OOXML / PDF Digital Signing in Draw and elsewhere

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About Miklos

From Hungary

- More details: https://www.collaboraoffice.com/about-us/

Google Summer of Code 2010 / 2011

- Rewrite of the Writer RTF import/export

Then a full-time LibreOffice developer for SUSE

Now a contractor at Collabora

Digital signing in Draw and elsewhere

ODF signing

“The” document signing we inherited from OOo

- Can sign ODT, ODS, ODP, ODG
  - MD5 and SHA1 only
  - RSA only
- Verification
  - Checks if the digest matches
  - Validates the certificate
  - Checks if the whole document is signed
  - Based on X509 certificates

OOXML signing

Added in 2016, LibreOffice 5.2

- Based on the [xmldsig-core] specification, similar to ODF
- Does not sign metadata, has separate files for each signature
- Interoperable with MSO
- Has its own “Relationships Transform Algorithm”, now libxmlsec supports this
- Leaks software / hardware details

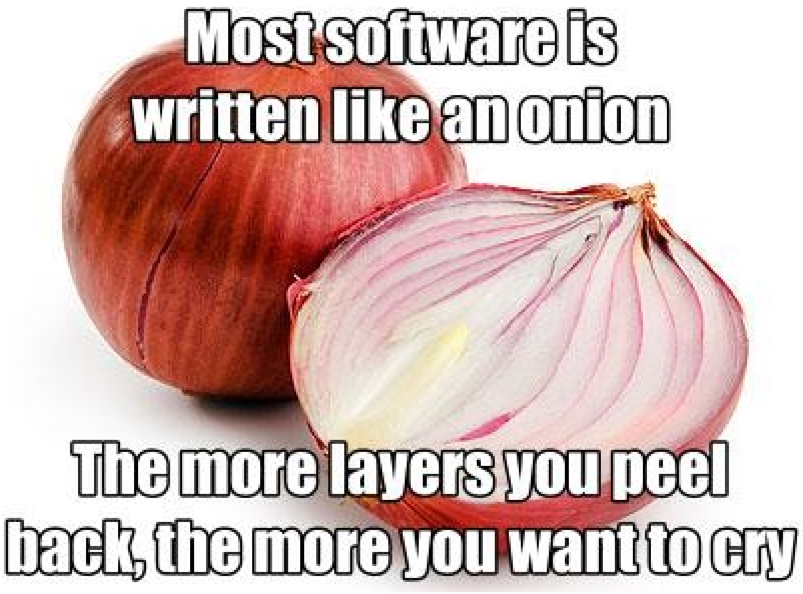
```
<WindowsVersion>6.1</WindowsVersion>
<OfficeVersion>16.0</OfficeVersion>
<ApplicationVersion>16.0</ApplicationVersion>
<Monitors>1</Monitors>
<HorizontalResolution>1280</HorizontalResolution>
<VerticalResolution>800</VerticalResolution>
<ColorDepth>32</ColorDepth>
```

Signing during PDF export

Started by Gökçen Eraslan, finished by Tor Lillqvist in 5.0

- Started as a GSoC project
- Finished by Collabora, sponsored by Wilhelm Tux crowd-funding
- Writer a placeholder to the PDF file, then hash what's before and after
- Do a standard PKCS#7 binary signature on the hash, write hexdump to the placeholder
- Handles new PDF files, single signature

Verification of PDF signatures


Most software is written like an onion
The more layers you peel back, the more you want to cry

Needed a whole new PDF parser, new in 5.3

- All existing ones were problematic back then:
  - Poppler is not available in MPL subset builds
  - Own boost-based parser (used for hybrid PDF) is hard to extend
  - PDFium did not have a signature API back then
- Basic verification is simple: parse the PKCS#7 hexdump, and the data before/after the signature has to be hashed
- Multiple signatures are chained by definition, and technically only the last signature can be complete, which is sad

Signing existing PDFs

Builds on top verification, since need the same PDF parser, new in 5.3

- Adds an incremental update to the document, to not break existing signatures
- Works with Acrobat-created PDF 1.5 files:
  - Supports cross-reference streams
  - Supports object streams
  - Supporst stream predictors
- Lots of corner-cases, but at the end appending signature in both Acrobat and LibreOffice in any order is meant to work

XML Advanced Electronic Signatures (XAdES) PDF Advanced Electronic Signatures (PAdES)

