Writing Perfect Papers

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A long talk today on writing perfect papers
“Perfect papers” don’t exist
But let’s try our best
And try to write good papers quickly
Writing perfect papers
Writing good papers fast!
Our goal today: improve both the skills and the process.
Writing perfect papers
A top-down approach: from the big picture to tiny details
I am going to talk about four things

Writing perfect papers
The story

1.1 Writing perfect papers
1.2

The work

Writing perfect papers
The art

Writing perfect papers
1.4

The details

Writing perfect papers
The story

Writing perfect papers
How do I make a great movie?
A great movie starts from a powerful and convincing story
A great app starts from a tasteful design
Three essential elements of a great story
My solution

My math proofs

My simulation results
I am very smart!

My math proofs

My simulation results
I am very smart!

I am smarter than you think

My simulation results
I am very smart!

I am smarter than you think

The thing actually works!
I am very smart!

I am smarter than you think

The thing actually works!
Your paper is not really the best place to show your theoretical prowess
It’s about advancing the state-of-the-art
What’s new?  

The problem  

How is it better?
The problem

 Doesn’t have to be something “trendy”
But it has to be something you really enjoy working on
The problem

The "trend" may not last forever
Google Scholar search: “P2P” in the paper title

- Good timing
- Not sure if timing is good
- Not good timing
Following the trend may lead to more "incremental" results — less exciting and less important
Be a contrarian and work against the trend
In fact, a recent 2017 paper, titled “BBR: Congestion-based Congestion Control,” brought congestion control in the general case back to the spotlight.
So, be a contrarian and working against the trend may be a good idea
In the context of what’s already done in the related work, what’s new in your work?
First, briefly introduce the **state-of-the-art** in the literature, solving the same problem you wish to solve.
Then write about what is new in your work that is different from previous work.
If the problem is different from previous work — different assumptions, for example — provide justifications why this is important and necessary.
Now that your ideas are new, they should also lead to **better** results than before.
Show how your solution is better than previous work: such as stronger theoretical properties or better experimental results.
The problem

What’s new?

How is it better?

Three essential elements
1.2

The work

Writing perfect papers
Two things that you must do
Goal: become an expert on the problem
Read

But how?
Read

Start from one paper
Read

Perhaps a highly cited seminal paper
Read

Then do an expanded-ring search
Read Papers that cited this paper
Read Papers that it cited
Read Papers authored by the same researchers
Try not to depend only on a search engine
Read

Read quickly first
Read more carefully if necessary later
Write about what you understood
Write every day
idea

do research

write a paper
idea

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do research

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write a paper
write a paper

do research
If I don’t have an idea, what do I write about?
You write *anyway*
Write about related work
Write about what’s challenging
Write about why the problem is important
Write about what needs to be fixed
Write a survey paper
Submit your survey paper for publication
Write about **what’s new** in the context of related work.

The problem

What’s new?

How is it better?
Creating ideas interacts with writing closely
Writing is the best way to force yourself to think clearly and be focused
and to *crystallize* what you don’t quite understand yet.
Writing also opens a dialogue
For others to read what you wrote
To stimulate discussions with others
That’s why **writing** is a **slow and painful** process.
Write in a **crystal clear** way
Write about one problem and one (potential) solution.
Write with a flow of ideas that’s easy to follow
Keep your readers engaged throughout the paper
Write your paper so that it’s as easy to understand as absolutely possible
Your readers don’t have to work hard
Write your paper **slowly**, so that your readers can read **quickly**
The art

1.3

Writing perfect papers
Pay attention to the title, abstract, introduction, and flow of ideas.
Title: 2 lines, 10,000 readers
Abstract: 10 lines, 1,000 readers
Introduction: 100 lines, 100 readers
The rest of the paper:
1,000 lines, 10 readers
The title

Writing perfect papers: the art
What’s a good title?

It attracts a reader to read the abstract
It reflects the essence of the new idea
It is as simple as possible
does not have to be a precise summary of the paper
does not need to include all the keywords
The best title is one that is the easiest to understand at a glance.
Let’s say we have a new idea that uses a new coding technique to reduce the latency when delivering data over the Internet.
Which title is the best?

LLRC: A Low-Latency Rate-Controlled System for Fast Data Delivery over the Internet

Coded Information Distribution: New Content-Delivery Protocols for the Internet

Coding Reduces Latency over the Internet
Which title is the best?

