

The nodetree package

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github.com/Josef-Friedrich/nodetree

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```
Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 5.06pt
├─HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 6.94pt
│   └─head:
│       └─LOCAL_PAR
│           └─HLIST subtype: indent, width: 15pt
│               └─GLYPH subtype: glyph, char: 110 (0x6e, 'n'), width: 5.56pt, height: 4.42pt
│                   └─GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 5pt, height: 4.48pt, depth: 0.11pt
│                       └─KERN subtype: fontkern, kern: 0.28pt
│                           └─GLYPH subtype: glyph, char: 100 (0x64, 'd'), width: 5.56pt, height: 6.94pt, depth: 0.11pt
│                               └─properties: {'injections': {'leftkern': 18350.08}}
│                                   └─GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
│                                       └─DISC subtype: regular, penalty: 50
│                                           └─pre:
│                                               └─GLYPH subtype: glyph, char: 45 (0x2d, '-'), width: 3.33pt, height: 2.45pt
│                                                   └─GLYPH subtype: glyph, char: 116 (0x74, 't'), width: 3.89pt, height: 6.15pt, depth: 0.11pt
│                                                       └─GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 3.92pt, height: 4.42pt
│                                                           └─GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
│                                                               └─GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
│                                                                   └─PENALTY subtype: linepenalty, penalty: 10000
│                                                                       └─GLUE subtype: parfillskip, stretch: +1fil
│                                                                           └─GLUE subtype: rightskip
└─-----
```

Contents

1	Abstract	3
2	Usage	3
2.1	As a plain Lua _T _E X package	4
2.1.1	Available macros	4
2.1.2	Available options	4
2.2	As a Lua ^A _T _E X package	5
2.2.1	Available macros	5
2.2.2	Available options	5
2.3	As a Lua module	6
2.4	The package <code>nodetree-embed</code>	8
2.4.1	Available macros	9
2.4.2	Available environment	9
2.4.3	Available options	9
3	Macros	10
3.1	<code>\NodetreeRegisterCallback</code>	10
3.2	<code>\NodetreeUnregisterCallback</code>	10
3.3	<code>\NodetreeSetOption</code>	10
3.4	<code>\NodetreeResetOption</code>	10
3.5	<code>\NodetreeSet</code>	10
3.6	<code>\NodetreeReset</code>	10
3.7	<code>\NodetreeEmbedCmd</code>	10
3.8	<code>\NodetreeEmbedInput</code>	10
4	Environments	11
4.1	<code>NodetreeEmbedEnv</code>	11
5	Options	12
5.1	Option <code>callback</code>	12
5.2	Option <code>channel</code>	12
5.3	Option <code>verbosity</code>	13
5.3.1	Example: <code>verbosity=1</code>	13
5.3.2	Example: <code>verbosity=2</code>	13
5.4	Option <code>color</code>	13
5.5	Option <code>unit</code>	13
5.5.1	Example: <code>unit=pt</code>	13
5.5.2	Example: <code>unit=sp</code>	14
5.5.3	Example: <code>unit=cm</code>	14
5.6	Option <code>decimalplaces</code>	15
5.6.1	Example: <code>decimalplaces=0</code>	15
5.6.2	Example: <code>decimalplaces=2</code>	15
5.6.3	Example: <code>decimalplaces=5</code>	15
5.7	Option <code>theme</code> and <code>thememode</code>	15
5.7.1	Example: <code>theme=bwdark thememode=dark</code>	15
5.7.2	Example: <code>theme=bwlight thememode=light</code>	16
5.7.3	Example: <code>theme=monokaisoda thememode=dark</code>	16
5.7.4	Example: <code>theme=monokaisoda thememode=light</code>	16

5.8	Option <code>font</code>	16
5.8.1	Example: <code>font={Liberation Mono}</code>	16
5.8.2	Example: <code>font={Ubuntu Mono}</code>	17
5.9	Option <code>fontsize</code>	17
5.9.1	Example:	17
5.9.2	Example:	17
6	Visual tree structure	18
6.1	Two different connections	18
6.2	Unicode characters to show the tree view	18
7	Examples	19
7.1	The node list of the package name	19
7.2	The node list of a mathematical formula	19
7.3	The node list of the word <i>Office</i>	20
7.4	Node types	20
7.4.1	Type: <code>hlist(0)</code> Subtype: <code>line(1)</code>	20
7.4.2	Type: <code>hlist(0)</code> Subtype: <code>box(2)</code>	21
7.4.3	Type: <code>hlist(0)</code> Subtype: <code>indent(3)</code>	21
7.4.4	Type: <code>vlist(1)</code>	21
7.4.5	Type: <code>rule(2)</code>	22
7.4.6	Type: <code>mark(4)</code>	22
7.4.7	Type: <code>disc(7)</code> Subtype: <code>discretionary(0)</code>	23
7.4.8	Type: <code>disc(7)</code> Subtype: <code>regular(3)</code>	24
7.4.9	Type: <code>whatsit(8)</code> Subtype: <code>pdfaction(22)</code>	24
7.4.10	Type: <code>whatsit(8)</code> Subtype: <code>pdfcolorstack(28)</code>	25
7.4.11	Type: <code>glue(12)</code> Subtype: <code>baselineskip(2)</code>	26
7.4.12	Type: <code>glue(12)</code> Subtype: <code>parskip(3)</code>	26
7.4.13	Type: <code>glue(12)</code> Subtype: <code>spaceskip(13)</code>	27
7.4.14	Type: <code>glue(12)</code> Subtype: <code>leaders(100)</code>	27
7.4.15	Type: <code>glue(12)</code> Subtype: <code>cleaders(101)</code>	28
7.4.16	Type: <code>glue(12)</code> Subtype: <code>xleaders(102)</code>	28
7.4.17	Type: <code>glue(12)</code> Subtype: <code>gleaders(102)</code>	29
7.4.18	Type: <code>kern(13)</code> Subtype: <code>userkern(0)</code>	29
7.4.19	Type: <code>kern(13)</code> Subtype: <code>fontkern(1)</code>	29
7.4.20	Type: <code>kern(13)</code> Subtype: <code>accentkern(2)</code>	30
7.4.21	Type: <code>kern(13)</code> Subtype: <code>italiccorrection(3)</code>	30
7.4.22	Type: <code>penalty(14)</code>	30
7.4.23	Type: <code>glyph(29)</code>	31
7.4.24	Type: <code>attribute(38)</code>	31
7.4.25	Type: <code>attributelist(40)</code>	31
8	Implementation	33
8.1	The file <code>nodetree.tex</code>	33
8.2	The file <code>nodetree.sty</code>	34
8.3	The file <code>nodetree.lua</code>	38

1 Abstract

`nodetree` is a development package that visualizes the structure of node lists. `nodetree` shows its debug informations in the consoles' output when you compile a Lua \TeX file. It uses a similar visual representation for node lists as the UNIX `tree` command does for a folder tree.

Node lists are the main building blocks of each document generated by the \TeX engine *Lua \TeX* . The package `nodetree` doesn't change the rendered document. The tree view can only be seen when using a terminal to generate the document.

`nodetree` is inspired by a [gist from Patrick Gundlach](#).

2 Usage

The package `nodetree` has four usage scenarios. It can be used as a standalone Lua module, as a plain Lua \TeX , a Lua \LaTeX package or as package to embed `nodetree` views in a Lua \LaTeX document.

2.1 As a plain LuaTeX package

Run `luatex luatex-test.tex` for example to list the nodes using LuaTeX.

```
\input{nodetree.tex}
\NodetreeRegisterCallback{postline}

Lorem ipsum dolor.
\bye
```

2.1.1 Available macros

Macro name	Reference
<code>\NodetreeRegisterCallback{<callbacks>}</code>	Page 10, Section 3.1
<code>\NodetreeUnregisterCallback{<callbacks>}</code>	Page 10, Section 3.2
<code>\NodetreeSetOption[<option>]{<value>}</code>	Page 10, Section 3.3
<code>\NodetreeResetOption{<option>}</code>	Page 10, Section 3.4
<code>\NodetreeReset</code>	Page 10, Section 3.6

2.1.2 Available options

Option name	Reference
<code>callback</code>	Page 12, Section 5.1
<code>channel</code>	Page 12, Section 5.2
<code>verbosity</code>	Page 13, Section 5.3
<code>color</code>	Page 13, Section 5.4
<code>unit</code>	Page 13, Section 5.5
<code>decimalplaces</code>	Page 15, Section 5.6

2.2 As a Lua^AT_EX package

Or run `luaAtex lualatex-test.tex` to show a node tree using Lua^AT_EX. In Lua^AT_EX you can omit `\NodetreeRegisterCallback{postline}`. `\usepackage{nodetree}` registers automatically the `post_linebreak_filter`. If you don't want debug the `post_linebreak_filter` use `\NodetreeUnregisterCallback{postline}`.

```
\documentclass{article}
\usepackage{nodetree}

\begin{document}
Lorem ipsum dolor.
\end{document}
```

2.2.1 Available macros

Macro name	Reference
<code>\NodetreeRegisterCallback{<callbacks>}</code>	Page 10, Section 3.1
<code>\NodetreeUnregisterCallback{<callbacks>}</code>	Page 10, Section 3.2
<code>\NodetreeSetOption[<option>]{<value>}</code>	Page 10, Section 3.3
<code>\NodetreeResetOption{<option>}</code>	Page 10, Section 3.4
<code>\NodetreeReset</code>	Page 10, Section 3.6
<code>\NodetreeSet{<kv-options>}</code>	Page 10, Section 3.5

2.2.2 Available options

Option name	Reference
<code>callback</code>	Page 12, Section 5.1
<code>channel</code>	Page 12, Section 5.2
<code>verbosity</code>	Page 13, Section 5.3
<code>color</code>	Page 13, Section 5.4
<code>unit</code>	Page 13, Section 5.5
<code>decimalplaces</code>	Page 15, Section 5.6

2.3 As a Lua module

Import the Lua module of the package inside `\directlua{}` with this command: `local nodetree = require('nodetree')`. Then use the Lua function `nodetree.print(head, options)` to debug nodes inside your Lua code.

