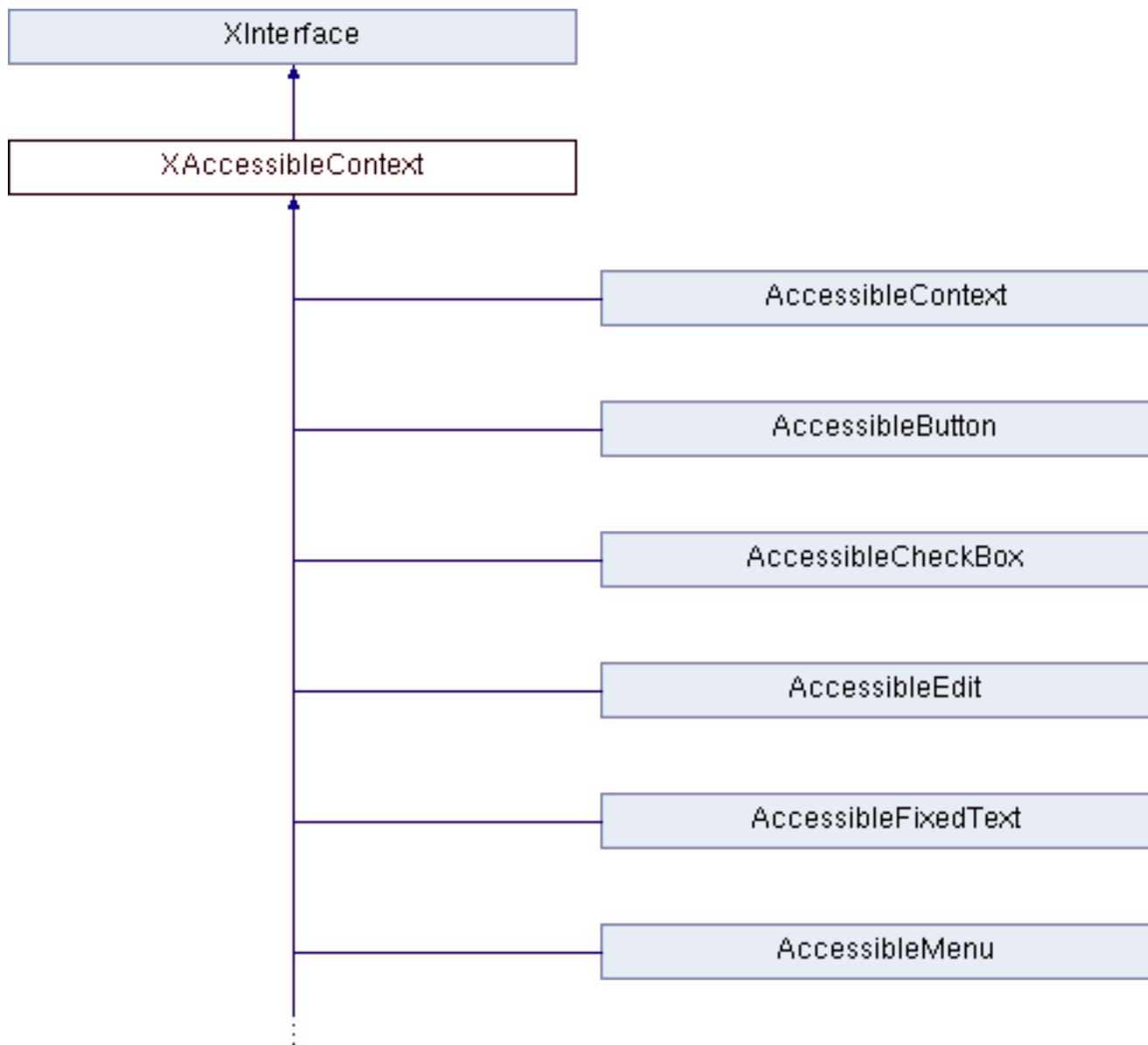
# Architecture



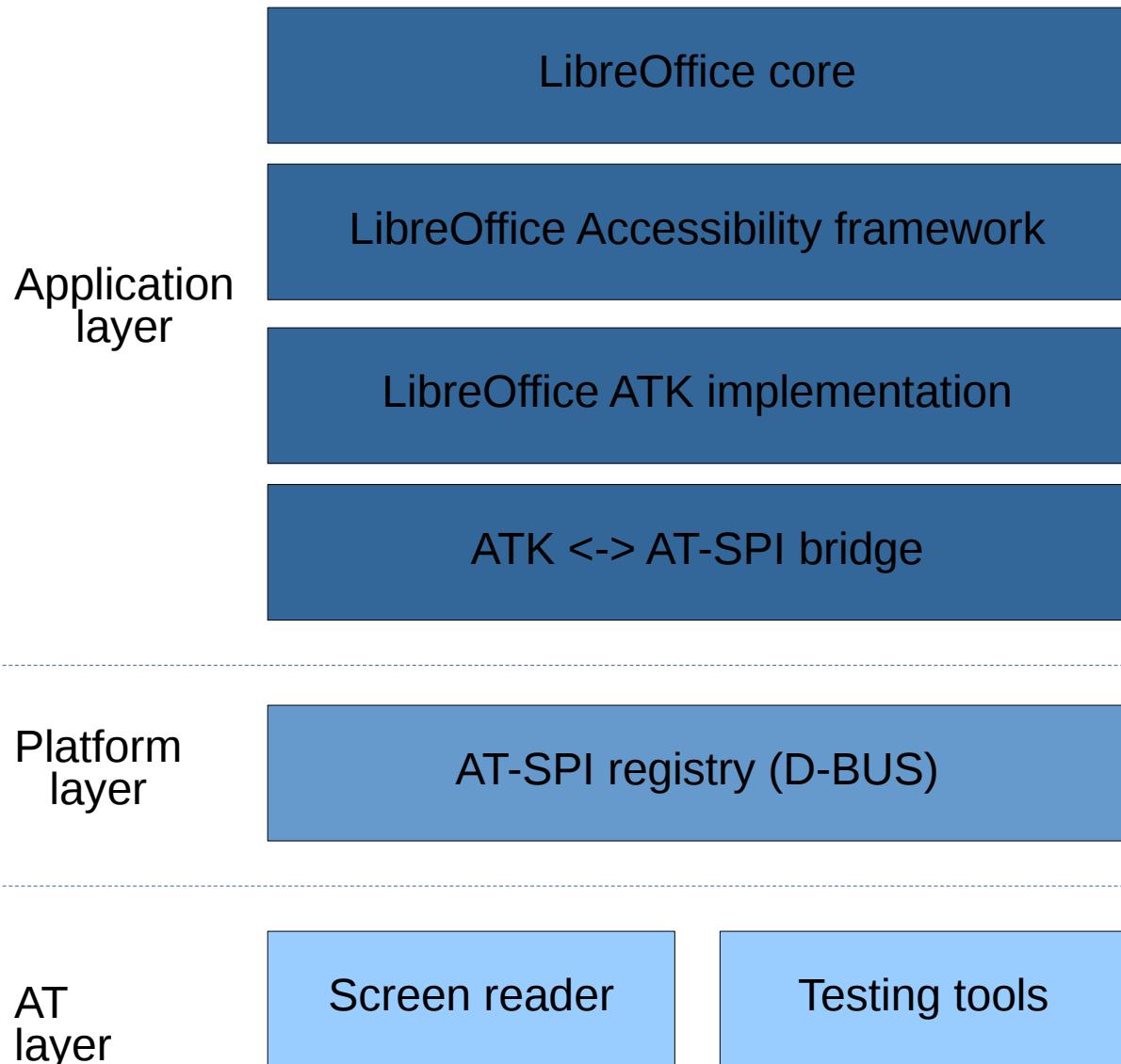
# Architecture



# Interfaces involved



# Layers



# Current status

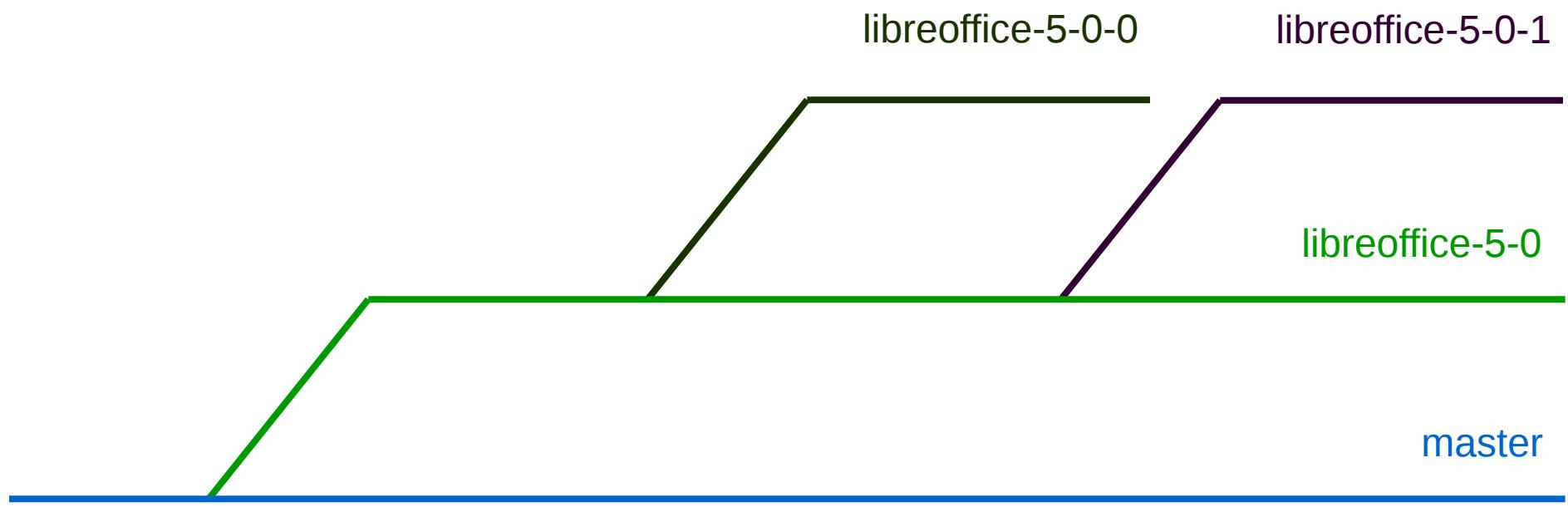
- It's been under real use for years
  - Reports increase, suggests an increase of users
- Of course, there are open bugs
  - Like in any software!
  - New reports are a symptom of good health

# Quality assurance

# Techniques and tools

- Peer review
- Unit tests
- Continuous integration
- *Crashtests*
- Static code analysis
- *Bug triaging*
