Language-agnostic ways to render PDFs

Overview of best solutions (at least these I tried so far).

Boss: Customer wants to generate PDF reports. How long it will take?

Tools that we will look at

HTML is converted to PDF

- `electron-pdf`
- `wkhtmltopdf`
- Headless browsers
  - PhantomJS
  - Chrome

Domain specific language is converted to PDF

- LaTeX
- XSL-FO


LATEX

LaTeX

- Built on top of TeX

Pros

- You probably already know it (if you were in academia)
- Allow almost arbitrary design
- Exceptionally good for mathematics
- There are free templates to start with
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- Very predictable results
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- There is a good chance that your front-end developer don't know it
- Can require processing - vector images are not supported
- Learning curve isn't great
- Requires ~1GB of space on disk - can be a problem on cheap VPS

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```
\            {invoice} % Use the custom invoice class (invoice.cls)
\    \    {\       {3ex}} % Define \tab to create some horizontal white space
\     {document}
\   {\Huge\bf Initech Inc.}\    % Company providing the invoice
\      \      % Whitespace
\      % Horizontal line
123 Broadway \    (000) 111-1111 \  % Your address and contact information
City, State 12345 \    john@smith.com
\  \
{\   Invoice To:} \
\    James Smith \  % Invoice recipient
\    Generic Corporation \  % Recipient's company
{\   Date:} \
\    \      \  % Invoice date
\     {invoiceTable}
\      {Consulting Services} % Fee category description
\       {October 3, 2012}{8}{12}
\        % Prints a subtotal, can be used multiple times
\      {Hosting Expenses} % Fee category description
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\   {invoiceTable}
\   {document}
```

It's very simple to get PDF file from LaTeX input.

```
$ sudo apt-get install texlive-latex-base texlive-latex-extra
$ pdflatex invoice.tex invoice.pdf
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Initech Inc.

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john@smith.com

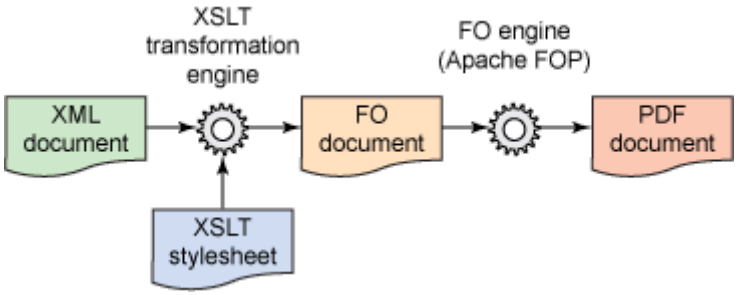
Invoice To:

James Smith
Generic Corporation

Date:

May 15, 2017

XSL - FO


XSLT
transformation
engine
FO engine
(Apache FOP)
XML
document
FO
document
PDF
document
XSLT
stylesheet

XSL - FO (XSL Formatting Objects)

- XML
- Traditionally used with XSLT - XSL Templates (yay, more XML)

Pros

- XML feels like enterprise

Cons

- Limited tooling - you can get **Apache FOP** for free or pay 5000 dollars for commercial tools
- Formatting and text setting is poor - on par with CSS1/CSS2 possibilities (and often worse)
- Almost no community
- Prehistoric - last specification version was released 5 years ago
- Writing XML by hand is a pain. Writing XSLT - too.
- Formatting must be done inline - styles and content aren't separated at all

```
<       xmlns:fo="http://www.w3.org/1999/XSL/Format">
  <                  >
    <                     master-name="A4-portrait"
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      <             />
    </                    >
  </                  >
  <                master-reference="A4-portrait">
    <       flow-name="xsl-region-body">
      <       >
        Hello, World!
      </       >
    </      >
  </                >
</      >
```

Yes, that's Hello World. And it's going to be worser.

```
$ sudo apt-get install fop
$ fop hello_world.fo hello_world.fo
```

Hello, World!

