

Why our HTML Docs Don't Just Print and What to Do About It



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“

*The principal task of a conductor is not to put himself
in evidence but to disappear behind his functions*

– Liszt Ferenc

Why our HTML Docs Don't
Just Print and What to Do
About It



Print, Export to Word, Export to PDF are very often just a trap

What to do with a long line in a listing?

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Print, Export to Word, Export to PDF are very often just a trap

What to do with a long line in a listing?

- We may scale



Print, Export to Word, Export to PDF are very often just a trap

What to do with a long line in a listing?

- We may scale
- Or use landscape orientation



Print, Export to Word, Export to PDF are very often just a trap

What to do with a long line in a listing?

- We may scale
- Or use landscape orientation
- Or both, but would it be enough?



Print, Export to Word, Export to PDF are very often just a trap

What to do with a long line in a listing?

- We may scale
- Or use landscape orientation
- Or both, but would it be enough?
- If not, we may fire error for long lines or wrap them



Print, Export to Word, Export to PDF are very often just a trap

What to do with a long line in a listing?

- We may scale
- Or use landscape orientation
- Or both, but would it be enough?
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- With linefeed and spaces? And how to copy?



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What to do with a long line in a listing?

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- With indents? Still impossible to copy from PDF



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- With indents? Still impossible to copy from PDF
- And on the web we can just add horizontal scroll bar.



Print, Export to Word, Export to PDF are very often just a trap

What to do with a long line in a listing?

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There is a core mismatch: semantic markup meets the rigid world of print



Iterations in converting simple text markup to print formats

- <https://github.com/CourseOrchestra/course-doc>: XSL-FO templates for Asciidoctor → DocBook backend
- <https://github.com/CourseOrchestra/asciidoc-open-document>: Open Document Converter for Asciidoc
- <https://github.com/fiddlededee/unidoc-publisher>: UniDoc Publisher – any markup to any printing rendering engine



Main formats for printing

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Main formats for printing

1. PDF

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Main formats for printing

1. PDF
2. Text processing formats (Open XML – MS Office, Open Document – LibreOffice)

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Main formats for printing

1. PDF
2. Text processing formats (Open XML – MS Office, Open Document – LibreOffice)
3. HTML?

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Main formats for printing

1. PDF
 2. Text processing formats (Open XML – MS Office, Open Document – LibreOffice)
 3. HTML?
-



CSS Paged Media – CSS extension, defining style specific for printing



Most widespread rendering approaches

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Most widespread rendering approaches

- PDF ← native PDF-generating libraries

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Most widespread rendering approaches

- PDF ← native PDF-generating libraries
- PDF ← XSL-FO with FOP-processors

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Most widespread rendering approaches

- PDF ← native PDF-generating libraries
- PDF ← XSL-FO with FOP-processors
- PDF ← via TeX



Most widespread rendering approaches

- PDF ← native PDF-generating libraries
- PDF ← XSL-FO with FOP-processors
- PDF ← via TeX
- PDF ← HTML + Paged Media CSS

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Most widespread rendering approaches

- PDF ← native PDF-generating libraries
- PDF ← XSL-FO with FOP-processors
- PDF ← via TeX
- PDF ← HTML + Paged Media CSS
- DOCX/ODT, PDF ← +/- text processors (MS Word, LO Writer)



Most widespread rendering approaches

- PDF ← native PDF-generating libraries
 - PDF ← XSL-FO with FOP-processors
 - PDF ← via TeX
 - PDF ← HTML + Paged Media CSS
 - DOCX/ODT, PDF ← +/- text processors (MS Word, LO Writer)
-

These technologies are not aligned in a great number of details like:



- Apache FOP has problems with Leader alignment (dots in a table of contents)
 - LO Writer doesn't support typography (like keep with next) within table cells
 - Microsoft doesn't recommend running automation tasks (like saving PDF) on a server
-



Some brief conclusions

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Some brief conclusions



Feel like speleologist?

