LaTeXday, afternoon session
Mastering LaTeX

Maxime Folschette Guillaume Perez Benjamin Miraglio

I3S, team MDSC
maxime.folschette@i3s.unice.fr, guillaume.perez@i3s.unice.fr, miraglio@i3s.unice.fr

Association des Doctorants en STIC de l'Université Nice Sophia-Antipolis

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Afternoon session outline

- making a bibliography in LaTeX
- summarising exercise
- presentation of other LaTeXeditors
- defining macros as new commands
- easily drawing graphics with TikZ
- making LaTeXpresentations with beamer

BibTeX presentation

BibTeX is a bibliography managing format.
The bibliography *database* is located in an external file (`.bib`) and the bibliography is inserted in the document with the help of:

```
\bibliographystyle{plain}
\bibliography{⟨biblio-name⟩}
```

You can refer to the an entry of the bibliography with the command `\cite{article_id}` [3]
It is possible to include several .bib files: `\bibliography{biblio1,biblio2}`

Adding new entries to the bibliography

Several types of entry available: `article`, `book`, `booklet`, `inproceedings`, `manual`, `pdhthesis`, `techreport`, `unpublished`, `misc...`

Example of a `.bib` file:

```
    @book{goossens93,
author    = "Goossens, Michel and Mittlebach, Frank",
title     = "The Latex Companion",
year      = "1993",
publisher = "Addison-Wesley",
address   = "Reading, Massachusetts"
    }

    @article{greenwade93,
author  = "Unknown",
title   = "Title",
year    = "1993",
journal = "Journal name",
volume  = "14",
number  = "3",
pages   = "342--351"
    }
```

Entry types

- `phdthesis` and `mastersthesis` : Ph.D. and Master thesis
  - required fields: `author, title, school, year`
- `inproceedings` : conference article
  - required fields: `author, title, booktitle, year`
- `article` : journal article
  - required fields: `author, title, journal, yearr`
- `book` : book
  - required fields: `author/editor, title, publisher, year`
- `techreport` : technical report
  - required fields: `author, title, institution, year`
- `misc` : miscellanous document
  - No field required

Bibliography styles

The bibliography style is specified with the command:

```
\bibliographystyle{⟨style⟩}
```

A bibliography style file (`.bst`) is often provided by the conference or journal.
It is also possible to use *abbrv-fr* or *alpha-fr* styles.

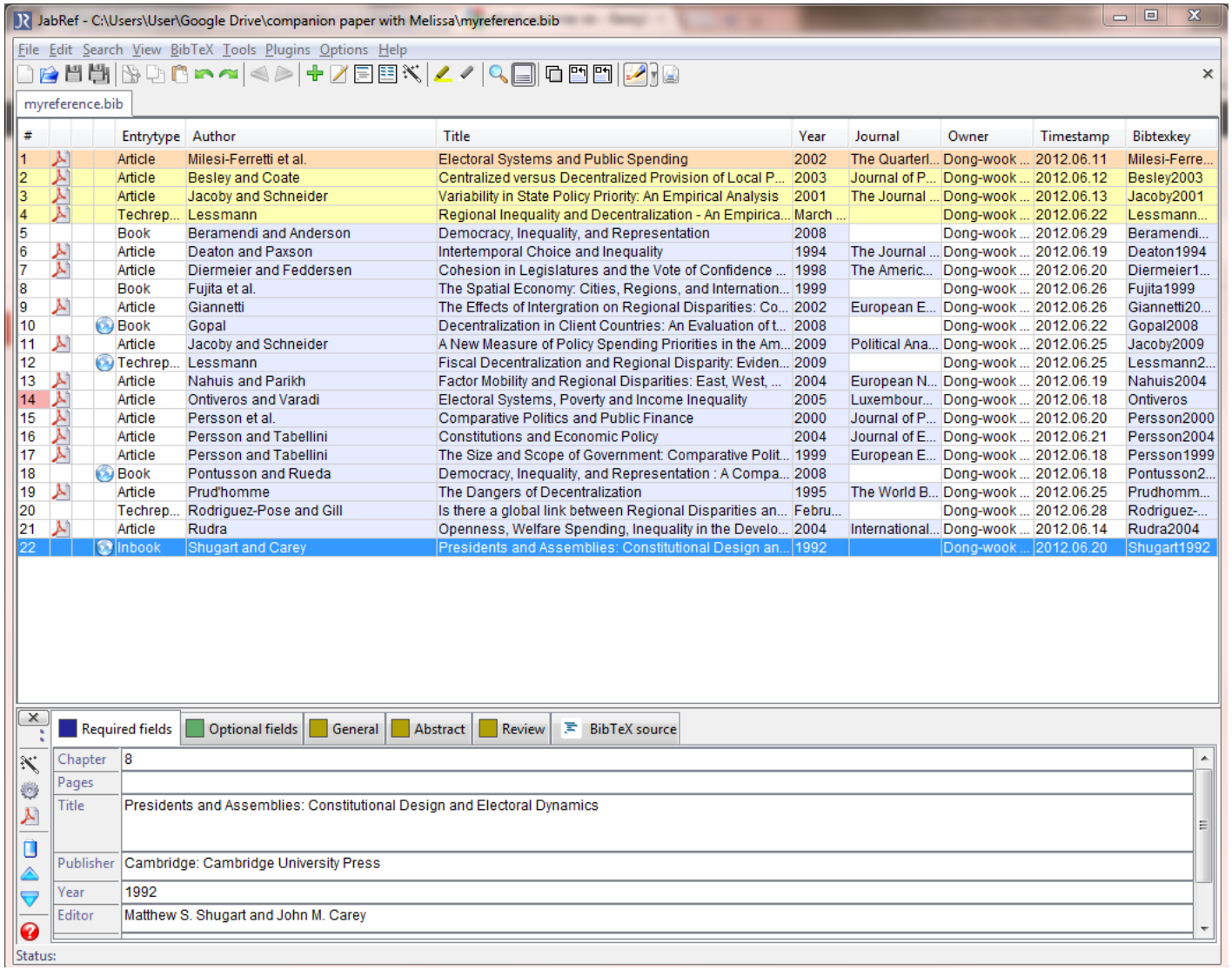
Bibliography managers

Most of the bibliography databases can export their data in BibTeX (PubMed, Google Scholar ...).

