

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

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2016/05/30, v1.12

## 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  $\text{\TeX}$  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  $\text{\LaTeX}$  package.

The package uses only free  $\text{\TeX}$  packages and fonts included in  $\text{\TeX}$ Live, Mik $\text{\TeX}$  and other popular  $\text{\TeX}$  distributions. It is intended to be published in these distributions itself, which minimizes users' efforts in the installation and support of the package.

I am grateful to Matthew Fluet, John Owens, Craig Rodkin, Bernard Rous, David Shamma, Stephen Spencer and many others for their invaluable help.

The development version of the package is available at <https://github.com/borisveytsman/acmart>.

## 2 User's guide

### 2.1 Installation

Most probably, you already have this package installed in your favorite  $\text{\TeX}$  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  $\text{\LaTeX}$  can find them (see [1] or the documentation for your  $\text{\TeX}$  system).
3. Update the database of file names. Again, see [1] or the documentation for your  $\text{\TeX}$  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.

The class uses a number of other packages. They are included in all major  $\text{\TeX}$  distributions ( $\text{\TeX}$ Live, Mac $\text{\TeX}$ , Mik $\text{\TeX}$ ) of 2015 and later, so you probably have them installed. Just in case here is the list of these packages:

- `amscs`, <http://www.ctan.org/pkg/amscs>

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

- *amsfonts*, <http://www.ctan.org/pkg/amsfonts>
- *amsmath*, <http://www.ctan.org/pkg/amsmath>
- *binhex*, <http://www.ctan.org/pkg/binhex>
- *caption*, <http://www.ctan.org/pkg/caption>
- *comment*, <http://www.ctan.org/pkg/comment>
- *environ*, <http://www.ctan.org/pkg/environ>
- *fancyhdr*, <http://www.ctan.org/pkg/fancyhdr>
- *float*, <http://www.ctan.org/pkg/float>
- *fontaxes*, <http://www.ctan.org/pkg/fontaxes>
- *geometry*, <http://www.ctan.org/pkg/geometry>
- *graphics*, <http://www.ctan.org/pkg/graphics>
- *hyperref*, <http://www.ctan.org/pkg/hyperref>
- *ifluatex*, <http://www.ctan.org/pkg/ifluatex>
- *ifxetex*, <http://www.ctan.org/pkg/ifxetex>
- *inconsolata*, <http://www.ctan.org/pkg/inconsolata>
- *latex-tools*, <http://www.ctan.org/pkg/latex-tools>
- *libertine*, <http://www.ctan.org/pkg/libertine>
- *manyfoot*, <http://www.ctan.org/pkg/manyfoot>
- *microtype*, <http://www.ctan.org/pkg/microtype>
- *ms*, <http://www.ctan.org/pkg/ms>
- *mweights*, <http://www.ctan.org/pkg/mweights>
- *natbib*, <http://www.ctan.org/pkg/natbib>
- *nccfoots*, <http://www.ctan.org/pkg/nccfoots>
- *newtx*, <http://www.ctan.org/pkg/newtx>
- *oberdiek*, <http://www.ctan.org/pkg/oberdiek>
- *pdftex-def*, <http://www.ctan.org/pkg/pdftex-def>
- *setspace*, <http://www.ctan.org/pkg/setspace>
- *totpages*, <http://www.ctan.org/pkg/totpages>

- *trimspaces*, <http://www.ctan.org/pkg/trimspaces>
- *upquote*, <http://www.ctan.org/pkg/upquote>
- *url*, <http://www.ctan.org/pkg/url>
- *xcolor*, <http://www.ctan.org/pkg/xcolor>
- *xkeyval*, <http://www.ctan.org/pkg/xkeyval>

## 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

```
\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 option `natbib` is used when the corresponding BibTeX style is based on `natbib`. In most cases you do not need to set it. See Section 2.9.

The option `anonymous` is used for anonymous review process: all author information becomes obscured.

Table 1: The possible values for the format option

Value	Meaning
manuscript	A manuscript. This is the default
acmsmall	Small single column 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, TOPS, TOS, TOSEM, TOSN, TRET, TSAS, TSC, 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 for SIGPLAN conferences
sigchi	Proceedings format for SIGCHI conferences
sigchi-a	Format for SIGCHI extended abstract

Table 2: Boolean options

Option	Default	Meaning
review	false	A review version: lines are numbered, hyperlinks are colored
screen	false	A screen version: hyperlinks are colored
natbib		Whether to use natbib package (see Section 2.9)
anonymous	false	Whether to make author(s) anonymous
authorversion	false	Whether to generate a special version for authors' personal use or posting (see Section 2.3)

## 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 `\acmVolume` or `\acmDOI`—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.

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.

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
TOPS	ACM Transactions on Privacy and Security
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
TSC	ACM Transactions on Social Computing
TSLP	ACM Transactions on Speech and Language Processing
TWEB	ACM Transactions on the Web



`\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 the the one of  
`\affiliation` `amsart` [3] (and different from the standard  $\LaTeX$ ). For each author a separate command  
`\email` `\author` should be used, followed by `\affiliation` 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 correspond-  
ing 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 inserted by the editor and set the journal volume, issue, article number, year and month correspondingly. The arguments of all these commands, including `\acmMonth` is numerical, including `\acmMonth`, for example,

```

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

```

`\acmArticleSeq`      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 `\acmArticleSeq{<n>}` can be used to change it:

```

\acmArticle{39}    % The sequence number will be 39 by default
\acmArticleSeq{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}

```

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

```

\acmISBN{978-1-4503-3916-2}

```

`\acmDOI`      The macro `\acmDOI{<DOI>}` sets the DOI number of the article, for example,

```

\acmDOI{10.1145/9999997.9999999}

```

It is normally set by the typesetter.

`\acmBadgeR`      Some conference articles get special distinction, for example, the artifact evaluation for PPOPP 2016 (see <http://ctuning.org/ae/ppopp2016.html>). These articles display special badges supplied by the conference organizers. The class provides commands to add these badges: `\acmBadgeR[<url>]{<graphics>}` and `\acmBadgeL[<url>]{<graphics>}`. The first command puts the badge to the right of the title, and the second one—to the left. The exception is the `sigchi`—a mode for SIGCHI Extended abstract, which puts the badges on the left margin. The argument have the following meaning: `[<url>]`, if

provided, sets the link to the badge authority in the screen version, while `{\graphics}` sets the graphics file with the badge image. The file must be a cropped square, which is scaled to a standard size in the output. For example, if the badge image is `ae-logo.pdf`, the command is

```
\acmBadgeR[http://ctuning.org/ae/ppopp2016.html]{ae-logo}
```

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

```
\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 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}
```

There is a special case for a personal copy that the authors may be allowed to generate for their use or a posting on a personal site (check the instructions for the specific journal or conference for the details). The document option `authorversion=true` produces the special form of the copyright statement for this case. Note that you still need the `\setcopyright` command and (optionally) `\copyrightyear` command to tell  $\TeX$  about the copyright owner and year. Also, you should be aware that due to the different sizes

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

of the permission blocks for the printed version and authors' version the page breaks might be different between them.

<code>abstract</code>	The environment <code>abstract</code> must <i>precede</i> <code>\maketitle</code> command. Again, this is different from the standard $\LaTeX$ .
<code>teaserfigure</code>	<p>A special kind of figure is used for many two-column conference proceedings. This figure is placed just after the authors, but before the main text. The environment <code>teaserfigure</code> is used for these figures. This environment must be used <i>before</i> <code>\maketitle</code>, for example,</p> <pre> \begin{teaserfigure}   \includegraphics[width=\textwidth]{sampleteaser}   \caption{This is a teaser}   \label{fig:teaser} \end{teaserfigure} </pre>
<code>\settopmatter</code>	<p>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 <code>\settopmatter{&lt;settings&gt;}</code>. The settings and their meanings are listed in Table 5. For example,</p> <pre> \settopmatter{printbib=false, printccs=true} </pre>
<code>\received</code>	<p>The command <code>\received[&lt;stage&gt;]{&lt;date&gt;}</code> sets the history of the publication. The <code>[&lt;stage&gt;]</code> argument is optional; the default is Received for the first date and revised for the subsequent ones. For example</p> <pre> \received{February 2007} \received[revised]{March 2009} \received[accepted]{June 2009} </pre>
<code>\maketitle</code>	The macro <code>\maketitle</code> must be the last command in the top matter group: i.e., it must follow the commands defined in this section.
<code>\shortauthors</code>	<p><i>After</i> the command <code>\maketitle</code> the macro <code>\shortauthors</code> 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.,</p> <pre> \maketitle \renewcommand{\shortauthors}{Zhou et. al.} </pre>

## 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  $\LaTeX$  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 types 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
sourcenote. This is a table sourcenote. This is a table
sourcenote.

\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

Tables and figures (including margin tables and margin figures) are by default centered. However, in some cases (for example, when you use several subimages per figure) you may need to override this decision. A good way to do so is to put the contents into a `\minipage` of the width `\columnwidth`.

## 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` Some supplementary material in ACM publication is put online, but not in the printed  
`screenonly` 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 Note about anonymous mode

`anonsuppress` When the option `anonymous` is selected,  $\text{\TeX}$  suppresses author information (including number of authors) for a blind review. However, sometimes the information identifying the authors may be present in the body of the paper, for example, in the acknowledgements. The environment `anonsuppress` is used to suppress such information, for example

```
\section*{Acknowledgements}
\begin{anonsuppress}
  The authors wish to thank Prof. C.~O.~Lleague for her generous
  advices and the Society for Development of Oort Cloud for the
  financial support.
\end{anonsuppress}
```

## 2.9 Bibliography

At present some formats use *natbib* package by default, while some are not compatible with *natbib*. Table

Usually when you select a format,  $\text{\TeX}$  automatically determines whether you need *natbib* and the required settings. However, you can override these decision by manually setting the option `natbib` to true or false. You may further customize *natbib* using `\setcitestyle` command, for example,

```
\setcitestyle{numbers,sort&compress}
```

If you use *natbib*, then commands like `\cite` and `\citeauthor` are automatically supported.



Table 6: Bibliography styles used by different formats

Format	<i>natbib</i> use	Bibliography style	Citation format
manuscript	Yes	ACM-Reference-Format-Journals	Author/year
acmsmall	Yes	ACM-Reference-Format-Journals	Author/year
acmlarge	Yes	ACM-Reference-Format-Journals	Author/year
acmtog	Yes	ACM-Reference-Format-Journals	Author/year
sigconf	No	acm-abbrev, acm-alpha, acm-plain or acm-unsrt	Numeric or alpha
siggraph	No	acmsiggraph	Author/year
sigplan	Yes	ACM-Reference-Format-Journals	Author/year
sigchi	No	SIGCHI-Reference-Format	Numeric
sigchi-a	No	SIGCHI-Reference-Format	Numeric

## 2.10 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.

## 2.11 Typographical niceties

By default `acmart` prevents all widows and orphans (i.e. lonely lines at the beginning and the end of the page) and hyphenation at the end of the page. This is done by rather strict settings

```
\widowpenalty=10000
\clubpenalty=10000
\brokenpenalty=10000
```

However, this may lead to frustrating results when the authors must obey a page limit. Setting these penalties to smaller values may help if you absolutely need to.

Another problem might be the too strict line breaking rules. Again, a strategically placed `\sloppy` command or putting the problematic paragraph inside `sloppypar` environment might help—but beware the results might be, well, sloppy.

## 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 [2016/05/30 v1.12 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[varqu]{zi4}
13 \usepackage[libertine]{newtxmath}
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@authorversion Whether we use author's version
60 \define@boolkey+{acmart.cls}[@ACM@]{authorversion}[true]{%
61   \if@ACM@authorversion
62     \PackageInfo{\@classname}{Using authorversion mode}%
63   \else
64     \PackageInfo{\@classname}{Not using authorversion mode}%
65   \fi}{\PackageError{\@classname}{Option authorversion can be either true or
66     false}}
67 \ExecuteOptionsX{authorversion=false}

\if@ACM@natbib@override Whether to override the format decision about natbib
68 \newif\if@ACM@natbib@override
69 \@ACM@natbib@overridefalse

\if@ACM@natbib Whether we use natbib mode
70 \define@boolkey+{acmart.cls}[@ACM@]{natbib}[true]{%
71   \@ACM@natbib@override=true
72   \if@ACM@natbib
73     \PackageInfo{\@classname}{Explicitly selecting natbib mode}%

```

```

74 \else
75 \PackageInfo{\@classname}{Explicitly deselecting natbib mode}%
76 \fi}{\PackageError{\@classname}{Option natbib can be either true or
77 false}}

\if@ACM@anonymous Whether we use anonymous mode
78 \define@boolkey+{acmart.cls}[@ACM@]{anonymous}[true]{%
79 \if@ACM@anonymous
80 \PackageInfo{\@classname}{Using anonymous mode}%
81 \else
82 \PackageInfo{\@classname}{Not using anonymous mode}%
83 \fi}{\PackageError{\@classname}{Option anonymous can be either true or
84 false}}
85 \ExecuteOptionsX{anonymous=false}

\ACM@fontsize The font size to pass to the base class
86 \def\ACM@fontsize{
87 \DeclareOptionX{9pt}{\edef\ACM@fontsize{\CurrentOption}}
88 \DeclareOptionX{10pt}{\edef\ACM@fontsize{\CurrentOption}}
89 \DeclareOptionX{11pt}{\edef\ACM@fontsize{\CurrentOption}}
90 \DeclareOptionX{12pt}{\edef\ACM@fontsize{\CurrentOption}}

91 \DeclareOptionX{draft}{\PassOptionsToClass{\CurrentOption}{amsart}}
92 \DeclareOptionX{*}{\PassOptionsToClass{\CurrentOption}{amsart}}
93 \ProcessOptionsX
94 \ClassInfo{\@classname}{Using format \ACM@format, number \ACM@format@nr}

