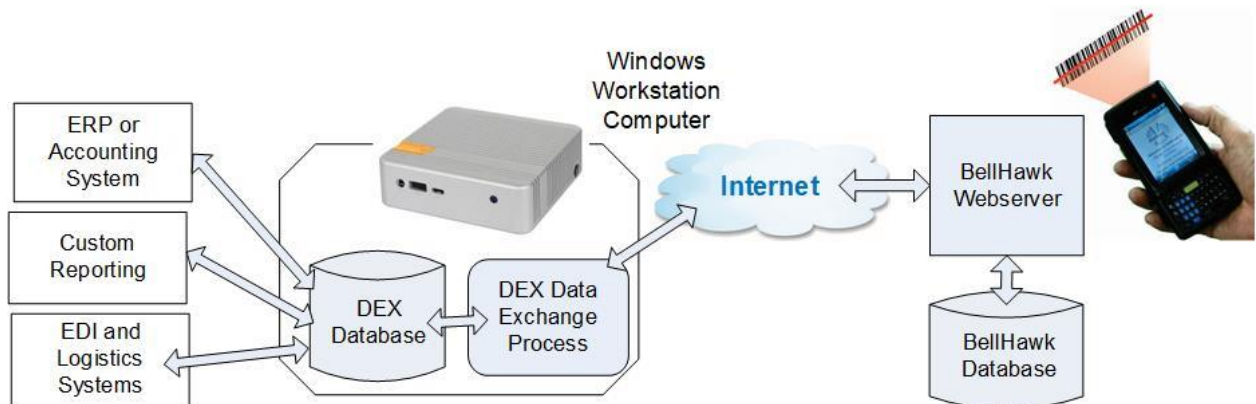


BellHawk Data Sheet DEX Data Exchange Interface

Introduction



Running software such as BellHawk in the Cloud has many advantages, whether it is being run on computers at a secure data center managed by a third party, or is being run at a client's data center, or on a private Cloud based server.

The disadvantage is that this makes the BellHawk database inaccessible for implementing automated data exchange interfaces with systems such as ERP and accounting systems or for clients creating custom reports.

Skilled programmers could use the BellHawk web-services interface to exchange data with BellHawk but for many users and, even their IT departments, this is way too complicated. Also, this interface is only documented at a code level. As a result, the DEX data exchange interface was developed to make it easy to exchange data with BellHawk without needing to understand the intricacies of the BellHawk database or the BellHawk web-services interface.

The DEX interface essentially mirrors the data tables in the BellHawk database into a local SQL Server database, which is formatted such as to be user friendly for interface and report creators.

This overcomes a major disadvantage of directly using the BellHawk database, which is structured for rapid response to many users doing barcode scanning at the same time. This structure, while good for rapid data capture, is not very user friendly for interface or report implementation.

Also, the DEX interface is well documented whereas the structure of the BellHawk database is only documented by means of the HLDO (High Level Data Object) definitions used by programs, such as the DEX interface, to communicate with the BellHawk database.

Data written into specific tables within the DEX database, such as for Items or Work Orders, will be automatically be transferred to the BellHawk database. Similarly, data captured by BellHawk transactions are automatically made available in specific tables within the DEX database.

Some uses of the DEX interface include:

1. Automatically exchanging data with an ERP or accounting system
2. Generating custom reports using software such as Access, Excel, Crystal Reports, or SSRS based on data from the BellHawk database.
3. Exchanging data with EDI and shipping systems
4. Interfacing with process control equipment and machines
5. Generating large screen shop-floor displays showing performance dashboards

Data Exchange

Tables that can be written into, include:

1. Customers
2. Customer Addresses
3. Suppliers
4. Supplier Addresses
5. Work Centers and Operations
6. Item Categories and Material Types
7. Item Master Records (including routes, BOMs, and estimated labor and equipment time)
8. Purchase Orders (header and detail tables)
9. Pick Orders (for Work Order Operations, Ship Orders, and Material Transfers)
10. Work Orders (including routes, BOMs, and estimated labor and equipment time)
11. Ship Orders (header and detail tables)

Once data is written into the tables in the DEX database, this data will be automatically transferred to BellHawk via BellHawk's web-services interface.

