# CS422: Computer Architecture

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# Critical review of a research paper

# Why read a research paper?

- Understand concepts
- Literature review
- Remain up-to-date
- Prospect new ideas
- Write research papers
- Review (as a reviewer)
- …

# How to read a paper: A three pass approach [1]

- First pass
  - Read title, abstract, introduction, section/subsection headings and conclusion
  - Useful to categorize, list down the contributions
  - You may decide not to read the paper further, why?

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- Third pass
  - At this point, you know answers to “why” and “what”
  - Some idea/curiosity in your mind about “how”
  - Read end-to-end to be happy, surprised or sometimes disappointed

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# Critical review

- Summary (3-5 sentences)
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- Summary (3-5 sentences)
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- Details (max 10 sentences)
  - Applicability, Assumptions, Contributions and their validations, Trade-offs

# Critical review

- Positives (3 bulleted lines)
  - Unacceptable (for this course): generic/vague statements like “very well written”, “properly evaluated” …
  - Points related to novelty of the idea(s), comprehensiveness, design and implementation related, design of experiments

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- Negatives (3 bulleted lines)
  - Unacceptable (for this course): generic/vague statements like “not understandable”, “writing can be improved”, “typos and grammar” ...
  - Hidden assumptions, negatively impacted use cases, compromise on scalability, security, performance ...

# Critical review contd.

- Possible extensions (at least one), extension can be one of the following
  - Problem generalization and possible solution
  - Specialized application of the idea
  - Improvement(s) to address the negative(s)
  - Tip: Think carefully about the feasibility, side-effects

# Critical review howto

My take on multiple pass is slightly altered

## STEP 1:

- Do not read abstract and conclusion
- Read introduction, background, motivation and related work sections
  - If you do not understand terminologies, see references, search web, ask me !
  - Think, think and think to make the following notes (part of interim notes)
  - "Wow expressions", "I wonder how expressions", "Ohh. is it that simple expressions", "buzzwords", "what is the big deal expressions", "Let us see how this paper tackles these cases" "I would implement the idea this way"
- Make a note of the contribution claims (in your own understanding)
- Write down your thoughts on how the contributions can be validated

# Critical review howto (contd.)

## STEP 2: Read remaining sections

- After each section
  - Revisit your interim notes
  - Think what has changed?
  - Keep on answering/commenting on the points (part of interim notes)
  - Add new points if any (part of interim notes)
- For design and implementation sections
  - Pause and think after every paragraph
  - Revisit  previous paragraphs and figures if necessary
  - Think about possible optimizations, alternate implementations
- Evaluation section
  - Understand how the experiment relates to the contributions claim

# Critical review howto (contd.)

## STEP 3

- Write the final review
- Refer to your interim notes
- If you have followed step 1 and 2 diligently, it is easy now!
- Now you can read abstract and conclusion !
- Tips (my experience)
  - Avoid context switching
  - Be critical but keep an open mind

# Due before next class

- Critical review [1] of the following paper
  - High Performance Cache Replacement Using Re-Reference Interval Prediction (RRIP)
- Due before next class (3.30 PM, 19-10-2022)
- Read, understand and submit a review
- What to submit?
  - Interim notes and final review (PDF only)
- Evaluation
  - Quality of the above two submission items