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Architecture Choices for ERP Systems

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Abstract

This paper examines the impact of Enterprise Resource Planning (ERP) systems from the perspective of IT architecture choices. The underlying IT architecture has implications for executive sponsorship, capital investment, ongoing support, user training, and process reengineering. This paper proposes a framework to guide the assessment of architecture choices, gaps, and implications in relation to an enterprise's current IT infrastructure in three scenarios – the mainframe-centric environment, the network-centric environment, and the Internet-centric environment.

ERP Software

ERP systems are designed to model and automate core business processes of an enterprise in four areas: supply chain management, manufacturing, financial, and human resources. A primary goal of ERP systems is to integrate information across an enterprise to eliminate complex, expensive links between computer systems that do not communicate with each other.

Integrated ERP systems share several common features:

Online systems with no traditional batch interfaces,
One integrated, relational database for all data,
Clear definition of every data item, documented in a data dictionary,
Efficient support of back-office transition processing, such as accounts payable, but weak in decision support and analytical support,
Templates for processes performed by best practices in a specific industry sector, and
Client/server computing, network infrastructure, relational databases, and graphical user interface.

Market Trends

Several market trends influence the architecture of leading ERP systems:

Integrated database,
Client/server architecture,
Three-tier thin client/server architecture,
Web Client/server,
Web enablement and Electronic Commerce technologies, and
Open systems environment.

ERP Architecture Components

Evaluation of competing ERP systems should focus on their underlying architecture components, as illustrated in Table 1.

IT Environments

An organization's current technology environment will influence the selection and implementation of ERP systems. Generally, an IT environment falls into one of the following scenarios, as each scenario represents a different generation of technology architecture and organization maturity:

a) The mainframe-centric environment is characterized by centralized legacy systems, fragmented LANs, limited use of desktop computing and data access. This is still a predominant environment in the not-for-profit sector and many small companies.

b) The network-centric environment is built on the WAN and client/server computing. Data sharing and efficient use of workstations and productivity tools and groupware characterize a high degree of user competency and interactive organization supported by networks, common tools, and database.

c) The internet-centric environment adopts Internet and Web technologies to accelerate the sharing and distribution of information within and outside of the enterprise boundary. This environment is achieved when a distributed network is in place and users are adequately trained.

An Evaluation Framework

The underlying architecture of a chosen ERP system presents multiple implications. This author proposes a framework to assess the gaps between architecture requirements and current IT environment to develop implementation strategies. As shown in Table 2, this gap analysis is performed along eight architecture components: 1) network infrastructure, 2) server platform, 3) database management system, 4) data ownership, 5) client platform, 6) Web technology, 7) Prerequisite user skills, and 8) IT capacity. The chart below illustrates the gap analysis in a mainframe-centric environment, which highlights both technical and non-technical implications for enterprises that have not fully migrated from the main-frame-centric environment.

Conclusion

In conclusion, many enterprise architecture efforts were neglected or cancelled because senior management often views ERP implementation as stand-along projects, unwilling to invest in enterprise infrastructure. While successful ERP implementation is often determined by business and organization changes, architecture choices deserve thorough consideration during the system procurement phase because the selection of ERP systems have technical and non-technical impacts on the enterprise as well as the success of ERP implementation

References

Avai Chan, S.S. "Technology Architecture Choices for Enterprise Financial Systems," *Government Finance Review*, December 1998, pp. 21-24.

Clewett, A., Franklin, D., and McCown, A. *Network Resource Planning for SAP R/3, Baan IV, and PeopleSoft*, McGraw-Hill, 1998.

Davenport, T.H. "Putting the Enterprise into the Enterprise System," *Harvard Business Review*, July-August, 1998, pp. 121-131.

Duchessi, P. and Chengalur-Smith, I. "Client/server Benefits, Problems, Best practices," *Communications of the ACM. (41:5), May 1998, pp. 87-94.*

Weill, P., Broadbent, M., and St. Clair, D. "I/T Value and the Role of IT Infrastructure Investments," *Strategic Alignment*, Oxford University Press, 1996.

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Table 1. A Checklist for ERP Technology Requirements

Software Release	❑ Does the current release support full client/server architecture? ❑ ❑ Does the current release support a mixed environment of mainframe and client/server? ❑ Does the current release have only a mainframe version?
Architecture	❑ 3-tier (or n-tier) thin client architecture ❑ 2-tier fat client architecture ❑ Both 3-tier and 2-tier client/server architecture ❑ Mainframe or midrange hosts only
Server Operating Systems	❑ UNIX ❑ Windows NT ❑ OS/400 ❑Other
Server Platform	❑ UNIX-based ❑ Multi-platforms ❑ Mainframe as Enterprise Server ❑ Other
DBMS	❑ Oracle ❑ Sybase ❑MS SQL*Server ❑ DB2 ❑Other
Client OS	❑ Windows NT ❑ Windows 95 ❑ Windows 3.x ❑ Character screen with host software
Client Workstations	❑ Pentium ❑ 486 minimum ❑ < 386 ❑ 3270 terminals
GUI	❑ % of GUI (% of screens are in full GUI)
Web Browser Enablement	❑ % of Web Browser Enabled (% of software can be accessed via a browser)

Table 2. A Framework for Assessing ERP Implications

Architecture Components	Requirements	Current Environment*	Implications
Network Infrastructure	Wide Area Network Local Area Network Standards & Policies	Fragmented LANs Lack of a single network Lack of LAN standard Lack of common email No integrated WAN	Delay ERP until infrastructure is in place. Build infrastructure as a capital project or as part of ERP proposal. Outsource infrastructure development and construction to accelerate timetable.
Server OS/ Platform	Open Systems Unix Based Non Unix Based	Mainframe or midrange hosts Proprietary OS	Challenge in managing an open system environment. Reluctance of mainframe IS group to change platform.
Database	Relational DBMS	Mainframe flat files Duplicated reports and applications Multiple data entries Lack of query capability	Relational database allows flexible query and reporting. Shifting responsibility in information management to users.
Data Ownership	Integrated Database Clear ownership and data sharing	Unable to share data Duplicated data capture	An integrated database demands significant process reengineering and data policies.
Client OS/ Workstations	High-end workstations Common standard	Low-end PCs Lack of software and OS standards	Easy to achieve a compatible client environment if funding is available.
Web Enablement	Common Web Browser Intranet and Firewall Bandwidth	Lack of knowledge and skills in Internet technology Firewall and high speed network not in place Uneven use of Web browsers Lack of policies and standards	Presents creative opportunities for e-government Need Internet strategies, security and firewall.
Prerequisite User Skills	Windows, GUI, desktop productivity tools	Uneven knowledge of packages and operating systems	Target basic training prior to FMIS implementation.
IT Capacity	ERP Package Client/Server OS Relational database Network management Transaction Processing Process Reengineering User Training and Support	Skill gap in ERP, c/s, and relational database Absence of a strong network group in IT division Inability to manage distributed environment	May need a two-tier IS support structure: Central IS support infrastructure and database; User group support help desk, training, and application maintenance