

TikZ Mini Course for Automatic Control People

Padova Automatic Control Group

University of Padova - Italy



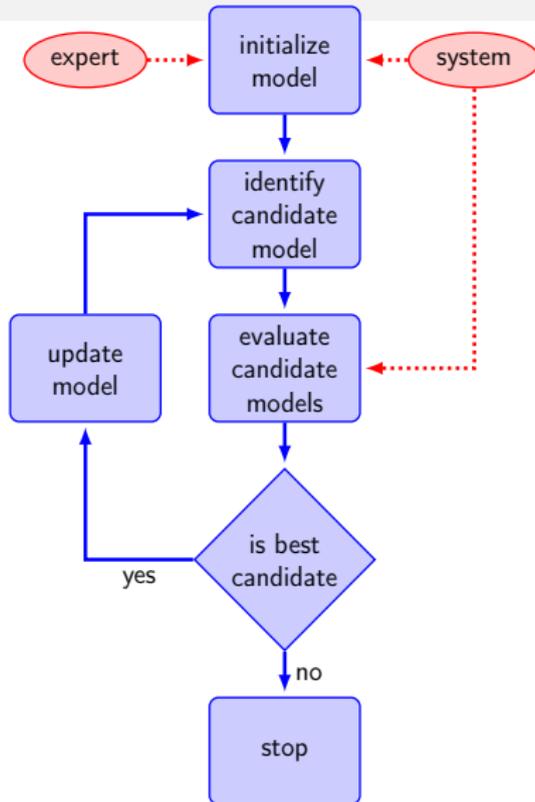
DEPARTMENT OF
INFORMATION
ENGINEERING
UNIVERSITY OF PADOVA



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Do you like... ?



TikZ ist kein Zeichenprogramm

why should we use TikZ for drawings?

Advantages w.r.t. other drawing methods:

- extremely simple for logically simple drawings
- usage of *native code* \Rightarrow portable
- text and styles are the standard \LaTeX ones
- modification of existing drawings can be **orders of magnitude** more rapid (seconds vs. hours)



TikZ ist kein Zeichenprogramm

why should we **do not** use TikZ for drawings?

Disadvantages w.r.t. other drawing methods:

- quite slow when starting learning
- complicated for “logically complicated” pictures
- production of the first drafts can be **orders of magnitudo** slower (hours vs. minutes)

General advice

read the chapter on “Guidelines on Graphics” on the TikZ manual! (1.7)

general guidelines and principles concerning the creation of graphics for scientific presentations, papers, and books

Warning for the \LaTeX source code of this guide

In the `.tex` files of this presentation you may find something like `"uncover<1->"`: they are BEAMER commands, not TikZ commands!!

if you want to use this code you should cancel them

Where to obtain TikZ

stable version: pgf2.0 - official versions available in:

- CTAN: <http://www.ctan.org/>
- SourceForge: <http://sourceforge.net/projects/pgf/>

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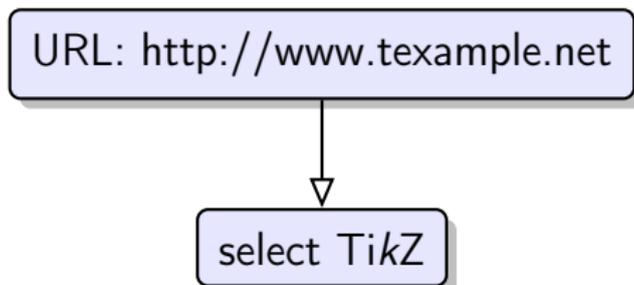
- CTAN: <http://www.ctan.org/>
- SourceForge: <http://sourceforge.net/projects/pgf/>

development version: <http://www.texample.net>

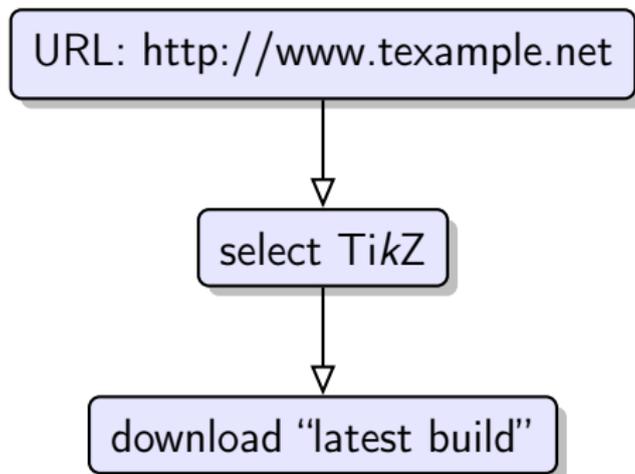
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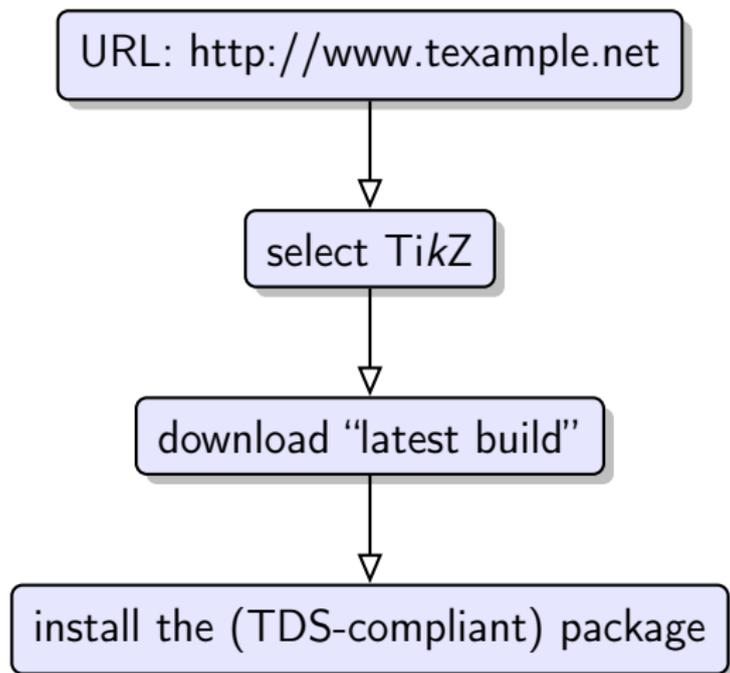
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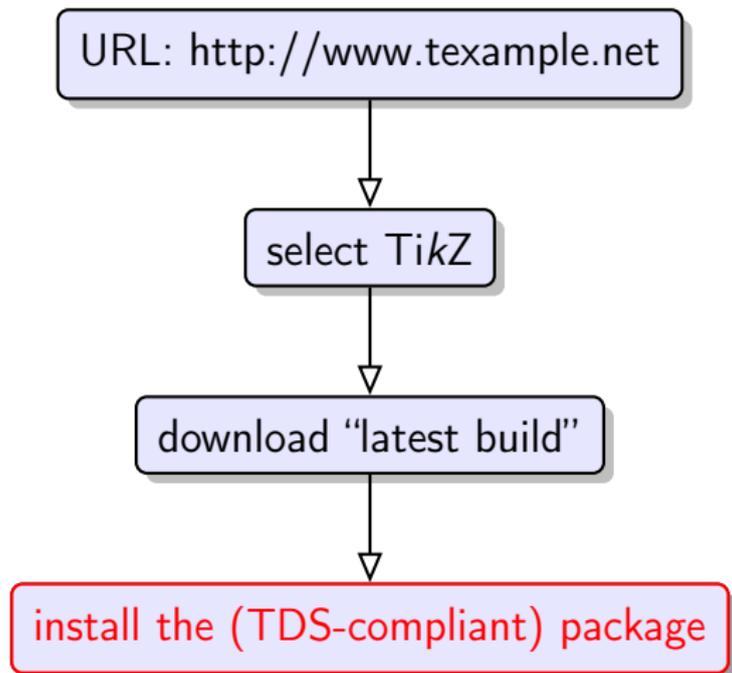
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Where to obtain the development version



