

prerex.sty: Prerequisite Charts in LaTeX

Version 5.3

R. D. Tennent
rdt@cs.queensu.ca

October 30, 2009

1 Description

`prerex.sty` defines macros that LaTeX can use to draw charts consisting of labelled course boxes linked by arrows that represent pre- and co-requisite requirements; see the example chart in Figure 1 on page 2. In addition to the usual LaTeX output, auxiliary files will be generated containing image-map data for the hyperlinked nodes in the diagram and a shell script for converting a PDF chart to a PNG image.

If the source file satisfies the constraints of the `prerex(5)` format, a chart description may be edited using the `prerex(1)` interactive editor (as well as any conventional text editor).

2 Terminology

A prerequisite chart consists of a number of *course boxes*, linked by *arrows*. Courses are either *half* or *full*, and may be *required*. Each course box can contain a course *code* (upper left corner), a course *title* (lower half), and *timetable* information (upper right corner). An arrow can be either a *prerequisite* (solid), a *corequisite* (dotted), or *recommended* (dashed). When a conventional arrow would be inappropriate, it is possible to use a *mini* course “box” (consisting of just a course code) just above a target box. A line of text may be placed anywhere on the chart.

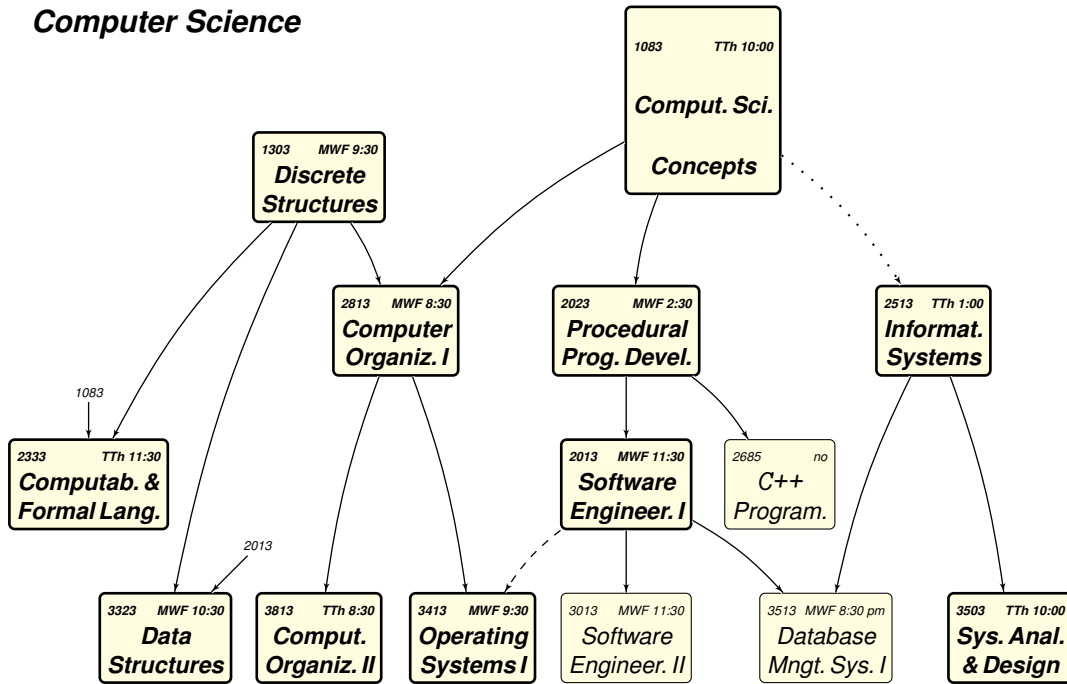
3 Coordinate System

A conventional two-dimensional Cartesian coordinate system is used to specify the locations of diagram elements. The origin (where $x = 0$ and $y = 0$) is at the lower-left corner of the diagram. The diagram height is configurable; the width is determined by the values of `\textwidth` and an adjustable `\unit` length, which defines the absolute value of a coordinate unit. It is possible to put a coordinate grid with labelled axes in the background of a chart. The coordinates of a *box*, *mini*, or *text-line* are those of its centre point. An *arrow* is described by the coordinates of the centre points of its source and target boxes/minis/text-lines.

