Fermilab

TECHNICAL SCOPE of WORK

Between

The Minos Collaboration

and

The Fermilab Computing Sector

for

Support of Computing used in the Operation of the Minos Experiment

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Version 0.9

Abstract:

This document is the Technical Scope of Work (TSW), formerly known as a Memorandum of Understanding (MOU), between the Fermilab Computing Sector (CS) and the Minos collaboration for support of the Computing Systems used by the Minos experiment. This document is intended to clarify the roles and responsibilities of the two parties in supporting the computing resources based upon the requirements agreed to at the time of publication.

Table of Contents

1 Introduction

This document is the Computing Sector – Minos Technical Scope of Work (TSW) that describes in more detail than the Minos –Fermilab TSW, the responsibilities of the Fermilab Computing Sector (CS) and the Minos collaboration personnel for computing services used by the Minos experiment.

This document applies both the the Minos and Minos Plus experiments. For the sake of brevity, the term Minos used hereafter applies to both experiments.

The TSW:

- Will be reviewed on a yearly basis by all the parties to the agreement and amended as requirements change.
- Shall be valid until the end of data analysis for the Minos experiment.
- Shall cover the long-term computing needs of the experiment including any data preservation needs.
- Shall reflect the computing requirements provided each year in the Computing Sector Strategic and Tactical plans and the SCPPM, to which the Minos experiment provides substantial input.
- Shall refer to the requirements for computing capacity and hardware covered in separate Minos Computing Requirements documents.
- Shall not include activities funded under the Minos experiment project funds.
- Shall not include activities or equipment funded with PPD funds, such as DAQ computers in the control room.

The following organizational units are involved in support activities under this TSW:

- The Computing Sector (CS), including the Office of the Chief Information Officer (OCIO), the Core Computing Division (CCD), and the Scientific Computing Division (SCD).
- The Minos Collaboration. Minos Batch/Simulation/Core Computing group, Minos online/data acquisition group, the Minos Analysis Coordinator and the Minos physics analysis groups.

Contacts:

- Minos: Computing Sector Liaison to the Minos collaboration.
- Computing Sector: Brian Mckittrick - Service Level Manager, OCIO.

1.1 Overview of Computing Sector Support

Computing Sector service support is provided as specified in the *FNAL Foundation Service Level Agreement (SLA)* [1], which applies to all Computing

Sector supported services, except as amended by service-specific Service Level Agreements (SLAs). It is important to note that in general:

- Computing Sector support is provided on an 8x5 basis unless otherwise specified and agreed.
- Additional Service Level Agreements apply for specific services (such as Networking, Database, Grid and Cloud Computing, Storage, Engineering, etc.). These additional SLAs are published in the Service Level Management (subtopic of ITIL Processes and Functions) topic in CD-DocDB.
- All services provided by the Computing Sector are managed through the Computing Sector Service Desk (http://servicedesk.fnal.gov/, or 630-840-2345).

In the event of issues with any service, Minos collaboration personnel shall utilize the Service Desk interface to report any issues. For off hours (outside of the standard 8x5 business hours of Monday-Friday, 8AM to 5PM), the support escalation procedure is to telephone the service desk at 630-840-2345 and select the option to page the on-call service desk personnel.

Computing at Fermilab is governed by the *Fermilab Policy on Computing.*[2] This policy covers all Fermilab-owned computers and any computer, regardless of ownership, when it is connected to the Fermilab network (and/or showing a Fermilab address).

Significant Computing Sector change and maintenance activities shall be coordinated with the Minos collaboration so as not to adversely affect Minos experiment operations. Similarly, the collaboration shall advise and consult with the Computing Sector prior to performing activities that might result in unusual usage patterns or impose unusually large loads on computing systems.

1.2 Overview of Minos Experiment Services and Activities

The details of the Minos systems are documented in *The Minos Technical Design Report (TDR).*[3] Below we summarize the major points to provide a context for the set of services that require operational support.

The Minos experiment is in a mature phase and it is not anticipated that substantial changes will be made to the existing model and procedures. It is acknowledged that the computing models for many of the Intensity Frontier experiments will have significant similarities, and that leveraging those similarities to provide for common solutions is in the best interests of Computing Sector and Minos. Both parties will seek to identify and exploit such opportunities.

