LaTeX Installation

Michel Goossens, CERN

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- The components of a LaTeX system;
- TDS 1.0 and Web2c 7.3;
- TeXLive 4: installation, platforms;
- PostScript fonts;
- Custimization, debugging.

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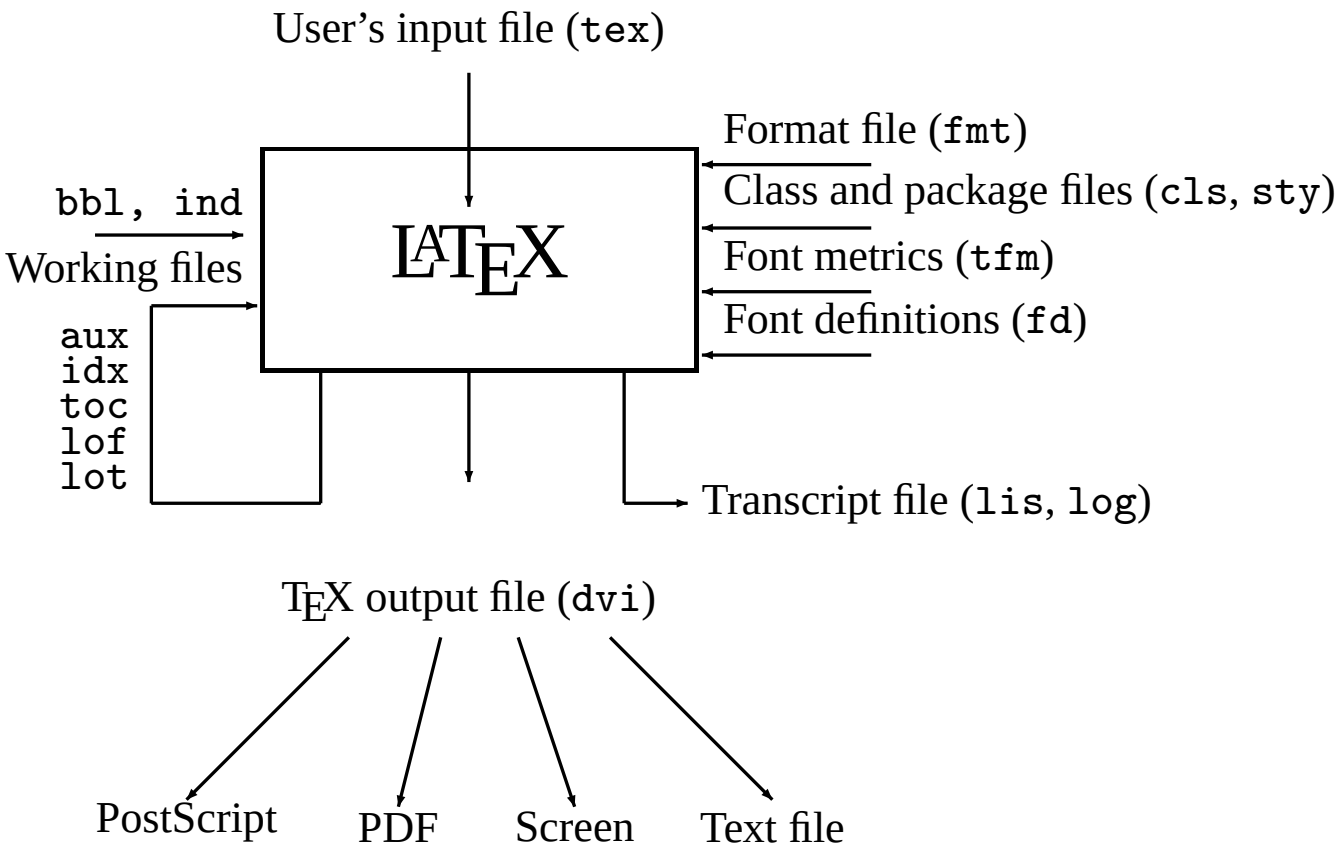
Files needed by LaTeX



Files needed by LaTeX (*cont.*)

LaTeX input file	`tex`, `ltx`
TeX formatted output file	`dvi`
TeX transcript file	`log`, `texlog`, `lis`, `list`
METAFONT sources file	`mf`
Font definition file	`fd`
Font image file	`pk`
Font metrics file	`tfm`
String pool file	`pool`, `poo`, `pol`
Format file	`fmt`
LaTeX layout & structure file	`clo`, `cls`, `dtx`, `sty`
LaTeX auxiliary file	`aux`
Table of contents file	`toc`
List of figures file	`lof`
List of tables file	`lot`
BibTeX related files	`bbl`, `bib`, `blg`, `bst`
Index and `MakeIndex` related files	`idx`, `ilg`, `ind`, `ist`

