Exhibit 300: Capital Asset Plan and Business Case Summary

Part I: Summary Information And Justification (All Capital Assets)

Section A: Overview (All Capital Assets)

1. Date of Submission:	9/10/2007
2. Agency:	Department of Energy
3. Bureau:	Energy Programs
4. Name of this Capital Asset:	SC Lattice Quantum ChromoDynamics Computing (LQCD)
5. Unique Project (Investment) Identifier: (For IT investment only, see section 53. For all other, use agency ID system.)	019-20-01-21-01-1032-00
6. What kind of investment will this be in FY2009? (Please NOTE: Investments moving to O&M in FY2009, with Planning/Acquisition activities prior to FY2009 should not select O&M. These investments should indicate their current status.)	Mixed Life Cycle
7. What was the first budget year this investment was submitted to OMB?	FY2006

8. Provide a brief summary and justification for this investment, including a brief description of how this closes in part or in whole an identified agency performance gap:

LQCD Computing is part of DOE Office of Science (SC) High Energy Physics (HEP) & Nuclear Physics (NP) programs to accomplish SC strategic goal 6 (Deliver computing for the frontiers of science) and DOE strategic goals 3.1 (Scientific Breakthroughs) & 3.2 (Foundations of Science) to further the President's "Competitive" Initiative. The theoretical framework for large experimental programs in HEP & NP is QCD. Many of the properties of QCD most important to the experimental programs can only be determined through large scale computer simulations. The SC SciDAC Lattice QCD Computing project (2001-2006) identified the need for tens of teraflop-years of sustained integrated computing power dedicated to QCD simulations. By the end of FY09, the LQCD project will operate facilities with an aggregate capacity of 17.4 TF/s to meet this need. The computer hardware is housed at Brookhaven National Laboratory (BNL), Fermi National Accelerator Laboratory (FNAL), and Thomas Jefferson National Accelerator Facility (TJNAF). In addition to the computers acquired by this investment, the hardware operated includes the QCDOC supercomputer completed at BNL in 2005 & the prototype LQCD clusters built at FNAL and TJNAF by the DOE SciDAC Lattice QCD project. The DME, or project, phase of this investment is complete after system acceptance, therefore, the Total Project Cost for this investment's lifecycle is the total DME ($6.251M). This investment provides funds for operational support through FY09. Planning is underway for a follow-on project to provide ongoing operations and maintenance support for the computers acquired by this investment through the end of their life cycle. Existing LQCD distributed cluster systems and supercomputers comply with the DOE technical architecture. These systems run physics applications built using optimized LQCD libraries developed by the SciDAC project. Collaboration with the SciDAC-2 LQCD project, funded by the HEP, NP, and ASCR (Advanced Scientific Computing Research) program offices, allows the development of further optimizations that increase the cost effectiveness of the hardware acquired by this investment. This investment supports the Scientific and Technological Research and Innovation sub-function of the General Science and Innovation LoB of the Services for Citizens business area of the BRM. In particular, LQCD provides computational resources as "Services for Citizens" (001109026) in "Research for Development" (002202069).

9. Did the Agency's Executive/Investment Committee approve this request?	Yes
a. If "yes," what was the date of this approval?	8/24/2006
10. Did the Project Manager review this Exhibit?	Yes
11. Contact information of Project Manager?	
Name	Kogut, John B
Phone Number	301-903-1298
Email	john.kogut@science.doe.gov
a. What is the current FAC-P/PM certification level of the project/program manager?	TBD
12. Has the agency developed and/or promoted cost effective, energy-efficient and environmentally sustainable techniques or practices for this project?	Yes
a. Will this investment include electronic assets (including computers)?	Yes

b. Is this investment for new construction or major retrofit of a Federal building or facility? (answer applicable to non-IT assets only)	No
1. If "yes," is an ESPC or UESC being used to help fund this investment?	
2. If "yes," will this investment meet sustainable design principles?	
3. If "yes," is it designed to be 30% more energy efficient than relevant code?	
13. Does this investment directly support one of the PMA initiatives?	Yes
If "yes," check all that apply:	Expanded E-Government Competitive Sourcing
a. Briefly and specifically describe for each selected how this asset directly supports the identified initiative(s)? (e.g. If E-Gov is selected, is it an approved shared service provider or the managing partner?)	Supports e-Government initiatives of collaboration & reuse; the project uses optimized application libraries produced by the DOE SciDAC LQCD Computing project; collaboration leads to further optimizations. Supports Competitive Sourcing by outsourcing maintenance and operations to GOCO Laboratories & through competitive awards for the computing hardware.
14. Does this investment support a program assessed using the Program Assessment Rating Tool (PART)? (For more information about the PART, visit www.whitehouse.gov/omb/part.)	No
a. If "yes," does this investment address a weakness found during a PART review?	No
b. If "yes," what is the name of the PARTed program?	
c. If "yes," what rating did the PART receive?	
15. Is this investment for information technology?	Yes

If the answer to Question 15 is "Yes," complete questions 16-23 below. If the answer is "No," do not answer questions 16-23.

For information technology investments only:

16. What is the level of the IT Project? (per CIO Council PM Guidance)	Level 1
17. What project management qualifications does the Project Manager have? (per CIO Council PM Guidance)	(1) Project manager has been validated as qualified for this investment
18. Is this investment or any project(s) within this investment identified as "high risk" on the Q4 - FY 2007 agency high risk report (per OMB Memorandum M-05-23)	No
19. Is this a financial management system?	No
a. If "yes," does this investment address a FFMIA compliance area?	No
1. If "yes," which compliance area:	
2. If "no," what does it address?	

b. If "yes," please identify the system name(s) and system acronym(s) as reported in the most recent financial systems inventory update required by Circular A-11 section 52

20. What is the percentage breakout for the total FY2009 funding request for the following? (This should total 100%)

Hardware	70
Software	3
Services	27
Other	
21. If this project produces information dissemination products for the public, are these products published to the Internet in conformance with OMB Memorandum 05-04 and included in your agency inventory, schedules and priorities?	N/A

22. Contact information of individual responsible for privacy related questions:

Name	Boroski, William
Phone Number	680-840-4344
Title	Contractor Project Manager
E-mail	boroski@fnal.gov
23. Are the records produced by this investment appropriately scheduled with the National Archives and Records Administration's approval?	Yes
Question 24 must be answered by all Investments:	
24. Does this investment directly support one of the GAO High Risk Areas?	No

Section B: Summary of Spending (All Capital Assets)

1. Provide the total estimated life-cycle cost for this investment by completing the following table. All amounts represent budget authority in millions, and are rounded to three decimal places. Federal personnel costs should be included only in the row designated "Government FTE Cost," and should be excluded from the amounts shown for "Planning," "Full Acquisition," and "Operation/Maintenance." The "TOTAL" estimated annual cost of the investment is the sum of costs for "Planning," "Full Acquisition," and "Operation/Maintenance." For Federal buildings and facilities, life-cycle costs should include long term energy, environmental, decommissioning, and/or restoration costs. The costs associated with the entire life-cycle of the investment should be included in this report.

Table 1: SUMMARY OF SPENDING FOR PROJECT PHASES (REPORTED IN MILLIONS)
(Estimates for BY+1 and beyond are for planning purposes only and do not represent budget decisions)

	PY-1 and earlier	PY 2007	CY 2008	BY 2009	BY+1 2010	BY+2 2011	BY+3 2012	BY+4 and beyond	Total
Planning:	0.025	0.114	0.119	0.123	0	0	0	0	0.381
Acquisition:	1.85	1.592	1.63	0.798	0	0	0	0	5.870
Subtotal Planning & Acquisition:	1.875	1.706	1.749	0.921	0	0	0	0	6.251
Operations & Maintenance:	0.625	0.794	0.751	0.779	0	0	0	0	2.949
TOTAL:	2.500	2.500	2.500	1.700	0	0	0	0	9.200
Government FTE Costs should not be included in the amounts provided above.									
Government FTE Costs	0.011	0.011	0.011	0.011	0	0	0	0	0.044
Number of FTE represented by Costs:	1	1	1	1	0	0	0	0	4

Note: For the multi-agency investments, this table should include all funding (both managing partner and partner agencies). Government FTE Costs should not be included as part of the TOTAL represented.