  - Regression detection tools
- Manual testing

# Peer review



# Peer review

- master branch
  - Commiters without review, 1 review for others
- libreoffice-5-0 branch:
  - Only bugfixing
  - +1 review in any case
- libreoffice-5-0-x branches:
  - Only patches from 5-0 branch
  - +2 reviews

# Peer review

Change 12213 by sushil\_shinde   Review in Progress C [Reply...](#)

Reviewers  
CC test\_jenkins\_mac  
Project core  
Branch master  
Strategy Cherry Pick

Updated 23 hours ago  
Change-Id: I5d664867c982e48d2ff01363659282354822e541  
Topic

Commit 781575e97a42e7873e5de11f7e987151e0591292 ([gitweb](#))  
Author sushil\_shinde <sushilshinde@libreoffice.org> Nov 3, 2014 8:23 AM  
Committer sushil\_shinde <sushilshinde@libreoffice.org> Nov 3, 2014 10:53 AM  
**fdo#85491** : break parameter incorrectly set in .XLSX import.  
1) TextBreak Parameter was bydefault 'false'.  
2) At xichart.cxx::convert() [line:2973] 'TextBreak' property was changed as per 'labelFreq' value.  
4) I have done same thing here and by doing this no existing unit test was failed.  
5) Added unit test to check 'TextBreak' value for chart.