4 Usage

The command `\usepackage{prerex}` should appear in the document preamble. This will define a LaTeX environment

Computer Science



Notes

- A solid arrow \longrightarrow indicates a required prerequisite, a dotted arrow $\cdots \rightarrow$ indicates a corequisite (to be taken before or concurrently), and a dashed arrow $--- \rightarrow$ indicates a recommended prerequisite. Core courses are in **bold** boxes; other courses (i.e., options or prerequisites) are in **light** boxes.
- Timetable abbreviations: M, T, W, Th, F=Mon, Tue, Wed, Thur, Fri, resp.; no=not offered.
- ...

Figure 1: A Prerequisite Chart

```
\begin{chart} ... \end{chart}
```

within which the commands described in the following sections may be used to produce course boxes, minis, text-lines, and arrows. The order of commands is not significant except that the commands for the source and target boxes of an arrow should precede the command for the arrow, and the `\grid` command, if present, should precede other chart commands.

5 Course Boxes

The commands producing course boxes have the following forms:

```
\halfcourse  $x,y$  : { code } { title } { timetable }
```

```
\reqhalfcourse  $x,y$  : { code } { title } { timetable }
```

```
\fullcourse  $x,y$  : { code } { title } { timetable }
```

```
\reqfullcourse  $x,y$  : { code } { title } { timetable }
```

where x,y are the coordinates of the centerpoint of the box, relative to the origin of the coordinate system at the lower-left corner of the diagram. The *code*, *title*, and *timetable* arguments are arbitrary (well-bracketed) text, possibly with LaTeX markup.

6 Mini Course Boxes and Text-Lines

A mini course “box” is produced by a command of the form

```
\mini  $x,y$  : { code }
```

A text-line is produced by a command of the form

```
\text  $x,y$  : { line of text }
```

There are several differences between minis and text-lines. The maximum length allowed for a course-code may be less than that for a text-line. A sans-serif font and a reduced font size is used for a course-code. A course-code may be hyperlinked but a text-line is not (except when the coordinate grid is on).

7 Arrows

Arrows between course boxes (or minis or text-lines) are produced by commands of the form

```
\prereq  $x_0,y_0,x_1,y_1$  :
```

```
\coreq  $x_0,y_0,x_1,y_1$  :
```

```
\recomm  $x_0,y_0,x_1,y_1$  :
```

These produce, respectively, solid, dotted, and dashed arrows from the course box (or mini or text-line) centered at coordinates x_0,y_0 to the entity centered at coordinates x_1,y_1 .

Arrows by default have a non-zero curvature (unless they are very short). It is possible to override the default curvature for a particular arrow by using the instructions

`\prereqc $x_0,y_0,x_1,y_1;c$:`

`\coreqc $x_0,y_0,x_1,y_1;c$:`

`\recommc $x_0,y_0,x_1,y_1;c$:`

where c is an integer in the range 0–100 specifying the desired curvature; for example, $c = 0$ will produce a straight arrow. To change the default curvature for all arrows, the user program may redefine the `\DefaultCurvature` command.

8 Web Links

Course boxes and minis may be hyperlinked. The default URL for course boxes is `course-code.html` where `course-code` is the `code` argument of the course box. The URL scheme may be changed by the user by redefining the `\CourseURL` command; see Section 14.

9 Coordinate Grid

The following command produces a coordinate grid with labelled axes, which is useful while editing a diagram:

`\grid`






This is normally placed before all the other chart commands so that grid lines are in the background, covered by course boxes, minis, text-lines, and arrows, as in Figure 2 on page 5.

