

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 T_EX 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 L^AT_EX package.

This package uses only free T_EX packages and fonts included in T_EXLive, MikT_EX and other popular T_EX 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 customizatop 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 T_EX Users Group. The world-wide T_EX Users Group is at <https://tug.org/>; please consider joining us if you use T_EX regularly.

2.1 Installation

Most probably, you already have this package installed in your favorite T_EX 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 \LaTeX 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:

- *amscls*, <http://www.ctan.org/pkg/amscls>
- *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
manuscript	A manuscript. This is the default.
acmsmall	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, THRI, THS, 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, TRETTS, TSAS, TSC, TSLP and TWEB, including special issues.
acmlarge	Large single-column format. Used for IMWUT, JOCCH, POMACS and TAP, including special issues.
acmtog	Large double-column format. Used for TOG, including annual conference Technical Papers.
sigconf	Proceedings format for most ACM conferences (with the exceptions listed below) and all ICPS volumes.
sigplan	Proceedings format for SIGPLAN conferences.
sigchi	Proceedings format for SIGCHI conferences.
sigchi-a	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.

2.3 Top matter

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

This class internally loads the `amsart` class, so many top-matter commands are inherited from `amsart` [2].

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

`\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.

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

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

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

name: the name of the conference.

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)}
```

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

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

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

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

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

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{<subtitle>}` macro.

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

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

```
\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 Thørvöld Group.

<pre> \position \institution \department \streetaddress \city \state \postcode \country </pre>	<p>The <code>\affiliation</code> and <code>\additionalaffiliation</code> commands are further structured to interact with the metadata extraction tools. Inside these commands you should use the <code>\position</code>, <code>\institution</code>, <code>\department</code>, <code>\city</code>, <code>\streetaddress</code>, <code>\state</code>, <code>\postcode</code> and <code>\country</code> 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 <i>are</i> necessary since they are used by the XML metadata extraction programs. Do <i>not</i> put commas or <code>\\</code> between the elements of <code>\affiliation</code>. They will be provided automatically.</p>
--	--

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 institution. 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 *not* use this option for journals.

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

`\thanks` Like `amsart` (and unlike standard \LaTeX), we allow `\thanks` only *outside* of the commands `\title` and `\author`. This command is obsolete and should *not* be used in most cases. Do not list your acknowledgments or grant sponsors here. Put this information in the `acks` environment (see Section 2.10).

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

```

\authorsaddresses{%
  Authors' addresses: G.~Zhou, Computer Science Department, College of
  William and Mary, 104 Jameson Rd, Williamsburg, PA 23185, US;
  V.~B'eranger, Inria Paris-Rocquencourt, Rocquencourt, France;
  A.~Patel, Rajiv Gandhi University, Rono-Hills, Doimukh, Arunachal
  Pradesh, India; H.~Chan, Tsinghua University, 30 Shuangqing Rd,
  Haidian Qu, Beijing Shi, China; T.~Yan, Eaton Innovation Center,
  Prague, Czech Republic; T.~He, C.~Huang, J.~A.~Stankovic University
  of Virginia, School of Engineering Charlottesville, VA 22903, USA;
  T. F. Abdelzاهر, (Current address) NASA Ames Research Center,
  Moffett Field, California 94035.}

```

You can *suppress* printing authors' addresses by setting them to an empty string: `\authorsaddresses{}`.

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

```

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

```

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

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

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

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

`\acmVolume` The macros `\acmVolume`, `\acmNumber`, `\acmArticle`, `\acmYear` and `\acmMonth` are 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
\acmNumber
\acmArticle
\acmYear
\acmMonth
\acmVolume{9}
\acmNumber{4}
\acmArticle{39}
\acmYear{2010}
\acmMonth{3}
```

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

`\acmArticleSeq` The articles in the same issue of a journal have a *sequence number*. It is used to vertically position the black blob on the first page of some formats. By default it is the same as the article number, but the command `\acmArticleSeq{n}` can be used to change it:

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

Setting this number to zero suppresses the blob.

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

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

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

```
\acmPrice{25.00}
```

Note that you do not need to put the dollar sign here, just the amount. By default the price is \$15.00, unless the copyright is set to `usgov`, `rightsretained`, `iw3c2w3`, or `iw3c2w3g`, when it is suppressed. Note that to override the defaults you need to set the

price *after* the `\setcopyright` command. Also, the command `\acmPrice{}` suppresses the printing of the price.

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

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

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

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

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

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

`\acmBadgeR` Some conference articles get special distinctions, for example, the artifact evaluation
`\acmBadgeL` for PPOPP 2016 (see <http://ctuning.org/ae/ppopp2016.html>). These articles display special badges supplied by the conference organizers. This class provides commands to add these badges: `\acmBadgeR[<url>]{<graphics>}` and `\acmBadgeL[<url>]{<graphics>}`. The first command puts the badge to the right of the title, and the second one—to the left. The 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.

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

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

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

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

```

`sidebar`
`marginfigure`
`margintable`

SIGCHI extended 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  $0.5V$  with most
  measurements between  $0.2V$  and  $0.8V$ }
  \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 $\{\langle sponsorID \rangle\}$ is the unique ID used to match grants to sponsors, $\{\langle name \rangle\}$ is the name of the sponsor, $\{\langle url \rangle\}$ is its URL, and $\{\langle number \rangle\}$ is the grant number. The $\{\langle sponsorID \rangle\}$ of the `\grantnum` command must correspond to the $\{\langle sponsorID \rangle\}$ 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 $\{\langle sponsorID \rangle\}$ 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 the special entry types `online` and `game` 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",
}
```

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 `sloppy` 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
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

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

Abbreviation	Publication
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
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
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 [2019/03/29 v1.59 Typesetting articles for the Association for
7 Computing Machinery]
```

And the driver code:

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

3.2 Preload hook

We preload acmart-preload-hook:

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

3.3 Options

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

```
30 \RequirePackage{xkeyval}
```

We use xstring to check whether user input is valid

```
31 \RequirePackage{xstring}
```

format The possible formats

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

\if@ACM@screen Whether we use screen mode

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

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

```
57 \define@boolkey+{acmart.cls}[@ACM@]{acmthm}[true]{%
58 \if@ACM@acmthm
59 \PackageInfo{\@classname}{Requiring acmthm}%
60 \else
61 \PackageInfo{\@classname}{Suppressing acmthm}%
62 \fi}{\PackageError{\@classname}{The option acmthm can be either true or
63 false}}
64 \ExecuteOptionsX{acmthm=true}
```

\if@ACM@review Whether we use review mode

```
65 \define@boolkey+{acmart.cls}[@ACM@]{review}[true]{%
66 \if@ACM@review
67 \PackageInfo{\@classname}{Using review mode}%
68 \AtBeginDocument{\@ACM@printfoliostrue}%
69 \else
70 \PackageInfo{\@classname}{Not using review mode}%
71 \fi}{\PackageError{\@classname}{The option review can be either true or
72 false}}
73 \ExecuteOptionsX{review=false}
```

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

```

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

```

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

```

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

```

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

```

94 \define@boolkey+{acmart.cls}[@ACM@]{balance}[true]{}{%
95   \PackageError{\@classname}{The option balance can be either true or
96     false}}
97 \ExecuteOptionsX{balance}

```

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

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

```

98 \define@boolkey+{acmart.cls}[@ACM@]{natbib}[true]{%
99   \if@ACM@natbib
100     \PackageInfo{\@classname}{Explicitly selecting natbib mode}%
101   \else
102     \PackageInfo{\@classname}{Explicitly deselecting natbib mode}%
103   \fi}{\PackageError{\@classname}{The option natbib can be either true or
104     false}}
105 \ExecuteOptionsX{natbib=true}

```

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

```

106 \define@boolkey+{acmart.cls}[@ACM@]{anonymous}[true]{%
107   \if@ACM@anonymous
108     \PackageInfo{\@classname}{Using anonymous mode}%
109   \else
110     \PackageInfo{\@classname}{Not using anonymous mode}%
111   \fi}{\PackageError{\@classname}{The option anonymous can be either true or

```



```

112     false}}
113 \ExecuteOptionsX{anonymous=false}

```

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

```

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

```

`\if@ACM@authordraft` Whether we use author-draft mode

```

122 \define@boolkey+{acmart.cls}[@ACM@]{authordraft}[true]{%
123   \if@ACM@authordraft
124     \PackageInfo{\@classname}{Using authordraft mode}%
125     \@ACM@timestamptrue
126     \@ACM@reviewtrue
127   \else
128     \PackageInfo{\@classname}{Not using authordraft mode}%
129   \fi}{\PackageError{\@classname}{The option authordraft can be either true or
130     false}}
131 \ExecuteOptionsX{authordraft=false}

```

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

```

132 \def\ACM@fontsize{}
133 \DeclareOptionX{9pt}{\edef\ACM@fontsize{\CurrentOption}}
134 \DeclareOptionX{10pt}{\edef\ACM@fontsize{\CurrentOption}}
135 \DeclareOptionX{11pt}{\edef\ACM@fontsize{\CurrentOption}}
136 \DeclareOptionX{12pt}{\edef\ACM@fontsize{\CurrentOption}}

137 \DeclareOptionX{draft}{\PassOptionsToClass{\CurrentOption}{amsart}}
138 \DeclareOptionX{*}{\PassOptionsToClass{\CurrentOption}{amsart}}
139 \ProcessOptionsX
140 \ClassInfo{\@classname}{Using format \ACM@format, number \ACM@format@nr}

```

3.4 Setting switches

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

```

141 \newif\if@ACM@manuscript

```

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

```

142 \newif\if@ACM@journal

```

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

```

143 \newif\if@ACM@sigchiamode

```

Setting up switches

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

3.5 Loading the base class and package

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

```
176 \ifx\ACM@fontsize\@empty
177   \ifcase\ACM@format@nr
178   \relax % manuscript
179     \def\ACM@fontsize{9pt}%
180   \or % acmsmall
181     \def\ACM@fontsize{10pt}%
182   \or % acmlarge
183     \def\ACM@fontsize{10pt}%
184   \or % acmtog
185     \def\ACM@fontsize{9pt}%
186   \or % sigconf
187     \def\ACM@fontsize{9pt}%
```

```

188 \or % siggraph
189   \def\ACM@fontsize{9pt}%
190 \or % sigplan
191   \def\ACM@fontsize{10pt}%
192 \or % sigchi
193   \def\ACM@fontsize{10pt}%
194 \or % sigchi-a
195   \def\ACM@fontsize{10pt}%
196 \fi
197 \fi
198 \ClassInfo{\@classname}{Using fontsize \ACM@fontsize}
199 \LoadClass[\ACM@fontsize, reqno]{amsart}
200 \RequirePackage{microtype}
    We need etoolbox for delayed code
201 \RequirePackage{etoolbox}
    Booktabs is now the default
202 \RequirePackage{booktabs}
    We need totpages to calculate the number of pages and refcount to use that number
203 \RequirePackage{refcount}
204 \RequirePackage{totpages}
    The \collect@body macro in amsmath is defined using \def. We load environ to
    access the \long version of this command
205 \RequirePackage{environ}
    We use setspace for double spacing
206 \if@ACM@manuscript
207 \RequirePackage{setspace}
208 \onehalfspacing
209 \fi
    We need textcase for better upcasing
210 \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.

```

211 \if@ACM@natbib
212   \RequirePackage{natbib}
213   \renewcommand{\bibsection}{%
214     \section*{\refname}%
215     \phantomsection\addcontentsline{toc}{section}{\refname}%
216   }
217   \renewcommand{\bibfont}{\bibliofont}
218   \renewcommand\setcitestyle[1]{
219     \@for\@tempa:=#1\do

```

```

220 {\def\@tempb{round}\ifx\@tempa\@tempb
221   \renewcommand\NAT@open{()\renewcommand\NAT@close{}}\fi
222 \def\@tempb{square}\ifx\@tempa\@tempb
223   \renewcommand\NAT@open{[]\renewcommand\NAT@close{]}}\fi
224 \def\@tempb{angle}\ifx\@tempa\@tempb
225   \renewcommand\NAT@open{<}\renewcommand\NAT@close{>}\fi
226 \def\@tempb{curly}\ifx\@tempa\@tempb
227   \renewcommand\NAT@open{\{\}\renewcommand\NAT@close{\}}\fi
228 \def\@tempb{semicolon}\ifx\@tempa\@tempb
229   \renewcommand\NAT@sep{;}\fi
230 \def\@tempb{colon}\ifx\@tempa\@tempb
231   \renewcommand\NAT@sep{:}\fi
232 \def\@tempb{comma}\ifx\@tempa\@tempb
233   \renewcommand\NAT@sep{,}\fi
234 \def\@tempb{authoryear}\ifx\@tempa\@tempb
235   \NAT@numbersfalse\fi
236 \def\@tempb{numbers}\ifx\@tempa\@tempb
237   \NAT@numberstrue\NAT@superfalse\fi
238 \def\@tempb{super}\ifx\@tempa\@tempb
239   \NAT@numberstrue\NAT@supertrue\fi
240 \def\@tempb{nobibstyle}\ifx\@tempa\@tempb
241   \let\bibstyle=\gobble\fi
242 \def\@tempb{bibstyle}\ifx\@tempa\@tempb
243   \let\bibstyle=\citestyle\fi
244 \def\@tempb{sort}\ifx\@tempa\@tempb
245   \def\NAT@sort{\@ne}\fi
246 \def\@tempb{nosort}\ifx\@tempa\@tempb
247   \def\NAT@sort{\z@}\fi
248 \def\@tempb{compress}\ifx\@tempa\@tempb
249   \def\NAT@cmprs{\@ne}\fi
250 \def\@tempb{nocompress}\ifx\@tempa\@tempb
251   \def\NAT@cmprs{\z@}\fi
252 \def\@tempb{sort&compress}\ifx\@tempa\@tempb
253   \def\NAT@sort{\@ne}\def\NAT@cmprs{\@ne}\fi
254 \def\@tempb{mcite}\ifx\@tempa\@tempb
255   \let\NAT@merge\@ne\fi
256 \def\@tempb{merge}\ifx\@tempa\@tempb
257   \ifnum{\NAT@merge<\tw@}{\let\NAT@merge\tw@}\fi
258 \def\@tempb{elide}\ifx\@tempa\@tempb
259   \ifnum{\NAT@merge<\thr@}{\let\NAT@merge\thr@}\fi
260 \def\@tempb{longnamesfirst}\ifx\@tempa\@tempb
261   \NAT@longnamestrue\fi
262 \def\@tempb{nonamebreak}\ifx\@tempa\@tempb
263   \def\NAT@nmfmt#1{\mbox{\NAT@up#1}}\fi
264 \expandafter\NAT@find@eq\@tempa=\relax\@nil
265 \if\@tempc\relax\else
266   \expandafter\NAT@rem@eq\@tempc
267   \def\@tempb{open}\ifx\@tempa\@tempb
268     \xdef\NAT@open{\@tempc}\fi
269   \def\@tempb{close}\ifx\@tempa\@tempb

```

```

270 \xdef\NAT@close{\@tempc}\fi
271 \def\@tempb{aysep}\ifx\@tempa\@tempb
272 \xdef\NAT@aysep{\@tempc}\fi
273 \def\@tempb{yysep}\ifx\@tempa\@tempb
274 \xdef\NAT@yrsep{\@tempc}\fi
275 \def\@tempb{notesep}\ifx\@tempa\@tempb
276 \xdef\NAT@cmt{\@tempc}\fi
277 \def\@tempb{citesep}\ifx\@tempa\@tempb
278 \xdef\NAT@sep{\@tempc}\fi
279 \fi
280 }%
281 \NAT@@setcites
282 }
283 \renewcommand\citestyle[1]{%
284 \ifcsname bibstyle@#1\endcsname%
285 \csname bibstyle@#1\endcsname\let\bibstyle\@gobble%
286 \else%
287 \@latex@error{Undefined ‘#1’ citestyle}%
288 \fi
289 }%
290 \fi

```

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

```

291 \newcommand{\bibstyle@acmauthoryear}{%
292 \setcitestyle{%
293 authoryear,%
294 open={[]},close={}],citesep={;},%
295 aysep={},yysep={,},%
296 notesep={, }}}

```

`\bibstyle@acmnumeric` The default numeric format:

```

297 \newcommand{\bibstyle@acmnumeric}{%
298 \setcitestyle{%
299 numbers,sort&compress,%
300 open={[]},close={}],citesep={,},%
301 notesep={, }}}

```

The default is numeric:

```

302 \if@ACM@natbib
303 \citestyle{acmnumeric}
304 \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:

```

305 \def\@startsection#1#2#3#4#5#6{%
306 \if@noskipsec \leavevmode \fi
307 \par
308 \@tempskipa #4\relax