don't know how? Google it!

The most important advice:

The most important advice:

TikZ manual is your friend!

Environment declaration

- template file for floating figures:

`./Sources/template__floating_figure_declaration.tex`

- template file for non floating figures:

`./Sources/template__non_floating_figure_declaration.tex`



First main objects: nodes

Main properties:

- they are labelled (in order to be referenced)
- they can be placed everywhere
- you can write \LaTeX code inside them
- can be *fully* customized

(example file: `./Sources/basic_concepts__nodes_examples.tex`)

$$\text{process s.t. } \mathbb{P} \left[\int_0^{+\infty} x(t) dt = \lambda \right] = 1$$

Second main objects: paths

Main properties:

- can be drawn everywhere - connect everything
- can have text along them
- can be *fully* customized

(example file: `./Sources/basic_concepts__paths_examples.tex`)

try to do this automatically in other ways 8-) →

Well, not all can be done in a single presentation. . .

and the coordinates specification??

too time consuming to be fully explained! We'll use only:

- absolute coordinates (like at (1.3cm, 2.1cm))
- relative coordinates (like above this guy, left of this other)

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again: take a look at the manual.



Nodes: how to set the shape

(example file: `./Sources/nodes__examples_of_shapes.tex` - using shapes library)



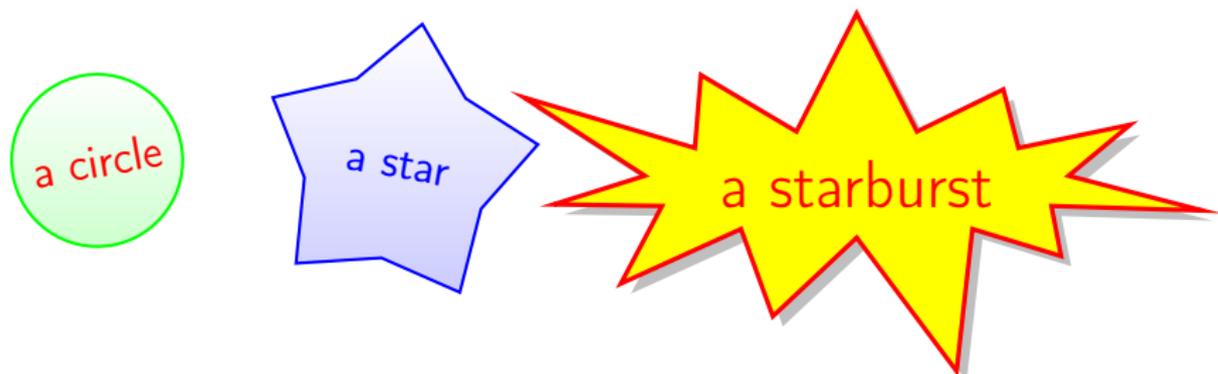
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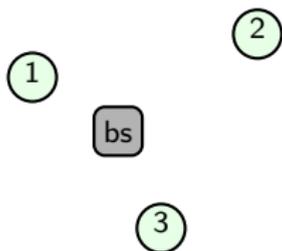
Avoid hard coding: styles definitions will make you save LOTS of time

declare the styles in a
separate file and input it somewhere

(example file: `./Sources/graphical_settings.tex`)

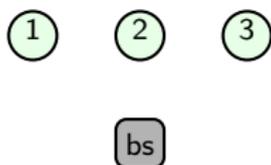
Nodes positioning: absolute coordinates

we can place the various nodes using absolute coordinates
(example file: `./Sources/nodes__absolute__positioning.tex`)



