

L^AT_EX 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 Machinery¹ 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 \TeX 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.

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

2 User's guide

This class uses many commands and customizatón 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.

¹<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>
- *ifluatex*, <http://www.ctan.org/pkg/ifluatex>
- *ifxetex*, <http://www.ctan.org/pkg/ifxetex>
- *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>

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.

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.

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 2.11.

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.

Table 1: The possible values for the format option

Value	Meaning
<code>manuscript</code>	A manuscript. This is the default.
<code>acmsmall</code>	Small single-column format. Used for CIE, CSUR, DTRAP, HEALTH, 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, TRET, TSAS, TSC, TSLP and TWEB, including special issues.
<code>acmlarge</code>	Large single-column format. Used for IMWUT, JOCCH, POMACS and TAP, including special issues.
<code>acmtog</code>	Large double-column format. Used for TOG, including annual conference Technical Papers.
<code>sigconf</code>	Proceedings format for most ACM conferences (with the exceptions listed below) and all ICPS volumes.
<code>sigplan</code>	Proceedings format for SIGPLAN conferences.
<code>sigchi</code>	Proceedings format for SIGCHI conferences.
<code>sigchi-a</code>	Format for SIGCHI extended abstracts.

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.

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.

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

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 2.11)
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 2.7
balance	true	Whether to balance the last page in two column mode
urlbreakonhyphens	true	Whether to break urls on hyphens

used before `\maketitle`.

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[\langle ShortTitle \rangle]{\langle FullTitle \rangle}
```

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

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

`\subtitle` Besides title, ACM classes allow a subtitle, set with the `\subtitle{\langle subtitle \rangle}` 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 OR-

`\orcid` CID, <http://www.orcid.org/>), `\affiliation` and `\email`. In the simplest case, you

`\affiliation` enter them in this order:

```
\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 Thørväld Group.

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` commands.

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.

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 Germany, 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 <i>not</i> use this option for journals.
	It is expected that these commands are inserted by the author of the manuscript.
<code>\thanks</code>	Like <code>amsart</code> (and unlike standard \LaTeX), we allow <code>\thanks</code> only <i>outside</i> of the commands <code>\title</code> and <code>\author</code> . This command is obsolete and should <i>not</i> be used in most cases. Do not list your acknowledgments or grant sponsors here. Put this information in the <code>acks</code> environment (see Section 2.10).
<code>\authorsaddresses</code>	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 <code>\authorsaddresses{<contact addresses>}</code> , for example, <pre> \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.} </pre>
	You can <i>suppress</i> printing authors' addresses by setting them to an empty string: <code>\authorsaddresses{}</code> .
<code>\titlenote</code>	While the command <code>\thanks</code> generates a note without a footnote mark, sometimes the authors might need notes more tightly connected to the title, subtitle or author. The commands <code>\titlenote</code> , <code>\subtitlenote</code> and <code>\authornote</code> that follow the corresponding commands (<code>\title</code> , <code>\subtitle</code> and <code>\author</code>) generate such notes. For example, <pre> \title{This is a title} \titlenote{This is a titlenote} \author{A. U. Thor} \authornote{This is an authornote} </pre>
<code>\subtitlenote</code>	
<code>\authornote</code>	
	Please never use a <code>\footnote</code> inside an <code>\author</code> or <code>\title</code> command since this confuses the metadata extraction software. (Actually these commands now produce errors.)
<code>\authornotemark</code>	Sometimes one may need to have the same footnote connected to several authors. The command <code>\authornotemark[<number>]</code> adds just the footnote mark, for example, <pre> \author{A. U. Thor} \authornote{Both authors contributed equally to the paper} ... \author{A. N. Other} \authornotemark[1] </pre>
	The correct numbering of these marks is the responsibility of the user.
<code>\acmVolume</code>	The macros <code>\acmVolume</code> , <code>\acmNumber</code> , <code>\acmArticle</code> , <code>\acmYear</code> and <code>\acmMonth</code> are
<code>\acmNumber</code>	
<code>\acmArticle</code>	
<code>\acmYear</code>	
<code>\acmMonth</code>	

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

```
\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 exception is the `sigchi-a` mode for SIGCHI extended abstracts, which puts the badges on the left margin. 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`.

`\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.,

```

\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 .

`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}

```

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.

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

```

\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.

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

```

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

```

`\maketitle` The macro `\maketitle` must be the last command in the top-matter group. 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 Algorithms

There are now several good packages for typesetting algorithms [3, 4, 5], and the authors are free to choose their favorite one.

2.5 Figures and tables

The new ACM styles use the standard \LaTeX interface for figures and tables. There are some important items to be aware of, however.

1. The captions for figures must be entered *after* the figure bodies and for 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`.

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

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`.
 - (c) For `marginfigure`, use `\marginparwidth`.
 - (d) For `figure*` in SIGCHI extended abstracts, use `\fulltextwidth`.

It is strongly recommended to use the package `booktabs` [6] 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
sourcernote. This is a table sourcernote. This is a table
sourcernote.

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

```

sidebar
 marginfigure
 margintable

SIGCHI extended abstracts use margin space extensively. 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

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

2.6 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.

2.7 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.

2.8 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.

2.9 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.

2.10 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` `\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.nnsf.cn/youngscientists]{GS501100001809}{Young Scientists' Support Program}.

\end{acks}

2.11 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",

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

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

See the examples at <http://arxiv.org/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”.

2.12 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 [7]: 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.

2.13 Other notable packages and typographic remarks

Several other packages are recommended for specialized tasks.

The package `subcaption` [8] is recommended for complex figures with several subplots or subfigures that require separate subcaptioning. The packages `nomencl` [9] and `glossaries` [10] 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 [11], so the command `\NoCaseChange` inside the title may help to prevent extraneous uppercasing.

2.14 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.

2.15 A note for wizards: `acmart-preload-hook.tex`

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.

2.16 Currently supported publications

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

Abbreviation	Publication
CIE	ACM Computers in Entertainment
CSUR	ACM Computing Surveys
DTRAP	Digital Threats: Research and Practice
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

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

Abbreviation	Publication
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 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
TOIS	ACM Transactions on Information Systems
TOIT	ACM Transactions on Internet Technology
TOMACS	ACM Transactions on Modeling and Computer Simulation
TOMM	ACM Transactions on Multimedia Computing, Communications and Applications
TOMPECS	ACM Transactions on Modeling and Performance Evaluation of Computing Systems
TOMS	ACM Transactions on Mathematical Software
TOPC	ACM Transactions on Parallel Computing
TOPLAS	ACM Transactions on Programming Languages and Systems
TOPS	ACM Transactions on Privacy and Security
TOS	ACM Transactions on Storage
TOSEM	ACM Transactions on Software Engineering and Methodology
TOSN	ACM Transactions on Sensor Networks
TRETS	ACM Transactions on Reconfigurable Technology and Systems

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

Abbreviation	Publication
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

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 [2019/07/31 v1.62 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}
```


format The possible formats

```

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

```

\if@ACM@screen Whether we use screen mode

```

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

```

\if@ACM@urlbreakonhyphens

```

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

```

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

```

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

```

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

```

72 \define@boolkey+{acmart.cls}[@ACM@]{review}[true]{%
73   \if@ACM@review
74     \PackageInfo{\@classname}{Using review mode}%
75     \AtBeginDocument{\@ACM@printfoliostrue}%
76   \else
77     \PackageInfo{\@classname}{Not using review mode}%
78   \fi}{\PackageError{\@classname}{The option review can be either true or
79     false}}
80 \ExecuteOptionsX{review=false}

```

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

```

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

```

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

```

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

```

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

```

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

```

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

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

```

105 \define@boolkey+{acmart.cls}[@ACM@]{natbib}[true]{%
106   \if@ACM@natbib
107     \PackageInfo{\@classname}{Explicitly selecting natbib mode}%
108   \else
109     \PackageInfo{\@classname}{Explicitly deselecting natbib mode}%

```

```

110 \fi}{\PackageError{\@classname}{The option natbib can be either true or
111     false}}
112 \ExecuteOptionsX{natbib=true}

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

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

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

\ACM@fontsize The font size to pass to the base class
139 \def\ACM@fontsize{}
140 \DeclareOptionX{9pt}{\edef\ACM@fontsize{\CurrentOption}}
141 \DeclareOptionX{10pt}{\edef\ACM@fontsize{\CurrentOption}}
142 \DeclareOptionX{11pt}{\edef\ACM@fontsize{\CurrentOption}}
143 \DeclareOptionX{12pt}{\edef\ACM@fontsize{\CurrentOption}}

144 \DeclareOptionX{draft}{\PassOptionsToClass{\CurrentOption}{amsart}}
145 \DeclareOptionX{*}{\PassOptionsToClass{\CurrentOption}{amsart}}
146 \ProcessOptionsX
147 \ClassInfo{\@classname}{Using format \ACM@format, number \ACM@format@nr}

```

3.4 Setting switches

<code>\if@ACM@manuscript</code>	Whether we use manuscript mode 148 <code>\newif\if@ACM@manuscript</code>
<code>\if@ACM@journal</code>	There are two kinds of publications: journals and books 149 <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. 150 <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. 151 <code>\newif\if@ACM@sigchiamode</code>

Setting up switches

```

152 \ifnum\ACM@format@nr=5\relax % siggraph
153   \ClassWarning{\@classname}{The format siggraph is now obsolete.
154     I am switching to sigconf.}
155   \setkeys{acmart.cls}{format=sigconf}
156 \fi
157 \ifnum\ACM@format@nr=0\relax
158   \@ACM@manuscripttrue
159 \else
160   \@ACM@manuscriptfalse
161 \fi
162 \@ACM@sigchiamodefalse
163 \ifcase\ACM@format@nr
164 \relax % manuscript
165   \@ACM@journaltrue
166 \or % acmsmall
167   \@ACM@journaltrue
168 \or % acmlarge
169   \@ACM@journaltrue
170 \or % acmtog
171   \@ACM@journaltrue
172 \or % sigconf
173   \@ACM@journalfalse
174 \or % siggraph
175   \@ACM@journalfalse
176 \or % sigplan
177   \@ACM@journalfalse
178 \or % sigchi
179   \@ACM@journalfalse
180 \or % sigchi-a
181   \@ACM@journalfalse
182   \@ACM@sigchiamodetrue
183 \fi

```

```

184 \if@ACM@journal
185 \@ACM@journal@bibstriptrue
186 \else
187 \@ACM@journal@bibstripfalse
188 \fi

```

3.5 Loading the base class and package

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

```

189 \ifx\ACM@fontsize\@empty
190 \ifcase\ACM@format@nr
191 \relax % manuscript
192 \def\ACM@fontsize{9pt}%
193 \or % acmsmall
194 \def\ACM@fontsize{10pt}%
195 \or % acmlarge
196 \def\ACM@fontsize{10pt}%
197 \or % acmtog
198 \def\ACM@fontsize{9pt}%
199 \or % sigconf
200 \def\ACM@fontsize{9pt}%
201 \or % siggraph
202 \def\ACM@fontsize{9pt}%
203 \or % sigplan
204 \def\ACM@fontsize{10pt}%
205 \or % sigchi
206 \def\ACM@fontsize{10pt}%
207 \or % sigchi-a
208 \def\ACM@fontsize{10pt}%
209 \fi
210 \fi
211 \ClassInfo{\@classname}{Using fontsize \ACM@fontsize}
212 \LoadClass[\ACM@fontsize, reqno]{amsart}
213 \RequirePackage{microtype}

```

We need etoolbox for delayed code

```
214 \RequirePackage{etoolbox}
```

Booktabs is now the default

```
215 \RequirePackage{booktabs}
```

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

```
216 \RequirePackage{refcount}
217 \RequirePackage{totpages}
```

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

```
218 \RequirePackage{environ}
```

We use setspace for double spacing

```
219 \if@ACM@manuscript
220 \RequirePackage{setspace}
221 \onehalfspacing
222 \fi
```

We need textcase for better upcasing

```
223 \RequirePackage{textcase}
```

3.6 Citations

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

```
224 \if@ACM@natbib
225   \RequirePackage{natbib}
226   \renewcommand{\bibsection}{%
227     \section*{\refname}%
228     \phantomsection\addcontentsline{toc}{section}{\refname}%
229   }
230   \renewcommand{\bibfont}{\bibliofont}
231   \renewcommand{\setcitestyle}[1]{
232     \@for\@tempa:=#1\do
233     {\def\@tempb{round}\ifx\@tempa\@tempb
234       \renewcommand\NAT@open{(\}\renewcommand\NAT@close{)}\fi
235     \def\@tempb{square}\ifx\@tempa\@tempb
236       \renewcommand\NAT@open{[\}\renewcommand\NAT@close{]}\fi
237     \def\@tempb{angle}\ifx\@tempa\@tempb
238       \renewcommand\NAT@open{$<\}\renewcommand\NAT@close{$>}\fi
239     \def\@tempb{curly}\ifx\@tempa\@tempb
240       \renewcommand\NAT@open{\{\}\renewcommand\NAT@close{\}}\fi
241     \def\@tempb{semicolon}\ifx\@tempa\@tempb
242       \renewcommand\NAT@sep{;}\fi
243     \def\@tempb{colon}\ifx\@tempa\@tempb
244       \renewcommand\NAT@sep{;}\fi
245     \def\@tempb{comma}\ifx\@tempa\@tempb
246       \renewcommand\NAT@sep{,}\fi
247     \def\@tempb{authoryear}\ifx\@tempa\@tempb
248       \NAT@numbersfalse\fi
249     \def\@tempb{numbers}\ifx\@tempa\@tempb
250       \NAT@numberstrue\NAT@superfalse\fi
251     \def\@tempb{super}\ifx\@tempa\@tempb
252       \NAT@numberstrue\NAT@supertrue\fi
253     \def\@tempb{nobibstyle}\ifx\@tempa\@tempb
254       \let\bibstyle=\@gobble\fi
255     \def\@tempb{bibstyle}\ifx\@tempa\@tempb
256       \let\bibstyle=\@citestyle\fi
257     \def\@tempb{sort}\ifx\@tempa\@tempb
258       \def\NAT@sort{\@ne}\fi
259     \def\@tempb{nosort}\ifx\@tempa\@tempb
```

```

260 \def\NAT@sort{\z@}\fi
261 \def\@tempb{compress}\ifx\@tempa\@tempb
262 \def\NAT@cmprs{\@ne}\fi
263 \def\@tempb{nocompress}\ifx\@tempa\@tempb
264 \def\NAT@cmprs{\z@}\fi
265 \def\@tempb{sort&compress}\ifx\@tempa\@tempb
266 \def\NAT@sort{\@ne}\def\NAT@cmprs{\@ne}\fi
267 \def\@tempb{mcite}\ifx\@tempa\@tempb
268 \let\NAT@merge\@ne\fi
269 \def\@tempb{merge}\ifx\@tempa\@tempb
270 \ifnum{\NAT@merge<\tw@}{\let\NAT@merge\tw@}\fi
271 \def\@tempb{elide}\ifx\@tempa\@tempb
272 \ifnum{\NAT@merge<\thr@@}{\let\NAT@merge\thr@@}\fi
273 \def\@tempb{longnamesfirst}\ifx\@tempa\@tempb
274 \NAT@longnamestrue\fi
275 \def\@tempb{nonamebreak}\ifx\@tempa\@tempb
276 \def\NAT@nmfmt#1{\mbox{\NAT@up#1}}\fi
277 \expandafter\NAT@find@eq\@tempa=\relax\@nil
278 \if\@tempc\relax\else
279 \expandafter\NAT@rem@eq\@tempc
280 \def\@tempb{open}\ifx\@tempa\@tempb
281 \xdef\NAT@open{\@tempc}\fi
282 \def\@tempb{close}\ifx\@tempa\@tempb
283 \xdef\NAT@close{\@tempc}\fi
284 \def\@tempb{aysep}\ifx\@tempa\@tempb
285 \xdef\NAT@aysep{\@tempc}\fi
286 \def\@tempb{yysep}\ifx\@tempa\@tempb
287 \xdef\NAT@yrsep{\@tempc}\fi
288 \def\@tempb{notesep}\ifx\@tempa\@tempb
289 \xdef\NAT@cmt{\@tempc}\fi
290 \def\@tempb{citesep}\ifx\@tempa\@tempb
291 \xdef\NAT@sep{\@tempc}\fi
292 \fi
293 }%
294 \NAT@@setcites
295 }
296 \renewcommand\citestyle[1]{%
297 \ifcsname bibstyle@#1\endcsname%
298 \csname bibstyle@#1\endcsname\let\bibstyle\@gobble%
299 \else%
300 \@latex@error{Undefined ‘#1’ citestyle}%
301 \fi
302 }%
303 \fi

```

\bibstyle@acmauthoryear The default author-year format:

```

304 \newcommand{\bibstyle@acmauthoryear}{%
305 \setcitestyle{%
306 authoryear,%
307 open={[]},close={[]},citesep={;},%

```

```

308     aysep={},yysep={,},%
309     notesep={, }}

```

`\bibstyle@acmnumeric` The default numeric format:

```

310 \newcommand{\bibstyle@acmnumeric}{%
311   \setcitestyle{%
312     numbers,sort&compress,%
313     open={},close={},citesep={,},%
314     notesep={, }}

