

108TH CONGRESS  
2D SESSION

# H. R. 4516

To require the Secretary of Energy to carry out a program of research and development to advance high-end computing.

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IN THE HOUSE OF REPRESENTATIVES

JUNE 4, 2004

Mrs. BIGGERT (for herself and Mr. DAVIS of Tennessee) introduced the following bill; which was referred to the Committee on Science

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## A BILL

To require the Secretary of Energy to carry out a program of research and development to advance high-end computing.

1        *Be it enacted by the Senate and House of Representa-*  
2        *tives of the United States of America in Congress assembled,*

3        **SECTION 1. SHORT TITLE.**

4        This Act may be cited as the “Department of Energy  
5        High-End Computing Revitalization Act of 2004”.

6        **SEC. 2. FINDINGS.**

7        Congress finds that—

8                (1) high-end computing is a critical component  
9        of the scientific advances, defense capabilities, and

1 commercial competitiveness of the United States in  
2 the 21st Century;

3 (2) with the deployment of the Earth System  
4 Simulator in Japan, the United States no longer has  
5 a clear lead in high-end computing worldwide;

6 (3)(A) promising new architectures should be  
7 developed that increase memory and network band-  
8 width, minimize latency, and coordinate the architec-  
9 tures' various components to maximize application  
10 performance; and

11 (B) it is recognized that different architectures  
12 may be better suited to different applications;

13 (4)(A) software that improves efficiency on and  
14 accessibility to high-end systems should be devel-  
15 oped; and

16 (B) this development effort should include re-  
17 search in optimal algorithms, programming environ-  
18 ments, tools, languages, and operating systems for  
19 high-end computing in collaboration with architec-  
20 ture development efforts;

21 (5) without government support, market forces  
22 are unlikely to drive sufficient innovation in high-  
23 end computing because the private sector would not  
24 capture the full value of its innovations on a short  
25 enough time frame; and

1           (6) having played an important role in the de-  
2           velopment of high-end computing, networking, and  
3           information technology, the Department of Energy,  
4           and the research programs of the Office of Science  
5           of the Department of Energy, are particularly quali-  
6           fied to lead research in those fields.

7 **SEC. 3. DEFINITIONS.**

8           For purposes of this Act:

9           (1) **HIGH-END COMPUTING SYSTEM.**—The term  
10          “high-end computing system” means a computing  
11          system with performance that substantially exceeds  
12          systems that are commonly available for advanced  
13          scientific and engineering applications.

14          (2) **LEADERSHIP SYSTEM.**—The term “Leader-  
15          ship System” means a high-end computing system  
16          that is among the most advanced in the world in  
17          terms of performance in solving scientific and engi-  
18          neering problems.

19          (3) **INSTITUTION OF HIGHER EDUCATION.**—The  
20          term “institution of higher education” has the  
21          meaning given the term in section 101(a) of the  
22          Higher Education Act of 1965 (20 U.S.C. 1001(a)).

23          (4) **SECRETARY.**—The term “Secretary” means  
24          the Secretary of Energy.

1 **SEC. 4. DEPARTMENT OF ENERGY HIGH-END COMPUTING**  
2 **RESEARCH AND DEVELOPMENT PROGRAM.**

3 (a) IN GENERAL.—The Secretary, acting through the  
4 Director of the Office of Science, shall carry out a pro-  
5 gram of research and development (involving software and  
6 hardware) to advance high-end computing systems, and  
7 shall develop and deploy such systems for advanced sci-  
8 entific and engineering applications.

9 (b) PROGRAM.—The program shall—

10 (1) support both individual investigators and  
11 multidisciplinary teams of investigators;

12 (2) conduct research in multiple architectures,  
13 which may include vector, reconfigurable logic,  
14 streaming, processor-in-memory, and multithreading  
15 architectures;

16 (3) conduct research in software development  
17 on optimal algorithms, programming environments,  
18 tools, languages, and operating systems for high-end  
19 computing systems, in collaboration with architec-  
20 ture development efforts;

21 (4) provide for sustained access by the research  
22 community in the United States to high-end com-  
23 puting systems and to Leadership Systems, includ-  
24 ing provision for technical support for users of such  
25 systems;

1           (5) support technology transfer to the private  
2           sector and others in accordance with applicable law;  
3           and

4           (6) ensure that the high-end computing activi-  
5           ties of the Department of Energy are coordinated  
6           with relevant activities in industry and with other  
7           Federal agencies, including the National Nuclear Se-  
8           curity Administration, the National Science Founda-  
9           tion, the Defense Advanced Research Projects Agen-  
10          cy, the National Security Agency, the National Insti-  
11          tutes of Health, the National Aeronautics and Space  
12          Administration, the National Oceanic and Atmos-  
13          pheric Administration, the National Institute of  
14          Standards and Technology, and the Environmental  
15          Protection Agency.

16          (c) LEADERSHIP SYSTEMS FACILITIES.—

17           (1) IN GENERAL.—As part of the program car-  
18           ried out under this Act, the Secretary, acting  
19           through the Director of the Office of Science, shall  
20           establish and operate Leadership Systems facilities  
21           to—

22           (A) conduct advanced scientific and engi-  
23           neering research and development using Lead-  
24           ership Systems; and

1           (B) develop potential advancements in  
2           high-end computing system hardware and soft-  
3           ware.

4           (2) ADMINISTRATION.—In carrying out this  
5           subsection, the Secretary, acting through the Direc-  
6           tor of the Office of Science, shall provide access to  
7           Leadership Systems on a competitive, merit-reviewed  
8           basis to researchers in United States industry, insti-  
9           tutions of higher education, national laboratories,  
10          and other Federal agencies.

11 **SEC. 5. AUTHORIZATION OF APPROPRIATIONS.**

12          In addition to amounts otherwise made available for  
13 high-end computing, there are authorized to be appro-  
14 priated to the Secretary to carry out this Act—

15          (a) \$50,000,000 for fiscal year 2005;

16          (b) \$55,000,000 for fiscal year 2006; and

17          (c) \$60,000,000 for fiscal year 2007.

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