

# LibreOffice

## Architecture, accessibility and QA

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

```
    attribute */  
    uint64  
    CODE,  
    "de.",  
    "de",  
    0,  
    64,  
    /*  
    /,  
    E
```

Jacobo Aragunde Pérez

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

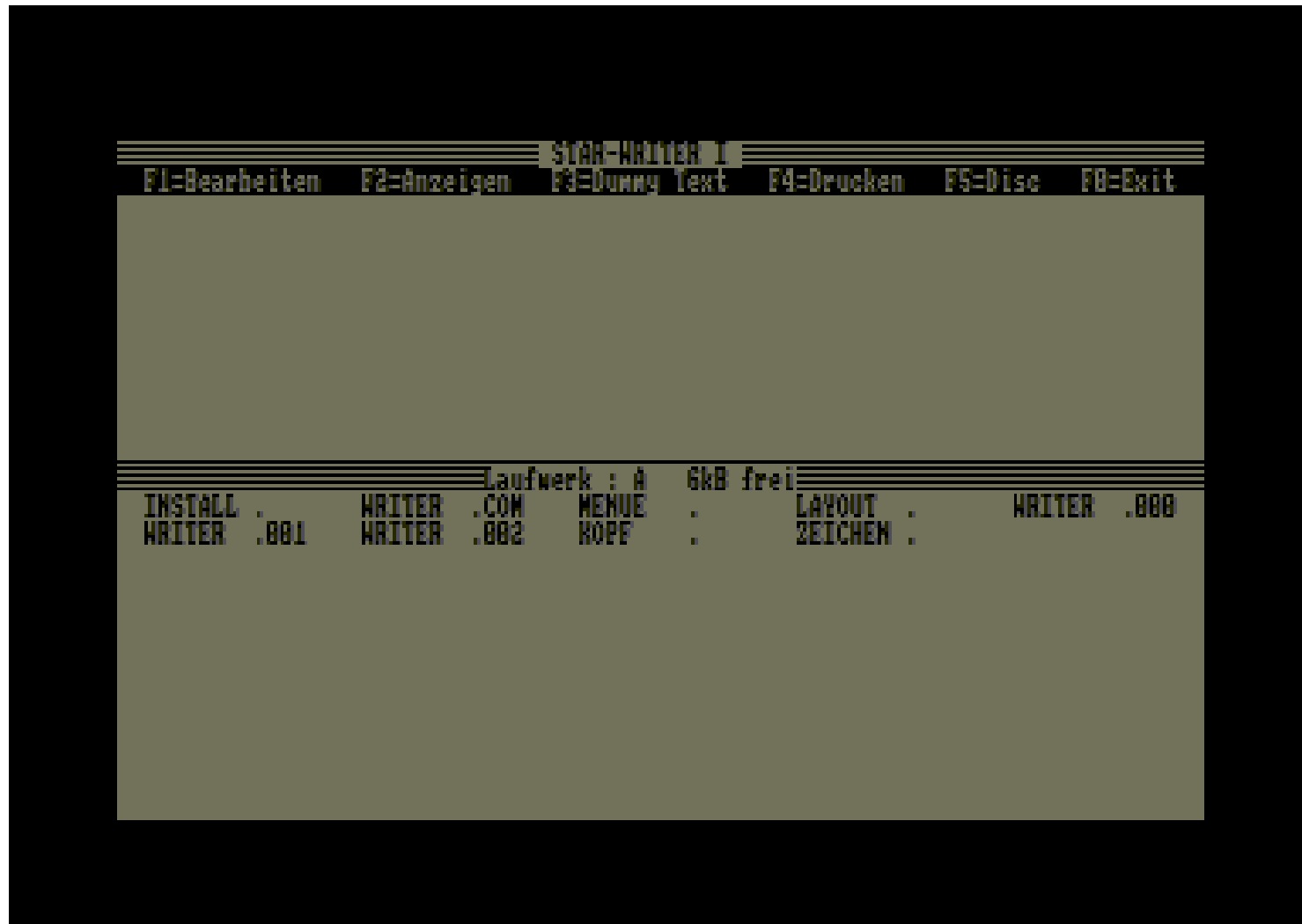


# Project history

# Some history

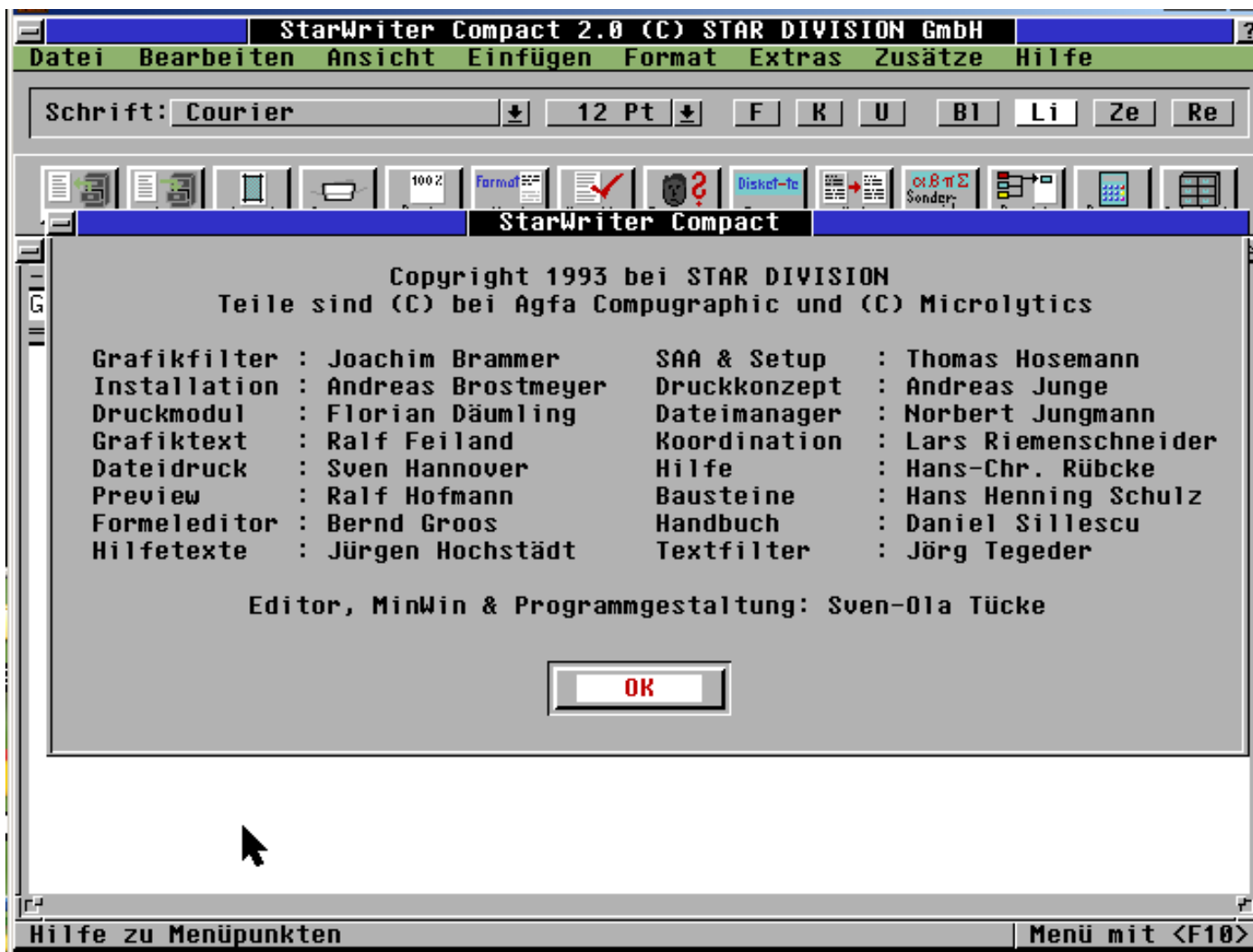
- 1985: StarWriter for Z80 micros
- 1986: StarDivision founded, StarOffice
- 1999: Sun Microsystems acquires StarDivision

# StarWriter 1.0, 1986



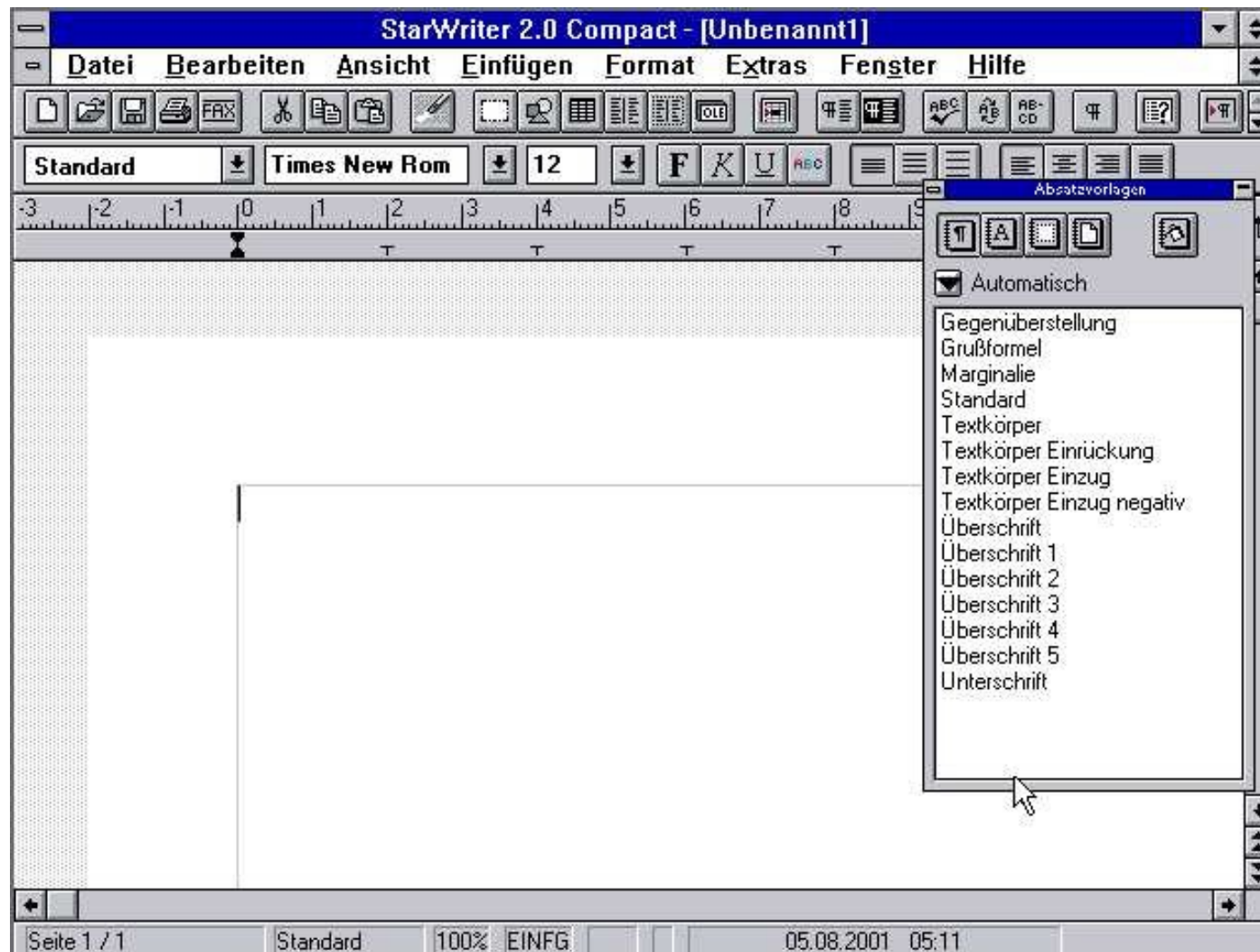
(source)