```
local nodetree = require('nodetree')

local rule1 = node.new('rule')
rule1.width = 20 * 65536
rule1.height = 10 * 65536
rule1.depth = 10 * 65536
nodetree.print(vbox)
```

The function `nodetree.print()` takes as a second argument a Lua table to configure the output.

```
nodetree.print(vbox, { verbosity = 2, unit = 'cm' })
```

This are the default options:

```
options = {
  callback = 'post_linebreak_filter',
  channel = 'term',
  color = 'colored',
  decimalplaces = 2,
  unit = 'pt',
  verbosity = 1,
}
```

The following code snippet demonstrates the usage in Lua \TeX . `head` is the current node.

```
\directlua{
  local nodetree = require('nodetree')
  local test = function (head)
    nodetree.print(head)
  end
  callback.register('post_linebreak_filter', test)
}

Lorem ipsum dolor.
\bye
```

This example illustrates how the function has to be applied in Lua \LaTeX .

```
\documentclass{article}
\usepackage{nodetree}

\begin{document}

\directlua{
  local nodetree = require('nodetree')
  local test = function (head)
    nodetree.print(head)
  end
  luatexbase.add_to_callback('post_linebreak_filter', test, 'test')
}

Lorem ipsum dolor.
```

```
\end{document}
```


2.4 The package `nodetree-embed`

The single purpose of this auxiliary package is to provide a view similar to a terminal (console) output. This view mimics the output of `nodetree` in a terminal. The view can be embedded in a Lua \LaTeX file. You have to compile documents using this embedded view with the option `--shell-escape`. The main environment of this package is `NodetreeEmbed`. Markup inside this environment is written into a temporary \LaTeX file. This file is compiled in the background by `latexmk` and the `nodetree` output is embedded into this view. The following list shows the single intermediate steps:

1. `jobname.tex`

```
\begin{NodetreeEmbedEnv}
nodetree
\end{NodetreeEmbedEnv}
```

2. `_nodetree-jobname/1.tex`

```
%!TEX program = lualatex
\documentclass{article}
\usepackage{nodetree}
\NodetreeSetOption[channel]{tex}
\NodetreeSetOption[verbosity]{1}
\NodetreeSetOption[unit]{pt}
\NodetreeSetOption[decimalplaces]{2}
\NodetreeUnregisterCallback{post_linebreak_filter}
\NodetreeRegisterCallback{post_linebreak_filter}
\begin{document}
nodetree
\end{document}
```

3. `_nodetree-jobname/1.nttex`: This temporary Lua \LaTeX file is compiled using `latexmk` and embed in the environment `NodetreeEmbed`

```
\par{}\par{}Callback: \textcolor{NTEred}{post\_linebreak\_filter}\par{}
-----\par{}
\mbox{\textcolor{NTEmagentabright}{GLUE\hspace{0.5em}}\textcolor{NTEyellow}{subtype:}
↪ baselineskip, \textcolor{NTEyellow}{width:}
↪ 5.06\textcolor{NTEwhite}{pt}}\par{}
...
```

4. Finally the result:

```
Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 5.06pt
├─HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 6.94pt
└─head:
   └─LOCAL_PAR
      └─HLIST subtype: indent, width: 15pt
         └─GLYPH subtype: glyph, char: 110 (0x6e, 'n'), width: 5.56pt, height: 4.42pt
            └─GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 5pt, height: 4.48pt, depth: 0.11pt
               └─KERN subtype: fontkern, kern: 0.28pt
                  └─GLYPH subtype: glyph, char: 100 (0x64, 'd'), width: 5.56pt, height: 6.94pt, depth: 0.11pt
                     properties: {[ 'injections' ] = {[ 'leftkern' ] = 18350.08}}
                        └─GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
                           └─DISC subtype: regular, penalty: 50
                              └─pre:
                                 └─GLYPH subtype: glyph, char: 45 (0x2d, '-'), width: 3.33pt, height: 2.44pt
```

```

|GLYPH subtype: glyph, char: 116 (0x74, 't'), width: 3.89pt, height: 6.15pt, depth: 0.11pt
|GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 3.92pt, height: 4.42pt, depth: 0.11pt
|GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
|GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
|PENALTY subtype: linepenalty, penalty: 10000
|GLUE subtype: parfillskip, stretch: +1fil
|GLUE subtype: rightskip
-----

```

2.4.1 Available macros

Macro name	Reference
<code>\NodetreeRegisterCallback{<callbacks>}</code>	Page 10, Section 3.1
<code>\NodetreeUnregisterCallback{<callbacks>}</code>	Page 10, Section 3.2
<code>\NodetreeSetOption[<option>]{<value>}</code>	Page 10, Section 3.3
<code>\NodetreeResetOption{<option>}</code>	Page 10, Section 3.4
<code>\NodetreeReset</code>	Page 10, Section 3.6
<code>\NodetreeSet{<kv-options>}</code>	Page 10, Section 3.5
<code>\NodetreeEmbedCmd[<kv-options>]{<tex-markup>}</code>	Page 10, Section 3.7
<code>\NodetreeEmbedInput[<kv-options>]{<nttex-file>}</code>	Page 10, Section 3.8

2.4.2 Available environment

Environment name	Reference
<code>\begin{NodetreeEmbedEnv}[<kv-options>]</code>	Page 11, Section 4.1

2.4.3 Available options

Option name	Reference
<code>callback</code>	Page 12, Section 5.1
<code>channel</code>	Page 12, Section 5.2
<code>verbosity</code>	Page 13, Section 5.3
<code>color</code>	Page 13, Section 5.4
<code>unit</code>	Page 13, Section 5.5
<code>decimalplaces</code>	Page 15, Section 5.6
<code>theme</code>	Page 15, Section 5.7
<code>thememode</code>	Page 15, Section 5.7
<code>font</code>	Page 16, Section 5.8
<code>fontsize</code>	Page 17, Section 5.9

3 Macros

3.1 `\NodetreeRegisterCallback`

`\NodetreeRegisterCallback` `\NodetreeRegisterCallback{<callbacks>}`: The argument `{<callbacks>}` takes a comma separated list of callback aliases as described in (→ 5.1).

3.2 `\NodetreeUnregisterCallback`

`\NodetreeUnregisterCallback` `\NodetreeUnregisterCallback{<callbacks>}`: The argument `{<callbacks>}` takes a comma separated list of callback aliases as described in (→ 5.1).

3.3 `\NodetreeSetOption`

`\NodetreeSetOption` `\NodetreeSetOption[<option>]{<value>}`: (→ 5) This macro sets a single `[<option>]` to `{<value>}`.

3.4 `\NodetreeResetOption`

`\NodetreeResetOption` `\NodetreeResetOption{<option>}`: (→ 5) This macro resets a single `{<option>}` to its default value.

3.5 `\NodetreeSet`

`\NodetreeSet` `\NodetreeSet{<kv-options>}`: This macro sets multiple options a once. It only can be used along with Lua^AT_EX. `{<kv-options>}` are key value pairs.

```
\NodetreeSet{color=no, callbacks={hpack, vpack}, verbosity=2}
```

3.6 `\NodetreeReset`

`\NodetreeReset` `\NodetreeReset`: This macro resets multiple options to its default values.

3.7 `\NodetreeEmbedCmd`

`\NodetreeEmbedCmd` `\NodetreeEmbedCmd[<kv-options>]{<tex-markup>}`:

Main macro (cmd) to evaluate some T_EX markup and generate a node tree from it. See environment version. (→ 3.7). Uses the `xparse +v` option to grab the verbatim content. Only available in the package `nodetree-embed`.

3.8 `\NodetreeEmbedInput`

`\NodetreeEmbedInput` `\NodetreeEmbedInput[<kv-options>]{<nttex-file>}`: The path or filename of `*.nttex` file without the extension. Only available in the package `nodetree-embed`.

4 Environments

4.1 NodetreeEmbedEnv

`NodetreeEmbedEnv` (*env.*) `\begin{NodetreeEmbedEnv}[\langle kv-options \rangle] ...TeX markup for evaluation ...\end{NodetreeEmbedEnv}`

Main environment (*env.*) to evaluate some `TeX` markup and generate a node tree from it. See command version ([→ 3.7](#)). Uses the `\detokenize` command to grab the verbatim content. Only available in the package `nodetree-embed`.

The callbacks are listed in the same order as in the LuaTeX reference manual.

Callback	Alias	Alias (longer)
contribute_filter	contribute	contributefilter
buildpage_filter	buildfilter	buildpagefilter
build_page_insert	buildinsert	buildpageinsert
pre_linebreak_filter	preline	prelinebreakfilter
linebreak_filter	line	linebreakfilter
append_to_vlist_filter	append	appendtovlistfilter
post_linebreak_filter	postline	postlinebreakfilter
hpack_filter	hpack	hpackfilter
vpack_filter	vpack	vpackfilter
hpack_quality	hpackq	hpackquality
vpack_quality	vpackq	vpackquality
process_rule	process	processrule
pre_output_filter	preout	preoutputfilter
hyphenate	hyph	
ligaturing	liga	
kerning	kern	
insert_local_par	insert	insertlocalpar
mlist_to_hlist	mhlist	mlisttohlist

Figure 1: The callback aliases

5 Options

5.1 Option callback

The option `callback` is the most important setting of the package. It is possible to specify an alias to select the `callback`. Take a look at the overview of callbacks (→ Figure 1). `nodetree` supports all node related callbacks as listed in the LuaTeX reference manual.

This macros process callback options: `\NodetreeRegisterCallback{<callbacks>}`, `\NodetreeUnregisterCallback{<callbacks>}`, `\NodetreeSet{<callback=<callbacks>}` and `\usepackage[<callback=<callbacks>]{<nodetree>}`.

Use commas to specify multiple callbacks. Avoid using whitespaces:

