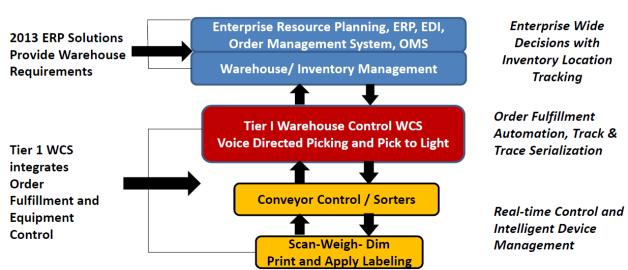# The NuminaGroup

Real-time Distribution System, RDS™
Tier I Warehouse Control System, WCS Overview

Real-Time Distribution System, RDS™ is the industry's most flexible and scalable automation software for warehouse control requirements and is the true **definition of a Tier I Warehouse Control System, (WCS)**. It is modular, real-time control with unsurpassed performance proven in hundreds of demanding high volume installations. RDS™ automates receiving, order fulfillment using voice and pick to light picking, intelligent barcode & RFID directed conveyor sorting, pack station automation, and print and apply labeling. It directly connects to existing ERP and Warehouse Management Systems, (WMS) to automate current or new distribution centers.

Warehouse Control Systems requires application know-how, proven software and experienced professionals to ensure project success and deliver the required ROI. RDS is a proven solution for automating distribution and manufacturing product movement and controlling material handling equipment and executing pick pack and ship automation.

RDS™ includes a family of pre-developed application control modules including order release optimization, location management, voice directed picking, pack automation, print and apply labeling for shipping and retail compliance using both barcode vision order validation. It's internal Oracle-My SQL database definition is ideally suited to lot tracking and serialization requirements for Pharmaceutical Track and Trace requirements. What truly differentiates RDS™ is its sophisticated Order Management Module WMS; bridging the functionality gap between traditional WCS, WMS/ERP.

**RDS™ Order Fulfillment Automation
includes Wave Order Release, Cartonization**

2013 ERP Solutions Provide Warehouse Requirements

Enterprise Resource Planning, ERP, EDI, Order Management System, OMS

Warehouse/ Inventory Management

Enterprise Wide Decisions with Inventory Location Tracking

**Tier I Warehouse Control WCS
Voice Directed Picking and Pick to Light**

Order Fulfillment Automation, Track & Trace Serialization

Tier 1 WCS integrates Order Fulfillment and Equipment Control

Conveyor Control / Sorters

**Scan-Weigh- Dim
Print and Apply Labeling**

Real-time Control and Intelligent Device Management

The NuminaGroup

Overview

RDS™ is a rock solid, highly scalable Tier I WCS. It combines order fulfillment automation, real-time (sub-millisecond) control and a high performance SQL database distinguishing its capabilities from traditional WCS packages. RDS manages pick pack and ship order fulfillment automation and equipment control duties found in mid to high volume distribution operations, high speed packaging control, inspection and serialization track and trace data archiving for food and pharmaceutical order shipment applications.

RDS™ manages barcode scanners, RFID, voice directed picking, pick to light, high speed material tracking, sorters, conveyor, in-motion scales, dimensioning, print and apply label applicators, robotics and other automation devices. RDS™ scales from small applications to high performance, millions of transactions an hour requirements found in high speed conveyor sorting, manufacturing, packaging, inspection and product tracking applications.

RDS™ Automation Modules Include:

Wave Order Release Optimization to balance work load with order release across work zones to match ship, delivery rules and labor

Dynamic Slotting by wave or order to move and slot high movers at a forward pick area or zone

Receiving/Cross Docking In-bound audit with Print and Apply Labeling

Cartonization Pick to carton cubing with pre-selection of carton based on item quantity, cube and weight