```

```

309 \@afterindenttrue
310 \ifdim \@tempskipa <\z@
311   \@tempskipa -\@tempskipa \@afterindentfalse
312 \fi
313 \if@nobreak
314   \everypar{}%
315 \else
316   \addpenalty\@secpenalty\advvspace\@tempskipa
317 \fi
318 \ifstar
319   {\@essect{#3}{#4}{#5}{#6}}%
320   {\@dblarg{\@sect{#1}{#2}{#3}{#4}{#5}{#6}}}
321 \def\@sect#1#2#3#4#5#6[#7]#8{%
322   \edef\@toclevel{\ifnum#2=\@m 0\else\@number#2\fi}%
323   \ifnum #2>\c@secnumdepth
324     \let\@svsec\@empty
325   \else
326     \refstepcounter{#1}%
327     \protected@edef\@svsec{\@secntformat{#1}\relax}%
328   \fi
329   \@tempskipa #5\relax
330   \ifdim \@tempskipa>\z@
331     \begingroup
332       #6{%
333         \@hangfrom{\hskip #3\relax\@svsec}%
334         \interlinepenalty \@M #8\@epar}%
335     \endgroup
336     \csname #1mark\endcsname{#7}%
337     \ifnum #2>\c@secnumdepth \else
338       \@tochangmeasure{\csname the#1\endcsname}%
339     \fi
340     \addcontentsline{toc}{#1}{%
341       \ifnum #2>\c@secnumdepth \else
342         \protect\numberline{\csname the#1\endcsname}%
343       \fi
344       #7}%
345   \else
346     \def\@svsechd{%
347       #6{\hskip #3\relax
348         \@svsec #8}%
349       \csname #1mark\endcsname{#7}%
350       \ifnum #2>\c@secnumdepth \else
351         \@tochangmeasure{\csname the#1\endcsname\space}%
352       \fi
353       \addcontentsline{toc}{#1}{%
354         \ifnum #2>\c@secnumdepth \else
355           \protect\numberline{\csname the#1\endcsname}%
356         \fi
357         #7}}%
358   \fi

```

```

359 \@xsect{#5}}
360 \def\@xsect#1{%
361   \@tempkipa #1\relax
362   \ifdim \@tempkipa>\z@
363     \par \nobreak
364     \vskip \@tempkipa
365     \@afterheading
366   \else
367     \@nobreakfalse
368     \global\@noskipsectrue
369     \everypar{%
370       \if@noskipsec
371         \global\@noskipsecfalse
372         {\setbox\z@\lastbox}%
373         \clubpenalty\@M
374         \begingroup \@svsechd \endgroup
375         \unskip
376         \@tempkipa #1\relax
377         \hskip -\@tempkipa
378       \else
379         \clubpenalty \@clubpenalty
380         \everypar{}}%
381     \fi}%
382 \fi
383 \ignorespaces}
384 \def\@secCNTformat#1{\csname the#1\endcsname\quad}
385 \def\@ssect#1#2#3#4#5{%
386   \@tempkipa #3\relax
387   \ifdim \@tempkipa>\z@
388     \begingroup
389     #4{%
390       \@hangfrom{\hskip #1}%
391       \interlinepenalty \@M #5\@@par}%
392     \endgroup
393   \else
394     \def\@svsechd{#4{\hskip #1\relax #5}}%
395   \fi
396   \@xsect{#3}}

```

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

```

397 \def\@starttoc#1#2{\begingroup\makeatletter
398   \setTrue{#1}%
399   \par\removelastskip\vskip\z@skip
400   \@startsection{section}\@M\z@{\linespacing\@plus\linespacing}%
401     {.5\linespacing}{\centering\contentsnamefont}{#2}%
402   \input{\jobname.#1}%
403   \if@filesw
404     \exp\newwrite\csname tf@#1\endcsname
405     \immediate\exp\openout\csname tf@#1\endcsname \jobname.#1\relax

```

```

406 \fi
407 \global\@nobeckfalse \endgroup
408 \addvspace{32\p@\@plus14\p@}%
409 }

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

\l@subsection The spacing in amsart is too large
411 \def\l@subsection{\@tocline{2}{0pt}{1pc}{3pc}{}}

\l@subsubsection The spacing in amsart is too large
412 \def\l@subsubsection{\@tocline{2}{0pt}{1pc}{5pc}{}}

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

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

\@footnotetext In sigchi-a mode our footnotes are in the margin!
414 \if@ACM@sigchiamode
415 \long\def\@footnotetext#1{\marginpar{%
416 \reset@font\small
417 \interlinepenalty\interfootnotelinepenalty
418 \protected@edef\@currentlabel{%
419 \csname p@footnote\endcsname\@thefnmark
420 }%
421 \color@begingroup
422 \@makefnmark{%
423 \rule\z@\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
424 \color@endgroup}}%
425 \fi

\@mpfootnotetext We want the footnotes in minipages centered:
426 \long\def\@mpfootnotetext#1{%
427 \global\setbox\@mpfootins\vbox{%
428 \unvbox\@mpfootins
429 \reset@font\footnotesize
430 \hsize\columnwidth
431 \@parboxrestore
432 \protected@edef\@currentlabel
433 {\csname p@mpfootnote\endcsname\@thefnmark}%
434 \color@begingroup\centering
435 \@makefnmark{%
436 \rule\z@\footnotesep\ignorespaces#1\@finalstrut\strutbox}%
437 \color@endgroup}}

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

```


And now, hyperref

```
439 \let\@footnotemark@nolink\@footnotemark
440 \let\@footnotetext@nolink\@footnotetext
441 \RequirePackage[bookmarksnumbered,unicode]{hyperref}
442 \pdfstringdefDisableCommands{%
443   \def\addtocounter#1#2{%
444     \def\unskip{%
445       \def\textbullet{- }%
446       \def\textrightarrow{ -> }%
447       \def\footnotemark{%
448         }
449       \urlstyle{rm}
450       \ifcase\ACM@format@nr
451       \or % manuscript
452       \or % acmsmall
453       \or % acmlarge
454       \or % acmtog
455       \or % sigconf
456       \or % siggraph
457       \or % sigplan
458       \urlstyle{sf}
459       \or % sigchi
460       \or % sigchi-a
461       \urlstyle{sf}
462       \fi
463       \AtEndPreamble{%
464         \if@ACM@screen
465           \hypersetup{colorlinks,
466             linkcolor=ACMPurple,
467             citecolor=ACMPurple,
468             urlcolor=ACMDarkBlue,
469             filecolor=ACMDarkBlue}
470         \else
471           \hypersetup{hidelinks}
472         \fi
473         \hypersetup{pdflang={en},
474           pdfdisplaydoctitle}}
475 \if@ACM@natbib
476   \let\citeN\cite
477   \let\cite\citep
478   \let\citeANP\citeauthor
479   \let\citeNN\citeyearpar
480   \let\citeyearNP\citeyear
481   \let\citeNP\citealt
482   \DeclareRobustCommand\citeA
483     {\begingroup\NAT@swafalse
484       \let\NAT@ctype\@ne\NAT@partrue\NAT@fullfalse\NAT@open\NAT@citetp}%
485   \providecommand\newblock{}}
```

```

486 \else
487   \AtBeginDocument{%
488     \let\shortcite\cite%
489     \providecommand\citename[1]{#1}}
490 \fi
491 \newcommand\shortcite[2][{}]{%
492   \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:

```

493 \def\bibliographystyle#1{%
494   \ifx\@begindocumenthook\@undefined\else
495     \expandafter\AtBeginDocument
496     \fi
497   {\if@filesw
498     \immediate\write\@auxout{\string\bibstyle{#1}}%
499     \fi}}

```

Graphics and color.

```

500 \RequirePackage{graphicx}
501 \RequirePackage[prologue]{xcolor}

```

We define ACM colors according to [7]:

```

502 \definecolor[named]{ACMBlue}{cmyk}{1,0.1,0,0.1}
503 \definecolor[named]{ACMYellow}{cmyk}{0,0.16,1,0}
504 \definecolor[named]{ACMOrange}{cmyk}{0,0.42,1,0.01}
505 \definecolor[named]{ACMRed}{cmyk}{0,0.90,0.86,0}
506 \definecolor[named]{ACMLightBlue}{cmyk}{0.49,0.01,0,0}
507 \definecolor[named]{ACMGreen}{cmyk}{0.20,0,1,0.19}
508 \definecolor[named]{ACMPurple}{cmyk}{0.55,1,0,0.15}
509 \definecolor[named]{ACMDarkBlue}{cmyk}{1,0.58,0,0.21}

```

Author-draft mode

```

510 \if@ACM@authordraft
511   \RequirePackage{draftwatermark}
512   \SetWatermarkFontSize{0.5in}
513   \SetWatermarkColor[gray]{.9}
514   \SetWatermarkText{\parbox{12em}{\centering
515     Unpublished working draft.\
516     Not for distribution.}}
517 \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>.

```

518 \RequirePackage{geometry}
519 \ifcase\ACM@format@nr
520 \relax % manuscript

```

```

521 \geometry{letterpaper,head=13pt,
522 marginparwidth=6pc,heightrounded}%
523 \or % acmsmall
524 \geometry{twoside=true,
525 includeheadfoot, head=13pt, foot=2pc,
526 paperwidth=6.75in, paperheight=10in,
527 top=58pt, bottom=44pt, inner=46pt, outer=46pt,
528 marginparwidth=2pc,heightrounded
529 }%
530 \or % acmlarge
531 \geometry{twoside=true, head=13pt, foot=2pc,
532 paperwidth=8.5in, paperheight=11in,
533 includeheadfoot,
534 top=78pt, bottom=114pt, inner=81pt, outer=81pt,
535 marginparwidth=4pc,heightrounded
536 }%
537 \or % acmtog
538 \geometry{twoside=true, head=13pt, foot=2pc,
539 paperwidth=8.5in, paperheight=11in,
540 includeheadfoot, columnsep=24pt,
541 top=52pt, bottom=75pt, inner=52pt, outer=52pt,
542 marginparwidth=2pc,heightrounded
543 }%
544 \or % sigconf
545 \geometry{twoside=true, head=13pt,
546 paperwidth=8.5in, paperheight=11in,
547 includeheadfoot, columnsep=2pc,
548 top=57pt, bottom=73pt, inner=54pt, outer=54pt,
549 marginparwidth=2pc,heightrounded
550 }%
551 \or % siggraph
552 \geometry{twoside=true, head=13pt,
553 paperwidth=8.5in, paperheight=11in,
554 includeheadfoot, columnsep=2pc,
555 top=57pt, bottom=73pt, inner=54pt, outer=54pt,
556 marginparwidth=2pc,heightrounded
557 }%
558 \or % sigplan
559 \geometry{twoside=true, head=13pt,
560 paperwidth=8.5in, paperheight=11in,
561 includeheadfoot=false, columnsep=2pc,
562 top=1in, bottom=1in, inner=0.75in, outer=0.75in,
563 marginparwidth=2pc,heightrounded
564 }%
565 \or % sigchi
566 \geometry{twoside=true, head=13pt,
567 paperwidth=8.5in, paperheight=11in,
568 includeheadfoot, columnsep=2pc,
569 top=66pt, bottom=73pt, inner=54pt, outer=54pt,
570 marginparwidth=2pc,heightrounded

```

```

571   }%
572 \or % sigchi-a
573   \geometry{twoside=false, head=13pt,
574     paperwidth=11in, paperheight=8.5in,
575     includeheadfoot, marginparsep=72pt,
576     marginparwidth=170pt, columnsep=20pt,
577     top=72pt, bottom=72pt, left=314pt, right=72pt
578   }%
579   \@parswitchfalse
580   \reversemarginpar
581 \fi

```

`\parindent` Paragraphing

```

\parskip 582 \setlength\parindent{10\p@}
583 \setlength\parskip{z@}
584 \ifcase\ACM@format@nr
585 \relax % manuscript
586 \or % acmsmall
587 \or % acmlarge
588 \or % acmtog
589 \setlength\parindent{9\p@}%
590 \or % sigconf
591 \or % siggraph
592 \or % sigplan
593 \or % sigchi
594 \or % sigchi-a
595 \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.

```
596 \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.

```

597 \def\copyrightpermissionfootnoterule{\kern-3\p@
598   \hrule \@width \columnwidth \kern 2.6\p@}

599 \RequirePackage{manyfoot}
600 \SelectFootnoteRule[2]{copyrightpermission}
601 \DeclareNewFootnote{authorsaddresses}

```

```

602 \SelectFootnoteRule[2]{copyrightpermission}
603 \DeclareNewFootnote{copyrightpermission}

\footnoterule Tschichold's rules:
604 \def\footnoterule{\kern-3\p@
605   \hrule \@width 4pc \kern 2.6\p@}

\endminipage We do not use footnote rules in minipages
606 \def\endminipage{%
607   \par
608   \unskip
609   \ifvoid\@mpfootins\else
610     \vskip\skip\@mpfootins
611     \normalcolor
612     \unvbox\@mpfootins
613   \fi
614   \@minipagefalse
615   \color@endgroup
616   \egroup
617   \expandafter\@iiparbox\@mpargs{\unvbox\@tempboxa}}

\@textbottom Add some stretch according to David Carlisle's advice at http://tex.stackexchange.com/a/62318/5522
618 \def\@textbottom{\vskip \z@ \@plus 1pt}
619 \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.

```

620 \ifcase\ACM@format@nr
621 \relax % manuscript
622 \or % acmsmall
623 \or % acmlarge
624 \or % acmtog
625   \flushbottom
626 \or % sigconf
627   \flushbottom
628 \or % siggraph
629   \flushbottom
630 \or % sigplan
631   \flushbottom
632 \or % sigchi
633   \flushbottom
634 \or % sigchi-a
635 \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.

```
636 \RequirePackage{iftex}
637 \ifPDFTeX
638 \input{glyphtounicode}
639 \pdfglyptounicode{f_f}{FB00}
640 \pdfglyptounicode{f_f_i}{FB03}
641 \pdfglyptounicode{f_f_l}{FB04}
642 \pdfglyptounicode{f_i}{FB01}
643 \pdfglyptounicode{t_t}{0074 0074}
644 \pdfglyptounicode{f_t}{0066 0074}
645 \pdfglyptounicode{T_h}{0054 0068}
646 \pdfgentounicode=1
647 \fi
648 \RequirePackage{cmap}
```

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

```
649 \newif\if@ACM@newfonts
650 @ACM@newfontstrue
651 \IfFileExists{libertine.sty}{\ClassWarning{\@classname}{You do not
652   have the libertine package installed. Please upgrade your
653   TeX}\@ACM@newfontsfalse}
654 \IfFileExists{zi4.sty}{\ClassWarning{\@classname}{You do not
655   have the zi4 package installed. Please upgrade your
656   TeX}\@ACM@newfontsfalse}
657 \IfFileExists{newtxmath.sty}{\ClassWarning{\@classname}{You do not
658   have the newtxmath package installed. Please upgrade your
659   TeX}\@ACM@newfontsfalse}
```

We use Libertine throughout.

```
660 \if@ACM@newfonts
661   \RequirePackage[T1]{fontenc}
662 \ifxetex
663   \RequirePackage[tt=false]{libertine}
664   \setmonofont{inconsolata}
665 \else
666   \RequirePackage[tt=false, type1=true]{libertine}
667 \fi
668 \RequirePackage[varqu]{zi4}
669 \RequirePackage[libertine]{newtxmath}
670 \fi
```

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

```
671 \let\liningnums\undefined
672 \AtEndPreamble{%
673   \DeclareTextFontCommand{\liningnums}{\libertineLF}}
```

The SIGCHI extended abstracts are sans serif:

```
674 \if@ACM@sigchiamode
```

```
675 \renewcommand{\familydefault}{\sfdefault}
676 \fi
```

3.9 Image descriptions

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

```
677 \newif\if@Description@present
678 \@Description@presenttrue
```

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

```
679 \newif\if@undescrbed@images
680 \@undescrbed@imagesfalse
```

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

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

The global warning

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

Hooks for figures and tables

```
684 \AtBeginEnvironment{figure}{\@Description@presentfalse
685 \let\@vspace\@vspace@orig
686 \let\@vspacer\@vspacer@orig}
687 \AtBeginEnvironment{figure*}{\@Description@presentfalse
688 \let\@vspace\@vspace@orig
689 \let\@vspacer\@vspacer@orig}
690 \AtEndEnvironment{figure}{\if@Description@presentfalse
691 \global\@undescrbed@imagestrue
692 \ClassWarning{\@classname}{A possible image without description}\fi}
693 \AtEndEnvironment{figure*}{\if@Description@presentfalse
694 \global\@undescrbed@imagestrue
695 \ClassWarning{\@classname}{A possible image without description}\fi}
696 \AtBeginEnvironment{table}{\let\@vspace\@vspace@orig
697 \let\@vspacer\@vspacer@orig}
698 \AtBeginEnvironment{table*}{\let\@vspace\@vspace@orig
699 \let\@vspacer\@vspacer@orig}
```