Using a bibliography manager can be handy:

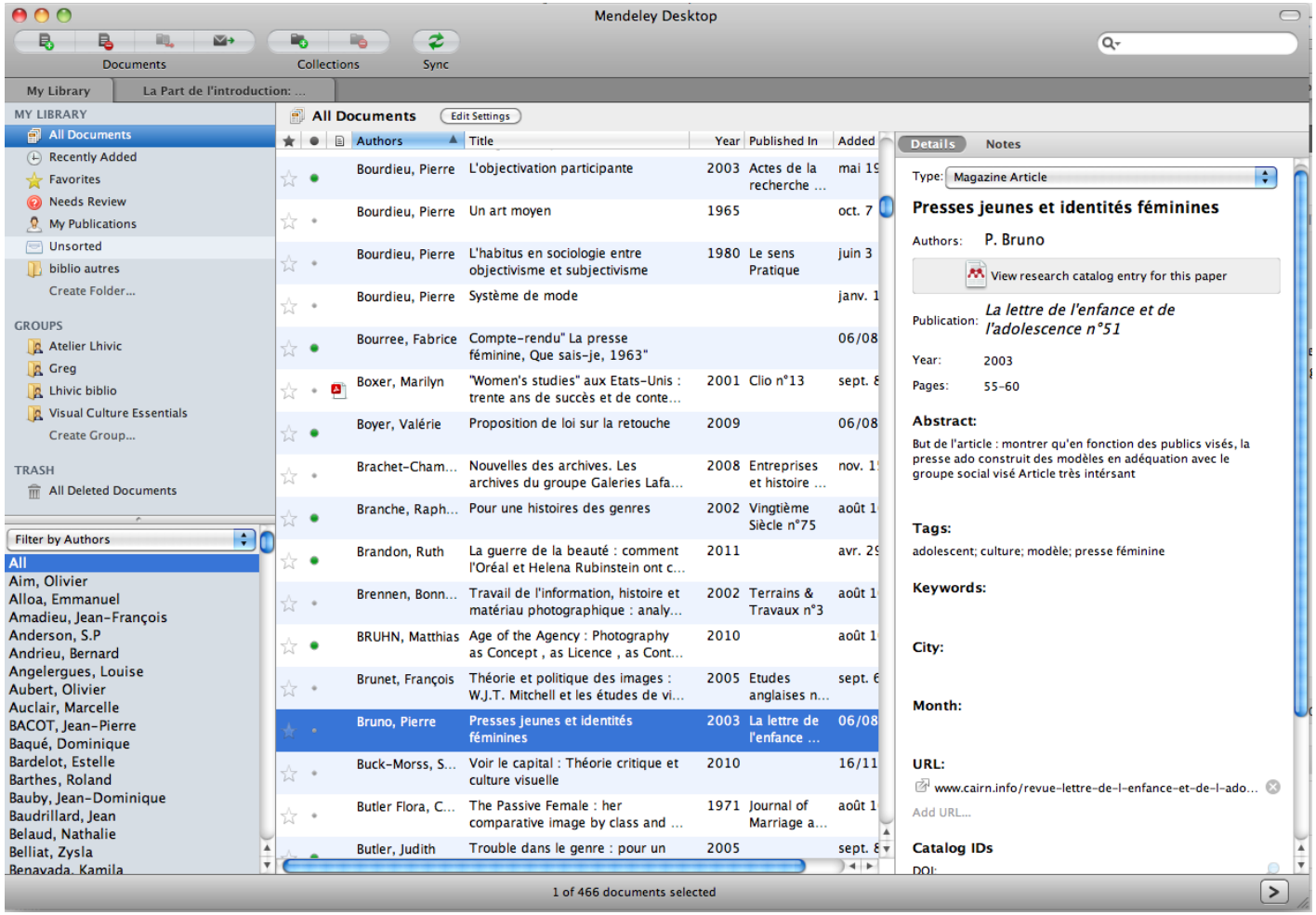
- JabRef
- Mendeley
- Zotero

Jabref



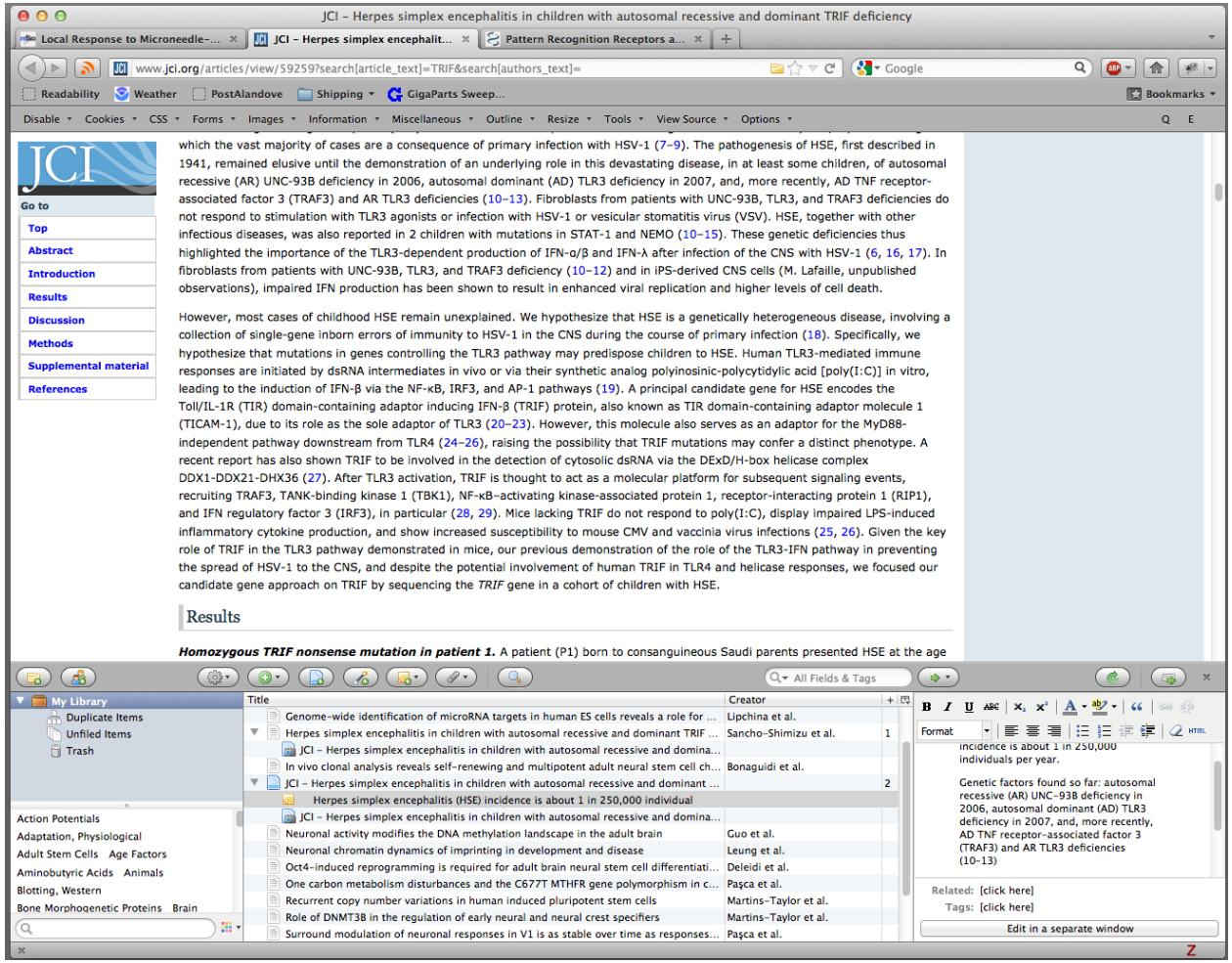
Download at `http://jabref.sourceforge.net/`

Mendeley



Download at `http://www.mendeley.com/`

Zotero



Download at `http://www.zotero.org/`

Bibliographie

TikZ and PGF Examples sut TEXample.net.
`http://www.texample.net/tikz/examples/`.

WikiBooks LaTeX/Presentations.
`https://en.wikibooks.org/wiki/LaTeX/Presentations`.

