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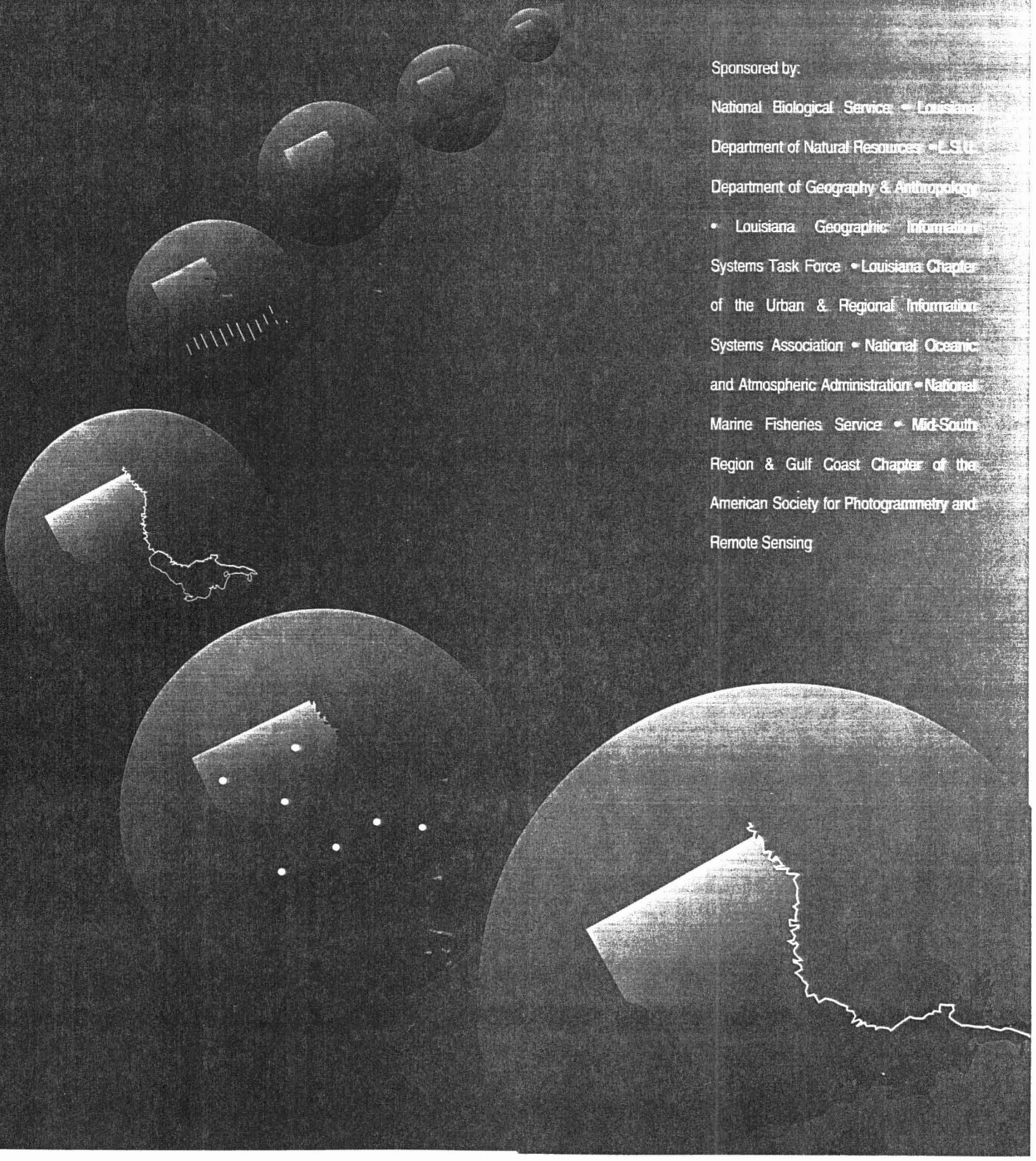

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APPLICATION OF A HIGH PERFORMANCE SEMANTIC DATA BASE TO GIS DATA REQUIREMENTS[2]

by

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ABSTRACT

The basis for any geographic information system (GIS) is the manipulation of large volumes of geospatial data. From the retrieval process to the display function, the significant burden imposed on both the hardware and software of the target system to process the data in a timely manner creates the impetus for the development of new techniques in data handling. The methods must ensure that the representation to the user is believable, useful, versatile, and accomplishes the implicit functions of a GIS: to represent data graphically or pictorially, either statically or dynamically, in a determinate span of time, what would be exhausting if not impossible to accomplish textually. A key component in the achievement of these goals is how data are represented on a virtual storage medium and the manner in which these data are retrieved. The systematic coordination between the data access method and the application that processes a highly detailed visual representation must be time-tolerant for the user when the data are time relative. The challenge is to implement these ideals with the technology most prevalent to current potential users, e.g., research facilities, libraries, and municipalities, with serious consideration of future users equipped with only desktop computers.

We are developing a Semantic/spatial Information System (SemSIS) which can access vast amounts of geospatial data, retrieve the data in an efficient and time critical manner, and display its representation in an adjustable real-time mode. SemSIS is comprised of an Application/GIS, Standard Interface, Query Language, and Database Manager. This paper and related presentation was a conceptual description of the facets that make up SemSIS.

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SemSIS will consist of four independent but highly correlated components, each providing the features of modularity enabling their independent implementation. The Application/GIS is the module that interfaces with the user. It provides for the displaying of data and for the accepting of run-time parameters from the user. The primary purpose of developing an Application/GIS as part of this project is to model our advanced techniques of data storage and retrieval. The Standard Interface module provides the bridge between the application and the query language and thus allows the application to be independent of the access methods enables the building of applications suited for a specific domain with distinct methods. The Query Language module is the means by which to access the database. In an standard query language style, it is developed for access to a semantic data base and for the movement of vast amounts of data in a determinably small period of time. The Database Manager is responsible for the representation and storing of massive amounts of semantic and spatial data.

The long-range goal is to apply SemSIS where the amount of spatial data is in the range from 2 terabytes to 10 petabytes and where the real-time graphical representation of such data changes by the second. As one demonstration application, we are developing an animation of the time change of the ozone hole by querying Total Ozone Mapping Spectrometer data acquired over a 15 year period. In all cases, we are proposing to develop the mechanics to store, retrieve and rapidly manipulate vast amounts of data that represent multiple elements of a single observable source.