3.10 Floats

We use the caption package

```
700 \RequirePackage{caption, float}
701 \captionsetup[table]{position=top}
702 \if@ACM@journal
703 \captionsetup{labelfont={sf, small},
704 textfont={sf, small}, margin=\z@}
705 \captionsetup[figure]{name={Fig.}}
706 \else
707 \captionsetup{labelfont={bf},
```

```

708   textfont={bf}, labelsep=colon, margin=\z@}
709   \ifcase\ACM@format@nr
710   \relax % manuscript
711   \or % acsmall
712   \or % acmlarge
713   \or % acmtog
714   \or % sigconf
715   \or % siggraph
716   \captionsetup{textfont={it}}
717   \or % sigplan
718   \captionsetup{labelfont={bf},
719     textfont={normalfont}, labelsep=period, margin=\z@}
720   \or % sigchi
721   \captionsetup[figure]{labelfont={bf, small},
722     textfont={bf, small}}
723   \captionsetup[table]{labelfont={bf, small},
724     textfont={bf, small}}
725   \or % sigchi-a
726   \captionsetup[figure]{labelfont={bf, small},
727     textfont={bf, small}}
728   \captionsetup[table]{labelfont={bf, small},
729     textfont={bf, small}}
730   \fi
731 \fi

```

sidebar The sidebar environment:

```

732 \newfloat{sidebar}{s}{sbar}
733 \floatname{sidebar}{Sidebar}
734 \renewenvironment{sidebar}{\Collect@Body\@sidebar}{}

```

\@sidebar The processing of the saved text

```

735 \long\def\@sidebar#1{\bgroup\let\@vspace\@vspace@orig
736   \let\@vspacer\@vspacer@orig\captionsetup{type=sidebar}%
737   \marginpar{\small#1}\egroup}

```

marginfigure The marginfigure environment:

```

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

```

\@marginfigure The processing of the saved text

```

739 \long\def\@marginfigure#1{\bgroup
740   \let\@vspace\@vspace@orig
741   \let\@vspacer\@vspacer@orig
742   \captionsetup{type=figure}%
743   \marginpar{\@Description@presentfalse\centering
744     \small#1\if@Description@present\else
745       \global\@undescrbed@imagestrue
746       \ClassWarning{\@classname}{A possible image without description}
747       \fi}%
748   \egroup}

```



```

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

\@margintable The processing of the saved text
750 \long\def\@margintable#1{\bgroup\let\@vspace\@vspace@orig
751 \let\@vspacer\@vspacer@orig\captionsetup{type=table}%
752 \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
753 \newdimen\fulltextwidth
754 \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)
755 \if@ACM@sigchiamode
756 \def\@dblfloat{\bgroup\let\@vspace\@vspace@orig
757 \let\@vspacer\@vspacer@orig\columnwidth=\fulltextwidth
758 \let\@endfloatbox\@endwidefloatbox
759 \def\@fpsaddddefault{\def\@fps{tp}}%
760 \@float}
761 \fi

\end@dblfloat And the end. Just adding a \bgroup.
762 \if@ACM@sigchiamode
763 \def\end@dblfloat{%
764 \end@float\egroup}
765 \fi

\@endwidefloatbox This is the end of a wide box—we basically move everything to the left
766 \def\@endwidefloatbox{%
767 \par\vskip\z@skip
768 \@minipagefalse
769 \outer@nobreak
770 \egroup
771 \color@endbox
772 \global\setbox\@currbox=\vbox{\moveleft
773 \dimexpr(\fulltextwidth-\textwidth)\box\@currbox}%
774 \wd\@currbox=\textwidth
775 }

```

3.11 Lists

```

776 \ifcase\ACM@format@nr
777 \relax % manuscript
778 \or % acmsmall
779 \or % acmlarge

```

```

780 \or % acmtog
781 \or % sigconf
782 \or % siggraph
783 \or % sigplan
784 \def\labelenumi{\theenumi.}
785 \def\labelenumii{\theenumii.}
786 \def\labelenumiii{\theenumiii.}
787 \def\labelenumiv{\theenumiv.}
788 \or % sigchi
789 \or % sigchi-a
790 \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`.

```

791 \newdimen\@ACM@labelwidth
792 \AtBeginDocument{%
793   \setlength\labelsep{4pt}
794   \setlength{\@ACM@labelwidth}{6.5pt}
795
796   %% First-level list: when beginning after the first line of an
797   %% indented paragraph or ending before an indented paragraph, labels
798   %% should not hang to the left of the preceding/following text.
799   \setlength\leftmargini{\z@}
800   \addtolength\leftmargini{\parindent}
801   \addtolength\leftmargini{2\labelsep}
802   \addtolength\leftmargini{\@ACM@labelwidth}
803
804   %% Second-level and higher lists.
805   \setlength\leftmarginii{\z@}
806   \addtolength\leftmarginii{0.5\labelsep}
807   \addtolength\leftmarginii{\@ACM@labelwidth}
808   \setlength\leftmarginiii{\leftmarginii}
809   \setlength\leftmarginiv{\leftmarginiii}
810   \setlength\leftmarginv{\leftmarginiv}
811   \setlength\leftmarginvi{\leftmarginv}
812   \@listi}
813 \newskip\listisep
814 \listisep\smallskipamount
815 \def\@listI{\leftmargin\leftmargini
816   \labelwidth\leftmargini \advance\labelwidth-\labelsep
817   \listparindent\z@
818   \topsep\listisep}
819 \let\@listi\@listI
820 \def\@listii{\leftmargin\leftmarginii
821   \labelwidth\leftmarginii \advance\labelwidth-\labelsep
822   \topsep\z@skip}

```

```

823 \def\@listiii{\leftmargin\leftmarginiii
824 \labelwidth\leftmarginiii \advance\labelwidth-\labelsep}
825 \def\@listiv{\leftmargin\leftmarginiv
826 \labelwidth\leftmarginiv \advance\labelwidth-\labelsep}
827 \def\@listv{\leftmargin\leftmarginv
828 \labelwidth\leftmarginv \advance\labelwidth-\labelsep}
829 \def\@listvi{\leftmargin\leftmarginvi
830 \labelwidth\leftmarginvi \advance\labelwidth-\labelsep}

\descriptionlabel We do not use a colon by default like amsart does:
831 \renewcommand{\descriptionlabel}[1]{\upshape\bfseries #1}

\description Make the description environment indentation consistent with that of the itemize
and enumerate environments.
832 \renewenvironment{description}{\list{}{%
833 \labelwidth\@ACM@labelwidth
834 \let\makelabel\descriptionlabel}%
835 }{
836 \endlist
837 }
838 \let\enddescription=\endlist % for efficiency

```

3.12 Top-matter data

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

```

839 \define@choicekey*+{ACM}{acmJournal}[\@journalCode\@journalCode@nr]{%
840 CIE,%
841 CSUR,%
842 DTRAP,%
843 HEALTH,%
844 IMWUT,%
845 JACM,%
846 JDIQ,%
847 JEA,%
848 JERIC,%
849 JETC,%
850 JOCCH,%
851 PACMCGIT,%
852 PACMHCI,%
853 PACMPL,%
854 POMACS,%
855 TAAS,%
856 TACCESS,%
857 TACO,%
858 TALG,%
859 TALLIP,%
860 TAP,%
861 TCPS,%
862 TDS,%

```

863 TEAC,%
864 TECS,%
865 THRI,%
866 TIIS,%
867 TIOT,%
868 TISSEC,%
869 TIST,%
870 TKDD,%
871 TMIS,%
872 TOCE,%
873 TOCHI,%
874 TOCL,%
875 TOCS,%
876 TOCT,%
877 TODAES,%
878 TODS,%
879 TOG,%
880 TOIS,%
881 TOIT,%
882 TOMACS,%
883 TOMM,%
884 TOMPECS,%
885 TOMS,%
886 TOPC,%
887 TOPS,%
888 TOPLAS,%
889 TOS,%
890 TOSEM,%
891 TOSN,%
892 TRETs,%
893 TSAS,%
894 TSC,%
895 TSLP,%
896 TWEB%
897 }{%
898 \ifcase\@journalCode@nr
899 \relax % CIE
900 \def\@journalName{ACM Computers in Entertainment}%
901 \def\@journalNameShort{ACM Comput. Entertain.}%
902 \def\@permissionCodeOne{1544-3574}%
903 \or % CSUR
904 \def\@journalName{ACM Computing Surveys}%
905 \def\@journalNameShort{ACM Comput. Surv.}%
906 \def\@permissionCodeOne{0360-0300}%
907 \or % DTRAP
908 \def\@journalName{Digital Threats: Research and Practice}%
909 \def\@journalNameShort{Digit. Threat. Res. Pract.}%
910 \def\@permissionCodeOne{2576-5337}%
911 \or % HEALTH
912 \def\@journalName{ACM Transactions on Computing for Healthcare}%

```

913 \def\@journalNameShort{ACM Trans. Comput. Healthcare}%
914 \def\@permissionCodeOne{2637-8051}%
915 \or % IMWUT
916 \def\@journalName{Proceedings of the ACM on Interactive, Mobile,
917     Wearable and Ubiquitous Technologies}%
918 \def\@journalNameShort{Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.}%
919 \def\@permissionCodeOne{2474-9567}%
920 \@ACM@screentrue
921 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
922 \or % JACM
923 \def\@journalName{Journal of the ACM}%
924 \def\@journalNameShort{J. ACM}%
925 \def\@permissionCodeOne{0004-5411}%
926 \or % JDIQ
927 \def\@journalName{ACM Journal of Data and Information Quality}%
928 \def\@journalNameShort{ACM J. Data Inform. Quality}%
929 \def\@permissionCodeOne{1936-1955}%
930 \or % JEA
931 \def\@journalName{ACM Journal of Experimental Algorithmics}%
932 \def\@journalNameShort{ACM J. Exp. Algor.}%
933 \def\@permissionCodeOne{1084-6654}%
934 \or % JERIC
935 \def\@journalName{ACM Journal of Educational Resources in Computing}%
936 \def\@journalNameShort{ACM J. Edu. Resources in Comput.}%
937 \def\@permissionCodeOne{1073-0516}%
938 \or % JETC
939 \def\@journalName{ACM Journal on Emerging Technologies in Computing Systems}%
940 \def\@journalNameShort{ACM J. Emerg. Technol. Comput. Syst.}%
941 \def\@permissionCodeOne{1550-4832}%
942 \or % JOCCH
943 \def\@journalName{ACM Journal on Computing and Cultural Heritage}%
944 \def\@journalNameShort{ACM J. Comput. Cult. Herit.}%
945 \or % PACMCGIT
946 \def\@journalName{Proceedings of the ACM on Computer Graphics and Interactive Techniques}%
947 \def\@journalNameShort{Proc. ACM Comput. Graph. Interact. Tech.}%
948 \def\@permissionCodeOne{2577-6193}%
949 \@ACM@screentrue
950 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
951 \or % PACMHCI
952 \def\@journalName{Proceedings of the ACM on Human-Computer Interaction}%
953 \def\@journalNameShort{Proc. ACM Hum.-Comput. Interact.}%
954 \def\@permissionCodeOne{2573-0142}%
955 \@ACM@screentrue
956 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
957 \or % PACMPL
958 \def\@journalName{Proceedings of the ACM on Programming Languages}%
959 \def\@journalNameShort{Proc. ACM Program. Lang.}%
960 \def\@permissionCodeOne{2475-1421}%
961 \@ACM@screentrue
962 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%

```

```

963 \or % POMACS
964 \def\@journalName{Proceedings of the ACM on Measurement and Analysis of Computing Systems}%
965 \def\@journalNameShort{Proc. ACM Meas. Anal. Comput. Syst.}%
966 \def\@permissionCodeOne{2476-1249}%
967 \@ACM@screentrue
968 \PackageInfo{\@classname}{Using screen mode due to \@journalCode}%
969 \or % TAAS
970 \def\@journalName{ACM Transactions on Autonomous and Adaptive Systems}%
971 \def\@journalNameShort{ACM Trans. Autonom. Adapt. Syst.}%
972 \def\@permissionCodeOne{1556-4665}%
973 \or % TACCESS
974 \def\@journalName{ACM Transactions on Accessible Computing}%
975 \def\@journalNameShort{ACM Trans. Access. Comput.}%
976 \def\@permissionCodeOne{1936-7228}%
977 \or % TACO
978 \def\@journalName{ACM Transactions on Architecture and Code Optimization}%
979 \def\@journalNameShort{ACM Trans. Arch. Code Optim.}%
980 \or % TALG
981 \def\@journalName{ACM Transactions on Algorithms}%
982 \def\@journalNameShort{ACM Trans. Algor.}%
983 \def\@permissionCodeOne{1549-6325}%
984 \or % TALLIP
985 \def\@journalName{ACM Transactions on Asian and Low-Resource Language Information Processing}%
986 \def\@journalNameShort{ACM Trans. Asian Low-Resour. Lang. Inf. Process.}%
987 \def\@permissionCodeOne{2375-4699}%
988 \or % TAP
989 \def\@journalName{ACM Transactions on Applied Perception}%
990 \or % TCPS
991 \def\@journalName{ACM Transactions on Cyber-Physical Systems}%
992 \or % TDS
993 \def\@journalName{ACM Transactions on Data Science}%
994 \def\@journalNameShort{ACM Trans. Data Sci.}%
995 \def\@permissionCodeOne{2577-3224}%
996 \or % TEAC
997 \def\@journalName{ACM Transactions on Economics and Computation}%
998 \or % TECS
999 \def\@journalName{ACM Transactions on Embedded Computing Systems}%
1000 \def\@journalNameShort{ACM Trans. Embedd. Comput. Syst.}%
1001 \def\@permissionCodeOne{1539-9087}%
1002 \or % THRI
1003 \def\@journalName{ACM Transactions on Human-Robot Interaction}%
1004 \def\@journalNameShort{ACM Trans. Hum.-Robot Interact.}%
1005 \def\@permissionCodeOne{2573-9522}%
1006 \or % TIIS
1007 \def\@journalName{ACM Transactions on Interactive Intelligent Systems}%
1008 \def\@journalNameShort{ACM Trans. Interact. Intell. Syst.}%
1009 \def\@permissionCodeOne{2160-6455}%
1010 \or % TIOT
1011 \def\@journalName{ACM Transactions on Internet of Things}%
1012 \def\@journalNameShort{ACM Trans. Internet Things}%

```

```

1013 \def\@permissionCodeOne{2577-6207}%
1014 \or % TISSEC
1015 \def\@journalName{ACM Transactions on Information and System Security}%
1016 \def\@journalNameShort{ACM Trans. Info. Syst. Sec.}%
1017 \def\@permissionCodeOne{1094-9224}%
1018 \or % TIST
1019 \def\@journalName{ACM Transactions on Intelligent Systems and Technology}%
1020 \def\@journalNameShort{ACM Trans. Intell. Syst. Technol.}%
1021 \def\@permissionCodeOne{2157-6904}%
1022 \or % TKDD
1023 \def\@journalName{ACM Transactions on Knowledge Discovery from Data}%
1024 \def\@journalNameShort{ACM Trans. Knowl. Discov. Data.}%
1025 \def\@permissionCodeOne{1556-4681}%
1026 \or % TMIS
1027 \def\@journalName{ACM Transactions on Management Information Systems}%
1028 \def\@journalNameShort{ACM Trans. Manag. Inform. Syst.}%
1029 \def\@permissionCodeOne{2158-656X}%
1030 \or % TOCE
1031 \def\@journalName{ACM Transactions on Computing Education}%
1032 \def\@journalNameShort{ACM Trans. Comput. Educ.}%
1033 \def\@permissionCodeOne{1946-6226}%
1034 \or % TOCHI
1035 \def\@journalName{ACM Transactions on Computer-Human Interaction}%
1036 \def\@journalNameShort{ACM Trans. Comput.-Hum. Interact.}%
1037 \def\@permissionCodeOne{1073-0516}%
1038 \or % TOCL
1039 \def\@journalName{ACM Transactions on Computational Logic}%
1040 \def\@journalNameShort{ACM Trans. Comput. Logic}%
1041 \def\@permissionCodeOne{1529-3785}%
1042 \or % TOCS
1043 \def\@journalName{ACM Transactions on Computer Systems}%
1044 \def\@journalNameShort{ACM Trans. Comput. Syst.}%
1045 \def\@permissionCodeOne{0734-2071}%
1046 \or % TOCT
1047 \def\@journalName{ACM Transactions on Computation Theory}%
1048 \def\@journalNameShort{ACM Trans. Comput. Theory}%
1049 \def\@permissionCodeOne{1942-3454}%
1050 \or % TODAES
1051 \def\@journalName{ACM Transactions on Design Automation of Electronic Systems}%
1052 \def\@journalNameShort{ACM Trans. Des. Autom. Electron. Syst.}%
1053 \def\@permissionCodeOne{1084-4309}%
1054 \or % TODS
1055 \def\@journalName{ACM Transactions on Database Systems}%
1056 \def\@journalNameShort{ACM Trans. Datab. Syst.}%
1057 \def\@permissionCodeOne{0362-5915}%
1058 \or % TOG
1059 \def\@journalName{ACM Transactions on Graphics}%
1060 \def\@journalNameShort{ACM Trans. Graph.}%
1061 \def\@permissionCodeOne{0730-0301}%
1062 \or % TOIS

```

