DATAMANAGEMENT CONCEPTS



IN COOPERATION WITH







<u>PART 1</u>

LYSIDATA

Integrated Scientific Data Management System

The universal software system for measuring facilities



• STANDARD SOFTWARE COMPONENTS

- LysiData is a software package for measuring equipment and research institutes that consists of different, independent software modules, which can be scaled according to your requirements. It covers all aspects from data capture and data visualization/analysis to technical facility management.
- LysiData is designed independent of hardware, logger and sensor manufacturers. Existing or new measuring devices can be easily integrated after first time of establishing a LysiData Software System.
- LysiData uses a central SQL database to store all data of system configuration, measurement and event data and settings to control the software modules. The database system is individually designed and established to the customer.
- Your SQL database can be installed locally on a computer, on a (data) server in your lab or department, or connected to a central database server in your data center. This way any college or technical operator who is authorized can work on your measuring data immediately after acquisition.





LysiData Software System offers you a Software-Module for any Requirement



Default Environment without LysiData System





Default Environment with LysiData Software System



Database Architecture





- All properties of the measuring units are mapped to configuration tables
- All definitions and configurations are stored in configuration tables
- Event- and Logbook-Tables provide clear evaluation of measurement conditions



STANDARD SOFTWARE COMPONENTS

- LDMess Automatic Data Acquiring
- LDVisu Data Visualization and Export
- LDDBAdmin Simple User Database Management

ADVANCED SOFTWARE COMPONENTS

LDControl

• ????

- LDWeb WWW-Visualization
- LDProtocol Logbook and Data Mining
 - Controlling Big Facilities
 - Software-Moduls an Plugins for individual demand



 LDMess acquires your measurement data in regular and adjustable time intervals from your dataloggers, evaluates this data and at last transmits your data to the central database system. It comes with following benefits :

LDMess – Data Aquisition



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- Automatic Acquisition in free scalable Time Periods
- Continuous Software Activity Protocol
- TreeView of Measurement Unit, DataLoggers and Sensors
- Detail Information Sensor e.g.
- Actual Error Sensor List
- Automatic Validation of measurements Values. Standard Validation :
 - Maximum, Minimum, Delta, Error -Values by Hardware
 - Custom Validations
- Software-Side generated for Values in Time Periods:
 - Average, Maximum, Minimum, Dropped-Values
 - Custom Methods on Demand

LDMess – Data Aquisition



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- Popup-Alarm-Window if datalogger is not accessible for defined time intervall or last measurement values are older than specified
- Sending an email notice, if an irregular measurement state is happened (needs a setup and integration of your email-server)
- Automatic distribution of daily status reports regarding your measuring plots, data loggers and sensors(optional, needs a setup and integration of your email-server)



- LDVisu is used for the visualization of your data. You can view the data of all your measuring devices in one visualization software/GUI.
- The visualization Software LDVisu can be used from any computer which has the privileges to access the database at the same time.

LDVisu - Data Visualization



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- Visualize 10 Sensors on 3 Axis at once
- Viewing data over arbitrary, individual selected time period
- Save and load individual chart configurations including sensors, time period or until today and viewing details like graph-type and color selction for frequent or daily use
- Export Data To Advanced Analysis Software-Tools



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- Comfortable presentation and charting features :
 - Zoom in/out on x-/y-plain or visual selected area
 - automatic adaption to the actual measurement rang
 - Line-, Plot- ,bar-graphs or combined graphs for any sensor, individual color selectio





 LDDBAdmin LDDBAdmin is used to process administrative tasks for maintenance and best performance o SQL-Database with no need of Database or SQL knowledge.

LDDBAdmin – Database Management



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• Certain Benefits :

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- Automatic Creation of Data Value Tables for best performance
- Checking Data Table and Sensor Data State
- Creating User Access Rights to Data Tables
- Checking Database Connection



- LDProtocol offers additional options for an ideal (technical) management and maintenance of your facility/measurement equipment.
- It is useful for leading a central electronical logbook and data mining / creating reports on your facility.