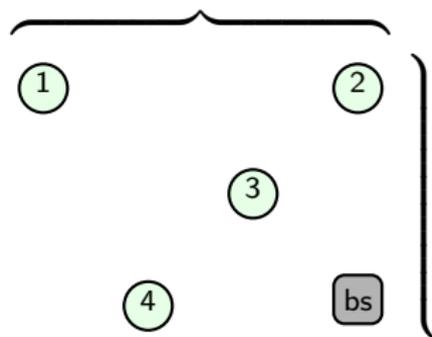
Nodes positioning: relative coordinates

place the various nodes using relative coordinates
(example file: `./Sources/nodes__relative_positioning.tex`)



Nodes positioning: matricial positioning

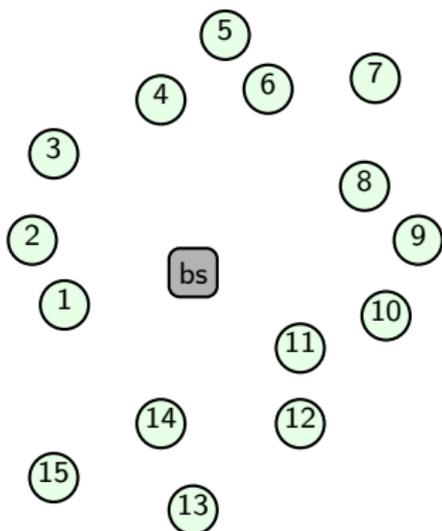
place the various nodes inside a matrix
(example file: `./Sources/nodes__matricial_positioning.tex` - requires `matrix` library)



(read the manual! This library has **really useful tools!**)

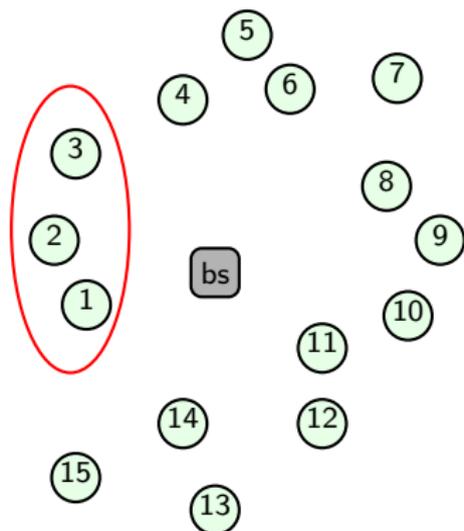
Automatic fit of sets of nodes

(example file: `./Sources/nodes__fitting_sets_of_nodes.tex` -
requires `fit` library)



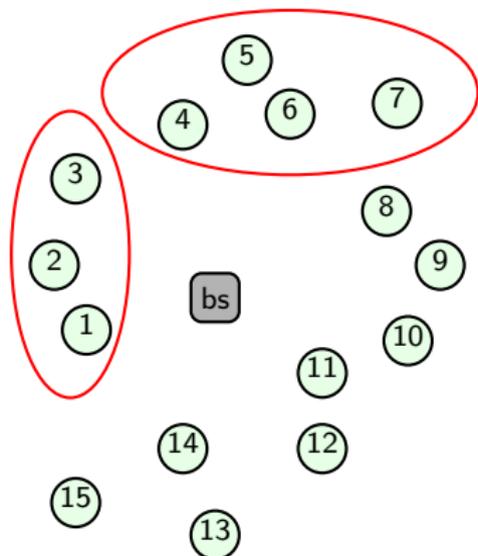
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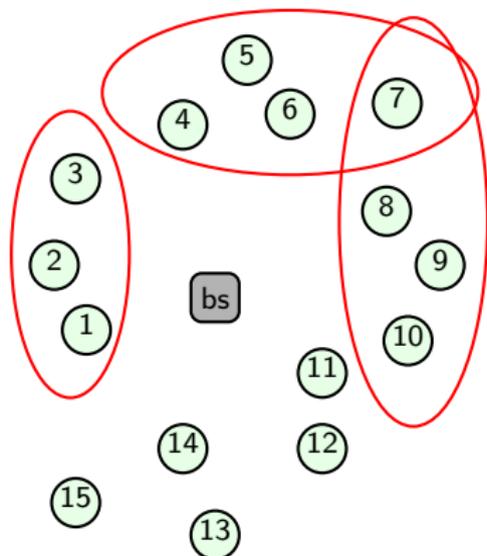
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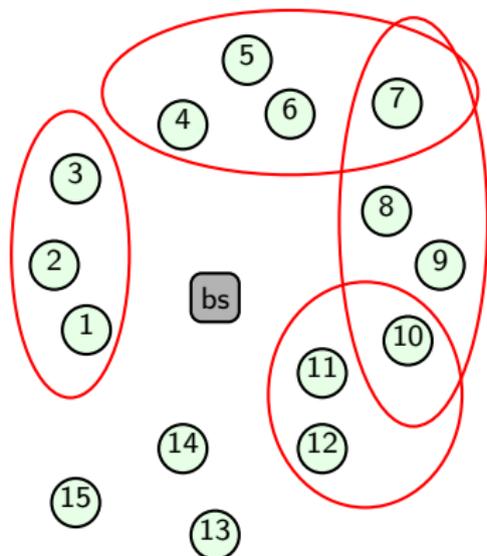
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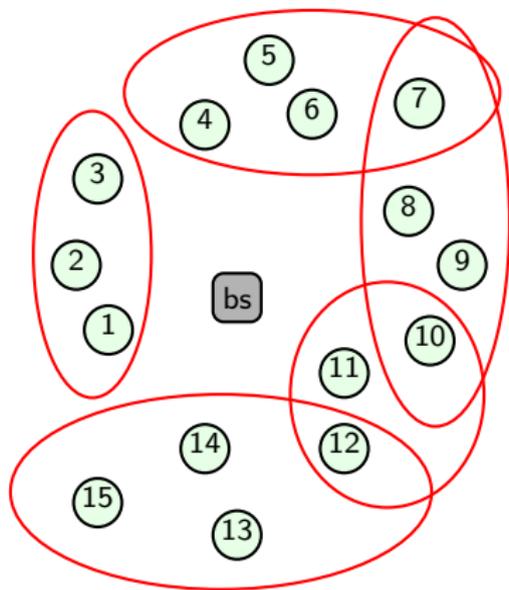
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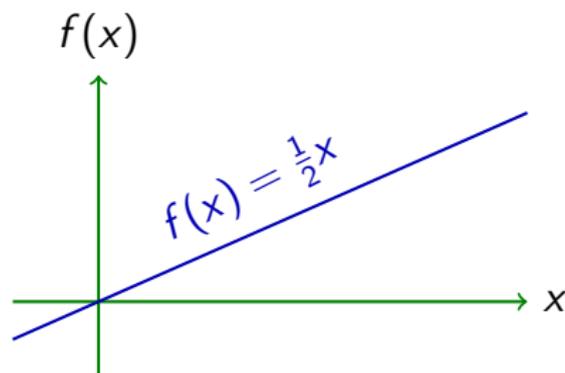
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Paths: brief introduction