HTML and CSS

Pros

- You already know it
- Existing views can be used as template
- Live preview in browser

Cons

- Heavy weight tools
  - Electron use 90MB of memory only to display *help* in console.
  - Chrome use 180MB of memory only to display start page.
  - These values doesn't include shared memory - it can be higher on server.
- No commercial support
- Installation can be cumbersome in some cases

Invoice code based on github.com/sparksuite/simple-html-invoice-template (MIT license)

```
<    >
<    >
    <    type="text/css" rel="stylesheet" href="style.css">
</    >
<    >
    <    class="invoice-box">
        <     cellpadding="0" cellspacing="0">
            <   class="heading">
                <  >Item</  >
                <  >Price</  >
            </  >
            <   class="item last">
                <  >Domain name (1 year) </  >
                <  >$10.00</  >
            </  >
            <   class="total">
                <  ></  >
                <  >Total: $385.00</  >
            </  >
        </    >
    </   >
</    >
</    >
```

PhantomJS as headless WebKit isn't designed to generate PDFs. But we can do it!

We need to install it:

```
$ wget https://bitbucket.org/ariya/phantomjs/downloads/phantomjs-2.1.1-linux-x86_64.tar.bz2
$ tar xvjf phantomjs-2.1.1-linux-x86_64.tar.bz2
$ sudo cp ./phantomjs-2.1.1-linux-x86_64/bin/phantomjs /usr/local/bin
$ phantomjs script.js
```

And script.js must look like:

```
    page = require('webpage').create();
page.open('file://path/to/our/file',        () {
    page.render('output.html');
    phantom.exit();
});
```

As we see, it requires creation of new process every time we need PDF. Even if we parametrize this script (as it was already done in official example rasterize.js it's less than ideal.

We have three solutions for this:

- learn to live with it
- write Node.js microservice using `phantom` module and pooling processes
- write your own implementation of PhantomJS controller (Phantom allow to expose simple HTTP based API)

With `electron-pdf` module we can convert files by command line from any language.

```
$ npm       -g electron-pdf
$ sudo apt-          xvfb # X11       working   -
$       DISPLAY=':99.0'
$ Xvfb :99 -screen 0 1024x768x24 > /dev/null 2>&1 &
$ electron-pdf source.html output.html
```

Though spawning heavy process for each PDF isn't good idea. On my i5-6600 spawning process takes 350ms and similar single-core performance on server would significantly damage your company budget.

`electron-pdf` expose programmatic API for this case, but only for Node.

Though, writing microservice for this task is easy-peasy - it took less than 100 lines of code for me (but still too big to place it here).

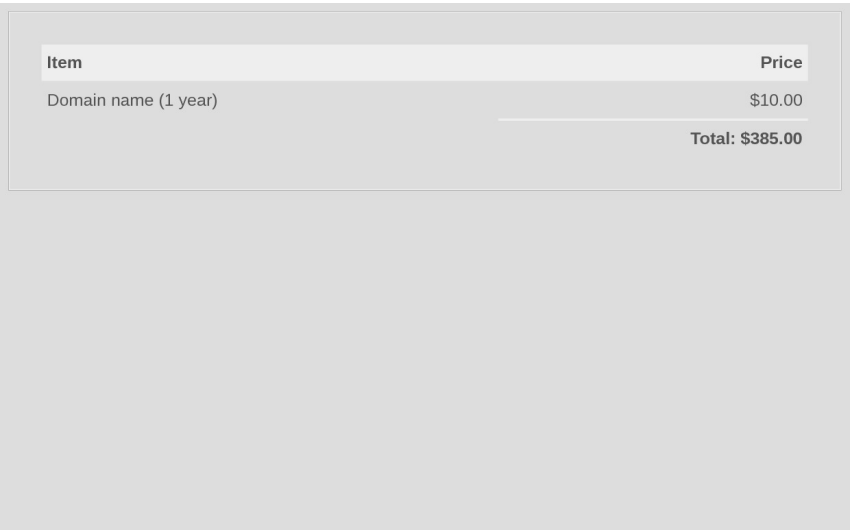
`wkhtmltopdf` is simple tool built on top of QtWebKit. It's easy to use from C and other languages providing bindings for C (like Java)... Or just from command line.

```
$ sudo apt install wkhtmltopdf
$ wkhtmltopdf invoice.html output.html
```

`wkhtmltopdf` is solid solution, but it uses rather outdated `QtWebKit`.

Its engine is over 2 years now and doesn't support most recent CSS and HTML features. Support for capturing SPA is limited too.

