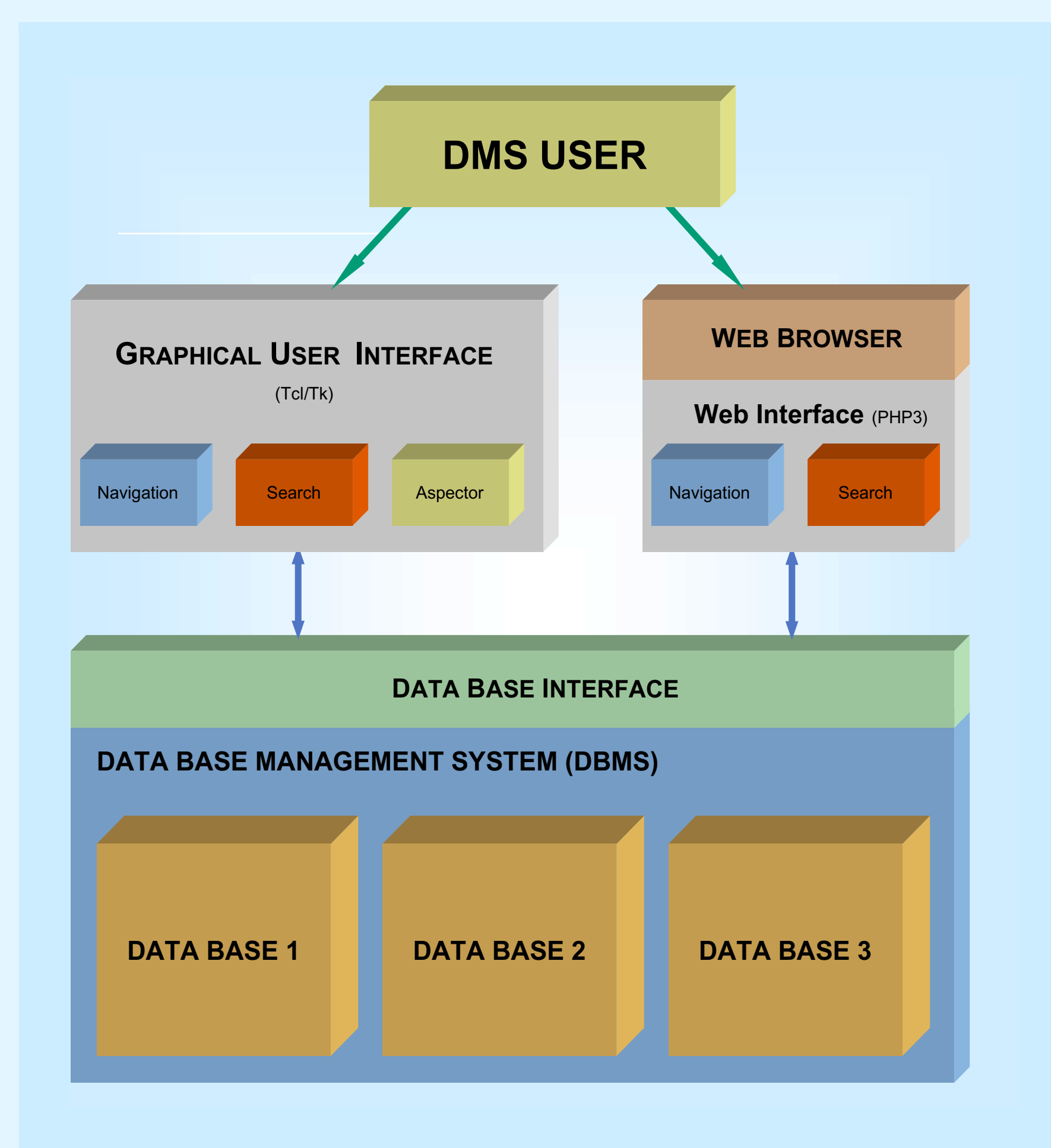


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## FEATURES

- Intranet based Data Management System for
  - simulation models
  - stimuli and simulation Results
  - measurement and characterization data
  - documents
  - meta data
- Reuse of micromechanical components in further projects
- Extensive search and retrieval capabilities
- Decrease of data redundancy through document management
- Data integrity by refined access-rights
- Data structure is modifiable to match new requirements
- Client/Server solution based on the relational database system PostgreSQL
- Accessible by graphical user interface (GUI) based on the script language Tcl/Tk and web browser
- Compatible with different operation systems (Unix, Linux, Windows)
- Integration of the specification tool for analogue systems Aspector (developed at the Chemnitz University of technology)