Dashboard User interface with visibility and business intelligence

Pick Execution Multi-Modal Pick to Light and Voice Directed Picking

Carton Zone Routing Conveyor routing for pick to case orders

Order Validation Inline weight and Vision Inspect & Audit

Data Tracking Product track and trace barcode/ RFID time stamped real-time database archiving for plant floor lines and/or RF or Voice enabled wireless terminals
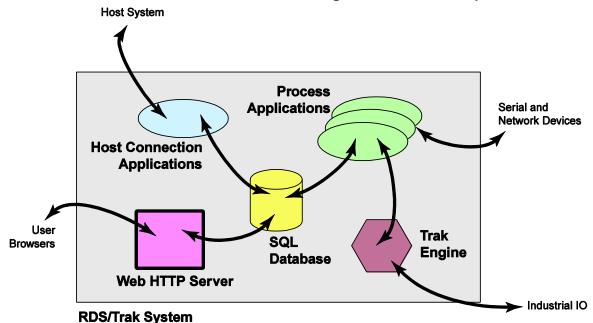
Conveyor Control and Diagnostics

Lit Pak™ Pack sheet print fold and insertion into open totes and cartons

Sortman All varieties of sorter controls including Shoe, Tilt-Tray, Bombay and Cross-Belt

X-Press PAL™ Automated Print and Apply of Shipping and Compliance Labels

One-Step™ Print and apply of a combination packing slips/shipping labels or the application of a full 8.5" x 11' pack sheet to the outside of the carton shipment

Real-time-One of the most confusing terms in automation software is the use of the term real-time. RDS/Trak™ is a true real-time sub millisecond (100 microseconds) control engine that runs in a guaranteed Linux real-time task. RDS™ contains a control language called Trak. Trak is a versatile multi-function event based control engine that performs controls at speeds beyond PLC's. A family of pre-developed control functions/modules for conveyor control, high-speed sortation packaging control, printer/applicator labeling, vision capture/inspection, and scan/weigh/cube in-line automation lowers the risk and software development requirements.

RDS™ Platform is constructed from the following core software components:

RDS/Trak System

PC Architecture- Industrial hardened computers to large RAID-array Virtual Servers

Linux OS- Apache Web Server, RTAI real-time kernel, C and Java

RDS Software- library of, utilities, messaging tools, methodologies, and pre-developed application control modules

 Oracle-**MySQL Database** with ram-resident high speed look-up and archiving

Interface Modules to seamlessly integrate automation directly to SAP (support for direct RFC and XML messaging), IBM with the Java Toolkit, JDBC, ODBC, and virtually any WMS / ERP Systems. Socket Message tool set and other interfaces are easily supported.

Dashboard browser based User interface screens and reporting tools to provide easy to use and view equipment and operation performance data

Graphical user display and equipment interactive web based diagnostics display a tool, to zoom the user display to the area of interest for pinpointing the equipment problem or fault

RDS Core Software Component Description:

Process Application Control Modules A collection of interacting process applications are the core to the performance of the application modules. We following *a divide and conquer software development methodology;* each process such as control of a print and apply labeling control module or a conveyor sorter divert are independent pre-developed software components. This allows a high level of re-use of application code, distributed team development and an environment that provides an easier means to customize and make a change to a single component for a client's specific requirement. The application modules all use the same inter-process data messaging tool to interact between the real-time control and SQL Database.

Trak Operates in a real-time extension to the Linux kernel. Trak performs PLC like control tasks at an effective scan time of 200 microseconds. The event based control language is ideally suited to product tracking and data driven control decisions with lightning fast, memory based interface to the application data. Trak eliminates the typical communication bottleneck and dual development environment of mixed PC-PLC solutions. The physical input and output, I/O devices is Ethernet based with support for a wide variety of control networks.
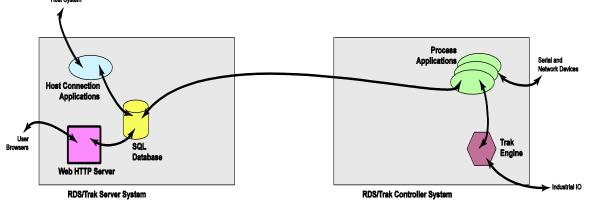
Oracle MySQL Database holds all the persistent system data storage and access. Oracle MySQL is a very high transaction rate database that can operate ram-resident to allow extremely fast data look-ups. Incorporating a full SQL database, RDS retains time-stamped historical information with easy data access, archiving and multi-user support**.**

Host Interfaces- includes a full family of pre-developed communication interfaces to integrate its family of WCS automation modules to IBM AS-400/I-Series SAP, Oracle, Infor, Manhattan, Softeon, and other leading WMS/ERP It handles the controls and database lookups, storage, Web based user Dashboard and tracks operation performance, labor management and reporting without interruption of the real-time control