# StarOffice 2.0, 1994



(source)

# StarOffice 2.0, 1994



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# StarOffice 5.2, 2000

StarOffice 5.2 - [kupfer.sdw]

File Edit View Insert Format Tools Window Help

file:///home/warmada/My-Data/Pongkor/soff

Standard Times 12

**Kupfer**

Erzminerale

Chalkopyrit	$\text{CuFeS}_2$	34,5% Cu	D=4,2-4,3
Chalkosin	$\text{Cu}_2\text{S}$	80	5,7-5,8
Enargit	$\text{Cu}_3\text{AsS}_4$	48	4,4
Digenit	$\text{Cu}_5\text{S}_8$	78	5,7-5,8
Covellin	$\text{Cu}_2\text{S}$	66	4,7
Cuprit	$\text{Cu}_2\text{O}$	89	6,2
Malachit	$\text{Cu}_2(\text{OH})_2\text{CO}_3$	72	4

- Bauwürdig 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 Metalles 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

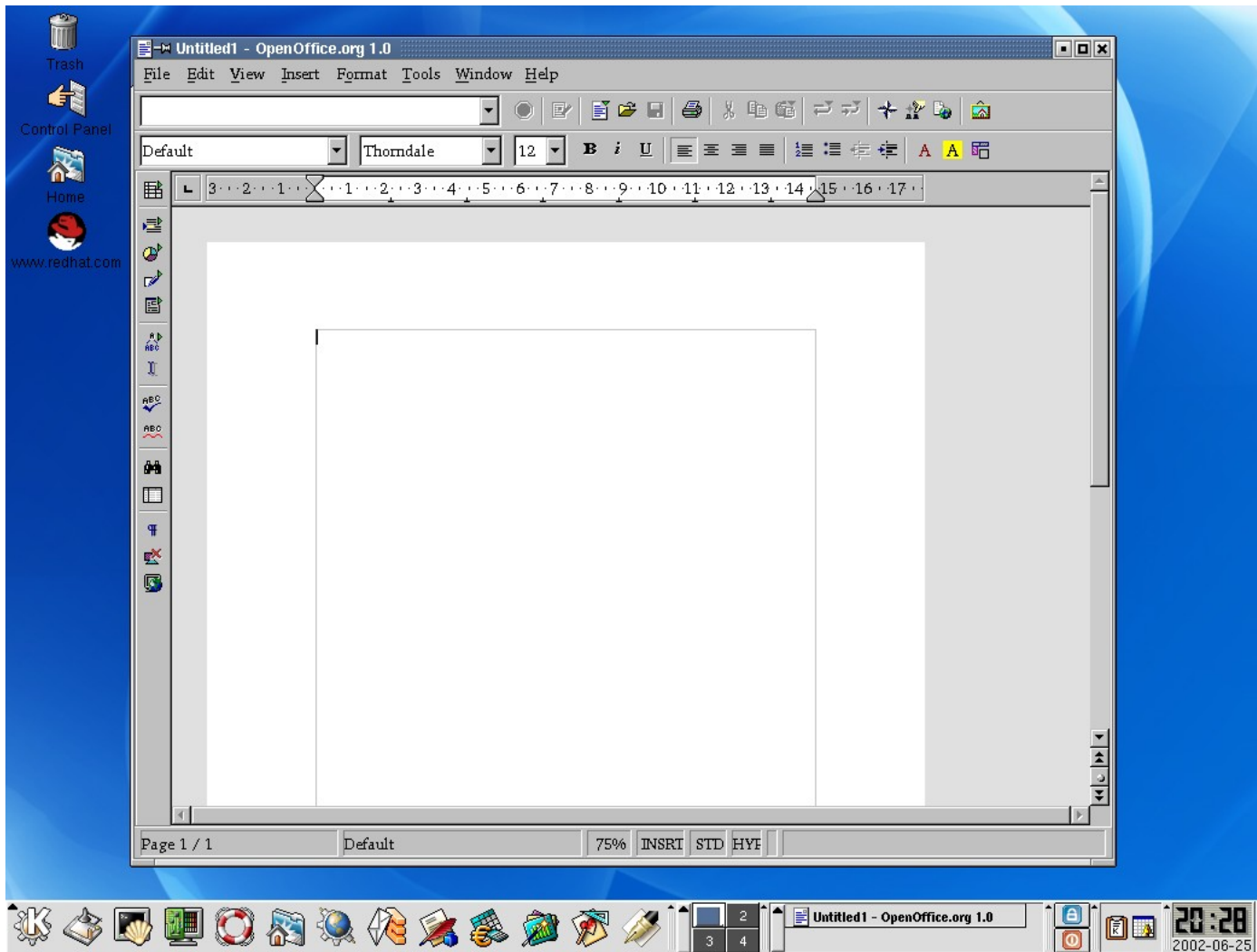
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# Some history

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

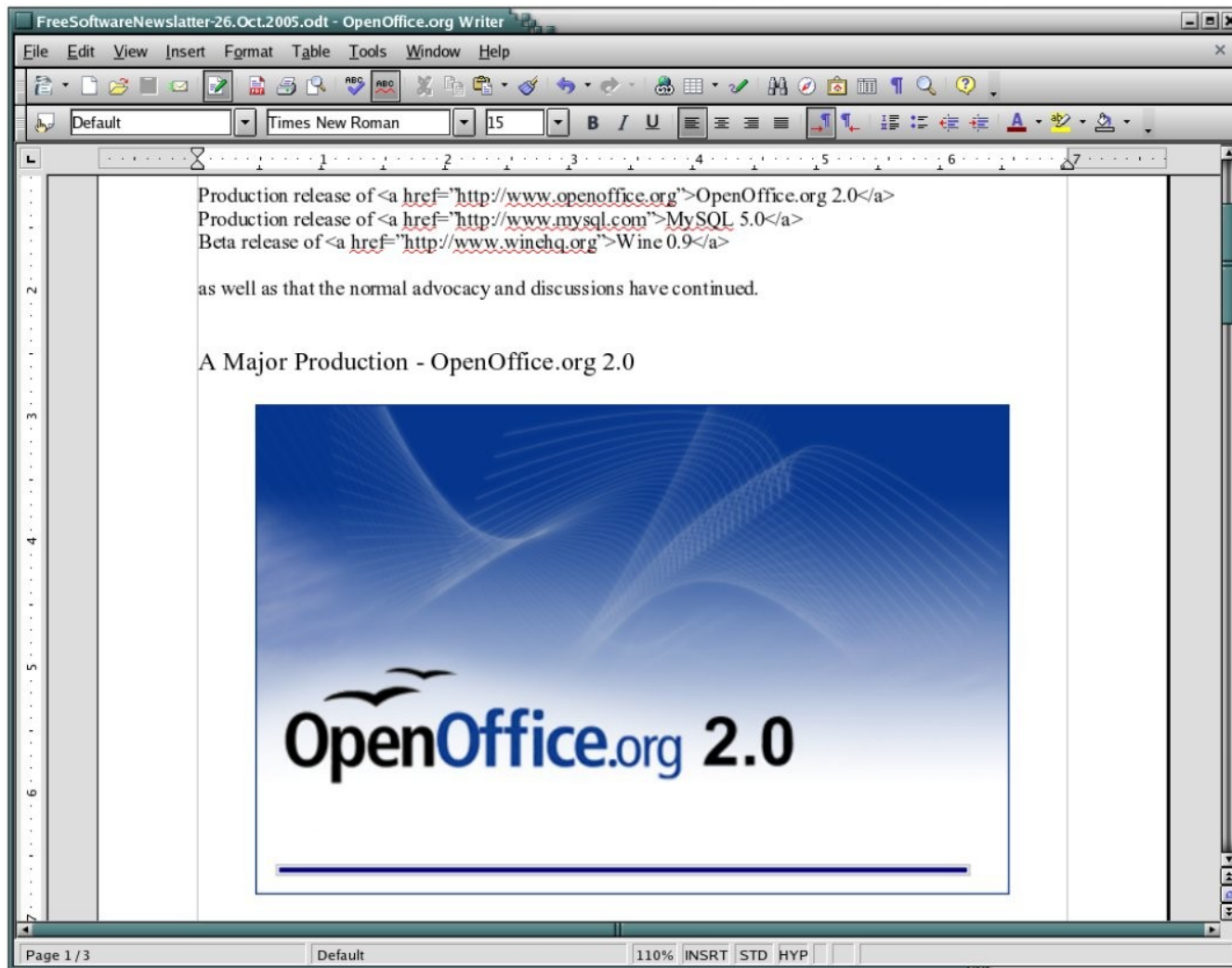


# OpenOffice.org 1.0, 2002



(source)

