

# L<sup>A</sup>T<sub>E</sub>X Class for *Association for Computing Machinery*\*

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## Abstract

This package provides a class for typesetting publications of Association for Computing Machinery.

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# 1 Introduction

Association for Computing Machinery is the world's largest educational and scientific computing society, which delivers resources that advance computing as a science and a profession<sup>1</sup>. It was one of the early adopters of T<sub>E</sub>X for its typesetting.

It provided several different classes for a number of journal and conference proceedings. Unfortunately during the years since these classes were written, the code was patched many times, and the support of the different versions of the classes became difficult.

This package provides the uniform interface for all ACM publications. It is intended to replace all different classes and packages and provide an up to date L<sup>A</sup>T<sub>E</sub>X package.

The package uses only free T<sub>E</sub>X packages and fonts included in T<sub>E</sub>XLive, MikT<sub>E</sub>X and other popular T<sub>E</sub>X distributions. It is intended to be published in these distributions itself, which minimizes users' efforts in the installation and support of the package.

## 2 User's guide

### 2.1 Installation

Most probably, you already have this package installed in your favorite T<sub>E</sub>X distribution; if not, you may want to upgrade. You may need to upgrade it anyway since the package uses a number relatively recent packages, especially the ones related to the fonts.

If you decide to install the package yourself, follow the standard rules:

1. Run `latex` on `acmart.ins`. This will produce the file `acmart.cls`.
2. Put the file `acmart.cls` and the bibliography files `*.bst` to the places where L<sup>A</sup>T<sub>E</sub>X can find them (see [1] or the documentation for your T<sub>E</sub>X system).
3. Update the database of file names. Again, see [1] or the documentation for your T<sub>E</sub>X system for the system-specific details.
4. The file `acmart.pdf` provides the documentation for the package (this is the file you are probably reading now).

As an alternative to items 2 and 3 you can just put the files in the working directory where your `.tex` file is.

### 2.2 Invocation and options

To use the class put in the preamble of your document

```
\documentclass[<options>]{acmart}
```

There are several options corresponding to the type of the document and its general appearance. They are described below. Generally speaking, the options have key=value forms, for example

---

<sup>1</sup><http://www.acm.org/>

Table 1: The possible values for the format option

Value	Meaning
manuscript	A manuscript. This is the default
acmsmall	Small format, used for CIE, CSUR, JACM, JDIQ, JEA, JERIC, JETC, TAAS, TACCESS, TACO, TALG, TALLIP (formerly TALIP), TCPS, TEAC, TECS, TIIS, TISSEC, TIST, TKDD, TMIS, TOCE, TOCHI, TOCL, TOCS, TOCT, TODAES, TODS, TOIS, TOIT, TOMACS, TOMM (formerly TOMCCAP), TOMPECS, TOMS, TOPC, TOPLAS, TOS, TOSEM, TOSN, TRET, TSAS, TSLP, TWEB.
acmlarge	Large single column format, used for JOCCH, TAP
acmtog	Large double column format, used for TOG
sigconf	Proceedings format for most of ACM conferences (with the exceptions listed below)
siggraph	Proceedings format for SIGGRAPH and SIGGRAPH Asia conferences, published in ACM Transactions on Graphics journal issues
sigplan	Proceedings format used for SIGPLAN conferences
sigchi	Proceedings format for SIGCHI conferences
sigchi-a	Format for SIGCHI extended abstract

```
\documentclass[format=acmsmall, screen=true, review=false]{acmart}
```

The option format describes the format of the output. There are several possible values for this option, for example,

```
\documentclass[format=acmtog]{acmart}
```

Actually the words format= can be omitted, e.g.,

```
\documentclass[acmtog, review=false]{acmart}
```

The possible formats are listed in Table 1. Note that formats starting with acm are intended for journals and transactions, while formats starting with sig are intended for proceedings published as books.

There are several Boolean options which can take true or false values. They are listed in Table 2. The words =true can be omitted when setting the Boolean option, so instead of screen=true one can write just screen, for example,

```
\documentclass[acmsmall, screen, review]{acmart}
```

The option review is useful when combined with the manuscript format option: it provides a version suitable for reviewers and copyeditors. The option screen may in the future involve additional features suitable for on-screen versions of the articles. The

Table 2: Boolean options

Option	Default	Meaning
review	false	A review version: doublespaced, lines are numbered, hyperlinks are colored
screen	false	A screen version: hyperlinks are colored
natbib	false	Whether to use natbib package (see Section 2.8)
anonymous	false	Whether to make the authors anonymous

option natbib is used when the corresponding BibTeX style is based on natbib. The option anonymous is used for anonymous review process: all author information becomes obscured.

## 2.3 Topmatter commands

A number of commands set up *top matter* information, or, in the computer science jargon, *metadata* for the article. They establish the publication name, article title, authors, doi and other data. Some of these commands, like \title or \author, should be put by the authors. Others, like \volume or \doi—by the editors. Below we describe these commands and mention who should issue them. These macros should be used *before* the \maketitle command. Note that in the previous versions of ACM classes some of these commands should be used before \maketitle, and some after it. Now they all must be used before \maketitle.

The class internally loads amsart class, so many top matter commands are inherited from amsart [2].

\acmJournal

The macro \acmJournal{<shortName>} sets the name of the journal or transaction for journals and transactions. The argument is the short name of the publication *in uppercase*, for example,

```
\acmJournal{TOMS}
```

The currently recognized journals are listed in Table 3. Note that conference proceedings published in *book* form do not set this macro.

It is expected that this command is inserted by the author of the manuscript when she decides to which journal to submit the manuscript.

\acmConference

The macro \acmConference[<short name>]{<name>}{<date>}{<venue>} is used for conference proceedings published in the book form. The arguments are the following:

**short name:** the abbreviated name of the conference (optional).

**name:** the name of the conference *or* the name of the book as set by the editor.

**date:** the date(s) of the conference.

**venue:** the place of the conference.

Table 3: ACM publications and arguments of the \acmJournal command

Abbreviation	Publication
CIE	ACM Computers in Entertainment
CSUR	ACM Computing Surveys
JACM	Journal of the ACM
JDIQ	ACM Journal of Data and Information Quality
JEA	ACM Journal of Experimental Algorithmics
JERIC	ACM Journal of Educational Resources in Computing
JETC	ACM Journal on Emerging Technologies in Computing Systems
JOCCH	ACM Journal on Computing and Cultural Heritage
TAAS	ACM Transactions on Autonomous and Adaptive Systems
TACCESS	ACM Transactions on Accessible Computing
TACO	ACM Transactions on Architecture and Code Optimization
TALG	ACM Transactions on Algorithms
TALLIP	ACM Transactions on Asian and Low-Resource Language Information Processing
TAP	ACM Transactions on Applied Perception
TCPS	ACM Transactions on Cyber-Physical Systems
TEAC	ACM Transactions on Economics and Computation
TECS	ACM Transactions on Embedded Computing Systems
TIIS	ACM Transactions on Interactive Intelligent Systems
TISSEC	ACM Transactions on Information and System Security
TIST	ACM Transactions on Intelligent Systems and Technology
TKDD	ACM Transactions on Knowledge Discovery from Data
TMIS	ACM Transactions on Management Information Systems
TOCE	ACM Transactions on Computing Education
TOCHI	ACM Transactions on Computer-Human Interaction
TOCL	ACM Transactions on Computational Logic
TOCS	ACM Transactions on Computer Systems
TOCT	ACM Transactions on Computation Theory
TODAES	ACM Transactions on Design Automation of Electronic Systems
TODS	ACM Transactions on Database Systems
TOG	ACM Transactions on Graphics
TOIS	ACM Transactions on Information Systems
TOIT	ACM Transactions on Internet Technology
TOMACS	ACM Transactions on Modeling and Computer Simulation
TOMM	ACM Transactions on Multimedia Computing, Communications and Applications
TOMPECS	ACM Transactions on Modeling and Performance Evaluation of Computing Systems
TOMS	ACM Transactions on Mathematical Software
TOPC	ACM Transactions on Parallel Computing
TOPLAS	ACM Transactions on Programming Languages and Systems
TOS	ACM Transactions on Storage
TOSEM	ACM Transactions on Software Engineering and Methodology
TOSN	ACM Transactions on Sensor Networks
TRETS	ACM Transactions on Reconfigurable Technology and Systems
TSAS	ACM Transactions on Spatial Algorithms and Systems
TSLP	ACM Transactions on Speech and Language Processing
TWEB	ACM Transactions on the Web

Examples:

```
\acmConference[TD'15]{Technical Data Conference}{November
12--16}{Dallas, TX, USA}
\acmConference{SA'15 Art Papers}{November 02--06, 2015}{Kobe, Japan}
```

Normally this command is entered either by the editor or by the typesetter.

`\title` The command `\title`, as in `amsart` class, has two arguments: one optional, and one mandatory:

```
\title[\ShortTitle]{\FullTitle}
```

The mandatory argument is the full title of the article. The optional argument, if present, defines the shorter version of the title for running heads. If the optional argument is absent, the full title is used instead.

It is expected that this command is inserted by the author of the manuscript.

`\subtitle` Besides title, ACM classes allow subtitle, set with the `\subtitle{\subtitle}` macro.

`\author` The interface for specifying the authors and their affiliations is close to the one of `amsart` [3] (and different from the standard  $\LaTeX$ ). For each author a separate command `\affiliation` should be used, followed by `\email` and `\email`. If several authors share affiliations, in journal formats like `acmsmall` or `acmlarge` one may put the affiliation after all these authors, for example:

```
\author{A. U. Thor}
\email{author@nsw.au.edu}
\affiliation{University of New South Wales}
\author{A. N. Other}
\author{C. O. Respondent}
\affiliation{University of Pennsylvania}
```

In the cases of overlapping affiliations it is advisable to repeat the full list, for example,

```
\author{A. U. Thor}
\affiliation{University of New South Wales, Australia}
\email{author@nsw.edu.au}
\author{A. N. Other}
\affiliation{University of Pennsylvania, USA and University of New South
Wales, Australia}
\email{other@upenn.edu}
```

For *conferences* the affiliations should *always* be repeated, even if they are shared between the authors.

Note that old ACM conference formats did not allow for more than six authors and required some efforts from the authors to achieve alignment. The new format is much better in this.

It is expected that these commands are inserted by the author of the manuscript.

`\thanks` Like `amsart` (and unlike standard  $\LaTeX$ ), we allow `\thanks` only *outside* of commands

`\title` and `\author`. Example:

```
\thanks{This work is supported by the Widget Corporation Grant
\#312-001.\\
Author's address: D. Pineo, Kingsbury Hall, 33 Academic Way, Durham,
N.H. 03824; email: dspineo@comcast.net; Colin Ware, Jere A. Chase
Ocean Engineering Lab, 24 Colovos Road, Durham, NH 03824; email:
cware@ccom.unh.edu;
Sean Fogarty, (Current address) NASA Ames Research Center, Moffett
Field, California 94035.}
```

It is expected that this command is inserted by the author of the manuscript.

`\titlenote`      While the command `\thanks` generates a note without footnote mark, sometimes  
`\subtitlenote` the authors might need notes more tightly connected to the title, subtitle or author. The  
`\authornote` commands `\titlenote`, `\subtitlenote` and `\authornote` that follow the corresponding  
commands (`\title`, `\subtitle` and `\author`) generate such notes, for example

```
\title{This is a title}
\titlenote{This is a titlenote}
\author{A. U. Thor}
\authornote{This is an authornote}
```

`\acmVolume`      The macros `\acmVolume`, `\acmNumber`, `\acmArticle`, `\acmYear` and `\acmMonth` are  
`\acmNumber` inserted by the editor and set the journal volume, issue, article number, year and month  
`\acmArticle` correspondingly. The arguments of all these commands, including `\acmMonth` is numer-  
`\acmYear` ical, including `\acmMonth`, for example,  
`\acmMonth`

```
\acmVolume{9}
\acmNumber{4}
\acmArticle{39}
\acmYear{2010}
\acmMonth{3}
```

`\articleSeq`      The articles in the same issue of a journal have *sequential number*. It is used to  
position black blob in same formats. By default it is the same as article number, but the  
command `\articleSeq` sequence number can be used to change it:

```
\acmArticle{39} % The sequence number will be 39 by default
\articleSeq{5}  % We rededine it to 5
```

`\acmPrice`      The macro `\acmPrice{<price>}` sets the price for the article (by default 15.00), for  
example,

```
\acmPrice{25.00}
```



`\isbn` Book-like volumes have ISBN numbers attached to them. The macro `\isbn{<ISBN>}` sets it. Normally it is set by the typesetter, for example,

```
\isbn{978-1-4503-3916-2}
```

`\doi` The macro `\doiDOI` sets the DOI number of the article, for example,

```
\doi{http://doi.acm.org/10.1145/9999997.9999999}
```

It is normally set by the typesetter.

`\startPage` The macro `\startPage{<page>}` sets the first page of the article in the journal or book. It is used by the typesetter.