The `\grid` command also redefines the `CourseURL` command so that, in (some) PDF viewers, if the mouse cursor is placed over a box, mini, or midpoint of an arrow, the *coordinates* of the box/mini/textline (or the coordinates of the source *and* target of the arrow) will be displayed as follows: in the status bar in `xpdf` and `gpdf`, and in a “tooltip” in recent versions of `kpdf/okular`, `evince`, and the Acrobat Reader. This coordinate display make it easier to edit chart descriptions.

The `prerex` package at <http://www.ctan.org/tex-archive/graphics/prerex/> has a patch for `kpdf` (recently incorporated into `okular`) to make it display URIs in tooltips and also capture coordinates of course boxes, arrows, and background points in the X selection clipboard (for pasting into a command being composed at the `prerex` prompt).

10 Stand-Alone Commands

The following commands may be used outside a chart environment, such as in the explanatory notes for a chart:

<code>\solidarrow</code>	
<code>\dottedarrow</code>	
<code>\dashedarrow</code>	
<code>\lightbox</code>	
<code>\boldbox</code>	

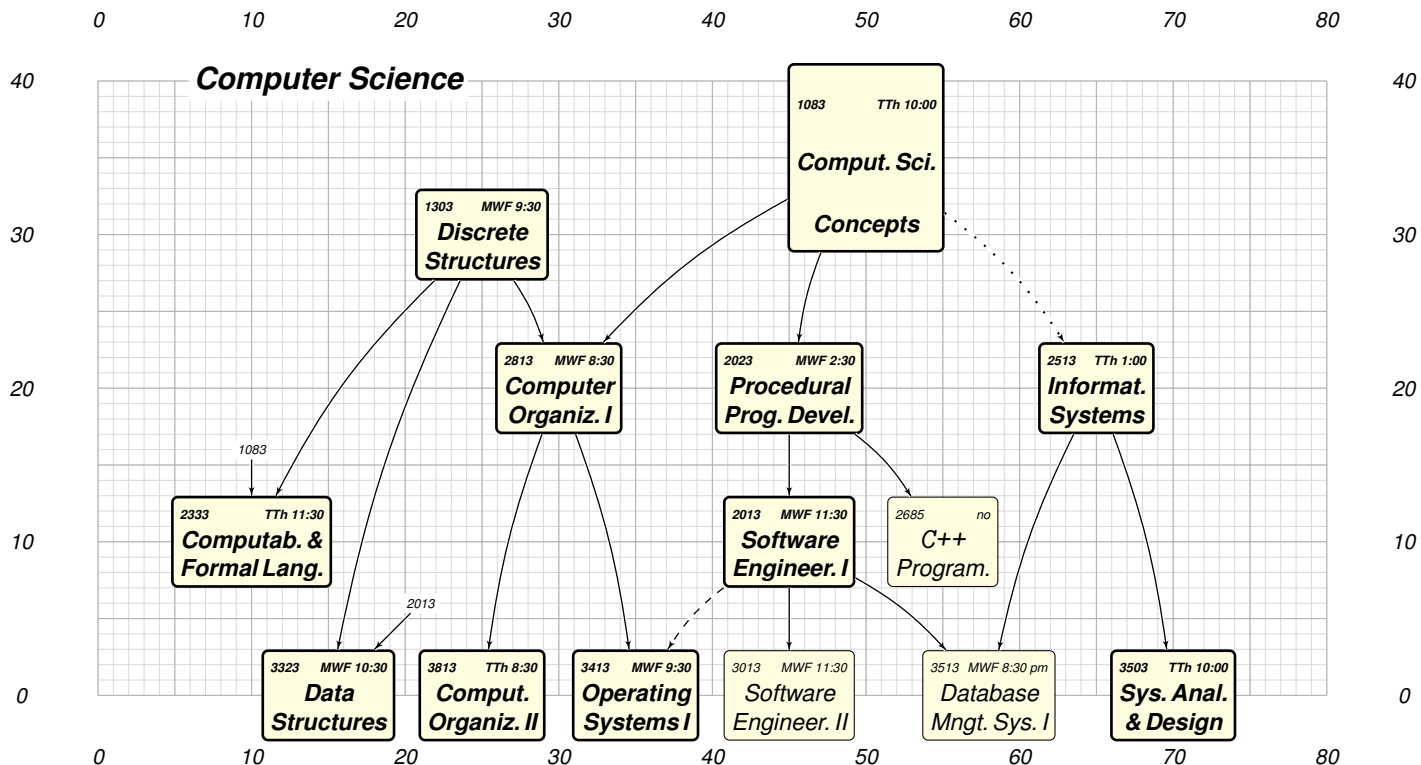


Figure 2: A Prerequisite Chart with a Coordinate Grid

11 Dependencies

This implementation of `prerex.sty` uses `pgf` (version 1.18 or later) with add-on package `tikz`. The following additional packages are used: `multido`, `resize`, `calc`, `ifthen`, `textcomp`, `zref-savepos`, and `hyperref`. *Either* `pdflatex` or `latex` followed by `dvips` (and, possibly, `ps2pdf`) may be used.

12 Conversion to Portable Network Graphic (PNG) Format

To convert a chart (in Postscript or PDF format) to a reasonably high-quality image, it is suggested to use the `convert` tool of the `ImageMagick` package as follows:

```
convert -density 125 -quality 100 chart.pdf chart.png
```

The `density` parameter specifies the number of pixels per inch; if this is too small, the image is of poor quality, and if it is too large, the image file is too big. The `quality` parameter provides the maximal (loss-free) compression. From version 5.0, `prerex.sty` generates an auxiliary file containing image-map data for the hyperlinked nodes in the chart; consult a reference on the HTML language for an explanation of (client-side) image maps.

