

# Writing and presenting technical content

Course T-110.5191 Spring 2015  
Seminar on Internetworking

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# Summary of the last week

## Lecture 1

- introduction and practicalities
  - learning outcomes of the course
  - organization and assessment methods
- course topics
  - overview and tutor presentations

## Course sign-up

- registration in Oodi
- request for seminar topics

# Learning outcomes

- Find research papers and technical documentation
- Describe the elements and the structure of a technical document
- Evaluate the contribution of a scientific work
- Outline strengths and weaknesses of a technical document
- Explain a topic in a technical format
- Present technical content as a written document and through an oral presentation

# Technical documentation

## Technical document

- describes the **functions** and the **architecture**
- or else a **study** or an **evaluation**
- of a practical, scientific or technological **product**

## Manual

- collection of **instructions**
- usually to operate a machine or software

## Software documentation

- usually embedded in the source code
  - as either **comments** or **docstrings**
- **documentation generators** collect and convert the annotated source into a document (e.g., Doxygen, Sphinx)

# Types of technical documents

## Specification

- detailed description of a product (e.g., protocol or algorithm) or statement of requirements
  - patent specification, description of an invention

## Standard

- a technical specification subject to a codified process
- involving a standardization body (or institute)

## Academic (scholarly) paper

- description of original research results or review of existing ones

## Technical report

- may not include research results, usually not peer reviewed
  - whitepaper, overview of a problem and solution (content marketing)

# Standardization bodies

Body	Representative fields	Examples
ANSI	programming languages	C99
IEEE	communication protocols and technologies	IEEE 802.11n, IEEE 802.15.1
IETF	Internet standards	RFC 6455, RFC 3561, RFC 3748, RFC 6238
ISO/IEC	programming languages, character sets, document formats	C++11, ISO 8859-1, OpenDocument
NIST	cryptographic functions	AES, SHA

**Acronyms:** American National Standards Institute (**ANSI**), International Electrotechnical Commission (**IEC**), Institute of Electrical and Electronics Engineers (**IEEE**), Internet Engineering Task Force (**IETF**), International Standard Organization (**ISO**), National Institute of Standards and Technology (**NIST**)

# Types of academic papers

## Regular paper (article)

- presents original research results

## Survey

- overviews (summarizes) existing research

## Position paper

- expresses an opinion or vision of the future

## Poster

- a large document for both information and presentation purposes

## Extended abstract

- short technical report describing a work-in progress or a demo

# Publishing media

## Self-publishing and document repositories

- personal homepage or research group website
- official university document repositories
  - Aaltodoc publication archive (theses, research material)
- other document repositories and archives
  - arXiv, a repository of (electronic) technical reports

## Events with proceedings

- include an oral presentation of the published results
- conferences, workshops and symposia

## Press

- publishing only
- journals and magazines



# Resources related to publications

## Physical resources

- Aalto University library (<http://lib.aalto.fi>)
- University of Helsinki library  
(<http://www.helsinki.fi/library/>)

## Online resources

- Digital Object Identifier (DOI)
- publishers' websites (e.g., IEEE, ACM, Elsevier, Springer)
  - usually require a (paid) subscription
  - can be accessed from within the university network or elsewhere through the Aalto libproxy server (<http://libproxy.aalto.fi>)
- special purpose databases
  - through the Nelli portal (<http://www.nellipoortaali.fi>)



# Structure of an article: summary and metadata

Element	Description
Title	Very important, different media may have specific constraints or preferences; may include a short name of the proposed solution for “marketing” purposes
Authors	Order usually matters, one corresponding author
Abstract	Summary with focus on novelty and contributions; extremely important as audience decides to read the article further based on it
Keywords	For indexing purposes
Acknowledgments	Thanks to non-authors and funding agencies
References	List of cited articles, books, websites and so on

Element	Description
Introduction	Immediately follows the abstract and keywords; briefly describes the reference scenario (problem), provides the motivation and the main contributions (including relevance and significance) of the work
Related work	Usually after the introduction or just before the conclusion; overviews the relevant literature and contrasts it with the proposed solution (results)
Background	Preliminary material for the reader to understand the technical content (e.g., overview of a technology for a study about the related performance)