```

The default is numeric:

```

315 \if@ACM@natbib
316 \citestyle{acmnumeric}
317 \fi

```

`\@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:

```

318 \def\@startsection#1#2#3#4#5#6{%
319   \if@noskipsec \leavevmode \fi
320   \par
321   \@tempskipa #4\relax
322   \@afterindenttrue
323   \ifdim \@tempskipa <\z@
324     \@tempskipa -\@tempskipa \@afterindentfalse
325   \fi
326   \if@nobreak
327     \everypar{}%
328   \else
329     \addpenalty\@secpenalty\addvspace\@tempskipa
330   \fi
331   \ifstar
332     {\@ssect{#3}{#4}{#5}{#6}}%
333     {\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}
334 \def\@sect#1#2#3#4#5#6[#7]#8{%
335   \edef\@toclevel{\ifnum#2=\@m 0\else\number#2\fi}%
336   \ifnum #2>\c@secnumdepth
337     \let\@svsec\@empty
338   \else
339     \refstepcounter{#1}%
340     \protected@edef\@svsec{\@secntformat{#1}\relax}%
341   \fi
342   \@tempskipa #5\relax
343   \ifdim \@tempskipa>\z@
344     \begingroup
345       #6{%
346         \@hangfrom{\hskip #3\relax\@svsec}%
347         \interlinepenalty \@M #8\@par}%
348     \endgroup

```



```

349 \csname #1mark\endcsname{#7}%
350 \ifnum #2>\c@secnumdepth \else
351   \@tochangmeasure{\csname the#1\endcsname}%
352 \fi
353 \addcontentsline{toc}{#1}{%
354   \ifnum #2>\c@secnumdepth \else
355     \protect\numberline{\csname the#1\endcsname}%
356   \fi
357   #7}%
358 \else
359   \def\@svsechd{%
360     #6{\hskip #3\relax
361       \@svsec #8}%
362     \csname #1mark\endcsname{#7}%
363     \ifnum #2>\c@secnumdepth \else
364       \@tochangmeasure{\csname the#1\endcsname\space}%
365     \fi
366     \addcontentsline{toc}{#1}{%
367       \ifnum #2>\c@secnumdepth \else
368         \protect\numberline{\csname the#1\endcsname}%
369       \fi
370       #7}}%
371 \fi
372 \@xsect{#5}}
373 \def\@xsect#1{%
374   \@tempskipa #1\relax
375   \ifdim \@tempskipa>\z@
376     \par \nobreak
377     \vskip \@tempskipa
378     \afterheading
379   \else
380     \@nobreakfalse
381     \global\@noskipsectrue
382     \everypar{%
383       \if@noskipsec
384         \global\@noskipsecfalse
385         {\setbox\z@\lastbox}%
386         \clubpenalty\@M
387         \begingroup \@svsechd \endgroup
388         \unskip
389         \@tempskipa #1\relax
390         \hskip -\@tempskipa
391       \else
392         \clubpenalty \@clubpenalty
393       \everypar{}}%
394     \fi}%
395 \fi
396 \ignorespaces}
397 \def\@secntformat#1{\csname the#1\endcsname\quad}
398 \def\@ssect#1#2#3#4#5{%

```

```

399 \@tempskipa #3\relax
400 \ifdim \@tempskipa>\z@
401   \begingroup
402     #4{%
403       \@hangfrom{\hskip #1}%
404       \interlinepenalty \@M #5\@par}%
405   \endgroup
406 \else
407   \def\@svsechd{#4{\hskip #1\relax #5}}%
408 \fi
409 \@xsect{#3}}

```

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

```

410 \def\@starttoc#1#2{\begingroup\makeatletter
411   \setTrue{#1}%
412   \par\removelastskip\vskip\z@skip
413   \@startsection{section}\@M\z@{\linespacing\@plus\linespacing}%
414     {.5\linespacing}{\centering\contentsnamefont}{#2}%
415   \@input{\jobname.#1}%
416   \if@filesw
417     \xp\newwrite\csname tf@#1\endcsname
418     \immediate\xp\openout\csname tf@#1\endcsname \jobname.#1\relax
419   \fi
420   \global\@nobreakfalse \endgroup
421   \addvspace{32\p@\@plus14\p@}%
422 }

```

\l@section Section spacing is more generous than for amsart

```

423 \def\l@section{\@tocline{1}{0pt}{1pc}{2pc}{}}

```

\l@subsection The spacing in amsart is too large

```

424 \def\l@subsection{\@tocline{2}{0pt}{1pc}{3pc}{}}

```

\l@subsubsection The spacing in amsart is too large

```

425 \def\l@subsubsection{\@tocline{2}{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

```

426 \def\@makefnmark{\noindent\@makefnmark}

```

\@footnotetext In sigchi-a mode our footnotes are in the margin!

```

427 \if@ACM@sigchiamode
428 \long\def\@footnotetext#1{\marginpar{%
429   \reset@font\small
430   \interlinepenalty\interfootnotelinepenalty
431   \protected@edef\@currentlabel{%
432     \csname p@footnote\endcsname\@thefnmark

```

```

433 }%
434 \color@begingroup
435 \makefnmark{\rule{z}{\footnotesep\ignorespaces#1}\finalstrut\strutbox}%
436 \color@endgroup}}%
437 \fi

```

`\mpfootnotetext` We want the footnotes in minipages centered:

```

439 \long\def\mpfootnotetext#1{%
440 \global\setbox\mpfootins\vbox{%
441 \unvbox\mpfootins
442 \reset@font\footnotesize
443 \hsize\columnwidth
444 \@parboxrestore
445 \protected@edef\currentlabel
446 {\csname p\mpfootnote\endcsname\@thefnmark}%
447 \color@begingroup\centering
448 \makefnmark{\rule{z}{\footnotesep\ignorespaces#1}\finalstrut\strutbox}%
449 \color@endgroup}}

```

`\makefnmark` AMS classes use a buggy definition of `\makefnmark`. We revert to the standard one.

```

451 \def\makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}

```

And now, `hyperref`

```

452 \let\@footnotemark@nolink\@footnotemark
453 \let\@footnotetext@nolink\@footnotetext
454 \RequirePackage[bookmarksnumbered,unicode]{hyperref}
455 \pdfstringdefDisableCommands{%
456 \def\addtocounter#1#2{}%
457 \def\unskip{}%
458 \def\textbullet{- }%
459 \def\textrightarrow{-> }%
460 \def\footnotemark{}%
461 }
462 \urlstyle{rm}
463 \ifcase\ACM@format@nr
464 \relax % manuscript
465 \or % acmsmall
466 \or % acmlarge
467 \or % acmtog
468 \or % sigconf
469 \or % siggraph
470 \or % sigplan
471 \urlstyle{sf}
472 \or % sigchi
473 \or % sigchi-a
474 \urlstyle{sf}
475 \fi

```

```

476 \AtEndPreamble{%
477   \if@ACM@urlbreakonhyphens
478     \def\do@url@hyp{\do\~}%
479   \fi
480   \if@ACM@screen
481     \hypersetup{colorlinks,
482       linkcolor=ACMPurple,
483       citecolor=ACMPurple,
484       urlcolor=ACMDarkBlue,
485       filecolor=ACMDarkBlue}
486   \else
487     \hypersetup{hidelinks}
488   \fi
489   \hypersetup{pdflang={en},
490     pdfdisplaydoctitle}}

```

Bibliography mangling.

```

491 \if@ACM@natbib
492   \let\citeN\cite
493   \let\cite\citep
494   \let\citeANP\citeauthor
495   \let\citeNN\citeyearpar
496   \let\citeyearNP\citeyear
497   \let\citeNP\citealt
498   \DeclareRobustCommand\citeA
499     {\begingroup\NAT@swafalse
500       \let\NAT@ctype\@ne\NAT@partrue\NAT@fullfalse\NAT@open\NAT@citetp}%
501   \providecommand\newblock{}%
502 \else
503   \AtBeginDocument{%
504     \let\shortcite\cite%
505     \providecommand\citename[1]{#1}}
506 \fi
507 \newcommand\shortcite[2][]{%
508   \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:

```

509 \def\bibliographystyle#1{%
510   \ifx\@begindocumenthook\@undefined\else
511     \expandafter\AtBeginDocument
512   \fi
513   {\if@filesw
514     \immediate\write\@auxout{\string\bibstyle{#1}}%
515   \fi}}

```

Graphics and color.

```

516 \RequirePackage{graphicx}
517 \RequirePackage[prologue]{xcolor}

```

We define ACM colors according to [7]:

```
518 \definecolor[named]{ACMBlue}{cmyk}{1,0.1,0,0.1}
519 \definecolor[named]{ACMYellow}{cmyk}{0,0.16,1,0}
520 \definecolor[named]{ACMOrange}{cmyk}{0,0.42,1,0.01}
521 \definecolor[named]{ACMRed}{cmyk}{0,0.90,0.86,0}
522 \definecolor[named]{ACMLightBlue}{cmyk}{0.49,0.01,0,0}
523 \definecolor[named]{ACMGreen}{cmyk}{0.20,0,1,0.19}
524 \definecolor[named]{ACMPurple}{cmyk}{0.55,1,0,0.15}
525 \definecolor[named]{ACMDarkBlue}{cmyk}{1,0.58,0,0.21}
```

Author-draft mode

```
526 \if@ACM@authordraft
527   \RequirePackage{draftwatermark}
528   \SetWatermarkFontSize{0.5in}
529   \SetWatermarkColor[gray]{.9}
530   \SetWatermarkText{\parbox{12em}{\centering
531     Unpublished working draft.\}
532     Not for distribution.}}
533 \fi
```

3.7 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>.

```
534 \RequirePackage{geometry}
535 \ifcase\ACM@format@nr
536 \relax % manuscript
537   \geometry{letterpaper,head=13pt,
538     marginparwidth=6pc,heightrounded}%
539 \or % acmsmall
540   \geometry{twoside=true,
541     includeheadfoot, head=13pt, foot=2pc,
542     paperwidth=6.75in, paperheight=10in,
543     top=58pt, bottom=44pt, inner=46pt, outer=46pt,
544     marginparwidth=2pc,heightrounded
545   }%
546 \or % acmlarge
547   \geometry{twoside=true, head=13pt, foot=2pc,
548     paperwidth=8.5in, paperheight=11in,
549     includeheadfoot,
550     top=78pt, bottom=114pt, inner=81pt, outer=81pt,
551     marginparwidth=4pc,heightrounded
552   }%
553 \or % acmtog
554   \geometry{twoside=true, head=13pt, foot=2pc,
555     paperwidth=8.5in, paperheight=11in,
556     includeheadfoot, columnsep=24pt,
557     top=52pt, bottom=75pt, inner=52pt, outer=52pt,
```

```

558     marginparwidth=2pc,heightrounded
559   }%
560 \or % sigconf
561   \geometry{twoside=true, head=13pt,
562     paperwidth=8.5in, paperheight=11in,
563     includeheadfoot, columnsep=2pc,
564     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
565     marginparwidth=2pc,heightrounded
566   }%
567 \or % siggraph
568   \geometry{twoside=true, head=13pt,
569     paperwidth=8.5in, paperheight=11in,
570     includeheadfoot, columnsep=2pc,
571     top=57pt, bottom=73pt, inner=54pt, outer=54pt,
572     marginparwidth=2pc,heightrounded
573   }%
574 \or % sigplan
575   \geometry{twoside=true, head=13pt,
576     paperwidth=8.5in, paperheight=11in,
577     includeheadfoot=false, columnsep=2pc,
578     top=1in, bottom=1in, inner=0.75in, outer=0.75in,
579     marginparwidth=2pc,heightrounded
580   }%
581 \or % sigchi
582   \geometry{twoside=true, head=13pt,
583     paperwidth=8.5in, paperheight=11in,
584     includeheadfoot, columnsep=2pc,
585     top=66pt, bottom=73pt, inner=54pt, outer=54pt,
586     marginparwidth=2pc,heightrounded
587   }%
588 \or % sigchi-a
589   \geometry{twoside=false, head=13pt,
590     paperwidth=11in, paperheight=8.5in,
591     includeheadfoot, marginparsep=72pt,
592     marginparwidth=170pt, columnsep=20pt,
593     top=72pt, bottom=72pt, left=314pt, right=72pt
594   }%
595   \@mparswitchfalse
596   \reversemarginpar
597 \fi

\parindent Paragraphing
\parskip 598 \setlength\parindent{10\p@}
599 \setlength\parskip{\z@}
600 \ifcase\ACM@format@nr
601 \relax % manuscript
602 \or % acmsmall
603 \or % acmlarge
604 \or % acmtog
605   \setlength\parindent{9\p@}%

```

```

606 \or % sigconf
607 \or % siggraph
608 \or % sigplan
609 \or % sigchi
610 \or % sigchi-a
611 \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.

```

612 \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.

```

613 \def\copyrightpermissionfootnoterule{\kern-3\p@
614   \hrule \@width \columnwidth \kern 2.6\p@}

615 \RequirePackage{manyfoot}
616 \SelectFootnoteRule[2]{copyrightpermission}
617 \DeclareNewFootnote{authorsaddresses}
618 \SelectFootnoteRule[2]{copyrightpermission}
619 \DeclareNewFootnote{copyrightpermission}

```

`\footnoterule` Tschichold’s rules:

```

620 \def\footnoterule{\kern-3\p@
621   \hrule \@width 4pc \kern 2.6\p@}

```

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

```

622 \def\endminipage{%
623   \par
624   \unskip
625   \ifvoid\@mpfootins\else
626     \vskip\skip\@mpfootins
627     \normalcolor
628     \unvbox\@mpfootins
629   \fi
630   \@minipagefalse
631   \color@endgroup
632   \egroup
633   \expandafter\@iiparbox\@mpargs{\unvbox\@tempboxa}}

```

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

```
634 \def\@textbottom{\vskip \z@ \@plus 1pt}
635 \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.

```
636 \ifcase\ACM@format@nr
637 \relax % manuscript
638 \or % acmsmall
639 \or % acmlarge
640 \or % acmtog
641 \flushbottom
642 \or % sigconf
643 \flushbottom
644 \or % siggraph
645 \flushbottom
646 \or % sigplan
647 \flushbottom
648 \or % sigchi
649 \flushbottom
650 \or % sigchi-a
651 \fi
```

3.8 Fonts

Somehow PDFTeX 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.

```
652 \RequirePackage{iftex}
653 \ifPDFTeX
654 \input{glyphtounicode}
655 \pdfglyphtounicode{f_f}{FB00}
656 \pdfglyphtounicode{f_f_i}{FB03}
657 \pdfglyphtounicode{f_f_l}{FB04}
658 \pdfglyphtounicode{f_i}{FB01}
659 \pdfglyphtounicode{t_t}{0074 0074}
660 \pdfglyphtounicode{f_t}{0066 0074}
661 \pdfglyphtounicode{T_h}{0054 0068}
662 \pdfgentounicode=1
663 \fi
664 \RequirePackage{cmap}
```

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

```
665 \newif\if@ACM@newfonts
666 \@ACM@newfontstrue
667 \IfFileExists{libertine.sty}{\ClassWarning{\@classname}{You do not
668 have the libertine package installed. Please upgrade your
```



```

669 TeX}\@ACM@newfontsfalse}
670 \IfFileExists{zi4.sty}{\ClassWarning{\@classname}{You do not
671   have the zi4 package installed. Please upgrade your
672   TeX}\@ACM@newfontsfalse}
673 \IfFileExists{newtxmath.sty}{\ClassWarning{\@classname}{You do not
674   have the newtxmath package installed. Please upgrade your
675   TeX}\@ACM@newfontsfalse}

```

We use Libertine throughout.