# OpenOffice.org 2.0, 2005

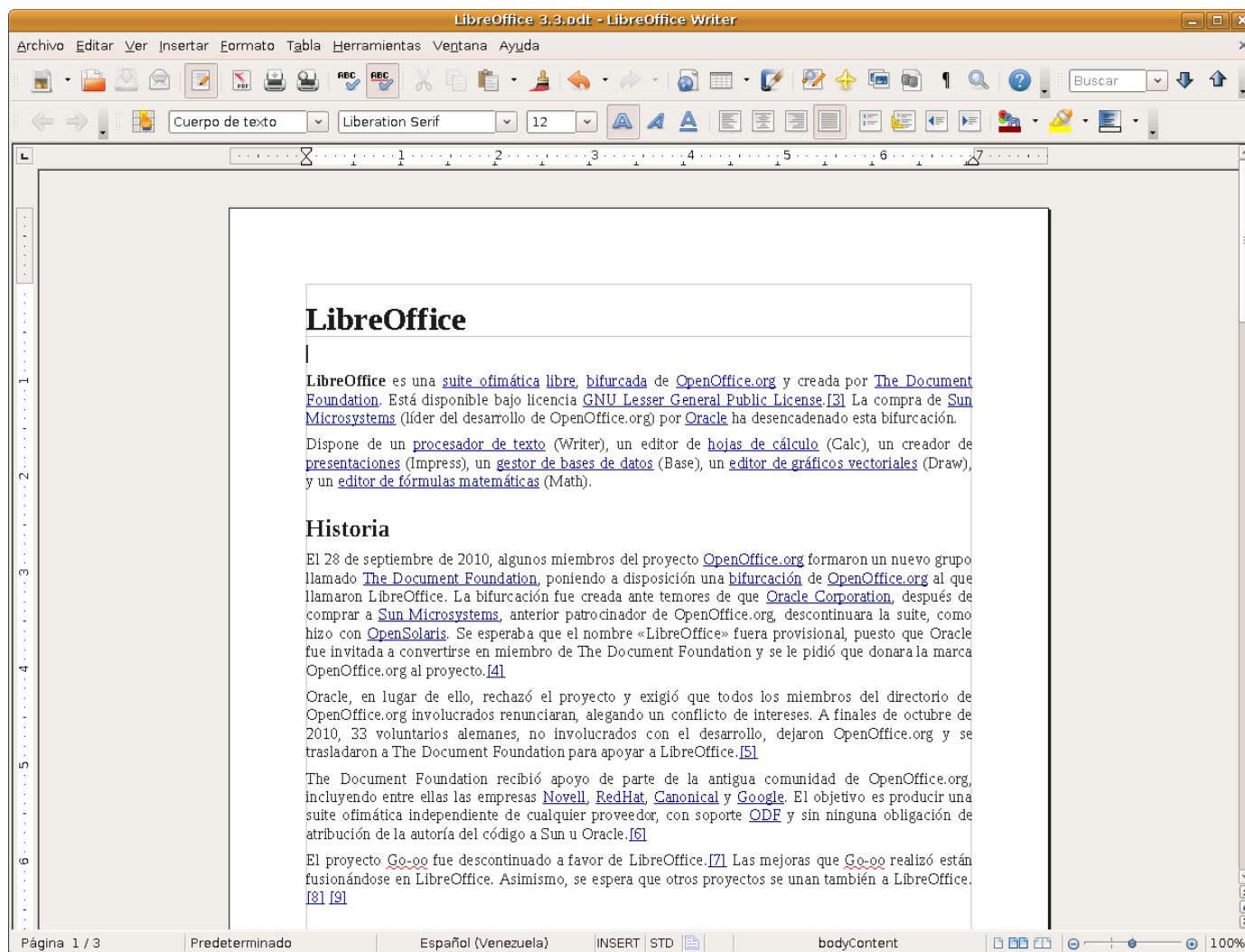


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# Some history

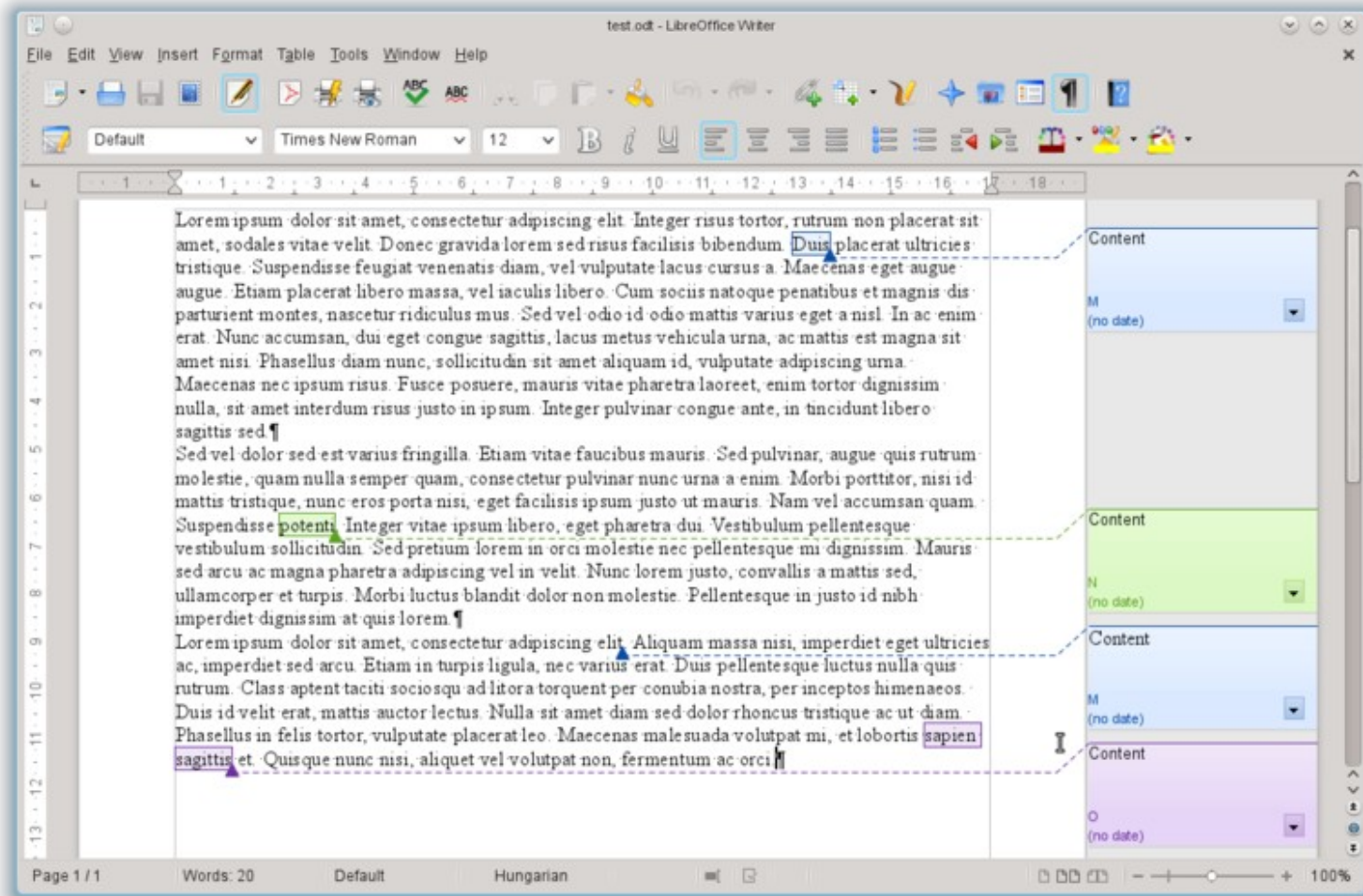
- 2010: Oracle acquires Sun
- 2010: LibreOffice and The Document Foundation
- 2011: Apache OpenOffice

# LibreOffice 3.3, 2010



(source)

# LibreOffice 4.x, 2013-15



(source)

# LibreOffice 5.x, 2015-17

tdf-migrationwhitepaper1.pdf - LibreOffice Writer

File Edit View Insert Format Styles Table Tools Window Help

Autore Liberation Se 12

**LibreOffice**  
The Document Foundation

## White Paper

### Migrating to LibreOffice to promote Software and Document Freedom

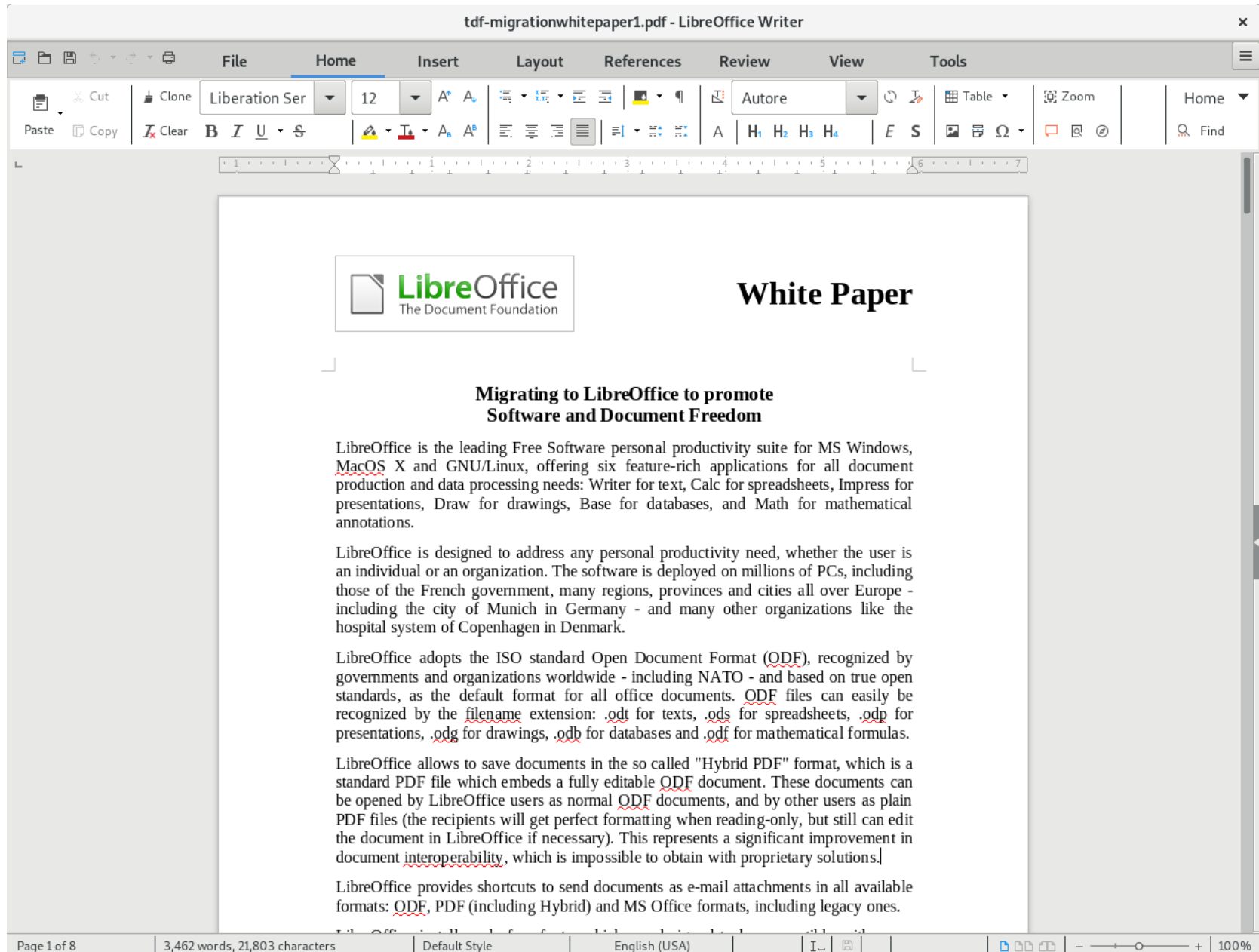
LibreOffice is the leading Free Software personal productivity suite for MS Windows, MacOS X and GNU/Linux, offering six feature-rich applications for all document production and data processing needs: Writer for text, Calc for spreadsheets, Impress for presentations, Draw for drawings, Base for databases, and Math for mathematical annotations.