Element	Description
Technical content	<p>The main part of the article, eventually consisting of multiple sections, for instance:</p> <ul style="list-style-type: none"><li>■ description of solution (e.g., protocol, algorithm or system), mathematical analysis, simulation (or experimental) setup, obtained results and related comments;</li><li>■ architecture, components, implementation details, qualitative or quantitative evaluation</li></ul>
Conclusion	<p>The last technical section before acknowledgments and references; summarizes the article with focus on findings, also usually provides directions for future work</p>

# Sample article: summary and metadata

## RaSMaLai: A Randomized Switching Algorithm for Maximizing Lifetime in Tree-based Wireless Sensor Networks

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**Abstract**—In most wireless sensor network (WSN) applications, data are typically gathered by the sensor nodes and reported to a data collection point, called the sink. In order to support such data collection, a tree structure rooted at the sink is usually defined. Based on different aspects, including the actual WSN topology and the available energy budget, the energy consumption of nodes belonging to different paths in the data collection tree may vary significantly. This affects the overall network lifetime, defined in terms of when the first node in the network runs out of energy. In this paper, we address the problem of lifetime maximization of WSNs in the context of data collection trees. In particular, we propose a novel and efficient algorithm, called Randomized Switching for Maximizing

explicitly attempt to organize the network topology in such a way that sensor nodes have uniform loads in terms of data forwarding. Since nodes closer to the sink have higher traffic to forward, they run out of their energy earlier. Thus, load balancing approaches are suitable to address the lifetime maximization problem [5, 6] by creating a *balanced* data collection tree. However, existing approaches in this domain often encounter three major challenges: a) oscillation, a situation where topology changes repeatedly, while trying to balance the loads; b) high time complexity; c) unsuitability for distributed implementation. In this paper, we propose a novel randomized

K. A. Imon, A. Khan, M. Di Francesco, and S. K. Das, “RaSMaLai: A Randomized Switching Algorithm for Maximizing Lifetime in Tree-based Wireless Sensor Networks”, INFOCOM 2013



# Evaluation criteria

## Intrinsic properties

- clarity of presentation
- technically sound and complete content
- contribution (e.g., value)
- correct (convincing) argumentations

## Comparison with the state of the art

- novelty
- significance
- requires to be aware of the relevant prior work

# Peer review: basics

## Rationale

- repeatability and verifiability of the obtained results is necessary to establish their validity
- also part of the scientific method
- evaluation by peers, experts in the same field of work

## Expected outcomes

- indication of quality and value
- selection of relevant works
- fair content-driven process (e.g., blind review)



# Peer review: actors and roles

## Author

- **writes** a research article

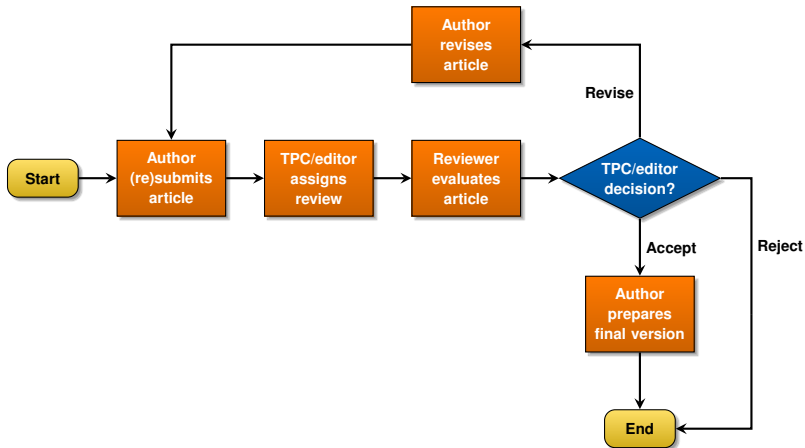
## Reviewer

- **evaluates** one or more research articles

## Technical committee

- hierarchical structure, varies between conferences and journals
  - **technical program committee** chairs and members in conferences
  - editor-in-chief with area (or guest) **editors** in journals and magazines
- **manages** the peer review process
- **decides** accepted (rejected) papers

