Writing a Conference or Journal Paper

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Introduction
Why Good Writing is Important
Planning and Organizing
A Few Tips . . .
An Exercise
Collaborative Writing

Brief personal background . . .
I’ve written some papers,
Brief personal background . . .

- I’ve written *some* papers,
- I’ve read *many* papers, and
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- I’ve reviewed or served as editor for somewhere between *some* and *many* papers.
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- My own favorite:
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Much of the advice given here is “common wisdom,” some of it is my personal opinion, none of it is absolute.
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- Consult your adviser for her/his opinions.
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As you read papers, ask yourself “what do I like or dislike about the way the paper is written?”
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Develop your own style!
Overview

1. Why good writing is important
2. Planning and organizing
3. A few general tips
4. Some additional specific tips
5. An exercise
6. Collaborative writing
Some Resources

1. “Mathematical Writing” by Donald Knuth, Tracy Larrabee, and Paul Roberts
2. “Writing for Computer Science” by Justin Zobel, Springer
First a word on peer review . . .

- Conference papers
First a word on peer review . . .

- Conference papers
  - Paper reviewed quickly by $O(1)$ reviewers

- Journal papers
  - Paper reviewed slowly by $O(1)$ reviewers
  - Associate editor examines reviews and makes decision
  - Decision may be: Accept, small revisions and accept, major revisions and resubmit, reject
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Won’t good results just speak for themselves?

*No tale is so good that it can’t be spoiled in the telling.*  
–Proverb

- Peer reviewers are busy volunteers.
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- Peer reviewers are busy volunteers.
- Some reviewers will read your paper (too) quickly.
- Conference decisions are binary.
- Journal review is (generally) rigorous and *slooootively*. 
- Good writing can tilt a paper towards acceptance, bad writing can kill a paper.
Def 3: influence environment of instruction: For one certain compile instruction d, the aggregate of all environment units that may be changed after execution is called influence environment of instruction, written as Ins_Affect(d).
Each worker maintains two deques, the *now* and the *next* deque. Always the now deque is active, but execution of a frame may cause frames to be added to the next deque. When all the work
Some Real Examples

- \( \mathcal{P} \): Set of lightpaths in the logical topology.
- \( o(p) \) (\( l(p) \)): Originating (Terminating) node of logical edge \( p \).
- \( q \): Capacity of a lightpath using the OC-\( n \) notation.
- \( Q \): Set of all traffic requests.
- \( n_q \): The cardinality, \( |Q| \), of \( Q \).
- \( \mathcal{P} \): The cardinality, \( |\mathcal{P}| \), of \( \mathcal{P} \).
- \( s_q(d_q) \): Source (Destination) of traffic request \( q \).
- \( t_q \): Data communication rate for traffic request \( q \), using the OC-\( n \) notation.
- \( \mathbb{R} \): Number of link-disjoint routes through the physical topology to be considered for RWA between each ordered pair of end-nodes.
- \( D \): Fiber-lightpath incidence matrix with \( |E_P| \) rows and \( |\mathcal{P}| \times \mathbb{R} \) columns.
- \( d_{p,r}^e \): The element of matrix \( D \) in row \( e \in E_P \) and the column corresponding to logical edge \( p \in \mathcal{P} \) and route \( r, 1 \leq r \leq \mathbb{R} \). The element is defined as follows:

\[
d_{p,r}^e = \begin{cases} 
1 & \text{if the } r^{th} \text{ route through the physical topology for logical edge } p \text{ uses link } e, \\
0 & \text{otherwise.}
\end{cases}
\]

- \( \mathcal{A} \): A matrix with \( |E_P| \) rows and \( |\mathcal{P}| \) columns.
There are no Algorithms for Writing a Paper!
An Algorithm from a Writing Guide for Computer Scientists

Alg. 1 WriteTree(t)

Input: tree of ideas t
Output: scientific text s

begin
    Write title(n)
    if (n is not leaf node)
        begin
            Writing an introductory paragraph:
            Write content(n)
            for all u = child(n)
            Write title(u)
            for all u = child(n)
            WriteTree(u)
        end
    else
        Writing a main paragraph:
        Write content(n)
end
Planning the Writing Process

