

# Union Calendar No. 306

107TH CONGRESS  
2D SESSION

# H. R. 3400

**[Report No. 107-511]**

To amend the High-Performance Computing Act of 1991 to authorize appropriations for fiscal years 2003 through 2007 for the coordinated Federal program on networking and information technology research and development, and for other purposes.

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## IN THE HOUSE OF REPRESENTATIVES

DECEMBER 4, 2001

Mr. SMITH of Michigan (for himself, Ms. EDDIE BERNICE JOHNSON of Texas, Mr. BOEHLERT, and Mr. HALL of Texas) introduced the following bill; which was referred to the Committee on Science

JUNE 18, 2002

Additional sponsor: Mr. FORBES

JUNE 18, 2002

Reported with an amendment, committed to the Committee of the Whole House on the State of the Union, and ordered to be printed

[Strike out all after the enacting clause and insert the part printed in italic]

[For text of introduced bill, see copy of bill as introduced on December 4, 2001]

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## A BILL

To amend the High-Performance Computing Act of 1991 to authorize appropriations for fiscal years 2003 through 2007 for the coordinated Federal program on networking and information technology research and development, and for other purposes.

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 “Networking and Infor-*  
5   *mation Technology Research Advancement Act”.*

6   **SEC. 2. FINDINGS.**

7       *The Congress makes the following findings:*

8           *(1) Information technology is an enabling tech-*  
9   *nology that contributes to other scientific disciplines.*  
10   *Advances in nanotechnology, bioinformatics, intel-*  
11   *ligent networks, wireless networking, robotics, artifi-*  
12   *cial intelligence, and other fields depend on further*  
13   *advances in information technology research and de-*  
14   *velopment. In turn, advances in networking and in-*  
15   *formation technology depend on research in a wide*  
16   *range of fields, such as computer science and engi-*  
17   *neering, mathematics, and many others, and in the*  
18   *development of electronic components such as semi-*  
19   *conductors and fiber optics that are faster, denser,*  
20   *and cheaper. Research in fields such as materials*  
21   *sciences, physics, chemistry, and photonics lays the*  
22   *foundation for building these advanced components.*

23           *(2) Federal investment in information tech-*  
24   *nology research and development over the past 50*  
25   *years has led to technological innovations that have*

1       *transformed our society and stimulated economic*  
2       *growth.*

3           *(3) A 1999 report from the President's Informa-*  
4       *tion Technology Advisory Committee entitled "Infor-*  
5       *mation Technology Research: Investing in Our Fu-*  
6       *ture" states that—*

7           *(A) Federal support for research in infor-*  
8       *mation technology is inadequate;*

9           *(B) Federal investment in information tech-*  
10       *nology research and development should give a*  
11       *higher priority to long-term, basic research; and*

12           *(C) Federal information technology research*  
13       *management should develop a long-term and co-*  
14       *herent strategy for sustained attention to na-*  
15       *tional goals.*

16           *(4) Long-term, basic research is necessary to cre-*  
17       *ate technological breakthroughs in information tech-*  
18       *nology. The Federal Government is uniquely posi-*  
19       *tioned to support long-term fundamental research.*

20           *(5) Advances in networking and information*  
21       *technology have permeated and dramatically im-*  
22       *proved product design and development processes,*  
23       *production efficiency, and distribution systems of a*  
24       *wide range of manufacturing and other industries.*  
25       *From the aeronautical and automotive industries to*

1       *farming, advances in networking and information*  
2       *technology have allowed United States industry to*  
3       *compete more effectively and better utilize limited re-*  
4       *sources through improved quality control and other*  
5       *means. Therefore, research in networking and infor-*  
6       *mation technology that advances the field also ad-*  
7       *vances productivity and economic growth for the*  
8       *United States economy.*

9           *(6) Information technology encompasses ways to*  
10       *develop, store and retrieve, organize and use, make*  
11       *sense of, compute, and communicate information to*  
12       *further a number of societal goals, including increas-*  
13       *ing economic growth through product development*  
14       *and increased efficiency of services and manufac-*  
15       *turing, advancing scientific research, and education.*

