The **memorygraphs** package

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\begin{tikzpicture}
\node[draw] (x) {37};
\node[draw,right=of x] {42};
\end{tikzpicture}

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1 Introduction

This is the documentation of the \LaTeX{} package memorygraphs. It defines some TikZ styles and adds anchors to existing styles that ease the declaration of "memory graphs". It is intended for graphs that represent the memory of a computer program during its execution.

2 Functionality

/tikz/memory graph

The **memory graph** style is to be used on \texttt{tikzpicture}. It sets a different node distance that the author finds suitable for this kind of graphs.

\begin{tikzpicture}[memory graph]
\node[draw] (x) {37};
\node[draw,right=of x] {42};
\end{tikzpicture}
2.1 Nodes

The following styles can be used to typeset memory blocks:

/tikz/block

This is the most basic style to define a memory block. By default, this shape is a rectangle with borders:

```
\begin{tikzpicture}[memory graph]
    \node[block] {37};
\end{tikzpicture}
```

/tikz/arity = \langle n \rangle

The \texttt{arity} style can be used to create a node with arguments. This implies \texttt{block}:

```
\begin{tikzpicture}[memory graph]
    \node[arity=2] {Cons};
\end{tikzpicture}
```

\texttt{\textbackslash arg\{i\}}

Because blocks with \texttt{arity} are multipart rectangles, one can use TikZ’s \texttt{\nodepart} to put contents in the arguments. However, it can be confusing that \texttt{\nodepart\{two\}} refers to the first argument, so we redefine \texttt{\arg} in \texttt{blocks} to identify arguments of the memory block:

```
\begin{tikzpicture}[memory graph]
    \node[arity=2]{Cons \arg{1} 37 \arg{2} \dots};
\end{tikzpicture}
```

Should one want to use math mode’s \texttt{\arg} in a memory block, they can first rename it:

```
\let\matharg\arg
\begin{tikzpicture}[memory graph]
    \node[block] {$\matharg(1)$};
\end{tikzpicture}
```

2.2 Markings

It is possible to mark the head of memory blocks using triangles in the north east and south east corners.

/tikz/block mark north east = \langle style \rangle
/tikz/block mark north west = \langle style \rangle
/tikz/block mark south east = \langle style \rangle
/tikz/block mark south west = \langle style \rangle

With this key, triangular marks can be added to the corners of the head of a node:

```
\begin{tikzpicture}[memory graph]
    \node[arity=2,block mark north east] {Cons};
\end{tikzpicture}
```

It is optional to add a style:
The key is long to avoid clashes with other packages, and because it depends on the context what nodes should be marked for. It is of course possible to define a shorthand in your own document. One application is to mark nodes that are in head normal form (HNF), for which one may define the key \texttt{hnf}:

\begin{tikzpicture}[memory graph]
\node[arity=2,hnf]{Cons \arg{1}$\ldots$ \arg{2}$\ldots$};
\node[arity=2] at (0,-1){map \arg{1}$\ldots$ \arg{2}$\ldots$};
\end{tikzpicture}

The size of the rectangles is defined by \texttt{\memorygraphs@marklength}, which can of course be changed. The default is 4.0pt.

\begin{tikzpicture}[memory graph]
\makeatletter
\memorygraphs@marklength=7pt
\makeatother
\node[arity=2,block mark north west=fill]{Cons \arg{1}$\ldots$ \arg{2}$\ldots$};
\end{tikzpicture}

\section*{2.3 Anchors}

Because blocks with \texttt{arity} are multipart rectangles, one can use anchors like \texttt{two south} to refer to the south of the second part of a node. These are aliased as \texttt{arg i south} (and similar for other anchors on multipart nodes), where \texttt{arg 1} stands for \texttt{two}. The first block of a node is aliased as \texttt{head} instead of \texttt{arg 0}, so one can use \texttt{head south}. For \texttt{head}, anchors for the corners (\texttt{head north east}, etc.) are defined as well.

The parts of multipart rectangles do not normally have a \texttt{center} anchor, but \texttt{memorygraphs} defines these. One can use both \texttt{two center} and \texttt{arg 1 center} to refer to the center of the first argument of a node.

The additional anchors are shown below. See the TikZ manual for the predefined anchors.
2.4 References

This is a simple style for arrows with a circle at the start and slightly rounded corners:

3 Examples

- The linked list of Fibonacci numbers on the title page was generated with:
• A cyclical linked list, with unboxed integers:

```
\begin{tikzpicture}[memory graph]
\node[block,arity=2] (xs) {Cons \arg{1} 1};
\node[block,arity=2,right=of xs.arg 2 east] (xsb) {Cons \arg{1} 2};
\node[block,arity=2,right=of xsb.arg 2 east] (xsc) {Cons \arg{1} 3};
\draw[ref] (xs.arg 2 center) -- (xsb);
\draw[ref] (xsb.arg 2 center) -- (xsc);
\draw[ref] (xsc.arg 2 center) -- +(0,.6) -| (xs.head north);
\end{tikzpicture}
```

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