LIST OF CURRENT AND PENDING RESEARCH SUPPORT

I. R. Ramakrishnan

Current:

Source: NASA (Joint with Profs. Livny and Norman)
Title: Analysis and Visualization of Sequence Data in Earth Sciences
Amount: $593,702
Period: 10/1/93 - 9/30/96
Person-Months: 3 months (total)
Location: University of Wisconsin - Madison
Abstract: Existing analysis tools are not adequate to handle a broad class of sequence data applications; in particular, there is no good sequence query facility and sequence visualization tool. We propose to build upon existing software such as CORAL to provide such tools. (The BIRCH and SEQ tools and the current version of DEVise are based upon work supported by this grant.)

Source: ORD (Joint with Profs. Ioannidis and Livny)
Title: Clusters of Data Providers
Amount Requested: $662,000
Period: 3/15/95 - 6/30/97
Person-Months: 1 months (total)
Location: University of Wisconsin - Madison
Abstract: As large amounts of data become accessible over the Web, users need to integrate this information, and data providers need tools to control access by external users, and to support such requests efficiently. We are developing techniques and tools to address these issues: (1) Semantic integration of relational data and integrated data access. (2) Agent software that profiles external requests and schedules them so as to maintain desired levels of local service. (3) Idle resource utilization for query evaluation based on a combination of Coral and Condor.

Pending:

Source: EPA (Joint with Prof. Livny)
Title: Exploratory Analysis of Large Datasets
Amount Requested: $567,247
Period: 9/1/96 - 8/31/99
Person-Months: 3 months (total)
Location: University of Wisconsin - Madison
Abstract: Data Mining and exploratory data analysis are increasing in importance, and specific algorithms and tools are being developed to assist in these activities. It is widely recognized, however, that such tools must be used in conjunction with each other, and with traditional tools for querying and visualizing data. We propose to develop algorithms for data mining

tasks such as finding association rules
and sequential patterns, and to integrate them into
a toolkit architecture combining
the DEVise visualization tool, the SEQ sequence query
package, the Coral deductive query system and the BIRCH
clustering tool. Further, we propose to use the
Condor system to transparently provide computing cycles
for analysis tasks generated through the toolkit interface.

II. M. Livny

Current:

Source:	NSF (Joint with Profs. Borisy, Ioannidis, and Norman)
Title:	Developing an Experiment Management System
Award	Amount:$413,000
Period:	9/1/93 - 9/30/96
Person-Months:	2.5 summer months (total)
Location:	University of Wisconsin - Madison
Abstract:	In this proposal, we request funds to continue our on-going efforts to develop an Experiment Management System that every experimental scientist would like to have on his/her desk. We are primarily motivated by the needs of of experimentation environments that we have developed and/or manage. The focus of our fundamental database research will be on graphical user interfaces and on the integration of database systems with experimentation environments.

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Amount:	$593,702
Period:	10/1/93 - 9/30/96
Person-Months:	3 months (total)
Location:	University of Wisconsin - Madison
Abstract:	Existing analysis tools are not adequate to handle a broad class of sequence data applications; in particular, there is no good sequence query facility and sequence visualization tool. We propose to build upon existing software such as CORAL to provide such tools. (The BIRCH and SEQ tools and the current version of DEVise are based upon work supported by this grant.)

Source:	ORD (Joint with Profs. Ioannidis and Ramakrishnan)
Title:	Clusters of Data Providers
Amount Requested:	$662,000
Period:	3/15/95 - 6/30/97
Person-Months:	1 months (total)
Location:	University of Wisconsin - Madison
Abstract:	As large amounts of data become accessible over the Web, users need to integrate this information, and data providers need tools to control access by external users, and to support such requests efficiently. We are developing techniques and tools to address these issues: (1) Semantic integration

of relational data and integrated data access. (2) Agent software that profiles external requests and schedules them so as to maintain desired levels of local service. (3) Idle resource utilization for query evaluation based on a combination of Coral and Condor.

Source:	NASA (Joint with Prof. Salem)
Title:	Ingesting Data Using Workstation Clusters
Amount Requested:	$581,132
Period:	5/1/94 - 4/31/97
Person-Months:	3 months (total)
Location:	University of Wisconsin - Madison
Abstract:	In this proposal we outline an effort to develop, implement, and evaluate means to utilize the resources of workstation clusters to ingest large scientific data sets into an archive. We plan to enhance the Condor management system, which has proven to be an effective source of processing cycles for CPU-intensive jobs, to accommodate the data-intensive nature of the data ingest task.

Pending:

Source:	EPA (Joint with Prof. Ramakrishnan)
Title:	Exploratory Analysis of Large Datasets
Amount Requested:	$567,247
Period:	9/1/96 - 8/31/99
Person-Months:	3 months (total)
Location:	University of Wisconsin - Madison
Abstract:	Data Mining and exploratory data analysis are increasing in importance, and specific algorithms and tools are being developed to assist in these activities. It is widely recognized, however, that such tools must be used in conjunction with each other, and with traditional tools for querying and visualizing data. We propose to develop algorithms for data mining tasks such as finding association rules and sequential patterns, and to integrate them into a toolkit architecture combining the DEVise visualization tool, the SEQ sequence query package, the Coral deductive query system and the BIRCH clustering tool. Further, we propose to use the Condor system to transparently provide computing cycles for analysis tasks generated through the toolkit interface.

Source:	NSF (Joint with Prof. Ioannidis and Markely)
Title:	Exploratory Analysis of Large Datasets
Amount Requested:	$900,000
Period:	6/1/97 - 5/31/00
Person-Months:	3 months (total)
Location:	University of Wisconsin - Madison
Abstract:	The goal of this project is to equip the National Magnetic Resonance Facility at Madison (NMRFAM) with a Customized Desk-top Experiment Management System (CDEMS) that will provide users with effective desk-top access to the facility software and hardware resources.

