AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

110TH CONGRESS
1st Session

HOUSE OF REPRESENTATIVES

REPORT
110–40

AMENDING THE HIGH-PERFORMANCE COMPUTING ACT OF 1991

MARCH 8, 2007.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. GORDON of Tennessee, from the Committee on Science and Technology, submitted the following

R E P O R T

[To accompany H.R. 1068]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science and Technology, to whom was referred the bill (H.R. 1068) to amend the High-Performance Computing Act of 1991, having considered the same, report favorably thereon without amendment and recommend that the bill do pass.

CONTENTS

		Page
I.	Purpose of the Bill	2
II.	Background and Need for the Legislation	2
III.	Summary of Hearings	2
IV.	Committee Actions	3
V.	Summary of Major Provisions of the Bill	4
VI.	Section-by-Section Analysis	4
VII.	Committee Views	6
VIII.	Cost Estimate	8
IX.	Congressional Budget Office Cost Estimate	8
X.	Compliance With Public Law 104–4 (Unfunded Mandates)	9
XI.	Committee Oversight Findings and Recommendations	9
XII.	Statement on General Performance Goals and Objectives	9
XIII.	Constitutional Authority Statement	9
XIV.	Federal Advisory Committee Statement	9
XV.	Congressional Accountability Act	9
XVI.	Statement on Preemption of State, Local, or Tribal Law	9
XVII.	Changes in Existing Law Made by the Bill, as Reported	9
XVIII.	Committee Recommendations	13
XIX.	Proceedings of the Full Committee Markup	14

59–006

I. Purpose of the Bill

The purpose of the bill is to revitalize interagency coordination and planning for the interagency program, called the National Networking and Information Technology R&D (NITRD) program, established by the High-Performance Computing Act of 1991 and to focus greater attention and resources on federal high-performance computing programs. The NITRD program includes activities at the National Science Foundation (NSF), the National Institutes of Health (NIH), the Department of Defense (DOD), the Department of Energy (DOE) Office of Science, the National Aeronautics and Space Administration (NASA), the National Institute of Standards and Technology (NIST), the National Oceanic and Atmospheric Administration (NOAA), and the Environmental Protection Agency (EPA).

II. Background and Need for the Legislation

High-performance computing and networking is an essential component of U.S. scientific, industrial, and military competitiveness, and the U.S. is still highly competitive in this field. The depth and strength of U.S. capability stems in part from the sustained research and development program carried out by federal research agencies under the NITRD program codified by the High-Performance Computing Act of 1991. That Act is widely credited with reinvigorating U.S. high-performance computing capabilities after a period of relative decline during the late 1980s.

The Federal government promotes high-performance computing and networking in several different ways. First, it funds research and development at universities, government laboratories and companies to help develop new hardware and software; second, it funds the purchase of high-performance computers for universities and government laboratories and supports access to high-speed networks; and third, it provides access to high-performance computers for a wide variety of researchers by allowing them to use government-supported computers at universities and government laboratories.

The total estimated NITRD program budget for all agencies for Fiscal Year 2006 (FY06) is $2,838 million. The largest research and development programs are at DOD, $1106 million; NSF, $812 million; the DOE Office of Science, $282 million, and NIH, $486 million. These budget estimates do not include the procurement costs for high-performance computers purchased by agencies such as National Nuclear Security Administration (NNSA) and NOAA for computational science related to their missions. The NITRD program includes several program component areas including high-end computing (often referred to as supercomputing); large scale networking; human-computer interaction and information management; cyber security; high confidence software and systems; social, economic and workforce implications of information technology; and software design and productivity.

III. Summary of Hearings

On May 12, 2005, the Committee on Science held a hearing to examine the state of computer science research in the U.S. and the evolution of federal support for this field. Dr. John Marburger, Di-

rector of the Office of Science and Technology Policy (OSTP), spoke to the importance of the NITRD program to support advances in all areas of information technology. He agreed with the conclusion of a recent report from the President's Information Technology Advisory Committee that improved coordination was needed in the NITRD program to increase the efficiency and effectiveness of the government's investment in cyber security research. He also pointed out that the NITRD coordination office was attempting to identify important scientific questions and technical problems for which forward progress in understanding is difficult or impossible without leading edge computing capabilities. Dr. Thomson Leighton, Chief Scientist of Akamai Technologies, commented on the need for more effective priority setting to ensure the federal investment in information technology meets national needs, particularly in cyber security areas. Dr. William Wulf, President of the National Academy of Engineering, and Dr. Anthony Tether, Director of the Defense Advanced Research Projects Agency, differed on whether DARPA had moved its support away from university-based basic information technology research and on the effect of current patterns of agencies' funding on the overall health of research in this field.

On May 13, 2004, the Committee on Science held a hearing to examine the current state of federal high-performance computing research and development activities. Dr. John Marburger, Director of OSTP, released the report of OSTP's High-End Computing Revitalization Task Force, Federal Plan for High-End Computing, during his appearance before the Committee. He also endorsed H.R. 4218 (the bill on which H.R. 1068 is based) on behalf of the Administration. Dr. Marburger also released the report of OSTP's High-End Computing Revitalization Task Force, Federal Plan for High-End Computing, during his appearance before the Committee.

The other witnesses also voiced their support for the legislation. The Committee heard testimony from Dr. Irving Wladawsky-Berger, Vice President for Technology and Strategy, IBM Corporation; Dr. Daniel Reed, Director of the Renaissance Computing Institute at the University of North Carolina at Chapel Hill; and Dr. Rick Stevens, Director of the Mathematics and Computer Science Division at Argonne National Laboratory. Witnesses addressed the need for an ongoing, coordinated interagency planning process to guide federal investment in high-performance computing procurements, research, and development. The witnesses noted the importance of the federal role in high-performance computing to ensure U.S. leadership in the field, and to ensure that U.S. academic and industrial researchers have access to leadership class machines.

IV. Committee Actions

On February 15, 2007, Research and Science Education Subcommittee Chairman Brian Baird and Representative Judy Biggert introduced H.R. 1068, a bill to amend the High-Performance Computing Act of 1991 and to strengthen the U.S. position in high-performance computing.

The Full Committee on Science and Technology met on Wednesday, February 28, 2007, to consider the bill. No amendments were offered.

Mr. Hall moved that the Committee favorably report the bill, H.R. 1068, to the House with the recommendation that the bill do

pass, and that the staff be instructed to make technical and conforming changes to the bill and prepare the legislative report and that the Chairman take all necessary steps to bring the bill before the House for consideration. With a quorum present, the motion was agreed to by a voice vote.

V. Summary of Major Provisions of the Bill

• Defines "high-performance computing" as advanced computing, communications, and information technologies, including supercomputer systems, high-capacity and high-speed networks, special purpose and experimental systems, applications and systems software, and the management of large data sets.