## PRINCIPLE



## STRUCTURE

The basis of the DMS is a database where the data is structured in a physical data scheme. The data model is based on the Entity-Relationship-Concept. New requirements can be applied to the structure easily by use of the design process method based on the phase model. An application program with a graphical user interface is the connection between user and database. The application provides different forms for user-friendly data presentation and functions for data input respectively manipulation. These functions are based on the Structure Query Language SQL.

## CATEGORIES

The centre of the scheme is the micromechanical component respectively system and their behavior description and usage. Therefore, the design- and characterization data in the scheme is subdivided in different categories. These categories are denoted Project, Design, Technology, Manufacturing/Quality Assurance, Models and Simulation.

### PROJECT

The project is the generic name for the allocation of micromechanical components within the database. Information like project aims, current states, statistics and results can be assigned to the project in terms of documents.

### DESIGN

This category contains data, which describe and characterize components. Relevant specifications are, for example, notation, structure, geometric dimensions, material properties or system parameters of the component. These characterizing data are the basis for the further modeling process. They can differ considerably between the different components. Therefore, it is possible to create user-specific properties for characterization. From a wide range of predefined magnitudes and units for the characterizing data, the user can refer them to the specific component or a part it consist of.

A micromechanical component can be a composite of other components and consist of form-elements respectively construction-elements. These elements represent the smallest modules of a component. Information about the hierarchy of a micromechanical component are used to generate part lists and to give surveys about the structure and the disposition.

Additionally, the management of layout-structures is an essential part in the Design category. This includes information about the used wafers and the assigned technology.

### TECHNOLOGY

The category describes different technologies for manufacturing of micromechanical components. This contains documents about technological parameters and proceedings, for example, lithography, thick-film technology, thin-film technology, bonding and housing technology. The information can be assigned to more than one micromechanical component and intend the manufacturing process in form of a technological sequence.