The DEX Data Exchange process also remotely monitors tables in the BellHawk database looking for new entries by long-polling its web-services interface. It then writes the following into tables in the DEX database, as events occur in the BellHawk database:

1. Received materials/containers
2. Shipped materials/containers
3. Materials Picked against Pick Orders
4. Materials withdrawn from inventory
5. Materials entered into inventory
6. Nightly snapshot of inventory (adding up quantities by ERP location in containers)
7. Nightly snapshot of all containers (in containers table)
8. Status of Work Orders

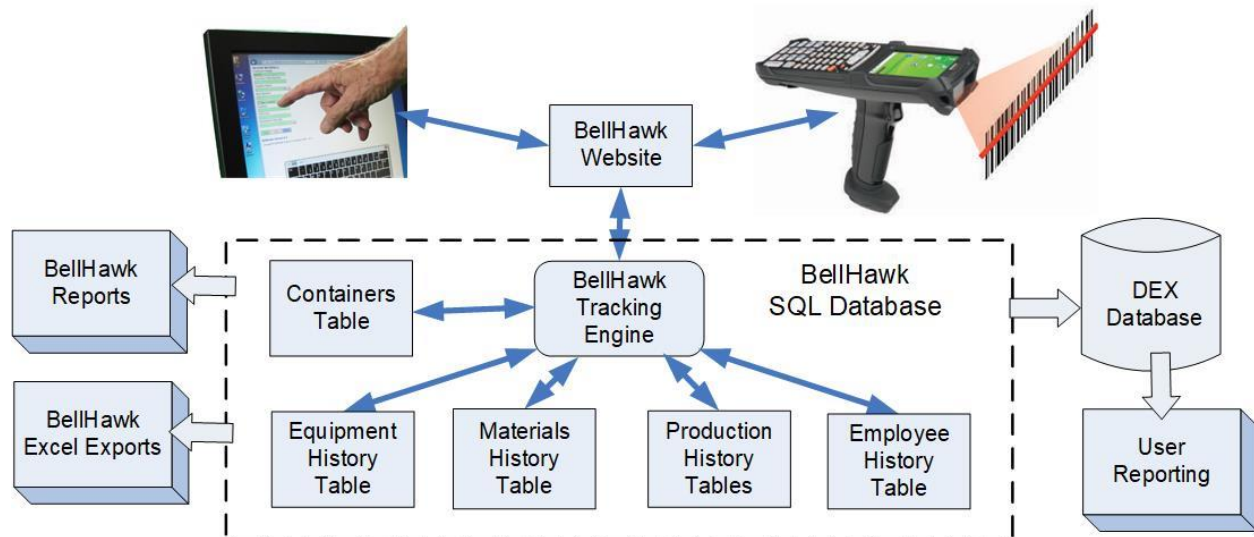
9. Labor, Materials, and Equipment Time consumed on Work Order Operations

10. Materials produced by Work Orders and Materials Returned to Stock from Work Orders

These entries can then be picked up from the DEX database and transferred to other systems, as needed.

Please note that the data which can be exchanged depends on the BellHawk options in use.

Producing Custom Reports using DEX



BellHawk maintains the status of all active materials in its containers table. It also captures the transaction history in a set of tables relating to materials receipt, movement, usage, production and shipment as well as the equipment and labor times used in production operations.