`\terms` The macros `\terms{<term, term,...>}` and `\keywords{<keyword, keyword,...>}` set the main terms and the additional keywords for the article. Term and keywords must be separated by commas, for example,

```
\terms{wireless, interference}
\keywords{wireless sensor networks, media access control,
multi-channel, radio interference, time synchronization}
```

`CCSXML` ACM publications are classified according to the ACM Computing Classification Scheme (CCS). CCS codes are used both in the typeset version of the publications *and* in the metadata in the various databases. Therefore you need to provide both  $\TeX$  commands and XML metadata with the paper.

The tool at <http://dl.acm.org/ccs.cfm> can be used to generate CCS codes. After you select the topics, click on “Generate CCS codes” to get the result like the following:

```
\begin{CCSXML}
<ccs2012>
<concept>
<concept_id>10010520.10010553.10010562</concept_id>
<concept_desc>Computer systems organization~Embedded systems</concept_desc>
<concept_significance>500</concept_significance>
</concept>
<concept>
<concept_id>10010520.10010575.10010755</concept_id>
<concept_desc>Computer systems organization~Redundancy</concept_desc>
<concept_significance>300</concept_significance>
</concept>
<concept>
<concept_id>10010520.10010553.10010554</concept_id>
<concept_desc>Computer systems organization~Robotics</concept_desc>
<concept_significance>100</concept_significance>
</concept>
<concept>
<concept_id>10003033.10003083.10003095</concept_id>
<concept_desc>Networks~Network reliability</concept_desc>
<concept_significance>100</concept_significance>
</concept>
</ccs2012>
\end{CCSXML}
```

Table 4: Parameters for \setcopyright command

Parameter	Meaning
none	The copyright and permission information is not typeset (this is the option for some ACM conferences).
acmcopyright	The authors transfer the copyright to ACM (the “traditional” choice).
acmlicensed	The authors retain the copyright but license the publication rights to ACM.
rightsretained	The authors retain the copyright and publication rights to themselves or somebody else.
usgov	All the authors are employees of the US Government.
usgovmixed	Some authors are employees of the US Government.
cagov	All the authors are employees of the Canadian Government.
cagovmixed	Some authors are employees of the Canadian Government.

</concept>

</ccs2012>

\end{CCSXML}

\ccsdesc[500]{Computer systems organization~Embedded systems}

\ccsdesc[300]{Computer systems organization~Redundancy}

\ccsdesc{Computer systems organization~Robotics}

\ccsdesc[100]{Networks~Network reliability}

You need to just copy this code and paste it in your paper anywhere before \maketitle.

\setcopyright There are several possibilities for the copyright of the papers published by ACM: the authors may transfer the rights to ACM, license them to ACM, some or all authors might be employees of the US or Canada Government, etc. Accordingly the new command \setcopyright{...} is introduced. Its argument is the copyright status of the paper, for example, \setcopyright{acmcopyright}. The possible values for this command are listed in Table 4.

The ACM submission software should generate the right command for you to paste into your file.

\copyrightyear Each copyright statement must have the year of copyright. By default it is the same as \acmYear, but you can override this decision using the macro \copyrightyear, e.g.,

\acmYear{2016}

\copyrightyear{2015}

abstract The environment abstract must *precede* \maketitle command. Again, this is different from the standard L<sup>A</sup>T<sub>E</sub>X.

teaserfigure A special kind of figure is used for many two-column conference proceedings.

Table 5: Settings for `\settopmatter` command

Parameter	Values	Meaning
<code>printccs</code>	true/false	Whether to print CCS categories
<code>printbib</code>	true/false	Whether to print ACM bibliographic entry

This figure is placed just after the authors, but before the main text. The environment `teaserfigure` is used for these figures. This environment must be used *before* `\maketitle`, for example,

```
\begin{teaserfigure}
  \includegraphics[width=\textwidth]{sampleteaser}
  \caption{This is a teaser}
  \label{fig:teaser}
\end{teaserfigure}
```

`\settopmatter` Some information in the top matter is printed for certain journals or proceedings and suppressed for others. You may override these defaults using the command `\settopmatter{<settings>}`. The settings and their meanings are listed in Table 5. For example,

```
\settopmatter{printbib=false, printccs=true}
```

`\received` The command `\received{<[<stage>]<date>}` sets the history of the publication. The `<stage>` argument is optional; the default is Received for the first date and revised for the subsequent ones. For example

```
\received{February 2007}
\received[revised]{March 2009}
\received[accepted]{June 2009}
```

`\maketitle` The macro `\maketitle` must be the last command in the top matter group: i.e., it must follow the commands defined in this section.

`\shortauthors` After the command `\maketitle` the macro `\shortauthors` stores the names of the authors for the running head. You may redefine it if the list of author's name is too long, e.g.,

```
\maketitle
\renewcommand{\shortauthors}{Zhou et. al.}
```

## 2.4 Algorithms

There now several good packages for typesetting algorithms [4, 5, 6], and the authors are now free to choose their favorite one.

## 2.5 Figures and tables

New ACM styles use the standard  $\text{\LaTeX}$  interface for figures and tables. There are some important items to be aware of, however.

1. The captions for figures must be entered *after* the figure bodies, and for the tables *before* the table bodies.
2. ACM uses the standard types for figures and tables and adds several new ones. In total there are following types:

**figure, table:** a standard figure or table, taking full text width in one-column formats and one column in two-column formats.

**figure\*, table\*** in two-column formats, a special figure or table taking full text width.

**teaserfigure:** a special figure before `\maketitle`.

**sidebar, marginfigure, margintable:** in the sigchi-a format, special sidebars, tables and figures on the margin.

3. Accordingly, when scaling the images, one should use the following sizes:
  - (a) For figure in one-column mode, figure\* in two-column mode or teaserfigure—`\textwidth` (in the one-column you can also use `\columnwidth`, which coincides with `\textwidth` in this case).
  - (b) For figure in two-column mode—`\columnwidth`.
  - (c) For marginfigure—`\marginparwidth`.
  - (d) For figure\* in SIGCHI Extended abstracts—`\fulltextwidth`.

It is strongly recommended to use the package `booktabs` [7] and follow its main principles of typography with respect to tables:

1. Never, ever use vertical rules.
2. Never use double rules.

It is also a good idea not to overuse horizontal rules.

For table *footnotes* you have several options described in TeX FAQ [1]. The simplest one is to use `\minipage` environment:

```
\begin{table}
\caption{Simulation Configuration}
\label{tab:conf}
\begin{minipage}{\columnwidth}
\begin{center}
\begin{tabular}{ll}
\toprule
TERRAIN\footnote{This is a table footnote. This is a
table footnote. This is a table footnote.} &
```

```

(200\,m$\times$200\,m) Square\\
Node Number      & 289\\
Node Placement   & Uniform\\
Application       & Many-to-Many/Gossip CBR Streams\\
Payload Size     & 32 bytes\\
Routing Layer    & GF\\
MAC Layer        & CSMA/MMSN\\
Radio Layer      & RADIO-ACCNOISE\\
Radio Bandwidth  & 250Kbps\\
Radio Range      & 20m--45m\\
\bottomrule
\end{tabular}
\end{center}
\bigskip
\footnotesize\emph{Source:} This is a table
sourcernote. This is a table sourcernote. This is a table
sourcernote.

\emph{Note:} This is a table footnote.
\end{minipage}
\end{table}

```

sidebar  
 marginfigure  
 margintable

Sigchi extended abstract extensively uses margin space. The package provides three environments for this with option captions:

**sidebar:** textual information on the margin

**marginfigure:** a figure on the margin

**margintable:** a table on the margin

## 2.6 Theorems

ACM classes define two theorem styles and several pre-defined theorem environments:

**acmplain:** this is the style used for theorem, conjecture, proposition, lemma, corollary, and

**acmdefinition:** this is the style used for example and definition.

## 2.7 Online-only and offline-only material

printonly  
 screenonly

Some supplementary material in ACM publication is put online, but not in the printed version. The text inside the environment `screenonly` will be typeset only when the option `screen` (see Section 2.2) is set to true. Conversely, the text inside the environment `printonly` is typeset only when this option is set to false. For example

```
\section{Supplementary materials}
```

```

\begin{printonly}
  This section is included in the online version of the paper.
\end{printonly}

\begin{screenonly}
  (The actual section).
\end{screenonly}

```

## 2.8 Bibliography

The Boolean option `natbib` selects whether to use `natbib` package for bibliography. If you use `natbib`, then commands like `\citep` and `\citeauthor` are automatically supported.

ACM journals use `natbib` and the style `ACM-Reference-Format-Journals`.

ACM conference proceedings do *not* use `natbib`. SIGGRAPH conferences use `acmsiggraph` style. SIGCHI conferences use `SIGCHI-Reference-Format` style. The other conferences employ one of the four styles:

1. `acm-abbrev`
2. `acm-alpha`
3. `acm-plain`
4. `acm-unsrt`

The author should consult specific instructions about the style to choose.

## 2.9 Colors

While printed ACM publications are usually black and white, screen mode allows the use of colors. The ACM classes pre-define several colors according to [8]: `ACMBlue`, `ACMYellow`, `ACMOrange`, `ACMRed`, `ACMLightBlue`, `ACMGreen`, `ACMPurple`, `ACMDarkBlue`. You can use them in the color assignments.

## 3 Implementation

### 3.1 Identification

We start with the declaration who we are. Most .dtx files put driver code in a separate driver file .drv. We roll this code into the main file, and use the pseudo-guard <gobble> for it.

```
1 <class>\NeedsTeXFormat{LaTeX2e}
2 <*gobble>
3 \ProvidesFile{acmart.dtx}
4 </gobble>
5 <class>\ProvidesClass{acmart}
6 [2016/04/18 v1.01 Typesetting articles for Association of
7 Computing Machinery]
```

And the driver code:

```
8 <*gobble>
9 \documentclass{ltxdoc}
10 \usepackage{array,booktabs,amsmath,graphicx,fancyvrb,tabularx}
11 \usepackage[tt=false]{libertine}
12 \usepackage[libertine]{newtxmath}
13 \usepackage[varqu]{zi4}
14 \usepackage[tableposition=top]{caption}
15 \usepackage{hypdoc}
16 \PageIndex
17 \CodelineIndex
18 \RecordChanges
19 \EnableCrossrefs
20 \begin{document}
21   \DocInput{acmart.dtx}
22 \end{document}
23 </gobble>
24 <*class>
25 \def\@classname{acmart}
```

### 3.2 Options

We need xkeyval since some of our options may have values:

```
26 \RequirePackage{xkeyval}
```

format The possible formats

```
27 \define@choicekey*+{acmart.cls}{format}[\ACM@format\ACM@format@nr]{%
28   manuscript, acmsmall, acmlarge, acmtog, sigconf, siggraph,
29   sigplan, sigchi, sigchi-a}[manuscript]{}{%
30   \ClassError{\@classname}{The option format must be manuscript,
31     acmsmall, acmlarge, acmtog, sigconf, siggraph,
32     sigplan, sigchi or sigchi-a}}
33 \def\@DeclareACMFormat#1{\DeclareOptionX{#1}{\setkeys{acmart.cls}{format=#1}}}
34 \@DeclareACMFormat{manuscript}
```

```

35 \DeclareACMFormat{acmsmall}
36 \DeclareACMFormat{acmlarge}
37 \DeclareACMFormat{acmtog}
38 \DeclareACMFormat{sigconf}
39 \DeclareACMFormat{siggraph}
40 \DeclareACMFormat{sigplan}
41 \DeclareACMFormat{sigchi}
42 \DeclareACMFormat{sigchi-a}
43 \ExecuteOptionsX{format}

\if@ACM@screen Whether we use screen mode
44 \define@boolkey+{acmart.cls}[@ACM@]{screen}[true]{%
45   \if@ACM@screen
46     \PackageInfo{\@classname}{Using screen mode}%
47   \else
48     \PackageInfo{\@classname}{Not using screen mode}%
49   \fi}{\PackageError{\@classname}{Option screen can be either true or
50     false}}
51 \ExecuteOptionsX{screen=false}

\if@ACM@review Whether we use review mode
52 \define@boolkey+{acmart.cls}[@ACM@]{review}[true]{%
53   \if@ACM@review
54     \PackageInfo{\@classname}{Using review mode}%
55   \else
56     \PackageInfo{\@classname}{Not using review mode}%
57   \fi}{\PackageError{\@classname}{Option review can be either true or
58     false}}
59 \ExecuteOptionsX{review=false}

\if@ACM@natbib Whether we use natbib mode
60 \define@boolkey+{acmart.cls}[@ACM@]{natbib}[true]{%
61   \if@ACM@natbib
62     \PackageInfo{\@classname}{Using natbib mode}%
63   \else
64     \PackageInfo{\@classname}{Not using natbib mode}%
65   \fi}{\PackageError{\@classname}{Option natbib can be either true or
66     false}}
67 \ExecuteOptionsX{natbib=false}

\if@ACM@anonymous Whether we use anonymous mode
68 \define@boolkey+{acmart.cls}[@ACM@]{anonymous}[true]{%
69   \if@ACM@anonymous
70     \PackageInfo{\@classname}{Using anonymous mode}%
71   \else
72     \PackageInfo{\@classname}{Not using anonymous mode}%
73   \fi}{\PackageError{\@classname}{Option anonymous can be either true or
74     false}}
75 \ExecuteOptionsX{anonymous=false}