```

1063 \def\@journalName{ACM Transactions on Information Systems}%
1064 \def\@permissionCodeOne{1046-8188}%
1065 \or % TOIT
1066 \def\@journalName{ACM Transactions on Internet Technology}%
1067 \def\@journalNameShort{ACM Trans. Internet Technol.}%
1068 \def\@permissionCodeOne{1533-5399}%
1069 \or % TOMACS
1070 \def\@journalName{ACM Transactions on Modeling and Computer Simulation}%
1071 \def\@journalNameShort{ACM Trans. Model. Comput. Simul.}%
1072 \or % TOMM
1073 \def\@journalName{ACM Transactions on Multimedia Computing, Communications and Applications}%
1074 \def\@journalNameShort{ACM Trans. Multimedia Comput. Commun. Appl.}%
1075 \def\@permissionCodeOne{1551-6857}%
1076 \def\@permissionCodeTwo{0100}%
1077 \or % TOMPECS
1078 \def\@journalName{ACM Transactions on Modeling and Performance Evaluation of Computing Systems}%
1079 \def\@journalNameShort{ACM Trans. Model. Perform. Eval. Comput. Syst.}%
1080 \def\@permissionCodeOne{2376-3639}%
1081 \or % TOMS
1082 \def\@journalName{ACM Transactions on Mathematical Software}%
1083 \def\@journalNameShort{ACM Trans. Math. Softw.}%
1084 \def\@permissionCodeOne{0098-3500}%
1085 \or % TOPC
1086 \def\@journalName{ACM Transactions on Parallel Computing}%
1087 \def\@journalNameShort{ACM Trans. Parallel Comput.}%
1088 \def\@permissionCodeOne{1539-9087}%
1089 \or % TOPS
1090 \def\@journalName{ACM Transactions on Privacy and Security}%
1091 \def\@journalNameShort{ACM Trans. Priv. Sec.}%
1092 \def\@permissionCodeOne{2471-2566}%
1093 \or % TOPLAS
1094 \def\@journalName{ACM Transactions on Programming Languages and Systems}%
1095 \def\@journalNameShort{ACM Trans. Program. Lang. Syst.}%
1096 \def\@permissionCodeOne{0164-0925}%
1097 \or % TOS
1098 \def\@journalName{ACM Transactions on Storage}%
1099 \def\@journalNameShort{ACM Trans. Storage}%
1100 \def\@permissionCodeOne{1553-3077}%
1101 \or % TOSEM
1102 \def\@journalName{ACM Transactions on Software Engineering and Methodology}%
1103 \def\@journalNameShort{ACM Trans. Softw. Eng. Methodol.}%
1104 \def\@permissionCodeOne{1049-331X}%
1105 \or % TOSN
1106 \def\@journalName{ACM Transactions on Sensor Networks}%
1107 \def\@journalNameShort{ACM Trans. Sensor Netw.}%
1108 \def\@permissionCodeOne{1550-4859}%
1109 \or % TRET
1110 \def\@journalName{ACM Transactions on Reconfigurable Technology and Systems}%
1111 \def\@journalNameShort{ACM Trans. Reconfig. Technol. Syst.}%
1112 \def\@permissionCodeOne{1936-7406}%

```



```

1113 \or % TSAS
1114 \def\@journalName{ACM Transactions on Spatial Algorithms and Systems}%
1115 \def\@journalNameShort{ACM Trans. Spatial Algorithms Syst.}%
1116 \def\@permissionCodeOne{2374-0353}%
1117 \or % TSC
1118 \def\@journalName{ACM Transactions on Social Computing}%
1119 \def\@journalNameShort{ACM Trans. Soc. Comput.}%
1120 \def\@permissionCodeOne{2469-7818}%
1121 \or % TSLP
1122 \def\@journalName{ACM Transactions on Speech and Language Processing}%
1123 \def\@journalNameShort{ACM Trans. Speech Lang. Process.}%
1124 \def\@permissionCodeOne{1550-4875}%
1125 \or % TWEB
1126 \def\@journalName{ACM Transactions on the Web}%
1127 \def\@journalNameShort{ACM Trans. Web}%
1128 \def\@permissionCodeOne{1559-1131}%
1129 \fi
1130 \ClassInfo{\@classname}{Using journal code \@journalCode}%
1131 }{%
1132 \ClassError{\@classname}{Incorrect journal #1}%
1133 }%

```

`\acmJournal` And the syntactic sugar around it

```
1134 \def\acmJournal#1{\setkeys{ACM}{acmJournal=#1}}
```

The defaults:

```

1135 \def\@journalCode@nr{0}
1136 \def\@journalName{}%
1137 \def\@journalNameShort{\@journalName}%
1138 \def\@permissionCodeOne{XXXX-XXXX}%
1139 \def\@permissionCodeTwo{}%

```

`\acmConference` This is the conference command

```

1140 \newcommand\acmConference[4][{}%
1141 \gdef\acmConference@shortname{#1}%
1142 \gdef\acmConference@name{#2}%
1143 \gdef\acmConference@date{#3}%
1144 \gdef\acmConference@venue{#4}%
1145 \ifx\acmConference@shortname\empty
1146 \gdef\acmConference@shortname{#2}%
1147 \fi}
1148 \acmConference[Conference'17]{ACM Conference}{July 2017}{Washington,
1149 DC, USA}

```

`\acmBooktitle` The book title of the conference:

```

\@acmBooktitle 1150 \def\acmBooktitle#1{\gdef\acmBooktitle{#1}}
1151 \acmBooktitle{Proceedings of \acmConference@name
1152 \ifx\acmConference@name\acmConference@shortname\else
1153 \ (\acmConference@shortname)\fi}

```

```

\@editorsAbbrev How to abbreviate editors
1154 \def\@editorsAbbrev{(Ed.)}

\@acmEditors The list of editors
1155 \def\@acmEditors{}

\editor Add a new editor to the list
1156 \def\editor#1{\ifx\@acmEditors\empty
1157   \gdef\@acmEditors{#1}%
1158   \else
1159     \gdef\@editorsAbbrev{(Eds.)}%
1160     \g@addto@macro\@acmEditors{\and#1}%
1161 \fi}

\subtitle The subtitle macro
1162 \def\subtitle#1{\def\@subtitle{#1}}
1163 \subtitle{}

\num@authorgroups The total number of “groups”. Each group is several authors with the same affiliations(s)
1164 \newcount\num@authorgroups
1165 \num@authorgroups=0\relax

\num@author The total number of authors
1166 \newcount\num@author
1167 \num@author=0\relax

\if@insideauthorgroup Whether we are continuing an author group
1168 \newif\if@insideauthorgroup
1169 \@insideauthorgroupfalse

\author Adding an author to the list of authors and addresses
1170 \renewcommand\author[2][{}]{%
1171   \IfSubStr{#2}{,}{\ClassWarning{\@classname}{Do not put several
1172     authors in the same \string\author\space macro!}}{}%
1173   \global\advance\num@author by 1\relax
1174   \if@insideauthorgroup\else
1175     \global\advance\num@authorgroups by 1\relax
1176     \global\@insideauthorgrouptrue
1177   \fi
1178   \ifx\addresses\empty
1179     \if@ACM@anonymous
1180       \gdef\addresses{\@author{Anonymous Author(s)}%
1181         \ifx\@acmSubmissionID\empty\else\Submission Id:
1182         \@acmSubmissionID\fi}}%
1183       \gdef\authors{Anonymous Author(s)}%
1184     \else
1185       \gdef\addresses{\@author{#2}}%
1186       \gdef\authors{#2}%

```

```

1187 \fi
1188 \else
1189 \if@ACM@anonymous\else
1190 \g@addto@macro\addresses{\and\@author{#2}}%
1191 \g@addto@macro\authors{\and#2}%
1192 \fi
1193 \fi
1194 \if@ACM@anonymous
1195 \ifx\shortauthors\@empty
1196 \gdef\shortauthors{Anon.
1197 \ifx\@acmSubmissionID\@empty\else Submission Id:
1198 \@acmSubmissionID\fi}%
1199 \fi
1200 \else
1201 \def\@tempa{#1}%
1202 \ifx\@tempa\@empty
1203 \ifx\shortauthors\@empty
1204 \gdef\shortauthors{#2}%
1205 \else
1206 \g@addto@macro\shortauthors{\and#2}%
1207 \fi
1208 \else
1209 \ifx\shortauthors\@empty
1210 \gdef\shortauthors{#1}%
1211 \else
1212 \g@addto@macro\shortauthors{\and#1}%
1213 \fi
1214 \fi
1215 \fi}

```

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

```

1216 \newcommand{\affiliation}[2][{}]{%
1217 \global\@insideauthorgroupfalse
1218 \if@ACM@anonymous\else
1219 \g@addto@macro\addresses{\affiliation{#1}{#2}}%
1220 \fi}

```

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

```

1221 \define@boolkey+{@ACM@affiliation@}[{@ACM@affiliation@}]{obeypunctuation}%
1222 [true]{\ClassError{\@classname}{The option obeypunctuation can be either true or false}}

```

`\additionalaffiliation` Additional affiliations go to footnotes

```

1223 \def\additionalaffiliation#1{\authornote{\@additionalaffiliation{#1}}}

```

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

```

1224 \def\@additionalaffiliation#1{\bgroup
1225 \def\position##1{\ignorespaces}%

```

```

1226 \def\institution##1{##1\ignorespaces}%
1227 \def\department{\@ifnextchar[{\@department}{\@department[]}}%
1228 \def\@department[##1]##2{\unskip, ##2\ignorespaces}%
1229 \let\streetaddress\position
1230 \let\city\position
1231 \let\state\position
1232 \let\postcode\position
1233 \let\country\position
1234 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.
1235 \renewcommand{\email}[2][{}]{%
1236 \IfSubStr{#2}{,}{\ClassWarning{\@classname}{Do not put several
1237 addresses in the same \string\email\space macro!}}{}%
1238 \if@ACM@anonymous\else
1239 \g@addto@macro\addresses{\email{#1}{#2}}%
1240 \fi}

\orcid Right now we do not typeset ORCIDs
1241 \def\orcid#1{\unskip\ignorespaces}

\authorsaddresses Setting up authors' addresses
1242 \def\authorsaddresses#1{\def\@authorsaddresses{#1}}
1243 \authorsaddresses{\mkauthorsaddresses}

\@titlenotes The title notes
1244 \def\@titlenotes{}

\@titlenote Adding a note to the title
1245 \def\@titlenote#1{%
1246 \g@addto@macro\@title{\footnotemark}%
1247 \if@ACM@anonymous
1248 \g@addto@macro\@titlenotes{%
1249 \stepcounter{footnote}\footnotetext{Title note}}%
1250 \else
1251 \g@addto@macro\@titlenotes{\stepcounter{footnote}\footnotetext{#1}}%
1252 \fi}

\@subtitlenotes The subtitle notes
1253 \def\@subtitlenotes{}

\@subtitlenote Adding a note to the subtitle
1254 \def\@subtitlenote#1{%
1255 \g@addto@macro\@subtitle{\footnotemark}%
1256 \if@ACM@anonymous
1257 \g@addto@macro\@subtitlenotes{%
1258 \stepcounter{footnote}\footnotetext{Subtitle note}}%
1259 \else

```

```

1260   \g@addto@macro\@subtitlenotes{%
1261     \stepcounter{footnote}\footnotetext{#1}}%
1262   \fi}

\@authornotes The author notes
1263 \def\@authornotes{}

\authornote Adding a note to the author
1264 \def\authornote#1{%
1265   \if@ACM@anonymous\else
1266     \g@addto@macro\addresses{\@authornotemark}%
1267     \g@addto@macro\@authornotes{%
1268       \stepcounter{footnote}\footnotetext{#1}}%
1269   \fi}

\authornotemark Adding a footnote mark to the authors
1270 \newcommand\authornotemark[1][\relax]{%
1271   \ifx#1\relax\relax\relax
1272     \g@addto@macro\addresses{\@authornotemark}%
1273   \else
1274     \g@addto@macro\addresses{\@authornotemark{#1}}%
1275   \fi}

\acmVolume The current volume
1276 \def\acmVolume#1{\def\@acmVolume{#1}}
1277 \acmVolume{1}

\acmNumber The current number
1278 \def\acmNumber#1{\def\@acmNumber{#1}}
1279 \acmNumber{1}

\acmArticle The current article
1280 \def\acmArticle#1{\def\@acmArticle{#1}}
1281 \acmArticle{}

\acmArticleSeq The sequence number
1282 \def\acmArticleSeq#1{\def\@acmArticleSeq{#1}}
1283 \acmArticleSeq{\@acmArticle}

\acmYear The current year
1284 \def\acmYear#1{\def\@acmYear{#1}}
1285 \acmYear{\the\year}

\acmMonth The current month
1286 \def\acmMonth#1{\def\@acmMonth{#1}}
1287 \acmMonth{\the\month}

```

`\@acmPubDate` The publication date
1288 `\def\@acmPubDate{\ifcase\@acmMonth\or`
1289 `January\or February\or March\or April\or May\or June\or`
1290 `July\or August\or September\or October\or November\or`
1291 `December\fi}\@acmYear}`

`\acmPrice` The price
1292 `\def\acmPrice#1{\def\@acmPrice{#1}}`
1293 `\acmPrice{15.00}`

`\acmSubmissionID` The submission ID
1294 `\def\acmSubmissionID#1{\def\@acmSubmissionID{#1}}`
1295 `\acmSubmissionID{}`

`\acmISBN` The book ISBN
1296 `\def\acmISBN#1{\def\@acmISBN{#1}}`
1297 `\acmISBN{978-x-xxxx-xxxx-x/YY/MM}`

`\acmDOI` The paper DOI
1298 `\def\acmDOI#1{\def\@acmDOI{#1}}`
1299 `\acmDOI{10.1145/nnnnnnn.nnnnnnn}`

`\if@ACM@badge` Whether to print a badge. Note that either a left or right badge triggers it:
1300 `\newif\if@ACM@badge`
1301 `\@ACM@badgefalse`

`\@ACM@badge@width` The width of the badge
1302 `\newlength\@ACM@badge@width`
1303 `\setlength\@ACM@badge@width{5pc}`

`\@ACM@title@width` The width of the badge
1304 `\newlength\@ACM@title@width`

`\@ACM@badge@skip` The space between the badge and the title
1305 `\newlength\@ACM@badge@skip`
1306 `\setlength\@ACM@badge@skip{1pc}`

`\acmBadgeR` Setting the right badge
1307 `\newcommand\acmBadgeR[2][\@ACM@badgetrue`
1308 `\def\@acmBadgeR@url{#1}%`
1309 `\def\@acmBadgeR@image{#2}}`
1310 `\def\@acmBadgeR@url{}`
1311 `\def\@acmBadgeR@image{}`

`\acmBadgeL` Setting the left badge
1312 `\newcommand\acmBadgeL[2][\@ACM@badgetrue`
1313 `\def\@acmBadgeL@url{#1}%`
1314 `\def\@acmBadgeL@image{#2}}`
1315 `\def\@acmBadgeL@url{}`
1316 `\def\@acmBadgeL@image{}`

`\startPage` The start page of the paper
1317 `\def\startPage#1{\def\@startPage{#1}}`
1318 `\startPage{}`

`\terms` Terms are obsolete. We use CCS now.
1319 `\def\terms#1{\ClassWarning{\@classname}{The command \string\terms{} is`
1320 `obsolete. I am going to ignore it}}`

`\keywords` Keywords are mostly obsolete. We use CCS now. Still it makes sense to keep them for compatibility.
1321 `\def\keywords#1{\def\@keywords{#1}}`
1322 `\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
1323 `\renewenvironment{abstract}{\Collect@Body\@saveabstract}{}`

`\@saveabstract` And saving the abstract
1324 `\long\def\@saveabstract#1{\long\gdef\@abstract{#1}}`
1325 `\@saveabstract{}`

`\@empty` The long version of `\@empty` (to compare with `\@abstract`)
1326 `\long\def\@empty{}`

`\if@ACM@printccs` Whether to print CCS
1327 `\define@boolkey+{@ACM@topmatter@}[@ACM@]{printccs}[true]{%`
1328 `\if@ACM@printccs`
1329 `\ClassInfo{\@classname}{Printing CCS}%`
1330 `\else`
1331 `\ClassInfo{\@classname}{Suppressing CCS}%`
1332 `\fi}{\ClassError{\@classname}{The option printccs can be either true or false}}`

`\if@ACM@printacmref` Whether to print the ACM bibstrip
1333 `\define@boolkey+{@ACM@topmatter@}[@ACM@]{printacmref}[true]{%`
1334 `\if@ACM@printacmref`
1335 `\ClassInfo{\@classname}{Printing bibformat}%`
1336 `\else`
1337 `\ClassInfo{\@classname}{Suppressing bibformat}%`
1338 `\fi}{\ClassError{\@classname}{The option printacmref can be either true or false}}`

`\if@ACM@printfolios` Whether to print folios
1339 `\define@boolkey+{@ACM@topmatter@}[@ACM@]{printfolios}[true]{%`
1340 `\if@ACM@printfolios`
1341 `\ClassInfo{\@classname}{Printing folios}%`
1342 `\else`
1343 `\ClassInfo{\@classname}{Suppressing folios}%`
1344 `\fi}{\ClassError{\@classname}{The option printfolios can be either true or false}}`

`\@ACM@authorsperrow` The number of authors per row. 0 means use the default algorithm.