LLRC: A Low-Latency Rate-Controlled System for Fast Data Delivery over the Internet

Coded Information Distribution: New Content-Delivery Protocols for the Internet

Coding Reduces Latency over the Internet
Here’s another new paper on the wireless spectrum market, where buyers and sellers are matched in a nicely optimized fashion.
Which title is the best?

Extended Deferred Acceptance: Interference-Free Matching between Spectrum Buyers and Sellers
Stable Matching for Wireless Spectrum Markets
Spectrum Matching
Which title is the best?

Extended Deferred Acceptance: Interference-Free Matching between Spectrum Buyers and Sellers

Stable Matching for Wireless Spectrum Markets

Spectrum Matching
I have a co-authored paper in 2016 titled “Spectrum Matching” — so though it’s a bit risky, it can work out.
The abstract

Writing perfect papers: the art
The abstract

The abstract is a very important tool to attract readers to read the introduction.

Again, it conveys essential information about the paper.

It should be concise, and does not need to be long.
Remember the three essential elements

The problem

What's new?

How is it better?
A typical structure

One sentence to state the background

One sentence to state what the problem is

Two to four sentences to state the original contributions in the paper — what’s new?

One sentence to state how the solution is better, validated using analyses, simulations, or experiments
Here is an abstract from one of my co-authored papers
We will use this as our running example throughout this talk
It’s title: “Oruta: Privacy-Preserving Public Auditing for Shared Data in the Cloud”
It currently has the highest number of citations in all the papers I co-authored
So let’s take a look at how it’s written
With cloud storage services, it is commonplace for data to be not only stored in the cloud, but also shared across multiple users. However, public auditing for such shared data — while preserving both data and identity privacy — remains to be an open challenge.
With cloud storage services, it is commonplace for data to be not only stored in the cloud, but also shared across multiple users. However, public auditing for such shared data — while preserving both data and identity privacy — remains to be an open challenge.
In this paper, we propose the first privacy-preserving mechanism that allows public auditing on shared data stored in the cloud. In particular, we exploit ring signatures to compute the metadata needed to verify the integrity of shared data. With our mechanism, the identity of the signer of each data block is kept private from a third party auditor (TPA), who is still able to publicly verify the integrity of shared data without retrieving the entire file. In addition, we utilize homomorphic MACs and homomorphic hash functions to mitigate the overhead of storing our signatures.
Contribution: Highlights

In this paper, we propose the first privacy-preserving mechanism that allows public auditing on shared data stored in the cloud. In particular, we exploit ring signatures to compute the metadata needed to verify the integrity of shared data. With our mechanism, the identity of the signer of each data block is kept private from a third party auditor (TPA), who is still able to publicly verify the integrity of shared data without retrieving the entire file. In addition, we utilize homomorphic MACs and homomorphic hash functions to mitigate the overhead of storing our signatures.
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Contribution: Additional features

In this paper, we propose the first privacy-preserving mechanism that allows public auditing on shared data stored in the cloud. In particular, we exploit ring signatures to compute the metadata needed to verify the integrity of shared data. With our mechanism, the identity of the signer of each data block is kept private from a third party auditor (TPA), who is still able to publicly verify the integrity of shared data without retrieving the entire file. In addition, we utilize homomorphic MACs and homomorphic hash functions to mitigate the overhead of storing our signatures.
Our experimental results demonstrate the effectiveness and efficiency of our proposed mechanism when auditing shared data.
The introduction

Writing perfect papers: the art
If your title and abstract can get a reader to read the introduction, you are half way there
The remaining job: impress the reader with an exciting and clear introduction
The introduction is so important that I rewrote the introduction in many of my papers.
It is important because we wish our readers to understand our ideas, even if they only read the introduction and nothing else.
Remember the three essential elements

- The problem
- What’s new?
- How is it better?
Writing a good introduction

It should be self-contained, so that a reader short on time doesn’t need to read the rest of the paper.

It should be clear what the problem is.