LibreOffice is designed to address any personal productivity need, whether the user is an individual or an organization. The software is deployed on millions of PCs, including those of the French government, many regions, provinces and cities all over Europe - including the city of Munich in Germany - and many other organizations like the hospital system of Copenhagen in Denmark.

LibreOffice adopts the ISO standard Open Document Format (ODF), recognized by governments and organizations worldwide - including NATO - and based on true open standards, as the default format for all office documents. ODF files can easily be recognized by the filename extension: .odt for texts, .ods for spreadsheets, .odp for

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

# LibreOffice 6.x, 2018-



tdf-migrationwhitepaper1.pdf - LibreOffice Writer

File Home Insert Layout References Review View Tools

Cut Clone Liberation Ser 12 A<sup>+</sup> A<sup>-</sup> Paste Copy Clear B I U A<sup>+</sup> A<sup>-</sup> Autore Table Zoom Home Find

LibreOffice  
The Document Foundation

## White Paper

### Migrating to LibreOffice to promote Software and Document Freedom

LibreOffice is the leading Free Software personal productivity suite for MS Windows, MacOS X and GNU/Linux, offering six feature-rich applications for all document production and data processing needs: Writer for text, Calc for spreadsheets, Impress for presentations, Draw for drawings, Base for databases, and Math for mathematical annotations.

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LibreOffice allows to save documents in the so called "Hybrid PDF" format, which is a standard PDF file which embeds a fully editable ODF document. These documents can be opened by LibreOffice users as normal ODF documents, and by other users as plain PDF files (the recipients will get perfect formatting when reading-only, but still can edit the document in LibreOffice if necessary). This represents a significant improvement in document interoperability, which is impossible to obtain with proprietary solutions.

LibreOffice provides shortcuts to send documents as e-mail attachments in all available formats: ODF, PDF (including Hybrid) and MS Office formats, including legacy ones.

Page 1 of 8 | 3,462 words, 21,803 characters | Default Style | English (USA) | 100%

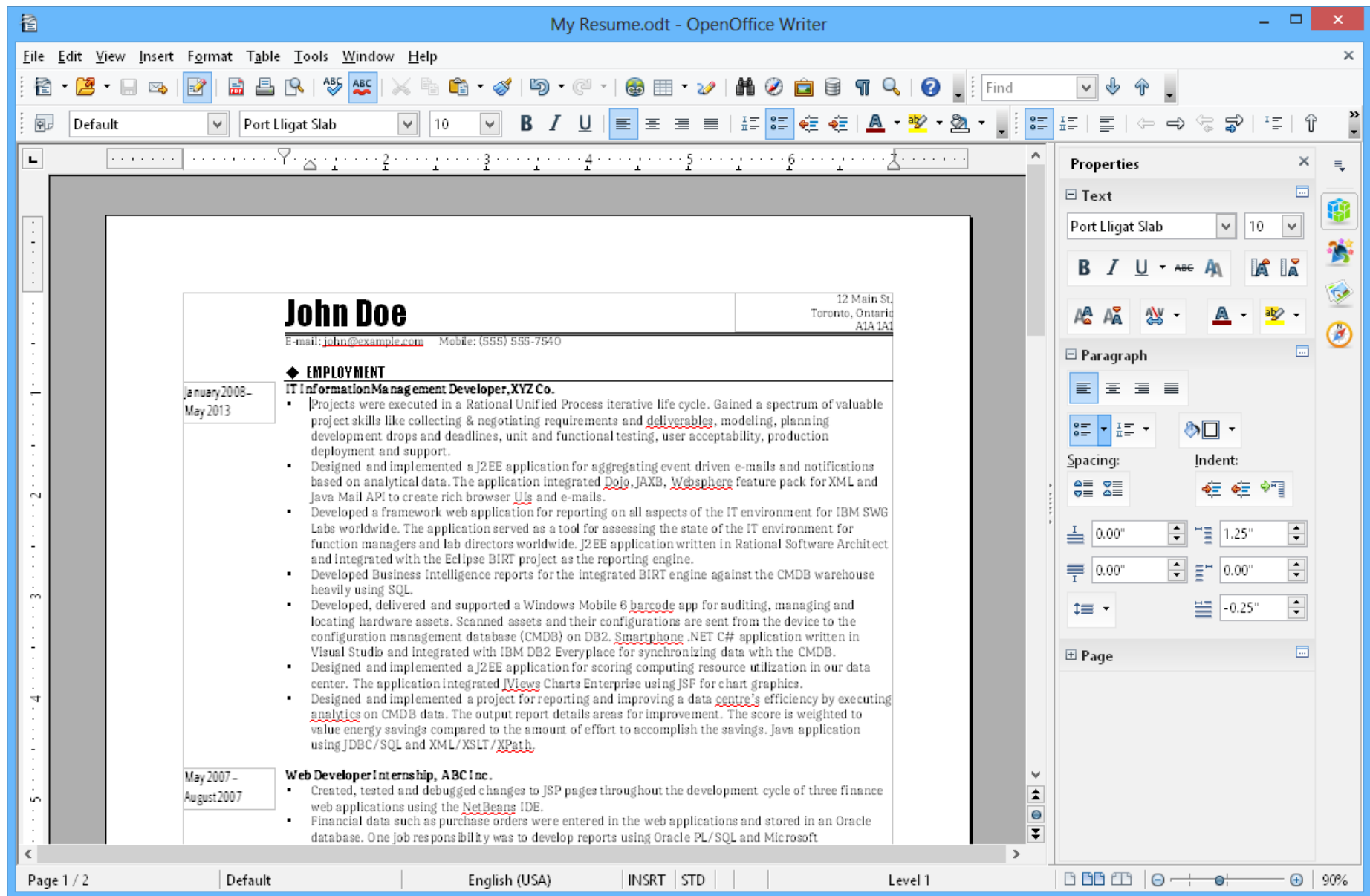
# LibreOffice Online, 2019

The screenshot displays the LibreOffice Online web interface. The browser's address bar shows the URL for 'example.odt'. The interface includes a top navigation bar with menu items: Archivo, Editar, Ver, Insertar, Formato, Tabla, Herramientas, and Ayuda. A status bar below the menu indicates the last modification was 'hace 4 años'. The main editing area contains a document titled 'ownCloud Example Document'. The document text reads: 'Welcome to ownCloud, your self-hosted file sync and share solution. OwnCloud is open source file sync and share software for everyone from individuals operating the free Community Edition, to large enterprises and service providers operating ownCloud Enterprise Edition. ownCloud provides a safe, secure and compliant file sync and share solution on servers you control. With ownCloud you can share one or more folders on your PC, and sync them with your ownCloud server. Place files in your local shared directories, and those files are immediately synced to the server, and then to other PCs via the desktop client. Not near a desktop client? No problem, simply log in with the web client and manage your files there. The Android and iOS mobile apps allow you to browse, download and upload photos and videos. On Android, you may also create, download, edit and upload any other files, with the correct software installed. Whether using a mobile device, a workstation, or a web client, ownCloud provides the ability to put the right files in the right hands at the right time on any device in one simple-to-use, secure, private and controlled solution. After all, with ownCloud, it's Your Cloud, Your Data, Your Way.'

At the bottom of the interface, there is a search bar, a page indicator 'Página 1 de 1', a character count '204 palabras, 1.239 caracteres', and a status bar showing '2 usuarios' and a zoom level of '100%'.



# Apache OpenOffice 4.1.7, 2019



(source)

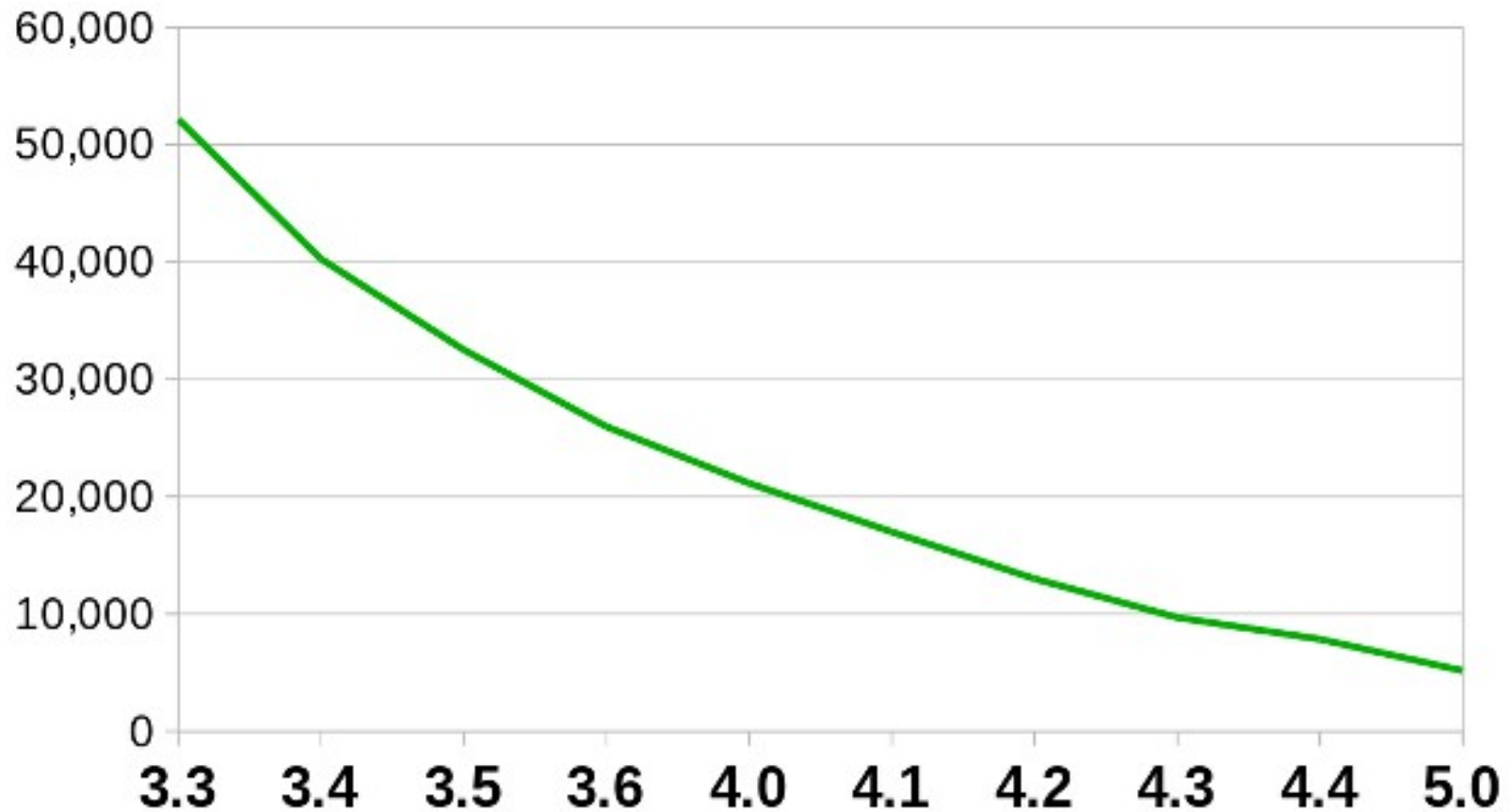
# The project today

# Development figures

- Around 400 weekly commits by 50 different authors
- 9M lines of code
- ~28 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.”
- Still 50000 lines of German code comments when LibreOffice was forked!
  - Bug closed in 2018