• Allow yourself time for friendly review and multiple drafts.
• Last minute writing for a conference deadline is no fun and often leads to errors.
There are No Writing Algorithms!
An Algorithm

write first draft;
repeat
    read it;
    comment on it;
    refine it;
until polished;
give it to friends, collaborators, adviser to critique;
refine it;
set it aside for a few days;
read it and refine it again;
Scheduling the Writing

- Make a schedule for yourself.
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- Make a schedule for yourself.
- Make arrangements *in advance* for others to read your drafts.
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- If you suffer from “writer’s block” set yourself small manageable milestones.
Scheduling the Writing

• Make a schedule for yourself.
• Make arrangements *in advance* for others to read your drafts.
• If you suffer from “writer’s block” set yourself small manageable milestones.
• Determine what other writing resources are available to you (e.g. a writing center).
A few questions to ask yourself before you begin...

- Who is my intended audience?
  - Computer scientists in general?
  - Researchers in the networking field?
  - Researchers in optical networking?
  - Researchers in the area of traffic grooming for wavelength division multiplexed (WDM) networks?
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- How much background and detail is appropriate for this audience? For example . . .
  - Do I need to explain depth-first search?
  - How much can I assume they know about networks, optical networks, WDM, traffic grooming?
Organizing the paper (one way)

1. Title
2. Abstract (write it last!)
3. Introduction
4. Related Work (sometimes at right before Conclusion)
5. Preliminaries, Notation, Problem Statement
6. Main Results
7. Experimental Results
8. Conclusion and Future Work
9. Bibliography
The Title

- A good title is:
  1. Short
  2. Descriptive
  3. Interesting (admittedly subjective!)
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- Examples (good or bad?):
  1. The Halting Problem is Undecidable
  2. A New Routing Algorithm
  3. Dynamic Routing in Hypercube WDM Networks using Online Minimum-Cost Network Flow
  4. Dynamic Routing in Hypercubic Optical Networks
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  4. *Dynamic Routing in Hypercubic Optical Networks*
The Abstract

Write it Last! (i.e. “We’ll come back to this later”)

Ran Libeskind-Hadas
Writing a Conference or Journal Paper
The Introduction

- Briefly motivate the problem that you are going to present.
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- State your problem.
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• Briefly motivate the problem that you are going to present.
• State your problem.
• Explain why the problem is important.
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The Introduction

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- Explain why the problem is important.
- State your results.
- Explain why your results are important.
- Some authors advocate stating the result and its significance immediately:

  This paper presents the design of a new multiplication circuit that has lower depth complexity than that of any existing design.
Related Work

- Try to organize and categorize the related work:

  Several authors examine the routing problem under the assumption that traffic is static [10, 13, 14, 15]. More recently, dynamic routing has been studied for several classes of regular networks [11, 15, 17]. In contrast to previous work, this paper . . . .
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• Avoid judging the related work (in public):

  Tintin and Haddock [15] give a preposterously inelegant solution . . .

  While Tintin and Haddock [15] gave the first correct solution, we offer a faster algorithm . . .
Preliminaries, Notation, and Problem Statement

- The introduction may describe your problem too informally for later use.
- A formal description may require some more details:
  1. Assumptions: State them explicitly!
  2. Notation: Choose it judiciously.
- The problem statement should be precise and easy to find.
We model a network with a directed acyclic graph (DAG) \( G = (V, E) \). Let \( M \) denote a \(|V| \times |V|\) matrix of non-negative integer values, where \( M_{ij} \) represents the amount of traffic to be sent from vertex \( i \) to vertex \( j \). We assume that each network link (edge) has an integer capacity and let \( C \) denote the maximum such capacity. A function \( f : E \rightarrow \{0, \ldots, C\} \) represents the amount of traffic routed on each edge.

The Maximum Traffic Routing Problem is formulated as follows: blah, blah, blah
The Main Results (Usually there’s a better name for this!)

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- Motivate first and give examples to support the precise technical content.
Think about organization in advance.

Use subsections to reflect your organization.