The data flows and computing model for Minos is well established. Raw data is stored on disk and tape at Fermilab and primary reconstruction of this data occurs on the General Purpose (GP) Grid Cluster at Fermilab. Production output is stored on disk and archived to tape. The reconstructed data is read from disk and further processed and reduced on the FermiGrid GP cluster to produce analysis datasets. These are stored on disk at Fermilab and backed-

up to tape. All data through this phase is cataloged in SAM with appropriate metadata. Physicists use the combined interactive and batch services available on the MINOS cluster and the GP cluster as well as other FermiGrid resources. Additional disk storage that is accessible from the Minos cluster and GP Grid cluster are needed to support this analysis activity. The data processing capacity and data rates are based on experience for the last 10 years.

2 Core Computing Services

2.1 Authentication and Directory Services[4]

The Minos collaboration will utilize the standard Authentication and Directory Services offerings:

- Kerberos Authentication Services
- Services Domain Authentication Services

These services will be provided under the standard Authentication and Directory Services SLA.

2.2 Backup and Restore[5]

The Minos collaboration will utilize the standard Backup and Restore Services.

2.3 Central Web Hosting[6]

The Minos collaboration has its main web pages on the standard Central Web Hosting Services and these will be supported.

2.3.1 Apache Central Web Server - Shared Virtual Host

Note this SLA provides 24x7 support for this offering. The Minos collaboration has the following websites covered by this SLA

http://www-numi.fnal.gov

http://nusoft.fnal.gov/minos

2.4 Data Center Services[7]

The Minos collaboration will utilize the standard Data Center Services.

2.5 Database Hosting[8]

The Minos collaboration utilizes the standard Database Hosting Services together with the following enhanced services.

Maintaining database services entails support across three tightly coupled layers: hardware, database, and application. Ensuring robust services requires coordinated planning by all stakeholders across all layers. Database servers at the Far Detectors site are not supported by the Fermilab Computing Sector. The requirements for supporting the Far Detector database service are managed by the Minos project. The Computing Sector provides tiered levels of support for database services ranging from 24x7 “on call” to

8x5 “best effort”. The choice of service level depends upon the application and the type of underlying database. It is assumed that each production database instance supported by the Computing Sector will be accompanied by integration and development instances, both of which receive the lowest available tier of support.

There are three database areas needed by the experiment: 1) SAM for the data file catalog, 2) the conditions data recording configuration, beam parameters, detector calibrations, detector alignment, etc., and 3) the Electronic log book.

2.5.1 Enhanced Postgres

SAM data file catalog, 24x7 service availability, 12x7 support availability.

2.5.2 MySQL

Conditions data recording configuration – beam parameters, detector calibrations, detector alignment, etc.

Desktop Services[9]

The Minos collaboration will utilize the standard Desktop Services together with the following enhanced services:

Need list from the experiment.

2.5.3 Chat

The Minos collaboration will utilize the standard FermiMail Chat Services.

2.5.4 Email

The Minos collaboration will utilize the standard FermiMail Email Services.

2.5.5 Mail Lists

The Minos collaboration will utilize the standard FermiMail Mail List (LISTSERV) Services

2.6 Enterprise Support Services

The Minos collaboration will utilize the standard Enterprise Support Services including support for an instance of the document management system (DocDB) for use by Minos. DocDB is critical to Minos operations and 24x7 support is requested.

2.7 Network Services[10]

The Minos collaboration will utilize the standard Network Services together with the following enhanced services.

The Far detector LAN at Soudan and the Near detector LAN at Fermilab have been configured and installed by the Fermilab network group. The strategy for the Soudan LAN support is to incorporate the operation and management into the Fermilab campus network support effort. The Fermilab policy that defines the campus network as a restricted central service [6] is extended to include the local network at Soudan.

The support level for the Minos network devices are listed in Table 1 and the Support levels for these enhanced services are listed in Table 2 below.

Network switches supported for the Minos experiment

Service Area: Network		
Use	**Responsible**	**Devices**
Minos Near Detector DAQ	Networking	
Minos Far Detector DAQ	Networking	
Pseudo-Wire WAN	Networking	

Network support levels for the Minos experiment

Service Area: Network	Service Level Commitments				
Use	Service Availability Schedule	Support Availability	Incident Response	Incident Resolution	Request Response

<insert diagram of network>

Minos is responsible to notifying Fermilab of changes to Minos's requirements or new computing deployments as early as possible. Minos should be aware that significant lead-time may be necessary should there be a need to change an existing service or current infrastructure to accommodate Minos's needs.

