

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

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## Abstract

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

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## 1 Introduction

The Association for Computing Machinery<sup>1</sup> is the world’s largest educational and scientific computing society, which delivers resources that advance computing as a science and a profession. It was one of the early adopters of  $\TeX$  for its typesetting.

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

This package provides the uniform interface for all ACM publications. It is intended to replace all the different classes and packages and provide an up-to-date  $\LaTeX$  package.

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

I am grateful to Michael D. Adams, Leif Andersen, Lawrence Christopher Angrave, Dirk Beyer, Andrew Black, Joachim Breitner, Yegor Bugayenko, Benjamin Byholm, John Collins, Nils Anders Danielsson, Michael Ekstrand, Matthew Fluet, Paolo G. Giarrusso, Ben Greenman, Enrico Gregorio, Jamie Davis, Ulrike Fischer, Jason Hemann, Peter Kemp, Luis Leiva, Ben Liblit, Rholais Lii, LianTze Lim, Kuldeep S. Meel, Kai Mindermann, Frank Mittelbach, Serguei Mokhov, Ross Moore, John Owens, Joel Nider, Scott Pakin, Tobias Pape, Henning Pohl, Philip Quinn, Mathias Rav, Andreas Reichinger, Matteo Riondato, Craig Rodkin, Bernard Rous, Feras Saad, Kerry A. Seitz, Jr., David Shamma, Gabriel Scherer, Kartik Singhal, Christoph Sommer, Stephen Spencer, Shin Hwei Tan, Daniel Thomas, Shari Trewin, Zack Weinberg, John Wickerson 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

This class uses many commands and customization options, so it might appear intimidating for a casual user. Do not panic! Many of these commands and options can be safely left with their default values or the values recommended by your conference or journal editors. If you have problems or questions, do not hesitate to ask me directly or the community at <https://github.com/borisveytsman/acmart>, <https://tex.stackexchange.com> or the closest  $\TeX$  Users Group. The world-wide  $\TeX$  Users Group is at <https://tug.org/>; please consider joining us if you use  $\TeX$  regularly.

### 2.1 Installation

Most probably, you already have this package installed in your favorite  $\TeX$  distribution; if not, you may want to upgrade. You may need to upgrade it anyway since this package uses a number of relatively recent packages, especially the ones related to fonts.

The latest released version of this package can be found on CTAN: <https://www.ctan.org/pkg/acmart>. The development version can be found on GitHub: <https://github.com/borisveytsman/acmart>. At this address you can file a bug report—or even contribute your own enhancement by making a pull request.

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

Please note that the version on Github is a development (or experimental) version: please download it for testing new features. The production version is the one on CTAN and ACM sites.

Most users should not attempt to install this package themselves but should rather rely on their  $\TeX$  distributions to provide it. If you decide to install the package yourself, follow the standard rules:

1. Run `latex acmart.ins`. This will produce the file `acmart.cls`
2. Put the files `acmart.cls` and `ACM-Reference-Format.bst` in places where  $\TeX$  can find them (see [1] or the documentation for your  $\TeX$  system).
3. Update the database of file names. Again, see [1] or the documentation for your  $\TeX$  system for the system-specific details.
4. The file `acmart.pdf` provides the documentation for the package. (This is probably the file you are 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.

This class uses a number of other packages. They are included in all major  $\TeX$  distributions ( $\TeX$ Live, Mac $\TeX$ , Mik $\TeX$ ) 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>
- *amsfonts*, <http://www.ctan.org/pkg/amsfonts>
- *amsmath*, <http://www.ctan.org/pkg/amsmath>
- *binhex*, <http://www.ctan.org/pkg/binhex>
- *balance*, <http://www.ctan.org/pkg/balance>
- *booktabs*, <http://www.ctan.org/pkg/booktabs>
- *caption*, <http://www.ctan.org/pkg/caption>
- *comment*, <http://www.ctan.org/pkg/comment>
- *cm-super*, <http://www.ctan.org/pkg/cm-super>
- *cmap*, <http://www.ctan.org/pkg/cmap>
- *draftwatermark*, <http://www.ctan.org/pkg/draftwatermark>
- *environ*, <http://www.ctan.org/pkg/environ>
- *etoolbox*, <http://www.ctan.org/pkg/etoolbox>
- *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>
- *hyperxmp*, <http://www.ctan.org/pkg/hyperxmp>
- *iftex*, <http://www.ctan.org/pkg/iftex>
- *inconsolata*, <http://www.ctan.org/pkg/inconsolata>
- *libertine*, <http://www.ctan.org/pkg/libertine>
- *manyfoot*, <http://www.ctan.org/pkg/manyfoot>
- *microtype*, <http://www.ctan.org/pkg/microtype>
- *mmap*, <http://www.ctan.org/pkg/mmap>
- *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>
- *refcount*, <http://www.ctan.org/pkg/refcount>
- *setspace*, <http://www.ctan.org/pkg/setspace>
- *textcase*, <http://www.ctan.org/pkg/textcase>
- *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>
- *xstring*, <http://www.ctan.org/pkg/xstring>

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, DLT, FAC, JACM, JDIQ, JEA, JERIC, JETC, PACMCGIT, PACMHCI, PACMPL, TAAS, TACCESS, TACO, TALG, TALLIP (formerly TALIP), TCPS, TDS, TEAC, TECS, TELO, THRI, TIIS, TIOT, 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, TQC, TRETS, TSAS, TSC, TSLP and TWEB, including special issues.
acmlarge	Large single-column format. Used for DTRAP, HEALTH, IMWUT, JOCCH, POMACS and TAP, including special issues.
acmtog	Large double-column format. Used for TOG, including annual conference Technical Papers.
sigconf	Proceedings format for most ACM conferences (with the exceptions listed below) and all ICPS volumes.
sigplan	Proceedings format for SIGPLAN conferences.

## 2.2 Invocation and options

To use this 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.

Note that sometimes conference proceedings are published as a special issue (or issues) of an ACM journal. In this case, you should use the journal format for a conference paper. Please contact your conference committee if in doubt.

Starting in 2020, ACM retired formats `sigchi` and `sigchi-a`. SIGCHI conferences now use `sigconf` format for their publications. If a file uses `sigchi` format, a warning

is issued, and the format is automatically switched to `sigconf`. Format `sigchi-a` can be used for non-ACM documents only (see Section 2.19).

There are several Boolean options that can take `true` or `false` values. They are listed in Table 2. The words `=true` can be omitted when setting a 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 copy editors.

Two samples in the `samples` directory, `manuscript` and `acmsmall-submission`, show manuscripts formatted for submission to ACM.

The default for the option `screen` depends on the publication. At present it is `false` for all publications *but* PACM, since PACM is now electronic-only. Thus PACM titles (see Table 5) set this option to `true`. In the future this option may involve additional features suitable for on-screen versions of 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 2.12.

The option `anonymous` is used for anonymous review processes and causes all author information to be obscured.

The option `timestamp` is used to include a time stamp in the footer of each page. When preparing a document, this can help avoid confusing different revisions. The footer also includes the page range of the document. This helps detect missing pages in hard copies.

The option `authordraft` is intended for author's drafts that are not intended for distribution. It typesets a copyright block to give the author an idea of its size and the overall size of the paper but overprints it with the phrase "Unpublished working draft. Not for distribution.", which is also used as a watermark. This option sets `timestamp` and `review` to `true`, but these can be overridden by setting these options to `false` *after* setting `authordraft` to `true`.

The option `balance` determines whether the last page in the two column mode has balanced columns. By default it is `true`; however, it may lead to problems for some documents. Set it to `false` if you encounter compilation errors. Note that for one page documents `\balance` command might cause problems. An alternative is the (experimental) option `pbalance`, which uses the new package `pbalance` for this end.

The option `urlbreakonhyphens` determines whether URLs can be split between lines after hyphens. By default it is `true`. Set it to `false` to disallow these breaks.

The option `language` is used to define the languages for the multi-language papers. It is discussed in Section 2.4.

### 2.3 Top matter

A number of commands set up *top matter* or (in computer science jargon) *metadata* for an article. They establish the publication name, article title, authors, DOI and other data. Some of these commands, like `\title` and `\author`, should be put by the authors. Others, like `\acmVolume` and `\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 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`.

Table 2: Boolean options

Option	Default	Meaning
review	false	A review version: lines are numbered and hyperlinks are colored
screen	see text	A screen version: hyperlinks are colored
natbib	true	Whether to use the natbib package (see Section 2.12)
anonymous	false	Whether to make author(s) anonymous
authorversion	false	Whether to generate a special version for the authors' personal use or posting (see Section 2.3)
nonacm	false	Use the class typesetting options for a non-ACM document, which will not include the conference/journal header and footers or permission statements
timestamp	false	Whether to put a time stamp in the footer of each page
authordraft	false	Whether author's-draft mode is enabled
acmthm	true	Whether to define theorem-like environments, see Section 2.8
balance	true	Whether to balance the last page in two column mode
pbalance	false	Whether to balance the last page in two column mode using pbalance package
urlbreakonhyphens	true	Whether to break urls on hyphens



This class internally loads the `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 5. Note that conference proceedings published in *book* form do not set this macro.

`\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.

**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}
```

`\acmBooktitle` By default we assume that conference proceedings are published in the book named *Proceedings of CONFERENCE*, where CONFERENCE is the name of the conference inferred from the command `\acmConference` above. However, sometimes the book title is different. The command `\acmBooktitle` can be used to set this title, for example,

```
\acmBooktitle{Companion to the first International Conference on the
Art, Science and Engineering of Programming (Programming '17)}
```

An ACM paper should have either `\acmJournal` or `\acmConference` command. If it has both (or more) commands, the last one takes precedence. Note that if you have the command `\acmConference` in a journal format like `acmsmall`, the class will use conference format for bibstrip and reference citation formatting. In the samples directory there is a file `sample-acmsmall-conf.tex` with the example of this usage.

`\editor` In most cases, conference proceedings are edited. You can use the command `\editor{<editor>}` to set the editor of the volume. This command can be repeated, for example,

```
\editor{Jennifer B. Sartor}
\editor{Theo D'Hondt}
\editor{Wolfgang De Meuter}
```

`\title` The command `\title`, as in the `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.

`\subtitle` It is expected that this command is inserted by the author of the manuscript. Besides title, ACM classes allow a subtitle, set with the `\subtitle{<subtitle>}` macro.

The commands for specifying authors are highly structured. The reason is they serve double duty: the authors' information is typeset in the manuscript *and* is used by the metadata extraction tools for indexing and cataloguing. Therefore it is very important to follow the guidelines exactly.

`\author` The basic commands are `\author`, `\orcid` (for the researchers registered with ORCID, <http://www.orcid.org/>), `\affiliation` and `\email`. In the simplest case, you enter them in this order:

`\orcid`

`\affiliation`

`\email`

```
\author{...}
\orcid{...}
\affiliation{...}
\email{...}
```

Do *not* use the  $\LaTeX$  `\and` macro or commas, or `\\` between the authors! Each author deserves his or her own `\author` command. An attempt to list several authors or their e-mails in one command leads to a warning or an error. This is not a bug, but the expected behavior.

Note that some formats do not typeset e-mails or ORCID identifiers. Do not worry: the metadata tools will get them.

Sometimes an author has several affiliations. In this case, the `\affiliation` command should be repeated:

```
\author{...}
\orcid{...}
\affiliation{...}
\affiliation{...}
\email{...}
```

Similarly you can repeat the `\email` command.

You may have several authors with the same affiliation, different affiliations, or overlapping affiliations (author  $A_1$  is affiliated with institutions  $I_1$  and  $I_2$ , while author  $A_2$  is affiliated with  $I_2$  only, author  $A_3$  is affiliated with  $I_1$  and  $I_3$ , etc.). The recommended solution is to put the `\affiliation` commands after each author, possibly repeating them:

```
\author{...}
\orcid{...}
\affiliation{...}
\affiliation{...}
\email{...}
\author{...}
\orcid{...}
\affiliation{...}
\email{...}
\author{...}
\orcid{...}
```

```

\affiliation{...}
\affiliation{...}
\email{...}

```

In some cases, when several authors share the same affiliation, you can try to save space using the format

```

\author{...}
\email{...}
\author{...}
\email{...}
\affiliation{...}

```

However, this format is not generally recommended.

`\additionalaffiliation`

In some cases, too many affiliations can take too much space. The command `\additionalaffiliation{<affiliation>}` creates a footnote after an author’s name with the words “Also with {<affiliation>}”. You should use this command only as a last resort. An example of usage is:

```

\author{G. Tobin}
\author{Ben Trovato}
\additionalaffiliation{%
  \institution{The Th{\o}rv{\a}ld Group}
  \streetaddress{1 Th{\o}rv{\a}ld Circle}
  \city{Hekla}
  \country{Iceland}}
\affiliation{%
  \institution{Institute for Clarity in Documentation}
  \streetaddress{P.O. Box 1212}
  \city{Dublin}
  \state{Ohio}
  \postcode{43017-6221}}

```

Here Trovato and Tobin share their affiliation with the Institute for Clarity in Documentation, but only Ben Trovato is affiliated with The Thørvæld Group.

`\position`  
`\institution`  
`\department`  
`\streetaddress`  
`\city`  
`\state`  
`\postcode`  
`\country`

The `\affiliation` and `\additionalaffiliation` commands are further structured to interact with the metadata extraction tools. Inside these commands you should use the `\position`, `\institution`, `\department`, `\city`, `\streetaddress`, `\state`, `\postcode` and `\country` macros to indicate the corresponding parts of the affiliation. Note that in some cases (for example, journals) these parts are not printed in the resulting copy, but they *are* necessary since they are used by the XML metadata extraction programs. Do *not* put commas or `\\` between the elements of `\affiliation`. They will be provided automatically.

The fields `\institution`, `\city` and `\country` are mandatory. If they are not provided, an error or a warning is issued. Currently the absence of `\country` produces an error; ACM may change this in the future.

An example of the author block:

```

\author{A. U. Thor}
\orcid{1234-4564-1234-4565}
\affiliation{}

```

```

\institution{University of New South Wales}
\department{School of Biomedical Engineering}
\streetaddress{Samuels Building (F25), Kensington Campus}
\city{Sidney}
\state{NSW}
\postcode{2052}
\country{Australia}}
\email{author@nsw.au.edu}
\author{A. N. Other}
\affiliation{%
  \institution{University of New South Wales}
  \city{Sidney}
  \state{NSW}
  \country{Australia}}
\author{C. O. Respondent}
\orcid{1234-4565-4564-1234}
\affiliation{%
  \institution{University of Pennsylvania}
  \city{Philadelphia}
  \state{PA}
  \country{USA}}
\affiliation{%
  \institution{University of New South Wales}
  \city{Sidney}
  \state{NSW}
  \country{Australia}}

```

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

Sometimes an author works in several departments within the same insitution. There could be two situations: the departments are independent, or one department is within another. In the first case, just repeat the command `\department` several times. To handle the second case the command has an optional numerical parameter. The departments with higher numbers are higher in the organizational chart. Compare

```

\affiliation{%
  \department[0]{Department of Lunar Studies} % 0 is the default
  \department[1]{John Doe Institute} % higher than 0
  \institution{University of San Serriffe}
  \country{San Serriffe}}

```

and

```

\affiliation{%
  \department{Department of Lunar Studies} % Not in the John Doe Institute!
  \department{John Doe Institute}
  \institution{University of San Serriffe}
  \country{San Serriffe}}

```

The command `\affiliation` formats its output according to American conventions. This might be wrong for some cases. Consider, for example, a German address. In Ger-

many, the postcode is put before the city and is not separated by a comma. We can handle this order using

```
\affiliation{%
  \institution{Fluginstitut}
  \streetaddress{Sonnenallee 17}
  \postcode{123456}
  \city{Helm}
  \country{Germany}}
```

However, the comma after the postcode is unfortunate: the address will be typeset (in some formats) as

```
Fluginstitut
Sonnenallee 17
123456, Helm, Germany
```

To overcome this problem, the command `\affiliation` has an optional parameter `obeypunctuation`, which can be `false` (the default) or `true`. If this parameter is `true`, `\affiliation` obeys the author's command. Thus

```
\affiliation[obeypunctuation=true]{%
  \institution{Fluginstitut}\\
  \streetaddress{Sonnenallee 17}\\
  \postcode{123456}
  \city{Helm},
  \country{Germany}}
```

will be typeset as

```
Fluginstitut
Sonnenallee 17
123456 Helm, Germany
```

Note that you should *not* use this option for journals.

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 the commands `\title` and `\author`. This command is obsolete and should *not* be used in most cases. Do not list your acknowledgments or grant sponsors here. Put this information in the `acks` environment (see Section 2.11).

`\authorsaddresses` In some formats, addresses are printed as a footnote on the first page. By default  $\LaTeX$  typesets them itself using the information you give it. However, you can override its choice using the command `\authorsaddresses{⟨contact addresses⟩}`, for example,

```
\authorsaddresses{%
  Authors' addresses: G.~Zhou, Computer Science Department, College of
  William and Mary, 104 Jameson Rd, Williamsburg, PA 23185, US;
  V.~B'eranger, Inria Paris-Rocquencourt, Rocquencourt, France;
  A.~Patel, Rajiv Gandhi University, Rono-Hills, Doimukh, Arunachal
  Pradesh, India; H.~Chan, Tsinghua University, 30 Shuangqing Rd,
  Haidian Qu, Beijing Shi, China; T.~Yan, Eaton Innovation Center,
  Prague, Czech Republic; T.~He, C.~Huang, J.~A.~Stankovic University
```

of Virginia, School of Engineering Charlottesville, VA 22903, USA;  
 T. F. Abdelzaher, (Current address) NASA Ames Research Center,  
 Moffett Field, California 94035.}

You can *suppress* printing authors' addresses by setting them to an empty string: `\authorsaddresses{}`. Please note that authors' addresses are mandatory for journal articles.

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

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

Please never use a `\footnote` inside an `\author` or `\title` command since this confuses the metadata extraction software. (Actually these commands now produce errors.)

`\authornotemark` Sometimes one may need to have the same footnote connected to several authors. The command `\authornotemark[number]` adds just the footnote mark, for example,

```
\author{A. U. Thor}
\authornote{Both authors contributed equally to the paper}
...
\author{A. N. Other}
\authornotemark[1]
```

The correct numbering of these marks is the responsibility of the user.

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

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

Note that `\acmArticle` is used not only for journals but also for some conference proceedings.

`\acmArticleSeq` The articles in the same issue of a journal have a *sequence number*. It is used to vertically position the black blob on the first page of some formats. By default it is the same as the 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 redefine it to 5
```

Setting this number to zero suppresses the blob.

`\acmSubmissionID` If your paper got a Submission ID from the Conference Management System, put it here:

```
\acmSubmissionID{123-A56-BU3}
```

`\acmPrice` The macro `\acmPrice{<price>}` sets the price for the article, for example,

```
\acmPrice{25.00}
```

Note that you do not need to put the dollar sign here, just the amount. By default the price is \$15.00, unless the copyright is set to `usgov`, `rightsretained`, `iw3c2w3`, or `iw3c2w3g`, when it is suppressed. Note that to override the defaults you need to set the price *after* the `\setcopyright` command. Also, the command `\acmPrice{}` suppresses the printing of the price.

`\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}
```

Setting it to the empty string, as `\acmISBN{}`, suppresses printing the ISBN.

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

```
\acmDOI{10.1145/9999997.9999999}
```

It is normally set by the typesetter. Setting it to the empty string, as `\acmDOI{}`, suppresses the DOI.

`\acmBadgeR` Some conference articles get special distinctions, for example, the artifact evaluation  
`\acmBadgeL` for PPOPP 2016 (see <http://ctuning.org/ae/ppopp2016.html>). These articles display special badges supplied by the conference organizers. This 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 arguments 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 a journal or book. It is used by the typesetter.

`\terms` The command `\keywords{<keyword, keyword,...>}` sets keywords for the article.  
`\keywords` They must be separated by commas, for example,

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

CCSXML      ACM publications are classified according to the ACM Computing Classification  
\ccsdesc    Scheme (CCS). CCS codes are used both in the typeset version of the publications *and* in  
the metadata in 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 results 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}

\ccsdesc[500]{Computer systems organization~Embedded systems}
\ccsdesc[300]{Computer systems organization~Redundancy}
\ccsdesc{Computer systems organization~Robotics}
\ccsdesc[100]{Networks~Network reliability}

```

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

CCS Concepts and user-defined keywords are required for all articles over two pages  
in length, and are optional for one- and two-page articles (or abstracts).

\setcopyright    There are several possibilities for the copyright of the papers published by the ACM:  
the authors may transfer the rights to the ACM, license them to the ACM, some or all  
authors might be employees of the US or Canadian governments, 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 3. This command must be placed in the preamble, before  
 $\begin\{document\}$ .

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 using the macro  $\copyrightyear$ , e.g.,



Table 3: Parameters for the `\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 the 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.
<code>licensedusgovmixed</code>	Some authors are employees of the US government, and the publication rights are licensed to ACM.
<code>licensedcagov</code>	All the authors are employees of the Canadian government, and the publication rights are licensed to ACM.
<code>licensedcagovmixed</code>	Some authors are employees of the Canadian government, and the publication rights are licensed to ACM.
<code>othergov</code>	Authors are employees of a government other than the US or Canada.
<code>licensedothergov</code>	Authors are employees of a government other than the US or Canada, and the publication rights are licensed to ACM.
<code>iw3c2w3</code>	Special statement for conferences organized by IW3C2.
<code>iw3c2w3g</code>	Special statement for conferences organized by IW3C2, when some authors are approved Google employees.

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

`abstract` The environment `abstract` must *precede* the `\maketitle` command. Again, this is different from the standard  $\LaTeX$ . Putting `abstract` after `\maketitle` will trigger an error.

`teaserfigure` 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 `teaserfigure` is used for these figures. This environment must be used *before* `\maketitle`, for example,

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

`\settopmatter` Some information in the top matter is printed for certain journals or proceedings and suppressed for others. You can override these defaults using the command `\settopmatter{<settings>}`. The settings and their meanings are listed in Table 4. For example,

```
\settopmatter{printacmref=false, printccs=true, printfolios=true}
```

The parameter `authorsperrow` requires some explanation. In conference proceedings authors' information is typeset in boxes, several boxes per row (see `sample-sigconf.pdf`, `sample-sigplan.pdf`, etc.). The number of boxes per row is determined automatically. If you want to override this, you can do it using this parameter, for example,

```
\settopmatter{authorsperrow=4}
```

However, in most cases you should *not* do this and should use the default settings. Setting `authorsperrow` to 0 will revert it to the default settings.

The parameter `printacmref` specifies whether to print the ACM bibliographic entry (default), or not. Note that this entry is required for all articles over one page in length, and is optional for one-page articles (abstracts).

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

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

Table 4: Settings for the `\settopmatter` command

Parameter	Values	Meaning
<code>printccs</code>	true/false	Whether to print CCS categories
<code>printacmref</code>	true/false	Whether to print the ACM bibliographic entry
<code>printfolios</code>	true/false	Whether to print page numbers (folios)
<code>authorsperrow</code>	numeric	Number of authors per row for the title page in conference proceedings formats

`\maketitle` The macro `\maketitle` must be the last command in the top-matter group. That is it must follow the commands defined in this section.

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

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

## 2.4 Internationalization

ACM accepts publications in languages other than English, as well as papers in English with translations of titles, subtitles, keywords and abstracts into other languages. Papers in languages other than English usually have titles, subtitles (if applicable), keywords and abstracts in English. Note that CCS concepts are always typeset in English.

To submit these papers you need to set the option `language` in the `\documentclass` command. This option can be repeated, for example,

```
\documentclass[sigconf, language=french, language=english]{acmart}
```

The last language in the list is the main language of the paper, i.e. the one for the main title, abstract, body, etc. The other languages are *secondary*, and used for translated titles, keywords, abstracts. Thus the paper above is written in English, and has a secondary abstract and a secondary title in French. On the other hand, a paper in French with secondary titles and abstracts in English and German should use, for example

```
\documentclass[sigconf,
               language=german,
               language=english,
               language=french]{acmart}
```

This key can use any language defined in *babel* package [3] (currently the package is tested with English, French, German and Spanish languages; other languages may require a translation of `\keywordsname` macro). Actually *acmart* loads *babel* internally, so you can use the facilities provided by this package.

If this key is set, you have access to several additional top matter commands.

`\translatedtitle` The commands `\translatedtitle{<language>}title`, `\translatedsubtitle{<language>}subtitle`  
`\translatedsubtitle` and `\translatedkeywordslanguagekeywords` are used to set title, subtitle and key-  
`\translatedkeywords` words in the secondary language. For example, a paper in English with French title and abstract may set

```
\title{A note on computational complexity}
\translatedtitle{french}{Remarque sur la complexit'e de calcul}
```

while a paper in French should set

```
\title{Remarque sur la complexit'e de calcul}
\translatedtitle{english}{A note on computational complexity}
```

translatedabstract Similarly, translatedabstract environment has a mandatory language argument, for example,

```
\begin{translatedabstract}{english}
This is the English version of the abstract
\end{translatedabstract}
```

You can repeat these commands if a paper has more than one secondary language.

Use the standard commands (`\title`, `\subtitle`, `\keywords`, `abstract`) for the main language of the paper.

## 2.5 Algorithms

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

## 2.6 Figures and tables

The new ACM styles use the standard L<sup>A</sup>T<sub>E</sub>X 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 tables *before* the table bodies.
2. The ACM uses the standard types for figures and tables and adds several new ones. In total there are the following types:

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

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

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

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

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 the TeX FAQ [1]. The simplest one is to use a `\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}

```

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

## 2.7 Descriptions of images

`\Description` Some readers of ACM publications might be visually challenged. These readers might use a voice-over software to read aloud the papers. It is important to provide them a description of each image used in the paper.

The command `\Description[short description]{long description}` should be placed inside every figure, `teaserfigure` or `marginfigure` environment to provide a description of the image(s) used in the figure. Unlike `\caption`, which is used alongside the image, `\Description` is intended to be used instead of the image, for example,

```

\begin{figure}
  \centering
  \includegraphics{voltage}
  \Description{A bell-like histogram centered at  $0.5\text{V}$  with most
  measurements between  $0.2\text{V}$  and  $0.8\text{V}$ }
  \caption{Histogram of the measurements of voltage}
  \label{fig:voltage}
\end{figure}

```

At present the lack of descriptions generates a warning at compilation.

## 2.8 Theorems

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

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

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

These environments are defined by default. In the unusual circumstance that a user does not wish to have these environments defined, the option `acmthm=false` in the preamble will suppress them.

Sometimes authors want to define new theorem-like constructs that use theorem counters. These constructs must be defined either after `\begin{document}`, or delayed using `\AtEndPreamble` macro, for example,

```

\AtEndPreamble{%
  \theoremstyle{acmdefinition}
  \newtheorem{remark}[theorem]{Remark}}

```

## 2.9 Online-only and offline-only material

`printonly` Some supplementary material in ACM publications 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}
  Supplementary materials are available in the online version of this paper.
\end{printonly}

\begin{screenonly}
  (The actual supplementary materials.)
\end{screenonly}

```

We use the `comment` package for typesetting this code, so `\begin` and `\end` should start on a line of their own with no leading or trailing spaces.

## 2.10 Note about anonymous mode

`anonsuppress` When the option `anonymous` is selected,  $\TeX$  suppresses author information (including the 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,

```
\begin{anonsuppress}
  This is the continuation of the previous work by the author
  \cite{prev1, prev2}.
\end{anonsuppress}
```

As for the `printonly` and `screenonly` environments, `\begin{anonsuppress}` and `\end{anonsuppress}` should start on a line of their own with no leading or trailing spaces.

