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

Nikolaj Potashnikov

PhD in Economics, Solution architect, Course-IT

✉ consulting@yandex.ru @nmpotashnikoff

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

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

⚠ 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/asciidoctor-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

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

- 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

⚠ 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

In search for flexibility: Asciidoctor open document

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

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

Styling? But text processors do support styling!

⚠

- `<span class="bold green">bold, green</span>` — impossible to apply two styles to one element

💡

- Asciidoctor 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

- 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

Thoughts before the second step

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

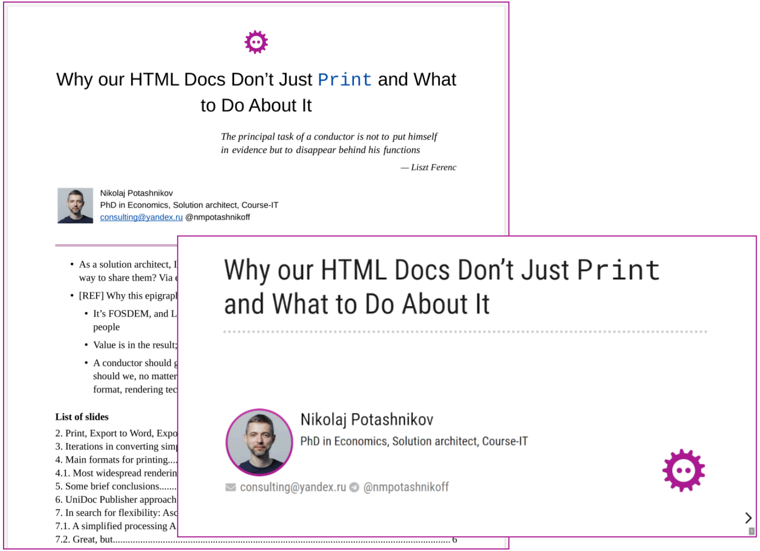
Estimated requirements

- 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?

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

Let’s convert this presentation to LO Writer



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List of slides

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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`)
- 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(AsciidoctorOdAdapter)
    unknownTagProcessingRule = unknownTagProcessingRuleRevealJs()
    parse()
            // Processing AST
    ast2fodt()
}
```

Processing AST

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

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
|===
```

Rearranging title, extracting semantics

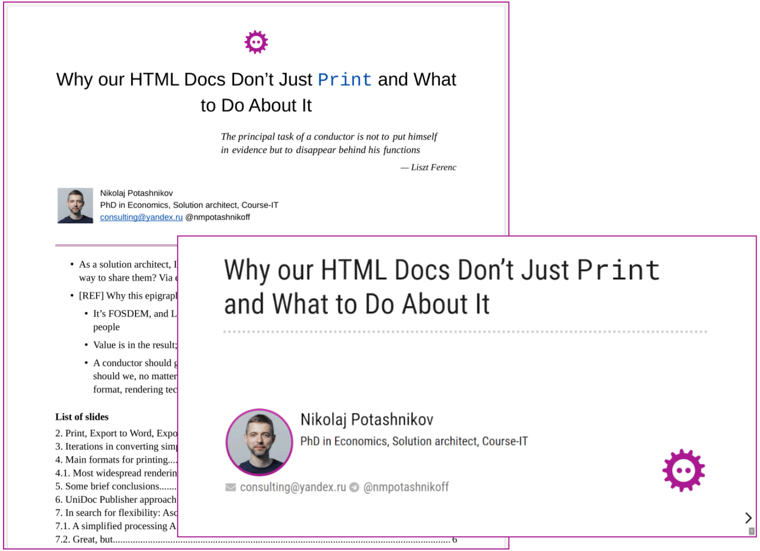
```
val title = titleSlideSection.descendant { it is Heading && it.level == 1 }.first()
val notes = titleSlideSection.descendant { it.sourceTagName == "aside" }.first()
val (fullName, bio, photo, contact, logo) =
    arrayOf("full-name", "bio", "title-photo", "contact", "logo")
        .map { role ->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

Back return to the result



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List of slides

2. Print, Export to Word, Expo
3. Iterations in converting simp
4. Main formats for printing....
4.1. Most widespread renderin
5. Some brief conclusions.......
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7.2. Great, but.. 6

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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

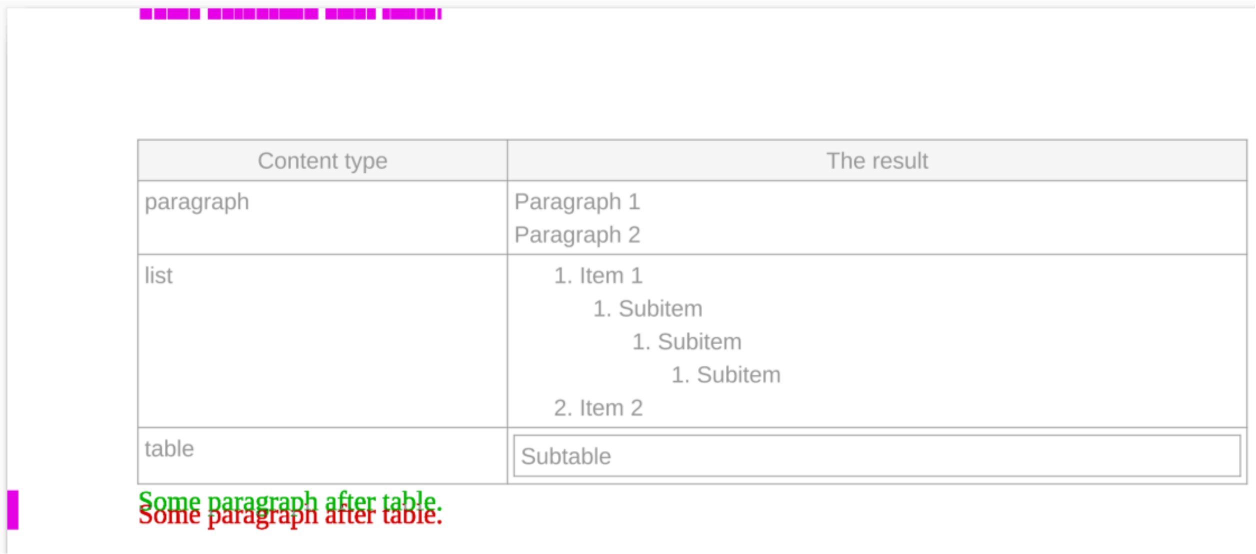
```
ast().descendant { it.roles.contains("notes") }
    .forEach { it.insertBefore(HorizontalLine()) } ❶
ast().descendant { it is Heading && it.level > 1 }
    .forEach {
        it.insertBefore(
            Paragraph().apply { roles("slide-finish") }
        )
    } ❷
odtStyleList.add(odtStyles())
odtStyleList.add(rougeStyles())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

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)
        }
    }
},
```

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.

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

- 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

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