```
\NodetreeRegisterCallback{preline,line,postline}
```

Wrap your callback aliases in curly braces for the macro `\NodetreeSet`:

```
\NodetreeSet{callback={preline,line,postline}}
```

The same applies for the macro `\usepackage`:

```
\usepackage{callback={preline,line,postline}}
```

5.2 Option channel

You can select the debug output channel with this option. The default value for the option `channel` is `term` which displays the node tree in the current terminal.

Specify `log` and the package creates a log file named `jobname.ntlog`. Specify `tex` and a log file named `jobname.nttex` is created. `nt...` stands for `nodetree`. `jobname` is the basename of your file you want to debug. The debug channel is only useful for the auxiliary package `nodetree-embed`. Paste the markup in the environment `NodetreeEmbedView` and you get a terminal like view in your document.

5.3 Option verbosity

Higher integer values result in a more verbose output. The default value for this options is 1. At the moment only verbosity level 2 is implemented.

5.3.1 Example: verbosity=1

```

Callback: pre_linebreak_filter
-----
|LOCAL_PAR
|HLIST subtype: indent, width: 15pt
|GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
|PENALTY subtype: linepenalty, penalty: 10000
|GLUE subtype: parfillskip, stretch: +1fil
-----

```

5.3.2 Example: verbosity=2

```

Callback: pre_linebreak_filter
-----
|LOCAL_PAR[9] no: 464
|HLIST[0] no: 417, subtype: indent[3], width: 15pt
|GLYPH[29] no: 398, subtype: glyph[256], char: 46 (0x2e, '.'), font: 15, width: 2.78pt, height: 1.06pt
|PENALTY[14] no: 329, subtype: linepenalty[2], penalty: 10000
|GLUE[12] no: 470, subtype: parfillskip[15], stretch: +1fil
-----

```

5.4 Option color

The default option for color is `colored`. Use any other string (for example `none` or `no`) to disable the colored terminal output of the package.

```
\usepackage[color=no]{nodetree}
```

5.5 Option unit

The option `unit` sets the length unit to display all length values of the nodes. The default option for `unit` is `pt`. See figure 2 and 3 for possible values.

5.5.1 Example: unit=pt

```

Callback: pre_linebreak_filter
-----
|LOCAL_PAR
|HLIST subtype: indent, width: 15pt
|GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 6.25pt, height: 6.83pt
|GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 5pt, height: 4.48pt, depth: 0.11pt
|GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 3.92pt, height: 4.42pt
|GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
-----

```

Unit	Description
pt	Point 1/72.27 inch. The conversion to metric units, to two decimal places, is 1 point = 2.85 mm = 28.45 cm.
pc	Pica, 12 pt
in	Inch, 72.27 pt
bp	Big point, 1/72 inch. This length is the definition of a point in PostScript and many desktop publishing systems.
cm	Centimeter
mm	Millimeter
dd	Didot point, 1.07 pt
cc	Cicero, 12 dd
sp	Scaled point, 1/65536 pt

Figure 2: Fixed units

Unit	Description
ex	x-height of the current font
em	Width of the capital letter M

Figure 3: Relative units

```

|GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 8.33pt, height: 4.42pt
|GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
|PENALTY subtype: linepenalty, penalty: 10000
|GLUE subtype: parfillskip, stretch: +1fil
-----

```

5.5.2 Example: unit=sp

```

Callback: pre_linebreak_filter
-----
|LOCAL_PAR
|HLIST subtype: indent, width: 983040sp
|GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 409600sp, height: 447611sp
|GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 327680sp, height: 293601sp, depth: 7209sp
|GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 256901sp, height: 289669sp
|GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 290980sp, height: 293601sp, depth: 7209sp
|GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 545915sp, height: 289669sp
|GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 182190sp, height: 69468sp
|PENALTY subtype: linepenalty, penalty: 10000
|GLUE subtype: parfillskip, stretch: +1fil
-----

```

5.5.3 Example: unit=cm

```

Callback: pre_linebreak_filter
-----
|LOCAL_PAR
|HLIST subtype: indent, width: 0.53cm
|GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 0.22cm, height: 0.24cm
|GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 0.18cm, height: 0.16cm, depth: 0cm
|GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 0.14cm, height: 0.16cm
|GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 0.16cm, height: 0.16cm, depth: 0cm
|GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 0.29cm, height: 0.16cm
|GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 0.1cm, height: 0.04cm
|PENALTY subtype: linepenalty, penalty: 10000
|GLUE subtype: parfillskip, stretch: +1fil
-----

```

5.6 Option decimalplaces

The options `decimalplaces` sets the number of decimal places for some node fields. If `decimalplaces` is set to 0 only integer values are shown.

```
\NodetreeSetOption[decimalplaces]{4}
```

5.6.1 Example: decimalplaces=0

```
Callback: pre_linebreak_filter
-----
|LOCAL_PAR
|HLIST subtype: indent, width: 1cc
|GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 0cc, height: 1cc
|GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 0cc, height: 0cc, depth: 0cc
|GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 0cc, height: 0cc
|GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 0cc, height: 0cc, depth: 0cc
|GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 1cc, height: 0cc
|GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 0cc, height: 0cc
|PENALTY subtype: linepenalty, penalty: 10000
|GLUE subtype: parfillskip, stretch: +1fil
-----
```

5.6.2 Example: decimalplaces=2

```
Callback: pre_linebreak_filter
-----
|LOCAL_PAR
|HLIST subtype: indent, width: 1.17cc
|GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 0.49cc, height: 0.53cc
|GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 0.39cc, height: 0.35cc, depth: 0.81cc
|GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 0.31cc, height: 0.34cc
|GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 0.35cc, height: 0.35cc, depth: 0.81cc
|GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 0.65cc, height: 0.34cc
|GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 0.22cc, height: 0.08cc
|PENALTY subtype: linepenalty, penalty: 10000
|GLUE subtype: parfillskip, stretch: +1fil
-----
```

5.6.3 Example: decimalplaces=5

```
Callback: pre_linebreak_filter
-----
|LOCAL_PAR
|HLIST subtype: indent, width: 1.16821cc
|GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 0.48676cc, height: 0.53193cc
|GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 0.3894cc, height: 0.34891cc, depth: 0.80857cc
|GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 0.30529cc, height: 0.34423cc
|GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 0.34579cc, height: 0.34891cc, depth: 0.80857cc
|GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 0.64875cc, height: 0.34423cc
|GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 0.21651cc, height: 0.08255cc
|PENALTY subtype: linepenalty, penalty: 10000
|GLUE subtype: parfillskip, stretch: +1fil
-----
```

5.7 Option theme and thememode

5.7.1 Example: theme=bwdark thememode=dark


```

Callback: pre_linebreak_filter
-----
├LOCAL_PAR
├HLIST subtype: indent, width: 15pt
├GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
├PENALTY subtype: linepenalty, penalty: 10000
└GLUE subtype: parfillskip, stretch: +1fil
-----

```

5.7.2 Example: theme=bwlight thememode=light

```

Callback: pre_linebreak_filter
-----
├LOCAL_PAR
├HLIST subtype: indent, width: 15
├GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78 , height: 1.06
├PENALTY subtype: linepenalty, penalty: 10000
└GLUE subtype: parfillskip, stretch: +1
-----

```

5.7.3 Example: theme=monokaisoda thememode=dark

```

Callback: pre_linebreak_filter
-----
├LOCAL_PAR
├HLIST subtype: indent, width: 15pt
├GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
├PENALTY subtype: linepenalty, penalty: 10000
└GLUE subtype: parfillskip, stretch: +1fil
-----

```

5.7.4 Example: theme=monokaisoda thememode=light

```

Callback: pre_linebreak_filter
-----
├LOCAL_PAR
├HLIST subtype: indent, width: 15pt
├GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
├PENALTY subtype: linepenalty, penalty: 10000
└GLUE subtype: parfillskip, stretch: +1fil
-----

```

5.8 Option font

nodetree-embed passes the option `font` down to the command `\setmonofont{}` of the `fontspec` package. The used font should be a monospaced and have some box drawing glyphs (See table [UNICODE glyphs 4](#)).

5.8.1 Example: font={Liberation Mono}

```

Callback: post_linebreak_filter
-----
├GLUE subtype: baselineskip, width: 10.94pt
├HLIST subtype: line, width: 345pt, height: 1.06pt
└┬head:

```

```

LOCAL_PAR
HLIST subtype: indent, width: 15pt
GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
PENALTY subtype: linepenalty, penalty: 10000
GLUE subtype: parfillskip, stretch: +1fil
GLUE subtype: rightskip
-----

```

5.8.2 Example: font={Ubuntu Mono}

```

Callback: post_linebreak_filter
-----
GLUE subtype: baselineskip, width: 10.94pt
HLIST subtype: line, width: 345pt, height: 1.06pt
└─head:
    LOCAL_PAR
    HLIST subtype: indent, width: 15pt
    GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
    PENALTY subtype: linepenalty, penalty: 10000
    GLUE subtype: parfillskip, stretch: +1fil
    GLUE subtype: rightskip
-----

```

5.9 Option fontsize

5.9.1 Example: \small

