# Complex Systems Theory and Practice

Semester Project – Guidelines

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Some guidelines for the students that decide to pass the course by designing and implementing large scale app and ignoring the lists are listed below. Note that the detailed requirements and the content required by the second milestone will be individually agreed upon, as they are project-dependent.

- The project should be created by groups of at most 4. Due to the expected size of the project, groups of at least 3 people are advised.
- It is allowed that the group consists of people from different laboratory groups, in such cases all deadlines consider the earliest group of any team member.
- The project should be reported at least three times during the semester:

  **Milestone I:** The group should provide a document that states the team members, the design of the project, the general aim of the project, main database functionalities that will be provided, describe the type of the data and its sources, the entities in the database and the main issue the project aims to cope with (e.g., efficiency during large batch operations,node failure, storing and encryption of significant number of records, privacy aspect of the database or large number of simultaneous users).
  Deadline – the same as the deadline for list 1.

  **Milestone II:** The group should present a partial implementation of the project, including at least half of the planned entities and tests of the approach to the main issue the group copes with. The UI should be implemented, yet part of it may be mocked. The group should provide a report that covers all the differences between the implemented part as well as the planned part and the design presented during Milestone I.
  Deadline – the first lab classes after 2021-12-01.

  **Milestone III:** The group should present the final application, show its functionalities, explain the problem the group was coping with and the manner of solving the problem. Moreover, at least 48h before the deadline the group

should send me (via e-mail) a report that summarizes all the differences between the initial design and the final application.
Deadline – the last laboratory classes.

- The project may be focused on SQL or NOSQL languages, it may utilize both approaches if suitable.
- The project should incorporate significant amount of information – the database should contain at least 3 million records or at least 150 of multimedia files (images, audio, videos) with a joint size of at least 500MB.
- The application should allow at least 3 user levels (one of which is user that did not sign in), with different access levels. The user with the highest access level should be able to backup the database (or part of it, stored on a single node) with a button (without database commands), and restore a database backup in a similar manner.
- The basic functionalities should involve adding, deleting, modifying and selecting records, files or their fragments at the application level with no knowledge about the databases or project structure (respecting access levels mentioned above).
- The NOSQL part should allow batch importing data from a XML/JSON/yaml/... file or directory for multimedia files, ensuring that either all data are imported or none of them and a proper error is displayed. The SQL part should involve transactions in most operations.
- The correctness of the data is checked before adding it to the database.

Note that all the reports and documents should be in pdf format with the necessary images and diagrams embedded.