

CS550 Advanced Operating System

Instructor: **Xian-He Sun**

Department of Computer Science

Project Report Guideline

Most projects will be individual projects. Small team projects, with a member of two or three, may be permitted on a case by case base.

The project report and presentation will contribute 30% toward your final grade. The goal of your project report is to explain your project sufficiently so that the reader can understand what the problem is and how you have solved it. The reader should be able to understand your methods without reading the code.

There are five main parts in your writeup:

- Problem description,
- Important existing solution(s),
- Description of your solution,
- Results,
- Analysis and Conclusion.

The problem description should introduce the problem, and point out the essential parts of your problem with respect to its computational aspects. Existing approaches to the problem should be outlined in order to put the proposed solution into perspective. The description of your algorithm (if any) should be in prose and in pseudocode. In addition to explaining your approach, the prose should help clarify why you made important choices. The pseudocode should be at a high enough level to be easily and quickly read, yet it should illustrate the important points of the algorithm. Excessive details will be counterproductive, and will indicate that you have not thought enough about what the important issues are. The results should be brief, and, if appropriate, should compare with some known results. The analysis and conclusion should be a retrospective on your approach toward solving the problem, especially what you would do differently if you were to do it again. For example, was the environment chosen appropriate? Were there parts of your algorithm that seemed like a good idea when you started, but turned out to be not working well? Were there ideas that you tried and dropped? Your project report must be self-contained, including a short abstract and a list of references. If you don't know the format of technical papers, read any journal articles in *IEEE Trans. on Computers* or *IEEE Trans. on Parallel and Distributed Systems*. Keep in mind that you have to give credits to all papers you referenced in your report. Your project report must be type-written using any of your favorite word processing or typesetting package. In general, your paper is expected to have 12 to 18 double-spaced pages (team project should be longer), without counting the program code. Here is the breakdown about how will your term paper be graded.

- Technical content: 25%
- Clearly stated background and motivation: 10%
- Paper organization and quality of presentation: 15%

- Your own efforts (contribution, criticism, comparison, etc.): 40%
- Satisfactory English: 10%

SUGGESTED TOPICS

You may study any topic relevant to OS and distributed systems, including system, application, algorithm, performance evaluation, middleware, and network and distributed parallel computing. Here is a list of topics that I have in mind at this moment.

- Study and practice of some middleware programming-environment, software packages, applications.
- Study and analyze some distributed environment, architectures, and network structures.
- Study the distributed solution of certain application package, algorithm, and system software.
- Performance metric, measurement, and benchmark.
- Study and practice of some visualization tools.
- Survey of certain topics.
- Any other topics that are relevant to this course.

Current hot topics in these areas include data/IO systems, virtual machine and virtualization technology, system support of multicore architectures, and cloud and edge computing. We will have one lecture on project topics.

The next question you may have is *where can I find out references?* The papers in technical journals are usually two or three years old due to the long reviewing process. So, read recent conference papers is very important. But the quality and readability of journal articles (I mean prestigious journals) is usually better than conference articles or technical reports. However, you have to pay attention on one thing: *Don't be easily convinced by conclusions or comments made by the author(s)*. Published papers do not guarantee that their arguments are correct. You have to make your own assessment.

SUGGESTED SOURCES OF REFERENCES

In addition to the textbook and listed references, here I list some journals and conference proceedings which have useful articles to this course. You should be able to find most of them through the IIT digital library and online search. Note that you don't have to trace back all old issues. Except a few classical papers, only those issues published in the last five years may still be useful.

References

- *Communications of ACM*. This is a flag magazine published monthly by ACM. There are some nice articles.
- *Computing Surveys*. This is a survey magazine published quarterly by ACM. It is the place you can find all kinds of interesting topics.
- *IEEE Computer*. This is the most popular magazine published by IEEE Computer Society (every IEEE CS member receives a copy). Papers in this journal are very readable and covers all new advances in computers.

- *IEEE Trans. on Computers*. This is the most prestigious journal published by IEEE Computer Society. It has both theoretical and practical papers.
- *IEEE Trans. on Parallel and Distributed Systems*. This is the flagship journal of IEEE in the area of parallel and distributed processing. It has both theoretical and practical papers and is published by IEEE Computer Society. You can find many articles related to this course.
- *IEEE Trans. on Software Engineering*. This journal mainly covers software and language related articles. Some database and performance papers can be found there.
- *ACM/IEEE Trans. on Networking*
- *IEEE Pervasive Computing*
- *IEEE Software*. This is another very readable magazine. There are some articles related to parallel programming and concurrency control.
- *IEEE Micro* By its name, it sounds like a hardware oriented magazine. However, it often publishes good papers in distributed computing, including mobile and wearable computing.
- *IEEE Internet Computing* A new magazine created to meet the new development in internet computing.
- *IEEE Concurrency* It is a on-line journal aimed to the field of parallel and distributed processing.
- *Journal of Parallel and Distributed Computing*. Similar to IEEE Trans. on Parallel and Distributed Systems. It is the oldest journal in the field of parallel and distributed processing.
- *Parallel Computing*. This is a good journal in the areas of computational sciences. It covers a wide range of issues, from software tools to numerical algorithms.
- *ACM/IEEE Supercomputing Conf.* The largest Conf. in the field of supercomputing and parallel processing. It emphasizes application and practical issues.
- *ACM International Conf. on Supercomputing*. A prestigious supercomputing conference which is more on the research side.
- *International Parallel Distributed Processing Symposium*. This is a conference which covers all the respects of parallel processing.
- *International Conf. on Parallel Processing*. Similar to International Parallel Processing Symposium.
- *Performance Evaluation Review (SIGMETRIC/PERFORMANCE)*. A prestigious conference in performance modeling and evaluation.
- *International Conf. on Distributed Computing Systems*.

Distributed systems has been a very hot research area in the past twenty years. You may find many other conferences in this area. Some magazines, such as *Journal of High Performance Computing Application*, *Mobile Networks and Applications*, and *Journal of Concurrency: Practice and Experience* also have many good articles addressing issues of parallel and distributed systems. The above listed publications are given from the viewpoint of distributed computing. More journal and conferences can be found from the viewpoint of systems, big data, and operating systems. Use on-line resources to find related materials. Talk with me if you have difficulty in searching of references.

FINAL COMMENTS

You have to submit a two-page project proposal including a short description of your topic and a list of references via Blackboard by Jan. 30, 2023. Your project report is due on April

27, 2023. An in class presentation is required.

Contact Information

- Email: sun at iit.edu
- Telephone: (312) 567-5260
- FAX: (312) 567-5067
- USMail:

Xian-He Sun
Department of Computer Science
Illinois Institute of Technology
10 West 31st Street
Chicago, IL 60616-3793