Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army										DATE: February 2011	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603461A: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*							
COST ($ in Millions)	**FY 2010**	**FY 2011**	**FY 2012 Base**	**FY 2012 OCO**	**FY 2012 Total**	**FY 2013**	**FY 2014**	**FY 2015**	**FY 2016**	**Cost To Complete**	**Total Cost**
Total Program Element	-	-	183.150	-	183.150	183.150	183.150	173.150	173.150	Continuing	Continuing
DS7: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	-	-	183.150	-	183.150	183.150	183.150	173.150	173.150	Continuing	Continuing

Note

New PE/Project for High Performance Computing Modernization Program.

A. Mission Description and Budget Item Justification

The objective of this program element (PE) is to provide cost effective tools the Department of Defense (DoD) needs to provide the address the most difficult defense problems. These tools include modern high performance computing hardware, parallel software, wide area networking services and the expertise to use them. The High Performance Computing Modernization Program (HPCMP) enables DoD personnel to:

1) conduct basic research into areas such as materials, fuels, turbulence, proteins, electromagnetic fields, signal image relationships, structural response, blast effects, and combustion;
2) conduct applied research into areas such as aerodynamics applied to fighter and transport manned and unmanned aircraft, automated target recognition; hydrodynamics applied to new hull forms, structural performance of new armor and penetrator concepts, and explosives performance;
3) design elements of weapon systems such as the Hellfire missile, F-35, MRAP, C-17, the Javelin missile, and directed energy weapons systems;
4) test and evaluate weapons system performance on systems such as F-16, F-22, F-35, C-17, FCS, AIM-9X, GBU-39 and Stryker; and
5) immediately support urgent operations for efforts such as counter improvised explosion devices, Hurricane Katrina related flood modeling, and the 2010 Gulf Oil Spill migration modeling.

High Performance Computing has been identified as a key enabling technology essential to achieving the DoD's research development, test and evaluation (RDT&E) objectives. Validated requirements collected across the DoD reflect the needs of 4,400 scientists and engineers located at hundreds of locations (DoD Laboratories, Test Centers, academic institutions and commercial businesses). The integrated HPCMP consists of DoD Supercomputing Resource Centers (DSRCs), the Defense Research and Engineering Network (DREN), and Software Application Support. DSRCs provide extensive capabilities to address user requirements for hardware, software, and programming environments. Dedicated HPC project investments (DHPIs) augment the DSRCs to form the total HPCMP computational capability. DHPIs address critical HPC requirements that cannot be met at DSRCs, such as real-time, and near real-time computing requirements, and leverage significant HPC and mission expertise located at these remote sites. All elements of the HPCMP are interconnected with all Science and Technology and Test and Evaluation user sites via the Defense Research and Engineering Network. DREN provides the flexible wide area network fabric needed by the RDT&E community to support technology demonstrations and distributed test and evaluation events in addition to providing access to the supercomputing centers. The Software Application Support component develops critical common DoD applications programs that run efficiently on advanced HPC systems, supports technology transition activities with academic and commercial institutions, trains users, and builds collaborative programming environments. The Computational Research and Engineering Acquisition Tools and

Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Army	DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603461A: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*

Environments (CREATE) produces supercomputer-based engineering design and test tools, improving the acquisition process for major weapons systems. HPCMP activities are coordinated with the High Performance Computing Modernization Office and the Services.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

The HPCMP transfers from the Office Secretary of Defense to the Department of the Army in FY12.

B. Program Change Summary ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	-	-	-	-	-
Current President's Budget	-	-	183.150	-	183.150
Total Adjustments	-	-	183.150	-	183.150
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	183.150	-	183.150

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army			DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603461A: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	PROJECT DS7: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	

COST ($ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
DS7: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	-	-	183.150	-	183.150	183.150	183.150	173.150	173.150	Continuing	Continuing

A. Mission Description and Budget Item Justification

The objective of this program element (PE) is to provide cost effective tools the Department of Defense (DoD) needs to provide the Warfighter technological superiority and military dominance on the battlefield by providing advanced computational services to U.S. weapons system scientists and engineers. By exploiting continuous advances in HPC technology, the defense research, development, test and evaluation (RDT&E) community is able to resolve critical scientific and engineering problems more quickly and with more precision. The results of these efforts feed directly into the acquisition process by improving weapons system designs through an increased fundamental understanding of materials, aerodynamics, chemistry, fuels, acoustics, signal image recognition, electromagnetics, and other areas of basic and applied research. As such, HPC has been identified as a key enabling technology essential to achieving the objectives of the DoD's RDT&E.

The program primarily provides supercomputing services through DoD Supercomputing Resource Centers (DSRCs). Additionally, support for specialized programs is provided through dedicated HPC project investments (DHPIs). DHPIs support a one-time need and have no support tail within the HPC Modernization Program. Centers and DHPIs directly support the DoD RDT&E laboratories and test centers and are accessible to local and remote scientists and engineers via high-speed network access. An integral part of the program is providing for the adaptation of broadband, widely used applications and algorithms to address RDT&E requirements, along with continued training of users as new system designs and concepts evolve. The program pursues continuous interaction with the national HPC infrastructure, including academia, industry, and other government agencies to facilitate the sharing of knowledge, tools, and expertise.

