UNIVERSITATEA „TRANSILVANIA” DIN BRAŞOV
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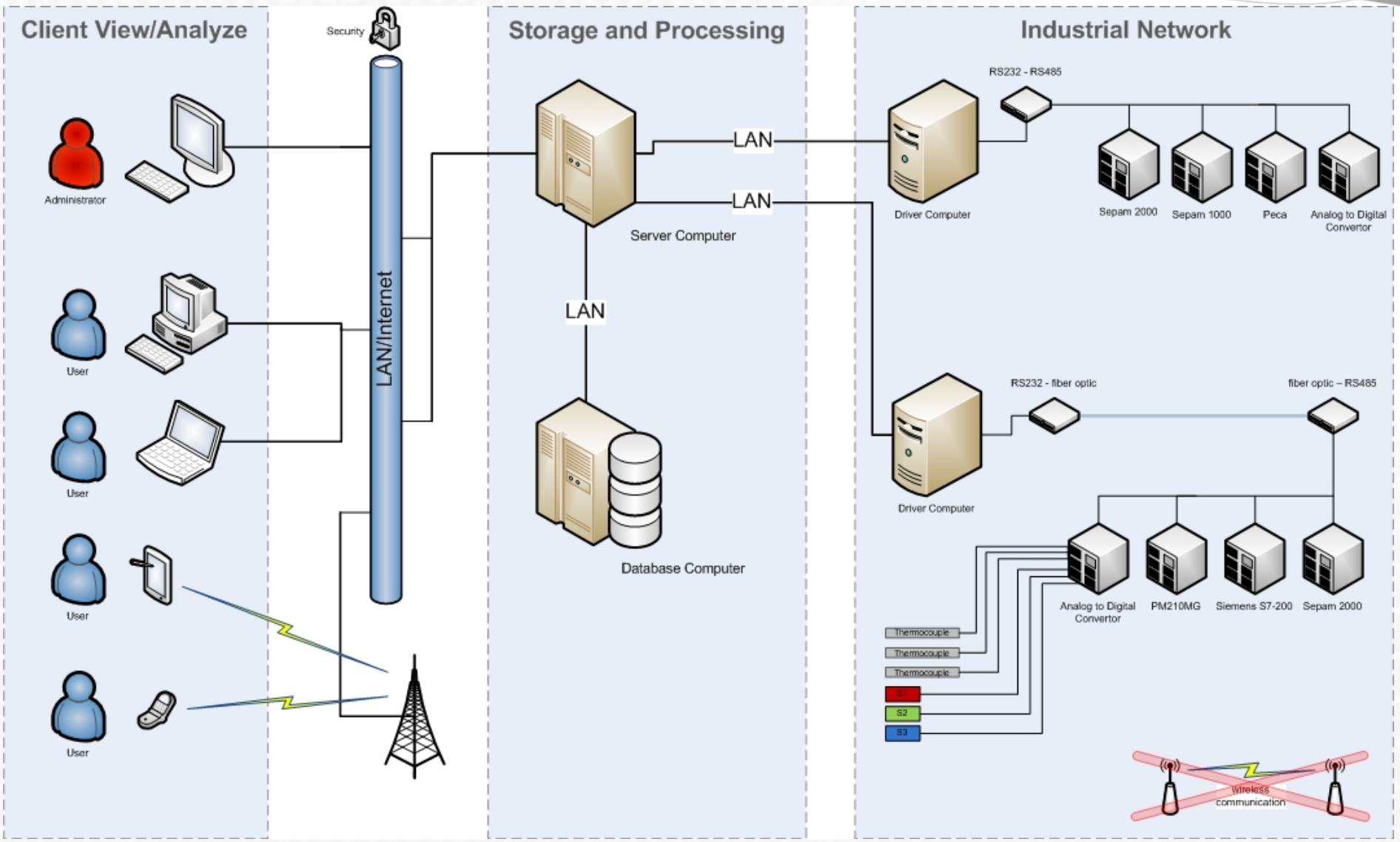
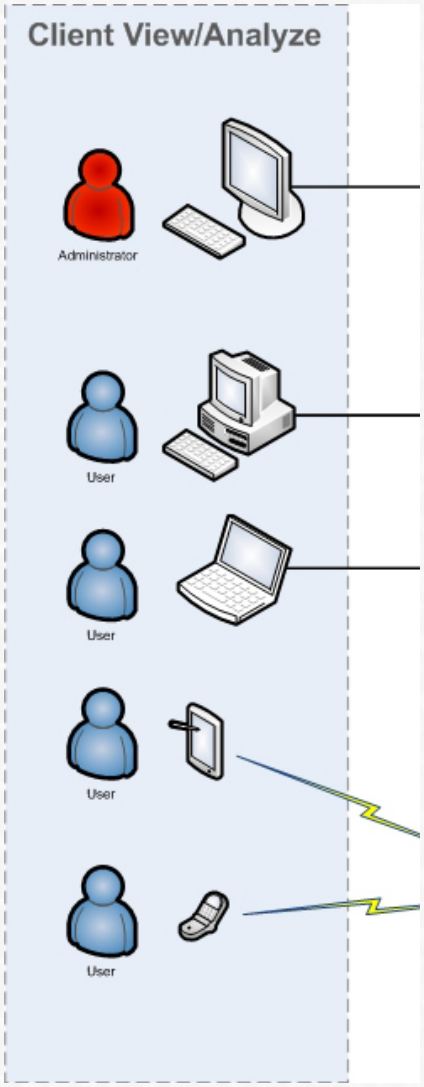
Retele de senzori

