Alpha-Vision® Sushy

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1. Introduction

The latest visualisation solution in the automation sector is called SUSHy.

SUSHy is a powerful development framework that enables the easy creation of HMI, SCADA, IPMS and Damage Control solutions. Due to the comprehensive core functionalities of the framework, visualisation solutions can be developed time- and cost-efficiently. It is characterised above all by its openness, scalability and simplicity. The open framework character of SUSHy allows for easy modification of existing and addition of missing functionalities.

SUSHy combines the advantages of the previous solutions ALPHA-VISION® VISUalisation and BDC.

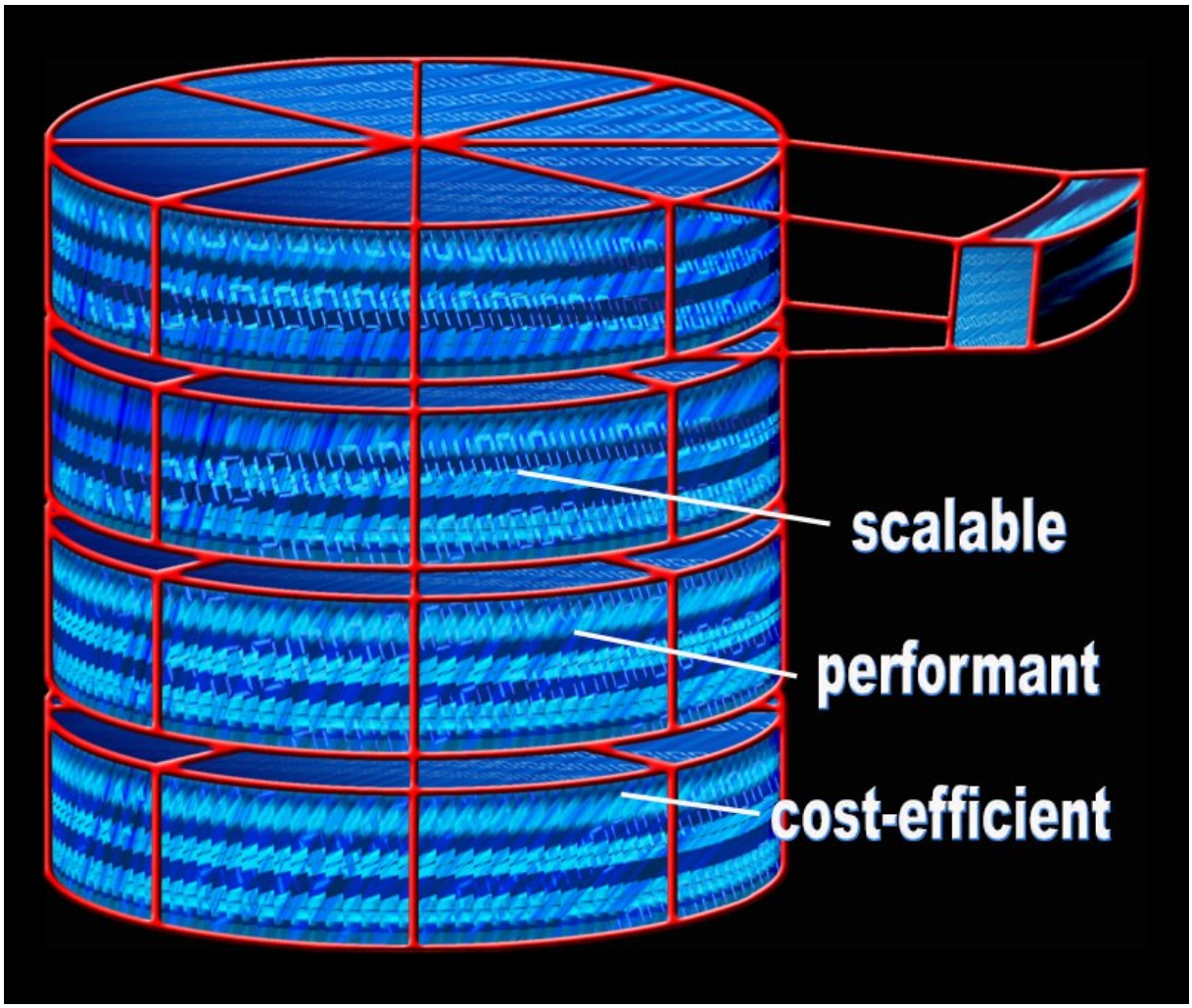
WPF (Windows Presentation Foundation) is used to create the user interface, which means that all the possibilities of this framework are available, e.g. freely accessible components – such as controls – can be adapted for SUSHy with a minimum of effort.

Your SUSHy application is created with the standard tools VisualStudio and Blend. SUSHy extends the framework with powerful, application-specific features.

Our optimised database system handles the necessary tasks for data storage, data synchronisation, history and other services.
Other components of SUSHy provide functional enhancements such as access protection, damage management and an alarm system. In addition SUSHy provides templates for easy creation of visualisations with fixed image areas in which a status line or an alarm line is permanently visible.