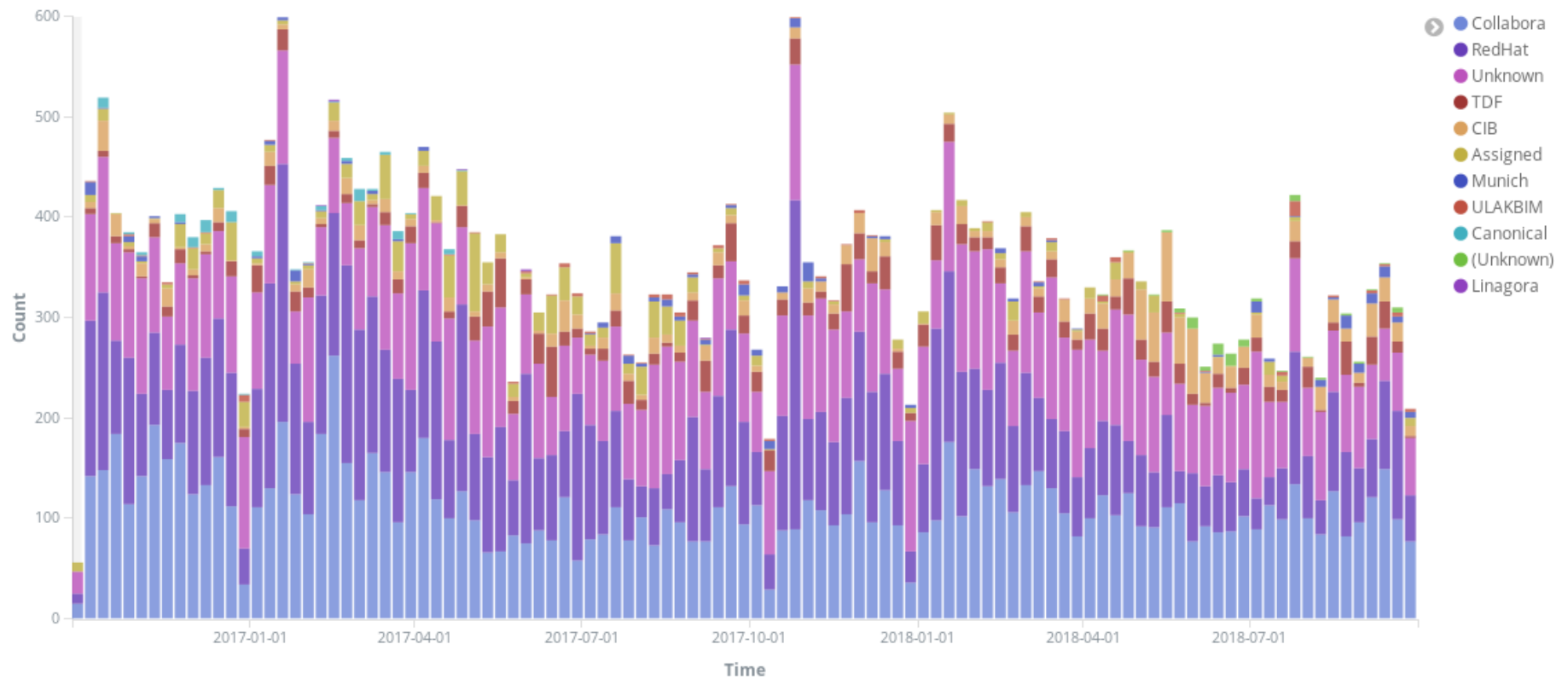
# Stats: German comments

Detected lines of German comment



# Stats: commits (Oct 16-Sep 18)

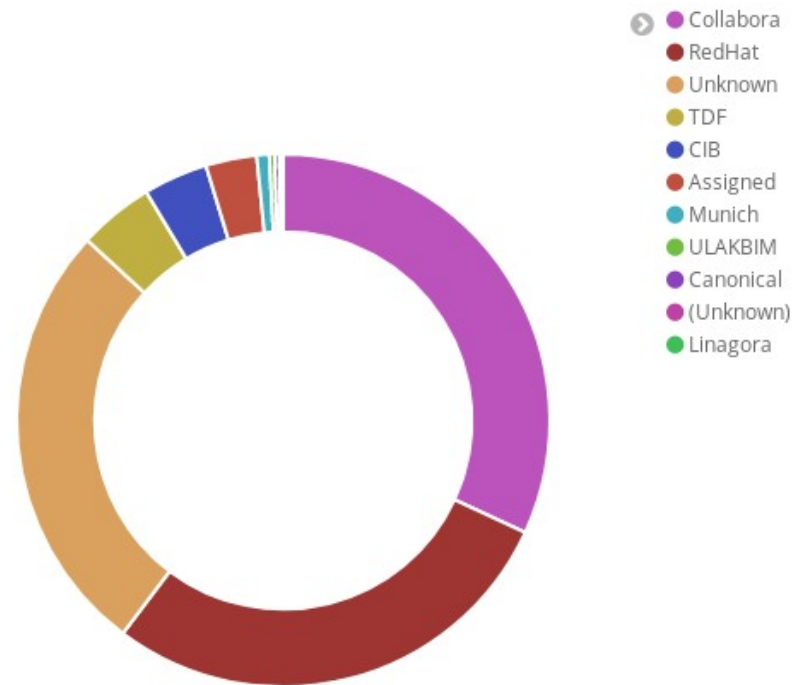
Organizations



(source)

# Stats: commits (Oct 16-Sep 18)

Organizations



(source)

# Release calendar

- *Release early, release often*
- Major release every six months (6.3.0)
  - Brings new features
- Minor release ~ every month (6.3.1, etc.)
  - Bugfixing only
- End of life: 9 months
- Always two versions coexisting
  - Right now: 6.2.8 and 6.3.3

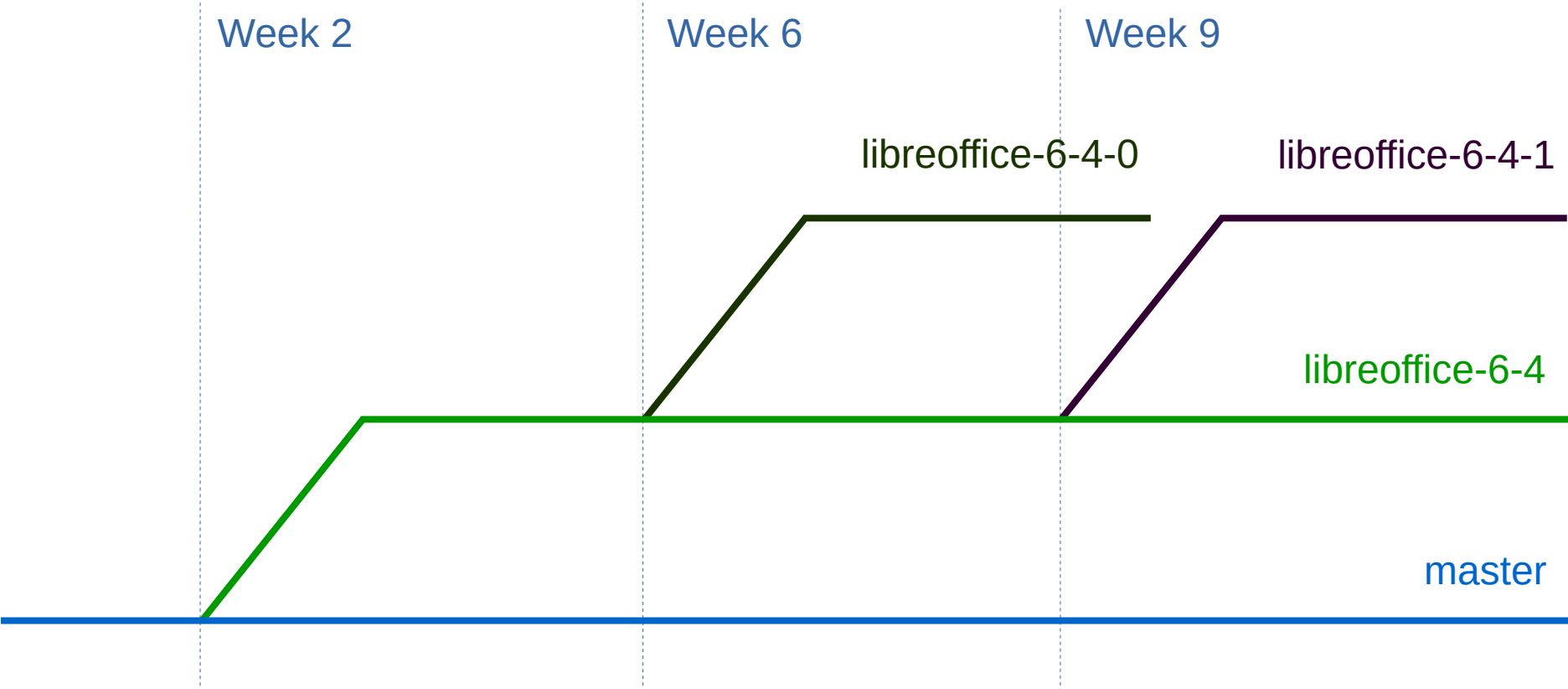
# Release calendar

- Plan for 6.4
  - <https://wiki.documentfoundation.org/ReleasePlan>

Release	Freeze	Publishing
<b>6.4.0 (freeze: week 02)</b>	Week 42 , Oct 14, 2019 - Oct 20, 2019	Week 05 , Jan 27, 2020 - Feb 2, 2020
<b>6.4.1</b>	Week 06 , Feb 3, 2020 - Feb 9, 2020	Week 09 , Feb 24, 2020 - Mar 1, 2020
<b>6.4.2</b>	Week 09 , Feb 24, 2020 - Mar 1, 2020	Week 12 , Mar 16, 2020 - Mar 22, 2020
<b>6.4.3</b>	Week 13 , Mar 23, 2020 - Mar 29, 2020	Week 16 , Apr 13, 2020 - Apr 19, 2020
<b>6.4.4</b>	Week 18 , Apr 27, 2020 - May 3, 2020	Week 21 , May 18, 2020 - May 24, 2020
<b>6.4.5</b>	Week 24 , Jun 8, 2020 - Jun 14, 2020	Week 27 , Jun 29, 2020 - Jul 5, 2020
<b>6.4.6</b>	Week 30 , Jul 20, 2020 - Jul 26, 2020	Week 33 , Aug 10, 2020 - Aug 16, 2020
<b>6.4.7</b>	Week 39 , Sep 21, 2020 - Sep 27, 2020	Week 42 , Oct 12, 2020 - Oct 18, 2020
<b>End of Life</b>	November 30, 2020	