LDProtocol – Logbook/Data Mining



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Logbook :

- Central logging / protocolling of all event data, which were not automatically generated:
 - Events like power or logger blackout, external damages or manually switched auxiliary devices (Heating, etc. ...)
 - Service- und calibration activities
 - cultivation time periods and data

LDProtocol – Logbook/Data Mining



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- Data Mining / Report :
- Generate reports/memorandums about all logbook entries and, in combination with LDControl, all measurement events from your sensors, loggers or measurement equipment :
 - Search for events or logbook entries over free defined time periods and combinations of sensors, dataloggers and measurement plot
 - Search for maintenance, service or calibration activities
 - Search for extended information like cultivation time periods and data

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 Save all search result and reports in files for later use



- LDControl is the ultimate software tool for the maintenance and operating of all your sensors and measurement equipment in your facility.
- LDControl comes with an clearly represented Graphic User Interface for daily monitoring of your facility operations and shows all state messages which will be generated, automatically by the software system or manuallly by the operator(s).

LDControl – Daily Facility Operating



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LDControl GUI :

- Main Window winth Sensor and Logger Events Overview in Treeviews with Details per unit, classified and grouped by sensors/logger and event.
- Filter events by processed / unprocessed events and event classification
- List of event details

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 Automatic refresh of event states on free defined time periods(occured / terminated)

LDControl – Daily Facility Operating



MichalovceControl v2.2	
Kanalereignis bearbeiten Datai Ereignisiste Bearbeiten Kanalereignis bearbeiten Kanalinformationen Kanal Kanal [2516 - battery] Lysimeter SSA (Stat.2) Inter 04 (Stat.1) Ereignis -/Fehlerinformationen Kanal [2516 - battery] Lysimeter SSA (Stat.2) Ereignis -/Fehlerinformationen Ereignis -/Fehlerinformationen Itension 100 tension 100 aktueller Status Fehlerinformationen scale (3) [25 battery [251 Informationen Dattery [251 Dattery [251 Informationen Ereignisse Ereignisse Dattery [251 Itersion 100 Ereignisse : Bearbeiter Dattery [251 Itersion 100 Ereignisse : Bearbeiter Datum Bo 05.2014 009 Iterignisse : Bearbeiter Mito Ereignisse : Bearbeiter Ereignisse : Bearbeiter Warte 00:00:22 Schlafmodus	urs minimum Klasse Hinweis 409.000 zuletzt bearbeitet am Änderung giltig bis MichalovceControl v22 Programm Kanalereignis bearbeiten Kanalereignis bearbeiten Lysimeter Kanal D Ereignis inneter 04 (Stat.) Freigniskasse ändern Ereignis surückstellen bis aktuel : Hinweis inneter 05 (Stat.) pundwater (Stat.) Ereigniskasse ändern Ereignis sofort entfernen, wenn es nicht mehr aufmit in Ereignis - Informationen Ereignis - Informatione
	sather Station Datum 18.05.2014 03 21.05.2014 03 21.05.2014 03 Maderungen übernehmen Ereignis entfernen Info Typ Zet Ereignisse: Bearbeitet: Änderungen : 0 Warte 00:00:26 Schlafmodus

- LDControl Edit Events :
- Detailed event informations
- Extended event list on single events (occured / terminated)
- Redefine event classification (Error, Warning,...)
- Leaving comments on every event state or timestamp
- postponement of events (e.g. outside humidity sensors in wintertime)
- Manual or automatic removal of events from actual event list
- Editing multiple events at one time

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 LDWeb is an online visualisation package for use in internet or intranet. It is a webserver application to present or monitor your data on any common used web browser without any software installation on client side.

LDWeb - Online Visualisation





Meteostation Neubiberg - UniBW M	ünchen IfW-WWR
Bitte die Sensoren auswählen und	den Achsen zuordnen:
Lufttemperatur 2m 💌	Achse 2 💌 green 💌
Lufttemperatur 10m 💌	Achse 2 💌 navy 💌
Temperatur Boden 📃	Achse 2 💌 crimson 💌
Windgeschwindigkeit GA 2m 📃	Achse 1 💌 darkred 🔍
Luftdruck	Achse 3 🔻 silver 💌
Die Diagrammtypen, ggf. mit Achse anpassen: Achse 1: Liniendiagramm 💌 mir Achse 2: Punktdiagramm 💌 mir Achse 3: Balkendiagramm 💌 mir	nmaxima und -minima

Darstellung: Breite: Seitenverhältnis:	770 16/9]
	Chart generieren	

Benefits :