```



`\ACM@fontsize` The font size to pass to the base class

```

76 \def\ACM@fontsize{}
77 \DeclareOptionX{9pt}{\edef\ACM@fontsize{\CurrentOption}}
78 \DeclareOptionX{10pt}{\edef\ACM@fontsize{\CurrentOption}}
79 \DeclareOptionX{11pt}{\edef\ACM@fontsize{\CurrentOption}}
80 \DeclareOptionX{12pt}{\edef\ACM@fontsize{\CurrentOption}}

81 \DeclareOptionX{draft}{\PassOptionsToClass{\CurrentOption}{amsart}}
82 \DeclareOptionX{*}{\PassOptionsToClass{\CurrentOption}{amsart}}
83 \ProcessOptionsX
84 \ClassInfo{\@classname}{Using format \ACM@format, number \ACM@format@nr}

```

### 3.3 Setting switches

`\if@ACM@manuscript` Whether we use manuscript mode

```

85 \newif\if@ACM@manuscript

```

`\if@ACM@journal` There are two kinds of publications: journals and books

```

86 \newif\if@ACM@journal

```

`\if@ACM@sigchiamode` The formatting of SIGCHI abstracts is quite unusual. We have a special switch for them.

```

87 \newif\if@ACM@sigchiamode

```

Setting up switches

```

88 \ifnum\ACM@format@nr=0\relax
89 \@ACM@manuscripttrue
90 \else
91 \@ACM@manuscriptfalse
92 \fi
93 \@ACM@sigchiamodefalse
94 \ifcase\ACM@format@nr
95 \relax % manuscript
96 \@ACM@journaltrue
97 \or % acmsmall
98 \@ACM@journaltrue
99 \or % acmlarge
100 \@ACM@journaltrue
101 \or % acmtog
102 \@ACM@journaltrue
103 \or % sigconf
104 \@ACM@journalfalse
105 \or % siggraph
106 \@ACM@journalfalse
107 \or % sigplan
108 \@ACM@journalfalse
109 \or % sigchi
110 \@ACM@journalfalse
111 \or % sigchi-a

```

```

112 \ACM@journalfalse
113 \ACM@sigchiamodetrue
114 \fi

```

### 3.4 Loading base class and package

At this point we either have \ACM@fontsize, or use defaults

```

115 \ifx\ACM@fontsize\empty
116 \ifcase\ACM@format@nr
117 \relax % manuscript
118 \def\ACM@fontsize{9pt}%
119 \or% acmsmall
120 \def\ACM@fontsize{10pt}%
121 \or % acmlarge
122 \def\ACM@fontsize{9pt}%
123 \or % acmtog
124 \def\ACM@fontsize{9pt}%
125 \or % sigconf
126 \def\ACM@fontsize{9pt}%
127 \or % siggraph
128 \def\ACM@fontsize{9pt}%
129 \or % sigplan
130 \def\ACM@fontsize{9pt}%
131 \or % sigchi
132 \def\ACM@fontsize{10pt}%
133 \or % sigchi-a
134 \def\ACM@fontsize{10pt}%
135 \fi
136 \fi
137 \ClassInfo{\@classname}{Using fontsize \ACM@fontsize}
138 \LoadClass[\ACM@fontsize, reqno]{amsart}
139 \RequirePackage{microtype}

```

We need totpages package to calculate the number of pages

```

140 \RequirePackage{totpages}

```

The amsmath \collect@body is defined using \def. We load environ to access the \long version of the command

```

141 \RequirePackage{environ}

```

We use setspace for doublespacing

```

142 \if@ACM@manuscript
143 \RequirePackage{setspace}
144 \onehalfspacing
145 \fi

```

Citations:

```

146 \if@ACM@natbib
147 \RequirePackage{natbib}
148 \bibpunct[, ]{[ ]}{ }{ }{a}{ }{ }, }
149 \fi

```

Before we call `hyperref`, we redefine `\startsection` commands to their  $\LaTeX$  defaults, since `amsart` ones are too AMS-specific. We need to do this early since we want `hyperref` to have a chance to redefine them again:

```

150 \def\@startsection#1#2#3#4#5#6{%
151   \if@noskipsec \leavevmode \fi
152   \par
153   \@tempskipa #4\relax
154   \@afterindenttrue
155   \ifdim \@tempskipa <\z@
156     \@tempskipa -\@tempskipa \@afterindentfalse
157   \fi
158   \if@nobreak
159     \everypar{}%
160   \else
161     \addpenalty\@secpenalty\addvspace\@tempskipa
162   \fi
163   \@ifstar
164     {\@ssect{#3}{#4}{#5}{#6}}%
165     {\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}
166 \def\@sect#1#2#3#4#5#6[#7]#8{%
167   \ifnum #2>\c@secnumdepth
168     \let\@svsec\@empty
169   \else
170     \refstepcounter{#1}%
171     \protected@edef\@svsec{\@secntformat{#1}\relax}%
172   \fi
173   \@tempskipa #5\relax
174   \ifdim \@tempskipa>\z@
175     \begingroup
176       #6{%
177         \@hangfrom{\hskip #3\relax\@svsec}%
178         \interlinepenalty \@M #8\@par}%
179     \endgroup
180     \csname #1mark\endcsname{#7}%
181     \addcontentsline{toc}{#1}{%
182       \ifnum #2>\c@secnumdepth \else
183         \protect\numberline{\csname the#1\endcsname}%
184       \fi
185       #7}%
186   \else
187     \def\@svsechd{%
188       #6{\hskip #3\relax
189         \@svsec #8}%
190     \csname #1mark\endcsname{#7}%
191     \addcontentsline{toc}{#1}{%
192       \ifnum #2>\c@secnumdepth \else
193         \protect\numberline{\csname the#1\endcsname}%
194       \fi
195       #7}}%

```

```

196 \fi
197 \@xsect{#5}}
198 \def\@xsect#1{%
199 \@tempskipa #1\relax
200 \ifdim \@tempskipa>\z@
201 \par \nobreak
202 \vskip \@tempskipa
203 \@afterheading
204 \else
205 \@nobreakfalse
206 \global\@noskipsectrue
207 \everypar{%
208 \if@noskipsec
209 \global\@noskipsecfalse
210 {\setbox\z@\lastbox}%
211 \clubpenalty\@M
212 \begingroup \@svsechd \endgroup
213 \unskip
214 \@tempskipa #1\relax
215 \hskip -\@tempskipa
216 \else
217 \clubpenalty \@clubpenalty
218 \everypar{}}%
219 \fi}%
220 \fi
221 \ignorespaces}
222 \def\@secntformat#1{\csname the#1\endcsname\quad}
223 \def\@ssect#1#2#3#4#5{%
224 \@tempskipa #3\relax
225 \ifdim \@tempskipa>\z@
226 \begingroup
227 #4{%
228 \@hangfrom{\hskip #1}%
229 \interlinepenalty \@M #5\@par}%
230 \endgroup
231 \else
232 \def\@svsechd{#4{\hskip #1\relax #5}}%
233 \fi
234 \@xsect{#3}}

```

#### And hyperref

```

235 \let\@footnotemark@nolink\@footnotemark
236 \let\@footnotetext@nolink\@footnotetext
237 \RequirePackage{hyperref}
238 \if@ACM@sigchiamode
239 \urlstyle{sf}
240 \else
241 \urlstyle{rm}
242 \fi
243 \if@ACM@screen

```

```

244 \hypersetup{colorlinks,
245   linkcolor=ACMRed,
246   citecolor=ACMPurple,
247   urlcolor=ACMDarkBlue,
248   filecolor=ACMDarkBlue}
249 \else
250 \hypersetup{hidelinks}
251 \fi

  Bibliography mangling
252 \if@ACM@natbib
253   \let\citeN\cite
254   \let\cite\citep
255   \let\citeANP\citeauthor
256   \let\citeNN\citeyearpar
257   \let\citeyearNP\citeyear
258   \let\citeyear\citeyearpar
259   \let\citeNP\citealt
260   \def\shortcite#1{\citeyear{#1}}
261   \DeclareRobustCommand\citeA
262     {\begingroup\NAT@swafalse
263      \let\NAT@ctype\@ne\NAT@partrue\NAT@fullfalse\NAT@open\NAT@citetp}
264   \providecommand\newblock{}
265 \else
266   \providecommand\citename[1]{#1}
267 \fi

  Graphics and color
268 \RequirePackage{graphicx, xcolor}

  We define ACM colors according to [8]:
269 \definecolor[named]{ACMBlue}{cmyk}{1,0.1,0,0.1}
270 \definecolor[named]{ACMYellow}{cmyk}{0,0.16,1,0}
271 \definecolor[named]{ACMOrange}{cmyk}{0,0.42,1,0.01}
272 \definecolor[named]{ACMRed}{cmyk}{0,0.90,0.86,0}
273 \definecolor[named]{ACMLightBlue}{cmyk}{0.49,0.01,0,0}
274 \definecolor[named]{ACMGreen}{cmyk}{0.20,0,1,0.19}
275 \definecolor[named]{ACMPurple}{cmyk}{0.55,1,0,0.15}
276 \definecolor[named]{ACMDarkBlue}{cmyk}{1,0.58,0,0.21}

```

### 3.5 Paper size and paragraphing

We use geometry for dimensions

```

277 \RequirePackage{geometry}
278 \ifcase\ACM@format@nr
279 \relax % manuscript
280   \geometry{letterpaper,head=1pc}%
281 \or% acmsmall
282   \geometry{twoside=true,
283     includeheadfoot, head=1pc, foot=2pc,

```

```

284     paperwidth=6.75in, paperheight=10in,
285     top=58pt, bottom=44pt, inner=46pt, outer=46pt
286 }%
287 \or % acmlarge
288 \geometry{twoside=true, head=1pc, foot=2pc,
289     paperwidth=8.5in, paperheight=11in,
290     includeheadfoot,
291     top=78pt, bottom=114pt, inner=81pt, outer=81pt
292 }%
293 \or % acmtog
294 \geometry{twoside=true, head=1pc, foot=2pc,
295     paperwidth=8.5in, paperheight=11in,
296     includeheadfoot, columnsep=24pt,
297     top=52pt, bottom=75pt, inner=52pt, outer=52pt
298 }%
299 \or % sigconf
300 \geometry{twoside=true, head=1pc,
301     paperwidth=8.5in, paperheight=11in,
302     includeheadfoot, columnsep=2pc,
303     top=57pt, bottom=75pt, inner=54pt, outer=57pt
304 }%
305 \or % siggraph
306 \geometry{twoside=true, head=1pc,
307     paperwidth=8.5in, paperheight=11in,
308     includeheadfoot, columnsep=2pc,
309     top=57pt, bottom=75pt, inner=54pt, outer=57pt
310 }%
311 \or % sigplan
312 \geometry{twoside=true, head=1pc,
313     paperwidth=8.5in, paperheight=11in,
314     includeheadfoot, columnsep=2pc,
315     top=74pt, bottom=70pt, inner=54pt, outer=54pt
316 }%
317 \or % sigchi
318 \geometry{twoside=true, head=1pc,
319     paperwidth=8.5in, paperheight=11in,
320     includeheadfoot, columnsep=2pc,
321     top=66pt, bottom=78pt, inner=54pt, outer=48pt
322 }%
323 \or % sigchi-a
324 \geometry{twoside=false, head=1pc,
325     paperwidth=11in, paperheight=8.5in,
326     includeheadfoot, marginparsep=72pt,
327     marginparwidth=170pt, columnsep=20pt,
328     top=72pt, bottom=72pt, left=314pt, right=72pt
329 }%
330 \@mparswitchfalse
331 \reversemarginpar
332 \fi

```

```

\parindent Paragraping
\parskip 333 \setlength\parindent{10\p@}
334 \setlength\parskip{\z@}
335 \ifcase\ACM@format@nr
336 \relax % manuscript
337 \or% acmsmall
338 \or % acmlarge
339 \or % acmtog
340 \setlength\parindent{9\p@}%
341 \or % sigconf
342 \or % siggraph
343 \or % sigplan
344 \or % sigchi
345 \or % sigchi-a
346 \fi

\footnoterule Tschichold's rules:
347 \def\footnoterule{\kern-3\p@
348 \hrule \@width \columnwidth \kern 2.6\p@}

\endminipage We do not use footnote rules in minipages
349 \def\endminipage{%
350 \par
351 \unskip
352 \ifvoid\@mpfootins\else
353 \vskip\skip\@mpfootins
354 \normalcolor
355 \unvbox\@mpfootins
356 \fi
357 \@minipagefalse %% added 24 May 89
358 \color@endgroup
359 \egroup
360 \expandafter\@iiparbox\@mpargs{\unvbox\@tempboxa}}
361

\@makefnmark We do note use indentation for footnotes
362 \def\@makefnmark{\noindent\@makefnmark}

\@footnotetext In sigchi-a mode our footnotes are on the margins!
363 \if@ACM@sigchiamode
364 \long\def\@footnotetext#1{\marginpar{%
365 \reset@font\small
366 \interlinepenalty\interfootnotelinepenalty
367 \protected@edef\@currentlabel{%
368 \csname p@footnote\endcsname\@thefnmark
369 }%
370 \color@begingroup
371 \@makefnmark{\rule{\footnotesep}{\ignorespaces}\@finalstrut\strutbox}%
372