Web Interface User interface is a Java Dashboard and a family of pre-developed user screens served out through the Web Server. Pre-developed operator interfaces include alert screens, carton history, operational status and equipment diagnostics with graphical annunciation. Operational data is time-stamped and logged to the DB. Parameters such as sort rule table settings, maintenance and supervisor actions are changed through web screen database table edit tools. Any PC on the corporate intranet network with a browser and authorized password can view and access the web screens.
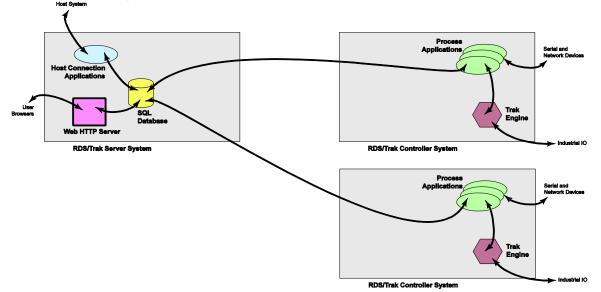
Platform Scalability, Reliability and Redundancy

All plant floor device connections and data messaging occur over Ethernet, so components are *network transparent*. This allows RDS™ scalability to meet any size application and operate even with a distributed database or part of the application hosted on a Server or Virtual Server.

An example of an RDS Central Server and remote Industrial Trak Controllers shown below:

The above shows the SQL Database, Host/ERP interface and Web Services deployed on a Server or Virtual Server. The application and real-time control I/O executes on an industrial hardened computer with a solid state disk can be used for RDS Trak Controller to survive extreme temperature and vibration requirements.

RDS Trak also supports a distributed "Cluster Control" architecture:

Above are two or more separate RDS/Trak control computers operating at remote locations from the Central/Virtual Server or Cloud based Server.
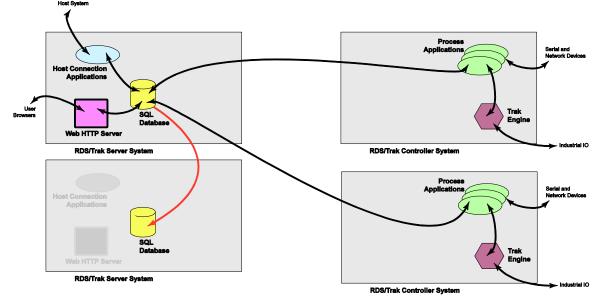
RDS™ architecture supports all processes and controllers sharing the same database. Any number of RDS/Trak controllers can be used in several facility areas using an Oracle SQL central database server. RDS™ supports redundant, high available control. If a primary controller fails a second PC controller can be on-line and take over control without loss of data.

Shown below is the RDS/Trak *Mission Critical* industrial hardened dual or quad core computer platform rated to operate at up to 55 degree C.

Linux High Availability Heartbeat plus Distributed Replicated Block Devices (DRDB)

True redundancy is available at both the database and application level as shown below:

RDS™ supports Linux-HB commonly referred to as Linux Heartbeat. This provides both redundancy of the application and database server. Replication of both the application and the database occurs over a separate Ethernet connection path in red. Heartbeat messages are sent over Ethernet between the Primary and Secondary Servers. If a failure is detected in the Primary Server, fail-over occurs though "IP Address Failover". Connections from the remote RDS Trak Controllers would automatically fail over to the Secondary Server.

Conclusion

RDS™ is the definition of next generation Tier I Warehouse Control System, WCS. It eliminates the performance limitations, lack of flexibility and reliability of competitive packages. RDS integrates automated order fulfillment, serialization track and trace, distribution automation practices to new or existing ERP/WMS Systems. RDS is proven in 100's of distribution and manufacturing automation applications and includes a family of best practice application control modules for picking, print and apply labeling, in-line order packing validation and conveyor and sorting control including Tilt Tray, Cross-Belt, Bombay and Shoe Sorters

Proven Performance, Scalability, Reliability, Redundancy and Connectivity positions RDS™ as the platform of choice for real-time control and WCS requirements. Call us at 630-343-2600 to find out more about RDS and how Numina Group's Team of Automation Professionals can help you improve your manufacturing and/or distribution operation.