It should be easy to understand why our solution is new, and how it’s better than previous work.
Writing a good introduction

Don’t make it too long
Don’t spend too much space on the background and related work

There can be a separate “Related Work” section
Don’t make your work sound more original than it really is
Introduction: a typical structure
First (opening) paragraph

A general overview of the research field — basic facts needed to “warm up” the reader and to prepare for the problem statement

Not too long — 2-3 sentences are good enough
For our auditing paper, here is the first paragraph that the student author at the time wrote —
Nowadays, data storage and sharing is one of the most popular service in cloud computing. For instance, a group of user can share and edit the same document simultaneously using Google Apps. Although the cloud can provide more reliable services than personal devices, the integrity of the cloud data still faces challenging security threats [1]. Due to human errors, device failures or internal/external attacks, the outsourced data on the cloud may easily lost or corrupted [1]. Another threat for the integrity of the cloud data is that the cloud service provider may delete rarely used data without informing users to save the storage space and reduce the commercial cost on those data [1].
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Now let’s find out all the problems in this paragraph together
This paragraph is simply too long — the author is asking the reader to “decipher” it.
The first two sentences tried to warm-up the reader with an overview
And the last three sentences actually tried to describe the problem — the problem statement
In this case, they should be separated into two paragraphs
The second paragraph: problem statement

A clear description of the challenges to be addressed and the problems to be solved

Appeal to the intuition of the reader

Describe at a high level

It is fine (and even a good idea) to include an intuitive solution to the problem
Getting back to our example
Nowadays, data storage and sharing is one of the most popular services in cloud computing. For instance, a group of users can share and edit the same document simultaneously using Google Apps.

Although the cloud can provide more reliable services than personal devices, the integrity of the cloud data still faces challenging security threats [1]. Due to human errors, device failures or internal/external attacks, the outsourced data on the cloud may easily be lost or corrupted [1]. Another threat for the integrity of the cloud data is that the cloud service provider may delete rarely used data without informing users to save storage space and reduce the commercial cost on those data [1].
The two paragraphs are not balanced in length
And the second paragraph is pretty hard to understand
Let’s first take a look at the first paragraph to see if we can improve it further.
Nowadays, data storage and sharing is one of the most popular service in cloud computing. For instance, a group of user can share and edit the same document simultaneously using Google Apps.
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What’s “cloud computing?” Not perfectly self-contained
Nowadays, data storage and sharing is one of the most popular services in cloud computing. For instance, a group of users can share and edit the same document simultaneously using Google Apps.

Poor transition: “for instance” with respect to what?
Now let me show you the first paragraph I wrote
Cloud service providers manage an enterprise-class infrastructure that offers a scalable, secure, and reliable environment for users, at a much lower marginal cost due to the sharing nature of resources. It is routine for users to use cloud storage services to share data with others in a team, as data sharing becomes a standard feature in most cloud storage offerings, including Dropbox and Google Docs.

First, “warm-up” to cloud computing
Cloud service providers manage an enterprise-class infrastructure that offers a scalable, secure, and reliable environment for users, at a much lower marginal cost due to the sharing nature of resources. It is routine for users to use cloud storage services to share data with others in a team, as data sharing becomes a standard feature in most cloud storage offerings, including Dropbox and Google Docs.

At the same time, “warm-up” to the idea of sharing
Cloud service providers manage an enterprise-class infrastructure that offers a scalable, secure, and reliable environment for users, at a much lower marginal cost due to the sharing nature of resources. It is routine for users to use cloud storage services to share data with others in a team, as data sharing becomes a standard feature in most cloud storage offerings, including Dropbox and Google Docs.

Formally introduce the idea of “sharing data”
Now let’s take a look at the next two paragraphs that the student wrote (after detaching the original first paragraph)
Although the cloud can provide more reliable services than personal devices, the integrity of the cloud data still faces challenging security threats [1]. Due to human errors, device failures or internal/external attacks, the outsourced data on the cloud may easily lost or corrupted [1]. Another threat for the integrity of the cloud data is that the cloud service provider may delete rarely used data without informing users to save the storage space and reduce the commercial cost on those data [1].
To protect the integrity of the cloud data, an efficient method is to enable public auditing by introducing a third party auditor (TPA). This public auditor should have more powerful computation and communication abilities than regular users and is able to offer security services to cloud users [1].
Observation: both are somewhat related to the challenges of storing data in the cloud
The intuitive idea is that data stored in the cloud may be lost or corrupted, and the users don’t know
So a third-party auditor can be used to check the integrity of data on behalf of the users.
But what the student wrote is asking a reader to do the hard work to "decipher" the writing and get the idea.
The problem with his writing was that he tried to mix the **basic idea** with unnecessary details.
Although the cloud can provide more reliable services than personal devices, the integrity of the cloud data still faces challenging security threats [1]. Due to human errors, device failures or internal/external attacks, the outsourced data on the cloud may easily lost or corrupted [1]. Another threat for the integrity of the cloud data is that the cloud service provider may delete rarely used data without informing users to save the storage space and reduce the commercial cost on those data [1].