• Updates the authorized activities of the interagency High-Performance Computing Research and Development Program. Requires the program to provide for long-term basic and applied research on high-performance computing; sustained access by the research community in the United States to high-performance computing systems; computational science and engineering research on mathematical modeling and algorithms for applications in all fields of science and engineering; and educating and training of additional undergraduate and graduate students in fields relevant to high-performance computing.

• Updates and strengthens the coordination responsibilities of the Director of the Office of Science and Technology Policy (OSTP). Requires the Director to establish the goals and priorities for Federal high-performance computing research, development, networking, and other activities and to develop and maintain a research, development, and deployment roadmap for the provision of high-performance computing systems for use by the research community in the United States.

• Requires the outside advisory committee for the NITRD program to conduct periodic evaluations of the funding, management, coordination, implementation, and activities of the program, and to report to Congress on the findings.

VI. Section-by-Section Analysis

SECTION-BY-SECTION ANALYSIS OF H.R. 1068

Sec. 1. High-Performance Computing Research and Development Program

Amends section 101 of the High-Performance Computing Act of 1991 (HPC Act), which describes the organization and responsibilities of the interagency research and development program originally referred to as the National High-Performance Computing Program—and renamed the High-Performance Computing Research and Development Program in this Act. Requires the program to:

• Provide for long-term basic and applied research on high-performance computing;

• Provide for research and development on, and demonstration of, technologies to advance the capacity and capabilities of high-performance computing and networking systems;

• Provide for sustained access by the research community in the United States to high-performance computing systems that are among the most advanced in the world in terms of per-

formance in solving scientific and engineering problems, including provision for technical support for users of such systems;

- Provide for efforts to increase software availability, productivity, capability, security, portability, and reliability;
- Provide for high-performance networks, including experimental testbed networks, to enable research and development on, and demonstration of, advanced applications enabled by such networks;
- Provide for computational science and engineering research on mathematical modeling and algorithms for applications in all fields of science and engineering;
- Provide for the technical support of, and research and development on, high-performance computing systems and software required to address Grand Challenges;
- Provide for educating and training additional undergraduate and graduate students in software engineering, computer science, computer and network security, applied mathematics, library and information science, and computational science;
- Provide for improving the security of computing and networking systems, including research required to establish security standards and practices for these systems.

Requires the Director of the Office of Science and Technology Policy (OSTP) to:

- Establish the goals and priorities for Federal high-performance computing research, development, networking, and other activities;
- Establish Program Component Areas that implement the goals established for the Program and identify the Grand Challenges that the Program should address;
- Provide for interagency coordination of Federal high-performance computing research, development, networking, and other activities undertaken pursuant to the Program;
- Develop and maintain a research, development, and deployment roadmap for the provision of high-performance computing systems for use by the research community in the United States.

Leaves substantially unchanged the provisions of the HPC Act requiring the Director of OSTP to:

- Provide an annual report to Congress, along with the annual budget request, describing the implementation of the Program, including current and proposed funding levels and programmatic changes, if any, from the previous year;
- Consult with academic, State, and other appropriate groups conducting research on and using high-performance computing.

Requires the Director of OSTP to include in his annual report to Congress:

- A detailed description of the Program Component Areas, including a description of any changes in the definition of activities under the Program Component Areas from the previous year, and the reasons for such changes, and a description of Grand Challenges supported under the Program;

- An analysis of the extent to which the Program incorporates the recommendations of the Advisory Committee established by section 101(b) of the HPC Act.

Requires the Advisory Committee to conduct periodic evaluations of the funding, management, coordination, implementation, and activities of the Program, and to report to Congress once every two fiscal years, with the first report due within one year of enactment.

Sec. 2. Definitions

Amends section 4 of the HPC Act to further elaborate on, or amend, the definition of terms used in the Act:

- "Grand Challenge" means a fundamental problem in science or engineering, with broad economic and scientific impact, whose solution will require the application of high-performance computing resources and multidisciplinary teams of researchers;
- "High-performance computing" means advanced computing, communications, and information technologies, including supercomputer systems, high-capacity and high-speed networks, special purpose and experimental systems, applications and systems software, and the management of large data sets;
- "Program" means the High-Performance Computing Research and Development Program described in section 101;
- "Program Component Areas" means the major subject areas under which are grouped related individual projects and activities carried out under the Program.

VII. Committee Views

INTERAGENCY PLANNING AND COORDINATION

The *High-Performance Computing Act of 1991* codified an interagency planning process that remains in place today. The Committee expects all of the participating agencies to engage in a forward-looking planning and coordination process led by OSTP to coordinate high-performance computing activities across the federal government. The agencies, led by OSTP, should submit a coordinated budget for federal high-performance computing activities to the Office of Management and Budget. Furthermore, the agencies, led by OSTP, should develop and periodically refine a research, development, and deployment roadmap for high-performance computing systems. In addition, in formulating plans for the Program, the Committee expects the participating agencies to take into consideration the findings and recommendations of the advisory committee established by section 101(b) of the Act, which is required to conduct recurring reviews of the planning, implementation, and contents of the Program.

ASSURING U.S. RESEARCHERS SUSTAINED ACCESS TO HIGH-PERFORMANCE COMPUTING INFRASTRUCTURE

The Committee believes that the High-Performance Computing Program, in general, and NSF and DOE's Office of Science, in particular, must provide U.S. researchers with sustained access to high-performance computers that are among the most advanced in the world in terms of performance in solving scientific and engineering problems. This is necessary in order for the U.S. to main-

tain its position as a world leader in scientific and engineering fields and in technology innovation. By "among the most advanced in the world," the Committee means general purpose scientific computing systems that would rank among the top few systems in existence in performance (1) on widely accepted standardized tests, such as the LINPACK Benchmark used to generate the Top 500 list; and (2) on actual production codes for solving the most demanding problems in science and engineering disciplines. The Committee intends that such computing systems be equivalent to "Leadership Systems" as described in the May 10, 2004 OSTP report, *Federal Plan for High-End Computing*.

Overall, the Committee believes that for the federal government to effectively meet the scientific community's high-performance computing needs, NSF and DOE's Office of Science each must support Leadership Systems which should be available for use by researchers from academia, industry, and government laboratories. By use of the phrase "sustained access" in section 101(a)(1)(C) the Committee expects NSF and DOE to develop and maintain plans and budgets to assure ongoing improvements in the capability of high-performance computing user facilities, such as the NSF supercomputer centers and DOE's Office of Science high-end (high-performance) computing user facilities, so that the computing infrastructure made available through these facilities remains among the most advanced in the world.