```

```

373 \color@endgroup}}%
374 \fi

```

### 3.6 Fonts

We use Times throughout

```

375 \usepackage[tt=false]{libertine}
376 \usepackage[libertine]{newtxmath}
377 \usepackage[varqu]{zi4}

```

The sigchi abstract are sans serif:

```

378 \if@ACM@sigchiamode
379 \renewcommand{\familydefault}{\sfdefault}
380 \fi

```

### 3.7 Floats

We use caption package

```

381 \RequirePackage{caption, float}
382 \captionsetup[table]{position=top}
383 \if@ACM@journal
384 \captionsetup{labelfont={sf, small},
385 textfont={sf, small}, margin=\z@}
386 \captionsetup[figure]{name={Fig.}}
387 \else
388 \captionsetup{labelfont={bf},
389 textfont={bf}, labelsep=colon, margin=\z@}
390 \ifcase\ACM@format@nr
391 \relax % manuscript
392 \or % acmsmall
393 \or % acmlarge
394 \or % acmtog
395 \or % sigconf
396 \or % siggraph
397 \captionsetup{textfont={it}}
398 \or % sigplan
399 \or % sigchi
400 \captionsetup[figure]{labelfont={bf, small},
401 textfont={bf, small}}
402 \or % sigchi-a
403 \captionsetup[figure]{labelfont={bf, small},
404 textfont={bf, small}}
405 \fi
406 \fi

```

sidebar The sidebar environment:

```

407 \newfloat{sidebar}{}{sbar}
408 \floatname{sidebar}{Sidebar}
409 \renewenvironment{sidebar}{\Collect@Body\@sidebar}{}

```



`\@sidebar` The processing of the saved text  
410 `\long\def\@sidebar#1{\bgroup\captionsetup{type=sidebar}%`  
411 `\marginpar{\small#1}\egroup}`

`marginfigure` The marginfigure environment:  
412 `\newenvironment{marginfigure}{\Collect@Body\@marginfigure}{}`

`\@marginfigure` The processing of the saved text  
413 `\long\def\@marginfigure#1{\bgroup\captionsetup{type=figure}%`  
414 `\marginpar{\small#1}\egroup}`

`marginfigure` The marginfigure environment:  
415 `\newenvironment{marginfigure}{\Collect@Body\@marginfigure}{}`

`\@marginfigure` The processing of the saved text  
416 `\long\def\@marginfigure#1{\bgroup\captionsetup{type=figure}%`  
417 `\marginpar{\small#1}\egroup}`

SIGCHI extended abstract provides an interesting possibility to push into the margin.  
Here we use `figure*` and `table*` for this.

`\fulltextwidth` We define the width of the boxes as  
418 `\newdimen\fulltextwidth`  
419 `\fulltextwidth=\dimexpr(\textwidth+\marginparwidth+\marginparsep)`

`\@dblfloat` We redefine the double float command. First, we make the size bigger. Second, our  
default position is going to be `tp` (to give marginalia a chance)  
420 `\if@ACM@sigchiamode`  
421 `\def\@dblfloat{\bgroup\columnwidth=\fulltextwidth`  
422 `\let\endfloatbox\endwidefloatbox`  
423 `\def\@fpsaddddefault{\def\@fps{tp}}%`  
424 `\@float}`  
425 `\fi`

`\enddblfloat` And the end. Just adding a `\bgroup`.  
426 `\if@ACM@sigchiamode`  
427 `\def\enddblfloat{%`  
428 `\endfloat\egroup}`  
429 `\fi`

`\@endwidefloatbox` This is the end of a wide box - we basically move everything to the left  
430 `\def\@endwidefloatbox{%`  
431 `\par\vskip\z@skip`  
432 `\@minipagefalse`  
433 `\outer@nobreak`  
434 `\egroup`  
435 `\color@endbox`  
436 `\global\setbox\@currbox=\vbox{\moveleft`  
437 `\dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%`  
438 `\wd\@currbox=\textwidth`  
439 `}`

### 3.8 Top matter data

We use keyval interface to define journal title and relevant information

```
440 \define@choicekey*+{ACM}{acmJournal}[\@journalCode\@journalCode@nr]{%
441   CIE,%
442   CSUR,%
443   JACM,%
444   JDIQ,%
445   JEA,%
446   JERIC,%
447   JETC,%
448   JOCCH,%
449   TAAS,%
450   TACCESS,%
451   TACO,%
452   TALG,%
453   TALLIP,%
454   TAP,%
455   TCPS,%
456   TEAC,%
457   TECS,%
458   TIIS,%
459   TISSEC,%
460   TIST,%
461   TKDD,%
462   TMIS,%
463   TOCE,%
464   TOCHI,%
465   TOCL,%
466   TOCS,%
467   TOCT,%
468   TODAES,%
469   TODS,%
470   TOG,%
471   TOIS,%
472   TOIT,%
473   TOMACS,%
474   TOMM,%
475   TOMPECS,%
476   TOMS,%
477   TOPC,%
478   TOPLAS,%
479   TOS,%
480   TOSEM,%
481   TOSN,%
482   TRETs,%
483   TSAS,%
484   TSLP,%
485   TWEB%
486 }{%
```

```

487 \ifcase\@journalCode@nr
488 \relax % CIE
489 \def\@journalName{ACM Computers in Entertainment}%
490 \def\@journalNameShort{ACM Comput. Entertain.}%
491 \def\@permissionCodeOne{1544-3574}%
492 \or % CSUR
493 \def\@journalName{ACM Computing Surveys}%
494 \def\@journalNameShort{ACM Comput. Surv.}%
495 \def\@permissionCodeOne{0360-0300}%
496 \or % JACM
497 \def\@journalName{Journal of the ACM}%
498 \def\@journalNameShort{J. ACM}%
499 \def\@permissionCodeOne{0004-5411}%
500 \or % JDIQ
501 \def\@journalName{ACM Journal of Data and Information Quality}%
502 \def\@journalNameShort{ACM J. Data Inform. Quality}%
503 \def\@permissionCodeOne{1936-1955}%
504 \or % JEA
505 \def\@journalName{ACM Journal of Experimental Algorithmics}%
506 \def\@journalNameShort{ACM J. Exp. Algor.}%
507 \def\@permissionCodeOne{1084-6654}%
508 \or % JERIC
509 \def\@journalName{ACM Journal of Educational Resources in Computing}%
510 \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%
511 \def\@permissionCodeOne{1073-0516}%
512 \or % JETC
513 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
514 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
515 \def\@permissionCodeOne{1550-4832}%
516 \or % JOCCH
517 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%
518 \def\@journalNameShort{ACM J. Comput. Cult. Herit.}%
519 \or % TAAS
520 \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
521 \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
522 \def\@permissionCodeOne{1556-4665}%
523 \or % TACCESS
524 \def\@journalName{ACM Transactions on Accessible Computing}%
525 \def\@journalNameShort{ACM Trans. Access. Comput.}%
526 \def\@permissionCodeOne{1936-7228}%
527 \or % TACO
528 \def\@journalName{ACM Transactions on Architecture and Code Optimization}%
529 \or % TALG
530 \def\@journalName{ACM Transactions on Algorithms}%
531 \def\@journalNameShort{ACM Trans. Algor.}%
532 \def\@permissionCodeOne{1549-6325}%
533 \or % TALLIP
534 \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
535 \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
536 \def\@permissionCodeOne{2375-4699}%

```

```

537 \or % TAP
538 \def\@journalName{ACM Transactions on Applied Perception}%
539 \or % TCPS
540 \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
541 \or % TEAC
542 \def\@journalName{ACM Transactions on Economics and Computation}%
543 \or % TECS
544 \def\@journalName{ACM Transactions on Embedded Computing Systems}%
545 \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%
546 \def\@permissionCodeOne{1539-9087}%
547 \or % TIIS
548 \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%
549 \def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%
550 \def\@permissionCodeOne{2160-6455}%
551 \or % TISSEC
552 \def\@journalName{ACM Transactions on Information and System Security}%
553 \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%
554 \def\@permissionCodeOne{1094-9224}%
555 \or % TIST
556 \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%
557 \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%
558 \def\@permissionCodeOne{2157-6904}%
559 \or % TKDD
560 \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%
561 \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%
562 \def\@permissionCodeOne{1556-4681}%
563 \or % TMIS
564 \def\@journalName{ACM Transactions on Management Information Systems}%
565 \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%
566 \def\@permissionCodeOne{2158-656X}%
567 \or % TOCE
568 \def\@journalName{ACM Transactions on Computing Education}%
569 \def\@journalNameShort{ACM Trans. Comput. Educ.}%
570 \def\@permissionCodeOne{1946-6226}%
571 \or % TOCHI
572 \def\@journalName{ACM Transactions on Computer-Human Interaction}%
573 \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%
574 \def\@permissionCodeOne{1073-0516}%
575 \or % TOCL
576 \def\@journalName{ACM Transactions on Computational Logic}%
577 \def\@journalNameShort{ACM Trans. Comput. Logic}%
578 \def\@permissionCodeOne{1529-3785}%
579 \or % TOCS
580 \def\@journalName{ACM Transactions on Computer Systems}%
581 \def\@journalNameShort{ACM Trans. Comput. Syst.}%
582 \def\@permissionCodeOne{0734-2071}%
583 \or % TOCT
584 \def\@journalName{ACM Transactions on Computation Theory}%
585 \def\@journalNameShort{ACM Trans. Comput. Theory}%
586 \def\@permissionCodeOne{1942-3454}%

```

```

587 \or % TODAES
588 \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%
589 \def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
590 \def\@permissionCodeOne{1084-4309}%
591 \or % TODS
592 \def\@journalName{ACM Transactions on Database Systems}%
593 \def\@journalNameShort{ACM Trans. Datab. Syst.}%
594 \def\@permissionCodeOne{0362-5915}%
595 \or % TOG
596 \def\@journalName{ACM Transactions on Graphics}%
597 \def\@journalNameShort{ACM Trans. Graph.}%
598 \def\@permissionCodeOne{0730-0301}%
599 \or % TOIS
600 \def\@journalName{ACM Transactions on Information Systems}%
601 \def\@journalNameShort{ACM Transactions on Information Systems}%
602 \def\@permissionCodeOne{1046-8188}%
603 \or % TOIT
604 \def\@journalName{ACM Transactions on Internet Technology}%
605 \def\@journalNameShort{ACM Trans. Internet Technol.}%
606 \def\@permissionCodeOne{1533-5399}%
607 \or % TOMACS
608 \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
609 \def\@journalNameShort{ACM Transactions on Modeling and Computer Simulation}%
610 \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
611 \or % TOMM
612 \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
613 \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
614 \def\@permissionCodeOne{1551-6857}%
615 \def\@permissionCodeTwo{0100}%
616 \or % TOMPECS
617 \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
618 \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
619 \def\@permissionCodeOne{2376-3639}%
620 \or % TOMS
621 \def\@journalName{ACM Transactions on Mathematical Software}%
622 \def\@journalNameShort{ACM Trans. Math. Softw.}%
623 \def\@permissionCodeOne{0098-3500}%
624 \or % TOPC
625 \def\@journalName{ACM Transactions on Parallel Computing}%
626 \def\@journalNameShort{ACM Trans. Parallel Comput.}%
627 \def\@permissionCodeOne{1539-9087}%
628 \or % TOPLAS
629 \def\@journalName{ACM Transactions on Programming Languages and Systems}%
630 \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
631 \def\@permissionCodeOne{0164-0925}%
632 \or % TOS
633 \def\@journalName{ACM Transactions on Storage}%
634 \def\@journalNameShort{ACM Trans. Storage}%
635 \def\@permissionCodeOne{1553-3077}%
636 \or % TOSEM

```

```

637 \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
638 \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
639 \def\@permissionCodeOne{1049-331X}%
640 \or % TOSN
641 \def\@journalName{ACM Transactions on Sensor Networks}%
642 \def\@journalNameShort{ACM Trans. Sensor Netw.}%
643 \def\@permissionCodeOne{1550-4859}%
644 \or % TRET
645 \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
646 \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
647 \def\@permissionCodeOne{1936-7406}%
648 \or % TSAS
649 \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%
650 \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
651 \def\@permissionCodeOne{2374-0353}%
652 \or % TSLP
653 \def\@journalName{ACM Transactions on Speech and Language Processing}%
654 \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
655 \def\@permissionCodeOne{1550-4875}%
656 \or % TWEB
657 \def\@journalName{ACM Transactions on the Web}%
658 \def\@journalNameShort{ACM Trans. Web}%
659 \def\@permissionCodeOne{1559-1131}%
660 \fi
661 \ClassInfo{\@classname}{Using journal code \@journalCode}%
662 }{%
663 \ClassError{\@classname}{Incorrect journal #1}%
664 }%

```

\acmJournal And the syntactic sugar around it

```

665 \def\acmJournal#1{\setkeys{ACM}{acmJournal=#1}}