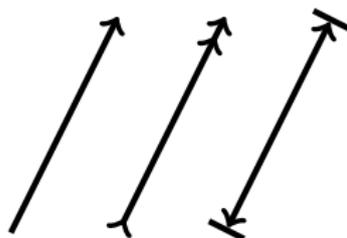
- connect two points (e.g. with arrows)
- connect two nodes (e.g. with arrows)
- draw some useful lines (e.g. axes)
- fully customizable

(example file: `./Sources/paths__scalar_linear_function.tex`)



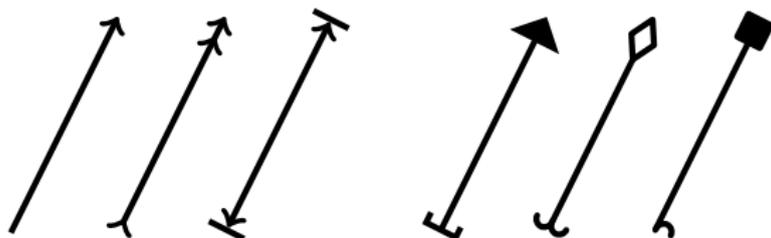
Paths: how to set their terminations

(example file: `./Sources/paths__caps__usage.tex` - requires arrows library)



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How to position text along a path

(example file: `./Sources/paths__text_positioning.tex`)