`\anon` To suppress short snippets of information, use the command `\anon[<substitute>]{<suppressed-text>}`. By default [*<substitute>*] is the word ANONYMOUS. Examples:

```
This work was performed at \anon{NSA}.
This work was performed at \anon[No Such Agency]{NSA}.
```

## 2.11 Acknowledgments

The traditional “Acknowledgments” section is conventionally used to thank persons and granting agencies for their help and support. However, there are several important considerations about this section.

First, in anonymous mode this section must be omitted: it gives too much information to reviewers. Second, data about grants is extracted and stored separately by the postprocessing software. ACM classes provide facilities for both these tasks.

`acks` The environment `acks` starts an unnumbered section “Acknowledgments” unless the anonymous mode is chosen. Put all thanks inside this environment.

As for the `printonly` and `screenonly` environments, `\begin{acks}` and `\end{acks}` should start on a line of their own with no leading or trailing spaces.

`\grantsponsor` All financial support *must* be listed using the commands `\grantsponsor` and  
`\grantnum` These commands tell the postprocessing software about the granting organization and grant. The format of these commands is the following:

```
\grantsponsor{<sponsorID>}{<name>}{<url>}
\grantnum[<url>]{<sponsorID>}{<number>}.
```

Here `{<sponsorID>}` is the unique ID used to match grants to sponsors, `{<name>}` is the name of the sponsor, `{<url>}` is its URL, and `{<number>}` is the grant number. The `{<sponsorID>}` of the `\grantnum` command must correspond to the `{<sponsorID>}` of a `\grantsponsor` command. Some awards have their own web pages, which you can include using the optional argument of the `\grantnum` command.

At present `{<sponsorID>}` is chosen by the authors and can be an arbitrary key in the same way the label of a `\cite` is arbitrarily chosen. There might be a change to this policy if the ACM decides to create a global database of sponsoring organizations.

Example:

```
\begin{acks}
  The authors would like to thank Dr. Yuhua Li for providing the
```

matlab code of the \textit{BEPS} method.

The authors would also like to thank the anonymous referees for their valuable comments and helpful suggestions. This work is supported by the \grantsponsor{GS501100001809}{National Natural Science Foundation of China}{https://doi.org/10.13039/501100001809} under Grant No.: \grantnum{GS501100001809}{61273304} and \grantnum[http://www.nsf.cn/youngscientists]{GS501100001809}{Young Scientists' Support Program}.

```
\end{acks}
```

## 2.12 Bibliography

The ACM uses the natbib package for formatting references and the BibTeX style file ACM-Reference-Format.bst for BibTeX processing. You can disable loading of natbib using the option natbib=false in \documentclass. However, it is not recommended, as well as the use of BibTeX styles other than ACM-Reference-Format.bst, and may delay the processing of the manuscript.

`\citestyle` If you use natbib, you can select one of two predefined citation styles using the command \citestyle: the author-year format acmauthoryear or the numeric format acmnumeric. For example,

```
\citestyle{acmauthoryear}
```

Note that numeric citations are the default mode for most formats.

`\setcitestyle` You can further customize natbib using the \setcitestyle command, for example,

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

One of the more common versions is

```
\setcitestyle{nosort}
```

It is useful if you do not like the way natbib sorts citation lists.

If you use natbib, then commands like \citep and \citeauthor are automatically supported. The command \shortcite is the same as \cite in numerical mode and cites the year in author-date mode.

Note that before version 1.48 the command \citeyear put the year in parentheses. In version 1.48 and later it produces just the year; the command \citeyearpar can be used to emulate its old behavior.

There are several customized BibTeX entry types and fields in the ACM style file ACM-Reference-Format.bst that you may want to be aware of.

The style supports the fields doi and url, for example,

```
doi = "10.1145/1188913.1188915",  
url = "http://ccrma.stanford.edu/~jos/bayes/bayes.pdf",
```



Normally the printing of URL is suppressed if DOI is present. However, there is a special field `distinctURL`. If it is present and is not zero, URL is printed even if DOI is present.

The style supports the arXiv-recommended fields `eprint` and (optionally) `primaryclass`, for example,

```
eprint = "960935712",
primaryclass = "cs",
```

See the examples at <https://arxiv.org/help/hypertex/bibstyles>.

There are several special entry types. Types `online` and `game` are used for Web pages and games, for example,

```
@online{Thornburg01,
  author = "Harry Thornburg",
  year = "2001",
  title = "Introduction to Bayesian Statistics",
  url = "http://ccrma.stanford.edu/~jos/bayes/bayes.html",
  month = mar,
  lastaccessed = "March 2, 2005",
}
```

Entry types `artifactsoftware`, `artifactdataset` (with synonyms `software` and `dataset`) can be used to cite software artifacts and datasets, for example,

```
@ArtifactSoftware{R,
  title = {R: A Language and Environment for Statistical Computing},
  author = {{R Core Team}},
  organization = {R Foundation for Statistical Computing},
  address = {Vienna, Austria},
  year = {2019},
  url = {https://www.R-project.org/},
}
@ArtifactDataset{UMassCitations,
  author = {Sam Anzaroot and Andrew McCallum},
  title = {{UMass} Citation Field Extraction Dataset},
  year = 2013,
  url =
    {http://www.iesl.cs.umass.edu/data/data-umasscitationfield},
  lastaccessed = {May 27, 2019}
}
```

For these entry types you can use the `lastaccessed` field to add the access date for the URL.

There are two ways to enter video or audio sources in the bibliography corresponding to two different possibilities. For standalone sources available online, you can use an `online` entry and set its `howpublished` field. For example,

```
@online{Obama08,
  author = "Barack Obama",
  year = "2008",
  title = "A more perfect union",
  howpublished = "Video",
```

```

    day = "5",
    url = "http://video.google.com/videoplay?docid=6528042696351994555",
    month = mar,
    lastaccessed = "March 21, 2008",
}

```

For sources available as attachments to conference proceedings and similar documents, you can use the usual `inproceedings` entry type and set its `howpublished` field:

```

@Inproceedings{Novak03,
  author = "Dave Novak",
  title = "Solder man",
  booktitle = "ACM SIGGRAPH 2003 Video Review on Animation theater Program",
  year = "2003",
  publisher = "ACM Press",
  address = "New York, NY",
  pages = "4",
  month = "March 21, 2008",
  doi = "10.9999/woot07-S422",
  howpublished = "Video",
}

```

Sometimes you need to cite a complete issue of a journal. The periodical entry type is intended for this:

```

@periodical{JCohen96,
  key = "Cohen",
  editor = "Jacques Cohen",
  title = "Special issue: Digital Libraries",
  journal = "Communications of the {ACM}",
  volume = "39",
  number = "11",
  month = nov,
  year = "1996",
}

```

If you do not know the year of publication, the style will add “[n. d.]” (for “no date”) to the entry.

If you do not know the author (this is often the case for online entries), use the `key` field to add a key for sorting and citations, for example,

```

@online{TUGInstmem,
  key = {TUG},
  year = 2017,
  title = "Institutional members of the {\TeX} Users Group",
  url = "http://wwtug.org/instmem.html",
  lastaccessed = "May 27, 2017",
}

```

A note about sorting. The current ACM bibliography styles always sort the entries according to authors names and publication year. There is a controversy about sorting

names with “von” or “van” part: should Ludwig van Beethoven be sorted under “V” or under “B”? The American practice is to use “van” in sorting, i.e. to file van Beethoven under “V”. However, some authorities recommend to sort Dutch persons according to their last names (see e.g. <https://www.ifla.org/files/assets/cataloguing/pubs/names-of-persons.1996.pdf>). While I do not want to take a part in this dispute, I would like to point to the old “noopsort” trick by Oren Patashnik. Add to the .bib file the line

```
@PREAMBLE{"\providecommand{\noopsort}[1]{}"}
```

and then encode the author as

```
author = {Ludwig {\noopsort{Beethoven}}van Beethoven},
```

This will make the author to be sorted as “Beethoven” rather than “van Beethoven”.

The current bst style defines a number of macros for common journal names. In particular, all journals listed in Table 5 are included, so you can use strings like `journal = taccess` for *ACM Transactions on Accessible Computing*.

## 2.13 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 and ACMDarkBlue. You can use them in color assignments.

The ACM provides the following recommendation on color use.

The most accessible approach would be to ensure that your article is still readable when printed in greyscale. The most notable reasons for this are:

1. The most common type of inherited Color Vision Deficiency (CVD) is red-green (in which similar-brightness colors that differ only in their amounts of red or green are often confused), and it affects up to 8% of males and 0.5% of females of Northern European descent.
2. The most common type of acquired Color Vision Deficiency (CVD) is blue-yellow (including mild cases for many older adults).
3. Most printing is in black and white.
4. Situational impairments (e.g., bright sunlight shining on a mobile screen) tend to reduce the entire color gamut, reducing color discriminability.

**Note:** It is *not* safe to encode information using only variations in color (i.e., only differences in hue and/or saturation) as there is bound to be someone affected!

To ensure that you are using the most accessible colors, the ACM recommends that you choose sets of colors to help ensure suitable variations in when printed in greyscale by using either of the following tools:

1. ColourBrewer: <http://colorbrewer2.org/>
2. ACE: The Accessible Colour Evaluator: <http://daprlab.com/ace/> for designing WCAG 2.0 compliant palettes.

## 2.14 Other notable packages and typographic remarks

Several other packages are recommended for specialized tasks.

The package `subcaption` [9] is recommended for complex figures with several subplots or subfigures that require separate subcaptioning. The packages `nomencl` [10] and `glossaries` [11] can be used for the automatic creation of the lists of symbols and concepts used.

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

Note that the uppercasing in section titles is done using the `textcase` package [12], so the command `\NoCaseChange` inside the title may help to prevent extraneous uppercasing.

## 2.15 Counting words

Some ACM conferences use word count limits for papers. The calculation of word number for a paper with math, tables and figures is not a trivial task. Currently the authoritative word count is done by translating the PDF to text and using `wc -w` on the output. Authors can use the package `texcount` (used by Overleaf) to get an estimate of the word count. To facilitate this one adds to the beginning of the package metacomments

```
%TC:macro \cite [option:text,text]
%TC:macro \citep [option:text,text]
%TC:macro \citet [option:text,text]
%TC:envir table 0 1
%TC:envir table* 0 1
%TC:envir tabular [ignore] word
%TC:envir displaymath 0 word
%TC:envir math 0 word
%TC:envir comment 0 0
```

and uses `\begin{math}... \end{math}` instead of dollar signs for math. Note that the count is in any case approximate, and the final decision of editors is based on PDF count.

The script `texcount` provides a report of word count in the document.

## 2.16 Disabled or forbidden commands

The goal of `acmart` package is to provide a uniform look and feel for ACM publications. Accordingly, a number of commands is forbidden or disabled in `acmart`.

You may *not* put several authors or several e-mails into a `\author` or `\email` command. This may lead to errors or warning.

You cannot change `\baselinestretch` in your document: this produces an error.

You should not abuse the command `\vspace`: this command may disturb the typesetting of ACM papers.

You should not load `amssymb` package since the package `acmart` defines the corresponding symbols itself.

## 2.17 Notes for wizards

Sometimes you need to change the behavior of `acmart`. The usual way to do this is to redefine commands in the preamble. However, these definitions are executed *after* `acmart` is loaded and certain decisions are made. This presents a number of problems.

For example, one may want to use the `titletoc` package with `acmart`. This package should be loaded before `hyperref`. However, since `acmart` loads `hyperref` itself, the line `\usepackage{titletoc}` in the preamble will lead to grief (see <http://tex.stackexchange.com/questions/357265/using-titletoc-with-acm-acmart-style>).

Another example is passing options to a package. Suppose you want to use the `dvipsnames` option of the `xcolor` package. Normally you cannot do this because `acmart` loads this package itself without options.

The file `acmart-preload-hook.tex` can be used to solve these problems. If this file exists, it will be processed before any other package. You can use this file to load packages or pass options to them. For example, if you put in this file

```
\let\LoadClassOrig\LoadClass
\renewcommand\LoadClass[2][\LoadClassOrig[#1]{#2}%
\usepackage{titletoc}
```

then `titletoc` will be loaded before `hyperref`. If you put in this file

```
\PassOptionsToPackage{dvipsnames}{xcolor}
```

you will pass `dvipsnames` to `xcolor`.

**Important note.** This hook makes it too easy to create a manuscript that is not acceptable by the ACM. It is even easier to create a file that cannot be compiled. So please do not use it *unless you know what you are doing*. And if you use it, *do not ask for support*. If you decide to use this hook, you are on your own.

`\AtBeginMaketitle` Another hook is `\AtBeginMaketitle`. The commands in this hook are executed before `\maketitle`, for example,

```
\AtBeginMaketitle{\acmPrice{125.00}}
```

## 2.18 Currently supported publications

Table 5: ACM publications and arguments of the `\acmJournal` command

Abbreviation	Publication
CIE	ACM Computers in Entertainment
CSUR	ACM Computing Surveys
DLT	Distributed Ledger Technologies: Research and Practice
DGOV	Digital Government: Research and Practice
DTRAP	Digital Threats: Research and Practice
FAC	Formal Aspects of Computing
HEALTH	ACM Transactions on Computing for Healthcare
IMWUT	PACM on Interactive, Mobile, Wearable and Ubiquitous Technologies
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
PACMCGIT	Proceedings of the ACM on Computer Graphics and Interactive Techniques
PACMHCI	PACM on Human-Computer Interaction
PACMPL	PACM on Programming Languages
POMACS	PACM on Measurement and Analysis of Computing Systems
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
TDS	ACM/IMS Transactions on Data Science
TEAC	ACM Transactions on Economics and Computation
TECS	ACM Transactions on Embedded Computing Systems
TELO	ACM Transactions on Evolutionary Learning
THRI	ACM Transactions on Human-Robot Interaction
TIIS	ACM Transactions on Interactive Intelligent Systems
TIOT	ACM Transactions on Internet of Things
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

Table 5: ACM publications and arguments of the `\acmJournal` command (continued)

Abbreviation	Publication
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
TQC	ACM Transactions on Quantum Computing
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

Besides the publications listed in Table 5, there is a special “publication” type FACMP, a forthcoming ACM publication, reserved for new journals which are not assigned an ISSN yet.

## 2.19 A note about sigchi-a format

Starting in Spring 2020 ACM retired SIGCHI Extended Abstract format (`sigchi-a`). ACM will not, under any circumstances, accept documents in this format for publication and will not offer technical support to the authors who use this template.

You may use this format in the `nonacm` mode only, as in

```
\documentclass[sigchi-a, nonacm]{acmart}
```

sidebar  
marginfigure  
margintable

This format has large margin uses for special figures and tables. This package provides three environments for this with optional captions:

**sidebar:** textual information in the margin,

**marginfigure:** a figure in the margin,

**margintable:** a table in the margin.

The environments `figure` and `table` produce figures and tables with the width of the text column. The environments `figure*` and `table*` produce “wide” figures and tables, which take a large part of the margin.

The horizontal sizes of figures are:

1. figure: \columnwidth,
2. marginfigure: \marginparwidth,
3. figure\*: \fulltextwidth.



## 3 Implementation

### 3.1 Identification

We start with a declaration of who we are. Most .dtx files put driver code in a separate .drv driver file. 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 [2022/02/19 v1.83 Typesetting articles for the Association for Computing Machinery]
```

And the driver code:

```
7 <*gobble>
8 \documentclass{ltxdoc}
9 \usepackage{array,booktabs,amsmath,graphicx,fancyvrb,tabularx, longtable}
10 \usepackage[tt=false, type1=true]{libertine}
11 \usepackage[varqu]{zi4}
12 \usepackage[libertine]{newtxmath}
13 \usepackage[tableposition=top]{caption}
14 \usepackage{hypdoc}
15 \PageIndex
16 \CodelineIndex
17 \RecordChanges
18 \EnableCrossrefs
19 \begin{document}
20   \DocInput{acmart.dtx}
21 \end{document}
22 </gobble>
23 <*class>
24 \def\@classname{acmart}
```

### 3.2 Preload hook

We preload acmart-preload-hook:

```
25 \InputIfFileExists{acmart-preload-hook.tex}{%
26   \ClassWarning{\@classname}{%
27     I am loading acmart-preload-hook.tex. You are fully responsible
28     for any problems from now on.}}{}
```

### 3.3 Options

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

```
29 \RequirePackage{xkeyval}
   We use xstring to check whether user input is valid
30 \RequirePackage{xstring}
   We need iftex to check the engine
31 \RequirePackage{iftex}
```

format The possible formats

```
32 \define@choicekey*+{acmart.cls}{format}[\ACM@format\ACM@format@nr]{%
33 manuscript, acmsmall, acmlarge, acmtog, sigconf, siggraph,
34 sigplan, sigchi, sigchi-a}[manuscript]{}{%
35 \ClassError{\@classname}{The option format must be manuscript,
36 acmsmall, acmlarge, acmtog, sigconf, siggraph,
37 sigplan, sigchi or sigchi-a}}
38 \def\@DeclareACMFormat#1{\DeclareOptionX{#1}{\setkeys{acmart.cls}{format=#1}}}
39 \@DeclareACMFormat{manuscript}
40 \@DeclareACMFormat{acmsmall}
41 \@DeclareACMFormat{acmlarge}
42 \@DeclareACMFormat{acmtog}
43 \@DeclareACMFormat{sigconf}
44 \@DeclareACMFormat{siggraph}
45 \@DeclareACMFormat{sigplan}
46 \@DeclareACMFormat{sigchi}
47 \@DeclareACMFormat{sigchi-a}
48 \ExecuteOptionsX{format}
```

\if@ACM@screen Whether we use screen mode

```
49 \define@boolkey+{acmart.cls}[@ACM@]{screen}[true]{%
50 \if@ACM@screen
51 \PackageInfo{\@classname}{Using screen mode}%
52 \else
53 \PackageInfo{\@classname}{Not using screen mode}%
54 \fi}{\PackageError{\@classname}{The option screen can be either true or
55 false}}
56 \ExecuteOptionsX{screen=false}
```

\if@ACM@urlbreakonhyphens

```
57 \define@boolkey+{acmart.cls}[@ACM@]{urlbreakonhyphens}[true]{%
58 \if@ACM@urlbreakonhyphens
59 \PackageInfo{\@classname}{Using breaking urls on hyphens}%
60 \else
61 \PackageInfo{\@classname}{Not breaking urls on hyphens}%
62 \fi}{\PackageError{\@classname}{The option urlbreakonhyphens can be either true or
63 false}}
64 \ExecuteOptionsX{urlbreakonhyphens=true}
```

\if@ACM@acmthm Whether we define theorem-like environments.

```
65 \define@boolkey+{acmart.cls}[@ACM@]{acmthm}[true]{%
66 \if@ACM@acmthm
67 \PackageInfo{\@classname}{Requiring acmthm}%
68 \else
69 \PackageInfo{\@classname}{Suppressing acmthm}%
70 \fi}{\PackageError{\@classname}{The option acmthm can be either true or
71 false}}
72 \ExecuteOptionsX{acmthm=true}
```

\if@ACM@review Whether we use review mode

```
73 \define@boolkey+{acmart.cls}[@ACM@]{review}[true]{%
74 \if@ACM@review
75 \PackageInfo{\@classname}{Using review mode}%
```

```

76 \AtBeginDocument{\@ACM@printfoliostrue}%
77 \else
78 \PackageInfo{\@classname}{Not using review mode}%
79 \fi}{\PackageError{\@classname}{The option review can be either true or
80 false}}
81 \ExecuteOptionsX{review=false}

```

`\if@ACM@authorversion` Whether we use author's-version mode

```

82 \define@boolkey+{acmart.cls}[@ACM@]{authorversion}[true]{%
83 \if@ACM@authorversion
84 \PackageInfo{\@classname}{Using authorversion mode}%
85 \else
86 \PackageInfo{\@classname}{Not using authorversion mode}%
87 \fi}{\PackageError{\@classname}{The option authorversion can be either true or
88 false}}
89 \ExecuteOptionsX{authorversion=false}

```

`\if@ACM@nonacm` Special option for non-ACM publications using the ACM typesetting options.

```

90 \define@boolkey+{acmart.cls}[@ACM@]{nonacm}[true]{%
91 \if@ACM@nonacm
92 \PackageInfo{\@classname}{Using nonacm mode}%
93 \AtBeginDocument{\@ACM@printacmreffalse}%
94 % in 'nonacm' mode we disable the "ACM Reference Format"
95 % printing by default, but this can be re-enabled by the
96 % user using \settopmatter{printacmref=true}
97 \else
98 \PackageInfo{\@classname}{Not using nonacm mode}%
99 \fi}{\PackageError{\@classname}{The option nonacm can be either true or
100 false}}
101 \ExecuteOptionsX{nonacm=false}

```

`\if@ACM@balance` Whether to balance the last page

```

102 \define@boolkey+{acmart.cls}[@ACM@]{balance}[true]{%
103 \PackageError{\@classname}{The option balance can be either true or
104 false}}
105 \ExecuteOptionsX{balance}

```

`\if@ACM@pbalance` Whether to balance the last page

```

106 \define@boolkey+{acmart.cls}[@ACM@]{pbalance}[true]{%
107 \PackageError{\@classname}{The option pbalance can be either true or
108 false}}
109 \ExecuteOptionsX{pbalance=false}

```

`\if@ACM@natbib@override` This macro is no longer used.

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

```

110 \define@boolkey+{acmart.cls}[@ACM@]{natbib}[true]{%
111 \if@ACM@natbib
112 \PackageInfo{\@classname}{Explicitly selecting natbib mode}%
113 \else
114 \PackageInfo{\@classname}{Explicitly deselecting natbib mode}%
115 \fi}{\PackageError{\@classname}{The option natbib can be either true or
116 false}}
117 \ExecuteOptionsX{natbib=true}

```

```

\if@ACM@anonymous Whether we use anonymous mode
118 \define@boolkey+{acmart.cls}[@ACM@]{anonymous}[true]{%
119 \if@ACM@anonymous
120 \PackageInfo{\@classname}{Using anonymous mode}%
121 \else
122 \PackageInfo{\@classname}{Not using anonymous mode}%
123 \fi}{\PackageError{\@classname}{The option anonymous can be either true or
124 false}}
125 \ExecuteOptionsX{anonymous=false}

\if@ACM@timestamp Whether we use timestamp mode
126 \define@boolkey+{acmart.cls}[@ACM@]{timestamp}[true]{%
127 \if@ACM@timestamp
128 \PackageInfo{\@classname}{Using timestamp mode}%
129 \else
130 \PackageInfo{\@classname}{Not using timestamp mode}%
131 \fi}{\PackageError{\@classname}{The option timestamp can be either true or
132 false}}
133 \ExecuteOptionsX{timestamp=false}

\if@ACM@authordraft Whether we use author-draft mode
134 \define@boolkey+{acmart.cls}[@ACM@]{authordraft}[true]{%
135 \if@ACM@authordraft
136 \PackageInfo{\@classname}{Using authordraft mode}%
137 \@ACM@timestamptrue
138 \@ACM@reviewtrue
139 \else
140 \PackageInfo{\@classname}{Not using authordraft mode}%
141 \fi}{\PackageError{\@classname}{The option authordraft can be either true or
142 false}}
143 \ExecuteOptionsX{authordraft=false}

\ACM@fontsize The font size to pass to the base class
144 \def\ACM@fontsize{}
145 \DeclareOptionX{9pt}{\edef\ACM@fontsize{\CurrentOption}}
146 \DeclareOptionX{10pt}{\edef\ACM@fontsize{\CurrentOption}}
147 \DeclareOptionX{11pt}{\edef\ACM@fontsize{\CurrentOption}}
148 \DeclareOptionX{12pt}{\edef\ACM@fontsize{\CurrentOption}}

\ACM@languages The languages of the document
149 \def\ACM@languages{}
150 \DeclareOptionX{language}{%
151 \ifx\ACM@languages\@empty
152 \gdef\ACM@languages{english}\fi
153 \g@addto@macro\ACM@languages{, #1}}

154 \DeclareOptionX{draft}{\PassOptionsToClass{\CurrentOption}{amsart}}
155 \DeclareOptionX{*}{\PassOptionsToClass{\CurrentOption}{amsart}}
156 \ProcessOptionsX
157 \ClassInfo{\@classname}{Using format \ACM@format, number \ACM@format@nr}

```

### 3.4 Setting switches

<code>\if@ACM@manuscript</code>	Whether we use manuscript mode 158 <code>\newif\if@ACM@manuscript</code>
<code>\if@ACM@journal</code>	There are two kinds of publications: journals and books 159 <code>\newif\if@ACM@journal</code>
<code>\if@ACM@journal@bibstrip</code>	Sometimes ACM wants a journal-like publication to have conference information in the bibstrip and vice versa, so we have an additional switch. 160 <code>\newif\if@ACM@journal@bibstrip</code>
<code>\if@ACM@sigchiamode</code>	The formatting of SIGCHI extended abstracts is quite unusual. We have a special switch for them. 161 <code>\newif\if@ACM@sigchiamode</code>

#### Setting up switches

```
162 \ifnum\ACM@format@nr=5\relax % siggraph
163 \ClassWarning{\@classname}{%
164   The format siggraph is now obsolete.\MessageBreak
165   I am switching to sigconf.}
166 \setkeys{acmart.cls}{format=sigconf}
167 \fi
168 \ifnum\ACM@format@nr=7\relax % sigchi
169 \ClassWarning{\@classname}{%
170   The format sigchi is now obsolete.\MessageBreak
171   I am switching to sigconf.}
172 \setkeys{acmart.cls}{format=sigconf}
173 \fi
174 \ifnum\ACM@format@nr=8\relax % sigchi
175 \ClassWarning{\@classname}{%
176   ACM SIGCHI has retired the SIGCHI-A template\MessageBreak
177   effective immediately. ACM is keeping this template\MessageBreak
178   option available to authors who are working on legacy\MessageBreak
179   documents only. ACM will not, under any circumstances,\MessageBreak
180   accept documents in this format for publication and\MessageBreak
181   will not offer technical support to the authors who use\MessageBreak
182   this template.\MessageBreak
183   ACM SIGCHI is directing Conference leaders and\MessageBreak
184   authors to publish their articles using the SIGCONF\MessageBreak
185   template call.}
186 \fi
187 \ifnum\ACM@format@nr=0\relax
188   \@ACM@manuscripttrue
189 \else
190   \@ACM@manuscriptfalse
191 \fi
192 \@ACM@sigchiamodefalse
193 \ifcase\ACM@format@nr
194 \relax % manuscript
195   \@ACM@journaltrue
196 \or % acmsmall
197   \@ACM@journaltrue
```

```

198 \or % acmlarge
199 \@ACM@journaltrue
200 \or % acmtog
201 \@ACM@journaltrue
202 \or % sigconf
203 \@ACM@journalfalse
204 \or % siggraph
205 \@ACM@journalfalse
206 \or % sigplan
207 \@ACM@journalfalse
208 \or % sigchi
209 \@ACM@journalfalse
210 \or % sigchi-a
211 \@ACM@journalfalse
212 \@ACM@sigchiamodetrue
213 \fi
214 \if@ACM@journal
215 \@ACM@journal@bibstriptrue
216 \else
217 \@ACM@journal@bibstripfalse
218 \fi

```

### 3.5 Loading the base class and package

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

```

219 \ifx\ACM@fontsize\@empty
220 \ifcase\ACM@format@nr
221 \relax % manuscript
222 \def\ACM@fontsize{9pt}%
223 \or % acmsmall
224 \def\ACM@fontsize{10pt}%
225 \or % acmlarge
226 \def\ACM@fontsize{10pt}%
227 \or % acmtog
228 \def\ACM@fontsize{9pt}%
229 \or % sigconf
230 \def\ACM@fontsize{9pt}%
231 \or % siggraph
232 \def\ACM@fontsize{9pt}%
233 \or % sigplan
234 \def\ACM@fontsize{10pt}%
235 \or % sigchi
236 \def\ACM@fontsize{9pt}%
237 \or % sigchi-a
238 \def\ACM@fontsize{10pt}%
239 \fi
240 \fi
241 \ClassInfo{\@classname}{Using fontsize \ACM@fontsize}
242 \LoadClass[\ACM@fontsize, reqno]{amsart}
243 \RequirePackage{microtype}

```

We need etoolbox for delayed code

```
244 \RequirePackage{etoolbox}
```

Booktabs is now the default

```
245 \RequirePackage{booktabs}
```

We need `totpages` to calculate the number of pages and `refcount` to use that number

```
246 \RequirePackage{refcount}
```

```
247 \RequirePackage{totpages}
```

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

```
248 \RequirePackage{environ}
```

We use `setspace` for double spacing

```
249 \if@ACM@manuscript
```

```
250 \RequirePackage{setspace}
```

```
251 \onehalfspacing
```

```
252 \fi
```

We need `textcase` for better upcasing

```
253 \RequirePackage{textcase}
```

### 3.6 Citations

We patch `\setcitestyle` to allow, for example, `\setcitestyle{sort}` and `\setcitestyle{nosort}`. We patch `\citetstyle` to warn about undefined citation styles.