2. Will this project require the agency to hire additional FTE's? No

a. If "yes," How many and in what year?

3. If the summary of spending has changed from the FY2008 President's budget request, briefly explain those changes:

The summary of spending remains unchanged.

Section C: Acquisition/Contract Strategy (All Capital Assets)

1. Complete the table for all (including all non-Federal) contracts and/or task orders currently in place or planned for this investment. Total Value should include all option years for each contract. Contracts and/or task orders completed do not need to be included.

Contracts/Task Orders Table: * Costs in millions

Contract or Task Order Number	Type of Contract/ Task Order	Has the contract been awarded (Y/N)	If so what is the date of the award? If not, what is the planned award date?	Start date of Contract/ Task Order	End date of Contract/ Task Order	Total Value of Contract/ Task Order ($M)	Is this an Interagency Acquisition? (Y/N)	Is it performance based? (Y/N)	Competitively awarded? (Y/N)	What, if any, alternative financing option is being used? (ESPC, UESC, EUL, N/A)	Is EVM in the contract? (Y/N)	Does the contract include the required security & privacy clauses? (Y/N)	Name of CO	CO Contact information (phone/email)	Contracting Officer Certification Level (Level 1,2,3,N/A)	If N/A, has the agency determined the CO assigned has the competencies and skills necessary to support this acquisition? (Y/N)
FNAL/TJNAF/ BNL FY09 System Operations	Firm-fixed price	No	10/1/2008	10/1/2008	9/30/2009	0.902	No	Yes	No	NA	Yes	Yes	Boroski, William	680-840-4344 / boroski@fnal.gov	N/A	Yes
Planned FY09 Cluster at FNAL	Firm-fixed price	No	10/15/2008	10/15/2008	3/1/2009	0.798	No	Yes	Yes	NA	No	Yes	Boroski, William	680-840-4344 / boroski@fnal.gov	N/A	Yes
FNAL/TJNAF/ BNL FY08 System Operations	Firm-fixed price	No	10/1/2007	10/1/2007	9/30/2008	0.87	No	Yes	No	NA	Yes	Yes	Boroski, William	680-840-4344 / boroski@fnal.gov	N/A	Yes
Planned FY08 Cluster at FNAL	Firm-fixed price	No	7/1/2008	7/1/2008	12/30/2008	1.63	No	Yes	Yes	NA	No	Yes	Boroski, William	680-840-4344 / boroski@fnal.gov	N/A	Yes
FNAL/TJNAF/ BNL FY07 System Operations	Firm-fixed price	Yes	10/1/2006	10/1/2006	9/30/2007	0.908	No	Yes	No	NA	Yes	Yes	Boroski, William	680-840-4344 / boroski@fnal.gov	N/A	Yes
BNL KA1401040, KB0301020	Firm-fixed price	Yes	10/1/2005	10/1/2005	9/30/2006	0.202	No	Yes	No	NA	Yes	Yes	Boroski, William	680-840-4344 / boroski@fnal.gov	N/A	Yes
TJNAF KB03010200	Firm-fixed price	Yes	10/1/2005	10/1/2005	9/30/2006	0.148	No	Yes	No	NA	Yes	Yes	Boroski, William	680-840-4344 / boroski@fnal.gov	N/A	Yes
FNAL KA140104	Firm-fixed price	Yes	10/1/2005	10/1/2005	9/30/2006	0.302	No	Yes	No	NA	Yes	Yes	Boroski, William	680-840-4344 / boroski@fnal.gov	N/A	Yes
Sura-06-C0350	Firm-fixed price	Yes	2/28/2006	2/28/2006	4/5/2006	0.283	No	Yes	Yes	NA	No	Yes	Holmgren, Don	630-840-2745 / djholm@fnal.gov	N/A	Yes
FNAL-569342, 570081, 570420, 570478	Firm-fixed price	Yes	6/19/2006	6/19/2006	11/1/2006	1.538	No	Yes	No	NA	No	Yes	Boroski, William	680-840-4344 / boroski@fnal.gov	N/A	Yes

Contracts/Task Orders Table: * Costs in millions

Contract or Task Order Number	Type of Contract/ Task Order	Has the contract been awarded (Y/N)	If so what is the date of the award? If not, what is the planned award date?	Start date of Contract/ Task Order	End date of Contract/ Task Order	Total Value of Contract/ Task Order ($M)	Is this an Interagency Acquisition? (Y/N)	Is it performance based? (Y/N)	Competitively awarded? (Y/N)	What, if any, alternative financing option is being used? (ESPC, UESC, EUL, N/A)	Is EVM in the contract? (Y/N)	Does the contract include the required security & privacy clauses? (Y/N)	Name of CO	CO Contact information (phone/email)	Contracting Officer Certification Level (Level 1,2,3,N/A)	If N/A, has the agency determined the CO assigned has the competencies and skills necessary to support this acquisition? (Y/N)
FY07 Cluster at TJNAF	Firm-fixed price	No	2/1/2007	2/1/2007	9/30/2007	1.592	No	Yes	Yes	NA	No	Yes	Boroski, William	680-840-4344 / boroski@fnal.gov	N/A	Yes

2. If earned value is not required or will not be a contract requirement for any of the contracts or task orders above, explain why:

The DOE has determined that this investment does not meet the criteria requiring EVM. Note for the Contracts/Task Orders Table listed above: The contracts listed as "Planned FY09 Cluster at FNAL", "Planned FY08 Cluster at FNAL", "Sura-06-C0350", "FNAL-569342, 570081, 570420, 570478", and "FY07 Cluster at TJNAF" are subcontracts issued by the host laboratories that cover the purchase of computer hardware only. System integration and operation of this computer hardware are performed by the host laboratories. The host laboratories' M&O contracts include the required security and privacy clauses, and these requirements are satisfied by the laboratories' staff. The host laboratories' M&O contracts are performance-based contracts and include EVM per DOE Order 413. The task orders listed in 1, 3, 5-8 correspond to the SS funding at the three labs for FY06-FY09 (milestones 1, 4, 5, 7, 8, 9, 10, 12, 14, 15, 17 in Table II.D).

3. Do the contracts ensure Section 508 compliance?	Yes
a. Explain why:	These task orders are of two types: subcontracts issued by the host laboratories to hardware vendors that cover the purchase of computer hardware and some physical integration only, and funding to the laboratories for the operation of the LQCD computing systems. The host laboratories' M&O contracts include requirements that ensure Section 508 compliance.
4. Is there an acquisition plan which has been approved in accordance with agency requirements?	Yes
a. If "yes," what is the date?	5/15/2007
b. If "no," will an acquisition plan be developed?	
1. If "no," briefly explain why:	

Section D: Performance Information (All Capital Assets)

In order to successfully address this area of the exhibit 300, performance goals must be provided for the agency and be linked to the annual performance plan. The investment must discuss the agency's mission and strategic goals, and performance measures (indicators) must be provided. These goals need to map to the gap in the agency's strategic goals and objectives this investment is designed to fill. They are the internal and external performance benefits this investment is expected to deliver to the agency (e.g., improve efficiency by 60 percent, increase citizen participation by 300 percent a year to achieve an overall citizen participation rate of 75 percent by FY 2xxx, etc.). The goals must be clearly measurable investment outcomes, and if applicable, investment outputs. They do not include the completion date of the module, milestones, or investment, or general goals, such as, significant, better, improved that do not have a quantitative or qualitative measure.

Agencies must use the following table to report performance goals and measures for the major investment and use the Federal Enterprise Architecture (FEA) Performance Reference Model (PRM). Map all Measurement Indicators to the corresponding "Measurement Area" and "Measurement Grouping" identified in the PRM. There should be at least one Measurement Indicator for each of the four different Measurement Areas (for each fiscal year). The PRM is available at www.egov.gov. The table can be extended to include performance measures for years beyond FY 2009.