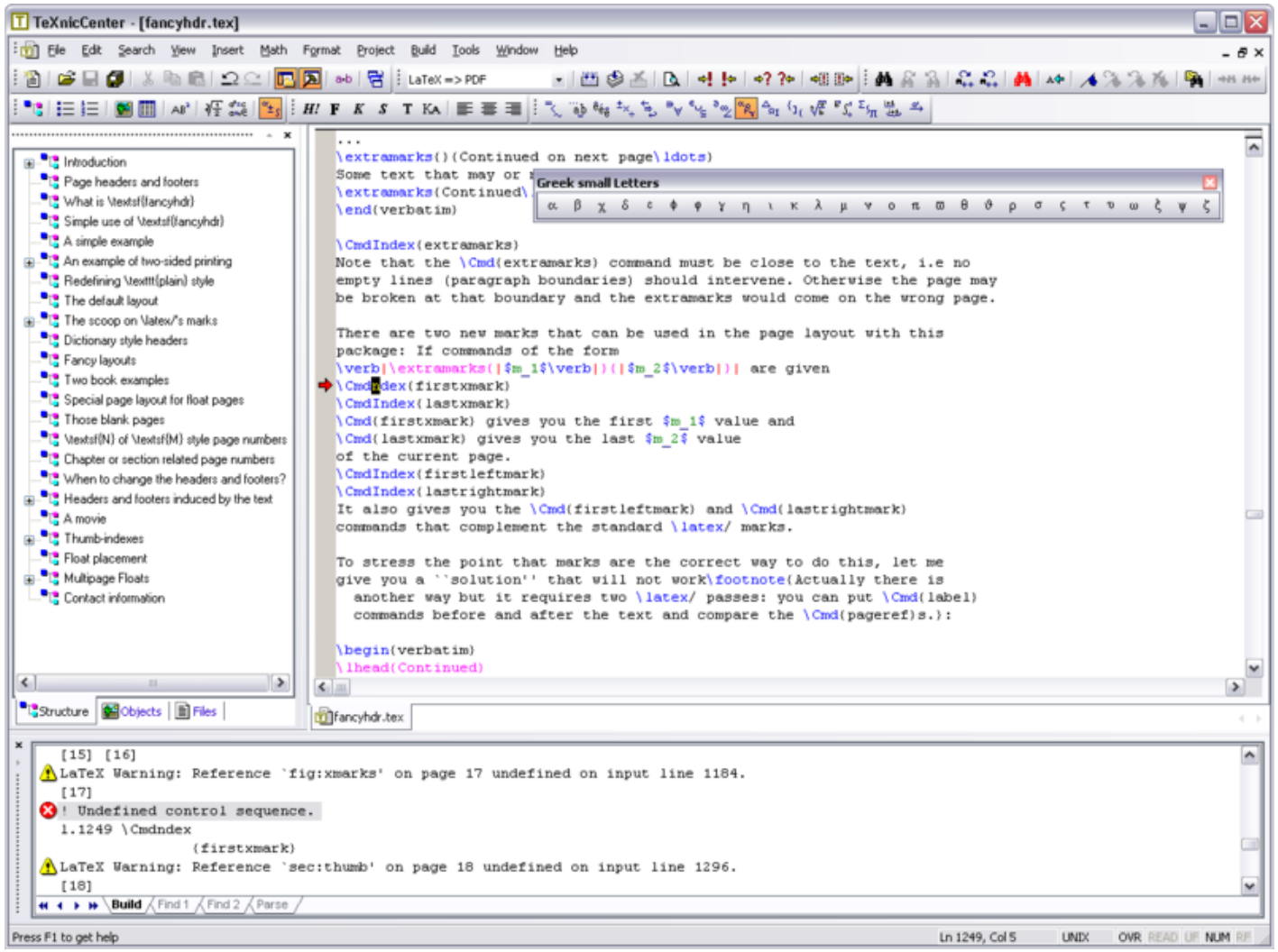
M. Goossens et F. Mittlebach :
The Latex Companion.
Addison-Wesley, Reading, Massachusetts, 2 édn, 1993.

V. Lozano :
Tout ce que vous avez toujours voulu savoir sur LATEX sans jamais oser le demander.
In Libro Veritas, 2008.

N.-A. Maguis :
Rédigez des documents de qualité avec LaTeX.
SimpleIT, 2010.

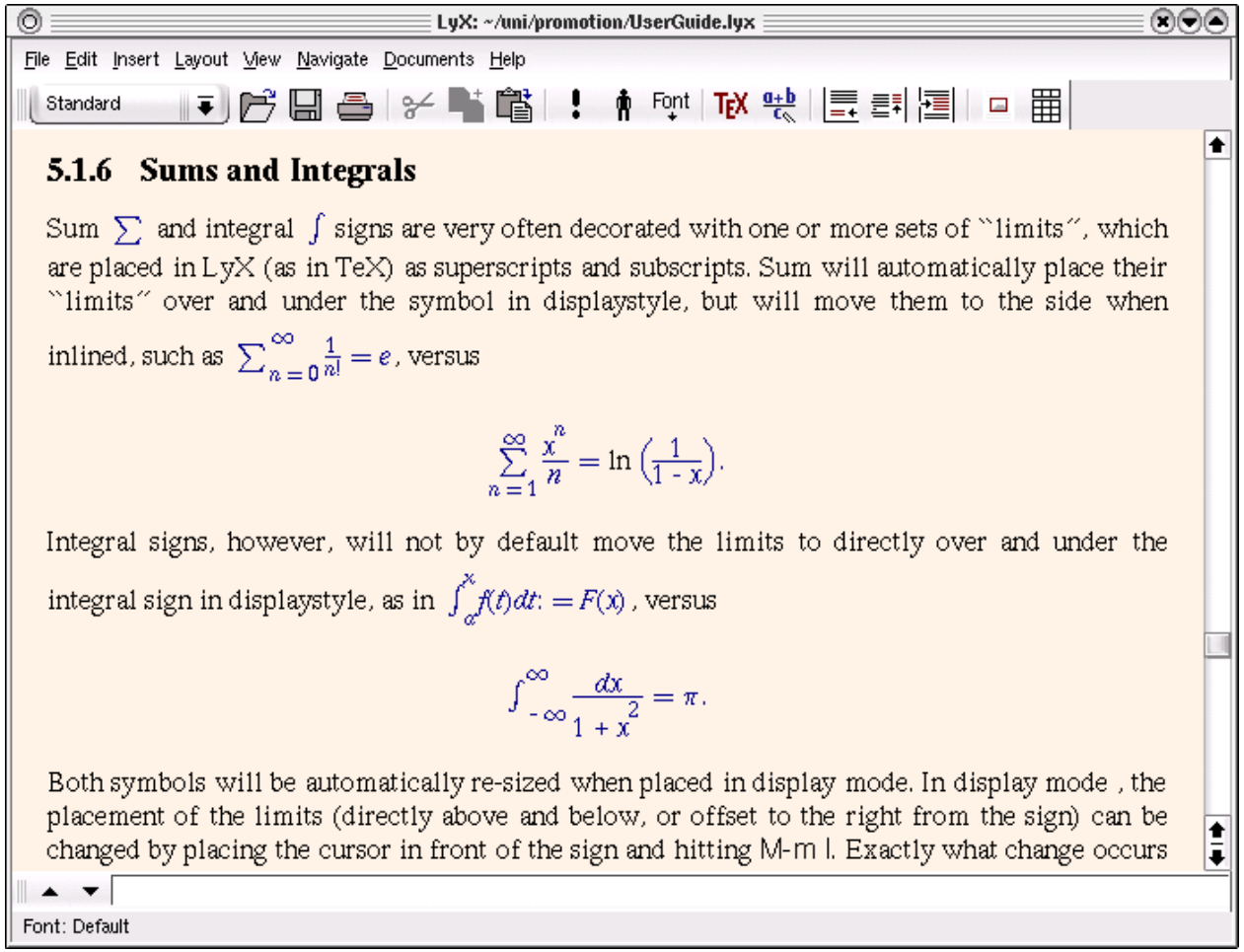
Summarising exercice.