```
254 \if@ACM@natbib
```

```
255 \RequirePackage{natbib}
```

```
256 \renewcommand{\bibsection}{%
```

```
257 \section*{\refname}%
```

```
258 \phantomsection\addcontentsline{toc}{section}{\refname}%
```

```
259 }
```

```
260 \renewcommand{\bibfont}{\bibliofont}
```

```
261 \renewcommand\setcitestyle[1]{
```

```
262 \@for\@tempa:=#1\do
```

```
263 {\def\@tempb{round}\ifx\@tempa\@tempb
```

```
264 \renewcommand\NAT@open{(\renewcommand\NAT@close{)}\fi
```

```
265 \def\@tempb{square}\ifx\@tempa\@tempb
```

```
266 \renewcommand\NAT@open{[\renewcommand\NAT@close{]}\fi
```

```
267 \def\@tempb{angle}\ifx\@tempa\@tempb
```

```
268 \renewcommand\NAT@open{<}\renewcommand\NAT@close{>}\fi
```

```
269 \def\@tempb{curly}\ifx\@tempa\@tempb
```

```
270 \renewcommand\NAT@open{\{\renewcommand\NAT@close{\}}\fi
```

```
271 \def\@tempb{semicolon}\ifx\@tempa\@tempb
```

```
272 \renewcommand\NAT@sep{;}\fi
```

```
273 \def\@tempb{colon}\ifx\@tempa\@tempb
```

```
274 \renewcommand\NAT@sep{;}\fi
```

```
275 \def\@tempb{comma}\ifx\@tempa\@tempb
```

```
276 \renewcommand\NAT@sep{,}\fi
```

```
277 \def\@tempb{authoryear}\ifx\@tempa\@tempb
```

```
278 \NAT@numbersfalse\fi
```

```
279 \def\@tempb{numbers}\ifx\@tempa\@tempb
```

```
280 \NAT@numberstrue\NAT@superfalse\fi
```

```
281 \def\@tempb{super}\ifx\@tempa\@tempb
```

```
282 \NAT@numberstrue\NAT@supertrue\fi
```

```
283 \def\@tempb{nobibstyle}\ifx\@tempa\@tempb
```

```
284 \let\bibstyle=@gobble\fi
```

```

285 \def\@tempb{bibstyle}\ifx\@tempa\@tempb
286   \let\bibstyle=\@citestyle\fi
287 \def\@tempb{sort}\ifx\@tempa\@tempb
288   \def\NAT@sort{\@ne}\fi
289 \def\@tempb{nosort}\ifx\@tempa\@tempb
290   \def\NAT@sort{\z@}\fi
291 \def\@tempb{compress}\ifx\@tempa\@tempb
292   \def\NAT@cmprs{\@ne}\fi
293 \def\@tempb{nocompress}\ifx\@tempa\@tempb
294   \def\NAT@cmprs{\z@}\fi
295 \def\@tempb{sort&compress}\ifx\@tempa\@tempb
296   \def\NAT@sort{\@ne}\def\NAT@cmprs{\@ne}\fi
297 \def\@tempb{mcite}\ifx\@tempa\@tempb
298   \let\NAT@merge\@ne\fi
299 \def\@tempb{merge}\ifx\@tempa\@tempb
300   \ifnum{\NAT@merge<\tw@}{\let\NAT@merge\tw@}\fi
301 \def\@tempb{elide}\ifx\@tempa\@tempb
302   \ifnum{\NAT@merge<\thr@}{\let\NAT@merge\thr@}\fi
303 \def\@tempb{longnamesfirst}\ifx\@tempa\@tempb
304   \NAT@longnamestrue\fi
305 \def\@tempb{nonamebreak}\ifx\@tempa\@tempb
306   \def\NAT@nmfmt#1{\mbox{\NAT@up#1}}\fi
307 \expandafter\NAT@find@eq\@tempa=\relax\@nil
308 \if\@tempc\relax\else
309   \expandafter\NAT@rem@eq\@tempc
310   \def\@tempb{open}\ifx\@tempa\@tempb
311     \xdef\NAT@open{\@tempc}\fi
312   \def\@tempb{close}\ifx\@tempa\@tempb
313     \xdef\NAT@close{\@tempc}\fi
314   \def\@tempb{aysep}\ifx\@tempa\@tempb
315     \xdef\NAT@aysep{\@tempc}\fi
316   \def\@tempb{yysep}\ifx\@tempa\@tempb
317     \xdef\NAT@yrsep{\@tempc}\fi
318   \def\@tempb{notesep}\ifx\@tempa\@tempb
319     \xdef\NAT@cmt{\@tempc}\fi
320   \def\@tempb{citesep}\ifx\@tempa\@tempb
321     \xdef\NAT@sep{\@tempc}\fi
322   \fi
323 }%
324 \NAT@@setcites
325 }
326 \renewcommand\citestyle[1]{%
327   \ifcsname bibstyle@#1\endcsname%
328     \csname bibstyle@#1\endcsname\let\bibstyle\@gobble%
329   \else%
330     \@latex@error{Undefined ‘#1’ citestyle}%
331   \fi
332 }%
333 \fi

```

`\bibstyle@acmauthoryear` The default author-year format:

```

334 \newcommand{\bibstyle@acmauthoryear}{%
335   \setcitestyle{%
336     authoryear,%

```



```

337   open={[],close=[]},citesep={;},%
338   aysep={},yysep={,},%
339   notesep={, }}

```

`\bibstyle@acmnumeric` The default numeric format:

```

340 \newcommand{\bibstyle@acmnumeric}{%
341   \setcitestyle{%
342     numbers,sort&compress,%
343     open={[],close=[]},citesep={,},%
344     notesep={, }}

```

The default is numeric:

```

345 \if@ACM@natbib
346 \citestyle{acmnumeric}
347 \fi

```

### 3.7 Internationalization

```

348 \if@ACM@journal
349 \renewcommand\keywordsname{Additional Key Words and Phrases}%
350 \else
351 \renewcommand\keywordsname{Keywords}%
352 \fi
353 \ifx\ACM@languages\@empty
354 \else
355 \RequirePackage[\ACM@languages]{babel}%
356 \addto\captionsenglish{%
357   \if@ACM@journal
358     \renewcommand\keywordsname{Additional Key Words and Phrases}%
359   \else
360     \renewcommand\keywordsname{Keywords}%
361   \fi
362   \renewcommand\acksname{Acknowledgements}%
363 }%
364 \addto\captionsfrench{%
365   \if@ACM@journal
366     \renewcommand\keywordsname{Mots Clés et Phrases Supplémentaires}%
367   \else
368     \renewcommand\keywordsname{Mots clés}%
369   \fi
370   \renewcommand\acksname{Remerciements}%
371 }%
372 \addto\captionsgerman{%
373   \if@ACM@journal
374     \renewcommand\keywordsname{Zusätzliche Schlüsselwörter und Phrasen}%
375   \else
376     \renewcommand\keywordsname{Schlüsselwörter}%
377   \fi
378   \renewcommand\acksname{Danksagungen}%
379 }%
380 \addto\captionsspanish{%
381   \if@ACM@journal
382     \renewcommand\keywordsname{Palabras y Frases Claves Adicionales}%
383   \else

```

```

384         \renewcommand\keywordsname{Palabras claves}%
385         \fi
386         \renewcommand\acksname{Expresiones de gratitud}%
387     }%
388 \fi

\ACM@lang@check Some commands should not be used if the document is monlingual
389 \newcommand\ACM@lang@check[1]{%
390     \ifx\ACM@languages\empty\relax
391     \ClassError{\@classname}{%
392         Command \string#1 \MessageBreak is used in monlingual document}{%
393         You used a command (\string#1) \MessageBreak
394         that does not have a meaning \MessageBreak
395         unless are languages are defined. \MessageBreak
396         Please choose the languages in \string\documentclass
397         \MessageBreak
398         (e.g. \string\documentclass[languages={french, english}]{acmart}),
399         \MessageBreak
400         or delete the command.}%
401     \fi}

\@translatedtitle
402 \def\@translatedtitle{}

\translatedtitle The title of the paper in a different language
403 \newcommand\translatedtitle[2]{\ACM@lang@check{\translatedtitle}%
404 \g@addto@macro\@translatedtitle{\par\foreignlanguage{#1}{#2}}}

\@translatedsubtitle
405 \def\@translatedsubtitle{}

\translatedsubtitle The subtitle of the paper in a different language
406 \newcommand\translatedsubtitle[2]{\ACM@lang@check{\translatedsubtitle}%
407 \g@addto@macro\@translatedsubtitle{\par\foreignlanguage{#1}{#2}}}

\@translatedkeywords
408 \def\@translatedkeywords{}

\translatedkeywords Add keywords to the paper in the language specified
409 \newcommand\translatedkeywords[2]{\ACM@lang@check{\translatedkeywords}%
410 \g@addto@macro\@translatedkeywords{\@mktranslatedkeywords{#1}{#2}}}

\@translatedabstracts The container for translated abstracts.
411 \def\@translatedabstracts{}

translatedabstract We save translated abstracts into \@translatedabstracts
412 \newenvironment{translatedabstract}[1]{\Collect@Body
413     \@savetranslatedabstract\@mktranslatedabstract{#1}}{}

\@savetranslatedabstract And saving the abstract
414 \long\def\@savetranslatedabstract#1{\if@ACM@maketitle@typeset
415     \ClassError{\@classname}{Abstract must be defined before maketitle
416     command. Please move it!}\fi
417     \ACM@lang@check{translatedabstract}%
418     \g@addto@macro\@translatedabstracts{\bgroup#1\egroup}}

```

### 3.8 Sectioning

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

```
419 \def\@startsection#1#2#3#4#5#6{%
420   \if@noskipsec \leavevmode \fi
421   \par
422   \@tempskipa #4\relax
423   \@afterindenttrue
424   \ifdim \@tempskipa <\z@
425     \@tempskipa -\@tempskipa \@afterindentfalse
426   \fi
427   \if@nobreak
428     \everypar{}%
429   \else
430     \addpenalty\@secpenalty\addvspace\@tempskipa
431   \fi
432   \@ifstar
433     {\@ssect{#3}{#4}{#5}{#6}}%
434     {\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}
435 \def\@sect#1#2#3#4#5#6[#7]#8{%
436   \edef\@toclevel{\ifnum#2=\@m 0\else\number#2\fi}%
437   \ifnum #2>\c@secnumdepth
438     \let\@svsec\@empty
439   \else
440     \refstepcounter{#1}%
441     \protected@edef\@svsec{\@secntformat{#1}\relax}%
442   \fi
443   \@tempskipa #5\relax
444   \ifdim \@tempskipa>\z@
445     \begingroup
446       #6{%
447         \@hangfrom{\hskip #3\relax\@svsec}%
448         \interlinepenalty \@M #8\@par}%
449     \endgroup
450     \csname #1mark\endcsname{#7}%
451     \ifnum #2>\c@secnumdepth \else
452       \@tochangmeasure{\csname the#1\endcsname}%
453     \fi
454     \addcontentsline{toc}{#1}{%
455       \ifnum #2>\c@secnumdepth \else
456         \protect\numberline{\csname the#1\endcsname}%
457       \fi
458       #7}%
459   \else
460     \def\@svsechd{%
461       #6{\hskip #3\relax
462         \@svsec #8}%
463       \csname #1mark\endcsname{#7}%
464       \ifnum #2>\c@secnumdepth \else
465         \@tochangmeasure{\csname the#1\endcsname\space}%
466       \fi
467       \addcontentsline{toc}{#1}{%
```

```

468     \ifnum #2>\c@secnumdepth \else
469       \protect\numberline{\csname the#1\endcsname}%
470     \fi
471     #7}}%
472 \fi
473 \@xsect{#5}}
474 \def\@xsect#1{%
475   \@tempskipa #1\relax
476   \ifdim \@tempskipa>\z@
477     \par \nobreak
478     \vskip \@tempskipa
479     \@afterheading
480   \else
481     \@nobreakfalse
482     \global\@noskipsectrue
483     \everypar{%
484       \if@noskipsec
485         \global\@noskipsecfalse
486         {\setbox\z@\lastbox}%
487         \clubpenalty\@M
488         \begingroup \@svsechd \endgroup
489         \unskip
490         \@tempskipa #1\relax
491         \hskip -\@tempskipa
492       \else
493         \clubpenalty \@clubpenalty
494         \everypar{}%
495       \fi}%
496 \fi
497 \ignorespaces}
498 \def\@secntformat#1{\csname the#1\endcsname\quad}
499 \def\@ssect#1#2#3#4#5{%
500   \@tempskipa #3\relax
501   \ifdim \@tempskipa>\z@
502     \begingroup
503     #4{%
504       \@hangfrom{\hskip #1}%
505       \interlinepenalty \@M #5\@par}%
506     \endgroup
507   \else
508     \def\@svsechd{#4{\hskip #1\relax #5}}%
509   \fi
510   \@xsect{#3}}

```

`\@startsection` The `amsart` package redefines `\startsection`. Here we redefine it again to make the table of contents work.

```

511 \def\@starttoc#1#2{\begingroup\makeatletter
512   \setTrue{#1}%
513   \par\removelastskip\vskip\z@skip
514   \@startsection{section}\@M\z@{\linespacing\@plus\linespacing}%
515     {.5\linespacing}{centering\contentsnamefont}{#2}%
516   \@input{\jobname.#1}%
517   \if@filesw
518     \xp\newwrite\csname tf@#1\endcsname

```

```

519 \immediate\exp\openout\csname tf@#1\endcsname \jobname.#1\relax
520 \fi
521 \global\@nobreakfalse \endgroup
522 \addvspace{32\p@\@plus14\p@}%
523 }

\l@section Section spacing is more generous than for amsart
524 \def\l@section{\@toctline{1}{0pt}{1pc}{2pc}{}}

\l@section The spacing in amsart is too large
525 \def\l@section{\@toctline{2}{0pt}{1pc}{3pc}{}}

\l@subsection The spacing in amsart is too large
526 \def\l@subsection{\@toctline{3}{0pt}{1pc}{5pc}{}}

We need to define footnote-related stuff before the call to hyperref (Ross Moore)

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

\@footnotetext In sigchi-a mode our footnotes are in the margin!
528 \if@ACM@sigchiamode
529 \long\def\@footnotetext#1{\marginpar{%
530 \reset@font\small
531 \interlinepenalty\interfootnotelinepenalty
532 \protected@edef\@currentlabel{%
533 \csname p@footnote\endcsname\@thefnmark
534 }%
535 \color@begingroup
536 \@makefnmark{%
537 \rule\z@\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
538 \color@endgroup}}%
539 \fi

\@mpfootnotetext We want the footnotes in minipages centered:
540 \long\def\@mpfootnotetext#1{%
541 \global\setbox\@mpfootins\vbox{%
542 \unvbox\@mpfootins
543 \reset@font\footnotesize
544 \hsize\columnwidth
545 \@parboxrestore
546 \protected@edef\@currentlabel
547 {\csname p@mpfootnote\endcsname\@thefnmark}%
548 \color@begingroup\centering
549 \@makefnmark{%
550 \rule\z@\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
551 \color@endgroup}}

\@makefnmark AMS classes use a buggy definition of \makefnmark. We revert to the standard one.
552 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}

```

### 3.9 Hyperxmp and hyperref

Adding hyperxmp

```
553 \RequirePackage{hyperxmp}
    And now, hyperref
554 \let\@footnotemark@nolink\@footnotemark
555 \let\@footnotetext@nolink\@footnotetext
556 \RequirePackage[bookmarksnumbered,unicode]{hyperref}
557 \pdfstringdefDisableCommands{%
558   \def\addtocounter#1#2{%
559     \def\unskip{ }%
560     \def\textbullet{- }%
561     \def\textrightarrow{-> }%
562     \def\footnotemark{ }%
563   }
564 \urlstyle{rm}
565 \ifcase\ACM@format@nr
566 \relax % manuscript
567 \or % acsmall
568 \or % acmlarge
569 \or % acmtog
570 \or % sigconf
571 \or % siggraph
572 \or % sigplan
573 \urlstyle{sf}
574 \or % sigchi
575 \or % sigchi-a
576 \urlstyle{sf}
577 \fi
578 \AtEndPreamble{%
579   \if@ACM@urlbreakonhyphens
580     \def\do@url@hyp{\do\~}%
581   \fi
582   \if@ACM@screen
583     \hypersetup{colorlinks,
584       linkcolor=ACMPurple,
585       citecolor=ACMPurple,
586       urlcolor=ACMDarkBlue,
587       filecolor=ACMDarkBlue}
588   \else
589     \hypersetup{hidelinks}
590   \fi
591   \hypersetup{pdflang={en},
592     pdfdisplaydoctitle}}
    Bibliography mangling.
593 \if@ACM@natbib
594 \let\citeN\cite
595 \let\cite\citep
596 \let\citeANP\citeauthor
597 \let\citeNN\citeyearpar
598 \let\citeyearNP\citeyear
599 \let\citeNP\citealt
600 \DeclareRobustCommand\citeA
```

```

601     {\begingroup\NAT@swafalse
602       \let\NAT@ctype\@ne\NAT@partrue\NAT@fullfalse\NAT@open\NAT@citetp}%
603   \providecommand\newblock{}%
604 \else
605   \AtBeginDocument{%
606     \let\shortcite\cite%
607     \providecommand\citename[1]{#1}}
608 \fi
609 \newcommand\shortcite[2][{}]{%
610   \ifNAT@numbers\cite[#1]{#2}\else\citeyearpar[#1]{#2}\fi}

```

`\bibliographystyle` The `amsart` package redefines `\bibliographystyle` since it prefers the AMS bibliography style. We turn it back to the  $\LaTeX$  definition:

```

611 \def\bibliographystyle#1{%
612   \ifx\@begindocumenthook\undefined\else
613     \expandafter\AtBeginDocument
614   \fi
615   {\if@filesw
616     \immediate\write\@auxout{\string\bibstyle{#1}}%
617   \fi}}

```

### 3.10 Other packages

Graphics and color.

```

618 \RequirePackage{graphicx}
619 \RequirePackage[prologue]{xcolor}

```

We define ACM colors according to [8]:

```

620 \definecolor[named]{ACMBlue}{cmyk}{1,0.1,0,0.1}
621 \definecolor[named]{ACMYellow}{cmyk}{0,0.16,1,0}
622 \definecolor[named]{ACMOrange}{cmyk}{0,0.42,1,0.01}
623 \definecolor[named]{ACMRed}{cmyk}{0,0.90,0.86,0}
624 \definecolor[named]{ACMLightBlue}{cmyk}{0.49,0.01,0,0}
625 \definecolor[named]{ACMGreen}{cmyk}{0.20,0,1,0.19}
626 \definecolor[named]{ACMPurple}{cmyk}{0.55,1,0,0.15}
627 \definecolor[named]{ACMDarkBlue}{cmyk}{1,0.58,0,0.21}

```

Author-draft mode or sigchi-a mode

```

628 \if@ACM@authordraft
629   \RequirePackage{draftwatermark}
630   \SetWatermarkFontSize{0.5in}
631   \SetWatermarkColor[gray]{.9}
632   \SetWatermarkText{\parbox{12em}{\centering
633     Unpublished working draft. \\\
634     Not for distribution.}}
635 \else
636   \if@ACM@sigchiamode
637     \if@ACM@nonacm\else
638       \RequirePackage{draftwatermark}
639       \SetWatermarkFontSize{0.5in}
640       \SetWatermarkColor[gray]{.9}
641       \SetWatermarkText{\parbox{12em}{\centering
642         Legacy document. \\\
643         Not for publication in an ACM venue}}

```

```

644 \fi
645 \fi
646 \fi

```

### 3.11 Paper size and paragraphing

We use geometry for dimensions. Note that the present margins do not depend on the font size option—we might need to change this. See <https://github.com/borisveytsman/acmart/issues/5#issuecomment-272881329>.

```

647 \RequirePackage{geometry}
648 \ifcase\ACM@format@nr
649 \relax % manuscript
650 \geometry{letterpaper,head=13pt,
651 marginparwidth=6pc,heightrounded}%
652 \or % acmsmall
653 \geometry{twoside=true,
654 includeheadfoot, head=13pt, foot=2pc,
655 paperwidth=6.75in, paperheight=10in,
656 top=58pt, bottom=44pt, inner=46pt, outer=46pt,
657 marginparwidth=2pc,heightrounded
658 }%
659 \or % acmlarge
660 \geometry{twoside=true, head=13pt, foot=2pc,
661 paperwidth=8.5in, paperheight=11in,
662 includeheadfoot,
663 top=78pt, bottom=114pt, inner=81pt, outer=81pt,
664 marginparwidth=4pc,heightrounded
665 }%
666 \or % acmtog
667 \geometry{twoside=true, head=13pt, foot=2pc,
668 paperwidth=8.5in, paperheight=11in,
669 includeheadfoot, columnsep=24pt,
670 top=52pt, bottom=75pt, inner=52pt, outer=52pt,
671 marginparwidth=2pc,heightrounded
672 }%
673 \or % sigconf
674 \geometry{twoside=true, head=13pt,
675 paperwidth=8.5in, paperheight=11in,
676 includeheadfoot, columnsep=2pc,
677 top=57pt, bottom=73pt, inner=54pt, outer=54pt,
678 marginparwidth=2pc,heightrounded
679 }%
680 \or % siggraph
681 \geometry{twoside=true, head=13pt,
682 paperwidth=8.5in, paperheight=11in,
683 includeheadfoot, columnsep=2pc,
684 top=57pt, bottom=73pt, inner=54pt, outer=54pt,
685 marginparwidth=2pc,heightrounded
686 }%
687 \or % sigplan
688 \geometry{twoside=true, head=13pt,
689 paperwidth=8.5in, paperheight=11in,
690 includeheadfoot=false, columnsep=2pc,

```



```

691     top=1in, bottom=1in, inner=0.75in, outer=0.75in,
692     marginparwidth=2pc,heightrounded
693   }%
694 \or % sigchi
695   \geometry{twoside=true, head=13pt,
696     paperwidth=8.5in, paperheight=11in,
697     includeheadfoot, columnsep=2pc,
698     top=66pt, bottom=73pt, inner=54pt, outer=54pt,
699     marginparwidth=2pc,heightrounded
700   }%
701 \or % sigchi-a
702   \geometry{twoside=false, head=13pt,
703     paperwidth=11in, paperheight=8.5in,
704     includeheadfoot, marginparsep=72pt,
705     marginparwidth=170pt, columnsep=20pt,
706     top=72pt, bottom=72pt, left=314pt, right=72pt
707   }%
708   \@mparswitchfalse
709   \reversemarginpar
710 \fi

```

#### `\parindent` Paragraphing

```

\parskip 711 \setlength\parindent{10\p@}
712 \setlength\parskip{\z@}
713 \ifcase\ACM@format@nr
714 \relax % manuscript
715 \or % acmsmall
716 \or % acmlarge
717 \or % acmtog
718 \setlength\parindent{9\p@}%
719 \or % sigconf
720 \or % siggraph
721 \or % sigplan
722 \or % sigchi
723 \or % sigchi-a
724 \fi

```

`\normalparindent` The `amsart` package defines the `\normalparindent` length and initializes it to 12pt (the value of `\parindent` in `amsart`). It is later used to set the `\listparindent` length in the quotation environment and the `\parindent` length in the `\@footnotetext` command. We set `\normalparindent` to the value of `\parindent` as selected by `acmart` for consistent paragraph indents.

```
725 \setlength\normalparindent{\parindent}
```

Footnotes require some consideration. We have several layers of footnotes: front-matter footnotes, “regular” footnotes and the special insert for the `bibstrip`. In the old ACM classes, the `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 the `bibstrip` from the rest of the paper. It is a full width rule.

```

726 \def\copyrightpermissionfootnoterule{\kern-3\p@
727   \hrule \@width \columnwidth \kern 2.6\p@}

```

```

728 \RequirePackage{manyfoot}
729 \SelectFootnoteRule[2]{copyrightpermission}
730 \DeclareNewFootnote{authorsaddresses}
731 \SelectFootnoteRule[2]{copyrightpermission}
732 \DeclareNewFootnote{copyrightpermission}

```

`\footnoterule` Tschichold's rules:

```

733 \def\footnoterule{\kern-3\p@
734 \hrule \@width 4pc \kern 2.6\p@}

```

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

```

735 \def\endminipage{%
736 \par
737 \unskip
738 \ifvoid\@mpfootins\else
739 \vskip\skip\@mpfootins
740 \normalcolor
741 \unvbox\@mpfootins
742 \fi
743 \@minipagefalse
744 \color@endgroup
745 \egroup
746 \expandafter\@iiparbox\@mpargs{\unvbox\@tempboxa}}

```

`\@textbottom` Add some stretch according to David Carlisle's advice at <http://tex.stackexchange.com/a/62318/5522>

```

747 \def\@textbottom{\vskip \z@ \@plus 1pt}
748 \let\@texttop\relax

```

In two-column layouts, force both columns to be the same height by inserting extra internal vertical space to fill out the page.

```

749 \ifcase\ACM@format@nr
750 \relax % manuscript
751 \or % acmsmall
752 \or % acmlarge
753 \or % acmtog
754 \flushbottom
755 \or % sigconf
756 \flushbottom
757 \or % siggraph
758 \flushbottom
759 \or % sigplan
760 \flushbottom
761 \or % sigchi
762 \flushbottom
763 \or % sigchi-a
764 \fi

```

### 3.12 Fonts

Somehow PDF<sub>T</sub>EX and XeTeX require different incantations to make a PDF compliant with the current Acrobat bugs. Xpdf is much better.

The code below is by Ross Moore.

```

765 \ifPDFTeX
766 \input{glyphtounicode}
767 \pdfglyphtounicode{f_f}{FB00}
768 \pdfglyphtounicode{f_f_i}{FB03}
769 \pdfglyphtounicode{f_f_l}{FB04}
770 \pdfglyphtounicode{f_i}{FB01}
771 \pdfglyphtounicode{t_t}{0074 0074}
772 \pdfglyphtounicode{f_t}{0066 0074}
773 \pdfglyphtounicode{T_h}{0054 0068}
774 \pdfgentounicode=1
775 \RequirePackage{cmap}
776 \fi

```

\if@ACM@newfonts Whether we load the new fonts

```

777 \newif\if@ACM@newfonts
778 \@ACM@newfontstrue
779 \IfFileExists{libertine.sty}{\ClassWarning{\@classname}{You do not
780   have the libertine package installed. Please upgrade your
781   TeX}\@ACM@newfontsfalse}
782 \IfFileExists{zi4.sty}{\ClassWarning{\@classname}{You do not
783   have the inconsolata (zi4.sty) package installed. Please upgrade your
784   TeX}\@ACM@newfontsfalse}
785 \IfFileExists{newtxmath.sty}{\ClassWarning{\@classname}{You do not
786   have the newtxmath package installed. Please upgrade your
787   TeX}\@ACM@newfontsfalse}

```

We use Libertine throughout.