```

1345 \define@cmdkey{@ACM@topmatter@}[@ACM@]{authorsperrow}[0]{%
1346   \IfInteger{#1}{\ClassInfo{\@classname}{Setting authorsperrow to
1347     #1}}{\ClassWarning{\@classname}{The parameter authorsperrow must be
1348     numerical. Ignoring the input #1}\gdef\@ACM@authorsperrow{0}}}
```

`\settopmatter` The usual syntactic sugar

```

1349 \def\settopmatter#1{\setkeys{@ACM@topmatter@}{#1}}
```

Now the settings

```

1350 \settopmatter{printccs=true, printacmref=true}
1351 \if@ACM@manuscript
1352   \settopmatter{printfolios=true}
1353 \else
1354   \if@ACM@journal
1355     \settopmatter{printfolios=true}
1356   \else
1357     \settopmatter{printfolios=false}
1358   \fi
1359 \fi
1360 \settopmatter{authorsperrow=0}
```

`\@received` The container for the paper history

```

1361 \def\@received{}
```

`\received` The `\received` command

```

1362 \newcommand\received[2][\def\@tempa{#1}%
1363   \ifx\@tempa\@empty
1364     \ifx\@received\@empty
1365       \gdef\@received{Received #2}%
1366     \else
1367       \g@addto@macro{\@received}{; revised #2}%
1368     \fi
1369   \else
1370     \ifx\@received\@empty
1371       \gdef\@received{#1 #2}%
1372     \else
1373       \g@addto@macro{\@received}{; #1 #2}%
1374     \fi
1375   \fi}
1376 \AtEndDocument{%
1377   \ifx\@received\@empty\else
1378     \par\bigskip\noindent\small\normalfont\@received\par
1379   \fi}
```

3.13 Concepts system

We exclude CCSXML stuff generated by the ACM system:


```

1380 \RequirePackage{comment}
1381 \excludecomment{CCSXML}

\@concepts This is the storage macro and counter for concepts
1382 \let\@concepts\empty
1383 \newcounter{@concepts}

\ccsdesc The first argument is the significance, the second is the concept(s)
1384 \newcommand\ccsdesc[2][100]{%
1385   \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!
1386 \RequirePackage{textcomp}
1387 \def\ccsdesc@parse#1~#2~#3~{%
1388   \stepcounter{@concepts}%
1389   \expandafter\ifx\csname CCS@General@#2\endcsname\relax
1390     \expandafter\gdef\csname CCS@General@#2\endcsname{\textbullet\
1391       \textbf{#2}}%
1392     \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{;}%
1393     \expandafter\gdef\csname CCS@Specific@#2\endcsname{}%
1394     \g@addto@macro{\@concepts}{\csname CCS@General@#2\endcsname
1395       \csname CCS@Punctuation@#2\endcsname
1396       \csname CCS@Specific@#2\endcsname}%
1397     \fi
1398     \ifx#3\relax\relax\else
1399       \expandafter\gdef\csname CCS@Punctuation@#2\endcsname{
1400         \textrightarrow\ }%
1401       \expandafter\g@addto@macro\expandafter{\csname CCS@Specific@#2\endcsname}{%
1402         \addtocounter{@concepts}{-1}%
1403         \ifnum#1>499\textbf{#3}\else
1404         \ifnum#1>299\textit{#3}\else
1405         #3\fi\fi\ifnum\value{@concepts}=0.\else; \fi}%
1406       \fi
1407 \ccsdesc@parse@finish}

\ccsdesc@parse@finish Gobble everything to \ccsdesc@parse@end
1408 \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
1409 \newif\if@printcopyright
1410 \@printcopyrighttrue

\if@printpermission Whether to print the permission block
1411 \newif\if@printpermission
1412 \@printpermissiontrue
```

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

1413 \newif\if@acmowned

1414 \@acmownedtrue

Keys:

```
1415 \define@choicekey*{ACM@}{acmcopyrightmode}[%
1416   \acm@copyrightinput\acm@copyrightmode]{none,%
1417   acmcopyright,acmlicensed,rightsretained,%
1418   usgov,usgovmixed,cagov,cagovmixed,licensedusgovmixed,%
1419   licensedcagov,licensedcagovmixed,othergov,licensedothergov,%
1420   iw3c2w3,iw3c2w3g}{%
1421   \@printpermissiontrue
1422   \@printcopyrighttrue
1423   \@acmownedtrue
1424   \ifnum\acm@copyrightmode=0\relax % none
1425   \@printpermissionfalse
1426   \@printcopyrightfalse
1427   \@acmownedfalse
1428   \fi
1429   \ifnum\acm@copyrightmode=2\relax % acmlicensed
1430   \@acmownedfalse
1431   \fi
1432   \ifnum\acm@copyrightmode=3\relax % rightsretained
1433   \@acmownedfalse
1434   \AtBeginDocument{\acmPrice{}}%
1435   \fi
1436   \ifnum\acm@copyrightmode=4\relax % usgov
1437   \@printpermissiontrue
1438   \@printcopyrightfalse
1439   \@acmownedfalse
1440   \AtBeginDocument{\acmPrice{}}%
1441   \fi
1442   \ifnum\acm@copyrightmode=6\relax % cagov
1443   \@acmownedfalse
1444   \fi
1445   \ifnum\acm@copyrightmode=8\relax % licensedusgovmixed
1446   \@acmownedfalse
1447   \fi
1448   \ifnum\acm@copyrightmode=9\relax % licensedcagov
1449   \@acmownedfalse
1450   \fi
1451   \ifnum\acm@copyrightmode=10\relax % licensedcagovmixed
1452   \@acmownedfalse
1453   \fi
1454   \ifnum\acm@copyrightmode=11\relax % othergov
1455   \@acmownedtrue
1456   \fi
1457   \ifnum\acm@copyrightmode=12\relax % licensedothergov
1458   \@acmownedfalse
1459   \fi
```

```

1460 \ifnum\acm@copyrightmode=13\relax % iw3c2w3
1461 \@acmownedfalse
1462 \AtBeginDocument{\acmPrice{}}%
1463 \fi
1464 \ifnum\acm@copyrightmode=14\relax % iw3c2w3g
1465 \@acmownedfalse
1466 \AtBeginDocument{\acmPrice{}}%
1467 \fi}

```

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

```

1468 \def\setcopyright#1{\setkeys{ACM@}{acmcopyrightmode=#1}}
1469 \setcopyright{acmcopyright}

```

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

```

1470 \def\@copyrightowner{%
1471 \ifcase\acm@copyrightmode\relax % none
1472 \or % acmcopyright
1473 Association for Computing Machinery.
1474 \or % acmlicensed
1475 Copyright held by the owner/author(s). Publication rights licensed to
1476 ACM\@.
1477 \or % rightsretained
1478 Copyright held by the owner/author(s).
1479 \or % usgov
1480 \or % usgovmixed
1481 Association for Computing Machinery.
1482 \or % cagov
1483 Crown in Right of Canada.
1484 \or %cagovmixed
1485 Association for Computing Machinery.
1486 \or %licensedusgovmixed
1487 Copyright held by the owner/author(s). Publication rights licensed to
1488 ACM\@.
1489 \or % licensedcagov
1490 Crown in Right of Canada. Publication rights licensed to
1491 ACM\@.
1492 \or %licensedcagovmixed
1493 Copyright held by the owner/author(s). Publication rights licensed to
1494 ACM\@.
1495 \or % othergov
1496 Association for Computing Machinery.
1497 \or % licensedothergov
1498 Copyright held by the owner/author(s). Publication rights licensed to
1499 ACM\@.
1500 \or % ic2w3www
1501 IW3C2 (International World Wide Web Conference Committee), published
1502 under Creative Commons CC-BY~4.0 License.
1503 \or % ic2w3wwwgoogle
1504 IW3C2 (International World Wide Web Conference Committee), published
1505 under Creative Commons CC-BY-NC-ND~4.0 License.

```

1506 \fi}

\@formatdoi Print a clickable DOI

1507 \def\@formatdoi#1{\url{https://doi.org/#1}}

\@copyrightpermission The canned permission block.

1508 \def\@copyrightpermission{%

1509 \ifcase\acm@copyrightmode\relax % none

1510 \or % acmcopyright

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1512 work for personal or classroom use is granted without fee provided
1513 that copies are not made or distributed for profit or commercial
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1536 and that copies bear this notice and the full citation on the first
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1538 honored. For all other uses, contact the
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1540 \or % usgov

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1546 \or % usgovmixed

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```

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1622 disseminate the work on their personal and corporate Web sites with
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1627 (CC-BY-NC-ND~4.0) license. Authors reserve their rights to
1628 disseminate the work on their personal and corporate Web sites with
1629 the appropriate attribution.
1630 \fi}

\copyrightyear By default, the copyright year is the same as \acmYear, but one can override this:
1631 \def\copyrightyear#1{\def\@copyrightyear{#1}}
1632 \copyrightyear{\@acmYear}

\@teaserfigures The teaser figures container
1633 \def\@teaserfigures{}

teaserfigure The teaser figure
1634 \newenvironment{teaserfigure}{\Collect@Body\@saveteaser}{}

\@saveteaser Saving the teaser
1635 \long\def\@saveteaser#1{\g@addto@macro\@teaserfigures{\@teaser{#1}}}}

\thanks We redefine amsart \thanks so the anonymous key works
1636 \renewcommand{\thanks}[1]{%
1637 \ifnotempty{#1}{%
1638 \if@ACM@anonymous
1639 \g@addto@macro\thankses{\thanks{A note}}%
1640 \else
1641 \g@addto@macro\thankses{\thanks{#1}}%
1642 \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⟩]`.

```
1643 \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.

```
1644 \def\maketitle{%
1645   \if@ACM@anonymous
1646     % Anonymize omission of \author-s
1647     \ifnum\@authorgroups=0\author{}\fi
1648   \fi
1649   \begingroup
1650   \let\@vspace\@vspace@orig
1651   \let\@vspacer\@vspacer@orig
1652   \let\@footnotemark\@footnotemark@nolink
1653   \let\@footnotetext\@footnotetext@nolink
1654   \renewcommand\thefootnote{\@fnsymbol\c@footnote}%
1655   \hsize=\textwidth
1656   \def\@makefnmark{\hbox{\@textsuperscript{\@thefnmark}}}%
1657   \@mktitle\if@ACM@sigchiamode\else\mkauthors\fi\mkteasers
1658   \@printtopmatter
1659   \if@ACM@sigchiamode\mkauthors\fi
1660   \setcounter{footnote}{0}%
1661   \def\@makefnmark{\hbox{\@textsuperscript{\normalfont\@thefnmark}}}%
1662   \@titlenotes
1663   \@subtitlenotes
1664   \@authornotes
1665   \let\@makefnmark\relax
1666   \let\@thefnmark\relax
1667   \let\@makefntext\noindent
1668   \ifx\@empty\thankses\else
1669     \footnotetextauthorsaddresses{%
1670       \def\par{\let\par\@par}\parindent\z@\@setthanks}%
1671   \fi
1672   \ifx\@empty\@authorsaddresses\else
1673     \if@ACM@anonymous\else
1674       \if@ACM@journal
1675         \footnotetextauthorsaddresses{%
1676           \def\par{\let\par\@par}\parindent\z@\@setauthorsaddresses}%
1677       \fi
1678     \fi
1679   \fi
1680   \if@ACM@nonacm\else\footnotetextcopyrightpermission{%
```

```

1681 \if@ACM@authordraft
1682     \raisebox{-2ex}[\z@][\z@]{\makebox[0pt][l]{\large\bfseries
1683         Unpublished working draft. Not for distribution.}}%
1684     \color[gray]{0.9}%
1685 \fi
1686 \parindent\z@\parskip0.1\baselineskip
1687 \if@ACM@authorversion\else
1688     \if@printpermission\@copyrightpermission\par\fi
1689 \fi
1690 \if@ACM@manuscript\else
1691     \if@ACM@journal\else % Print the conference information
1692     {\itshape \acmConference@shortname, \acmConference@date, \acmConference@venue}\par
1693     \fi
1694 \fi
1695 \if@printcopyright
1696     \copyright\ \@copyrightyear\ \@copyrightowner\
1697 \else
1698     \@copyrightyear.\
1699 \fi
1700 \if@ACM@manuscript
1701     Manuscript submitted to ACM\
1702 \else
1703     \if@ACM@authorversion
1704         This is the author's version of the work. It is posted here for
1705         your personal use. Not for redistribution. The definitive Version
1706         of Record was published in
1707         \if@ACM@journal
1708             \emph{\@journalName}%
1709         \else
1710             \emph{\@acmBooktitle}%
1711         \fi
1712         \ifx\@acmDOI\@empty
1713             .
1714         \else
1715             , \@formatdoi{\@acmDOI}.
1716         \fi\
1717     \else
1718         \if@ACM@nonacm\else
1719             \if@ACM@journal
1720                 \@permissionCodeOne/\@acmYear/\@acmMonth-ART\@acmArticle
1721                 \ifx\@acmPrice\@empty\else\ $\@acmPrice\fi\
1722                 \@formatdoi{\@acmDOI}%
1723             \else % Conference
1724                 \ifx\@acmISBN\@empty\else ACM~ISBN~\@acmISBN
1725                 \ifx\@acmPrice\@empty.\else\dots\$\@acmPrice\fi\fi
1726                 \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi%
1727             \fi
1728         \fi
1729     \fi
1730 \fi}

```



```

1731   \fi
1732 \endgroup
1733 \setcounter{footnote}{0}%
1734 \mkabstract
1735 \if@ACM@printccs
1736 \ifx\@concepts\@empty\else\bgroup
1737   {\@specialsection{CCS Concepts}%
1738     \@concepts\par}\egroup
1739   \fi
1740 \fi
1741 \ifx\@keywords\@empty\else\bgroup
1742   {\if@ACM@journal
1743     \@specialsection{Additional Key Words and Phrases}%
1744     \else
1745       \@specialsection{Keywords}%
1746     \fi
1747     \@keywords}\par\egroup
1748 \fi
1749 \andify\authors
1750 \andify\shortauthors
1751 \global\let\authors=\authors
1752 \global\let\shortauthors=\shortauthors
1753 \if@ACM@printacmref
1754   \mkbibcitation
1755 \fi
1756 \hypersetup{%
1757   pdfauthor={\authors},
1758   pdftitle={\@title},
1759   pdfsubject={\@concepts},
1760   pdfkeywords={\@keywords},
1761   pdfcreator={LaTeX with acmart
1762     \csname ver@acmart.cls\endcsname\space
1763     and hyperref
1764     \csname ver@hyperref.sty\endcsname}}%
1765 \global\@topnum\z@ % this prevents floats from falling
1766                   % at the top of page 1
1767 \global\@botnum\z@ % we do not want them to be on the bottom either
1768 \@printendtopmatter
1769 \@afterindentfalse
1770 \@afterheading
1771 }

```

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

```

1772 \def\@specialsection#1{%
1773   \ifcase\ACM@format@nr
1774     \relax % manuscript
1775     \par\medskip\small\noindent#1: %
1776     \or % acmsmall
1777     \par\medskip\small\noindent#1: %
1778     \or % acmlarge

```

```

1779 \par\medskip\small\noindent#1: %
1780 \or % acmtog
1781 \par\medskip\small\noindent#1: %
1782 \or % sigconf
1783 \section*{#1}%
1784 \or % siggraph
1785 \section*{#1}%
1786 \or % sigplan
1787 \paragraph*{#1}%
1788 \or % sigchi
1789 \section*{#1}%
1790 \or % sigchi-a
1791 \section*{#1}%
1792 \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.

