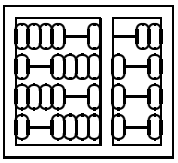
MO809/MC964 - Topics in Distributed Computing
First Semester – 2021
Instituto de Computação — UNICAMP

Prof. Luiz Fernando Bittencourt
www.ic.unicamp.br/∼bit/ - bit@ic.unicamp.br



Course dynamics

Classes and support material. Classes and support material for students is going to be available through online tools, such as Google Classroom (https://classroom.google.com/a/unicamp.br). Classes will be recorded and made available to the students, so the course will be in an asynchronous mode. To get access to Google Classroom, students must use their DAC accounts. Invites to the course page with access codes will be sent to your e-mails.

Appointments. Schedule by e-mail to have an appointment through an online tool. Appointments for discussion/questions on the course content should be made in the same timeframe of the previously programmed classes. Exceptions can be made for those who have constraints or for urgent matters.

Course contents

The topics below will be discussed during the course.

- Introduction to parallelism and distributed systems (definitions, architectures, networks);
- Graph representation and complexity;
- Datacenters;
- Web services;
- Client-server and P2P architectures;
- Mobility and Ubiquitous computing;
- Grid Computing;
- Cloud Computing;
- Fog e Edge Computing;
- Mobile Edge Computing/Multi-access Edge Computing;
- Distributed and federated learning / Edge Intelligence;
- Applications: dependent tasks/workflows and independent tasks;
- Introduction to task scheduling;
- GGPU, APU, Multi-core in distributed computing;
- Programming paradigms (OpenMP, UPC, MPI, RMI, Hadoop/MapReduce);
- Energy saving/Green Computing;
- HPC / e-Science / Scientific Computing;

Evaluation/Assignments

- Each student will present a seminar in one of the discussed topics, focusing on the contents of one or two papers from the literature. Duration of each presentation will depend on the number of students enrolled in the course. Dates for each seminar will be chosen by the students during the first weeks of the course. **Seminars will be synchronous, i.e., all students should attend to ask questions**.
- Other students must participate and ask questions during the seminars, which will be also part of the evaluation. The quality of the questions will be considered, thus reading the papers beforehand is highly recommended.

- Each student will deliver a report (< 5 pages) about the topic of each seminar up to one week after the seminar. Alternatively, students can choose one topic to perform a deep bibliographic review and deliver a survey in the format of a scientific article.

Each student will be assessed through a weighted average based on his/her seminar (weight: 4) e answered questions (weight: 2), reports/survey (weight: 4) and questions asked during the seminars (weight: 2). Grades will be assigned based on this average ($A >= 8.5$; $B >= 7$; $C => 5$; $D >= 3$; E otherwise).

Bibliography

1. Tanenbaum, Andrew S, Van Steen, Maarten. Distributed systems: principles and paradigms. Pearson/Prentice Hall. 2nd Ed.

2. Kshemkalyani, Ajay D., Singhal, Mukesh. Distributed computing: principles, algorithms, and systems. Cambridge University Press.

3. Coulouris, G, Dollimore, J., Kindberg, T. Distributed Systems: concepts and design. 4th Ed.

4. Sinnen, Oliver. Task Scheduling for Parallel Systems. Wiley.

5. Pinedo, M. Scheduling : theory, algorithms, and systems. Springer, 3rd Ed.

6. T'Kindt, V., Billaut, J-C. Multicriteria scheduling : theory, models and algorithms. 2nd ed. Springer.

7. Foster, I., Kesselman, C. (Eds.). The GRID2: Blueprint for a New Computing Infrastructure. Morgan Kaufmann.

8. Corrêa, R. Dutra, I., Fiallos, M., Gomes, F. (Eds.). Models for Parallel and Distributed Computation: Theory, Algorithmic Techniques and Applications. Kluwer Academic Publishers.

9. Barbosa, V.C. Massively Parallel Models of Computation. Ellis Horwood Limited.