A set of extensions to the XML-DSig recommendation / PDF spec, new in 5.3

- If all conditions met, then this can result in a legally binding signature
- SHA-256 support has to be added
- ECDSA support has to be added
- Had to make sure that the signing certificate is part of the signed data
- PAdES passes the DSS validator

Signing existing PDFs: visible signatures

Replacing a stub widget with an actually visible signature, new in 7.1

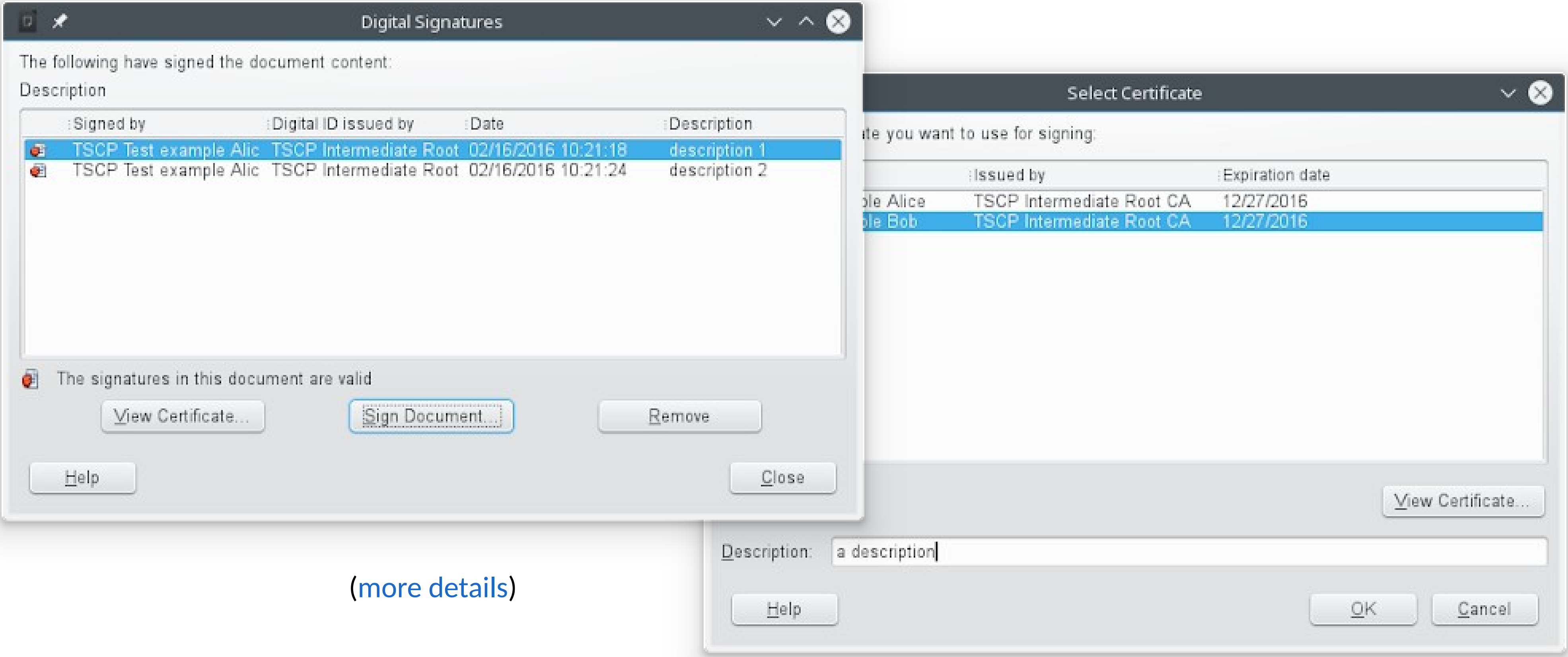
- UI is similar to signature lines, the result is a vector graphic (DocuSign doesn’t seem to do this)
- Used PDF markup associates the visible signature with the digital signature, helping a11y (DocuSign not doing this)
- The created signature shape can be resized and repositioned before signing (Acrobat has problems here)

How is this implemented?