The TEX directory structure

```
bibtex/             BibTeX input files
. bib, bst/         BibTeX databases and style files
doc/                documentation
fonts/              font-related files
. <type>/[mode]       file type (e.g., pk, type1, tfm)
. . <supplier>/     name of a font supplier (e.g., public)
. . . <typeface>/ name of a typeface (e.g., cm)
. . . . . dpi<nnn>/  font resolution (for pk and gf only)
metafont/           METAFONT (non-font) input files
<program>/          TeX-related programs (e.g., dvips, web2c)
source/             program source code by name (e.g., latex, fonts)
tex/                TeX input files
. <format>/         name of a format (e.g., latex, eplain)
. . base/           base distribution for format (e.g., article.cls)
. . <package>/      name of a package (e.g., graphics, psnfss)
. generic/          format-independent packages
. . <package>/      name of a package (e.g., babel)
```

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The TEXLive CD-ROM: a complete LATEX

- Based on Web2c (7.3), Knuth's sources translated into C.
- TEXLive Version 1, based on Thomas Esser's `teTeX` was released in May 1996.
- Improved TEXLive Versions 2 through 4 were released at yearly intervals (around Easter).
- TEXLive Versions 5 is in the works (for "Easter 2000").
- TEXLive runs on Unixes, Windows32, Amiga and NeXT systems and provides a complete TEX system: TEX, LATEX 2_ε, METAFONT, METAPOST, plus many other programs such as `makeindex`, `dvips`, `xdvi` and BIBTEX.
- TEXLive contains a very large set of macros and PostScript fonts, includes a lot of documentation. It uses the TDS.

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The TEXLive CD-ROM: “other stuff”

- ε-TEX, which adds a small but powerful set of new primitives, and the TEX--XET extensions for left to right typesetting; in default mode, ε-TEX is 100% compatible with ordinary TEX.
- pdfTEX can produce PDF directly (instead of DVI).
- Ω (Omega), which works internally with 16-bit characters, using Unicode (the future, see Friday’s talk).
- Other complete packages included *as-is* (not integrated):
  - CMacTeX for Macintosh.
  - emTeX for DOS and OS/2.
  - emTeX/TDS for OS/2
  - The DJGPP version of the Web2c TEX system, which works under DOS and all Windows versions.
  - A shareware TEX shell for Windows (Winedt)

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Ready-to-run systems on the CD-ROM

After declaring the relevant directory in the `PATH` environment variable, pre-built executables become available for the following systems off the CD-ROM:

`alpha-osf4.0`	DEC Alpha OSF/I (4.0)
`hppa11-hpux10.10`	HP9000 HPUX 10.10
`i386-linux`	Linux on Intel Pentium.
`i386-linux-libc5`	Linux on Intel Pentium (lib5c variant)
`mips-irix6.2`	SGI IRIX 6.2
`rs6000-aix4.1.1`	IBM RS 6000 AIX (4.1.4)
`sparc-solaris2.5.1`	Sun Sparc Solaris 2.5.1
`win32`	Windows 95 or NT (Intel processors)

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TEXLive: Easy to install

- Mount the CD-ROM and off you go:

```
mount -t iso9660 /dev/cdrom /cdrom
```

```
export PATH=/cdrom/bin/i386-linux:$PATH
```

- Install (part of) TEXLive to hard disk.
  Initialization:

```
sh install.sh
```

```
Initializing collections... Done.
Counting selected collections... Done.
Calculating disk space requirements for collections... Done.
Initializing system packages... Done.
```

- *control screen* for selecting type of system, collections to install (*basic*, *recommended* or *other* level), location on hard disk, and some runtime behaviour features.
- basic setup 10 Mbytes, recommended setup about 100 Mbytes.