Redundant sentence
Although the cloud can provide more reliable services than personal devices, the integrity of the cloud data still faces challenging security threats [1]. Due to human errors, device failures or internal/external attacks, the outsourced data on the cloud may easily lost or corrupted [1]. Another threat for the integrity of the cloud data is that the cloud service provider may delete rarely used data without informing users to save the storage space and reduce the commercial cost on those data [1].
Although the cloud can provide more reliable services than personal devices, the integrity of the cloud data still faces challenging security threats [1]. Due to human errors, device failures or internal/external attacks, the outsourced data on the cloud may easily lost or corrupted [1]. Another threat for the integrity of the cloud data is that the cloud service provider may delete rarely used data without informing users to save the storage space and reduce the commercial cost on those data [1].
Why can’t we just describe the basic idea of the problem and its existing solution intuitively — and remove all the details that make it harder to read?
Unnecessary details inhibit the natural and brisk flow of the main ideas.
Now let me show you the second paragraph I wrote
The integrity of data in cloud storage, however, is subject to skepticism and scrutiny, as data stored in an untrusted cloud can easily be lost or corrupted, due to hardware failures and human error [1]. To protect the integrity of cloud data, it is best to perform public auditing by introducing a third party auditor (TPA), who offers its auditing service with more powerful computation and communication abilities than regular users.
The integrity of data in cloud storage, however, is subject to skepticism and scrutiny, as data stored in an untrusted cloud can easily be lost or corrupted, due to hardware failures and human error [1]. To protect the integrity of cloud data, it is best to perform public auditing by introducing a third party auditor (TPA), who offers its auditing service with more powerful computation and communication abilities than regular users.

Mentioning two of the several reasons of lost data
The integrity of data in cloud storage, however, is subject to skepticism and scrutiny, as data stored in an untrusted cloud can easily be lost or corrupted, due to hardware failures and human error [1]. To protect the integrity of cloud data, it is best to perform public auditing by introducing a third party auditor (TPA), who offers its auditing service with more powerful computation and communication abilities than regular users.
Now let’s see the new 1\textsuperscript{st} and 2\textsuperscript{nd} paragraphs in the second draft
Cloud service providers manage an enterprise-class infrastructure that offers a scalable, secure, and reliable environment for users, at a much lower marginal cost due to the sharing nature of resources. It is routine for users to use cloud storage services to share data with others in a team, as data sharing becomes a standard feature in most cloud storage offerings, including Dropbox and Google Docs.

The integrity of data in cloud storage, however, is subject to skepticism and scrutiny, as data stored in an untrusted cloud can easily be lost or corrupted, due to hardware failures and human error [1]. To protect the integrity of cloud data, it is best to perform public auditing by introducing a third party auditor (TPA), who offers its auditing service with more powerful computation and communication abilities than regular users.
You may say, oh this is hard!
But remember, we only went through the first two paragraphs in the introduction
The gap between mediocre and excellent writing: only a few words here and there
Returning to the typical structure of the introduction
General overview to warm-up the reader (the opening paragraph)

State the problem (challenge) and existing solutions (1-2 paragraphs)

Limitations of existing solutions that motivate this paper (2-3 paragraphs)

Proposed solution: main idea (1-2 paragraphs)
Now it’s time to write about what’s new
What are the original highlights of the proposed solution? (1-2 paragraphs)

Why is the proposed solution different from and better than existing solutions?