Curs 1 - 1st edition

Monitoring and control system - architecture



Client View/Analyze

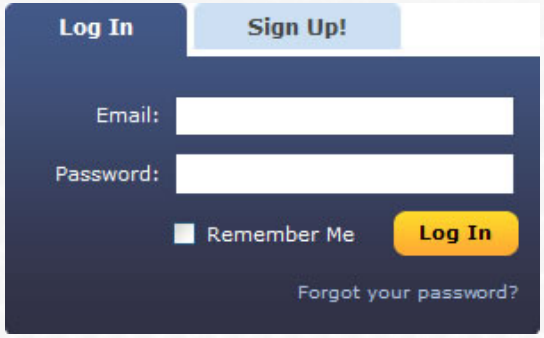


Users:

- *administrator:*
  - access the system (software) using a username and a password;
  - configure the system;
  - ensure system maintenance.
- *common user:*
  - access the system (software) using a username and a password;
  - view and analyze the stored information.
- *anonymous:*
  - usually not allowed.

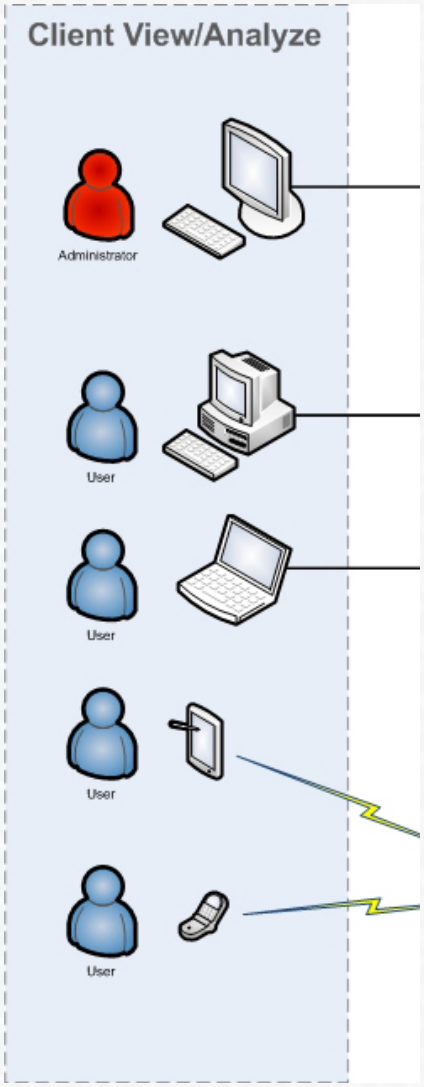
Devices used as interface with the system:

- PCs;
- laptops;
- tablets;
- mobile phones;
- PDA, Pocket PCs, etc.



