Advanced Database Organization - Fall 2023
CS 525 - 04/05
Programming Assignment: Organization

1. **Task**

There will be several programming assignments during the course. Starting from a storage manager you will be implementing your own tiny database-like system from scratch. You will explore how to implement the concepts and data structures discussed in the lectures and readings. The assignments will require the use of skills learned in this course as well as other skills you have developed throughout your program. Each assignment will build upon the code developed during the previous assignment. In the end there will be an optional assignment for extra credit. Each of the regular assignments will have optional parts that give extra credit. All assignments have to be implemented using C. We will specify test cases for the assignments, but you are encouraged to add additional test cases. Detailed descriptions will be linked on this page once an assignment is handed out.

- `Assignment 1- Storage Manager`: Implement a storage manager that allows read/writing of blocks to/from a file on disk
- `Assignment 2 - Buffer Manager:` Implement a buffer manager that manages a buffer of blocks in memory including reading/flushing to disk and block replacement (flushing blocks to disk to make space for reading new blocks from disk)
- `Assignment 3 - Record Manager:` Implement a simple record manager that allows navigation through records, and inserting and deleting records

2. **Source Code Management and Handing in Assignments**

- The assignments will be completed in groups of at most **three** students. Groups will be determined in the first week of class.
- All assignments helper files are available on Blackboard
- For each group, we will create a repository and team on `BitBucket`. Git is a distributed version control system. Good introductions to git are gitmagic and the official git documentation.
- Once groups have been formed, you will receive an invitation to collaborate on a shared `BitBucket repository` named `cs525-S23-group`. All your work in this class will be submitted via your shared private repository on `BitBucket`.
- We will consider code submitted until `midnight of the assignment deadline`.

3. **Grading of Assignments**

The following criteria will be considered in the grading:

- Functionality: Does the code do what it is supposed to do? All all tests completing successfully?
- Documentation: How well documented is the code?
- Code Organization: Is the structure of the code clear and suits the goal?
- Innovation: Does the solution use new and innovative ideas?

`We will check for plagiarism. Plagiarism will result in zero points for the assignment, potentially academic sanctions, and may result in an E grade.`

4. Stuff to get familiar with

- See resources section below for links to documentation and tutorials
- OS C-library: system calls for accessing and creating files or alternatively the C standard library file IO
- GDB - gnu debugger and its GUIs like DDD
- valgrind - debug memory errors

5. Resourses

Some links with information related to the course:

- Information about Git: gitmagic and the official git documentation.
- BitBucket: The version control system we use for the programming assignments.
- Linux system programming: How to use system calls to access a file in linux.
- Make documentation: Documentation for the make build system.
- maketutor: A nice small tutorial for writing Makefiles.
- `gcc_make`: Tutorial for writing `C` Makefiles
- GDB Gnu Debugger Tutorial
- GDB GUIs - graphical frontends for GDB
- Valgrind - Debug memory errors.