State 1-2 most impressive highlights, not all of them

Make the originality of the paper crystal clear and stand out

You may use the sentence: “Highlights of our original contributions in this paper are as follows. First, ... Second, ... Finally, ...”
The list of original contributions drives the entire paper — the rest of the paper substantiates the claims you have made.
Your readers may think: “Hey, if they can really deliver this, that’ll be very exciting! I’d better read the rest of the paper.”
It is a good idea to include a table to compare important properties of the proposed solution with its “direct competitors” in the existing literature, highlighting your advantages.
It is a good idea to include a table to compare important properties of the proposed solution with its “direct competitors” in the existing literature, highlighting your advantages.
It’s an even better idea to show an intuitive example.
Your example shows how your main idea works in a special case
Continue with more examples throughout the paper
After each theorem is proved — or each algorithm shown — explain their implications or intuition with an example.
Your examples need to be really simple

Use more examples
Your examples need to be really simple
They help readers to understand your solution well

Use more examples
It’ll be a great idea to include a well-designed figure to illustrate your example.
Include as many figures as you can throughout the paper

Use well-designed figures
The flow of ideas

Writing perfect papers: the art
Just like the storyboard when making a movie, the flow of ideas needs to be carefully designed.
Make sure that each paragraph contains one complete idea — split a paragraph that contains more than one idea, and merge short paragraphs that cover the same idea.
Flow of ideas

Where is the section on related work?
Flow of ideas

Some prefer to place it after the introduction

**Rationale:** the section can be used to “warm up” the reader

Some others prefer to place it before the conclusion

**Rationale:** After the introduction, the readers don’t understand your main ideas yet, there’s no point in talking about their differences from related work
It depends on the design of your flow of ideas
Where do you write about experimental results?
Most papers collect all the experimental results and put them at the end.
But you don’t have to
Some negative or preliminary experimental results may be important for motivating the main idea in the paper.
Your flow of ideas can then be: “initial results — idea to improve — more results to show better performance”
You can even **interleave** experimental results with descriptions of your idea, if this provides the best flow
How do you allocate space across sections?
The short answer is: no one knows it better than you, because it depends on the flow of ideas.
General rules of thumb

Don’t write a very long abstract (200 words), introduction (one page), related work (half a page), or concluding remarks (1-2 paragraphs)

Throughout the paper, make it self-contained, but don’t use a lot of space for unnecessary background

Keep the motivation short and concise
1.3 The art Writing perfect papers
1.4 The details

Writing perfect papers
Use a *git* repository to manage your workflow

*Writing perfect papers: the details*
Git repositories help you to track all histories and collaborate with others.
Place everything — source code, references — into your git repository.
Use any of the public cloud services such as GitHub
Performance-wise, after only 6 hours of training using emulated network environments, Orca is able to achieve the best performance to date in a variety of typical network environments, compared with both traditional hand-tuned heuristics (such as BRKv2) and recent DRL-based congestion control protocols (such as Aurora). It also incurs very little overhead, on par with hand-tuned heuristics such as TCP CUBIC and BRK. With respect to fairness, it is friendly to competing TCP CUBIC flows, most likely because it uses TCP CUBIC itself as the underlying congestion control protocol, and therefore does not show aggressive behavior when trying to saturate the available bottleneck bandwidth.
Eliminate typographical and grammatical mistakes

Writing perfect papers: the details
First, eliminate all spelling mistakes by running your paper through a spell checker.
Use a UNIX command-line tool such as ispell to check spelling — not Microsoft Word
Then fix grammar and usage problems by proofreading
Proofreading also helps you to fix the remaining spelling mistakes that a spell checker cannot catch.

Example: instead of “must,” you wrote “mist”
Proofreading also helps you to fix the remaining spelling mistakes that a spell checker cannot catch.

Example: instead of “must,” you wrote “mist”
You cannot rely on someone else — certainly not the reviewers — to proofread for you, it’s your paper!
Use **transitional** words, phrases, and sentences

**Writing perfect papers: the details**
Use **transitions** across the boundary of sentences, paragraphs and sections
Important for readers to follow your flow of ideas
If you don’t add transitions, readers will need to add them subconsciously in their mind, anyway.
You are asking readers to do the hard work!
Examples of transitions

Connecting two halves of a sentence —

as, since, or else
Examples of transitions

Connecting sentences —

However, In addition, Further, Nevertheless, Fortunately, Unfortunately, Surprisingly,

To make matters worse, to further exacerbate the problem, The bad news is,

The implications are two-fold, It turns out that, As an example, To take ... a step further,
Examples of transitions

Connecting paragraphs and sections —

- It only remains to see...
- The simple answer to this question is,
- The only challenge that remains now is,
- To address this challenge,
- We first present...
- Next, we evaluate...
- We are now ready to...
Use correct English

Writing perfect papers: the details
Keep punctuation marks inside the closing quotation mark
... making it a “shared secret key”. 
... making it a “shared secret key”.
... making it a “shared secret key”.
... making it a “shared secret key.”
Don’t use long sentences with more than one comma in the middle of the sentence — and abuse “where,” “in which,” “whose,” “so that,” “such that”
Don’t be too colloquial

Don’t use words that are too informal and colloquial

“a lot of” is more colloquial than “a large number of”

Instead of “big,” use “substantial” or “large”
Overly formal words and phrases sometimes feel awkward

“We endeavour to ascertain that...” — “We show that...”

