Exam themes’ specification and requirements

Runtimes for concurrency and distribution
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Modality

- **Individual or collaborative** undertaking
  - Max group size $\leq 3$ individuals
- Topic chosen freely out of the topics enumerated here
- Exam work in **three steps**
  1. Study of the *state of the art* around the chosen topic
  2. Selection of an applicable *real-world scenario* of interest
  3. Implementation of *Proof-of-Concept* based on above scenario to prove the candidates’ understanding of the subject matter
- Exam work’s output has two parts
  - Technical report (TR) on the candidate’s findings
  - Oral presentation
  - Both delivered in English
- Admission to oral presentation upon approval of the TR
Technical Report: main components

- **Problem statement**
  - Scope (boundary)
  - Purpose (technical and scientific expectations)
  - Aspects to be investigated

- **Work product**
  - Technical choices made in the realization of the PoC
  - Design of the evaluation experiments
  - Results of the evaluation experiments

- **Self-assessment**
  - Candidate’s own critique of own exam work (achievements, failures)
  - Discussion of the candidate’s *learning outcomes*
List of topics

A. Exploration of **scalability** challenges and solutions in a real-world scenario of choice
B. Application of **Paxos** or **Raft** algorithms to real-world scenario of choice
C. Exploration of real-world situations where **eventual consistency** is known to be used soundly
D. Exploration of **saga** (**distributed transaction**) **pattern** for rationale and challenges of use in real-world applications
E. Study of how an **orchestration** language (e.g., Ballerina, Jolie) can help implement microservices-based Cloud-native apps
F. Students’ own proposal (subject to instructor’s approval)
Examples of excellent outcomes

- **Rafting multiplayer video games**
  Gabriele Pozzan, Tullio Vardanega
  *Software: Practice and Experience*, 2021
  [https://doi.org/10.1002/spe.3048](https://doi.org/10.1002/spe.3048)

- **The scalability challenge of Ethereum: An initial quantitative analysis**
  Mirko Bez, Giacomo Fornari, Tullio Vardanega
  13th Conference on Service Oriented Software Engineering (SOSE), 2019
  [https://doi.org/10.1109/SOSE.2019.00031](https://doi.org/10.1109/SOSE.2019.00031)

- **Microservice-Based Agile Architectures: An Opportunity for Specialized Niche Technologies**
  Stefano Munari, Sebastiano Valle, Tullio Vardanega
  23rd Ada-Europe International Conference on Reliable Software Technologies, 2018
  [https://doi.org/10.1007/978-3-319-92432-8_10](https://doi.org/10.1007/978-3-319-92432-8_10)
Schedule

- **No fixed date for the exam (big risk!)**
  - Registration attached to the closest official exam session
- **Notification of choice of topic**
  - By **12:00 hrs, 17 January 2022**
  - With explicit declaration of estimated delivery time
- **Bonus applied to early delivery**
  - **2 points** if by **18:00 hrs on 15 April 2022**
  - **1 point** if by **18:00 hrs on 10 June 2022**
  - Computed on delivery time, redeemed on passing exam
- **Latest submission time**
  - By **18:00 on 28 September 2022**