this is at the end

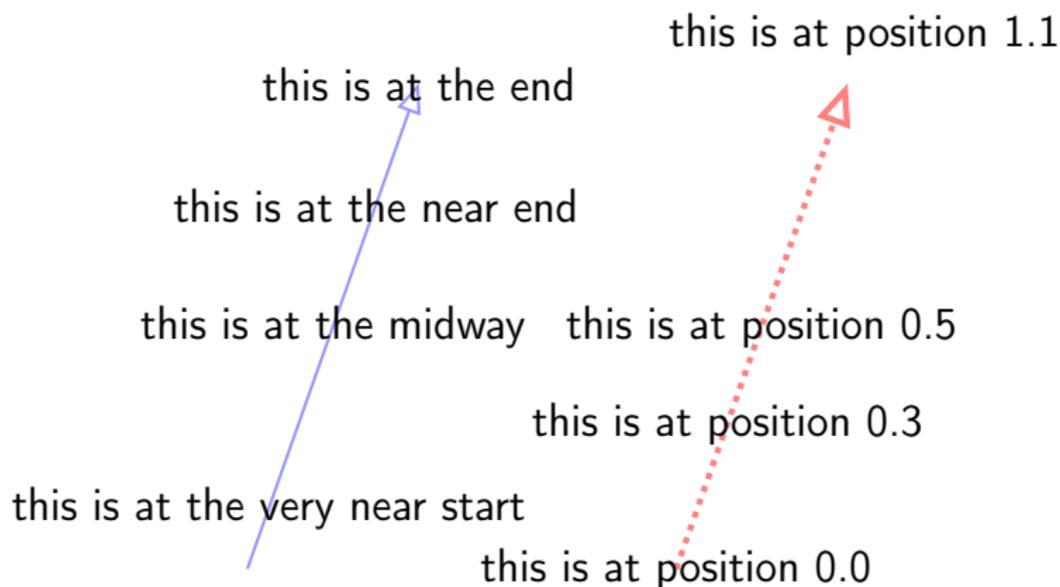
this is at the near end

this is at the midway

this is at the very near start

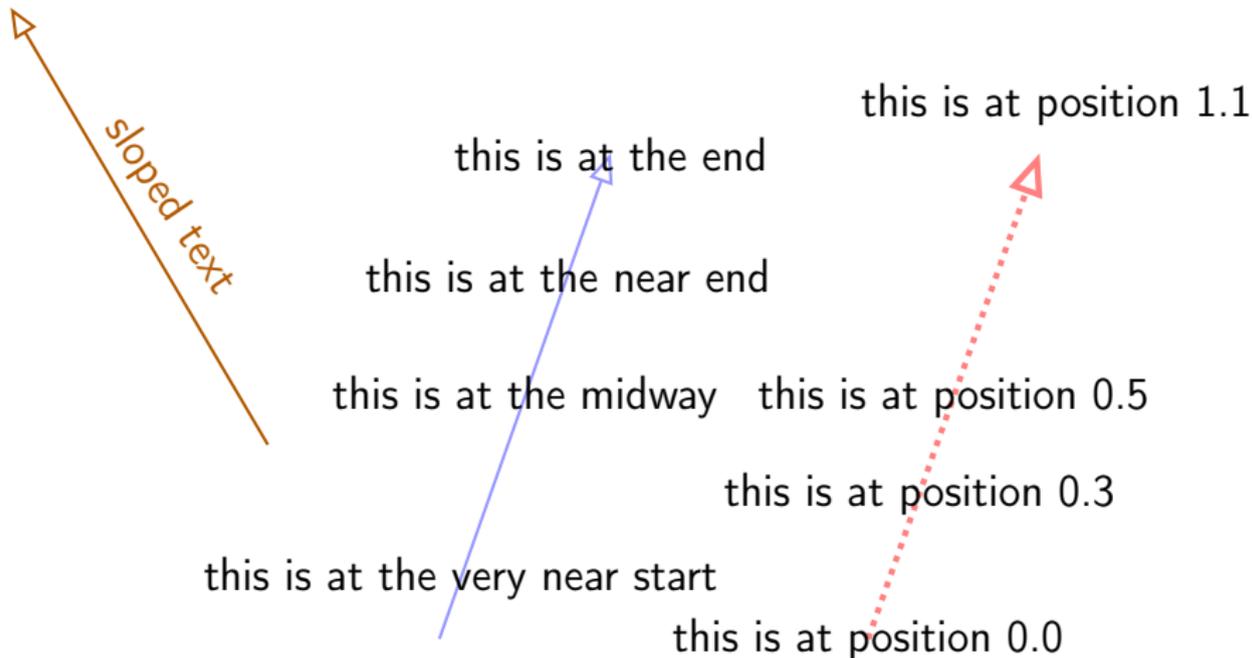
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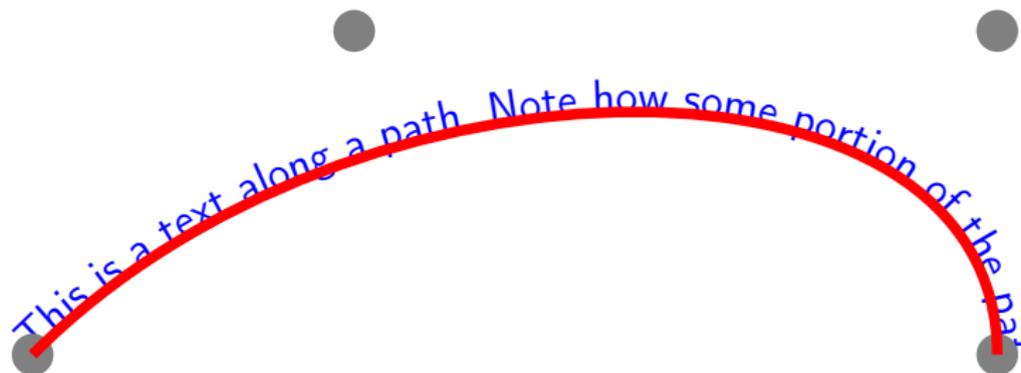
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(example file: `./Sources/paths__decorations.tex`)

This is a text along a path. Note how some portion of the pat

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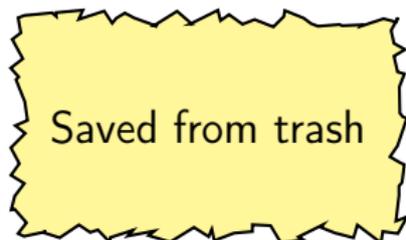
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Straight connections using nodes' anchors

(example file:

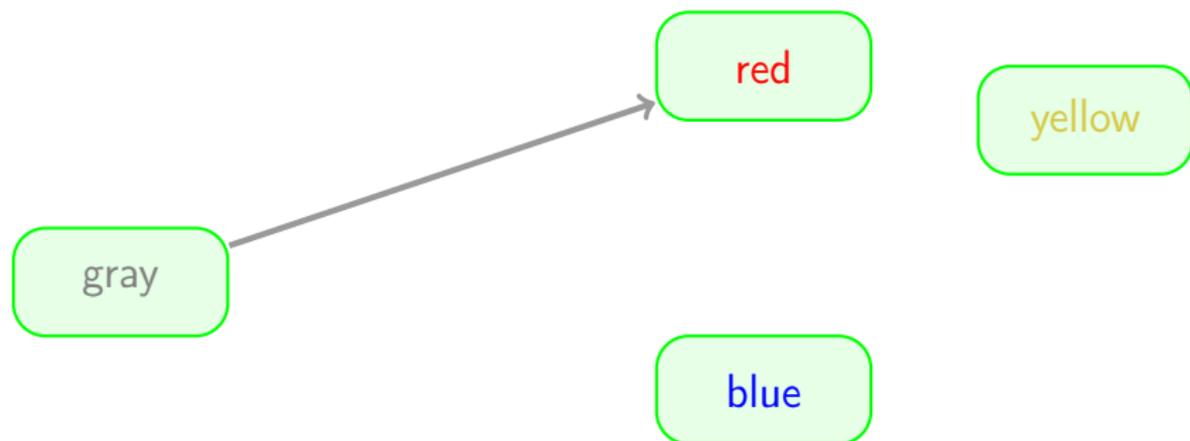
`./Sources/connection_of_nodes__straight_connections.tex`)



Straight connections using nodes' anchors

(example file:

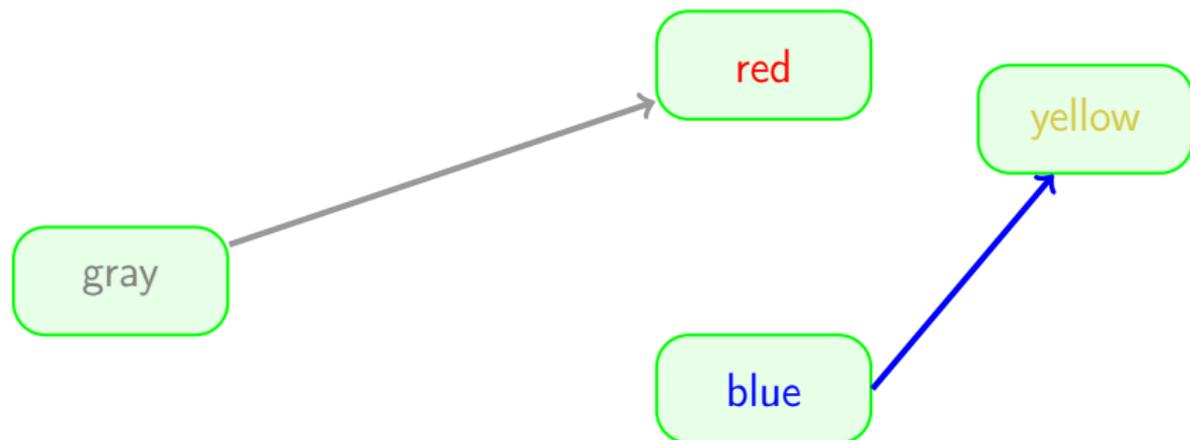
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Straight connections using nodes' anchors