Performance Information Table

Fiscal Year	Strategic Goal(s) Supported	Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Target	Actual Results
2007	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Customer Results	Customer Benefit	Customer Satisfaction	% of improvement in customer satisfaction rating (Customers rate satisfaction with the service provided on a scale of 1 to 10)	None. Baseline survey to be conducted during FY07-Q4.	Improve satisfaction rating by 20%	Baseline survey will be completed by September 14, 2007.
2007	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S.	Customer Results	Service Coverage	New Customers and Market Penetration	Number of distinct users (includes DOE labs, LQCD and academic communities)	73 (Number of distinct users served by metafacility in FY06)	Increase to 25 (Based on projected FY06 baseline of 20)	77 distinct users served in FY07

Performance Information Table

Fiscal Year	Strategic Goal(s) Supported	Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Target	Actual Results
	scientific primacy.							
2007	GOAL 3.1 Scientific Discovery – Achieve the major scientific discoveries that will drive U.S. competitiveness, inspire America, and revolutionize our approaches to the Nation's energy, national security, and environmental quality challenges.	Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	% of completed necessary improved staggered configurations enabling various physics studies of CKM matrix elements and hadron structure [SC Goals 4, 6] [NP-1]	40^3 x 96: 100% 48^3 x 144 (one quark mass): 50% 48^3 x 144 (second quark mass): 50%	Increase % of required generated lattices as follows:48^3 x 144 (one quark mass): 100% 48^3 x 144 (second quark mass): 100%	Available in Q1FY08
2007	GOAL 3.1 Scientific Discovery – Achieve the major scientific discoveries that will drive U.S. competitiveness, inspire America, and revolutionize our approaches to the Nation's energy, national security, and environmental quality challenges.	Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	% of completed improved staggered lattices analyzed for calculation of CKM matrix elements [SC Goals 4, 6] [NP-1]	40^3 x 96 lattices: 100%48^3 x 144 lattices: 0%	Increase percentage of 48^3 x 144 lattices analyzed to 100%	Available in Q1FY08
2007	GOAL 3.1 Scientific Discovery – Achieve the major scientific discoveries that will drive U.S. competitiveness, inspire America, and revolutionize our approaches to the Nation's energy, national security, and environmental quality challenges.	Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	Computer usage, in aggregate integrated TF-Yrs, applied to hybrid calculation of quark structure of nucleon in chiral regime [SC Goals 4, 6]	0.8 teraflops-year	Add an additional 1.0 TF-yrs of integrated usage to bring total to 1.8 teraflops-year	Available in Q1FY08
2007	GOAL 3.1 Scientific Discovery – Achieve the major scientific discoveries that will drive U.S. competitiveness, inspire America, and revolutionize our approaches to the Nation's energy, national security, and environmental quality challenges.	Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	Usage, in aggregate integrated TF-Yrs, for Pentaquark and N* spectroscopy calculations in the chiral regime [SC Goals 4, 6]	0.5 teraflops-year	Add an additional 0.75 TF-yrs of integrated usage to bring total to 1.25 teraflops-year	Available in Q1FY08
2007	GOAL 3.1 Scientific Discovery – Achieve the major scientific discoveries that will drive U.S. competitiveness, inspire America, and revolutionize our approaches to the Nation's energy, national security, and environmental	Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	Computer usage, in aggregate integrated TF-Yrs, applied to calculation of properties of hot hadronic and quark matter in chiral regime [SC Goals 5, 6]	1.0 teraflops-year	Add an additional 1.25 TF-yrs of integrated usage to bring the total to 2.25 teraflops-year	Available in Q1FY08

Performance Information Table

Fiscal Year	Strategic Goal(s) Supported	Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Target	Actual Results
	quality challenges.							
2007	GOAL 3.1 Scientific Discovery – Achieve the major scientific discoveries that will drive U.S. competitiveness, inspire America, and revolutionize our approaches to the Nation's energy, national security, and environmental quality challenges.	Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	% of required generated domain wall lattice configurations [SC Goals 4,6]	24^3 x 64 at one quark mass: 100%	24^3 x 64 at a second quark mass: 100% 32^3 x 64 at one quark mass: 25%	Available in Q1FY08
2007	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Processes and Activities	Cycle Time and Resource Time	Timeliness	Increase % of tickets closed within 2 business days	Projected FY06 baseline: 85%	Increase to 90%	Actual results will be available Q1 FY08. (FY07 performance through 3/31/2007)
2007	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Processes and Activities	Quality	Errors	% reduction of delivered node hours consumed by jobs (BNL, JLAB, and TJNAF) with an error exit status.	14.5% (Baseline determined from FY06 data)	11.6% (Additional 20% reduction from baseline)	11% (FY07 performance through 05/22/07)
2007	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Processes and Activities	Security and Privacy	Security	Increase the frequency of vulnerability scans on nodes visible from the Internet performed at each site	6 scans (In FY06 scans were performed every other month (total of 6 per year)	Increase rate of vulnerability scans by 100% to monthly (total of 12 per year)	Actual results will be available Q1 FY08
2007	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S.	Technology	Effectiveness	IT Contribution to Process, Customer, or Mission	Aggregate computing resources provided by the project expressed as an average of the Asqtad and DWF algorithm performances in Tflops.	8.6 TF. (This capability allows the completion of the physics program planned for 2007.)	Increase to 11.5 TF (= 8.6+ 3.1 (new) - 0.2 (retired))This would establish sufficient capability for the planned 2008 physics program.	Available in Q1FY08

Performance Information Table

Fiscal Year	Strategic Goal(s) Supported	Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Target	Actual Results
	scientific primacy.							
2007	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Technology	Reliability and Availability	Availability	% of average machine uptime at the Meta-facility	88%	Increase to 92%	Weighted average machine uptime at the metafacility in FY07 = 96.5%. Unweighted average = 95.6%. (Data through 5/31/2007):
2008	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Customer Results	Customer Benefit	Customer Satisfaction	Additional % of improvement in customer satisfaction rating (Customers rate satisfaction with the service provided on a scale of 1 to 10)	Rating achieved from FY07 survey results.	Additional 5% improvement over FY07 survey rating.	Available Q1FY09
2008	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Customer Results	Service Coverage	New Customers and Market Penetration	Number of distinct users of the facility (includes DOE labs, LQCD and academic communities)	25	Increase to 30	Available Q1FY09
2008	GOAL 3.1 Scientific Discovery – Achieve the major scientific discoveries that will drive U.S. competitiveness, inspire America, and revolutionize our approaches to the Nation's energy, national security, and environmental quality challenges.	Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	TF-Yrs delivered towards the completion of the 2008 Scientific Program	9.0 TF-Yrs delivered in FY07	Increase to 12.0 TF-Yrs delivered in FY08	Available in Q1FY09
2008	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S.	Processes and Activities	Cycle Time and Resource Time	Timeliness	% of tickets closed within 2 business days	90%	Increase to 92%	Available Q1FY09

Performance Information Table

Fiscal Year	Strategic Goal(s) Supported	Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Target	Actual Results
	scientific primacy.							
2008	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Processes and Activities	Quality	Errors	Percent of delivered node hours consumed by jobs with an "error" exit status.	Rating achieved during 2007	Additional 10% reduction from baseline	Available in Q1FY09
2008	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Processes and Activities	Security and Privacy	Security	Increase the frequency of vulnerability scans on nodes visible from the Internet performed at each site	Monthly (total of 12 scans per year)	Increase frequency by 100% to biweekly (total of 24 scans per year)	Available in Q1FY09
2008	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Technology	Effectiveness	IT Contribution to Process, Customer, or Mission	Aggregate computing resources provided by the project expressed as an average of the Asqtad and DWF algorithm performances in Tflops.	11.5 TF This capability allows the completion of the physics program planned for 2008.	Increase to 15.6 TF (Additional 4.1)	Available in Q1FY09
2008	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Technology	Reliability and Availability	Availability	% of average machine uptime at the Meta-facility	92%	Increase to 93%	Available in Q1FY09
2009	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S.	Customer Results	Customer Benefit	Customer Satisfaction	Additional % of improvement in customer satisfaction rating (Customers rate satisfaction with the service provided on a scale of 1 to 10)	Rating achieved from FY08 survey.	5% improvement over FY08 survey rating.	Available in Q1FY09