Motivate first and give examples to support the precise technical content.

Provide the reader with the intuitive ideas to help make sense of complicated machinery. Avoid the precise but dry model of: *Lemma, lemma, theorem, proof, corollary.*
Experimental Results

- Explain the objectives of the experiments.
Experimental Results

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- Explain the setup carefully. Ideally, enough information is provided to allow the results to be replicated.
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- Make sure that your graphs are clear, axes documented, captions provided, and every graph cited from within the text.
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- (Good) graphs are wonderful, but accompanying higher-level text is important too.
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- (Good) graphs are wonderful, but accompanying higher-level text is important too.
- Interpret findings. What does one learn from all of this data?
Conclusions and Future Research

- Remind the reader of the major contributions of the paper.
- Describe some interesting related problems for future work.
• Make sure that your literature search is thorough.
Bibliography

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- Cite *all* closely related papers, cite only representative major papers in more distant related work.
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• Cite all closely related papers, cite only representative major papers in more distant related work.
• Using Bibtex makes this relatively easy!
• Spell check very carefully. (Spell checkers can’t help you with names!) Some of the cited authors are likely to be reviewers!
Back to the Abstract!

- Keep it short (200 word limit is common, but that is usually way too long).
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- State your contributions and their significance.
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- Ask yourself “would I want to read a paper with this abstract?”
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• Ask yourself “would I want to read a paper with this abstract?”
• Read abstracts of other papers and ask yourself if they are effective.
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Use LaTeX

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- Look at LaTeX source of nicely done papers.
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Use \LaTeX

- Other programs may be easier at first, but the time savings of \LaTeX are very substantial over time (not to mention that it just looks so much better)!
- Look at \LaTeX source of nicely done papers.
- Use Bibtex for your bibliography and learn about tools to find Bibtex citations online.
- Learn to use other tools for graphics, plotting data, etc.
Basic Mechanics

- Check the spelling.
Basic Mechanics

• Check the spelling.
• Check grammar is wrong or not is, possibly with help from an expert.
  1. Do not assume that a “native” speaker is an authority!
  2. Do not assume that a “non-native” speaker is not highly qualified.

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Writing a Conference or Journal Paper
A Few Stylistic Suggestions

- Keep sentences short. Some variability in length is good, but very long sentences are difficult for the reader to parse and therefore have the potential of obfuscating the intent of the author, which is clearly undesirable in a peer reviewed paper, or, for that matter, in any written document, with the possible exception of legal documents where confusing the reader may in fact be part of the intent, although this assertion is certainly disputable.
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- Every paragraph should begin with a sentence that clearly describes the point of the paragraph and should end when the point is made:

  There are significant benefits in using optical interconnects in distributed memory parallel computers. First, .... Second, .... Finally, ....
A Few Stylistic Suggestions

- Motivate and recap.

We will now show that, under the assumptions described above, the network must have the property that blah, blah, blah. The idea behind the proof is blah, blah, blah. (Theorem and proof here)
Now that we know that the network has the blah, blah, blah property, we use this to show blah, blah, blah.
• Define terms and acronyms before first use. Use italics where term is defined (e.g. “A graph is said to be friendly if . . .” )
About English

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- Avoid repeating words – mix things up (e.g. “Thus”, “therefore”, “It follows”).
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- Define terms and acronyms before first use. Use italics where term is defined (e.g. “A graph is said to be friendly if . . .”)
- Never start a sentence with a symbol!
- Avoid repeating words – mix things up (e.g. “Thus”, “therefore”, “It follows”).
- Spell out small number (less than 10 or 100) unless they are measurements, digits, or references.
Common pitfalls in English Usage

- “Which” versus “that”
  
  *The lawn mower, which is by the garage, is broken.*
  
  *The lawn mower that is by the garage is broken.*
Common pitfalls in English Usage

- “Which” versus “that”
  The lawn mower, which is by the garage, is broken.
  The lawn mower that is by the garage is broken.