Authentication of the user

Administrator tasks

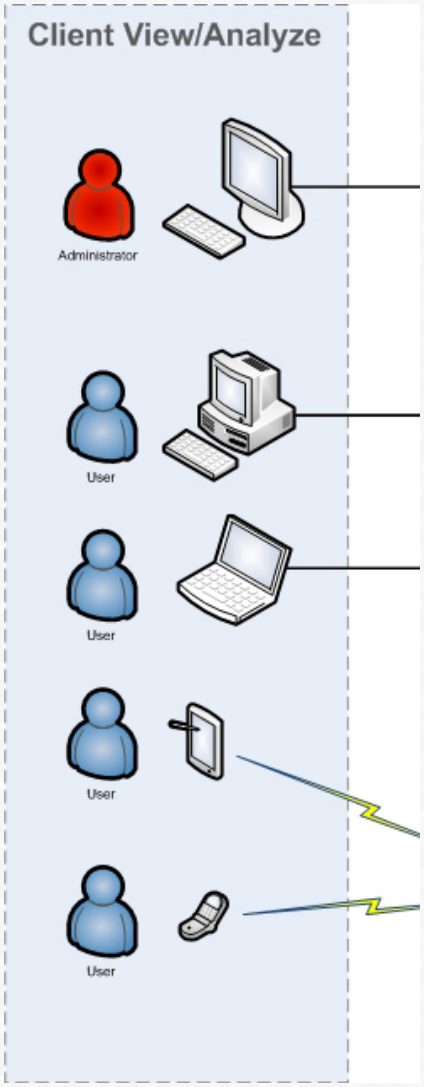


Some examples:

- create and maintain the list of users which access the system (and establish for each or for groups of users their access to application's functionalities);
- setup the system (configure all devices which will be monitored or controlled);
- view the state of the system 's physical connections;
- configure the connection to the database (username, password, database computer address);
- ensure the security of the network;
- analyze the system performance.

System performance

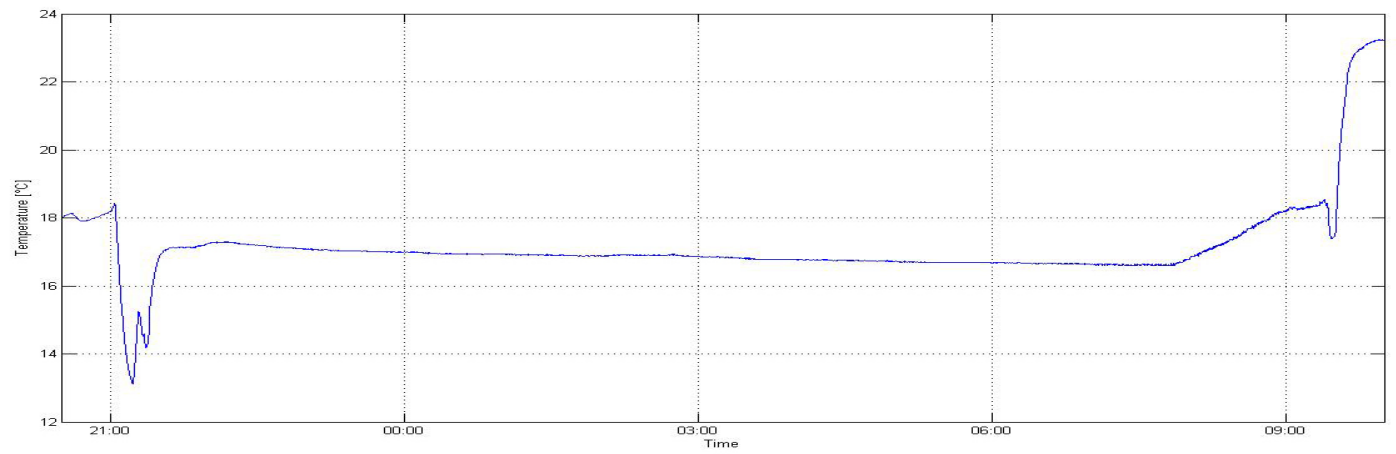
Common user tasks



Usually he is allowed to require information and to view it in different formats (numeric or variation charts).

