CS730: Topics in Operating Systems

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Course and instructors

$whereis cs730

https://cse.iitk.ac.in/users/deba/cs730/index.html (Course material, Assignments etc.)

Piazza link: https://piazza.com/iitk.ac.in/firstsemester2024/cs730/

(All announcements related to the course)

Canvas: https://canvas.cse.iitk.ac.in/courses/79

$whereis deba

KD 212, deba@cse.iitk.ac.in

Course policy

Add/Drop

Course registration:- Before next class

Last date of drop:- 15 - Aug -2024 (strict, no further drops allowed)

Class logistics

- Be on time!
- Keep your mobile phones (and other devices) switched off / silent
- Ask questions and interact

Evaluation

1. Hands-on Quizzes (15%)
2. Paper review (30%)
3. Paper presentation (10%)
4. Project (45%)

Hands-on Quizzes

- Will be done in a group of 2 students
- Hands-on exercise will be solved by each group
- Evaluation will be done in the class itself
- Adequate assistance will be provided
- If you are stuck, do not hesitate to contact

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Project

- Will be done in a group of 2-3 students – form your groups by 17th Aug
- Project topics will be provided, you can also suggest!
- Evaluated in multiple phases
  - Interim report and presentation ⟶ Midsem
- Final presentation and report ⟶ Endsem

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References

Operating Systems: Three Easy Pieces. Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau.
Understanding the Linux Kernel, Daniel P. Bovet, Marco Cesati.
Linux Kernel Development, 3rd Edition, Robert Love.
Linux Device Drivers, 3rd Edition, By Jonathan Corbet, Greg Kroah-Hartman, Alessandro Rubini.
Linux kernel documentation
Research papers

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“Take pride in honest hard work ”

“Cheating implies accepting defeat”

“If you are here to learn, never defeat the purpose by cheating”

https://www.cse.iitk.ac.in/pages/AntiCheatingPolicy.html

Getting ready for CS730

- Personal laptops/desktops with decent backup desirable
- **HW1: Setup a Virtual machine for the course (Due before next lecture)**
  - Create a Linux VM (Ubuntu Linux recommended) (KVM is prefered)
  - Download the Linux kernel version - 6.1.4
  - Compile and boot the latest kernel

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?

1. S. Keshav. 2007. How to read a paper. SIGCOMM Computer Communication Review

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  - Read the remaining sections except the implementation details
  - Carefully observe the figures, graphs etc.
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  - If you are still struggling?
- 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)
  - Your understanding of the paper in 3 to 5 sentences
  - Not copy of abstract

Critical review

- Summary (3-5 sentences)
  - Your understanding of the paper in 3 to 5 sentences
  - Not copy of abstract
- 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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  - Points related to novelty of the idea(s), comprehensiveness, design and implementation related, design of experiments
- 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 of the following paper
  - Portkey: Hypervisor-Assisted Container Migration in Nested Cloud Environments, VEE 2022
  - Due before next class (3.30PM, 05-08-2024)
- Read, understand and submit a review
- What to submit?
  - Interim notes amd final review (PDF only)
- Evaluation
  - Quality of the above two submission items