But the most advanced high-performance computing hardware, on its own, will not be enough to enable researchers to conduct the most advanced science. The Committee believes that the development of software, applications, networking, and data storage and management techniques, including support for the applied mathematics required to develop advanced software and algorithms, will be essential to enable researchers to make effective use of the high-performance computing resources made available under this Act.

NATIONAL INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT PROGRAM (NITRD)

The NITRD program includes eight program component areas: High End Computing Infrastructure and Applications, High End Computing Research and Development, Large Scale Networking, Software Design and Productivity, Human-Computer Interaction and Information Management, High Confidence Software and Systems, Cyber Security and Information Assurance, and Social, Economic, and Workforce Implications of Information Technology. The Committee recognizes that all program component areas are essential parts of the federal information technology research and development effort and expects the planning and coordination process for the NITRD program to result in an appropriate balance of resources among the program component areas. The committee expects the annual report for the program to provide the rationale for the allocation of funding among the program component areas. The Committee expects that the allocations for the high-end computing component areas will be sufficient to carry out the requirements of section 101(a)(1)(C) of this Act.

VIII. Cost Estimate

A cost estimate and comparison prepared by the Director of the Congressional Budget Office under section 402 of the *Congressional Budget Act of 1974* has been timely submitted to the Committee on Science and Technology prior to the filing of this report and is included in Section IX of this report pursuant to House rule XIII, clause 3(c)(3).

H.R. 1086 does not contain new budget authority, credit authority, or changes in revenues or tax expenditures. H.R. 1086 does not authorize additional discretionary spending, as described in the Congressional Budget Office report on the bill, which is contained in Section IX of this report.

IX. Congressional Budget Office Cost Estimate

March 5, 2007.

Hon. Bart Gordon,
Chairman, Committee on Science and Technology,
House of Representatives, Washington, DC.

Dear Mr. Chairman: The Congressional Budget Office has prepared the enclosed cost estimate for H.R. 1068, a bill to amend the High-Performance Computing Act of 1991.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contact is Daniel Hoople.

Sincerely,

Peter R. Orszag.

Enclosure.

H.R. 1068—A bill to amend the High-Performance Computing Act of 1991

H.R. 1068 would amend existing statutory guidelines for interagency research and development (R&D) within the National High-Performance Computing Program. The bill would realign program objectives with the current R&D priorities of individual agencies, repeal authorizations for activities that are technologically outdated, and emphasize more current issues, such as providing researchers sustained access to the most advanced computing systems in the world. In addition, the bill would direct the program's advisory committee to provide the Congress with an evaluation of program funding, management, and effectiveness at least once every two years.

Nondefense R&D on high-performance computing is conducted at six agencies: the National Science Foundation, the Department of Energy, the National Institutes of Health, the National Aeronautics and Space Administration, the Department of Commerce, and the Environmental Protection Agency. CBO expects that implementing H.R. 1068 would have no effect on individual agency requirements but would update and realign the goals of overall R&D policy as overseen by the Office of Science and Technology Policy. As such, CBO estimates that enacting H.R. 1068 would have no significant net impact on the federal budget.

H.R. 1068 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act and would impose no costs on state, local, and tribal governments.

The CBO staff contact for this estimate is Daniel Hoople. This estimate was approved by Peter H. Fontaine, Deputy Assistant Director for Budget Analysis.

X. Compliance With Public Law 104–4 (Unfunded Mandates)

H.R. 1068 contains no unfunded mandates.

XI. Committee Oversight Findings and Recommendations

The Committee on Science and Technology's oversight findings and recommendations are reflected in the body of this report.

XII. Statement on General Performance Goals and Objectives

Pursuant to clause (3)(c) of House rule XIII, the goals of H.R. 1068 are to update the activities of the interagency High-Performance Computing Program and to expand the responsibilities of OSTP and advisory committee to the Program in order to enhance the planning, management, and coordination of the Program.

XIII. Constitutional Authority Statement

Article I, section 8 of the Constitution of the United States grants Congress the authority to enact H.R. 1067.

XIV. Federal Advisory Committee Statement

The functions of the advisory committee required by H.R. 1068 could be performed by one or more agencies or by enlarging the mandate of another existing advisory committee.

XV. Congressional Accountability Act

The Committee finds that H.R. 1068 does not relate to the terms and conditions of employment or access to public services or accommodations within the meaning of section 102(b)(3) of the Congressional Accountability Act (Public Law 104–1).

XVI. Statement on Preemption of State, Local, or Tribal Law

This bill is not intended to preempt any state, local, or tribal law.

XVII. Changes in Existing Law Made by the Bill, as Reported

In compliance with clause 3(e) of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

HIGH-PERFORMANCE COMPUTING ACT OF 1991

* * * * * * *

SEC. 4. DEFINITIONS.

As used in this Act, the term—

(1) * * *

(2) "Grand Challenge" means a fundamental problem in science or engineering, with broad economic and scientific im-

pact, whose solution will require the application of high-performance computing resources *and multidisciplinary teams of researchers*;

(3) "high-performance computing" means advanced computing, communications, and information technologies, including [scientific workstations,] supercomputer systems [(including vector supercomputers and large scale parallel systems)], high-capacity and high-speed networks, special purpose and experimental systems, [and applications] *applications* and systems software*, and the management of large data sets*;

(4) "Internet" means the international computer network of both Federal and non-Federal interoperable [packet switched] data networks;

(5) "Network" means a computer network referred to as the National Research and Education Network established under section 102; [and]

(6) "Program" means the National High-Performance Computing Program described in section 101[.]*; and*

(7) "Program Component Areas" means the major subject areas under which are grouped related individual projects and activities carried out under the Program.

TITLE I—HIGH-PERFORMANCE COMPUTING [AND THE NATIONAL RESEARCH AND EDUCATION NETWORK] *RESEARCH AND DEVELOPMENT*

SEC. 101. NATIONAL HIGH-PERFORMANCE COMPUTING PROGRAM.

(a) NATIONAL HIGH-PERFORMANCE COMPUTING PROGRAM.—(1) The President shall implement a National High-Performance Computing Program, which shall—

[(A) establish the goals and priorities for Federal high-performance computing research, development, networking, and other activities; and

[(B) provide for interagency coordination of Federal high-performance computing research, development, networking, and other activities undertaken pursuant to the Program.]