```

### 3.3 Setting switches

```

\if@ACM@manuscript Whether we use manuscript mode
95 \newif\if@ACM@manuscript

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

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

Setting up switches
98 \ifnum\ACM@format@nr=0\relax
99 \@ACM@manuscripttrue
100 \else
101 \@ACM@manuscriptfalse
102 \fi
103 \@ACM@sigchiamodefalse
104 \ifcase\ACM@format@nr
105 \relax % manuscript
106 \@ACM@journaltrue

```

```

107 \or % acmsmall
108 \ACM@journaltrue
109 \or % acmlarge
110 \ACM@journaltrue
111 \or % acmtog
112 \ACM@journaltrue
113 \or % sigconf
114 \ACM@journalfalse
115 \or % siggraph
116 \ACM@journalfalse
117 \or % sigplan
118 \ACM@journalfalse
119 \or % sigchi
120 \ACM@journalfalse
121 \or % sigchi-a
122 \ACM@journalfalse
123 \ACM@sigchiamodetrue
124 \fi

```

A format sets up `\if@ACM@natbib` only if `\ACM@natbib@override` is false (i.e. user did *not* override format's selection):

```

125 \if@ACM@natbib@override\else
126 \ifcase\ACM@format@nr
127 \relax % manuscript
128 \ACM@natbibtrue
129 \or % acmsmall
130 \ACM@natbibtrue
131 \or % acmlarge
132 \ACM@natbibtrue
133 \or % acmtog
134 \ACM@natbibtrue
135 \or % sigconf
136 \ACM@natbibfalse
137 \or % siggraph
138 \ACM@natbibfalse
139 \or % sigplan
140 \ACM@natbibtrue
141 \or % sigchi
142 \ACM@natbibfalse
143 \or % sigchi-a
144 \ACM@natbibfalse
145 \fi
146 \fi

```

### 3.4 Loading base class and package

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

```

147 \ifx\ACM@fontsize\empty
148 \ifcase\ACM@format@nr
149 \relax % manuscript

```

```

150 \def\ACM@fontsize{9pt}%
151 \or % acmsmall
152 \def\ACM@fontsize{10pt}%
153 \or % acmlarge
154 \def\ACM@fontsize{9pt}%
155 \or % acmtog
156 \def\ACM@fontsize{9pt}%
157 \or % sigconf
158 \def\ACM@fontsize{9pt}%
159 \or % siggraph
160 \def\ACM@fontsize{9pt}%
161 \or % sigplan
162 \def\ACM@fontsize{9pt}%
163 \or % sigchi
164 \def\ACM@fontsize{10pt}%
165 \or % sigchi-a
166 \def\ACM@fontsize{10pt}%
167 \fi
168 \fi
169 \ClassInfo{\@classname}{Using fontsize \ACM@fontsize}
170 \LoadClass[\ACM@fontsize, reqno]{amsart}
171 \RequirePackage{microtype}

```

We need totpages package to calculate the number of pages

```
172 \RequirePackage{totpages}
```

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

```
173 \RequirePackage{environ}
```

We use setspace for doublespacing

```

174 \if@ACM@manuscript
175 \RequirePackage{setspace}
176 \onehalfspacing
177 \fi

```

Citations. We patch \setcitestyle to allow, e.g., \setcitestyle{sort} and \setcitestyle{nosort}

```

178 \if@ACM@natbib
179 \RequirePackage{natbib}
180 \renewcommand{\bibfont}{\bibliofont}
181 \renewcommand\setcitestyle[1]{
182 \@for\@tempa:=#1\do
183 {\def\@tempb{round}\ifx\@tempa\@tempb
184 \renewcommand\NAT@open{(\renewcommand\NAT@close{)}\fi
185 \def\@tempb{square}\ifx\@tempa\@tempb
186 \renewcommand\NAT@open{[\renewcommand\NAT@close{]}\fi
187 \def\@tempb{angle}\ifx\@tempa\@tempb
188 \renewcommand\NAT@open{<\renewcommand\NAT@close{>}\fi
189 \def\@tempb{curly}\ifx\@tempa\@tempb
190 \renewcommand\NAT@open{\{\renewcommand\NAT@close{\}}\fi

```

```

191 \def\@tempb{semicolon}\ifx\@tempa\@tempb
192 \renewcommand\NAT@sep{;} \fi
193 \def\@tempb{colon}\ifx\@tempa\@tempb
194 \renewcommand\NAT@sep{;} \fi
195 \def\@tempb{comma}\ifx\@tempa\@tempb
196 \renewcommand\NAT@sep{,} \fi
197 \def\@tempb{authoryear}\ifx\@tempa\@tempb
198 \NAT@numbersfalse \fi
199 \def\@tempb{numbers}\ifx\@tempa\@tempb
200 \NAT@numberstrue\NAT@superfalse \fi
201 \def\@tempb{super}\ifx\@tempa\@tempb
202 \NAT@numberstrue\NAT@supertrue \fi
203 \def\@tempb{nobibstyle}\ifx\@tempa\@tempb
204 \let\bibstyle=\@gobble \fi
205 \def\@tempb{bibstyle}\ifx\@tempa\@tempb
206 \let\bibstyle=\@citestyle \fi
207 \def\@tempb{sort}\ifx\@tempa\@tempb
208 \def\NAT@sort{\@ne} \fi
209 \def\@tempb{nosort}\ifx\@tempa\@tempb
210 \def\NAT@sort{\@z} \fi
211 \def\@tempb{compress}\ifx\@tempa\@tempb
212 \def\NAT@cmprs{\@ne} \fi
213 \def\@tempb{nocompress}\ifx\@tempa\@tempb
214 \def\NAT@cmprs{\@z} \fi
215 \def\@tempb{sort&compress}\ifx\@tempa\@tempb
216 \def\NAT@sort{\@ne}\def\NAT@cmprs{\@ne} \fi
217 \def\@tempb{mcite}\ifx\@tempa\@tempb
218 \let\NAT@merge\@ne \fi
219 \def\@tempb{merge}\ifx\@tempa\@tempb
220 \ifnum{\NAT@merge<\tw}{\let\NAT@merge\tw}{\fi}
221 \def\@tempb{elide}\ifx\@tempa\@tempb
222 \ifnum{\NAT@merge<\thr@@}{\let\NAT@merge\thr@@}{\fi}
223 \def\@tempb{longnamesfirst}\ifx\@tempa\@tempb
224 \NAT@longnamestrue \fi
225 \def\@tempb{nonamebreak}\ifx\@tempa\@tempb
226 \def\NAT@nmfmt#1{\mbox{\NAT@up#1}} \fi
227 \expandafter\NAT@find@eq\@tempa=\relax\@nil
228 \if\@tempc\relax\else
229 \expandafter\NAT@rem@eq\@tempc
230 \def\@tempb{open}\ifx\@tempa\@tempb
231 \xdef\NAT@open{\@tempc} \fi
232 \def\@tempb{close}\ifx\@tempa\@tempb
233 \xdef\NAT@close{\@tempc} \fi
234 \def\@tempb{aysep}\ifx\@tempa\@tempb
235 \xdef\NAT@aysep{\@tempc} \fi
236 \def\@tempb{yysep}\ifx\@tempa\@tempb
237 \xdef\NAT@yrsep{\@tempc} \fi
238 \def\@tempb{notesep}\ifx\@tempa\@tempb
239 \xdef\NAT@cmt{\@tempc} \fi
240 \def\@tempb{citesep}\ifx\@tempa\@tempb

```

```

241     \xdef\NAT@sep{\@tempc}\fi
242   \fi
243 }%
244 \NAT@@setcites
245 }
246 \setcitestyle{%
247   open={},close={},citesep={;},%
248   authoryear,aysep={},yysep={},,%
249   notesep={, }}
250 \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:

```

251 \def\@startsection#1#2#3#4#5#6{%
252   \if@noskipsec \leavevmode \fi
253   \par
254   \@tempkipa #4\relax
255   \@afterindenttrue
256   \ifdim \@tempkipa <\z@
257     \@tempkipa -\@tempkipa \@afterindentfalse
258   \fi
259   \if@nobreak
260     \everypar{}%
261   \else
262     \addpenalty\@secpenalty\addvspace\@tempkipa
263   \fi
264   \@ifstar
265     {\@ssect{#3}{#4}{#5}{#6}}%
266     {\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}
267 \def\@sect#1#2#3#4#5#6[#7]#8{%
268   \ifnum #2>\c@secnumdepth
269     \let\@svsec\@empty
270   \else
271     \refstepcounter{#1}%
272     \protected@edef\@svsec{\@secntformat{#1}\relax}%
273   \fi
274   \@tempkipa #5\relax
275   \ifdim \@tempkipa>\z@
276     \begingroup
277       #6{%
278         \@hangfrom{\hspace #3\relax\@svsec}%
279         \interlinepenalty \@M #8\@par}%
280     \endgroup
281     \csname #1mark\endcsname{#7}%
282     \addcontentsline{toc}{#1}{%
283       \ifnum #2>\c@secnumdepth \else
284         \protect\numberline{\csname the#1\endcsname}%
285       \fi
286       #7}%

```



```

287 \else
288   \def\@svsechd{%
289     #6{\hskip #3\relax
290       \@svsec #8}%
291     \csname #1mark\endcsname{#7}%
292     \addcontentsline{toc}{#1}{%
293       \ifnum #2>\c@secnumdepth \else
294         \protect\numberline{\csname the#1\endcsname}%
295       \fi
296     #7}}%
297   \fi
298   \@xsect{#5}}
299 \def\@xsect#1{%
300   \@tempskipa #1\relax
301   \ifdim \@tempskipa>\z@
302     \par \nobreak
303     \vskip \@tempskipa
304     \afterheading
305   \else
306     \@nobreakfalse
307     \global\@noskipsectrue
308     \everypar{%
309       \if@noskipsec
310         \global\@noskipsecfalse
311         {\setbox\z@\lastbox}%
312         \clubpenalty\@M
313         \begingroup \@svsechd \endgroup
314         \unskip
315         \@tempskipa #1\relax
316         \hskip -\@tempskipa
317       \else
318         \clubpenalty \@clubpenalty
319       \everypar{}}%
320     \fi}%
321   \fi
322   \ignorespaces}
323 \def\@secntformat#1{\csname the#1\endcsname\quad}
324 \def\@essect#1#2#3#4#5{%
325   \@tempskipa #3\relax
326   \ifdim \@tempskipa>\z@
327     \begingroup
328       #4{%
329         \@hangfrom{\hskip #1}%
330         \interlinepenalty \@M #5\@@par}%
331     \endgroup
332   \else
333     \def\@svsechd{#4{\hskip #1\relax #5}}%
334   \fi
335   \@xsect{#3}}

```

### And hyperref

```

336 \let\@footnotemark@nolink\@footnotemark
337 \let\@footnotetext@nolink\@footnotetext
338 \RequirePackage{hyperref}
339 \urlstyle{rm}
340 \ifcase\ACM@format@nr
341 \relax % manuscript
342 \or % acmsmall
343 \or % acmlarge
344 \or % acmtog
345 \or % sigconf
346 \or % siggraph
347 \or % sigplan
348 \urlstyle{sf}
349 \or % sigchi
350 \or % sigchi-a
351 \urlstyle{sf}
352 \fi
353 \if@ACM@screen
354 \hypersetup{colorlinks,
355   linkcolor=ACMRed,
356   citecolor=ACMPurple,
357   urlcolor=ACMDarkBlue,
358   filecolor=ACMDarkBlue}
359 \else
360 \hypersetup{hidelinks}
361 \fi

```

Bibliography mangling. Siggraph does not want the label.