```

The defaults:

```

666 \def\@journalName{}%
667 \def\@journalNameShort{\@journalName}%
668 \def\@permissionCodeOne{XXXX-XX}%
669 \def\@permissionCodeTwo{}%

```

\acmConference This is the conference command

```

670 \newcommand\acmConference[4][{}]{%
671 \gdef\acmConference@shortname{#1}%
672 \gdef\acmConference@name{#2}%
673 \gdef\acmConference@date{#3}%
674 \gdef\acmConference@venue{#4}%
675 \ifx\acmConference@shortname\@empty
676 \gdef\acmConference@shortname{#2}%
677 \fi}
678 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
679 DC, USA}

```

```

\subtitle The subtitle macro
680 \def\subtitle#1{\def\@subtitle{#1}}
681 \subtitle{}

\num@authors The total number of authors
682 \newcount\num@authors
683 \num@authors=0\relax

\author Adding an author to the list of authors and addresses
684 \renewcommand\author[2][{}%
685   \global\advance\num@authors by 1\relax
686   \ifx\addresses\@empty
687     \if@ACM@anonymous
688       \gdef\addresses{\@author{Anonymous}}%
689       \gdef\authors{Anonymous}%
690     \else
691       \gdef\addresses{\@author{#2}}%
692       \gdef\authors{#2}%
693     \fi
694   \else
695     \if@ACM@anonymous
696       \g@addto@macro\addresses{\and\@author{Anonymous}}%
697       \g@addto@macro\authors{\and Anonymous}%
698     \else
699       \g@addto@macro\addresses{\and\@author{#2}}%
700       \g@addto@macro\authors{\and#2}%
701     \fi
702   \fi
703   \if@ACM@anonymous
704     \ifx\shortauthors\@empty
705       \gdef\shortauthors{Anon.}%
706     \else
707       \g@addto@macro\shortauthors{\and Anon.}%
708     \fi
709   \else
710     \def\@tempa{#1}%
711     \ifx\@tempa\@empty
712       \ifx\shortauthors\@empty
713         \gdef\shortauthors{#2}%
714       \else
715         \g@addto@macro\shortauthors{\and#2}%
716       \fi
717     \else
718       \ifx\shortauthors\@empty
719         \gdef\shortauthors{#1}%
720       \else
721         \g@addto@macro\shortauthors{\and#1}%
722       \fi
723     \fi
724   \fi}

```

`\affiliation` The macro `\affiliation` mimics `\address` from `amsart`. Note that it has an optional argument we do not currently need, but keep for the possible future use.

```

725 \newcommand{\affiliation}[2][{}]{%
726   \if@ACM@anonymous
727     \g@addto@macro\addresses{\affiliation{}}{Address}}%
728   \else
729     \g@addto@macro\addresses{\affiliation{#1}{#2}}%
730   \fi}

```

`\email` The macro `\email` mimics `\email` from `amsart`. Again it has an optional argument we do not currently need, but keep for the possible future use.

```

731 \renewcommand{\email}[2][{}]{%
732   \if@ACM@anonymous
733     \g@addto@macro\addresses{\email{}}{e-mail}}%
734   \else
735     \g@addto@macro\addresses{\email{#1}{#2}}%
736   \fi}

```

`\@titlenotes` The titlenotes

```

737 \def\@titlenotes{}

```

`\titlenote` Adding note to the title

```

738 \def\titlenote#1{%
739   \g@addto@macro\@title{\footnotemark}%
740   \if@ACM@anonymous
741     \g@addto@macro\@titlenotes{%
742       \stepcounter{footnote}\footnotetext{Title note}}%
743   \else
744     \g@addto@macro\@titlenotes{\stepcounter{footnote}\footnotetext{#1}}%
745   \fi}

```

`\@subtitlenotes` The subtitlenotes

```

746 \def\@subtitlenotes{}

```

`\subtitlenote` Adding note to the subtitle

```

747 \def\subtitlenote#1{%
748   \g@addto@macro\@subtitle{\footnotemark}%
749   \if@ACM@anonymous
750     \g@addto@macro\@subtitlenotes{%
751       \stepcounter{footnote}\footnotetext{Subtitle note}}%
752   \else
753     \g@addto@macro\@subtitlenotes{%
754       \stepcounter{footnote}\footnotetext{#1}}%
755   \fi}

```

`\@authornotes` The subtitlenotes

```

756 \def\@authornotes{}

```



**\authornote** Adding note to the author

```

757 \def\authornote#1{\g@addto@macro\addresses{\@authornotemark}%
758   \if@ACM@anonymous
759     \g@addto@macro\@authornotes{%
760       \stepcounter{footnote}\footnotetext{Author note}}%
761   \else
762     \g@addto@macro\@authornotes{%
763       \stepcounter{footnote}\footnotetext{#1}}%
764   \fi}

```

**\acmVolume** The current volume

```

765 \def\acmVolume#1{\def\@acmVolume{#1}}
766 \acmVolume{VV}

```

**\acmNumber** The current number

```

767 \def\acmNumber#1{\def\@acmNumber{#1}}
768 \acmNumber{NNN}

```

**\acmArticle** The current article

```

769 \def\acmArticle#1{\def\@acmArticle{#1}}
770 \acmArticle{AA}

```

**\articleSeq** The sequence number

```

771 \def\articleSeq#1{\def\@articleSeq{#1}}
772 \articleSeq{\@acmArticle}

```

**\acmYear** The current year

```

773 \def\acmYear#1{\def\@acmYear{#1}}
774 \acmYear{YYYY}

```

**\acmMonth** The current month

```

775 \def\acmMonth#1{\def\@acmMonth{#1}}
776 \acmMonth{MM}

```

**\@acmPubDate** The publication date

```

777 \def\@acmPubDate{\ifcase\@acmMonth\or
778   January\or February\or March\or April\or May\or June\or
779   July\or August\or September\or October\or November\or
780   December\fi~\@acmYear}

```

**\acmPrice** The price

```

781 \def\acmPrice#1{\def\@acmPrice{#1}}
782 \acmPrice{15.00}

```

**\isbn** The paper isbn

```

783 \def\isbn#1{\def\@isbn{#1}}
784 \isbn{978-xxxx-xxxxx}

```

`\doi` The paper isbn  
785 `\def\doi#1{\def\@doi{\url{#1}}}`  
786 `\doi{dddddddddd}`

`\startPage` The start page of the paper  
787 `\def\startPage#1{\def\@startPage{#1}}`  
788 `\startPage{}`

`\terms` Terms are mostly obsolete, we use CCS now. Still it makes sense to keep them for compatibility.  
789 `\def\terms#1{\def\@terms{#1}}`  
790 `\terms{}`

`\keywords` Keywords are mostly obsolete, we use CCS now. Still it makes sense to keep them for compatibility.  
791 `\def\keywords#1{\def\@keywords{#1}}`  
792 `\keywords{}`

`abstract` Amsart puts abstract in the box. Since we do not know whether we will use two column mode, we prefer to save the text  
793 `\renewenvironment{abstract}{\Collect@Body\@saveabstract}{}`

`\@saveabstract` And saving the abstract  
794 `\long\def\@saveabstract#1{\long\gdef\@abstract{#1}}`  
795 `\@saveabstract{}`

`\@empty` The long version of `\@empty` (to compare with `\@abstract`)  
796 `\long\def\@empty{}`

`\if@ACM@printcss` Whether to print CCS  
797 `\define@boolkey+{@ACM@topmatter@}[@ACM@]{printcss}[true]{%`  
798 `\if@ACM@printcss`  
799 `\ClassInfo{\@classname}{Printing CSS}%`  
800 `\else`  
801 `\ClassInfo{\@classname}{Suppressing CSS}%`  
802 `\fi}{\ClassError{\@classname}{printcss must be true or false}}`

`\if@ACM@printbib` Whether to print ACM bib  
803 `\define@boolkey+{@ACM@topmatter@}[@ACM@]{printbib}[true]{%`  
804 `\if@ACM@printcss`  
805 `\ClassInfo{\@classname}{Printing bibformat}%`  
806 `\else`  
807 `\ClassInfo{\@classname}{Suppressing bibformat}%`  
808 `\fi}{\ClassError{\@classname}{printbib must be true or false}}`

`\settopmatter` The usual syntactic sugar  
809 `\def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}`

Now the settings

```
810 \settopmatter{printcss=true}
811 \if@ACM@manuscript
812   \settopmatter{printbib=false}
813 \else
814   \if@ACM@journal
815     \settopmatter{printbib=true}
816   \else
817     \settopmatter{printbib=false}
818   \fi
819 \fi
```

\@received The container for the paper history

```
820 \def\@received{}
```

\received The \received command

```
821 \newcommand\received[2][\def\@tempa{#1}%
822   \ifx\@tempa\@empty
823     \ifx\@received\@empty
824       \gdef\@received{Received #2}%
825     \else
826       \g@addto@macro{\@received}{; revised #2}%
827     \fi
828   \else
829     \ifx\@received\@empty
830       \gdef\@received{#1 #2}%
831     \else
832       \g@addto@macro{\@received}{; #1 #2}%
833     \fi
834   \fi}
835 \AtEndDocument{%
836   \ifx\@received\@empty\else
837     \par\bigskip\noindent\small\normalfont\@received\par
838   \fi}
```

### 3.9 Concepts system

We exclude CCSXML stuff generated by the ACM system:

```
839 \RequirePackage{comment}
840 \excludecomment{CCSXML}
```

\@concepts This is the storage macro for concepts

```
841 \let\@concepts\@empty
```

\ccsdesc The first argument is the significance, the second is the concept(s)

```
842 \newcommand\ccsdesc[2][100]{%
843   \ccsdesc@parse#1~#2~}
```

\ccsdesc@parse The parser of the expression Significance~General~Specific:

```
844 \def\ccsdesc@parse#1~#2~#3~{%
845   \expandafter\ifx\csname CCS@#2\endcsname\relax
846     \expandafter\gdef\csname CCS@#2\endcsname{\textbullet\textbf{#2} $\to$ }%
847     \g@addto@macro{\@concepts}{\csname CCS@#2\endcsname}\fi
848     \expandafter\g@addto@macro\expandafter{\csname CCS@#2\endcsname}{%
849       \ifnum#1>499\textbf{#3; }\else
850       \ifnum#1>299\textit{#3; }\else
851       #3; \fi\fi}}
```

### 3.10 Copyright system

This is from acmcopyright.sty

\if@printcopyright A flag whether to print copyright symbol

```
852 \newif\if@printcopyright
853 \@printcopyrighttrue
```

\if@printpermission Whether to print permission block

```
854 \newif\if@printpermission
855 \@printpermissiontrue
```

\if@acmowned Whether ACM owns the rights to the paper

```
856 \newif\if@acmowned
857 \@acmownedtrue
```

Keys:

```
858 \define@choicekey*{ACM@}{acmcopyrightmode}[%
859   \acm@copyrightinput\acm@copyrightmode]{none,acmcopyright,acmlicensed,%
860   rightsretained,usgov,usgovmixed,cagov,cagovmixed,%
861   licensedusgovmixed,licensedcagovmixed,othergov,licensedothergov}{%
862   \@printpermissiontrue
863   \@printcopyrighttrue
864   \@acmownedtrue
865   \ifnum\acm@copyrightmode=0\relax % none
866     \@printpermissionfalse
867     \@printcopyrightfalse
868     \@acmownedfalse
869   \fi
870   \ifnum\acm@copyrightmode=2\relax % acmlicensed
871     \@acmownedfalse
872   \fi
873   \ifnum\acm@copyrightmode=3\relax % rightsretained
874     \@acmownedfalse
875   \fi
876   \ifnum\acm@copyrightmode=4\relax % usgov
877     \@printpermissiontrue
878     \@printcopyrightfalse
879     \@acmownedfalse
```

```

880 \fi
881 \ifnum\acm@copyrightmode=6\relax % cagov
882 \@acmownedfalse
883 \fi
884 \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
885 \@acmownedfalse
886 \fi
887 \ifnum\acm@copyrightmode=9\relax % licensedcagovmixed
888 \@acmownedfalse
889 \fi
890 \ifnum\acm@copyrightmode=10\relax % othergov
891 \@acmownedtrue
892 \fi
893 \ifnum\acm@copyrightmode=11\relax % licensedothergov
894 \@acmownedfalse
895 \@printcopyrightfalse
896 \fi}

```

\setcopyright This is the syntactic sugar around setting keys.

```

897 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}
898 \setcopyright{acmcopyright}

```

\@copyrightowner Here is the owner of the copyright

```

899 \def\@copyrightowner{%
900 \ifcase\acm@copyrightmode\relax % none
901 \or % acmcopyright
902 ACM\@.
903 \or % acmlicensed
904 Copyright held by the owner/author(s). Publication rights licensed to
905 ACM\@.
906 \or % rightsretained
907 Copyright held by the owner/author(s).
908 \or % usgov
909 \or % usgovmixed
910 ACM\@.
911 \or % cagov
912 Crown in Right of Canada.
913 \or %cagovmixed
914 ACM\@.
915 \or %licensedusgovmixed
916 Copyright held by the owner/author(s). Publication rights licensed to
917 ACM\@.
918 \or %licensedcagovmixed
919 Copyright held by the owner/author(s). Publication rights licensed to
920 ACM\@.
921 \or % othergov
922 ACM\@.
923 \or % licensedothergov
924 \fi}