Texniccenter



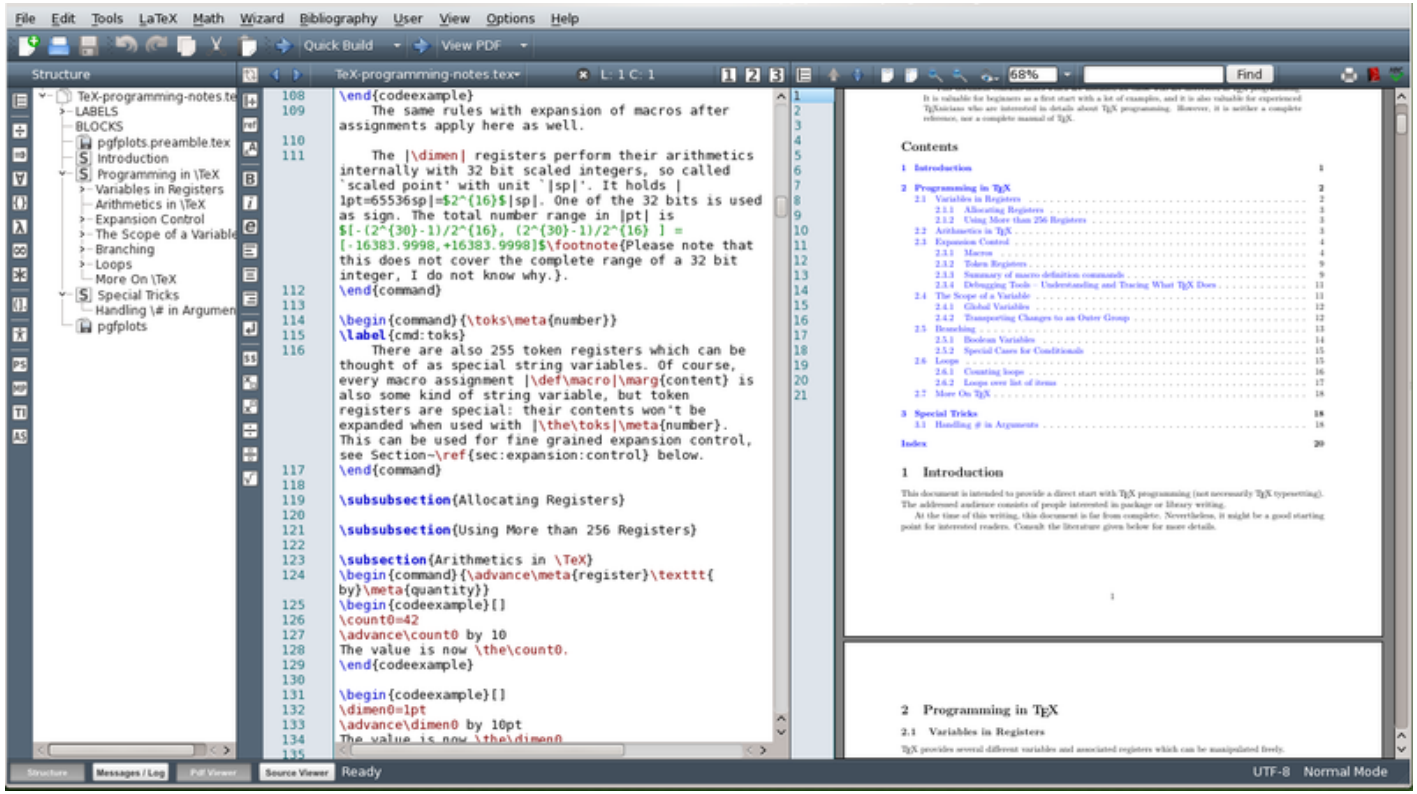
Download at `http://www.texniccenter.org/`

LyX



Download at `http://www.lyx.org/`

Texmaker



Download at `http://www.xm1math.net/texmaker/`

Simple command definition

- Reusability
- Simplification

```
\newcommand{\⟨commandname⟩}{⟨Body of the command⟩}
```

Every time the created command is invoked, it is replaced by its body.

Example:

```
\newcommand{\ltsname}{Labeled transition system}
```

Creates a command called `\ltsname`
which writes: “Labeled transition system”.

Result:

```
Let $D$ be a \ltsname.
```

Let D be a Labeled transition system.

Commands with arguments

```
\newcommand{\⟨commandname⟩}[⟨n⟩]{⟨Body with #1, ..., #n⟩}
```

Up to 9 **mandatory** arguments for a command can be specified, and referenced with `#1`, `#2`, `#3`, etc.

Example:

```
\newcommand{\abs}[1]{\left|#1\right|}
```

Creates a command `\abs{xxx}`
which represents the absolute value of its argument: "$\left|xxx\right|$".

```
\begin{equation}
  \abs{\sum n} \leq
  \sum \abs{n}
\end{equation}
```

$$\left|\sum n\right| \leq \sum |n| \tag{1}$$

Commands with an optional argument

`\newcommand{\⟨commandname⟩}[⟨n⟩][⟨Default value⟩]{⟨Body with #1, ..., #n⟩}`

It is possible to set the first (and only the first) argument as **optional**, by defining its value in case it is not specified.
In this case, the first argument is written between brackets.

Example:

```
\newcommand{\lts}[1][n]{\left(Q^{#1},q^{#1},A_{#1},\rightarrow_{#1}\right)}
```

Creates a command which can be used with an argument: `\lts[xxx]`
or without: `\lts` in which case the default value `n` is used.

```
\begin{equation}
  \lts[3]
\end{equation}

\begin{equation}
  \lts
\end{equation}
```

$$\left(Q^3, q^3, A_3, \rightarrow_3\right) \tag{2}$$

$$\left(Q^n, q^n, A_n, \rightarrow_n\right) \tag{3}$$

PGF/TikZ: vector graphics in LaTeX

What are PGF/TikZ ?

- PGF is a **complete** and **complicated** language for vector graphics,
- TikZ is a **simpler** overlay language to use PGF.

They allow to draw complex figures easily. Pros:

- The figures are **integrated** to the LaTeX document (no external file),
- Everybody loves vector graphics: always smooth, even for printing,
- Very **rich**, a lot of existing **examples** available.

Cons:

- Still **difficult** to get used to,
- May **slow** the compilation down,
- May create **heavy** PDF files that take time to render.

