TEX Engines and Formats

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Introduction
What is “\texttt{TEX}”

\texttt{TEX} = \texttt{pdfL\texttt{A}TEX}
What is “\textsc{TX}”

\textsc{TX} \neq \textsc{pdfLaTX}
Engines
Engines

An engine is *machine code* that you run.
The original version of TeX

Impossible to run now
TEX82 (1983)

The current version of \TeX

Multiple equivalent implementations
pdfTeX (1996)

Adds native PDF output

Adds support for microtypography
Xe\TeX (2005)

Direct support for Unicode

Can load unmodified OTF/TTF fonts
LuaTEX (2006)

Direct support for Unicode

Includes an embedded Lua interpreter
LuaMetaTEX (2019)

Many new features, many removals
Formats
Formats

A format is a large collection of \TeX code
Plain (1983)

The original format

Intended as a base, not a complete set of macros
\textsc{LaTeX 2.09 (1985)}

Original version of LaTeX

Very similar to modern LaTeX

Obsolete for nearly 30 years
$\LaTeX \, 2\varepsilon \ (1994)$

The current version of $\LaTeX$

Intended as a short-term release before $\LaTeX3$
Superficially similar to \LaTeX~2

Monolithic and uniform
OpTEX (2020)

An extended Plain, with Lua
File Names
Documents

Documents are named "⟨name⟩.tex"
Plain \TeX

“Macros”

tex/plain/\langle name\rangle/\langle name\rangle.tex

tex/generic/\langle name\rangle/\langle name\rangle.tex
“Package”

tex/latex/{name}/latex{name}.sty

“Class”

tex/latex/{name}/latex{name}.cls
“Module”

tex/context/third/⟨name⟩/t-⟨name⟩.mkiv

tex/context/third/⟨name⟩/t-⟨name⟩.mkxl
"Macro Packages"

tex/optex/⟨name⟩/⟨name⟩.opm
Lua

“Module”

tex/luatex/{name}/{name}.lua

scripts/{name}/{name}.lua
“Standard” Documents
Set the document style
\input personal-style % Optional

% Load Packages
\input some-package

Document contents.
% End the document
\bye
\documentstyle{package-a, package-b}
{article} \% Mandatory!

\begin{document}

Document Contents

\end{document}
% Set the document style
\documentclass{article} % Mandatory!

% Load packages
\usepackage{package-a, package-b}

% Start the document
\begin{document}
Document Contents

% End the document
\end{document}
ConTeXt

% Set the document style
\environment personal-style % Optional

% Load packages
\usemodule[some-package]

% Start the document
\starttext % or \startdocument
Document contents

% End the document
\stoptext % or \stopdocument
OpTeX

% Set the document style
\input personal-style % Optional
\fontfam[LMfonts] % Recommended

% Load packages
\load[some-package]

Document contents
% End the document
\bye
Font Switching
% Defining
\a=\text{cmr10}
\b=\text{cmb10}

% Switching
\a\text{ Regular}
\b\text{ Bold}
\texttt{\texttt{\textbackslash \texttt{\textbackslash font\texttt{\textbackslash tenrm}=\texttt{cmr10}}}}
\texttt{\texttt{\textbackslash font\texttt{\textbackslash tenbf}=\texttt{cmb10}}}
\texttt{\texttt{\textbackslash font\texttt{\textbackslash faketwentyrm}=\texttt{cmb10 \texttt{at 20pt}}}}

% Switching
\texttt{\texttt{\textbackslash tenrm \texttt{Regular}}}  \texttt{\texttt{\textbackslash tenbf \texttt{Bold}}}  \texttt{\texttt{\textbackslash faketwentyrm \texttt{Bigger}}}

% Defining
pdfTeX

Adds map files (not particularly interesting...)
% Defining
\font\tenrm="[lmroman10-regular]"
\font\stixbf="STIX Two Text Bold:+c2sc"

% Switching
\tenrm Regular
\stixbf Bold Text
Regular

Bold Text
Lua\TeX

No changes from pdf\TeX
% Load luaotfload:
\input luaotfload.sty
% Defining
\font\tenrm="[lmroman10-regular]"
\font\stixbf="STIX Two Text Bold:+c2sc"
\font\pagella={name:TeX Gyre Pagella}
\font\heros=file:texgyreheros-bold.otf

% Switching
\texttt{Regular}

\textbf{Bold Text}

\texttt{Pagella}

\texttt{Heros}
LuaTEX

Regular

**Bold Text**

Pagella

Heros
Plain

\textit{} Regular
\textbf{} Bold
\textit{} Italic
\textit{} Small
\textbf{} Small Bold
Plain

Regular

Bold

Italic

Small

Small Bold
\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{Latex 2.09}}}}}}}}}}}

\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{rm \text{ Regular}}}}}}}}}}}}}

\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{bf \text{ Bold}}}}}}}}}}}

\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{it \text{ Italic}}}}}}}}}}}

\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{vpt\texttt{\text{ Small}}}}}}}}}}}}

\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{\texttt{bf \text{ Small Bold}}}}}}}}}}}

TUG 2022
Regular
\textbf{Bold}
\textit{Italic}
\tiny Small
\textbf{Small Bold}
\LaTeX\ 2\varepsilon

Regular

Bold

*Italic*

Small

Small Bold
Regular
\bf Bold
\it Italic
\texttt Small
\bf Small Bold
Regular
\bf Bold
\it Italic
\typosize[5/] Small
\bf Small Bold
More Fonts
Changing families
\usepackage{tgschola}

% Changing sizes
\fontsize{21.5pt}{24pt}\selectfont

% Bold + Italic
\textbf{\textit{Bold Italic}}

% Small Caps
\textsc{Small Caps}
LATEX 2ε

Bold Italic

SMALL CAPS
\usepackage{fontspec}

% Changing families
\setmainfont{TeV Gyre Schola}
% Changing families
\switchtobodyfont[schola]

% Changing sizes
\switchtobodyfont[21.5pt]

% Bold + Italic
\bold{\italic{Bold Italic}}

% Small Caps
\smallcaps{Small Caps}
ConTEXT

Bold Italic

Small Caps
% Changing families
\fontfam[Schola]
% Changing sizes
\typosize[21.5/]
% Bold + Italic
{%bf \em Bold Italic%}
% Small Caps
{%caps\rm Small Caps%}
Questions?