## MANUFACTURING / QUALITY ASSURANCE

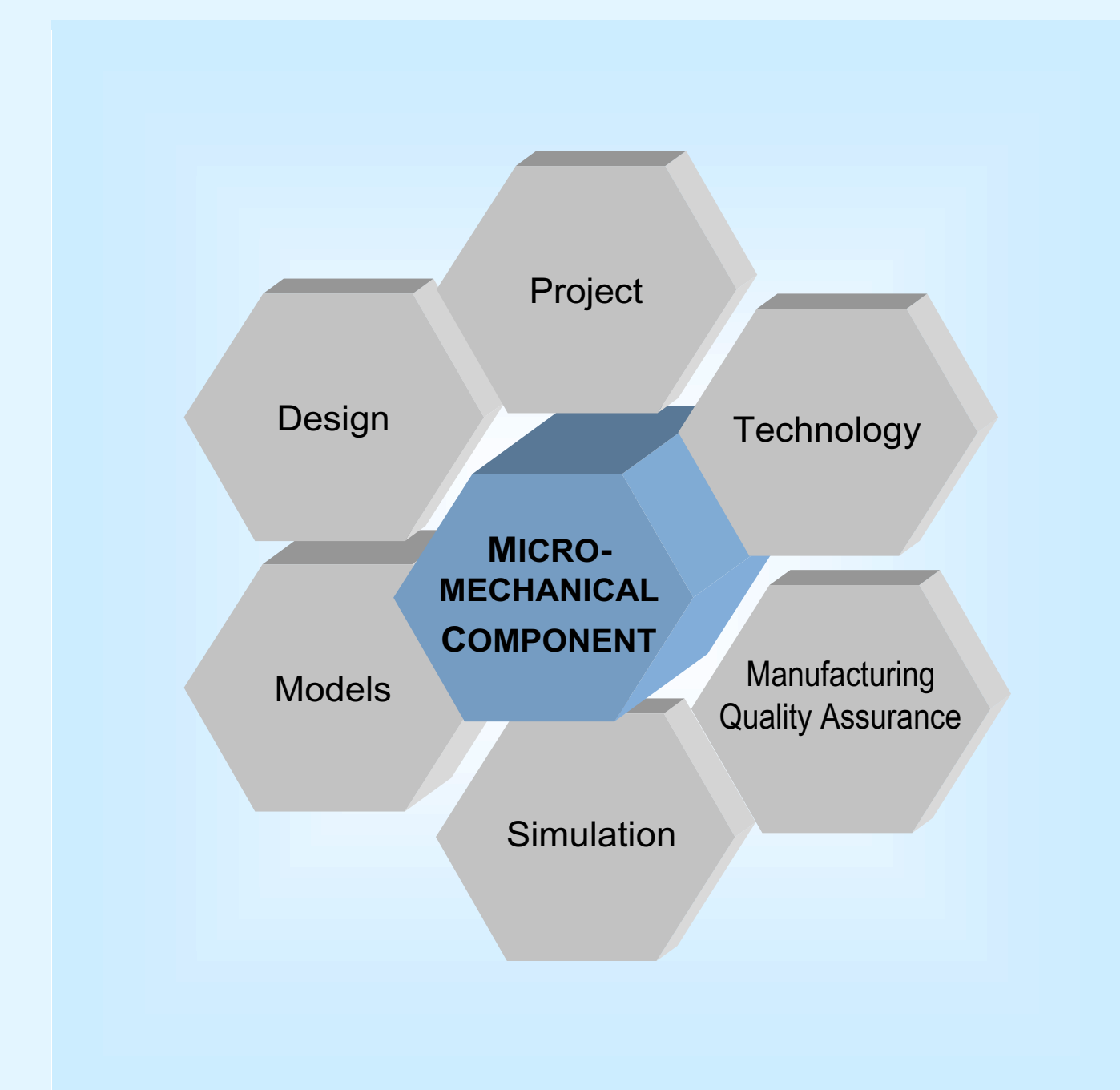
This category contains data for manufacturing and quality assurance. The final product is defined by name, serial number and date of manufacture. The used technology for the micromechanical components can be assigned through a link to a record in the category technology. The quality assurance is based on measurement data. The measurement data can be stored as characterizing properties. In addition, it is possible to link to further documents such as measurement conditions, measurement results and certificates.

## MODELS

The category Models unifies the different simulation models of the micromechanical components. The models are described through scope, quality, modeling method and simulator. The modeling method specifies the theory or the behavior based on measurement, the model is built. The used parameter, for example, moment of inertia, spring constant, resonance frequency and damping factor can be stored as characterization data.