```

Callback: pre_linebreak_filter
-----
LOCAL_PAR
HLIST subtype: indent, width: 15pt
GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
PENALTY subtype: linepenalty, penalty: 10000
GLUE subtype: parfillskip, stretch: +1fil
-----

```

5.9.2 Example: \tiny

```

Callback: pre_linebreak_filter
-----
LOCAL_PAR
HLIST subtype: indent, width: 15pt
GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
PENALTY subtype: linepenalty, penalty: 10000
GLUE subtype: parfillskip, stretch: +1fil
-----

```

Code	Character	Name
U+2500	—	BOX DRAWINGS LIGHT HORIZONTAL
U+2502		BOX DRAWINGS LIGHT VERTICAL
U+2514	└	BOX DRAWINGS LIGHT UP AND RIGHT
U+251C	├	BOX DRAWINGS LIGHT VERTICAL AND RIGHT
U+2550	=	BOX DRAWINGS DOUBLE HORIZONTAL
U+2551		BOX DRAWINGS DOUBLE VERTICAL
U+255A	└┐	BOX DRAWINGS DOUBLE UP AND RIGHT
U+2560	├┤	BOX DRAWINGS DOUBLE VERTICAL AND RIGHT

Figure 4: The UNICODE box drawings glyphs

6 Visual tree structure

6.1 Two different connections

Nodes in LuaTeX are connected. The `nodetree` package distinguishes between the `list` and `field` connections.

- `list`: Nodes, which are double connected by `next` and `previous` fields.
- `field`: Connections to nodes by other fields than `next` and `previous` fields, e. g. `head`, `pre`.

6.2 Unicode characters to show the tree view

The package `nodetree` uses the unicode box drawing symbols. Your default terminal font should contain this characters to obtain the tree view. Eight box drawing characters are necessary.

For `list` connections *light* characters are shown.



`field` connections are visualized by *Double* characters.



7 Examples

In this section lists some examples of the nodetree output.

7.1 The node list of the package name

nodetree

```
Callback: post_linebreak_filter
-----
|GLUE subtype: baselineskip, width: 5.06pt
|HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 6.94pt
|  head:
|    LOCAL_PAR
|    HLIST subtype: indent, width: 15pt
|    GLYPH subtype: glyph, char: 110 (0x6e, 'n'), width: 5.56pt, height: 4.42pt
|    GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 5pt, height: 4.48pt, depth: 0.11pt
|    KERN subtype: fontkern, kern: 0.28pt
|    GLYPH subtype: glyph, char: 100 (0x64, 'd'), width: 5.56pt, height: 6.94pt, depth: 0.11pt
|      properties: [{'injections'] = [{'leftkern'] = 18350.08}]
|    GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
|    DISC subtype: regular, penalty: 50
|    pre:
|      GLYPH subtype: glyph, char: 45 (0x2d, '-'), width: 3.33pt, height: 2.45pt
|    GLYPH subtype: glyph, char: 116 (0x74, 't'), width: 3.89pt, height: 6.15pt, depth: 0.11pt
|    GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 3.92pt, height: 4.42pt
|    GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
|    GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
|    PENALTY subtype: linepenalty, penalty: 10000
|    GLUE subtype: parfillskip, stretch: +1fil
|    GLUE subtype: rightskip
-----
```

7.2 The node list of a mathematical formula

$\$1+2\$$

```
Callback: post_linebreak_filter
-----
|GLUE subtype: baselineskip, width: 5.56pt
|HLIST subtype: line, width: 345pt, depth: 0.83pt, height: 6.44pt
|  head:
|    LOCAL_PAR
|    HLIST subtype: indent, width: 15pt
|    MATH subtype: beginmath
|    GLYPH subtype: glyph, char: 49 (0x31, '1'), width: 5pt, height: 6.44pt
|    GLUE subtype: medmuskip, width: 2.22pt, stretch: 1.11pt, shrink: 2.22pt
|    GLYPH subtype: glyph, char: 43 (0x2b, '+'), width: 7.78pt, height: 5.83pt, depth: 0.83pt
|    PENALTY subtype: noadpenalty, penalty: 700
|    GLUE subtype: medmuskip, width: 2.22pt, stretch: 1.11pt, shrink: 2.22pt
|    GLYPH subtype: glyph, char: 50 (0x32, '2'), width: 5pt, height: 6.44pt
|    MATH subtype: endmath
|    PENALTY subtype: linepenalty, penalty: 10000
|    GLUE subtype: parfillskip, stretch: +1fil
|    GLUE subtype: rightskip
-----
```

7.3 The node list of the word *Office*

The characters *ffi* are deeply nested in a discretionary node.
Office

```
Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 4.95pt
├─HLIST subtype: line, width: 345pt, depth: 0.22pt, height: 7.05pt
├─head:
│   └─LOCAL_PAR
│       └─HLIST subtype: indent, width: 15pt
│           └─GLYPH subtype: glyph, char: 79 (0x4f, 'O'), width: 7.78pt, height: 7.05pt, depth: 0.22pt
│               └─DISC subtype: regular, penalty: 50
│                   └─replace:
│                       └─GLYPH subtype: glyph ligature, char: 64259 (0xfb03, 'Œ'), width: 8.33pt, height: 7.05pt
│                           └─components:
│                               └─GLYPH subtype: glyph ligature, char: 64256 (0xfb00, 'Œ'), width: 5.83pt, height: 7.05pt
│                                   └─components:
│                                       └─GLYPH subtype: glyph, char: 102 (0x66, 'f'), width: 3.06pt, height: 7.05pt
│                                           └─GLYPH subtype: glyph, char: 102 (0x66, 'f'), width: 3.06pt, height: 7.05pt
│                                       └─GLYPH subtype: glyph, char: 105 (0x69, 'i'), width: 2.78pt, height: 6.57pt
│                                   └─pre:
│                                       └─GLYPH subtype: glyph, char: 102 (0x66, 'f'), width: 3.06pt, height: 7.05pt
│                                       └─GLYPH subtype: glyph, char: 45 (0x2d, '-'), width: 3.33pt, height: 2.45pt
│                                   └─post:
│                                       └─GLYPH subtype: glyph ligature, char: 64257 (0xfb01, 'fi'), width: 5.56pt, height: 7.05pt
│                                           └─components:
│                                               └─GLYPH subtype: glyph, char: 102 (0x66, 'f'), width: 3.06pt, height: 7.05pt
│                                                   └─GLYPH subtype: glyph, char: 105 (0x69, 'i'), width: 2.78pt, height: 6.57pt
│                                           └─GLYPH subtype: glyph, char: 99 (0x63, 'c'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
│                                           └─GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
│                                           └─PENALTY subtype: linepenalty, penalty: 10000
│                                           └─GLUE subtype: parfillskip, stretch: +1fil
│                                           └─GLUE subtype: rightskip
└─-----
```

7.4 Node types

This chapter shows some node types in a nodetree view.

7.4.1 Type: hlist(0) Subtype: line(1)

Lorem

```
Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 5.17pt
├─HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 6.83pt
├─head:
│   └─LOCAL_PAR
│       └─HLIST subtype: indent, width: 15pt
│           └─GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 6.25pt, height: 6.83pt
│               └─GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 5pt, height: 4.48pt, depth: 0.11pt
│                   └─GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 3.92pt, height: 4.42pt
│                       └─GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
│                           └─GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 8.33pt, height: 4.42pt
│                               └─PENALTY subtype: linepenalty, penalty: 10000
```

```

└─GLUE subtype: parfillskip, stretch: +1fil
└─GLUE subtype: rightskip
-----

```

7.4.2 Type: hlist(0) Subtype: box(2)

L\hbox to 40pt{ore}m

```

Callback: post_linebreak_filter
-----
└─GLUE subtype: baselineskip, width: 5.17pt
└─HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 6.83pt
  └─head:
    └─LOCAL_PAR
      └─HLIST subtype: indent, width: 15pt
        └─GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 6.25pt, height: 6.83pt
          └─HLIST subtype: box, width: 40pt, depth: 0.11pt, height: 4.48pt
            └─head:
              └─GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 5pt, height: 4.48pt, depth: 0.11pt
                └─GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 3.92pt, height: 4.42pt
                  └─GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
                └─GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 8.33pt, height: 4.42pt
              └─PENALTY subtype: linepenalty, penalty: 10000
            └─GLUE subtype: parfillskip, stretch: +1fil
          └─GLUE subtype: rightskip
        -----

```

7.4.3 Type: hlist(0) Subtype: indent(3)

\setlength {\parindent }{5cm} I

```

Callback: post_linebreak_filter
-----
└─GLUE subtype: baselineskip, width: 0.18cm
└─HLIST subtype: line, width: 12.13cm, height: 0.24cm
  └─head:
    └─LOCAL_PAR
      └─HLIST subtype: indent, width: 5cm
        └─GLYPH subtype: glyph, char: 73 (0x49, 'I'), width: 0.13cm, height: 0.24cm
          └─PENALTY subtype: linepenalty, penalty: 10000
            └─GLUE subtype: parfillskip, stretch: +1fil
          └─GLUE subtype: rightskip
        -----

```

7.4.4 Type: vlist(1)

L\vbox to 40pt{0}L

```

Callback: post_linebreak_filter
- groupcode: vbox
-----
└─HLIST subtype: line, width: 12.13cm, depth: 0.01cm, height: 0.25cm
  └─head:
    └─LOCAL_PAR
      └─HLIST subtype: indent, width: 0.53cm
        └─GLYPH subtype: glyph, char: 79 (0x4f, 'O'), width: 0.27cm, height: 0.25cm, depth: 0.01cm
          └─PENALTY subtype: linepenalty, penalty: 10000
        -----

```