```

362 \if@ACM@natbib
363 \let\cite\citeN
364 \let\cite\citep
365 \let\citeANP\citeauthor
366 \let\citeNN\citeyearpar
367 \let\citeyearNP\citeyear
368 \let\citeyear\citeyearpar
369 \let\citeNP\citealt
370 \def\shortcite#1{\citeyear{#1}}
371 \DeclareRobustCommand\citeA
372   {\begingroup\NAT@swafalse
373     \let\NAT@ctype\@ne\NAT@partrue\NAT@fullfalse\NAT@open\NAT@citetp}
374 \providecommand\newblock{}
375 \else
376 \providecommand\citename[1]{#1}
377 \fi
378 \ifcase\ACM@format@nr
379 \relax % manuscript
380 \or % acmsmall
381 \or % acmlarge
382 \or % acmtog

```

```

383 \or % sigconf
384 \or % siggraph
385   \def\@biblabel#1{}
386   \ifx\bibhang\@undefined
387     \newlength\bibhang
388     \fi
389     \setlength\bibhang{1em}
390     \renewenvironment{thebibliography}[1]{%
391       \@bibtylestyle
392       \normalfont\bibliofont\labelsep .5em\relax
393       \renewcommand\theenumiv{\arabic{enumiv}}\let\p@enumiv\@empty
394       \list{\@biblabel{\theenumiv}}{\labelwidth\z@
395         \setlength\itemindent{-\bibhang}%
396         \setlength\leftmargin{\bibhang}%
397         \labelsep\z@
398         \def\newblock{\hspace .11em plus .33em minus .07em}%
399         \usecounter{enumiv}}%
400       \sloppy \clubpenalty\@M \widowpenalty\clubpenalty
401       \sfcode'\.=\@m
402     }{%
403       \def\@noitemerr{\@latex@warning{Empty 'thebibliography' environment}}%
404       \endlist
405     }
406 \or % sigplan
407 \or % sigchi
408 \or % sigchi-a
409 \fi

```

### Graphics and color

```

410 \RequirePackage{graphicx, xcolor}

We define ACM colors according to [8]:
411 \definecolor[named]{ACMBlue}{cmyk}{1,0.1,0,0.1}
412 \definecolor[named]{ACMYellow}{cmyk}{0,0.16,1,0}
413 \definecolor[named]{ACMOrange}{cmyk}{0,0.42,1,0.01}
414 \definecolor[named]{ACMRed}{cmyk}{0,0.90,0.86,0}
415 \definecolor[named]{ACMLightBlue}{cmyk}{0.49,0.01,0,0}
416 \definecolor[named]{ACMGreen}{cmyk}{0.20,0,1,0.19}
417 \definecolor[named]{ACMPurple}{cmyk}{0.55,1,0,0.15}
418 \definecolor[named]{ACMDarkBlue}{cmyk}{1,0.58,0,0.21}

```

## 3.5 Paper size and paragraphing

We use geometry for dimensions

```

419 \RequirePackage{geometry}
420 \ifcase\ACM@format@nr
421 \relax % manuscript
422   \geometry{letterpaper,head=1pc}%
423 \or % acmsmall
424   \geometry{twoside=true,

```

```

425     includeheadfoot, head=1pc, foot=2pc,
426     paperwidth=6.75in, paperheight=10in,
427     top=58pt, bottom=44pt, inner=46pt, outer=46pt
428 }%
429 \or % acmlarge
430 \geometry{twoside=true, head=1pc, foot=2pc,
431     paperwidth=8.5in, paperheight=11in,
432     includeheadfoot,
433     top=78pt, bottom=114pt, inner=81pt, outer=81pt
434 }%
435 \or % acmtog
436 \geometry{twoside=true, head=1pc, foot=2pc,
437     paperwidth=8.5in, paperheight=11in,
438     includeheadfoot, columnsep=24pt,
439     top=52pt, bottom=75pt, inner=52pt, outer=52pt
440 }%
441 \or % sigconf
442 \geometry{twoside=true, head=1pc,
443     paperwidth=8.5in, paperheight=11in,
444     includeheadfoot, columnsep=2pc,
445     top=57pt, bottom=75pt, inner=54pt, outer=57pt
446 }%
447 \or % siggraph
448 \geometry{twoside=true, head=1pc,
449     paperwidth=8.5in, paperheight=11in,
450     includeheadfoot, columnsep=2pc,
451     top=57pt, bottom=75pt, inner=54pt, outer=57pt
452 }%
453 \or % sigplan
454 \geometry{twoside=true, head=1pc,
455     paperwidth=8.5in, paperheight=11in,
456     includeheadfoot=false, columnsep=2pc,
457     top=1in, bottom=1in, inner=0.75in, outer=0.75in
458 }%
459 \or % sigchi
460 \geometry{twoside=true, head=1pc,
461     paperwidth=8.5in, paperheight=11in,
462     includeheadfoot, columnsep=2pc,
463     top=66pt, bottom=78pt, inner=54pt, outer=48pt
464 }%
465 \or % sigchi-a
466 \geometry{twoside=false, head=1pc,
467     paperwidth=11in, paperheight=8.5in,
468     includeheadfoot, marginparsep=72pt,
469     marginparwidth=170pt, columnsep=20pt,
470     top=72pt, bottom=72pt, left=314pt, right=72pt
471 }%
472 \@mparswitchfalse
473 \reversemarginpar
474 \fi

```

`\parindent` Paragraphing

```
\parskip 475 \setlength\parindent{10\p@}
476 \setlength\parskip{\z@}
477 \ifcase\ACM@format@nr
478 \relax % manuscript
479 \or % acmsmall
480 \or % acmlarge
481 \or % acmtog
482 \setlength\parindent{9\p@}%
483 \or % sigconf
484 \or % siggraph
485 \or % sigplan
486 \or % sigchi
487 \or % sigchi-a
488 \fi
```

Footnotes require some consideration. We have several layers of footnotes: front-matter footnotes, “regular” footnotes and the special insert for bibstrip. In the old ACM classes bibstrip was a `\@float`. The problem with floats is that they tend to, well, float—and we want the guarantee they stay.

We use *manyfoot* for layered footnotes instead.

`\copyrightpermissionfootnoterule` This is the footnote rule that separates bibstrip from the rest of the paper. It is a full width rule.

```
489 \def\copyrightpermissionfootnoterule{\kern-3\p@
490 \hrule \@width \columnwidth \kern 2.6\p@}

491 \RequirePackage{manyfoot}
492 \SelectFootnoteRule[2]{copyrightpermission}
493 \DeclareNewFootnote{copyrightpermission}
```

`\footnoterule` Tschichold’s rules:

```
494 \def\footnoterule{\kern-3\p@
495 \hrule \@width 4pc \kern 2.6\p@}
```

`\endminipage` We do not use footnote rules in minipages

```
496 \def\endminipage{%
497 \par
498 \unskip
499 \ifvoid\@mpfootins\else
500 \vskip\skip\@mpfootins
501 \normalcolor
502 \unvbox\@mpfootins
503 \fi
504 \@minipagefalse %% added 24 May 89
505 \color@endgroup
506 \egroup
507 \expandafter\@iiiparbox\@mpargs{\unvbox\@tempboxa}}
508
```

```

\@makefnmark We do not use indentation for footnotes
509 \def\@makefnmark{\noindent\@makefnmark}

\@footnotetext In sigchi-a mode our footnotes are on the margins!
510 \if@ACM@sigchiamode
511 \long\def\@footnotetext#1{\marginpar{%
512   \reset@font\small
513   \interlinepenalty\interfootnotelinepenalty
514   \protected@edef\@currentlabel{%
515     \csname p@footnote\endcsname\@thefnmark
516   }}%
517   \color@begingroup
518     \@makefnmark{%
519       \rule{z}{\footnotesep}\ignorespaces#1\@finalstrut\strutbox}%
520   \color@endgroup}}%
521 \fi

```

### 3.6 Fonts

```

\if@ACM@newfonts Whether we load the new fonts
522 \newif\if@ACM@newfonts
523 \@ACM@newfontstrue
524 \IfFileExists{libertine.sty}{\ClassWarning{\@classname}{You do not
525   have libertine package installed. Please upgrade your
526   TeX}\@ACM@newfontsfalse}
527 \IfFileExists{zi4.sty}{\ClassWarning{\@classname}{You do not
528   have zi4 package installed. Please upgrade your TeX}\@ACM@newfontsfalse}
529 \IfFileExists{newtxmath.sty}{\ClassWarning{\@classname}{You do not
530   have newtxmath package installed. Please upgrade your
531   TeX}\@ACM@newfontsfalse}

We use Times throughout.
532 \if@ACM@newfonts
533 \RequirePackage[tt=false]{libertine}
534 \RequirePackage[varqu]{zi4}
535 \RequirePackage[libertine]{newtxmath}
536 \else
537 \RequirePackage{textcomp}
538 \fi

The SIGCHI extended abstracts are sans serif:
539 \if@ACM@sigchiamode
540 \renewcommand{\familydefault}{\sfdefault}
541 \fi

```

### 3.7 Floats

```

We use caption package
542 \RequirePackage{caption, float}

```

```

543 \captionsetup[table]{position=top}
544 \if@ACM@journal
545   \captionsetup{labelfont={sf, small},
546     textfont={sf, small}, margin=\z@}
547   \captionsetup[figure]{name={Fig.}}
548 \else
549   \captionsetup{labelfont={bf},
550     textfont={bf}, labelsep=colon, margin=\z@}
551   \ifcase\ACM@format@nr
552   \relax % manuscript
553   \or % acmsmall
554   \or % acmlarge
555   \or % acmtog
556   \or % sigconf
557   \or % siggraph
558     \captionsetup{textfont={it}}
559   \or % sigplan
560     \captionsetup{labelfont={bf},
561       textfont={normalfont}, labelsep=period, margin=\z@}
562   \or % sigchi
563     \captionsetup[figure]{labelfont={bf, small},
564       textfont={bf, small}}
565   \or % sigchi-a
566     \captionsetup[figure]{labelfont={bf, small},
567       textfont={bf, small}}
568   \fi
569 \fi

```

sidebar The sidebar environment:

```

570 \newfloat{sidebar}{}{sbar}
571 \floatname{sidebar}{Sidebar}
572 \renewenvironment{sidebar}{}{\Collect@Body\@sidebar}{}

```

\@sidebar The processing of the saved text

```

573 \long\def\@sidebar#1{\bgroup\captionsetup{type=sidebar}%
574   \marginpar{\small#1}\egroup}

```

marginfigure The marginfigure environment:

```

575 \newenvironment{marginfigure}{}{\Collect@Body\@marginfigure}{}

```

\@marginfigure The processing of the saved text

```

576 \long\def\@marginfigure#1{\bgroup\captionsetup{type=figure}%
577   \marginpar{\centering\small#1}\egroup}

```

margintable The margintable environment:

```

578 \newenvironment{margintable}{}{\Collect@Body\@margintable}{}

```

\@margintable The processing of the saved text

```

579 \long\def\@margintable#1{\bgroup\captionsetup{type=table}%
580   \marginpar{\centering\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
581 \newdimen\fulltextwidth
582 \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)
583 \if@ACM@sigchiamode
584 \def\@dblfloat{\bgroup\columnwidth=\fulltextwidth
585 \let\@endfloatbox\@endwidefloatbox
586 \def\@fpsaddddefault{\def\@fps{tp}}%
587 \@float}
588 \fi

\end@dblfloat And the end. Just adding a \bgroup.
589 \if@ACM@sigchiamode
590 \def\end@dblfloat{%
591 \end@float\egroup}
592 \fi

\@endwidefloatbox This is the end of a wide box - we basically move everything to the left
593 \def\@endwidefloatbox{%
594 \par\vskip\z@skip
595 \@minipagefalse
596 \outer@nobreak
597 \egroup
598 \color@endbox
599 \global\setbox\@currbox=\vbox{\moveleft
600 \dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%
601 \wd\@currbox=\textwidth
602 }
```

### 3.8 Lists

```
603 \ifcase\ACM@format@nr
604 \relax % manuscript
605 \or % acmsmall
606 \or % acmlarge
607 \or % acmtog
608 \or % sigconf
609 \or % siggraph
610 \or % sigplan
611 \def\labelenumi{\theenumi.}
612 \def\labelenumii{\theenumii.}
613 \def\labelenumiii{\theenumiii.}
614 \def\labelenumiv{\theenumiv.}
615 \or % sigchi
```



```

616 \or % sigchi-a
617 \fi

\descriptionlabel We do not use default colon as \amsart does:
618 \renewcommand{\descriptionlabel}[1]{\hspace\labelsep \upshape\bfseries #1}

```

### 3.9 Top matter data

We use keyval interface to define journal title and relevant information

```

619 \define@choicekey*+{ACM}{acmJournal}[\@journalCode\@journalCode@nr]{%
620   CIE,%
621   CSUR,%
622   JACM,%
623   JDIQ,%
624   JEA,%
625   JERIC,%
626   JETC,%
627   JOCCH,%
628   TAAS,%
629   TACCESS,%
630   TACO,%
631   TALG,%
632   TALLIP,%
633   TAP,%
634   TCPS,%
635   TEAC,%
636   TECS,%
637   TIIS,%
638   TISSEC,%
639   TIST,%
640   TKDD,%
641   TMIS,%
642   TOCE,%
643   TOCHI,%
644   TOCL,%
645   TOCS,%
646   TOCT,%
647   TODAES,%
648   TODS,%
649   TOG,%
650   TOIS,%
651   TOIT,%
652   TOMACS,%
653   TOMM,%
654   TOMPECS,%
655   TOMS,%
656   TOPC,%
657   TOPS,%
658   TOPLAS,%
659   TOS,%

```

```

660 TOSEM,%
661 TOSN,%
662 TRET$,%
663 TSAS,%
664 TSC,%
665 TSLP,%
666 TWEB%
667 }{%
668 \ifcase\@journalCode@nr
669 \relax % CIE
670 \def\@journalName{ACM Computers in Entertainment}%
671 \def\@journalNameShort{ACM Comput. Entertain.}%
672 \def\@permissionCodeOne{1544-3574}%
673 \or % CSUR
674 \def\@journalName{ACM Computing Surveys}%
675 \def\@journalNameShort{ACM Comput. Surv.}%
676 \def\@permissionCodeOne{0360-0300}%
677 \or % JACM
678 \def\@journalName{Journal of the ACM}%
679 \def\@journalNameShort{J. ACM}%
680 \def\@permissionCodeOne{0004-5411}%
681 \or % JDIQ
682 \def\@journalName{ACM Journal of Data and Information Quality}%
683 \def\@journalNameShort{ACM J. Data Inform. Quality}%
684 \def\@permissionCodeOne{1936-1955}%
685 \or % JEA
686 \def\@journalName{ACM Journal of Experimental Algorithmics}%
687 \def\@journalNameShort{ACM J. Exp. Algor.}%
688 \def\@permissionCodeOne{1084-6654}%
689 \or % JERIC
690 \def\@journalName{ACM Journal of Educational Resources in Computing}%
691 \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%
692 \def\@permissionCodeOne{1073-0516}%
693 \or % JETC
694 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
695 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
696 \def\@permissionCodeOne{1550-4832}%
697 \or % JOCCH
698 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%
699 \def\@journalName{ACM J. Comput. Cult. Herit.}%
700 \or % TAAS
701 \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
702 \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
703 \def\@permissionCodeOne{1556-4665}%
704 \or % TACCESS
705 \def\@journalName{ACM Transactions on Accessible Computing}%
706 \def\@journalNameShort{ACM Trans. Access. Comput.}%
707 \def\@permissionCodeOne{1936-7228}%
708 \or % TACO
709 \def\@journalName{ACM Transactions on Architecture and Code Optimization}%

```