Performance Information Table

Fiscal Year	Strategic Goal(s) Supported	Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Target	Actual Results
	scientific primacy.							
2009	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Customer Results	Service Coverage	New Customers and Market Penetration	Number of distinct users of the facility (includes DOE labs, LQCD and academic communities)	30	Increase to 35	Available in Q1FY10
2009	GOAL 3.1 Scientific Discovery – Achieve the major scientific discoveries that will drive U.S. competitiveness, inspire America, and revolutionize our approaches to the Nation's energy, national security, and environmental quality challenges.	Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	TF-Yrs delivered towards the completion of the 2009 Scientific Program	12.0 TF-Yrs	Increase to 15.0 TF-Yrs	Available in Q1FY10
2009	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Processes and Activities	Cycle Time and Resource Time	Timeliness	% of tickets closed within 2 business days	92%	Increase to 95%	Available in Q1FY10
2009	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Processes and Activities	Quality	Errors	% reduction of delivered node hours consumed by jobs (BNL, JLAB, and TJNAF) with an error exit status.	Rating achieved during FY08	Additional 10% reduction from baseline	Available in Q1FY10
2009	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S.	Processes and Activities	Security and Privacy	Security	Increase the frequency of vulnerability scans on nodes visible from the Internet performed at each site	Biweekly scans (total of 24 per year)	100% to weekly scans (total of 52 scans per year)	Available in Q1FY10

Performance Information Table

Fiscal Year	Strategic Goal(s) Supported	Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Target	Actual Results
	scientific primacy.							
2009	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Technology	Effectiveness	IT Contribution to Process, Customer, or Mission	Aggregate computing resources provided by the project expressed as an average of the Asqtad and DWF algorithm performances in Tflops.	11.9 TF	Increase to 17.4 TF	Available in Q1FY10
2009	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Technology	Reliability and Availability	Availability	% of average machine uptime at the Meta-facility	93%	Increase to 95%	Available in Q1FY10
2010	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Customer Results	Customer Benefit	Customer Complaints	Additional % of improvement in customer satisfaction rating (Customers rate satisfaction with the service provided on a scale of 1 to 10)	Rating achieved from FY09 survey.	5% improvement over FY09 survey rating.	Available in Q1FY11
2010	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Customer Results	Service Coverage	New Customers and Market Penetration	Number of distinct users of the facility (includes DOE labs, LQCD and academic communities)	35	Increase to 40	Available in Q1FY11
2010	GOAL 3.1 Scientific Discovery – Achieve the major scientific discoveries that will drive U.S. competitiveness, inspire America, and revolutionize our approaches to the Nation's energy, national security, and environmental	Mission and Business Results	General Science and Innovation	Scientific and Technological Research and Innovation	TF-Yrs delivered towards the completion of the 2010 Scientific Program	15.0 TF-Yrs	Maintain at 15.0 TF-Yrs	Available in Q1FY11

Performance Information Table								
Fiscal Year	Strategic Goal(s) Supported	Measurement Area	Measurement Category	Measurement Grouping	Measurement Indicator	Baseline	Target	Actual Results
	quality challenges.							
2010	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Processes and Activities	Cycle Time and Resource Time	Timeliness	% of tickets closed within 2 business days	95%	Increase to 96%	Available in Q1FY11
2010	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Processes and Activities	Quality	Errors	% of delivered node hours consumed by jobs (BNL, JLAB, and TJNAF) with an error exit status.	Rating achieved during 2009.	Additional 3% reduction from 2009 rating.	Available in Q1FY11
2010	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Processes and Activities	Security and Privacy	Security	Frequency of vulnerability scans on nodes visible from the Internet performed at each site	Weekly scans (total of 52 per year)	Weekly scans (total of 52 scans per year)	Available in Q1FY11
2010	GOAL 3.2 Foundations of Science – Deliver the scientific facilities, train the next generation of scientist and engineers, and provide the laboratory capabilities and infrastructure required for U.S. scientific primacy.	Technology	Reliability and Availability	Availability	% of average machine uptime at the Meta-facility	95%	Maintain at 95% Available in Q1FY11	Available in Q1FY11

Section E: Security and Privacy (IT Capital Assets only)

In order to successfully address this area of the business case, each question below must be answered at the system/application level, not at a program or agency level. Systems supporting this investment on the planning and operational systems security tables should match the systems on the privacy table below. Systems on the Operational Security Table must be included on your agency FISMA system inventory and should be easily referenced in the inventory (i.e., should use the same name or identifier).

For existing Mixed-Life Cycle investments where enhancement, development, and/or modernization is planned, include the investment in both the "Systems in Planning" table (Table 3) and the "Operational Systems" table (Table 4). Systems which are already operational, but have enhancement, development, and/or modernization activity, should be included in both Table 3 and

Table 4. Table 3 should reflect the planned date for the system changes to be complete and operational, and the planned date for the associated C&A update. Table 4 should reflect the current status of the requirements listed. In this context, information contained within Table 3 should characterize what updates to testing and documentation will occur before implementing the enhancements; and Table 4 should characterize the current state of the materials associated with the existing system.

All systems listed in the two security tables should be identified in the privacy table. The list of systems in the "Name of System" column of the privacy table (Table 8) should match the systems listed in columns titled "Name of System" in the security tables (Tables 3 and 4). For the Privacy table, it is possible that there may not be a one-to-one ratio between the list of systems and the related privacy documents. For example, one PIA could cover multiple systems. If this is the case, a working link to the PIA may be listed in column (d) of the privacy table more than once (for each system covered by the PIA).

The questions asking whether there is a PIA which covers the system and whether a SORN is required for the system are discrete from the narrative fields. The narrative column provides an opportunity for free text explanation why a working link is not provided. For example, a SORN may be required for the system, but the system is not yet operational. In this circumstance, answer "yes" for column (e) and in the narrative in column (f), explain that because the system is not operational the SORN is not yet required to be published.

Please respond to the questions below and verify the system owner took the following actions:

1. Have the IT security costs for the system(s) been identified and integrated into the overall costs of the investment: Yes

a. If "yes," provide the "Percentage IT Security" for the budget year: 3

2. Is identifying and assessing security and privacy risks a part of the overall risk management effort for each system supporting or part of this investment. Yes

3. Systems in Planning and Undergoing Enhancement(s), Development, and/or Modernization - Security Table(s):

Name of System	Agency/ or Contractor Operated System?	Planned Operational Date	Date of Planned C&A update (for existing mixed life cycle systems) or Planned Completion Date (for new systems)
FNAL LQCD FY08	Contractor Only	12/30/2008	12/1/2008
FNAL LQCD FY09	Contractor Only	6/30/2009	6/1/2009

4. Operational Systems - Security Table:

Name of System	Agency/ or Contractor Operated System?	NIST FIPS 199 Risk Impact level (High, Moderate, Low)	Has C&A been Completed, using NIST 800-37? (Y/N)	Date Completed: C&A	What standards were used for the Security Controls tests? (FIPS 200/NIST 800-53, NIST 800-26, Other, N/A)	Date Complete(d): Security Control Testing	Date the contingency plan tested
BNL LQCD, BNL Research Enclave	Contractor Only	Low	Yes	1/30/2006	FIPS 200 / NIST 800-53	1/12/2007	6/24/2007
FNAL LQCD, General Computing Enclave	Contractor Only	Low	Yes	9/30/2006	FIPS 200 / NIST 800-53	6/6/2007	6/29/2007
TJNAF LQCD, HPC/Sci-Comp Protected Zone	Contractor Only	Low	Yes	7/1/2005	FIPS 200 / NIST 800-53	9/21/2006	9/21/2006

5. Have any weaknesses, not yet remediated, related to any of the systems part of or supporting this investment been identified by the agency or IG? Yes

a. If "yes," have those weaknesses been incorporated into the agency's plan of action and milestone process? Yes

6. Indicate whether an increase in IT security funding is requested to remediate IT security weaknesses? No

a. If "yes," specify the amount, provide a general description of the weakness, and explain how the funding request will remediate the weakness.

7. How are contractor security procedures monitored, verified, and validated by the agency for the contractor systems above?