(example file:

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Curved connections using nodes' anchors

(example file:

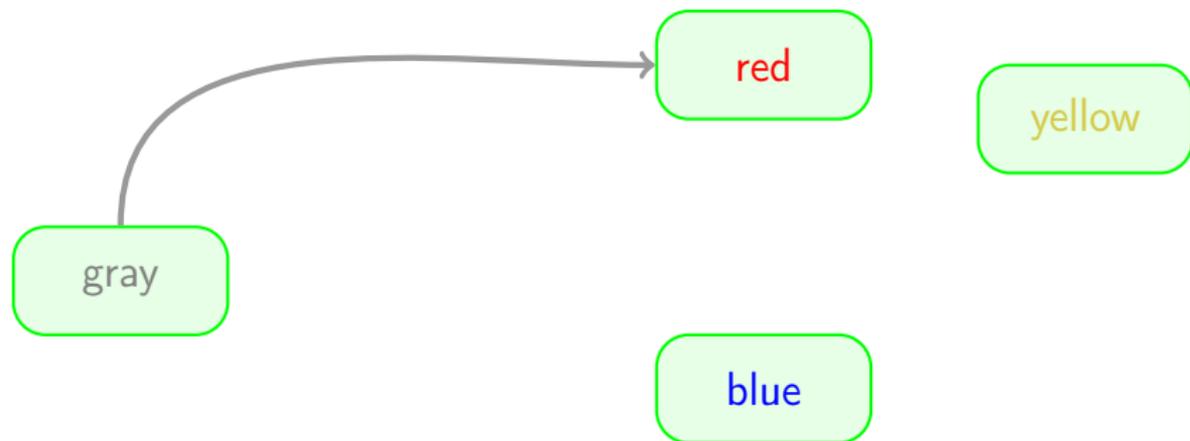
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(example file:

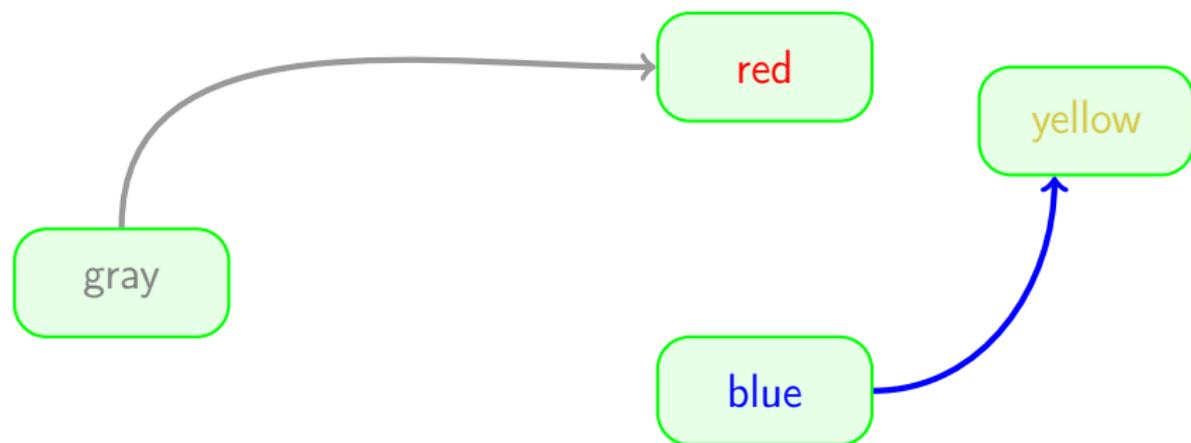
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Curved connections using nodes' anchors

(example file:

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Straight connections using nodes' anchors - 2

(example file:

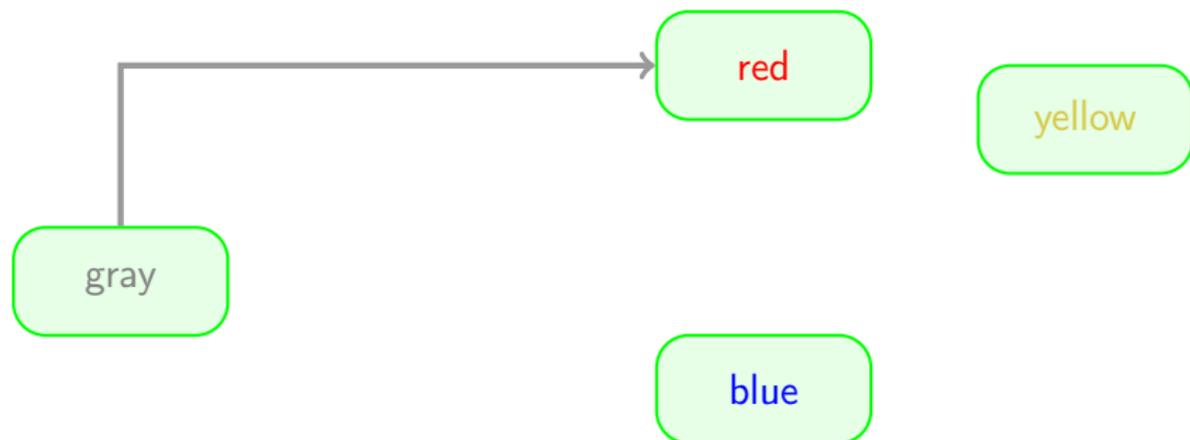
`./Sources/connection_of_nodes__horizontal_vertical_connections.tex`)