2.8 Networked Storage Hosting[11]

The Minos collaboration will utilize the standard Networked Storage Hosting Services listed below

2.8.1 Bluearc

The Minos collaboration uses the following BlueArc volumes:

- Blue2:/minos/data2
- Blue3:/nusoft/data
- If-nas-0:/minos/app
- If-nas-0:/nusoft/app
- Blue2:/fermigrid-fermiapp
- Blue2:/fermigrid-data

2.8.2 AFS

Minos uses the standard (/afs/fnal.gov/files/home/*) AFS space for the home directories of its members

Minos will move its www-numi web pages from AFS to CWS as soon as is practical

2.9 Service Desk[12]

The Minos collaboration will utilize the standard Service Desk Services. The Service Desk Service SLA describes the expectations and responsibilities of the customer (Minos) and the Computing Sector

2.10 Video Conferencing[13]

The Minos collaboration will utilize the standard Video Conferencing Services.

- Readytalk is used for meetings
- Point to point Video is used to certify new remote shift stations

3 Scientific Computing Services

3.1 Engineering and Electronics

The Minos collaboration is not planning to utilize the standard Engineering and Electronics Services.

3.2 Grid and Cloud Computing

The Minos collaboration depends on the standard Grid and Cloud Computing Services. Scientific Computing System, Scientific Data Storage and Access, and Grid and Cloud Services provide support for Minos data analysis and processing systems under the Foundation SLA with 8x5 support. The number of batch slots, experiment data storage size and performance, and common job submission and monitoring tools are provided as part of these services. The needs for each year are proposed and agreed to through the Fermilab Scientific Portfolio Management process.

Minos development of simulation, reconstruction and analysis is ongoing, and makes use of

- Grid computing resources (FermiGrid).
- Disk storage for Project areas
- Disk storage for managed data.
- Tape storage for managed data.
- Support for specialized service machines (i.e. VMs for Nearline, Calibration, OS testing, physical systems for data management)

3.2.1 FermiGrid

The Minos collaboration uses the standard FermiGrid Services. The Minos collaboration relies on FermiGrid as the ensemble of interfaces and services to access the Fermilab computing infrastructure. The data-intensive computing activities, such as reconstruction, are run on FermiGrid and remote system like OSG. Purely compute-intensive tasks, such as monte-carlo generation, are run on University computing facilities. CS takes responsibility to manage the ensemble of the services that allow access to the computing infrastructure at Fermilab at the level described in the SLA.

3.2.2 FermiCloud

Minos makes use of standard CS Virtualized and Cloud Services.

3.2.3 GridFTP

The Minos collaboration uses GridFTP Services. For transferring the output of Grid jobs, Minos relies on a Globus GridFTP server configured to maintain both user and *group* id file ownership.

3.2.4 Accounting Service

The Minos collaboration will use the standard Gratia Accounting Services.

3.2.5 JobSsub

The Minos collaboration will utilize the standard FIFE Jobsub Services. JobSub is an ensemble of services to submit and manage jobs to local and remote resources. The ensemble includes a user-facing interface for job management, which encapsulates the semantic of experiment-specific use cases, job queuing and resource matching services, basic provisioning services, as well as input / output sandbox transfer service. Minos relies on this service for the submission of all jobs to resources, either local or remote, dedicated or opportunistic, public or private or commercial.

3.2.6 FIFEMON

The Minos collaboration will utilize the standard FIFEmon Services. FIFEifemon is the service that monitors the status of submitted jobs. FIFEifemon shows the status of the jobs as they go through their lifecycle e.g. submitted, idle, running, and completed. The service allows the user to “drill down” at an increasing level of detail for those jobs of particular interest.

3.2.6.1 Computing Sector responsibilities

1. Operation and support for use of the Interactive/Batch Analysis Cluster GPCF.
2. Operation and support for use of local Grid accessible resources agreed to with the collaboration.
3. Support and consulting for the use of offsite resources through the Open Science Grid.
4. Provide consultation with offline personnel from the collaboration on issues related to grid utilization.

