PACKAGE ID - 001158SPARC00 GEOVIEWER1.65

KWIC TITLE - Intelligent Object-Oriented GIS Engine W/dynamic Coupling to Modeled Objects

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LIMITATION CODE -COPY **AUDIENCE CODE -** LIM

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DESCRIPTION - The GEOVIEWER is an intelligent object-oriented Geographic Information System (GIS) engine that provides not only a spatially-optimized object representation, but also direct linkage to the underlying object, its data and behaviors. Tools are incorporated to perform tasks involving typical GIS functionality, data ingestion, linkage to external models, and integration with other application frameworks. The GOEVIEWER module was designed to provide GIS functionality to create, query, view, and manipulate software objects within a selected area under investigation in a simulation system. Many of these objects are not stored in a format conductive to efficient GIS usage. Their dynamic nature, complexity, and the sheer number of possible entity classes preclude effective integration with traditional GIS technologies due to the loosely coupled nature of their data representations. The primary difference between GEOVIEWER and standard GIS packages is that standard GIS packages offer static views of geospatial data while GEOVIEWER can be dynamically coupled to models and/or applications producing data and, therefore, display changes in geometry, attributes or behavior as they occur in the simulation.

PACKAGE CONTENTS - Media Directory; Software Abstract; Media Includes Source Code;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 3.5 Diskette

METHOD OF SOLUTION - The protocol based, dynamic, object-oriented approach of GEOVIEWER mitigates many problems which plague traditional GIS systems. The extensible framework employed utilizes multiple methods for the encapsulation of a variety of data types and formats. This framework encompasses spatial data representations, indexing, and context-sensitive visualization information. At its foundation is a lightweight object, the GeoObject, that provides optimized storage for the spatial geometry. The spatial indexing framework is quadtree-based, supplying storage and access for objects that respond to the spatial indexing protocol. An adaptive data driven pruning

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METHOD OF SOLUTION -(CONT) algorithm incorporated in the quadtree, with each layer conceptually independently indexed, limits the depth of the trees. Thus, whether there are ten or ten million objects in the tree, the depth of the tree is to an appropriate level. In reality, only one index-tree exists, with each layer's tree overlaid on the next. This approach makes for efficient storage, rapid access and effective search pruning. In addition, balancing algorithms are used to distribute objects within nodes of the tree to optimize locality of reference. The GEOVIEWER query mechanism depends heavily on meta-protocols to extend the expressive power of the query engine beyond that of relational calculus. These are dynamic in nature, derived from the base query protocol, allowing run-time changes to the query engine. This dynamic nature allows any function published by a GeoObjects intelligent delegate, via the query protocol, to be incorporated in the GEOVIEWER. Again, the delegates can change the meaning of these functions, or even add or delete functions, as the simulation progresses.

COMPUTER - SUN SPARC

OPERATING SYSTEMS - Unix (Sun Solaris)

PROGRAMMING LANGUAGES - Smalltalk (95%) C (5%)

SOFTWARE LIMITATIONS - None designed into the software. Users are limited by their individual computing environments.

SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - The primary difference between GEOVIEWER and standard GIS packages is that while standard packages offer static view of geospatial data, GEOVIEWER can be dynamically coupled to models and/or applications producing data, and thereby, display events as they occur in the simulation. GEOVIEWER is an intelligent system that supplies not only a spatially optimized object representation, but also direct linkage to the underlying object, its data and behaviors.

RELATED SOFTWARE - An object based or relational database management system can be used to store the data.

OTHER PROG/OPER SYS INFO - GEOVIEWER was designed to operate within the Dynamic Information Architecture System (DIAS), a proprietary modeling and simulation developed at Argonne; however, it is operable under an alternate, object-oriented modeling and simulation architecture or as an extensible stand alone system.

HARDWARE REQS - A Unix workstation is required to host this software. The hardware requirements are determined by the simulation architecture that uses the GEOVIEWER software. DIAS needs a

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HARDWARE REQS -(CONT) workstation with 128 Mbytes of RAM and 2 Gbytes of disk space for atypical application. If GEOVIEWER were run in a non-Unix environment, memory and disk storage requirements would be similar.

TIME REQUIREMENTS - GEOVIEWERS time requirements are driven by the needs of the simulation as defined by the user; computation times are typically small compared to those of other components in the simulation system.

ABSTRACT STATUS - Submitted 2/12/97. Released AS-IS 3/7/97

SUBJECT CLASS CODE - N

KEYWORDS -
COMPUTER PROGRAM DOCUMENTATION
G CODES
MAPPING
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D CODES
GEOGRAPHY

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SPONSOR - DOE/ER

PACKAGE TYPE - AS - IS