The lattice gauge computing systems are managed at BNL, FNAL, and TJNAF, each of which is a government-owned, contractor-operated facility. Performance is monitored by the DOE site office at each laboratory, in accordance with the requirements specified in the contracts between the DOE and the respective contracting agencies (Brookhaven Science Associates (BSA) for BNL, Fermi Research Alliance (FRA) for FNAL, and Jefferson Science Associates, LLC (JSA) for TJNAF). These contracts include requirements for compliance with pertinent government (NIST 800-53) and DOE Computer Security policies (e.g. DOE O 205.1 Department of Energy Cyber Security Management Program). At each laboratory, contractor security procedures are monitored, verified, and validated by numerous external entities including: 1) DOE-OCIO, 2) DOE Office of Performance Management and Oversight Assessment, 3) Site Assistance Visits, 4) the DOE-IG, and 5) external reviews. The dates of recent and planned

monitoring, verification, and validation activities by the DOE at each of the host laboratories involved in this investment are: FNAL: Cyber security assessment conducted as part of the overall Fermilab Safeguards and Security Assessment (March 5-8, 2007); Cyber security FISMA audit conducted by DOE IG - started 03/02/2007; BNL: SAIC evaluation as part of C&A process 01/12/2007; TJNAF: DOE OA (Office of Independent Oversight and Performance Assurance) Site Assistance Visit 09/21/2006. Users of the LQCD systems are required to take computer security training courses annually. At each laboratory, all network activity originating internally or externally is monitored. The detection of inappropriate activity triggers an incident investigation by each site's CIRT (Computer security Incident Response Team). Response and reporting of incidents will follow the procedures outlined in the host site's CSPP. Following the DOE CSPP, computer incidents are reported to the DOE Computer Incident Advisory Capability (CIAC), which is sponsored by the DOE CIO. CIAC handles the reporting of all incidents to DOE and to FedCIRC, as well as providing analysis and alerts to the DOE community. In each month in which there are no incidents to report, in accordance to DOE policy each site submits negative reports.

8. Planning & Operational Systems - Privacy Table:

(a) Name of System	(b) Is this a new system? (Y/N)	(c) Is there at least one Privacy Impact Assessment (PIA) which covers this system? (Y/N)	(d) Internet Link or Explanation	(e) Is a System of Records Notice (SORN) required for this system? (Y/N)	(f) Internet Link or Explanation
BNL LQCD, BNL Research Enclave.	No	No	This system does not contain, process, or transmit personal identifying information.Because a PIA is not yet required to be completed at this time.	No	
FNAL LQCD FY08	Yes	No	This system does not contain, process, or transmit personal identifying information.Because a PIA is not yet required to be completed at this time.	No	
FNAL LQCD FY09	Yes	No	This system does not contain, process, or transmit personal identifying information.Because a PIA is not yet required to be completed at this time.	No	
FNAL LQCD, General Computing Enclave	No	No	This system does not contain, process, or transmit personal identifying information.Because a PIA is not yet required to be completed at this time.	No	
TJNAF LQCD, HPC/Sci-Comp Protected Zone	No	No	This system does not contain, process, or transmit personal identifying information.Because a PIA is not yet required to be completed at this time.	No	

Details for Text Options:
Column (d): If yes to (c), provide the link(s) to the publicly posted PIA(s) with which this system is associated. If no to (c), provide an explanation why the PIA has not been publicly posted or why the PIA has not been conducted.

Column (f): If yes to (e), provide the link(s) to where the current and up to date SORN(s) is published in the federal register. If no to (e), provide an explanation why the SORN has not been published or why there isn't a current and up to date SORN.

Note: Working links must be provided to specific documents not general privacy websites. Non-working links will be considered as a blank field.

Section F: Enterprise Architecture (EA) (IT Capital Assets only)

In order to successfully address this area of the capital asset plan and business case, the investment must be included in the agency's EA and Capital Planning and Investment Control (CPIC) process and mapped to and supporting the FEA. The business case must demonstrate the relationship between the investment and the business, performance, data, services, application, and technology layers of the agency's EA.

1. Is this investment included in your agency's target enterprise architecture? Yes

   a. If "no," please explain why?

2. Is this investment included in the agency's EA Transition Yes

Strategy?

a. If "yes," provide the investment name as identified in the Transition Strategy provided in the agency's most recent annual EA Assessment.

Office of Science Lattice Quantum ChromoDynamics Computing (SC LQCD) found in EA Transition Plan section 2.1.4.1 Core Mission - Scientific Research

b. If "no," please explain why?

3. Is this investment identified in a completed (contains a target architecture) and approved segment architecture?

No

a. If "yes," provide the name of the segment architecture as provided in the agency's most recent annual EA Assessment.

4. Service Component Reference Model (SRM) Table:
Identify the service components funded by this major IT investment (e.g., knowledge management, content management, customer relationship management, etc.). Provide this information in the format of the following table. For detailed guidance regarding components, please refer to http://www.egov.gov.

Agency Component Name	Agency Component Description	FEA SRM Service Domain	FEA SRM Service Type	FEA SRM Component (a)	Service Component Reused Name (b)	Service Component Reused UPI (b)	Internal or External Reuse? (c)	BY Funding Percentage (d)
Lattice QCD Metadata Specification	Defined schema used to describe key parameters of Lattice QCD simulations.	Back Office Services	Data Management	Data Exchange			No Reuse	1
SciDAC Lattice QCD Software Libraries	Software libraries written and maintained as part of the SciDAC Lattice QCD Computing project which optimize performance of physics applications on clusters and supercomputers.	Business Analytical Services	Knowledge Discovery	Simulation	Simulation	019-20-01-21-02-3059-00	Internal	0
Lattice QCD Simulation Hardware	The resources to perform lattice QCD simulations. Dedicated computing hardware designed to execute lattice QCD computer codes in the most cost effective manner. Supports the LQCD hardware abstraction software libraries developed by the SciDAC Lattice Gauge Computing Project.	Business Analytical Services	Knowledge Discovery	Simulation			No Reuse	91
SciDAC Lattice QCD Prototype Clusters	Prototype high performance clusters built as part of the SciDAC Lattice QCD Computing project at FNAL and TJNAF.	Business Analytical Services	Knowledge Discovery	Simulation	Simulation	019-20-01-21-02-3059-00	Internal	0
Lattice QCD Metadata Catalogs	Databases that relate the simulation parameters (quark masses, interaction constants, action, lattice spacing, lattice size) used to generate gauge configurations and quark propagators to data file series	Digital Asset Services	Document Management	Classification			No Reuse	1

4. Service Component Reference Model (SRM) Table:
Identify the service components funded by this major IT investment (e.g., knowledge management, content management, customer relationship management, etc.). Provide this information in the format of the following table. For detailed guidance regarding components, please refer to http://www.egov.gov.

Agency Component Name	Agency Component Description	FEA SRM Service Domain	FEA SRM Service Type	FEA SRM Component (a)	Service Component Reused Name (b)	Service Component Reused UPI (b)	Internal or External Reuse? (c)	BY Funding Percentage (d)
	stored in various archives.							
Lattice QCD Vacuum Gauge Configuration Archives	Resources for the organization and archival storage (disk and tape) of vacuum gauge configuration data generated on Lattice OCD Simulation Hardware.	Digital Asset Services	Document Management	Library / Storage			No Reuse	2
Lattice QCD Replica Catalogs	Databases that relate lattice QCD data file series to physical storage locations.	Digital Asset Services	Knowledge Management	Information Retrieval			No Reuse	1
Lattice QCD Authenticated Data and System Access	Strong authentication mechanisms (Kerberos, SSH) permitting access to Lattice QCD data and simulation hardware by authorized users.	Digital Asset Services	Knowledge Management	Information Sharing			No Reuse	1
Lattice QCD Data Transport	Mechanisms to access and transport data products to/from Lattice QCD Simulation hardware.	Digital Asset Services	Knowledge Management	Knowledge Distribution and Delivery			No Reuse	1
Lattice QCD hardware Remote Management	Resources to enable remote management of Lattice QCD simulation hardware. Examples include mechanisms for power cycling computer hardware, reloading operating systems, data, and firmware, and resetting computer and network hardware.	Support Services	Systems Management	Remote Systems Control			No Reuse	1
Lattice QCD Hardware Monitoring	Rresources for monitoring the status of Lattice QCD simulation hardware. Includes the gathering, storage, analysis, and presentation of machine health and status information.	Support Services	Systems Management	System Resource Monitoring			No Reuse	1

a. Use existing SRM Components or identify as "NEW". A "NEW" component is one not already identified as a service component in the FEA SRM.

b. A reused component is one being funded by another investment, but being used by this investment. Rather than answer yes or no, identify the reused service component funded by the other investment and identify the other investment using the Unique Project Identifier (UPI) code from the OMB Ex 300 or Ex 53 submission.

c. 'Internal' reuse is within an agency. For example, one agency within a department is reusing a service component provided by another agency within the same department. 'External' reuse is one agency within a department reusing a service component provided by another agency in another department. A good example of this is an E-Gov initiative service being

reused by multiple organizations across the federal government.

d. Please provide the percentage of the BY requested funding amount used for each service component listed in the table. If external, provide the percentage of the BY requested funding amount transferred to another agency to pay for the service. The percentages in the column can, but are not required to, add up to 100%.

