The dashrule package[*]

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Abstract

The dashrule package makes it easy to draw a huge variety of dashed rules (i.e., lines) in LaTeX. dashrule provides a command, `\hdashrule`, which is a cross between LaTeX's `\rule` and PostScript's `setdash` command. `\hdashrule` draws horizontally dashed rules using the same syntax as `\rule` but with an additional, `setdash`-like parameter that specifies the pattern of dash segments and the space between those segments. Because dashrule's rules are constructed internally using `\rule` (as opposed to, e.g., PostScript `\special`s) they are fully compatible with every LaTeX back-end processor.

1 Usage

`\hdashrule` LaTeX's `\rule` command draws a rectangular blob of ink with a given width, height, and distance above the baseline. The dashrule package introduces an analogous command, `\hdashrule`, which draws the same blob of ink, but horizontally dashed. `\hdashrule` takes five parameters, two of which are optional:

`\hdashrule [`⟨*raise*⟩`] [`⟨*leader*⟩`] {`⟨*width*⟩`} {`⟨*height*⟩`} {`⟨*dash*⟩`}`

The ⟨*raise*⟩, ⟨*width*⟩, and ⟨*height*⟩ parameters have the same meaning as in LaTeX's `\rule` macro: the distance to raise the rule above the baseline and the width and height of the rule.

Because `\hdashrule` is implemented in terms of TeX's primitive leader commands (`\leaders`, `\cleaders`, and `\xleaders`), the dash pattern must be repeated an integral number of times. ⟨*leader*⟩ specifies what to do with the extra whitespace (always less than the width of the dash pattern) that this requirement introduces. The default, which corresponds to TeX's `\leaders` command, adds space to both ends of the rule so the dash patterns from multiple `\hdashrule`s line up. If ⟨*leader*⟩ is `c`, which corresponds to TeX's `\cleaders` command, an equal amount of whitespace is added to both ends of the rule. If ⟨*leader*⟩ is `x`, which corresponds to

[*] This document corresponds to dashrule v1.1, dated 2008/04/27.

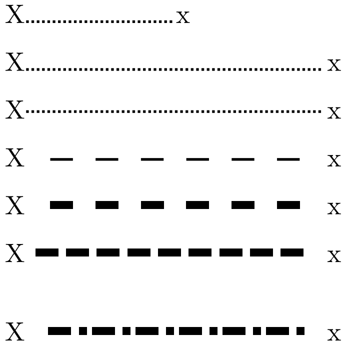
TEX's `\xleaders` command, the whitespace is divided up, and the same amount of whitespace separates each repetition of the dash pattern.

The ⟨*dash*⟩ argument specifies the dash pattern and is analogous to the *array* argument to PostScript's `setdash` function. That is, it is a list of space-separated ⟨*dimen*⟩s that alternate "on" and "off" distances. For instance, "`2pt 1pt`" means a 2 pt. rule, followed by a 1 pt. gap, followed by a 2 pt. rule, followed by a 1 pt. gap, and so forth. An odd number of ⟨*dimen*⟩s is no different; "`2pt`" alternates 2 pt. rules and 2 pt. gaps, and "`1pt 2pt 3pt`" repeats "1 pt. rule, 2 pt. gap, 3 pt. rule, 1 pt. gap, 2 pt. rule, 3 pt. gap."

2 Examples

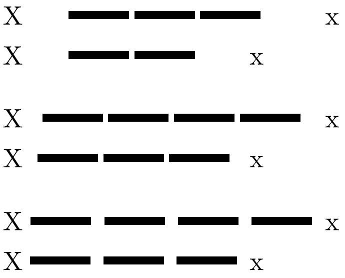
The following are some typical ways to use `\hdashrule`. Each example changes from the previous in only one parameter. For clarity, underlines are used to indicate modified text, and the rule is bracketed by an upper- and lowercase "X".

```
\hdashrule{2cm}{1pt}{1pt}

\hdashrule{4cm}{1pt}{1pt}

\hdashrule[0.5ex]{4cm}{1pt}{1pt}

\hdashrule[0.5ex]{4cm}{1pt}{3mm}

\hdashrule[0.5ex]{4cm}{1mm}{3mm}

\hdashrule[0.5ex]{4cm}{1mm}{3mm 3pt}

\hdashrule[0.5ex]{4cm}{1mm}{%
  3mm 3pt 1mm 2pt}
```