```

676 \if@ACM@newfonts
677   \RequirePackage[T1]{fontenc}
678 \ifxetex
679   \RequirePackage[tt=false]{libertine}
680   \setmonofont{inconsolata}
681 \else
682   \RequirePackage[tt=false, type1=true]{libertine}
683 \fi
684 \RequirePackage[varqu]{zi4}
685 \RequirePackage[libertine]{newtxmath}
686 \fi

```

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

```

687 \let\liningnums\@undefined
688 \AtEndPreamble{%
689   \DeclareTextFontCommand{\liningnums}{\libertineLF}}

```

The SIGCHI extended abstracts are sans serif:

```

690 \if@ACM@sigchiamode
691   \renewcommand{\familydefault}{\sfdefault}
692 \fi

```

3.9 Image descriptions

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

```

693 \newif\if@Description@present
694 \@Description@presenttrue

```

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

```

695 \newif\if@undescrbed@images
696 \@undescrbed@imagesfalse

```

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

```

697 \newcommand\Description[2][\global\@Description@presenttrue\ignorespaces}

```

The global warning

```

698 \AtEndDocument{\if@undescrbed@images
699   \ClassWarningNoLine{\@classname}{Some images may lack descriptions}\fi}

```

Hooks for figures and tables

```

700 \AtBeginEnvironment{figure}{\@Description@presentfalse
701   \let\@vspace\@vspace@orig
702   \let\@vspacer\@vspacer@orig}
703 \AtBeginEnvironment{figure*}{\@Description@presentfalse
704   \let\@vspace\@vspace@orig
705   \let\@vspacer\@vspacer@orig}
706 \AtEndEnvironment{figure}{\if@Description@present\else
707   \global\@undescrbed@imagestrue
708   \ClassWarning{\@classname}{A possible image without description}\fi}
709 \AtEndEnvironment{figure*}{\if@Description@present\else
710   \global\@undescrbed@imagestrue
711   \ClassWarning{\@classname}{A possible image without description}\fi}
712 \AtBeginEnvironment{table}{\let\@vspace\@vspace@orig
713   \let\@vspacer\@vspacer@orig}
714 \AtBeginEnvironment{table*}{\let\@vspace\@vspace@orig
715   \let\@vspacer\@vspacer@orig}

```

3.10 Floats

We use the caption package

```

716 \RequirePackage{caption, float}
717 \captionsetup[table]{position=top}
718 \if@ACM@journal
719   \captionsetup{labelfont={sf, small},
720     textfont={sf, small}, margin=\z@}
721   \captionsetup[figure]{name={Fig.}}
722 \else
723   \captionsetup{labelfont={bf},
724     textfont={bf}, labelsep=colon, margin=\z@}
725   \ifcase\ACM@format@nr
726     \relax % manuscript
727     \or % acmsmall
728     \or % acmlarge
729     \or % acmtog
730     \or % sigconf
731     \or % siggraph
732     \captionsetup{textfont={it}}
733     \or % sigplan
734     \captionsetup{labelfont={bf},
735       textfont={normalfont}, labelsep=period, margin=\z@}
736     \or % sigchi
737     \captionsetup[figure]{labelfont={bf, small},
738       textfont={bf, small}}
739     \captionsetup[table]{labelfont={bf, small},
740       textfont={bf, small}}
741     \or % sigchi-a
742     \captionsetup[figure]{labelfont={bf, small},
743       textfont={bf, small}}

```

```

744 \captionsetup[table]{labelfont={bf, small},
745 textfont={bf, small}}
746 \fi
747 \fi

sidebar The sidebar environment:
748 \newfloat{sidebar}{}{sbar}
749 \floatname{sidebar}{Sidebar}
750 \renewenvironment{sidebar}{\Collect@Body\@sidebar}{}

\@sidebar The processing of the saved text
751 \long\def\@sidebar#1{\bgroup\let\@vspace\@vspace@orig
752 \let\@vspacer\@vspacer@orig\captionsetup{type=sidebar}%
753 \marginpar{\small#1}\egroup}

marginfigure The marginfigure environment:
754 \newenvironment{marginfigure}{\Collect@Body\@marginfigure}{}

\@marginfigure The processing of the saved text
755 \long\def\@marginfigure#1{\bgroup
756 \let\@vspace\@vspace@orig
757 \let\@vspacer\@vspacer@orig
758 \captionsetup{type=figure}%
759 \marginpar{\@Description@presentfalse\centering
760 \small#1\if@Description@present\else
761 \global\@undescrbed@imagestrue
762 \ClassWarning{\@classname}{A possible image without description}
763 \fi}%
764 \egroup}

margintable The margintable environment:
765 \newenvironment{margintable}{\Collect@Body\@margintable}{}

\@margintable The processing of the saved text
766 \long\def\@margintable#1{\bgroup\let\@vspace\@vspace@orig
767 \let\@vspacer\@vspacer@orig\captionsetup{type=table}%
768 \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
769 \newdimen\fulltextwidth
770 \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)
771 \if@ACM@sigchiamode
772 \def\@dblfloat{\bgroup\let\@vspace\@vspace@orig

```

```

773 \let\@vspacer\@vspacer@orig\columnwidth=\fulltextwidth
774 \let\@endfloatbox\@endwidefloatbox
775 \def\@fpsadddefault{\def\@fps{tp}}%
776 \@float}
777 \fi

```

\end@dblfloat And the end. Just adding a \bgroup.

```

778 \if@ACM@sigchiamode
779 \def\end@dblfloat{%
780     \end@float\egroup}
781 \fi

```

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

```

782 \def\@endwidefloatbox{%
783     \par\vskip\z@skip
784     \minipagefalse
785     \outer@nobreak
786     \egroup
787     \color@endbox
788     \global\setbox\@currbox=\vbox{\moveleft
789         \dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%
790     \wd\@currbox=\textwidth
791 }

```

3.11 Lists

```

792 \ifcase\ACM@format@nr
793 \relax % manuscript
794 \or % acmsmall
795 \or % acmlarge
796 \or % acmtog
797 \or % sigconf
798 \or % siggraph
799 \or % sigplan
800 \def\labelenumi{\theenumi.}
801 \def\labelenumii{\theenumii.}
802 \def\labelenumiii{\theenumiii.}
803 \def\labelenumiv{\theenumiv.}
804 \or % sigchi
805 \or % sigchi-a
806 \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`.

```

807 \newdimen\ACM@labelwidth

```

```

808 \AtBeginDocument{%
809   \setlength\labelsep{4pt}
810   \setlength{\@ACM@labelwidth}{6.5pt}
811
812   %% First-level list: when beginning after the first line of an
813   %% indented paragraph or ending before an indented paragraph, labels
814   %% should not hang to the left of the preceding/following text.
815   \setlength\leftmargini{\z@}
816   \addtolength\leftmargini{\parindent}
817   \addtolength\leftmargini{2\labelsep}
818   \addtolength\leftmargini{\@ACM@labelwidth}
819
820   %% Second-level and higher lists.
821   \setlength\leftmarginii{\z@}
822   \addtolength\leftmarginii{0.5\labelsep}
823   \addtolength\leftmarginii{\@ACM@labelwidth}
824   \setlength\leftmarginiii{\leftmarginii}
825   \setlength\leftmarginiv{\leftmarginiii}
826   \setlength\leftmarginv{\leftmarginiv}
827   \setlength\leftmarginvi{\leftmarginv}
828   \@listi}
829 \newskip\listisep
830 \listisep\smallskipamount
831 \def\@listI{\leftmargin\leftmargini
832   \labelwidth\leftmargini \advance\labelwidth-\labelsep
833   \listparindent\z@
834   \topsep\listisep}
835 \let\@listi\@listI
836 \def\@listii{\leftmargin\leftmarginii
837   \labelwidth\leftmarginii \advance\labelwidth-\labelsep
838   \topsep\z@skip}
839 \def\@listiii{\leftmargin\leftmarginiii
840   \labelwidth\leftmarginiii \advance\labelwidth-\labelsep}
841 \def\@listiv{\leftmargin\leftmarginiv
842   \labelwidth\leftmarginiv \advance\labelwidth-\labelsep}
843 \def\@listv{\leftmargin\leftmarginv
844   \labelwidth\leftmarginv \advance\labelwidth-\labelsep}
845 \def\@listvi{\leftmargin\leftmarginvi
846   \labelwidth\leftmarginvi \advance\labelwidth-\labelsep}
\descriptionlabel We do not use a colon by default like amsart does:
847 \renewcommand{\descriptionlabel}[1]{\upshape\bfseries #1}

\description Make the description environment indentation consistent with that of the itemize
and enumerate environments.
848 \renewenvironment{description}{\list{}}{%
849   \labelwidth\@ACM@labelwidth
850   \let\makelabel\descriptionlabel}%
851 }{
852   \endlist

```

```

853 }
854 \let\enddescription=\endlist % for efficiency

```

3.12 Top-matter data

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

```

855 \define@choicekey*+{ACM}{acmJournal}[\@journalCode\@journalCode@nr]{%
856   CIE,%
857   CSUR,%
858   DTRAP,%
859   HEALTH,%
860   IMWUT,%
861   JACM,%
862   JDIQ,%
863   JEA,%
864   JERIC,%
865   JETC,%
866   JOCCH,%
867   PACMCGIT,%
868   PACMHCI,%
869   PACMPL,%
870   POMACS,%
871   TAAS,%
872   TACCESS,%
873   TACO,%
874   TALG,%
875   TALLIP,%
876   TAP,%
877   TCPS,%
878   TDS,%
879   TEAC,%
880   TECS,%
881   TELO,%
882   THRI,%
883   TIIS,%
884   TIOT,%
885   TISSEC,%
886   TIST,%
887   TKDD,%
888   TMIS,%
889   TOCE,%
890   TOCHI,%
891   TOCL,%
892   TOCS,%
893   TOCT,%
894   TODAES,%
895   TODS,%
896   TOG,%
897   TOIS,%

```

```

898 TOIT,%
899 TOMACS,%
900 TOMM,%
901 TOMPECS,%
902 TOMS,%
903 TOPC,%
904 TOPS,%
905 TOPLAS,%
906 TOS,%
907 TOSEM,%
908 TOSN,%
909 TRETs,%
910 TSAS,%
911 TSC,%
912 TSLP,%
913 TWEB%
914 }{%
915 \ifcase\@journalCode@nr
916 \relax % CIE
917 \def\@journalName{ACM Computers in Entertainment}%
918 \def\@journalNameShort{ACM Comput. Entertain.}%
919 \def\@permissionCodeOne{1544-3574}%
920 \or % CSUR
921 \def\@journalName{ACM Computing Surveys}%
922 \def\@journalNameShort{ACM Comput. Surv.}%
923 \def\@permissionCodeOne{0360-0300}%
924 \or % DTRAP
925 \def\@journalName{Digital Threats: Research and Practice}%
926 \def\@journalNameShort{Digit. Threat. Res. Pract.}%
927 \def\@permissionCodeOne{2576-5337}%
928 \or % HEALTH
929 \def\@journalName{ACM Transactions on Computing for Healthcare}%
930 \def\@journalNameShort{ACM Trans. Comput. Healthcare}%
931 \def\@permissionCodeOne{2637-8051}%
932 \or % IMWUT
933 \def\@journalName{Proceedings of the ACM on Interactive, Mobile,
934 Wearable and Ubiquitous Technologies}%
935 \def\@journalNameShort{Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.}%
936 \def\@permissionCodeOne{2474-9567}%
937 \@ACM@screentruer
938 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
939 \or % JACM
940 \def\@journalName{Journal of the ACM}%
941 \def\@journalNameShort{J. ACM}%
942 \def\@permissionCodeOne{0004-5411}%
943 \or % JDIQ
944 \def\@journalName{ACM Journal of Data and Information Quality}%
945 \def\@journalNameShort{ACM J. Data Inform. Quality}%
946 \def\@permissionCodeOne{1936-1955}%
947 \or % JEA

```

```

948 \def\@journalName{ACM Journal of Experimental Algorithmics}%
949 \def\@journalNameShort{ACM J. Exp. Algor.}%
950 \def\@permissionCodeOne{1084-6654}%
951 \or % JERIC
952 \def\@journalName{ACM Journal of Educational Resources in Computing}%
953 \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%
954 \def\@permissionCodeOne{1073-0516}%
955 \or % JETC
956 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
957 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
958 \def\@permissionCodeOne{1550-4832}%
959 \or % JOCC
960 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%
961 \def\@journalNameShort{ACM J. Comput. Cult. Herit.}%
962 \or % PACMCGIT
963 \def\@journalName{Proceedings of the ACM on Computer Graphics and Interactive Techniques}%
964 \def\@journalNameShort{Proc. ACM Comput. Graph. Interact. Tech.}%
965 \def\@permissionCodeOne{2577-6193}%
966 \@ACM@screentru
967 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
968 \or % PACMHCI
969 \def\@journalName{Proceedings of the ACM on Human-Computer Interaction}%
970 \def\@journalNameShort{Proc. ACM Hum.-Comput. Interact.}%
971 \def\@permissionCodeOne{2573-0142}%
972 \@ACM@screentru
973 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
974 \or % PACMPL
975 \def\@journalName{Proceedings of the ACM on Programming Languages}%
976 \def\@journalNameShort{Proc. ACM Program. Lang.}%
977 \def\@permissionCodeOne{2475-1421}%
978 \@ACM@screentru
979 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
980 \or % POMACS
981 \def\@journalName{Proceedings of the ACM on Measurement and Analysis of Computing Systems}%
982 \def\@journalNameShort{Proc. ACM Meas. Anal. Comput. Syst.}%
983 \def\@permissionCodeOne{2476-1249}%
984 \@ACM@screentru
985 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
986 \or % TAAS
987 \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
988 \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
989 \def\@permissionCodeOne{1556-4665}%
990 \or % TACCESS
991 \def\@journalName{ACM Transactions on Accessible Computing}%
992 \def\@journalNameShort{ACM Trans. Access. Comput.}%
993 \def\@permissionCodeOne{1936-7228}%
994 \or % TACO
995 \def\@journalName{ACM Transactions on Architecture and Code Optimization}%
996 \def\@journalNameShort{ACM Trans. Arch. Code Optim.}%
997 \or % TALG

```



```

998 \def\@journalName{ACM Transactions on Algorithms}%
999 \def\@journalNameShort{ACM Trans. Algor.}%
1000 \def\@permissionCodeOne{1549-6325}%
1001 \or % TALLIP
1002 \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
1003 \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
1004 \def\@permissionCodeOne{2375-4699}%
1005 \or % TAP
1006 \def\@journalName{ACM Transactions on Applied Perception}%
1007 \or % TCPS
1008 \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
1009 \or % TDS
1010 \def\@journalName{ACM Transactions on Data Science}%
1011 \def\@journalNameShort{ACM Trans. Data Sci.}%
1012 \def\@permissionCodeOne{2577-3224}%
1013 \or % TEAC
1014 \def\@journalName{ACM Transactions on Economics and Computation}%
1015 \or % TECS
1016 \def\@journalName{ACM Transactions on Embedded Computing Systems}%
1017 \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%
1018 \def\@permissionCodeOne{1539-9087}%
1019 \or % TELO
1020 \def\@journalName{ACM Transactions on Evolutionary Learning}%
1021 \def\@journalNameShort{ACM Trans. Evol. Learn.}%
1022 \def\@permissionCodeOne{2688-3007}%
1023 \or % THRI
1024 \def\@journalName{ACM Transactions on Human-Robot Interaction}%
1025 \def\@journalNameShort{ACM Trans. Hum.-Robot Interact.}%
1026 \def\@permissionCodeOne{2573-9522}%
1027 \or % TIIS
1028 \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%
1029 \def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%
1030 \def\@permissionCodeOne{2160-6455}%
1031 \or % TIOT
1032 \def\@journalName{ACM Transactions on Internet of Things}%
1033 \def\@journalNameShort{ACM Trans. Internet Things}%
1034 \def\@permissionCodeOne{2577-6207}%
1035 \or % TISSEC
1036 \def\@journalName{ACM Transactions on Information and System Security}%
1037 \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%
1038 \def\@permissionCodeOne{1094-9224}%
1039 \or % TIST
1040 \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%
1041 \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%
1042 \def\@permissionCodeOne{2157-6904}%
1043 \or % TKDD
1044 \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%
1045 \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%
1046 \def\@permissionCodeOne{1556-4681}%
1047 \or % TMIS

```

```

1048 \def\@journalName{ACM Transactions on Management Information Systems}%
1049 \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%
1050 \def\@permissionCodeOne{2158-656X}%
1051 \or % TOCE
1052 \def\@journalName{ACM Transactions on Computing Education}%
1053 \def\@journalNameShort{ACM Trans. Comput. Educ.}%
1054 \def\@permissionCodeOne{1946-6226}%
1055 \or % TOCHI
1056 \def\@journalName{ACM Transactions on Computer-Human Interaction}%
1057 \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%
1058 \def\@permissionCodeOne{1073-0516}%
1059 \or % TOCL
1060 \def\@journalName{ACM Transactions on Computational Logic}%
1061 \def\@journalNameShort{ACM Trans. Comput. Logic}%
1062 \def\@permissionCodeOne{1529-3785}%
1063 \or % TOCS
1064 \def\@journalName{ACM Transactions on Computer Systems}%
1065 \def\@journalNameShort{ACM Trans. Comput. Syst.}%
1066 \def\@permissionCodeOne{0734-2071}%
1067 \or % TOCT
1068 \def\@journalName{ACM Transactions on Computation Theory}%
1069 \def\@journalNameShort{ACM Trans. Comput. Theory}%
1070 \def\@permissionCodeOne{1942-3454}%
1071 \or % TODAES
1072 \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%
1073 \def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
1074 \def\@permissionCodeOne{1084-4309}%
1075 \or % TODS
1076 \def\@journalName{ACM Transactions on Database Systems}%
1077 \def\@journalNameShort{ACM Trans. Datab. Syst.}%
1078 \def\@permissionCodeOne{0362-5915}%
1079 \or % TOG
1080 \def\@journalName{ACM Transactions on Graphics}%
1081 \def\@journalNameShort{ACM Trans. Graph.}%
1082 \def\@permissionCodeOne{0730-0301}%
1083 \or % TOIS
1084 \def\@journalName{ACM Transactions on Information Systems}%
1085 \def\@permissionCodeOne{1046-8188}%
1086 \or % TOIT
1087 \def\@journalName{ACM Transactions on Internet Technology}%
1088 \def\@journalNameShort{ACM Trans. Internet Technol.}%
1089 \def\@permissionCodeOne{1533-5399}%
1090 \or % TOMACS
1091 \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
1092 \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
1093 \or % TOMM
1094 \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
1095 \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
1096 \def\@permissionCodeOne{1551-6857}%
1097 \def\@permissionCodeTwo{0100}%