```

710 \or % TALG
711 \def\@journalName{ACM Transactions on Algorithms}%
712 \def\@journalNameShort{ACM Trans. Algor.}%
713 \def\@permissionCodeOne{1549-6325}%
714 \or % TALLIP
715 \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
716 \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
717 \def\@permissionCodeOne{2375-4699}%
718 \or % TAP
719 \def\@journalName{ACM Transactions on Applied Perception}%
720 \or % TCPS
721 \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
722 \or % TEAC
723 \def\@journalName{ACM Transactions on Economics and Computation}%
724 \or % TECS
725 \def\@journalName{ACM Transactions on Embedded Computing Systems}%
726 \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%
727 \def\@permissionCodeOne{1539-9087}%
728 \or % TIIS
729 \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%
730 \def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%
731 \def\@permissionCodeOne{2160-6455}%
732 \or % TISSEC
733 \def\@journalName{ACM Transactions on Information and System Security}%
734 \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%
735 \def\@permissionCodeOne{1094-9224}%
736 \or % TIST
737 \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%
738 \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%
739 \def\@permissionCodeOne{2157-6904}%
740 \or % TKDD
741 \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%
742 \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%
743 \def\@permissionCodeOne{1556-4681}%
744 \or % TMIS
745 \def\@journalName{ACM Transactions on Management Information Systems}%
746 \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%
747 \def\@permissionCodeOne{2158-656X}%
748 \or % TOCE
749 \def\@journalName{ACM Transactions on Computing Education}%
750 \def\@journalNameShort{ACM Trans. Comput. Educ.}%
751 \def\@permissionCodeOne{1946-6226}%
752 \or % TOCHI
753 \def\@journalName{ACM Transactions on Computer-Human Interaction}%
754 \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%
755 \def\@permissionCodeOne{1073-0516}%
756 \or % TOCL
757 \def\@journalName{ACM Transactions on Computational Logic}%
758 \def\@journalNameShort{ACM Trans. Comput. Logic}%
759 \def\@permissionCodeOne{1529-3785}%

```

```

760 \or % TOCS
761   \def\@journalName{ACM Transactions on Computer Systems}%
762   \def\@journalNameShort{ACM Trans. Comput. Syst.}%
763   \def\@permissionCodeOne{0734-2071}%
764 \or % TOCT
765   \def\@journalName{ACM Transactions on Computation Theory}%
766   \def\@journalNameShort{ACM Trans. Comput. Theory}%
767   \def\@permissionCodeOne{1942-3454}%
768 \or % TODAES
769   \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%
770   \def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
771   \def\@permissionCodeOne{1084-4309}%
772 \or % TODS
773   \def\@journalName{ACM Transactions on Database Systems}%
774   \def\@journalNameShort{ACM Trans. Datab. Syst.}%
775   \def\@permissionCodeOne{0362-5915}%
776 \or % TOG
777   \def\@journalName{ACM Transactions on Graphics}%
778   \def\@journalNameShort{ACM Trans. Graph.}%
779   \def\@permissionCodeOne{0730-0301}%
780 \or % TOIS
781   \def\@journalName{ACM Transactions on Information Systems}%
782   \def\@journalName{ACM Transactions on Information Systems}%
783   \def\@permissionCodeOne{1046-8188}%
784 \or % TOIT
785   \def\@journalName{ACM Transactions on Internet Technology}%
786   \def\@journalNameShort{ACM Trans. Internet Technol.}%
787   \def\@permissionCodeOne{1533-5399}%
788 \or % TOMACS
789   \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
790   \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
791   \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
792 \or % TOMM
793   \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
794   \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
795   \def\@permissionCodeOne{1551-6857}%
796   \def\@permissionCodeTwo{0100}%
797 \or % TOMPECS
798   \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
799   \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
800   \def\@permissionCodeOne{2376-3639}%
801 \or % TOMS
802   \def\@journalName{ACM Transactions on Mathematical Software}%
803   \def\@journalNameShort{ACM Trans. Math. Softw.}%
804   \def\@permissionCodeOne{0098-3500}%
805 \or % TOPC
806   \def\@journalName{ACM Transactions on Parallel Computing}%
807   \def\@journalNameShort{ACM Trans. Parallel Comput.}%
808   \def\@permissionCodeOne{1539-9087}%
809 \or % TOPS

```

```

810 \def\@journalName{ACM Transactions on Privacy and Security}%
811 \def\@journalNameShort{ACM Trans. Priv. Sec.}%
812 \def\@permissionCodeOne{2471-2566}%
813 \or % TOPLAS
814 \def\@journalName{ACM Transactions on Programming Languages and Systems}%
815 \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
816 \def\@permissionCodeOne{0164-0925}%
817 \or % TOS
818 \def\@journalName{ACM Transactions on Storage}%
819 \def\@journalNameShort{ACM Trans. Storage}%
820 \def\@permissionCodeOne{1553-3077}%
821 \or % TOSEM
822 \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
823 \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
824 \def\@permissionCodeOne{1049-331X}%
825 \or % TOSN
826 \def\@journalName{ACM Transactions on Sensor Networks}%
827 \def\@journalNameShort{ACM Trans. Sensor Netw.}%
828 \def\@permissionCodeOne{1550-4859}%
829 \or % TRET
830 \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
831 \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
832 \def\@permissionCodeOne{1936-7406}%
833 \or % TSAS
834 \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%
835 \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
836 \def\@permissionCodeOne{2374-0353}%
837 \or % TSC
838 \def\@journalName{ACM Transactions on Social Computing}%
839 \def\@journalNameShort{ACM Trans. Soc. Comput.}%
840 \def\@permissionCodeOne{2469-7818}%
841 \or % TSLP
842 \def\@journalName{ACM Transactions on Speech and Language Processing}%
843 \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
844 \def\@permissionCodeOne{1550-4875}%
845 \or % TWEB
846 \def\@journalName{ACM Transactions on the Web}%
847 \def\@journalNameShort{ACM Trans. Web}%
848 \def\@permissionCodeOne{1559-1131}%
849 \fi
850 \ClassInfo{\@classname}{Using journal code \@journalCode}%
851 }{%
852 \ClassError{\@classname}{Incorrect journal #1}%
853 }%

```

\acmJournal And the syntactic sugar around it

```
854 \def\acmJournal#1{\setkeys{ACM}{acmJournal=#1}}
```

The defaults:

```
855 \def\@journalName{}
```

```

856 \def\@journalNameShort{\@journalName}%
857 \def\@permissionCodeOne{XXXX-XX}%
858 \def\@permissionCodeTwo{}%

\acmConference This is the conference command
859 \newcommand\acmConference[4][{}%
860   \gdef\acmConference@shortname{#1}%
861   \gdef\acmConference@name{#2}%
862   \gdef\acmConference@date{#3}%
863   \gdef\acmConference@venue{#4}%
864   \ifx\acmConference@shortname\@empty
865     \gdef\acmConference@shortname{#2}%
866   \fi}
867 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
868   DC, USA}

\subtitle The subtitle macro
869 \def\subtitle#1{\def\@subtitle{#1}}
870 \subtitle{}

\num@authors The total number of authors
871 \newcount\num@authors
872 \num@authors=0\relax

\author Adding an author to the list of authors and addresses
873 \renewcommand\author[2][{}%
874   \global\advance\num@authors by 1\relax
875   \ifx\addresses\@empty
876     \if@ACM@anonymous
877       \gdef\addresses{\@author{Anonymous Author(s)}}%
878       \gdef\authors{Anonymous Author(s)}%
879     \else
880       \gdef\addresses{\@author{#2}}%
881       \gdef\authors{#2}%
882     \fi
883   \else
884     \if@ACM@anonymous\else
885       \g@addto@macro\addresses{\and\@author{#2}}%
886       \g@addto@macro\authors{\and#2}%
887     \fi
888   \fi
889   \if@ACM@anonymous
890     \ifx\shortauthors\@empty
891       \gdef\shortauthors{Anon.}%
892     \fi
893   \else
894     \def\@tempa{#1}%
895     \ifx\@tempa\@empty
896       \ifx\shortauthors\@empty

```

```

897     \gdef\shortauthors{#2}%
898     \else
899         \g@addto@macro\shortauthors{\and#2}%
900     \fi
901 \else
902     \ifx\shortauthors\@empty
903         \gdef\shortauthors{#1}%
904     \else
905         \g@addto@macro\shortauthors{\and#1}%
906     \fi
907 \fi
908 \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.

```

909 \newcommand{\affiliation}[2][{}]{%
910     \if@ACM@anonymous\else
911         \g@addto@macro\addresses{\affiliation{#1}{#2}}%
912     \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.

```

913 \renewcommand{\email}[2][{}]{%
914     \if@ACM@anonymous\else
915         \g@addto@macro\addresses{\email{#1}{#2}}%
916     \fi}

```

`\@titlenotes` The `titlenotes`

```

917 \def\@titlenotes{}

```

`\titlenote` Adding note to the title

```

918 \def\titlenote#1{%
919     \g@addto@macro\@title{\footnotemark}%
920     \if@ACM@anonymous
921         \g@addto@macro\@titlenotes{%
922             \stepcounter{footnote}\footnotetext{Title note}}%
923     \else
924         \g@addto@macro\@titlenotes{\stepcounter{footnote}\footnotetext{#1}}%
925     \fi}

```

`\@subtitlenotes` The `subtitlenotes`

```

926 \def\@subtitlenotes{}

```

`\subtitlenote` Adding note to the subtitle

```

927 \def\subtitlenote#1{%
928     \g@addto@macro\@subtitle{\footnotemark}%
929     \if@ACM@anonymous
930         \g@addto@macro\@subtitlenotes{%
931             \stepcounter{footnote}\footnotetext{Subtitle note}}%

```

```

932 \else
933 \g@addto@macro\@subtitlenotes{%
934 \stepcounter{footnote}\footnotetext{#1}}%
935 \fi}

\@authornotes The authornotes
936 \def\@authornotes{}

\authornote Adding note to the author
937 \def\authornote#1{%
938 \if@ACM@anonymous\else
939 \g@addto@macro\addresses{\@authornotemark}
940 \g@addto@macro\@authornotes{%
941 \stepcounter{footnote}\footnotetext{#1}}%
942 \fi}

\acmVolume The current volume
943 \def\acmVolume#1{\def\@acmVolume{#1}}
944 \acmVolume{VV}

\acmNumber The current number
945 \def\acmNumber#1{\def\@acmNumber{#1}}
946 \acmNumber{NNN}

\acmArticle The current article
947 \def\acmArticle#1{\def\@acmArticle{#1}}
948 \acmArticle{AA}

\acmArticleSeq The sequence number
949 \def\acmArticleSeq#1{\def\@acmArticleSeq{#1}}
950 \acmArticleSeq{\@acmArticle}

\acmYear The current year
951 \def\acmYear#1{\def\@acmYear{#1}}
952 \acmYear{YYYY}

\acmMonth The current month
953 \def\acmMonth#1{\def\@acmMonth{#1}}
954 \acmMonth{MM}

\@acmPubDate The publication date
955 \def\@acmPubDate{\ifcase\@acmMonth\or
956 January\or February\or March\or April\or May\or June\or
957 July\or August\or September\or October\or November\or
958 December\fi~\@acmYear}

\acmPrice The price
959 \def\acmPrice#1{\def\@acmPrice{#1}}
960 \acmPrice{15.00}

```



<code>\acmISBN</code>	<p>The book isbn</p> <pre> 961 \def\acmISBN#1{\def\@acmISBN{#1}} 962 \acmISBN{978-x-xxxx-xxxx-x/YY/MM} </pre>
<code>\acmDOI</code>	<p>The paper doi</p> <pre> 963 \def\acmDOI#1{\def\@acmDOI{#1}} 964 \acmDOI{10.1145/nnnnnnn.nnnnnnn} </pre>
<code>\if@ACM@badge</code>	<p>Whether to print badge. Note that either left or right badge triggers it:</p> <pre> 965 \newif\if@ACM@badge 966 \@ACM@badgefalse </pre>
<code>\@ACM@badge@width</code>	<p>The width of the badge</p> <pre> 967 \newlength\@ACM@badge@width 968 \setlength\@ACM@badge@width{5pc} </pre>
<code>\@ACM@title@width</code>	<p>The width of the badge</p> <pre> 969 \newlength\@ACM@title@width </pre>
<code>\@ACM@badge@skip</code>	<p>The space between the badge and the title</p> <pre> 970 \newlength\@ACM@badge@skip 971 \setlength\@ACM@badge@skip{1pc} </pre>
<code>\acmBadgeR</code>	<p>Setting the right badge</p> <pre> 972 \newcommand\acmBadgeR[2][\@ACM@badgetrue 973   \def\@acmBadgeR@url{#1}% 974   \def\@acmBadgeR@image{#2}} 975 \def\@acmBadgeR@url{} 976 \def\@acmBadgeR@image{} </pre>
<code>\acmBadgeL</code>	<p>Setting the left badge</p> <pre> 977 \newcommand\acmBadgeL[2][\@ACM@badgetrue 978   \def\@acmBadgeL@url{#1}% 979   \def\@acmBadgeL@image{#2}} 980 \def\@acmBadgeL@url{} 981 \def\@acmBadgeL@image{} </pre>
<code>\startPage</code>	<p>The start page of the paper</p> <pre> 982 \def\startPage#1{\def\@startPage{#1}} 983 \startPage{} </pre>
<code>\terms</code>	<p>Terms are mostly obsolete, we use CCS now. Still it makes sense to keep them for compatibility.</p> <pre> 984 \def\terms#1{\def\@terms{#1}} 985 \terms{} </pre>
<code>\keywords</code>	<p>Keywords are mostly obsolete, we use CCS now. Still it makes sense to keep them for compatibility.</p> <pre> 986 \def\keywords#1{\def\@keywords{#1}} 987 \keywords{} </pre>

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

