

Performance Evaluation and Applications

 POLITECNICO DI MILANO

Introduction to the course



Course structure

2

The course will be composed by 2 hours of in-person sessions, on Wednesday and Friday. Each session will mix theory, exercises and applications.

It will be given by
Prof. Marco Gribaudo

Slides will be published on the WeBeep web page.

Lessons will be streamed, recorded and video will be made available as soon as possible.

The screenshot shows a web browser window with the URL `webeep.polimi.it/course/view.php?id=1048`. The page header includes a green menu icon, the 'WeBeep' logo, and a user profile icon. The main content area is titled '056897 - PERFORMANCE EVALUATION AND APPLICATIONS (GRIBAUDE MARCO)' and includes a settings icon and an 'Attiva modifica' button. Below the title, there are four white boxes with the following content:

- Bacheca**: Consulta gli annunci del corso. Comunica con il docente, i tutor e i tuoi compagni di corso tramite il forum.
- Materiali**: Consulta i materiali forniti dal docente.
- Registrazioni**: Rivedi le lezioni del corso per cui è disponibile la registrazione.
- Consegne**: Consegna gli elaborati richiesti da un'esercitazione o da una prova in itinere.

On the right side, there is a 'Attività recente' section showing the last activity on September 12, 2021, and a link to the 'Report completo dell'attività recente...'. At the bottom, there are two columns of links: 'AIUTO' (Chiedi al bot, Scrivici, Chatta con noi) and 'DOCUMENTAZIONE' (FAQ, Moodle Docs, Informativa sulla privacy). A 'LINK' section at the very bottom contains links to 'Beep (versione precedente di WeBeep)' and 'Servizi online'.



Course structure

The course will use an extensive set of case studies, coming from different domains to explain the main techniques used in performance evaluation

Some applications will cover the following area:

1. Surveillance System based on facial recognition
2. Control of a fleet of vehicles
3. Scalable healthcare sensor system
4. Body Area Networks
5. Car maintenance service management
6. Impact of variability of Interarrival and Service Times on performance
7. Impact of synchronization in parallel computing for AI applications
8. Publisher/Subscriber systems
9. Modelling Map Reduce in Big Data applications

Thanks to Prof. Giuseppe Serazzi,
for helping with this list.



Course structure

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Some applications will cover the following area:

10. Energy consumption optimization in Data Centers
11. Simulation of the workflow of a web App
12. Impact of security features (two factor authentication) on performance
13. A crowd computing platform
14. Bottleneck switching in a two class workload
15. Smart batching of signals in the Health scenario
16. Dynamic management of load spikes
17. Performance of Car navigation service
18. Rock falling monitoring

Thanks to Prof. Giuseppe Serazzi,
for helping with this list.



Relation with “Computing Infrastructure”

There is a *Performance Evaluation* part in the “Computing Infrastructure” Course.

This Course is meant to be the continuation of those subjects, and it is more effective if taken after the “Computing Infrastructure” exam.

However, the topics and the usage of the theory here, are sufficiently different to be considered an independent course with only a marginal superposition with the other.

In the past, this course has been fruitfully followed and the exam has been passed by a lot of students before “Computing Infrastructure”, so do not worry if you have not taken that exam yet!

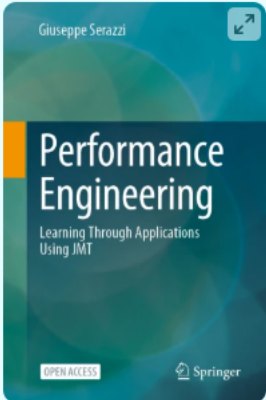


Many of the examples and of the idea shown in this course, can be found in the book by prof. G. Serazzi:

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Performance Engineering

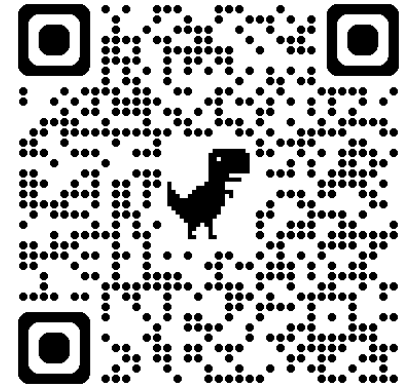
Learning Through Applications Using JMT

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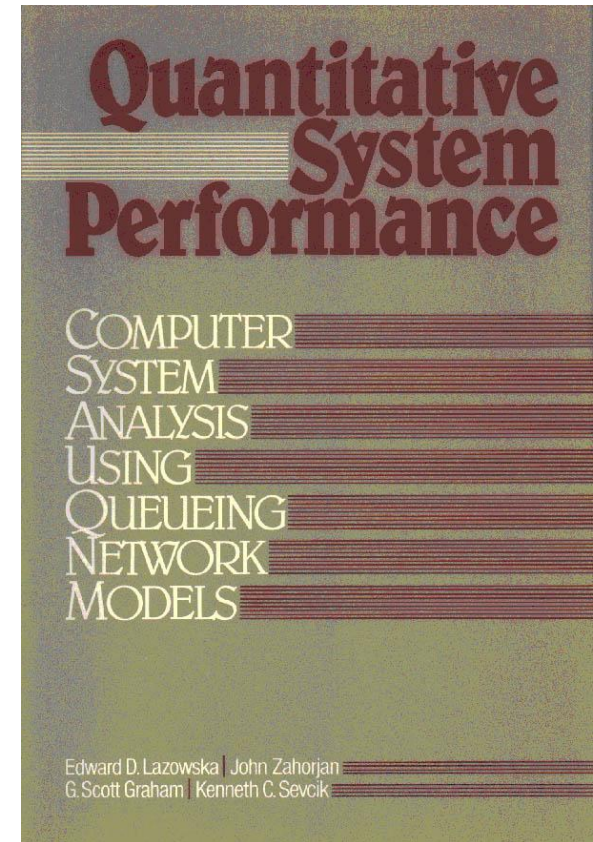


Open Access and available here:

<https://link.springer.com/book/10.1007/978-3-031-36763-2>



Another book which will contain a lot of material used in this course is the following by prof. E. D. Lazowska:



No longer published, but available here:

<https://homes.cs.washington.edu/~lazowska/qsp/>



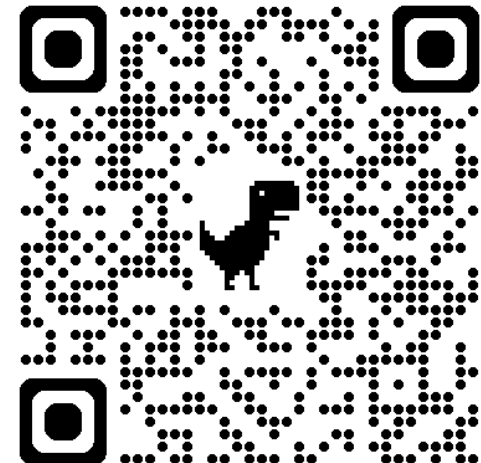
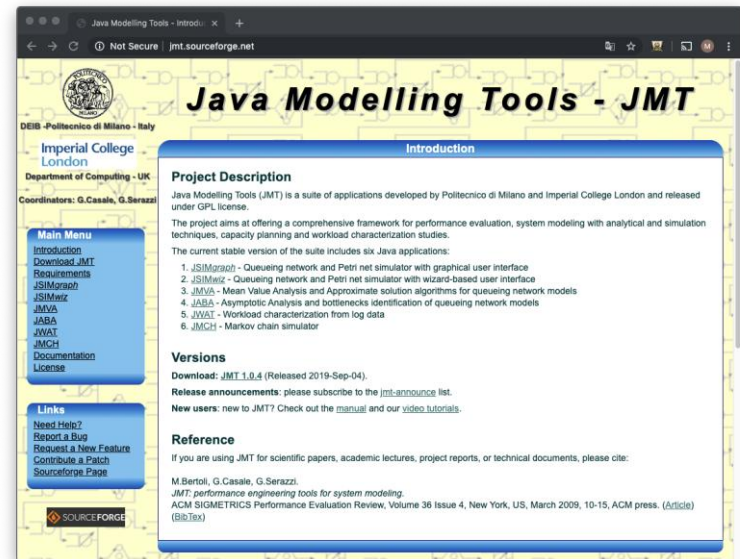


During the course we will use the following tool:

- JMT - Java Modeling Tool

The tool is free and easily available on-line:

jmt.sourceforge.net





We will also use tools for mathematical computations and statistics to define workloads and analyze the results.

We will use *Python*, since it is rapidly becoming the new standard for math computation, but any other alternative, such as *Matlab*, *Octave*, *Scilab*, *Mathematica*, can be used if desired.

However, beside *Python* and *Matlab* (which was used in the previous years), we cannot offer support for the other tools.



Exam - tracks

The evaluation will be based on a set of (*mandatory*) assignments, which will be given at the end of most of the lessons.

There will be two different ways of passing the exam:

- Oral version
- In-course evaluation version



Exam tracks - standard version

The oral version of the exam is meant for students who wants to prepare the exam at their own pace.