```

```

1098 \or % TOMPECS
1099 \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
1100 \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
1101 \def\@permissionCodeOne{2376-3639}%
1102 \or % TOMS
1103 \def\@journalName{ACM Transactions on Mathematical Software}%
1104 \def\@journalNameShort{ACM Trans. Math. Softw.}%
1105 \def\@permissionCodeOne{0098-3500}%
1106 \or % TOPC
1107 \def\@journalName{ACM Transactions on Parallel Computing}%
1108 \def\@journalNameShort{ACM Trans. Parallel Comput.}%
1109 \def\@permissionCodeOne{1539-9087}%
1110 \or % TOPS
1111 \def\@journalName{ACM Transactions on Privacy and Security}%
1112 \def\@journalNameShort{ACM Trans. Priv. Sec.}%
1113 \def\@permissionCodeOne{2471-2566}%
1114 \or % TOPLAS
1115 \def\@journalName{ACM Transactions on Programming Languages and Systems}%
1116 \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
1117 \def\@permissionCodeOne{0164-0925}%
1118 \or % TOS
1119 \def\@journalName{ACM Transactions on Storage}%
1120 \def\@journalNameShort{ACM Trans. Storage}%
1121 \def\@permissionCodeOne{1553-3077}%
1122 \or % TOSEM
1123 \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
1124 \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
1125 \def\@permissionCodeOne{1049-331X}%
1126 \or % TOSN
1127 \def\@journalName{ACM Transactions on Sensor Networks}%
1128 \def\@journalNameShort{ACM Trans. Sensor Netw.}%
1129 \def\@permissionCodeOne{1550-4859}%
1130 \or % TRET
1131 \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
1132 \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
1133 \def\@permissionCodeOne{1936-7406}%
1134 \or % TSAS
1135 \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%
1136 \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
1137 \def\@permissionCodeOne{2374-0353}%
1138 \or % TSC
1139 \def\@journalName{ACM Transactions on Social Computing}%
1140 \def\@journalNameShort{ACM Trans. Soc. Comput.}%
1141 \def\@permissionCodeOne{2469-7818}%
1142 \or % TSLP
1143 \def\@journalName{ACM Transactions on Speech and Language Processing}%
1144 \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
1145 \def\@permissionCodeOne{1550-4875}%
1146 \or % TWEB
1147 \def\@journalName{ACM Transactions on the Web}%

```

```

1148 \def\@journalNameShort{ACM Trans. Web}%
1149 \def\@permissionCodeOne{1559-1131}%
1150 \fi
1151 \ClassInfo{\@classname}{Using journal code \@journalCode}%
1152 }{%
1153 \ClassError{\@classname}{Incorrect journal #1}%
1154 }%

\acmJournal And the syntactic sugar around it
1155 \def\acmJournal#1{\setkeys{ACM}{acmJournal=#1}%
1156 \global\@ACM@journal@bibstriptrue}

The defaults:
1157 \def\@journalCode@nr{0}
1158 \def\@journalName{}%
1159 \def\@journalNameShort{\@journalName}%
1160 \def\@permissionCodeOne{XXXX-XXXX}%
1161 \def\@permissionCodeTwo{}%

\acmConference This is the conference command
1162 \newcommand\acmConference[4][{}%
1163 \gdef\acmConference@shortname{#1}%
1164 \gdef\acmConference@name{#2}%
1165 \gdef\acmConference@date{#3}%
1166 \gdef\acmConference@venue{#4}%
1167 \ifx\acmConference@shortname\@empty
1168 \gdef\acmConference@shortname{#2}%
1169 \fi
1170 \global\@ACM@journal@bibstripfalse
1171 }
1172 \if@ACM@journal\else
1173 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
1174 DC, USA}%
1175 \fi

\acmBooktitle The book title of the conference:
\@acmBooktitle 1176 \def\acmBooktitle#1{\gdef\@acmBooktitle{#1}}
1177 \acmBooktitle{Proceedings of \acmConference@name
1178 \ifx\acmConference@name\acmConference@shortname\else
1179 \ (\acmConference@shortname)\fi}

\@editorsAbbrev How to abbreviate editors
1180 \def\@editorsAbbrev{Ed.}}

\@acmEditors The list of editors
1181 \def\@acmEditors{}

\editor Add a new editor to the list
1182 \def\editor#1{\ifx\@acmEditors\@empty

```

```

1183     \gdef\@acmEditors{#1}%
1184     \else
1185         \gdef\@editorsAbbrev{(Eds.)}%
1186         \g@addto@macro\@acmEditors{\and#1}%
1187 \fi}

\subtitle The subtitle macro
1188 \def\subtitle#1{\def\@subtitle{#1}}
1189 \subtitle{}

\num@authorgroups The total number of “groups”. Each group is several authors with the same affiliations(s)
1190 \newcount\num@authorgroups
1191 \num@authorgroups=0\relax

\num@author The total number of authors
1192 \newcount\num@author
1193 \num@author=0\relax

\if@insideauthorgroup Whether we are continuing an author group
1194 \newif\if@insideauthorgroup
1195 \@insideauthorgroupfalse

\author Adding an author to the list of authors and addresses
1196 \renewcommand\author[2][{}%
1197     \IfSubStr{#2}{,}{\ClassWarning{\@classname}{Do not put several
1198         authors in the same \string\author\space macro!}}{}%
1199     \global\advance\num@author by 1\relax
1200     \if@insideauthorgroup\else
1201         \global\advance\num@authorgroups by 1\relax
1202         \global\@insideauthorgrouptrue
1203     \fi
1204     \ifx\addresses\@empty
1205         \if@ACM@anonymous
1206             \gdef\addresses{\@author{Anonymous Author(s)}%
1207                 \ifx\@acmSubmissionID\@empty\else\Submission Id:
1208                     \@acmSubmissionID\fi}}%
1209             \gdef\authors{Anonymous Author(s)}%
1210         \else
1211             \gdef\addresses{\@author{#2}}%
1212             \gdef\authors{#2}%
1213         \fi
1214     \else
1215         \if@ACM@anonymous\else
1216             \g@addto@macro\addresses{\and\@author{#2}}%
1217             \g@addto@macro\authors{\and#2}%
1218         \fi
1219     \fi
1220     \if@ACM@anonymous
1221         \ifx\shortauthors\@empty

```

```

1222 \gdef\shortauthors{Anon.
1223 \ifx\@acmSubmissionID\empty\else Submission Id:
1224 \@acmSubmissionID\fi}%
1225 \fi
1226 \else
1227 \def\@tempa{#1}%
1228 \ifx\@tempa\empty
1229 \ifx\shortauthors\empty
1230 \gdef\shortauthors{#2}%
1231 \else
1232 \g@addto@macro\shortauthors{\and#2}%
1233 \fi
1234 \else
1235 \ifx\shortauthors\empty
1236 \gdef\shortauthors{#1}%
1237 \else
1238 \g@addto@macro\shortauthors{\and#1}%
1239 \fi
1240 \fi
1241 \fi}

```

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

```

1242 \newcommand{\affiliation}[2][{}]{%
1243 \global\@insideauthorgroupfalse
1244 \if@ACM@anonymous\else
1245 \g@addto@macro\addresses{\affiliation{#1}{#2}}%
1246 \fi}

```

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

```

1247 \define@boolkey+{@ACM@affiliation@}{@ACM@affiliation@}{obeypunctuation}%
1248 [true]{}{\ClassError{\@classname}{The option obeypunctuation can be either true or false}}

```

`\additionalaffiliation` Additional affiliations go to footnotes

```

1249 \def\additionalaffiliation#1{\authornote{\@additionalaffiliation{#1}}}

```

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

```

1250 \def\@additionalaffiliation#1{\bgroup
1251 \def\position##1{\ignorespaces}%
1252 \def\institution##1{##1\ignorespaces}%
1253 \def\department{\@ifnextchar[{\@department}{\@department[]}}%
1254 \def\@department[##1]##2{\unskip, ##2\ignorespaces}%
1255 \let\streetaddress\position
1256 \let\city\position
1257 \let\state\position
1258 \let\postcode\position
1259 \let\country\position
1260 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.

```

1261 \renewcommand{\email}[2][{}]{%
1262   \IfSubStr{#2}{,}{\ClassWarning{\@classname}{Do not put several
1263     addresses in the same \string\email\space macro!}}{}%
1264   \if@ACM@anonymous\else
1265     \g@addto@macro\addresses{\email{#1}{#2}}%
1266   \fi}

```

`\orcid` Right now we do not typeset ORCIDs

```

1267 \def\orcid#1{\unskip\ignorespaces}

```

`\authorsaddresses` Setting up authors' addresses

```

1268 \def\authorsaddresses#1{\def\@authorsaddresses{#1}}
1269 \authorsaddresses{\mkauthorsaddresses}

```

`\@titlenotes` The title notes

```

1270 \def\@titlenotes{}

```

`\titlenote` Adding a note to the title

```

1271 \def\titlenote#1{%
1272   \g@addto@macro\@title{\footnotemark}%
1273   \if@ACM@anonymous
1274     \g@addto@macro\@titlenotes{%
1275       \stepcounter{footnote}\footnotetext{Title note}}%
1276   \else
1277     \g@addto@macro\@titlenotes{\stepcounter{footnote}\footnotetext{#1}}%
1278   \fi}

```

`\@subtitlenotes` The subtitle notes

```

1279 \def\@subtitlenotes{}

```

`\subtitlenote` Adding a note to the subtitle

```

1280 \def\subtitlenote#1{%
1281   \g@addto@macro\@subtitle{\footnotemark}%
1282   \if@ACM@anonymous
1283     \g@addto@macro\@subtitlenotes{%
1284       \stepcounter{footnote}\footnotetext{Subtitle note}}%
1285   \else
1286     \g@addto@macro\@subtitlenotes{%
1287       \stepcounter{footnote}\footnotetext{#1}}%
1288   \fi}

```

`\@authornotes` The author notes

```

1289 \def\@authornotes{}

```

`\authornote` Adding a note to the author

```

1290 \def\authornote#1{%

```

```

1291 \if@ACM@anonymous\else
1292 \g@addto@macro\addresses{\@authornotemark}%
1293 \g@addto@macro\authornotes{%
1294 \stepcounter{footnote}\footnotetext{#1}}%
1295 \fi}

\authornotemark Adding a footnote mark to the authors
1296 \newcommand\authornotemark[1][\relax]{%
1297 \ifx#1\relax\relax\relax
1298 \g@addto@macro\addresses{\@authornotemark}%
1299 \else
1300 \g@addto@macro\addresses{\@authornotemark{#1}}%
1301 \fi}

\acmVolume The current volume
1302 \def\acmVolume#1{\def\@acmVolume{#1}}
1303 \acmVolume{1}

\acmNumber The current number
1304 \def\acmNumber#1{\def\@acmNumber{#1}}
1305 \acmNumber{1}

\acmArticle The current article
1306 \def\acmArticle#1{\def\@acmArticle{#1}}
1307 \acmArticle{}

\acmArticleSeq The sequence number
1308 \def\acmArticleSeq#1{\def\@acmArticleSeq{#1}}
1309 \acmArticleSeq{\@acmArticle}

\acmYear The current year
1310 \def\acmYear#1{\def\@acmYear{#1}}
1311 \acmYear{\the\year}

\acmMonth The current month
1312 \def\acmMonth#1{\def\@acmMonth{#1}}
1313 \acmMonth{\the\month}

\@acmPubDate The publication date
1314 \def\@acmPubDate{\ifcase\@acmMonth\or
1315 January\or February\or March\or April\or May\or June\or
1316 July\or August\or September\or October\or November\or
1317 December\fi~\@acmYear}

\acmPrice The price
1318 \def\acmPrice#1{\def\@acmPrice{#1}}
1319 \acmPrice{15.00}

```


<code>\acmSubmissionID</code>	<p>The submission ID</p> <pre>1320 \def\acmSubmissionID#1{\def\@acmSubmissionID{#1}} 1321 \acmSubmissionID{}</pre>
<code>\acmISBN</code>	<p>The book ISBN</p> <pre>1322 \def\acmISBN#1{\def\@acmISBN{#1}} 1323 \acmISBN{978-x-xxxx-xxxx-x/YY/MM}</pre>
<code>\acmDOI</code>	<p>The paper DOI</p> <pre>1324 \def\acmDOI#1{\def\@acmDOI{#1}} 1325 \acmDOI{10.1145/nnnnnnn.nnnnnnn}</pre>
<code>\if@ACM@badge</code>	<p>Whether to print a badge. Note that either a left or right badge triggers it:</p> <pre>1326 \newif\if@ACM@badge 1327 \@ACM@badgefalse</pre>
<code>\@ACM@badge@width</code>	<p>The width of the badge</p> <pre>1328 \newlength\@ACM@badge@width 1329 \setlength\@ACM@badge@width{5pc}</pre>
<code>\@ACM@title@width</code>	<p>The width of the badge</p> <pre>1330 \newlength\@ACM@title@width</pre>
<code>\@ACM@badge@skip</code>	<p>The space between the badge and the title</p> <pre>1331 \newlength\@ACM@badge@skip 1332 \setlength\@ACM@badge@skip{1pc}</pre>
<code>\acmBadgeR</code>	<p>Setting the right badge</p> <pre>1333 \newcommand\acmBadgeR[2][\@ACM@badgetrue 1334 \def\@acmBadgeR@url{#1}% 1335 \def\@acmBadgeR@image{#2}} 1336 \def\@acmBadgeR@url{} 1337 \def\@acmBadgeR@image{}</pre>
<code>\acmBadgeL</code>	<p>Setting the left badge</p> <pre>1338 \newcommand\acmBadgeL[2][\@ACM@badgetrue 1339 \def\@acmBadgeL@url{#1}% 1340 \def\@acmBadgeL@image{#2}} 1341 \def\@acmBadgeL@url{} 1342 \def\@acmBadgeL@image{}</pre>
<code>\startPage</code>	<p>The start page of the paper</p> <pre>1343 \def\startPage#1{\def\@startPage{#1}} 1344 \startPage{}</pre>
<code>\terms</code>	<p>Terms are obsolete. We use CCS now.</p> <pre>1345 \def\terms#1{\ClassWarning{\@classname}{The command \string\terms{} is 1346 obsolete. I am going to ignore it}}</pre>

`\keywords` Keywords are mostly obsolete. We use CCS now. Still it makes sense to keep them for compatibility.

```

1347 \def\keywords#1{\def\@keywords{#1}}
1348 \keywords{}
```

`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

```

1349 \renewenvironment{abstract}{\Collect@Body\@saveabstract}{}
```

`\@saveabstract` And saving the abstract

```

1350 \long\def\@saveabstract#1{\long\gdef\@abstract{#1}}
1351 \@saveabstract{}
```

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

```

1352 \long\def\@empty{}
```

`\if@ACM@printccs` Whether to print CCS

```

1353 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printccs}[true]{%
1354   \if@ACM@printccs
1355     \ClassInfo{\@classname}{Printing CCS}%
1356   \else
1357     \ClassInfo{\@classname}{Suppressing CCS}%
1358   \fi}{\ClassError{\@classname}{The option printccs can be either true or false}}
```

`\if@ACM@printacmref` Whether to print the ACM bibstrip

```

1359 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printacmref}[true]{%
1360   \if@ACM@printacmref
1361     \ClassInfo{\@classname}{Printing bibformat}%
1362   \else
1363     \ClassInfo{\@classname}{Suppressing bibformat}%
1364   \fi}{\ClassError{\@classname}{The option printacmref can be either true or false}}
```

`\if@ACM@printfolios` Whether to print folios

```

1365 \define@boolkey+{@ACM@topmatter@}[@ACM@]{printfolios}[true]{%
1366   \if@ACM@printfolios
1367     \ClassInfo{\@classname}{Printing folios}%
1368   \else
1369     \ClassInfo{\@classname}{Suppressing folios}%
1370   \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.

```

1371 \define@cmdkey{@ACM@topmatter@}[@ACM@]{authorssperrow}[0]{%
1372   \IfInteger{#1}{\ClassInfo{\@classname}{Setting authorssperrow to
1373     #1}}{\ClassWarning{\@classname}{The parameter authorssperrow must be
1374     numerical. Ignoring the input #1}}\gdef\@ACM@authorssperrow{0}}
```

`\settopmatter` The usual syntactic sugar

```

1375 \def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}
```

Now the settings

```
1376 \settopmatter{printccs=true, printacmref=true}
1377 \if@ACM@manuscript
1378   \settopmatter{printfolios=true}
1379 \else
1380   \if@ACM@journal
1381     \settopmatter{printfolios=true}
1382   \else
1383     \settopmatter{printfolios=false}
1384   \fi
1385 \fi
1386 \settopmatter{authorsperrow=0}
```

\@received The container for the paper history

```
1387 \def\@received{}
```

\received The \received command

```
1388 \newcommand\received[2][\def\@tempa{#1}%
1389   \ifx\@tempa\@empty
1390     \ifx\@received\@empty
1391       \gdef\@received{Received #2}%
1392     \else
1393       \g@addto@macro{\@received}{; revised #2}%
1394     \fi
1395   \else
1396     \ifx\@received\@empty
1397       \gdef\@received{#1 #2}%
1398     \else
1399       \g@addto@macro{\@received}{; #1 #2}%
1400     \fi
1401   \fi}
1402 \AtEndDocument{%
1403   \ifx\@received\@empty\else
1404     \par\bigskip\noindent\small\normalfont\@received\par
1405   \fi}
```

3.13 Concepts system

We exclude CCSXML stuff generated by the ACM system:

```
1406 \RequirePackage{comment}
1407 \excludecomment{CCSXML}
```

\@concepts This is the storage macro and counter for concepts

```
1408 \let\@concepts\@empty
1409 \newcounter{@concepts}
```

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

```
1410 \newcommand\ccsdesc[2][100]{%
1411   \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!