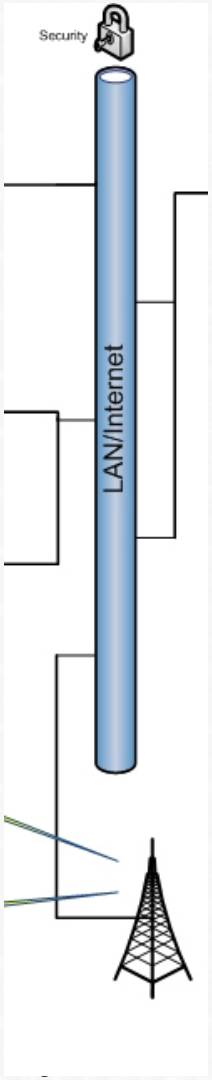
• one common feature is to view the evolution of one parameter during a period of time.

• according to how often the parameter value have been recorded into the database it is possible to have stored lots of records. In this case it is important that the useful information to get to the user in the shortest time (-> database optimization).



Temperature variation

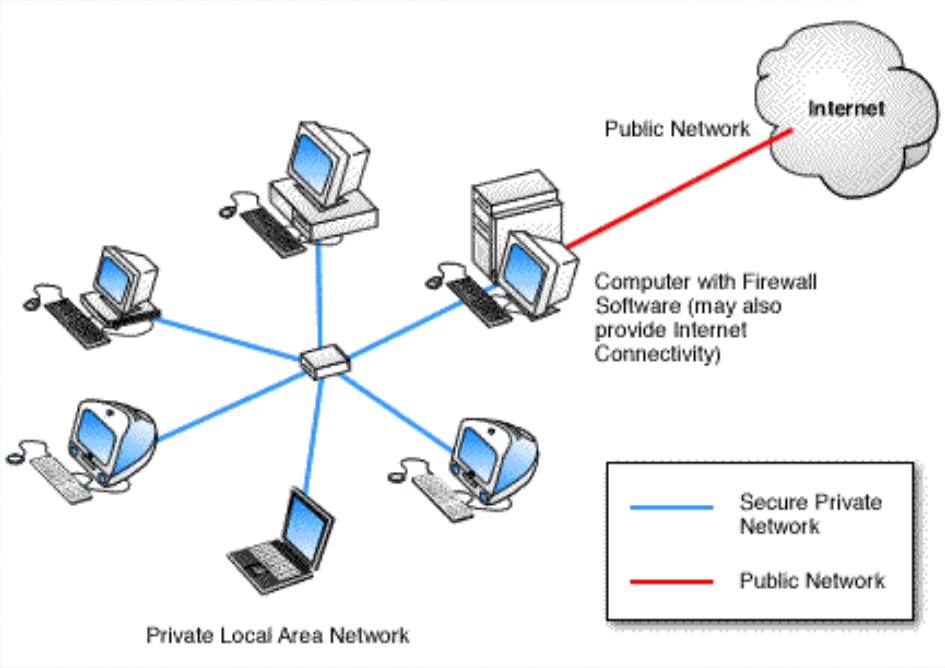
Communication client -> the other part of the system



Usually there are used LAN networks which are more safe than Internet and have a higher level of data transfer.