5. Technical Reference Model (TRM) Table:
To demonstrate how this major IT investment aligns with the FEA Technical Reference Model (TRM), please list the Service Areas, Categories, Standards, and Service Specifications supporting this IT investment.

FEA SRM Component (a)	FEA TRM Service Area	FEA TRM Service Category	FEA TRM Service Standard	Service Specification (b) (i.e., vendor and product name)
Simulation	Component Framework	Business Logic	Platform Independent	C/C++ (GNU compilers, Intel C/C++ compilers, Portland Group C/C++ compilers)
Remote Systems Control	Component Framework	Business Logic	Platform Independent	IPMI (Intelligent Platform Management Interface)
Simulation	Component Framework	Business Logic	Platform Independent	Perl
Simulation	Component Framework	Business Logic	Platform Independent	Python
Classification	Component Framework	Data Interchange	Data Exchange	XQuery (World Wide Web Consortium, w3.org)
System Resource Monitoring	Component Framework	Presentation / Interface	Dynamic Server-Side Display	Ganglia (sourceforge.ganglia.net)
System Resource Monitoring	Component Framework	Presentation / Interface	Dynamic Server-Side Display	MRTG
Simulation	Service Access and Delivery	Access Channels	Other Electronic Channels	Maui Scheduler Plug-In for Torque
Simulation	Service Access and Delivery	Access Channels	Other Electronic Channels	Torque (OpenPBS) Batch System
Information Retrieval	Service Access and Delivery	Delivery Channels	Internet	ESNET
Knowledge Distribution and Delivery	Service Access and Delivery	Service Transport	Service Transport	Hyper Text Transfer Protocol (HTTP)
Knowledge Distribution and Delivery	Service Access and Delivery	Service Transport	Service Transport	SCP (OpenSSH)
Knowledge Distribution and Delivery	Service Access and Delivery	Service Transport	Service Transport	SFTP (OpenSSH)
Information Sharing	Service Access and Delivery	Service Transport	Supporting Network Services	Kerberos (MIT krb5)
Information Sharing	Service Access and Delivery	Service Transport	Supporting Network Services	OpenSSH.org, Implementation of SSH
Data Exchange	Service Interface and Integration	Interoperability	Data Format / Classification	International Lattice Data Grid LQCD Metadata Schema
Library / Storage	Service Platform and Infrastructure	Database / Storage	Storage	Anacapa "XTORE" NAS (network attached storage)
Library / Storage	Service Platform and Infrastructure	Database / Storage	Storage	Infortrend RAID Disk Arrys (SCSI-Attached SATA Disk Arrays)
Library / Storage	Service Platform and Infrastructure	Database / Storage	Storage	Jetstore RAID Disk Arrays (SCSI-Attached EIDE and SATA Disk Arrays)
Library / Storage	Service Platform and Infrastructure	Database / Storage	Storage	StorageTek Tape Silos ("Powderhorn") and Tape Drives (T9940A, T9940B)
Knowledge Distribution and Delivery	Service Platform and Infrastructure	Delivery Servers	Web Servers	Apache (www.apache.org)
Simulation	Service Platform and Infrastructure	Hardware / Infrastructure	Local Area Network (LAN)	Ethernet
Simulation	Service Platform and Infrastructure	Hardware / Infrastructure	Local Area Network (LAN)	Mellanox Infiniband Switches and Host Channel Adapters
Simulation	Service Platform and Infrastructure	Hardware / Infrastructure	Local Area Network (LAN)	Myricom Myrinet 2000
Simulation	Service Platform and Infrastructure	Hardware / Infrastructure	Servers / Computers	Custom QCDOC Supercomputer
Simulation	Service Platform and Infrastructure	Hardware / Infrastructure	Servers / Computers	SciDAC Lattice OCD Prototype Clusters
Simulation	Service Platform and Infrastructure	Hardware / Infrastructure	Servers / Computers	X86 Processor-based Clusters (Xeon, Pentium 4, Opteron)
Simulation	Service Platform and Infrastructure	Support Platforms	Platform Dependent	Custom QOS Operating System
Simulation	Service Platform and Infrastructure	Support Platforms	Platform Independent	Linux (Scientific Linux, RedHat Linux)
Simulation	Service Platform and Infrastructure	Support Platforms	Platform Independent	SciDAC Lattice QCD Software Libraries

a. Service Components identified in the previous question should be entered in this column. Please enter multiple rows for FEA SRM Components supported by multiple TRM Service Specifications

b. In the Service Specification field, agencies should provide information on the specified technical standard or vendor product mapped to the FEA TRM Service Standard, including model or version numbers, as appropriate.

6. Will the application leverage existing components and/or applications across the Government (i.e., FirstGov, Pay.Gov, etc)?	No

a. If "yes," please describe.

Exhibit 300: Part II: Planning, Acquisition and Performance Information

Section A: Alternatives Analysis (All Capital Assets)

Part II should be completed only for investments identified as "Planning" or "Full Acquisition," or "Mixed Life-Cycle" investments in response to Question 6 in Part I, Section A above.

In selecting the best capital asset, you should identify and consider at least three viable alternatives, in addition to the current baseline, i.e., the status quo. Use OMB Circular A-94 for all investments and the Clinger Cohen Act of 1996 for IT investments to determine the criteria you should use in your Benefit/Cost Analysis.

1. Did you conduct an alternatives analysis for this project? Yes

a. If "yes," provide the date the analysis was completed? 7/6/2007

b. If "no," what is the anticipated date this analysis will be completed?

c. If no analysis is planned, please briefly explain why:

2. Alternative Analysis Results: * Costs in millions

Use the results of your alternatives analysis to complete the following table:

Alternative Analyzed	Description of Alternative	Risk Adjusted Lifecycle Costs estimate	Risk Adjusted Lifecycle Benefits estimate
1	In FY08-09 build 6.2 teraflop/s cluster at $0.36 per sustained megaflop/s ($2.5M), operate (10%/yr). FY08-09 machine lifecycle cost: 1.6 +10%*3.5yr =$3.38M. Note: last 2 years of operation will be funded in a follow-on project. Operate existing QCDOC at BNL and clusters at FNAL & JLab: $0.89M/year average for 08/09. Total FY2006-FY2009 project cost, including FY06-07 procurements and operations ($5M): $9.2M. This alternative complies with the DOE Information Technology Archictecture (EITA).	9.2	36.8
2	Traditional Supercomputers: Expand DOE supercomputers. NERSC estimates $6 per sustained MF/s, falling to $3/MF in 08, $2/MF in 09. Procure 3.1 TF in FY08 ($8M), 3.1 TF in FY09 ($8M). Operations at 10%/yr: FY08 ($0.8M), FY09 ($1.6M). Incremental 2-yr cost: $18.4M. FY08-09 lifecycle cost: $16M +10%/yr*3.5yr =$21.6M. Total FY06-09 project cost, including FY06-07 procurements & operation of all resources: $25.2M. This alternative complies with the DOE Information Technology Architecture(EITA).	25.2	36.8
3	BlueGene/P: Purchase 3.1 TF sustained BG/P in FY08 ($3.1M), 3.1 TF BG/P in 09 ($3.1M). Support contract: free first year, 8% in FY09 ($0.25M). Other operations 2%/yr: FY08 ($0.06M), FY09 ($0.12M). Incremental 2-yr cost: $6.63M. FY08-09: 3.5 yr lifecycle cost: $6.2M+20% =$7.46M. Total FY06-09 project cost, including FY06-07 procurements & operation of all resources: $13.8M. This alternative complies with the DOE Information Technology Architecture (EITA).	13.9	36.8
4	(Status Quo). Operate the systems deployed through FY07. This option is included only for completeness, and would not be capable of providing the necessary computational capacity to achieve the scientific goals of this project. The cost of this alternative is $1.3M to operate the existing facilities as a coherent resource. The incremental cost of this alternative is $0. This alternative complies with the DOE Information Technology	0	0

2. Alternative Analysis Results: * Costs in millions

Use the results of your alternatives analysis to complete the following table:

Alternative Analyzed	Description of Alternative	Risk Adjusted Lifecycle Costs estimate	Risk Adjusted Lifecycle Benefits estimate
	Archictecture (EITA).		

