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Exhibit R-2, RDT&E Budget Item Justification: PB 2013 Office of Secretary Of Defense	DATE: February 2012
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APPROPRIATION/BUDGET ACTIVITY				R-1 ITEM NOMENCLATURE							
0400: <i>Research, Development, Test & Evaluation, Defense-Wide</i> BA 3: <i>Advanced Technology Development (ATD)</i>				PE 0603755D8Z: <i>High Performance Computing Modernization Program</i>							
COST (\$ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
Total Program Element	235.209	-	-	-	-	-	-	-	-	Continuing	Continuing
P507: <i>High Performance Computing Modernization Program</i>	235.209	-	-	-	-	-	-	-	-	Continuing	Continuing

Note

The High Performance Computing Modernization Program (HPCMP) was transferred from the Office of the Secretary of Defense to the Department of the Army in FY 2012.

A. Mission Description and Budget Item Justification

Today, the Department of Defense (DoD) faces many challenges. The High Performance Computing Modernization Program (HPCMP) provides cost effective tools the Department needs to 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 HPCMP helps enable DoD personnel to:

- Conduct basic research into areas such as materials, fuels, turbulence, proteins, electromagnetic fields, signal image relationships, structural response, blast effects, and combustion;
- 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;
- Design elements of weapon systems such as the Hellfire missile, F-35, Mine Resistant Ambush Protected (MRAP) vehicle, C-17, the Javelin missile, and directed energy weapons systems;
- Test and evaluate weapons system performance on systems such as F-16, F-22, F-35, C-17, FCS, AIM-9X, GBU-39 and Striker;
- Immediately support urgent operations for efforts such as counter Improvised Explosive Devices (IED), Hurricane Katrina related flood modeling, and the 2010 Gulf oil spill migration modeling.

High Performance Computing (HPC) 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 are responsible for as much of DoD's RDT&E computational workload as feasible. 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 DREN. 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

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APPROPRIATION/BUDGET ACTIVITY 0400: <i>Research, Development, Test & Evaluation, Defense-Wide</i> BA 3: <i>Advanced Technology Development (ATD)</i>	R-1 ITEM NOMENCLATURE PE 0603755D8Z: <i>High Performance Computing Modernization Program</i>
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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 Environments (CREATE) produces supercomputer-based engineering design and test tools, improving the acquisition process for major weapons systems.

B. Program Change Summary (\$ in Millions)	<u>FY 2011</u>	<u>FY 2012</u>	<u>FY 2013 Base</u>	<u>FY 2013 OCO</u>	<u>FY 2013 Total</u>
Previous President's Budget	200.986	-	-	-	-
Current President's Budget	235.209	-	-	-	-
Total Adjustments	34.223	-	-	-	-
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.731	-			
• SBIR/STTR Transfer	-5.336	-			
• Congressional Adjustments	40.000	-	-	-	-
• Economic Assumptions	-1.227	-	-	-	-
• FFRDC	-0.885	-	-	-	-
• Other Program Adjustments	-0.060	-	-	-	-

Change Summary Explanation

The High Performance Computing Modernization Program (HPCMP) transferred from the Office of the Secretary of Defense to the Department of the Army in FY 2012.

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Exhibit R-2A, RDT&E Project Justification: PB 2013 Office of Secretary Of Defense									DATE: February 2012		
APPROPRIATION/BUDGET ACTIVITY 0400: Research, Development, Test & Evaluation, Defense-Wide BA 3: Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603755D8Z: High Performance Computing Modernization Program				PROJECT P507: High Performance Computing Modernization Program			
COST (\$ in Millions)	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
P507: High Performance Computing Modernization Program	235.209	-	-	-	-	-	-	-	-	Continuing	Continuing

Note

The High Performance Computing Modernization Program (HPCMP) transferred from the Office of the Secretary of Defense to the Department of the Army in FY 2012.

A. Mission Description and Budget Item Justification

The Department of Defense (DoD) High Performance Computing Modernization Program (HPCMP) supports the needs of the warfighter for 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 high performance computing (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 HPCMP. 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 help drive program decisions. The integrated HPC program consists of DoD Supercomputing Resource Centers (DSRCs), the Defense Research and Engineering Network (DREN), and Software Application Support. DSRCs are responsible for as large a fraction of DoD's science and technology (S&T) and test and evaluation (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 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 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.