# Branch model



# 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
  - OOXML
  - Document Liberation Project
- GTK+ 3, Wayland, KDE Plasma
- UX improvements (design team)
- Polish

# Architecture

# General considerations

- There is not a global, application-wide design
  - Document filters: finite-state machine
  - VCL (visual components library): modeled after existing UI frameworks
  - Document model: Frame-Controller-Model

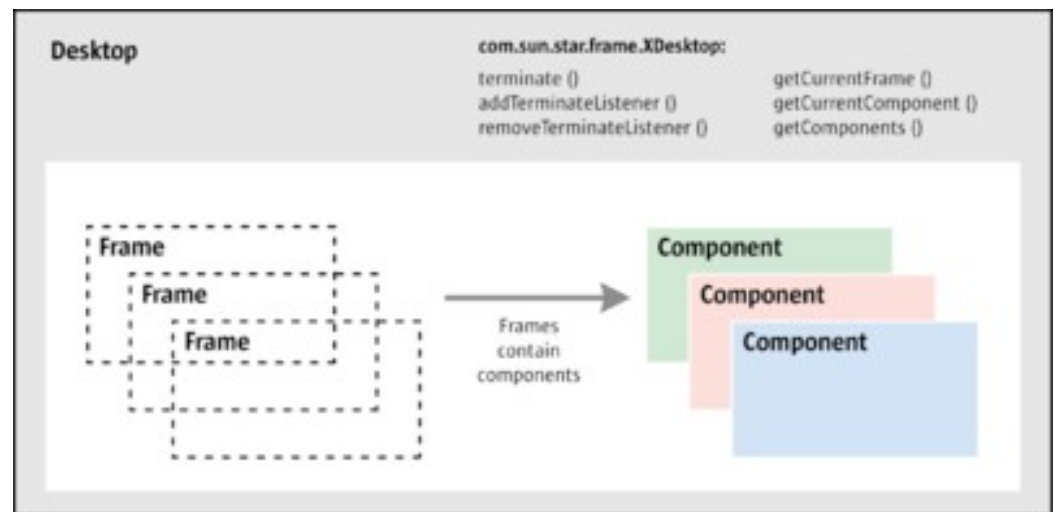
# Frame-Controller-Model

- 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
  - Bidirectional communication between controller and UI
  - Hierarchical organization



# Other elements

- Component
  - Common interface between controller and frame
  - A frame can contain several components, which are either controllers of other frames
- 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

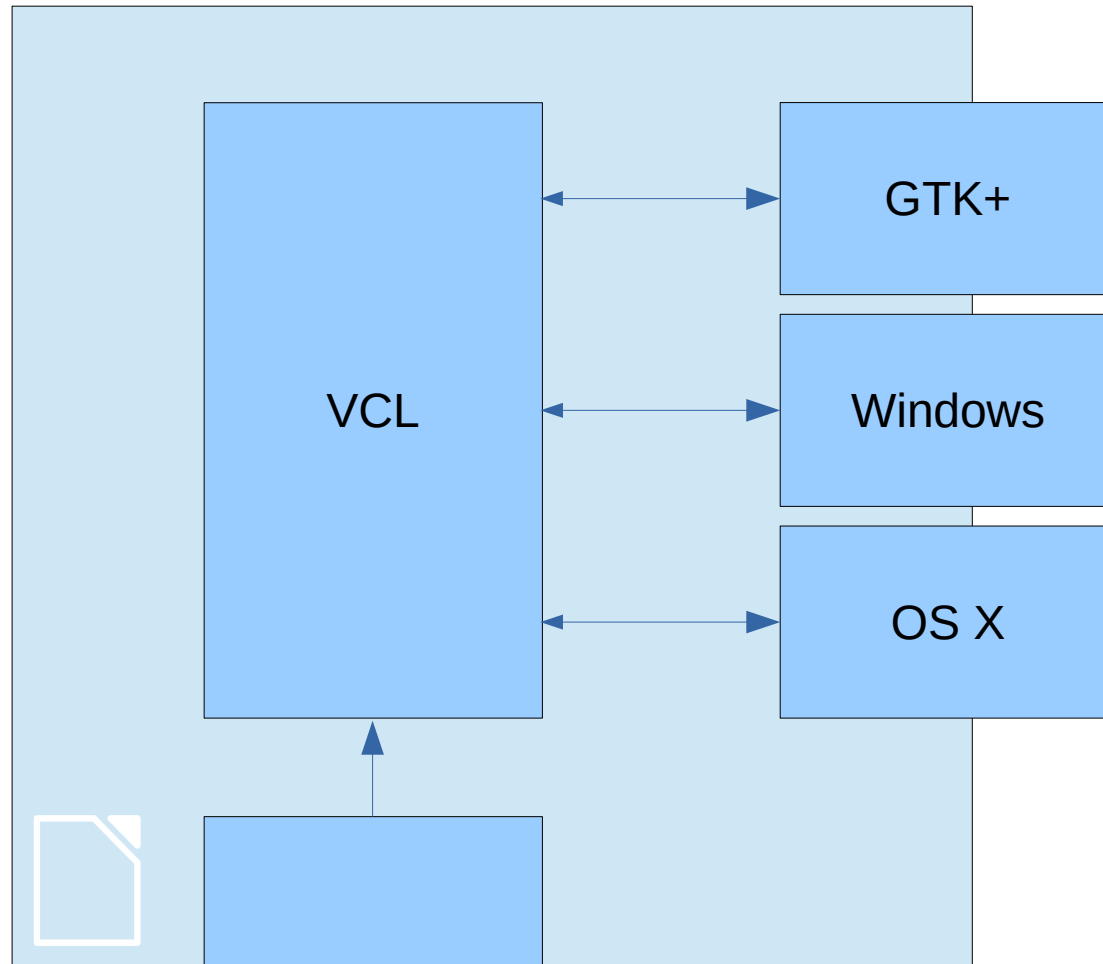
# Other considerations

- Sometimes, interfaces expose the Frame-Controller-Model architecture but the implementation does not match
  - Historical reasons: architecture was engineered over an existing code base
  - Need to provide uniform API

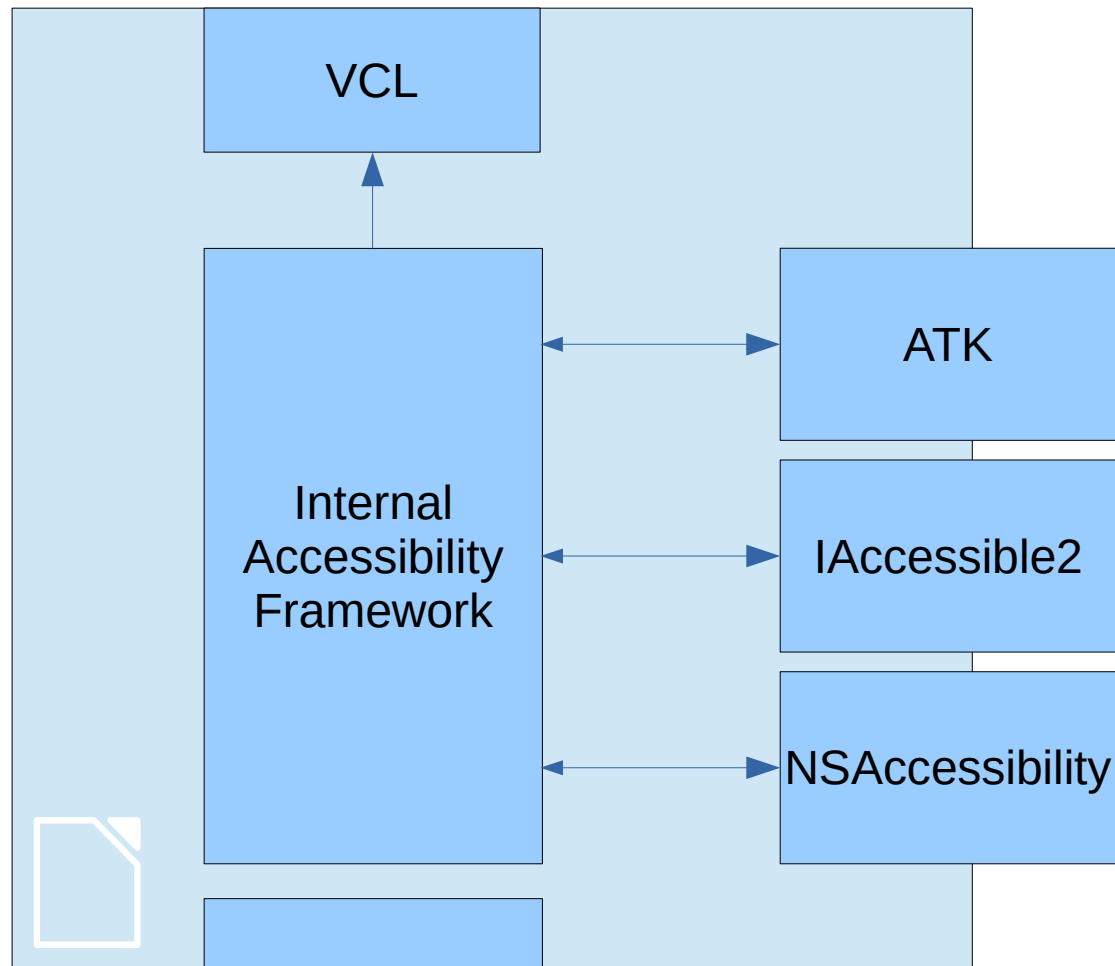
# Visual components library

- Abstract UI elements: buttons, menus, etc.
- Each abstract element wraps an actual element of a supported UI framework
- Several UI frameworks available, enabled in compile time
  - GTK+, Windows, OSX