```

788 \if@ACM@newfonts
789   \RequirePackage[T1]{fontenc}
790   % Note that the order in which packages are loaded matters,
791   % and the correct order depends on the LaTeX engine used.
792   % See https://github.com/borisveytsman/acmart/issues/402
793   % and https://github.com/borisveytsman/acmart/issues/410
794   \ifxetex
795     \RequirePackage[libertine]{newtxmath}
796     \RequirePackage[tt=false]{libertine}
797     \setmonofont[StylisticSet=3]{inconsolata}
798   \else
799     \ifluatex
800       \RequirePackage[libertine]{newtxmath}
801       \RequirePackage[tt=false]{libertine}
802       \setmonofont[StylisticSet=3]{inconsolata}
803     \else
804       \RequirePackage[tt=false, type1=true]{libertine}
805       \RequirePackage[varqu]{zi4}
806       \RequirePackage[libertine]{newtxmath}
807     \fi
808   \fi
809 \fi

```

\liningnums Libertine defines \liningnums, which makes fontspec unhappy. While we do not use fontspec, some users do.

```

810 \let\liningnums\undefined
811 \AtEndPreamble{%

```

```
812 \DeclareTextFontCommand{\liningnums}{\libertineLF}}
```

The SIGCHI extended abstracts are sans serif:

```
813 \if@ACM@sigchiamode
814 \renewcommand{\familydefault}{\sfdefault}
815 \fi
```

### 3.13 Image descriptions

`\if@Description@present` A local switch: whether there is a description in the given figure

```
816 \newif\if@Description@present
817 \@Description@presenttrue
```

`\if@undescrbed@images` A global switch whether some images were *not* described

```
818 \newif\if@undescrbed@images
819 \@undescrbed@imagesfalse
```

`\Description` The `Description` macro right now just sets switches

```
820 \newcommand\Description[2][\global\@Description@presenttrue\ignorespaces}
```

The global warning

```
821 \AtEndDocument{\if@undescrbed@images
822 \ClassWarningNoLine{\@classname}{Some images may lack descriptions}\fi}
```

Hooks for figures and tables. We also patch `algorithm` and `algorithm*` in case somebody uses them.

```
823 \AtBeginEnvironment{figure}{\@Description@presentfalse
824 \let\@vspace\@vspace@orig
825 \let\@vspacer\@vspacer@orig}
826 \AtBeginEnvironment{figure*}{\@Description@presentfalse
827 \let\@vspace\@vspace@orig
828 \let\@vspacer\@vspacer@orig}
829 \AtEndEnvironment{figure}{\if@Description@presentfalse
830 \global\@undescrbed@imagestrue
831 \ClassWarning{\@classname}{A possible image without description}\fi}
832 \AtEndEnvironment{figure*}{\if@Description@presentfalse
833 \global\@undescrbed@imagestrue
834 \ClassWarning{\@classname}{A possible image without description}\fi}
835 \AtBeginEnvironment{table}{\let\@vspace\@vspace@orig
836 \let\@vspacer\@vspacer@orig}
837 \AtBeginEnvironment{table*}{\let\@vspace\@vspace@orig
838 \let\@vspacer\@vspacer@orig}
839 \AtBeginEnvironment{algorithm}{\let\@vspace\@vspace@orig
840 \let\@vspacer\@vspacer@orig}
841 \AtBeginEnvironment{algorithm*}{\let\@vspace\@vspace@orig
842 \let\@vspacer\@vspacer@orig}
843 \AtBeginEnvironment{lstlisting}{\let\@vspace\@vspace@orig
844 \let\@vspacer\@vspacer@orig}
845 \AtBeginEnvironment{lstlisting*}{\let\@vspace\@vspace@orig
846 \let\@vspacer\@vspacer@orig}
847 \AtBeginEnvironment{minted}{\let\@vspace\@vspace@orig
848 \let\@vspacer\@vspacer@orig}
849 \AtBeginEnvironment{minted*}{\let\@vspace\@vspace@orig
```

```

850 \let\@vspacer\@vspacer@orig}
851 \AtBeginEnvironment{listing}{\let\@vspace\@vspace@orig
852 \let\@vspacer\@vspacer@orig}
853 \AtBeginEnvironment{listing*}{\let\@vspace\@vspace@orig
854 \let\@vspacer\@vspacer@orig}
855

```

### 3.14 Floats

We use the caption package

```

856 \RequirePackage{caption, float}
857 \captionsetup[table]{position=top}
858 \if@ACM@journal
859 \captionsetup{labelfont={sf, small},
860 textfont={sf, small}, margin=\z@}
861 \captionsetup[figure]{name={Fig.}}
862 \else
863 \captionsetup{labelfont={bf},
864 textfont={bf}, labelsep=colon, margin=\z@}
865 \ifcase\ACM@format@nr
866 \relax % manuscript
867 \or % acmsmall
868 \or % acmlarge
869 \or % acmtog
870 \or % sigconf
871 \or % siggraph
872 \captionsetup{textfont={it}}
873 \or % sigplan
874 \captionsetup{labelfont={bf},
875 textfont={normalfont}, labelsep=period, margin=\z@}
876 \or % sigchi
877 \captionsetup[figure]{labelfont={bf, small},
878 textfont={bf, small}}
879 \captionsetup[table]{labelfont={bf, small},
880 textfont={bf, small}}
881 \or % sigchi-a
882 \captionsetup[figure]{labelfont={bf, small},
883 textfont={bf, small}}
884 \captionsetup[table]{labelfont={bf, small},
885 textfont={bf, small}}
886 \fi
887 \fi

```

sidebar The sidebar environment:

```

888 \newfloat{sidebar}{}{sbar}
889 \floatname{sidebar}{Sidebar}
890 \renewenvironment{sidebar}{\Collect@Body\@sidebar}{}

```

\@sidebar The processing of the saved text

```

891 \long\def\@sidebar#1{\bgroup\let\@vspace\@vspace@orig
892 \let\@vspacer\@vspacer@orig\captionsetup{type=sidebar}%
893 \marginpar{\small#1}\egroup}

```

marginfigure The marginfigure environment:

```
894 \newenvironment{marginfigure}{\Collect@Body\@marginfigure}{}
```

\@marginfigure The processing of the saved text

```
895 \long\def\@marginfigure#1{\bgroup
896 \let\@vspace\@vspace@orig
897 \let\@vspacer\@vspacer@orig
898 \captionsetup{type=figure}%
899 \marginpar{\@Description@presentfalse\centering
900 \small#1\if@Description@present\else
901 \global\@undescribed@imagestrue
902 \ClassWarning{\@classname}{A possible image without description}
903 \fi}%
904 \egroup}
```

margintable The margintable environment:

```
905 \newenvironment{margintable}{\Collect@Body\@margintable}{}
```

\@margintable The processing of the saved text

```
906 \long\def\@margintable#1{\bgroup\let\@vspace\@vspace@orig
907 \let\@vspacer\@vspacer@orig\captionsetup{type=table}%
908 \marginpar{\centering\small#1}\egroup}
```

SIGCHI extended abstracts provide 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

```
909 \newdimen\fulltextwidth
910 \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)

```
911 \if@ACM@sigchiamode
912 \def\@dblfloat{\bgroup\let\@vspace\@vspace@orig
913 \let\@vspacer\@vspacer@orig\columnwidth=\fulltextwidth
914 \let\@endfloatbox\@endwidefloatbox
915 \def\@fpsadddefault{\def\@fps{tp}}%
916 \@float}
917 \fi
```

\enddblfloat And the end. Just adding a \bgroup.

```
918 \if@ACM@sigchiamode
919 \def\enddblfloat{%
920 \end@float\egroup}
921 \fi
```

\@endwidefloatbox This is the end of a wide box—we basically move everything to the left

```
922 \def\@endwidefloatbox{%
923 \par\vskip\z@skip
924 \@minipagefalse
925 \outer@nobreak
926 \egroup
927 \color@endbox}
```

```

928 \global\setbox\@currbox=\vbox{\moveleft
929   \dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%
930   \wd\@currbox=\textwidth
931 }

```

### 3.15 Lists

```

932 \ifcase\ACM@format@nr
933 \relax % manuscript
934 \or % acmsmall
935 \or % acmlarge
936 \or % acmtog
937 \or % sigconf
938 \or % siggraph
939 \or % sigplan
940 \def\labelenumi{\theenumi.}
941 \def\labelenumii{\theenumii.}
942 \def\labelenumiii{\theenumiii.}
943 \def\labelenumiv{\theenumiv.}
944 \or % sigchi
945 \or % sigchi-a
946 \fi

```

The AMS uses generous margins for lists. Note that `amsart` defines `\leftmargin` values for list levels at the beginning of the document, so we must redefine them in the same manner. Also, note that `amsart` redefines the `enumerate` and `itemize` environments with a `\makeLabel` command that uses `\llap`, so the `\labelwidth` value is (effectively) irrelevant; nonetheless, we follow `amsart` and set `\labelwidth` to `\leftmargin` minus `\labelsep`.

```

947 \newdimen\@ACM@labelwidth
948 \AtBeginDocument{%
949   \setlength\labelsep{4pt}
950   \setlength{\@ACM@labelwidth}{6.5pt}
951
952   %% First-level list: when beginning after the first line of an
953   %% indented paragraph or ending before an indented paragraph, labels
954   %% should not hang to the left of the preceding/following text.
955   \setlength\leftmargini{\z@}
956   \addtolength\leftmargini{\parindent}
957   \addtolength\leftmargini{2\labelsep}
958   \addtolength\leftmargini{\@ACM@labelwidth}
959
960   %% Second-level and higher lists.
961   \setlength\leftmarginii{\z@}
962   \addtolength\leftmarginii{0.5\labelsep}
963   \addtolength\leftmarginii{\@ACM@labelwidth}
964   \setlength\leftmarginiii{\leftmarginii}
965   \setlength\leftmarginiv{\leftmarginiii}
966   \setlength\leftmarginv{\leftmarginiv}
967   \setlength\leftmarginvi{\leftmarginv}
968   \@listi}
969 \newskip\listisep
970 \listisep\smallskipamount
971 \def\@listI{\leftmargin\leftmargini

```

```

972 \labelwidth\leftmargini \advance\labelwidth-\labelsep
973 \listparindent\z@
974 \topsep\listisep}
975 \let\@listi\@listI
976 \def\@listii{\leftmargin\leftmarginii
977 \labelwidth\leftmarginii \advance\labelwidth-\labelsep
978 \topsep\z@skip}
979 \def\@listiii{\leftmargin\leftmarginiii
980 \labelwidth\leftmarginiii \advance\labelwidth-\labelsep}
981 \def\@listiv{\leftmargin\leftmarginiv
982 \labelwidth\leftmarginiv \advance\labelwidth-\labelsep}
983 \def\@listv{\leftmargin\leftmarginv
984 \labelwidth\leftmarginv \advance\labelwidth-\labelsep}
985 \def\@listvi{\leftmargin\leftmarginvi
986 \labelwidth\leftmarginvi \advance\labelwidth-\labelsep}

```

`\descriptionlabel` We do not use a colon by default like `amsart` does:

```

987 \renewcommand{\descriptionlabel}[1]{\upshape\bfseries #1}

```

`\description` Make the description environment indentation consistent with that of the `itemize` and `enumerate` environments.

```

988 \renewenvironment{description}{\list{}}{%
989 \labelwidth\@ACM@labelwidth
990 \let\makelabel\descriptionlabel}%
991 }{
992 \endlist
993 }
994 \let\enddescription=\endlist % for efficiency

```

### 3.16 Top-matter data

`\if@ACM@maketitle@typeset` The switch to check whether `\maketitle` is already typeset. It is initially false, and setting top matter when it is true is wrong.

```

995 \newif\if@ACM@maketitle@typeset
996 \@ACM@maketitle@typesetfalse

```

We use the `xkeyval` interface to define journal titles and the relevant information

```

997 \define@choicekey*+{ACM}{acmJournal}[\@journalCode\@journalCode@nr]{%
998 CIE,%
999 CSUR,%
1000 DGOV,%
1001 DLT,%
1002 DTRAP,%
1003 FAC,%
1004 HEALTH,%
1005 IMWUT,%
1006 JACM,%
1007 JDIQ,%
1008 JEA,%
1009 JERIC,%
1010 JETC,%
1011 JOCCH,%
1012 PACMCGIT,%
1013 PACMHCI,%

```



1014 PACMPL,%  
1015 POMACS,%  
1016 TAAS,%  
1017 TACCESS,%  
1018 TACO,%  
1019 TALG,%  
1020 TALLIP,%  
1021 TAP,%  
1022 TCPS,%  
1023 TDS,%  
1024 TEAC,%  
1025 TECS,%  
1026 TELO,%  
1027 THRI,%  
1028 TIIS,%  
1029 TIOT,%  
1030 TISSEC,%  
1031 TIST,%  
1032 TKDD,%  
1033 TMIS,%  
1034 TOCE,%  
1035 TOCHI,%  
1036 TOCL,%  
1037 TOCS,%  
1038 TOCT,%  
1039 TODAES,%  
1040 TODS,%  
1041 TOG,%  
1042 TOIS,%  
1043 TOIT,%  
1044 TOMACS,%  
1045 TOMM,%  
1046 TOMPECS,%  
1047 TOMS,%  
1048 TOPC,%  
1049 TOPS,%  
1050 TOPLAS,%  
1051 TOS,%  
1052 TOSEM,%  
1053 TOSN,%  
1054 TQC,%  
1055 TRET%  
1056 TSAS,%  
1057 TSC,%  
1058 TSLP,%  
1059 TWEB,%  
1060 FACMP%  
1061 }{%  
1062 \ifcase\@journalCode@nr  
1063 \relax % CIE  
1064 \def\@journalName{ACM Computers in Entertainment}%  
1065 \def\@journalNameShort{ACM Comput. Entertain.}%  
1066 \def\@permissionCodeOne{1544-3574}%  
1067 \or % CSUR

```

1068 \def\@journalName{ACM Computing Surveys}%
1069 \def\@journalNameShort{ACM Comput. Surv.}%
1070 \def\@permissionCodeOne{0360-0300}%
1071 \or % DGOV
1072 \def\@journalName{Digital Government: Research and Practice}%
1073 \def\@journalNameShort{Digit. Gov. Res. Pract.}%
1074 \def\@permissionCodeOne{2639-0175}%
1075 \or % DLT
1076 \def\@journalName{Distributed Ledger Technologies: Research and Practice}%
1077 \def\@journalNameShort{Distrib. Ledger Technol.}%
1078 \def\@permissionCodeOne{2769-6472}%
1079 \or % DTRAP
1080 \def\@journalName{Digital Threats: Research and Practice}%
1081 \def\@journalNameShort{Digit. Threat. Res. Pract.}%
1082 \def\@permissionCodeOne{2576-5337}%
1083 \or % FAC
1084 \def\@journalName{Formal Aspects of Computing}%
1085 \def\@journalNameShort{Form. Asp. Comput.}%
1086 \def\@permissionCodeOne{0934-5043}%
1087 \def\@permissionCodeTwo{1433-299X}%
1088 \or % HEALTH
1089 \def\@journalName{ACM Transactions on Computing for Healthcare}%
1090 \def\@journalNameShort{ACM Trans. Comput. Healthcare}%
1091 \def\@permissionCodeOne{2637-8051}%
1092 \or % IMWUT
1093 \def\@journalName{Proceedings of the ACM on Interactive, Mobile,
1094     Wearable and Ubiquitous Technologies}%
1095 \def\@journalNameShort{Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.}%
1096 \def\@permissionCodeOne{2474-9567}%
1097 \@ACM@screentruer
1098 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1099 \or % JACM
1100 \def\@journalName{Journal of the ACM}%
1101 \def\@journalNameShort{J. ACM}%
1102 \def\@permissionCodeOne{0004-5411}%
1103 \or % JDIQ
1104 \def\@journalName{ACM Journal of Data and Information Quality}%
1105 \def\@journalNameShort{ACM J. Data Inform. Quality}%
1106 \def\@permissionCodeOne{1936-1955}%
1107 \or % JEA
1108 \def\@journalName{ACM Journal of Experimental Algorithmics}%
1109 \def\@journalNameShort{ACM J. Exp. Algor.}%
1110 \def\@permissionCodeOne{1084-6654}%
1111 \or % JERIC
1112 \def\@journalName{ACM Journal of Educational Resources in Computing}%
1113 \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%
1114 \def\@permissionCodeOne{1073-0516}%
1115 \or % JETC
1116 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
1117 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
1118 \def\@permissionCodeOne{1550-4832}%
1119 \or % JOCCH
1120 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%
1121 \def\@journalNameShort{ACM J. Comput. Cult. Herit.}%

```

```

1122 \def\@permissionCodeOne{1556-4673}%
1123 \def\@permissionCodeTwo{1556-4711}%
1124 \or % PACMCGIT
1125 \def\@journalName{Proceedings of the ACM on Computer Graphics and Interactive Techniques}%
1126 \def\@journalNameShort{Proc. ACM Comput. Graph. Interact. Tech.}%
1127 \def\@permissionCodeOne{2577-6193}%
1128 \@ACM@screentruerue
1129 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1130 \or % PACMHCI
1131 \def\@journalName{Proceedings of the ACM on Human-Computer Interaction}%
1132 \def\@journalNameShort{Proc. ACM Hum.-Comput. Interact.}%
1133 \def\@permissionCodeOne{2573-0142}%
1134 \@ACM@screentruerue
1135 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1136 \or % PACMPL
1137 \def\@journalName{Proceedings of the ACM on Programming Languages}%
1138 \def\@journalNameShort{Proc. ACM Program. Lang.}%
1139 \def\@permissionCodeOne{2475-1421}%
1140 \@ACM@screentruerue
1141 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1142 \or % POMACS
1143 \def\@journalName{Proceedings of the ACM on Measurement and Analysis of Computing Systems}%
1144 \def\@journalNameShort{Proc. ACM Meas. Anal. Comput. Syst.}%
1145 \def\@permissionCodeOne{2476-1249}%
1146 \@ACM@screentruerue
1147 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
1148 \or % TAAS
1149 \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
1150 \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
1151 \def\@permissionCodeOne{1556-4665}%
1152 \or % TACCESS
1153 \def\@journalName{ACM Transactions on Accessible Computing}%
1154 \def\@journalNameShort{ACM Trans. Access. Comput.}%
1155 \def\@permissionCodeOne{1936-7228}%
1156 \or % TACO
1157 \def\@journalName{ACM Transactions on Architecture and Code Optimization}%
1158 \def\@journalNameShort{ACM Trans. Arch. Code Optim.}%
1159 \def\@permissionCodeOne{1544-3566}%
1160 \def\@permissionCodeTwo{1544-3973}%
1161 \or % TALG
1162 \def\@journalName{ACM Transactions on Algorithms}%
1163 \def\@journalNameShort{ACM Trans. Algor.}%
1164 \def\@permissionCodeOne{1549-6325}%
1165 \or % TALLIP
1166 \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
1167 \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
1168 \def\@permissionCodeOne{2375-4699}%
1169 \or % TAP
1170 \def\@journalName{ACM Transactions on Applied Perception}%
1171 \def\@journalNameShort{ACM Trans. Appl. Percept.}%
1172 \def\@permissionCodeOne{1544-3558}%
1173 \or % TCPS
1174 \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
1175 \def\@journalNameShort{ACM Trans. Cyber-Phys. Syst.}%

```

1176 \def\@permissionCodeOne{2378-962X}%  
1177 \or % TDS  
1178 \def\@journalName{ACM/IMS Transactions on Data Science}%  
1179 \def\@journalNameShort{ACM/IMS Trans. Data Sci.}%  
1180 \def\@permissionCodeOne{2577-3224}%  
1181 \or % TEAC  
1182 \def\@journalName{ACM Transactions on Economics and Computation}%  
1183 \def\@journalNameShort{ACM Trans. Econ. Comput.}%  
1184 \def\@permissionCodeOne{2167-8375}%  
1185 \or % TECS  
1186 \def\@journalName{ACM Transactions on Embedded Computing Systems}%  
1187 \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%  
1188 \def\@permissionCodeOne{1539-9087}%  
1189 \or % TELO  
1190 \def\@journalName{ACM Transactions on Evolutionary Learning}%  
1191 \def\@journalNameShort{ACM Trans. Evol. Learn.}%  
1192 \def\@permissionCodeOne{2688-3007}%  
1193 \or % THRI  
1194 \def\@journalName{ACM Transactions on Human-Robot Interaction}%  
1195 \def\@journalNameShort{ACM Trans. Hum.-Robot Interact.}%  
1196 \def\@permissionCodeOne{2573-9522}%  
1197 \or % TIIS  
1198 \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%  
1199 \def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%  
1200 \def\@permissionCodeOne{2160-6455}%  
1201 \or % TIOT  
1202 \def\@journalName{ACM Transactions on Internet of Things}%  
1203 \def\@journalNameShort{ACM Trans. Internet Things}%  
1204 \def\@permissionCodeOne{2577-6207}%  
1205 \or % TISSEC  
1206 \def\@journalName{ACM Transactions on Information and System Security}%  
1207 \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%  
1208 \def\@permissionCodeOne{1094-9224}%  
1209 \or % TIIST  
1210 \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%  
1211 \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%  
1212 \def\@permissionCodeOne{2157-6904}%  
1213 \or % TKDD  
1214 \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%  
1215 \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%  
1216 \def\@permissionCodeOne{1556-4681}%  
1217 \or % TMIS  
1218 \def\@journalName{ACM Transactions on Management Information Systems}%  
1219 \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%  
1220 \def\@permissionCodeOne{2158-656X}%  
1221 \or % TOCE  
1222 \def\@journalName{ACM Transactions on Computing Education}%  
1223 \def\@journalNameShort{ACM Trans. Comput. Educ.}%  
1224 \def\@permissionCodeOne{1946-6226}%  
1225 \or % TOCHI  
1226 \def\@journalName{ACM Transactions on Computer-Human Interaction}%  
1227 \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%  
1228 \def\@permissionCodeOne{1073-0516}%  
1229 \or % TOCL

```

1230 \def\@journalName{ACM Transactions on Computational Logic}%
1231 \def\@journalNameShort{ACM Trans. Comput. Logic}%
1232 \def\@permissionCodeOne{1529-3785}%
1233 \or % TOCS
1234 \def\@journalName{ACM Transactions on Computer Systems}%
1235 \def\@journalNameShort{ACM Trans. Comput. Syst.}%
1236 \def\@permissionCodeOne{0734-2071}%
1237 \or % TOCT
1238 \def\@journalName{ACM Transactions on Computation Theory}%
1239 \def\@journalNameShort{ACM Trans. Comput. Theory}%
1240 \def\@permissionCodeOne{1942-3454}%
1241 \or % TODAES
1242 \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%
1243 \def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
1244 \def\@permissionCodeOne{1084-4309}%
1245 \or % TODS
1246 \def\@journalName{ACM Transactions on Database Systems}%
1247 \def\@journalNameShort{ACM Trans. Datab. Syst.}%
1248 \def\@permissionCodeOne{0362-5915}%
1249 \or % TOG
1250 \def\@journalName{ACM Transactions on Graphics}%
1251 \def\@journalNameShort{ACM Trans. Graph.}%
1252 \def\@permissionCodeOne{0730-0301}%
1253 \or % TOIS
1254 \def\@journalName{ACM Transactions on Information Systems}%
1255 \def\@journalNameShort{ACM Trans. Inf. Syst.}%
1256 \def\@permissionCodeOne{1046-8188}%
1257 \or % TOIT
1258 \def\@journalName{ACM Transactions on Internet Technology}%
1259 \def\@journalNameShort{ACM Trans. Internet Technol.}%
1260 \def\@permissionCodeOne{1533-5399}%
1261 \or % TOMACS
1262 \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
1263 \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
1264 \def\@permissionCodeOne{1049-3301}%
1265 \def\@permissionCodeTwo{1558-1195}%
1266 \or % TOMM
1267 \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
1268 \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
1269 \def\@permissionCodeOne{1551-6857}%
1270 \def\@permissionCodeTwo{1551-6865}%
1271 \or % TOMPECS
1272 \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
1273 \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
1274 \def\@permissionCodeOne{2376-3639}%
1275 \or % TOMS
1276 \def\@journalName{ACM Transactions on Mathematical Software}%
1277 \def\@journalNameShort{ACM Trans. Math. Softw.}%
1278 \def\@permissionCodeOne{0098-3500}%
1279 \or % TOPC
1280 \def\@journalName{ACM Transactions on Parallel Computing}%
1281 \def\@journalNameShort{ACM Trans. Parallel Comput.}%
1282 \def\@permissionCodeOne{1539-9087}%
1283 \or % TOPS

```

```

1284 \def\@journalName{ACM Transactions on Privacy and Security}%
1285 \def\@journalNameShort{ACM Trans. Priv. Sec.}%
1286 \def\@permissionCodeOne{2471-2566}%
1287 \or % TOPLAS
1288 \def\@journalName{ACM Transactions on Programming Languages and Systems}%
1289 \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
1290 \def\@permissionCodeOne{0164-0925}%
1291 \or % TOS
1292 \def\@journalName{ACM Transactions on Storage}%
1293 \def\@journalNameShort{ACM Trans. Storage}%
1294 \def\@permissionCodeOne{1553-3077}%
1295 \or % TOSEM
1296 \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
1297 \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
1298 \def\@permissionCodeOne{1049-331X}%
1299 \or % TOSN
1300 \def\@journalName{ACM Transactions on Sensor Networks}%
1301 \def\@journalNameShort{ACM Trans. Sensor Netw.}%
1302 \def\@permissionCodeOne{1550-4859}%
1303 \or % TQC
1304 \def\@journalName{ACM Transactions on Quantum Computing}%
1305 \def\@journalNameShort{ACM Trans. Quantum Comput.}%
1306 \def\@permissionCodeOne{2643-6817}%
1307 \or % TRET
1308 \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
1309 \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
1310 \def\@permissionCodeOne{1936-7406}%
1311 \or % TSAS
1312 \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%
1313 \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
1314 \def\@permissionCodeOne{2374-0353}%
1315 \or % TSC
1316 \def\@journalName{ACM Transactions on Social Computing}%
1317 \def\@journalNameShort{ACM Trans. Soc. Comput.}%
1318 \def\@permissionCodeOne{2469-7818}%
1319 \or % TSLP
1320 \def\@journalName{ACM Transactions on Speech and Language Processing}%
1321 \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
1322 \def\@permissionCodeOne{1550-4875}%
1323 \or % TWEB
1324 \def\@journalName{ACM Transactions on the Web}%
1325 \def\@journalNameShort{ACM Trans. Web}%
1326 \def\@permissionCodeOne{1559-1131}%
1327 \else % FACMP, a dummy journal
1328 \def\@journalName{ACM Just Accepted}%
1329 \def\@journalNameShort{ACM Accepted}%
1330 \def\@permissionCodeOne{XXXX-XXXX}%
1331 \fi
1332 \ClassInfo{\@classname}{Using journal code \@journalCode}%
1333 }{%
1334 \ClassError{\@classname}{Incorrect journal #1}%
1335 }%

```

`\acmJournal` And the syntactic sugar around it

```
1336 \def\acmJournal#1{\setkeys{ACM}{acmJournal=#1}%
1337 \global\@ACM@journal@bibstriptrue}
```

The defaults:

```
1338 \def\@journalCode@nr{0}
1339 \def\@journalName{}%
1340 \def\@journalNameShort{\@journalName}%
1341 \def\@permissionCodeOne{XXXX-XXXX}%
1342 \def\@permissionCodeTwo{}%
```