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TEXLive: Installation: Main control screen

```
==================> TeX Live installation procedure <==================

===> Note: Letters/digits in <angle brackets> indicate menu items <===
===>       for commands or configurable options                    <===

    Proposed platform: Intel x86 with GNU/Linux
    <P> over-ride system detection and choose platform
    <C> collections:    24 out of 34, disk space required: 9812099 kB
    <S> systems:         1 out of  8, disk space required:   7925 kB
                               total disk space required: 9820024 kB
    <L> install level (1: basic, 2: recommended, 3: all): 2
    <D> directories:
      TEXDIR     (The main TeX directory)            : /usr/TeX
      TEXMFLOCAL (TeX directory for local styles etc): /var/TeX-local
    <O> options:
       [ ] alternate directory for generated fonts ()
       [ ] alternate directory for configuration ()
       [ ] create symlinks in standard directories
       [ ] do not install macro/font doc tree
       [ ] do not install macro/font source tree
       [ ] only install free software
    <I> start installation,  <H> help,  <Q> quit
Enter command:
```

TEXLive Installation: Selecting Collections

```
      name            selection         size
 <1>  bibtex     [recommended]     7597 kB
 <2>  doc        [recommended]    21152 kB
 <3>  dvips      [recommended]      430 kB
 <4>  etex       [recommended]      102 kB
 <5>  fonts      [recommended]    51447 kB
 <6>  formats    [recommended]    14651 kB
 <7>  generic    [recommended]      459 kB
 <8>  graphics   [recommended]     9674 kB
 <9>  lang       [recommended]    19618 kB
 <U>  latex      [recommended]    23429 kB
 <V>  metapost   [recommended]     1443 kB
 <W>  omega      [recommended]     4986 kB
 <X>  pdftex     [recommended]      471 kB
 <Y>  plain      [recommended]     1113 kB
 <Z>  texlive    [recommended]    10155 kB
                           SUM:  166829 kB
================================================================================
  global commands: select <N>one / <B>asic / R<E>commended / <A>ll
                   for all collections
  <R>   return to platform menu
  <Q>   quit
```

Using the set up

- After installation by the standard provided procedure the system will find all files from the CD-ROM. If you want to include other files you might want to edit `texmf.cnf` (see latex) or else redefine the `TEXINPUTS` environment variable to include the directory where you additional files live (the current directory `.` is included by default).
- Distribution on the CD-ROM does not include any `pk` bitmap font images. Hence, by default, the PostScript Type1 images of the fonts, if available, will be used in the PostScript files generated by `dvips`.
- It is safe to stick to the CM fonts, or to use Times (and `cmtt`, `cmmi`, etc.).
- Unless you use only Times (hardly possible), you should include complete fonts (needed for making correct PDF).

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Top level directories on the CD-ROM

`bin`	The TEX family programs, per platform; directories.
`tldoc`	TEXLive documentation.
`FAQ`	Frequently Asked Questions, in English, French, and German.
`info`	GNU “info” format documentation for the TEX system.
`man`	Unix “man” documentation for the TEX system.
`source`	The source of all programs.
`support`	Supplementary utilities, *not* installed by default.
`systems`	Packaged TEX systems complementary to TEXLive.
	`macintosh` The CMacTeX package ready to install.
	`msdos` DOS TEX package emTeX.
	`os2` The Os/2 TEX package emTeX/TDS.
`texmf`	Main support tree of macros, fonts and documentation;
`usergrps`	TEX User Groups material.

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TDS structure (relevant directories below `texmf`

`ams`	American Mathematical Society macro packages and fonts.
`bibtex`	BIBTEX styles and databases.
`doc`	General guides and documentation (HTML, PDF, etc.).
`dvips`	Support for Rokicki's DVI-to-PostScript driver.
`fonts`	Font sources, metrics, PostScript and bitmap forms.
`formats`	Eplain, RevTEX, phyzzx, texsis, alatex, text1, lollipop, etc.
`generic`	Extra macros for use with any format.
`graphics`	Macro packages for graphics.
`lang`	Support for non-English languages.
`latex`	LATEX, including official tools and all LATEX 2_ε contributed packages.
`pdftex`	Support for pdfTEX
`plain`	Macros for plain TEX.
`systems`	Binaries for Unix and Win32 platforms.
`texlive`	Basic material for the distribution.

Each collections is divided into *basic*, *recommended*, and *other*.

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Where can I find that file...?

- Web2c uses Karl Berry's Kpathsea path searching library for *locating* files in the TEX() trees;
- Kpathsea uses a combination of *environment variables* and a few *configuration files* to optimize searching the TEX directory tree(s);
- support for *several* directory trees;
- permits maintaining "standard" distribution (e.g. CD-ROM) and "local extensions" in two (or more) disjoint hierarchies;
- each directory tree can have a file list `ls-R` at its root node to speed up file searching;
- after an `ls-R` is searched, an no match found, a walk through the file hierarchy can be made (if allowed).