(A) provide for long-term basic and applied research on high-performance computing;

(B) provide for research and development on, and demonstration of, technologies to advance the capacity and capabilities of high-performance computing and networking systems;

(C) provide for sustained access by the research community in the United States to high-performance computing systems that are among the most advanced in the world in terms of performance in solving scientific and engineering problems, including provision for technical support for users of such systems;

(D) provide for efforts to increase software availability, productivity, capability, security, portability, and reliability;

(E) provide for high-performance networks, including experimental testbed networks, to enable research and development on, and demonstration of, advanced applications enabled by such networks;

(F) provide for computational science and engineering research on mathematical modeling and algorithms for applications in all fields of science and engineering;

(G) provide for the technical support of, and research and development on, high-performance computing systems and software required to address Grand Challenges;

(H) provide for educating and training additional undergraduate and graduate students in software engineering, computer science, computer and network security, applied mathematics, library and information science, and computational science; and

(I) provide for improving the security of computing and networking systems, including Federal systems, including research required to establish security standards and practices for these systems.

[(2) The Program shall—

[(A) provide for the development of technologies to advance the capacity and capabilities of the Internet;

[(B) provide for high performance testbed networks to enable the research, development, and demonstration of advanced networking technologies and to develop and demonstrate advanced applications made possible by the existence of such testbed networks;

[(C) promote connectivity among computer networks of Federal agencies and departments;

[(D) provide for efforts to increase software availability, productivity, capability, portability, and reliability;

[(E) provide for improved dissemination of Federal agency data and electronic information;

[(F) provide for acceleration of the development of high-performance computing systems, subsystems, and associated software;

[(G) provide for the technical support and research and development of high-performance computing software and hardware needed to address Grand Challenges;

[(H) provide for educating and training additional undergraduate and graduate students in software engineering, computer science, library and information science, and computational science; and

[(I) provide—

[(i) for the security requirements, policies, and standards necessary to protect Federal research computer networks and information resources accessible through Federal research computer networks, including research required to establish security standards for high-performance computing systems and networks; and

[(ii) that agencies and departments identified in the annual report submitted under paragraph (3)(A) shall define and implement a security plan consistent with the Program and with applicable law.]

[(3)] *(2)* The Director shall—

(A) establish the goals and priorities for Federal high-performance computing research, development, networking, and other activities;

(B) establish Program Component Areas that implement the goals established under subparagraph (A), and identify the Grand Challenges that the Program should address;

(C) provide for interagency coordination of Federal high-performance computing research, development, networking, and other activities undertaken pursuant to the Program;

[(A)] *(D)* submit to the Congress an annual report, along with the President's annual budget request, describing the implementation of the Program;

[(B) provide for interagency coordination of the Program; and]

(E) develop and maintain a research, development, and deployment roadmap for the provision of high-performance computing systems under paragraph (1)(C); and

[(C)] *(F)* consult with academic, State, industry, and other appropriate groups conducting research on and using high-performance computing.

[(4)] *(3)* The annual report submitted under [paragraph (3)(A)] *paragraph (2)(D)* shall—

[(A) include a detailed description of the goals and priorities established by the President for the Program;]

(A) provide a detailed description of the Program Component Areas, including a description of any changes in the definition of or activities under the Program Component Areas from the preceding report, and the reasons for such changes, and a description of Grand Challenges supported under the Program;

* * * * * * *

(C) describe the levels of Federal funding for the fiscal year during which such report is submitted, and the levels proposed for the fiscal year with respect to which the budget submission applies, for [specific activities, including education, research, hardware and software development, and support for the establishment of the Network] *each Program Component Area*;

(D) describe the levels of Federal funding for each agency and department participating in the Program *and for each Program Component Area* for the fiscal year during which such report is submitted, and the levels proposed for the fiscal year with respect to which the budget submission applies; *and*

[(E) include the report of the Secretary of Energy required by section 203(d); and]

[(F)] *(E)* include an analysis of the progress made toward achieving the goals and priorities established for the Program *and the extent to which the Program incorporates the recommendations of the advisory committee established under subsection (b)*.

[(b) ADVISORY COMMITTEE.—The President shall establish an advisory committee on high-performance computing consisting of non-Federal members, including representatives of the research, education, and library communities, network providers, and industry, who are specially qualified to provide the Director with advice and information on high-performance computing. The recommendations of the advisory committee shall be considered in reviewing and revising the Program. The advisory committee shall provide the Director with an independent assessment of—

[(1) progress made in implementing the Program;

[(2) the need to revise the Program;

[(3) the balance between the components of the Program;

[(4) whether the research and development undertaken pursuant to the Program is helping to maintain United States leadership in computing technology; and

[(5) other issues identified by the Director.]

(b) ADVISORY COMMITTEE.—(1) The President shall establish an advisory committee on high-performance computing consisting of non-Federal members, including representatives of the research, education, and library communities, network providers, and industry, who are specially qualified to provide the Director with advice and information on high-performance computing. The recommendations of the advisory committee shall be considered in reviewing and revising the Program. The advisory committee shall provide the Director with an independent assessment of—

(A) progress made in implementing the Program;

(B) the need to revise the Program;

(C) the balance between the components of the Program, including funding levels for the Program Component Areas;

(D) whether the research and development undertaken pursuant to the Program is helping to maintain United States leadership in high-performance computing and networking technology; and

(E) other issues identified by the Director.

(2) In addition to the duties outlined in paragraph (1), the advisory committee shall conduct periodic evaluations of the funding, management, coordination, implementation, and activities of the Program, and shall report not less frequently than once every two fiscal years to the Committee on Science of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on its findings and recommendations. The first report shall be due within one year after the date of enactment of this paragraph.

(3) Section 14 of the Federal Advisory Committee Act shall not apply to the advisory committee established by this subsection.

(c) OFFICE OF MANAGEMENT AND BUDGET.—(1) Each Federal agency and department participating in the Program shall, as part of its annual request for appropriations to the Office of Management and Budget, submit a report to the Office of Management and Budget which—

(A) identifies each element of its high-performance computing activities which contributes directly to the [Program or] *Program Component Areas or* benefits from the Program; and

* * * * * * *

XVIII. COMMITTEE RECOMMENDATIONS

On February 28, 2007, a quorum being present, the Committee on Science and Technology favorably reported H.R. 1068 by a voice vote and recommended its enactment.

XIX. PROCEEDINGS OF THE FULL COMMITTEE MARKUP ON H.R. 1068, TO AMEND THE HIGH-PERFORMANCE COMPUTING ACT OF 1991

WEDNESDAY, FEBRUARY 28, 2007

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, DC.

The Committee met, pursuant to call, at 10:05 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Bart Gordon [Chairman of the Committee] presiding.