3. Which alternative was selected by the Agency's Executive/Investment Committee and why was it chosen?

Alternative 1 was selected because it meets the scientific goals in the most cost effective manner. Compared to Alternatives 2 and 3, 1 is significantly less expensive because the systems in this alternative are specially architected to optimally perform LQCD calculations. Alternative 1 (selected alternative) is chosen because it optimizes performance, cost and coupling to the user communities. Three criteria are used for choosing the best alternative: 1. Achievement of the performance goals of the project 2. Lowest cost 3. Most effective collaboration between the experimental and theoretical collaborators and the systems developers Each of the first three alternatives are scoped to achieve the scientific goals. The fourth alternative is included only for completeness, and does not meet the goals of the project. Based upon criteria 1, alternative 1, 2, or 3 is preferred. The three alternatives have very different costs as the performance of any given supercomputer varies dramatically depending on application. Consequently the actual application is used to verify the performance. Based on criteria 2, alternative 1 is preferred. Staffing needs will be approximately the same for commercial supercomputers as for the proposed system assembled from commercial components, 10% of the initial cost of the hardware per year. For the BlueGene family, it is 8%/year for support (first year free), and other operations costs are about 2%/year. Alternatives 1 and 3 would locate scientific computational facilities at laboratories where the experiments are taking place. This means that the theoretical and experimental users most interested in the performance of the systems and the results would have the maximum assurance that the computational results are closely linked to the experimental results and planning. While modern networking and collaboration tools will be used to integrate the systems at the host labs with the largely university based community, close physical proximity of the computational hardware, the systems developers, the experimentalists and theorists has been observed by the community to enhance the focus on total performance. Based on criteria 3, Alternative 1 or 3 is preferred. Conclusion: Alternative 1 is the most cost effective way of meeting the scientific objectives, and the most effective solution for community collaboration.

4. What specific qualitative benefits will be realized?

This investment provides two classes of benefits to the High-Energy Physics (HEP) and Nuclear Physics (NP) programs of the DOE's Office of Science (DOE-SC). One consists of direct enhancements to the science itself: the theoretical calculations are important, and in some cases essential, to a cost effective exploitation of much more expensive experiments. In the FY07 Operating Plan, the total HEP and NP programs in DOE-SC were $752M and $432M, respectively. Further, both fields of science receive substantial, though smaller, grants from the National Science Foundation. This should be compared to the budget of this project, $2.5M/year in FY06-FY08, and $1.7M in FY09. In HEP, roughly 30% of the Tevatron program at Fermilab has a direct interplay with lattice QCD calculations. Furthermore, the entire PEP-2/BaBar B physics program at SLAC, and the entire (NSF-funded) CLEO-c program at Cornell depends on lattice QCD for a full understanding of the experimental measurements. The whole suite of measurements and calculations are worth much more together than in isolation, so one must conclude that the return on investment for HEP is at least five-fold, possibly even twenty-fold. In NP, the situation is much the same. A significant development at BNL's Relativistic Heavy-Ion Collider is to search for the critical point of the QCD phase transition. Lattice QCD calculations indicate that this search is within RHIC's reach; RHIC would not proceed without this guidance. At Jefferson Lab a key motivation for the upgraded accelerator is the search for hybrid mesons and gluonic excitations, states whose theoretical foundation rests on lattice QCD. One concludes again that the return on investment for NP is at least five-fold, possibly even twenty-fold. With such high rates of return, it is safe to view the calculations as necessary for the DOE to do a sensible deployment of the experiments. But one should then ask whether other computing facilities could do the job. Indeed, all of the experiments in question have computing budgets that rival or surpass this project. However, their communications networks are ill suited to the data-structures of lattice QCD, with a mismatch in efficiency of nearly a factor of 10. In the past, LQCD has, therefore, been carried out at supercomputer centers. Compared to this project's computing facilities, the costs at supercomputer centers are two to eight times as much to deliver the same amount of dedicated lattice QCD computing.

5. Will the selected alternative replace a legacy system in-part or in-whole?	No
a. If "yes," are the migration costs associated with the migration to the selected alternative included in this investment, the legacy investment, or in a separate migration investment.	
b. If "yes," please provide the following information:	

List of Legacy Investment or Systems

Name of the Legacy Investment of Systems	UPI if available	Date of the System Retirement

Section B: Risk Management (All Capital Assets)

You should have performed a risk assessment during the early planning and initial concept phase of this investment's life-cycle, developed a risk-adjusted life-cycle cost estimate and a plan to eliminate, mitigate or manage risk, and be actively managing risk throughout the investment's life-cycle.

1. Does the investment have a Risk Management Plan?	Yes
a. If "yes," what is the date of the plan?	7/13/2007
b. Has the Risk Management Plan been significantly changed since last year's submission to OMB?	No

c. If "yes," describe any significant changes:

2. If there currently is no plan, will a plan be developed?

a. If "yes," what is the planned completion date?

b. If "no," what is the strategy for managing the risks?

3. Briefly describe how investment risks are reflected in the life cycle cost estimate and investment schedule:

In each year of the investment, additional computing capacity is added at either FNAL or TJNAF (2.0 Tflops, 2.9 Tflops, 3.7 Tflops, and 2.5 Tflops, respectively, in FY06-FY09) to meet the needs of the scientific program. The cost and schedule in the investment plan are based upon the solid trend, observed over the last seven years, of the performance of lattice QCD codes improving on commodity cluster systems by 60% each year for fixed cost (a "Moore's Law" doubling time of 18 months). Industry fluctuations in the release schedules of improved components, in the price of existing and new components, and in the performance of new components, result in cost and schedule risks. To mitigate these risks,historical costing trends are used to project investment costs. In addition, the project bases the projected performance and costs of the computer systems using a longer 22 month Moore's Law (46% annual performance increase). Annual external reviews of the project by the DOE examine the achieved performance of each year's LQCD system, and the proposed architecture and projected performance of the next planned system. Although this investment is exempt from using an ANSI-compliant EVMS (per DOE Order 314), we actively manage cost, schedule, and performance as a key element of risk management.

Section C: Cost and Schedule Performance (All Capital Assets)

EVM is required only on DME portions of investments. For mixed lifecycle investments, O&M milestones should still be included in the table (Comparison of Initial Baseline and Current Approved Baseline). This table should accurately reflect the milestones in the initial baseline, as well as milestones in the current baseline.

1. Does the earned value management system meet the criteria in ANSI/EIA Standard-748? No

2. Is the CV% or SV% greater than +/- 10%? (CV%= CV/EV x 100; SV%= SV/PV x 100) No

a. If "yes," was it the CV or SV or both?

b. If "yes," explain the causes of the variance:

c. If "yes," describe the corrective actions:

3. Has the investment re-baselined during the past fiscal year? No

a. If "yes," when was it approved by the agency head?

4. Comparison of Initial Baseline and Current Approved Baseline

Complete the following table to compare actual performance against the current performance baseline and to the initial performance baseline. In the Current Baseline section, for all milestones listed, you should provide both the baseline and actual completion dates (e.g., "03/23/2003"/ "04/28/2004") and the baseline and actual total costs (in $ Millions). In the event that a milestone is not found in both the initial and current baseline, leave the associated cells blank. Note that the 'Description of Milestone' and 'Percent Complete' fields are required. Indicate '0' for any milestone no longer active.