16 **SEC. 3. DEFINITIONS.**

17       *Section 4 of the High-Performance Computing Act of*  
18       *1991 (15 U.S.C. 5503) is amended—*

19           *(1) in paragraph (3)—*

20           *(A) by striking “high-performance com-*  
21       *puting” and inserting “networking and informa-*  
22       *tion technology”; and*

23           *(B) by striking “(including vector super-*  
24       *computers and large scale parallel systems)”;*

3 (3) by striking paragraphs (5) and (6); and

4 (4) by adding at the end the following new para-  
5 graphs:

6                   “(5) ‘Program’ means the Networking and Infor-  
7                   mation Technology Research and Development Pro-  
8                   gram described in section 101; and

9                   “(6) ‘Program Component Areas’ means the  
10                   major subject areas under which are grouped related  
11                   individual projects and activities carried out under  
12                   the Program and which are developed according to  
13                   section 101(a)(3)(B) and identified in the annual re-  
14                   port required under section 101(a)(3)(A).”.

15 SEC. 4. NETWORKING AND INFORMATION TECHNOLOGY RE-

## **SEARCH AND DEVELOPMENT PROGRAM.**

17        (a) AMENDMENTS.—Section 101 of the High-Perform-  
18 ance Computing Act of 1991 (15 U.S.C. 5511) is  
19 amended—

20 (1) in the section heading, by striking “**NA-**  
21 **TIONAL HIGH-PERFORMANCE COMPUTING**” and  
22 inserting “**NETWORKING AND INFORMATION**  
23 **TECHNOLOGY RESEARCH AND DEVELOPMENT**”;

(2) by striking “high-performance computing”  
each place it appears other than in subsection

1       (a)(2)(F) and inserting “networking and information  
2       technology”;

3               (3) in the subsection heading of subsection (a),  
4       by striking “NATIONAL HIGH-PERFORMANCE COM-  
5       PUTING” and inserting “NETWORKING AND INFORMA-  
6       TION TECHNOLOGY RESEARCH AND DEVELOPMENT”;

7               (4) in subsection (a)—

8                       (A) by striking “National High-Perform-  
9       ance Computing” and inserting “Networking  
10       and Information Technology Research and De-  
11       velopment”;

12                       (B) in paragraph (1)—

13                               (i) by striking “and” at the end of sub-  
14       paragraph (A);

15                               (ii) by redesignating subparagraph (B)  
16       as subparagraph (C); and

17                               (iii) by inserting after subparagraph  
18       (A) the following new subparagraph:

19                               “(B) establish Program Component Areas that  
20       implement the goals established under subparagraph  
21       (A); and”;

22                               (C) by striking “and” at the end of para-  
23       graph (2)(H);

24                               (D) by striking subparagraph (I) of para-  
25       graph (2) and inserting the following:

1           “(I) provide for improving the security of  
2 networked information systems, including research re-  
3 quired to establish security standards and practices  
4 for computing systems and networks; and

5           “(J) provide for long-term basic research on net-  
6 working and information technology, with priority  
7 given to research that helps address issues related  
8 to—

9           “(i) high end computing and software;  
10           “(ii) network stability, fragility, reliability,  
11           security (including privacy), and scalability;  
12           and

13           “(iii) the social and economic consequences  
14           of information technology.”;

15           (E) in subparagraph (B) of paragraph (3),  
16           by inserting “, including establishing the process  
17           by which Program Component Areas are de-  
18           fined” after “of the Program”;

19           (F) by amending subparagraph (A) of  
20           paragraph (4) to read as follows:

21           “(A) provide a detailed description of the Pro-  
22           gram Component Areas, including—

23           “(i) a description of any changes in the  
24           Program Component Areas from the preceding  
25           report and the reasons for such changes; and

