Operating Systems

2016 Term Project

You will research a topic and at the end prepare a term Project Report and also produce a Poster summarizing key aspects of your project. The objective of this paper is for you to explore the state of the art relating to some of the topics in the class.

The term paper will be based on a comprehensive study of the particular topic. You are required to formulate your own views of the topic once you have understood the concept well. You will also mention how you expect things to evolve in the future.

Some details are subject to revision.

Form/Join Team: October 19, 2016

Detailed Abstract: Nov 9, 2016

Poster Session: Fri, December 9th 2016: 10:30-Noon CSB 3rd floor atrium

Final Paper: December 13, 2016

List of recommended topics: You may choose from the list below. If you like you may choose slightly different topics after consulting with the instructor.

Virtualization:

1. Performance Overhead Comparison of Virtualization Hypervisors: Desktop (e.g. VMPlayer, VirtualBox, etc.)
2. Performance Overhead Comparison of Virtualization Hypervisors: Server (e.g. KVM, Xen, VMWare ESXi)
3. Storage virtualization (e.g. Instance Store, Elastic Block Storage, others)
4. Network Virtualization
5. Virtual machine managers
6. Nested virtualization
7. Desktop Virtualization hypervisors
8. Full virtualization hypervisors (e.g. KVM, XEN hvm)
9. Disaster recovery using virtualization
10. Spot Instances/Auction based pricing mechanisms for virtual machines
11. I/O virtualization drivers/methods comparison (e.g. KVM virtio, others)
12. Server consolidation/ Live migration of Virtual Machines
13. Virtual Machine Image Formats and packaging
14. Virtualization schedulers comparison (e.g. Xen SEDF, Credit, BVT)

Multicore Processors:

15. Transactional memory. What is it and how does it help in a multicore environment.

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16. Scalability. How to provide an increase in computational performance that scales with the number of processor cores.
17. Parallel programmability. How to reduce the programming effort for multi-core architectures.
18. Resource management. How to utilize and manage computational resources in multicore systems.
19. Virtualization. How does virtualization advance our ability to utilize multicore systems.

Other ideas:

20. Simultaneous multithreading (e.g. Hyperthreading) architectures
21. Simultaneous multithreading programming issues
22. Simultaneous multithreading scheduling and performance
23. Courseware development for thread pools
24. IOS/Android recent developments
25. Cloud gaming: architecture and performance
26. Power Management in Smartphones

Thanks to Srideep Pallikara and Russ Wakefield for some of the ideas.

Forming the groups: You can take the lead and try to form a group (by advertising it on **Piazza**), or join a groups others are trying to form. A group will have 3 or 4 students. There can be a **maximum of two** groups with an identical topic. You can claim a topic as your own by mentioning it on Piazza with the topic clearly identified in the post title (for example "Topic 26 Power Management in Smartphones").

Detailed Abstract:

The first deliverable of the term paper is a detailed abstract, around 1000 words. It should include a brief description of the topic and include a minimum of 8-10 total citations of appropriate papers or references.

It must have the following components:

1.   Why is this particular topic important now? Why did you choose it?
2.   Why will this be important in the future?
3.   A history of how this aspect has evolved in the past? The driving forces behind this.
4.   A quick snapshot of the current state of the art for this particular aspect.

Items (3) and (4) should cite at least 8-10 references.

Final Report:

The finished term paper should be approximately 4000 words and include a minimum of 10-15 total references supporting the paper. The final term paper must be coherent, succinct, and readable. It should include the following:

1.   An introduction that outlines the rationale, organization, and key contributions of the term paper.

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2. A literature survey of the topics that contrasts different approaches to the problem.
3. Limitations in the current approaches that may not be suitable in the future, and potential improvements.
4. At least some non-text elements – figures, tables, mathematical analysis, algorithms etc.
5. A conclusion that includes assertions about the state of the art that you have on the topic surveyed. This will also include 4-5 key assertions about what you expect things to look like in the next 2-4 years.

The poster will present some of the report contents in a visual format.

Both the Detailed Abstract and the Final Report (and the related poster) will need to be submitted as pdf files using Canvas.

Additional details will be available later.

Grading

This assignment would be worth 15 points towards your final grade. Following are the points break up.

- 2 points for Term Paper Detailed Abstract
- 2 peer review
- 6 points for Term Paper
- 5 points for the Poster Session, participation