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Exhibit R-2A, RDT&E Project Justification: PB 2013 Office of Secretary Of Defense		DATE: February 2012			
APPROPRIATION/BUDGET ACTIVITY 0400: Research, Development, Test & Evaluation, Defense-Wide BA 3: Advanced Technology Development (ATD)		R-1 ITEM NOMENCLATURE PE 0603755D8Z: High Performance Computing Modernization Program	PROJECT P507: High Performance Computing Modernization Program		
<p>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 best-value supercomputers; (2) acquire, develop, deploy and support software applications and computational work environments that enable critical DoD research, 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.</p> <p>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 (WORLD COM) 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 HPCMP employs state-of-the-art WAN security and strong host and user security creating a defense-in-depth security architecture.</p>					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2011	FY 2012	FY 2013
<p>Title: Department of Defense Supercomputing Resource Centers (DSRCs)</p> <p>Description: The program supports DSRCs that are responsible for as large a fraction of DoD's S&T and T&E computational workload as feasible. Dedicated HPC project investments (DHPIs) support a one-time need and have no legacy within the HPC Modernization Program.</p> <p>FY 2011 Accomplishments:</p> <p>Since 1994, the program has sustained and regularly modernized HPC systems, storage, and scientific data analysis and visualization capabilities to fulfill a significant portion of the science and technology (S&T) and test and evaluation (T&E) community HPC requirements. Six DSRCs were initially supported in FY 2011. Steps to streamline DSRC structure reduced the number to five DSRCs in June 2011. Two DHPIs at the NAVAIR's Air Combat Environment Test and Evaluation Facility, Patuxent River, MD and at the Army Research Laboratory, Adelphi, MD were competitively awarded and fully funded in FY 2011. Two DHPIs at the AFRL-RD, Kihei, HI and at the NRL-MRY, Monterey, CA were competitively awarded and partially funded in FY 2011 will follow-on funding planned for FY 2012. Computational services were provided to over 4,000 scientists and engineers located at over 200 DoD Laboratories, Test Centers, academic institutions and commercial businesses. These services enabled basic research, applied research, design elements of weapon systems, test and evaluation of weapons system performance.</p> <p>A program adjustment provided in the FY 2011 Appropriation was used for accelerated portal development and "green computing" projects.</p>			127.149	-	-
Title: Networking			36.326	-	-

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APPROPRIATION/BUDGET ACTIVITY 0400: <i>Research, Development, Test & Evaluation, Defense-Wide</i> BA 3: <i>Advanced Technology Development (ATD)</i>	R-1 ITEM NOMENCLATURE PE 0603755D8Z: <i>High Performance Computing Modernization Program</i>	PROJECT P507: <i>High Performance Computing Modernization Program</i>	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2011	FY 2012
<p>Description: The Defense Research and Engineering Network (DREN) provides wide area network (WAN) connectivity among the Department's science and technology and test and evaluation communities and provides the computer and network security for the HPCMP.</p> <p>FY 2011 Accomplishments: The DREN provided network services to link all elements of the program as well as network security and enhancements. A new DREN network services contract will be awarded FY 2011. DREN provided a flexible wide area network fabric allowing the DoD RDT&E community to support technology demonstrations and distributed test and evaluation events as well as providing this community access to the six supercomputing centers. Collaborative work with the federal networking community and standards associations assured that the DREN remained compatible with technology changes.</p> <p>A program adjustment provided in the FY 2011 Appropriation was used for accelerated portal development and enhanced network security.</p>			
<p>Title: Software Applications</p> <p>Description: Software Applications provide for the adaptation of broadband, widely used applications and algorithms to address RDT&E requirements, continued training of users as new system designs and concepts evolve, and continuous interaction with the national HPC infrastructure, including academia, industry, and other government agencies to facilitate the sharing of knowledge, tools, and expertise.</p> <p>FY 2011 Accomplishments: Computational Research and Engineering Acquisition Tools and Environments (CREATE) continued development of supercomputer-based engineering design and test tools to improve the acquisition process for major weapons systems across the Department. Development efforts in software programs continued to mature as other projects were completed, and others begun with a greater emphasis on engineering applications. Software Institutes continued to develop shared scalable applications to exploit scalable HPC assets. However, the number of institutes was adjusted as the program was re-focused. An Academic Outreach Program continued to encourage and support computational science in universities across the United States. The Programming Environments and Training effort provided computational and computer science support to the DoD HPC user community through interaction and collaborative projects with academic and industrial partners. Efforts to develop technologies and methodologies to protect and limit end-use of high performance computing applications software were completed.</p>		71.734	-
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B. Accomplishments/Planned Programs (\$ in Millions)								FY 2011	FY 2012	FY 2013	
A program adjustment provided in the FY 2011 Appropriation was used for software research to improve application performance and explore new technology.											
Accomplishments/Planned Programs Subtotals								235.209	-	-	
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2011	FY 2012	FY 2013 Base	FY 2013 OCO	FY 2013 Total	FY 2014	FY 2015	FY 2016	FY 2017	Cost To Complete	Total Cost
• 0902198D8Z Procurement: <i>Major Equipment OSD</i>	53.194	0.000	0.000		0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
D. Acquisition Strategy N/A											
E. Performance Metrics N/A											