Change-Id: I5d664867c982e48d2ff01363659282354822e541

Code-Review  
Verified

**Files**      Diff against: [Base](#)

	File Path	Comments	Size
▶	Commit Message chart2/qa/extras/chart2import.cxx	21	
A	chart2/qa/extras/data/xlsx/chart-label-text-break.xlsx oox/source/drawingml/chart/axisconverter.cxx	2 +22, -1	

**History**      [Expand All](#)

sushil\_shinde  
Uploaded patch set 1.

test\_jenkins\_mac  
Patch Set 1:  
Build Started [http://ci.libreoffice.org/job/gerrit\\_master/431/](http://ci.libreoffice.org/job/gerrit_master/431/)

test\_jenkins\_mac  
Patch Set 1:  
Build Successful  
[http://ci.libreoffice.org/job/gerrit\\_master/431/](http://ci.libreoffice.org/job/gerrit_master/431/) : SUCCESS

# Unit tests

- Check key elements in documents
  - Import
  - Import + export + import
- Variable coverage
  - Good coverage for new document formats
- No automated UI testing as for now

# Continuous integration

- Several machines are periodically compiling LibreOffice
  - Daily or several times per day
  - Also run unit tests
- Compile patches in code review
- Different platforms
  - All supported platforms and some more (Android, iOS)
- Different compilation options

# Continuous integration

# Crashtests

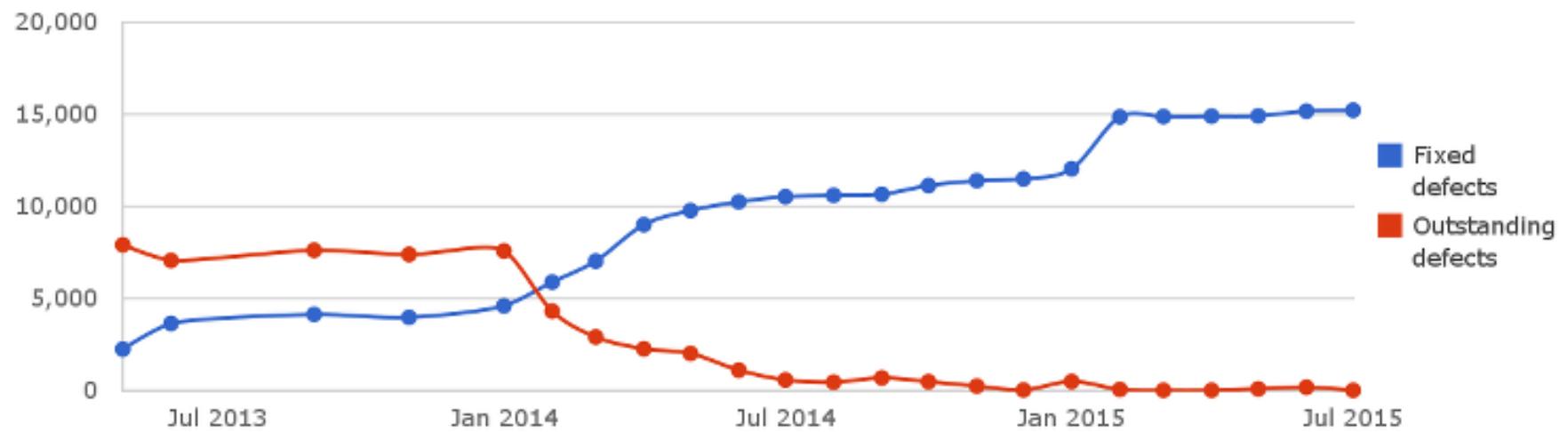
- Check crashes when opening and saving documents
- Sample size: 55000 documents
  - Most come from bug reports
- Periodicity: weekly

# Static code analysis

- Tool *Coverity Scan*
  - Free for open source projects
- Detects: dead code, uninitialized variables, uncaught exceptions...
- Defect density reduced from 1,1 to ~0
  - Density measured in defects every 1000 lines
  - Average for similar sized projects: 0,71