```

└GLUE subtype: parfillskip, stretch: +1fil
└GLUE subtype: rightskip
-----
Callback: post_linebreak_filter
-----
└GLUE subtype: lineskip, width: 0.04cm
└HLIST subtype: line, width: 12.13cm, depth: 0.01cm, height: 1.41cm
  └head:
    └LOCAL_PAR
      └HLIST subtype: indent, width: 0.53cm
        └GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 0.22cm, height: 0.24cm
          └VLIST subtype: unknown, width: 12.13cm, depth: 0.01cm, height: 1.41cm
            └head:
              └HLIST subtype: line, width: 12.13cm, depth: 0.01cm, height: 0.25cm
                └head:
                  └LOCAL_PAR
                    └HLIST subtype: indent, width: 0.53cm
                      └GLYPH subtype: glyph, char: 79 (0x4f, 'O'), width: 0.27cm, height: 0.25cm, depth: 0.01cm
                        └PENALTY subtype: linepenalty, penalty: 10000
                          └GLUE subtype: parfillskip, stretch: +1fil
                            └GLUE subtype: rightskip
                              └GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 0.22cm, height: 0.24cm
                                └PENALTY subtype: linepenalty, penalty: 10000
                                  └GLUE subtype: parfillskip, stretch: +1fil
                                    └GLUE subtype: rightskip
-----

```

7.4.5 Type: rule(2)

```
\rule [-2mm]{10mm}{4mm}
```

```

Callback: post_linebreak_filter
-----
└GLUE subtype: baselineskip, width: 2.22mm
└HLIST subtype: line, width: 121.25mm, depth: 2mm, height: 2mm
  └head:
    └LOCAL_PAR
      └HLIST subtype: indent, width: 5.27mm
        └HLIST subtype: box, width: 10mm, depth: 2mm, height: 2mm
          └head:
            └RULE subtype: normal, width: 10mm, depth: 2mm, height: 2mm
              └PENALTY subtype: linepenalty, penalty: 10000
                └GLUE subtype: parfillskip, stretch: +1fil
                  └GLUE subtype: rightskip
-----

```

7.4.6 Type: mark(4)

```
\mark {Lorem}.
```

```

Callback: pre_output_filter
- size: 36044800
- groupcode: output
- direction: TLT
- maxdepth: 327680
- packtype: exactly
-----
└WHATSIT subtype: write, stream: 129, data:

```

```

|MARK subtype: 0, mark: table: 0x68667f0
|GLUE subtype: topskip, width: 3.14mm
|HLIST subtype: line, width: 121.25mm, height: 0.37mm
  |head:
    |LOCAL_PAR
    |HLIST subtype: indent, width: 5.27mm
    |GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 0.98mm, height: 0.37mm
    |PENALTY subtype: linepenalty, penalty: 10000
    |GLUE subtype: parfillskip, stretch: +1fil
    |GLUE subtype: rightskip
  |GLUE subtype: userskip, stretch: +1fil
-----
Callback: pre_output_filter
- size: 36044800
- groupcode: output
- direction: TLT
- maxdepth: 327680
- packtype: exactly
-----
|WHATSIT subtype: write, stream: 129, data:
|GLUE subtype: topskip, width: 3.51mm
|VLIST subtype: unknown
-----
Callback: pre_output_filter
- size: 36044800
- groupcode: output
- direction: TLT
- maxdepth: 327680
- packtype: exactly
-----
|WHATSIT subtype: write, stream: 129, data:
|GLUE subtype: topskip, width: 3.51mm
|HLIST subtype: unknown, width: 121.25mm
|GLUE subtype: userskip, stretch: +1fill
-----

```

7.4.7 Type: disc(7) Subtype: discretionary(0)

L\0\L

```

Callback: post_linebreak_filter
-----
|GLUE subtype: baselineskip, width: 4.95pt
|HLIST subtype: line, width: 345pt, depth: 0.22pt, height: 7.05pt
  |head:
    |LOCAL_PAR
    |HLIST subtype: indent, width: 15pt
    |GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 6.25pt, height: 6.83pt
    |DISC subtype: explicit, penalty: 50
      |pre:
        |GLYPH subtype: glyph, char: 45 (0x2d, '-'), width: 3.33pt, height: 2.45pt
      |GLYPH subtype: glyph, char: 79 (0x4f, 'O'), width: 7.78pt, height: 7.05pt, depth: 0.22pt
    |DISC subtype: explicit, penalty: 50
      |pre:
        |GLYPH subtype: glyph, char: 45 (0x2d, '-'), width: 3.33pt, height: 2.45pt
      |GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 6.25pt, height: 6.83pt
    |PENALTY subtype: linepenalty, penalty: 10000
  |GLUE subtype: parfillskip, stretch: +1fil

```



```
└─GLUE subtype: rightskip
```

7.4.8 Type: disc(7) Subtype: regular(3)

Office

```
Callback: post_linebreak_filter
```

```
└─GLUE subtype: baselineskip, width: 4.95pt
└─HLIST subtype: line, width: 345pt, depth: 0.22pt, height: 7.05pt
  └─head:
    └─LOCAL_PAR
      └─HLIST subtype: indent, width: 15pt
        └─GLYPH subtype: glyph, char: 79 (0x4f, 'O'), width: 7.78pt, height: 7.05pt, depth: 0.22pt
          └─DISC subtype: regular, penalty: 50
            └─pre:
              └─GLYPH subtype: glyph, char: 102 (0x66, 'f'), width: 3.06pt, height: 7.05pt
                └─GLYPH subtype: glyph, char: 45 (0x2d, '-'), width: 3.33pt, height: 2.45pt
              └─post:
                └─GLYPH subtype: glyph ligature, char: 64257 (0xfb01, 'fi'), width: 5.56pt, height: 7.05pt
                  └─components:
                    └─GLYPH subtype: glyph, char: 102 (0x66, 'f'), width: 3.06pt, height: 7.05pt
                      └─GLYPH subtype: glyph, char: 105 (0x69, 'i'), width: 2.78pt, height: 6.57pt
                └─replace:
                  └─GLYPH subtype: glyph ligature, char: 64259 (0xfb03, 'fi'), width: 8.33pt, height: 7.05pt
                    └─components:
                      └─GLYPH subtype: glyph ligature, char: 64256 (0xfb00, 'fi'), width: 5.83pt, height: 7.05pt
                        └─components:
                          └─GLYPH subtype: glyph, char: 102 (0x66, 'f'), width: 3.06pt, height: 7.05pt
                            └─GLYPH subtype: glyph, char: 102 (0x66, 'f'), width: 3.06pt, height: 7.05pt
                          └─GLYPH subtype: glyph, char: 105 (0x69, 'i'), width: 2.78pt, height: 6.57pt
                  └─GLYPH subtype: glyph, char: 99 (0x63, 'c'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
                └─GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
            └─PENALTY subtype: linepenalty, penalty: 10000
            └─GLUE subtype: parfillskip, stretch: +1fil
            └─GLUE subtype: rightskip
```

7.4.9 Type: whatsit(8) Subtype: pdfaction(22)

```
\usepackage{hyperref}
\begin{document}
\url{http://luatex.org}
\end{document}
```

```
Callback: post_linebreak_filter
```

```
└─GLUE subtype: baselineskip, width: 5.06pt
└─HLIST subtype: line, width: 345pt, depth: 2.29pt, height: 6.94pt
  └─head:
    └─LOCAL_PAR
      └─HLIST subtype: indent, width: 15pt
        └─WHATSIT subtype: pdf_start_link, width: -16384pt, depth: -16384pt, height: -16384pt, objnum:
          └─action:
            └─WHATSIT subtype: pdf_action, action_type: 3, file: , data: /Subtype/Link/A<</Type/Action
        └─MATH subtype: beginmath
```

```

|GLYPH subtype: glyph, char: 104 (0x68, 'h'), width: 5.25pt, height: 6.11pt
|GLYPH subtype: glyph, char: 116 (0x74, 't'), width: 5.25pt, height: 5.54pt, depth: 0.06pt
|GLYPH subtype: glyph, char: 116 (0x74, 't'), width: 5.25pt, height: 5.54pt, depth: 0.06pt
|GLYPH subtype: glyph, char: 112 (0x70, 'p'), width: 5.25pt, height: 4.31pt, depth: 2.22pt
|GLUE subtype: thickmuskip
|GLYPH subtype: glyph, char: 58 (0x3a, ':'), width: 5.25pt, height: 4.31pt
|PENALTY subtype: noadpenalty, penalty: 500
|GLUE subtype: thickmuskip
|GLYPH subtype: glyph, char: 47 (0x2f, '/'), width: 5.25pt, height: 6.94pt, depth: 0.85pt
|GLYPH subtype: glyph, char: 108 (0x6c, 'l'), width: 5.25pt, height: 6.11pt
|GLYPH subtype: glyph, char: 117 (0x75, 'u'), width: 5.25pt, height: 4.31pt, depth: 0.06pt
|GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5.25pt, height: 4.4pt, depth: 0.06pt
|GLYPH subtype: glyph, char: 116 (0x74, 't'), width: 5.25pt, height: 5.54pt, depth: 0.06pt
|GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 5.25pt, height: 4.4pt, depth: 0.06pt
|GLYPH subtype: glyph, char: 120 (0x78, 'x'), width: 5.25pt, height: 4.31pt
|GLUE subtype: medmuskip
|GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 5.25pt, height: 1.25pt
|PENALTY subtype: noadpenalty, penalty: 700
|GLUE subtype: medmuskip
|GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 5.25pt, height: 4.4pt, depth: 0.06pt
|GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 5.25pt, height: 4.37pt
|GLYPH subtype: glyph, char: 103 (0x67, 'g'), width: 5.25pt, height: 4.42pt, depth: 2.29pt
|MATH subtype: endmath
|WHATSIT subtype: pdf_end_link
|PENALTY subtype: linepenalty, penalty: 10000
|GLUE subtype: parfillskip, stretch: +1fil
|GLUE subtype: rightskip
-----

```

7.4.10 Type: whatsit(8) Subtype: pdfcolorstack(28)