```

988 \renewenvironment{abstract}{\Collect@Body\@saveabstract{}}

```

\@saveabstract    And saving the abstract

```

989 \long\def\@saveabstract#1{\long\gdef\@abstract{#1}}
990 \@saveabstract{}

```

\@empty    The long version of \@empty (to compare with \@abstract)

```

991 \long\def\@empty{}

```

\if@ACM@printcss    Whether to print CCS

```

992 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printcss}[true]{%
993   \if@ACM@printcss
994     \ClassInfo{\@classname}{Printing CSS}%
995   \else
996     \ClassInfo{\@classname}{Suppressing CSS}%
997   \fi}{\ClassError{\@classname}{printcss must be true or false}}

```

\if@ACM@printbib    Whether to print ACM bib

```

998 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printbib}[true]{%
999   \if@ACM@printcss
1000     \ClassInfo{\@classname}{Printing bibformat}%
1001   \else
1002     \ClassInfo{\@classname}{Suppressing bibformat}%
1003   \fi}{\ClassError{\@classname}{printbib must be true or false}}

```

\settopmatter    The usual syntactic sugar

```

1004 \def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}

```

Now the settings

```

1005 \settopmatter{printcss=true}
1006 \if@ACM@manuscript
1007   \settopmatter{printbib=false}
1008 \else
1009   \if@ACM@journal
1010     \settopmatter{printbib=true}
1011   \else
1012     \settopmatter{printbib=false}
1013   \fi
1014 \fi

```

\@received    The container for the paper history

```

1015 \def\@received{}

```

\received    The \received command

```

1016 \newcommand\received[2][\def\@tempa{#1}%
1017   \ifx\@tempa\@empty

```

```

1018 \ifx\@received\@empty
1019 \gdef\@received{Received #2}%
1020 \else
1021 \g@addto@macro{\@received}{; revised #2}%
1022 \fi
1023 \else
1024 \ifx\@received\@empty
1025 \gdef\@received{#1 #2}%
1026 \else
1027 \g@addto@macro{\@received}{; #1 #2}%
1028 \fi
1029 \fi}
1030 \AtEndDocument{%
1031 \ifx\@received\@empty\else
1032 \par\bigskip\noindent\small\normalfont\@received\par
1033 \fi}

```

### 3.10 Concepts system

We exclude CCSXML stuff generated by the ACM system:

```

1034 \RequirePackage{comment}
1035 \excludecomment{CCSXML}

```

\@concepts This is the storage macro for concepts

```

1036 \let\@concepts\@empty

```

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

```

1037 \newcommand\ccsdesc[2][100]{%
1038 \ccsdesc@parse#1~#2~}

```

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

```

1039 \def\ccsdesc@parse#1~#2~#3~{%
1040 \expandafter\ifx\csname CCS@#2\endcsname\relax
1041 \expandafter\gdef\csname CCS@#2\endcsname{\textbullet\textbf{#2} $\to$ }%
1042 \g@addto@macro{\@concepts}{\csname CCS@#2\endcsname}\fi
1043 \expandafter\g@addto@macro\expandafter{\csname CCS@#2\endcsname}{%
1044 \ifnum#1>499\textbf{#3; }\else
1045 \ifnum#1>299\textit{#3; }\else
1046 #3; \fi\fi}}

```

### 3.11 Copyright system

This is from acmcopyright.sty

\if@printcopyright A flag whether to print copyright symbol

```

1047 \newif\if@printcopyright
1048 \@printcopyrighttrue

```

\if@printpermission Whether to print permission block

```
1049 \newif\if@printpermission
1050 \@printpermissiontrue
```

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

```
1051 \newif\if@acmowned
1052 \@acmownedtrue
```

Keys:

```
1053 \define@choicekey*{ACM@}{acmcopyrightmode}[%
1054   \acm@copyrightinput\acm@copyrightmode]{none,acmcopyright,acmlicensed,%
1055   rightsretained,usgov,usgovmixed,cagov,cagovmixed,%
1056   licensedusgovmixed,licensedcagovmixed,othergov,licensedothergov}{%
1057   \@printpermissiontrue
1058   \@printcopyrighttrue
1059   \@acmownedtrue
1060   \ifnum\acm@copyrightmode=0\relax % none
1061     \@printpermissionfalse
1062     \@printcopyrightfalse
1063     \@acmownedfalse
1064   \fi
1065   \ifnum\acm@copyrightmode=2\relax % acmlicensed
1066     \@acmownedfalse
1067   \fi
1068   \ifnum\acm@copyrightmode=3\relax % rightsretained
1069     \@acmownedfalse
1070   \fi
1071   \ifnum\acm@copyrightmode=4\relax % usgov
1072     \@printpermissiontrue
1073     \@printcopyrightfalse
1074     \@acmownedfalse
1075   \fi
1076   \ifnum\acm@copyrightmode=6\relax % cagov
1077     \@acmownedfalse
1078   \fi
1079   \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
1080     \@acmownedfalse
1081   \fi
1082   \ifnum\acm@copyrightmode=9\relax % licensedcagovmixed
1083     \@acmownedfalse
1084   \fi
1085   \ifnum\acm@copyrightmode=10\relax % othergov
1086     \@acmownedtrue
1087   \fi
1088   \ifnum\acm@copyrightmode=11\relax % licensedothergov
1089     \@acmownedfalse
1090   \fi}
```

\setcopyright This is the syntactic sugar around setting keys.

```

1091 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}
1092 \setcopyright{acmcopyright}

```

\@copyrightowner Here is the owner of the copyright

```

1093 \def\@copyrightowner{%
1094   \ifcase\acm@copyrightmode\relax % none
1095   \or % acmcopyright
1096   ACM\@.
1097   \or % acmlicensed
1098   Copyright held by the owner/author(s). Publication rights licensed to
1099   ACM\@.
1100   \or % rightsretained
1101   Copyright held by the owner/author(s).
1102   \or % usgov
1103   \or % usgovmixed
1104   ACM\@.
1105   \or % cagov
1106   Crown in Right of Canada.
1107   \or %cagovmixed
1108   ACM\@.
1109   \or %licensedusgovmixed
1110   Copyright held by the owner/author(s). Publication rights licensed to
1111   ACM\@.
1112   \or %licensedcagovmixed
1113   Copyright held by the owner/author(s). Publication rights licensed to
1114   ACM\@.
1115   \or % othergov
1116   ACM\@.
1117   \or % licensedothergov
1118   Copyright held by the owner/author(s). Publication rights licensed to
1119   ACM\@.
1120   \fi}

```

\@formatdoi Print a clickable doi

```

1121 \def\@formatdoi#1{\url{http://dx.doi.org/#1}}

```

\@copyrightpermission The canned permission block.

```

1122 \def\@copyrightpermission{%
1123   \ifcase\acm@copyrightmode\relax % none
1124   \or % acmcopyright
1125   Permission to make digital or hard copies of all or part of this
1126   work for personal or classroom use is granted without fee provided
1127   that copies are not made or distributed for profit or commercial
1128   advantage and that copies bear this notice and the full citation on
1129   the first page. Copyrights for components of this work owned by
1130   others than ACM must be honored. Abstracting with credit is
1131   permitted. To copy otherwise, or republish, to post on servers or to
1132   redistribute to lists, requires prior specific permission
1133   and\hspace*{.5pt}/or a fee. Request permissions from

```

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1135 \or % acmlicensed  
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1137 work for personal or classroom use is granted without fee provided  
1138 that copies are not made or distributed for profit or commercial  
1139 advantage and that copies bear this notice and the full citation on  
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1141 others than the author(s) must be honored. Abstracting with credit  
1142 is permitted. To copy otherwise, or republish, to post on servers  
1143 or to redistribute to lists, requires prior specific permission  
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1147 Permission to make digital or hard copies of part or all of this work  
1148 for personal or classroom use is granted without fee provided that  
1149 copies are not made or distributed for profit or commercial advantage  
1150 and that copies bear this notice and the full citation on the first  
1151 page. Copyrights for third-party components of this work must be  
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1153 owner\hspace\*{.5pt}/author(s).  
1154 \or % usgov  
1155 This paper is authored by an employee(s) of the United States  
1156 Government and is in the public domain. Non-exclusive copying or  
1157 redistribution is allowed, provided that the article citation is  
1158 given and the authors and agency are clearly identified as its  
1159 source.  
1160 \or % usgovmixed  
1161 ACM acknowledges that this contribution was authored or co-authored  
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1172 \or % cagov  
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1180 use is granted. Copies must bear this notice and the full citation  
1181 on the first page. Copyrights for components of this work owned by  
1182 others than the Canadian Government must be honored. To copy  
1183 otherwise, distribute, republish, or post, requires prior specific

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 1185 permissions@acm.org.  
 1186 \or % cagovmixed  
 1187 ACM acknowledges that this contribution was co-authored by an  
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 1212 \or % othergov  
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 1221 or affiliate of a national government. As such, the Government  
 1222 retains a nonexclusive, royalty-free right to publish or reproduce  
 1223 this article, or to allow others to do so, for Government purposes  
 1224 only.  
 1225 \fi}

\copyrightyear By default, the copyright year is the same as \acmYear, but one can override this:

1226 \def\copyrightyear#1{\def\@copyrightyear{#1}}  
 1227 \copyrightyear{\@acmYear}

\@teaserfigures The teaser figures container

1228 \def\@teaserfigures{}

teaserfigure The teaser figure  
1229 \newenvironment{teaserfigure}{\Collect@Body\@saveteaser}{}

\@saveteaser Saving the teaser  
1230 \long\def\@saveteaser#1{\g@addto@macro\@teaserfigures{\@teaser{#1}}}

\thanks We redefine amsart \thanks, so the anonymous key works  
1231 \renewcommand{\thanks}[1]{%  
1232 \ifnotempty{#1}{%  
1233 \if@ACM@anonymous  
1234 \g@addto@macro\thankses{\thanks{A note}}%  
1235 \else  
1236 \g@addto@macro\thankses{\thanks{#1}}%  
1237 \fi}}

### 3.12 Typesetting top matter

\mkttitle@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}*].  
1238 \newbox\mkttitle@bx

\maketitle The (in)famous \maketitle. Note that in sigchi-a mode authors are *not* in the title box.  
Another note: there is a subtle difference between author notes, title notes and thankses. The latter refer to the paper itself, and therefore belong to the copyright/permission block. By the way, this was the default behavior of the old ACM classes.

1239 \def\maketitle{%  
1240 \if@ACM@anonymous  
1241 % Anonymize omission of \author-s  
1242 \ifnum\@num@authors=0\author{}\fi  
1243 \fi  
1244 \begingroup  
1245 \let\@footnotemark\@footnotemark@nolink  
1246 \let\@footnotetext\@footnotetext@nolink  
1247 \renewcommand\thefootnote{\@fnsymbol\c@footnote}%  
1248 \@topnum\z@ % this prevents figures from falling at the top of page  
1249 % 1  
1250 \hsize=\textwidth  
1251 \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}  
1252 \mkttitle\if@ACM@sigchiamode\else\mkauthors\fi\mkteasers  
1253 \printtopmatter  
1254 \if@ACM@sigchiamode\mkauthors\fi  
1255 \setcounter{footnote}{0}%  
1256 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}  
1257 \@titlenotes  
1258 \@subtitlenotes  
1259 \@authornotes  
1260 \let\@makefnmark\relax \let\@thefnmark\relax



```

1261 \let\@makefntext\noindent
1262 \ifx\@empty\thankses\else
1263   \footnotetextcopyrightpermission{%
1264     \def\par{\let\par\@par}\parindent\z@\setthanks}%
1265   \fi
1266   \footnotetextcopyrightpermission{\parindent\z@\parskip0.1\baselineskip
1267   \if@ACM@authorversion\else
1268     \if@printpermission\@copyrightpermission\par\fi
1269   \fi
1270   \if@ACM@manuscript\else
1271     \if@ACM@journal\else % Print the conference short name
1272       {\itshape \acmConference@shortname, \acmConference@venue}\par
1273     \fi
1274   \fi
1275   \if@printcopyright
1276     \copyright\ \@copyrightyear\ \@copyrightowner\
1277   \else
1278     \@copyrightyear.\
1279   \fi
1280   \if@ACM@manuscript
1281     Manuscript submitted to ACM\
1282   \else
1283     \if@ACM@authorversion
1284       This is the author's version of the work. It is posted here for
1285       your personal use. Not for redistribution. The definitive Version
1286       of Record was published in
1287       \if@ACM@journal
1288         \emph{\@journalName}%
1289       \else
1290         \emph{Proceedings of \acmConference@name, \acmConference@date}%
1291       \fi
1292       \ifx\@acmDOI\@empty
1293         .
1294       \else
1295         , \@formatdoi{\@acmDOI}.
1296       \fi\
1297     \else
1298       \if@ACM@journal
1299         \@permissionCodeOne/\@acmYear/\@acmMonth-ART\@acmArticle\
1300         \$\@acmPrice\
1301         DOI: \nolinkurl{\@acmDOI}%
1302       \else % Conference
1303         \acmISBN
1304         \ifx\@acmPrice\@empty.\else\dots\$\@acmPrice\fi\
1305         DOI: \nolinkurl{\@acmDOI}%
1306       \fi
1307     \fi
1308   \fi}%
1309 \endgroup
1310 \setcounter{footnote}{0}%

```