Electron



Phantom

Item	Price
Domain name (1 year)	$10.00
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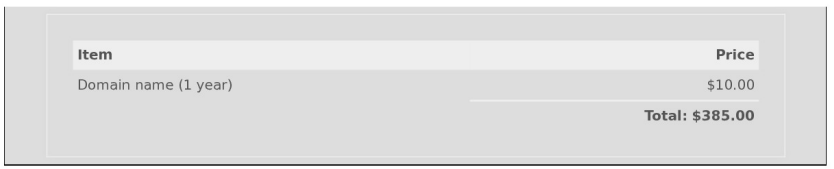
wkhtmltopdf



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	Phantom	wkhtml2pdf	Electron
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Engine release date	N/A	03/2015	2017
Java/C#/Python bindings	no	yes	no
Memory usage	50MB	80MB	105MB
Time took	680ms	850ms	1050ms
Node.js bindings	yes	yes	yes

Other solutions

Headless Chrome

New big player is coming. Chrome can run headless and PDF generation is high on list of priorities. It will probably deprecate PhantomJS and other solutions.

About me

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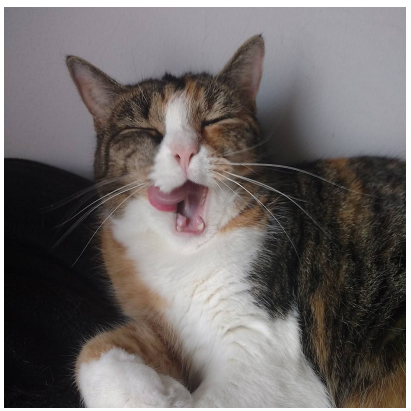


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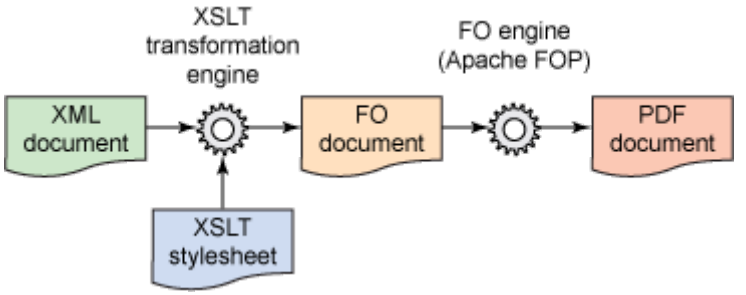
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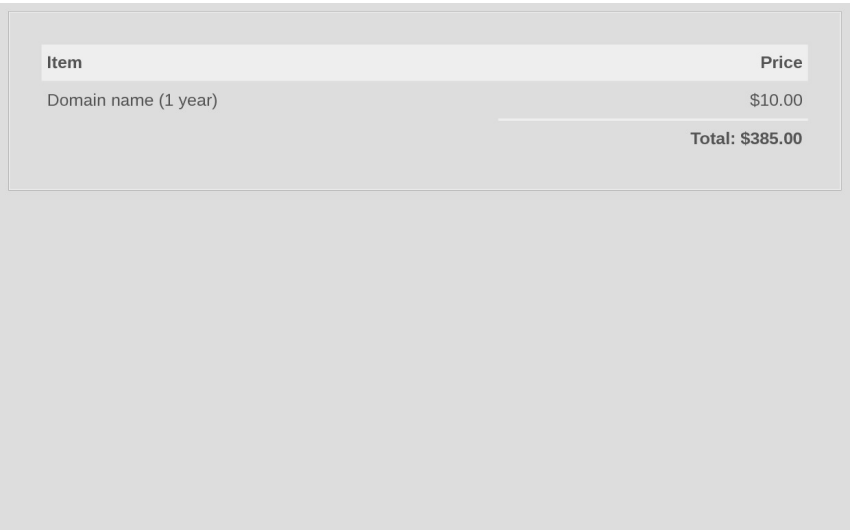

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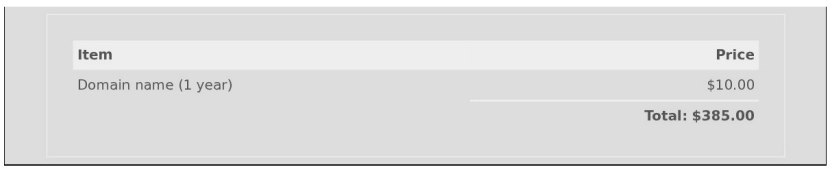

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