```

\usepackage{color}
\begin{document}
Lo\textcolor{red}{re}m.
\end{document}

```

```

Callback: post_linebreak_filter
-----
|GLUE subtype: baselineskip, width: 5.17pt
|HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 6.83pt
  |head:
    |LOCAL_PAR
      |HLIST subtype: indent, width: 15pt
        |GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 6.25pt, height: 6.83pt
        |GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 5pt, height: 4.48pt, depth: 0.11pt
        |WHATSIT subtype: pdf_colorstack, data: 1 0 0 rg 1 0 0 RG
        |GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 3.92pt, height: 4.42pt
        |GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
        |WHATSIT subtype: pdf_colorstack, data:
        |GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 8.33pt, height: 4.42pt
        |GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
        |PENALTY subtype: linepenalty, penalty: 10000
        |GLUE subtype: parfillskip, stretch: +1fil
        |GLUE subtype: rightskip
      -----

```

7.4.11 Type: glue(12) Subtype: baselineskip(2)

\baselineskip=5cm Lorem Lorem

```
Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 4.76cm
├─HLIST subtype: line, width: 12.13cm, depth: 0cm, height: 0.24cm
└─head:
  └─LOCAL_PAR
    └─HLIST subtype: indent, width: 0.53cm
      └─GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 0.22cm, height: 0.24cm
        └─GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 0.18cm, height: 0.16cm, depth: 0cm
          └─GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 0.14cm, height: 0.16cm
            └─GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 0.16cm, height: 0.16cm, depth: 0cm
              └─GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 0.29cm, height: 0.16cm
                └─PENALTY subtype: linepenalty, penalty: 10000
                  └─GLUE subtype: parfillskip, stretch: +1fil
                    └─GLUE subtype: rightskip

-----
Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 4.76cm
├─HLIST subtype: line, width: 12.13cm, depth: 0cm, height: 0.24cm
└─head:
  └─LOCAL_PAR
    └─HLIST subtype: indent, width: 0.53cm
      └─GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 0.22cm, height: 0.24cm
        └─GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 0.18cm, height: 0.16cm, depth: 0cm
          └─GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 0.14cm, height: 0.16cm
            └─GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 0.16cm, height: 0.16cm, depth: 0cm
              └─GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 0.29cm, height: 0.16cm
                └─PENALTY subtype: linepenalty, penalty: 10000
                  └─GLUE subtype: parfillskip, stretch: +1fil
                    └─GLUE subtype: rightskip

-----
```

7.4.12 Type: glue(12) Subtype: parskip(3)

\parskip=5cm Lorem Lorem

```
Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 5.17pt
├─HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 6.83pt
└─head:
  └─LOCAL_PAR
    └─HLIST subtype: indent, width: 15pt
      └─GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 6.25pt, height: 6.83pt
        └─GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 5pt, height: 4.48pt, depth: 0.11pt
          └─GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 3.92pt, height: 4.42pt
            └─GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
              └─GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 8.33pt, height: 4.42pt
                └─PENALTY subtype: linepenalty, penalty: 10000
                  └─GLUE subtype: parfillskip, stretch: +1fil
                    └─GLUE subtype: rightskip

-----
Callback: post_linebreak_filter
```

```

-----
|GLUE subtype: baselineskip, width: 5.06pt
|HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 6.83pt
|  |head:
|  | |LOCAL_PAR
|  | |HLIST subtype: indent, width: 15pt
|  | |GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 6.25pt, height: 6.83pt
|  | |GLYPH subtype: glyph, char: 111 (0x6f, 'o'), width: 5pt, height: 4.48pt, depth: 0.11pt
|  | |GLYPH subtype: glyph, char: 114 (0x72, 'r'), width: 3.92pt, height: 4.42pt
|  | |GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
|  | |GLYPH subtype: glyph, char: 109 (0x6d, 'm'), width: 8.33pt, height: 4.42pt
|  | |PENALTY subtype: linepenalty, penalty: 10000
|  | |GLUE subtype: parfillskip, stretch: +1fil
|  | |GLUE subtype: rightskip
|  |
|  |-----

```

7.4.13 Type: glue(12) Subtype: spaceskip(13)

\spaceskip =5cm a a

```

Callback: post_linebreak_filter
-----
|GLUE subtype: baselineskip, width: 7.52pt
|HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 4.48pt
|  |head:
|  | |LOCAL_PAR
|  | |HLIST subtype: indent, width: 15pt
|  | |GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5pt, height: 4.48pt, depth: 0.11pt
|  | |GLUE subtype: spaceskip, width: 142.26pt
|  | |GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5pt, height: 4.48pt, depth: 0.11pt
|  | |PENALTY subtype: linepenalty, penalty: 10000
|  | |GLUE subtype: parfillskip, stretch: +1fil
|  | |GLUE subtype: rightskip
|  |
|  |-----

```

7.4.14 Type: glue(12) Subtype: leaders(100)

a \leavevmode \leaders \hbox { . }\hfill \kern 0pt a

```

Callback: post_linebreak_filter
-----
|GLUE subtype: baselineskip, width: 7.52pt
|HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 4.48pt
|  |head:
|  | |LOCAL_PAR
|  | |HLIST subtype: indent, width: 15pt
|  | |GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5pt, height: 4.48pt, depth: 0.11pt
|  | |GLUE subtype: spaceskip, width: 3.33pt, stretch: 1.66pt, shrink: 1.11pt
|  | |GLUE subtype: leaders, stretch: +1fill
|  | |  |leader:
|  | |  | |HLIST subtype: box, width: 10.55pt, height: 1.06pt
|  | |  | |  |head:
|  | |  | |  | |GLUE subtype: spaceskip, width: 3.33pt, stretch: 1.66pt, shrink: 1.11pt
|  | |  | |  | |GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
|  | |  | |  | |GLUE subtype: spaceskip, width: 4.44pt, stretch: 4.99pt, shrink: 0.37pt
|  | |  | |
|  | |  | |-----
|  | |KERN subtype: userkern
|  | |GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5pt, height: 4.48pt, depth: 0.11pt
|  |
|  |-----

```

```

├PENALTY subtype: linepenalty, penalty: 10000
├GLUE subtype: parfillskip, stretch: +1fil
└GLUE subtype: rightskip
-----

```

7.4.15 Type: glue(12) Subtype: cleaders(101)

a \leavevmode \cleaders \hbox { . }\hfill \kern Opt a

```

Callback: post_linebreak_filter
-----
├GLUE subtype: baselineskip, width: 7.52pt
├HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 4.48pt
└┬head:
  ├──LOCAL_PAR
  ├──HLIST subtype: indent, width: 15pt
  ├──GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5pt, height: 4.48pt, depth: 0.11pt
  ├──GLUE subtype: spaceskip, width: 3.33pt, stretch: 1.66pt, shrink: 1.11pt
  ├──GLUE subtype: cleaders, stretch: +1fill
  └┬leader:
    ├──HLIST subtype: box, width: 10.55pt, height: 1.06pt
    └┬head:
      ├──GLUE subtype: spaceskip, width: 3.33pt, stretch: 1.66pt, shrink: 1.11pt
      ├──GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
      └GLUE subtype: spaceskip, width: 4.44pt, stretch: 4.99pt, shrink: 0.37pt
  ├──KERN subtype: userkern
  ├──GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5pt, height: 4.48pt, depth: 0.11pt
  ├──PENALTY subtype: linepenalty, penalty: 10000
  ├──GLUE subtype: parfillskip, stretch: +1fil
  └GLUE subtype: rightskip
-----

```

7.4.16 Type: glue(12) Subtype: xleaders(102)

a \leavevmode \xleaders \hbox { . }\hfill \kern Opt a

```

Callback: post_linebreak_filter
-----
├GLUE subtype: baselineskip, width: 7.52pt
├HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 4.48pt
└┬head:
  ├──LOCAL_PAR
  ├──HLIST subtype: indent, width: 15pt
  ├──GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5pt, height: 4.48pt, depth: 0.11pt
  ├──GLUE subtype: spaceskip, width: 3.33pt, stretch: 1.66pt, shrink: 1.11pt
  ├──GLUE subtype: xleaders, stretch: +1fill
  └┬leader:
    ├──HLIST subtype: box, width: 10.55pt, height: 1.06pt
    └┬head:
      ├──GLUE subtype: spaceskip, width: 3.33pt, stretch: 1.66pt, shrink: 1.11pt
      ├──GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
      └GLUE subtype: spaceskip, width: 4.44pt, stretch: 4.99pt, shrink: 0.37pt
  ├──KERN subtype: userkern
  ├──GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5pt, height: 4.48pt, depth: 0.11pt
  ├──PENALTY subtype: linepenalty, penalty: 10000
  ├──GLUE subtype: parfillskip, stretch: +1fil
  └GLUE subtype: rightskip
-----

```

7.4.17 Type: glue(12) Subtype: gleaders(102)

a \leavevmode \gleaders \hbox { . }\hfill \kern 0pt a