These next examples show the effect of using different leader types. Each leader is used with both a 4 cm wide rule and a 3 cm wide rule.

```
\hdashrule[0.5ex]{4cm}{1mm}{8mm 2pt}
\hdashrule[0.5ex]{3cm}{1mm}{8mm 2pt}

\hdashrule[0.5ex][c]{4cm}{1mm}{8mm 2pt}
\hdashrule[0.5ex][c]{3cm}{1mm}{8mm 2pt}

\hdashrule[0.5ex][x]{4cm}{1mm}{8mm 2pt}
\hdashrule[0.5ex][x]{3cm}{1mm}{8mm 2pt}
```



Notice how the dashes in the first pair of `\hdashrule`s line up; the rules in the second pair each have an equal amount of whitespace on either side of the rule;

and the rules in the third pair have extra spaces within the dash pattern itself instead of around it. The `x` qualifier is rarely useful for dashed rules because it alters the pattern itself. However, `x` does enable rules with long dashes to better fill a comparatively small width, as in the following example:

```
\hdashrule[0.5ex][x]{3in}{2pt}{2cm 0pt}
```

X ▬▬▬ ▬▬▬ ▬▬▬ x

The gaps in the above are clearly wider than `0pt`, but they *are* evenly spaced.

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3 Differences from `setdash`

`\hdashrule` is different from PostScript's `setdash` command in the following ways:

- `setdash` takes on/off values in terms of PostScript points (TEX "big points" or "`bp`"), while `\hdashrule` requires explicit units.

- There is no equivalent of `setdash`'s *offset* parameter to specify a starting offset into the pattern. If you're desperate you can fake *offset* with a leading `\rule` and `\hspace`.

- Unlike `setdash`, `\hdashrule` can't draw a solid line. Use `\rule` for solid lines.

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4 Implementation

```
⟨*package⟩
```

`\hdr@do@rule` This macro is exactly like LATEX's `\rule` except that the optional argument is required, and it has the side effect of pointing `\hdr@do@something` to `\hdr@do@skip`.

```
\def\hdr@do@rule[#1]#2#3{%
  \rule[#1]{#2}{#3}%
  \let\hdr@do@something=\hdr@do@skip
}
```

`\hdr@do@skip` This macro takes the same arguments as `\hdr@do@rule`, but instead of drawing a rule, it inserts an equivalent amount of horizontal whitespace. Additionally, it points `\hdr@do@something` to `\hdr@do@rule` as a side effect.

```
\def\hdr@do@skip[#1]#2#3{%
  \hspace*{#2}%
  \let\hdr@do@something=\hdr@do@rule
}
```

`\c@hdr@segments`
`\hdr@tally@segments`

Dash patterns containing an odd number of segments are treated differently from dash patterns containing an even number of segments. We therefore define a macro, `\hdr@tally@segments`, which counts the number of space-separated segments in a dash pattern and stores the tally in the `hdr@segments` counter. Note that `hdr@segments` should be initialized to `0` before invoking `\hdr@tally@segments`.

```
\newcounter{hdr@segments}
\def\hdr@tally@segments#1 {%
  \ifx#1!%
  \else
    \addtocounter{hdr@segments}{1}%
    \expandafter\hdr@tally@segments
  \fi
}
```

`\hdashrule`

This is the only macro in dashrule's external interface. (`\hdashrule@ii` does most of the work for `\hdashrule`, though.) All `\hdashrule` itself does is invoke `\hdashrule@i` with its first optional argument or `0.0pt` if none was provided. `\hdashrule@i`, in turn, invokes `\hdashrule@ii` with the two optional arguments, supplying `\empty` as the default value of the second optional argument.

```
\DeclareRobustCommand{\hdashrule}{\mbox{}\@testopt{\hdashrule@i}{0pt}}
```