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Kpathsea's configuration file `texmf.cnf`

- search path is `TEXMFCNF`;
- all files in search path are read in sequence;
- definitions in *earlier* files override those in *later* files, i.e., with `TEXMFCNF=.:..` definitions in `.` take precedence over those in `..`

`:`	Separator in path specification; at beginning or end of path substitutes "default" path expansion.	`//`	Subdirectory expansion. It can occur in the middle or at the end of a path (not at the beginning).
`;`	Like `:`.	`%`	Start of comment.
`$`	Variable expansion.	`\`	Continuation character (allows multi-line entries).
`~`	User's home directory.	`!!`	Search *only* database, *do not* search disk.
`{...}`	Brace expansion, e.g., `a{1,2}b` will become `a1b:a2b`.		

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Kpathsea's configuration file `texmf.cnf` *(cont.)*

```
% The CERN TeX root
TEXCERN=/usr/local/share
TEXMFMAIN = $TEXCERN/texmf
% Local additional texmf trees.
TEXMFLOCAL   = $TEXCERN/texmf-cern
TEXMFUPDATES = $TEXCERN/texmf-updates
% User texmf trees can be catered for like this...
HOMETEXMF=$HOME/texmf
% Now, list all the texmf trees; the braces are necessary!
TEXMF = {$HOMETEXMF,!!$TEXMFUPDATES,!!$TEXMFLOCAL,!!$TEXMFMAIN}
% The system trees.  These are the trees that are shared by all the users.
SYSTEXMF = $TEXMF
% Where generated fonts may be written.
VARTEXFONTS = /var/tmp/fonts
% Where to look for ls-R files.
TEXMFDBS = $TEXMF;$VARTEXFONTS;$TEXMFUPDATES
```

Kpathsea's configuration file texmf.cnf *(cont.)*

texmf.cnf also contains parameters to define constants used by the TEX set of programs. When running out of "something" one can try and increase its value in the texmf.cnf file. If no effect is observed, one probably has to recompile the format, with the new value in the texmf.cnf file visible. In the case below we have built a specific hugetex format.

```
%%%%% Array and other sizes for TeX, MF and MP %%%%%%%%
main_memory = 263000 % words of memory (TeX, MP, MF)
main_memory.hugetex = 1100000
font_mem_size = 200000 % font info -- all TFM's
font_max = 1000        % between 50 and 2000
pool_size = 125000
max_strings = 15000
max_strings.hugetex = 55000
pool_size.hugetex = 500000
pool_size.pdftex = 500000
trie_size = 64000    % hyphenation trie size
hyph_size = 1000     % hyphenation exceptions
```

The `kpsewhich` program

The `kpsewhich` program allows you to locate where a file lives.

`kpsewhich` *option(s) filename*

```
>> kpsewhich article.cls
/usr/local/share/texmf/tex/latex/base/article.cls

>> kpsewhich JAC99.cls
./JAC99.cls

>> kpsewhich cmr10.pk
/usr/local/share/texmf/fonts/pk/ljfour/public/cm/cmr10.600pk

>> kpsewhich -format "dvips config" config.ps
/usr/local/share/texmf-cern/dvips/config/config.ps
```

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```
>> grep psfonts.map /usr/local/share/texmf-cern/dvips/config/config.ps
% An "all-in-one" psfonts.map.
p psfonts.map
>> kpsewhich psfonts.map
/usr/local/share/texmf/dvips/config/psfonts.map
>> grep Times-Roman /usr/local/share/texmf/dvips/config/psfonts.map
ptmr8r Times-Roman "TeXBase1Encoding ReEncodeFont" <8r.enc
ptmro8r Times-Roman ".167 SlantFont TeXBase1Encoding ReEncodeFont" <8r.enc
rptmr    Times-Roman
rptmro   Times-Roman            ".167 SlantFont"
rptmrre  Times-Roman            "1.2 ExtendFont"
rptmrrn  Times-Roman            ".8 ExtendFont"
/usr/local/share/texmf/fonts/type1/urw/times/utmr8a.pfb
>> grep " Symbol" /usr/local/share/texmf/dvips/config/psfonts.map
psyr Symbol
psyro Symbol ".167 SlantFont"
rpsyr    Symbol
rpsyro   Symbol
```