“It can be ascribed to...” — “It is due to...”

“The overwhelming quantity of...” — “The exceedingly large number of...”

Don’t be too formal either
An “easy” solution to solve the problem above is to share the private key of the original user with other group members as a group private key, however, it is like “suicide”...

A sentence from the first draft of our example paper

Don’t use words that are too emotional
An “easy” solution to solve the problem above is to share the private key of the original user with other group members as a group private key, however, it is like “suicide”...

Similar emotional words: “kill,” “crazy,” “happy,” “fantastic,” “marvellous,” or “breathtaking”
If a word is countable, when using its plural form, remember to use “a few,” “a number of,” “fewer”

Instead of “less bits,” use “fewer bits”

If not, do not invent its plural form (such as “performances,” “advices,” “equipments,” “informations”), and use “less” or “lower” rather than “fewer”
Agreement of the verb with the subject

“The figures above shows” vs. “The figures above show”

“These problems that lead to lower efficiency shows that” vs. “... show that”

“Its efficiency in energy savings are remarkable” vs. “... is remarkable”

Slows down reading — your paper can be rejected just because of these problems!
It almost takes a lifetime to master the usage of common words, such as “with”, “of”, “for”, “at”, “against”, “in”, “on”.

Or to master the large number of phrases in English “in other words” or “in another word”?}

Watch out on common words and phrases
perfect

adjective  ['pəfɪkt]
1 having all the required or desirable elements, qualities, or characteristics; as good as it is possible to be: life certainly isn't perfect at the moment  
   a perfect summer's day. 
   - free from any flaw or defect in condition or quality; faultless: the equipment was in perfect condition. 
   - precisely accurate; exact: a perfect circle. 
   - highly suitable for someone or something: exactly right: with a little help you can create a room that is perfect for you, the perfect present for golfers everywhere. 
   - thoroughly trained in or conversant with: she was perfect in French.
2 (attributive) absolute; complete (used for emphasis): a perfect stranger; all that Joseph said made perfect sense to me.
3 Mathematics (of a number) equal to the sum of its positive divisors, e.g. the number 6, whose divisors (1, 2, 3) also add up to 6.
4 Grammar (of a tense) denoting a completed action or a state or habitual action which began in the past. The perfect tense is formed in English with have or has and the past participle, as in they have eaten and they have been eating (present perfect), they had eaten (past perfect), and they will have eaten (future perfect).
5 Botany (of a flower) having both stamens and carpels present and functional. 
   - Botany denoting the stage or state of a fungus in which sexually produced spores are formed. 
   - Entomology (of an insect) fully adult and (typically) winged.
verb  [pəfɪkt | [with object]
make (something) completely free from faults or defects; make as good as possible: he’s busy perfecting his bowling technique.
   - archaic bring to completion; finish: then, urgd, she perfected her illustrious toils.
   - complete (a printed sheet of paper) by printing the second side: the heap was normally printed as white paper in the morning, turned at the midday break, and perfected in the afternoon.
   - Law satisfy the necessary conditions or requirements for the transfer of (a gift, title, etc.): equity will not perfect an imperfect gift.
noun  [pəfɪkt | (the perfect) Grammar
the perfect tense.
adjectives
perfect
perfectible
perfection
perfectionism
perfectionist
perfective
perfectly
perfecto
perfecter
perfectible
perfectionist
perfectionism
perfection

DERIVATIVES
perfecter  ['pəfɪkta] noun
perfectible  ['pəfɪktəb(ə)l] adjective
perfectness  ['pəfɪktəs] noun

ORIGIN
Middle English: from Old French perfet, from Latin perfectus ‘completed’, from the verb perfectere, from per- ‘through, completely’ + facere ‘do’.
Oxford Dictionary of English (macOS)

**Phrases**

**in other words**

- **expressed in a different way; that is to say:** The new cat treat has a 90-plus palatability level. In other words, cats like it.