1                   “(ii) a description of activities within each  
2                   Program Component Area that contribute to the  
3                   improvement of the security of networked infor-  
4                   mation systems;”;

5                   (G) in paragraph (4)(C), by striking “spe-  
6                   cific activities” and all that follows through “the  
7                   Network” and inserting “each Program Compo-  
8                   nent Area”;

9                   (H) in paragraph (4)(D), by inserting “for  
10                   each Program Component Area and for all ac-  
11                   tivities that contribute to the improvement of the  
12                   security of networked information systems” after  
13                   “budget submission applies”; and

14                   (I) in paragraph (4)(F), by inserting “,  
15                   and the extent to which the Program incor-  
16                   porates the recommendations of the Advisory  
17                   Committee established under subsection (b)” after  
18                   “for the Program”;

19                   (5) in subsection (b)—

20                   (A) by redesignating paragraphs (1)  
21                   through (5) as subparagraphs (A) through (E),  
22                   respectively;

23                   (B) by inserting “(1)” after “ADVISORY  
24                   COMMITTEE.—”;

10       “(2) *In addition to the duties outlined in paragraph*  
11 *(1), the advisory committee shall conduct periodic evalua-*  
12 *tions of the funding, management, coordination, implemen-*  
13 *tation, and activities of the Program, and shall report not*  
14 *less frequently than once every two fiscal years to the Com-*  
15 *mittee on Science of the House of Representatives and the*  
16 *Committee on Commerce, Science, and Transportation of*  
17 *the Senate on its findings and recommendations. The first*  
18 *report shall be due within one year after the date of the*  
19 *enactment of this paragraph.”; and*

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

22 (b) *REPEALS*.—Sections 102 and 103 of the High-Per-  
23 formance Computing Act of 1991 (15 U.S.C. 5512 and  
24 5513) are repealed.

1        (c) CONFORMING AMENDMENT.—The heading of title  
2 *I* of the High-Performance Computing Act of 1991 is  
3 amended to read as follows:

4     **“TITLE I—NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND**  
5     **DEVELOPMENT PROGRAM”.**

## 7 SEC. 5. AGENCY ACTIVITIES.

8       (a) NATIONAL SCIENCE FOUNDATION ACTIVITIES.—  
9   Section 201 of the High-Performance Computing Act of  
10 1991 (15 U.S.C. 5521) is amended to read as follows:

## 11 "SEC. 201. NATIONAL SCIENCE FOUNDATION ACTIVITIES.

12       “(a) *GENERAL RESPONSIBILITIES.*—As part of the  
13 Program described in title I, the National Science Founda-  
14 tion shall—

15                   “(1) generate fundamental scientific and tech-  
16                   nical knowledge with the potential of advancing net-  
17                   working and information technology and its applica-  
18                   tions; and

19 “(2) provide computing and networking infra-  
20 structure support for all science and engineering dis-  
21 ciplines, and support basic research and human re-  
22 source development in all aspects of networking and  
23 information technology and advanced high speed com-  
24 puter networking.

1       “(b) *AUTHORIZATION OF APPROPRIATIONS.*—From  
2    *sums otherwise authorized to be appropriated, there are au-*  
3    *thorized to be appropriated to the National Science Foun-*  
4    *dation for the purposes of the Program \$704,000,000 for*  
5    *fiscal year 2003; \$774,000,000 for fiscal year 2004,*  
6    *\$851,000,000 for fiscal year 2005, \$937,000,000 for fiscal*  
7    *year 2006, and \$1,030,000,000 for fiscal year 2007.”.*

8       “(b) *NATIONAL AERONAUTICS AND SPACE ADMINISTRA-*  
9    *TION ACTIVITIES.*—Section 202 of the *High-Performance*  
10   *Computing Act of 1991 (15 U.S.C. 5522) is amended to*  
11   *read as follows:*

