IAL
Automation und Logistik

IAL-DataBridge (IDB)

SAP / Warehouse

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A network capable of connecting several different systems is the prerequisite for coordinated processes in controlling, administration and operations in today's enterprises. In the area of warehouse logistics, conveyor systems and devices for data acquisition (such as hand terminals and scanners) and data display (e.g., data entry terminals, monitors, barcode printers) are also needed. Frequently, too, parts of the system control or the display are replaced, or old components have to work with or be connected to new system extensions.

Often in this environment, all management and control functions are performed by an SAP R/3 system.

Warehouses use the SAP modules LES / WM (Logistics Execution System / Warehouse Management) and MM (Material Management) to manage inventory and parts with exact location precision.

When linking existing heterogenous systems in the warehouse and also in the connection to the SAP system which handles the inventory, difficulties frequently arise during the implementation of the interfaces between the individual components. The **I**AL **D**ata**B**ridge (**IDB**) concept is focussed on the creation of a universal interface for communication

- with the SAP system (**I**AL-**S**AP-**I**nterface **ISI**)
- and with the existing external systems such as
  - wireless terminals,
  - conveyor techonology,
  - remote PCs or other additional remote computers (as in automatic warehouse areas), etc. .

A significant aim here is the creation of a general "central" interface for all available systems at a production location. If the company facilities are located too far apart, for example, in different cities or even different countries, each location will require its own DataBridge.

The **IDB** consists of a PC server with a network connection, a database, communication programs and the customer-specific application programs.

If desired, the software is also available for other platforms (Unix, AIX, AS-400).

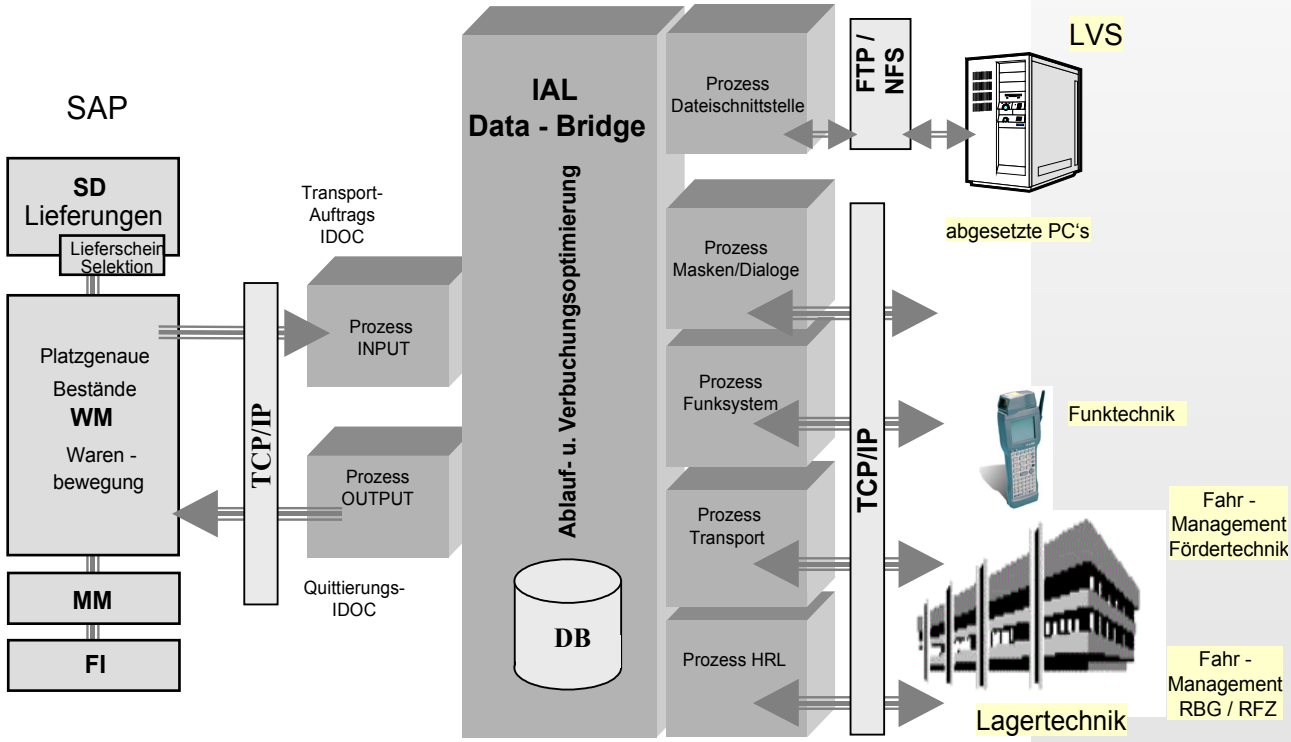
All data for communication and applications are stored in a separate database and made available to the communication processes.

