

Integrating Real-Time Systems with Corporate Information Systems

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Integrating distributed systems involves more than just connecting different communications technologies. It also involves connecting different information environments.

Traditionally, supervisory control and data acquisition systems have been designed to meet operational needs in the field and on the factory floor. Little attention has been given to how well these systems will integrate with the corporate information infrastructure. Today, every industry has felt the impact of several major trends: globalization, consolidation, deregulation, rapid cycle times, compressed time-to-market, and new products and services. The net effect is that “islands of automation” in the field or factory no longer meet business needs. Since 1990, HP has been exploring new ways to build distributed systems that integrate measurement and control systems with the business enterprise.

The Information Gap

Linking real-time systems to an enterprise system is a difficult undertaking, usually requiring custom code at each end. However, such links will have to become pervasive to give employees access to the real-time information they need to make timely business decisions with confidence.

It is common to have two central information systems: a traditional management information system (MIS) for business functions and a technical information system (TIS) for mission critical real-time measurement and control. These systems are typically managed by separate groups.

Establishing connections between the two systems is relatively simple. The real challenge is achieving true information integration. This is because of the four types of gaps between the MIS and TIS worlds (see **Table I**).

Table I

Information Gaps between Management Information Systems and Technical Information Systems

Type	Management Information System	Technical Information System
Time	Months, weeks, days	Seconds or less
Information	Transactions	Real-time events
Execution	Oriented to planning and scheduling	Oriented to measurement, control, and engineering
Culture	Driven by business needs	Driven by process needs

The width of these gaps is further illustrated by a recent study in which 43 percent of the companies surveyed reported only minor or occasional dialog between their management information systems and technical information systems groups.¹

Bridging the Gap

Numerous deployed and emerging technologies promise to provide information integration (see **Figure 1**).

Most of the familiar technologies are in the lower left corner, offering point-to-point connections as opposed to real integration. These include the original DCE products and the more recent CORBA and DCOM technologies, which enable objects to exchange messages over a network. However, interoperability and standard objects are still a long way off in these technologies.

From an end-user's perspective, better integration is achieved by the Microsoft® ActiveX component model. This provides a substantial level of desktop integration, allowing sophisticated applications to be built from modular components. However, ActiveX still does not serve the total integration needs of an enterprise.

The World Wide Web provides another promising form of integration, with documents interlinked across a network of systems. The huge popularity of the Web is encouraging rapid extensions to the technology, including dynamic content of web pages and push rather than pull distribution. However, building large distributed systems without managing huge numbers of point-to-point connections requires a true peer-to-peer communications environment.

New Connections

The publish/subscribe messaging model implements a scalable peer-to-peer communication architecture. It sets up an information pool in which publishers broadcast information identified by topic and applications subscribe to receive messages of interest. This is built on top of the Internet Protocol, allowing access to the large installed base of TCP/IP networks.

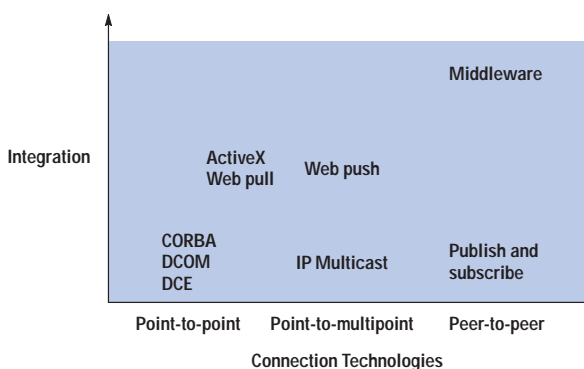
Information Integration

All these technologies achieve varying degrees of connection but fall short of true information integration. A new class of software, often called *middleware*, is emerging to connect MIS applications, such as SAP's R/3, to real-time systems. These applications are built on top of the connection technologies and provide an additional degree of integration.

When only two applications need to be integrated, it is tempting to build a simple custom interface. However, as the number of applications increases, this approach results

Figure 1

Integration technologies.



CORBA = Common Object Request Broker Architecture
DCE = Distributed Computing Environment
DCOM = Distributed Component Object Model

in several different interfaces, making development and maintenance difficult. Instead, properly designed middle-ware implements a software bus so that each application shares a single interface to the bus. Good middleware also provides a rich set of object-oriented features that are reused by each application. Such features include easy graphical configuration, object model reconciliation, data transformations, flexible triggers, one user interface for integrating multiple products, code reuse to simplify adaptation to new applications, spooling and caching of data, diagnostics and message tracing, and failure detection and recovery.

HP Enterprise Link² currently integrates real-time systems with the SAP PP-PI and PM modules and with the Oracle™ database.

Putting It All Together

With all these technologies and products to choose from, the challenge is to decide which one to use for a particular distributed system. As for most classes of problems, there is no single “one-size-fits-all” solution. Rather, each of these technologies has a role to play in linking front-line measurements to backroom systems, allowing users to have access to the real-time information they need. Examples of these products include:

- The HP RTAP (real-time application platform) supervisory control and data acquisition system is a complete software framework for building industrial automation systems. It also serves corporate needs via the HP Enterprise Link product.
- A desktop ActiveX interface that uses CORBA for communications with RTAP servers running on a variety of UNIX® platforms and on Microsoft Windows® NT.

Conclusion

There are many existing and emerging connection technologies that help to build distributed systems. However, integration means much more than just connection. On top of any connection technology, considerable work is needed to achieve real information integration. Middle-ware products help to fill this gap.

One important factor will characterize the successful companies of the future: the ability to provide real-time information to decision makers at all levels, anywhere, any time. The integration of mission-critical, real-time applications with corporate information systems will be essential.

References

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2. K. Jennyc, “Linking Enterprise Business Systems to the Factory Floor,” *Hewlett-Packard Journal*, May 1998, Vol. 49, no. 2, pp. 62-73.

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Online Information

Additional information about HP automatic integration software is available at:

<http://www.hp.com/go/ais>

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