```
Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 7.52pt
├─HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 4.48pt
  └─head:
    ├─LOCAL_PAR
    ├─HLIST subtype: indent, width: 15pt
    ├─GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5pt, height: 4.48pt, depth: 0.11pt
    ├─GLUE subtype: spaceskip, width: 3.33pt, stretch: 1.66pt, shrink: 1.11pt
    └─GLUE subtype: gleaders, stretch: +1fill
      └─leader:
        └─HLIST subtype: box, width: 10.55pt, height: 1.06pt
          └─head:
            ├─GLUE subtype: spaceskip, width: 3.33pt, stretch: 1.66pt, shrink: 1.11pt
            ├─GLYPH subtype: glyph, char: 46 (0x2e, '.'), width: 2.78pt, height: 1.06pt
            └─GLUE subtype: spaceskip, width: 4.44pt, stretch: 4.99pt, shrink: 0.37pt
├─KERN subtype: userkern
├─GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5pt, height: 4.48pt, depth: 0.11pt
├─PENALTY subtype: linepenalty, penalty: 10000
├─GLUE subtype: parfillskip, stretch: +1fil
└─GLUE subtype: rightskip
-----
```

7.4.18 Type: kern(13) Subtype: userkern(0)

a\kern 2pt

```
Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 7.52pt
├─HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 4.48pt
  └─head:
    ├─LOCAL_PAR
    ├─HLIST subtype: indent, width: 15pt
    ├─GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5pt, height: 4.48pt, depth: 0.11pt
    └─KERN subtype: userkern, kern: 2pt
├─PENALTY subtype: linepenalty, penalty: 10000
├─GLUE subtype: parfillskip, stretch: +1fil
└─GLUE subtype: rightskip
-----
```

7.4.19 Type: kern(13) Subtype: fontkern(1)

Ve

```
Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 5.17pt
├─HLIST subtype: line, width: 345pt, depth: 0.22pt, height: 6.83pt
  └─head:
    └─LOCAL_PAR
-----
```

```

├─HLIST subtype: indent, width: 15pt
├─GLYPH subtype: glyph, char: 86 (0x56, 'V'), width: 7.5pt, height: 6.83pt, depth: 0.22pt
├─KERN subtype: fontkern, kern: -0.83pt
├─GLYPH subtype: glyph, char: 101 (0x65, 'e'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
│   └─properties: [{'injections'] = [{'leftkern'] = -54394.88]}
├─PENALTY subtype: linepenalty, penalty: 10000
├─GLUE subtype: parfillskip, stretch: +1fil
└─GLUE subtype: rightskip
-----

```

7.4.20 Type: kern(13) Subtype: accentkern(2)

\`{a}

```

Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 5.02pt
├─HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 6.98pt
│   └─head:
│       └─LOCAL_PAR
│           └─HLIST subtype: indent, width: 15pt
│               └─GLYPH subtype: glyph, char: 224 (0xe0, 'à'), width: 5pt, height: 6.98pt, depth: 0.11pt
│                   └─PENALTY subtype: linepenalty, penalty: 10000
│                       └─GLUE subtype: parfillskip, stretch: +1fil
│                           └─GLUE subtype: rightskip
└─GLUE subtype: rightskip
-----

```

7.4.21 Type: kern(13) Subtype: italiccorrection(3)

\textit {L}\OL

```

Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 4.95pt
├─HLIST subtype: line, width: 345pt, depth: 0.22pt, height: 7.05pt
│   └─head:
│       └─LOCAL_PAR
│           └─HLIST subtype: indent, width: 15pt
│               └─GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 6.27pt, height: 6.83pt, depth: 0.22pt
│                   └─KERN subtype: italiccorrection, kern: 0.17pt
│                       └─GLYPH subtype: glyph, char: 79 (0x4f, 'O'), width: 7.78pt, height: 7.05pt, depth: 0.22pt
│                           └─GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 6.25pt, height: 6.83pt, depth: 0.22pt
│                               └─PENALTY subtype: linepenalty, penalty: 10000
│                                   └─GLUE subtype: parfillskip, stretch: +1fil
│                                       └─GLUE subtype: rightskip
└─GLUE subtype: rightskip
-----

```

7.4.22 Type: penalty(14)

L \penalty 23 OL

```

Callback: post_linebreak_filter
-----
├─GLUE subtype: baselineskip, width: 4.95pt
├─HLIST subtype: line, width: 345pt, depth: 0.22pt, height: 7.05pt
│   └─head:
│       └─LOCAL_PAR
└─GLUE subtype: rightskip
-----

```

```

|HLIST subtype: indent, width: 15pt
|GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 6.25pt, height: 6.83pt
|GLUE subtype: spaceskip, width: 3.33pt, stretch: 1.66pt, shrink: 1.11pt
|PENALTY subtype: userpenalty, penalty: 23
|GLYPH subtype: glyph, char: 79 (0x4f, 'O'), width: 7.78pt, height: 7.05pt, depth: 0.22pt
|GLYPH subtype: glyph, char: 76 (0x4c, 'L'), width: 6.25pt, height: 6.83pt
|PENALTY subtype: linepenalty, penalty: 10000
|GLUE subtype: parfillskip, stretch: +1fil
|GLUE subtype: rightskip
-----

```

7.4.23 Type: glyph(29)

abc

```

Callback: post_linebreak_filter
-----
|GLUE subtype: baselineskip, width: 5.06pt
|HLIST subtype: line, width: 345pt, depth: 0.11pt, height: 6.94pt
└─head:
  |LOCAL_PAR
  |HLIST subtype: indent, width: 15pt
  |GLYPH subtype: glyph, char: 97 (0x61, 'a'), width: 5pt, height: 4.48pt, depth: 0.11pt
  |GLYPH subtype: glyph, char: 98 (0x62, 'b'), width: 5.56pt, height: 6.94pt, depth: 0.11pt
  |KERN subtype: fontkern, kern: 0.28pt
  |GLYPH subtype: glyph, char: 99 (0x63, 'c'), width: 4.44pt, height: 4.48pt, depth: 0.11pt
  |properties: {'injections'} = {'leftkern'} = 18350.08}}
  |PENALTY subtype: linepenalty, penalty: 10000
  |GLUE subtype: parfillskip, stretch: +1fil
  |GLUE subtype: rightskip
  -----

```

7.4.24 Type: attribute(38)

{\attribute 0=1 A}

```

Callback: post_linebreak_filter
-----
|GLUE subtype: baselineskip, width: 4.84pt
|HLIST subtype: line, width: 345pt, height: 7.16pt
└─head:
  |LOCAL_PAR attr: 0=1
  |HLIST subtype: indent, width: 15pt, attr: 0=1
  |GLYPH subtype: glyph, char: 65 (0x41, 'A'), width: 7.5pt, height: 7.16pt, attr: 0=1
  |PENALTY subtype: linepenalty, penalty: 10000
  |GLUE subtype: parfillskip, stretch: +1fil
  |GLUE subtype: rightskip
  -----

```

7.4.25 Type: attributelist(40)

{\attribute 0=1 A}

```

Callback: post_linebreak_filter
-----
|GLUE subtype: baselineskip, width: 4.84pt
|HLIST subtype: line, width: 345pt, height: 7.16pt
└─head:

```



```
|LOCAL_PAR attr: 0=1
|HLIST subtype: indent, width: 15pt, attr: 0=1
|GLYPH subtype: glyph, char: 65 (0x41, 'A'), width: 7.5pt, height: 7.16pt, attr: 0=1
|PENALTY subtype: linepenalty, penalty: 10000
|GLUE subtype: parfillskip, stretch: +1fil
|GLUE subtype: rightskip
-----
```

8 Implementation

8.1 The file nodetree.tex

```
26 \directlua{
27   nodetree = require('nodetree')
28 }
```

\NodetreeSetOption

```
29 \def\NodetreeSetOption[#1]#2{
30   \directlua{
31     nodetree.set_option('#1', '#2')
32   }
33 }
34 \let\nodetreeoption\NodetreeSetOption
```

\NodetreeResetOption

```
35 \def\NodetreeResetOption#1{
36   \NodetreeSetOption[#1]{%
37     \directlua{
38       tex.print(nodetree.get_default_option('#1'))
39     }%
40   }%
41 }
```

\NodetreeReset

```
42 \def\NodetreeReset{
43   \NodetreeResetOption{callback}
44   \NodetreeResetOption{channel}
45   \NodetreeResetOption{color}
46   \NodetreeResetOption{decimalplaces}
47   \NodetreeResetOption{unit}
48   \NodetreeResetOption{verbosity}
49 }
50 \let\nodetreereset\NodetreeReset
```

\NodetreeRegisterCallback

```
51 \def\NodetreeRegisterCallback#1{
52   \directlua{
53     nodetree.set_option('callback', '#1')
54     nodetree.register_callbacks()
55   }
56 }
57 \let\nodetreeregister\NodetreeRegisterCallback
```

\NodetreeUnregisterCallback

```
58 \def\NodetreeUnregisterCallback#1{
59   \directlua{
60     nodetree.set_option('callback', '#1')
```

```

61     nodetree.unregister_callbacks()
62 }
63 }
64 \let\nodetreeunregister\NodetreeUnregisterCallback

```

8.2 The file nodetree.sty

```

26 \input{nodetree}

27 \RequirePackage{kvoptions}

28 \SetupKeyvalOptions{
29   family=NT,
30   prefix=NTK@
31 }

32 \DeclareStringOption[term]{channel}
33 \define@key{NT}{channel}[]{\NodetreeSetOption[channel]{#1}}

34 \DeclareStringOption[postlinebreak]{callback}
35 \define@key{NT}{callback}[]{\NodetreeSetOption[callback]{#1}}

36 \DeclareStringOption[1]{verbosity}
37 \define@key{NT}{verbosity}[]{\NodetreeSetOption[verbosity]{#1}}

38 \DeclareStringOption[colored]{color}
39 \define@key{NT}{color}[]{\NodetreeSetOption[color]{#1}}