# Static code analysis

**Outstanding vs Fixed defects over period of time**



# Bug triaging

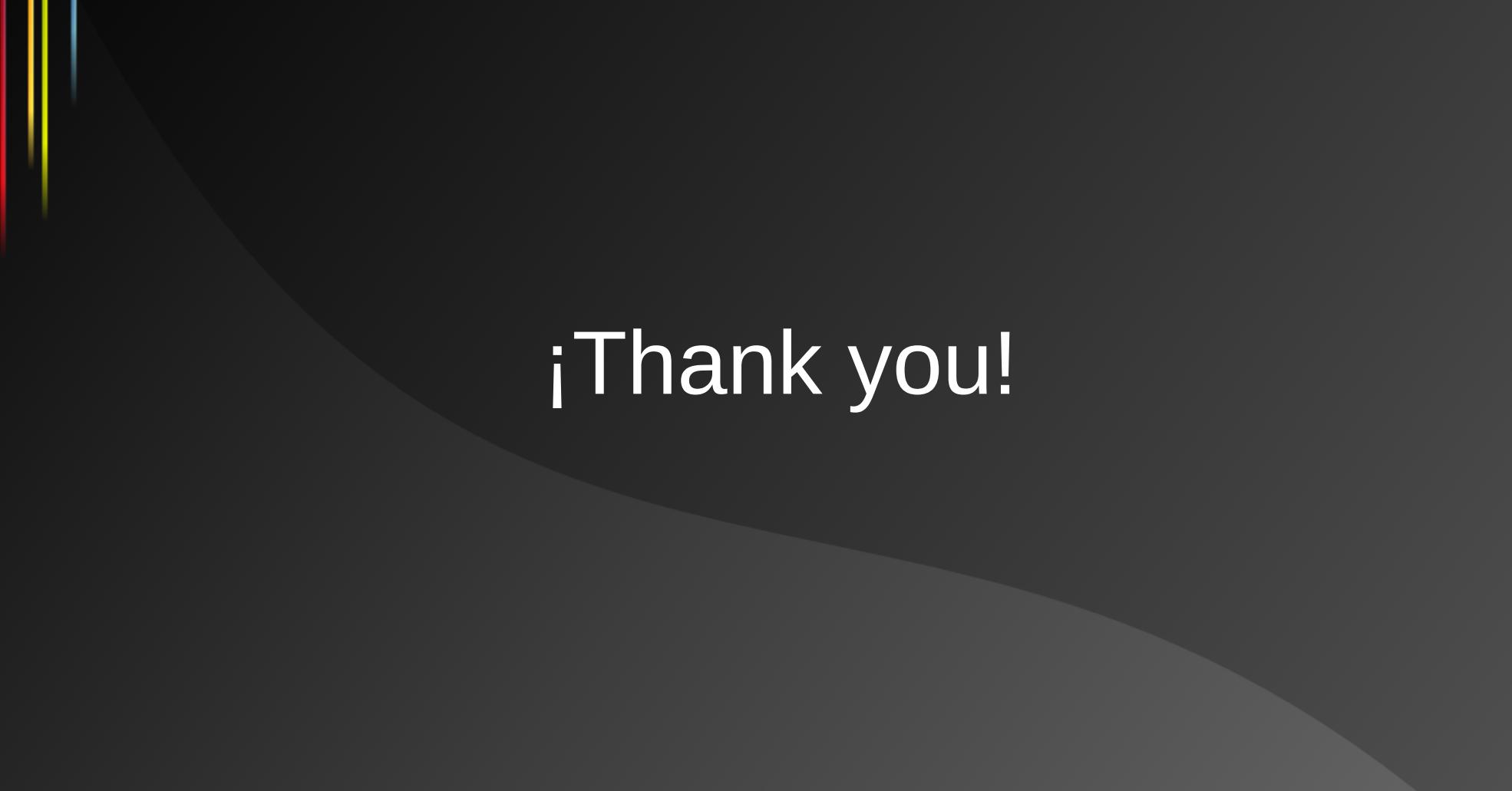
- Periodically check bugzilla reports
  - Confirm bugs
  - Detect duplicates
  - Prioritize
  - Verify patches

# Regression detection tools

- Regression: a problem that was not present in previous versions
- Main tool to fix regressions: *bisect*
  - Binary search of the guilty commit
  - Recompilation cycle makes it unfeasible in LibreOffice
- LibreOffice tool: *bi-bisect (binary bisect)*
  - Binary repository from different development stages
  - Recompilation not necessary

# Manual testing

- List of tests to be manually run
  - Tool: MozTrap
  - Testing rounds for every pre-release (betas, release candidates)
- “Freestyle” testing
- Bug hunting sessions



# ¡Thank you!



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