- The *Assignments* will be due for the date of the exam, and they will be the base for an oral discussion meant at understanding the real knowledge of the topic.
- It will be a “classical” oral exam where:
 - We will randomly pick some assignments, and use them as a starting point for further questions and discussions.
 - The evaluation will be based on the answers to the proposed questions.



Exam tracks - in-course version

The in-course version is meant for students who want to participate live and in-person to all the lessons.

- A topic will be presented to the lesson
- One week will be given for individual study on the topic
- The assignment on the topic will be given.
- The response will have a strict due date (midnight of the same day).
- At the end of the course, the evaluation will be computed according to the deliveries, and a marking will be proposed.
 - Please be aware that the *correction process will be very long*, and that it might require up to a couple of months after the end of the course for being completed!
- As an experiment, this year the presence to the lesson will not be checked, making this opportunity available, even if not suggested, to students who are not coming actively to the lessons.



Special evaluation case

- The proposed marking will be registered immediately, without an oral exam, with one exception:
- If you will score 30 e lode, you will have two opportunities:
 1. Do a short oral exam, aimed at verify your real involvement in the proposed solutions.
 2. Have it downgraded to 30, and have it registered immediately
- An marking ≤ 30 will be registered without an interview.



Exam tracks - in-course version

Why the presence to lessons is strongly suggested for this version of the exam?

- Based on the experience from the previous years, students tend to group to solve the assignments.
- In these groups, students discuss about the topic of the lessons, using the assignment as a guide to really understand the material.



Exam tracks - in-course version

- The lessons when an assignment will be proposed, will have a special structure to allow the students to discuss with the professor about the solution of the assignments.
- This creates an active environment that leads to a more involved way of learning, not possible without coming to the lessons, and meeting both the professor and the other students in person.



Exam tracks - in-course version

- Since, based on the experience from the previous years, students tend to group to solve the assignments...
- This will also be considered during the evaluation, allowing students who worked together to deliver the same results to the same assignments.



Exam mark rejection

Regardless of the track being followed, if a mark will be rejected, we will define together a way to improve it:

- The exact way a retake will be done, will then depend on the reasons that led to a marking not acceptable for the student.



Lesson structure: no assignments

The lessons where no assignment will be proposed, will have the classical structure of two parts and a break:

The start will be at 12:30, and end at 14:15.



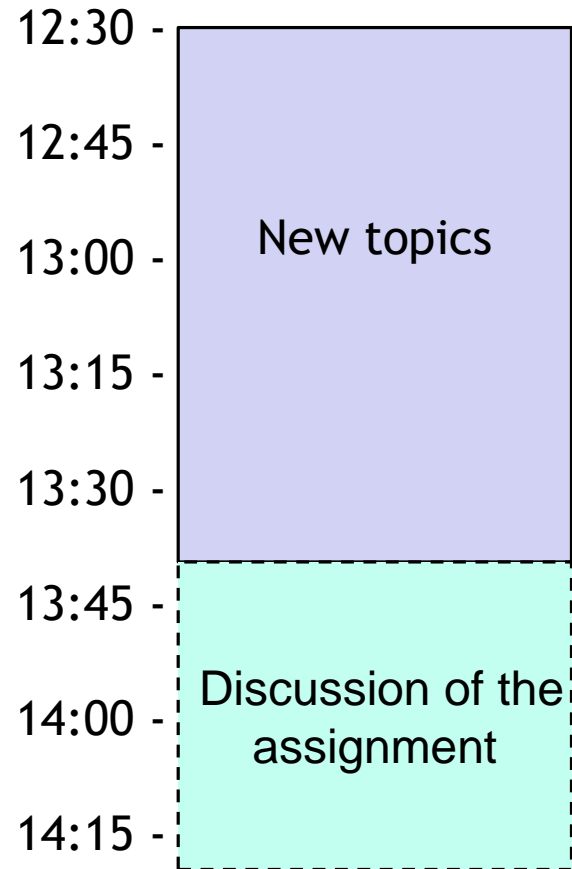


Lesson structure: no assignments

The lessons in which an assignment will be proposed, will pack the presentation in a single longer slot, and will leave the second part to start working together on the proposed exercises.

In this cases, bringing a (*charged*) laptop will help, but since there will be a few hours after the lessons to complete the assignments, it is not mandatory.

In the end, there will be a total of between 16 and 20 assignments.





Marco Gribaudo

02 2399 3568

marco.gribaudo@polimi.it

(Phone is usually better than mail!)