Signature descriptions

ODF: store a description next to the date

- OOXML & PDF already had markup for this
- Also called comment or reason



Digital Signatures

The following have signed the document content:

Description

	Signed by	Digital ID issued by	Date	Description
	TSCP Test example Alic	TSCP Intermediate Root	02/16/2016 10:21:18	description 1
	TSCP Test example Alic	TSCP Intermediate Root	02/16/2016 10:21:24	description 2

The signatures in this document are valid

Select Certificate

te you want to use for signing:

	Issued by	Expiration date
ple Alice	TSCP Intermediate Root CA	12/27/2016
ple Bob	TSCP Intermediate Root CA	12/27/2016

Description: a description

(more details)

OOXML signature import

Performing exactly the same hashing as MSO, needed:

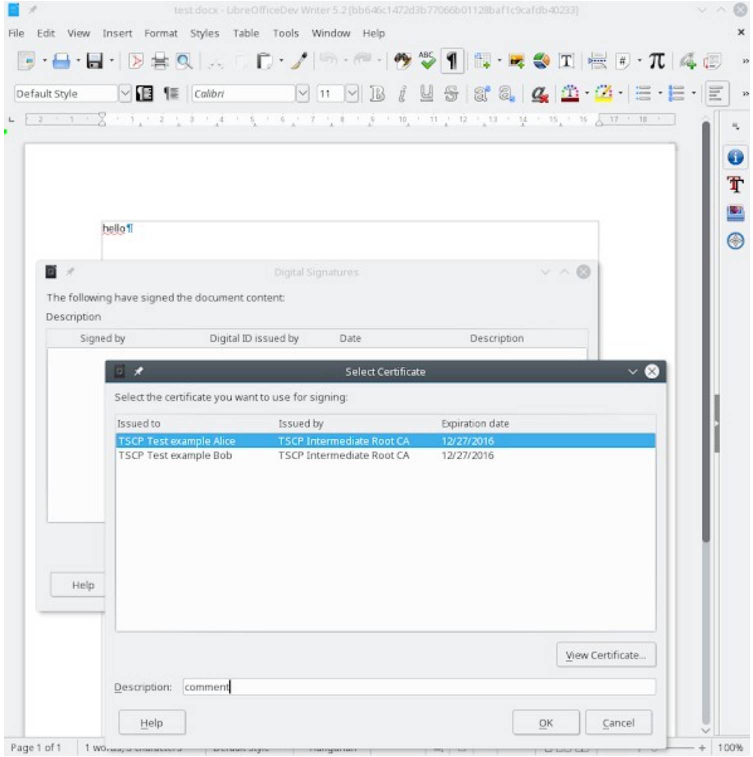
- support for the Relationships Transform Algorithm (described in ISO/IEC 29500-2:2012) in libxmlsec
- an actual XML parser for the OOXML signature in xmlsecurity/
- a new filter flag, so that our code no longer assumes "is ODF" means "supports digital signing" and
- some refactoring in xmlsecurity/, so that our digital signature code doesn’t assume that multiple signatures are always written to a single file

(via ascertia, more details)

OOXML signature export

Builds on top of the import side:

- signing a previously unsigned document
- appending a signature to an already signed document
- removing a signature from a document with multiple signatures
- removing the last signature of a signed document, turning it into an unsigned one
- [Content_Types].xml has to mention the .sigs extension and the individual /_xmlsignatures/sigN.xml streams
- _rels/.rels has to refer to _xmlsignatures/origin.sigs, which refers to the individual signatures
- DigitalSignaturesDialog has less code, factored out to a DocumentSignatureManager, so it can be tested from cppunit


test.docx - LibreOfficeDev Writer 5.2 [bb646c1472d3b77066b01128baf1c9cafdb40233]
File Edit View Insert Format Styles Table Tools Window Help
Default Style
Calibri
11
Digital Signatures
Select Certificate
Help
View Certificate...
OK
Cancel
Page 1 of 1
100%

hello¶

The following have signed the document content:

Description

Signed by	Digital ID issued by	Date	Description

Select the certificate you want to use for signing:

Issued to	Issued by	Expiration date
TSCP Test example Alice	TSCP Intermediate Root CA	12/27/2016
TSCP Test example Bob	TSCP Intermediate Root CA	12/27/2016

