Multimedia Synchronization is a *Process*

T.D.C. Little

Multimedia Communications Laboratory
Department of Electrical, Computer and Systems Engineering
Boston University, Boston, Massachusetts 02215, USA
(617) 353-9877, (617) 353-6440 fax
tdcl@bu.edu

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Synchronization in the context of multimedia computing deals with timing issues within and among media. The problems associated with multimedia synchronization can be, and have been, approached from many perspectives. These include that of the user, communications, databases, authoring, and end-system design. We impose a model on this domain that separates temporal *specification*, from the services that attempt to achieve the specification. In this model, the rendering of the temporal specification by the system is the *process* of synchronization. This model intrinsically defines quality of service (QOS) with respect to synchronization (Fig. 1). The difference between a specified multimedia presentation scenario and the rendered one yields a deviation from ideal; a measure of QOS.
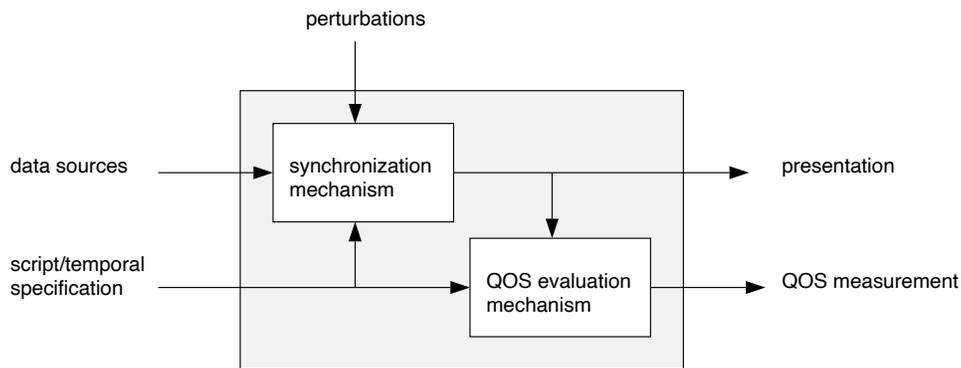

Figure 1: Synchronization as a Service for Satisfaction of a Temporal Specification

This concept of separation of the specification from the rendering is embodied in the abstraction concept for multimedia systems. One such model is shown in Fig. 2. Essentially, the model describes how a multimedia abstraction can be created.

The model captures the distinction of the conceptual models (abstractions) for the data/media and services, their implementation in a programming environment, and the services necessary to render them. The physical services include devices such as displays, networks, and storage devices. The services can consist of multiple levels of abstraction whereby a level provides services to levels above, and has services provided from levels below (i.e., the OSI services concept). Each level combines the services of the underlying levels, down to the level of the physical service or device.
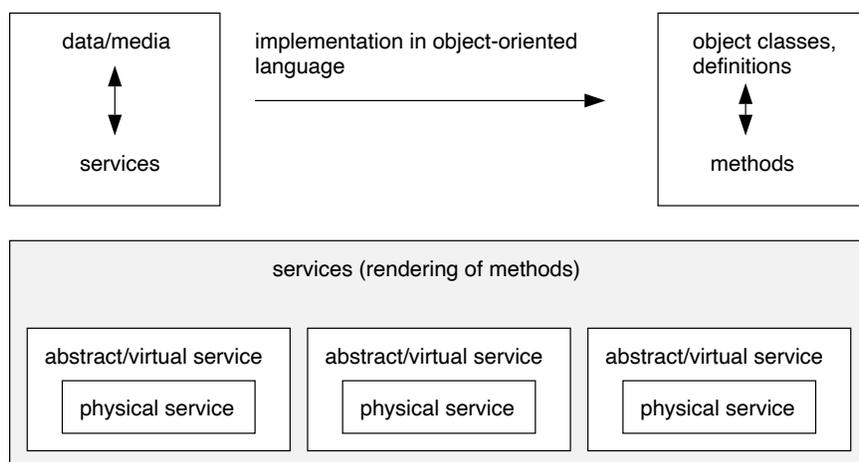
Figure 2: Abstraction in Multimedia Computer Systems

By defining methods with object requirements apart from the system services or rendering, we introduce a observation point for characterizing and evaluation of quality of service. For example, an object can require a specified level of service in its definition. The system services attempt to satisfy this specification at run-time. The difference between the specification and the rendering is readily perceived at this interface.

The idea of QOS being achieved by the system is captured for the process of multimedia synchronization in Fig. 1. In this example of a synchronization service, the data and their specification are used by the temporal rendering mechanism. The difference between the temporal specification and the rendering yields the achieved QOS. This approach can be used per system component or for the end-to-end system.