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Some brief conclusions



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Some brief conclusions



Feel like speleologist?

- The world of printing is the world of constraints

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Some brief conclusions



Feel like speleologist?

- The world of printing is the world of constraints
- And those constraints differ for each technology, you often need to support several chains (exquisitely looking PDF with TeX and LibreOffice for coordination)



Some brief conclusions



Feel like speleologist?

- The world of printing is the world of constraints
- And those constraints differ for each technology, you often need to support several chains (exquisitely looking PDF with TeX and LibreOffice for coordination)
- With no universal solutions



UniDoc Publisher approach suits best if at least **one** of

- You don't prepare documentation especially for printing purposes
- You are automating documentation generation and hope it will look good, no matter what will be generated
- Your output format is one of the text processing format

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In search for flexibility: Asciidoctor open document

Automation on the writer side

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In search for flexibility: Asciidoctor open document

Automation on the writer side

1. Asciidoctor parses markup into AST (Abstract Syntax Tree)

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Automation on the writer side

1. Asciidoctor parses markup into AST (Abstract Syntax Tree)
2. You may transform AST with Asciidoctor tree processor

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In search for flexibility: Asciidoctor open document

Automation on the writer side

1. Asciidoctor parses markup into AST (Abstract Syntax Tree)
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3. Asciidoctor runs writer template for each AST node recursively

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Automation on the writer side

1. Asciidoctor parses markup into AST (Abstract Syntax Tree)
2. You may transform AST with Asciidoctor tree processor
3. Asciidoctor runs writer template for each AST node recursively
4. You may override writer with pure Ruby or with special Slim templates



A simplified processing AST example

```
- !<OrderedList>
  roles:
    - "arabic"
    id: "ol-1"
    captioned_title:
      children:
        - !<Text>
          text: "Automation"
    children:
      - !<ListItem>
        children:
          - !<Paragraph>
            children:
              - !<Text>
                text: "Asciidoctor..."
      - !<ListItem>
    ...
  - list_style = "#{get_basic_style} ordered-list"
  - if captioned_title?
    text:p text:style-name="#{list_style}"
    text:bookmark text:name="#{id}"
    =captioned_title
  text:list text:style-name="#{list_style}"
    - items.each_with_index do |item, index|
      ...
    ...
```



Great, but

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Great, but

- You can't override part of a template



Great, but

- You can't override part of a template
- You should invent something for styling



Great, but

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Styling? But text processors do support styling!



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Great, but

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Styling? But text processors do support styling!



- `bold, green` – impossible to apply two styles to one element
-



Great, but

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Styling? But text processors do support styling!



- `bold, green` – impossible to apply two styles to one element
-



- Asciidoc Open Document uses slightly extended intermediary OD format (to preserve AST attributes)
 - It uses special functions that check, if style should be applied. It doesn't know styling attributes but forces the Open Document style structure
-



And still

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And still

- Unexpectedly transforming this extended Open Document format became one of the most used features of Asciidoctor Open Document

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And still

- Unexpectedly transforming this extended Open Document format became one of the most used features of Asciidoctor Open Document
- Styling as separate task of writing proved also to be useful

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And still

- Unexpectedly transforming this extended Open Document format became one of the most used features of Asciidoctor Open Document
- Styling as separate task of writing proved also to be useful
- Gradle was magnificent in gluing all parts together

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Thoughts before the second step

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Thoughts before the second step

- If creating universal converter is impossible...