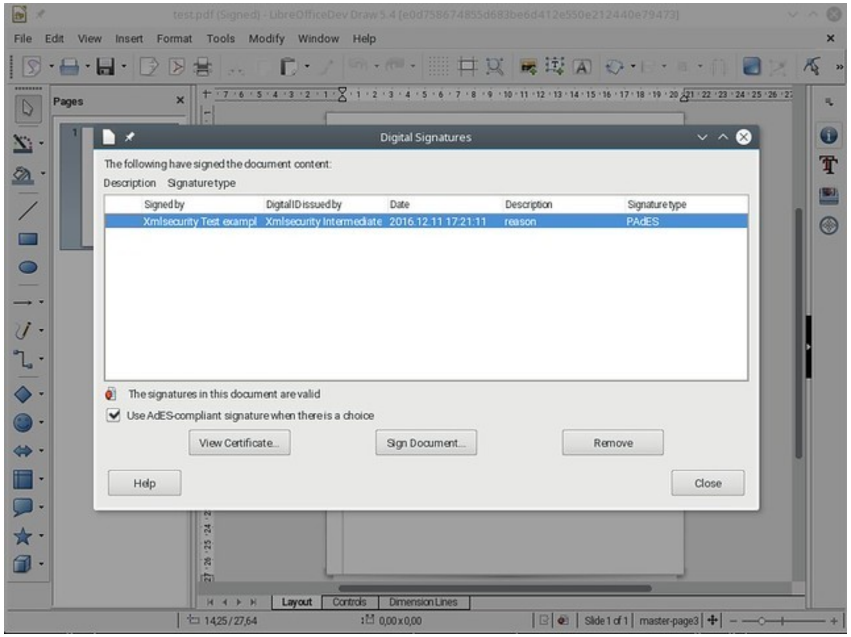
Description: comment

(more details)

Verifying existing PDF signatures

Parsing the PDF, then verify the signature

- File → Digital signatures → Sign exiting PDF
- Verification happens unconditionally, when opening a PDF file
- Discouraging editing when the file is opened for signing


test.pdf (Signed) - LibreOfficeDev Draw 5.4 [e0d758674855d683be6d412e550e212440e79473]

Digital Signatures

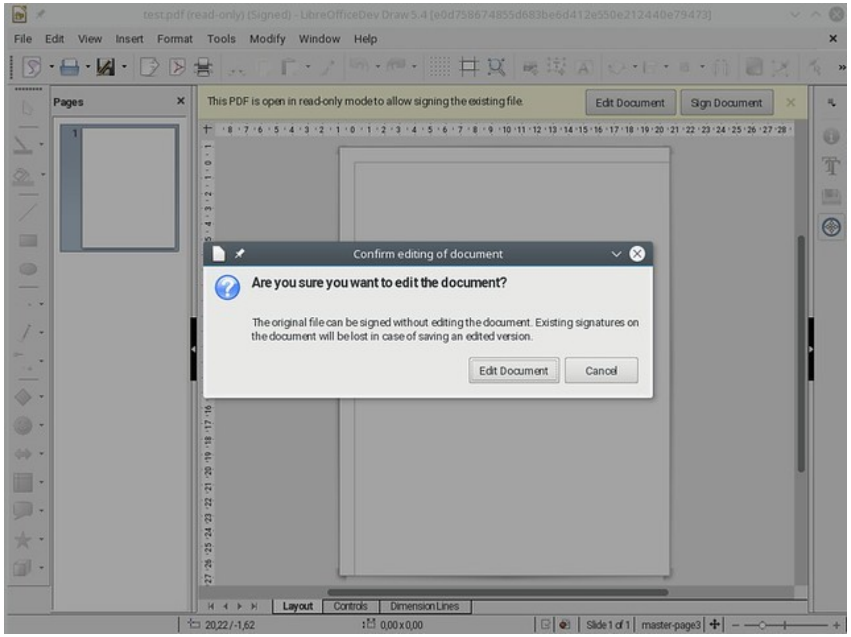
The following have signed the document content:

Description Signature type

Signed by	Digital ID issued by	Date	Description	Signature type
Xmlsecurity Test exampl	Xmlsecurity Intermediate	2016.12.11 17:21:11	reason	PAdES

The signatures in this document are valid

☑ Use AdES-compliant signature when there is a choice


test.pdf (read-only) (Signed) - LibreOfficeDev Draw 5.4 [e0d758674855d683be6d412e550e212440e79473]

This PDF is open in read-only mode to allow signing the existing file.

Confirm editing of document

Are you sure you want to edit the document?