```

1793 \def\@printtopmatter{%
1794 \ifx\@startPage\@empty
1795 \gdef\@startPage{1}%
1796 \else
1797 \setcounter{page}{\@startPage}%
1798 \fi
1799 \thispagestyle{firstpagestyle}%
1800 \noindent
1801 \ifcase\ACM@format@nr
1802 \relax % manuscript
1803 \box\mkttitle@bx\par
1804 \or % acmsmall
1805 \box\mkttitle@bx\par
1806 \or % acmlarge
1807 \box\mkttitle@bx\par
1808 \or % acmtog
1809 \twocolumn[\box\mkttitle@bx]%
1810 \or % sigconf
1811 \twocolumn[\box\mkttitle@bx]%
1812 \or % siggraph
1813 \twocolumn[\box\mkttitle@bx]%
1814 \or % sigplan
1815 \twocolumn[\box\mkttitle@bx]%
1816 \or % sigchi
1817 \twocolumn[\box\mkttitle@bx]%
1818 \or % sigchi-a
1819 \par\box\mkttitle@bx\par\bigskip
1820 \ifACM@badge
1821 \marginpar{\noindent
1822 \ifx\@acmBadgeL@image\@empty\else
1823 \href{\@acmBadgeL@url}{%
1824 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}%

```

```

1825         \hskip\@ACM@badge@skip
1826         \fi
1827         \ifx\@acmBadgeR@image\@empty\else
1828         \href{\@acmBadgeR@url}{%
1829         \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}%
1830         \fi}%
1831     \fi
1832 \fi
1833 }

\@mktitle The title of the article
1834 \def\@mktitle{%
1835     \ifcase\ACM@format@nr
1836     \relax % manuscript
1837     \@mktitle@i
1838     \or % acsmall
1839     \@mktitle@i
1840     \or % acmlarge
1841     \@mktitle@i
1842     \or % acmtog
1843     \@mktitle@i
1844     \or % sigconf
1845     \@mktitle@iii
1846     \or % siggraph
1847     \@mktitle@iii
1848     \or % sigplan
1849     \@mktitle@iii
1850     \or % sigchi
1851     \@mktitle@iii
1852     \or % sigchi-a
1853     \@mktitle@iv
1854     \fi
1855 }

\@titlefont The font to typeset the title
1856 \def\@titlefont{%
1857     \ifcase\ACM@format@nr
1858     \relax % manuscript
1859     \LARGE\sffamily\bfseries
1860     \or % acsmall
1861     \LARGE\sffamily\bfseries
1862     \or % acmlarge
1863     \LARGE\sffamily\bfseries
1864     \or % acmtog
1865     \Huge\sffamily
1866     \or % sigconf
1867     \Huge\sffamily\bfseries
1868     \or % siggraph
1869     \Huge\sffamily\bfseries
1870     \or % sigplan

```

```

1871 \Huge\bfseries
1872 \or % sigchi
1873 \Huge\sffamily\bfseries
1874 \or % sigchi-a
1875 \Huge\bfseries
1876 \fi}

```

`\@subtitlefont` The font to typeset the subtitle

```

1877 \def\@subtitlefont{\normalsize
1878 \ifcase\ACM@format@nr
1879 \relax % manuscript
1880 \mdseries
1881 \or % acmsmall
1882 \mdseries
1883 \or % acmlarge
1884 \mdseries
1885 \or % acmtog
1886 \LARGE
1887 \or % sigconf
1888 \LARGE\mdseries
1889 \or % siggraph
1890 \LARGE\mdseries
1891 \or % sigplan
1892 \LARGE\mdseries
1893 \or % sigchi
1894 \LARGE\mdseries
1895 \or % sigchi-a
1896 \mdseries
1897 \fi}

```

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

```

1898 \def\@mktitle@i{\hsize=\textwidth
1899 \@ACM@title@width=\hsize
1900 \ifx\@acmBadgeL@image\@empty\else
1901 \advance\@ACM@title@width by -\@ACM@badge@width
1902 \advance\@ACM@title@width by -\@ACM@badge@skip
1903 \fi
1904 \ifx\@acmBadgeR@image\@empty\else
1905 \advance\@ACM@title@width by -\@ACM@badge@width
1906 \advance\@ACM@title@width by -\@ACM@badge@skip
1907 \fi
1908 \setbox\mktitle@bx=\vbox{\noindent\@titlefont
1909 \ifx\@acmBadgeL@image\@empty\else
1910 \raisebox{-.5\baselineskip}[\z@][\z@]{\href{\@acmBadgeL@url}{%
1911 \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
1912 \hskip\@ACM@badge@skip
1913 \fi
1914 \parbox[t]{\@ACM@title@width}{\raggedright
1915 \@titlefont\noindent
1916 \@title

```

```

1917 \ifx\@subtitle\@empty\else
1918   \par\noindent{\@subtitlefont\@subtitle}
1919 \fi}%
1920 \ifx\@acmBadgeR@image\@empty\else
1921   \hskip\@ACM@badge@skip
1922   \raisebox{- .5\baselineskip}[\z@][\z@]{\href{\@acmBadgeR@url}{%
1923     \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
1924 \fi
1925 \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.
1926 \def\@mkttitle@iii{\hsize=\textwidth
1927   \setbox\mkttitle@bx=\vbox{\@titlefont\centering
1928     \@ACM@title@width=\hsize
1929     \if@ACM@badge
1930       \advance\@ACM@title@width by -2\@ACM@badge@width
1931       \advance\@ACM@title@width by -2\@ACM@badge@skip
1932       \parbox[b]{\@ACM@badge@width}{\strut
1933         \ifx\@acmBadgeL@image\@empty\else
1934           \raisebox{- .5\baselineskip}[\z@][\z@]{\href{\@acmBadgeL@url}{%
1935             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeL@image}}}%
1936         \fi}%
1937       \hskip\@ACM@badge@skip
1938     \fi
1939     \parbox[t]{\@ACM@title@width}{\centering\@titlefont
1940       \@title
1941       \ifx\@subtitle\@empty\else
1942         \par\noindent{\@subtitlefont\@subtitle}
1943       \fi
1944     }%
1945     \if@ACM@badge
1946       \hskip\@ACM@badge@skip
1947       \parbox[b]{\@ACM@badge@width}{\strut
1948         \ifx\@acmBadgeR@image\@empty\else
1949           \raisebox{- .5\baselineskip}[\z@][\z@]{\href{\@acmBadgeR@url}{%
1950             \includegraphics[width=\@ACM@badge@width]{\@acmBadgeR@image}}}%
1951         \fi}%
1952     \fi
1953     \par\bigskip}}%

\@mkttitle@iv The version of \@mkttitle for sigchi-a
1954 \def\@mkttitle@iv{\hsize=\textwidth
1955   \setbox\mkttitle@bx=\vbox{\raggedright\leftskip5pc\@titlefont
1956     \noindent\leavevmode\leaders\hrule height 2pt\hfill\kern0pt\par
1957     \noindent\@title
1958     \ifx\@subtitle\@empty\else

```

```

1959     \par\noindent\@subtitlefont\@subtitle
1960     \fi
1961     \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.

```

1962 \newbox\@ACM@commabox
1963 \def\@ACM@addtoaddress#1{%
1964     \ifvmode\else
1965         \if@ACM@affiliation@obexpunctuation\else
1966             \setbox\@ACM@commabox=\hbox{, }%
1967             \unskip\cleaders\copy\@ACM@commabox\hskip\wd\@ACM@commabox
1968         \fi\fi
1969     #1}

```

`\institution` `\position` `\department` Theoretically we can define the macros for `\affiliation` inside the `\@mkauthors`-style commands. However, this would lead to a strange error if an author uses them outside `\affiliation`. Of course we can make them produce an error message, but...

```

\streetaddress 1970 \def\streetaddress#1{\unskip\ignorespaces}
\city           1971 \def\postcode#1{\unskip\ignorespaces}
\state         1972 \if@ACM@journal
\postcode      1973 \def\position#1{\unskip\ignorespaces}
\country       1974 \def\institution#1{\unskip~#1\ignorespaces}
               1975 \def\city#1{\unskip\ignorespaces}
               1976 \def\state#1{\unskip\ignorespaces}
               1977 \newcommand\department[2][0]{\unskip\ignorespaces}
               1978 \def\country#1{\if@ACM@affiliation@obexpunctuation\else, \fi#1\ignorespaces}
               1979 \else
               1980 \def\position#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
               1981 \def\institution#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
               1982 \newcommand\department[2][0]{\if@ACM@affiliation@obexpunctuation
               1983     #2\else#2\par\fi}%
               1984 % \def\streetaddress#1{\if@ACM@affiliation@obexpunctuation#1\else#1\par\fi}%
               1985 \let\city\@ACM@addtoaddress
               1986 \let\state\@ACM@addtoaddress
               1987 % \def\postcode#1{\if@ACM@affiliation@obexpunctuation#1\else\unskip\space#1\fi}%
               1988 \let\country\@ACM@addtoaddress
               1989 \fi

```

`\@mkauthors` Typesetting the authors

```

1990 \def\@mkauthors{\begingroup
1991     \hsize=\textwidth
1992     \ifcase\ACM@format@nr

```

```

1993 \relax % manuscript
1994 \mkauthors@i
1995 \or % acsmall
1996 \mkauthors@i
1997 \or % acmlarge
1998 \mkauthors@i
1999 \or % acmtog
2000 \mkauthors@i
2001 \or % sigconf
2002 \mkauthors@iii
2003 \or % siggraph
2004 \mkauthors@iii
2005 \or % sigplan
2006 \mkauthors@iii
2007 \or % sigchi
2008 \mkauthors@iii
2009 \or % sigchi-a
2010 \mkauthors@iv
2011 \fi
2012 \endgroup
2013 }

```

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

```

2014 \def\@authorfont{\Large\sffamily}

```

\@affiliationfont Font for affiliations

```

2015 \def\@affiliationfont{\normalsize\normalfont}

```

Adjusting fonts for different formats

```

2016 \ifcase\ACM@format@nr
2017 \relax % manuscript
2018 \or % acsmall
2019 \def\@authorfont{\large\sffamily}
2020 \def\@affiliationfont{\small\normalfont}
2021 \or % acmlarge
2022 \or % acmtog
2023 \def\@authorfont{\LARGE\sffamily}
2024 \def\@affiliationfont{\large}
2025 \or % sigconf
2026 \def\@authorfont{\LARGE}
2027 \def\@affiliationfont{\large}
2028 \or % siggraph
2029 \def\@authorfont{\normalsize\normalfont}
2030 \def\@affiliationfont{\normalsize\normalfont}
2031 \or % sigplan
2032 \def\@authorfont{\Large\normalfont}
2033 \def\@affiliationfont{\normalsize\normalfont}
2034 \or % sigchi
2035 \def\@authorfont{\bfseries}

```

```

2036 \def\@affiliationfont{\mdseries}
2037 \or % sigchi-a
2038 \def\@authorfont{\bfseries}
2039 \def\@affiliationfont{\mdseries}
2040 \fi

```

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

```

2041 \def\@typeset@author@line{%
2042 \andify\@currentauthors\par\noindent
2043 \@currentauthors\def\@currentauthors{}}%
2044 \ifx\@currentaffiliations\@empty\else
2045 \andify\@currentaffiliations
2046 \unskip, {\@currentaffiliations}\par
2047 \fi
2048 \def\@currentaffiliations{}}

```

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

```

2049 \def\@mkauthors@i{%
2050 \def\@currentauthors{}}%
2051 \def\@currentaffiliations{}}%
2052 \global\let\and\@typeset@author@line
2053 \def\@author##1{%
2054 \ifx\@currentauthors\@empty
2055 \gdef\@currentauthors{\@authorfont\MakeTextUppercase{##1}}%
2056 \else
2057 \g@addto@macro{\@currentauthors}{\and\MakeTextUppercase{##1}}%
2058 \fi
2059 \gdef\and{}}%
2060 \def\email##1##2{%
2061 \def\affiliation##1##2{%
2062 \def\@tempa{##2}\ifx\@tempa\@empty\else
2063 \ifx\@currentaffiliations\@empty
2064 \gdef\@currentaffiliations{%
2065 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2066 \setkeys{@ACM@affiliation@}{##1}%
2067 \@affiliationfont##2}%
2068 \else
2069 \g@addto@macro{\@currentaffiliations}{\and
2070 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2071 \setkeys{@ACM@affiliation@}{##1}##2}%
2072 \fi
2073 \fi
2074 \global\let\and\@typeset@author@line}%
2075 \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par\medskip
2076 \noindent\addresses\@typeset@author@line
2077 \par\medskip}%
2078 }

```


`\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
2079 `\newbox\author@bx`

`\author@bx@wd` The width of the author box
2080 `\newdimen\author@bx@wd`

`\author@bx@sep` The separation between author boxes
2081 `\newskip\author@bx@sep`
2082 `\author@bx@sep=1pc\relax`

`\typeset@author@bx` Typesetting the box with authors. Note that in sigchi-a the box is not centered.
2083 `\def\typeset@author@bx{\bgroup\hsize=\author@bx@wd\def\and{\par}%`
2084 `\global\setbox\author@bx=\vtop{\if@ACM@sigchiamode\else\centering\fi`
2085 `\@authorfont\@currentauthors\par\@affiliationfont`
2086 `\@currentaffiliation}\egroup`
2087 `\box\author@bx\hspace{\author@bx@sep}%`
2088 `\gdef\@currentauthors{}`
2089 `\gdef\@currentaffiliation{}}`

`\mkauthors@iii` The sigconf version. Here we use a centered design with each author in a separate box.
2090 `\def\mkauthors@iii{%`

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

2091 `\author@bx@wd=\textwidth\relax`
2092 `\advance\author@bx@wd by -\author@bx@sep\relax`
2093 `\ifnum\@ACM@authorsperrow>0\relax`
2094 `\divide\author@bx@wd by \@ACM@authorsperrow\relax`
2095 `\else`
2096 `\ifcase\@num@authorgroups`
2097 `\relax % 0?`
2098 `\or % 1=one author per row`
2099 `\or % 2=two authors per row`
2100 `\divide\author@bx@wd by \@num@authorgroups\relax`
2101 `\or % 3=three authors per row`
2102 `\divide\author@bx@wd by \@num@authorgroups\relax`
2103 `\or % 4=two authors per row (!)`
2104 `\divide\author@bx@wd by 2\relax`
2105 `\else % three authors per row`
2106 `\divide\author@bx@wd by 3\relax`
2107 `\fi`
2108 `\fi`
2109 `\advance\author@bx@wd by -\author@bx@sep\relax`

Now, parsing of \addresses:

```

2110 \gdef\@currentauthors{}%
2111 \gdef\@currentaffiliation{}%
2112 \def\@author##1{\ifx\@currentauthors\@empty
2113 \gdef\@currentauthors{\par##1}%
2114 \else
2115 \g@addto@macro\@currentauthors{\par##1}%
2116 \fi
2117 \gdef\and{}}%
2118 \def\email##1##2{\ifx\@currentaffiliation\@empty
2119 \gdef\@currentaffiliation{\bgroup
2120 \mathchardef\UrlBreakPenalty=10000\nolinkurl{##2}\egroup}%
2121 \else
2122 \g@addto@macro\@currentaffiliation{\par\bgroup
2123 \mathchardef\UrlBreakPenalty=10000\nolinkurl{##2}\egroup}%
2124 \fi}%
2125 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
2126 \gdef\@currentaffiliation{%
2127 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2128 \setkeys{@ACM@affiliation@}{##1}##2}%
2129 \else
2130 \g@addto@macro\@currentaffiliation{\par
2131 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2132 \setkeys{@ACM@affiliation@}{##1}##2}%
2133 \fi
2134 \global\let\and\@typeset@author@bx
2135 }%

```

Actual typesetting is done by the \and macro:

```

2136 \hsize=\textwidth
2137 \global\setbox\mktitle@bx=\vbox{\noindent
2138 \box\mktitle@bx\par\medskip\leavevmode
2139 \lineskip=1pc\relax\centering\hspace*{-1em}%
2140 \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.

```
2141 \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 $(\text{width} - \text{margin})/N - \text{margin}$, where N is the number of boxes per row.

```

2142 \author@bx@wd=\columnwidth\relax
2143 \advance\author@bx@wd by -\author@bx@sep\relax
2144 \ifnum\@ACM@authorsperrow>0\relax
2145 \divide\author@bx@wd by \@ACM@authorsperrow\relax
2146 \else
2147 \ifcase\@num@authorgroups
2148 \relax % 0?

