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# LibreOffice as JavaScript idiomatic WebWidget + Library

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# Office Suites as platform



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- used for Line of Business Applications
  - like Order Administration & Warehouse software
  - or document generation & inhouse mapping of processes
- why an Office Suite?
  - tons of powerful features (form letter templating, charts for data presentation, ...)
  - macros & external APIs
  - spreadsheets with formulas, filtering, dynamic formatting, ...
- Office Suites are low-code platforms!

# Office Suites in the web



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- **problem: migration to Web-based solutions**
  - “Cloud Office” suites aren’t either meant for customization or force hard vendor infrastructure dependencies upon workflows
  - costly adaption of code to JS libraries / APIs
- **solution:**
  - native LO in the browser’s Javascript engine!

# From LOWA to native JS



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- 2021: prototype running LibreOffice via WASM
  - a.k.a “LOWA”
  - API: interaction only through low-level Embind code
- 2024 – ZetaJS:
  - providing a native Javascript API for easy programmability

# From LOWA to native JS



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advantages:

- **ZetaJS: provides an idiomatic JS library for LibreOffice**
- just a static webserver is needed
- LibreOffice runs fully client side
- we got the size down to 32 MB binary and 15 MB data
  - ongoing work...
  - using the browser cache

# From LWA to native JS



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## Digression: “advanced Javascript”

- normal JS runs in a “main thread”
- parallelization through “web workers”
  - process-like isolation
  - loophole: `SharedArrayBuffer`
  - but can’t access “document” object inside workers
  - message passing through “port” object (not shown here)

# Demo



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## Letter Address Tool



Download:

ODT

PDF

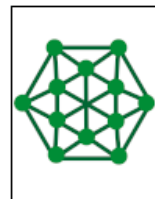
<SENDER'S NAME>  
<SENDER'S COMPANY NAME>  
<SENDER'S STREET>  
<SENDER'S POSTAL CODE><SENDER'S CITY>  
<SENDER'S STATE>

<RECIPIENT'S TITLE><RECIPIENT'S NAME>  
<RECIPIENT'S STREET>  
<RECIPIENT'S POSTAL CODE><RECIPIENT'S CITY>  
<RECIPIENT'S STATE>

31. Oktober 2024

Dear <RECIPIENT'S TITLE><RECIPIENT'S NAME>.

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.



Insert Address

Reload file

Bashir, Julian Subal  
Chapel, Christine  
Chekov, Pavel  
Dax, Jadzia  
de Monti, Mario  
Sigbjörnson, Hasso  
Jagellovsk, Tamara  
Kirk, James T.  
Legrelle, Helga  
McCoy, Leonard  
McLane, Cliff Alliste  
Nerys, Kira  
O'Brien, Miles Edwa  
O'Brien, Keiko  
Odo, Mr.  
Quark, Mr.  
Rand, Janice  
Scott, Montgomery  
Shubashi, Atan

See the video ...

# LOWA to native JS



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```
# web worker: get UNO entry points
```

```
css = zetajs.uno.com.sun.star;
```

```
context = zetajs.getUnoComponentContext();
```

```
desktop = css.frame.Desktop.create(context);
```



# LOWA to native JS



```
# web worker: store file
```

```
doc.storeToURL("file:///tmp/output",  
  [new css.beans.PropertyValue({  
    Name: "FilterName",  
    Value: "writer_pdf_Export"  
  })]);
```

# LOWA to native JS



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```
# main "thread"

const bytes = FS.readFile("/tmp/output");
const blob = new Blob(
  [bytes], {type: "application/pdf"});

const link = document.createElement("a");
link.href = URL.createObjectURL(blob);
link.download = "letter.pdf";
link.style = "display:none";
document.body.appendChild(link);
link.click();
```

# Different applications



## ZetaOffice: Vue.js Calc Ping Tool

**B** *I* U

The screenshot displays the ZetaOffice Vue.js Calc Ping Tool interface. It features a spreadsheet with columns A-F and rows 1-23. The data in the spreadsheet is as follows:

	A	B	C	D	E	F	G	H	I
1	Host	ms							
2	documentfoundation.org	65							
3	ip4.me	381							
4	allotropia.de	397							
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									

A bar chart is overlaid on the spreadsheet, showing the ping times for the three hosts: documentfoundation.org (65 ms), ip4.me (381 ms), and allotropia.de (397 ms). The chart has a vertical axis from 0 to 400 ms.

In the top right corner, there is a "Ping" tool with a text input field containing "https://zetaoffice.net/". Below the input field, the ping results are displayed: documentfoundation.org: 65, ip4.me: 381, and allotropia.de: 397.

At the bottom of the screenshot, a window titled "calc\_ping\_example.ods - LibreOffice Calc" is visible. It shows a spreadsheet with columns A-F and rows 1-14. The data in the spreadsheet is as follows:

	A	B	C	D	E	F
1	Host	ms				
2	example.org	400				
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

A bar chart is overlaid on the spreadsheet, showing the ping time for example.org (400 ms). The chart has a vertical axis from 0 to 400 ms.

# Different applications



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See [zetaoffice.net](http://zetaoffice.net) for

- precompiled LOWA binaries
- more examples
  - convert files
  - register JavaScript to LibreOffice events
  - find and replace text and document elements
  - run fully fledged LibreOffice UI in the browser
  - small introduction examples
  - ...

# Cutting the Edge



underlying technology is still fairly new

- **WASM (Web Assembly):**
  - **intermediate “bytecode”**
    - **like Java JVM stack machine, Android DEX, CIL (.NET), Python \*.pyc, ...**
  - **much more performant than plain Javascript**
  - **good compilation from other languages**
- **Emscripten compiles C++ to WASM**
- **Web Workers enable concurrence in the web browser**

# Cutting the Edge



- CPU bugs: Spectre + Meltdown
  - WTF!? Browsers & CPU bugs???
  - LibreOffice needs SharedArrayBuffers  
-> foreign origin must agree (CORS)
  - see LibreOffice Conference 2024 talk
- WASM: since 2017, Safari is the new Internet Explorer
- Emscripten: since 2012 (asm.js based before WASM)
  - made several Emscripten upstream patches



# Outlook / Future Plans



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- improve integration with Vue.js, Angular, ...
- add type information for TypeScript
- strip down WASM binary size
- optimized production and debug builds



Subscribe at: [zetaoffice.net/#contact](https://zetaoffice.net/#contact)



Thank you! Any questions?