`\acmConference` This is the conference command

```
1343 \newcommand\acmConference[4][{}]{%
1344 \gdef\acmConference@shortname{#1}%
1345 \gdef\acmConference@name{#2}%
1346 \gdef\acmConference@date{#3}%
1347 \gdef\acmConference@venue{#4}%
1348 \ifx\acmConference@shortname\@empty
1349 \gdef\acmConference@shortname{#2}%
1350 \fi
1351 \global\@ACM@journal@bibstripfalse
1352 }
1353 \if@ACM@journal\else
1354 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
1355 DC, USA}%
1356 \fi
```

`\acmBooktitle` The book title of the conference:

```
\@acmBooktitle 1357 \def\acmBooktitle#1{\gdef\@acmBooktitle{#1}}
1358 \acmBooktitle{}
1359 \ifx\acmConference@name\@undefined\else
1360 \acmBooktitle{Proceedings of \acmConference@name
1361 \ifx\acmConference@name\acmConference@shortname\else
1362 \ (\acmConference@shortname)\fi}
1363 \fi
```

`\@editorsAbbrev` How to abbreviate editors

```
1364 \def\@editorsAbbrev{(Ed.)}
```

`\@acmEditors` The list of editors

```
1365 \def\@acmEditors{}
```

`\editor` Add a new editor to the list

```
1366 \def\editor#1{\ifx\@acmEditors\@empty
1367 \gdef\@acmEditors{#1}%
1368 \else
1369 \gdef\@editorsAbbrev{(Eds.)}%
1370 \g@addto@macro\@acmEditors{\and#1}%
1371 \fi}
```

`\subtitle` The subtitle macro

```
1372 \def\subtitle#1{\def\@subtitle{#1}}
1373 \subtitle{}
```

`\num@authorgroups` The total number of “groups”. Each group is several authors with the same affiliations(s)  
1374 `\newcount\num@authorgroups`  
1375 `\num@authorgroups=0\relax`

`\num@authors` The total number of authors  
1376 `\newcount\num@authors`  
1377 `\num@authors=0\relax`

`\if@insideauthorgroup` Whether we are continuing an author group  
1378 `\newif\if@insideauthorgroup`  
1379 `\@insideauthorgroupfalse`

`\author` Adding an author to the list of authors and addresses.  
Note that we want to typeset the link to the author’s orcid if known. The problem is, we know the orcid only after the author is entered. The trick is based on the idea that `\csname... \endcsname` is `\relax` unless defined. Therefore we typeset authors by the special macro `\csname typeset@author\the\num@authors\endcsname`, which is defined by `\orcid` command.

```

1380 \renewcommand\author[2][{}%
1381 \IfSubStr{\detokenize{#2}}{,}{\ClassWarning{\@classname}{Do not put several
1382     authors in the same \string\author\space macro!}}{}%
1383 \global\advance\num@authors by 1\relax
1384 \if@insideauthorgroup\else
1385     \global\advance\num@authorgroups by 1\relax
1386     \global\@insideauthorgrouptrue
1387 \fi
1388 \ifx\addresses\@empty
1389     \if@ACM@anonymous
1390         \gdef\addresses{\@author{Anonymous Author(s)}%
1391             \ifx\@acmSubmissionID\@empty\else\Submission Id:
1392                 \@acmSubmissionID\fi}}%
1393         \gdef\authors{Anonymous Author(s)}%
1394     \else
1395         \expandafter\gdef\expandafter\addresses\expandafter{%
1396             \expandafter\@author\expandafter{%
1397                 \csname typeset@author\the\num@authors\endcsname{#2}}}%
1398         \gdef\authors{#2}%
1399     \fi
1400 \else
1401     \if@ACM@anonymous\else
1402         \expandafter\g@addto@macro\expandafter\addresses\expandafter{%
1403             \expandafter\and\expandafter\@author\expandafter{%
1404                 \csname typeset@author\the\num@authors\endcsname{#2}}}%
1405         \g@addto@macro\authors{\and#2}%
1406     \fi
1407 \fi
1408 \if@ACM@anonymous
1409     \ifx\shortauthors\@empty
1410         \gdef\shortauthors{Anon.
1411             \ifx\@acmSubmissionID\@empty\else Submission Id:
1412                 \@acmSubmissionID\fi}%
1413     \fi
1414 \else

```



```

1415 \def\@tempa{#1}%
1416 \ifx\@tempa\@empty
1417 \ifx\shortauthors\@empty
1418 \gdef\shortauthors{#2}%
1419 \else
1420 \g@addto@macro\shortauthors{\and#2}%
1421 \fi
1422 \else
1423 \ifx\shortauthors\@empty
1424 \gdef\shortauthors{#1}%
1425 \else
1426 \g@addto@macro\shortauthors{\and#1}%
1427 \fi
1428 \fi
1429 \fi}

```

`\affiliation` The macro `\affiliation` mimics `\address` from `amsart`. Note that it has an optional argument, which we use differently from `amsart`.

```

1430 \newcommand{\affiliation}[2][{}]{%
1431 \global\@insideauthorgroupfalse
1432 \if@ACM@anonymous\else
1433 \g@addto@macro\addresses{\affiliation{#1}{#2}}%
1434 \fi}

```

`\obeypunctuation` Whether to use the author's punctuation (false by default, which adds American-style address punctuation)

```

1435 \define@boolkey+{@ACM@affiliation@}[@ACM@affiliation@]{obeypunctuation}%
1436 [true]{\ClassError{\@classname}{The option obeypunctuation can be either true or false}}

```

`\additionalaffiliation` Additional affiliations go to footnotes

```

1437 \def\additionalaffiliation#1{\authornote{\@additionalaffiliation{#1}}}

```

`\@additionalaffiliation` Process `\additionalaffiliation` inside `\authornote`

```

1438 \def\@additionalaffiliation#1{\bgroup
1439 \def\position##1{\ignorespaces}%
1440 \def\institution##1{##1\ignorespaces}%
1441 \def\department{\@ifnextchar[{\@department}{\@department[]}}%
1442 \def\@department[##1]##2{\unskip, ##2\ignorespaces}%
1443 \let\streetaddress\position
1444 \let\city\position
1445 \let\state\position
1446 \let\postcode\position
1447 \let\country\position
1448 Also with #1\unskip.\egroup}

```

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

```

1449 \renewcommand{\email}[2][{}]{%
1450 \IfSubStr{#2}{,}{\ClassWarning{\@classname}{Do not put several
1451 addresses in the same \string\email\space macro!}}}%
1452 \if@ACM@anonymous\else
1453 \g@addto@macro\addresses{\email{#1}{#2}}%
1454 \fi}

```

```

\orcid We redefine the command to typeset the current author
1455 \def\orcid#1{\unskip\ignorespaces%
1456 \IfBeginWith{#1}{http}{%
1457 \expandafter\gdef\csname
1458 typeset@author\the\num@authors\endcsname##1{%
1459 \href{#1}{##1}}}%
1460 \expandafter\gdef\csname
1461 typeset@author\the\num@authors\endcsname##1{%
1462 \href{https://orcid.org/#1}{##1}}}

\authorsaddresses Setting up authors' addresses
1463 \def\authorsaddresses#1{\def\@authorsaddresses{#1}}
1464 \authorsaddresses{\@mkauthorsaddresses}

\@mktranslatedkeywords We have two argument: the language to typeset keywords and the keywords.
1465 \newcommand\@mktranslatedkeywords[2]{\bgroup
1466 \selectlanguage{#1}%
1467 {\@specialsection{keywordsname}%
1468 \noindent#2\par}\egroup}

\@titlenotes The title notes
1469 \def\@titlenotes{}

\titlenote Adding a note to the title
1470 \def\titlenote#1{%
1471 \g@addto@macro\@title{\footnotemark}%
1472 \if@ACM@anonymous
1473 \g@addto@macro\@titlenotes{%
1474 \stepcounter{footnote}\footnotetext{Title note}}%
1475 \else
1476 \g@addto@macro\@titlenotes{\stepcounter{footnote}\footnotetext{#1}}%
1477 \fi}

\@subtitlenotes The subtitle notes
1478 \def\@subtitlenotes{}

\subtitlenote Adding a note to the subtitle
1479 \def\subtitlenote#1{%
1480 \g@addto@macro\@subtitle{\footnotemark}%
1481 \if@ACM@anonymous
1482 \g@addto@macro\@subtitlenotes{%
1483 \stepcounter{footnote}\footnotetext{Subtitle note}}%
1484 \else
1485 \g@addto@macro\@subtitlenotes{%
1486 \stepcounter{footnote}\footnotetext{#1}}%
1487 \fi}

\@authornotes The author notes
1488 \def\@authornotes{}

\authornote Adding a note to the author
1489 \def\authornote#1{%
1490 \if@ACM@anonymous\else

```

```

1491     \g@addto@macro\addresses{\@authornotemark}%
1492     \g@addto@macro\authornotes{%
1493         \stepcounter{footnote}\footnotetext{#1}}%
1494     \fi}

\authornotemark Adding a footnote mark to the authors
1495 \newcommand\authornotemark[1][\relax]{%
1496     \ifx#1\relax\relax\relax
1497     \g@addto@macro\addresses{\@authornotemark}%
1498     \else
1499     \g@addto@macro\addresses{\@authornotemark{#1}}%
1500     \fi}

\acmVolume The current volume
1501 \def\acmVolume#1{\def\@acmVolume{#1}}
1502 \acmVolume{1}

\acmNumber The current number
1503 \def\acmNumber#1{\def\@acmNumber{#1}}
1504 \acmNumber{1}

\acmArticle The current article
1505 \def\acmArticle#1{\def\@acmArticle{#1}}
1506 \acmArticle{}

\acmArticleSeq The sequence number
1507 \def\acmArticleSeq#1{\def\@acmArticleSeq{#1}}
1508 \acmArticleSeq{\@acmArticle}

\acmYear The current year
1509 \def\acmYear#1{\def\@acmYear{#1}}
1510 \acmYear{\the\year}

\acmMonth The current month
1511 \def\acmMonth#1{\def\@acmMonth{#1}}
1512 \acmMonth{\the\month}

\@acmPubDate The publication date
1513 \def\@acmPubDate{\ifcase\@acmMonth\or
1514     January\or February\or March\or April\or May\or June\or
1515     July\or August\or September\or October\or November\or
1516     December\fi~\@acmYear}

\acmPrice The price
1517 \def\acmPrice#1{\def\@acmPrice{#1}}
1518 \acmPrice{15.00}

\acmSubmissionID The submission ID
1519 \def\acmSubmissionID#1{\def\@acmSubmissionID{#1}}
1520 \acmSubmissionID{}

\acmISBN The book ISBN
1521 \def\acmISBN#1{\def\@acmISBN{#1}}
1522 \acmISBN{978-x-xxxx-xxxx-x/YY/MM}

```

`\acmDOI` The paper DOI  
1523 `\def\acmDOI#1{\def\@acmDOI{#1}}`  
1524 `\acmDOI{10.1145/nnnnnnn.nnnnnnn}`

`\if@ACM@badge` Whether to print a badge. Note that either a left or right badge triggers it:  
1525 `\newif\if@ACM@badge`  
1526 `\@ACM@badgefalse`

`\@ACM@badge@width` The width of the badge  
1527 `\newlength\@ACM@badge@width`  
1528 `\setlength\@ACM@badge@width{5pc}`

`\@ACM@title@width` The width of the badge  
1529 `\newlength\@ACM@title@width`

`\@ACM@badge@skip` The space between the badge and the title  
1530 `\newlength\@ACM@badge@skip`  
1531 `\setlength\@ACM@badge@skip{1pc}`

`\acmBadgeR` Setting the right badge  
1532 `\newcommand\acmBadgeR[2][\@ACM@badgetrue`  
1533 `\def\@acmBadgeR@url{#1}%`  
1534 `\def\@acmBadgeR@image{#2}}`  
1535 `\def\@acmBadgeR@url{}`  
1536 `\def\@acmBadgeR@image{}`

`\acmBadgeL` Setting the left badge  
1537 `\newcommand\acmBadgeL[2][\@ACM@badgetrue`  
1538 `\def\@acmBadgeL@url{#1}%`  
1539 `\def\@acmBadgeL@image{#2}}`  
1540 `\def\@acmBadgeL@url{}`  
1541 `\def\@acmBadgeL@image{}`

`\startPage` The start page of the paper  
1542 `\def\startPage#1{\def\@startPage{#1}}`  
1543 `\startPage{}`

`\terms` Terms are obsolete. We use CCS now.  
1544 `\def\terms#1{\ClassWarning{\@classname}{The command \string\terms} is`  
1545 `obsolete. I am going to ignore it}}`

`\keywords` Keywords are mostly obsolete. We use CCS now. Still it makes sense to keep them for compatibility.  
1546 `\def\keywords#1{\def\@keywords{#1}}`  
1547 `\let\@keywords\@empty`  
1548 `\AtEndDocument{\if@ACM@nonacm\else\ifx\@keywords\@empty`  
1549 `\ifnum\getrefnumber{TotPages}>2\relax`  
1550 `\ClassWarningNoLine{\@classname}{ACM keywords are mandatory`  
1551 `for papers over two pages}%`  
1552 `\fi\fi\fi}`

```

abstract The amsart package puts abstract in a box. Since we do not know whether we will
use two-column mode, we prefer to save the text
1553 \renewenvironment{abstract}{\Collect@Body\@saveabstract}{\}

\@saveabstract And saving the abstract
1554 \long\def\@saveabstract#1{\if@ACM@maketitle@typeset
1555 \ClassError{\@classname}{Abstract must be defined before maketitle
1556 command. Please move it!}\fi
1557 \long\gdef\@abstract{#1}}
1558 \@saveabstract{ }

\@empty The long version of \@empty (to compare with \@abstract)
1559 \long\def\@empty{ }

\if@ACM@printccs Whether to print CCS
1560 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printccs}[true]{%
1561 \if@ACM@printccs
1562 \ClassInfo{\@classname}{Printing CCS}%
1563 \else
1564 \ClassInfo{\@classname}{Suppressing CCS}%
1565 \fi}{\ClassError{\@classname}{The option printccs can be either true or false}}

\if@ACM@printacmref Whether to print the ACM bibstrip
1566 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printacmref}[true]{%
1567 \if@ACM@printacmref
1568 \ClassInfo{\@classname}{Printing bibformat}%
1569 \else
1570 \ClassInfo{\@classname}{Suppressing bibformat}%
1571 \fi}{\ClassError{\@classname}{The option printacmref can be either true or false}}

1572 \AtEndDocument{\if@ACM@nonacm\else\if@ACM@printacmref\else
1573 \ifnum\getrefnumber{TotPages}>1\relax
1574 \ClassWarningNoLine{\@classname}{%
1575 ACM reference format is mandatory \MessageBreak
1576 for papers over one page. \MessageBreak
1577 Please add printacmref=true to the \MessageBreak
1578 \string\settopmatter\space command.}%
1579 \fi\fi\fi}

\if@ACM@printfolios Whether to print folios
1580 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printfolios}[true]{%
1581 \if@ACM@printfolios
1582 \ClassInfo{\@classname}{Printing folios}%
1583 \else
1584 \ClassInfo{\@classname}{Suppressing folios}%
1585 \fi}{\ClassError{\@classname}{The option printfolios can be either true or false}}

\@ACM@authorssperrow The number of authors per row. 0 means use the default algorithm.
1586 \define@cmdkey{@ACM@topmatter@}[@ACM@]{authorssperrow}[0]{%
1587 \IfInteger{#1}{\ClassInfo{\@classname}{Setting authorssperrow to
1588 #1}}{\ClassWarning{\@classname}{The parameter authorssperrow must be
1589 numerical. Ignoring the input #1}\gdef\@ACM@authorssperrow{0}}}}

```

`\settopmatter` The usual syntactic sugar  
 1590 `\def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}`

Now the settings

```
1591 \settopmatter{printccs=true, printacmref=true}
1592 \if@ACM@manuscript
1593   \settopmatter{printfolios=true}
1594 \else
1595   \if@ACM@journal
1596     \settopmatter{printfolios=true}
1597   \else
1598     \settopmatter{printfolios=false}
1599   \fi
1600 \fi
1601 \settopmatter{authorsperrow=0}
```

`\@received` The container for the paper history  
 1602 `\def\@received{}`

`\received` The `\received` command

```
1603 \newcommand\received[2][\def\@tempa{#1}%
1604   \ifx\@tempa\@empty
1605     \ifx\@received\@empty
1606       \gdef\@received{Received #2}%
1607     \else
1608       \g@addto@macro{\@received}{; revised #2}%
1609     \fi
1610   \else
1611     \ifx\@received\@empty
1612       \gdef\@received{#1 #2}%
1613     \else
1614       \g@addto@macro{\@received}{; #1 #2}%
1615     \fi
1616   \fi}
1617 \AtEndDocument{%
1618   \ifx\@received\@empty\else
1619     \par\bigskip\noindent\small\normalfont\@received\par
1620   \fi}
```

### 3.17 Concepts system

We exclude CCSXML stuff generated by the ACM system:

```
1621 \RequirePackage{comment}
1622 \excludcomment{CCSXML}
```

`\@concepts` This is the storage macro and counter for concepts  
 1623 `\let\@concepts\@empty`  
 1624 `\newcounter{@concepts}`

`\ccsdesc` The first argument is the significance, the second is the concept(s)  
 1625 `\newcommand\ccsdesc[2][100]{%`  
 1626 `\ccsdesc@parse#1~#2~~\ccsdesc@parse@end}`

```

\ccsdesc@parse The parser of the expression Significance~General~Specific (we need textcomp for
\textrightarrow). Note that Specific can be empty!
1627 \def\textrightarrow{\rightarrow}
1628 \def\ccsdesc@parse#1~#2~#3~{%
1629 \stepcounter{@concepts}%
1630 \expandafter\ifx\csname CCS@General@#2\endcsname\relax
1631 \expandafter\gdef\csname CCS@General@#2\endcsname{\textbullet\
1632 \textbf{#2}}%
1633 \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{;}%
1634 \expandafter\gdef\csname CCS@Specific@#2\endcsname{}%
1635 \g@addto@macro{@concepts}{\csname CCS@General@#2\endcsname
1636 \csname CCS@Punctuation@#2\endcsname
1637 \csname CCS@Specific@#2\endcsname}%
1638 \fi
1639 \ifx#3\relax\relax\else
1640 \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{
1641 \textrightarrow\ }%
1642 \expandafter\g@addto@macro\expandafter{\csname CCS@Specific@#2\endcsname}{%
1643 \addtocounter{@concepts}{-1}%
1644 \ifnum#1>499\textbf{#3}\else
1645 \ifnum#1>299\textit{#3}\else
1646 #3\fi\fi\ifnum\value{@concepts}=0.\else; \fi}%
1647 \fi
1648 \ccsdesc@parse@finish}

1649 \AtEndDocument{\if@ACM@nonacm\else\ifx\@concepts\@empty\relax
1650 \ifnum\getrefnumber{TotPages}>2\relax
1651 \ClassWarningNoLine{\@classname}{CCS concepts are mandatory
1652 for papers over two pages}%
1653 \fi\fi\fi}

\ccdesc@parse@finish Gobble everything to \ccsdesc@parse@end
1654 \def\ccsdesc@parse@finish#1\ccsdesc@parse@end{}

```

### 3.18 Copyright system

This is from acmcopyright.sty

```

\if@printcopyright Whether to print a copyright symbol
1655 \newif\if@printcopyright
1656 \@printcopyrighttrue

\if@printpermission Whether to print the permission block
1657 \newif\if@printpermission
1658 \@printpermissiontrue

\if@acmowned Whether the ACM owns the rights to the paper
1659 \newif\if@acmowned
1660 \@acmownedtrue

```

Keys:

```

1661 \define@choicekey*{ACM@}{acmcopyrightmode}[%
1662 \acm@copyrightinput\acm@copyrightmode]{none,%

```

```

1663   acmcopyright,acmlicensed,rightsretained,%
1664   usgov,usgovmixed,cagov,cagovmixed,licensedusgovmixed,%
1665   licensedcagov,licensedcagovmixed,othergov,licensedothergov,%
1666   iw3c2w3,iw3c2w3g}{%
1667 \@printpermissiontrue
1668 \@printcopyrighttrue
1669 \@acmownedtrue
1670 \ifnum\acm@copyrightmode=0\relax % none
1671 \@printpermissionfalse
1672 \@printcopyrightfalse
1673 \@acmownedfalse
1674 \fi
1675 \ifnum\acm@copyrightmode=2\relax % acmlicensed
1676 \@acmownedfalse
1677 \fi
1678 \ifnum\acm@copyrightmode=3\relax % rightsretained
1679 \@acmownedfalse
1680 \AtBeginDocument{\acmPrice{}}%
1681 \fi
1682 \ifnum\acm@copyrightmode=4\relax % usgov
1683 \@printpermissiontrue
1684 \@printcopyrightfalse
1685 \@acmownedfalse
1686 \AtBeginDocument{\acmPrice{}}%
1687 \fi
1688 \ifnum\acm@copyrightmode=6\relax % cagov
1689 \@acmownedfalse
1690 \fi
1691 \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
1692 \@acmownedfalse
1693 \fi
1694 \ifnum\acm@copyrightmode=9\relax % licensedcagov
1695 \@acmownedfalse
1696 \fi
1697 \ifnum\acm@copyrightmode=10\relax % licensedcagovmixed
1698 \@acmownedfalse
1699 \fi
1700 \ifnum\acm@copyrightmode=11\relax % othergov
1701 \@acmownedtrue
1702 \fi
1703 \ifnum\acm@copyrightmode=12\relax % licensedothergov
1704 \@acmownedfalse
1705 \fi
1706 \ifnum\acm@copyrightmode=13\relax % iw3c2w3
1707 \@acmownedfalse
1708 \AtBeginDocument{\acmPrice{}}%
1709 \fi
1710 \ifnum\acm@copyrightmode=14\relax % iw3c2w3g
1711 \@acmownedfalse
1712 \AtBeginDocument{\acmPrice{}}%
1713 \fi}

```

`\setcopyright` This is the syntactic sugar around setting keys.

```

1714 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}

```



```

1715 \setcopyright{acmcopyright}

\@copyrightowner Here is the owner of the copyright
1716 \def\@copyrightowner{%
1717 \ifcase\acm@copyrightmode\relax % none
1718 \or % acmcopyright
1719 Association for Computing Machinery.
1720 \or % acmlicensed
1721 Copyright held by the owner/author(s). Publication rights licensed to
1722 ACM\@.
1723 \or % rightsretained
1724 Copyright held by the owner/author(s).
1725 \or % usgov
1726 \or % usgovmixed
1727 Association for Computing Machinery.
1728 \or % cagov
1729 Crown in Right of Canada.
1730 \or %cagovmixed
1731 Association for Computing Machinery.
1732 \or %licensedusgovmixed
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1734 ACM\@.
1735 \or % licensedcagov
1736 Crown in Right of Canada. Publication rights licensed to
1737 ACM\@.
1738 \or %licensedcagovmixed
1739 Copyright held by the owner/author(s). Publication rights licensed to
1740 ACM\@.
1741 \or % othergov
1742 Association for Computing Machinery.
1743 \or % licensedothergov
1744 Copyright held by the owner/author(s). Publication rights licensed to
1745 ACM\@.
1746 \or % ic2w3www
1747 IW3C2 (International World Wide Web Conference Committee), published
1748 under Creative Commons CC-BY~4.0 License.
1749 \or % ic2w3wwwgoogle
1750 IW3C2 (International World Wide Web Conference Committee), published
1751 under Creative Commons CC-BY-NC-ND~4.0 License.
1752 \fi}

```

```

\@formatdoi Print a clickable DOI
1753 \def\@formatdoi#1{\url{https://doi.org/#1}}

```

```

\@copyrightpermission The canned permission block.
1754 \def\@copyrightpermission{%
1755 \ifcase\acm@copyrightmode\relax % none
1756 \or % acmcopyright
1757 Permission to make digital or hard copies of all or part of this
1758 work for personal or classroom use is granted without fee provided
1759 that copies are not made or distributed for profit or commercial
1760 advantage and that copies bear this notice and the full citation on
1761 the first page. Copyrights for components of this work owned by
1762 others than ACM must be honored. Abstracting with credit is

```

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1770 that copies are not made or distributed for profit or commercial  
1771 advantage and that copies bear this notice and the full citation on  
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1862 retains a nonexclusive, royalty-free right to publish or reproduce  
1863 this article, or to allow others to do so, for Government purposes  
1864 only.

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1868 disseminate the work on their personal and corporate Web sites with  
1869 the appropriate attribution.

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```

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1873 (CC-BY-NC-ND~4.0) license. Authors reserve their rights to
1874 disseminate the work on their personal and corporate Web sites with
1875 the appropriate attribution.
1876 \fi}

```

```

\copyrightyear By default, the copyright year is the same as \acmYear, but one can override this:
1877 \def\copyrightyear#1{\def\@copyrightyear{#1}}
1878 \copyrightyear{\@acmYear}

```

```

\@teaserfigures The teaser figures container
1879 \def\@teaserfigures{}

```

```

teaserfigure The teaser figure
1880 \newenvironment{teaserfigure}{\Collect@Body\@saveteaser}{}

```

```

\@saveteaser Saving the teaser
1881 \long\def\@saveteaser#1{\g@addto@macro\@teaserfigures{\@teaser{#1}}}

```

```

\thanks We redefine amsart \thanks so the anonymous key works
1882 \renewcommand{\thanks}[1]{%
1883 \ifnotempty{#1}{%
1884 \if@ACM@anonymous
1885 \g@addto@macro\thankses{\thanks{A note}}%
1886 \else
1887 \g@addto@macro\thankses{\thanks{#1}}%
1888 \fi}}

```

```

\anon We provide \anon command, which blinds parts of the text if the package option
anonymous is set
1889 \newcommand{\anon}[2][ANONYMIZED]{%
1890 \if@ACM@anonymous%
1891 {\color{ACMOrange}#1}%
1892 \else%
1893 #2%
1894 \fi}

```

### 3.19 Maketitle hook

The current  $\LaTeX$  provides a nice lthooks mechanism. However, since it is relatively new, we will use oldfashioned approach—at least for now.

```

\@beginmaketitlehook The hook
1895 \ifx\@beginmaketitlehook\undefined
1896 \let\@beginmaketitlehook\@empty
1897 \fi

```

```

\AtBeginMaketitle Adding to the hook
1898 \def\AtBeginMaketitle{\g@addto@macro\@beginmaketitlehook}

```

### 3.20 Typesetting top matter

`\mktitle@bx` Some of our formats use a two-column design. Some use a one-column design. In all cases we use a wide title. Thus we typeset the top matter in a special box to be used in the construction `\twocolumn[⟨box⟩]`.