SUSHy is less a programme than a framework that allows customised visualisations to be created efficiently and effectively in a way that is familiar to .NET developers.

2. Repository



A wide variety of customer systems such as navigation, bridge and control systems, engine control systems, etc. connect to the repository via bus systems and their communication protocols such as OPC, Modbus, ProfiNet, Canbus, etc. in order to store or read out their data.

An adapter is needed to store the various data structures of the communication protocols. This serves as a kind of "interpreter" that stores the data in the repository with the help of the interface. This data is used by various user interfaces, e.g. for visualisation.

The key features and user benefits are:

- Persistent storage of all data in NoSQL databases
- Distribution of data to all applications involved
- Redundant communication between the systems involved
- Fail-safe due to multiple standby servers
- Runs on standard desktop hardware (no separate servers required)
- Encapsulation of data management and communication through object-oriented interface

3. Application Toolkit

The SUSHy framework provides a wide range of functionalities to easily create HMI, SCADA, IPMS and Damage Control solutions.
The standard functionalities include, among others:

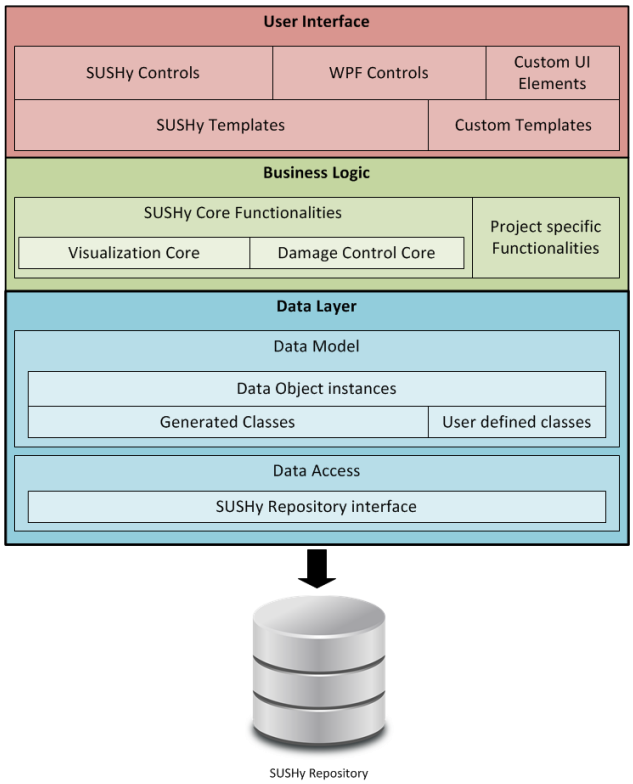
- Notification system (alarms and events)
- Reports
- Archiving and replay of measured values
- Trends
- Palette switching (e.g. day-night switching)
- Damage management
- Resource management (personnel and material management)
- CCTV
- On-board training system

Due to the possibility of unlimited extensibility of functionality, all applications can be integrated into one user interface, which leads to uniform handling and user-friendliness.
This is possible through the use of the widely used technologies of the Microsoft .NET Framework, such as C# and Windows Presentation Foundation (WPF).
The greatest advantages of WPF are:

- Wide range of controls and symbols
- Advanced graphics functionalities such as resolution-independent, infinitely scalable vector graphics, transparency, colour gradients, 2D/3D graphics and animations, multimedia content
- Possibility to adapt each control element according to individual ideas (e.g. to specifications through norms, standards or corporate identity)
- Use of standard design and construction tools (XAML compatible) to draw appealing interface elements, such as Microsoft Expression Blend, Adobe Illustrator, CAD programs.
- Unterstützung von Multi-touch Bedienung

3.1. Architecture of the SUSHy framework

The SUSHy framework allows easy creation of HMI, SCADA, IPMS and damage control solutions. It is an open framework structured in a layered architecture.