5. Develop and provide training and documentation in the recommended use patterns of the above resources.

3.2.6.2 Minos responsibilities

6. Validate users authorized to access Minos grid computing resources. The collaboration will further provide personnel for the roles of “Group Managers”, “Operations Contact”, “Security Contact” and “Spokesperson”, pursuant to the “Establishing Grid Trust with Fermilab” document [3].
7. Document the local grid and interactive computing resources required to meet the physics goals of the collaboration.
8. Ensure that Minos users are informed as to the appropriate usage patterns for all computing resources[1]. Work with CS personnel as needed to investigate and address operational issues or utilization efficiency issues.
9. Perform job submission and data processing tasks.
10. Provide user support for job submission and job tracking, and user documentation and education on the use of Minos computing resources.
11. Provide job submission or monitoring tools that are specific to Minos.

3.2.6.3 Joint responsibilities

12. Meet as needed to discuss operational issues affecting the use of computing systems, best practices for using the systems, user support issues, utilization strategies, or other items of mutual interest with respect to the computing systems.
13. Investigate and deploy suitable mechanisms for transferring executables, database information, etc., to remote worker nodes for the purpose of Monte Carlo generation, and for transferring generated files back to Fermilab.

3.3 PREP

The Minos collaboration will utilize the standard PREP Services

3.3.1 Prep Logistics

The Minos collaboration will utilize the standard PREP Logistics Services. PREP support is through standard replace and repair procedures with the availability of the Prep service window being 9.30am -4pm 5 days a week. All PREP loans are authorized under a TSW. Experiments sign full TSW’s with the division heads organized by the Directorate Office of Program Planning. Test

1Experiments that use Grid resources must establish the appropriate Grid Trust Agreements [3] prior to use of the Fermilab Campus Grid (FermiGrid) resources. In addition to the Fermilab Policy on Computing, specific additional policies apply to Grid computing activities on FermiGrid [4] and further policies apply to Grid resources accessed via the Open Science Grid (OSG) collaboration [5].

beam experiments do the same, save that the CS signature has been delegated by the Division head to the PREP Scientific Manager.

3.3.2 PREP Electronics

The Minos collaboration will utilize the standard PREP Electronics Services, together with the following list of additional enhanced services:

- <list>

There is a TSW template for offsite loans signed by the User, PREP Scientific Manager, and Associate Director for Program Planning. Expansions beyond the “PREP list” in a TSW are normal, expected, and by negotiation. There are no explicit Service Level Agreements (SLA’s). Implicit in the pool model is that working spares are available to replace failures and diagnose issues. PREP, when asked, will do whatever it can to get a running experiment that is down, back to taking data. This includes spares, replacements, and technical consulting with the Techs and managers as required.

The Minos experiment utilizes a broad array of electronics in the operation of the DAQ system and the experiment as a whole. The equipment required includes standard test and laboratory equipment (e.g., oscilloscopes, voltage meters, current load boxes, NIM crates and associated modules), basic data acquisition systems needed to interface with other laboratory systems, and Minos-specific hardware procured from outside vendors or built in-house.

3.4 Scientific Collaboration Tools

The Minos collaboration will utilize the standard Scientific Collaboration Tools Services.

3.4.1 Redmine

The Minos collaboration depends on the standard Redmine Services.

3.4.2 CVS/Subversion/GIT

The Minos collaboration will utilize the standard CVS/Subversion/GIT Services.
Minos code repositories are hosted through cdcvs.fnal.gov redmine core repository and collaboration management system.

3.4.3 ECL

The Minos collaboration will utilize the standard ECL Services together with the following enhanced services.

Support for the database servers Support is needed round the clock during data taking. Tickets for off-hours support for ECL database servers will be generated by the PPD Experimental Operations support organization (IFTBG).[14]

See PPD support documentation for enhanced support levels.

3.4.4 UPS/UPD

The Minos collaboration will utilize the standard UPS/UPD Services

3.5 Control Room

The Minos collaboration will utilize the standard Experiment Desktop Services.

The MINOS control room (CR) is co-located with other Neutrino experiments in the ROC-W on WH1W. The control room hosts standard Fermilab desktops and displays on the general laboratory network. These machines are designed and configured to be generic display stations. Any machine can perform any control room function, and no single machine is considered a critical system for operations. These control room workstations are supported under the SLA for Minos control room computing.