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Thoughts before the second step

- If creating universal converter is impossible...
- We should create **meta converter** – platform for building converters



Thoughts before the second step

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Estimated requirements

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Estimated requirements

- Native converter as a reader



Thoughts before the second step

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Estimated requirements

- Native converter as a reader
- Sound ways of transforming AST



Thoughts before the second step

- If creating universal converter is impossible...
- We should create **meta converter** – platform for building converters

Estimated requirements

- Native converter as a reader
- Sound ways of transforming AST
- A good approach for styling as a separate focus



Thoughts before the second step

- If creating universal converter is impossible...
- We should create **meta converter** – platform for building converters

Estimated requirements

- Native converter as a reader
- Sound ways of transforming AST
- A good approach for styling as a separate focus
- 99% generic writer



Thoughts before the second step

- If creating universal converter is impossible...
- We should create **meta converter** – platform for building converters

Estimated requirements

- Native converter as a reader
- Sound ways of transforming AST
- A good approach for styling as a separate focus
- 99% generic writer
- Good integration with CI/CD with a focus on homogeneity



Native converter as a reader?

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Native converter as a reader?



Each converter outputs HTML. HTML is quite semantic, why shouldn't we use it?

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Let's convert this presentation to LO Writer

The slide has a purple border and a purple gear icon at the top center. The title is in bold black font. Below the title is a quote by Liszt Ferenc. A photo and bio of the speaker, Nikolaj Potashnikov, are on the left. A list of bullet points follows. At the bottom left is a 'List of slides' table of contents. The bottom right corner shows a navigation icon.

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- As a solution architect, I want to share them? Via email?
- [REF] Why this epigraph?
 - It's FOSDEM, and lots of people
 - Value is in the result
 - A conductor should disappear behind his functions, so should we, no matter what format, rendering techniques

List of slides

2. Print, Export to Word, Export
3. Iterations in converting simple
4. Main formats for printing....
4.1. Most widespread rendering engines
5. Some brief conclusions.....
6. UniDoc Publisher approach
7. In search for flexibility: Ascii
7.1. A simplified processing A
7.2. Great, but.....

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Notes on this demo

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Notes on this demo

- All conversion settings are written in Kotlin

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Notes on this demo

- All conversion settings are written in Kotlin
- Everything is in a single Gradle script (`build.gradle.kts`)



Notes on this demo

- All conversion settings are written in Kotlin
- Everything is in a single Gradle script (`build.gradle.kts`)
- The following code listings are excerpts from this script



Boilerplate

```
FodtConverter {
    html = AsciidocHtmlFactory()
        .getHtmlFromFile(File("${project.projectDir}/$presentationFile.adoc"), true)
    template = File("${project.projectDir}/template-1.fodt").readText()
    adaptWith(AsciidocToOdtAdapter)
    unknownTagProcessingRule = unknownTagProcessingRuleRevealJs()
    parse() // Processing AST
    ast2fodt()
}
```

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Processing AST

```
ast().descendant { section ->
    section.sourceTagName == "section" &&
        section.descendant { it is Heading && it.level == 1 }
            .isNotEmpty()
}.first().also { it.insertBefore(makeTitle(it)) }.remove()
```

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Rearranging title (Asciidoc source)

```
| ====
a|
[.title-photo]
image::images/nmp1.jpg[]
a|
[.full-name]
Nikolaj Potashnikov

[.bio]
PhD in Economics, Solution architect, Course-IT
.2+>.>a|{nbsp}
[.logo]
image::images/fosdem-logo.svg[]
2+a|
[.contact]
icon:envelope[] consulting@yandex.ru icon:telegram[]{nbsp}@nmpotashnikoff
| ====

```

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Rearranging title, extracting semantics

```
val title = titleSlideSection.descendant { it is Heading && it.level == 1 }.first()
val notes = titleSlideSection.descendant { it.sourceTagName == "aside" }.first()
val (fullName, bio, photo, contact, logo) =
    arrayOf("full-name", "bio", "title-photo", "contact", "logo")
    .map { role -> titleSlideSection.descendant { it.roles.contains(role) }.first()

logo.descendant { it is Image }.first().let { it as Image }
    .width = Length(1000F, LengthUnit.cmm)
photo.descendant { it is Image }.first().let { it as Image }
    .width = Length(1500F, LengthUnit.cmm)
```