Chairman GORDON. Good morning. The Committee on Science and Technology will come to order. Pursuant to notice, the Committee on Science and Technology meets to consider the following measures: H.R. 363, *Sowing the Seeds Through Science and Engineering Research Act;* H.R. 1068, *To amend the High-Performance Computing Act of 1991;* H.R. 1126, *To reauthorize the Steel and Aluminum Energy Conservation and Technology Competitiveness Act of 1988;* and H.R. 85, the *Energy Technology Transfer.*

Today, we are here to mark up these four bipartisan bills. They are all good bills and I am happy to support them all. I want to note that all of these bills have extensive legislative histories in prior Congress. It is not my intention for this committee to regularly markup legislation that has not gone through the Subcommittee hearing process; however, as I noted before, these bills were fully vetted in the last Congress and they are ready to go.

I have said it before and I will say it again. I want this committee to be a Committee of good ideas. Here, we have four good ideas and I hope four bills everybody on this committee can get behind and support.

Now I recognize Mr. Hall to present his opening remarks.

Mr. HALL. Mr. Chairman, I thank you for calling the markup today. We have before us today, as you say, four bills that were passed by this Committee in the 109th Congress, and I look forward to their easy passage again today. The continued bipartisan support for these bills reflects their broad appeal and the fact that they are good bills and they are good for this country.

The National Academy of Science's *Rising Above the Gathering Storm* and the President's American Competitiveness Initiative have emphasized the importance of supporting high-risk research, young researchers, and research infrastructure in the U.S. to ensure that the next generation of high tech industries and products are developed in the United States.

H.R. 363 is a step in the right direction. I thank the Chairman for his willingness to work with us on improving this legislation, and recommend a yes vote for the manager's amendment and for the underlying measure.

As the Chairman has already mentioned, Mrs. Biggert has been instrumental in getting a high-performance computing bill through the Committee and the full House, for that matter, in two previous

Congresses, and I certainly applaud her and Mr. Baird for their persistence. I recommend a yes vote on H.R. 1068 and trust the Senate will follow suit when it is sent to them once again.

I am happy to see Mr. Lipinski and Mr. Ehlers continuing former Representative Hart's lead in their continuing effort to reauthorize the *Steel and Aluminum Energy Conservation and Technology Competitiveness Act of 1988.* This is another bill that has been passed twice by our committee in the full House, and I also recommend a yes vote for H.R. 1126.

I would also recommend a yes vote for Representative Biggert and Representative Miller's bill, H.R. 85, that will provide for the establishment of centers to encourage demonstration and commercial applications of advanced energy methods and technology. As I understand, they will be offering an amendment in the nature of a substitute that makes technical corrections, which I support as well.

Mr. Chairman, I look forward to these bills moving to the Floor. With that, I yield back the balance of my time.

[The prepared statement of Mr. Hall follows:]

PREPARED STATEMENT OF REPRESENTATIVE RALPH M. HALL

Mr. Chairman, thank you for calling this markup today. We have before us today four bills that were passed by this committee in the 109th Congress, and I look forward to their easy passage again today. The continued bipartisan support for these bills reflects their broad appeal and the fact that they are good bills that are good for the country.

The National Academy of Science's *Rising above the Gathering Storm* and the President's American Competitiveness Initiative (ACI) have emphasized the importance of supporting high-risk research, young researchers, and research infrastructure in the United States to ensure that the next generation of high-tech industries and products are developed in the United States. H.R. 363 is a step in the right direction. This bill authorizes programs at the National Science Foundation (NSF) and the Department of Energy (DOE) Office of Science to provide grants to researchers just starting their careers to conduct high-risk, high-return research at the cutting edge of new scientific fields. In addition, it requires NIST to report to us on their efforts to recruit and retain young scientists and engineers, and it includes our recognition that NASA should be at the table for any interagency efforts to promote innovation and economic competitiveness. I thank the Chairman for his willingness to work with us on improving this legislation and recommend a "yes" vote for the managers' amendment and for the underlying measure.

As the Chairman has already mentioned, Mrs. Biggert has been instrumental in getting this bill through the Committee, and the full House for that matter, in two previous Congresses, and I applaud her and Mr. Baird for their persistence. I recommend a "yes" vote on H.R. 1068 and trust the Senate will follow suit when it is sent to them once again.

I am happy to see Mr. Lipinski and Mr. Ehlers continuing former Representative Hart's lead in their continuing effort to reauthorize the *Steel and Aluminum Energy Conservation and Technology Competitiveness Act of 1988.* This is another bill that has been passed twice by our committee, and the full House and I also recommend a "yes" vote for H.R. 1126.

I would also recommend a "yes" vote for Rep. Biggert and Rep. Miller's bill, H.R. 85 that will provide for the establishment of centers to encourage demonstration and commercial application of advanced energy methods and technologies. I understand they will be offering an amendment in the nature of a substitute that makes technical corrections which I will support as well.

Mr. Chairman, I look forward to these bills moving to the floor and being passed. With that I yield back the balance of my time.

Chairman GORDON. Thank you, Mr. Hall.

Without objection, Members may place statements in the record.

[The prepared statement of Mr. Mitchell follows:]

PREPARED STATEMENT OF REPRESENTATIVE HARRY MITCHELL

Thank you, Mr. Chairman.

America needs innovators and leaders if it wants to remain competitive in the global economy. This is especially true when it comes to science and engineering.

Retaining scientists and engineers, however, is often difficult, because they receive such low pay early-on in their careers.

If we don't invest early in our future innovators, we will fall behind.

Spreading technological innovation across existing industry is another indispensable part of maintaining our competitiveness.

In my view, we should help businesses access both the technology and the research they need to modernize and improve their efficiency.

Industry standards can also play a role.

Today, we are considering four bills to address these issues and I look forward to working on them.

I yield back the balance of my time.

Chairman GORDON. We will now consider H.R. 1068, *To amend the High-Performance Computing Act of 1991.*

I yield to Mr. Baird for five minutes to describe his bill.

Mr. BAIRD. Mr. Chairman, I want to thank you for calling up H.R. 1068, a bill to amend the *High-Performance Computing Act of 1991,* which Congresswoman Biggert and I introduced. I want to particularly acknowledge the role that Ms. Biggert has played in working to develop the legislation over the past several years.

Indeed, as the Chair mentioned, this bill has been passed by two prior Congresses. It was led on its way by Ms. Biggert and by Lincoln Davis on our side of the aisle, and they are both to be commended for that effort.

This bill focuses on improving the way the interagency networking and information technology R&D program is planned and prioritized. The bill seeks to reverse what I would characterize as a weakening of the planning mechanism for this R&D program established by the 1991 Act.

High-performance computing technology is vital to the Nation's economic competitiveness and security, and it is important to ensure that resources are available to advance the technology are allocated to the highest priority areas, and that the activities supported are carefully coordinated among the performing agencies. To that end, the bill requires formal biennial reviews of the interagency program by its external advisory committee in order to provide advise from the research community and from the information technology industries on how to sharpen program priorities and improve program implementation. Also, the required annual progress report for the program must now include a formal response to the recommendations of the advisory committee.