```
1899 \newbox\mktitle@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 thanks. The latter two 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.

```
1900 \def\maketitle{\@beginmaketitlehook
1901 \@ACM@maketitle@typesettrue
1902 \if@ACM@anonymous
1903 % Anonymize omission of \author-s
1904 \ifnum\num@authorgroups=0\author{}\fi
1905 \fi
1906 \begingroup
1907 \let\@vspace\@vspace@orig
1908 \let\@vspacer\@vspacer@orig
1909 \let\@footnotemark\@footnotemark@nolink
1910 \let\@footnotetext\@footnotetext@nolink
1911 \renewcommand\thefootnote{\@fnsymbol\c@footnote}%
1912 \hsize=\textwidth
1913 \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}%
1914 \mktitle\if@ACM@sigchiamode\else\mkauthors\fi\mkteasers
1915 \@printtopmatter
1916 \if@ACM@sigchiamode\mkauthors\fi
1917 \setcounter{footnote}{0}%
1918 \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}%
1919 \@titlenotes
1920 \@subtitlenotes
1921 \@authornotes
1922 \let\@makefnmark\relax
1923 \let\@thefnmark\relax
1924 \let\@makefntext\noindent
1925 \ifx\@empty\thankses\else
1926 \footnotetextauthorsaddresses{%
1927 \def\par{\let\par\@par}\parindent\z@\@setthanks}%
1928 \fi
1929 \ifx\@empty\authorsaddresses\else
1930 \if@ACM@anonymous\else
1931 \if@ACM@journal@bibstrip
1932 \footnotetextauthorsaddresses{%
1933 \def\par{\let\par\@par}\parindent\z@\@setauthorsaddresses}%
1934 \fi
1935 \fi
1936 \fi
1937 \if@ACM@nonacm\else\footnotetextcopyrightpermission{%
1938 \if@ACM@authordraft
1939 \raisebox{-2ex}[\z@][\z@]{\makebox[0pt][l]{\large\bfseries
1940 Unpublished working draft. Not for distribution.}}%
1941 \color[gray]{0.9}%
```

```

1942 \fi
1943 \parindent\z@\parskip0.1\baselineskip
1944 \if@ACM@authorversion\else
1945 \if@printpermission\@copyrightpermission\par\fi
1946 \fi
1947 \if@ACM@manuscript\else
1948 \if@ACM@journal@bibstrip\else % Print the conference information
1949 {\itshape \acmConference@shortname, \acmConference@date, \acmConference@venue}\par
1950 \fi
1951 \fi
1952 \if@printcopyright
1953 \copyright\ \@copyrightyear\ \@copyrightowner\
1954 \else
1955 \@copyrightyear.\
1956 \fi
1957 \if@ACM@manuscript
1958 Manuscript submitted to ACM\
1959 \else
1960 \if@ACM@authorversion
1961 This is the author's version of the work. It is posted here for
1962 your personal use. Not for redistribution. The definitive Version
1963 of Record was published in
1964 \if@ACM@journal@bibstrip
1965 \emph{\@journalName}%
1966 \else
1967 \emph{\@acmBooktitle}%
1968 \fi
1969 \ifx\@acmDOI\@empty
1970 .
1971 \else
1972 , \@formatdoi{\@acmDOI}.
1973 \fi\
1974 \else
1975 \if@ACM@nonacm\else
1976 \if@ACM@journal@bibstrip
1977 \@permissionCodeOne/\@acmYear/\@acmMonth-ART\@acmArticle
1978 \ifx\@acmPrice\@empty\else\ $\@acmPrice\fi\
1979 \@formatdoi{\@acmDOI}%
1980 \else % Conference
1981 \ifx\@acmISBN\@empty\else ACM~ISBN~\@acmISBN
1982 \ifx\@acmPrice\@empty.\else\dots\$\@acmPrice\fi\\\fi
1983 \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi%
1984 \fi
1985 \fi
1986 \fi
1987 \fi}
1988 \fi
1989 \endgroup
1990 \setcounter{footnote}{0}%
1991 \@mkabstract
1992 \ifx\@translatedabstracts\@empty\else
1993 \@translatedabstracts\fi
1994 \if@ACM@printccs
1995 \ifx\@concepts\@empty\else\bgroup

```

```

1996     {\@specialsection{CCS Concepts}%
1997         \noindent\@concepts\par}\egroup
1998     \fi
1999 \fi
2000 \ifx\@keywords\@empty\else\bgroup
2001     {\@specialsection{\keywordsname}%
2002         \noindent\@keywords\par}\egroup
2003     \fi
2004 \ifx\@translatedkeywords\@empty\else
2005     \@translatedkeywords
2006 \fi
2007 \let\metadata@authors=\authors
2008 \nxandlist{, }{, }{, }\metadata@authors
2009 \def\@ACM@checkaffil{}%
2010 \hypersetup{%
2011     pdfauthor={\metadata@authors},
2012     pdftitle={\@title},
2013     pdfsubject={\@concepts},
2014     pdfkeywords={\@keywords},
2015     pdfcreator={LaTeX with acmart
2016         \csname ver@acmart.cls\endcsname\space
2017         and hyperref
2018         \csname ver@hyperref.sty\endcsname}}%
2019 \andify\authors
2020 \andify\shortauthors
2021 \global\let\authors=\authors
2022 \global\let\shortauthors=\shortauthors
2023 \if@ACM@printacmref
2024     \mkbibcitation
2025 \fi
2026 \global\@topnum\z@ % this prevents floats from falling
2027                     % at the top of page 1
2028 \global\@botnum\z@ % we do not want them to be on the bottom either
2029 \@printendtopmatter
2030 \@afterindentfalse
2031 \@afterheading
2032 }

```

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

```

2033 \def\@specialsection#1{%
2034     \let\@vspace\@vspace@orig
2035     \let\@vspacer\@vspacer@orig
2036     \ifcase\ACM@format@nr
2037     \relax % manuscript
2038     \par\medskip\small\noindent#1: %
2039     \or % acmsmall
2040     \par\medskip\small\noindent#1: %
2041     \or % acmlarge
2042     \par\medskip\small\noindent#1: %
2043     \or % acmtog
2044     \par\medskip\small\noindent#1: %
2045     \or % sigconf
2046     \section*{#1}%
2047     \or % siggraph

```

```

2048 \section*{#1}%
2049 \or % sigplan
2050 \noindentparagraph*{#1:~}%
2051 \or % sigchi
2052 \section*{#1}%
2053 \or % sigchi-a
2054 \section*{#1}%
2055 \fi
2056 \let\@vspace\@vspace@acm
2057 \let\@vspacer\@vspacer@acm
2058 }

```

\@printtopmatter The printing of top matter starts a 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 in the margins.

Note that if there are too many authors, \mkttitle@bx might overflow the page. Therefore we start with checking this and if this happens, we split the box and print it page by page.

```

2059 \def\@printtopmatter{%
2060 \ifx\@startPage\@empty
2061 \gdef\@startPage{1}%
2062 \else
2063 \setcounter{page}{\@startPage}%
2064 \fi
2065 \@tempdima=\ht\mkttitle@bx
2066 \advance\@tempdima by \dp\mkttitle@bx
2067 \ifdim\@tempdima>0.9\textheight
2068 \loop
2069 \setbox\@tempboxa=\vsplit \mkttitle@bx to 0.9\textheight
2070 \thispagestyle{firstpagestyle}%
2071 \noindent\unvbox\@tempboxa
2072 \clearpage
2073 \@tempdima=\ht\mkttitle@bx
2074 \advance\@tempdima by \dp\mkttitle@bx
2075 \ifdim\@tempdima>0.9\textheight\repeat
2076 \fi
2077 \thispagestyle{firstpagestyle}%
2078 \noindent
2079 \ifcase\ACM@format@nr
2080 \relax % manuscript
2081 \box\mkttitle@bx\par
2082 \or % acmsmall
2083 \box\mkttitle@bx\par
2084 \or % acmlarge
2085 \box\mkttitle@bx\par
2086 \or % acmtog
2087 \twocolumn[\box\mkttitle@bx]%
2088 \or % sigconf
2089 \twocolumn[\box\mkttitle@bx]%
2090 \or % siggraph
2091 \twocolumn[\box\mkttitle@bx]%
2092 \or % sigplan
2093 \twocolumn[\box\mkttitle@bx]%
2094 \or % sigchi

```



```

2095 \twocolumn[\box\mktitle@bx]%
2096 \or % sigchi-a
2097 \par\box\mktitle@bx\par\bigskip
2098 \if@ACM@badge
2099 \marginpar{\noindent
2100 \ifx\@acmBadgeL@image\@empty\else
2101 \href{\@acmBadgeL@url}{%
2102 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}%
2103 \hskip\@ACM@badge@skip
2104 \fi
2105 \ifx\@acmBadgeR@image\@empty\else
2106 \href{\@acmBadgeR@url}{%
2107 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}%
2108 \fi}%
2109 \fi
2110 \fi
2111 }

```

**\@mktitle** The title of the article

```

2112 \def\@mktitle{%
2113 \ifcase\ACM@format@nr
2114 \relax % manuscript
2115 \@mktitle@i
2116 \or % acmsmall
2117 \@mktitle@i
2118 \or % acmlarge
2119 \@mktitle@i
2120 \or % acmtog
2121 \@mktitle@i
2122 \or % sigconf
2123 \@mktitle@iii
2124 \or % siggraph
2125 \@mktitle@iii
2126 \or % sigplan
2127 \@mktitle@iii
2128 \or % sigchi
2129 \@mktitle@iii
2130 \or % sigchi-a
2131 \@mktitle@iv
2132 \fi
2133 }

```

**\@titlefont** The font to typeset the title

```

2134 \def\@titlefont{%
2135 \ifcase\ACM@format@nr
2136 \relax % manuscript
2137 \LARGE\sffamily\bfseries
2138 \or % acmsmall
2139 \LARGE\sffamily\bfseries
2140 \or % acmlarge
2141 \LARGE\sffamily\bfseries
2142 \or % acmtog
2143 \Huge\sffamily
2144 \or % sigconf

```

```

2145 \Huge\sfamily\bfseries
2146 \or % siggraph
2147 \Huge\sfamily\bfseries
2148 \or % sigplan
2149 \Huge\bfseries
2150 \or % sigchi
2151 \Huge\sfamily\bfseries
2152 \or % sigchi-a
2153 \Huge\bfseries
2154 \fi}

```

`\@subtitlefont` The font to typeset the subtitle

```

2155 \def\@subtitlefont{\normalsize
2156 \ifcase\ACM@format@nr
2157 \relax % manuscript
2158 \mdseries
2159 \or % acmsmall
2160 \mdseries
2161 \or % acmlarge
2162 \mdseries
2163 \or % acmtog
2164 \LARGE
2165 \or % sigconf
2166 \LARGE\mdseries
2167 \or % siggraph
2168 \LARGE\mdseries
2169 \or % sigplan
2170 \LARGE\mdseries
2171 \or % sigchi
2172 \LARGE\mdseries
2173 \or % sigchi-a
2174 \mdseries
2175 \fi}

```

`\@mktitle@i` The version of `\mktitle` for most journals

```

2176 \def\@mktitle@i{\hsize=\textwidth
2177 \@ACM@title@width=\hsize
2178 \ifx\@acmBadgeL@image\@empty\else
2179 \advance\@ACM@title@width by -\@ACM@badge@width
2180 \advance\@ACM@title@width by -\@ACM@badge@skip
2181 \fi
2182 \ifx\@acmBadgeR@image\@empty\else
2183 \advance\@ACM@title@width by -\@ACM@badge@width
2184 \advance\@ACM@title@width by -\@ACM@badge@skip
2185 \fi
2186 \setbox\mktitle@bx=\vbox{\noindent\@titlefont
2187 \ifx\@acmBadgeL@image\@empty\else
2188 \raisebox{- .5\baselineskip}[\z@][\z@]{\href{\@acmBadgeL@url}{%
2189 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
2190 \hskip\@ACM@badge@skip
2191 \fi
2192 \parbox[t]{\@ACM@title@width}{\raggedright
2193 \@titlefont\noindent
2194 \@title\@translatedtitle%

```

```

2195 \ifx\@subtitle\@empty\else
2196   \par\noindent{\@subtitlefont\@subtitle\@translatedsubtitle}%
2197 \fi}%
2198 \ifx\@acmBadgeR@image\@empty\else
2199   \hskip\@ACM@badge@skip
2200   \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeR@url}{%
2201     \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
2202 \fi
2203 \par\bigskip}}%

```

`\@mkttitle@ii` The version of `\mkttitle` for TOG. Since v1.06, this is subsumed by the `\mkttitle@i` macro

`\@mkttitle@iii` The version of `\@mkttitle` for SIG proceedings. Note that since the title is centered, we leave space for the left badge even if only the right badge is defined.

```

2204 \def\@mkttitle@iii{\hsize=\textwidth
2205   \setbox\mkttitle@bx=\vbox{\@titlefont\centering
2206     \@ACM@title@width=\hsize
2207     \if@ACM@badge
2208       \advance\@ACM@title@width by -2\@ACM@badge@width
2209       \advance\@ACM@title@width by -2\@ACM@badge@skip
2210       \parbox[b]{\@ACM@badge@width}{\strut
2211         \ifx\@acmBadgeL@image\@empty\else
2212           \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeL@url}{%
2213             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
2214         \fi}%
2215       \hskip\@ACM@badge@skip
2216     \fi
2217     \parbox[t]{\@ACM@title@width}{\centering\@titlefont
2218       \@title\@translatedtitle%
2219       \ifx\@subtitle\@empty\else
2220         \par\noindent{\@subtitlefont\@subtitle\@translatedsubtitle}
2221       \fi
2222     }%
2223     \if@ACM@badge
2224       \hskip\@ACM@badge@skip
2225       \parbox[b]{\@ACM@badge@width}{\strut
2226         \ifx\@acmBadgeR@image\@empty\else
2227           \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeR@url}{%
2228             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
2229         \fi}%
2230     \fi
2231   \par\bigskip}}%

```

`\@mkttitle@iv` The version of `\@mkttitle` for sigchi-a

```

2232 \def\@mkttitle@iv{\hsize=\textwidth
2233   \setbox\mkttitle@bx=\vbox{\raggedright\leftskip5pc\@titlefont
2234     \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
2235     \noindent\@title\@translatedtitle%
2236     \ifx\@subtitle\@empty\else
2237       \par\noindent\@subtitlefont\@subtitle\@translatedsubtitle%
2238     \fi
2239   \par\bigskip}}%

```

`\@ACM@addtoaddress` This macro adds an item to the address using the following rules:

1. If we start a paragraph, add the item
2. Otherwise, add a comma and the item
3. However, the comma is deleted if it is at the end of a line. We use the magic `\cleaders` trick for this.

```
2240 \newbox\@ACM@commabox
2241 \def\@ACM@addtoaddress#1{%
2242   \ifvmode\else
2243     \if@ACM@affiliation@obexpunctuation\else
2244       \setbox\@ACM@commabox=\hbox{, }%
2245       \unskip\cleaders\copy\@ACM@commabox\hskip\wd\@ACM@commabox
2246     \fi\fi
2247   #1}
```

```
\institution Theoretically we can define the macros for \affiliation inside the \@mkauthors-style
\position commands. However, this would lead to a strange error if an author uses them outside
\department \affiliation. Of course we can make them produce an error message, but...
\streetaddress 2248 \def\streetaddress#1{\unskip\ignorespaces}
\city 2249 \def\postcode#1{\unskip\ignorespaces}
\state 2250 \if@ACM@journal
\postcode 2251 \def\position#1{\unskip\ignorespaces}
\country 2252 \def\institution#1{\global\@ACM@instpresenttrue
2253   \unskip~#1\ignorespaces}
2254 \def\city#1{\global\@ACM@citypresenttrue\unskip\ignorespaces}
2255 \def\state#1{\unskip\ignorespaces}
2256 \newcommand\department[2][0]{\unskip\ignorespaces}
2257 \def\country#1{\global\@ACM@countrypresenttrue
2258   \if@ACM@affiliation@obexpunctuation\else, \fi#1\ignorespaces}
2259 \else
2260 \def\position#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
2261 \def\institution#1{\global\@ACM@instpresenttrue
2262   \if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
2263 \newcommand\department[2][0]{\if@ACM@affiliation@obexpunctuation
2264   #2\else#2\par\fi}%
2265 % \def\streetaddress#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
2266 \def\city#1{\global\@ACM@citypresenttrue\@ACM@addtoaddress{#1}}%
2267 \let\state\@ACM@addtoaddress
2268 % \def\postcode#1{\if@ACM@affiliation@obexpunctuation#1\else\unskip\space#1\fi}%
2269 \def\country#1{\global\@ACM@countrypresenttrue\@ACM@addtoaddress{#1}}%
2270 \fi
```

`\@mkauthors` Typesetting the authors

```
2271 \def\@mkauthors{\begingroup
2272   \hsize=\textwidth
2273   \ifcase\@ACM@format@nr
2274     \relax % manuscript
2275     \@mkauthors@i
2276     \or % acsmall
2277     \@mkauthors@i
2278     \or % acmlarge
2279     \@mkauthors@i
```

```

2280 \or % acmtog
2281 \mkauthors@i
2282 \or % sigconf
2283 \mkauthors@iii
2284 \or % siggraph
2285 \mkauthors@iii
2286 \or % sigplan
2287 \mkauthors@iii
2288 \or % sigchi
2289 \mkauthors@iii
2290 \or % sigchi-a
2291 \mkauthors@iv
2292 \fi
2293 \endgroup
2294 }

```

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

```
2295 \def\@authorfont{\Large\sffamily}
```

\@affiliationfont Font for affiliations

```
2296 \def\@affiliationfont{\normalsize\normalfont}
```

Adjusting fonts for different formats

```

2297 \ifcase\ACM@format@nr
2298 \relax % manuscript
2299 \or % acmsmall
2300 \def\@authorfont{\large\sffamily}
2301 \def\@affiliationfont{\small\normalfont}
2302 \or % acmlarge
2303 \or % acmtog
2304 \def\@authorfont{\LARGE\sffamily}
2305 \def\@affiliationfont{\large}
2306 \or % sigconf
2307 \def\@authorfont{\LARGE}
2308 \def\@affiliationfont{\large}
2309 \or % siggraph
2310 \def\@authorfont{\normalsize\normalfont}
2311 \def\@affiliationfont{\normalsize\normalfont}
2312 \or % sigplan
2313 \def\@authorfont{\Large\normalfont}
2314 \def\@affiliationfont{\normalsize\normalfont}
2315 \or % sigchi
2316 \def\@authorfont{\bfseries}
2317 \def\@affiliationfont{\mdseries}
2318 \or % sigchi-a
2319 \def\@authorfont{\bfseries}
2320 \def\@affiliationfont{\mdseries}
2321 \fi

```

\@typeset@author@line At this point we have \@currentauthors and \@currentaffiliations. We typeset them in the journal style

```

2322 \def\@typeset@author@line{%
2323 \andify\@currentauthors\par\noindent
2324 \@currentauthors\def\@currentauthors{}}%

```

```

2325 \ifx\@currentaffiliations\@empty\else
2326   \andify\@currentaffiliations
2327     \unskip, {\@currentaffiliations}\par
2328 \fi
2329 \def\@currentaffiliations{}}

\if@ACM@instpresent Whether the given affiliation has institution
2330 \newif\if@ACM@instpresent
2331 \@ACM@instpresenttrue

\if@ACM@citypresent Whether the given affiliation has city
2332 \newif\if@ACM@citypresent
2333 \@ACM@citypresenttrue

\if@ACM@countrypresent Whether the given affiliation has country
2334 \newif\if@ACM@countrypresent
2335 \@ACM@countrypresenttrue

\@ACM@resetaffil Reset affiliation flags
2336 \def\@ACM@resetaffil{%
2337   \global\@ACM@instpresentfalse
2338   \global\@ACM@citypresentfalse
2339   \global\@ACM@countrypresentfalse
2340 }

\@ACM@checkaffil Check affiliation flags
2341 \def\@ACM@checkaffil{%
2342   \if@ACM@instpresent\else
2343     \ClassWarningNoLine{\@classname}{No institution present for an affiliation}%
2344     \fi
2345   \if@ACM@citypresent\else
2346     \ClassWarningNoLine{\@classname}{No city present for an affiliation}%
2347     \fi
2348   \if@ACM@countrypresent\else
2349     \ClassError{\@classname}{No country present for an affiliation}{ACM
2350     requires each author to indicate their country using country macro.}%
2351     \fi
2352 }

\@mkauthors@i This version is used in most journal formats. Note that \and between authors with the
same affiliation becomes _and_:
2353 \def\@mkauthors@i{%
2354   \def\@currentauthors{}%
2355   \def\@currentaffiliations{}%
2356   \global\let\and\@typeset@author@line
2357   \def\@author##1{%
2358     \ifx\@currentauthors\@empty
2359       \gdef\@currentauthors{\@authorfont\MakeTextUppercase{##1}}%
2360     \else
2361       \g@addto@macro{\@currentauthors}{\and\MakeTextUppercase{##1}}%
2362     \fi
2363     \gdef\and{}}%
2364   \def\email##1##2{}}%

```

```

2365 \def\affiliation##1##2{%
2366   \def\@tempa{##2}\ifx\@tempa\@empty\else
2367     \ifx\@currentaffiliations\@empty
2368       \gdef\@currentaffiliations{%
2369         \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2370         \setkeys{@ACM@affiliation@}{##1}%
2371         \@ACM@resetaffil
2372         \@affiliationfont##2\@ACM@checkaffil}%
2373       \else
2374         \g@addto@macro{\@currentaffiliations}{\and
2375           \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2376           \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2377           ##2\@ACM@checkaffil}%
2378         \fi
2379       \fi
2380       \global\let\and\@typeset@author@line}%
2381 \global\setbox\mktitle@bx=\vbox{\noindent\unvbox\mktitle@bx\par\medskip
2382   \noindent\addresses\@typeset@author@line
2383   \par\medskip}%
2384 }

```

`\mkauthors@ii` The `\mkauthors@ii` command was the version used in `acmtog`. It is no longer necessary.

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

```
2385 \newbox\author@bx
```

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

```
2386 \newdimen\author@bx@wd
```

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

```
2387 \newskip\author@bx@sep
2388 \author@bx@sep=1pc\relax
```

`\@typeset@author@bx` Typesetting the box with authors. Note that in `sigchi-a` the box is not centered.

```

2389 \def\@typeset@author@bx{\bgroup\hsize=\author@bx@wd
2390   \def\and{\par}\normalbaselines
2391   \global\setbox\author@bx=\vtop{\if@ACM@sigchiamode\else\centering\fi
2392     \@authorfont\@currentauthors\par\@affiliationfont
2393     \@currentaffiliation}\egroup
2394   \box\author@bx\hspace{\author@bx@sep}%
2395   \gdef\@currentauthors{}}%
2396   \gdef\@currentaffiliation{}}

```

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

```
2397 \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.

```

2398 \author@bx@wd=\textwidth\relax
2399 \advance\author@bx@wd by -\author@bx@sep\relax
2400 \ifnum\@ACM@authorsperrow>0\relax

```

```

2401 \divide\author@bx@wd by \@ACM@authorsperrrow\relax
2402 \else
2403 \ifcase\num@authorgroups
2404 \relax % 0?
2405 \or % 1=one author per row
2406 \or % 2=two authors per row
2407 \divide\author@bx@wd by \num@authorgroups\relax
2408 \or % 3=three authors per row
2409 \divide\author@bx@wd by \num@authorgroups\relax
2410 \or % 4=two authors per row (!)
2411 \divide\author@bx@wd by 2\relax
2412 \else % three authors per row
2413 \divide\author@bx@wd by 3\relax
2414 \fi
2415 \fi
2416 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of \addresses:

```

2417 \gdef\@currentauthors{}%
2418 \gdef\@currentaffiliation{}%
2419 \def\@author##1{\ifx\@currentauthors\@empty
2420 \gdef\@currentauthors{\par##1}%
2421 \else
2422 \g@addto@macro\@currentauthors{\par##1}%
2423 \fi
2424 \gdef\and{}}%
2425 \def\email##1##2{\ifx\@currentaffiliation\@empty
2426 \gdef\@currentaffiliation{\bgroup
2427 \mathchardef\UrbreakPenalty=10000\nolinkurl{##2}\egroup}%
2428 \else
2429 \g@addto@macro\@currentaffiliation{\par\bgroup
2430 \mathchardef\UrbreakPenalty=10000\nolinkurl{##2}\egroup}%
2431 \fi}%
2432 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
2433 \gdef\@currentaffiliation{%
2434 \setkeys{@ACM@affiliation@}{obexpunctuation=false}%
2435 \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2436 ##2\@ACM@checkaffil}%
2437 \else
2438 \g@addto@macro\@currentaffiliation{\par
2439 \setkeys{@ACM@affiliation@}{obexpunctuation=false}%
2440 \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2441 ##2\@ACM@checkaffil}%
2442 \fi
2443 \global\let\and\@typeset@author@bx
2444 }%

```

Actual typesetting is done by the \and macro:

```

2445 \hspace=\textwidth
2446 \global\setbox\mktitle@bx=\vbox{\noindent
2447 \unvbox\mktitle@bx\par\medskip\leavevmode
2448 \lineskip=1pc\relax\centering\hspace*{-1em}%
2449 \addresses\let\and\@typeset@author@bx\and\par\bigskip}}

```



`\mkauthors@iv` The sigchi-a version. We put authors in the main text with no more than 2 authors per line, unless overridden.

```
2450 \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.

```
2451 \author@bx@wd=\columnwidth\relax
2452 \advance\author@bx@wd by -\author@bx@sep\relax
2453 \ifnum\@ACM@authorsperrow>0\relax
2454   \divide\author@bx@wd by \@ACM@authorsperrow\relax
2455 \else
2456   \ifcase\@num@authorgroups
2457   \relax % 0?
2458   \or % 1=one author per row
2459   \else % 2=two authors per row
2460     \divide\author@bx@wd by 2\relax
2461   \fi
2462 \fi
2463 \advance\author@bx@wd by -\author@bx@sep\relax
```

Now, parsing of `\addresses`:

```
2464 \gdef\@currentauthors{}%
2465 \gdef\@currentaffiliation{}%
2466 \def\@author##1{\ifx\@currentauthors\@empty
2467   \gdef\@currentauthors{\par##1}%
2468 \else
2469   \g@addto@macro\@currentauthors{\par##1}%
2470 \fi
2471 \gdef\and{}}%
2472 \def\email##1##2{\ifx\@currentaffiliation\@empty
2473   \gdef\@currentaffiliation{\nolinkurl{##2}}%
2474 \else
2475   \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
2476 \fi}%
2477 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
2478   \gdef\@currentaffiliation{%
2479     \setkeys{@ACM@affiliation@}{obypunctuation=false}%
2480     \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2481     ##2\@ACM@checkaffil}%
2482 \else
2483   \g@addto@macro\@currentaffiliation{\par
2484     \setkeys{@ACM@affiliation@}{obypunctuation=false}%
2485     \setkeys{@ACM@affiliation@}{##1}\@ACM@resetaffil
2486     ##2\@ACM@checkaffil}%
2487 \fi
2488 \global\let\and\@typeset@author@bx}%
2489 %
```

Actual typesetting is done by the `\and` macro

```
2490 \bgroup\hsize=\columnwidth
2491 \par\raggedright\leftskip=\z@
2492 \lineskip=1pc\noindent
2493 \addresses\let\and\@typeset@author@bx\and\par\bigskip\egroup}
```

`\@mkauthorsaddresses` Typesetting authors' addresses in the footnote style

```

2494 \def\@mkauthorsaddresses{%
2495   \ifnum\@authors>1\relax
2496   Authors' \else Author's \fi
2497   \ifnum\@authorgroups>1\relax
2498   addresses: \else address: \fi
2499   \bgroup
2500   \def\streetaddress##1{\unskip, ##1}%
2501   \def\postcode##1{\unskip, ##1}%
2502   \def\position##1{\unskip\ignorespaces}%
2503   \gdef\@ACM@institution@separator{, }%
2504   \def\institution##1{\unskip\@ACM@institution@separator ##1\gdef\@ACM@institution@separator{ and }}%
2505   \def\city##1{\unskip, ##1}%
2506   \def\state##1{\unskip, ##1}%
2507   \renewcommand\department[2][0]{\unskip\@addpunct, ##2}%
2508   \def\country##1{\unskip, ##1}%
2509   \def\and{\unskip; \gdef\@ACM@institution@separator{, }}%
2510   \def\@author##1{##1}%
2511   \def\email##1##2{\unskip, \nolinkurl{##2}}%
2512   \addresses
2513   \egroup}

2514 \AtEndDocument{\if@ACM@nonacm\else\if@ACM@journal
2515   \ifx\@authorsaddresses\@empty
2516   \ClassWarningNoLine{\@classname}{Authors'
2517   addresses are mandatory for ACM journals}%
2518   \fi\fi\fi}

```

`\@setaddresses` This is an `amsart` macro that we do not need.