**in so many words**

- **(often with negative) precisely in the way mentioned:** I haven’t told him in so many words, but he’d understand.

**in a word**

- **briefly:** Are there any real reasons to worry? In a word, plenty.

**keep one’s word**

- **do what one has promised:** You know that I always keep my word.

**a man/woman of his/her word**

- **a person who keeps their promises:** She was a woman of her word.

**(on/upon) my word**

- **an exclamation of surprise or emphasis:** My word, you were here quickly!

**of few words**

- **tactful:** He’s a man of few words.

**put something into words**

- **express something in speech or writing:** He felt a vague disappointment which he couldn’t put into words.

**put words into someone’s mouth**

- **inaccurately report what someone has said.**

**spread the word**

- **share the information or news:** He spread the word about the charity’s work.

**take someone at their word**

- **interpret a person’s words literally, especially by believing them or doing as they suggest:** I take him at his word, for I cannot go to see for myself.

**take the words out of someone’s mouth**
though

conjunction

though Scott was not particularly interested in early editions he did own several ALTHOUGH, even though/if, in spite of the fact that, despite the fact that, notwithstanding the fact that, notwithstanding that, for all that, while, whilst, granted that, even supposing, despite the possibility that, albeit, however, yet, but.

adverb

You can always do that. You can try. though: NEVERTHELESS, nonetheless, even so, however, be that as it may, for all that, in spite of that/everything, despite that/everything, after everything, having said that, just the same, all the same, at the same time, in any event, come what may, at any rate, notwithstanding, regardless, anyway, anyhow, informal still and all; archaic: howbeit, withal, notwithstanding.
The articles “a” / “an” (the indefinite article) and “the” (the definite article) are frequently used incorrectly by new students. Plural nouns are typically used without an article:

“The source node receives acknowledgments” (not “the acknowledgments”)

The indefinite article is weaker than the definite article:

“a large portion of” (not “the large portion of”)

Articles as determiners
But there’s no need for “the” in section titles — instead of “The System Model,” just say “System Model.”
Articles can be tricky to use, but there are too many of them in a paper — pay attention!
Let’s take a look at one example sentence
The extent to which the users can effectively communicate with the service providers depend on the size of community.
The extent to which the users can effectively communicate with the service providers depend on the size of community.

Plural noun: “users” — the definite article is not needed
The extent to which the users can effectively communicate with the service providers depend on the size of community.

Plural phrase: “service providers”
The extent to which the users can effectively communicate with service providers depend on the size of community.

Plural phrase: “service providers” — the definite article is not needed, but it feels strange without it, too
The extent to which the users can effectively communicate with their service providers depend on the size of community.

It would only be correct to use “their” as the determiner.
The extent to which users can effectively communicate with their service providers depend on the size of community.

Good enough?
The extent to which users can effectively communicate with their service providers depend on the size of community.
The extent to which users can effectively communicate with their service providers depends on the size of community.
The extent to which users can effectively communicate with their service providers depends on the size of community.
The extent to which users can effectively communicate with their service providers depends on the size of the community.

The noun "community" needs a determiner in front of it.
The extent to which users can effectively communicate with their service providers depends on the size of a community.
The extent to which users can effectively communicate with their service providers depends on the size of a community. The community in question is a specific community, not an arbitrary one.
The extent to which users can effectively communicate with their service providers depends on the size of the community.
The extent to which users can effectively communicate with their service providers depends on the size of the community.

This is good enough, but it’s even better to reinforce the idea of which community is being discussed.
The extent to which users can effectively communicate with their service providers depends on the size of their community.
The extent to which users can effectively communicate with their service providers depends on the size of their community.
Good news: most English problems are not hard to fix — just proofread every sentence with plenty of time!
Typeset your paper correctly and beautifully

Writing perfect papers: the details
E.1 Use LaTeX, no matter what
You do need to spend some time learning how to use \texttt{LaTeX}
But the typesetting results are dramatically better
In fact, my mind doesn’t work efficiently when reading a paper typeset in Word
There is a huge amount of useful information about LaTeX on the web — no excuse!
Draw figures using a vector-based application
Image-based drawing applications produce images that become fuzzy when zoomed in on a reader’s iPad.
Recommendation: draw.io

https://diagrams.net
Proofread your bibliography and make it consistent
Use **BibTeX** to typeset the bibliography in your paper.
After downloading BibTeX entries from the web, proofread to get them consistent
Keep a **consistent** style of abbreviating journal and conference titles throughout the bibliography
Try your best to find out the venue where the paper was published in, rather than citing arxiv.org
Writing perfect papers
1.1 The story