```

\@copyrightpermission The canned permission block.

```
925 \def\@copyrightpermission{%
926   \ifcase\acm@copyrightmode\relax % none
927   \or % acmcopyright
928     Permission to make digital or hard copies of all or part of this
929     work for personal or classroom use is granted without fee provided
930     that copies are not made or distributed for profit or commercial
931     advantage and that copies bear this notice and the full citation on
932     the first page. Copyrights for components of this work owned by
933     others than ACM must be honored. Abstracting with credit is
934     permitted. To copy otherwise, or republish, to post on servers or to
935     redistribute to lists, requires prior specific permission
936     and\hspace*{.5pt}/or a fee. Request permissions from
937     permissions@acm.org.
938   \or % acmlicensed
939     Permission to make digital or hard copies of all or part of this
940     work for personal or classroom use is granted without fee provided
941     that copies are not made or distributed for profit or commercial
942     advantage and that copies bear this notice and the full citation on
943     the first page. Copyrights for components of this work owned by
944     others than the author(s) must be honored. Abstracting with credit
945     is permitted. To copy otherwise, or republish, to post on servers
946     or to redistribute to lists, requires prior specific permission
947     and\hspace*{.5pt}/or a fee. Request permissions from
948     permissions@acm.org.
949   \or % rightsretained
950     Permission to make digital or hard copies of part or all of this work
951     for personal or classroom use is granted without fee provided that
952     copies are not made or distributed for profit or commercial advantage
953     and that copies bear this notice and the full citation on the first
954     page. Copyrights for third-party components of this work must be
955     honored. For all other uses, contact the
956     owner\hspace*{.5pt}/author(s).
957   \or % usgov
958     This paper is authored by an employee(s) of the United States
959     Government and is in the public domain. Non-exclusive copying or
960     redistribution is allowed, provided that the article citation is
961     given and the authors and agency are clearly identified as its
962     source.
963   \or % usgovmixed
964     ACM acknowledges that this contribution was authored or co-authored
965     by an employee, or contractor of the national government. As such,
966     the Government retains a nonexclusive, royalty-free right to
967     publish or reproduce this article, or to allow others to do so, for
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969     for personal or classroom use is granted. Copies must bear this
970     notice and the full citation on the first page. Copyrights for
971     components of this work owned by others than ACM must be
972     honored. To copy otherwise, distribute, republish, or post,
```

973 requires prior specific permission and\hspace\*{.5pt}/or a  
 974 fee. Request permissions from permissions@acm.org.  
 975 \or % cagov  
 976 This article was authored by employees of the Government of Canada.  
 977 As such, the Canadian government retains all interest in the  
 978 copyright to this work and grants to ACM a nonexclusive,  
 979 royalty-free right to publish or reproduce this article, or to allow  
 980 others to do so, provided that clear attribution is given both to  
 981 the authors and the Canadian government agency employing them.  
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 983 use is granted. Copies must bear this notice and the full citation  
 984 on the first page. Copyrights for components of this work owned by  
 985 others than the Canadian Government must be honored. To copy  
 986 otherwise, distribute, republish, or post, requires prior specific  
 987 permission and\hspace\*{.5pt}/or a fee. Request permissions from  
 988 permissions@acm.org.  
 989 \or % cagovmixed  
 990 ACM acknowledges that this contribution was co-authored by an  
 991 affiliate of the national government of Canada. As such, the Crown  
 992 in Right of Canada retains an equal interest in the copyright.  
 993 Reprints must include clear attribution to ACM and the author's  
 994 government agency affiliation. Permission to make digital or hard  
 995 copies for personal or classroom use is granted. Copies must bear  
 996 this notice and the full citation on the first page. Copyrights for  
 997 components of this work owned by others than ACM must be honored.  
 998 To copy otherwise, distribute, republish, or post, requires prior  
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 1007 purposes only.  
 1008 \or % licensedcagovmixed  
 1009 Publication rights licensed to ACM\@. ACM acknowledges that this  
 1010 contribution was authored or co-authored by an employee, contractor  
 1011 or affiliate of the national government of Canada. As such, the  
 1012 Government retains a nonexclusive, royalty-free right to publish or  
 1013 reproduce this article, or to allow others to do so, for Government  
 1014 purposes only.  
 1015 \or % othergov  
 1016 ACM acknowledges that this contribution was authored or co-authored  
 1017 by an employee, contractor or affiliate of a national government. As  
 1018 such, the Government retains a nonexclusive, royalty-free right to  
 1019 publish or reproduce this article, or to allow others to do so, for  
 1020 Government purposes only.  
 1021 \or % licensedothergov  
 1022 Publication rights licensed to ACM\@. ACM acknowledges that this

1023 contribution was authored or co-authored by an employee, contractor  
1024 or affiliate of a national government. As such, the Government  
1025 retains a nonexclusive, royalty-free right to publish or reproduce  
1026 this article, or to allow others to do so, for Government purposes  
1027 only.  
1028 \fi}

\copyrightyear By default, the copyright year is the same as \acmYear, but one can override this:  
1029 \def\copyrightyear#1{\def\copyrightyear{#1}}  
1030 \copyrightyear{\@acmYear}

\@teaserfigures The teaser figures container  
1031 \def\@teaserfigures{}

teaserfigure The teaser figure  
1032 \newenvironment{teaserfigure}{\Collect@Body\@saveteaser}{{}}

\@saveteaser Saving the teaser  
1033 \long\def\@saveteaser#1{\g@addto@macro\@teaserfigures{\@teaser{#1}}}

\thanks We redefine amsart \thanks, so the anonymous key works  
1034 \renewcommand{\thanks}[1]{%  
1035 \ifnotempty{#1}{%  
1036 \if@ACM@anonymous  
1037 \g@addto@macro\thankses{\thanks{A note}}}%  
1038 \else  
1039 \g@addto@macro\thankses{\thanks{#1}}}%  
1040 \fi}}

### 3.11 Typesetting top matter

\mktitle@bx Some of our formats use two column design, some use one column one. In all cases we use wide title. Thus we typeset the top matter in a special box to be use in the construction \@twocolumn[*{box}*].  
1041 \newbox\mktitle@bx

\maketitle The (in)famous \maketitle. Note that in sigchi-a mode authors are *not* in the title box.  
1042 \def\maketitle{\begin{group}  
1043 \let\@footnotemark\@footnotemark@nolink  
1044 \let\@footnotetext\@footnotetext@nolink  
1045 \renewcommand\thefootnote{\@fnsymbol\c@footnote}%  
1046 \@topnum\z@ % this prevents figures from falling at the top of page  
1047 % 1  
1048 \hsize=\textwidth  
1049 \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}  
1050 \@mktitle\if@ACM@sigchiamode\else\@mkauthors\fi\@mkteasers  
1051 \@printtopmatter  
1052 \if@ACM@sigchiamode\@mkauthors\fi



```

1053 \setcounter{footnote}{0}%
1054 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}
1055 \@titlenotes
1056 \@subtitlenotes
1057 \@authornotes
1058 \let\@makefnmark\relax \let\@thefnmark\relax
1059 \let\@makefntext\noindent
1060 \ifx\@empty\thankses\else
1061   \@footnotetext{\def\par{\let\par\@par}\parindent\z@\@setthanks}%
1062 \fi
1063 \if@printpermission\@footnotetext{\parindent\z@\@copyrightpermission}\fi
1064 \@footnotetext{\parindent\z@
1065   \if@ACM@manuscript\else
1066     \if@ACM@journal\else % Print the conference short name
1067       {\itshape \acmConference@shortname, \acmConference@venue}\par
1068     \fi
1069   \fi
1070   \if@printcopyright
1071     \copyright\ \@copyrightyear\ \@copyrightowner\
1072   \else
1073     \@copyrightyear\
1074   \fi
1075   \if@ACM@manuscript
1076     Manuscript submitted to ACM\\
1077   \else
1078     \if@ACM@journal
1079       \@permissionCodeOne/\@acmYear/\@acmMonth-ART\@acmArticle\
1080       \$\@acmPrice\\
1081     \else % Conference
1082       \@isbn
1083       \ifx\@acmPrice\@empty.\else\dots\$\@acmPrice\fi\\
1084     \fi
1085   \fi
1086   DOI: \@doi}%
1087 \mkabstract
1088 \if@ACM@printcss
1089   \ifx\@concepts\@empty\else\bgroup
1090     {\@specialsection{CCS Concepts}%
1091     \@concepts\par}\egroup
1092   \fi
1093 \fi
1094 \if\@terms\@empty\else\bgroup
1095   {\@specialsection{General Terms}%
1096   \@terms\par}\egroup
1097 \fi
1098 \ifx\@keywords\@empty\else\bgroup
1099   {\@specialsection{Additional Key
1100   Words and Phrases}\@keywords}\par\egroup
1101 \fi
1102 \andify\authors

```

```

1103 \andify\shortauthors
1104 \global\let\authors=\authors
1105 \global\let\shortauthors=\shortauthors
1106 \if@ACM@printbib
1107   \@mkbibcitation
1108 \fi
1109 \hypersetup{pdfauthor={\authors},
1110   pdftitle={\@title}, pdfkeywords={\@concepts}}%
1111 \@printendtopmatter
1112 \endgroup
1113 \setcounter{footnote}{0}%
1114 \@afterindentfalse
1115 \@afterheading
1116 }

```

`\@specialsection` This macro starts section for proceedings and uses small for journals

```

1117 \def\@specialsection#1{%
1118   \if@ACM@journal
1119     \par\medskip\small\noindent#1: %
1120   \else
1121     \section*{#1}%
1122   \fi}

```

`\@printtopmatter` The printing of top matter starts the new page, and uses the given title box.

```

1123 \def\@printtopmatter{%
1124   \ifx\@startPage\@empty
1125     \gdef\@startPage{1}%
1126   \else
1127     \setcounter{page}{\@startPage}%
1128   \fi
1129   \thispagestyle{firstpagestyle}%
1130   \noindent
1131   \ifcase\ACM@format@nr
1132   \relax % manuscript
1133     \box\mktitle@bx\par
1134     \noindent\hrulefill\par
1135   \or% acmsmall
1136     \box\mktitle@bx\par
1137     \noindent\hrulefill\par
1138   \or % acmlarge
1139     \box\mktitle@bx\par
1140     \noindent\hrulefill\par
1141   \or % acmtog
1142     \twocolumn[\box\mktitle@bx]%
1143   \or % sigconf
1144     \twocolumn[\box\mktitle@bx]%
1145   \or % siggraph
1146     \twocolumn[\box\mktitle@bx]%
1147   \or % sigplan
1148     \twocolumn[\box\mktitle@bx]%

```

```

1149 \or % sigchi
1150 \twocolumn[\box\mktitle@bx]%
1151 \or % sigchi-a
1152 \par\box\mktitle@bx\par\bigskip
1153 \fi
1154 }

\mktitle The title of the article
1155 \def\mktitle{%
1156 \ifcase\ACM@format@nr
1157 \relax % manuscript
1158 \mktitle@i
1159 \or% acmsmall
1160 \mktitle@i
1161 \or % acmlarge
1162 \mktitle@i
1163 \or % acmtog
1164 \mktitle@ii
1165 \or % sigconf
1166 \mktitle@iii
1167 \or % siggraph
1168 \mktitle@iii
1169 \or % sigplan
1170 \mktitle@iii
1171 \or % sigchi
1172 \mktitle@iii
1173 \or % sigchi-a
1174 \mktitle@iv
1175 \fi
1176 }

\mktitle@i The version of \mktitle for most journals
1177 \def\mktitle@i{\hsize=\textwidth
1178 \setbox\mktitle@bx=\vbox{\raggedright\LARGE\bfseries\sffamily\noindent
1179 \@title\par
1180 \ifx\@subtitle\@empty\else
1181 \noindent\mdseries\@subtitle\par
1182 \fi}}%

\mktitle@ii The version of \mktitle for TOG
1183 \def\mktitle@ii{\hsize=\textwidth
1184 \setbox\mktitle@bx=\vbox{\raggedright\Huge\sffamily\noindent
1185 \def\@currentfmarkstyle{\Huge\sffamily}%
1186 \@title
1187 \ifx\@subtitle\@empty\else
1188 \par\noindent{\LARGE\@subtitle}
1189 \fi
1190 \par\bigskip}}%