## SIMULATION

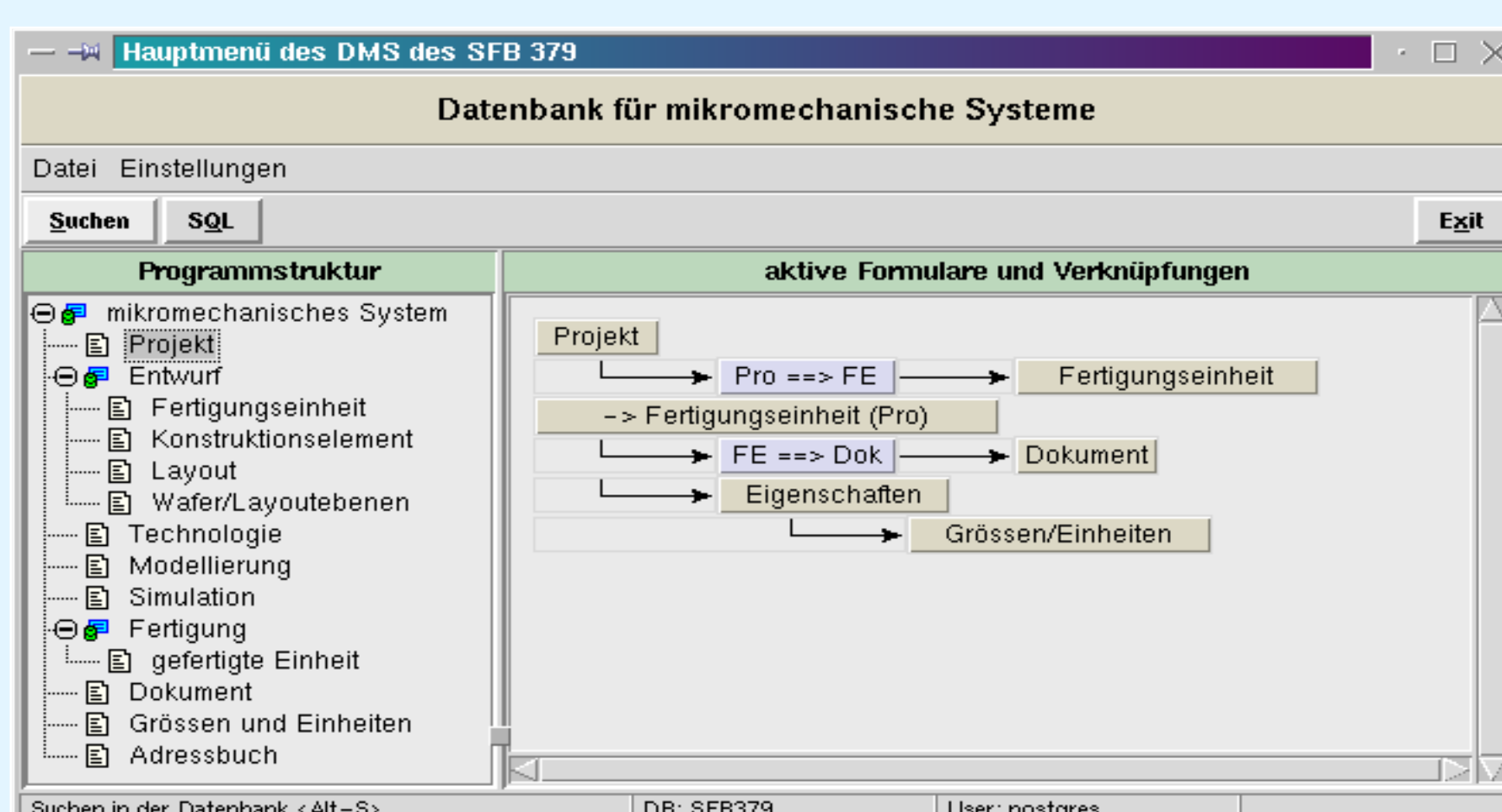
The results of a realized simulation as well as information about the simulation sequence and the used simulation model are contents of the category Simulation. The simulation sequence provides data about stimuli and simulation parameter such as calculation method, step size and simulation time. The simulation type describes the analysis method. Linked documents provides further information about stimuli generation or readout respectively interpretation of simulation results.