```

1412 \RequirePackage{textcomp}
1413 \def\ccsdesc@parse#1~#2~#3~{%
1414   \stepcounter{@concepts}%
1415   \expandafter\ifx\csname CCS@General@#2\endcsname\relax
1416     \expandafter\gdef\csname CCS@General@#2\endcsname{\textbullet\
1417       \textbf{#2}}%
1418   \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{; }%
1419   \expandafter\gdef\csname CCS@Specific@#2\endcsname{}%
1420   \g@addto@macro{\@concepts}{\csname CCS@General@#2\endcsname
1421     \csname CCS@Punctuation@#2\endcsname
1422     \csname CCS@Specific@#2\endcsname}%
1423   \fi
1424   \ifx#3\relax\relax\else
1425     \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{
1426       \textrightarrow\ }%
1427     \expandafter\g@addto@macro\expandafter{\csname CCS@Specific@#2\endcsname}{%
1428       \addtocounter{@concepts}{-1}%
1429       \ifnum#1>499\textbf{#3}\else
1430       \ifnum#1>299\textit{#3}\else
1431       #3\fi\fi\ifnum\value{@concepts}=0.\else; \fi}%
1432   \fi
1433 \ccsdesc@parse@finish}

```

`\ccdesc@parse@finish` Gobble everything to `\ccsdesc@parse@end`

```

1434 \def\ccsdesc@parse@finish#1\ccsdesc@parse@end{}

```

3.14 Copyright system

This is from `acmcopyright.sty`

`\if@printcopyright` Whether to print a copyright symbol

```

1435 \newif\if@printcopyright
1436 \@printcopyrighttrue

```

`\if@printpermission` Whether to print the permission block

```

1437 \newif\if@printpermission
1438 \@printpermissiontrue

```

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

```

1439 \newif\if@acmowned
1440 \@acmownedtrue

```

Keys:

```

1441 \define@choicekey*{ACM@}{acmcopyrightmode}[%
1442   \acm@copyrightinput\acm@copyrightmode]{none,%
1443   acmcopyright,acmlicensed,rightsretained,%

```

```

1444     usgov,usgovmixed,cagov,cagovmixed,licensedusgovmixed,%
1445     licensedcagov,licensedcagovmixed,othergov,licensedothergov,%
1446     iw3c2w3,iw3c2w3g}{%
1447 \@printpermissiontrue
1448 \@printcopyrighttrue
1449 \@acmownedtrue
1450 \ifnum\acm@copyrightmode=0\relax % none
1451 \@printpermissionfalse
1452 \@printcopyrightfalse
1453 \@acmownedfalse
1454 \fi
1455 \ifnum\acm@copyrightmode=2\relax % acmlicensed
1456 \@acmownedfalse
1457 \fi
1458 \ifnum\acm@copyrightmode=3\relax % rightsretained
1459 \@acmownedfalse
1460 \AtBeginDocument{\acmPrice{}}%
1461 \fi
1462 \ifnum\acm@copyrightmode=4\relax % usgov
1463 \@printpermissiontrue
1464 \@printcopyrightfalse
1465 \@acmownedfalse
1466 \AtBeginDocument{\acmPrice{}}%
1467 \fi
1468 \ifnum\acm@copyrightmode=6\relax % cagov
1469 \@acmownedfalse
1470 \fi
1471 \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
1472 \@acmownedfalse
1473 \fi
1474 \ifnum\acm@copyrightmode=9\relax % licensedcagov
1475 \@acmownedfalse
1476 \fi
1477 \ifnum\acm@copyrightmode=10\relax % licensedcagovmixed
1478 \@acmownedfalse
1479 \fi
1480 \ifnum\acm@copyrightmode=11\relax % othergov
1481 \@acmownedtrue
1482 \fi
1483 \ifnum\acm@copyrightmode=12\relax % licensedothergov
1484 \@acmownedfalse
1485 \fi
1486 \ifnum\acm@copyrightmode=13\relax % iw3c2w3
1487 \@acmownedfalse
1488 \AtBeginDocument{\acmPrice{}}%
1489 \fi
1490 \ifnum\acm@copyrightmode=14\relax % iw3c2w3g
1491 \@acmownedfalse
1492 \AtBeginDocument{\acmPrice{}}%
1493 \fi}

```

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

```
1494 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}
1495 \setcopyright{acmcopyright}
```

`\@copyrightowner` Here is the owner of the copyright

```
1496 \def\@copyrightowner{%
1497   \ifcase\acm@copyrightmode\relax % none
1498   \or % acmcopyright
1499   Association for Computing Machinery.
1500   \or % acmlicensed
1501   Copyright held by the owner/author(s). Publication rights licensed to
1502   ACM\@.
1503   \or % rightsretained
1504   Copyright held by the owner/author(s).
1505   \or % usgov
1506   \or % usgovmixed
1507   Association for Computing Machinery.
1508   \or % cagov
1509   Crown in Right of Canada.
1510   \or %cagovmixed
1511   Association for Computing Machinery.
1512   \or %licensedusgovmixed
1513   Copyright held by the owner/author(s). Publication rights licensed to
1514   ACM\@.
1515   \or % licensedcagov
1516   Crown in Right of Canada. Publication rights licensed to
1517   ACM\@.
1518   \or %licensedcagovmixed
1519   Copyright held by the owner/author(s). Publication rights licensed to
1520   ACM\@.
1521   \or % othergov
1522   Association for Computing Machinery.
1523   \or % licensedothergov
1524   Copyright held by the owner/author(s). Publication rights licensed to
1525   ACM\@.
1526   \or % ic2w3www
1527   IW3C2 (International World Wide Web Conference Committee), published
1528   under Creative Commons CC-BY~4.0 License.
1529   \or % ic2w3wwwgoogle
1530   IW3C2 (International World Wide Web Conference Committee), published
1531   under Creative Commons CC-BY-NC-ND~4.0 License.
1532   \fi}
```

`\@formatdoi` Print a clickable DOI

```
1533 \def\@formatdoi#1{\url{https://doi.org/#1}}
```

`\@copyrightpermission` The canned permission block.

```
1534 \def\@copyrightpermission{%
1535   \ifcase\acm@copyrightmode\relax % none
```

1536 \or % acmcopyright
1537 Permission to make digital or hard copies of all or part of this
1538 work for personal or classroom use is granted without fee provided
1539 that copies are not made or distributed for profit or commercial
1540 advantage and that copies bear this notice and the full citation on
1541 the first page. Copyrights for components of this work owned by
1542 others than ACM must be honored. Abstracting with credit is
1543 permitted. To copy otherwise, or republish, to post on servers or to
1544 redistribute to lists, requires prior specific permission
1545 and\hspace*{.5pt}/or a fee. Request permissions from
1546 permissions@acm.org.

1547 \or % acmlicensed
1548 Permission to make digital or hard copies of all or part of this
1549 work for personal or classroom use is granted without fee provided
1550 that copies are not made or distributed for profit or commercial
1551 advantage and that copies bear this notice and the full citation on
1552 the first page. Copyrights for components of this work owned by
1553 others than the author(s) must be honored. Abstracting with credit
1554 is permitted. To copy otherwise, or republish, to post on servers
1555 or to redistribute to lists, requires prior specific permission
1556 and\hspace*{.5pt}/or a fee. Request permissions from
1557 permissions@acm.org.

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1560 for personal or classroom use is granted without fee provided that
1561 copies are not made or distributed for profit or commercial advantage
1562 and that copies bear this notice and the full citation on the first
1563 page. Copyrights for third-party components of this work must be
1564 honored. For all other uses, contact the
1565 owner\hspace*{.5pt}/author(s).

1566 \or % usgov
1567 This paper is authored by an employee(s) of the United States
1568 Government and is in the public domain. Non-exclusive copying or
1569 redistribution is allowed, provided that the article citation is
1570 given and the authors and agency are clearly identified as its
1571 source.

1572 \or % usgovmixed
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1576 publish or reproduce this article, or to allow others to do so, for
1577 government purposes only.

1578 \or % cagov
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 1591 permissions@acm.org.
 1592 \or % cagovmixed
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 1610 purposes only.
 1611 \or % licensedcagov
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 1614 copyright to this work and grants to ACM a nonexclusive,
 1615 royalty-free right to publish or reproduce this article, or to allow
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 1617 the authors and the Canadian government agency employing them.
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 1620 on the first page. Copyrights for components of this work owned by
 1621 others than the Canadian Government must be honored. To copy
 1622 otherwise, distribute, republish, or post, requires prior specific
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```

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1641 or affiliate of a national government. As such, the Government
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1643 this article, or to allow others to do so, for Government purposes
1644 only.
1645 \or % iw3c2w3
1646 This paper is published under the Creative Commons Attribution~4.0
1647 International (CC-BY~4.0) license. Authors reserve their rights to
1648 disseminate the work on their personal and corporate Web sites with
1649 the appropriate attribution.
1650 \or % iw3c2w3g
1651 This paper is published under the Creative Commons
1652 Attribution-NonCommercial-NoDerivs~4.0 International
1653 (CC-BY-NC-ND~4.0) license. Authors reserve their rights to
1654 disseminate the work on their personal and corporate Web sites with
1655 the appropriate attribution.
1656 \fi}

\copyrightyear By default, the copyright year is the same as \acmYear, but one can override this:
1657 \def\copyrightyear#1{\def\@copyrightyear{#1}}
1658 \copyrightyear{\@acmYear}

\@teaserfigures The teaser figures container
1659 \def\@teaserfigures{}

teaserfigure The teaser figure
1660 \newenvironment{teaserfigure}{\Collect@Body\@saveteaser}{}

\@saveteaser Saving the teaser
1661 \long\def\@saveteaser#1{\g@addto@macro\@teaserfigures{\@teaser{#1}}}}

\thanks We redefine amsart \thanks so the anonymous key works
1662 \renewcommand{\thanks}[1]{%
1663   \@ifnotempty{#1}{%
1664     \if@ACM@anonymous
1665       \g@addto@macro\thankses{\thanks{A note}}}%
1666   \else
1667     \g@addto@macro\thankses{\thanks{#1}}}%
1668   \fi}}

```

3.15 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>].
1669 \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.

```

1670 \def\maketitle{%
1671   \if@ACM@anonymous
1672     % Anonymize omission of \author-s
1673     \ifnum\num@authorgroups=0\author{}\fi
1674   \fi
1675   \begingroup
1676   \let\@vspace\@vspace@orig
1677   \let\@vspacer\@vspacer@orig
1678   \let\@footnotemark\@footnotemark@nolink
1679   \let\@footnotetext\@footnotetext@nolink
1680   \renewcommand\thefootnote{\@fnsymbol\c@footnote}%
1681   \hsize=\textwidth
1682   \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}%
1683   \mktitle\if@ACM@sigchiamode\else\mkauthors\fi\mkteasers
1684   \@printtopmatter
1685   \if@ACM@sigchiamode\mkauthors\fi
1686   \setcounter{footnote}{0}%
1687   \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}%
1688   \@titlenotes
1689   \@subtitlenotes
1690   \@authornotes
1691   \let\@makefnmark\relax
1692   \let\@thefnmark\relax
1693   \let\@makefntext\noindent
1694   \ifx\@empty\thankses\else
1695     \footnotetextauthorsaddresses{%
1696       \def\par{\let\par\@par}\parindent\z@\@setthanks}%
1697   \fi
1698   \ifx\@empty\@authorsaddresses\else
1699     \if@ACM@anonymous\else
1700       \if@ACM@journal@bibstrip
1701         \footnotetextauthorsaddresses{%
1702           \def\par{\let\par\@par}\parindent\z@\@setauthorsaddresses}%
1703       \fi
1704     \fi
1705   \fi
1706   \if@ACM@nonacm\else\footnotetextcopyrightpermission{%
1707     \if@ACM@authordraft
1708       \raisebox{-2ex}{\z@}{\z@}{\makebox[0pt][l]{\large\bfseries
1709         Unpublished working draft. Not for distribution.}}%
1710       \color[gray]{0.9}%
1711     \fi
1712     \parindent\z@\parskip0.1\baselineskip
1713     \if@ACM@authorversion\else

```

```

1714     \if@printpermission\@copyrightpermission\par\fi
1715 \fi
1716 \if@ACM@manuscript\else
1717     \if@ACM@journal@bibstrip\else % Print the conference information
1718         {\itshape \acmConference@shortname, \acmConference@date, \acmConference@venue}\par
1719     \fi
1720 \fi
1721 \if@printcopyright
1722     \copyright\ \@copyrightyear\ \@copyrightowner\\
1723 \else
1724     \@copyrightyear.\
1725 \fi
1726 \if@ACM@manuscript
1727     Manuscript submitted to ACM\\
1728 \else
1729     \if@ACM@authorversion
1730         This is the author's version of the work. It is posted here for
1731         your personal use. Not for redistribution. The definitive Version
1732         of Record was published in
1733         \if@ACM@journal@bibstrip
1734             \emph{\@journalName}%
1735         \else
1736             \emph{\@acmBooktitle}%
1737         \fi
1738         \ifx\@acmDOI\@empty
1739             .
1740         \else
1741             , \@formatdoi{\@acmDOI}.
1742         \fi\\
1743     \else
1744         \if@ACM@nonacm\else
1745             \if@ACM@journal@bibstrip
1746                 \@permissionCodeOne/\@acmYear/\@acmMonth-ART\@acmArticle
1747                 \ifx\@acmPrice\@empty\else\ $\@acmPrice\fi\\
1748                 \@formatdoi{\@acmDOI}%
1749             \else % Conference
1750                 \ifx\@acmISBN\@empty\else ACM~ISBN~\@acmISBN
1751                 \ifx\@acmPrice\@empty.\else\dots\$\@acmPrice\fi\\fi
1752                 \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi%
1753             \fi
1754         \fi
1755     \fi
1756 \fi}
1757 \fi
1758 \endgroup
1759 \setcounter{footnote}{0}%
1760 \mkabstract
1761 \if@ACM@printccs
1762 \ifx\@concepts\@empty\else\bgroup
1763     {\@specialsection{CCS Concepts}%

```

```

1764         \@concepts\par}\egroup
1765     \fi
1766 \fi
1767 \ifx\@keywords\@empty\else\bgroup
1768     {\if@ACM@journal
1769         \@specialsection{Additional Key Words and Phrases}%
1770     \else
1771         \@specialsection{Keywords}%
1772     \fi
1773     \@keywords}\par\egroup
1774 \fi
1775 \andify\authors
1776 \andify\shortauthors
1777 \global\let\authors=\authors
1778 \global\let\shortauthors=\shortauthors
1779 \if@ACM@printacmref
1780     \mkbibcitation
1781 \fi
1782 \hypersetup{%
1783     pdfauthor={\authors},
1784     pdftitle={\@title},
1785     pdfsubject={\@concepts},
1786     pdfkeywords={\@keywords},
1787     pdfcreator={LaTeX with acmart
1788         \csname ver@acmart.cls\endcsname\space
1789         and hyperref
1790         \csname ver@hyperref.sty\endcsname}}%
1791 \global\@topnum\z@ % this prevents floats from falling
1792             % at the top of page 1
1793 \global\@botnum\z@ % we do not want them to be on the bottom either
1794 \@printendtopmatter
1795 \@afterindentfalse
1796 \@afterheading
1797 }

```

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

```

1798 \def\@specialsection#1{%
1799     \ifcase\ACM@format@nr
1800     \relax % manuscript
1801         \par\medskip\small\noindent#1: %
1802     \or % acmsmall
1803         \par\medskip\small\noindent#1: %
1804     \or % acmlarge
1805         \par\medskip\small\noindent#1: %
1806     \or % acmtog
1807         \par\medskip\small\noindent#1: %
1808     \or % sigconf
1809         \section*{#1}%
1810     \or % siggraph
1811         \section*{#1}%

```

```

1812 \or % sigplan
1813   \paragraph*{#1}%
1814 \or % sigchi
1815   \section*{#1}%
1816 \or % sigchi-a
1817   \section*{#1}%
1818 \fi}