Wilson Hall building management provides airflow and electricity to the ROC-W. Networking provides equipment to connect computers and other devices to the network, however networking equipment relies on WH building air for cooling and WH electrical service to operate.

3.6 Data Acquisition (DAQ)

The Minos collaboration will utilize the standard Scientific Computing Services. These services include support for the Minos collaboration DAQ systems (OS installation and patching) and other Minos collaboration desktops.

3.6.1 Experiment Desktops and Control Room Workstations

3.6.2 DAQ Computing Clusters

The Minos DAQ computing is configured with infrastructure to provide each system with:

- Serial console port access,
- Remote power on/off via network controllable PDUs,
- Full access (to the bios level) via keyboard/video/mouse servers that are accessible via TCP/IP.

3.6.2.1 Minos Detector Computing Systems:

- Hardware support (replacement under warranty) for approximately 10 server nodes at each site (Near, Soudan)
- Hardware support (replacement under warranty) for support infrastructure (consoles, PDUs, etc.)
- System administration for approximately 10 SLF6 systems, including configuration management, software updates and security Patches

3.6.2.2 SLA and deviations

All computer systems will comply with Fermilab Security policies, with exemptions obtained under those policies for elements that cannot meet Baseline standards.

These exemptions are usually needed only for DAQ systems, for which there are special controls.

3.6.2.3 Computing Sector responsibilities

- Installation of, updates, security and other patches for the Scientific Linux OS
- Monitoring and system administration services
- Installation and support of the PUPPET configuration management software.
- The hardware is under maintenance contract with the corresponding equipment's vendor

3.6.2.4 Minos responsibilities

- Install and support of all online application software, and Fermilab supported physics toolkits and utilities needed.
- Provide schedules for deploying security patches to all systems that are consistent with Lab security policies and the Minos Minor Application Plan.
- Provide an expert from the collaboration who can assist system administrators.
- Since files produced by the detector DAQ systems are irreplaceable, Minos will provide enough "spool" disk area to allow for the storing of at least several days of data in case of an outage of offline data handling systems.

3.6.2.5 Joint responsibilities

Any system or support level Change planning, requests and documentation

3.6.3 CVMFS

The Minos collaboration will utilize the standard CVMFS Services.

3.6.4 Build Service

The Minos collaboration will utilize the standard Build Service Services, if necessary.

3.7 Scientific Data Management

NOTE: Scientific Data Management will be on-boarded to ITIL later in FY14, and so currently there is no Service Level Agreement (SLA) in place. This TSW will serve in lieu of the SLA. Once the SDM SLA is accepted, that will supersede the statements in this section and in subsections below.

The Scientific Data Management services involve management of the experiment's event data files and includes the following service offerings:

- SAM/IFDH
- File Transfer Service (FTS)
- Data handling

The guiding principle is to provide data handling and management services to an experiment that are robust, efficient, innovative, easy to use, and easy to maintain and operate, and low cost.

The suite of offerings enables the Minos experiment to catalog and store event files in the Fermilab central storage system and retrieve such files for processing by jobs running at Fermilab and at remote sites.

Note that the term “event data files” is used here to describe the type of files handled by these services. These files generally contain event information originated by the Minos detectors or simulation. They may be Root files or based on a private format. Individual log files, histogram files, documents, and such are generally not handled by SDM services.

SDM services are generally geared for access to data from batch jobs. There are situations described below where interactive access to data may be possible.

3.7.1 SAM IF/DH

SAM is a system that catalogs, moves, and tracks event data from a central storage facility to caches world-wide. IFDH is a complementary system that handles the “last mile” of data transfer from a nearby cache to the worker node hosting the running job. SAM provides an interface (sameb) for the user and administrators to configure, communicate with, and monitor the data management system.

The current configuration of Minos’s data access system is to use Fermilab’s Enstore tape system for archival storage and the central cache system with dCache for cache management. The SAM system involves software as well as several physical services including SAM stations, stagers, and other servers. SCD will maintain such software as well as operate the physical services. There are two types of incidents that may be raised against the SDM services: regular incidents are those with either low impact or low urgency (as defined in the CS Foundation SLA). Critical incidents are those with both high impact and high urgency and must be initiated by the Minos offline manager or delegate and called into the Service Desk. Examples of potential incidents are include:

- an outage of a critical SAM physical component that halts data handling for all jobs at all sites is a critical incident
- an outage of a web service that prohibits access to all of data management for the experiment is a critical incident
- a software bug that causes a race condition halting all data handling for all jobs at all sites is a critical incident

- because the FermiGrid site is the primary batch system for Minos processing, an issue that halts data handling for all jobs on FermiGrid is a critical incident
- a remote site issue that causes data handling to fail at that particular site is a regular incident
- an issue that halts interactive access to files but leaves jobs unaffected is a regular incident
- issues of low impact (affecting only a few people) or low urgency are regular incidents
- in special circumstances, a regular incident may be elevated to critical with mutual agreement between the Minos offline manager and SDM service managers.