```

2519 \def\@setaddresses{}

```

`\@authornotemark` Adding a footnote mark to authors. This version adds a “normal” footnote mark.

```

2520 \def\@authornotemark{\g@addto@macro\@currentauthors{\footnotemark\relax}}

```

`\@@authornotemark` Adding a footnote mark to authors with a given number

```

2521 \def\@@authornotemark#1{\g@addto@macro\@currentauthors{\footnotemark[#1]}}

```

`\@mkteasers` Typesetting the teasers

```

2522 \def\@mkteasers{%
2523   \ifx\@teaserfigures\@empty\else
2524     \def\@teaser##1{\par\bigskip\bgroup
2525       \captionsetup{type=figure}##1\egroup\par}
2526     \global\setbox\mktitle@bx=\vbox{\noindent\unvbox\mktitle@bx\par
2527       \noindent\@Description@presentfalse
2528       \@teaserfigures\par\if@Description@present\else
2529         \global\@undescrbed@imagestrue
2530         \ClassWarning{\@classname}{A possible image without
2531         description}\fi
2532       \medskip}%
2533     \fi}

```

`\@mkabstract` Typesetting the abstract

```

2534 \def\@mkabstract{\bgroup

```

```

2535 \ifx\@abstract\@empty\else
2536 {\phantomsection\addcontentsline{toc}{section}{\abstractname}%
2537 \if@ACM@journal
2538 \everypar{\setbox\z@\lastbox\everypar{}}\small
2539 \else
2540 \section*{\abstractname}%
2541 \fi
2542 \ignorespaces\@abstract\par}%
2543 \fi\egroup}

```

`\@mktranslatedabstract` Typesetting a translated abstract

```

2544 \def\@mktranslatedabstract#1{\selectlanguage{#1}%
2545 \if@ACM@journal
2546 \everypar{\setbox\z@\lastbox\everypar{}}\small
2547 \else
2548 \section*{\abstractname}%
2549 \fi
2550 \ignorespaces}

```

`\@mkbibcitation` Print the bibcitation format

```

2551 \def\@mkbibcitation{\bgroup
2552 \let\@vspace\@vspace@orig
2553 \let\@vspacer\@vspacer@orig
2554 \def\@pages@word{\ifnum\getrefnumber{TotPages}=1\relax page\else pages\fi}%
2555 \def\footnotemark{}%
2556 \def\@unskip{\ignorespaces}%
2557 \def\footnote{\ClassError{\@classname}{Please do not use footnotes
2558 inside a \string\title{} or \string\author{} command! Use
2559 \string\titlenote{} or \string\authornote{} instead!}}%
2560 \def\@article@string{\ifx\@acmArticle\@empty{\ }else,
2561 Article~\@acmArticle\ \fi}%
2562 \par\medskip\small\noindent{\bfseries ACM Reference Format:}\par\nobreak
2563 \noindent\bgroup
2564 \def\@unskip{\ignorespaces}\authors\egroup. \@acmYear. \@title
2565 \ifx\@subtitle\@empty. \else: \@subtitle. \fi
2566 \if@ACM@nonacm\else
2567 % The 'nonacm' option disables 'printacmref' by default,
2568 % and the present \@mkbibcitation definition is never used
2569 % in this case. The conditional remains useful if the user
2570 % explicitly sets \settopmatter{printacmref=true}.
2571 \if@ACM@journal@bibstrip
2572 \textit{\@journalNameShort}
2573 \@acmVolume, \@acmNumber \@article@string (\@acmPubDate),
2574 \ref{TotPages}~\@pages@word.
2575 \else
2576 In \textit{\@acmBooktitle}%
2577 \ifx\@acmEditors\@empty\textit{.}\else
2578 \andify\@acmEditors\textit{, }\@acmEditors~\@editorsAbbrev.%
2579 \fi\
2580 ACM, New York, NY, USA%
2581 \@article@string\unskip, \ref{TotPages}~\@pages@word.
2582 \fi
2583 \fi
2584 \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi

```

```

2585 \par\egroup}

\@printendtopmatter End the top matter
2586 \def\@printendtopmatter{%
2587   \let\@vspace\@vspace@orig
2588   \let\@vspacer\@vspacer@orig
2589   \par\bigskip
2590   \let\@vspace\@vspace@acm
2591   \let\@vspacer\@vspacer@acm
2592   }

\@setthanks We redefine \setthanks using \long
2593 \def\@setthanks{\long\def\thanks##1{\par##1\@addpunct.}\thankses}

\@setauthorsaddresses
2594 \def\@setauthorsaddresses{\@authorsaddresses\unskip\@addpunct.}

```

### 3.21 Headers and Footers

We use fancyhdr for our headers and footers:

```
2595 \RequirePackage{fancyhdr}
```

\ACM@restore@pagestyle The following code by Ross Moore protects against changes by the totpages package:

```

2596 \let\ACM@ps@plain\ps@plain
2597 \let\ACM@ps@myheadings\ps@myheadings
2598 \let\ACM@ps@headings\ps@headings
2599 \def\ACM@restore@pagestyle{%
2600   \let\ps@plain\ACM@ps@plain
2601   \let\ps@myheadings\ACM@ps@myheadings
2602   \let\ps@headings\ACM@ps@headings}
2603 \AtBeginDocument{\ACM@restore@pagestyle}

```

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

```

2604 \if@ACM@review
2605   \newsavebox{\ACM@linecount@bx}
2606   \newlength\ACM@linecount@bxht
2607   \newcount\ACM@linecount
2608   \ACM@linecount\@ne\relax
2609   \def\ACM@mk@linecount{%
2610     \savebox{\ACM@linecount@bx}[4em][t]{\parbox[t]{4em}{\normalfont
2611       \normalsize
2612       \setlength{\ACM@linecount@bxht}{0pt}%
2613       \loop{\color{red}\scriptsize\the\ACM@linecount}\
2614         \global\advance\ACM@linecount by \@ne
2615         \addtolength{\ACM@linecount@bxht}{\baselineskip}%
2616         \ifdim\ACM@linecount@bxht<\textheight\repeat
2617         {\color{red}\scriptsize\the\ACM@linecount}\hfill
2618         \global\advance\ACM@linecount by \@ne}}
2619   \fi

```

\ACM@linecountL How to display the box on the left

```

2620 \def\ACM@linecountL{%
2621   \if@ACM@review

```

```

2622 \ACM@mk@linecount
2623 \begin{picture}(0,0)%
2624   \put(-26,-22){\usebox{\ACM@linecount@bx}}%
2625 \end{picture}%
2626 \fi}

```

\ACM@linecountR How to display the box on the right. In one column formats we do not step the numbers.

```

2627 \def\ACM@linecountR{%
2628   \if@ACM@review
2629     \ifcase\ACM@format@nr
2630       \relax % manuscript
2631         \relax
2632         \or % acmsmall
2633           \relax
2634           \or % acmlarge
2635             \relax
2636             \or % acmtog
2637               \ACM@mk@linecount
2638               \or % sigconf
2639                 \ACM@mk@linecount
2640                 \or % siggraph
2641                   \ACM@mk@linecount
2642                   \or % sigplan
2643                     \ACM@mk@linecount
2644                     \or % sigchi
2645                       \ACM@mk@linecount
2646                       \or % sigchi-a
2647                         \ACM@mk@linecount
2648   \fi
2649   \begin{picture}(0,0)%
2650     \put(20,-22){\usebox{\ACM@linecount@bx}}%
2651   \end{picture}%
2652 \fi}

```

\ACM@timestamp The timestamp system

```

2653 \if@ACM@timestamp
2654 % Subtracting 30 from \time gives us the effect of rounding down despite
2655 % \numexpr rounding to nearest
2656 \newcounter{ACM@time@hours}
2657 \setcounter{ACM@time@hours}{\numexpr (\time - 30) / 60 \relax}
2658 \newcounter{ACM@time@minutes}
2659 \setcounter{ACM@time@minutes}{\numexpr \time - \theACM@time@hours * 60 \relax}
2660 \newcommand\ACM@timestamp{%
2661   \footnotesize%
2662   \ifx\@acmSubmissionID\@empty\relax\else
2663     Submission ID: \@acmSubmissionID.{ }%
2664   \fi
2665   \the\year-\two@digits{\the\month}-\two@digits{\the\day}{ }%
2666   \two@digits{\theACM@time@hours}:\two@digits{\theACM@time@minutes}{. }%
2667   Page \thepage\ of \@startPage--\pageref*{TotPages}.%
2668 }
2669 \fi

```

`\@shortauthors` Even if the author redefined `\shortauthors`, we do not print it in the headers when in anonymous mode:

```

2670 \def\@shortauthors{%
2671   \if@ACM@anonymous
2672     Anon.
2673     \ifx\@acmSubmissionID\@empty\else Submission Id: \@acmSubmissionID\fi
2674   \else\shortauthors\fi}

```

`\@headfootfont` The font to typeset header and footer text.

```

2675 \def\@headfootfont{\sffamily\footnotesize}

```

`standardpagestyle` The page style for all pages but the first one The page style for all pages but the first one

```

2676 \AtBeginDocument{%
2677   \fancypagestyle{standardpagestyle}{%
2678     \fancyhf{}%
2679     \renewcommand{\headrulewidth}{\z@}%
2680     \renewcommand{\footrulewidth}{\z@}%
2681     \def\@acmArticlePage{%
2682       \if\@acmArticle\empty%
2683         \if@ACM@printfolios\thepage\fi%
2684       \else%
2685         \@acmArticle\if@ACM@printfolios:\thepage\fi%
2686       \fi%
2687     }%
2688     \if@ACM@journal@bibstrip
2689       \ifcase\ACM@format@nr
2690       \relax % manuscript
2691       \fancyhead[LE]{\ACM@linecountL\if@ACM@printfolios\thepage\fi}%
2692       \fancyhead[RO]{\if@ACM@printfolios\thepage\fi}%
2693       \fancyhead[RE]{\@shortauthors}%
2694       \fancyhead[LO]{\ACM@linecountL\shorttitle}%
2695       \if@ACM@nonacm\else%
2696         \fancyfoot[RO,LE]{\footnotesize Manuscript submitted to ACM}
2697       \fi%
2698     \or % acmsmall
2699       \fancyhead[LE]{\ACM@linecountL\@headfootfont\@acmArticlePage}%
2700       \fancyhead[RO]{\@headfootfont\@acmArticlePage}%
2701       \fancyhead[RE]{\@headfootfont\@shortauthors}%
2702       \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2703       \if@ACM@nonacm\else%
2704         \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2705           \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2706       \fi
2707     \or % acmlarge
2708       \fancyhead[LE]{\ACM@linecountL\@headfootfont
2709         \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
2710       \fancyhead[LO]{\ACM@linecountL}%
2711       \fancyhead[RO]{\@headfootfont
2712         \shorttitle\quad\textbullet\quad\@acmArticlePage}%
2713       \if@ACM@nonacm\else%
2714         \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2715           \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2716       \fi

```

```

2717 \or % acmtog
2718 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2719 \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
2720 \fancyhead[LO]{\ACM@linecountL}%
2721 \fancyhead[RE]{\ACM@linecountR}%
2722 \fancyhead[RO]{\@headfootfont
2723 \shorttitle\quad\textbullet\quad\@acmArticlePage\ACM@linecountR}%
2724 \if@ACM@nonacm\else%
2725 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2726 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2727 \fi
2728 \else % Proceedings
2729 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2730 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2731 \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2732 \if@ACM@nonacm
2733 \fancyhead[LE]{\ACM@linecountL}%
2734 \fancyhead[RO]{\ACM@linecountR}%
2735 \else%
2736 \fancyhead[LE]{\ACM@linecountL\@headfootfont\footnotesize
2737 \acmConference@shortname,
2738 \acmConference@date, \acmConference@venue}%
2739 \fancyhead[RO]{\@headfootfont
2740 \acmConference@shortname,
2741 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2742 \fi
2743 \fi
2744 \else % Proceedings
2745 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2746 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2747 \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2748 \if@ACM@nonacm
2749 \fancyhead[LE]{\ACM@linecountL}%
2750 \fancyhead[RO]{\ACM@linecountR}%
2751 \else%
2752 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2753 \acmConference@shortname,
2754 \acmConference@date, \acmConference@venue}%
2755 \fancyhead[RO]{\@headfootfont
2756 \acmConference@shortname,
2757 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2758 \fi
2759 \fi
2760 \if@ACM@sigchiamode
2761 \fancyheadoffset[L]{\dimexpr(\marginparsep+\marginparwidth)}%
2762 \fi
2763 \if@ACM@timestamp
2764 \fancyfoot[LO,RE]{\ACM@timestamp}
2765 \fi
2766 }%
2767 \pagestyle{standardpagestyle}
2768 }

```

```

\@folio@wd Folio blob width, height, offsets and max number
\@folio@ht
\@folio@voffset
\@folio@max

```

```

2769 \newdimen\@folio@wd
2770 \@folio@wd=\z@
2771 \newdimen\@folio@ht
2772 \@folio@ht=\z@
2773 \newdimen\@folio@voffset
2774 \@folio@voffset=\z@
2775 \def\@folio@max{1}
2776 \ifcase\ACM@format@nr
2777 \relax % manuscript
2778 \or % acmsmall
2779 \@folio@wd=45.75pt\relax
2780 \@folio@ht=1.25in\relax
2781 \@folio@voffset=.2in\relax
2782 \def\@folio@max{8}
2783 \or % acmlarge
2784 \@folio@wd=43.25pt\relax
2785 \@folio@ht=79pt\relax
2786 \@folio@voffset=.55in\relax
2787 \def\@folio@max{10}
2788 \fi

```

`\@folioblob` The macro to typeset the folio blob.

```

2789 \def\@folioblob{\@tempcnta=0\@acmArticleSeq\relax
2790 \ifnum\@tempcnta=0\relax\else
First, we calculate \@acmArticleSeq modulo \@folio@max
2791 \loop
2792 \ifnum\@tempcnta>\@folio@max\relax
2793 \advance\@tempcnta by - \@folio@max
2794 \repeat
2795 \advance\@tempcnta by -1\relax
2796 \@tempdima=\@folio@ht\relax
2797 \multiply\@tempdima by \the\@tempcnta\relax
2798 \advance\@tempdima by -\@folio@voffset\relax
2799 \begin{picture}(0,0)
2800 \makebox[\z@]{\raisebox{-\@tempdima}{%
2801 \rlap{%
2802 \raisebox{-0.45\@folio@ht}[\z@][\z@]{%
2803 \rule{\@folio@wd}{\@folio@ht}}}%
2804 \parbox{\@folio@wd}{%
2805 \centering
2806 \textcolor{white}{\LARGE\sffamily\bfseries\@acmArticle}}}}
2807 \end{picture}\fi}
2808

```

`firstpagestyle` The page style for the first page only.

```

2809 \AtBeginDocument{%
2810 \fancypagestyle{firstpagestyle}{%
2811 \fancyhf{}}%
2812 \renewcommand{\headrulewidth}{\z@}%
2813 \renewcommand{\footrulewidth}{\z@}%
2814 \if@ACM@journal@bibstrip
2815 \ifcase\ACM@format@nr
2816 \relax % manuscript

```



```

2817 \fancyhead[L]{\ACM@linecountL}%
2818 \fancyfoot[RO,LE]{\if@ACM@printfolios\small\thepage\fi}%
2819 \if@ACM@nonacm\else%
2820 \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
2821 \fi%
2822 \or % acsmall
2823 \if@ACM@nonacm\else%
2824 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2825 \@acmNumber, Article \@acmArticle. Publication date:
2826 \@acmPubDate.}%
2827 \fi%
2828 \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2829 \fancyhead[LO]{\ACM@linecountL}%
2830 \fancyhead[RO]{\@folioblob}%
2831 \fancyheadoffset[RO,LE]{0.6\@folio@wd}%
2832 \or % acmlarge
2833 \if@ACM@nonacm\else%
2834 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2835 \@acmNumber, Article \@acmArticle. Publication date:
2836 \@acmPubDate.}%
2837 \fi%
2838 \fancyhead[RO]{\@folioblob}%
2839 \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2840 \fancyhead[LO]{\ACM@linecountL}%
2841 \fancyheadoffset[RO,LE]{1.4\@folio@wd}%
2842 \or % acmtog
2843 \if@ACM@nonacm\else%
2844 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2845 \@acmNumber, Article \@acmArticle. Publication date:
2846 \@acmPubDate.}%
2847 \fi%
2848 \fancyhead[L]{\ACM@linecountL}%
2849 \fancyhead[R]{\ACM@linecountR}%
2850 \else % Conference proceedings
2851 \fancyhead[L]{\ACM@linecountL}%
2852 \fancyhead[R]{\ACM@linecountR}%
2853 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2854 \fi
2855 \else
2856 \fancyhead[L]{\ACM@linecountL}%
2857 \fancyhead[R]{\ACM@linecountR}%
2858 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2859 \fi
2860 \if@ACM@timestamp
2861 \ifnum\ACM@format@nr=0\relax % Manuscript
2862 \fancyfoot[LO,RE]{\ACM@timestamp\quad}
2863 \if@ACM@nonacm\else
2864 \footnotesize Manuscript submitted to ACM
2865 \fi}
2866 \else
2867 \fancyfoot[LO,RE]{\ACM@timestamp}
2868 \fi
2869 \fi
2870 }}

```

## 3.22 Sectioning

`\ACM@NRadjust` Ross Moore's macro.

Initially `\ACM@sect@format@` just passes through its #1 argument unchanged. When a sectioning macro such as `\section` occurs, the `\ACM@NRadjust` redefines `\ACM@sect@format@` to expand into the styling commands; e.g., `\@secfont`. Then `\Sectionformat` is temporarily redefined to produce `\realSectionformat{\ACM@sect@format{#1}}{#2}`, which ultimately becomes `\Sectionformat{\@secfont{#1}}{#2}`. This is done to allow `\Sectionformat` to be variable, as may be needed in particular circumstances. Its current expansion is saved as `\realSectionformat` which is used with the modified 1st argument, then `\Sectionformat` is reverted to its former expansion.

To style the section-number, the line `#1{}` is used at the end of `\ACM@NRadjust`. This imposes style-changing commands for fonts and sizes, but any `\MakeUppercase` acts on just the `{}`. It's a bit hacky, by essentially assuming that only numbers occur here, not letters to be case-changed. (This should be acceptable in a class-file, as it ought to be possible to change the case elsewhere, if that was ever desired.) Also, it can result in `\@adddotafter` being called too soon, so a slight adjustment is made, via `\ACM@adddotafter`, which now tests whether its argument is empty. But the coding has to allow for other packages to have also patched `\@adddotafter`.

```
2871 \def\ACM@NRadjust#1{%
2872   \begingroup
2873   \expandafter\ifx\csname Sectionformat\endcsname\relax
2874   % do nothing when \Sectionformat is unknown
2875   \def\next{\endgroup #1}%
2876   \else
2877   \def\next{\endgroup
2878     \let\realSectionformat\Sectionformat
2879     \def\ACM@sect@format@{#1}%
2880     \let\Sectionformat\ACM@NR@adjustedSectionformat
2881     %% next lines added 2018-06-17 to ensure section number is styled
2882     \let\real@adddotafter\@adddotafter
2883     \let\@adddotafter\ACM@adddotafter
2884     #1{ }% imposes the styles, but nullifies \MakeUppercase
2885     \let\@adddotafter\real@adddotafter
2886   }%
2887   \fi \next
2888 }
```

`\ACM@NR@adjustedSectionformat`

```
2889 \def\ACM@NR@adjustedSectionformat#1#2{%
2890   \realSectionformat{\ACM@sect@format{#1}}{#2}%
2891   \let\Sectionformat\realSectionformat}
2892 \DeclareRobustCommand{\ACM@sect@format@}{\ACM@sect@format@}
2893 \def\ACM@sect@format@null#1{#1}
2894 \let\ACM@sect@format@\ACM@sect@format@null
2895 \AtBeginDocument{%
2896   \expandafter\ifx\csname LTX@adddotafter\endcsname\relax
2897   \let\LTX@adddotafter\@adddotafter
2898   \fi
2899 }
```

\ACM@adddotafter

```
2900 \def\ACM@adddotafter#1{\ifx\relax#1\relax\else\LTX@adddotafter{#1}\fi}
```

Sectioning is different for different levels

```
2901 \renewcommand\section{\@startsection{section}{1}{\z@}%
2902 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2903 {.25\baselineskip}%
2904 {\ACM@NRadjust\@secfont}}
2905 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
2906 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2907 {.25\baselineskip}%
2908 {\ACM@NRadjust\@subsecfont}}
2909 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
2910 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2911 {-3.5\p@}%
2912 {\ACM@NRadjust{\@subsubsecfont\@adddotafter}}}}
2913 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
2914 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2915 {-3.5\p@}%
2916 {\ACM@NRadjust{\@parfont\@adddotafter}}}}
2917 \newcommand\noindentparagraph{\@startsection{paragraph}{4}{\z@}%
2918 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2919 {-3.5\p@}%
2920 {\ACM@NRadjust{\@parfont}}}}
2921
2922 \renewcommand\part{\@startsection{part}{9}{\z@}%
2923 {-10\p@ \@plus -4\p@ \@minus -2\p@}%
2924 {4\p@}%
2925 {\ACM@NRadjust\@parfont}}
```

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

```
2926 \def\section@raggedright{\@rightskip\@flushglue
2927 \rightskip\@rightskip
2928 \leftskip\z@skip
2929 \parindent\z@}
```

\@secfont Fonts for sections etc. are different for different formats.

```
\@subsecfont 2930 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
\@subsubsecfont 2931 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
\@parfont 2932 \def\@subsubsecfont{\sffamily\itshape}
2933 \def\@parfont{\itshape}
2934 \setcounter{secnumdepth}{3}
2935 \ifcase\ACM@format@nr
2936 \relax % manuscript
2937 \or % acmsmall
2938 \or % acmlarge
2939 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2940 \def\@subsecfont{\sffamily\large\section@raggedright}
2941 \or % acmtog
2942 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2943 \def\@subsecfont{\sffamily\large\section@raggedright}
2944 \or % sigconf
2945 \def\@secfont{\bfseries\Large\section@raggedright\MakeTextUppercase}
2946 \def\@subsecfont{\bfseries\Large\section@raggedright}
```

```

2947 \or % siggraph
2948 \def\@secfont{\sffamily\bfseries\Large\section@raggedright\MakeTextUppercase}
2949 \def\@subsecfont{\sffamily\bfseries\Large\section@raggedright}
2950 \or % sigplan
2951 \def\@secfont{\bfseries\Large\section@raggedright}
2952 \def\@subsecfont{\bfseries\section@raggedright}
2953 \def\@subsubsecfont{\bfseries\section@raggedright}
2954 \def\@parfont{\bfseries\itshape}
2955 \def\@subparfont{\itshape}
2956 \or % sigchi
2957 \setcounter{secnumdepth}{1}
2958 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2959 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2960 \or % sigchi-a
2961 \setcounter{secnumdepth}{0}
2962 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2963 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2964 \fi

```

\@adddotafter Add punctuation after a sectioning command

```
2965 \def\@adddotafter#1{#1\@addpunct{.}}
```

\@addspaceafter Add space after a sectioning command

```
2966 \def\@addspaceafter#1{#1\@addpunct{\enspace}}
```

### 3.23 TOC lists

\@dotsep Related to the \tableofcontents are all the horizontal fillers. Base  $\LaTeX$  defines \@dottedtocline, which we should not disable. Yet, this command expects \@dotsep to be defined but leaves this to the class implementation. Since amsart does not provide this, we copy the standard variant from article here.

```
2967 \providecommand*\@dotsep{4.5}
```

### 3.24 Theorems

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

```
2968 \def\@acmplainbodyfont{\itshape}
```

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

```
2969 \def\@acmplainindent{\parindent}
```

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

```
2970 \def\@acmplainheadfont{\scshape}
```

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

```
2971 \def\@acmplainnotefont{\@empty}
```

Customization of the acmplain theorem style:

```
2972 \ifcase\ACM@format@nr
```

```
2973 \relax % manuscript
```

```
2974 \or % acmsmall
```

```
2975 \or % acmlarge
```

```

2976 \or % acmtog
2977 \or % sigconf
2978 \or % siggraph
2979 \or % sigplan
2980 \def\@acmplainbodyfont{\itshape}
2981 \def\@acmplainindent{\z@}
2982 \def\@acmplainheadfont{\bfseries}
2983 \def\@acmplainnotefont{\normalfont}
2984 \or % sigchi
2985 \or % sigchi-a
2986 \fi

```

`acmplain` The `acmplain` theorem style

```

2987 \newtheoremstyle{acmplain}%
2988   {.5\baselineskip\@plus.2\baselineskip
2989     \@minus.2\baselineskip}% space above
2990   {.5\baselineskip\@plus.2\baselineskip
2991     \@minus.2\baselineskip}% space below
2992   {\@acmplainbodyfont}% body font
2993   {\@acmplainindent}% indent amount
2994   {\@acmplainheadfont}% head font
2995   {.}% punctuation after head
2996   {.5em}% spacing after head
2997   {\thmname{#1}\thmnumber{#2}\thmnote{ {\@acmplainnotefont(#3)}}}% head spec

```

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

```

2998 \def\@acmdefinitionbodyfont{\normalfont}

```

`\@acmdefinitionindent` The amount to indent the `acmdefinition` theorem style.

```

2999 \def\@acmdefinitionindent{\parindent}

```

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

```

3000 \def\@acmdefinitionheadfont{\itshape}

```

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

```

3001 \def\@acmdefinitionnotefont{\@empty}

```

Customization of the `acmdefinition` theorem style:

```

3002 \ifcase\ACM@format@nr
3003 \relax % manuscript
3004 \or % acmsmall
3005 \or % acmlarge
3006 \or % acmtog
3007 \or % sigconf
3008 \or % siggraph
3009 \or % sigplan
3010 \def\@acmdefinitionbodyfont{\normalfont}
3011 \def\@acmdefinitionindent{\z@}
3012 \def\@acmdefinitionheadfont{\bfseries}
3013 \def\@acmdefinitionnotefont{\normalfont}
3014 \or % sigchi
3015 \or % sigchi-a
3016 \fi

```

acmdefinition The acmdefinition theorem style

```
3017 \newtheoremstyle{acmdefinition}%
3018   {.5\baselineskip\@plus.2\baselineskip
3019   \@minus.2\baselineskip}% space above
3020   {.5\baselineskip\@plus.2\baselineskip
3021   \@minus.2\baselineskip}% space below
3022   {\@acmdefinitionbodyfont}% body font
3023   {\@acmdefinitionindent}% indent amount
3024   {\@acmdefinitionheadfont}% head font
3025   {.}% punctuation after head
3026   {.5em}% spacing after head
3027   {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmdefinitionnotefont(#3)}}}% head spec
```

Make acmplain the default theorem style.

```
3028 \theoremstyle{acmplain}
```

Delay defining the theorem environments until after other packages have been loaded. In particular, the `cleveref` package must be loaded before the theorem environments are defined in order to show the correct environment name (see <https://github.com/borisveytsman/acmart/issues/138>). The `acmthm` option is used to suppress the definition of any theorem environments. Also, to avoid obscure errors arising from these environment definitions conflicting with environments defined by the user or by user-loaded packages, we only define environments that have not yet been defined.

