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Writing your own class

Sometimes the best option to customize a document is to write a new class from scratch. This article explains the main structure and commands needed in a new class.

Contents

Introduction

The first thing to do before coding a new class is to determine whether you really need a new class or not. It's recommended to search on CTAN (Comprehensive TEX Archive Network) (http://www.ctan.org/ctan-portal/search/) and see if someone already created something similar to the document class you need.

Another important thing to have in mind is the difference between packages and classes (/learn/Understanding_packages_and_class_files). Making the wrong choice can affect the flexibility of the final product.

General structure

The structure of all class files can be roughly described in the next four parts:

- ***Identification***. The file declares itself as a class written with the LaTeX 2_ε syntax.
- ***Preliminary declarations***. Here the external packages and classes needed are imported. Also, in this part of the file the commands and definitions needed by the declared options are coded.
- ***Options***. The class declares and processes the options.
- ***More declarations***. The main body of the class. Almost everything a class does is defined here.

In the next subsections a more detailed description of the structure and a working example, *exampleclass.cls*, will be presented.

Identification

There are two simple commands that all classes must have:

```
\NeedsTeXFormat{LaTeX2e}
\ProvidesClass{exampleclass}[2014/08/16 Example LaTeX class]
```

The command `\NeedsTeXFormat{LaTeX2e}` sets the LaTeX version for the class to work. Additionally, a date can be added within brackets to specify the minimal release date required.

The command `ProvidesClass{exampleclass}[...]` identifies this class as *exampleclass* and, inside the brackets, the release date and some additional information is included. The date should be in the form YYYY/MM/DD

Open an example of how to write a class in ShareLaTeX (https://www.sharelatex.com/project/new/template?zipUrl=/project/53ee9e80eceb82a67658bce6/download/zip&templateName=ClassExample&compiler=pdfl

Preliminary declarations

Most of the classes extend and customize existing ones, and also need some external packages to work. Below, some more code is added to the sample class "exampleclass.cls".

```
\NeedsTeXFormat{LaTeX2e}
\ProvidesClass{exampleclass}[2014/08/16 Example LaTeX class]

\newcommand{\headlinecolor}{\normalcolor}
\LoadClass[twocolumn]{article}
\RequirePackage{xcolor}
\definecolor{slcolor}{HTML}{882B21}
```

The commands in this part either initialize some parameters that latter will be used to manage the options, or import external files.

The command `\LoadClass[twocolumn]{article}` loads the class `article` with the additional parameter `twocolumn`. Therefore all the commands in the standard **article** class will be automatically available in the **example** class, except that the document will be printed in a two-column format.

`\RequirePackage` is very similar to the well-known `\usepackage`, adding optional parameters within brackets will also work. The only difference is that the `\usepackage` can not be used before `\documentclass` command. It's strongly recommended to use `\RequierePackage` when writing new classes or packages.

Open an example of how to write a class in ShareLaTeX (https://www.sharelatex.com/project/new/template?zipUrl=/project/53ee9e80eceb82a67658bce6/download/zip&templateName=ClassExample&compiler=pdfl

Options

To allow some flexibility in the classes a few additional options are very useful. The next part in the file "exampleclass.cls" handles the parameters passed to the document class command.

```
\NeedsTeXFormat{LaTeX2e}
\ProvidesClass{exampleclass}[2014/08/16 Example LaTeX class]

\newcommand{\headlinecolor}{\normalcolor}
\LoadClass[twocolumn]{article}
\RequirePackage{xcolor}
\definecolor{slcolor}{HTML}{882B21}

\DeclareOption{onecolumn}{\OptionNotUsed}
\DeclareOption{green}{\renewcommand{\headlinecolor}{\color{green}}}
\DeclareOption{red}{\renewcommand{\headlinecolor}{\color{slcolor}}}
\DeclareOption*{\PassOptionsToClass{\CurrentOption}{article}}
\ProcessOptions\relax
```

There are four main commands here that handle the options passed to the class.

The command `\DeclareOption{}{}` handles a given option. It takes two parameters, the first one is the name of the option and the second one is the code to execute if the option is passed.

The command `\OptionNotUsed` will print a message in the compiler and the logs, the option won't be used. In this case the document is set to two-column and if the user tries to change it to one column that won't work, the option will be ignored.

The command `\Declareoption*{}` handles every option not explicitly defined. It takes only one parameter, the code to execute when an unknown option is passed. In this case it will run the next command:

`\PassOptionsToClass{}{}`. Passes the option inside the first pair of braces to the document class set inside the second pair of braces. In the example, all unknown options will be passed to the **article** document class.