```

```

\mktitle@iii The version of \mktitle for sigproc
1191 \def\mktitle@iii{\hsize=\textwidth
1192   \setbox\mktitle@bx=\vbox{\centering\Huge\sffamily\bfseries\noindent
1193     \@title
1194     \ifx\@subtitle\@empty\else
1195       \par\noindent{\LARGE\mdseries\@subtitle}
1196     \fi
1197   \par\bigskip}}%

\mktitle@iv The version of \mktitle for sigchi-a
1198 \def\mktitle@iv{\hsize=\textwidth
1199   \setbox\mktitle@bx=\vbox{\raggedright\leftskip5pc\bfseries\Huge
1200     \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
1201     \noindent\@title
1202     \ifx\@subtitle\@empty\else
1203       \par\noindent\mdseries\@subtitle
1204     \fi
1205   \par\bigskip}}%

\mkauthors Typesetting authors
1206 \def\mkauthors{\begingroup
1207   \hsize=\textwidth
1208   \ifcase\ACM@format@nr
1209     \relax % manuscript
1210     \mkauthors@i
1211   \or % acmsmall
1212     \mkauthors@i
1213   \or % acmlarge
1214     \mkauthors@i
1215   \or % acmtog
1216     \mkauthors@ii
1217   \or % sigconf
1218     \mkauthors@iii
1219   \or % siggraph
1220     \mkauthors@iii
1221   \or % sigplan
1222     \mkauthors@iii
1223   \or % sigchi
1224     \mkauthors@iii
1225   \or % sigchi-a
1226     \mkauthors@iv
1227   \fi
1228   \endgroup
1229 }

\authorfont Somehow different conferences use different fonts for author names. Why?
1230 \def\authorfont{\Large\sffamily}

\affiliationfont Font for affiliations
1231 \def\affiliationfont{\normalsize\normalfont}

```

### Adjusting fonts for different formats

```

1232 \ifcase\ACM@format@nr
1233 \relax % manuscript
1234 \or % acmsmall
1235 \or % acmlarge
1236 \or % acmtog
1237   \def\@authorfont{\LARGE\sffamily}
1238   \def\@affiliationfont{\large}
1239 \or % sigconf
1240   \def\@authorfont{\LARGE}
1241   \def\@affiliationfont{\large}
1242 \or % siggraph
1243   \def\@authorfont{\normalsize\normalfont}
1244   \def\@affiliationfont{\normalsize\normalfont}
1245 \or % sigplan
1246 \or % sigchi
1247   \def\@authorfont{\bfseries}
1248   \def\@affiliationfont{\mdseries}
1249 \or % sigchi-a
1250   \def\@authorfont{\bfseries}
1251   \def\@affiliationfont{\mdseries}
1252 \fi

```

\@mkauthors@i This is version used in most formats. Note that \and between authors with the same affiliation becomes \\_and\\_:

```

1253 \def\@mkauthors@i{%
1254   \def\@currentauthors{}%
1255   \def\and{%
1256     \andify\@currentauthors\par\noindent
1257     \@currentauthors\def\@currentauthors{}}%
1258   \def\@author##1{%
1259     \ifx\@currentauthors\@empty
1260       \gdef\@currentauthors{\@authorfont\MakeUppercase{##1}}%
1261     \else
1262       \g@addto@macro{\@currentauthors}{\and\MakeUppercase{##1}}%
1263     \fi
1264     \def\and{}}%
1265   \def\email##1##2{%
1266     \def\affiliation##1##2{%
1267       \ifx\@currentauthors\@empty\else
1268         \andify\@currentauthors\par\noindent\@currentauthors
1269       \fi
1270       \def\@currentauthors{\def\@tempa{##2}\ifx\@tempa\@empty\else
1271         \unskip, {\@affiliationfont##2}\fi\def\and{\par\noindent}}%
1272       \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip
1273         \noindent\addresses\andify\@currentauthors\par\noindent\@currentauthors\par\medskip}%
1274     }

```

\@mkauthors@ii This is version used in acmtog. A more vertical design

```

1275 \def\@mkauthors@ii{\par\medskip
1276 \def\@currentauthors{}%
1277 \def\and{}%
1278 \def\@author##1{%
1279 \ifx\@currentauthors\@empty
1280 \gdef\@currentauthors{\@authorfont
1281 \MakeUppercase{##1}}%
1282 \else
1283 \g@addto@macro{\@currentauthors}{\and\MakeUppercase{##1}}%
1284 \fi\def\and{}}%
1285 \def\email##1##2{%
1286 \def\affiliation##1##2{%
1287 \ifx\@currentauthors\@empty\else
1288 \andify\@currentauthors\par\noindent\@currentauthors
1289 \fi
1290 \def\@currentauthors{\def\@tempa{##2}\ifx\@tempa\@empty\else
1291 \par\noindent{\@affiliationfont##2}\fi
1292 \def\and{\par\noindent{\@affiliationfont and}\par
1293 \noindent\def\and{}}}%
1294 \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip
1295 \noindent\addresses\andify\@currentauthors\par\noindent\@currentauthors\par\medskip}%
1296 }

```

`\author@bx` The box to put individual author to

```
1297 \newbox\author@bx
```

`\author@bx@wd` The width of the author box

```
1298 \newdimen\author@bx@wd
```

`\author@bx@sep` The separation between the author boxes

```
1299 \newskip\author@bx@sep
1300 \author@bx@sep=1pc\relax
```

`\@mkauthors@iii` The sigconf version. Here we use centered design with each author in a separate box.

```
1301 \def\@mkauthors@iii{%
```

First, we need to determine the design of the author strip. The boxes are separated by `\author@bx@sep` plus two `\author@bx@sep` margins. This means that each box must be of width  $(\text{\textwidth} - \text{\author@bx@sep})/N - \text{\author@bx@sep}$ , where  $N$  is the number of boxes per row.

```

1302 \author@bx@wd=\textwidth\relax
1303 \advance\author@bx@wd by -\author@bx@sep\relax
1304 \ifcase\num@authors
1305 \relax % 0?
1306 \or % 1=one author per row
1307 \or % 2=two authors per row
1308 \divide\author@bx@wd by \num@authors\relax
1309 \or % 3=three authors per row
1310 \divide\author@bx@wd by \num@authors\relax

```

```

1311 \or % 4=two authors per row (!)
1312     \divide\author@bx@wd by 2\relax
1313 \else % three authors per row
1314     \divide\author@bx@wd by 3\relax
1315 \fi
1316 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of \addresses:

```

1317 \gdef\@currentauthors{}%
1318 \gdef\@currentaffiliation{}%
1319 \def\@author##1{\ifx\@currentauthors\@empty
1320     \gdef\@currentauthors{\par##1}%
1321 \else
1322     \g@addto@macro\@currentauthors{\quad##1}%
1323 \fi}%
1324 \def\@email##1##2{\ifx\@currentaffiliation\@empty
1325     \gdef\@currentaffiliation{\nolinkurl{##2}}%
1326 \else
1327     \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
1328 \fi}%
1329 \def\@affiliation##1##2{\ifx\@currentaffiliation\@empty
1330     \gdef\@currentaffiliation{##2}%
1331 \else
1332     \g@addto@macro\@currentaffiliation{\par##2}%
1333 \fi}%

```

Actual typesetting is done by \and macro

```

1334 \def\and{\bgroup\hsize=\author@bx@wd\def\and{\quad}%
1335     \global\setbox\author@bx=\vtop{\centering
1336         \@authorfont\@currentauthors\par\@affiliationfont
1337         \@currentaffiliation}\egroup
1338     \box\author@bx\hspace{\author@bx@sep}%
1339     \gdef\@currentauthors{}%
1340     \gdef\@currentaffiliation{}}%

```

And here we use it:

```

1341 \hsize=\textwidth
1342 \global\setbox\mktitle@bx=\vbox{\noindent
1343     \box\mktitle@bx\par\medskip\leavevmode
1344     \lineskip=1pc\relax\centering\hspace*{-1em}%
1345     \addresses\and\par\bigskip}}

```

\@mkauthors@iv The sigchia version. Now we put authors in the main text, and no more than 2 authors per line.

```

1346 \def\@mkauthors@iv{%

```

First, we need to determine the design of the author strip. The boxes are separated by \author@bx@sep plus two \author@bx@sep margins. This means that each box must be of width  $(\text{\textwidth} - \text{\author@bx@sep})/N - \text{\author@bx@sep}$ , where  $N$  is the number of boxes per row.

```

1347 \author@bx@wd=\columnwidth\relax

```

```

1348 \advance\author@bx@wd by -\author@bx@sep\relax
1349 \ifcase\num@authors
1350 \relax % 0?
1351 \or % 1=one author per row
1352 \else % 2=two authors per row
1353 \divide\author@bx@wd by 2\relax
1354 \fi
1355 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of \addresses:

```

1356 \gdef\@currentauthors{}%
1357 \gdef\@currentaffiliation{}%
1358 \def\@author##1{\ifx\@currentauthors\@empty
1359 \gdef\@currentauthors{\par##1}%
1360 \else
1361 \g@addto@macro\@currentauthors{\quad##1}%
1362 \fi}%
1363 \def\@email##1##2{\ifx\@currentaffiliation\@empty
1364 \gdef\@currentaffiliation{\nolinkurl{##2}}%
1365 \else
1366 \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
1367 \fi}%
1368 \def\@affiliation##1##2{\ifx\@currentaffiliation\@empty
1369 \gdef\@currentaffiliation{##2}%
1370 \else
1371 \g@addto@macro\@currentaffiliation{\par##2}%
1372 \fi}%

```

Actual typesetting is done by \and macro

```

1373 \def\and{\bgroup\hsize=\author@bx@wd\def\and{\quad}%
1374 \global\setbox\author@bx=\vtop{\raggedright
1375 \authorfont\@currentauthors\par\@affiliationfont
1376 \@currentaffiliation}\egroup
1377 \box\author@bx\hskip\author@bx@sep
1378 \gdef\@currentauthors{}%
1379 \gdef\@currentaffiliation{}}%

```

And here we use it:

```

1380 \bgroup\hsize=\columnwidth
1381 \par\raggedright\leftskip=\z@
1382 \lineskip=1pc\noindent\addresses\and\par\bigskip\egroup}

```

\@authornotemark Adding footnotemark to authors

```

1383 \def\@authornotemark{\g@addto@macro\@currentauthors{\footnotemark}}

```

\@mkteasers Typesetting teasers

```

1384 \def\@mkteasers{%
1385 \ifx\@teaserfigures\@empty\else
1386 \def\@teaser##1{\par\bigskip\bgroup
1387 \captionsetup{type=figure}##1\egroup\par}
1388 \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par

```



```

1389     \noindent\@teaserfigures\par\medskip}%
1390     \fi}

\@setaddresses This is an amsart macro, which we do not need.
1391 \def\@setaddresses{}

\@mkabstract Typesetting abstract
1392 \def\@mkabstract{\bgroup
1393     \ifx\@abstract\@empty\else
1394     {\if@ACM@journal
1395         \small\noindent
1396     \else
1397         \section*{ABSTRACT}%
1398     \fi
1399     \@abstract\par}%
1400 \fi\egroup}

\@mkbibcitation Print bibcitation format
1401 \def\@mkbibcitation{\bgroup
1402     \par\medskip\small\noindent{\bfseries ACM Reference format:}\par
1403     \noindent\authors. \@acmYear. \@title. \textit{\@journalNameShort}
1404     \@acmVolume, \@acmNumber, Article~\@acmArticle\
1405     (\@acmPubDate), \ref{TotPages}~pages.\par
1406     \noindent DOI: \@doi
1407 \par\egroup}

\@printendtopmatter End the top matter
1408 \def\@printendtopmatter{\par\medskip
1409     \ifcase\ACM@format@nr
1410     \relax % manuscript
1411     \noindent\hrulefill\par\medskip
1412 \or% acmsmall
1413     \noindent\hrulefill\par\medskip
1414 \or % acmlarge
1415     \noindent\hrulefill\par\medskip
1416 \or % acmtog
1417     \par\bigskip
1418 \or % sigconf
1419     \par\bigskip
1420 \or % siggraph
1421     \par\bigskip
1422 \or % sigplan
1423     \par\bigskip
1424 \or % sigchi
1425     \par\bigskip
1426 \or % sigchi-a
1427 \fi
1428 }

\@setthanks We redefine \setthanks using \long
1429 \def\@setthanks{\long\def\thanks##1{\par##1\@addpunct.}\thankses}