12   **“SEC. 202. NATIONAL AERONAUTICS AND SPACE ADMINIS-**  
13   **TRATION ACTIVITIES.**

14       “(a) *GENERAL RESPONSIBILITIES.*—As part of the  
15   *Program described in title I, the National Aeronautics and*  
16   *Space Administration shall conduct basic and applied re-*  
17   *search in networking and information technology, with em-*  
18   *phasis on—*

19           “(1) *computational fluid, thermal, and aero-*  
20   *dynamics;*

21           “(2) *scientific data dissemination and tools to*  
22   *enable data to be fully analyzed and combined from*  
23   *multiple sources and sensors;*

24           “(3) *remote exploration and experimentation;*  
25   *and*

1           “(4) tools for collaboration in systems design,  
2       analysis, and testing.

3       “(b) AUTHORIZATION OF APPROPRIATIONS.—From  
4       sums otherwise authorized to be appropriated, there are au-  
5       thorized to be appropriated to the National Aeronautics and  
6       Space Administration for the purposes of the Program  
7       \$199,000,000 for fiscal year 2003, \$219,000,000 for fiscal  
8       year 2004, \$240,000,000 for fiscal year 2005, \$265,000,000  
9       for fiscal year 2006, and \$292,000,000 for fiscal year  
10      2007.”.

11       (c) DEPARTMENT OF ENERGY ACTIVITIES.—Section  
12      203 of the High-Performance Computing Act of 1991 (15  
13      U.S.C. 5523) is amended—

14           (1) in subsection (a), by striking all after “the  
15       Secretary of Energy shall” and inserting “conduct  
16       basic and applied research in networking and infor-  
17       mation technology, with emphasis on—

18           “(1) supporting fundamental research in the  
19       physical sciences and engineering, and energy appli-  
20       cations;

21           “(2) providing supercomputer access and ad-  
22       vanced communication capabilities to scientific re-  
23       searchers; and

24           “(3) developing tools for distributed scientific  
25       collaboration.”; and

1 (2) in subsection (e)—

2 (A) by striking “(1)”;

9 (C) by striking paragraph (2).

10           (d) DEPARTMENT OF COMMERCE ACTIVITIES.—Sec-  
11 tion 204 of the High-Performance Computing Act of 1991  
12 (15 U.S.C. 5524) is amended—

15                   “(1) the National Institute of Standards and  
16                   Technology shall—

17                   “(A) conduct basic and applied measure-  
18                   ment research needed to support various com-  
19                   puting systems and networks;

20                   “(B) develop and propose voluntary stand-  
21                   ards and guidelines, and develop measurement  
22                   techniques and test methods, for the interoper-  
23                   ability of computing systems in networks and for  
24                   common user interfaces to systems;

1               “(C) be responsible for developing benchmark  
2               tests and standards for computing systems  
3               and software; and

4               “(D) encourage the development, deployment,  
5               and implementation of voluntary guidelines and standards for—

7               “(i) robust security technology; and

8               “(ii) best practices and interoperability relating to the security of commercial and government computer networks;  
9  
10               and

12               “(2) the National Oceanic and Atmospheric Administration shall conduct basic and applied research in networking and information technology, with emphasis on—

16               “(A) improving weather forecasting and climate prediction;

18               “(B) collection and dissemination of environmental information; and

20               “(C) development of more accurate models of the atmosphere-ocean system.”; and

22               (2) by striking subsections (c) and (d) and inserting the following:

1       “(c) *AUTHORIZATION OF APPROPRIATIONS.*—From  
2    *sums otherwise authorized to be appropriated, there are au-*  
3    *thorized to be appropriated*—

4           “(1) *to the National Institute of Standards and*  
5    *Technology for the purposes of the Program*  
6    *\$24,000,000 for fiscal year 2003, \$27,000,000 for fis-*  
7    *cal year 2004, \$29,000,000 for fiscal year 2005,*  
8    *\$32,000,000 for fiscal year 2006, and \$35,000,000 for*  
9    *fiscal year 2007; and*

