

CmpE321 - Project 1

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Deadline: 23rd March 2020, Monday, 17:00

1 Project Description

In this project, you are expected to design a storage management system. The design shall have a system catalog for storing the metadata and data storage units (files, pages, and records) for storing the actual data. The system design must support the following operations:

DDL Operations

- Create a type
- Delete a type
- List all types

DML Operations

- Create a record
- Delete a record
- Search for a record (by primary key)
- Update a record (by primary key)
- List all records of a type

You need to make certain decisions and assumptions while designing your system. The decisions shall *include*, but are not limited to:

- Page size (Something between 1KB and 2KBs is optimal)
- File size (Should contain reasonable amount of pages)
- What information to store in your page headers and record headers
- Max number of fields a type can have (≥ 3)
- Max length of a type name (≥ 8)
- Max length of a field name (≥ 8)

Assumptions:

- User always enters valid input.
- All fields shall be *integers*. However, type and field names shall be alphanumeric.
- A disk manager already exists that is able to fetch the necessary pages when addressed.

You can make further assumptions, as long as they do not conflict with the base assumptions and they are explained in the report clearly.

Constraints:

- The data *must* be organized in pages and pages *must* contain records. So, you *must* clearly explain your page and record structure in your report.
- You *are not allowed to* store all pages in the same file and a file *must* contain multiple pages. This means that your system *must* be able to create new files as storage manager grows. Moreover, when a file becomes free due to deletions, that file *must* be deleted.
- Although a file contains multiple pages, it must read page by page when it is needed. Loading the whole file to RAM is not allowed.
- The primary key of a record should be assumed to be the value of the first field of that record.
- Records in the files should be stored in ascending order according to their primary keys.

2 Report & Grading

You are expected to submit a report *written in L^AT_EX* that contains the sections below. Corresponding points are tentatively specified in parentheses.

1. **Title Page:** A separate page that includes course name, semester, assignment title, your name, and student number. *(5 pts)*
2. **Introduction:** Briefly describe the project *in your own words*. *(10 pts)*
3. **Assumptions & Constraints:** *Clearly* specify your assumptions and constraints of the system in an itemized or tabular format. *(25 pts)*
4. **Storage Structures:** Explain your system catalogue, page design, page header, record header etc. *with tables/diagrams/figures*. *(25 pts)*
5. **Operations:** Write your DDL and DML operations in pseudocode by referring to the structures in your design. *(25 pts)*
6. **Conclusions & Assessment:** Evaluate your design, considering its ups and downs. *(10 pts)*

3 Submission

The submissions will be through Moodle. Submit a single .zip file named with your student ID (e.g. 2017400XXX.zip) that contains .tex and .pdf files of your report named with your student ID as well (e.g. 2017400XXX.tex, 2017400XXX.pdf). Note that your reports and codes will be inspected for plagiarism with previous years' materials as well as this year's. Any sign of **plagiarism** will be **penalized**.