```

### 3.12 Headers and Footers

We use fancyhdr for our headers and footers:

```
1430 \RequirePackage{fancyhdr}

\ACM@linenum The number of lines (plus one) on the page
1431 \def\ACM@linenum{42}
1432 \ifcase\ACM@format@nr
1433 \relax % manuscript
1434 \def\ACM@linenum{43}
1435 \or% acmsmall
1436 \def\ACM@linenum{51}
1437 \or % acmlarge
1438 \def\ACM@linenum{54}
1439 \or % acmtog
1440 \def\ACM@linenum{61}
1441 \or % sigconf
1442 \def\ACM@linenum{60}
1443 \or % siggraph
1444 \def\ACM@linenum{60}
1445 \or % sigplan
1446 \def\ACM@linenum{60}
1447 \or % sigchi
1448 \def\ACM@linenum{53}
1449 \or % sigchi-a
1450 \def\ACM@linenum{40}
1451 \fi

\ACM@linecount@bx This is the box displayed in the review mode
1452 \if@ACM@review
1453 \newsavebox{\ACM@linecount@bx}
1454 \savebox{\ACM@linecount@bx}[4em][t]{\parbox[t]{4em}{%
1455 \@tempcnta\@ne\relax
1456 \loop{\color{ACMRed}\scriptsize\the\@tempcnta}\@
1457 \advance\@tempcnta by \@ne\ifnum\@tempcnta<\ACM@linenum\repeat}}
1458 \fi

\ACM@linecount How to display the box
1459 \def\ACM@linecount{%
1460 \if@ACM@review
1461 \begin{picture}(0,0)%
1462 \put(-26,-22){\usebox{\ACM@linecount@bx}}%
1463 \end{picture}%
1464 \fi}

standardpagestyle The pagestyle for all pages but the first one
1465 \fancypagestyle{standardpagestyle}{%
1466 \fancyhf{}%
1467 \renewcommand{\headrulewidth}{\z@}%
```

```

1468 \renewcommand{\footrulewidth}{\z@}%
1469 \ifcase\ACM@format@nr
1470 \relax % manuscript
1471 \fancyhead[RE]{\thepage}%
1472 \fancyhead[LO]{\ACM@linecount\thepage}%
1473 \fancyhead[LE]{\ACM@linecount\shortauthors}%
1474 \fancyhead[RO]{\shorttitle}%
1475 \fancyfoot[RO,LE]{\footnotesize Manuscript submitted to ACM}%
1476 \or% acmsmall
1477 \fancyhead[RE]{\sffamily\@acmArticle:\thepage}%
1478 \fancyhead[LO]{\ACM@linecount\sffamily\@acmArticle:\thepage}%
1479 \fancyhead[LE]{\ACM@linecount\sffamily\shortauthors}%
1480 \fancyhead[RO]{\sffamily\shorttitle}%
1481 \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
1482 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
1483 \or% acmlarge
1484 \fancyhead[LE]{\ACM@linecount\sffamily
1485 \@acmArticle:\thepage\quad\textbullet\quad\shortauthors}%
1486 \fancyhead[LO]{\ACM@linecount}%
1487 \fancyhead[RO]{\sffamily
1488 \shorttitle\quad\textbullet\quad\@acmArticle:\thepage}%
1489 \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
1490 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
1491 \or% acmtog
1492 \fancyhead[LE]{\ACM@linecount\sffamily
1493 \@acmArticle:\thepage\quad\textbullet\quad\shortauthors}%
1494 \fancyhead[LO]{\ACM@linecount}%
1495 \fancyhead[RO]{\sffamily
1496 \shorttitle\quad\textbullet\quad\@acmArticle:\thepage}%
1497 \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
1498 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
1499 \else % Proceedings
1500 \fancyfoot[R]{\footnotesize\thepage}%
1501 \fancyhead[L]{\ACM@linecount}%
1502 \fi
1503 }
1504 \pagestyle{standardpagestyle}

\@folio@wd Folio blob width, height, offsets and max number
\@folio@ht
\@folio@voffset
\@folio@max
1505 \newdimen\@folio@wd
1506 \@folio@wd=\z@
1507 \newdimen\@folio@ht
1508 \@folio@ht=\z@
1509 \newdimen\@folio@voffset
1510 \@folio@voffset=\z@
1511 \def\@folio@max{1}
1512 \ifcase\ACM@format@nr
1513 \relax % manuscript
1514 \or% acmsmall
1515 \@folio@wd=45.75pt\relax

```

```

1516 \@folio@ht=1.25in\relax
1517 \@folio@voffset=.2in\relax
1518 \def\@folio@max{8}
1519 \or % acmlarge
1520 \@folio@wd=43.25pt\relax
1521 \@folio@ht=79pt\relax
1522 \@folio@voffset=.55in\relax
1523 \def\@folio@max{10}
1524 \fi

```

\@folioblob The macro to typeset the folio blob.

```

1525 \def\@folioblob{\@tempcnta=\@articleSeq\relax
First, we calculate \@articleSeq modulo \@folio@max
1526 \loop
1527   \ifnum\@tempcnta>\@folio@max\relax
1528   \advance\@tempcnta by - \@folio@max
1529   \repeat
1530   \advance\@tempcnta by -1\relax
1531   \@tempdima=\@folio@ht\relax
1532   \multiply\@tempdima by \the\@tempcnta\relax
1533   \advance\@tempdima by -\@folio@voffset\relax
1534   \begin{picture}(0,0)
1535     \makebox[\z@]{\raisebox{-\@tempdima}{%
1536       \rlap{%
1537         \raisebox{-0.45\@folio@ht}{\z@}{\z@}{%
1538           \rule{\@folio@wd}{\@folio@ht}}}%
1539       \parbox{\@folio@wd}{%
1540         \centering
1541         \textcolor{white}{\LARGE\bfseries\sffamily\@acmArticle}}}}
1542   \end{picture}}
1543

```

firstpagestyle The pagestyle for all pages but the first one

```

1544 \fancypagestyle{firstpagestyle}{%
1545   \fancyhf{}%
1546   \renewcommand{\headrulewidth}{\z@}%
1547   \renewcommand{\footrulewidth}{\z@}%
1548   \ifcase\ACM@format@nr
1549   \relax % manuscript
1550     \fancyhead[L]{\ACM@linecount}%
1551     \fancyfoot[R0,LE]{\small\thepage}%
1552     \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
1553   \or% acmsmall
1554     \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
1555       \@acmNumber, Article \@acmArticle. Publication date:
1556       \@acmPubDate.}%
1557     \fancyhead[LE]{\ACM@linecount\@folioblob}%
1558     \fancyhead[LO]{\ACM@linecount}%
1559     \fancyhead[R0]{\@folioblob}%

```

```

1560 \fancyheadoffset[R0,LE]{0.6\@folio@wd}%
1561 \or % acmlarge
1562 \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
1563 \@acmNumber, Article \@acmArticle. Publication date:
1564 \@acmPubDate.}%
1565 \fancyhead[R0]{\@folioblob}%
1566 \fancyhead[LE]{\ACM@linecount\@folioblob}%
1567 \fancyhead[LO]{\ACM@linecount}%
1568 \fancyheadoffset[R0,LE]{1.4\@folio@wd}%
1569 \or % acmtog
1570 \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
1571 \@acmNumber, Article \@acmArticle. Publication date:
1572 \@acmPubDate.}%
1573 \fancyhead[L]{\ACM@linecount}%
1574 \else % Conference proceedings
1575 \fancyhead[L]{\ACM@linecount}%
1576 \fancyfoot[R]{\footnotesize\thepage}%
1577 \fi
1578 }

```

### 3.13 Sectioning

Fonts for sections etc. are different for different formats. Also, some formats use the ugly period after section number (sigh):

```

1579 \def\@secfont{\sffamily\bfseries\raggedright\MakeUppercase}
1580 \def\@subsecfont{\sffamily\bfseries\raggedright}
1581 \def\@subsubsecfont{\sffamily\itshape}
1582 \def\@parfont{\itshape}
1583 \setcounter{secnumdepth}{3}
1584 \ifcase\ACM@format@nr
1585 \relax % manuscript
1586 \or% acmsmall
1587 \or % acmlarge
1588 \def\@secfont{\sffamily\large\raggedright\MakeUppercase}
1589 \def\@subsecfont{\sffamily\large\raggedright}
1590 \or % acmtog
1591 \def\@secfont{\sffamily\large\raggedright\MakeUppercase}
1592 \def\@subsecfont{\sffamily\large\raggedright}
1593 \or % sigconf
1594 \def\@secfont{\bfseries\Large\raggedright\MakeUppercase}
1595 \def\@subsecfont{\bfseries\Large\raggedright}
1596 \or % siggraph
1597 \def\@secfont{\bfseries\sffamily\Large\raggedright\MakeUppercase}
1598 \def\@subsecfont{\bfseries\sffamily\Large\raggedright}
1599 \or % sigplan
1600 \def\@secfont{\bfseries\Large\raggedright\MakeUppercase}
1601 \def\@subsecfont{\bfseries\Large\raggedright}
1602 \or % sigchi
1603 \setcounter{secnumdepth}{1}

```

```

1604 \def\@secfont{\bfseries\sffamily\raggedright\MakeUppercase}
1605 \def\@subsecfont{\bfseries\sffamily\raggedright}
1606 \or % sigchi-a
1607 \setcounter{secnumdepth}{0}
1608 \def\@secfont{\bfseries\sffamily\raggedright\MakeUppercase}
1609 \def\@subsecfont{\bfseries\sffamily\raggedright}
1610 \fi

```

\@adddotafter    Add punctuation after the command

```

1611 \def\@adddotafter#1{#1\@addpunct{.}}

```

Sectioning is different for different levels

```

1612 \renewcommand\section{\@startsection{section}{1}{\z@}%
1613 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
1614 {.25\baselineskip}%
1615 {\@secfont}}
1616 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
1617 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
1618 {.25\baselineskip}%
1619 {\@subsecfont}}
1620 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{10pt}%
1621 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
1622 {-3.5\p@}%
1623 {\@subsubsecfont\@adddotafter}}
1624 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
1625 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
1626 {-3.5\p@}%
1627 {\@parfont\@adddotafter}}
1628 \renewcommand\part{\@startsection{part}{9}{\z@}%
1629 {-10\p@ \@plus -4\p@ \@minus -2\p@}%
1630 {4\p@}%
1631 {\@parfont}}

```

### 3.14 Theorems

acmplain    The acmplain theorem style

```

1632 \newtheoremstyle{acmplain}%
1633 {.5\baselineskip\@plus.2\baselineskip
1634 \@minus.2\baselineskip}% space above
1635 {.5\baselineskip\@plus.2\baselineskip
1636 \@minus.2\baselineskip}% Space below
1637 {\itshape}% body font
1638 {\parindent}% indent amount
1639 {\scshape}% head font
1640 {.}% punctuation after head
1641 {.5em}% spacing after head
1642 {\thmname{#1}\thmnumber{ #2}\thmnote{ (#3)}}% head spec

```

acmdefinition    The acmdefinition theorem style

```

1643 \newtheoremstyle{acmdefinition}%
1644   {.5\baselineskip\@plus.2\baselineskip
1645    \@minus.2\baselineskip}% space above
1646   {.5\baselineskip\@plus.2\baselineskip
1647    \@minus.2\baselineskip}% Space below
1648   {\normalfont}% body font
1649   {\parindent}% indent amount
1650   {\itshape}% head font
1651   {.}% punctuation after head
1652   {.5em}% spacing after head
1653   {\thmname{#1}\thmnumber{ #2}\thmnote{ \itshape(#3)}}}% head spec

```

The definitions for theorems:

```

1654 \theoremstyle{acmplain}
1655 \newtheorem{theorem}[Theorem][section]
1656 \newtheorem{conjecture}[theorem]{Conjecture}
1657 \newtheorem{proposition}[theorem]{Proposition}
1658 \newtheorem{lemma}[theorem]{Lemma}
1659 \newtheorem{corollary}[theorem]{Corollary}
1660 \theoremstyle{acmdefinition}
1661 \newtheorem{example}[theorem]{Example}
1662 \newtheorem{definition}[theorem]{Definition}

```

proof We want small caps proof name

```

1663 \renewenvironment{proof}[1][\proofname]{\par
1664   \pushQED{\qed}%
1665   \normalfont \topsep6\p@\@plus6\p@\relax
1666   \trivlist
1667     \item[\indent\hskip\labelsep
1668           \scshape
1669           #1\@addpunct{.}]\ignorespaces
1670 }{%
1671   \popQED\endtrivlist\@endpfalse
1672 }

```

### 3.15 Conditional typesetting

We use the comment package for conditional typesetting:

```

1673 \if@ACM@screen
1674   \includecomment{screenonly}
1675   \excludecomment{printonly}
1676 \else
1677   \excludecomment{screenonly}
1678   \includecomment{printonly}
1679 \fi

```

### 3.16 End of Class

```

1680 \normalsize\normalfont

```

1681 </class>



## References

- [1] UK T<sub>E</sub>X Users Group. UK list of T<sub>E</sub>X frequently asked questions. <http://www.tex.ac.uk>, 2016.
- [2] Michael Downes and Barbara Beeton. *The amsart, amsproc, and amsbook document classes*. American Mathematical Society, August 2004. <http://www.ctan.org/pkg/amslatex>.
- [3] American Mathematical Society. *Instructions for Preparation of Papers and Monographs, AMSL<sup>A</sup>T<sub>E</sub>X*, August 2004. <http://www.ctan.org/pkg/amslatex>.
- [4] Cristophe Fiorio. *algorithm2e.sty—package for algorithms*, October 2015.
- [5] Rogério Brito. *The algorithms bundle*, August 2009.
- [6] Carsten Heinz, Brooks Moses, and Jobst Hoffmann. *The Listings Package*, June 2015. <http://www.ctan.org/pkg/listings>.
- [7] Simon Fear. *Publication quality tables in L<sup>A</sup>T<sub>E</sub>X*, April 2005. <http://www.ctan.org/pkg/booktabs>.
- [8] Association for Computing Machinery. *ACM Visual Identity Standards*, 2007.

## Change History

v1.00		
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v1.01		
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Defined ACM colors . . . . .	15	15
		Explicitly put draft option
		(closes <a href="https://github.com/borisveytsman/acmart/issues/5">https://github.com/borisveytsman/acmart/issues/5</a> ) . . . . .
		Set headheight to 1pc for all formats
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