40 \DeclareStringOption[1]{unit}
41 \define@key{NT}{unit}[]{\NodetreeSetOption[unit]{#1}}

42 \DeclareStringOption[1]{decimalplaces}
43 \define@key{NT}{decimalplaces}[]{\NodetreeSetOption[decimalplaces]{#1}}

44 \ProcessKeyvalOptions{NT}
45 \directlua{
46   nodetree.register_callbacks()
47 }

\NodetreeSet

48 \newcommand{\NodetreeSet}[1]{%
49   \setkeys{NT}{#1}%
50 }
51 \let\nodetreeset\NodetreeSet

52 \NeedsTeXFormat{LaTeX2e}[1994/06/01]
53 \ProvidesPackage{nodetree-embed}
54   [2022/12/17 v2.2.1 Embed node trees into a LaTeX document]

55 \RequirePackage{xcolor,mdframed,expl3,xparse,fontspec}

56 \input{nodetree}

```

```

57 \RequirePackage{kvoptions}
58 \SetupKeyvalOptions{
59   family=NTE,
60   prefix=NTEK@
61 }

62 \directlua{
63   nodetree = require('nodetree')
64   nodetree.check_shell_escape()
65 }

66 \define@key{NTE}{callback}[]{\NodetreeSetOption[callback]{#1}}

67 \DeclareStringOption[1]{verbosity}
68 \define@key{NTE}{verbosity}[]{\NodetreeSetOption[verbosity]{#1}}

69 \DeclareStringOption[colored]{color}
70 \define@key{NTE}{color}[]{\NodetreeSetOption[color]{#1}}

71 \DeclareStringOption[1]{unit}
72 \define@key{NTE}{unit}[]{\NodetreeSetOption[unit]{#1}}

73 \DeclareStringOption[1]{decimalplaces}
74 \define@key{NTE}{decimalplaces}[]{\NodetreeSetOption[decimalplaces]{#1}}

75 \DeclareStringOption[monokaisoda]{theme}

76 \DeclareStringOption[dark]{thememode}

77 \DeclareStringOption[Ubuntu Mono]{font}

78 \DeclareStringOption[\footnotesize]{fontsize}

79 \DeclareBoolOption{showmarkup}

80 \ProcessKeyvalOptions{NTE}

```

\NTE@colors

```

81 \ExplSyntaxOn
82 \def\NTE@colors{
83   \str_case_e:nn{\NTEK@theme}{
84     {bwdark}{
85       \definecolor{NTEblack}{gray}{0}
86       \definecolor{NTEred}{gray}{1}
87       \definecolor{NTEgreen}{gray}{1}
88       \definecolor{NTEyellow}{gray}{1}
89       \definecolor{NTEblue}{gray}{1}
90       \definecolor{NTEmagenta}{gray}{1}
91       \definecolor{NTEcyan}{gray}{1}
92       \definecolor{NTEwhite}{gray}{1}
93       \definecolor{NTEblackbright}{gray}{0}
94       \definecolor{NTEredbright}{gray}{1}

```

```

95     \definecolor{NTEgreenbright}{gray}{1}
96     \definecolor{NTEyellowbright}{gray}{1}
97     \definecolor{NTEbluebright}{gray}{1}
98     \definecolor{NTEmagentabright}{gray}{1}
99     \definecolor{NTEcyanbright}{gray}{1}
100    \definecolor{NTEwhitebright}{gray}{1}
101  }
102  {bwligh}{
103    \definecolor{NTEblack}{gray}{0}
104    \definecolor{NTEred}{gray}{0}
105    \definecolor{NTEgreen}{gray}{0}
106    \definecolor{NTEyellow}{gray}{0}
107    \definecolor{NTEblue}{gray}{0}
108    \definecolor{NTEmagenta}{gray}{0}
109    \definecolor{NTEcyan}{gray}{0}
110    \definecolor{NTEwhite}{gray}{1}
111    \definecolor{NTEblackbright}{gray}{0}
112    \definecolor{NTEredbright}{gray}{0}
113    \definecolor{NTEgreenbright}{gray}{0}
114    \definecolor{NTEyellowbright}{gray}{0}
115    \definecolor{NTEbluebright}{gray}{0}
116    \definecolor{NTEmagentabright}{gray}{0}
117    \definecolor{NTEcyanbright}{gray}{0}
118    \definecolor{NTEwhitebright}{gray}{1}
119  }
120  {monokaisoda}{
121    \definecolor{NTEblack}{HTML}{1a1a1a}
122    \definecolor{NTEred}{HTML}{f4005f}
123    \definecolor{NTEgreen}{HTML}{98e024}
124    \definecolor{NTEyellow}{HTML}{fa8419}
125    \definecolor{NTEblue}{HTML}{9d65ff}
126    \definecolor{NTEmagenta}{HTML}{f4005f}
127    \definecolor{NTEcyan}{HTML}{58d1eb}
128    \definecolor{NTEwhite}{HTML}{c4c5b5}
129    \definecolor{NTEblackbright}{HTML}{625e4c}
130    \definecolor{NTEredbright}{HTML}{f4005f}
131    \definecolor{NTEgreenbright}{HTML}{98e024}
132    \definecolor{NTEyellowbright}{HTML}{e0d561}
133    \definecolor{NTEbluebright}{HTML}{9d65ff}
134    \definecolor{NTEmagentabright}{HTML}{f4005f}
135    \definecolor{NTEcyanbright}{HTML}{58d1eb}
136    \definecolor{NTEwhitebright}{HTML}{f6f6ef}
137  }
138  }
139  \str_case_e:nn{\NTEK@thememode}{
140    {dark}{
141      \definecolor{NTEbackground}{named}{NTEblack}
142      \definecolor{NTEfont}{named}{NTEwhitebright}
143    }
144    {light}{
145      \definecolor{NTEbackground}{named}{NTEwhitebright}
146      \definecolor{NTEfont}{named}{NTEblack}
147    }
148  }

```

```

149 }
150 \ExplSyntaxOff

```

\NTE@fonts

```

151 \def\NTE@fonts{
152   \bfseries%
153   \NTEK@fontsize%
154   \setmonofont{\NTEK@font}%
155   \ttfamily%
156   \setlength{\parindent}{0pt}%
157   \setlength{\parskip}{-0.9pt}%
158 }

```

\NodetreeSet Same definition as in nodetree.sty. Only implement this command if not already registers.

```

159 \providecommand{\NodetreeSet}[1]{%
160   \setkeys{NTE}{#1}%
161 }

162 \newenvironment{NodetreeEmbedView}[1][ ]{
163   \setkeys{NTE}{#1}
164   \NTE@colors
165   \begin{mdframed}[
166     linecolor=black,
167     backgroundcolor=NTEbackground,
168     fontcolor=NTEfont,
169   ]%
170   \NTE@fonts
171 }{
172   \end{mdframed}%
173 }

```

NodetreeEmbedEnv (*env.*)

```

174 \NewDocumentEnvironment { NodetreeEmbedEnv } { 0 } +b } {
175   \setkeys{NTE}{#1}
176   \ifNTEK@showmarkup
177     \noindent
178     \texttt{\detokenize{#2}}
179   \else
180     \fi
181     \NTE@colors
182     \begin{NodetreeEmbedView}
183       \directlua{
184         nodetree.compile_include('\luaescapestring{\unexpanded{#2}}')
185       }
186     \end{NodetreeEmbedView}
187 }{}

```

\NodetreeEmbedCmd

```

188 \NewDocumentCommand { \NodetreeEmbedCmd } { 0 } +v } {

```

```

189 \setkeys{NTE}{#1}
190 \ifNTEK@showmarkup
191   \noindent
192   \texttt{#2}
193 \else
194 \fi
195 \NTE@colors
196 \begin{NodetreeEmbedView}
197   \directlua{
198     nodetree.compile_include('\luaescapestring{\unexpanded{#2}}')
199   }
200 \end{NodetreeEmbedView}
201 }

```

`\NodetreeEmbedInput`

```

202 \newcommand{\NodetreeEmbedInput}[2] [] {
203   \setkeys{NTE}{#1}
204   \begin{NodetreeEmbedView}
205     \input{#2.nttex}
206   \end{NodetreeEmbedView}
207 }
208 \let\nodetreeterminalemulator\NodetreeEmbedInput

```

8.3 The file `nodetree.lua`

There is a source code documentation of the file `nodetree.lua` compiled with Ldoc on Github: <http://josef-friedrich.github.io/nodetree/>

Change History

v0.1			
	General: Converted to DTX file . . .	32	
v1.0			
	General: Inital release	32	
v1.1			
	General: Fix the registration of same callbacks	32	
v1.2			
	General: Fix difference between README.md in the upload and that from nodetree.dtx . . .	32	
v2.0			
	General: * Switch from lowercase macro names to PascalCase names for better readability. * The Lua code is no longer developed inside the DTX file, instead in a separate file named nodetree.lua. * Add a sub package named nodetree-embed.sty for embedding nodetree views into a L ^A T _E X document. * Add support for new node subtype names. * Add support for a		
			new Lua _T _E X node callback. * Add support for node properties. * Less verbose representation of node attributes. * Minor tree output adjustments.
			32
			v2.1
			General: * Make the package compatible with the Harfbuzz mode of the luaotfload fontloader. * Print node properties of copied nodes. . . .
			32
			v2.2
			General: * Fix unavailable library error (utf8 not in Lua5.1)
			32
			v2.2.1
			General: * Replace non-printable unicode symbols with ????. * Add missing newlines for callbacks with multiple node lists. * Print subtype fields with value 0. * Fix the presentation of the subtype field of a glyph as a bit field. . .
			32