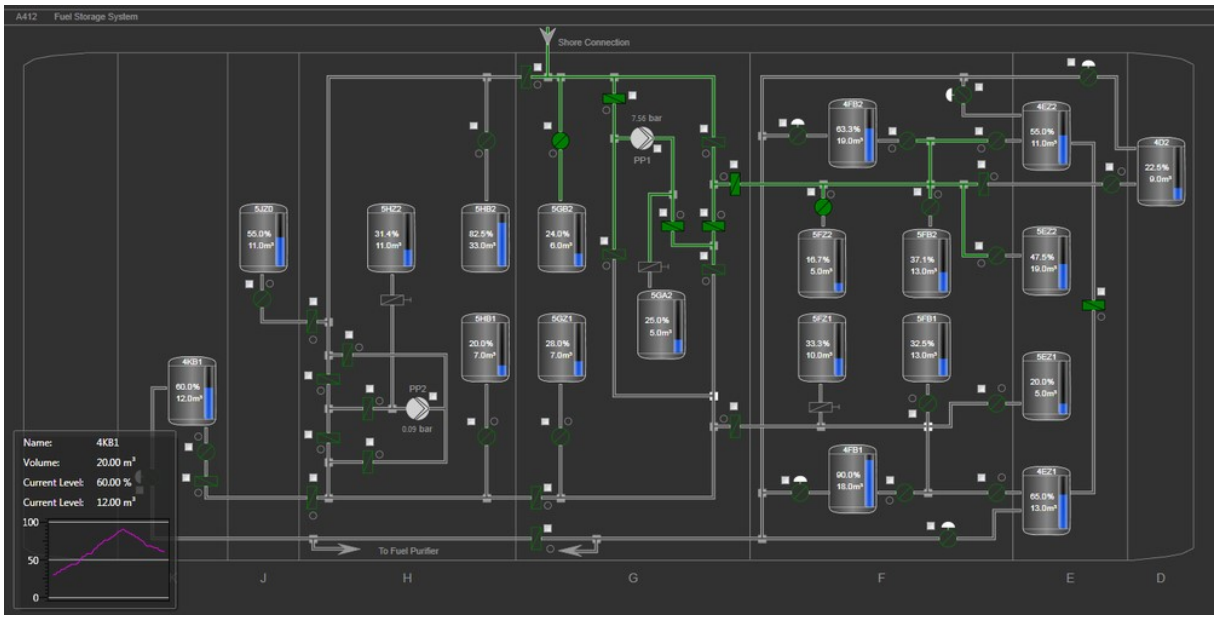
- The **User Interface** is based on Microsoft Windows Presentation Foundation (WPF), which allows advanced graphic functionalities: Resolution-independent, infinitely scalable vector graphics, touch/multitouch, transparency, colour gradients, 2D/3D graphics and animations and multimedia content.
  With the help of the extensive SUSHy library, the visualisation solution can be created from a variety of specific controls, symbols and templates. In addition, the large selection of standard WPF controls can be used, as well as those available on the Internet or from third-party suppliers. In this way, it is also easy to create your own controls and templates, which can then be reused for other projects.
- The application logic layer **Business Logic** is divided into three core areas:
  - Visualisation
  - Damage-Control
  - Project-specific functionalities

The wide-ranging SUSHy libraries provide the core functionalities for visualisation as well as for damage control. These are complemented by project-specific functionalities.
The openness of the framework makes it easy to extend and adapt existing core functionalities, depending on project-specific requirements.

- The **Data Layer** contains the entire data model. This includes classes and objects that can be generated by import interfaces for other engineering systems (e.g. PCS7). The data model is complemented by user-defined classes and objects
- The **Data Access Layer** provides a uniform, simple, object-oriented interface for exchanging data between the data model and the repository. Data can be read from and written to the repository from all applications. Third-party applications can be easily integrated.

4. Applications

4.1. IPMS



Automation solutions on board must ensure the safety of the machine and crew in every operational situation.
This requires absolute system availability as well as maximum reliability and ease of operation.
The IPMS handles the largely fail-safe control and monitoring of all power-operated systems on board and also ensures the vital functionalities of all systems in the case of an emergency. At the same time, IPMS relieves the crew by automating routine tasks.
The IPMS is the kernel function of SUSHy Framework:

- It allows simplified control and monitoring of the ship's systems such as propulsion, electrical or damage control via an HMI display and messaging system (alarm lists, operator logs).
- The measured values are displayed graphically in the form of trend curves, bar graphs or analogue and digital displays. In this way, the entire system can be monitored.
- Its open architecture makes it very easy to extend the IPMS with additional information from other segments such as stability or CCTV.
- Generated status reports such as fluid transfer or fuel consumption can be viewed on all PCs and also exported for further analysis and statistics.
- The integrated user administration and station in control functionality guarantee safe use.
- The IPMS status of connections, devices, etc. is constantly monitored.
- The import of measuring point lists guarantees a more convenient engineering.
- Integrated version control enables monitoring of the entire life cycle of the system.
- Fast data distribution to all operating stations and field devices is a given.
- The on-board training system (OBTS) makes it possible to train the staff.
- The IPMS is very adaptable, from a small number of measuring points to an almost infinite number. It is limited only by the hardware.

4.2. OBTS – On-board training system

The automation processes on board are becoming increasingly complex due to the growing variety of systems. In order to be able to use them efficiently, the operators are dependent on qualifying training measures. The OBTS training system familiarises the crew with the processes on board and helps them to make the most of the potential of the automation solution.

OBTS allows operators to be trained while the system is in operation. Without impacting the processes on board, the personnel can familiarise themselves with the functions of the system and its reaction to certain situations. A quick change between training and real operations is possible.
The same hardware and software is used in training as is operated by the personnel during normal operations.
Thus, an optimal training of the staff is achieved.

4.3. Dashboard

The dashboard gives the user a quick overview of all important information and events in the current situation. The graphically advanced dashboard can even be customised and rearranged during operation, depending on the specific needs of the operator.

4.4. Message system

The message system is an effective way to keep track of all alarms, events and malfunction messages. The messages contain detailed information on the time of occurrence, source and location and characteristics of the events. All messages can be output in a detailed list and can be sorted, grouped and filtered as needed to find the cause of the faults or alarms as quickly as possible.