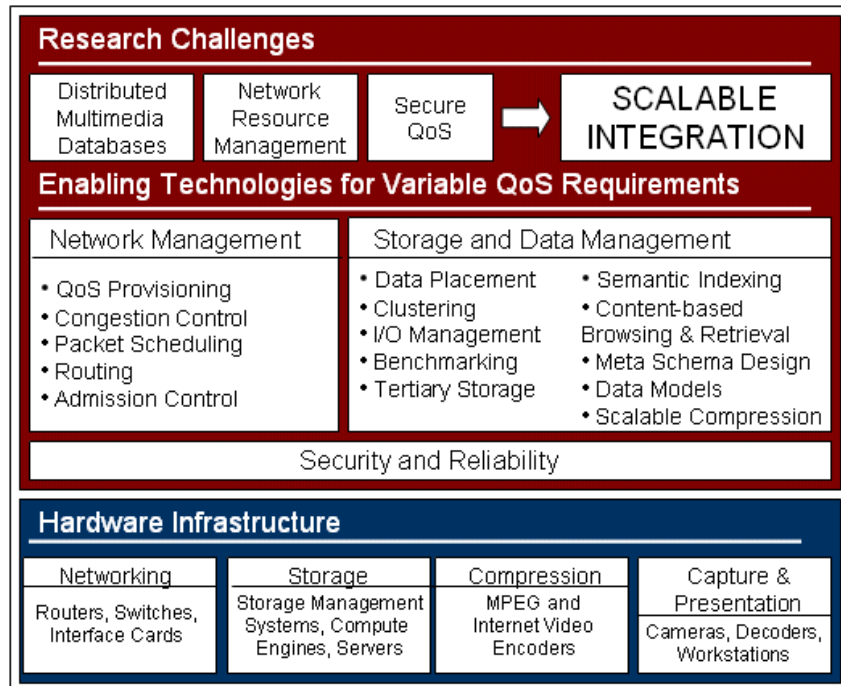**EIA9972883**
MSI: A Research Infrastructure for Integrated Quality of Service Management of Multimedia
Computing Environments
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MSI Project Infrastructure

Project Description:
The MSI research project addresses the integration of databases, networking and security – three pillars of today's digital society – through a computing environment capable of meeting user and application requirements on the Internet. The three subsystems, (1) context-sensitive information retrieval, storage and dissemination, (2) QOS-sensitive information transport, and (3) security-sensitive information processing, are coordinated by the MSI framework to achieve a seamless and efficient single-system image. MSI presents a user-friendly abstraction that facilitates single-stop computing in the digital space.

An MSI-developed Tool to Strengthen Video Database Research Potential.
A significant and ever increasing portion of the information created today has audio-visual components, and most of it is now available in digital form. Real world video-based applications require database technology that is capable of storing this information in the form of video databases and providing content-based video search and retrieval. Methods for handling traditional data storage and retrieval cannot be extended to provide this functionality, and current approaches for handling video hide the video data from the database system, so that meaningful processing and optimization is not possible. The development of the VDBMS video database management system within the MSI project was motivated by the requirements of video-based applications to retrieve portions of video data based on content and by the need for testbed facilities to facilitate research in the area of video database management. VDBMS provides a full range of functionality for video as a well-defined data type, with its own description, parameters and applicable methods. The development and integration of a video data type into the

database management system achieves a clear separation between the video processing and database components. This allows video-based application design to focus on details of the application itself, while relying on the underlying video framework components for storage, search, retrieval, analysis and presentation of the video data. Video applications thus inherit all the powerful functionality generally provided by database management systems, including query processing, optimization, concurrency and recovery.

Research problems that were addressed by VDBMS to support the handling of video data include MPEG7 standard multimedia content representation, algorithms for image-based shot detection, image processing techniques for extracting low-level visual features, a high-dimensional indexing technique to access the high-dimensional feature vectors extracted by image pre-processing, multimedia query processing and optimization, new query operators, real-time stream management, a search-based buffer management policy, and an access control model for selective, content-based access to streaming video. While investigating, developing, and testing the fundamental components required to support full video database functionality, we also utilized VDBMS as a testbed for integrating and evaluating video processing technologies from other sources. As such, the system has provided an environment for testing the correctness and scope of algorithms, measuring the performance of algorithms in a standardized way, and comparing the performance of different implementations of a component. The VDBMS project extended this concept by constructing video component wrappers with well-defined interfaces that allow components to be easily modified or replaced, and then developed corresponding semi-automatic mechanisms for integrating these components into VDBMS. The resulting VDBMS system is a flexible, extensible framework that can be used by the research community for developing, testing and benchmarking video database technologies.

The VDBMS Query Interface to the Video Database Management System