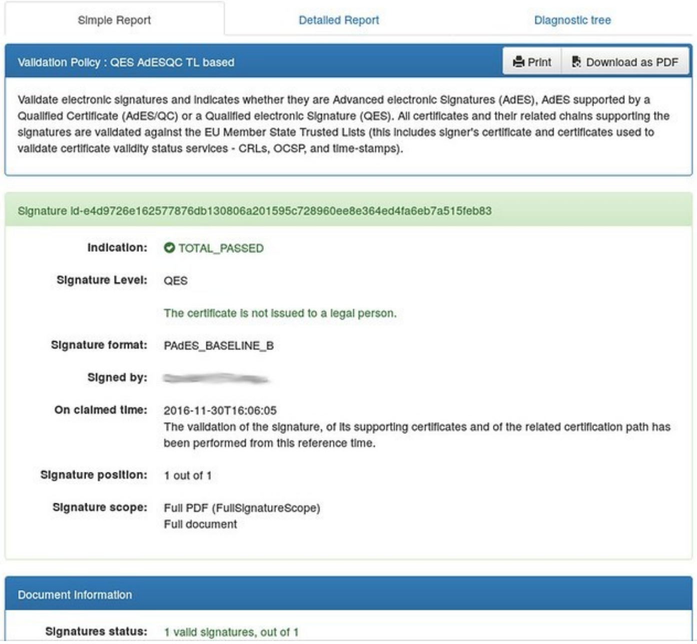
The original file can be signed without editing the document. Existing signatures on the document will be lost in case of saving an edited version.

(more details)

Adding PAdES support

Towards a legally binding signature:

- PDF signature creation now defaults to the stronger SHA-256 (instead of the previously used weaker SHA-1), and the PDF verifier understands SHA-256
- the PDF signature creation now embeds the signing certificate into the PKCS#7 signature blob in the PDF, so the verifier can check not only the key used for the signing, but the actual certificate as well
- the PDF signature import can now detect if such an embedded signing certificate is present in the signature or not



Validation Policy : QES AdESQC TL based

Validate electronic signatures and indicates whether they are Advanced electronic Signatures (AdES), AdES supported by a Qualified Certificate (AdES/QC) or a Qualified electronic Signature (QES). All certificates and their related chains supporting the signatures are validated against the EU Member State Trusted Lists (this includes signer's certificate and certificates used to validate certificate validity status services - CRLs, OCSP, and time-stamps).

Signature Id-e4d9726e162577876db130806a201595c728960ee8e364ed4fa6eb7a515feb83

Indication: ✓ TOTAL_PASSED

Signature Level: QES

The certificate is not issued to a legal person.

Signature format: PAdES_BASELINE_B

Signed by: [redacted]

On claimed time: 2016-11-30T16:06:05
The validation of the signature, of its supporting certificates and of the related certification path has been performed from this reference time.

Signature position: 1 out of 1

Signature scope: Full PDF (FullSignatureScope)
Full document

Document Information

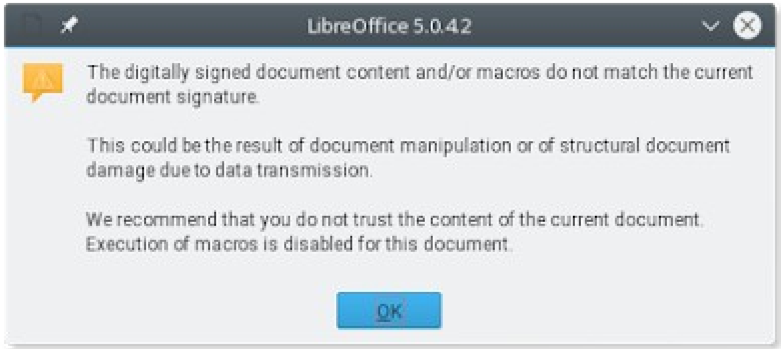
Signatures status: 1 valid signatures, out of 1

The DSS validator (more details)

Adding support for SHA-256 and ECDSA

Because real-word HW-based certificates often use those:

- SHA-256 can be a signature method or a digest method, different URIs
- First added patches to our old bundled libxmlsec to support this, on top of SHA-1, then updated libxmlsec
- ECDSA support some generic work, and also required switching to MSCNG on Windows, rewriting half of the xmlsecurity/ Windows code