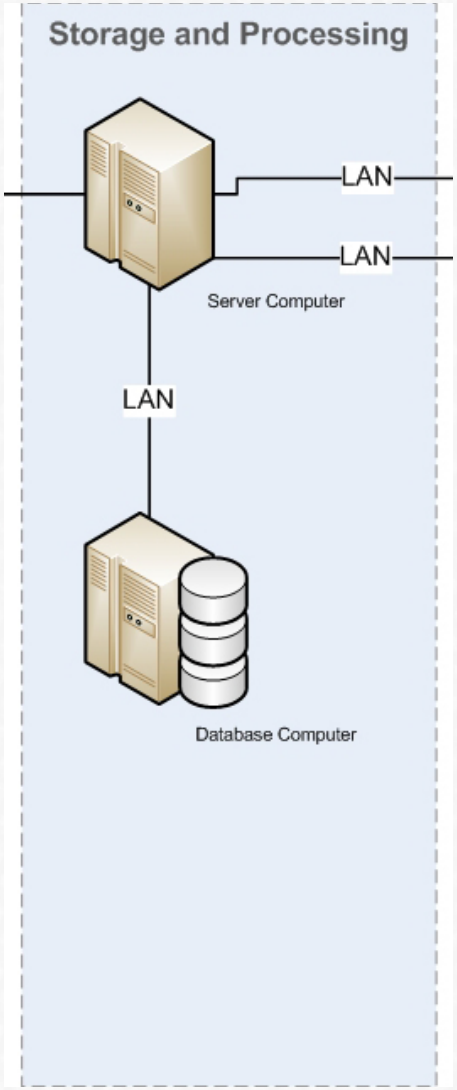
If using Internet:

- more security techniques should be applied to the data (encryption);
- ensure a high transfer band;
- anyway, not recommended.



Firewall protection

Communication client -> the other part of the system



Server Computer:

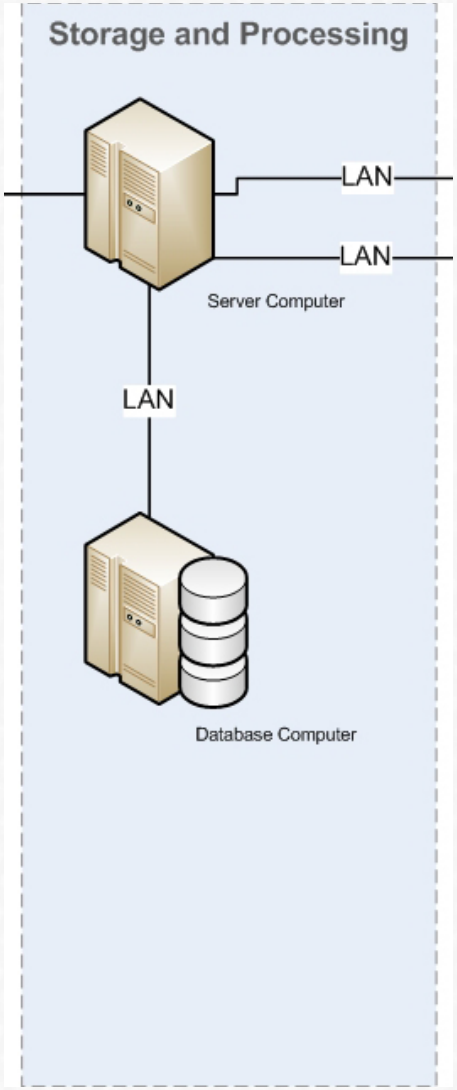
- high performance computer (processor, RAM);
- process and transfer the information from one side to another.

Database Computer:

- high performance computer (processor, RAM, hard disk);
- high capacity for storing the information;
- high performance database software;
- backup service;
- is high performance computer is useless if the database management is not done correctly.

Usually the Server computer and Database computer is the same. It depends on the system complexity if to use only one computer as server or a couple of computers.

Database



A simple *text file* could be viewed as a database, but it could be used only for storing small quantities of information.

A *system for database management* is simple called *database* even it provides more other functionalities (security, information storage, concurrent access, etc.).