Rearranging title, constructing title

```
appendChild(logo)
appendChild(title)
table {
  col(Length(18F)); col(Length(152F))
  roles("about-me")
  tableRowGroup(TRG.body) {
    tr {
      td { appendChild(photo) }
      td { arrayOf(fullName, bio, contact).forEach { appendChild(it) } }
    }
  }
}
appendChild(notes)
appendChild(Toc(2, "List of slides"))
normalizeImageDimensions()
```

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Back return to the result



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Styling

```
OdtStyle { p ->
    if (p !is Paragraph) return@OdtStyle
    if (p.ancestor { it.roles.contains("logo") }.isEmpty()) return@OdtStyle
        attributes("style:master-page-name" to "First_20_Page")
},
OdtStyle { tableCell ->
    if (tableCell !is TableCell) return@OdtStyle
    if (tableCell.ancestor { it.roles.contains("about-me") }.isEmpty()) return@OdtStyle
        tableCellProperties {
            arrayOf("top", "right", "bottom", "left")
                .forEach { attributes("fo:border-$it" to "none") }
        }
},
}
```



Some more AST processing

```
ast().descendant { it.roles.contains("notes") }
    .forEach { it.insertBefore(HorizontalLine()) } ❶
ast().descendant { it is Heading && it.level > 1 }
    .forEach {
        it.insertBefore(
            Paragraph().apply { roles("slide-finish") }
        )
    } ❷
odtStyleList.add(odtStyles())
odtStyleList.add(rougeStyles()) ❸
```

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Extending AST

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Extending AST

```
class HorizontalLine() : NoWriterNode() {  
    override val isInline: Boolean get() = false  
}
```

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Extending AST

```
class HorizontalLine() : NoWriterNode() {  
    override val isInline: Boolean get() = false  
}
```

```
OdtCustomWriter { horizontalLine ->  
    if (horizontalLine !is HorizontalLine) return@OdtCustomWriter  
    preOdNode.apply {  
        "text:p" {  
            attributes("text:style-name" to "Horizontal Line")  
            process(horizontalLine)  
        }  
    }  
},
```

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Testing



Content type	The result
paragraph	Paragraph 1 Paragraph 2
list	1. Item 1 1. Subitem 1. Subitem 1. Subitem 2. Item 2
table	Subtable

Some paragraph after table.
Some paragraph after table.

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Focus and trade-offs

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Focus and trade-offs

- CI friendly – pure Gradle (or an ordinary Kotlin project) to rule them all

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Focus and trade-offs

- CI friendly – pure Gradle (or an ordinary Kotlin project) to rule them all
- No declarations, everything should be programmed

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Focus and trade-offs

- CI friendly – pure Gradle (or an ordinary Kotlin project) to rule them all
- No declarations, everything should be programmed
- Typed AST – check before run

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Focus and trade-offs

- CI friendly – pure Gradle (or an ordinary Kotlin project) to rule them all
- No declarations, everything should be programmed
- Typed AST – check before run
- Clean and testable code

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Focus and trade-offs

- CI friendly – pure Gradle (or an ordinary Kotlin project) to rule them all
- No declarations, everything should be programmed
- Typed AST – check before run
- Clean and testable code
- One AST and one styling approach, but different styling API for each backend



Conclusion

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Conclusion

- Treat printing as engineering: design it, test it, automate it

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Conclusion

- Treat printing as engineering: design it, test it, automate it
- Printing is a lossy transformation – some semantics cannot survive it

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Conclusion

- Treat printing as engineering: design it, test it, automate it
- Printing is a lossy transformation – some semantics cannot survive it
- Keep rendering logic programmable and under your control

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Questions?

- <https://github.com/fiddlededee/unidoc-publisher>: UniDoc Publisher – any markup to any printing rendering engine
- <https://github.com/fiddlededee/fosdem-printing/tree/main>: this presentation repository

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