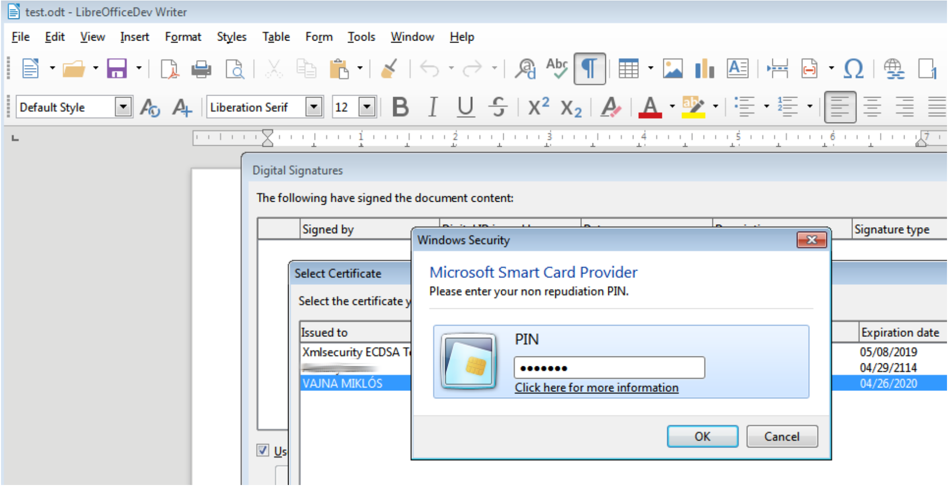


The digitally signed document content and/or macros do not match the current document signature.

This could be the result of document manipulation or of structural document damage due to data transmission.

We recommend that you do not trust the content of the current document. Execution of macros is disabled for this document.

(SHA-256 details)



The following have signed the document content:

Signed by	Signature type

Select the certificate y

Issued to	Expiration date
Xmlsecurity ECDSA T	05/08/2019
[redacted]	04/29/2114
VAJNA MIKLÓS	04/26/2020

☑ Us

Microsoft Smart Card Provider

Please enter your non repudiation PIN.

PIN: •••••••

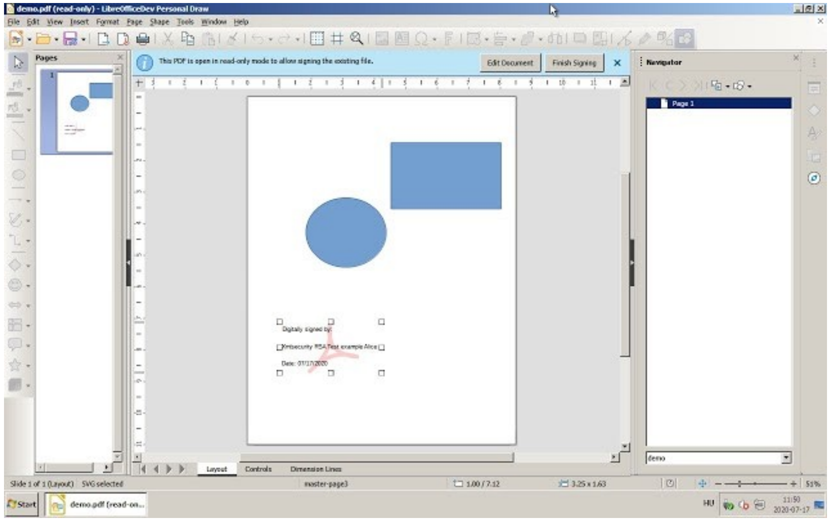
Click here for more information

(ECDSA details, CNG details)

Visible PDF signing

As always tries to reuse existing code:

- Signature lines were already working in Writer and Calc, this effort brings them to Draw, improving consistency.
- The generated object is locale-aware when it comes to the actual signature string and date format.
- The feature works for multiple signatures and multiple pages as well.
- Draw the signature rectangle, finalize it, then Finish signing:



This PDF is open in read-only mode to allow signing the existing file.

Digitally signed by:

Xmlsecurity RSA Test example Alice

Date: 07/17/2020

(more details)

Thanks

Collabora is an open source consulting and product company

- What we do and share with the community has to be paid by someone

The Dutch Ministry of Defense in cooperation with Nou&Off

- Made this work by Collabora possible

Summary

Good digital signature support of ODF, OOXML & PDF

- Including signature descriptions, XAdES & PAdES
- Modern hash & encryption algorithms: SHA-256 & ECDSA
- Interoperable with MS Office & Adobe Acrobat
- Latest news is visible PDF signatures

Thanks for listening! :-)

- Slides: https://people.collabora.com/~vmiklos/slides/