```

1311 \@mkabstract
1312 \if@ACM@printcss
1313   \ifx\@concepts\empty\else\bgroup
1314     {\@specialsection{CCS Concepts}%
1315      \@concepts\par}\egroup
1316   \fi
1317 \fi
1318 \if\@terms\empty\else\bgroup
1319   {\@specialsection{General Terms}%
1320    \@terms\par}\egroup
1321 \fi
1322 \ifx\@keywords\empty\else\bgroup
1323   {\if@ACM@journal
1324     \@specialsection{Additional Key Words and Phrases}%
1325     \else
1326       \@specialsection{Keywords}%
1327     \fi
1328     \@keywords}\par\egroup
1329 \fi
1330 \andify\authors
1331 \andify\shortauthors
1332 \global\let\authors=\authors
1333 \global\let\shortauthors=\shortauthors
1334 \if@ACM@printbib
1335   \@mkbibcitation
1336 \fi
1337 \hypersetup{pdfauthor={\authors},
1338   pdftitle={\@title}, pdfkeywords={\@concepts}}%
1339 \@printendtopmatter
1340 \@afterindentfalse
1341 \@afterheading
1342 }

```

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

```

1343 \def\@specialsection#1{%
1344   \ifcase\ACM@format@nr
1345     \relax % manuscript
1346     \par\medskip\small\noindent#1: %
1347   \or % acmsmall
1348     \par\medskip\small\noindent#1: %
1349   \or % acmlarge
1350     \par\medskip\small\noindent#1: %
1351   \or % acmtog
1352     \par\medskip\small\noindent#1: %
1353   \or % sigconf
1354     \section*{#1}%
1355   \or % siggraph
1356     \section*{#1}%
1357   \or % sigplan
1358     \paragraph*{#1}%

```

```

1359 \or % sigchi
1360   \section*{#1}%
1361 \or % sigchi-a
1362   \section*{#1}%
1363 \fi}

```

\@printtopmatter The printing of top matter starts the new page, and uses the given title box. Note that for sigchi-a we print badges here rather than in \mkttitle since we want them on the margins.

```

1364 \def\@printtopmatter{%
1365   \ifx\@startPage\@empty
1366     \gdef\@startPage{1}%
1367   \else
1368     \setcounter{page}{\@startPage}%
1369   \fi
1370   \thispagestyle{firstpagestyle}%
1371   \noindent
1372   \ifcase\ACM@format@nr
1373   \relax % manuscript
1374     \box\mkttitle@bx\par
1375     \noindent\hrulefill\par
1376   \or % acmsmall
1377     \box\mkttitle@bx\par
1378     \noindent\hrulefill\par
1379   \or % acmlarge
1380     \box\mkttitle@bx\par
1381     \noindent\hrulefill\par
1382   \or % acmtog
1383     \twocolumn[\box\mkttitle@bx]%
1384   \or % sigconf
1385     \twocolumn[\box\mkttitle@bx]%
1386   \or % siggraph
1387     \twocolumn[\box\mkttitle@bx]%
1388   \or % sigplan
1389     \twocolumn[\box\mkttitle@bx]%
1390   \or % sigchi
1391     \twocolumn[\box\mkttitle@bx]%
1392   \or % sigchi-a
1393     \par\box\mkttitle@bx\par\bigskip
1394     \if@ACM@badge
1395       \marginpar{\noindent
1396         \ifx\@acmBadgeL@image\@empty\else
1397           \href{\@acmBadgeL@url}{%
1398             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}%
1399           \hskip\@ACM@badge@skip
1400         \fi
1401         \ifx\@acmBadgeR@image\@empty\else
1402           \href{\@acmBadgeR@url}{%
1403             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}%
1404         \fi}%

```

```

1405     \fi
1406     \fi
1407 }

\@mktitle The title of the article
1408 \def\@mktitle{%
1409   \ifcase\ACM@format@nr
1410     \relax % manuscript
1411     \@mktitle@i
1412   \or % acmsmall
1413     \@mktitle@i
1414   \or % acmlarge
1415     \@mktitle@i
1416   \or % acmtog
1417     \@mktitle@i
1418   \or % sigconf
1419     \@mktitle@iii
1420   \or % siggraph
1421     \@mktitle@iii
1422   \or % sigplan
1423     \@mktitle@iii
1424   \or % sigchi
1425     \@mktitle@iii
1426   \or % sigchi-a
1427     \@mktitle@iv
1428   \fi
1429 }

\@titlefont The font to typeset title
1430 \def\@titlefont{%
1431   \ifcase\ACM@format@nr
1432     \relax % manuscript
1433     \LARGE\bfseries\sffamily
1434   \or % acmsmall
1435     \LARGE\bfseries\sffamily
1436   \or % acmlarge
1437     \LARGE\bfseries\sffamily
1438   \or % acmtog
1439     \Huge\sffamily
1440   \or % sigconf
1441     \Huge\sffamily\bfseries
1442   \or % siggraph
1443     \Huge\sffamily\bfseries
1444   \or % sigplan
1445     \Huge\bfseries
1446   \or % sigchi
1447     \Huge\sffamily\bfseries
1448   \or % sigchi-a
1449     \Huge\bfseries
1450   \fi}

```

```

\@subtitlefont The font to typeset title
1451 \def\@subtitlefont{%
1452   \ifcase\ACM@format@nr
1453   \relax % manuscript
1454   \mdseries
1455   \or % acmsmall
1456   \mdseries
1457   \or % acmlarge
1458   \mdseries
1459   \or % acmtog
1460   \LARGE
1461   \or % sigconf
1462   \LARGE\mdseries
1463   \or % siggraph
1464   \LARGE\mdseries
1465   \or % sigplan
1466   \LARGE\mdseries
1467   \or % sigchi
1468   \LARGE\mdseries
1469   \or % sigchi-a
1470   \mdseries
1471   \fi}

```

```

\@mktitle@i The version of \mktitle for most journals
1472 \def\@mktitle@i{\hsize=\textwidth
1473   \@ACM@title@width=\hsize
1474   \ifx\@acmBadgeL@image\@empty\else
1475     \advance\@ACM@title@width by -\@ACM@badge@width
1476     \advance\@ACM@title@width by -\@ACM@badge@skip
1477   \fi
1478   \ifx\@acmBadgeR@image\@empty\else
1479     \advance\@ACM@title@width by -\@ACM@badge@width
1480     \advance\@ACM@title@width by -\@ACM@badge@skip
1481   \fi
1482   \setbox\mktitle@bx=\vbox{\noindent\@titlefont
1483     \ifx\@acmBadgeL@image\@empty\else
1484       \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeL@url}{%
1485         \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
1486       \hskip\@ACM@badge@skip
1487     \fi
1488     \parbox[t]{\@ACM@title@width}{\raggedright
1489       \@titlefont\noindent
1490       \@title
1491     \ifx\@subtitle\@empty\else
1492       \par\noindent{\@subtitlefont\@subtitle}
1493     \fi}%
1494   \ifx\@acmBadgeR@image\@empty\else
1495     \hskip\@ACM@badge@skip
1496     \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeR@url}{%
1497       \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%

```

```

1498 \fi
1499 \par\bigskip}}%

\mktitle@ii The version of \mktitle for TOG. Since v1.06 is subsumed by the \mktitle@i macro

\mktitle@iii The version of \mktitle for sigproc. Note that since the title is centered, we leave the
space for the left badge even if only the right badge is defined.
1500 \def\mktitle@iii{\hsize=\textwidth
1501 \setbox\mktitle@bx=\vbox{\@titlefont\centering
1502 \ACM@title@width=\hsize
1503 \if@ACM@badge
1504 \advance\ACM@title@width by -2\ACM@badge@width
1505 \advance\ACM@title@width by -2\ACM@badge@skip
1506 \parbox[b]{\ACM@badge@width}{\strut
1507 \ifx\acmBadgeL@image\empty\else
1508 \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\acmBadgeL@url}{%
1509 \includegraphics[width=\ACM@badge@width]{\acmBadgeL@image}}}%
1510 \fi}%
1511 \hskip\ACM@badge@skip
1512 \fi
1513 \parbox[t]{\ACM@title@width}{\centering\@titlefont
1514 \@title
1515 \ifx\@subtitle\empty\else
1516 \par\noindent{\@subtitlefont\@subtitle}
1517 \fi
1518 }%
1519 \if@ACM@badge
1520 \hskip\ACM@badge@skip
1521 \parbox[b]{\ACM@badge@width}{\strut
1522 \ifx\acmBadgeR@image\empty\else
1523 \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\acmBadgeR@url}{%
1524 \includegraphics[width=\ACM@badge@width]{\acmBadgeR@image}}}%
1525 \fi}%
1526 \fi
1527 \par\bigskip}}%

\mktitle@iv The version of \mktitle for sigchi-a
1528 \def\mktitle@iv{\hsize=\textwidth
1529 \setbox\mktitle@bx=\vbox{\raggedright\leftskip5pc\@titlefont
1530 \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
1531 \noindent\@title
1532 \ifx\@subtitle\empty\else
1533 \par\noindent\@subtitlefont\@subtitle
1534 \fi
1535 \par\bigskip}}%

\mkauthors Typesetting authors
1536 \def\mkauthors{\begin{group}
1537 \hsize=\textwidth

```

```

1538 \ifcase\ACM@format@nr
1539 \relax % manuscript
1540 \mkauthors@i
1541 \or % acsmall
1542 \mkauthors@i
1543 \or % acmlarge
1544 \mkauthors@i
1545 \or % acmtog
1546 \mkauthors@ii
1547 \or % sigconf
1548 \mkauthors@iii
1549 \or % siggraph
1550 \mkauthors@iii
1551 \or % sigplan
1552 \mkauthors@iii
1553 \or % sigchi
1554 \mkauthors@iii
1555 \or % sigchi-a
1556 \mkauthors@iv
1557 \fi
1558 \endgroup
1559 }

```

\@authorfont Somehow different conferences use different fonts for author names. Why?

```

1560 \def\@authorfont{\Large\sffamily}

```

\@affiliationfont Font for affiliations

```

1561 \def\@affiliationfont{\normalsize\normalfont}

```

#### Adjusting fonts for different formats

```

1562 \ifcase\ACM@format@nr
1563 \relax % manuscript
1564 \or % acsmall
1565 \or % acmlarge
1566 \or % acmtog
1567 \def\@authorfont{\LARGE\sffamily}
1568 \def\@affiliationfont{\large}
1569 \or % sigconf
1570 \def\@authorfont{\LARGE}
1571 \def\@affiliationfont{\large}
1572 \or % siggraph
1573 \def\@authorfont{\normalsize\normalfont}
1574 \def\@affiliationfont{\normalsize\normalfont}
1575 \or % sigplan
1576 \def\@authorfont{\Large\normalfont}
1577 \def\@affiliationfont{\normalsize\normalfont}
1578 \or % sigchi
1579 \def\@authorfont{\bfseries}
1580 \def\@affiliationfont{\mdseries}

```

```

1581 \or % sigchi-a
1582 \def\@authorfont{\bfseries}
1583 \def\@affiliationfont{\mdseries}
1584 \fi

```

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

```

1585 \def\@mkauthors@i{%
1586   \def\@currentauthors{}%
1587   \def\and{%
1588     \andify\@currentauthors\par\noindent
1589     \@currentauthors\def\@currentauthors{}}%
1590   \def\@author##1{%
1591     \ifx\@currentauthors\@empty
1592       \gdef\@currentauthors{\@authorfont\MakeUppercase{##1}}%
1593     \else
1594       \g@addto@macro{\@currentauthors}{\and\MakeUppercase{##1}}%
1595     \fi
1596     \def\and{}}%
1597   \def\email##1##2{%
1598     \def\affiliation##1##2{%
1599       \ifx\@currentauthors\@empty\else
1600         \andify\@currentauthors\par\noindent\@currentauthors
1601       \fi
1602       \def\@currentauthors{}\def\@tempa{##2}\ifx\@tempa\@empty\else
1603         \unskip, {\@affiliationfont##2}\fi\def\and{\par\noindent}}%
1604     \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip
1605     \noindent\addresses\andify\@currentauthors\par\noindent\@currentauthors\par\medskip}%
1606 }

```

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

```

1607 \def\@mkauthors@ii{\par\medskip
1608   \def\@currentauthors{}%
1609   \def\and{}%
1610   \def\@author##1{%
1611     \ifx\@currentauthors\@empty
1612       \gdef\@currentauthors{\@authorfont
1613       \MakeUppercase{##1}}%
1614     \else
1615       \g@addto@macro{\@currentauthors}{\and\MakeUppercase{##1}}%
1616     \fi\def\and{}}%
1617   \def\email##1##2{%
1618     \def\affiliation##1##2{%
1619       \ifx\@currentauthors\@empty\else
1620         \andify\@currentauthors\par\noindent\@currentauthors
1621       \fi
1622       \def\@currentauthors{}\def\@tempa{##2}\ifx\@tempa\@empty\else
1623         \par\noindent{\@affiliationfont##2}\fi
1624       \def\and{\par\noindent{\@affiliationfont and}\par
1625       \noindent\def\and{}}}%

```