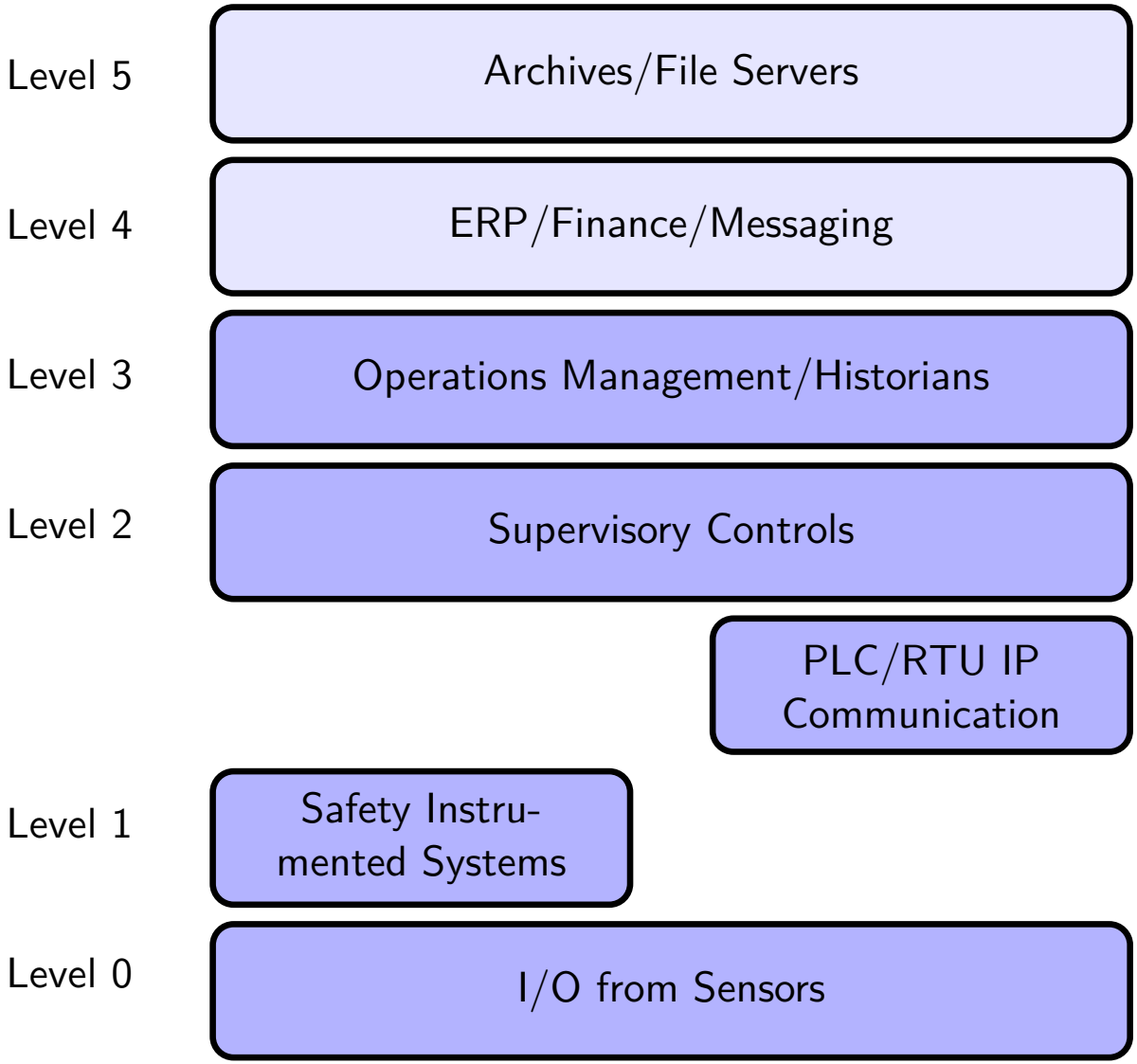


Figure : Architecture Model — TEXample.net [1]

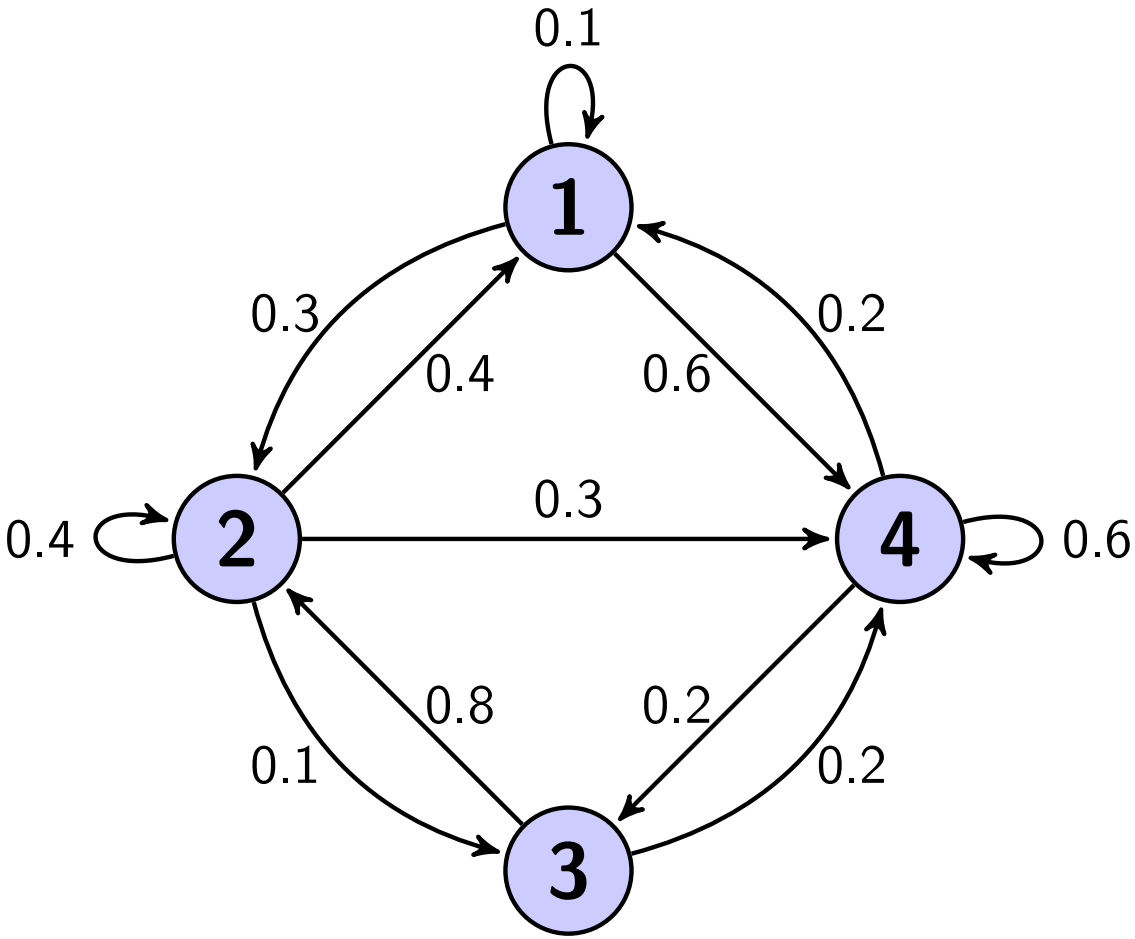


Figure : A Simple Graph — TEXample.net [1]