Annually validated requirements, collected across the DoD reflect the needs of 4,400 scientists and engineers located at hundreds of locations (DoD Laboratories, Test Centers, academic institutions and commercial businesses), and to drive program decisions. The integrated HPC program consists of DoD Supercomputing Resource Centers; the Defense Research and Engineering Network (DREN); and Software Application Support. DSRCs are responsible for as large a fraction of DoD`s S&T and T&E computational workload as feasible. DSRCs provide extensive capabilities to address user requirements for hardware, software, and programming environments. DHPIs augment the DSRCs to form the total HPC Modernization Program computational capability. DHPIs address critical HPC requirements that cannot be met at DSRCs, such as real-time, and near real-time computing requirements, and leverage significant HPC and mission expertise located at these remote sites. All elements of the HPC Modernization Program are interconnected with all S&T and T&E user sites via the DREN. Additionally, the Software Application Support component develops critical common DoD applications programs that run efficiently on advanced HPC systems, supports technology transition activities with academic and commercial institutions, trains users, and builds collaborative programming environments.

True modernization of DoD`s HPC capability and fulfillment of the program's vision and goals requires an on-going program strategy that addresses all aspects of HPC. While advancing the level of hardware performance is critical to success, the higher objective is to enable better scientific research, T&E environments, and technology development for superior weapons, warfighting, and related support systems. The Program goals are to (1) acquire, deploy, operate and maintain bestvalue supercomputers; (2) acquire, develop, deploy and support software applications and computational work environments that enable critical DoD research,

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603461A: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	PROJECT DS7: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*

development and test challenges to be analyzed and solved; (3) acquire, deploy, operate and maintain a communications network that enables effective access to supercomputers and to distributed S&T/T&E computing environments; (4) continuously educate the RDT&E workforce with the knowledge needed to employ computational modeling effectively and efficiently; and (5) promote collaborative relationships among the DoD computational science community, the national computational science community and minority serving institutes.

The DREN provides wide area network (WAN) connectivity among the Department's S&T and T&E communities. The DREN is implemented through an Intersite Services Contract awarded to MCI (WORLDCOM) during FY 2002. A new DREN network services contract is planned to be awarded in FY 2011. DREN currently provides services to sites throughout the continental United States, Alaska, Hawaii, and can be extended overseas where necessary. A Secret DREN using common Secret systems high key with NSA certified Type-1 encryptors that can transport classified traffic at OC-3 (155 Mbps) has also been deployed. The HPC Modernization Program employs state-of-the-art WAN security and strong host and user security creating a defense-in-depth security architecture. HPCMP activities are coordinated with the High Performance Computing Modernization Office and the Services.

The cited work is consistent with the Director, Defense Research and Engineering Strategic Plan, the Army Modernization Strategy, and the Army Science and Technology Master Plan.

The HPCMP transfers from the Office Secretary of Defense to the Department of the Army in FY12.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Title: Department of Defense (DoD) Supercomputing Resource Centers (DSRCs) ***Description:*** The program supports DoD Supercomputing Resource Centers (DSRCs) that are responsible for as large a fraction of DoD's science and technology and test and evaluation computational workload as feasible. Dedicated HPC project investments (DHPIs) support a one-time need and have no legacy within the HPC Modernization Program. DHPIs address critical HPC requirements that cannot be met at DSRCs, such as real-time, and near real-time computing requirements, and leverage significant HPC and mission expertise located at these remote sites. ***FY 2012 Plans:*** Will support five DoD Supercomputing Resource Centers (DSRCs) and will award two to five competitive Dedicated HPC project investments (DHPIs). This effort was formerly under PE 0603755D8Z- HPCMP.	-	-	91.575
Title: Networking ***Description:*** The Defense Research and Engineering Network (DREN) provides wide area network (WAN) connectivity among the Department's scince and technology (S&T) and test and evaluation (T&E) communities and provides the computer and network security for the HPCMP. ***FY 2012 Plans:***	-	-	28.919

Exhibit R-2A, RDT&E Project Justification: PB 2012 Army		DATE: February 2011
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603461A: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*	**PROJECT** DS7: *HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2010	FY 2011	FY 2012
Will provide network services to link all elements of the program and operation of security systems and enhancements. Will continue collaborative work with the federal networking community and standards associations will continue to assure that the Defense Research and Engineering Network (DREN) will remain compatible with future technology change. This effort was formerly under PE 0603755D8Z- HPCMP.			
Title: Software Applications ***Description:*** Software Applications provide for the adaptation of broadband, widely used applications and algorithms to address research, development, test and evaluation (RDT&E) requirements, continued training of users as new system designs and concepts evolve, and continuous interaction with the national high performance computing (HPC) infrastructure, including academia, industry, and other government agencies to facilitate the sharing of knowledge, tools, and expertise. ***FY 2012 Plans:*** Computational Research and Engineering Acquisition Tools and Environments (CREATE): will continue development of supercomputer-based engineering design and test tools to improve the acquisition process for major weapons systems across the DoD; will continue development efforts in software programs will continue to mature as other projects are completed, and others begun with a greater emphasis on engineering applications. Software Institutes: will continue to develop shared scalable applications to exploit scalable HPC assets. Academic Outreach Program: will continue be supported to encourage and support computational science in universities across the United States. U.S. Programming Environments and Training (PETTT): will continue to provide computational and computer science support to the DoD HPC user community through interaction and collaborative projects with academic and industrial partners; this effort will be adjusted as the program is re-focused. This effort was formerly under PE 0603755D8Z- HPCMP.	-	-	62.656
Accomplishments/Planned Programs Subtotals	-	-	183.150

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Performance metrics used in the preparation of this justification material may be found in the FY 2010 Army Performance Budget Justification Book, dated May 2010.