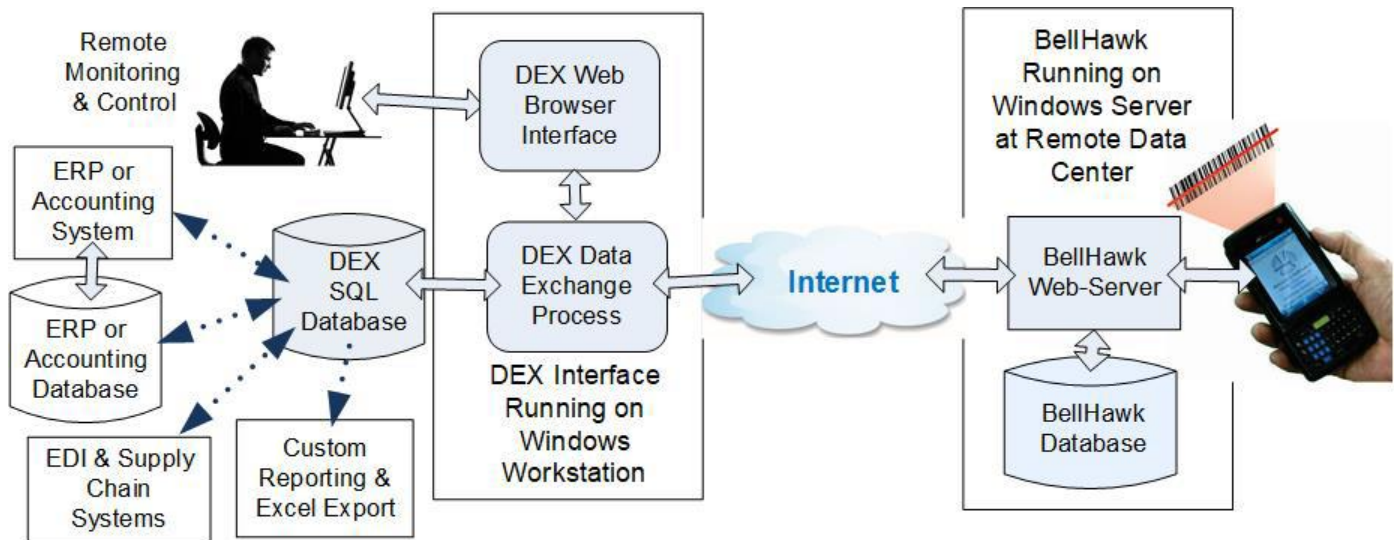
From these tables BellHawk produces a set of standard reports that cover most standard operations and materials tracking requirements. Also "reports" such as barcoded receiving and picking sheets, as well as purchase, work, and ship orders can be customized in a limited way, such as by using the client's logo instead of the BellHawk logo, and by adding fields to the header and lines on these "reports".

These standard reports, along with related Excel exports, usually meet the requirements of most organizations for reporting real-time operational status. Users can then create their own reports using report generation software such as Access, Crystal Reports and Excel using the contents of the DEX database, which contains "mirrors" of all of these table.

BellHawk can also export nightly inventory status "snapshots" to the DEX database. It is important to recognize, however, that aside from the exported transaction histories, the DEX database does not retain the historical status of the system, such as the status of the inventory at last month end.

If a historical status record, such as for inventory, is required it is therefore important to transfer this data to another system in a timely manner.

Technology



The DEX interface uses a SQL Server database, which can be a free SQL Server Express database. The DEX interface software and database can be run on a separate Windows Workstation computer or can be installed on the same Windows Server as BellHawk, if needed.

There can be multiple copies of the DEX interface running, one in each plant or warehouse, to provide local access to the BellHawk database. Each one of these requires a single BellHawk device license.

Users of DEX can link Microsoft Access to the DEX database and simply treat it as an Access database. Users can also link report generation programs, such as Crystal reports, to this database in order to generate custom reports. More sophisticated users, can integrate this database into an SSRS reporting scheme using SQL Server Standard.

DEX comes with a Web-browser interface, which can be used to schedule and monitor transfers between the DEX database and BellHawk. This interface also has the ability to alert an IT person by Email or Text message if a transfer fails. The IT person can then remotely access the DEX control web-site, determine the source of the problem, and remotely fix it.

There is no need to setup any special "holes" in the network firewall of the plant or warehouse in which DEX is installed, as DEX uses a standard "outbound" Internet connection, just like any other PC on the network. This avoids a major security risk and a need to involve IT in the installation.

DEX can be run on an industrial computer running the Windows IIOT operating system

Commentary

The concept behind DEX is to make exchanging data with BellHawk and producing custom reports as simple as if BellHawk were running locally in each plant or warehouse or other facility. But this method retains all the benefits of running BellHawk at a secure data center, on

computers managed and maintained by IT professionals, where BellHawk can be accessed by many different users at many different locations over the Internet.

There are other interfaces available with BellHawk, but access to these is limited to systems integrators, using BellHawk as a platform, who have an in-depth knowledge of developing software in a .Net environment.

Please see the DEX Interface Manual for details of the tables through which data can be exchanged with BellHawk and how to use the web-browser interface.