10          “(2) *to the National Oceanic and Atmospheric*  
11    *Administration for the purposes of the Program*  
12    *\$22,000,000 for fiscal year 2003, \$24,000,000 for fis-*  
13    *cal year 2004, \$26,000,000 for fiscal year 2005,*  
14    *\$29,000,000 for fiscal year 2006, and \$32,000,000 for*  
15    *fiscal year 2007.”.*

16          (e) *ENVIRONMENTAL PROTECTION AGENCY ACTIVI-*  
17    *TIES*—Section 205 of the *High-Performance Computing Act*  
18    *of 1991* (15 U.S.C. 5525) is amended to read as follows:

19    **“SEC. 205. ENVIRONMENTAL PROTECTION AGENCY ACTIVI-**  
20           **TIES.**

21          “(a) *GENERAL RESPONSIBILITIES.*—As part of the  
22    *Program described in title I, the Environmental Protection*  
23    *Agency shall conduct basic and applied research directed*  
24    *toward the advancement and dissemination of computa-*

1 *tional techniques and software tools with an emphasis on*  
2 *modeling of—*

3           “(1) *ecosystems;*  
4           “(2) *human effects*  
5           “(3) *atmospheric dynamics and chemistry; and*  
6           “(4) *pollutant transport.*

7       “(b) *AUTHORIZATION OF APPROPRIATIONS.—From*  
8 *sums otherwise authorized to be appropriated, there are au-*  
9 *thorized to be appropriated to the Environmental Protec-*  
10 *tion Agency for the purposes of the Program \$4,000,000 for*  
11 *fiscal year 2003, \$4,400,000 for fiscal year 2004, \$4,800,000*  
12 *for fiscal year 2005, \$5,300,000 for fiscal year 2006, and*  
13 *\$5,800,000 for fiscal year 2007.”.*

14 **SEC. 6. REPORTS.**

15       (a) *INTERNATIONAL BENCHMARKING STUDIES.—*

16           (1) *STUDY.—Not later than 3 months after the*  
17 *date of the enactment of this Act, the Director of the*  
18 *National Science Foundation shall enter into an ar-*  
19 *rangement with the National Research Council of the*  
20 *National Academy of Sciences to conduct an assess-*  
21 *ment of the state of research on networking and infor-*  
22 *mation technology in the United States. The study*  
23 *shall use the methodology and approach developed by*  
24 *the Committee on Science, Engineering, and Public*  
25 *Policy of the National Academies and documented in*

1 its 2000 report entitled “Experiments in International Benchmarking of U.S. Research Fields”.  
2

24 (4) ANNUAL REPORT.—The first annual report  
25 required by section 101(a)(3)(A) of the High-Perform-

1       *ance Computing Act of 1991 (15 U.S.C.*  
2       *5511(a)(3)(A)) that is due after the expiration of 9*  
3       *months after receipt by the Director of the Office of*  
4       *Science and Technology Policy of the report trans-*  
5       *mitted under paragraph (2) shall include a descrip-*  
6       *tion of activities under the Program established by*  
7       *section 101(a) of the High-Performance Computing*  
8       *Act of 1991 (15 U.S.C. 5511(a)) that address issues*  
9       *raised by the study conducted under paragraph (1),*  
10      *including strategies for—*

11       *(A) raising or maintaining the position of*  
12       *the United States relative to other nations in the*  
13       *research priority areas addressed by the report*  
14       *transmitted under paragraph (2); and*

15       *(B) promoting international research co-*  
16       *operation to leverage international niches of ex-*  
17       *cellence identified by the report transmitted*  
18       *under paragraph (2).*

19       *(5) AUTHORIZATION OF APPROPRIATIONS.—*  
20       *There are authorized to be appropriated to the Na-*  
21       *tional Science Foundation for carrying out the study*  
22       *under this subsection \$850,000.*

23       *(b) INFORMATION TECHNOLOGY WORKFORCE*  
24      *STUDY.—*

14 (D) the role of foreign workers in the infor-  
15 mation technology workforce;

## 22 (F) other relevant issues.

(2) ANALYSIS.—Not later than 3 months after the date of the enactment of this Act, the Director of the National Science Foundation shall enter into an

1 arrangement with the National Research Council of  
2 the National Academy of Sciences to analyze the data  
3 collected under paragraph (1) and publish a biennial  
4 update to the “Building a Workforce in the Informa-  
5 tion Economy” report, issued in October of 2000.