```
3029 \AtEndPreamble{%
3030   \if@ACM@acmthm
3031   \theoremstyle{acmplain}
3032   \@ifundefined{theorem}{%
3033     \newtheorem{theorem}{Theorem}[section]
3034   }{}
3035   \@ifundefined{conjecture}{%
3036     \newtheorem{conjecture}[theorem]{Conjecture}
3037   }{}
3038   \@ifundefined{proposition}{%
3039     \newtheorem{proposition}[theorem]{Proposition}
3040   }{}
3041   \@ifundefined{lemma}{%
3042     \newtheorem{lemma}[theorem]{Lemma}
3043   }{}
3044   \@ifundefined{corollary}{%
3045     \newtheorem{corollary}[theorem]{Corollary}
3046   }{}
3047   \theoremstyle{acmdefinition}
3048   \@ifundefined{example}{%
3049     \newtheorem{example}[theorem]{Example}
3050   }{}
3051   \@ifundefined{definition}{%
3052     \newtheorem{definition}[theorem]{Definition}
3053   }{}
3054   \fi
3055   \theoremstyle{acmplain}
3056 }
```

\@proofnamefont The font to typeset the proof name.

```

3057 \def\@proofnamefont{\scshape}
\@proofindent Whether or not to indent proofs.
3058 \def\@proofindent{\indent}

```

Customization of the proof environment.

```

3059 \ifcase\ACM@format@nr
3060 \relax % manuscript
3061 \or % acmsmall
3062 \or % acmlarge
3063 \or % acmtog
3064 \or % sigconf
3065 \or % siggraph
3066 \or % sigplan
3067 \def\@proofnamefont{\itshape}
3068 \def\@proofindent{\noindent}
3069 \or % sigchi
3070 \or % sigchi-a
3071 \fi

```

proof We want some customization of the proof environment.

```

3072 \renewenvironment{proof}[1][\proofname]{\par
3073 \pushQED{\qed}%
3074 \normalfont \topsep6\p@\@plus6\p@\relax
3075 \trivlist
3076 \item[\@proofindent\hskip\labelsep
3077 \@proofnamefont #1\@addpunct{.}]\ignorespaces
3078 }{%
3079 \popQED\endtrivlist\endpfalse
3080 }

```

### 3.25 Balancing columns

We need balancing only if the user did not disable it, and we use a two column format. Note that pbalance uses a different mechanism.

```

3081 \AtEndPreamble{%
3082 \if@ACM@pbalance
3083 \global\@ACM@balancefalse
3084 \ifcase\ACM@format@nr
3085 \relax % manuscript
3086 \or % acmsmall
3087 \or % acmlarge
3088 \or % acmtog
3089 \RequirePackage{pbalance}%
3090 \or % sigconf
3091 \RequirePackage{pbalance}%
3092 \or % siggraph
3093 \RequirePackage{pbalance}%
3094 \or % sigplan
3095 \RequirePackage{pbalance}%
3096 \or % sigchi
3097 \RequirePackage{pbalance}%
3098 \or % sigchi-a

```

```

3099 \fi
3100 \fi
3101 \if@ACM@balance
3102 \ifcase\ACM@format@nr
3103 \relax % manuscript
3104 \global\@ACM@balancefalse
3105 \or % acmsmall
3106 \global\@ACM@balancefalse
3107 \or % acmlarge
3108 \global\@ACM@balancefalse
3109 \or % acmtog
3110 \RequirePackage{balance}%
3111 \or % sigconf
3112 \RequirePackage{balance}%
3113 \or % siggraph
3114 \RequirePackage{balance}%
3115 \or % sigplan
3116 \RequirePackage{balance}%
3117 \or % sigchi
3118 \RequirePackage{balance}%
3119 \or % sigchi-a
3120 \global\@ACM@balancefalse
3121 \fi
3122 \fi
3123 }
3124 \AtEndDocument{%
3125 \if@ACM@balance
3126 \if@twocolumn
3127 \balance
3128 \fi\fi}

```

### 3.26 Acknowledgments

```

\acksname
3129 \newcommand\acksname{Acknowledgments}

\acks This is a comment-like structure
3130 \specialcomment{acks}{%
3131 \begingroup
3132 \section*{\acksname}
3133 \phantomsection\addcontentsline{toc}{section}{\acksname}
3134 }{%
3135 \endgroup
3136 }

\grantsponsor We just typeset the name of the sponsor
3137 \def\grantsponsor#1#2#3#2}

\grantnum
3138 \newcommand\grantnum[3][[]]{#3%
3139 \def\@tempa{#1}\ifx\@tempa\@empty\else\space(\url{#1})\fi}

```



### 3.27 Conditional typesetting

We use the comment package for conditional typesetting:

```
3140 \AtEndPreamble{%
3141 \if@ACM@screen
3142 \includecomment{screenonly}
3143 \excludecomment{printonly}
3144 \else
3145 \excludecomment{screenonly}
3146 \includecomment{printonly}
3147 \fi
3148 \if@ACM@anonymous
3149 \excludecomment{anonsuppress}
3150 \excludecomment{acks}
3151 \else
3152 \includecomment{anonsuppress}
3153 \fi}
```

### 3.28 Additional bibliography commands

`\showeprint` The command `\showeprint` has two arguments: the (optional) prefix and the eprint number. Right now the only prefix we understand is the (lowercase) word ‘arxiv’.

```
3154 \newcommand\showeprint[2][arxiv]{%
3155 \def\@tempa{#1}%
3156 \ifx\@tempa\@empty\def\@tempa{arxiv}\fi
3157 \def\@tempb{arxiv}%
3158 \ifx\@tempa\@tempb\relax
3159 arXiv:\href{https://arxiv.org/abs/#2}{#2}%
3160 \else
3161 \def\@tempb{arXiv}%
3162 \ifx\@tempa\@tempb\relax
3163 arXiv:\href{https://arxiv.org/abs/#2}{#2}%
3164 \else
3165 #1:#2%
3166 \fi
3167 \fi}
```

### 3.29 Index

`\theindex` Standard `amsart` uses plain page style in index pages. This clashes with line numbering for review option, so we redefine it.

```
3168 \def\theindex{\@restonecoltrue\if@twocolumn\@restonecolfalse\fi
3169 \columnseprule\z@ \columnsep 35\p@
3170 \@indextitlestyle
3171 \let\item\@idxitem
3172 \parindent\z@ \parskip\z@\@plus.3\p@\relax
3173 \raggedright
3174 \hyphenpenalty\@M
3175 \footnotesize}
```

### 3.30 End of Class

`\vspace` We do not disable `\vspace`, but add warning to it

```

3176 \let\@vspace@orig=\@vspace
3177 \let\@vspacer@orig=\@vspacer
3178 \apptocmd{\@vspace}{\ClassWarning{\@classname}{\string\vspace\space should
3179   only be used to provide space above/below surrounding
3180   objects}}{}}
3181 \apptocmd{\@vspacer}{\ClassWarning{\@classname}{\string\vspace\space should
3182   only be used to provide space above/below surrounding
3183   objects}}{}}
3184 \let\@vspace@acm=\@vspace
3185 \let\@vspacer@acm=\@vspacer

```

\ACM@origbaselinestretch We produce an error if the user tries to change \baselinestretch

```

3186 \let\ACM@origbaselinestretch\baselinestretch
3187 \AtEndDocument{\ifx\baselinestretch\ACM@origbaselinestretch\else
3188   \ClassError{\@classname}{An attempt to redefine
3189     \string\baselinestretch\space detected. Please do not do this for
3190     ACM submissions!}\fi}

```

```

3191 \normalsize\normalfont\frenchspacing
3192 </class>

```

## References

- [1] UK TeX Users Group. UK list of TeX frequently asked questions. <https://texfaq.org>, 2019.
- [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] Johannes L. Braams and Javier Bezos. *Babel*, 2022. <http://www.ctan.org/pkg/babel>.
- [4] Cristophe Fiorio. *algorithm2e.sty—package for algorithms*, October 2015. <http://www.ctan.org/pkg/algorithm2e>.
- [5] Rogério Brito. *The algorithms bundle*, August 2009. <http://www.ctan.org/pkg/algorithms>.
- [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. <http://identitystandards.acm.org>.
- [9] Axel Sommerfeldt. *The subcaption package*, April 2013. <http://www.ctan.org/pkg/subcaption>.
- [10] Boris Veytsman, Bern Schandl, Lee Netherton, and C. V. Radhakrishnan. *A package to create a nomenclature*, September 2005. <http://www.ctan.org/pkg/nomencl>.
- [11] Nicola L. C. Talbot. *User Manual for glossaries.sty v4.44*, December 2019. <http://www.ctan.org/pkg/glossaries>.
- [12] David Carlisle. *The textcase package*, October 2004. <http://www.ctan.org/pkg/textcase>.

## Change History

1.48	General: Added prologue option to xcolor . . . . .	47	General: ACM reference format is now mandatory for papers over one page; CCS concepts and keywords are now mandatory for papers over two pages . . . . .	33
	Bib code cleanup (Zack Weinberg)	33	Authors' addresses are mandatory for journal articles . . . . .	33
	Documentation update (siggraph)	33		
1.49	General: New journal: DTRAP . . . . .	33		
1.53	General: New journals: PACMCGIT, TIOT, TDSCI . . . . .	33	1.69	<code>\vspace</code> : Added the changed command to avoid grouping . . . . .
	Rearranged docs . . . . .	33	1.70	General: Name change for TDS . . . . .
1.54	General: Moved footnote stuff before hyperref call (Ross Moore) . . . . .	33	1.71	General: Bibliography change: volume for <code>@inproceedings</code> is now in brackets together with series . . . . .
1.56	General: Documented <code>\Description</code>	33		LuaTeX now uses the OTF versions of fonts . . . . .
1.57	General: Booktabs package is now the default . . . . .	33		Retired <code>sigchi</code> and <code>sigchi-a</code> . . . . .
1.58	General: Changes in samples (Enrico Gregorio) . . . . .	33	1.75	General: Documentation update . . . . .
	New journal: HEALTH. TDS is renamed to TDSCI . . . . .	33	1.78	General: Documentation update: Word count . . . . .
1.60	<code>\if@ACM@urlbreakonhyphens</code> : introduced macro . . . . .	34	1.79	General: Updated indormation for TAP, TCPS, TEAC . . . . .
	General: New option: <code>urlbreakonhyphens</code> . . . . .	33	1.80	General: Added DLT and FAC . . . . .
1.62	General: New journal: TELO . . . . .	33	1.82	General: Updated abbreviations and codes for several journals . . . . .
1.63	General: New journal: FACMP . . . . .	33	v1.00	General: First released version . . . . .
	New journal: TQUANT . . . . .	33	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> ) . . . . .
1.63a	General: Move: TQUANT to TQC . . . . .	33		Defined ACM colors . . . . .
1.64	General: Putting abstract after <code>\maketitle</code> now causes an error . . . . .	33		Explicitly put draft option (closes <a href="https://github.com/borisveytsman/acmart/issues/4">https://github.com/borisveytsman/acmart/issues/4</a> ) . . . . .
1.65	General: New journal: DGOV . . . . .	33		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> ) . . . . .
1.66	<code>\@mkauthorsaddresses</code> : Added warning for missing addresses . . . . .	90		
	<code>\ccsdesc@parse</code> : Added warning for missing concepts . . . . .	71		
	<code>\if@ACM@printacmref</code> : Added warning for longer papers . . . . .	69		
	<code>\keywords</code> : Added warning for missing keywords . . . . .	68		

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> ) . . . . .	33	v1.07	\@titlefont: Added macro . . . . .	81	
	Documentation changes (closes <a href="https://github.com/borisveytsman/acmart/issues/13">https://github.com/borisveytsman/acmart/issues/13</a> ) . . . . .	33		\acmBadgeL: Added macro . . . . .	68	
v1.03	\@formatdoi: Added macro . . . . .	73		\acmBadgeR: Added macro . . . . .	68	
	\if@ACM@authorversion: Added macro . . . . .	35		\if@ACM@badge: Added macro . . . . .	68	
	\maketitle: Added special case of authorversion . . . . .	77		\maketitle: Corrected a bug with abstract footnotes . . . . .	77	
	General: Added anonsuppress environment . . . . .	33		Corrected a bug with permission and footnotes order . . . . .	77	
	Added authorversion option (closes <a href="https://github.com/borisveytsman/acmart/issues/9">https://github.com/borisveytsman/acmart/issues/9</a> ) . . . . .	33	v1.08	General: SIGPLAN reformatting by Matthew Fluet . . . . .	33	
v1.04	\acmArticleSeq: Name change by Matthew Fluet . . . . .	67		Typos corrected (Tobias Pape) . . .	33	
	\acmDOI: Name change by Matthew Fluet . . . . .	68	v1.09	General: Revert SIGPLAN caption rules . . . . .	33	
	\acmISBN: Name change by Matthew Fluet . . . . .	67		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> . . . . .	77
	General: Updated bibliography for siggraph . . . . .	33		General: Changes of ‘licensedothergov’ wording . . . .	71	
v1.05	General: Added processing doi numbers for acmsiggraph and doi numbers for sigproc.bib . . . . .	33		standardpagestyle: Reversed folios location . . . . .	94	
	Patched \setcitestyle command; closes <a href="https://github.com/borisveytsman/acmart/issues/19">https://github.com/borisveytsman/acmart/issues/19</a> . . . . .	33	v1.11	General: Customization of ACM theorem styles and proof environment by Matthew Fluet . .	33	
v1.06	\@ACM@badge@skip: Added macro . . .	68	v1.12	\@marginfigure: Now centering by default . . . . .	54	
	\@ACM@badge@width: Added macro . .	68		\@marginfigure: Now centering by default . . . . .	54	
	\@ACM@title@width: Added macro . .	68		\@parfont: Moved to \section@raggedright . . . . .	99	
	\@mktitle@i: Added processing badges . . . . .	82		\copyrightpermissionfootnoterule: Added macro . . . . .	49	
	Made generic . . . . .	82		\descriptionlabel: Redefined . . . .	56	
	\@mktitle@ii: Now this macro is obsolete . . . . .	83		\footnoterule: Made shorter . . . . .	50	
	\@mktitle@iii: Added processing badges . . . . .	83		\if@ACM@natbib@override: Added macro . . . . .	35	
	Made more generic . . . . .	83		\if@ACM@newfonts: Added macro . . .	51	
	\@mktitle@iv: Made more generic . .	83		\maketitle: Moved thankses to copyrightpermission box . . . . .	77	
	\@printtopmatter: Added processing badges . . . . .	80		\section@raggedright: Introduced macro . . . . .	99	
	\@subtitlefont: Added macro . . . .	82		General: Added graceful behavior when libertine fonts are absent . .	50	
			v1.13	Documentation updates . . . . .	33	
				\@mpfootnotetext: Made minipage footnotes centered . . . . .	45	

\bibliographystyle: Redefined	v1.16	
macro . . . . .		47
\bibstyle@acmauthoryear: Added		
macro . . . . .		40
\bibstyle@acmnumeric: Added		
macro . . . . .		41
\if@ACM@printfolios: Added macro		69
General: Font adjustments for		
acmsmall . . . . .		85
Increased font size for ACM Large		38
Print bibliographic information by		
default for the proceedings . . . . .		70
standardpagestyle: Added headers		
for sigs . . . . .		94
Expanded headers for sigchi-a . . .		94
Suppressed folios if sig . . . . .		94
v1.14		
\bibstyle@acmauthoryear: Moved		
def of \bibstyle@acmauthoryear		
before use . . . . .		40
\bibstyle@acmnumeric: Moved def of		
\bibstyle@numeric before use . . .		41
General: \citestyle updates		
(Matthew Fluet) . . . . .		33
Patched \citestyle . . . . .		39
v1.15		
\@ACM@addtoaddress: Added macro		84
\@mkauthors@iii: New authors		
system . . . . .		87
\@shortauthors: Introduced macro .		93
\@typeset@author@bx: Moved to		
separate macro . . . . .		87
\acks: Added macro . . . . .		104
\affiliation: Added code for author		
groups . . . . .		65
\author: Added code for author		
groups . . . . .		64
\city: Added macro . . . . .		84
\country: Added macro . . . . .		84
\department: Added macro . . . . .		84
\grantnum: Added macro . . . . .		104
\grantsponsor: Added macro . . . . .		104
\if@insideauthorgroup: Introduced		
macro . . . . .		64
\institution: Added macro . . . . .		84
\num@authorgroups: Renamed . . . . .		64
\orcid: Introduced macro . . . . .		66
\position: Added macro . . . . .		84
\postcode: Added macro . . . . .		84
\state: Added macro . . . . .		84
\streetaddress: Added macro . . . . .		84
standardpagestyle: Better handling		
of anonymous mode . . . . .		94
\@headfootfont: Added macro . . . . .	v1.16	94
General: Formatting header/footer		
(Matthew Fluet) . . . . .		33
standardpagestyle: Customize		
header/footer text font . . . . .		94
v1.17		
\@makefnmark: Redefined . . . . .		45
\@mkauthors: TOG now uses the same		
authors block as other journals . .		84
\@mkauthors@ii: Deleted . . . . .		87
\@mkbibcitation: Added \nobreak		91
Changed format for sigs . . . . .		91
\acmArticle: The default is now		
numerical . . . . .		67
\acmMonth: The default must be		
numerical. Closes #50. . . . .		67
\acmNumber: The default is now		
numerical . . . . .		67
\acmVolume: The default is now		
numerical . . . . .		67
\acmYear: The default is now		
numerical . . . . .		67
\description: Decreased indent . . .		56
\grantnum: Added url . . . . .		104
\grantsponsor: Renamed . . . . .		104
\if@ACM@printacmref: Renamed		
from \if@ACM@printbib . . . . .		69
General: Slightly decreased margins		
for sigs . . . . .		48
standardpagestyle: Added paper		
title to sigs . . . . .		94
v1.18		
\@mkauthors@i: Now we andify		
affiliations . . . . .		86
\@typeset@author@line: Added		
macro . . . . .		85
General: Natbib is now the default for		
all formats . . . . .		33
v1.19		
\@mkabstract: Include 'Abstract' in		
PDF bookmarks (Matthew Fluet) . .		90
\acks: Include 'Acknowledgements' in		
PDF bookmarks (Matthew Fluet) . .		104
General: Include 'Abstract',		
'Acknowledgements', and		
'References' in PDF bookmarks		
(Matthew Fluet) . . . . .		33
Include 'References' in PDF		
bookmarks (Matthew Fluet) . . . . .		39
v1.20		
\@mkabstract: Deleted spurious space		90
General: Bug fixes for bst . . . . .		33

v1.21		\acmYear: The default now is the current year (Matteo Riondato) . . .	67
	\showeprint: Added macro . . . . .		105
v1.22		\additionalaffiliation: Added macro . . . . .	65
	General: More bibliography changes for Aptara . . . . .		33
v1.23		\l@section: Redefined macro . . .	45
	General: Add PACMPL journal option		33
v1.24		\l@subsubsection: Redefined macro	45
	General: Add IMWUT journal option		56
v1.25		General: Documentation changes . . .	33
	General: Updated PACMPL . . . . .		56
v1.26		v1.32	
	General: Corrected \shortcite bug .	\@formatdoi: New doi format . . . . .	73
	Documentation typos fixed (thanks to Stephen Spencer) . . . . .	General: Added POMACS journal option . . . . .	33
v1.27		Format siggraph is now obsolete .	33
	\if@ACM@printccs: Typo corrected .		69
v1.28		v1.33	
	\ccsdesc@parse: Change from \to to \textrightarrow (Matteo Riondato) . . . . .	\@ACM@addtoaddress: Added obeypunctuation code . . . . .	84
	General: Corrected option natbib behavior . . . . .	\@mkauthors@i: Added obeypunctuation code . . . . .	86
	Got rid of warnings in pdf keywords	\@mkauthors@iii: Added obeypunctuation code . . . . .	46
v1.29		\@mkauthors@iv: Added obeypunctuation code . . . . .	88
	\@mkabstract: Removed spurious indentation (John Wickerson) . . .	\@subtitlefont: Added \normalsize . . . . .	82
	\ccsdesc@parse: Add spacing after bullet and around rightarrow; semicolon separators no longer in bold/italic (John Wickerson) . . . .	\ACM@linecountL: Renamed macro . .	92
	General: Increased head to 13pt . . . .	\ACM@linecountR: Added macro . . .	93
	standardpagestyle: Corrected printfolios (Matthew Fluet) . . . . .	\ACM@timestamp: Added current page number . . . . .	93
v1.30		Added macro (Michael D. Adams) .	93
	\department: Added optional parameter . . . . .	Added submission id . . . . .	93
	General: Added \frenchspacing . . .	\acmSubmissionID: Added macro . . .	67
	Bibtex style now recognizes https:// in doi . . . . .	\city: Added obeypunctuation code	84
	Switched to T1: looks like libertine has problems with \l in OT1 . . . .	\country: Added obeypunctuation code . . . . .	84
	Updated IMWUT and PACMPL . . .	\department: Added obeypunctuation code . . . . .	84
v1.31		\if@ACM@affiliation@obeypunctuation: Added macro . . . . .	65
	\@additionalaffiliation: Added macro . . . . .	\if@ACM@authordraft: Added macro	36
	\@mkbibcitation: Disabled linebreak	\if@ACM@natbib@override: Deleted macro . . . . .	35
	\@startsection: Added \tochangmeasure . . . . .	\if@ACM@timestamp: Added macro (Michael D. Adams) . . . . .	36
	Redefined macro . . . . .	\institution: Added obeypunctuation code . . . . .	84
	\@textbottom: Redefined . . . . .	\institute: Fixed the bug with figures on top and bottom of the title page, thanks to David Epstein	77
	\acmMonth: The default now is the current month (Matteo Riondato)	\position: Added obeypunctuation code . . . . .	84
		\postcode: Added obeypunctuation code . . . . .	84
		\state: Added obeypunctuation code	84
		\streetaddress: Added obeypunctuation code . . . . .	84

General: Added acmart-preload-hook	33	General: Added PACMHCI journal options	56
Added cmap and glyphtounicode	50	Added the possibility to adjust number of author boxes per row in conference formats	33
BibTeX comma before articleno bug corrected	33	v1.37	
BibTeX crossref bug corrected	33	\description: Reduce list indentation (Matthew Fluet)	56
BibTeX numpages bug corrected	33	\descriptionlabel: Reduce list indentation (Matthew Fluet)	56
Documentation updates	33	\normalparindent: Set \normalparindent (Matthew Fluet)	49
Moved \citename definition for non-natbib bibliography, so a package may redefine it	46	General: Reduce list indentation (Matthew Fluet)	55
Switched to Type 1 fonts for libertine even if OTF-capable engine is used (Kai Mindermann)	51	Set \normalparindent; Reduce list indentation (Matthew Fluet)	33
firstpagestyle: Added right linecount for two-column formats	96	v1.38	
Added timestamp (Michael D. Adams)	96	General: Increase default font size for SIGPLAN	33, 38
standardpagestyle: Added right linecount for two-column formats	94	v1.39	
Added timestamp (Michael D. Adams)	94	\@@authornotemark: Added macro	90
v1.34		\authornotemark: Added macro	67
\@mkbibcitation: Deleted DOI from doi numbers	91	v1.40	
\ACM@linecount@bx: Rulers now are continuous	92	\@copyrightowner: Added new copyright version: licensedcagov	73
\ACM@linecountL: Rulers now are continuous	92	\@copyrightpermission: Added new copyright version: licensedcagov	73
\ACM@linecountR: Rulers now are continuous	93	\@mkauthors@i: Switched to MakeTextUppercase	86
\maketitle: Added date to the bibstrip in conf proceedings	77	\@parfont: Switched to MakeTextUppercase	99
Deleted 'DOI' from doi numbers	77	\ACM@linecount@bx: Work around a bug in xcolor: looks like cmyk colors in boxes do not work	92
Rearranged bibstrip	77	\ccdesc@parse@finish: Added macro	71
The \terms command is now obsolete	77	\city: We now do not print this even in SIG	84
\terms: The \terms command now just produces a warning	68	\country: Fixed bugs with extra spaces	84
v1.35		\l@section: Redefined macro	45
\bibstyle@acmauthoryear: Square brackets for author-year style	40	\postcode: We now do not print this even in SIG	84
General: BibTeX bug fixed: et al.	33	\state: We now do not print this even in SIG	84
If the copyright is set to usgov or rightsretained, the price is suppressed	71	\streetaddress: We now do not print this even in SIG	84
v1.36		General: Added 'textcase' package	39
\@ACM@authorsperrow: Added macro	69	Added heightrounded to geometry	48
\@mkauthors@iii: Added authorsperrow override	87	Added new copyright version: licensedcagov	33
\@mkauthors@iv: Added authorsperrow override	88	Added package cleveref	33
\if@ACM@authordraft: Corrected typo, thanks to bargteil	36		



Added Ross Moore code for glyphtounicode . . . . .	50	\ACM@linecount@bx: Rearranged the code to get rid of spurious underfull messages (Benjamin Byholm) . . . . .	92
Bibliography changes . . . . .	33	\author: Started counting authors . . .	64
v1.41		\authorsaddresses: Introduced macro . . . . .	66
General: Added new badges . . . . .	33	\country: Corrected spacing for institution . . . . .	84
v1.42		\if@ACM@acmthm: Modified description . . . . .	34
General: Deleted ACM badges . . . . .	33	\liningnums: Workaround for compatibility with fontspec . . . . .	51
v1.43		\maketitle: Added authors' addresses 'Thankses go before authors' addresses . . . . .	77
\@startsection: Added		\num@author: Introduced macro . . .	64
\makeatletter . . . . .	44	General: Added etoolbox . . . . .	33
\country: Added comma before country for journals . . . . .	84	Bst file bug fixes: label width is calculated correctly . . . . .	33
v1.44		Delayed hypersetup since journal options may change screen mode . . .	46
\@acmBooktitle: Added macro . . . . .	63	PACM now set screen to true . . . . .	56
\@acmEditors: Added macro . . . . .	63	Restore theorem defs to class file . .	33
\@editorsAbbrev: Added macro . . . . .	63	v1.47	
\@folioblob: Suppress the blob if acmArticleSeq is empty . . . . .	96	General: New journal: THRI . . . . .	33
\@mkbibcitation: If the paper has just one page, use 'page' instead of 'pages' . . . . .	91	v1.48	
\ACM@restore@pagestyle: Added macro . . . . .	92	\@headfootfont: Deleted unnecessary switch (Michael D. Adams) . . . . .	94
\acmArticle: The default is now empty . . . . .	67	\@mkabstract: Removed spurious indentation if abstract is followed by an empty line . . . . .	90
\acmArticleSeq: Now acmArticle might be empty . . . . .	67	\ACM@timestamp: Formatting change (Michael D. Adams) . . . . .	93
\acmBooktitle: Added macro . . . . .	63	\if@ACM@review: Review mode now switches on folios . . . . .	34
\editor: Added macro . . . . .	63	\maketitle: Added acmart and version info to pdfcreator tag . . . .	77
\if@ACM@acmthm: Added macro . . . . .	34	Added language and doctitle attributes to PDF (Andreas Reichinger) . . . . .	77
\maketitle: Empty DOI or ISBN are not printed (by Michael Ekstrand) . . .	77	Suppressed empty DOI (Serguei Mokhov) . . . . .	77
General: Added package refcount . . .	33	General: \citeyear no longer behaves like \citeyearpar . . . . .	46
Deleted package cleveref . . . . .	33	Code prettying (Michael D. Adams) . .	33
Put theorem defs in a separate style . .	33	Initial support for Biblalex (Daniel Thomas) . . . . .	33
v1.45		Misc entries in the bibliography no longer produce a separate date . . .	33
\@folioblob: Switched		Typos fixed (Jamie Davis) . . . . .	33
\bfseries\sffamily to \sffamily\bfseries . . . . .	96		
\@parfont: Switched			
\bfseries\sffamily to \sffamily\bfseries . . . . .	99		
\@titlefont: Switched			
\bfseries\sffamily to \sffamily\bfseries . . . . .	81		
v1.46			
\@mkauthorsaddresses: Introduced macro . . . . .	90		
\@mkbibcitation: Added subtitle . . .	91		
\@printendtopmatter: Made it \par\bigskip uniformly . . . . .	92		
\@printtopmatter: Deleted rule . . . . .	80		
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