# Peer review: process



# Peer review: evaluation form

## Example taken from a real conference

**summary** a short summary of the paper, including its **main contributions** and its **relevance** to the conference

**strengths** a clear description of the **value** and the **nature of the contributions**

**weaknesses** a clear indication of the perceived **limitations of the paper**, especially technical errors, missing related work and non-original results

**comments** **further** motivation of strong and weak points including **remarks** on novelty, technical depth and presentation

# Authoritative sources

## How reliable is a certain source?

- anonymous sources are usually not reliable
  - e.g., **Wikipedia**, Internet forums, newsgroups
- **authoritative source** (either person or information)
  - able to be trusted as accurate or true
- **standards** are authoritative (by definition)
- **peer-reviewed articles** are usually reliable
- different publication targets have **varying levels or reputation**

## How to measure “reputation”?

- qualitative metrics
- quantitative metrics (e.g., **bibliometrics**)

# Evaluating scientists

## Qualitative metrics

- awards (e.g., honors, medals, prizes)
- international recognition
  - participation to important events in a field (e.g., conferences)
  - invited (keynote) speaker
  - appearing in the news

## Quantitative metrics

- total number of citations, usually excluding self-citations
- Hirsch index (**h-index**)
  - a scientist has index  $h$  if  $h$  of his (her)  $n$  papers have at least  $h$  citations each, and the other  $(n - h)$  papers have no more than  $h$  citations each

# Evaluating conferences and journals

## Qualitative metrics

- most **experts** in the field **agree on the quality**
- sponsored by **well-known professional associations**
  - e.g., ACM (Association for Computer Machinery) and IEEE
- national and international **rankings**
  - e.g., Julkaisufoorumi and Excellence in Research for Australia

## Quantitative metrics

- conference **acceptance rate**
  - below 30% is good, best conferences below 15%
- journal **impact factor**
  - Nature: 42.351, Science: 31.477
  - JSAC: 4.138, CSUR: 4.043, TMC: 2.912, TON: 1.986

# Understanding novelty and significance

## Relation with the state-of-the-art

- new ideas are such if nobody has already thought about them
- novel solutions are pointless if they are worse than current ones
- **extensive knowledge** of existing literature **is necessary**

## Exploring related works

- **overviews** are a good starting point
  - surveys, tutorials, magazine articles
- books are also useful depending on their scope
- build on **influential** (important) articles
  - find them in the most focused media and communities
  - find articles citing them (e.g., through Google Scholar)

# Selected resources in computing and networking

Type	Resources
Overviews	ACM Computing Surveys (CSUR), IEEE Communications Surveys and Tutorials
Magazines	Communications of the ACM, IEEE Communications Magazine, IEEE Network
Top-tier journals	IEEE Journal on Selected Areas in Communications (JSAC), IEEE/ACM Transactions on Networking (TON), IEEE Transactions on Mobile Computing (TMC)
Other journals	Pervasive and Mobile Computing, Ad Hoc Networks, Computer Networks, Computer Communications, Wireless Networks, Performance Evaluation
Conferences	ACM SIGCOMM, IEEE INFOCOM, USENIX NSDI, ACM MobiCom, ACM UbiComp, ACM MobiSys, ACM SenSys



# A good seminar paper

## Makes a contribution

- to either technical or scientific **knowledge**
- **original** work and results
- **correct English** with neutral (objective) style

## Is informative

- a reader unfamiliar with the topic **learns** something
- has figures (diagrams) and **illustrative** examples

## Has focus and structure

- covers a **broad** area extensively or a **smaller** area in depth
- provides **relevant** and **up-to-date** references to **high-quality** technical sources
- **well-organized** technical content

# Common issues in writing

## Aspects reducing clarity

- insufficient text structure
  - linking words and paragraphs according to a line of thought
- relationships between portions of text are not adequate
- unnecessarily verbose discussion