# Visual components library



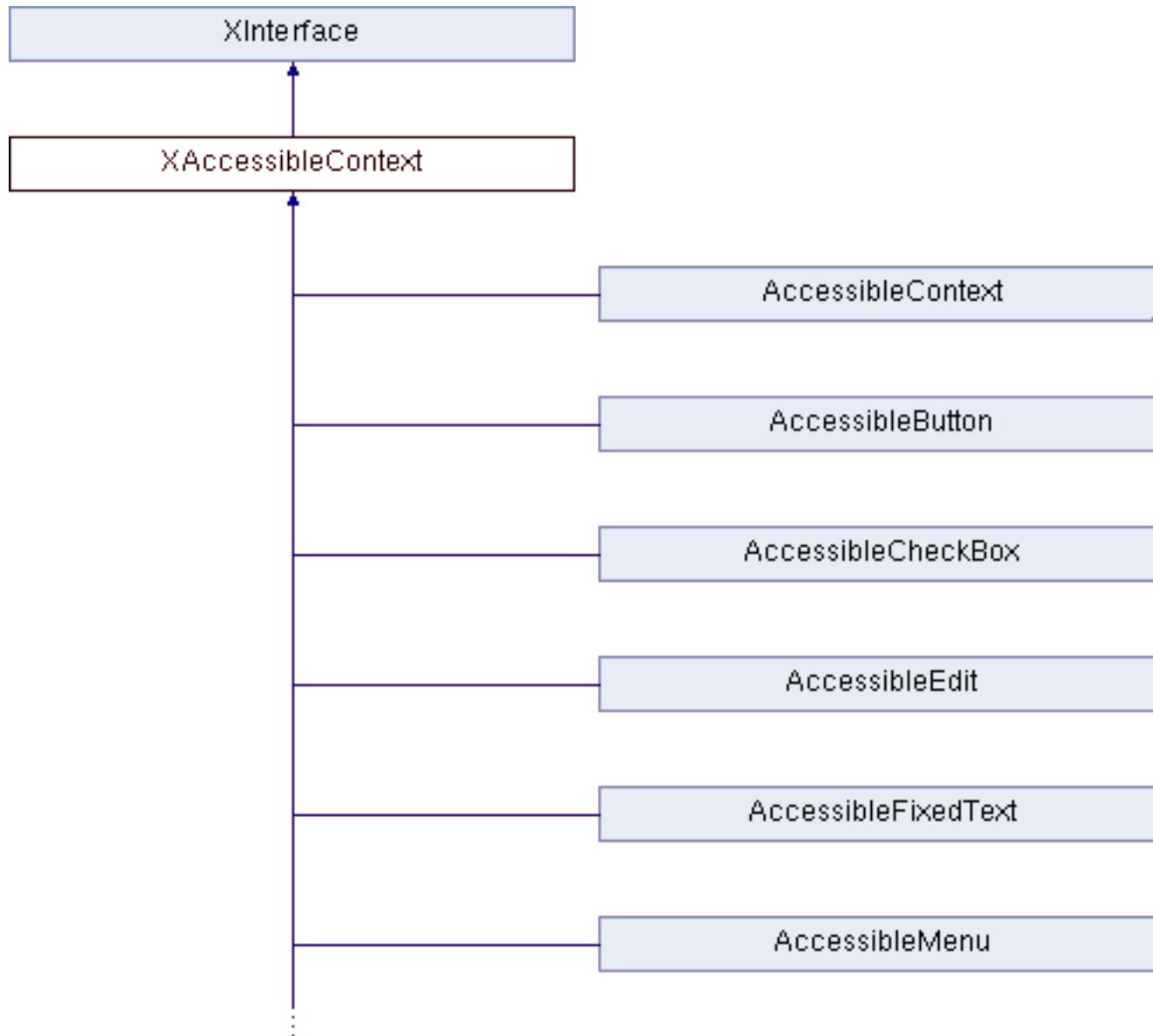
# Accessibility framework



# Accessibility framework

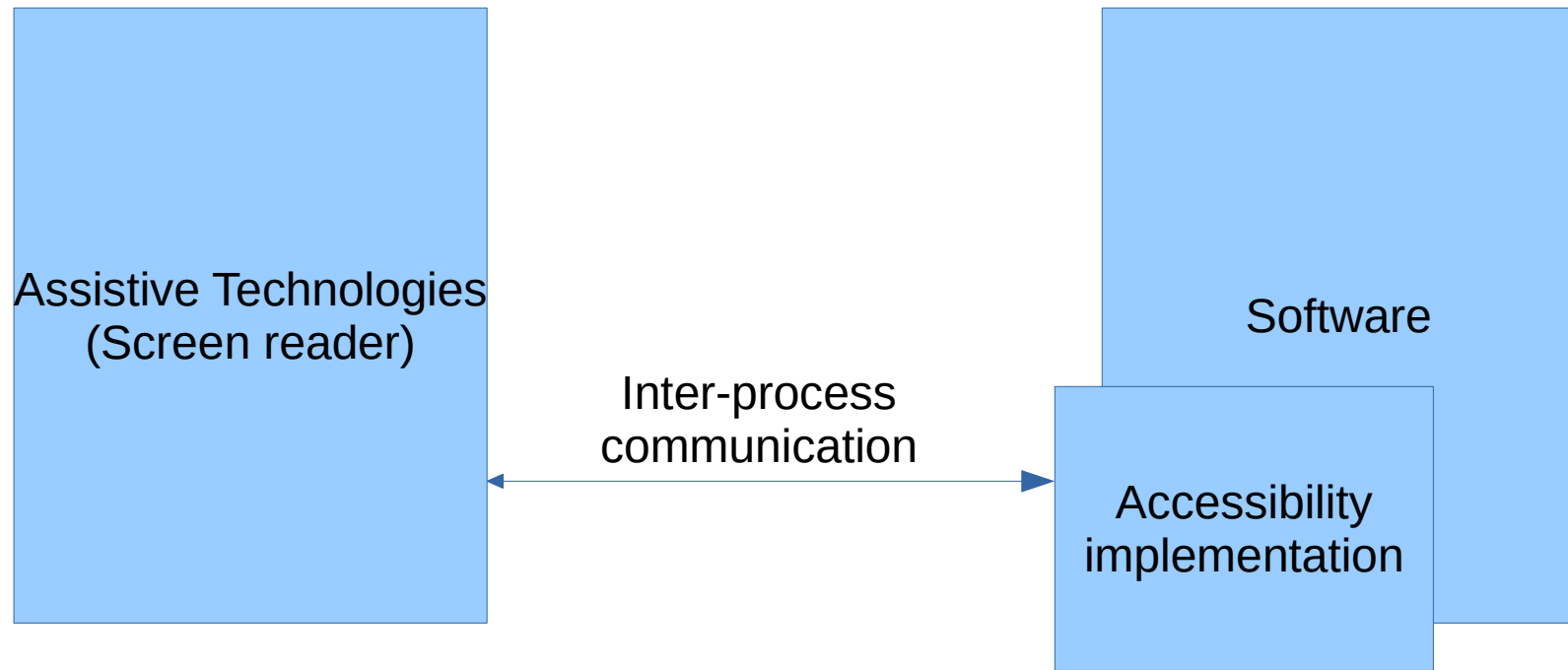
- Abstract accessible elements: buttons, menus, etc.
- Accessible elements match members of the VCL and wrap native classes of the a11y framework
- Several frameworks available, enabled in compile time
  - ATK (Linux), IAccessible2 (Windows), NSAccessibility (OSX)