Milestone Number	Description of Milestone	Initial Baseline		Current Baseline				Current Baseline Variance		Percent Complete
		Planned Completion Date (mm/dd/yyyy)	Total Cost ($M) Estimated	Completion Date (mm/dd/yyyy)		Total Cost ($M)		Schedule (# days)	Cost ($M)	
				Planned	Actual	Planned	Actual			
1	Computer architecture planning for FY07 complete and reviewed by external DOE committee (Table I.C.1 lines 6-8). (Not in initial baseline)		$0	6/30/2006	5/26/2006	$0.023	$0.025	35	$-0.002	100%
2	Initial (submission in 2004): Procurement and deployment of 1.8 teraflops (sustained) system at either FNAL or TJNAF. Current: Procurement and deployment of FY06 system at FNAL totaling 1.8 teraflops (sustained) (Table I.C.1 line 10)	3/30/2006	$1	9/30/2006	9/30/2006	$1.57	$1.538	0	$-0.3605	75%
3	Procurement and deployment of FY06 system at TFNAF totaling 0.2 teraflops (sustained) (Table I.C.1 line 9) (Not in initial baseline)		$0	6/30/2006	5/1/2006	$0.28	$0.283	60	$-0.003	100%
4	Initial	9/30/2006	$1	9/30/2006	10/7/2006	$0.627	$0.617	-7	$-0.10286	82%

4. Comparison of Initial Baseline and Current Approved Baseline

Complete the following table to compare actual performance against the current performance baseline and to the initial performance baseline. In the Current Baseline section, for all milestones listed, you should provide both the baseline and actual completion dates (e.g., "03/23/2003"/ "04/28/2004") and the baseline and actual total costs (in $ Millions). In the event that a milestone is not found in both the initial and current baseline, leave the associated cells blank. Note that the 'Description of Milestone' and 'Percent Complete' fields are required. Indicate '0' for any milestone no longer active.

Milestone Number	Description of Milestone	Initial Baseline		Current Baseline				Current Baseline Variance		Percent Complete
		Planned Completion Date (mm/dd/yyyy)	Total Cost ($M) Estimated	Completion Date (mm/dd/yyyy)		Total Cost ($M)		Schedule (# days)	Cost ($M)	
				Planned	Actual	Planned	Actual			
	(submission in 2004): 7 Teraflops-years computing delivered to LQCD community during FY06. Current: 6.2 TFlops-years computing delivered to LQCD community during FY06. (Table I.C.1 lines 6-8)									
5	Computer architecture planning for the FY08 procurement complete and reviewed by external DOE committee. (Table I.C.1 line 3) (Not in initial baseline)		$0	6/30/2007	5/15/2007	$0.024	$0.025	46	$-0.025	0%
6	Initial (submission in 2004): Procurement and deployment of 2.2 teraflops (sustained) system at either FNAL or TJNAF.	3/30/2007	$0.9	12/30/2007		$1.592	$0		$0	0%

4. Comparison of Initial Baseline and Current Approved Baseline

Complete the following table to compare actual performance against the current performance baseline and to the initial performance baseline. In the Current Baseline section, for all milestones listed, you should provide both the baseline and actual completion dates (e.g., "03/23/2003"/ "04/28/2004") and the baseline and actual total costs (in $ Millions). In the event that a milestone is not found in both the initial and current baseline, leave the associated cells blank. Note that the 'Description of Milestone' and 'Percent Complete' fields are required. Indicate '0' for any milestone no longer active.

Milestone Number	Description of Milestone	Initial Baseline		Current Baseline				Current Baseline Variance		Percent Complete
		Planned Completion Date (mm/dd/yyyy)	Total Cost ($M) Estimated	Completion Date (mm/dd/yyyy)		Total Cost ($M)		Schedule (# days)	Cost ($M)	
				Planned	Actual	Planned	Actual			
	Current: Procurement and deployment of FY07 system at TJNAF totaling 2.9 teraflops (sustained) (Table I.C.1 line 11)									
7	FY07 security controls and contingency plan testing complete at FNAL, BNL and TJNAF.		$0	8/31/2007		$0.083	$0		$0	0%
8	9 Teraflops-years aggregate computing delivered to LQCD community during FY07. (Table I.C.1 line 5)	9/30/2007	$1.1	9/30/2007		$0.801	$0		$0	0%
9	Computer architecture planning for the FY09 procurement complete and reviewed by external DOE committee. (Table I.C.1 line 3) (Not in initial baseline)		$0	6/30/2008		$0.025	$0		$0	0%
10	FY08 security		$0	8/31/2008		$0.088	$0		$0	0%

4. Comparison of Initial Baseline and Current Approved Baseline

Complete the following table to compare actual performance against the current performance baseline and to the initial performance baseline. In the Current Baseline section, for all milestones listed, you should provide both the baseline and actual completion dates (e.g., "03/23/2003"/ "04/28/2004") and the baseline and actual total costs (in $ Millions). In the event that a milestone is not found in both the initial and current baseline, leave the associated cells blank. Note that the 'Description of Milestone' and 'Percent Complete' fields are required. Indicate '0' for any milestone no longer active.

Milestone Number	Description of Milestone	Initial Baseline		Current Baseline				Current Baseline Variance		Percent Complete
		Planned Completion Date (mm/dd/yyyy)	Total Cost ($M) Estimated	Completion Date (mm/dd/yyyy)		Total Cost ($M)		Schedule (# days)	Cost ($M)	
				Planned	Actual	Planned	Actual			
	controls and contingency plan testing complete at FNAL, BNL and TJNAF.									
11	Initial (submission in 2004): Procurement and deployment of 3 teraflops (sustained) system at either FNAL or TJNAF. Current: Procurement and deployment of 4.2 teraflops (sustained) at Fermilab in FY09.	3/30/2008	$0.8	12/30/2008		$1.63	$0		$0	0%
12	12 Teraflops-years aggregate computing delivered to LQCD community during FY08. (Table I.C.1 line 3)	9/30/2008	$1.2	9/30/2008		$0.757	$0		$0	0%
13	Initial (submission in 2004): Procurement and deployment of 4.5 teraflops (sustained) system at either	9/30/2009	$0.8	6/30/2009		$0.798	$0		$0	0%

4. Comparison of Initial Baseline and Current Approved Baseline

Complete the following table to compare actual performance against the current performance baseline and to the initial performance baseline. In the Current Baseline section, for all milestones listed, you should provide both the baseline and actual completion dates (e.g., "03/23/2003"/ "04/28/2004") and the baseline and actual total costs (in $ Millions). In the event that a milestone is not found in both the initial and current baseline, leave the associated cells blank. Note that the 'Description of Milestone' and 'Percent Complete' fields are required. Indicate '0' for any milestone no longer active.

Milestone Number	Description of Milestone	Initial Baseline		Current Baseline				Current Baseline Variance		Percent Complete
		Planned Completion Date (mm/dd/yyyy)	Total Cost ($M) Estimated	Completion Date (mm/dd/yyyy)		Total Cost ($M)		Schedule (# days)	Cost ($M)	
				Planned	Actual	Planned	Actual			
	FNAL or TJNAF. Current: Procurement and deployment of 2.0 teraflops (sustained) at FNAL in FY09.									
14	FY09 security controls and contingency plan testing complete at FNAL, BNL and TJNAF.		$0	8/31/2009		$0.09	$0		$0	0%
15	15 Teraflops-years aggregate computing delivered to LQCD community during FY09. (Table I.C.1 line 1)	9/30/2009	$1.2	9/30/2009		$0.812	$0		$0	0%
16	Initial (submission in 2004): 12 Teraflops-years aggregate computing delivered during FY10. Note: no longer active. Project as approved BY06 covered only four years.	9/30/2010	$1.2			$0	$0		$0	0%
17	Evaluate costs for operations of		$0	9/30/2008		$0	$0		$0	0%

4. Comparison of Initial Baseline and Current Approved Baseline

Complete the following table to compare actual performance against the current performance baseline and to the initial performance baseline. In the Current Baseline section, for all milestones listed, you should provide both the baseline and actual completion dates (e.g., "03/23/2003"/ "04/28/2004") and the baseline and actual total costs (in $ Millions). In the event that a milestone is not found in both the initial and current baseline, leave the associated cells blank. Note that the 'Description of Milestone' and 'Percent Complete' fields are required. Indicate '0' for any milestone no longer active.

Milestone Number	Description of Milestone	Initial Baseline		Current Baseline				Current Baseline Variance		Percent Complete
		Planned Completion Date (mm/dd/yyyy)	Total Cost ($M) Estimated	Completion Date (mm/dd/yyyy)		Total Cost ($M)		Schedule (# days)	Cost ($M)	
				Planned	Actual	Planned	Actual			
	LQCD hardware for FY10 forward for a new project proposal or for extension of this project (Not in initial baseline)									
Project Totals		**9/30/2010**	**$9.2**	**9/30/2009**	**5/15/2007**	**$9.2**	**$2.488**	**869**	**$-0.49344**	**21.68%**