```

`\@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.

```

1819 \def\@printtopmatter{%
1820   \ifx\@startPage\@empty
1821     \gdef\@startPage{1}%
1822   \else
1823     \setcounter{page}{\@startPage}%
1824   \fi
1825   \thispagestyle{firstpagestyle}%
1826   \noindent
1827   \ifcase\ACM@format@nr
1828   \relax % manuscript
1829     \box\mkttitle@bx\par
1830   \or % acmsmall
1831     \box\mkttitle@bx\par
1832   \or % acmlarge
1833     \box\mkttitle@bx\par
1834   \or % acmtog
1835     \twocolumn[\box\mkttitle@bx]%
1836   \or % sigconf
1837     \twocolumn[\box\mkttitle@bx]%
1838   \or % siggraph
1839     \twocolumn[\box\mkttitle@bx]%
1840   \or % sigplan
1841     \twocolumn[\box\mkttitle@bx]%
1842   \or % sigchi
1843     \twocolumn[\box\mkttitle@bx]%
1844   \or % sigchi-a
1845     \par\box\mkttitle@bx\par\bigskip
1846     \if@ACM@badge
1847       \marginpar{\noindent
1848         \ifx\@acmBadgeL@image\@empty\else
1849           \href{\@acmBadgeL@url}{%
1850             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}%
1851           \hskip\@ACM@badge@skip
1852         \fi
1853         \ifx\@acmBadgeR@image\@empty\else
1854           \href{\@acmBadgeR@url}{%
1855             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}%
1856         \fi}%
1857     \fi

```

```

1858 \fi
1859 }

\@mktitle The title of the article
1860 \def\@mktitle{%
1861 \ifcase\ACM@format@nr
1862 \relax % manuscript
1863 \@mktitle@i
1864 \or % acmsmall
1865 \@mktitle@i
1866 \or % acmlarge
1867 \@mktitle@i
1868 \or % acmtog
1869 \@mktitle@i
1870 \or % sigconf
1871 \@mktitle@iii
1872 \or % siggraph
1873 \@mktitle@iii
1874 \or % sigplan
1875 \@mktitle@iii
1876 \or % sigchi
1877 \@mktitle@iii
1878 \or % sigchi-a
1879 \@mktitle@iv
1880 \fi
1881 }

\@titlefont The font to typeset the title
1882 \def\@titlefont{%
1883 \ifcase\ACM@format@nr
1884 \relax % manuscript
1885 \LARGE\sffamily\bfseries
1886 \or % acmsmall
1887 \LARGE\sffamily\bfseries
1888 \or % acmlarge
1889 \LARGE\sffamily\bfseries
1890 \or % acmtog
1891 \Huge\sffamily
1892 \or % sigconf
1893 \Huge\sffamily\bfseries
1894 \or % siggraph
1895 \Huge\sffamily\bfseries
1896 \or % sigplan
1897 \Huge\bfseries
1898 \or % sigchi
1899 \Huge\sffamily\bfseries
1900 \or % sigchi-a
1901 \Huge\bfseries
1902 \fi}

```

```

\@subtitlefont The font to typeset the subtitle
1903 \def\@subtitlefont{\normalsize
1904   \ifcase\ACM@format@nr
1905   \relax % manuscript
1906   \mdseries
1907   \or % acmsmall
1908   \mdseries
1909   \or % acmlarge
1910   \mdseries
1911   \or % acmtog
1912   \LARGE
1913   \or % sigconf
1914   \LARGE\mdseries
1915   \or % siggraph
1916   \LARGE\mdseries
1917   \or % sigplan
1918   \LARGE\mdseries
1919   \or % sigchi
1920   \LARGE\mdseries
1921   \or % sigchi-a
1922   \mdseries
1923   \fi}

\@mktitle@i The version of \mktitle for most journals
1924 \def\@mktitle@i{\hsize=\textwidth
1925   \@ACM@title@width=\hsize
1926   \ifx\@acmBadgeL@image\@empty\else
1927     \advance\@ACM@title@width by -\@ACM@badge@width
1928     \advance\@ACM@title@width by -\@ACM@badge@skip
1929   \fi
1930   \ifx\@acmBadgeR@image\@empty\else
1931     \advance\@ACM@title@width by -\@ACM@badge@width
1932     \advance\@ACM@title@width by -\@ACM@badge@skip
1933   \fi
1934   \setbox\mktitle@bx=\vbox{\noindent\@titlefont
1935     \ifx\@acmBadgeL@image\@empty\else
1936       \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeL@url}{%
1937         \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
1938       \hskip\@ACM@badge@skip
1939     \fi
1940     \parbox[t]{\@ACM@title@width}{\raggedright
1941       \@titlefont\noindent
1942       \@title
1943       \ifx\@subtitle\@empty\else
1944         \par\noindent{\@subtitlefont\@subtitle}
1945       \fi}%
1946     \ifx\@acmBadgeR@image\@empty\else
1947       \hskip\@ACM@badge@skip
1948       \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeR@url}{%
1949         \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%

```

```

1950 \fi
1951 \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.

```

1952 \def\@mkttitle@iii{\hsize=\textwidth
1953   \setbox\mkttitle@bx=\vbox{\@titlefont\centering
1954     \@ACM@title@width=\hsize
1955     \if@ACM@badge
1956       \advance\@ACM@title@width by -2\@ACM@badge@width
1957       \advance\@ACM@title@width by -2\@ACM@badge@skip
1958       \parbox[b]{\@ACM@badge@width}{\strut
1959         \ifx\@acmBadgeL@image\@empty\else
1960           \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeL@url}{%
1961             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
1962         \fi}%
1963       \hskip\@ACM@badge@skip
1964     \fi
1965     \parbox[t]{\@ACM@title@width}{\centering\@titlefont
1966       \@title
1967       \ifx\@subtitle\@empty\else
1968         \par\noindent{\@subtitlefont\@subtitle}
1969       \fi
1970     }%
1971     \if@ACM@badge
1972       \hskip\@ACM@badge@skip
1973       \parbox[b]{\@ACM@badge@width}{\strut
1974         \ifx\@acmBadgeR@image\@empty\else
1975           \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeR@url}{%
1976             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
1977         \fi}%
1978     \fi
1979     \par\bigskip}}%

```

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

```

1980 \def\@mkttitle@iv{\hsize=\textwidth
1981   \setbox\mkttitle@bx=\vbox{\raggedright\leftskip5pc\@titlefont
1982     \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
1983     \noindent\@title
1984     \ifx\@subtitle\@empty\else
1985       \par\noindent\@subtitlefont\@subtitle
1986     \fi
1987     \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.

```

1988 \newbox\@ACM@commabox
1989 \def\@ACM@addtoaddress#1{%
1990   \ifvmode\else
1991     \if@ACM@affiliation@obexpunctuation\else
1992       \setbox\@ACM@commabox=\hbox{, }%
1993       \unskip\cleaders\copy\@ACM@commabox\hskip\wd\@ACM@commabox
1994     \fi\fi
1995   #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 1996 \def\streetaddress#1{\unskip\ignorespaces}
\city 1997 \def\postcode#1{\unskip\ignorespaces}
\state 1998 \if@ACM@journal
\postcode 1999 \def\position#1{\unskip\ignorespaces}
\country 2000 \def\institution#1{\unskip~#1\ignorespaces}
2001 \def\city#1{\unskip\ignorespaces}
2002 \def\state#1{\unskip\ignorespaces}
2003 \newcommand\department[2][0]{\unskip\ignorespaces}
2004 \def\country#1{\if@ACM@affiliation@obexpunctuation\else, \fi#1\ignorespaces}
2005 \else
2006   \def\position#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
2007   \def\institution#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
2008   \newcommand\department[2][0]{\if@ACM@affiliation@obexpunctuation
2009     #2\else#2\par\fi}%
2010 % \def\streetaddress#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
2011 \let\city\@ACM@addtoaddress
2012 \let\state\@ACM@addtoaddress
2013 % \def\postcode#1{\if@ACM@affiliation@obexpunctuation#1\else\unskip\space#1\fi}%
2014 \let\country\@ACM@addtoaddress
2015 \fi

\@mkauthors Typesetting the authors
2016 \def\@mkauthors{\begingroup
2017   \hsize=\textwidth
2018   \ifcase\ACM@format@nr
2019     \relax % manuscript
2020     \@mkauthors@i
2021   \or % acmsmall
2022     \@mkauthors@i
2023   \or % acmlarge
2024     \@mkauthors@i
2025   \or % acmtog
2026     \@mkauthors@i

```

```

2027 \or % sigconf
2028     \@mkauthors@iii
2029 \or % siggraph
2030     \@mkauthors@iii
2031 \or % sigplan
2032     \@mkauthors@iii
2033 \or % sigchi
2034     \@mkauthors@iii
2035 \or % sigchi-a
2036     \@mkauthors@iv
2037 \fi
2038 \endgroup
2039 }

```

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

```

2040 \def\@authorfont{\Large\sffamily}

```

\@affiliationfont Font for affiliations

```

2041 \def\@affiliationfont{\normalsize\normalfont}

```

Adjusting fonts for different formats

```

2042 \ifcase\ACM@format@nr
2043 \relax % manuscript
2044 \or % acmsmall
2045     \def\@authorfont{\large\sffamily}
2046     \def\@affiliationfont{\small\normalfont}
2047 \or % acmlarge
2048 \or % acmtog
2049     \def\@authorfont{\LARGE\sffamily}
2050     \def\@affiliationfont{\large}
2051 \or % sigconf
2052     \def\@authorfont{\LARGE}
2053     \def\@affiliationfont{\large}
2054 \or % siggraph
2055     \def\@authorfont{\normalsize\normalfont}
2056     \def\@affiliationfont{\normalsize\normalfont}
2057 \or % sigplan
2058     \def\@authorfont{\Large\normalfont}
2059     \def\@affiliationfont{\normalsize\normalfont}
2060 \or % sigchi
2061     \def\@authorfont{\bfseries}
2062     \def\@affiliationfont{\mdseries}
2063 \or % sigchi-a
2064     \def\@authorfont{\bfseries}
2065     \def\@affiliationfont{\mdseries}
2066 \fi

```

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

```

2067 \def\@typeset@author@line{%
2068   \andify\@currentauthors\par\noindent
2069   \@currentauthors\def\@currentauthors{}%
2070   \ifx\@currentaffiliations\@empty\else
2071     \andify\@currentaffiliations
2072     \unskip, {\@currentaffiliations}\par
2073   \fi
2074   \def\@currentaffiliations{}}

```

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

```

2075 \def\mkauthors@i{%
2076   \def\@currentauthors{}%
2077   \def\@currentaffiliations{}%
2078   \global\let\and\@typeset@author@line
2079   \def\@author##1{%
2080     \ifx\@currentauthors\@empty
2081       \gdef\@currentauthors{\@authorfont\MakeTextUppercase{##1}}%
2082     \else
2083       \g@addto@macro{\@currentauthors}{\and\MakeTextUppercase{##1}}%
2084     \fi
2085     \gdef\and{}}%
2086   \def\email##1##2{%
2087     \def\@tempa{##2}\ifx\@tempa\@empty\else
2088       \ifx\@currentaffiliations\@empty
2089         \gdef\@currentaffiliations{%
2090           \setkeys{ACM@affiliation@}{obeypunctuation=false}%
2091           \setkeys{ACM@affiliation@}{##1}%
2092           \@affiliationfont##2}%
2093       \else
2094         \g@addto@macro{\@currentaffiliations}{\and
2095           \setkeys{ACM@affiliation@}{obeypunctuation=false}%
2096           \setkeys{ACM@affiliation@}{##1}##2}%
2097       \fi
2098     \fi
2099     \global\let\and\@typeset@author@line}%
2100   \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip
2101     \noindent\addresses\@typeset@author@line
2102     \par\medskip}%
2103   \par\medskip}%
2104 }

```

\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

```
2105 \newbox\author@bx
```

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

```
2106 \newdimen\author@bx@wd
```

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

```

2107 \newskip\author@bx@sep
2108 \author@bx@sep=1pc\relax

```

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

```

2109 \def\@typeset@author@bx{\bgroup\hsize=\author@bx@wd
2110 \def\and{\par}\normalbaselines
2111 \global\setbox\author@bx=\vtop{\if@ACM@sigchiamode\else\centering\fi
2112 \@authorfont\@currentauthors\par\@affiliationfont
2113 \@currentaffiliation}\egroup
2114 \box\author@bx\hspace{\author@bx@sep}%
2115 \gdef\@currentauthors{}}%
2116 \gdef\@currentaffiliation{}}

```

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

```

2117 \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 $(\texttt{\textbackslash textwidth} - \texttt{\textbackslash author@bx@sep})/N - \texttt{\textbackslash author@bx@sep}$, where N is the number of boxes per row.

```

2118 \author@bx@wd=\textwidth\relax
2119 \advance\author@bx@wd by -\author@bx@sep\relax
2120 \ifnum\@ACM@authorsperrow>0\relax
2121 \divide\author@bx@wd by \@ACM@authorsperrow\relax
2122 \else
2123 \ifcase\@num@authorgroups
2124 \relax % 0?
2125 \or % 1=one author per row
2126 \or % 2=two authors per row
2127 \divide\author@bx@wd by \@num@authorgroups\relax
2128 \or % 3=three authors per row
2129 \divide\author@bx@wd by \@num@authorgroups\relax
2130 \or % 4=two authors per row (!)
2131 \divide\author@bx@wd by 2\relax
2132 \else % three authors per row
2133 \divide\author@bx@wd by 3\relax
2134 \fi
2135 \fi
2136 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of `\addresses`:

```

2137 \gdef\@currentauthors{}}%
2138 \gdef\@currentaffiliation{}}%
2139 \def\@author##1{\ifx\@currentauthors\empty
2140 \gdef\@currentauthors{\par##1}%
2141 \else
2142 \g@addto@macro\@currentauthors{\par##1}%
2143 \fi
2144 \gdef\and{}}%

```

```

2145 \def\email##1##2{\ifx\@currentaffiliation\@empty
2146   \gdef\@currentaffiliation{\bgroup
2147     \mathchardef\UrlBreakPenalty=10000\nolinkurl{##2}\egroup}%
2148   \else
2149     \g@addto@macro\@currentaffiliation{\par\bgroup
2150       \mathchardef\UrlBreakPenalty=10000\nolinkurl{##2}\egroup}%
2151   \fi}%
2152 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
2153   \gdef\@currentaffiliation{%
2154     \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2155     \setkeys{@ACM@affiliation@}{##1}##2}%
2156   \else
2157     \g@addto@macro\@currentaffiliation{\par
2158       \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2159       \setkeys{@ACM@affiliation@}{##1}##2}%
2160   \fi
2161   \global\let\and\@typeset@author@bx
2162 }%

```

Actual typesetting is done by the \and macro:

```

2163 \hspace=\textwidth
2164 \global\setbox\mktitle@bx=\vbox{\noindent
2165   \box\mktitle@bx\par\medskip\leavevmode
2166   \lineskip=1pc\relax\centering\hspace*{-1em}%
2167   \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.