Source:	DARPA (via a subcontract from John Hopkins Uinversity)
Title:	Advanced Meta-Computing with Condor

Amount Requested:	$ 260,384
Period:	9/1/96 - 8/31/99
Person-Months:	3 months (total)
Location:	University of Wisconsin - Madison
Abstract:	In this proposal we out line an effort to transfer the Meta Computing scheduling technology developed by Professor Baruch Awerbuch and his group at Johns Hopkins University (JHU) to the Condor Resource Management System. We believe that the new scheduling technology developed at Johns Hopkins University will enable us to enhance the scheduling and accounting capabilities of Condor so that it can meet the needs of large scale Meta-Computing.

III. J. Norman

Current:

Source:	NASA (CO-PI with Tom Gower- UW Forestry)
Title:	Measurement and Scaling of Carbon Budgets for Contrasting Boreal Forest Sites
Award Amount:	$600,000
Period:	5/93-4/97
Person Months:	3 months total
Location:	UW-Madison &Canadian Sites
Abstract:	Current understanding of the contribution of boreal forests to the global carbon cycle is inadequate because it is based promarily on guiding principles from temperate forests, even though we know that boreal forests have unique attributes. The overall objective of this research is to measure the distribution and major fluxes of carbon in the crown, understory, and soil and quantify the transport of carbon between these resevoirs and the atmosphere as a function of environment and forest vegetation types representative of the boreal forest.

Source:	USDA Hatch (CO-PI with Tom Gower and Larry Bundy, UW)
Title:	Adapting a State of the Art Model for Practical Decision Making
Award Amount:	$115,000
Period:	3/95-2/97
Person Months:	1 month
Location:	UW-Madison
Abstract:	The fundamental processes involved in understanding cycling of nutrients, energy and water in natural and managed ecosystems are the same. By comparing essential processes in natural and agricultural systems, we believe that we can progress toward sustainable, managed systems for the production of food and fiber. In this study we are measuring and modeling nitrogen, carbon, energy and water cycles for a natural prairie, a no-till corn field, and a conventional corn system to assess various strategies for maintaining optimal corn productivity and reducing adverse environmental impacts (particularly nitrate leaching).

Source:	NASA (CO-PI with George Diak, UW)
Title:	Evapotranspiration and Sensible Heating Evaluated from Satellite and In-Situ Data Using an

	Optimal Estimation Approach
Award Amount:	$358,000
Period:	8/94-7/97
Person Months:	3 months total
Location:	UW-Madison
Abstract:	This research effort is designed to improve our knowledge of the water and energy balance of the land surface through the development of an optimal estimation system which will combine multiple in-situ and remote sensing data sources into a coherent spatial and temporal depiction of these land-surface properties on regional and larger scales. The components of the water budget will be estimated from a combination of surface radiometric temperature measurements from satellite, weather data from the synoptic network, soundings from the radiosonde network and surface characterization from vegetation type and amount maps.

Source:	NASA (PI is Raghu of comp. Sci.,UW)
Title:	Analysis and Visualization of UW-Madison Sequence Data in the Earth Sciences
Award Amount:	$594,000
Period:	6/94-5/97
Person Months:	3 months total
Location:	UW-Madison
Abstract:	Existing analysis tools are not adequate to handle a broad class of sequence data applications; in particular, there is no good sequence query facility and sequence visualization tool. We propose to build upon existing software such as CORAL to provide such tools. (The BIRCH and SEQ tools and the current version of CEVise are based upon work supported by this grant.)

Source:	EPA (PI is T. Sharkey of Botany Dept., UW)
Title:	Improved Inventories of Isoprene and Other Biogenic Bolatile Organic Compounds
Award Amount:	$747,000
Period:	8/94-7/97
Person Months:	3 months total
Location:	UW-Madison
Abstract:	This research empahsizes the measurement of isoprene emissions by mainly oak leaves in the field as a function of environmental conditions, and the scaling of these leaf emissions from the leaf level to the canopy level using a plant-environment model. Additional effort involves biochemical work to better understand the reasons for isoprene emissions in oak trees.

Source:	NASA (Cooperator, CO-PIs are Bill Bland and George Diak-UW)
Title:	Satellite Data Driven Real-Time Agricultural Management Decision Aids
Award Amount:	$842,000
Period:	1/95-12/97
Person Months:	3 months total
Location:	UW-Madison
Abstract:	This proposal describes a strategy for developing three end-user applications of satellite data in the agricultural and environmental management arena: 1) Irrigation scheduling decision support system (DSS) for on-farm use, 2) a DSS for

estimating the duration of leaf wetness leading to foliar disease prediction in potato, and 3) a DSS for protecting cranberry crops from frost damage throughout the growing season. The end product of this proposed effort will be an integrated system that will capture real-time observations, analyze those observations, apply algorithms to predict crop-relevant variables, distribute this information and display final results to end users.

Pending:

Source:	NASA (CO-PI with J. Foley-UW and C. Prentis-Sweeden)
Title:	Integrating Biogeochemical, Ecological, and Hydrological Processes in a Dynamic Biosphere
Award Amount:	$911,172
Period:	7/96 - 6/99
Person Months:	3 months total
Location:	UW-Madison
Abstract:	Many important relations between land surface processes, plant physiology, vegetation ecology and ecosystem biogeochemistry are not fully represented by the current generation of global models, because they are focused on the equilibrium state of ecosystems. This proposal describes the next step in the evolution of Earth System modeling: An integrated, global, dynamical biosphere model that captures the dynamic behavior vegetation.