## GRAPHICAL USER INTERFACE (GUI)

### MAIN MENU AND SELECTED FORMS

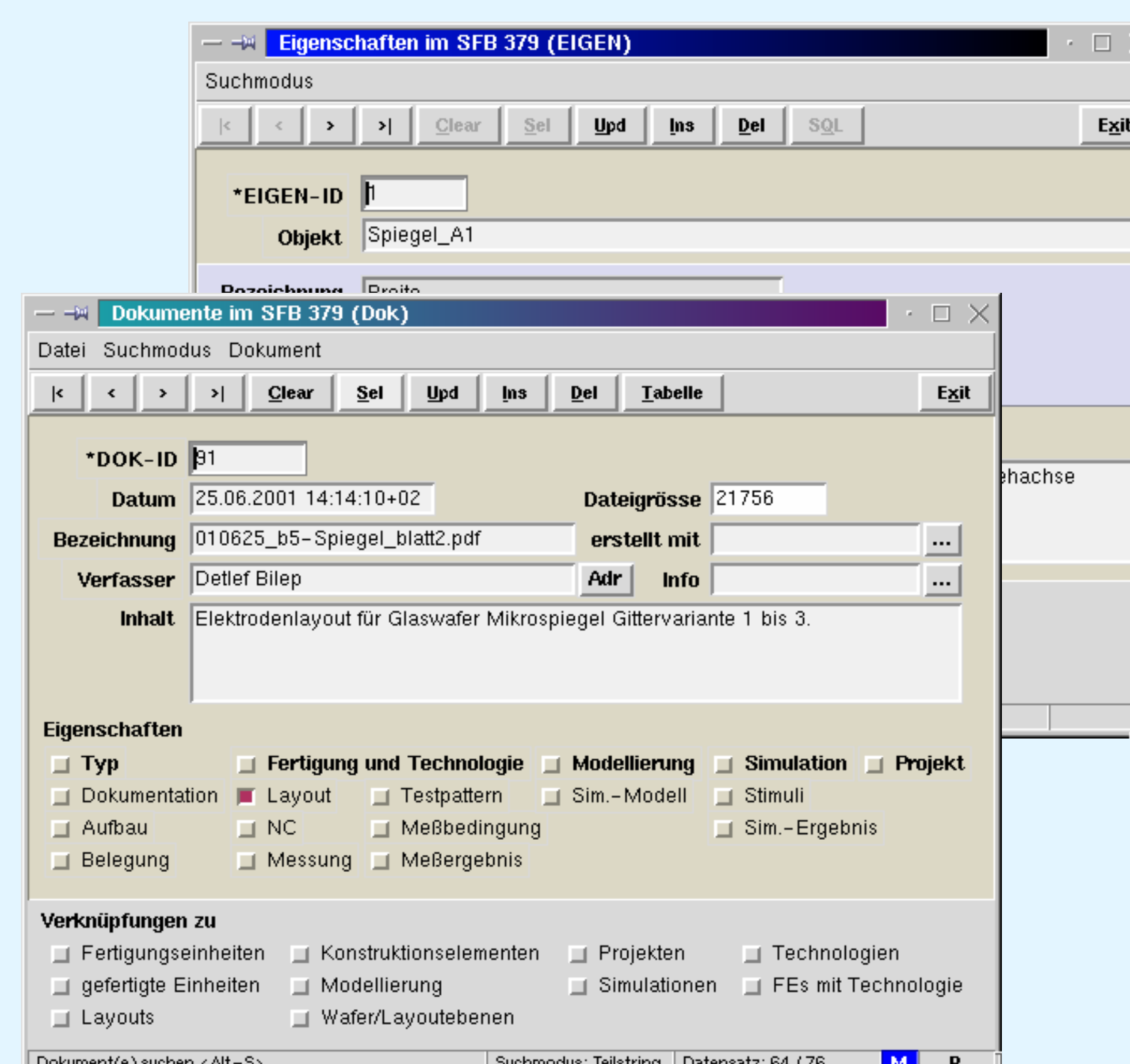
From the main menu the user can be enter every form provided by the DMS. The names of the forms are similar to the name of the categories in the data structure. Additionally, the data base administrator has the ability to create new user, user groups and access rights. The interactive SQL interface enables the selection of data directly through user defined SQL commands. The retrieval component in contrast, enables the search by key words. This form is more useful for user, which are not familiar with the Structure Query Language.



The dynamically generated block diagram provides a view over temporary opened forms and relationships between forms. The submission, editing and readout of the records within the data base takes place by using the proper forms of the desired category. Additionally, the user can establish or disable connections between records of different categories through relationship forms.

## DOCUMENT MANAGEMENT

In all categories, documents of different kind and types were used. To handle these documents the DMS has a form to record any type of document files. The files will be stored binary in the database as so called Large Object Files. If the user activates a file, the DMS link them to the proper viewer or text-processing program. Through user generated connections the documents will be assigned to the corresponding category. It is also possible to link more than one document to a record in a category. On the other hand, a document can be linked to more than one record as well. Thereby the document name appears as a primary key for identification.



## CONCLUSION

The Client-Server-Solution of the DMS is based on the relational database concept PostgreSQL running on a Linux PC. PostgreSQL is an Open Source database management software. Reasons to use PostgreSQL are clear structuring and easy extension of the database structure. However, a data migration to another relational database system is possible.

The graphical user interface for the clients is based on the Script-Language Tcl/Tk to ensure the compatibility with different operating systems such as Windows 9x/NT or Unix. Fine adjustable user-rights guarantee the necessary data integrity within the database. The DMS is currently in use within the framework of the SFB 379 (collaborative research center) at the Chemnitz University of Technology. The fields of research of the SFB 379 are micromechanical sensor- and actuator arrays.

The involved divisions within the SFB 379 have now the ability to bring together the data from different stages of the design flow of micromechanical components. In addition, it allows to accumulate acquired knowledge and to give an easier access to the concerned person, who are involved.

This takes of course a lot of time for data maintenance at the beginning but the benefit through the common and more efficient use of the knowledgebase is more precious.

## ACKNOWLEDGEMENTS

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