## English-related issues

- mistakes involving grammar and spelling
  - incorrect use of (un)determinate article
  - verbal forms not matching subject
  - misspelled words
- word choice
  - false friends
  - correct but awkward terms

# Some advice on technical writing

## General recommendations

- pronouns
  - avoid passive sentences
  - technical documents mostly use “we”
  - impersonal form can be used
- avoid informal text
  - shortened verbal forms: can’t, isn’t, aren’t, it’s
  - colloquial terms: a lot, like, want
- be specific: do not use “good” and “bad”

## More specific instructions

- given by the English teacher during the corresponding classes
- online resources (available in Noppa under “Additional reading”)
  - Aalto Language Center’s website about academic writing in English

# A good presentation

## Is memorable

- **key ideas** should stick to the audience
- **enough** information to **support** (encourage) reading the paper
- highlights the **contributions**

## Is structured

- logical and easy to follow
- each slide should be self-contained

## Has compelling visual elements

- plenty of **pictures**, tables, plots, diagrams
  - “a picture is worth a thousand words”
  - preferably **your own** otherwise should acknowledge the source
- **readable** slides when projected
- **consistent** styling

## Structure

- start by **introducing the topic**
- then give a very short **outline** of the talk
  - what will be the presentation about
  - motivation: why is your work important?
- main content
  - focus on **what is useful** for the audience
  - **do not repeat** the whole content of the paper
  - make choices based on consistency and timing
- end with **summary** and (or) conclusion
  - what the audience should **remember**

# Some advice on the presentation

(2 of 2)

## Additional recommendations

- be **concise**: avoid boilerplates and a large amount of text
  - the more text, the more distraction for the audience
  - the font size may be too small to be readable
- take advantage of **visual** elements
  - use (a limited amount) of animations to **better explain**
  - use color and strategic line breaking to **highlight**
- be **confident** and maintain the audience's **attention**
  - keep **eye contact**, do not read from slides
  - **practice** presenting and be adaptive to the remaining time

## More specific instructions

- given by the **English teacher** during the last class
- online resources (available in Noppa under “**Additional reading**”)
  - Arnaud Legaut's “**How to make good slides**”

# Requirements

## Seminar paper

- format
  - use the LaTeX template available in Noppa
- submissions
  - submit only a single file as an archive in zip or gzip/bzip format
  - include the seminar paper itself as a PDF document and the corresponding LaTeX source
  - do not forget figures and the source bibliography file

## Slides

- no particular template required
- submission
  - PDF, PowerPoint or HTML formats only
  - if you have two or more files then compress and submit them as a single (zip or gzip/bzip) archive

# Content of the seminar paper

## First draft

- logical outline and clear message
- description of topic and challenges with key references
- two pages of readable English text in single-column layout

## Second draft

- most of the text and the main ideas, almost final structure
- relevant, authoritative and up-to-date references
- 6–10 pages in single-column layout

## Final paper

- complete technical content and streamlined outline
- polished presentation and comprehensive bibliography
- 5–8 pages in two-column layout



# Summary and agenda

## Today's lecture

- scientific literature
  - access to resources and publications
  - evaluating their relevance and quality
- scientific articles
  - ideas and contributions
  - structure and content
- presenting technical content

## Next contact session

- first English class
  - feedback on the first draft
- either of the following, depending the group you belong to
  - Friday February 13, 2015
  - Monday February 16, 2015

# Further study

## Suggested activities

- read the references you already have about your topic then **analyze** their **structure** and **content**
- **explore** conferences and journals related to the **area of your topic**
- review the **additional reading material** of the course

## Curriculum development

- **Special Assignment in Networking and Security** (T-110.6101)
- **Business Presentations** (A61C00900)
- **Communicating Technology** (Kie-98.1114)

# What to do before the next contact session

## Contact your tutor

- arrange a meeting as soon as possible
- contact information are available on the wiki page with the list of topics and the “People” webpage of the department

## Familiarize with the LaTeX template

- download the template and compile the sample document
- additional resources are also available in Noppa under “Additional reading”

## Return the first draft by the deadline

- Saturday, February 7, 2015 at 23:59 EET