Writing perfect papers
1.2

The work

Writing perfect papers
The art

Writing perfect papers
1.4

The details

Writing perfect papers
Writing good papers fast!
Writing **good** papers is hard
That’s why you are advised to write slowly.
In the good old days, academics can take years to write one research paper.
But we have arxiv.org today, with a "timestamp" on papers
We also have the “publish or perish” culture, where the number of papers is an indication of quality.
I need to graduate — tell me how to write papers quickly
If others travel at the speed of sound, you wish to be supersonic.
Seminal papers

Worthless papers

Less time

More time

"Optimal" operating point, maybe?

The good old days — very challenging

The paper quality is too low

Worthless papers
max $Q(p)$
subject to $t(p) \leq T$
I am going to talk about three things

Writing good papers fast
Know your **deadline**

Writing good papers fast
\[ t(p) \leq T \]
Seminal papers

Worthless papers

Less time

More time

The paper quality is too low

“Optimal” operating point, maybe?

The good old days — very challenging

Deadline
At all times, always work towards a paper deadline
Deadlines are all equal

It doesn’t matter what kind of deadline it is —
a conference deadline

a deadline from a journal special issue

a deadline you set up yourself for submitting

a journal paper
dead · line — you will have to make it no matter what happens
But how do I guarantee that I will make my deadline?
Set your deadline realistically

Writing good papers fast: know your deadline
Admit that you are not able to write a good paper in a month or two
But a deadline six months later may not carry a lot of weight either — unless you are extremely disciplined.
Make it **public knowledge**

Writing good papers fast: know your deadline
Tell as many people as you can when your deadline will be
So that it feels like a **public disgrace** if you fail to meet the deadline
As a researcher, you sure wish to be seen as **responsible and dependable**
You work around the clock to make sure that others who depend on you will have the **peace of mind** that the work **will be done**.
And done by the **deadline**
Allocate your time well

Writing good papers fast: know your deadline
Design a rough timeline at the very beginning
Assign deadlines to each milestone in your timeline
Use a Gantt chart
If necessary, revise your timeline along the way.
But think seriously why you missed your milestone deadlines
Don’t procrastinate and delay all the work to the days before the deadline
It may be feasible, but it will be stressful and it degrades the quality of your work.
2.2

Don’t follow, lead!

Writing good papers fast
You are the first author of the new paper, right?
Then you are the leader, the boss, and the person who cares most about this work.
Start your team at the beginning of your project
Only invite trustworthy collaborators when building your team
Your collaborators include your **advisors** — get them to work for you
Get them to commit their time
Warn them of the **tough** work ahead along the way
Promise them an **exciting** outcome
Assign your collaborators to milestones — they are your “resources”
Remind them about their milestone deadlines often.
Persist if they forget about your requests
Cancel their “membership” in your team if they consistently fail.
Have **backup plans** if they fail to deliver by the deadline
Choose a problem with the right size

Writing good papers fast
It must be feasible to be completed before the deadline
Goal: make solid improvements over one paper, and one paper only
Choose a paper that you *enjoyed* reading
Or even better, a paper with source code
If its source code is not on GitHub, ask the authors
If you don’t have source code, estimate the amount of time to reproduce the work.
If it may take a long time, **give up and choose another paper**
Read the paper along with its source code
The source code contains secret ingredients in its “recipe”
It helps you to understand the paper completely and deeply.
And only with a complete and deep understanding can you **create something new**
And create something new quickly
To do it, you will have to have a **deadline** in your timeline for **creating something new**.
A deadline forces you to think long and hard.
Revise the source code and do a feasibility test for your idea
If its feasibility is promising, think about its theoretical properties — anything provably correct?
Your little problem must **fit into the scope** of the conference you’ll submit to
Goal: get the paper accepted
Many conferences have their *favoured* research topics
Writing good papers fast!
2.1 Know your **deadline**

**Writing good papers fast**
Don’t follow, lead!

Writing good papers fast
Choose a problem with the right size

Writing good papers fast
That’s it!
Good luck with your papers!