Straight connections using nodes' anchors - 2

(example file:

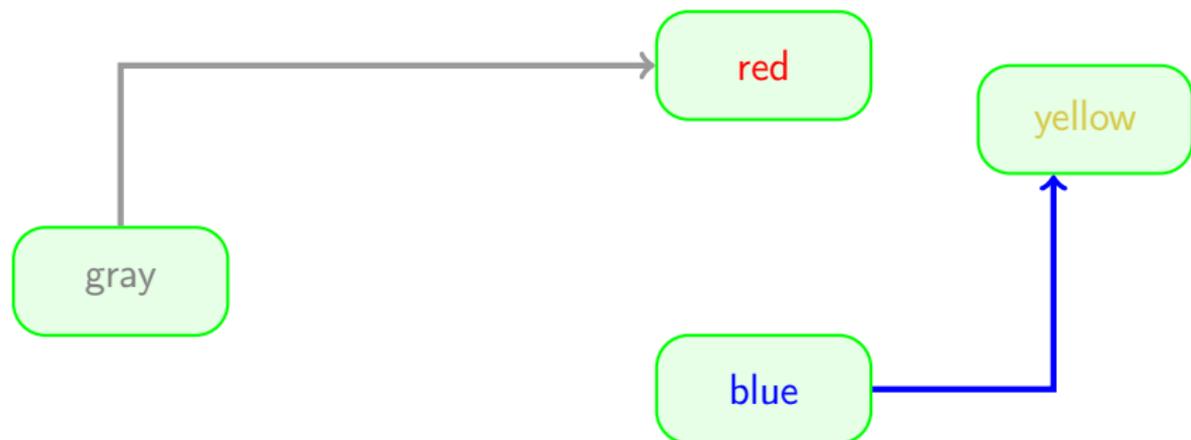
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Straight connections using nodes' anchors - 2

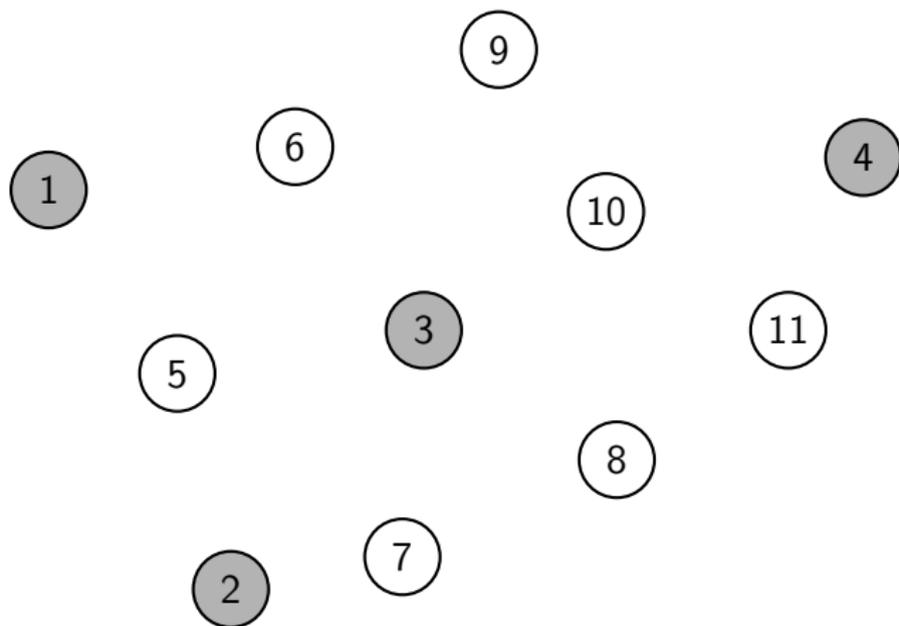
(example file:

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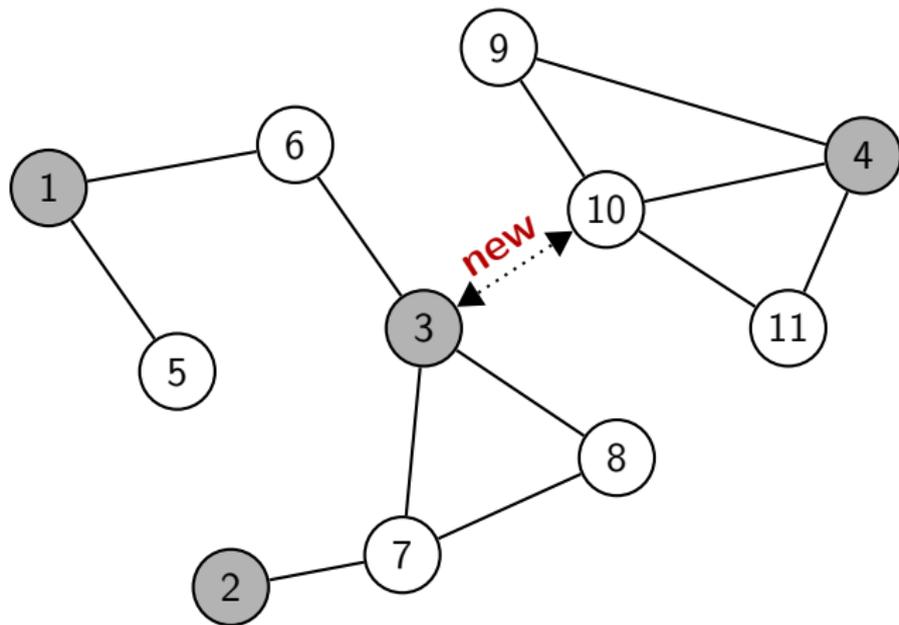
Example of sensor network

(example file: `./Sources/nets__sensor_network.tex`)



