
**Computational Science
and Engineering
at the
Division of Computational Bioscience**

Center for Information Technology

National Institutes of Health
Department of Health
and Human Services

Mission of the Computational Science and Engineering Program

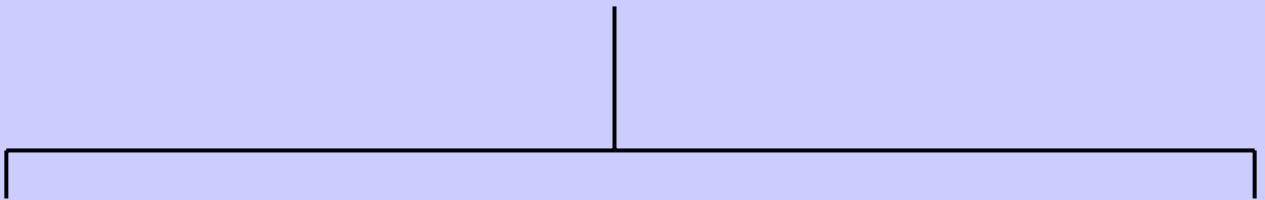
Support and strengthen the intramural research
of the NIH Institutes and Centers
by providing scientific and technical expertise
in computational science and engineering.

Collaborating NIH Institutes and Centers

- Clinical Center
- National Cancer Institute
- National Center for Research Resources
- National Eye Institute
- National Heart, Lung, and Blood Institute
- National Human Genome Research Institute
- National Institute on Aging
- National Institute on Alcohol Abuse and Alcoholism
- National Institute of Allergy and Infectious Diseases
- National Institute of Arthritis and Musculoskeletal and Skin Diseases
- National Institute of Child Health and Human Development
- National Institute on Deafness and Other Communication Disorders
- National Institute of Dental and Craniofacial Research
- National Institute of Diabetes and Digestive and Kidney Diseases
- National Institute of Environmental Health Sciences
- National Institute of General Medical Sciences
- National Institute of Mental Health
- National Institute of Neurological Disorders and Stroke
- National Library of Medicine

Organization of the Center for Information Technology

Office of the Director



Division of Computational Bioscience

Division of Computer System Services

Division of Network Systems and Telecommunications

Division of Customer Support

Division of Enterprise and Custom Applications

Computational Science and Engineering Activities

- Biomedical Instrumentation
- Telemedicine
- Biomedical Imaging
- Biomedical Informatics
- Computational Methods and Algorithms, and Parallel Computing
- Molecular Modeling and Structure Determination
- Mathematical and Statistical Analysis

Biomedical Instrumentation

- Design unique real-time signal processing and control systems for a variety of biomedical applications.
- Provide consultation in the development of computer-based biomedical instrumentation.

Telemedicine

- Implement advanced telemedicine systems using high-speed communication networks and multi-modality imaging technologies.
- Develop systems for the acquisition, storage, retrieval, and display of clinical and laboratory images.

Biomedical Imaging

- Develop and apply advanced imaging methods and algorithms to images of biomedical objects that range in size from organs to macromolecules.
- Create and implement innovative software technology for clinical, animal, and laboratory imaging.
- Provide image processing facilities for the NIH Intramural Research Community.

Biomedical Informatics

- Develop integrated methods for the analysis, viewing, storage, and management of cDNA, oligonucleotide, cell, and tissue microarrays.
- Implement Web-based tools for the distribution and analysis of associated images and test results.
- Design image archive systems for large clinical studies.

Computational Methods and Algorithms, and Parallel Computing

- Develop high-performance computational methods and algorithms to analyze biomedical research data and model complex biological systems.
- Provide algorithm expertise to solve computationally intensive problems in biomedicine through the use of parallel computing.
- Deploy modern, non-traditional computer architectures in a distributed computing environment.

Molecular Modeling and Structure Determination

- Assemble, develop, and promote computational tools and expertise needed for modeling and simulating molecular systems of interest to the NIH community.
- Apply computational chemistry methods for the modeling of biologically relevant molecules.
- Develop software tools for macromolecular structure determination by X-ray crystallography and solution nuclear magnetic resonance (NMR) spectroscopy.

Mathematical and Statistical Analysis

- Promote the use and accessibility of mathematical and statistical tools to advance both basic and clinical research.
- Develop and apply mathematical theories, which describe physical, chemical and biological processes.

Central Scientific Computing Resources

- Manage centralized scientific computational systems tailored to the needs of NIH intramural scientists providing access to a wide range of software applications.
- Serve two distinct user populations: those requiring high-performance scientific computing resources and those requiring broad-based scientific computing resources.

How the Computational Science and Engineering Program Benefits NIH Intramural Research

- Provides the NIH biomedical research program with a central resource of scientific and technical expertise in computational science and engineering that can adapt to new technologies and respond to the varying needs of each Institute.
- Allows the formation of project teams containing the combination of computational science and engineering skills needed to solve multidisciplinary research problems and develop unique systems.
- Manages centralized scientific computational and communication systems for the NIH intramural research community.
- Provides an environment to mentor computational scientists and engineers for careers in biomedical research.