6 (3) TRANSMITTAL TO CONGRESS.—Biennial up-  
7 dates required under paragraph (2) shall be trans-  
8 mitted to the Committee on Science of the House of  
9 Representatives and the Committee on Commerce,  
10 Science, and Transportation of the Senate, and to the  
11 National Coordination Office for Information Tech-  
12 nology Research and Development, not later than 1  
13 year after the date of the enactment of this Act and  
14 biennially thereafter.

15 **SEC. 7. RESEARCH CENTER.**

16 (a) IN GENERAL.—(1) As part of the Program de-  
17 scribed in section 101 of the High-Performance Computing  
18 Act of 1991 (15 U.S.C. 5511), the National Science Founda-  
19 tion, in consultation with the National Aeronautics and  
20 Space Administration, the Environmental Protection Agen-  
21 cy, the National Oceanic and Atmospheric Administration,  
22 and other Federal agencies as appropriate, shall establish  
23 a center for research on information technology questions  
24 related to crisis management.

1       (2) *The award to support the establishment and oper-*  
2 *ation of the center established under paragraph (1) shall*  
3 *be made to an eligible nonprofit organization or consortium*  
4 *thereof through a merit-reviewed, competitive process in ac-*  
5 *cordance with requirements specified by the National*  
6 *Science Foundation.*

7       (b) *USE OF FUNDS.—The center established under sub-*  
8 *section (a) shall carry out research to advance the role of*  
9 *information technology in crisis management. Such activi-*  
10 *ties may include—*

- 11       (1) *research on—*
  - 12           (A) *human-computer interface technologies*  
13           *suitable for meeting user needs and limitations;*
  - 14           (B) *network-based collaboration tools, in-*  
15           *cluding virtual situation rooms;*
  - 16           (C) *the interconnection, interoperation, and*  
17           *reliability of networks involving diverse informa-*  
18           *tion resources;*
  - 19           (D) *rapidly deployable, self-configuring*  
20           *wireless networks;*
  - 21           (E) *software to assist crisis managers in*  
22           *making decisions in the absence of complete in-*  
23           *formation;*
  - 24           (F) *means for improving the performance of*  
25           *distributed systems; and*

4 (2) establishment and use of experimental  
5 testbeds for crisis management-related research and  
6 development to allow for testing and validating tech-  
7 nologies under realistic conditions; and

12 (c) *SELECTION CRITERIA.*—In evaluating applications  
13 submitted under this section, the Director of the National  
14 Science Foundation shall consider, at a minimum, the ex-  
15 tent to which the applicant will work with individuals and  
16 organizations that would be users of the results of the re-  
17 search conducted by the center in establishing a research  
18 agenda and conducting activities under subsection (b)(2).

19 (d) *DEFINITION.*—In this section, the term “eligible  
20 nonprofit organization” means an institution of higher edu-  
21 cation as defined by section 101 of the Higher Education  
22 Act of 1965 (20 U.S.C. 1001), or a nonprofit research insti-  
23 tute or nonprofit association with experience related to ap-  
24 plications of information technology in crisis management  
25 as determined by the National Science Foundation.

1        (e) *AUTHORIZATION OF APPROPRIATIONS.*—*There are*  
2 *authorized to be appropriated to the National Science*  
3 *Foundation for the purposes of this section \$10,000,000 for*  
4 *each of the fiscal years 2003, 2004, 2005, 2006, and 2007.*

**Union Calendar No. 306**

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2D SESSION

**H. R. 3400**

**[Report No. 107-511]**

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JUNE 18, 2002

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