```

2168 \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 $(\text{columnwidth} - \text{author@bx@sep})/N - \text{author@bx@sep}$, where N is the number of boxes per row.

```

2169 \author@bx@wd=\columnwidth\relax
2170 \advance\author@bx@wd by -\author@bx@sep\relax
2171 \ifnum\@ACM@authorsperrow>0\relax
2172   \divide\author@bx@wd by \@ACM@authorsperrow\relax
2173 \else
2174   \ifcase\@num@authorgroups
2175     \relax % 0?
2176   \or % 1=one author per row
2177   \else % 2=two authors per row
2178     \divide\author@bx@wd by 2\relax
2179   \fi
2180 \fi
2181 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of \addresses:

```

2182 \gdef\@currentauthors{}%

```

```

2183 \gdef\@currentaffiliation{}%
2184 \def\@author##1{\ifx\@currentauthors\@empty
2185   \gdef\@currentauthors{\par##1}%
2186 \else
2187   \g@addto@macro\@currentauthors{\par##1}%
2188 \fi
2189 \gdef\and{}}%
2190 \def\email##1##2{\ifx\@currentaffiliation\@empty
2191   \gdef\@currentaffiliation{\nolinkurl{##2}}%
2192 \else
2193   \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
2194 \fi}%
2195 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
2196   \gdef\@currentaffiliation{%
2197     \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2198     \setkeys{@ACM@affiliation@}{##1}##2}%
2199 \else
2200   \g@addto@macro\@currentaffiliation{\par
2201     \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2202     \setkeys{@ACM@affiliation@}{##1}##2}%
2203 \fi
2204 \global\let\and\@typeset@author@bx}%
2205 %

```

Actual typesetting is done by the \and macro

```

2206 \bgroup\hsize=\columnwidth
2207 \par\raggedright\leftskip=\z@
2208 \lineskip=1pc\noindent
2209 \addresses\let\and\@typeset@author@bx\and\par\bigskip\egroup}

```

\@mkauthorsaddresses Typesetting authors' addresses in the footnote style

```

2210 \def\@mkauthorsaddresses{%
2211   \ifnum\num@authors>1\relax
2212   Authors' \else Author's \fi
2213   \ifnum\num@authorgroups>1\relax
2214   addresses: \else address: \fi
2215   \bgroup
2216   \def\streetaddress##1{\unskip\@addpunct, ##1}%
2217   \def\postcode##1{\unskip\@addpunct, ##1}%
2218   \def\position##1{\unskip\ignorespaces}%
2219   \def\institution##1{\unskip\@addpunct, ##1}%
2220   \def\city##1{\unskip\@addpunct, ##1}%
2221   \def\state##1{\unskip\@addpunct, ##1}%
2222   \renewcommand\department[2][0]{\unskip\@addpunct, ##2}%
2223   \def\country##1{\unskip\@addpunct, ##1}%
2224   \def\and{\unskip\@addpunct; }%
2225   \def\@author##1{##1}%
2226   \def\email##1##2{\unskip\@addpunct, \nolinkurl{##2}}%
2227   \addresses
2228   \egroup}

```

`\@setaddresses` This is an amsart macro that we do not need.
2229 `\def\@setaddresses{}`

`\@authornotemark` Adding a footnote mark to authors. This version adds a “normal” footnote mark.
2230 `\def\@authornotemark{\g@addto@macro\@currentauthors{\footnotemark\relax}}`

`\@@authornotemark` Adding a footnote mark to authors with a given number
2231 `\def\@@authornotemark#1{\g@addto@macro\@currentauthors{\footnotemark[#1]}}`

`\@mkteasers` Typesetting the teasers
2232 `\def\@mkteasers{%`
2233 `\ifx\@teaserfigures\@empty\else`
2234 `\def\@teaser##1{\par\bigskip\bgroup`
2235 `\captionsetup{type=figure}##1\egroup\par}`
2236 `\global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par`
2237 `\noindent\@Description@presentfalse`
2238 `\@teaserfigures\par\if@Description@present\else`
2239 `\global\@undescrbed@imagestrue`
2240 `\ClassWarning{\@classname}{A possible image without`
2241 `description}\fi`
2242 `\medskip}%`
2243 `\fi}`

`\@mkabstract` Typesetting the abstract
2244 `\def\@mkabstract{\bgroup`
2245 `\ifx\@abstract\@empty\else`
2246 `{\phantomsection\addcontentsline{toc}{section}{Abstract}%`
2247 `\if@ACM@journal`
2248 `\everypar{\setbox\z@\lastbox\everypar{}}\small`
2249 `\else`
2250 `\section*{\abstractname}%`
2251 `\fi`
2252 `\ignorespaces\@abstract\par}%`
2253 `\fi\egroup}`

`\@mkbibcitation` Print the bibcitation format
2254 `\def\@mkbibcitation{\bgroup`
2255 `\let\@vspace\@vspace@orig`
2256 `\let\@vspacer\@vspacer@orig`
2257 `\def\@pages@word{\ifnum\getrefnumber{TotPages}=1\relax page\else pages\fi}%`
2258 `\def\footnotemark{}%`
2259 `\def\@unskip{\ignorespaces}%`
2260 `\def\footnote{\ClassError{\@classname}{Please do not use footnotes`
2261 `inside a \string\title{} or \string\author{} command! Use`
2262 `\string\titlenote{} or \string\authornote{} instead!}}%`
2263 `\def\@article@string{\ifx\@acmArticle\@empty{\ } \else,`
2264 `Article~\@acmArticle\ } \fi}%`
2265 `\par\medskip\small\noindent{\bfseries ACM Reference Format:}\par\nobreak`
2266 `\noindent\bgroup`

```

2267 \def\{\unskip{, \ignorespaces}\authors\egroup. \@acmYear. \@title
2268 \ifx\@subtitle\@empty. \else: \@subtitle. \fi
2269 \if@ACM@nonacm\else
2270 % The 'nonacm' option disables 'printacmref' by default,
2271 % and the present \mkbibcitation definition is never used
2272 % in this case. The conditional remains useful if the user
2273 % explicitly sets \settopmatter{printacmref=true}.
2274 \if@ACM@journal@bibstrip
2275 \textit{\@journalNameShort}
2276 \@acmVolume, \@acmNumber \@article@string (\@acmPubDate),
2277 \ref{TotPages}~\@pages@word.
2278 \else
2279 In \textit{\@acmBooktitle}%
2280 \ifx\@acmEditors\@empty\textit{.}\else
2281 \andify\@acmEditors\textit{, }\@acmEditors~\@editorsAbbrev.%
2282 \fi\
2283 ACM, New York, NY, USA%
2284 \@article@string\unskip, \ref{TotPages}~\@pages@word.
2285 \fi
2286 \fi
2287 \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi
2288 \par\egroup}

```

\@printendtopmatter End the top matter

```

2289 \def\@printendtopmatter{\bgroup
2290 \let\@vspace\@vspace@orig
2291 \let\@vspacer\@vspacer@orig
2292 \par\bigskip
2293 \egroup}

```

\@setthanks We redefine \@setthanks using \@long

```

2294 \def\@setthanks{\@long\def\thanks##1{\par##1\@addpunct.}\thankses}

```

\@setauthorsaddresses

```

2295 \def\@setauthorsaddresses{\@authorsaddresses\unskip\@addpunct.}

```

3.16 Headers and Footers

We use fancyhdr for our headers and footers:

```

2296 \RequirePackage{fancyhdr}

```

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

```

2297 \let\ACM@ps@plain\ps@plain
2298 \let\ACM@ps@myheadings\ps@myheadings
2299 \let\ACM@ps@headings\ps@headings
2300 \def\ACM@restore@pagestyle{%
2301 \let\ps@plain\ACM@ps@plain
2302 \let\ps@myheadings\ACM@ps@myheadings
2303 \let\ps@headings\ACM@ps@headings}
2304 \AtBeginDocument{\ACM@restore@pagestyle}

```


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

```
2305 \if@ACM@review
2306   \newsavebox{\ACM@linecount@bx}
2307   \newlength\ACM@linecount@bxht
2308   \newcount\ACM@linecount
2309   \ACM@linecount\@ne\relax
2310   \def\ACM@mk@linecount{%
2311     \savebox{\ACM@linecount@bx}[4em][t]{\parbox[t]{4em}{%
2312       \setlength{\ACM@linecount@bxht}{0pt}%
2313       \loop{\color{red}\scriptsize\the\ACM@linecount}\
2314       \global\advance\ACM@linecount by \@ne
2315       \addtolength{\ACM@linecount@bxht}{\baselineskip}%
2316       \ifdim\ACM@linecount@bxht<\textheight\repeat
2317       {\color{red}\scriptsize\the\ACM@linecount}\hfill
2318       \global\advance\ACM@linecount by \@ne}}
2319   \fi
```

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

```
2320 \def\ACM@linecountL{%
2321   \if@ACM@review
2322     \ACM@mk@linecount
2323     \begin{picture}(0,0)%
2324       \put(-26,-22){\usebox{\ACM@linecount@bx}}%
2325     \end{picture}%
2326   \fi}
```

\ACM@linecountR How to display the box on the right

```
2327 \def\ACM@linecountR{%
2328   \if@ACM@review
2329     \ACM@mk@linecount
2330     \begin{picture}(0,0)%
2331       \put(20,-22){\usebox{\ACM@linecount@bx}}%
2332     \end{picture}%
2333   \fi}
```

\ACM@timestamp The timestamp system

```
2334 \if@ACM@timestamp
2335   % Subtracting 30 from \time gives us the effect of rounding down despite
2336   % \numexpr rounding to nearest
2337   \newcounter{ACM@time@hours}
2338   \setcounter{ACM@time@hours}{\numexpr (\time - 30) / 60 \relax}
2339   \newcounter{ACM@time@minutes}
2340   \setcounter{ACM@time@minutes}{\numexpr \time - \theACM@time@hours * 60 \relax}
2341   \newcommand\ACM@timestamp{%
2342     \footnotesize%
2343     \ifx\@acmSubmissionID\empty\relax\else
2344       Submission ID: \@acmSubmissionID.{ }%
2345     \fi
2346     \the\year-\two@digits{\the\month}-\two@digits{\the\day}{ }%
```

```

2347 \two@digits{\theACM@time@hours}:\two@digits{\theACM@time@minutes}{. }%
2348 Page \thepage\ of \@startPage--\pageref*{TotPages}.%
2349 }
2350 \fi

```

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

```

2351 \def\@shortauthors{%
2352 \if@ACM@anonymous
2353 Anon.
2354 \ifx\@acmSubmissionID\@empty\else Submission Id: \@acmSubmissionID\fi
2355 \else\@shortauthors\fi}

```

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

```

2356 \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

```

2357 \AtBeginDocument{%
2358 \fancypagestyle{standardpagestyle}{%
2359 \fancyhf{}%
2360 \renewcommand{\headrulewidth}{\z@}%
2361 \renewcommand{\footrulewidth}{\z@}%
2362 \def\@acmArticlePage{%
2363 \ifx\@acmArticle\empty%
2364 \if@ACM@printfolios\thepage\fi%
2365 \else%
2366 \@acmArticle\if@ACM@printfolios:\thepage\fi%
2367 \fi%
2368 }%
2369 \if@ACM@journal@bibstrip
2370 \ifcase\ACM@format@nr
2371 \relax % manuscript
2372 \fancyhead[LE]{\ACM@linecountL\if@ACM@printfolios\thepage\fi}%
2373 \fancyhead[RO]{\if@ACM@printfolios\thepage\fi}%
2374 \fancyhead[RE]{\@shortauthors}%
2375 \fancyhead[LO]{\ACM@linecountL\shorttitle}%
2376 \if@ACM@nonacm\else%
2377 \fancyfoot[RO,LE]{\footnotesize Manuscript submitted to ACM}
2378 \fi%
2379 \or % acmsmall
2380 \fancyhead[LE]{\ACM@linecountL\@headfootfont\@acmArticlePage}%
2381 \fancyhead[RO]{\@headfootfont\@acmArticlePage}%
2382 \fancyhead[RE]{\@headfootfont\@shortauthors}%
2383 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2384 \if@ACM@nonacm\else%
2385 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2386 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2387 \fi
2388 \or % acmlarge

```

```

2389 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2390 \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
2391 \fancyhead[LO]{\ACM@linecountL}%
2392 \fancyhead[RO]{\@headfootfont
2393 \shorttitle\quad\textbullet\quad\@acmArticlePage}%
2394 \if@ACM@nonacm\else%
2395 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2396 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2397 \fi
2398 \or % acmtog
2399 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2400 \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
2401 \fancyhead[LO]{\ACM@linecountL}%
2402 \fancyhead[RE]{\ACM@linecountR}%
2403 \fancyhead[RO]{\@headfootfont
2404 \shorttitle\quad\textbullet\quad\@acmArticlePage\ACM@linecountR}%
2405 \if@ACM@nonacm\else%
2406 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2407 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2408 \fi
2409 \else % Proceedings
2410 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2411 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2412 \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2413 \if@ACM@nonacm\else%
2414 \fancyhead[LE]{\ACM@linecountL\@headfootfont\footnotesize
2415 \acmConference@shortname,
2416 \acmConference@date, \acmConference@venue}%
2417 \fancyhead[RO]{\@headfootfont
2418 \acmConference@shortname,
2419 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2420 \fi
2421 \fi
2422 \else % Proceedings
2423 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2424 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2425 \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2426 \if@ACM@nonacm\else%
2427 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2428 \acmConference@shortname,
2429 \acmConference@date, \acmConference@venue}%
2430 \fancyhead[RO]{\@headfootfont
2431 \acmConference@shortname,
2432 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2433 \fi
2434 \fi
2435 \if@ACM@sigchiamode
2436 \fancyheadoffset[L]{\dimexpr(\marginparsep+\marginparwidth)}%
2437 \fi
2438 \if@ACM@timestamp

```

```

2439     \fancyfoot[LO,RE]{\ACM@timestamp}
2440     \fi
2441 }%
2442 \pagestyle{standardpagestyle}
2443 }

\@folio@wd Folio blob width, height, offsets and max number
\@folio@ht
\@folio@voffset
\@folio@max
2444 \newdimen\@folio@wd
2445 \@folio@wd=\z@
2446 \newdimen\@folio@ht
2447 \@folio@ht=\z@
2448 \newdimen\@folio@voffset
2449 \@folio@voffset=\z@
2450 \def\@folio@max{1}
2451 \ifcase\ACM@format@nr
2452 \relax % manuscript
2453 \or % acmsmall
2454     \@folio@wd=45.75pt\relax
2455     \@folio@ht=1.25in\relax
2456     \@folio@voffset=.2in\relax
2457     \def\@folio@max{8}
2458 \or % acmlarge
2459     \@folio@wd=43.25pt\relax
2460     \@folio@ht=79pt\relax
2461     \@folio@voffset=.55in\relax
2462     \def\@folio@max{10}
2463 \fi

\@folioblob The macro to typeset the folio blob.
2464 \def\@folioblob{\@tempcnta=0\@acmArticleSeq\relax
2465     \ifnum\@tempcnta=0\relax\else
First, we calculate \@acmArticleSeq modulo \@folio@max
2466     \loop
2467         \ifnum\@tempcnta>\@folio@max\relax
2468             \advance\@tempcnta by - \@folio@max
2469     \repeat
2470     \advance\@tempcnta by -1\relax
2471     \@tempdima=\@folio@ht\relax
2472     \multiply\@tempdima by \the\@tempcnta\relax
2473     \advance\@tempdima by -\@folio@voffset\relax
2474     \begin{picture}(0,0)
2475     \makebox[\z@]{\raisebox{-\@tempdima}{%
2476         \rlap{%
2477             \raisebox{-0.45\@folio@ht}{\z@}\z@}{%
2478                 \rule{\@folio@wd}{\@folio@ht}}}%
2479         \parbox{\@folio@wd}{%
2480             \centering
2481             \textcolor{white}{\LARGE\sffamily\bfseries\@acmArticle}}}}
2482     \end{picture}\fi}

```

2483

firstpagestyle The page style for the first page only.

```
2484 \AtBeginDocument{%
2485 \fancypagestyle{firstpagestyle}{%
2486   \fancyhf{}%
2487   \renewcommand{\headrulewidth}{\z@}%
2488   \renewcommand{\footrulewidth}{\z@}%
2489   \if@ACM@journal@bibstrip
2490     \ifcase\ACM@format@nr
2491       \relax % manuscript
2492       \fancyhead[L]{\ACM@linecountL}%
2493       \fancyfoot[RO,LE]{\if@ACM@printfolios\small\thepage\fi}%
2494       \if@ACM@nonacm\else%
2495         \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
2496       \fi%
2497     \or % acmsmall
2498       \if@ACM@nonacm\else%
2499         \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2500           \@acmNumber, Article \@acmArticle. Publication date:
2501             \@acmPubDate.}%
2502       \fi%
2503       \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2504       \fancyhead[LO]{\ACM@linecountL}%
2505       \fancyhead[RO]{\@folioblob}%
2506       \fancyheadoffset[RO,LE]{0.6\@folio@wd}%
2507     \or % acmlarge
2508       \if@ACM@nonacm\else%
2509         \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2510           \@acmNumber, Article \@acmArticle. Publication date:
2511             \@acmPubDate.}%
2512       \fi%
2513       \fancyhead[RO]{\@folioblob}%
2514       \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2515       \fancyhead[LO]{\ACM@linecountL}%
2516       \fancyheadoffset[RO,LE]{1.4\@folio@wd}%
2517     \or % acmtog
2518       \if@ACM@nonacm\else%
2519         \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2520           \@acmNumber, Article \@acmArticle. Publication date:
2521             \@acmPubDate.}%
2522       \fi%
2523       \fancyhead[L]{\ACM@linecountL}%
2524       \fancyhead[R]{\ACM@linecountR}%
2525     \else % Conference proceedings
2526       \fancyhead[L]{\ACM@linecountL}%
2527       \fancyhead[R]{\ACM@linecountR}%
2528       \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2529     \fi
2530   \else
```

```

2531 \fancyhead[L]{\ACM@linecountL}%
2532 \fancyhead[R]{\ACM@linecountR}%
2533 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2534 \fi
2535 \if@ACM@timestamp
2536 \ifnum\ACM@format@nr=0\relax % Manuscript
2537 \fancyfoot[LO,RE]{\ACM@timestamp\quad
2538 \if@ACM@nonacm\else
2539 \footnotesize Manuscript submitted to ACM
2540 \fi}
2541 \else
2542 \fancyfoot[LO,RE]{\ACM@timestamp}
2543 \fi
2544 \fi
2545 }}

```

3.17 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.

```

2546 \def\ACM@NRadjust#1{%
2547 \begingroup
2548 \expandafter\ifx\csname Sectionformat\endcsname\relax
2549 % do nothing when \Sectionformat is unknown
2550 \def\next{\endgroup #1}%
2551 \else
2552 \def\next{\endgroup
2553 \let\realSectionformat\Sectionformat
2554 \def\ACM@sect@format@{#1}%
2555 \let\Sectionformat\ACM@NR@adjustedSectionformat

```

```

2556 %% next lines added 2018-06-17 to ensure section number is styled
2557 \let\real@adddotafter\@adddotafter
2558 \let\@adddotafter\ACM@adddotafter
2559 #1}% imposes the styles, but nullifies \MakeUppercase
2560 \let\@adddotafter\real@adddotafter
2561 }%
2562 \fi \next
2563 }