`\CurrentOption` stores the name of the class option being handled at a determined moment.

The command `\ProcessOptions\relax` executes the code fore each option and must be inserted after all the option-handling commands were typed. There's a starred version of this command that will execute the options in the exact order specified by the calling commands.

In the example, if the options *red* or *green* are passed to the document the font used for the headline and the sections will be set to the corresponding colour. The colour called "slcolor" was defined in the preliminary declarations after importing the *xcolor* package.

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More declarations

In this part most of the commands will appear. In "exampleclass.cls" the dimensions of the page, the font size for the title, the body and the sections are set. Below you can see the full class file.

```
\NeedsTeXFormat{LaTeX2e}
\ProvidesClass{exampleclass}[2014/08/16 Example LaTeX class]

\newcommand{\headlinecolor}{\normalcolor}
\LoadClass[twocolumn]{article}
\RequirePackage{xcolor}
\definecolor{slcolor}{HTML}{882B21}


\DeclareOption{onecolumn}{\OptionNotUsed}
\DeclareOption{green}{\renewcommand{\headlinecolor}{\color{green}}}
\DeclareOption{red}{\renewcommand{\headlinecolor}{\color{slcolor}}}
\DeclareOption*{\PassOptionsToClass{\CurrentOption}{article}}
\ProcessOptions\relax

\renewcommand{\maketitle}{%
    \twocolumn[%
        \fontsize{50}{60}\fontfamily{phv}\fontseries{b}%
        \fontshape{sl}\selectfont\headlinecolor
        \@title
        \medskip
        ]%
}

\renewcommand{\section}{%
    \@startsection
    {section}{1}{0pt}{-1.5ex plus -1ex minus -.2ex}%
    {1ex plus .2ex}{\large\sffamily\slshape\headlinecolor}%
}

\renewcommand{\normalsize}{\fontsize{9}{10}\selectfont}
\setlength{\textwidth}{17.5cm}
\setlength{\textheight}{22cm}
\setcounter{secnumdepth}{0}
```

To understand the rest of the commands see the reference guide and the links in the further reading section.

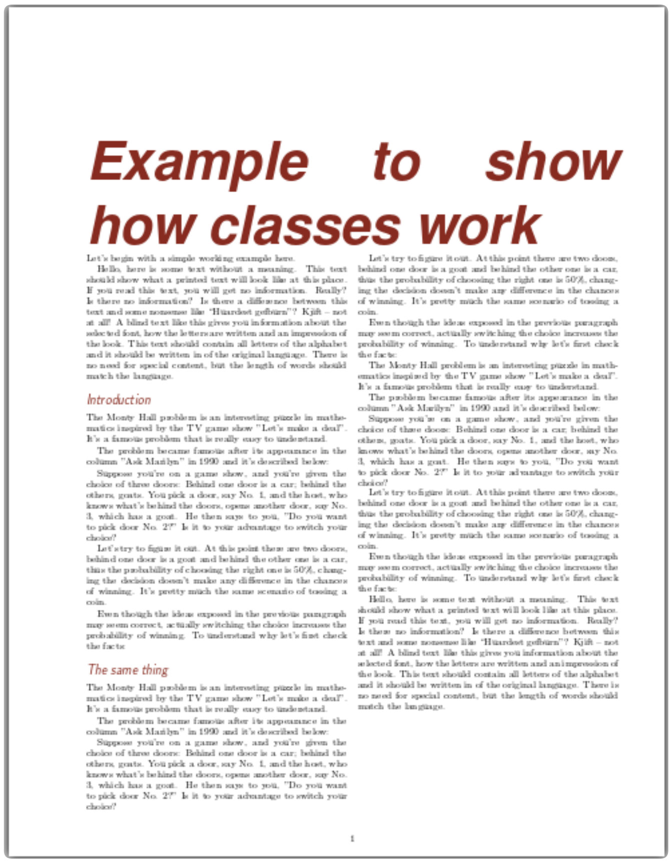
The last four commands in the example show the four things that all classes must contain:

- The definition of `normalsize`. Sets the default font size (/learn/Font_sizes_and_kinds).
- A default value for `textwidth` (/learn/Page_size_and_margins)
- A default value for `textheight` (/learn/Page_size_and_margins)

- The specifications for the page numbering (/learn/Page_numbering).