Due to splitting into individual processes, the communication between the systems is completely asynchronic. This has the advantage of total independence and separation of the individual communication paths. Thus the function remains available to all the other connected systems even in the case of a system breakdown or the interruption of a communication process. Updates or extensions of single software components can be carried out with disturbing the functionality of the other processes.

The database serves to synchronize the communication between the individual processes.

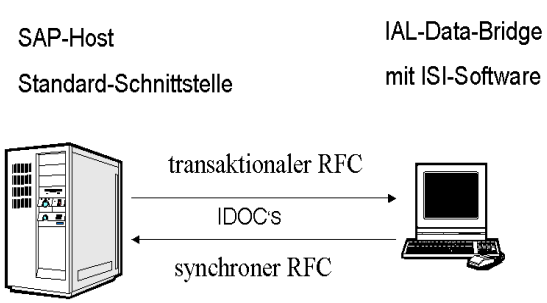
In accordance with the direction of coomunication, each communication process stores and receives its data in its own data tables, which can be accessed by both the procedural and bookkeeping control systems and the processes for control and managment of the conveyor systems.

The following overview of the **I**AL **D**ata**B**ridge (**IDB**) system shows the basic structure with the individual software components and the coordination with external systems.



Communication with SAP

Since its inception, the **IDB** has been using a standardized software for the communication with SAP systems via IDOC interfaces. We continue to expand and optimize this software. To date, several **IDB** installations serve companies worldwide.



Typically two communication processes are at work in the IDB, to serve both directions to and from SAP.

Both synchronic and asynchronic communication is possible.

All incoming data are stored in the database and all outgoing data are available in the desired form for the communication processes sending to SAP.

Wireless terminals / Scanners

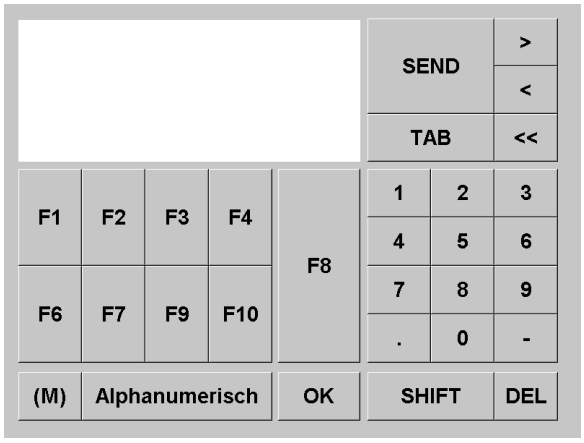
Another internationally-used IAL product is the software interface for controlling wireless systems: the **I**AL **F**unk **D**atenerfassung (**IFD**) ["wireless data acquisition"].

This wireless system supports the operator in tasks such as picking, putaways or stock movements to new locations within the warehouse.

The use of a VT 220 interface allows almost complete independence from the terminal hardware. Almost all the wireless terminals currently available provide this kind of terminal emulation. This enables in most cases the integration of the wireless terminals and scanners already at hand into the system design.

The IAl product **SoftTouch** provides a virtual keyboard for modern Windows-based handhelds and forklift terminals with touch screens. This optional enhancement simplifies the operation of the terminal with the terminal emulation by allowing the operator to define freely-sized "keys". Using this virtual keyboard often means that other connected devices need only reduced -- or even no -- keyboards.

Sample configuration:



The screen is completely filled by the actual application window containing a terminal emulation (marked white in the graph) and the virtual keyboard. Access to other Windows programs, like the Internet Explorer, is prevented. (See the IAL SoftTouch brochure for further details.)

IAL supplies complete solutions for wireless connections.

Because we are a manufacturer-independent system integrator, we can work constructively with your hardware preferences (Symbol / LXE / Intermec, etc.).

Terminals / remote PCs

The **I**AL **D**ata**B**ridge (**IDB**) can be augmented through the implementation of dialogs and customer-specific masks, which provide additional information for the operators at remote work stations (such as picking or packing stations).