```

\ACM@NR@adjustedSectionformat

```

2564 \def\ACM@NR@adjustedSectionformat#1#2{%
2565 \realSectionformat{\ACM@sect@format{#1}}{#2}%
2566 \let\Sectionformat\realSectionformat}
2567 \DeclareRobustCommand{\ACM@sect@format}{\ACM@sect@format@}
2568 \def\ACM@sect@format@null#1{#1}
2569 \let\ACM@sect@format@null\ACM@sect@format@null
2570 \AtBeginDocument{%
2571 \expandafter\ifx\csname LTX@adddotafter\endcsname\relax
2572 \let\LTX@adddotafter\@adddotafter
2573 \fi
2574 }

```

\ACM@adddotafter

```

2575 \def\ACM@adddotafter#1{\ifx\relax#1\relax\else\LTX@adddotafter{#1}\fi}

```

Sectioning is different for different levels

```

2576 \renewcommand\section{\@startsection{section}{1}{\z@}%
2577 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2578 {.25\baselineskip}%
2579 {\ACM@NRadjust\@secfont}}
2580 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
2581 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2582 {.25\baselineskip}%
2583 {\ACM@NRadjust\@subsecfont}}
2584 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
2585 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2586 {-3.5\p@}%
2587 {\ACM@NRadjust{\@subsubsecfont\@adddotafter}}}}
2588 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
2589 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2590 {-3.5\p@}%
2591 {\ACM@NRadjust{\@parfont\@adddotafter}}}}
2592 \renewcommand\part{\@startsection{part}{9}{\z@}%
2593 {-10\p@ \@plus -4\p@ \@minus -2\p@}%
2594 {4\p@}%
2595 {\ACM@NRadjust{\@parfont}}}

```

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

```

2596 \def\section@raggedright{\@rightskip\@flushglue

```

```

2597 \rightskip\@rightskip
2598 \leftskip\z@skip
2599 \parindent\z@}

\@secfont Fonts for sections etc. are different for different formats.
\@subsecfont 2600 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
\@subsubsecfont 2601 \def\@subsubsecfont{\sffamily\bfseries\section@raggedright}
\@parfont 2602 \def\@subsubsecfont{\sffamily\itshape}
2603 \def\@parfont{\itshape}
2604 \setcounter{secnumdepth}{3}
2605 \ifcase\ACM@format@nr
2606 \relax % manuscript
2607 \or % acmsmall
2608 \or % acmlarge
2609 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2610 \def\@subsecfont{\sffamily\large\section@raggedright}
2611 \or % acmtog
2612 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2613 \def\@subsecfont{\sffamily\large\section@raggedright}
2614 \or % sigconf
2615 \def\@secfont{\bfseries\Large\section@raggedright\MakeTextUppercase}
2616 \def\@subsecfont{\bfseries\Large\section@raggedright}
2617 \or % siggraph
2618 \def\@secfont{\sffamily\bfseries\Large\section@raggedright\MakeTextUppercase}
2619 \def\@subsecfont{\sffamily\bfseries\Large\section@raggedright}
2620 \or % sigplan
2621 \def\@secfont{\bfseries\Large\section@raggedright}
2622 \def\@subsecfont{\bfseries\section@raggedright}
2623 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
2624 {-0.75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2625 {0.25\baselineskip}%
2626 {\@subsubsecfont}}
2627 \def\@subsubsecfont{\bfseries\section@raggedright}
2628 \renewcommand\paragraph{\@startsection{paragraph}{4}{\z@}%
2629 {-0.5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2630 {-3.5\p@}%
2631 {\@parfont\@addspaceafter}}
2632 \def\@parfont{\bfseries\itshape}
2633 \renewcommand\subparagraph{\@startsection{subparagraph}{5}{\z@}%
2634 {-0.5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2635 {-3.5\p@}%
2636 {\@subparfont\@addspaceafter}}
2637 \def\@subparfont{\itshape}
2638 \or % sigchi
2639 \setcounter{secnumdepth}{1}
2640 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2641 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2642 \or % sigchi-a
2643 \setcounter{secnumdepth}{0}
2644 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}

```



```

2645 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2646 \fi

```

`\@adddotafter` Add punctuation after a sectioning command

```

2647 \def\@adddotafter#1{#1\@addpunct{.}}

```

`\@addspaceafter` Add space after a sectioning command

```

2648 \def\@addspaceafter#1{#1\@addpunct{\enspace}}

```

3.18 TOC lists

`\@dotsep` Related to the `\tableofcontents` are all the horizontal fillers. Base \TeX 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.

```

2649 \providecommand*\@dotsep{4.5}

```

3.19 Theorems

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

```

2650 \def\@acmplainbodyfont{\itshape}

```

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

```

2651 \def\@acmplainindent{\parindent}

```

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

```

2652 \def\@acmplainheadfont{\scshape}

```

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

```

2653 \def\@acmplainnotefont{\@empty}

```

Customization of the `acmplain` theorem style:

```

2654 \ifcase\ACM@format@nr
2655 \relax % manuscript
2656 \or % acmsmall
2657 \or % acmlarge
2658 \or % acmtog
2659 \or % sigconf
2660 \or % siggraph
2661 \or % sigplan
2662 \def\@acmplainbodyfont{\itshape}
2663 \def\@acmplainindent{\z@}
2664 \def\@acmplainheadfont{\bfseries}
2665 \def\@acmplainnotefont{\normalfont}
2666 \or % sigchi
2667 \or % sigchi-a
2668 \fi

```

acmplain The acmplain theorem style

```

2669 \newtheoremstyle{acmplain}%
2670   {.5\baselineskip\@plus.2\baselineskip
2671     \@minus.2\baselineskip}% space above
2672   {.5\baselineskip\@plus.2\baselineskip
2673     \@minus.2\baselineskip}% space below
2674   {\acmplainbodyfont}% body font
2675   {\acmplainindent}% indent amount
2676   {\acmplainheadfont}% head font
2677   {.}% punctuation after head
2678   {.5em}% spacing after head
2679   {\thmname{#1}\thmnumber{ #2}\thmnote{ {\acmplainnotefont{#3}}}}% head spec

```

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

```

2680 \def\acmdefinitionbodyfont{\normalfont}

```

\acmdefinitionindent The amount to indent the acmdefinition theorem style.

```

2681 \def\acmdefinitionindent{\parindent}

```

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

```

2682 \def\acmdefinitionheadfont{\itshape}

```

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

```

2683 \def\acmdefinitionnotefont{\empty}

```

Customization of the acmdefinition theorem style:

```

2684 \ifcase\ACM@format@nr
2685 \relax % manuscript
2686 \or % acmsmall
2687 \or % acmlarge
2688 \or % acmtog
2689 \or % sigconf
2690 \or % siggraph
2691 \or % sigplan
2692   \def\acmdefinitionbodyfont{\normalfont}
2693   \def\acmdefinitionindent{\z@}
2694   \def\acmdefinitionheadfont{\bfseries}
2695   \def\acmdefinitionnotefont{\normalfont}
2696 \or % sigchi
2697 \or % sigchi-a
2698 \fi

```

acmdefinition The acmdefinition theorem style

```

2699 \newtheoremstyle{acmdefinition}%
2700   {.5\baselineskip\@plus.2\baselineskip
2701     \@minus.2\baselineskip}% space above
2702   {.5\baselineskip\@plus.2\baselineskip
2703     \@minus.2\baselineskip}% space below
2704   {\acmdefinitionbodyfont}% body font

```

```

2705 {\acmdefinitionindent}% indent amount
2706 {\acmdefinitionheadfont}% head font
2707 {.}% punctuation after head
2708 {.5em}% spacing after head
2709 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\acmdefinitionnotefont{#3}}}}% head spec

```

Make acmplain the default theorem style.

```

2710 \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.

```

2711 \AtEndPreamble{%
2712   \if@ACM@acmthm
2713     \theoremstyle{acmplain}
2714     \@ifundefined{theorem}{%
2715       \newtheorem{theorem}{Theorem}[section]
2716     }{}
2717     \@ifundefined{conjecture}{%
2718       \newtheorem{conjecture}[theorem]{Conjecture}
2719     }{}
2720     \@ifundefined{proposition}{%
2721       \newtheorem{proposition}[theorem]{Proposition}
2722     }{}
2723     \@ifundefined{lemma}{%
2724       \newtheorem{lemma}[theorem]{Lemma}
2725     }{}
2726     \@ifundefined{corollary}{%
2727       \newtheorem{corollary}[theorem]{Corollary}
2728     }{}
2729     \theoremstyle{acmdefinition}
2730     \@ifundefined{example}{%
2731       \newtheorem{example}[theorem]{Example}
2732     }{}
2733     \@ifundefined{definition}{%
2734       \newtheorem{definition}[theorem]{Definition}
2735     }{}
2736   \fi
2737   \theoremstyle{acmplain}
2738 }

```

`\@proofnamefont` The font to typeset the proof name.

```

2739 \def\@proofnamefont{\scshape}

```

\@proofindent Whether or not to indent proofs.

```
2740 \def\@proofindent{\indent}
```

Customization of the proof environment.

```
2741 \ifcase\ACM@format@nr
2742 \relax % manuscript
2743 \or % acmsmall
2744 \or % acmlarge
2745 \or % acmtog
2746 \or % sigconf
2747 \or % siggraph
2748 \or % sigplan
2749 \def\@proofnamefont{\itshape}
2750 \def\@proofindent{\noindent}
2751 \or % sigchi
2752 \or % sigchi-a
2753 \fi
```

proof We want some customization of the proof environment.

```
2754 \renewenvironment{proof}[1][\proofname]{\par
2755   \pushQED{\qed}%
2756   \normalfont \topsep6\p@\@plus6\p@\relax
2757   \trivlist
2758   \item[\@proofindent\hskip\labelsep
2759     {\@proofnamefont #1\@addpunct{.}}]\ignorespaces
2760 }{\%
2761   \popQED\endtrivlist\@endpfalse
2762 }
```

3.20 Balancing columns

We need balancing only if the user did not disable it, and we use a two column format

```
2763 \AtEndPreamble{%
2764   \if@ACM@balance
2765     \ifcase\ACM@format@nr
2766     \relax % manuscript
2767       \global\@ACM@balancefalse
2768     \or % acmsmall
2769       \global\@ACM@balancefalse
2770     \or % acmlarge
2771       \global\@ACM@balancefalse
2772     \or % acmtog
2773       \RequirePackage{balance}%
2774     \or % sigconf
2775       \RequirePackage{balance}%
2776     \or % siggraph
2777       \RequirePackage{balance}%
2778     \or % sigplan
2779       \RequirePackage{balance}%

```

```

2780      \or % sigchi
2781          \RequirePackage{balance}%
2782      \or % sigchi-a
2783          \global\@ACM@balancefalse
2784      \fi
2785  \fi
2786 }
2787 \AtEndDocument{%
2788     \if@ACM@balance
2789     \if@twocolumn
2790     \balance
2791     \fi\fi}

```

3.21 Acknowledgments

\acksname

```

2792 \newcommand\acksname{Acknowledgments}

```

\acks This is a comment-like structure

```

2793 \specialcomment{acks}{%
2794     \begin{group}
2795     \section*{\acksname}
2796     \phantomsection\addcontentsline{toc}{section}{\acksname}
2797 }{%
2798     \end{group}
2799 }

```

\grantsponsor We just typeset the name of the sponsor

```

2800 \def\grantsponsor#1#2#3{#2}

```

\grantnum

```

2801 \newcommand\grantnum[3][{}]{#3%
2802     \def\@tempa{#1}\ifx\@tempa\@empty\else\space(\url{#1})\fi}

```

3.22 Conditional typesetting

We use the comment package for conditional typesetting:

```

2803 \AtEndPreamble{%
2804     \if@ACM@screen
2805         \includecomment{screenonly}
2806         \excludecomment{printonly}
2807     \else
2808         \excludecomment{screenonly}
2809         \includecomment{printonly}
2810     \fi
2811     \if@ACM@anonymous
2812         \excludecomment{anonsuppress}
2813         \excludecomment{acks}

```

```

2814 \else
2815   \includecomment{anonsuppress}
2816 \fi}

```

3.23 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’ (see <http://arxiv.org/hypertext/bibstyles/>).

```

2817 \newcommand\showeprint[2][arxiv]{%
2818   \def\@tempa{#1}%
2819   \ifx\@tempa\@empty\def\@tempa{arxiv}\fi
2820   \def\@tempb{arxiv}%
2821   \ifx\@tempa\@tempb
2822     arXiv:\href{http://arxiv.org/abs/#2}{#2}\else arXiv:#2%
2823   \fi}

```

3.24 End of Class

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

```

2824 \let\@vspace@orig=\@vspace
2825 \let\@vspacer@orig=\@vspacer
2826 \apptocmd{\@vspace}{\ClassWarning{\@classname}{\string\vspace\space should
2827   only be used to provide space above/below surrounding
2828   objects}}{}{}
2829 \apptocmd{\@vspacer}{\ClassWarning{\@classname}{\string\vspace\space should
2830   only be used to provide space above/below surrounding
2831   objects}}{}{}

```

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

```

2832 \let\ACM@origbaselinestretch\baselinestretch
2833 \AtEndDocument{\ifx\baselinestretch\ACM@origbaselinestretch\else
2834   \ClassError{\@classname}{An attempt to redefine
2835     \string\baselinestretch\space detected. Please do not do this for
2836     ACM submissions!}\fi}

```

```

2837 \normalsize\normalfont\frenchspacing
2838 </class>

```

References

- [1] UK T_EX Users Group. UK list of T_EX 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] Cristophe Fiorio. *algorithm2e.sty—package for algorithms*, October 2015. <http://www.ctan.org/pkg/algorithm2e>.
- [4] Rogério Brito. *The algorithms bundle*, August 2009. <http://www.ctan.org/pkg/algorithms>.
- [5] Carsten Heinz, Brooks Moses, and Jobst Hoffmann. *The Listings Package*, June 2015. <http://www.ctan.org/pkg/listings>.
- [6] Simon Fear. *Publication quality tables in L^AT_EX*, April 2005. <http://www.ctan.org/pkg/booktabs>.
- [7] Association for Computing Machinery. *ACM Visual Identity Standards*, 2007. <http://identitystandards.acm.org>.
- [8] Axel Sommerfeldt. *The subcaption package*, April 2013. <http://www.ctan.org/pkg/subcaption>.
- [9] Boris Veytsman, Bern Schandl, Lee Netherton, and C. V. Radhakrishnan. *A package to create a nomenclature*, September 2005. <http://www.ctan.org/pkg/nomencl>.
- [10] Nicola L. C. Talbot. *User Manual for glossaries.sty v4.25*, June 2016. <http://www.ctan.org/pkg/subcaption>.
- [11] David Carlisle. *The textcase package*, October 2004. <http://www.ctan.org/pkg/textcase>.

Change History

1.48		//github.com/borisveytsman/ acmart/issues/5)	32
	General: Added prologue option to		
	xcolor	44	v1.02
	Bib code cleanup (Zack Weinberg)	32	General: Added TOPS and TSC (closes
	Documentation update (siggraph) .	32	https: //github.com/borisveytsman/ acmart/issues/12)
1.49	General: New journal: DTRAP	32	Documentation changes (closes
1.53	General: New journals: PACMCGIT,		https: //github.com/borisveytsman/ acmart/issues/13)
	TIOT, TDSCI	32	
	Rearranged docs	32	v1.03
1.54	General: Moved footnote stuff before		<code>\@formatdoi</code> : Added macro
	hyperref call (Ross Moore)	32	<code>\if@ACM@authorversion</code> : Added
1.56	General: Documented <code>\Description</code>	32	macro
1.57	General: Booktabs package is now the		<code>\maketitle</code> : Added special case of
	default	32	authorversion
1.58	General: Changes in samples (Enrico		General: Added <code>anonsuppress</code>
	Gregorio)	32	environment
	New journal: HEALTH. TDS is		Added authorversion option (closes
	renamed to TDSCI	32	https: //github.com/borisveytsman/ acmart/issues/9)
1.60	<code>\if@ACM@urlbreakonhyphens</code> :		v1.04
	introduced macro	33	<code>\acmArticleSeq</code> : Name change by
	General: New option:		Matthew Fluet
	urlbreakonhyphens	32	<code>\acmDOI</code> : Name change by Matthew
1.62	General: New journal: TELO	32	Fluet
			<code>\acmISBN</code> : Name change by Matthew
			Fluet
			General: Updated bibliography for
			siggraph
			32
			v1.05
v1.00	General: First released version	32	General: Added processing doi
v1.01	General: Changed hyperref colors in		numbers for acmsiggraph and doi
	screen mode (closes https: //github.com/borisveytsman/ acmart/issues/1)	32	numbers for sigproc.bib
	Defined ACM colors	32	Patched <code>\setcitestyle</code> command;
	Explicitly put draft option (closes		closes https: //github.com/borisveytsman/ acmart/issues/19
	https: //github.com/borisveytsman/ acmart/issues/4)	35	32
	Set headheight to 1pc for all		v1.06
	formats (closes https:		<code>\@ACM@badge@skip</code> : Added macro . .
			<code>\@ACM@badge@width</code> : Added macro .
			<code>\@ACM@title@width</code> : Added macro .
			<code>\@mktitle@i</code> : Added processing
			badges
			Made generic
			79
			79

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