



Chapter 17

**CORBAMed and DHE:
Middleware Service Approach in
Healthcare Information Systems**

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The healthcare organizational structure is often naturally distributed. In order to improve the quality of care, the adoption of standards to allow the effective and robust networking of the various centers for clinical, epidemiological, administrative information management purposes has been widely recognized as an urgent and strategic need in the healthcare community. This chapter analyzes the status and challenges that today's healthcare information systems have, and introduces two middleware service frameworks for information systems, namely CORBAMed and DHE, in detail. The middleware service can address heterogeneous problems and significantly assist interoperability and integrity of information systems by providing common services and a set of standard interfaces that enable different applications to interact with each other.

INTRODUCTION

Characteristics of Current Healthcare

Healthcare is experiencing rapid improvements due to its changing focus and tremendous achievements in computing and communication technology. Concurrently, the healthcare organizational structure is often naturally distributed, being geographically dispersed centers at different levels of complexity and scale. The various structures operating over the territory are heterogeneous in organizational,

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logistic, and clinical perspectives. Healthcare is driven to move quickly from single-provider, proprietary, mainframe systems toward multi-providers, scalable, component-based systems. Patients are provided with healthcare services by multiple institutions. The patient information is widely dispersed — a patient's record is held in medical records departments of multiple hospitals. Therefore, ubiquitous lifetime patient information needs to be obtained from many locations and be efficiently integrated. Electronic medical records are commonly used (Forslund, 1997). They can be easily maintained and distributed across a healthcare network.

Challenges of Developing Healthcare Information Systems

The distributed nature of healthcare determines the need of powerful tools to access patient medical records over a wide area and assemble various data from different sources. There is a strong desire to create and apply some common standards, which are assertions, not realizations of requirements, for the architecture of HIS. The adoption of them allows the effective and robust networking of the various centers for clinical, epidemiological, and administrative information management purposes. As a result, physicians will be able to maximize the utilization and sharing of resources to make the right judgment. However, it is far from trivial to make it a reality because of several challenges:

- **Size/Scalability:** Usually the size of the overall healthcare network is huge.
- **Representation heterogeneity:** Same patient information may be represented in disparate ways within different systems, which sets the barrier for data integration. There is no consensus on data formats.
- **Platform and programming language heterogeneity:** Individual healthcare information systems are often platform-dependent. They are usually developed using different programming languages on heterogeneous platforms, which causes incompatibility problems.
- **Lack of computing interoperability:** Hospitals use assorted devices, instruments and systems that collect and maintain patient information. It lacks of computing interoperability among them.
- **Real-time capabilities:** Gathering and integrating distributed patient information must be quick enough to be useful for diagnosis or treatment.
- **Security:** Today's healthcare providers are concerned with collecting relevant patient information from multiple resources. The security and limitations on data access and disclosure must be taken into consideration during patient information sharing. The security will be the key to the smooth flow and share of information among the providers in healthcare community.

Developing advanced healthcare information integration techniques and standards will address the above problems and greatly benefit the healthcare community. First, it helps assemble longitudinal medical records of a patient from multiple

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