```

```

2149 \or % 1=one author per row
2150 \else % 2=two authors per row
2151 \divide\author@bx@wd by 2\relax
2152 \fi
2153 \fi
2154 \advance\author@bx@wd by -\author@bx@sep\relax

```

Now, parsing of \addresses:

```

2155 \gdef\@currentauthors{}%
2156 \gdef\@currentaffiliation{}%
2157 \def\@author##1{\ifx\@currentauthors\@empty
2158 \gdef\@currentauthors{\par##1}%
2159 \else
2160 \g@addto@macro\@currentauthors{\par##1}%
2161 \fi
2162 \gdef\and{}}%
2163 \def\email##1##2{\ifx\@currentaffiliation\@empty
2164 \gdef\@currentaffiliation{\nolinkurl{##2}}%
2165 \else
2166 \g@addto@macro\@currentaffiliation{\par\nolinkurl{##2}}%
2167 \fi}%
2168 \def\affiliation##1##2{\ifx\@currentaffiliation\@empty
2169 \gdef\@currentaffiliation{%
2170 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2171 \setkeys{@ACM@affiliation@}{##1}##2}%
2172 \else
2173 \g@addto@macro\@currentaffiliation{\par
2174 \setkeys{@ACM@affiliation@}{obeypunctuation=false}%
2175 \setkeys{@ACM@affiliation@}{##1}##2}%
2176 \fi
2177 \global\let\and\@typeset@author@bx}%
2178 %

```

Actual typesetting is done by the \and macro

```

2179 \bgroup\hsize=\columnwidth
2180 \par\raggedright\leftskip=\z@
2181 \lineskip=1pc\noindent
2182 \addresses\let\and\@typeset@author@bx\and\par\bigskip\egroup}

```

\@mkauthorsaddresses Typesetting authors' addresses in the footnote style

```

2183 \def\@mkauthorsaddresses{%
2184 \ifnum\num@authors>1\relax
2185 Authors' \else Author's \fi
2186 \ifnum\num@authorgroups>1\relax
2187 addresses: \else address: \fi
2188 \bgroup
2189 \def\streetaddress##1{\unskip\@addpunct, ##1}%
2190 \def\postcode##1{\unskip\@addpunct, ##1}%
2191 \def\position##1{\unskip\ignorespaces}%
2192 \def\institution##1{\unskip\@addpunct, ##1}%

```

```

2193 \def\city##1{\unskip\@addpunct, ##1}%
2194 \def\state##1{\unskip\@addpunct, ##1}%
2195 \renewcommand\department[2][0]{\unskip\@addpunct, ##2}%
2196 \def\country##1{\unskip\@addpunct, ##1}%
2197 \def\and{\unskip\@addpunct; }%
2198 \def\@author##1{##1}%
2199 \def\email##1##2{\unskip\@addpunct, \nolinkurl{##2}}%
2200 \addresses
2201 \egroup}

\@setaddresses This is an amsart macro that we do not need.
2202 \def\@setaddresses{}

\@authornotemark Adding a footnote mark to authors. This version adds a “normal” footnote mark.
2203 \def\@authornotemark{\g@addto@macro\@currentauthors{\footnotemark\relax}}

\@@authornotemark Adding a footnote mark to authors with a given number
2204 \def\@@authornotemark#1{\g@addto@macro\@currentauthors{\footnotemark[#1]}}

\@mkteasers Typesetting the teasers
2205 \def\@mkteasers{%
2206   \ifx\@teaserfigures\@empty\else
2207     \def\@teaser##1{\par\bigskip\bgroup
2208       \captionsetup{type=figure}##1\egroup\par}
2209     \global\setbox\mktitle@bx=\vbox{\noindent\box\mktitle@bx\par
2210       \noindent\@Description@presentfalse
2211       \@teaserfigures\par\if@Description@present\else
2212         \global\@undescrbed@imagestrue
2213         \ClassWarning{\@classname}{A possible image without
2214           description}\fi
2215       \medskip}%
2216     \fi}

\@mkabstract Typesetting the abstract
2217 \def\@mkabstract{\bgroup
2218   \ifx\@abstract\@empty\else
2219     {\phantomsection\addcontentsline{toc}{section}{Abstract}%
2220     \if@ACM@journal
2221       \everypar{\setbox\z@\lastbox\everypar{}}\small
2222     \else
2223       \section*{\abstractname}%
2224     \fi
2225     \ignorespaces\@abstract\par}%
2226   \fi\egroup}

\@mkbibcitation Print the bibcitation format
2227 \def\@mkbibcitation{\bgroup
2228   \let\@vspace\@vspace@orig
2229   \let\@vspacer\@vspacer@orig

```

```

2230 \def\@pages@word{\ifnum\getrefnumber{TotPages}=1\relax page\else pages\fi}%
2231 \def\footnotemark{}%
2232 \def\{\unskip}\ignorespaces}%
2233 \def\footnote{\ClassError{\@classname}{Please do not use footnotes
2234     inside a \string\title{} or \string\author{} command! Use
2235     \string\titlenote{} or \string\authornote{} instead!}}%
2236 \def\@article@string{\ifx\@acmArticle\@empty{\ } \else,
2237     Article~\@acmArticle\ \fi}%
2238 \par\medskip\small\noindent{\bfseries ACM Reference Format:}\par\nobreak
2239 \noindent\bgroup
2240     \def\{\unskip}, \ignorespaces\authors\egroup. \@acmYear. \@title
2241     \ifx\@subtitle\@empty. \else: \@subtitle. \fi
2242     \if@ACM@nonacm\else
2243         % The 'nonacm' option disables 'printacmref' by default,
2244         % and the present \mkbibcitation definition is never used
2245         % in this case. The conditional remains useful if the user
2246         % explicitly sets \settopmatter{printacmref=true}.
2247         \if@ACM@journal
2248             \textit{\@journalNameShort}
2249             \@acmVolume, \@acmNumber \@article@string (\@acmPubDate),
2250             \ref{TotPages}~\@pages@word.
2251         \else
2252             In \textit{\@acmBooktitle}%
2253             \ifx\@acmEditors\@empty\textit{.}\else
2254                 \andify\@acmEditors\textit{, }\@acmEditors~\@editorsAbbrev.%
2255             \fi\
2256             ACM, New York, NY, USA%
2257             \@article@string\unskip, \ref{TotPages}~\@pages@word.
2258         \fi
2259     \fi
2260     \ifx\@acmDOI\@empty\else\@formatdoi{\@acmDOI}\fi
2261 \par\egroup}

```

\@printendtopmatter End the top matter

```

2262 \def\@printendtopmatter{\bgroup
2263     \let\@vspace\@vspace@orig
2264     \let\@vspacer\@vspacer@orig
2265     \par\bigskip
2266     \egroup}

```

\@setthanks We redefine \setthanks using \long

```

2267 \def\@setthanks{\long\def\thanks##1{\par##1\@addpunct.}\thankses}

```

\@setauthorsaddresses

```

2268 \def\@setauthorsaddresses{\@authorsaddresses\unskip\@addpunct.}

```

3.16 Headers and Footers

We use fancyhdr for our headers and footers:

```

2269 \RequirePackage{fancyhdr}

```

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

```
2270 \if@ACM@review
2271   \newsavebox{\ACM@linecount@bx}
2272   \newlength\ACM@linecount@bxht
2273   \newcount\ACM@linecount
2274   \ACM@linecount\@ne\relax
2275   \def\ACM@mk@linecount{%
2276     \savebox{\ACM@linecount@bx}[4em][t]{\parbox[t]{4em}{%
2277       \setlength{\ACM@linecount@bxht}{0pt}%
2278       \loop{\color{red}\scriptsize\the\ACM@linecount}\
2279       \global\advance\ACM@linecount by \@ne
2280       \addtolength{\ACM@linecount@bxht}{\baselineskip}%
2281       \ifdim\ACM@linecount@bxht<\textheight\repeat
2282       {\color{red}\scriptsize\the\ACM@linecount}\hfill
2283       \global\advance\ACM@linecount by \@ne}}%
2284   \fi
```

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

```
2285 \def\ACM@linecountL{%
2286   \if@ACM@review
2287     \ACM@mk@linecount
2288     \begin{picture}(0,0)%
2289       \put(-26,-22){\usebox{\ACM@linecount@bx}}%
2290     \end{picture}%
2291   \fi}
```

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

```
2292 \def\ACM@linecountR{%
2293   \if@ACM@review
2294     \ACM@mk@linecount
2295     \begin{picture}(0,0)%
2296       \put(20,-22){\usebox{\ACM@linecount@bx}}%
2297     \end{picture}%
2298   \fi}
```

`\ACM@timestamp` The timestamp system

```
2299 \if@ACM@timestamp
2300   % Subtracting 30 from \time gives us the effect of rounding down despite
2301   % \numexpr rounding to nearest
2302   \newcounter{ACM@time@hours}
2303   \setcounter{ACM@time@hours}{\numexpr (\time - 30) / 60 \relax}
2304   \newcounter{ACM@time@minutes}
2305   \setcounter{ACM@time@minutes}{\numexpr \time - \theACM@time@hours * 60 \relax}
2306   \newcommand\ACM@timestamp{%
2307     \footnotesize%
2308     \ifx\@acmSubmissionID\@empty\relax\else
2309       Submission ID: \@acmSubmissionID.{ }%
2310     \fi
2311     \the\year-\two@digits{\the\month}-\two@digits{\the\day}{ }%
```

```

2312 \two@digits{\theACM@time@hours}:\two@digits{\theACM@time@minutes}{. }%
2313 Page \thepage\ of \@startPage--\pageref*{TotPages}.%
2314 }
2315 \fi

```

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

```

2316 \def\@shortauthors{%
2317 \if@ACM@anonymous
2318 Anon.
2319 \ifx\@acmSubmissionID\@empty\else Submission Id: \@acmSubmissionID\fi
2320 \else\@shortauthors\fi}

```

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

```

2321 \def\@headfootfont{\sffamily}

```

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

```

2322 \fancypagestyle{standardpagestyle}{%
2323 \fancyhf{}%
2324 \renewcommand{\headrulewidth}{\z@}%
2325 \renewcommand{\footrulewidth}{\z@}%
2326 \def\@acmArticlePage{%
2327 \ifx\@acmArticle\empty%
2328 \if@ACM@printfolios\thepage\fi%
2329 \else%
2330 \@acmArticle\if@ACM@printfolios:\thepage\fi%
2331 \fi%
2332 }
2333 \ifcase\ACM@format@nr
2334 \relax % manuscript
2335 \fancyhead[LE]{\ACM@linecountL\if@ACM@printfolios\thepage\fi}%
2336 \fancyhead[RO]{\if@ACM@printfolios\thepage\fi}%
2337 \fancyhead[RE]{\@shortauthors}%
2338 \fancyhead[LO]{\ACM@linecountL\shorttitle}%
2339 \if@ACM@nonacm\else%
2340 \fancyfoot[RO,LE]{\footnotesize Manuscript submitted to ACM}
2341 \fi%
2342 \or % acmsmall
2343 \fancyhead[LE]{\ACM@linecountL\@headfootfont\@acmArticlePage}%
2344 \fancyhead[RO]{\@headfootfont\@acmArticlePage}%
2345 \fancyhead[RE]{\@headfootfont\@shortauthors}%
2346 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2347 \if@ACM@nonacm\else%
2348 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2349 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2350 \fi%
2351 \or % acmlarge
2352 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2353 \@acmArticlePage\quad\textbullet\quad\@shortauthors}%

```

```

2354 \fancyhead[LO]{\ACM@linecountL}%
2355 \fancyhead[RO]{\@headfootfont
2356 \shorttitle\quad\textbullet\quad\@acmArticlePage}%
2357 \if@ACM@nonacm\else%
2358 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2359 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2360 \fi%
2361 \or % acmtog
2362 \fancyhead[LE]{\ACM@linecountL\@headfootfont
2363 \@acmArticlePage\quad\textbullet\quad\@shortauthors}%
2364 \fancyhead[LO]{\ACM@linecountL}%
2365 \fancyhead[RE]{\ACM@linecountR}%
2366 \fancyhead[RO]{\@headfootfont
2367 \shorttitle\quad\textbullet\quad\@acmArticlePage\ACM@linecountR}%
2368 \if@ACM@nonacm\else%
2369 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2370 \@acmNumber, Article \@acmArticle. Publication date: \@acmPubDate.}%
2371 \fi%
2372 \else % Proceedings
2373 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2374 \fancyhead[LO]{\ACM@linecountL\@headfootfont\shorttitle}%
2375 \fancyhead[RE]{\@headfootfont\@shortauthors\ACM@linecountR}%
2376 \if@ACM@nonacm\else%
2377 \fancyhead[LE]{\ACM@linecountL\@headfootfont\acmConference@shortname,
2378 \acmConference@date, \acmConference@venue}%
2379 \fancyhead[RO]{\@headfootfont\acmConference@shortname,
2380 \acmConference@date, \acmConference@venue\ACM@linecountR}%
2381 \fi%
2382 \fi
2383 \if@ACM@sigchiamode
2384 \fancyheadoffset[LL]{\dimexpr(\marginparsep+\marginparwidth)}%
2385 \fi
2386 \if@ACM@timestamp
2387 \fancyfoot[LO,RE]{\ACM@timestamp}
2388 \fi
2389 }
2390 \pagestyle{standardpagestyle}

```

```

\@folio@wd Folio blob width, height, offsets and max number
\@folio@ht 2391 \newdimen\@folio@wd
\@folio@voffset 2392 \@folio@wd=\z@
\@folio@max 2393 \newdimen\@folio@ht
2394 \@folio@ht=\z@
2395 \newdimen\@folio@voffset
2396 \@folio@voffset=\z@
2397 \def\@folio@max{1}
2398 \ifcase\ACM@format@nr
2399 \relax % manuscript
2400 \or % acmsmall
2401 \@folio@wd=45.75pt\relax

```



```

2402 \@folio@ht=1.25in\relax
2403 \@folio@voffset=.2in\relax
2404 \def\@folio@max{8}
2405 \or % acmlarge
2406 \@folio@wd=43.25pt\relax
2407 \@folio@ht=79pt\relax
2408 \@folio@voffset=.55in\relax
2409 \def\@folio@max{10}
2410 \fi

```

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

```

2411 \def\@folioblob{\@tempcnta=0\@acmArticleSeq\relax
2412 \ifnum\@tempcnta=0\relax\else
First, we calculate \@acmArticleSeq modulo \@folio@max
2413 \loop
2414 \ifnum\@tempcnta>\@folio@max\relax
2415 \advance\@tempcnta by - \@folio@max
2416 \repeat
2417 \advance\@tempcnta by -1\relax
2418 \@tempdima=\@folio@ht\relax
2419 \multiply\@tempdima by \the\@tempcnta\relax
2420 \advance\@tempdima by -\@folio@voffset\relax
2421 \begin{picture}(0,0)
2422 \makebox[\z@]{\raisebox{-\@tempdima}{%
2423 \rlap{%
2424 \raisebox{-0.45\@folio@ht}{\z@}[\z@]{%
2425 \rule{\@folio@wd}{\@folio@ht}}}%
2426 \parbox{\@folio@wd}{%
2427 \centering
2428 \textcolor{white}{\LARGE\sffamily\bfseries\@acmArticle}}}}
2429 \end{picture}\fi}
2430

```

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

```

2431 \fancypagestyle{firstpagestyle}{%
2432 \fancyhf{}%
2433 \renewcommand{\headrulewidth}{\z@}%
2434 \renewcommand{\footrulewidth}{\z@}%
2435 \ifcase\ACM@format@nr
2436 \relax % manuscript
2437 \fancyhead[L]{\ACM@linecountL}%
2438 \fancyfoot[RO,LE]{\if@ACM@printfolios\small\thepage\fi}%
2439 \if@ACM@nonacm\else%
2440 \fancyfoot[RE,LO]{\footnotesize Manuscript submitted to ACM}%
2441 \fi%
2442 \or % acmsmall
2443 \if@ACM@nonacm\else%
2444 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2445 \@acmNumber, Article \@acmArticle. Publication date:

```

```

2446     \@acmPubDate.}%
2447 \fi%
2448 \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2449 \fancyhead[LO]{\ACM@linecountL}%
2450 \fancyhead[RO]{\@folioblob}%
2451 \fancyheadoffset[RO,LE]{0.6\@folio@wd}%
2452 \or % acmlarge
2453 \if@ACM@nonacm\else%
2454 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2455     \@acmNumber, Article \@acmArticle. Publication date:
2456     \@acmPubDate.}%
2457 \fi%
2458 \fancyhead[RO]{\@folioblob}%
2459 \fancyhead[LE]{\ACM@linecountL\@folioblob}%
2460 \fancyhead[LO]{\ACM@linecountL}%
2461 \fancyheadoffset[RO,LE]{1.4\@folio@wd}%
2462 \or % acmtog
2463 \if@ACM@nonacm\else%
2464 \fancyfoot[RO,LE]{\footnotesize \@journalNameShort, Vol. \@acmVolume, No.
2465     \@acmNumber, Article \@acmArticle. Publication date:
2466     \@acmPubDate.}%
2467 \fi%
2468 \fancyhead[L]{\ACM@linecountL}%
2469 \fancyhead[R]{\ACM@linecountR}%
2470 \else % Conference proceedings
2471 \fancyhead[L]{\ACM@linecountL}%
2472 \fancyhead[R]{\ACM@linecountR}%
2473 \fancyfoot[C]{\if@ACM@printfolios\footnotesize\thepage\fi}%
2474 \fi
2475 \if@ACM@timestamp
2476 \ifnum\ACM@format@nr=0\relax % Manuscript
2477 \fancyfoot[LO,RE]{\ACM@timestamp\quad
2478     \if@ACM@nonacm\else
2479     \footnotesize Manuscript submitted to ACM
2480     \fi}
2481 \else
2482 \fancyfoot[LO,RE]{\ACM@timestamp}
2483 \fi
2484 \fi
2485 }