```

1626 \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip
1627 \noindent\addresses\andify\@currentauthors\par\noindent\@currentauthors\par\medskip}%
1628 }

\author@bx The box to put individual author to
1629 \newbox\author@bx

\author@bx@wd The width of the author box
1630 \newdimen\author@bx@wd

\author@bx@sep The separation between the author boxes
1631 \newskip\author@bx@sep
1632 \author@bx@sep=1pc\relax

\@mkauthors@iii The sigconf version. Here we use centered design with each author in a separate box.
1633 \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.
1634 \author@bx@wd=\textwidth\relax
1635 \advance\author@bx@wd by -\author@bx@sep\relax
1636 \ifcase\num@authors
1637 \relax % 0?
1638 \or % 1=one author per row
1639 \or % 2=two authors per row
1640 \divide\author@bx@wd by \num@authors\relax
1641 \or % 3=three authors per row
1642 \divide\author@bx@wd by \num@authors\relax
1643 \or % 4=two authors per row (!)
1644 \divide\author@bx@wd by 2\relax
1645 \else % three authors per row
1646 \divide\author@bx@wd by 3\relax
1647 \fi
1648 \advance\author@bx@wd by -\author@bx@sep\relax
Now, parsing of \addresses:
1649 \gdef\@currentauthors{}%
1650 \gdef\@currentaffiliation{}%
1651 \def\@author##1{\ifx\@currentauthors\@empty
1652 \gdef\@currentauthors{\par##1}%
1653 \else
1654 \g@addto@macro\@currentauthors{\quad##1}%
1655 \fi}%
1656 \def\@email##1##2{\ifx\@currentaffiliation\@empty
1657 \gdef\@currentaffiliation{\nolinkurl{##2}}%
1658 \else
1659 \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
1660 \fi}%

```

```

1661 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
1662   \gdef\@currentaffiliation{##2}%
1663   \else
1664     \g@addto@macro\@currentaffiliation{\par##2}%
1665   \fi}%

```

Actual typesetting is done by \and macro

```

1666 \def\and{\bgroup\hsize=\author@bx@wd\def\and{\quad}%
1667   \global\setbox\author@bx=\vtop{\centering
1668     \@authorfont\@currentauthors\par\@affiliationfont
1669     \@currentaffiliation}\egroup
1670   \box\author@bx\hspace{\author@bx@sep}%
1671   \gdef\@currentauthors{}%
1672   \gdef\@currentaffiliation{}}%

```

And here we use it:

```

1673 \hsize=\textwidth
1674 \global\setbox\mktitle@bx=\vbox{\noindent
1675   \box\mktitle@bx\par\medskip\leavevmode
1676   \lineskip=1pc\relax\centering\hspace*{-1em}%
1677   \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.

```

1678 \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.

```

1679 \author@bx@wd=\columnwidth\relax
1680 \advance\author@bx@wd by -\author@bx@sep\relax
1681 \ifcase\num@authors
1682   \relax % 0?
1683   \or % 1=one author per row
1684   \else % 2=two authors per row
1685     \divide\author@bx@wd by 2\relax
1686   \fi
1687   \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of \addresses:

```

1688 \gdef\@currentauthors{}%
1689 \gdef\@currentaffiliation{}%
1690 \def\@author##1{\ifx\@currentauthors\@empty
1691   \gdef\@currentauthors{\par##1}%
1692   \else
1693     \g@addto@macro\@currentauthors{\quad##1}%
1694   \fi}%
1695 \def\email##1##2{\ifx\@currentaffiliation\@empty
1696   \gdef\@currentaffiliation{\nolinkurl{##2}}%
1697   \else

```

```

1698 \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
1699 \fi}%
1700 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
1701 \gdef\@currentaffiliation{##2}%
1702 \else
1703 \g@addto@macro\@currentaffiliation{\par##2}%
1704 \fi}%

```

Actual typesetting is done by \and macro

```

1705 \def\and{\bgroup\hsize=\author@bx@wd\def\and{\quad}%
1706 \global\setbox\author@bx=\vtop{\raggedright
1707 \authorfont\@currentauthors\par\@affiliationfont
1708 \currentaffiliation}\egroup
1709 \box\author@bx\hskip\author@bx@sep
1710 \gdef\@currentauthors{}%
1711 \gdef\@currentaffiliation{}}%

```

And here we use it:

```

1712 \bgroup\hsize=\columnwidth
1713 \par\raggedright\leftskip=\z@
1714 \lineskip=1pc\noindent\addresses\and\par\bigskip\egroup}

```

\@authornotemark Adding footnotemark to authors

```

1715 \def\@authornotemark{\g@addto@macro\@currentauthors{\footnotemark}}

```

\@mkteasers Typesetting teasers

```

1716 \def\@mkteasers{%
1717 \ifx\@teaserfigures\@empty\else
1718 \def\@teaser##1{\par\bigskip\bgroup
1719 \captionsetup{type=figure}##1\egroup\par}
1720 \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par
1721 \noindent\@teaserfigures\par\medskip}%
1722 \fi}

```

\@setaddresses This is an amsart macro, which we do not need.

```

1723 \def\@setaddresses{}

```

\@mkabstract Typesetting abstract

```

1724 \def\@mkabstract{\bgroup
1725 \ifx\@abstract\@empty\else
1726 {\if@ACM@journal
1727 \small\noindent
1728 \else
1729 \section*{Abstract}%
1730 \fi
1731 \@abstract\par}%
1732 \fi\egroup}

```

\@mkbibcitation Print bibcitation format

```

1733 \def\@mkbibcitation{\bgroup

```

```

1734 \par\medskip\small\noindent{\bfseries ACM Reference format:}\par
1735 \noindent\authors. \@acmYear. \@title. \textit{\@journalNameShort}
1736 \@acmVolume, \@acmNumber, Article~\@acmArticle\
1737 (\@acmPubDate), \ref{TotPages}~pages.\par
1738 \noindent DOI: \nolinkurl{\@acmDOI}
1739 \par\egroup}

```

\@printendtopmatter End the top matter

```

1740 \def\@printendtopmatter{\par\medskip
1741 \ifcase\ACM@format@nr
1742 \relax % manuscript
1743 \noindent\hrulefill\par\medskip
1744 \or % acmsmall
1745 \noindent\hrulefill\par\medskip
1746 \or % acmlarge
1747 \noindent\hrulefill\par\medskip
1748 \or % acmtog
1749 \par\bigskip
1750 \or % sigconf
1751 \par\bigskip
1752 \or % siggraph
1753 \par\bigskip
1754 \or % sigplan
1755 \par\bigskip
1756 \or % sigchi
1757 \par\bigskip
1758 \or % sigchi-a
1759 \fi
1760 }

```

\@setthanks We redefine \@setthanks using \long

```

1761 \def\@setthanks{\long\def\thanks##1{\par##1\@addpunct.}\thankses}

```

### 3.13 Headers and Footers

We use fancyhdr for our headers and footers:

```

1762 \RequirePackage{fancyhdr}

```

\ACM@linecount@bx This is the box displayed in the review mode

```

1763 \if@ACM@review
1764 \newsavebox{\ACM@linecount@bx}
1765 \savebox{\ACM@linecount@bx}[4em][t]{\parbox[t]{4em}{%
1766 \newlength\ACM@linecount@bxht\setlength{\ACM@linecount@bxht}{-\baselineskip}
1767 \@tempcnta\@ne\relax
1768 \loop{\color{ACMRed}\scriptsize\the\@tempcnta}\@ne
1769 \advance\@tempcnta by \@ne
1770 \addtolength{\ACM@linecount@bxht}{\baselineskip}
1771 \ifdim\ACM@linecount@bxht<\textheight\repeat}}
1772 \fi

```

\ACM@linecount How to display the box

```
1773 \def\ACM@linecount{%
1774   \if@ACM@review
1775   \begin{picture}(0,0)%
1776     \put(-26,-22){\usebox{\ACM@linecount@bx}}%
1777   \end{picture}%
1778   \fi}
```

standardpagestyle The pagestyle for all pages but the first one

```
1779 \fancypagestyle{standardpagestyle}{%
1780   \fancyhf{}%
1781   \renewcommand{\headrulewidth}{\z@}%
1782   \renewcommand{\footrulewidth}{\z@}%
1783   \ifcase\ACM@format@nr
1784   \relax % manuscript
1785     \fancyhead[LE]{\ACM@linecount\thepage}%
1786     \fancyhead[RO]{\thepage}%
1787     \fancyhead[RE]{\shortauthors}%
1788     \fancyhead[LO]{\ACM@linecount\shorttitle}%
1789     \fancyfoot[RO,LE]{\footnotesize Manuscript submitted to ACM}%
1790   \or % acmsmall
1791     \fancyhead[LE]{\ACM@linecount\sffamily\@acmArticle:\thepage}%
1792     \fancyhead[RO]{\sffamily\@acmArticle:\thepage}%
1793     \fancyhead[RE]{\sffamily\shortauthors}%
1794     \fancyhead[LO]{\ACM@linecount\sffamily\shorttitle}%
1795     \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
1796       \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
1797   \or % acmlarge
1798     \fancyhead[LE]{\ACM@linecount\sffamily
1799       \@acmArticle:\thepage\quad\textbullet\quad\shortauthors}%
1800     \fancyhead[LO]{\ACM@linecount}%
1801     \fancyhead[RO]{\sffamily
1802       \shorttitle\quad\textbullet\quad\@acmArticle:\thepage}%
1803     \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
1804       \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
1805   \or % acmtog
1806     \fancyhead[LE]{\ACM@linecount\sffamily
1807       \@acmArticle:\thepage\quad\textbullet\quad\shortauthors}%
1808     \fancyhead[LO]{\ACM@linecount}%
1809     \fancyhead[RO]{\sffamily
1810       \shorttitle\quad\textbullet\quad\@acmArticle:\thepage}%
1811     \fancyfoot[RO,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
1812       \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
1813   \else % Proceedings
1814     \fancyfoot[R]{\footnotesize\thepage}%
1815     \fancyhead[L]{\ACM@linecount}%
1816   \fi
1817 }
1818 \pagestyle{standardpagestyle}
```

```

\@folio@wd Folio blob width, height, offsets and max number
\@folio@ht 1819 \newdimen\@folio@wd
\@folio@voffset 1820 \@folio@wd=\z@
\@folio@max 1821 \newdimen\@folio@ht
1822 \@folio@ht=\z@
1823 \newdimen\@folio@voffset
1824 \@folio@voffset=\z@
1825 \def\@folio@max{1}
1826 \ifcase\ACM@format@nr
1827 \relax % manuscript
1828 \or % acmsmall
1829 \@folio@wd=45.75pt\relax
1830 \@folio@ht=1.25in\relax
1831 \@folio@voffset=.2in\relax
1832 \def\@folio@max{8}
1833 \or % acmlarge
1834 \@folio@wd=43.25pt\relax
1835 \@folio@ht=79pt\relax
1836 \@folio@voffset=.55in\relax
1837 \def\@folio@max{10}
1838 \fi

\@folioblob The macro to typeset the folio blob.
1839 \def\@folioblob{\@tempcnta=\@acmArticleSeq\relax
First, we calculate \@acmArticleSeq modulo \@folio@max
1840 \loop
1841 \ifnum\@tempcnta>\@folio@max\relax
1842 \advance\@tempcnta by - \@folio@max
1843 \repeat
1844 \advance\@tempcnta by -1\relax
1845 \@tempdima=\@folio@ht\relax
1846 \multiply\@tempdima by \the\@tempcnta\relax
1847 \advance\@tempdima by -\@folio@voffset\relax
1848 \begin{picture}(0,0)
1849 \makebox[\z@]{\raisebox{-\@tempdima}{%
1850 \rlap{%
1851 \raisebox{-0.45\@folio@ht}{\z@}\z@}{%
1852 \rule{\@folio@wd}{\@folio@ht}}}%
1853 \parbox{\@folio@wd}{%
1854 \centering
1855 \textcolor{white}{\LARGE\bfseries\sffamily\@acmArticle}}}}
1856 \end{picture}}
1857

firstpagestyle The pagestyle for the first page only.
1858 \fancypagestyle{firstpagestyle}{%
1859 \fancyhf{}%
1860 \renewcommand{\headrulewidth}{\z@}%

```

```

1861 \renewcommand{\footrulewidth}{\z@}%
1862 \ifcase\ACM@format@nr
1863 \relax % manuscript
1864 \fancyhead[L]{\ACM@linecount}%
1865 \fancyfoot[R0,LE]{\small\thepage}%
1866 \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
1867 \or % acmsmall
1868 \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
1869 \@acmNumber, Article \@acmArticle. Publication date:
1870 \@acmPubDate.}%
1871 \fancyhead[LE]{\ACM@linecount\@folioblob}%
1872 \fancyhead[LO]{\ACM@linecount}%
1873 \fancyhead[R0]{\@folioblob}%
1874 \fancyheadoffset[R0,LE]{0.6\@folio@wd}%
1875 \or % acmlarge
1876 \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
1877 \@acmNumber, Article \@acmArticle. Publication date:
1878 \@acmPubDate.}%
1879 \fancyhead[R0]{\@folioblob}%
1880 \fancyhead[LE]{\ACM@linecount\@folioblob}%
1881 \fancyhead[LO]{\ACM@linecount}%
1882 \fancyheadoffset[R0,LE]{1.4\@folio@wd}%
1883 \or % acmtog
1884 \fancyfoot[R0,LE]{\footnotesize \@journalName, Vol. \@acmVolume, No.
1885 \@acmNumber, Article \@acmArticle. Publication date:
1886 \@acmPubDate.}%
1887 \fancyhead[L]{\ACM@linecount}%
1888 \else % Conference proceedings
1889 \fancyhead[L]{\ACM@linecount}%
1890 \fancyfoot[R]{\footnotesize\thepage}%
1891 \fi
1892 }