13 Installation

1. install the most recent version of pgf from <http://sourceforge.net/projects/pgf/>.
2. copy `prerex.sty` to `your-texmf-tree/tex/latex/misc`
3. copy `doc/prerex.{tex,pdf}` to `your-texmf-tree/doc/latex/misc`
4. if necessary, refresh the T_EX database (e.g., `texhash`)
5. copy `man/prerex.sty.7` to sub-directory `man7` of a `man` directory on your `MANPATH`
6. test by doing

```
$ man 7 prerex.sty
$ make chart.pdf
```

14 Configuration

The following are defined by the style file but may be re-defined by the user:

```
\newcommand{\DefaultCurvature}{20}
```

where the argument should be in the range 0–100; 0 means no curvature.

```
\newcommand{\CourseURL}[3]{#3.html}
```

where the arguments supplied at the call are the x and y coordinates of the box or mini and the course code.

```
\newcommand{\background}{LightYellow}
```

where `LightYellow` is defined by

```
\definecolor{LightYellow}{rgb}{1.0, 1.0, 0.878431}
```

```
\setlength{\unit}{5.7816pt}
```

which defines the absolute size of a coordinate unit; this yields 10 pixels per coordinate unit if the chart is converted to an image at 125 dpi.

```
\newcommand{\dpi}{125}
```

```
\newcommand{\PixelsPerUnit}{10}
```

These have to re-defined together if the image-map data are to be correct.

```
\setcounter{diagheight}{75}
```

which is the y -coordinate of the top of the diagram (reduced to 65 in landscape mode); the nominal diagram width is `\textwidth ÷ \unit + 10`.

The following define the thicknesses of the three kinds of arrows, and the thickness of bold boxes:

```
\newcommand{\solidwidth}{0.5pt}
```

```
\newcommand{\dottedwidth}{0.8pt}
```

```
\newcommand{\dashedwidth}{0.5pt}
```

```
\newcommand{\boldwidth}{1.0pt}
```

The following command is used to change to a smaller size for course codes, timetable information, and mini-course codes:

```
\newcommand{\smallersize}{\relsize{-3}}
```

15 License

`prerex.sty`, `prerex.sty.7`, `README.prerex` and this document may be distributed and/or modified under the conditions of the LaTeX Project Public License.