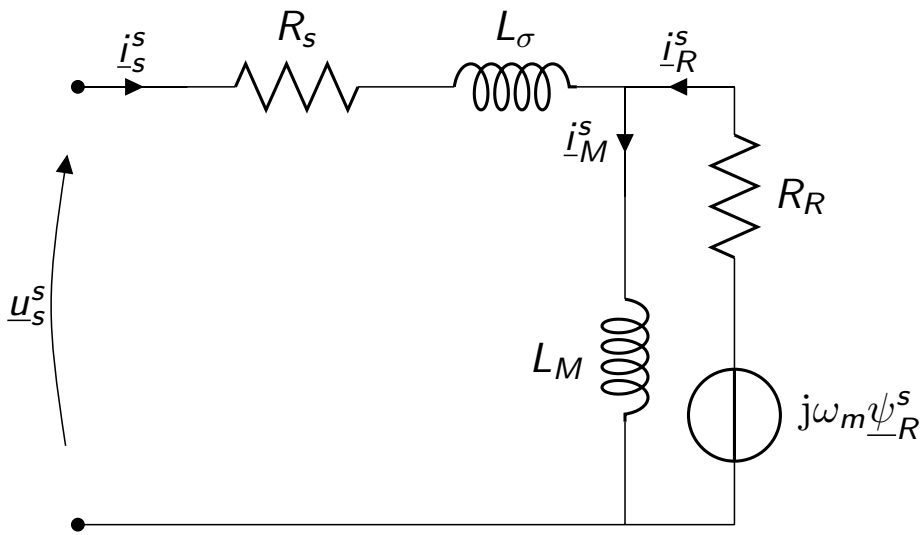


Figure : Electrical Circuit — TEXample.net [1]

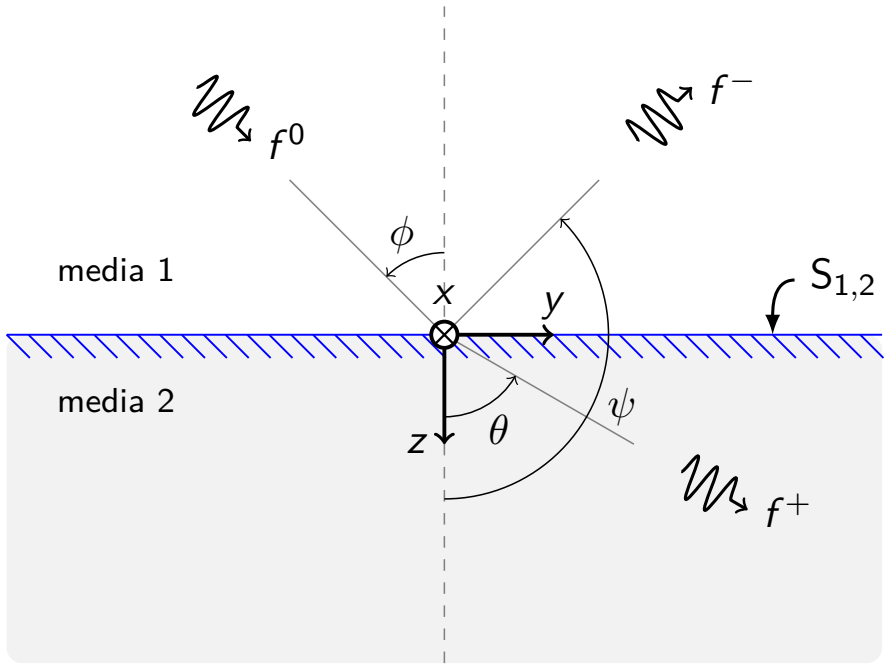


Figure : Oblique Incidence — TEXample.net [1]

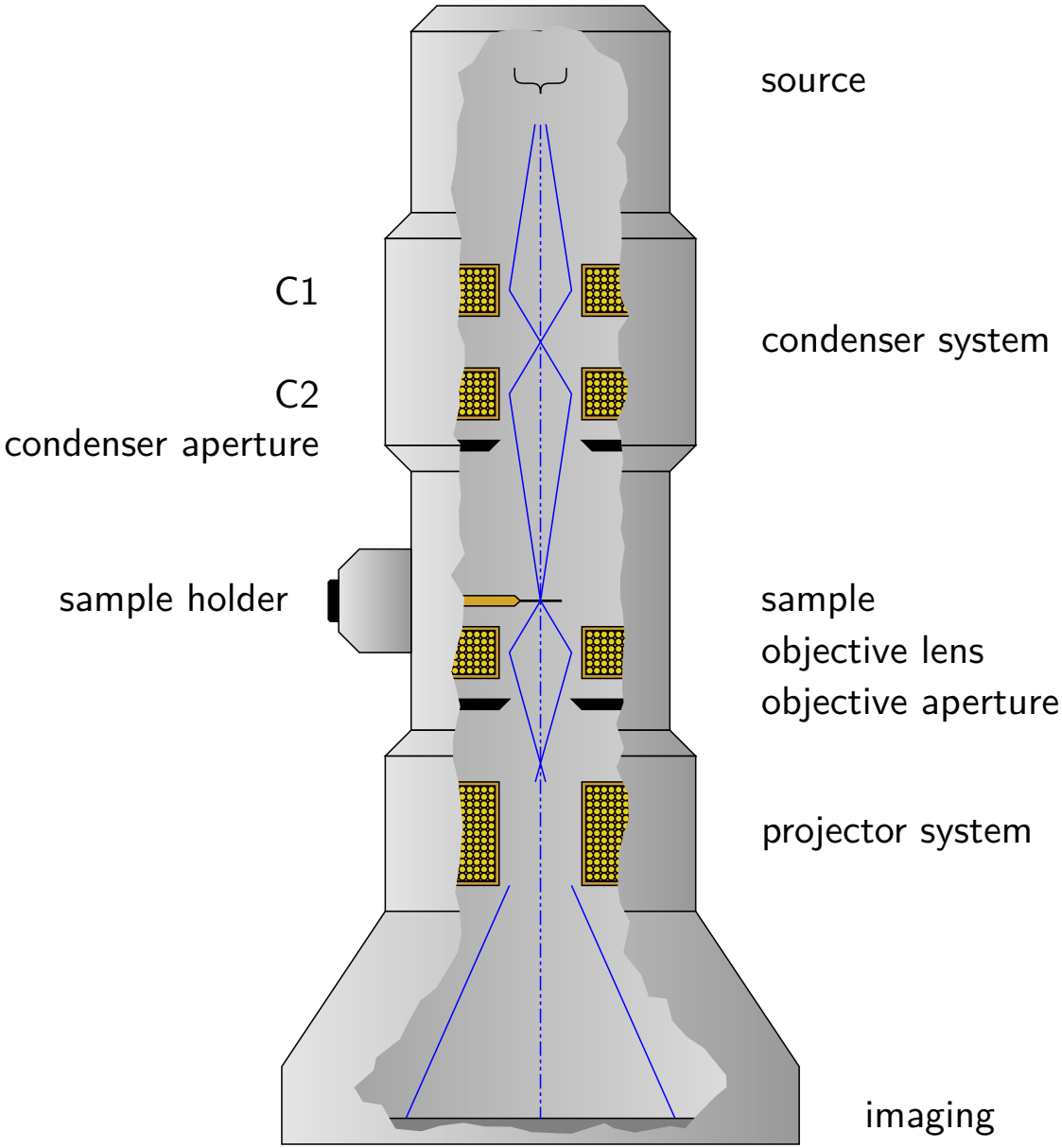


Figure : Transmission Electron Microscope System — TEXample.net [1]