H.R. 1068 calls on the agencies carrying out the program to focus more effort on high-end computing. The key requirement is for the Office of Science and Technology Policy to develop and maintain a road map for developing and deploying high-end systems necessary to ensure that the U.S. research community has sustained access to the most capable computing systems. This requirement is consistent with the recommendation of the President's Information Technology Advisory Committee to ensure the research community has access to the most powerful computing systems.

Finally, the bill clarifies the grand challenge problems supported under the interagency program that are intended to involve multidisciplinary teams of researchers working on science and engineering problems that demand the most capable high-performance computing and networking resources.

Consistent with this requirement, the bill also specifies the provisions for access to high-end computing systems includes technical support to users of these systems.

Mr. Chairman, the interagency research program launched by the 1991 Act has been largely a success. The program has made a substantial contribution to moving computation to an equal place alongside theory and experiment as the principle tools for conducting science and engineering research, and it has helped provide the computing and networking infrastructure required to support leading edge research and to drive information technology forward for the benefit of society at large.

H.R. 1068 will strive to—will serve to strengthen the research program and deserves the approval of the Committee. In a nutshell, my colleagues, what we are doing is making sure America stays first in this critical endeavor.

I ask my colleagues to support in reporting the bill favorably to the House.

I thank the Chairman.

[The prepared statement of Mr. Baird follows:]

PREPARED STATEMENT OF REPRESENTATIVE BRIAN BAIRD

Mr. Chairman, I want to thank you for calling up H.R. 1068, a bill to amend the *High-Performance Computing Act of 1991,* which Congresswoman Biggert and I introduced. I want particularly to acknowledge the role Mrs. Biggert has played in working to develop this legislation over the past several years. This bill is based on a bill introduced by Congresswoman Biggert and Congressman Lincoln Davis during the past two Congresses, both of which passed the House.

This bill focuses on improving the way the interagency Networking and Information Technology R&D program is planned and prioritized. The bill seeks to reverse what I would characterize as a weakening of the planning mechanisms for this R&D program established by the 1991 Act.

High-performance computing and communications technology is vital to the Nation's economic competitiveness and security, and it is important to ensure that the resources available to advance the technology are allocated to the highest priority areas and that the activities supported are carefully coordinated among the performing agencies.

To that end, the bill requires formal biennial reviews of the interagency program by its external advisory committee in order to provide advice from the research community and from the information technology industries on how to sharpen program priorities and improve program implementation. Also, the required annual progress report for the program must now include a formal response to the recommendations of the advisory committee.

H.R. 1068 calls on the agencies carrying out the program to focus more effort on high-end computing. The key requirement is for the Office of Science and Technology Policy to develop and maintain a roadmap for developing and deploying high-end systems necessary to ensure that the U.S. research community has sustained access to the most capable computing systems. This requirement is consistent with the recommendation of the President's Information Technology Advisory Committee to ensure the research community has access to the most powerful computing systems.

Finally, the bill clarifies that Grand Challenge problems supported under the interagency program are intended to involve multi-disciplinary teams of researchers working on science and engineering problems that demand the most capable high-performance computing and networking resources. Consistent with this requirement, the bill also specifies that provision for access to high-end computing systems includes technical support to users of these systems.

Mr. Chairman, the interagency research program launched by the 1991 Act has been largely a success. The program has made a substantial contribution to moving computation to an equal place along side theory and experiment as the principal tools for conducting science and engineering research. And it has helped provide the computing and networking infrastructure required to support leading edge research and to drive information technology forward for the benefit of society at large.

H.R. 1068 will serve to strengthen the research program and deserves the approval of the Committee. I ask my colleagues for their support in reporting the bill favorably to the House.

Chairman GORDON. Thank you, Mr. Baird.

I recognize Mr. Hall to present any remarks on the bill.

Mr. HALL. Mr. Chairman, when we pass this bill and prior to the time of going in to 1126, I am going to ask unanimous consent that Mr. McCaul be authorized to put a statement into the record and make whatever statements that he wants to make.

At this time, I yield my time to Mrs. Biggert.

Ms. BIGGERT. Thank you, Ranking Member Hall, for yielding me the time, and thank you, Mr. Chairman.

As Yogi Berra said, it is like déjà vu all over again, and we bring this bill back from several Congresses.

Unfortunately in the past, our friends on the other side of the Capitol, Congress after Congress, have come up with jurisdictional excuses for why they haven't even considered this legislation. That was endorsed by the President's science advisor, Dr. Marburger, some time ago, and that is a real shame.

When I first introduced the first *High-Performance Computing Revitalization Act* in April 2004, a new Japanese computer, the Earth simulator, was the fastest supercomputer in the world, a title that it held for well over two years, from June of 2002 to November of 2004. Some experts claimed that Japan was able to produce a computer far ahead of American machines because the U.S. had taken an overly cautious or conventional approach to computing R&D. In hindsight, we see that caution meant many lost opportunities.

Granted, a lot has changed since November of 2004. The U.S. is now home not only to the fastest supercomputer—we do not like to be behind, do we—in the world, not only that, but seven of the ten fastest computers, thanks to the hard work and competitive spirit of people at IBM, Cray, and Silicon Graphics, as well as at the Department of Energy and NSF.

But we have to remain vigilant if we are to retain leadership in the development and use of supercomputers, as confirmed by reports on the Council on Competitiveness and the President's Information Technology Advisory Committee, supercomputers are central to maintaining U.S. leadership in many scientific fields and have many applications, from pharmaceuticals and climate to the national and homeland security, and that is why the bill that we are considering today is so important.

I am honored to be working with the Chairman of the Research and Science Education Subcommittee, Mr. Baird, on this straightforward, common sense legislation, and I am hoping that the third time is the charm. I have good reason to be hopeful, as Mr. Gordon and Mr. Baird have already indicated. We made changes in the bill, changes that would prevent our colleagues in the Senate from offering up jurisdictional excuses for not moving it.

So I just want to say that this bill will provide researchers in the United States with the computing resources they need to remain world class. Our nation's scientific enterprise and our economy will be stronger for it. I urge my colleagues to support H.R. 1068.

I yield back the balance of my time.

[The prepared statement of Ms. Biggert follows:]

PREPARED STATEMENT OF REPRESENTATIVE JUDY BIGGERT

Thank you, Mr. Chairman, and thank you Ranking Member Hall for yielding me the time.

As Yogi Bera said, "it's like déjà vu, all over again." In both the 108th and 109th Congresses, I introduced legislation that would do exactly the same things as the bill we are considering today, H.R. 1068. Both bills were approved not only by the Science Committee, but by the full House of Representatives as well.