- Visualise 5 sensors on 3 axis at the same time
- Free time period definition
- Line-, point, bar- or area-charts on every axis
- Redefine maximum and minimum on every axis
- Normal- or widescreen visualisation (3/4 or 16/9) up to 2400 pixel width
- Detailed measurement information (sensor, date/time and value/unit) on mouseover event
- Multiple Window Visualisation, every subset can be shown in an own browser-windows



INTEGRATED SOFTWARE SYSTEM

- Based on a most flexible and intelligent SQL-Database Architecture
 - Easy extendable to nearly unlimited number of Sensors (limited by Hardware- / Database-System)
 - Distinct Long Time Data Storage and Accessibility
 - Individual adapted and equipped Database Model
 - Easy data access for scientists and operators
- Modular and independent Software components for each individual demand
 - Independent from Measurement equipment / provider
 - One GUI/User-Interface for each operation task (e.g. data acquisition, visualisation, ...)
 - Software Components self configuring by the database system
 - All Software Modules are developed in C++/LabView

LysiData Scientific Software System is in progress since more then 12 years



TOP WORKFLOW DEMANDS

- DATA ACQUISITION
 - Automatic Data Acquisition from nearly any resource into one data repository
 - Automatic Standard Data Evaluation
 - Easy Data Management in the data repository without SQL-Database knowledge
 - Extendable by integrating Software-PlugIns
- (TECHNICAL) FACILITY OPERATION SUPPORT
 - Manual and automatic event logging and alarms
 - Facility Controlling by Visualization-, Controlling-, Data-Mining- and Logbook-Tools
 - Easy User and Database Management by specific Software-Module
- Scientific Data Evaluation and Analysis
 - Extended Data Visualisation and Export Tools
 - Distinct Access to Measurement-, Operation- and Event-Logging

LysiData Software Systems References

REFERENCE PROJECTS

- HELMHOLTZ CENTER D-MUNICH
 - IBOE : Lysimeter Station with 48 Lysimeter and Weather Station
 - Supported Since 2001 (about 800 Sensors)
 - EUS/BIOP : Phytotron, Sun Simulation and Climatic Chambers
 - Supported Since 2005 (about 1300 Sensors)
 - IBOE : Research Farm / Platform Scheyern
 - Supported Since 2010 (about 3500 Sensors)

LysiData Software Systems References

REFERENCE PROJECTS

- BUNDESWEHR UNIVERSITY / TU MUNICH D-MUNICH
 - IfW/WWR : Climate and Soil Hydrology Station
 - Supported Since 2011 (about 80 Sensors) Cooperation UGT
- CVRV INSTITUTE SK-PIESTANY
 - Lysimeter and Weather Station
 - Supported Since 2013 (about 120 Sensors) Cooperation UGT
- CVRV INSTITUTE SK-MICHALOVCE
 - Lysimeter and Weather Station
 - 2014 (about 800 Sensors) Cooperation UGT

LysiData is ...



Person

- Dirk Römermann, Munich
 - Born 1960 in Düsseldorf
 - Consulting und Software Engineering since 1992
 - · Working in Munich and Düsseldorf

Activitiy Focus

- Development and Maintenance of Database and integrate Software Systems
- COOPERATION with UGT since 2008 on different Software and Research Facility Projects

LysiData is a Trademark of Dirk Römermann













- Datamanagement Solution in environmental science
 - Online Allround Solution for small and medium measurement devices
 - No own Inhouse-IT-Infrastructur necessary
- Standard, Extended and Exclusive Data Management packages available

Main Principle









- Data Management Services
 - Automatic Data Acquisition
 - Long Time Saving Data in SQL-Databases
 - Data Vaidation (automatic / manual)
 - Standard Statistik Routines
 - mean value, sum, maximum, minimum, etc.
- Exclusive Data Services
 - Individual Charts und Data Export Interfaces
 - Individual Data Processing
 - Quality procedures and -verification



- Sensor Management Services
 - Logging of Hardware-/Sensorstate and Events
 - Notification on Hardware events (E-Mail/SMS)
 - Exclusive Notifications on cumulated events from different sensors
 - Logbook and notification on service and maintainence
 QM-Reports on sensors/equipment





Practical Unit