Preamble

TikZ must be loaded as a package in the preamble: `\usepackage{tikz}`

All TikZ related libraries must also be loaded in the preamble with: `\usetikzlibrary{libraries}`, allowing to use:

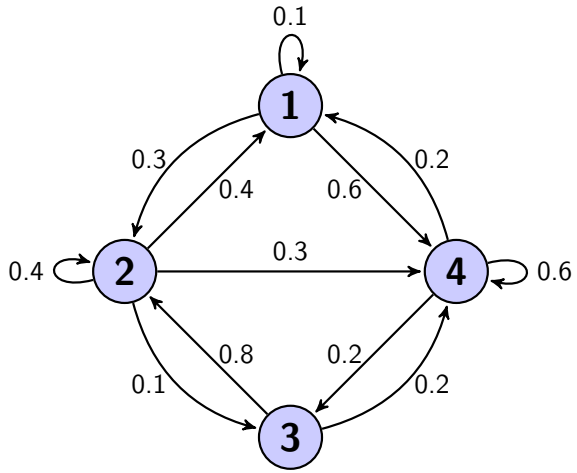
- new arrow shapes (`arrows`),
- shades (`shadings`),
- line styles (`decorations.pathmorphing`),
- etc.

Crating a figure

Inside the document, define a TikZ picture with the environment `tikzpicture`, usually encapsulated in a `figure`:

```
\begin{figure}
  \begin{tikzpicture}
    ...
    ...    % Content of the picture
    ...
  \end{tikzpicture}
  \caption{...}
  \label{...}
\end{figure}
```

Image description with TikZ



A TikZ picture is made of elements defined with commands:

```
\command[parameters] ... rest of the command ... ;
```

for example, this graph is made of nodes (the blue circles). Between the nodes are edges (the arrows). On these edges are labels (like “0.3”) which are also nodes.
All of them are defined with the TikZ commands `\node` and `\path`.

Example: a simple graph

A node is defined with command `\node`:

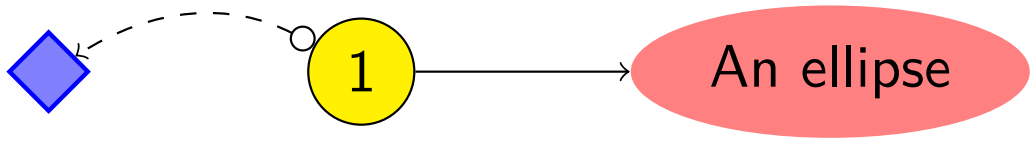
`\node[⟨options⟩] (⟨name⟩) {⟨label⟩};`

One can specify:

- the internal name `(name)`,
- the printed label `{label}`,
- the shape (`circle`, `ellipse`, `square`...), the type of line, the background color, the position (absolute or relative to the other nodes)...

```
\node[circle, fill=yellow, draw] (circ) {1};
\node[ellipse, fill=red!50, right of=circ, node distance=3cm]
  (ellipse) {An ellipse};
\node[diamond, fill=blue!50, draw=blue, thick] at (-2, 0) (emptydiamond) {};
```

Example: a simple graph



An edge can be defined between two nodes with:

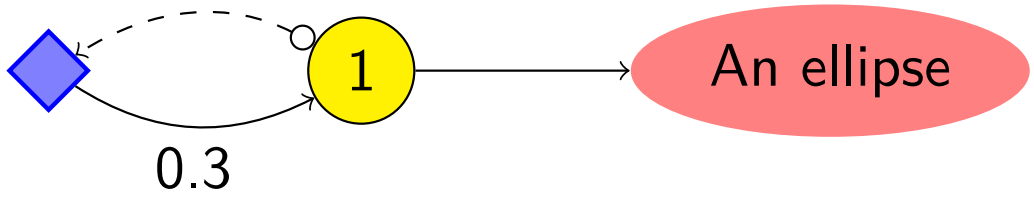
```
\path[⟨options⟩] (⟨origin⟩) edge (⟨target⟩);
```

One can define:

- the `(origin)` and the `(cible)` using their internal names,
- the type of arrow tip (`->`, `o->`, `-`), the curvature (`bend right`), the type of line (`thick`, `dashed`)...

```
\path[->] (circ) edge (ellipse);
\path[o->, bend right, dashed] (circ) edge (emptydiamond);
```

Example: a simple graph



A label can be placed on an edge by creating a node alongside this edge. This is achieved with the keyword `node`:

```
\path[->, bend right] (emptydiamond) edge
  node[below] (arrowback) {0.3}
  (circ);
```

Note that this new node acts as a normal node and can be referenced (as an origin or target for an edge, for instance).

Reuse, reuse, reuse!

In order to produce great figures with TikZ, it is best to look for examples to use them as a basis and modify.

for this:  **Internet!** 

The best resource is probably the TEXample website, where a section is dedicated to TikZ [1] at: `http://texample.net/tikz/examples/`.

Furthermore, it is possible to:

- define custom themes for similar pictures,
- use the available libraries for common diagrams or shapes (UML, electrical schematics...),
- define LaTeXcommands for the repeated parts.

What is Beamer?

Beamer is a LaTeX class.

Common points:

- **structuring** (parts, sections, sub-sections; no chapters),
- text formatting,
- inclusion of **figures** and **mathematical formulas**, etc.

Main differences:

- additional structuring into **frames**,
- new commands to handle **transitions** and animations,
- different layout rendering (fonts, arrangement).

You can reuse your math/figures from your articles from you LaTeXarticles.
Still produces a universally readable PDF (contrary to PPTX or Keynote).

Document definition

Beamer is a LaTeX class:

```
\documentclass[⟨options⟩]{beamer}
```

Amongst the `options`:

- `t`, `c` or `b` to vertically align the text at the top, center or bottom of each frame by default,
- `Xpt` to set the font size to `X` (ex: `9pt`),
- `handout` to produce a printable presentation (without transitions/animations).

Then comes the preamble, then the content, as before inside inside:

```
\begin{document}
  ...
  ...    % The frames come here
  ...
\end{document}
```

Definition of a frame

Each frame comes into an environment called `frame`:

```
\begin{frame}[⟨options⟩]
  ...
  ...   % Content of the frame
  ...
\end{frame}
```

The optional `options` may contain:

- `t`, `c` or `b` to change the vertical alignment for this frame only,
- `plain` in order not to produce the header and footer for this frame only,
- `shrink` to gain some space if there is a lot of text,
- `fragile` if the frame contains some source code (like here).

Properties of a frame

Title, subtitle, header, footer, and so on

A title and a subtitle can be defined for a frame:

```
\frametitle{⟨Title of the frame⟩}
\framesubtitle{⟨Subtitle of the frame⟩}
```

Furthermore, depending on the theme used, some information show in the header and footer of each frame:

- the current section,
- the title of the presentation, the authors and their institute,
- the numbering of the frame,
- etc.

Inside a frame

The content of a frame is regular LaTeX, that is:

- lists,
- figures (containing tables, complex figures, images...),
- text and mathematical equations,
- etc.