Below, a document that uses the class *exampleclass.cls*.

```
\documentclass[red]{exampleclass}
\usepackage[utf8]{inputenc}
\usepackage[english]{babel}

\usepackage{blindtext}

\title{Example to show how classes work}
\author{Team Learn ShareLaTeX}
\date{August 2014}

\begin{document}

\maketitle

\noindent
Let's begin with a simple working example here.

\blindtext

\section{Introduction}

The Monty Hall problem...

\section{The same thing}

The Monty...
```



Example to show how classes work

Let's begin with a simple working example here.

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like "Huardest gefburn"? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Introduction

The Monty Hall problem is an interesting puzzle in mathematics inspired by the TV game show "Let's make a deal". It's a famous problem that is really easy to understand.

The problem became famous after its appearance in the column "Ask Marilyn" in 1990 and it's described below:

Suppose you're on a game show, and you're given the choice of three doors: Behind one door is a car; behind the others, goats. You pick a door, say No. 1, and the host, who knows what's behind the doors, opens another door, say No. 3, which has a goat. He then says to you, "Do you want to pick door No. 2?" Is it to your advantage to switch your choice?

Let's try to figure it out. At this point there are two doors, behind one door is a goat and behind the other one is a car, thus the probability of choosing the right one is 50%, changing the decision doesn't make any difference in the chances of winning. It's pretty much the same scenario of tossing a coin.

Even though the ideas exposed in the previous paragraph may seem correct, actually switching the choice increases the probability of winning. To understand why let's first check the facts:

The same thing

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1

(/learn/File:WrittingClassesEx1.png)

Notice that the first command here is

```
\documentclass[red]{exampleclass}
```

Open an example of how to write a class in ShareLaTeX (https://www.sharelatex.com/project/new/template?zipUrl=/project/53ee9e80eceb82a67658bce6/download/zip&templateName=ClassExample&compiler=pdfl

Handling errors

When it comes to develop new classes it's important to handle possible errors to let know the user that something went wrong. There are four main commands to report errors in the compiler.

- `\ClassError{`*`class-name`*`}{`*`error-text`*`}{`*`help-text`*`}`. Takes three parameters, each one inside braces: the class name, the error text which is going to be displayed (the compilation process will be paused), and the help text that will be printed if the user press "h" when the compilation pauses because of the error.
- `\ClassWarning{`*`class-name`*`}{`*`warning-text`*`}`. In this case the text is displayed but the compilation process won't stop. It will show the line number where the warning occurred.
- `\ClassWarningNoLine{`*`class-name`*`}{`*`warning-text`*`}`. Works just like the previous command, but it won't show the line where the warning occurred.
- `\ClassInfo{`*`class name`*`}{`*`info-text`*`}`. In this case the information in the second parameter will only be printed in the transcript file, including the line number.

Open an example of how to write a class ShareLaTeX (https://www.sharelatex.com/project/new/template?zipUrl=/project/53ee9e80eceb82a67658bce6/download/zip&templateName=ClassExample&compiler=pdfl

Reference guide

List of commands commonly used in classes and packages

- `\newcommand{`*`name`*`}{`*`definition`*`}`. Defines a new command (/learn/Commands#Defining_a_new_command), the first parameter is the name of the new command, the second parameter is what the command will do.
- `\renewcommand{}{}`. The same as `\newcommand` but will overite an existing command.
- `\providecommand{}{}`. Works just as `\newcommand` but if the command is already defined this one will be silently ignored.
- `\CheckCommand{}{}`. The syntax is the same as `\newcommand`, but instead it will check whether the command exists and has the expected definition, LaTeX will show a warning if the command is now what `\CheckCommand` expected.
- `\setlength{}{}`. Sets the length of the element passed as first parameter to the value written as second parameter.
- `\mbox{}`. Creates a box that contains the elements written inside the braces.
- `\fbox{}`. The same as `\mbox`, but a box is actually printed around the contents.

Further reading

For more information see

- Understanding packages and class files (/learn/Understanding_packages_and_class_files)
- Writing your own package (/learn/Writing_your_own_package)
- Commands (/learn/Commands) and Environments (/learn/Environments)
- Lengths in LaTeX (/learn/Lengths_in_LaTeX)
- Using colours in LaTeX (/learn/Using_colours_in_LaTeX)
- Management in a large project (/learn/Management_in_a_large_project)
- LaTeX 2_ε for class and package writers (http://www.latex-project.org/guides/clsguide.pdf)
- Notes on programming in tex (http://pgfplots.sourceforge.net/TeX-programming-notes.pdf)
- Minutes in less than hours: Using LaTeX Resources (http://tutex.tug.org/pracjourn/2005-4/hefferon/hefferon.pdf)
- The LaTeX Companion. Second edition (http://ptgmedia.pearsoncmg.com/images/9780201362992/samplepages/0201362996.pdf)