`\hdashrule@i`

Supply `\empty` as the default second argument and call `\hdashrule@ii`.

```
\def\hdashrule@i[#1]{\@testopt{\hdashrule@ii[#1]}\empty}
```

`\hdashrule@ii`

Now we can do the real work for `\hdashrule`. `\hdashrule@ii` takes the following parameters:

#1	#2	#3	#4	#5
[⟨*raise*⟩]	[⟨*leader*⟩]	{⟨*width*⟩}	{⟨*height*⟩}	{⟨*dash*⟩}

The ⟨*raise*⟩, ⟨*width*⟩, and ⟨*height*⟩ parameters have the same meaning as in LaTeX's `\rule` macro. ⟨*leader*⟩ specifies the TeX leader function to use to fill ⟨*width*⟩ amount of space. It should be `c` for `\cleaders`, `x` for `\xleaders`, or nothing for ordinary `\leaders`. The ⟨*dash*⟩ argument specifies the dash pattern and is analogous to the *array* argument to PostScript's `setdash` function. That is, it is a list of space-separated ⟨*dimen*⟩s that alternate "on" and "off" distances.

```
\def\hdashrule@ii[#1][#2]#3#4#5{%
```

`\hdr@do@something`

The `\hdr@do@something` alias alternates between `\hdr@do@rule` and `\hdr@do@skip`, starting with `\hdr@do@rule`.

```
  \let\hdr@do@something=\hdr@do@rule
```

`\hdr@parse@dash`

For every space-separated ⟨*dimen*⟩ in ⟨*dash*⟩, we invoke `\hdr@do@something` to draw a rule or a space, as appropriate. We define `\hdr@parse@dash` within `\hdashrule@ii` so we don't have to pass in `\hdashrule@ii`'s `#1` and `#4` on every invocation.

```
  \def\hdr@parse@dash##1 {%
```

```
    \ifx##1!%
    \else
      \hdr@do@something[#1]{##1}{#4}%
      \expandafter\hdr@parse@dash
    \fi
  }%
```

We now count the number of segments in the dash pattern so we can determine if we have an even or odd number of them.

```
  \setcounter{hdr@segments}{0}%
  \hdr@tally@segments#5 !
```

Finally, we invoke `\leaders`, `\cleaders`, or `\xleaders` to draw the dashed line, repeating the pattern until ⟨*width*⟩ space is filled. The trick here is that odd-lengthed pattern descriptions must be repeated to yield the complete pattern. For instance, the pattern "`1pt`" is actually short for "1 pt. rule, 1 pt. space," and "`2pt 4pt 6pt`" is an abridged version of "2 pt. rule, 4 pt. space, 6 pt. rule, 2 pt. space, 4 pt. rule, 6 pt. space." Although it is valid to repeat even-lengthed patterns as well—an earlier draft of `\hdashrule@ii` did just that—this produces inferior results because TEX's various leader commands do not split boxes. The longer the pattern, the less likely it will fit snugly into the given width.

```
  \ifodd\c@hdr@segments
    \csname#2leaders\endcsname
      \hbox{\hdr@parse@dash#5 #5 ! }%
      \hskip#3\relax
  \else
    \csname#2leaders\endcsname
      \hbox{\hdr@parse@dash#5 ! }%
      \hskip#3\relax
  \fi
}
```

5 Future Work

dashrule v1.1 supports only horizontally dashed rules. Future versions (if any) may support vertically dashed rules as well. For the time being, the graphicx package's `\rotatebox` can be used to define a `\vdashrule` in terms of a rotated `\hdashrule`.

The next logical step after adding a `\vdashrule` is to support dashed rectangles, which would be composed of `\hdashrule`s and `\vdashrule`s. Other possible enhancements would be a way of drawing dotted lines, presumably composed from the limited set of circle characters available in LATEX's fonts.

Change History

v1.0

General: Initial version 1

v1.1

`\hdashrule`: Preceded the invocation of `\@testopt` with an empty box so that `\hdashrule` can now begin a paragraph . . . 4

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Numbers written in italic refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; numbers in roman refer to the code lines where the entry is used.