- “Fewer” versus “less”
  There are fewer computers in this room than in the other room.
  There are less computers in this room than in the other room.
• Provide prose to explain “difficult” or “scary” equations:

We now show that the average number of page faults incurred by the algorithm is upper-bounded by a logarithmic function of the number of memory accesses. More precisely, we show:

\[
\frac{1}{n} \sum_{i=1}^{n} \phi(i) \leq \frac{42}{3} \log_3 n + o(\log n)
\]
### About Mathematics

Keep your notation as simple and standard as possible:

<table>
<thead>
<tr>
<th>Notation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\mathbb{Z}$</td>
<td>The set of nodes in the network</td>
</tr>
<tr>
<td>$\mathcal{P}$</td>
<td>The host processor</td>
</tr>
<tr>
<td>$i$</td>
<td>The row containing the host processor</td>
</tr>
<tr>
<td>$j$</td>
<td>The column containing the host processor</td>
</tr>
<tr>
<td>$G_{V,E}$</td>
<td>The graph with vertex set $V$ and edge set $E$</td>
</tr>
<tr>
<td>$\pi^t_s$</td>
<td>The processor in row $s$ and column $t$ in the array</td>
</tr>
</tbody>
</table>
• Avoid unnecessary superscripts and subscripts:

Let $S$ denote a finite set of positive integers. For each $x_i$ in $S$, ...
About Mathematics

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  Let $S$ denote a finite set of positive integers. For each $x_i$ in $S$, ...

- Don’t introduce symbols unless you really need them!
  
  Let $n$ denote the cardinality of set $S$. If $n > 42$ ...

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About Mathematics

- Avoid unnecessary superscripts and subscripts:
  
  *Let* $S$ *denote a finite set of positive integers. For each* $x_i$ *in* $S$, . . .

- Don’t introduce symbols unless you really need them!
  
  *Let* $n$ *denote the cardinality of set* $S$. *If* $n > 42$ . . .

- Always define symbols before using them. Even the following can be confusing: “Now compute $2\alpha + \beta$, where $\alpha$ is . . .
About Mathematics

- Remind the reader of the meaning of a symbol before its first use:

  \[
  \text{Recall that } \alpha \text{ denotes the number of page faults incurred so far. Let } \beta = \sqrt{\alpha} \ldots
  \]
About Mathematics

- Remind the reader of the meaning of a symbol before its first use:

  \[ \text{Recall that } \alpha \text{ denotes the number of page faults incurred so far. Let } \beta = \sqrt{\alpha} \ldots. \]

- Avoid “recycling” symbols

  \[ \text{Let } n \text{ denote the number of elements in set } S. \quad (\text{AND LATER} \ldots) \]
  \[ \text{Consider a graph } G = (V, E) \text{ where } |V| = n. \]
Be aware of scope:

A graph is said to be friendly if . . . . Let $\alpha$ denote the average degree of a vertex. Let $\beta$ denote the maximum degree of a vertex in a largest connected component.

**Theorem**

*Given a friendly graph $G = (V, E)$, $m < n^{\alpha} - \beta$*
About Mathematics

Be aware of scope:

**Theorem**

*Given a friendly graph* $G = (V, E)$ *where* $n = |V|$, $m = |E|$, $\alpha$ *is the average degree of a vertex, and* $\beta$ *is the maximum degree of a vertex in a largest connected component,*

$$m < n^\alpha - \beta$$
An Exercise!

Ran Libeskind-Hadas

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Collaborative Writing

- Appoint an “editor”.
Collaborative Writing

- Appoint an “editor”.
- Decide on notation in advance.
Collaborative Writing

- Appoint an “editor”.
- Decide on notation in advance.
- Decide on additional stylistic conventions.
Collaborative Writing

- Appoint an “editor”.
- Decide on notation in advance.
- Decide on additional stylistic conventions.
- Editor produces draft.
Collaborative Writing

- Appoint an “editor”.
- Decide on notation in advance.
- Decide on additional stylistic conventions.
- Editor produces draft.
- Repeat read, comment, edit.
Collaborative Writing

- Appoint an “editor”.
- Decide on notation in advance.
- Decide on additional stylistic conventions.
- Editor produces draft.
- Repeat read, comment, edit.
- Group goes through document sentence-by-sentence using a projector.