Implementation of Databases Sheet 1

Ilya Kulikov 351063, Alina Shigabutdinova, Oleg Chernikov

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Exercise 1.1

1. There are layers in the database system:

- Logical data structures: this layer contains auxiliary structures: external schema description and integrity rules. The goal of this layer is to translate and optimize queries. Interface with transaction programs is SQL, which operates with relations, views and tuples.
- Logical access structures: this layer contains auxiliary structures: access path data, internal schema description. The task of this layer is to manage cursor, sort components and dictionary. Interface with logical data structures is record oriented interface, which operates with records, sets, keys, access paths.
- Storage structure: this layer contains auxiliary structures: DBTT, FPA, page indexes etc. The task of this layer is to manage record and index in the database system. Interface with Logical access structures is Internal record interface, which operates with records, B* trees etc.
- Page assignment: this layer contains auxiliary structures: page and block tables. The task of this layer is to manage buffer and segments. The interface with Storage structure is System buffer interface, which operates with pages and segments.
- Memory assignment structures: this layer contains auxiliary structures: VTOC, extent tables, system catalogue. The task of this layer is to manage files and external memory. The interface with Page assignment is File interface, which operates with blocks and files. The interface with Physical volume is Device interface, which operates with tracks, cylinders, channels etc.

2. The following sequence matches the top-down architecture:
(E) $\Rightarrow$ (D) $\Rightarrow$ (B) $\Rightarrow$ (A) $\Rightarrow$ (C)

3. (a) Data independence contains two separate properties of the system: the system should be able to manage data independent of top applications, and

secondly, system should be able to make data available for different application independently.
(b) Data independence is an important feature because it is not feasible to store the same data for each application several times and to provide shared data to several applications and to be sure, that data will be accessible.
(c)