The content can also be encapsulated into blocks:

```
\begin{exampleblock}{Title of the block}
  Content of the bloc (lists, equations, text...)
\end{exampleblock}
```

Title of the block

Content of the bloc (lists, equations, text...)

By default, 3 kinds of blocks : `block`, `alertblock` and `exampleblock`.

Theme example : Madrid

Normal block (neutral)

Content of the bloc (lists, equations, text...)

Alert block

If we suppose :

$$1 + 1 = 0 \tag{1}$$

then we can prove anything.

Example block

For instance :

- Everything true is also false, and conversely,
- $x = y$ for all x and all y,
- my cat and myself are the same person.

Animations

One can define static animations inside Beamer presentations.

Animations

One can define static animations inside Beamer presentations.

- They consist in apparitions...

Animations

One can define static animations inside Beamer presentations.

- ...or vanishings.

Animations

One can define static animations inside Beamer presentations.

- They consist in apparitions...
- ...or vanishings.

Animations in fact produce duplicates of the same frame, where some parts are not printed. Note that the printed numbering is not affected.

The `handout` option of the `\documentclass` allows to remove these animations to keep only the final frame.

Successive apparitions

With command `\pause` or `\pause[x]`

Example with `\pause`:

```
\begin{itemize}
  \item Bullet 1,
    \pause
  \item Bullet 2,
    \pause
  \item Bullet 3.
\end{itemize}
```

- Bullet 1,

Successive apparitions

With command `\pause` or `\pause[x]`

Example with `\pause`:

```
\begin{itemize}
  \item Bullet 1,
    \pause
  \item Bullet 2,
    \pause
  \item Bullet 3.
\end{itemize}
```

- Bullet 1,
- Bullet 2,

Successive apparitions

With command `\pause` or `\pause[x]`

Example with `\pause`:

```
\begin{itemize}
  \item Bullet 1,
    \pause
  \item Bullet 2,
    \pause
  \item Bullet 3.
\end{itemize}
```

- Bullet 1,
- Bullet 2,
- Bullet 3.

Fine-tuning animations

Command `\only<pages>{content}`: apparition without prior placeholder

```
| Text 1,
|
| \only<2->{Text 2 without placeholder,}
|
| Text 3.
```

Text 1,
Text 3.

Command `\uncover<pages>{content}`: apparition with prior placeholder

```
| Text 1,
|
| \uncover<3->{Text 2 with placeholder,}
|
| Text 3.
```

Text 1,

Text 3.

Fine-tuning animations

Command `\only<pages>{content}`: apparition without prior placeholder

```
| Text 1,
|
| \only<2->{Text 2 without placeholder,}
|
| Text 3.
```

Text 1,
Text 2 without placeholder,
Text 3.

Command `\uncover<pages>{content}`: apparition with prior placeholder

```
| Text 1,
|
| \uncover<3->{Text 2 with placeholder,}
|
| Text 3.
```

Text 1,

Text 3.

Fine-tuning animations

Command `\only<pages>{content}`: apparition without prior placeholder

```
| Text 1,
|
| \only<2->{Text 2 without placeholder,}
|
| Text 3.
```

Text 1,
Text 2 without placeholder,
Text 3.

Command `\uncover<pages>{content}`: apparition with prior placeholder

```
| Text 1,
|
| \uncover<3->{Text 2 with placeholder,}
|
| Text 3.
```

Text 1,
Text 2 with placeholder,
Text 3.

Fine-tuning animations

Other commands may use an optional <pages> argument.

Example: \item<pages>

```
\begin{itemize}
  \item<1,2> First bullet
  \item<3-> Second bullet
  \item<2-> Third but not last bullet
\end{itemize}
```

- First bullet

Another example: most commands of TikZ also accept the <pages> syntax.

Fine-tuning animations

Other commands may use an optional <pages> argument.

Example: \item<pages>

```
\begin{itemize}
  \item<1,2> First bullet
  \item<3-> Second bullet
  \item<2-> Third but not last bullet
\end{itemize}
```

- First bullet
- Third but not last bullet

Another example: most commands of TikZ also accept the <pages> syntax.

Fine-tuning animations

Other commands may use an optional <pages> argument.

Example: \item<pages>

```
\begin{itemize}
  \item<1,2> First bullet
  \item<3-> Second bullet
  \item<2-> Third but not last bullet
\end{itemize}
```

- Second bullet
- Third but not last bullet

Another example: most commands of TikZ also accept the <pages> syntax.

Themes

There exist many predefined themes allowing to modify the layout and colors of a Beamer presentation.

A **main theme** is called with `\usetheme{theme}` and changes the layout (title, header, footer, font, shape of the bullets...).
Examples: `Warsaw`, `Madrid`, `Copenhagen`, `CambridgeUS`...

A **color theme** is called with `\usecolortheme{theme}` and only affects the color palette (background, font, blocks, header, footer...).
Examples: `beaver`, `dolphin`, `dove`, `fly`...

It is also possible to customize most of these characteristics and even create a brand new theme.

Refer to the LaTeXWikibook [2] for a list of the default themes and customizable parameters.

Theme example : CambridgeUS

Normal block (neutral)

Content of the bloc (lists, equations, text...)

Alert block

If we suppose:

$$1 + 1 = 0 \tag{4}$$

then we can prove anything.

Example block

For instance:

- Everything true is also false, and conversely,
- $x = y$ for all x and all y,
- my cat and myself are the same person.

Theme example : Madrid

Normal block (neutral)

Content of the bloc (lists, equations, text...)

Alert block

If we suppose :

$$1 + 1 = 0 \tag{1}$$

then we can prove anything.

Example block

For instance :

- Everything true is also false, and conversely,
- $x = y$ for all x and all y,
- my cat and myself are the same person.

Exemple de thème : ECN

Bloc normal (neutre)

Contenu du bloc (listes, équations, maths, ...)

Bloc d'alerte

Si on suppose :

$$1 + 1 = 0 \tag{1}$$

alors on peut prouver n'importe quoi.

Bloc d'exemple

Par exemple :

- Tout ce qui est vrai est aussi faux, et inversement,
- $x = y$ pour tout x et tout y,
- mon chat et moi ne formons qu'une seule personne.

Theme example : Custom theme

Normal block (neutral)

Content of the bloc (lists, equations, text...)

Alert block

If we suppose:

$$1 + 1 = 0 \tag{1}$$

then we can prove anything.

Example block

For instance:

- Everything true is also false, and conversely,
- $x = y$ for all x and all y,
- my cat and myself are the same person.

Exercise

Here is the skeleton of a simple presentation:

```
\documentclass{beamer}

\usepackage[french]{babel}
\usepackage[utf8]{inputenc}

\usetheme{Madrid}
\usecolortheme{default}

\title{Présentation de ma thèse}
\author{Prénom Nom}
\institute[LDC]{Laboratoire des Chatons}

\begin{document}

\begin{frame}
  \maketitle
\end{frame}

% A partir d'ici,
% entrez ce que vous voulez...
\section{À propos de moi}

\begin{frame}
  \frametitle{Ce que j'aime}
  \begin{itemize}
    \item Les chatons,
    \pause
    \item le jus de raisin,
    \pause
    \item etc.
  \end{itemize}
\end{frame}

\end{document}
```