```

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

```

2486 \let\ACM@ps@plain\ps@plain
2487 \let\ACM@ps@myheadings\ps@myheadings
2488 \let\ACM@ps@headings\ps@headings
2489 \def\ACM@restore@pagestyle{%
2490     \let\ps@plain\ACM@ps@plain
2491     \let\ps@myheadings\ACM@ps@myheadings
2492     \let\ps@headings\ACM@ps@headings}
2493 \AtBeginDocument{\ACM@restore@pagestyle}

```

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`.

```
2494 \def\ACM@NRadjust#1{%
2495   \begingroup
2496   \expandafter\ifx\csname Sectionformat\endcsname\relax
2497   % do nothing when \Sectionformat is unknown
2498   \def\next{\endgroup #1}%
2499   \else
2500   \def\next{\endgroup
2501     \let\realSectionformat\Sectionformat
2502     \def\ACM@sect@format@{#1}%
2503     \let\Sectionformat\ACM@NR@adjustedSectionformat
2504     %% next lines added 2018-06-17 to ensure section number is styled
2505     \let\real@adddotafter\@adddotafter
2506     \let\@adddotafter\ACM@adddotafter
2507     #1{}% imposes the styles, but nullifies \MakeUppercase
2508     \let\@adddotafter\real@adddotafter
2509   }%
2510 \fi \next
2511 }
```

`\ACM@NR@adjustedSectionformat`

```
2512 \def\ACM@NR@adjustedSectionformat#1#2{%
2513   \realSectionformat{\ACM@sect@format{#1}}{#2}%
2514   \let\Sectionformat\realSectionformat}
2515 \DeclareRobustCommand{\ACM@sect@format}{\ACM@sect@format@}
2516 \def\ACM@sect@format@null#1{#1}
2517 \let\ACM@sect@format@\ACM@sect@format@null
```

```

2518 \AtBeginDocument{%
2519 \expandafter\ifx\cename LTX@adddotafter\endcename\relax
2520 \let\LTX@adddotafter\@adddotafter
2521 \fi
2522 }

```

\ACM@adddotafter

```

2523 \def\ACM@adddotafter#1{\ifx\relax#1\relax\else\LTX@adddotafter{#1}\fi}

```

Sectioning is different for different levels

```

2524 \renewcommand\section{\@startsection{section}{1}{\z@}%
2525 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2526 {.25\baselineskip}%
2527 {\ACM@NRadjust\@secfont}}
2528 \renewcommand\subsection{\@startsection{subsection}{2}{\z@}%
2529 {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2530 {.25\baselineskip}%
2531 {\ACM@NRadjust\@subsecfont}}
2532 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
2533 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2534 {-3.5\p@}%
2535 {\ACM@NRadjust{\@subsubsecfont\@adddotafter}}}}
2536 \renewcommand\paragraph{\@startsection{paragraph}{4}{\parindent}%
2537 {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2538 {-3.5\p@}%
2539 {\ACM@NRadjust{\@parfont\@adddotafter}}}}
2540 \renewcommand\part{\@startsection{part}{9}{\z@}%
2541 {-10\p@ \@plus -4\p@ \@minus -2\p@}%
2542 {4\p@}%
2543 {\ACM@NRadjust\@parfont}}

```

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

```

2544 \def\section@raggedright{\@rightskip\@flushglue
2545 \rightskip\@rightskip
2546 \leftskip\z@skip
2547 \parindent\z@}

```

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

```

\@subsecfont 2548 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
\@subsubsecfont 2549 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
\@parfont 2550 \def\@subsubsecfont{\sffamily\itshape}
2551 \def\@parfont{\itshape}
2552 \setcounter{secnumdepth}{3}
2553 \ifcase\ACM@format@nr
2554 \relax % manuscript
2555 \or % acsmall
2556 \or % acmlarge
2557 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2558 \def\@subsecfont{\sffamily\large\section@raggedright}

```

```

2559 \or % acmtog
2560 \def\@secfont{\sffamily\large\section@raggedright\MakeTextUppercase}
2561 \def\@subsecfont{\sffamily\large\section@raggedright}
2562 \or % sigconf
2563 \def\@secfont{\bfseries\Large\section@raggedright\MakeTextUppercase}
2564 \def\@subsecfont{\bfseries\Large\section@raggedright}
2565 \or % siggraph
2566 \def\@secfont{\sffamily\bfseries\Large\section@raggedright\MakeTextUppercase}
2567 \def\@subsecfont{\sffamily\bfseries\Large\section@raggedright}
2568 \or % sigplan
2569 \def\@secfont{\bfseries\Large\section@raggedright}
2570 \def\@subsecfont{\bfseries\section@raggedright}
2571 \renewcommand\subsubsection{\@startsection{subsubsection}{3}{\z@}%
2572   {- .75\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2573   {.25\baselineskip}%
2574   {\@subsubsecfont}}
2575 \def\@subsubsecfont{\bfseries\section@raggedright}
2576 \renewcommand\paragraph{\@startsection{paragraph}{4}{\z@}%
2577   {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2578   {-3.5\p@}%
2579   {\@parfont\@addspaceafter}}
2580 \def\@parfont{\bfseries\itshape}
2581 \renewcommand\subparagraph{\@startsection{subparagraph}{5}{\z@}%
2582   {- .5\baselineskip \@plus -2\p@ \@minus -.2\p@}%
2583   {-3.5\p@}%
2584   {\@subparfont\@addspaceafter}}
2585 \def\@subparfont{\itshape}
2586 \or % sigchi
2587 \setcounter{secnumdepth}{1}
2588 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2589 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2590 \or % sigchi-a
2591 \setcounter{secnumdepth}{0}
2592 \def\@secfont{\sffamily\bfseries\section@raggedright\MakeTextUppercase}
2593 \def\@subsecfont{\sffamily\bfseries\section@raggedright}
2594 \fi

```

`\@adddotafter` Add punctuation after a sectioning command

```
2595 \def\@adddotafter#1{#1\@addpunct{.}}
```

`\@addspaceafter` Add space after a sectioning command

```
2596 \def\@addspaceafter#1{#1\@addpunct{\enspace}}
```

3.18 TOC lists

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

2597 \providecommand*\dotsep{4.5}

3.19 Theorems

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

2598 \def\@acmplainbodyfont{\itshape}

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

2599 \def\@acmplainindent{\parindent}

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

2600 \def\@acmplainheadfont{\scshape}

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

2601 \def\@acmplainnotefont{\@empty}

Customization of the acmplain theorem style:

2602 \ifcase\ACM@format@nr

2603 \relax % manuscript

2604 \or % acmsmall

2605 \or % acmlarge

2606 \or % acmtog

2607 \or % sigconf

2608 \or % siggraph

2609 \or % sigplan

2610 \def\@acmplainbodyfont{\itshape}

2611 \def\@acmplainindent{\z@}

2612 \def\@acmplainheadfont{\bfseries}

2613 \def\@acmplainnotefont{\normalfont}

2614 \or % sigchi

2615 \or % sigchi-a

2616 \fi

acmplain The acmplain theorem style

2617 \newtheoremstyle{acmplain}%

2618 {.5\baselineskip\@plus.2\baselineskip

2619 \@minus.2\baselineskip}% space above

2620 {.5\baselineskip\@plus.2\baselineskip

2621 \@minus.2\baselineskip}% space below

2622 {\@acmplainbodyfont}% body font

2623 {\@acmplainindent}% indent amount

2624 {\@acmplainheadfont}% head font

2625 {.%} punctuation after head

2626 {.5em}% spacing after head

2627 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmplainnotefont(#3)}}}% head spec

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

2628 \def\@acmdefinitionbodyfont{\normalfont}

`\@acmdefinitionindent` The amount to indent the acmdefinition theorem style.
2629 `\def\@acmdefinitionindent{\parindent}`

`\@acmdefinitionheadfont` The font to typeset the head of the acmdefinition theorem style.
2630 `\def\@acmdefinitionheadfont{\itshape}`

`\@acmdefinitionnotefont` The font to typeset the note of the acmdefinition theorem style.
2631 `\def\@acmdefinitionnotefont{\@empty}`

Customization of the acmdefinition theorem style:

```

2632 \ifcase\ACM@format@nr
2633 \relax % manuscript
2634 \or % acsmall
2635 \or % acmlarge
2636 \or % acmtog
2637 \or % sigconf
2638 \or % siggraph
2639 \or % sigplan
2640 \def\@acmdefinitionbodyfont{\normalfont}
2641 \def\@acmdefinitionindent{\z@}
2642 \def\@acmdefinitionheadfont{\bfseries}
2643 \def\@acmdefinitionnotefont{\normalfont}
2644 \or % sigchi
2645 \or % sigchi-a
2646 \fi

```

`acmdefinition` The acmdefinition theorem style

```

2647 \newtheoremstyle{acmdefinition}%
2648 { .5\baselineskip\@plus.2\baselineskip
2649   \@minus.2\baselineskip}% space above
2650 { .5\baselineskip\@plus.2\baselineskip
2651   \@minus.2\baselineskip}% space below
2652 {\@acmdefinitionbodyfont}% body font
2653 {\@acmdefinitionindent}% indent amount
2654 {\@acmdefinitionheadfont}% head font
2655 {.%} punctuation after head
2656 {.5em}% spacing after head
2657 {\thmname{#1}\thmnumber{ #2}\thmnote{ {\@acmdefinitionnotefont(#3)}}}% head spec

```

Make `acmplain` the default theorem style.

```

2658 \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.

```

2659 \AtEndPreamble{%
2660   \if@ACM@acmthm
2661   \theoremstyle{acmplain}
2662   \@ifundefined{theorem}{%
2663     \newtheorem{theorem}{Theorem}[section]
2664   }{}
2665   \@ifundefined{conjecture}{%
2666     \newtheorem{conjecture}[theorem]{Conjecture}
2667   }{}
2668   \@ifundefined{proposition}{%
2669     \newtheorem{proposition}[theorem]{Proposition}
2670   }{}
2671   \@ifundefined{lemma}{%
2672     \newtheorem{lemma}[theorem]{Lemma}
2673   }{}
2674   \@ifundefined{corollary}{%
2675     \newtheorem{corollary}[theorem]{Corollary}
2676   }{}
2677   \theoremstyle{acmdefinition}
2678   \@ifundefined{example}{%
2679     \newtheorem{example}[theorem]{Example}
2680   }{}
2681   \@ifundefined{definition}{%
2682     \newtheorem{definition}[theorem]{Definition}
2683   }{}
2684   \fi
2685   \theoremstyle{acmplain}
2686 }

```

`\@proofnamefont` The font to typeset the proof name.
2687 \def\@proofnamefont{\scshape}

`\@proofindent` Whether or not to indent proofs.
2688 \def\@proofindent{\indent}

Customization of the proof environment.

```

2689 \ifcase\ACM@format@nr
2690 \relax % manuscript
2691 \or % acmsmall
2692 \or % acmlarge
2693 \or % acmtog
2694 \or % sigconf
2695 \or % siggraph
2696 \or % sigplan
2697   \def\@proofnamefont{\itshape}
2698   \def\@proofindent{\noindent}
2699 \or % sigchi

```



```

2700 \or % sigchi-a
2701 \fi

```

proof We want some customization of the proof environment.

```

2702 \renewenvironment{proof}[1][\proofname]{\par
2703   \pushQED{\qed}%
2704   \normalfont \topsep6\p@\@plus6\p@\relax
2705   \trivlist
2706   \item[\@proofindent\hskip\labelsep
2707     {\@proofnamefont #1\@addpunct{.}}]\ignorespaces
2708 }{%
2709   \popQED\endtrivlist\@endpfalse
2710 }

```

3.20 Balancing columns

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

```

2711 \AtEndPreamble{%
2712   \if@ACM@balance
2713     \ifcase\ACM@format@nr
2714       \relax % manuscript
2715         \global\@ACM@balancefalse
2716       \or % acmsmall
2717         \global\@ACM@balancefalse
2718       \or % acmlarge
2719         \global\@ACM@balancefalse
2720       \or % acmtog
2721         \RequirePackage{balance}%
2722       \or % sigconf
2723         \RequirePackage{balance}%
2724       \or % siggraph
2725         \RequirePackage{balance}%
2726       \or % sigplan
2727         \RequirePackage{balance}%
2728       \or % sigchi
2729         \RequirePackage{balance}%
2730       \or % sigchi-a
2731         \global\@ACM@balancefalse
2732     \fi
2733   \fi
2734 }
2735 \AtEndDocument{%
2736   \if@ACM@balance
2737     \if@twocolumn
2738       \balance
2739     \fi\fi}

```

3.21 Acknowledgments

`\acksname`
2740 `\newcommand\acksname{Acknowledgments}`

`\acks` This is a comment-like structure
2741 `\specialcomment{acks}{%`
2742 `\begingroup`
2743 `\section*{\acksname}`
2744 `\phantomsection\addcontentsline{toc}{section}{\acksname}`
2745 `}%`
2746 `\endgroup`
2747 `}`

`\grantsponsor` We just typeset the name of the sponsor
2748 `\def\grantsponsor#1#2#3{#2}`

`\grantnum`
2749 `\newcommand\grantnum[3][]{#3%`
2750 `\def\@tempa{#1}\ifx\@tempa\@empty\else\space(\url{#1})\fi}`

3.22 Conditional typesetting

We use the comment package for conditional typesetting:

```
2751 \AtEndPreamble{%
2752 \if@ACM@screen
2753 \includecomment{screenonly}
2754 \excludecomment{printonly}
2755 \else
2756 \excludecomment{screenonly}
2757 \includecomment{printonly}
2758 \fi
2759 \if@ACM@anonymous
2760 \excludecomment{anonsuppress}
2761 \excludecomment{acks}
2762 \else
2763 \includecomment{anonsuppress}
2764 \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/>).

```
2765 \newcommand\showeprint[2][arxiv]{%
2766 \def\@tempa{#1}%
2767 \ifx\@tempa\@empty\def\@tempa{arxiv}\fi
2768 \def\@tempb{arxiv}%
```

```

2769 \ifx\@tempa\@tempb
2770     arXiv:\href{http://arxiv.org/abs/#2}{#2}\else arXiv:#2%
2771 \fi}

```

3.24 End of Class

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

```

2772 \let\@vspace@orig=\@vspace
2773 \let\@vspacer@orig=\@vspacer
2774 \apptocmd{\@vspace}{\ClassWarning{\@classname}{\string\vspace\space should
2775     only be used to provide space above/below surrounding
2776     objects}}{}{}
2777 \apptocmd{\@vspacer}{\ClassWarning{\@classname}{\string\vspace\space should
2778     only be used to provide space above/below surrounding
2779     objects}}{}{}

```

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

```

2780 \let\ACM@origbaselinestretch\baselinestretch
2781 \AtEndDocument{\ifx\baselinestretch\ACM@origbaselinestretch\else
2782     \ClassError{\@classname}{An attempt to redefine
2783     \string\baselinestretch\space detected. Please do not do this for
2784     ACM submissions!}\fi}

```

```

2785 \normalsize\normalfont\frenchspacing
2786 </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] Christophe 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	Documentation changes (closes https://github.com/borisveytsman/acmart/issues/13)	30
	General: Added prologue option to xcolor	42
	Bib code cleanup (Zack Weinberg)	30
	Documentation update (siggraph)	30
1.49	v1.03	
	\@formatdoi: Added macro	68
	\if@ACM@authorversion: Added macro	32
1.53	\maketitle: Added special case of authorversion	71
	General: Added anonsuppress environment	30
1.54	Added authorversion option (closes https://github.com/borisveytsman/acmart/issues/9)	30
	General: Moved footnote stuff before hyperref call (Ross Moore)	30
1.56	General: Documented \Description	30
1.57	v1.04	
	\acmArticleSeq: Name change by Matthew Fluet	61
1.58	\acmDOI: Name change by Matthew Fluet	62
	\acmISBN: Name change by Matthew Fluet	62
	General: Updated bibliography for siggraph	30
	General: Changes in samples (Enrico Gregorio)	30
	New journal: HEALTH. TDS is renamed to TDSCI	30
v1.00	v1.05	
	General: Added processing doi numbers for acmsiggraph and doi numbers for sigproc.bib	30
v1.01	Patched \setcitestyle command; closes https://github.com/borisveytsman/acmart/issues/19	30
	General: Changed hyperref colors in screen mode (closes https://github.com/borisveytsman/acmart/issues/1)	30
	Defined ACM colors	30
	Explicitly put draft option (closes https://github.com/borisveytsman/acmart/issues/4)	33
	Set headheight to 1pc for all formats (closes https://github.com/borisveytsman/acmart/issues/5)	30
v1.02	v1.06	
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