Unfortunately, our friends on the other side of the Capitol, Congress after Congress, have come up with jurisdictional excuses for why they haven't even considered this legislation that was endorsed by the President's Science Advisor, Dr. Marburger, some time ago. And that's a real shame.

When I introduced the first *High-Performance Computing Revitalization Act* in April of 2004, a new Japanese Supercomputer, the Earth Simulator, was the fastest supercomputer in the world, a title it held for well over two years—from June 2002 through November of 2004. Some experts claim that Japan was able to produce a computer far ahead of American machines because the U.S. had taken an overly cautious or conventional approach to computing R&D. In hindsight, we see that caution meant lost opportunities.

Granted, a lot has changed since November of 2004. The U.S. is now home to not only the fastest supercomputer in the world, but seven of the ten fastest, thanks to the hard work and competitive spirit of people at IBM, Cray, and Silicon Graphics Inc., as well as at the Department of Energy and NSF.

But we must remain vigilant if we are to retain leadership in the development and use of supercomputers. As confirmed by reports of the Council on Competitiveness and the President's Information Technology Advisory Committee, supercomputers are central to maintaining U.S. leadership in many scientific fields, and have many applications, from pharmaceuticals and climate to national and homeland security. That's why the bill we are considering today is so important.

Designed to ensure U.S. preeminence and competitiveness in computational science, this bill commits the Federal Government to:

- Providing the research community with sustained access to the highest-end supercomputers,
- Supporting all aspects of high-performance computing, including software development and data management, for scientific and engineering applications, and
- Developing and maintaining a road map for computational science and the fields that require it.

I'm honored to be working with the Chairman of the Research and Science Education Subcommittee, Mr. Baird, on this straightforward, common-sense legislation. I'm hoping the third time's the charm. And I have good reason to be hopeful. As Mr. Baird and Chairman Gordon have already indicated, we made changes in this bill—changes that should prevent our colleagues in the Senate from offering up jurisdictional excuses for not moving it.

In closing, I just want to say that this bill will provide researchers in the United States with the computing resources they need to remain world-class. Our nation's scientific enterprise and our economy will be stronger for it. I urge my colleagues to support H.R. 1068, and I yield back the balance of my time.

Chairman GORDON. Thank you, Ms. Biggert.

Does anyone else wish to be recognized?

I ask unanimous consent that this bill is considered as read and open to amendment at any point, and that the Members proceed with the amendments in order of the roster. Without objection, so ordered.

Are there any amendments?

Hearing none, the vote is on the bill, H.R. 1068. All those in favor will say aye. All those opposed, say no. In the opinion of the Chair, the ayes have it.

I recognize Mr. Hall to offer a motion.

Mr. HALL. Mr. Chairman, I move that the Committee favorably report H.R. 1068 to the House, with recommendation that the bill do pass.

Furthermore, I move that the staff be instructed to prepare the legislative report and make necessary technical and conforming

changes, and that the Chairman take all necessary steps to bring the bill before the House for consideration.

I yield back.

Chairman GORDON. The question is on the motion to report the bill favorably. Those in favor of the motion will signify by saying aye. Opposed, no. The ayes have it. The bill is favorably reported.

Without objection, the motion to reconsider is laid upon the table. I move that Members have two subsequent calendar days in which to submit supplemental, minority or additional views on the measure. I move pursuant to Clause I of Rule 22 of the Rules of the House of Representatives that the Committee authorize the Chairman to offer such motions as may be necessary in the House to adopt and pass H.R. 1068, *To amend the High-Performance Computing Act of 1991.* Without objection, so ordered.

Let me finally say that these amendments—and I thank all of you for a smooth hearing, smooth markup. We went fairly quick today, but the reason is there was a lot of staff work put in before this, and I thank the staff for that. I thank the Members for their patience, and this is the conclusion of our Committee markup.

[Whereupon, at 11:08 a.m., the Committee was adjourned.]

Appendix:

H.R. 1068, Section-by-Section Summary

I

110TH CONGRESS
1ST SESSION

H. R. 1068

To amend the High-Performance Computing Act of 1991.

IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 15, 2007

Mr. BAIRD (for himself and Mrs. BIGGERT) introduced the following bill; which was referred to the Committee on Science and Technology

---

A BILL

To amend the High-Performance Computing Act of 1991.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. HIGH-PERFORMANCE COMPUTING RESEARCH AND DEVELOPMENT PROGRAM.

Title I of the High-Performance Computing Act of 1991 (15 U.S.C. 5511 et seq.) is amended—

(1) in the title heading, by striking "**AND THE NATIONAL RESEARCH AND EDUCATION NETWORK**" and inserting "**RESEARCH AND DEVELOPMENT**";

(2) in section 101(a)—

(A) by striking subparagraphs (A) and (B) of paragraph (1) and inserting the following:

"(A) provide for long-term basic and applied research on high-performance computing;

"(B) provide for research and development on, and demonstration of, technologies to advance the capacity and capabilities of high-performance computing and networking systems;

"(C) provide for sustained access by the research community in the United States to high-performance computing systems that are among the most advanced in the world in terms of performance in solving scientific and engineering problems, including provision for technical support for users of such systems;

"(D) provide for efforts to increase software availability, productivity, capability, security, portability, and reliability;

"(E) provide for high-performance networks, including experimental testbed networks, to enable research and development on, and demonstration of, advanced applications enabled by such networks;

"(F) provide for computational science and engineering research on mathematical modeling and al-

gorithms for applications in all fields of science and engineering;

"(G) provide for the technical support of, and research and development on, high-performance computing systems and software required to address Grand Challenges;

"(H) provide for educating and training additional undergraduate and graduate students in software engineering, computer science, computer and network security, applied mathematics, library and information science, and computational science; and

"(I) provide for improving the security of computing and networking systems, including Federal systems, including research required to establish security standards and practices for these systems.";

(B) by striking paragraph (2) and redesignating paragraphs (3) and (4) as paragraphs (2) and (3), respectively;

(C) in paragraph (2), as so redesignated by subparagraph (B) of this paragraph—

(i) by striking subparagraph (B);

(ii) by redesignating subparagraphs (A) and (C) as subparagraphs (D) and (F), respectively;

(iii) by inserting before subparagraph (D), as so redesignated by clause (ii) of this subparagraph, the following new subparagraphs:

"(A) establish the goals and priorities for Federal high-performance computing research, development, networking, and other activities;

"(B) establish Program Component Areas that implement the goals established under subparagraph (A), and identify the Grand Challenges that the Program should address;

"(C) provide for interagency coordination of Federal high-performance computing research, development, networking, and other activities undertaken pursuant to the Program;"; and

(iv) by inserting after subparagraph (D), as so redesignated by clause (ii) of this subparagraph, the following new subparagraph:

"(E) develop and maintain a research, development, and deployment roadmap for the provision of high-performance computing systems under paragraph (1)(C); and"; and

(D) in paragraph (3), as so redesignated by subparagraph (B) of this paragraph—

(i) by striking "paragraph (3)(A)" and inserting "paragraph (2)(D)";

(ii) by amending subparagraph (A) to read as follows:

"(A) provide a detailed description of the Program Component Areas, including a description of any changes in the definition of or activities under the Program Component Areas from the preceding report, and the reasons for such changes, and a description of Grand Challenges supported under the Program;";

(iii) in subparagraph (C), by striking "specific activities" and all that follows through "the Network" and inserting "each Program Component Area";

(iv) in subparagraph (D), by inserting "and for each Program Component Area" after "participating in the Program";

(v) in subparagraph (D), by striking "applies;" and inserting "applies; and";

(vi) by striking subparagraph (E) and redesignating subparagraph (F) as subparagraph (E); and

(vii) in subparagraph (E), as so redesignated by clause (vi) of this subpara-

graph, by inserting "and the extent to which the Program incorporates the recommendations of the advisory committee established under subsection (b)" after "for the Program";

(3) by striking subsection (b) and inserting the following:

"(b) ADVISORY COMMITTEE.—(1) The President shall establish an advisory committee on high-performance computing consisting of non-Federal members, including representatives of the research, education, and library communities, network providers, and industry, who are specially qualified to provide the Director with advice and information on high-performance computing. The recommendations of the advisory committee shall be considered in reviewing and revising the Program. The advisory committee shall provide the Director with an independent assessment of—

"(A) progress made in implementing the Program;

"(B) the need to revise the Program;

"(C) the balance between the components of the Program, including funding levels for the Program Component Areas;

"(D) whether the research and development undertaken pursuant to the Program is helping to maintain United States leadership in high-performance computing and networking technology; and

"(E) other issues identified by the Director.

"(2) In addition to the duties outlined in paragraph (1), the advisory committee shall conduct periodic evaluations of the funding, management, coordination, implementation, and activities of the Program, and shall report not less frequently than once every two fiscal years to the Committee on Science of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on its findings and recommendations. The first report shall be due within one year after the date of enactment of this paragraph.

"(3) Section 14 of the Federal Advisory Committee Act shall not apply to the advisory committee established by this subsection."; and

(4) in subsection (c)(1)(A), by striking "Program or" and inserting "Program Component Areas or".

SEC. 2. DEFINITIONS.

Section 4 of the High-Performance Computing Act of 1991 (15 U.S.C. 5503) is amended—

(1) in paragraph (2), by inserting "and multidisciplinary teams of researchers" after "high-performance computing resources";

(2) in paragraph (3)—

(A) by striking "scientific workstations,";

(B) by striking "(including vector supercomputers and large scale parallel systems)";

(C) by striking "and applications" and inserting "applications"; and

(D) by inserting ", and the management of large data sets" after "systems software";

(3) in paragraph (4), by striking "packet switched";

(4) by striking "and" at the end of paragraph (5);

(5) by striking the period at the end of paragraph (6) and inserting "; and"; and

(6) by adding at the end the following new paragraph:

"(7) 'Program Component Areas' means the major subject areas under which are grouped related individual projects and activities carried out under the Program.".

○

SECTION-BY-SECTION SUMMARY OF H.R. 1068

Sec. 1. High-Performance Computing Research and Development Program

Amends section 101 of the *High-Performance Computing Act of 1991* (HPC Act), which describes the organization and responsibilities of the interagency research and development program originally referred to as the National High-Performance Computing Program—and renamed the High-Performance Computing Research and Development Program in this Act. Requires the program to:

- Provide for long-term basic and applied research on high-performance computing;
- Provide for research and development on, and demonstration of, technologies to advance the capacity and capabilities of high-performance computing and networking systems;
- Provide for sustained access by the research community in the United States to high-performance computing systems that are among the most advanced in the world in terms of performance in solving scientific and engineering problems, including provision for technical support for users of such systems;
- Provide for efforts to increase software availability, productivity, capability, security, portability, and reliability;
- Provide for high-performance networks, including experimental testbed networks, to enable research and development on, and demonstration of, advanced applications enabled by such networks;
- Provide for computational science and engineering research on mathematical modeling and algorithms for applications in all fields of science and engineering;
- Provide for the technical support of, and research and development on, high-performance computing systems and software required to address Grand Challenges;
- Provide for educating and training additional undergraduate and graduate students in software engineering, computer science, computer and network security, applied mathematics, library and information science, and computational science;
- Provide for improving the security of computing and networking systems, including research required to establish security standards and practices for these systems.

Requires the Director of the Office of Science and Technology Policy (OSTP) to:

- Establish the goals and priorities for federal high-performance computing research, development, networking, and other activities;
- Establish Program Component Areas that implement the goals established for the Program and identify the Grand Challenges that the Program should address;
- Provide for interagency coordination of federal high-performance computing research, development, networking, and other activities undertaken pursuant to the Program;
- Develop and maintain a research, development, and deployment roadmap for the provision of high-performance computing systems for use by the research community in the United States.

Leaves substantially unchanged the provisions of the HPC Act requiring the Director of OSTP to:

- Provide an annual report to Congress, along with the annual budget request, describing the implementation of the Program, including current and proposed funding levels and programmatic changes, if any, from the previous year;
- Consult with academic, State, and other appropriate groups conducting research on and using high-performance computing.

Requires the Director of OSTP to include in his annual report to Congress:

- A detailed description of the Program Component Areas, including a description of any changes in the definition of activities under the Program Component Areas from the previous year, and the reasons for such changes, and a description of Grand Challenges supported under the Program;

- An analysis of the extent to which the Program incorporates the recommendations of the Advisory Committee established by section 101(b) of the HPC Act.

Requires the Advisory Committee to conduct periodic evaluations of the funding, management, coordination, implementation, and activities of the Program, and to report to Congress once every two fiscal years, with the first report due within one year of enactment.

Sec. 2. Definitions

Amends section 4 of the HPC Act to further elaborate on, or amend, the definition of terms used in the Act:

- "Grand Challenge" means a fundamental problem in science or engineering, with broad economic and scientific impact, whose solution will require the application of high-performance computing resources and multi-disciplinary teams of researchers;
- "High-performance computing" means advanced computing, communications, and information technologies, including supercomputer systems, high-capacity and high-speed networks, special purpose and experimental systems, applications and systems software, and the management of large data sets;
- "Program" means the High-Performance Computing Research and Development Program described in section 101;
- "Program Component Areas" means the major subject areas under which are grouped related individual projects and activities carried out under the Program.