The content of the database is stored into a single or multiple files. How it is stored depends on the database structure and configuration.

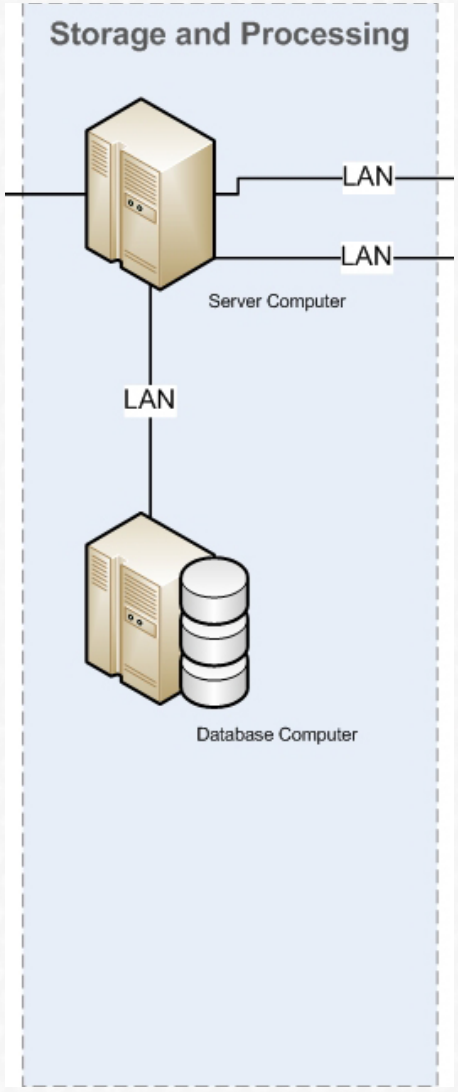
ex. *MsSQL*, Oracle, DB2, MySQL, PostgreSQL, etc.

For the commercial systems for database management the price depends on the functionalities they are able to provide.

For the laboratory tests it is recommended to use *MsSQL Express* (a free to use version of MsSQL).

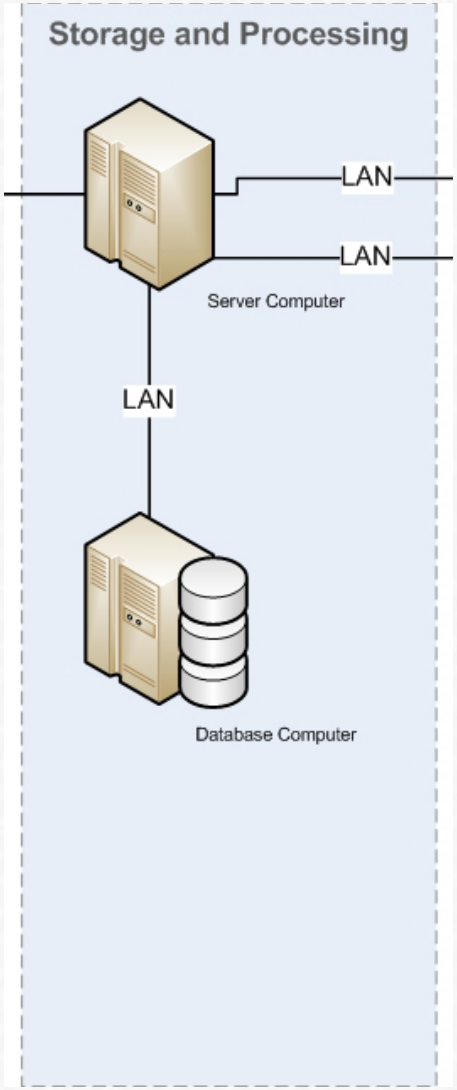
The database is a very important component of the system and should take care to ensure it's privacy and integrity !