These dialogs supply functions for generating transport orders not initiated by SAP, for example for internal stock movements and inventory activities.

All changes in the warehouse mapping are reported to SAP.

Remote warehouse computers

It is sometimes necessary to connect remote warehouse management computers or warehouse areas equipped with their own computers.

Often additional administrative information or the conversion of numeric cycles or formats are needed, which are not supplied by SAP. In this case, the conversions and required administration are provided by the **IDB**.

If the systems are equipped with a network connection and appropriate database access functions, direct access into the **IDB** database using SQL-Net or ODBC can be made possible. The **IDB** takes over the fitting and allocation of the data for the subsystem in tables created especially for this purpose.

If a direct (online) exchange of data is not planned or not possible, it is usual practice to exchange data telegrams in files via FTP or a shared mounted disk drive.

Conveyor systems

An SAP R/3 system with the modules WM/MM manages both location-precise inventory and inventory totals. In this case the warehouse conveyor system then does not need its own computer any longer and is connected to SAP through the **IDB**.

IAL's customer-specific software analyzes the WM/MM data and uses it to drive the warehouse equipment, in both the automatic and the manual storage areas.

Optimization of the movement orders for automatic storage areas is also carried out within the **IDB**. The orders are created according to the requirements of the storage control system and transmitted to that system in the desired format.

Since SAP assigns the preferred storage location, optimization here means a minimization of empty runs and the use of "double plays" during which the storage and retrieval machines are unloaded and direktly re-loaded, if possible within a single transport.

The PLC-layer (driving the storage machines and conveyors), is subordinate to the **IDB**. It controls and monitors the material transport of the automatic conveyor elements and vehicles.

Confirmations from the conveyor system about executed transports and stock movements are entered into the **IDB** database.

Movement runs can be started or conveyor settings can be changed.

A network connection via TCP/IP is used for the communication protocol between the **IDB** and the subordinate control layers.

Dialogs and masks, which the can provide, supply addition information for the operator on the individual work stations.

Examples:

- Print functions for reports or labels at the packing and picking stations
- Display functions and statistics
- Blocking and releasing of storage and retrieval systems or transport lanes
- Creation of manual movement orders for tests and servicing of parts of the conveyor system
- Driving instructions for internal stock movements or inventory movements (the new storage location and quantity difference are reported to SAP)
- Blocking and releasing storage locations and aisles

If aisles or storage and retrieval machines blocks are not temporary, e.g., as for a manual operation, but are rather long-term, these blocks are reported to SAP, since picking can no longer be done in the affected area. A cancellation will be sent to SAP for any open transport orders for the blocked area.

In the case of disturbances, acknowledgements from the control systems are displayed in an appropriate message for the operator.

The implementation of the dialogs is customer-specific and control-system specific and is adjusted to the local environment.

Process displays

A supervisory system with process displays is not part of the basic **I**AL **D**ata**B**ridge (**IDB**). Should such a system be desired, IAL can propose and supply it independent of the **IDB**.

This supervisory system primarily serves to continuously monitor service equipment and power units, as well as the direct influencing of control settings without the capacity to initiate certain processes in the warehouse, since there is no connection planned between this supervisory system and SAP.

Often the display system Intouch from Wonderware on an NT/Windows2000/XP basis is used as a supervisory system.

Terminology

ALE	Apllication-Linking-Enable
DB	Database
FT	„Fördertechnik“ conveyor system
FTP	File-Transfer-Protocol
HRL	„Hochregal-Lager“ High-bay warehouse
IDB	IAL - DataBridge
IDOC	Intermediate Document (SAP data format for communication with external systems via ALE)
IFD	„IAL Funk-Datenerfassung“ IAL wireless data entry system
ISI	IAL SAP-Interface
LES	Logistics Execution System (SAP module)
LVS	„Lager-Verwaltungs-System“ Warehouse management system
MM	Material-Management (SAP module)
ODBC	open-database-connectivity
RBG	„Regalbediengerät“ Stacker crane / storage and retrieval machine
RFC	remote-function-call
RFZ	„Regal-Förderzeug“ Conveyor
SD	Sales & Distribution (SAP module)
SPS	„Speicher programmierbare Steuerung“ programmable logic controller (PLC)
SQL	structured query language
TCP/IP	Standardized network protocol
WM	Warehouse-Management (SAP module)

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