# Interfaces involved in a11y

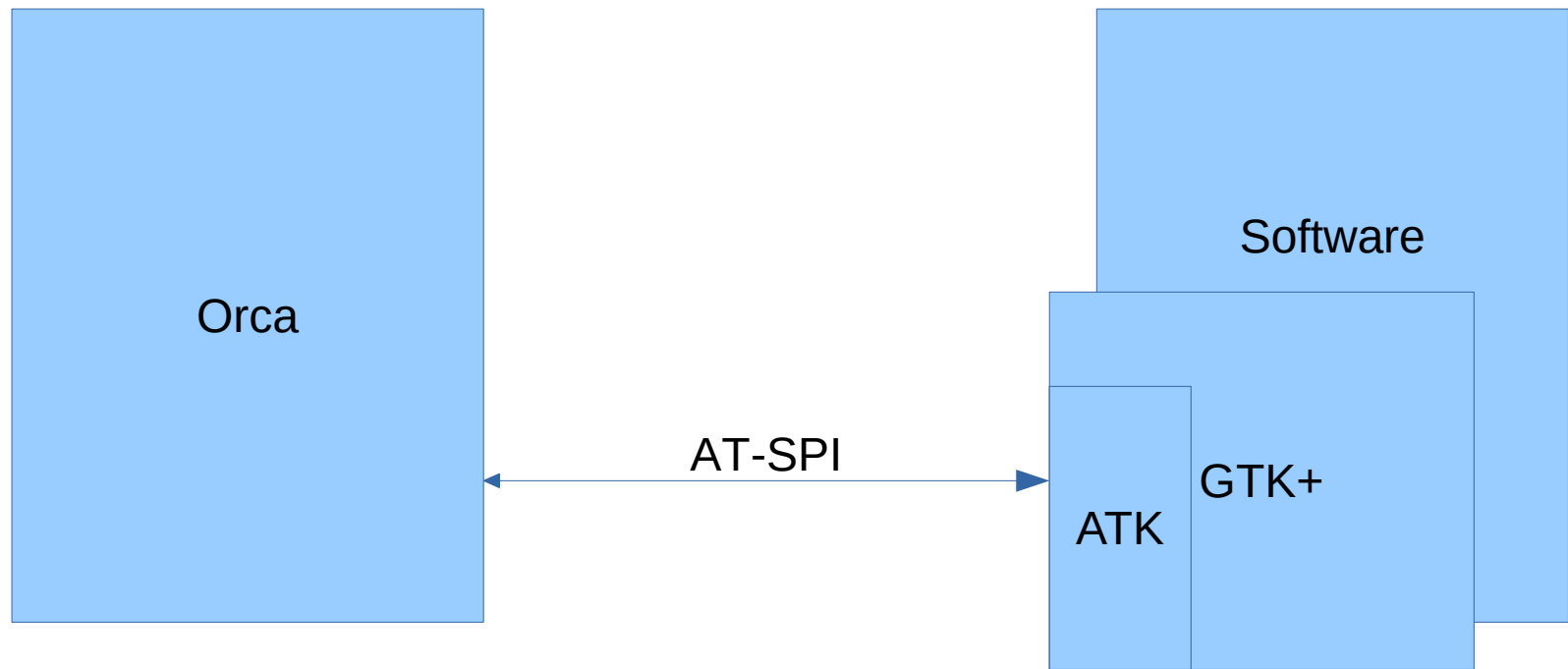




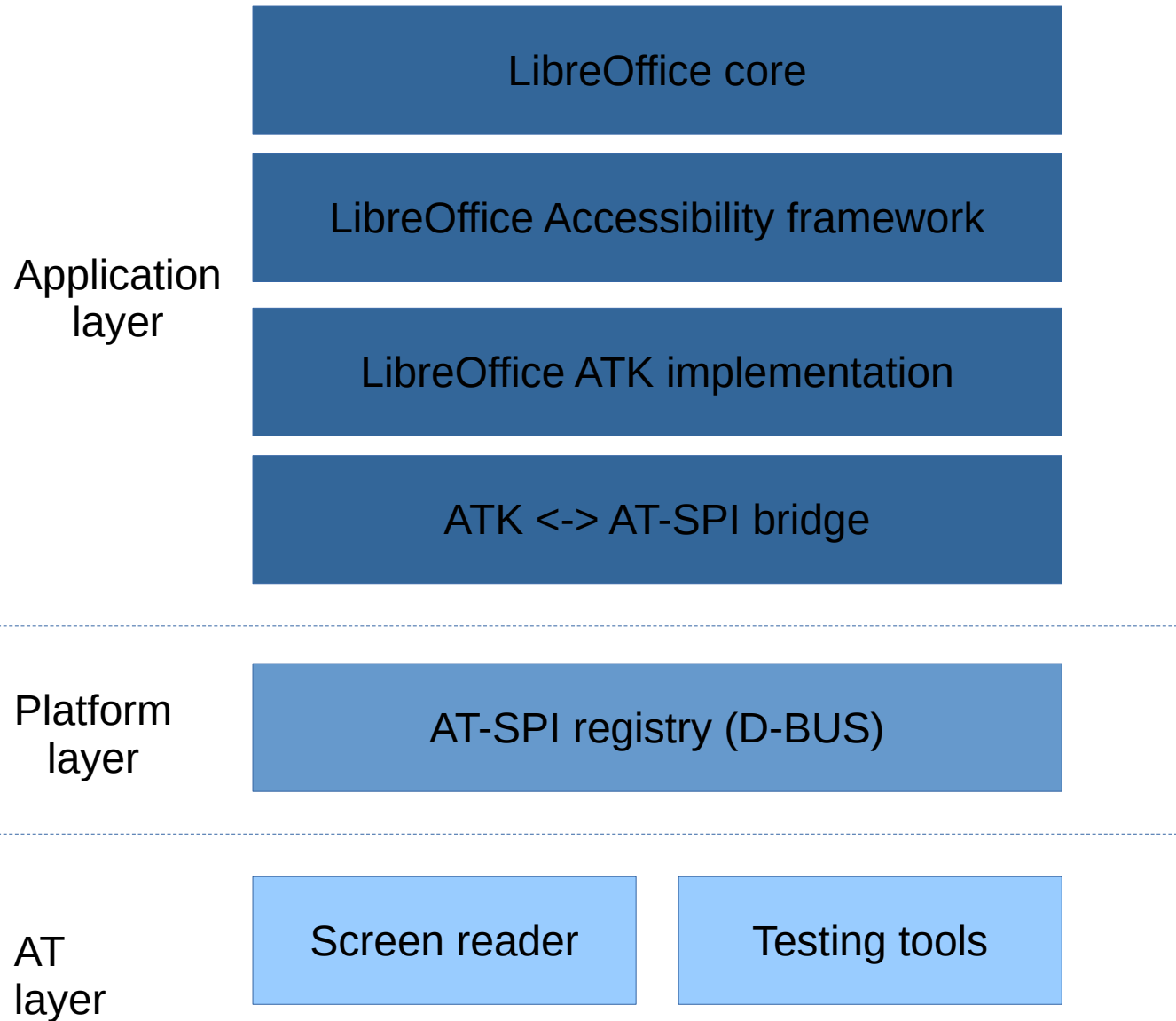
# An abstract screen reader



# Screen reader (GNOME)



# Layers



Quality assurance

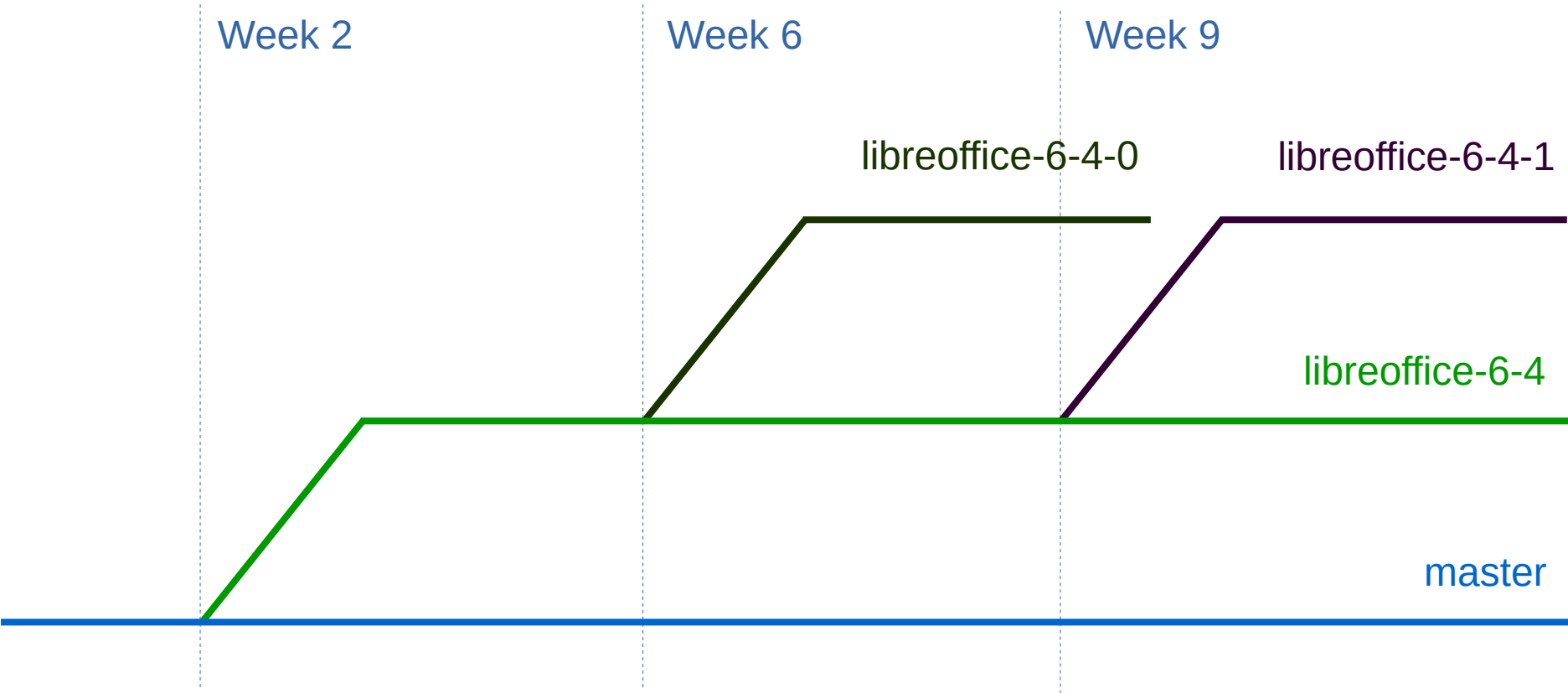
# Techniques and tools

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

# Peer review

- master branch
  - Committers without review, 1 review for others
- libreoffice-6-4 branch:
  - Only bugfixing
  - +1 review in any case
- libreoffice-6-4-x branches:
  - Only patches from 6-4 branch
  - +2 reviews

# Peer review



# Peer review

Change 12213 by sushil\_shinde Review in Progress 

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:

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

**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



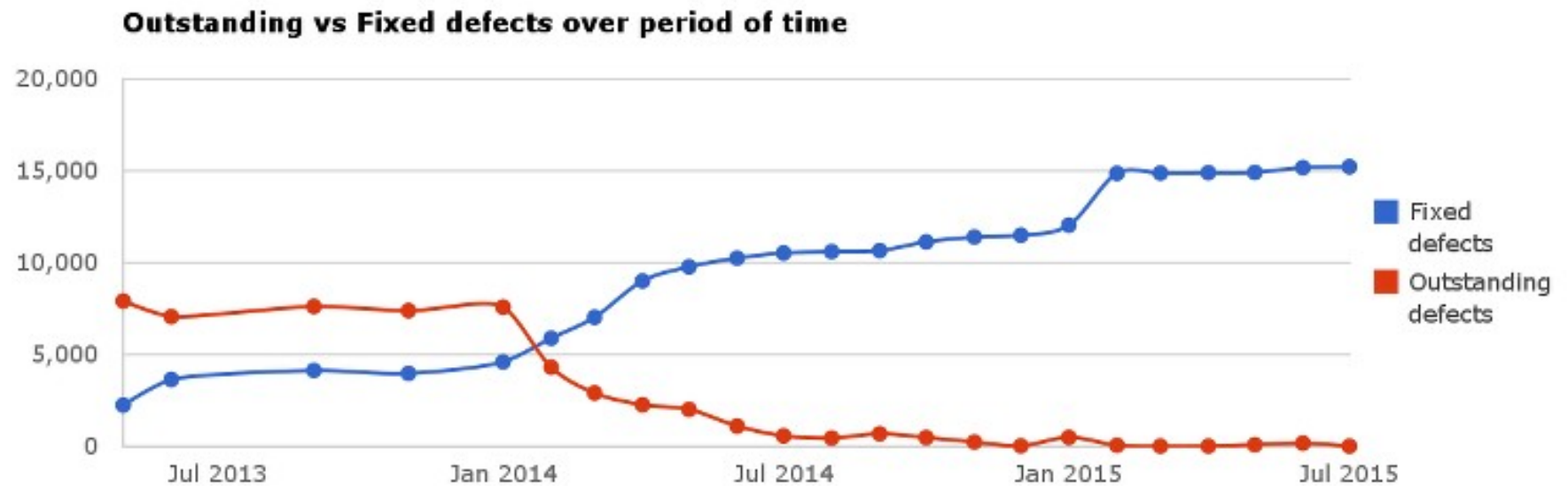
# Crashtests

- Check crashes when opening and saving documents
- Sample size: 92000 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



# 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!