Compare Microsoft SQL Server 2008 Editions



	Express	Enterprise
Number of CPUs	1	8
Maximum memory utilized	1Gb	1Tb
Maximum database size	10Gb	524Pb
Database mirroring	No	Yes
Fast recovery 2	No	Yes
Database Engine Tuning Advisor	No	Yes
Data compression	No	Yes
Table and index partitioning	No	Yes

Database optimization



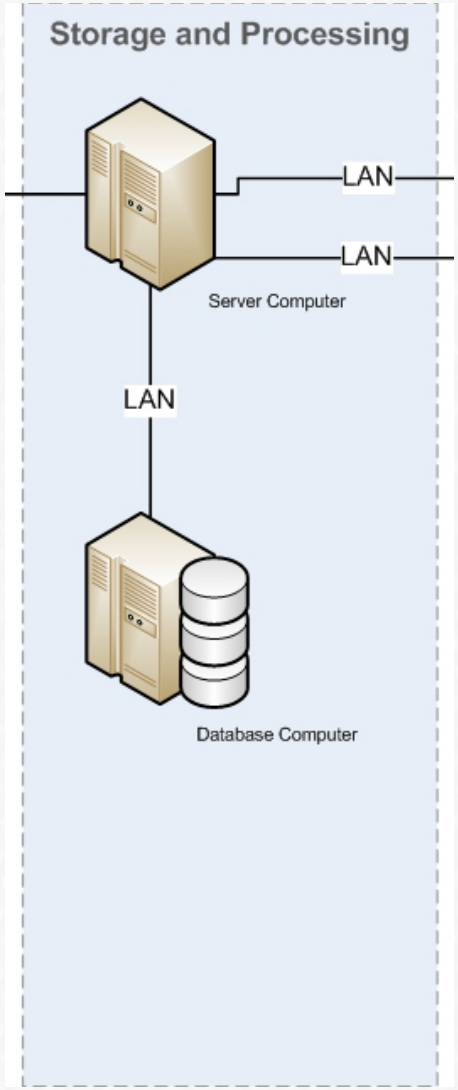
The most common database operations for a monitoring and control system are:

- *insert* a new record into the database;
- *select* a list of records for a specific period of time (for displaying charts);
- get the latest added records (instant values).

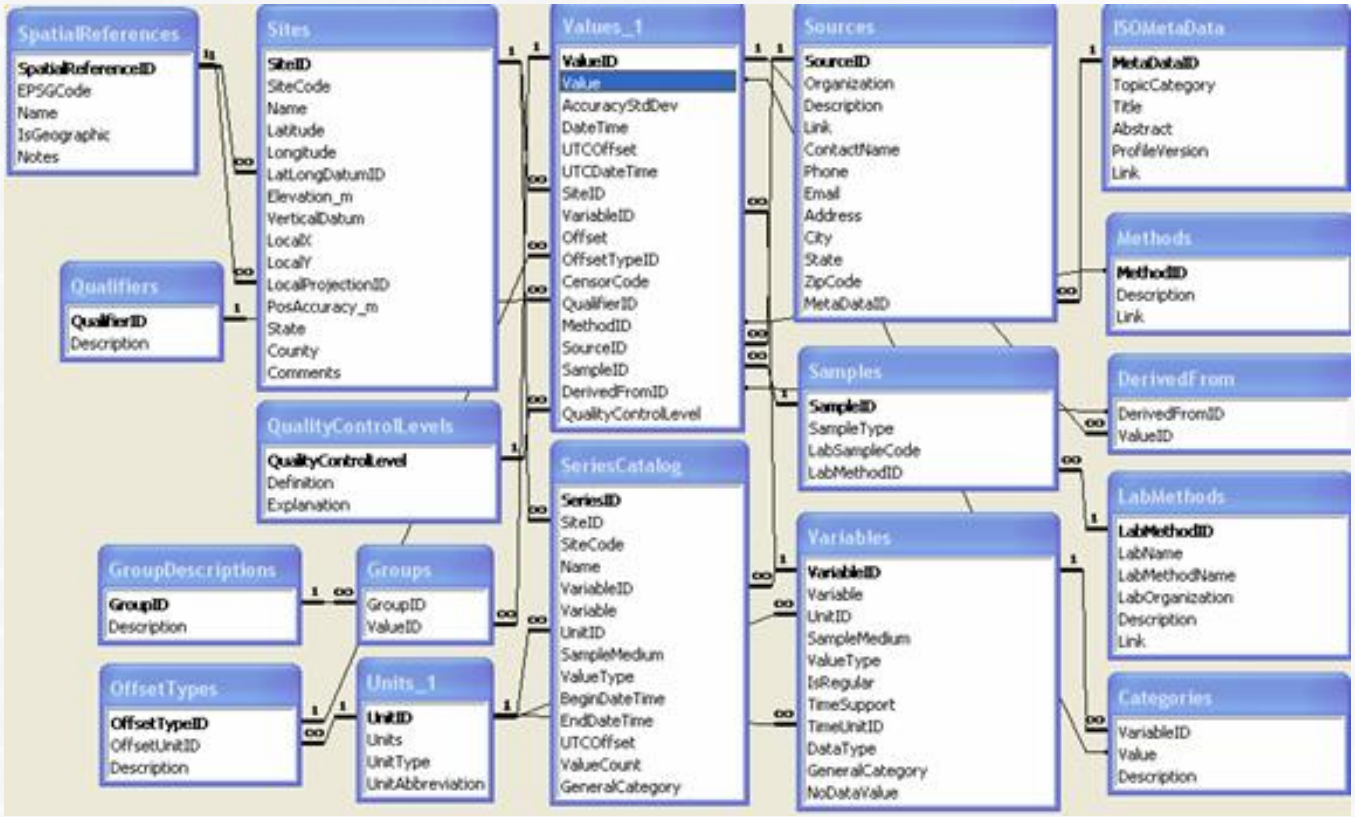
Optimal solution supposes:

- best structure of the database;
- proper types for information;
- best information storage;
- best information utilization.

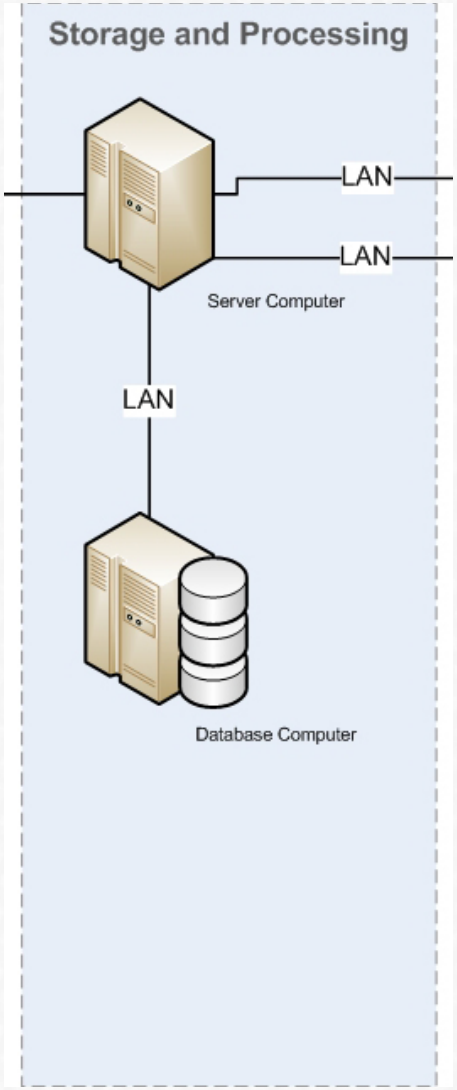
Database optimization



The structure of the database should be properly designed. When we have a few tables it is very simple, but when are many tables, to design the structure of the database could became very complicated.



Database optimization - methods



- normalization;
- use proper indexes;
- remake indexes;
- defragmentation of the indexes;
- updating statistics;
- concurrency management;
- data partitioning;
- optimization of the queries (SQL tuning);
- disk defragmentation;
- database mirroring;
- use cursor objects ???.