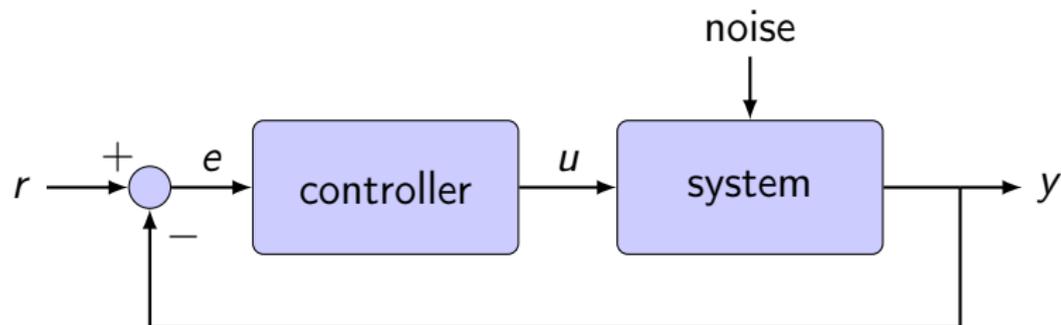
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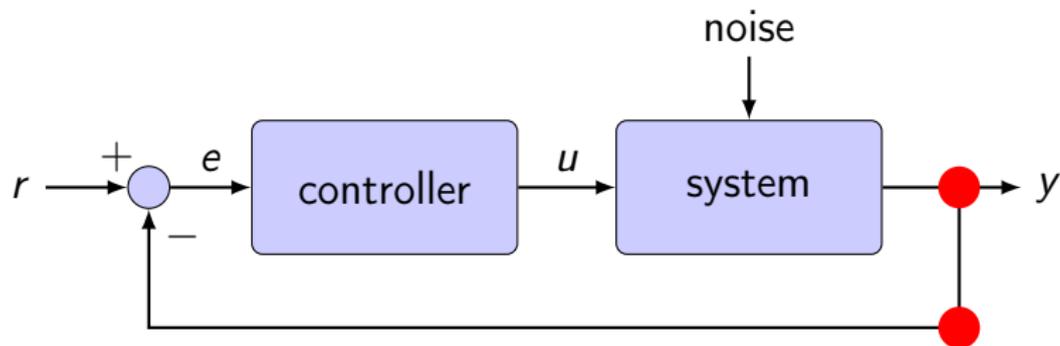
Block scheme example

(example file: `./Sources/block_schemes__example.tex`)



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Accepted syntax: `...node (nMyNodeOne) [...`



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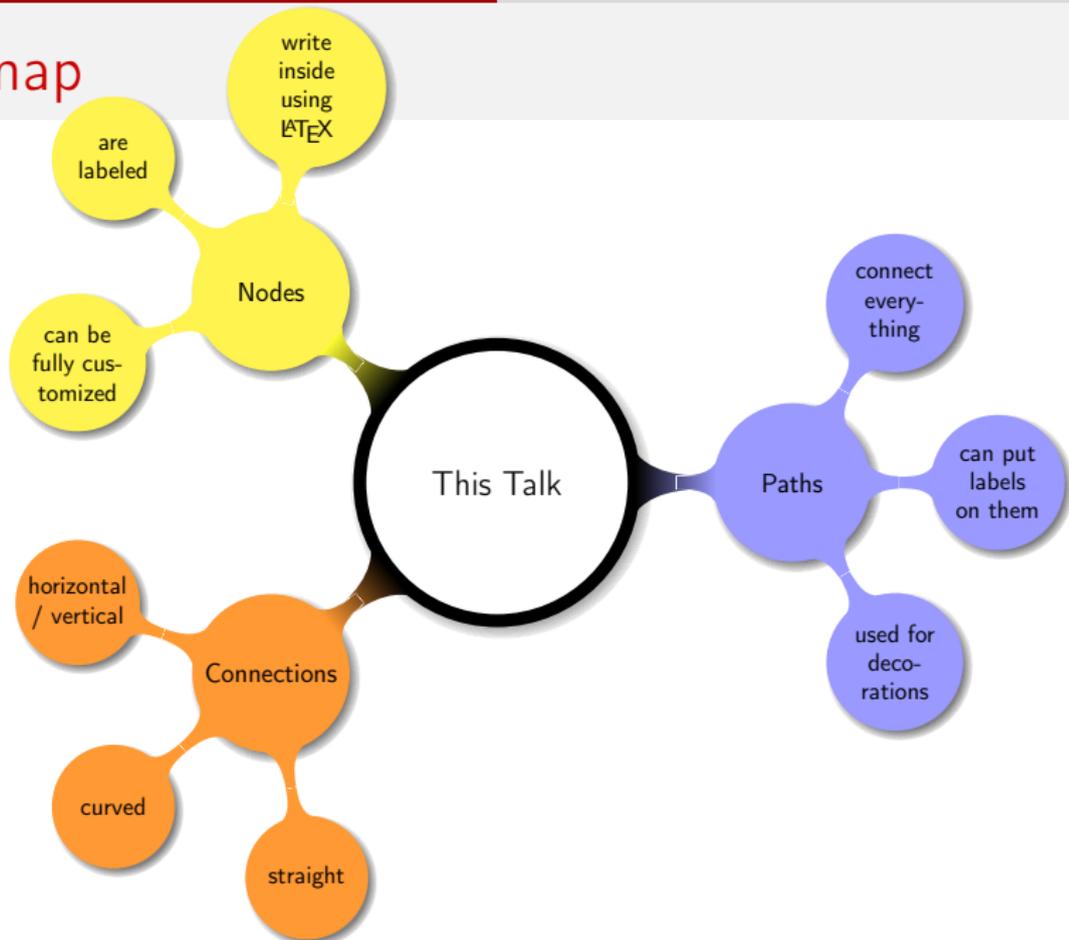


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- **watch out in changing the order of the nodes / paths properties**: sometimes the compiler is not able to understand if things are written in a non-expected order
- **did you forgot to include the library?** Sometimes strange errors are due to the fact that you didn't include the opportune TikZ library



Mindmap



entirely written in L^AT_EX_{2_ε} Beamer and TikZ



thank you