```

### 3.14 Sectioning

```

\@secfont Fonts for sections etc. are different for different formats.
\@subsecfont
\@subsubsecfont
\@parfont
1893 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeUppercase}
1894 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
1895 \def\@subsubsecfont{\sffamily\itshape}
1896 \def\@parfont{\itshape}
1897 \setcounter{secnumdepth}{3}
1898 \ifcase\ACM@format@nr
1899 \relax % manuscript
1900 \or % acmsmall
1901 \or % acmlarge
1902 \def\@secfont{\sffamily\large\section@raggedright\MakeUppercase}
1903 \def\@subsecfont{\sffamily\large\section@raggedright}
1904 \or % acmtog
1905 \def\@secfont{\sffamily\large\section@raggedright\MakeUppercase}

```

```

1906 \def\@subsecfont{\sffamily\large\section@raggedright}
1907 \or % sigconf
1908 \def\@secfont{\bfseries\Large\section@raggedright\MakeUppercase}
1909 \def\@subsecfont{\bfseries\Large\section@raggedright}
1910 \or % siggraph
1911 \def\@secfont{\bfseries\sffamily\Large\section@raggedright\MakeUppercase}
1912 \def\@subsecfont{\bfseries\sffamily\Large\section@raggedright}
1913 \or % sigplan
1914 \def\@secfont{\bfseries\Large\section@raggedright}
1915 \def\@subsecfont{\bfseries\section@raggedright}
1916 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
1917   {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
1918   {.25\baselineskip}%
1919   {\@subsubsecfont}}
1920 \def\@subsubsecfont{\bfseries\section@raggedright}
1921 \renewcommand\paragraph{\@startsection{paragraph}{4}{\z@}%
1922   {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
1923   {-3.5\p@}%
1924   {\@parfont\@addspaceafter}}
1925 \def\@parfont{\bfseries\itshape}
1926 \renewcommand\subparagraph{\@startsection{subparagraph}{5}{\z@}%
1927   {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
1928   {-3.5\p@}%
1929   {\@subparfont\@addspaceafter}}
1930 \def\@subparfont{\itshape}
1931 \or % sigchi
1932 \setcounter{secnumdepth}{1}
1933 \def\@secfont{\bfseries\sffamily\section@raggedright\MakeUppercase}
1934 \def\@subsecfont{\bfseries\sffamily\section@raggedright}
1935 \or % sigchi-a
1936 \setcounter{secnumdepth}{0}
1937 \def\@secfont{\bfseries\sffamily\section@raggedright\MakeUppercase}
1938 \def\@subsecfont{\bfseries\sffamily\section@raggedright}
1939 \fi

```

\@adddotafter Add punctuation after the command

```
1940 \def\@adddotafter#1{#1\@addpunct{.}}
```

\@addspaceafter Add space after the command

```
1941 \def\@addspaceafter#1{#1\@addpunct{\enspace}}
```

Sectioning is different for different levels

```

1942 \renewcommand\section{\@startsection{section}{1}{\z@}%
1943   {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
1944   {.25\baselineskip}%
1945   {\@secfont}}
1946 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
1947   {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
1948   {.25\baselineskip}%

```



```

1949 {\@subsecfont}}
1950 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{10pt}%
1951 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
1952 {-3.5\p@}%
1953 {\@subsubsecfont\@adddotafter}}
1954 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
1955 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
1956 {-3.5\p@}%
1957 {\@parfont\@adddotafter}}
1958 \renewcommand\part{\@startsection{part}{9}{\z@}%
1959 {-10\p@ \@plus -4\p@ \@minus -2\p@}%
1960 {4\p@}%
1961 {\@parfont}}

```

`\section@raggedright` Special version of `\raggedright` compatible with `\MakeUppercase`

```

1962 \def\section@raggedright{\@rightskip\@flushglue
1963 \rightskip\@rightskip
1964 \leftskip\z@skip
1965 \parindent\z@}

```

### 3.15 Theorems

`\acmplainbodyfont` The font to typeset the acmplain theorem style body.

```

1966 \def\acmplainbodyfont{\itshape}

```

`\acmplainindent` The amount to indent the acmplain theorem style.

```

1967 \def\acmplainindent{\parindent}

```

`\acmplainheadfont` The font to typeset the acmplain theorem style head.

```

1968 \def\acmplainheadfont{\scshape}

```

`\acmplainnotefont` The font to typeset the acmplain theorem style note.

```

1969 \def\acmplainnotefont{\@empty}

```

Customization of acmplain theorem style:

```

1970 \ifcase\ACM@format@nr
1971 \relax % manuscript
1972 \or % acmsmall
1973 \or % acmlarge
1974 \or % acmtog
1975 \or % sigconf
1976 \or % siggraph
1977 \or % sigplan
1978 \def\acmplainbodyfont{\itshape}
1979 \def\acmplainindent{\z@}
1980 \def\acmplainheadfont{\bfseries}
1981 \def\acmplainnotefont{\normalfont}
1982 \or % sigchi
1983 \or % sigchi-a
1984 \fi

```

acmplain The acmplain theorem style

```
1985 \newtheoremstyle{acmplain}%
1986   {.5\baselineskip\@plus.2\baselineskip
1987     \@minus.2\baselineskip}% space above
1988   {.5\baselineskip\@plus.2\baselineskip
1989     \@minus.2\baselineskip}% space below
1990   {\acmplainbodyfont}% body font
1991   {\acmplainindent}% indent amount
1992   {\acmplainheadfont}% head font
1993   {.}% punctuation after head
1994   {.5em}% spacing after head
1995   {\thmname{#1}\thmnumber{ #2}\thmnote{ {\acmplainnotefont{#3}}}}% head spec
```

\acmdefinitionbodyfont The font to typeset the acmdefinition theorem style body.

```
1996 \def\acmdefinitionbodyfont{\normalfont}
```

\acmdefinitionindent The amount to indent the acmdefinition theorem style.

```
1997 \def\acmdefinitionindent{\parindent}
```

\acmdefinitionheadfont The font to typeset the acmdefinition theorem style head.

```
1998 \def\acmdefinitionheadfont{\itshape}
```

\acmdefinitionnotefont The font to typeset the acmdefinition theorem style note.

```
1999 \def\acmdefinitionnotefont{\empty}
```

Customization of acmdefinition theorem style:

```
2000 \ifcase\ACM@format@nr
2001 \relax % manuscript
2002 \or % acmsmall
2003 \or % acmlarge
2004 \or % acmtog
2005 \or % sigconf
2006 \or % siggraph
2007 \or % sigplan
2008   \def\acmdefinitionbodyfont{\normalfont}
2009   \def\acmdefinitionindent{\z@}
2010   \def\acmdefinitionheadfont{\bfseries}
2011   \def\acmdefinitionnotefont{\normalfont}
2012 \or % sigchi
2013 \or % sigchi-a
2014 \fi
```

acmdefinition The acmdefinition theorem style

```
2015 \newtheoremstyle{acmdefinition}%
2016   {.5\baselineskip\@plus.2\baselineskip
2017     \@minus.2\baselineskip}% space above
2018   {.5\baselineskip\@plus.2\baselineskip
2019     \@minus.2\baselineskip}% space below
2020   {\acmdefinitionbodyfont}% body font
```

```

2021 {\@acmdefinitionindent}% indent amount
2022 {\@acmdefinitionheadfont}% head font
2023 {.}% punctuation after head
2024 {.5em}% spacing after head
2025 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmdefinitionnotefont(#3)}}}% head spec

```

The definitions for theorems:

```

2026 \theoremstyle{acmplain}
2027 \newtheorem{theorem}{Theorem}[section]
2028 \newtheorem{conjecture}[theorem]{Conjecture}
2029 \newtheorem{proposition}[theorem]{Proposition}
2030 \newtheorem{lemma}[theorem]{Lemma}
2031 \newtheorem{corollary}[theorem]{Corollary}
2032 \theoremstyle{acmdefinition}
2033 \newtheorem{example}[theorem]{Example}
2034 \newtheorem{definition}[theorem]{Definition}
2035 \theoremstyle{acmplain}

```

\@proofnamefont The font to typeset the proof name.

```

2036 \def\@proofnamefont{\scshape}

```

\@proofindent Whether or not to indent proofs.

```

2037 \def\@proofindent{\indent}

```

Customization of proof environment.

```

2038 \ifcase\ACM@format@nr
2039 \relax % manuscript
2040 \or % acmsmall
2041 \or % acmlarge
2042 \or % acmtog
2043 \or % sigconf
2044 \or % siggraph
2045 \or % sigplan
2046 \def\@proofnamefont{\itshape}
2047 \def\@proofindent{\noindent}
2048 \or % sigchi
2049 \or % sigchi-a
2050 \fi

```

proof We want some customization of proof environment.

```

2051 \renewenvironment{proof}[1][\proofname]{\par
2052 \pushQED{\qed}%
2053 \normalfont \topsep6\p@\@plus6\p@\relax
2054 \trivlist
2055 \item[\@proofindent\hskip\labelsep
2056 {\@proofnamefont #1\@addpunct{.}}]\ignorespaces
2057 }{%
2058 \popQED\endtrivlist\@endpfalse
2059 }

```

### 3.16 Conditional typesetting

We use the `comment` package for conditional typesetting:

```
2060 \if@ACM@screen
2061   \includecomment{screenonly}
2062   \excludecomment{printonly}
2063 \else
2064   \excludecomment{screenonly}
2065   \includecomment{printonly}
2066 \fi
2067 \if@ACM@anonymous
2068   \excludecomment{anonsuppress}
2069 \else
2070   \includecomment{anonsuppress}
2071 \fi
```

### 3.17 End of Class

```
2072 \normalsize\normalfont
2073 \end{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	General: First released version . . . . .	18	v1.05	General: Added processing doi numbers for acmsiggraph and doi numbers for sigproc.bib . . . . .	18
v1.01	General: Changed hyperref colors in screen mode (closes <a href="https://github.com/borisveytsman/acmart/issues/1">https://github.com/borisveytsman/acmart/issues/1</a> ) . . . . .	18		Patched \setcitestyle command; closes <a href="https://github.com/borisveytsman/acmart/issues/19">https://github.com/borisveytsman/acmart/issues/19</a> . . . . .	18
	Defined ACM colors . . . . .	18	v1.06	\@ACM@badge@skip: Added macro . . .	41
	Explicitly put draft option (closes <a href="https://github.com/borisveytsman/acmart/issues/4">https://github.com/borisveytsman/acmart/issues/4</a> ) . . . . .	20		\@ACM@badge@width: Added macro . . .	41
	Set headheight to 1pc for all formats (closes <a href="https://github.com/borisveytsman/acmart/issues/5">https://github.com/borisveytsman/acmart/issues/5</a> ) . . . . .	18		\@ACM@title@width: Added macro . . .	41
v1.02	General: Added TOPS and TSC (closes <a href="https://github.com/borisveytsman/acmart/issues/12">https://github.com/borisveytsman/acmart/issues/12</a> ) . . . . .	18		\@mktitle@i: Added processing badges . . . . .	53
	Documentation changes (closes <a href="https://github.com/borisveytsman/acmart/issues/13">https://github.com/borisveytsman/acmart/issues/13</a> ) . . . . .	18		Made generic . . . . .	53
v1.03	\@formatdoi: Added macro . . . . .	45		\@mktitle@ii: Now this macro is obsolete . . . . .	54
	\if@ACM@authorversion: Added macro . . . . .	19		\@mktitle@iii: Added processing badges . . . . .	54
	\maketitle: Added special case of authorversion . . . . .	48		Made more generic . . . . .	54
	General: Added anon suppress environment . . . . .	18		\@mktitle@iv: Made more generic . . .	54
	Added authorversion option (closes <a href="https://github.com/borisveytsman/acmart/issues/9">https://github.com/borisveytsman/acmart/issues/9</a> ) . . . . .	18		\@printtopmatter: Added processing badges . . . . .	51
v1.04	\acmArticleSeq: Name change by Matthew Fluet . . . . .	40		\@subtitlefont: Added macro . . . . .	53
	\acmDOI: Name change by Matthew Fluet . . . . .	41		\@titlefont: Added macro . . . . .	52
	\acmISBN: Name change by Matthew Fluet . . . . .	41		\acmBadgeL: Added macro . . . . .	41
	General: Updated bibliography for siggraph . . . . .	18		\acmBadgeR: Added macro . . . . .	41
				\if@ACM@badge: Added macro . . . . .	41
			v1.07	\maketitle: Corrected a bug with abstract footnotes . . . . .	48
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			v1.08	General: SIGPLAN reformatting by Matthew Fluet . . . . .	18
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			v1.09	General: Revert SIGPLAN caption rules . . . . .	18
			v1.10	\maketitle: Corrected a bug with doi in manuscript and author version, <a href="https://github.com/borisveytsman/acmart/issues/36">https://github.com/borisveytsman/acmart/issues/36</a> . . . . .	48

General: Changes of		\copyrightpermissionfootnoterule:	
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