As mentioned above, SAM and IFDH are geared for data delivery to batch jobs. For some situations, IFDH will have capabilities to deliver files to interactive sessions. Currently, these situations include:

- Interactive sessions on Fermilab Minos GPCF interactive nodes (e.g. minosgpvmXX) with the file resident or accessible to the central public dCache.

Data transfer rates and requirements are specified in SPPM presentations.

SCD Responsibilities:

- Provide the Scientific Data Management services that enable Minos to catalog, store, and retrieve event data as described in this section.
- Support SAM and IFDH software, interfaces, and libraries at a 8x5 level except in the case of bug that causes a critical incident. Such critical incidents are handled at an 8x7 level.
- Support SAM physical services and servers at an 8x5 level except in the case of an outage that causes a critical incident. Such critical incidents are handled at an 8x7 level.
- If a remote site experiences no or under-performing file delivery, the site will be investigated and debugged by SCD. Note that cooperation with site administrators may be necessary and Minos managers may need to assist.
- Respond in a timely manner to requests generated by Minos.
- Monitor the system for operations and performance at an 8x5 level. As practical as possible, critical incidents generate an automated page to SDM service operations personnel. Note that not every incident can be anticipated nor covered by automation. In the case of a critical incident page due to or resulting in a critical service outage, the SDM service operator will notify the Minos offline manager or delegate of the outage.
- Perform maintenance on systems and software as necessary. Such maintenance may incur a service outage or degradation during the maintenance window. Such maintenance windows must be negotiated with Minos offline management in advance. SDM service management

will make every attempt to minimize the occurrence of unplanned emergency maintenance windows.

Minos Responsibilities:

- Open Service Desk incidents when issues are noticed. Critical incidents as described above need to be initiated by the Minos offline manager and called into the Service Desk.
- Open Service Desk Requests for new meta data fields or advice about meta data fields.
- Open Service Desk Requests for new use cases or anticipated unusual increase in demand as early as possible. The SDM service management and operators will respond to the request and if possible, adjust the services configuration accordingly.
- While the SDM systems will be as robust as practical, Minos offline management should prevent, as much as practical, user abuse of SDM systems that cause unwanted increases in demand or unusual use cases.
- Negotiate with SDM service management for maintenance windows. Note that unplanned emergency maintenance windows may be necessary in special circumstances.

3.7.2 File Transfer Service (FTS)

The File Transfer Service (FTS) is a robust system for uploading files into the SAM catalog and central Fermilab storage. Its main use is for simulation and reconstructed files. FTS uses many SAM components and thus SCD and Minos responsibilities detailed in the SAM/IFDH section apply here. FTS also introduces its own software and physical server components and those are supported at a level similar to the SAM software and services. Both SDM service management and Minos operations will monitor the FTS system through its built in web monitoring service.

Minos will create Service Desk incidents if issues are noticed with FTS. Critical incidents may be initiated by the Minos online or offline management and called into the Service Desk. An incident that stops all storage of data (from DAQ or simulation jobs) is critical and will be handled at an 8x7 level.

3.7.3 Data Handling

Data handling is a service offering where SDM experts provide consultation and advice for an experiment’s data handing needs aligned with the principle stated above. Examples of topics include:

- Definition of file meta-data
- Exploring new data handling use cases and paradigms
- Exploring data handling technology

Minos may initiate consultation by opening a Service Desk request. SDM experts may approach Minos offline management for discussions as well.

3.8 Scientific Data Storage and Access[15]

The Minos collaboration will utilize the standard Scientific Data Storage and Access Services. The Scientific Data Storage and Access services are described in the related SLA. Support for Minos falls within the standard service categories. The responsibilities of each of the parties is described in the SLA. The expected scale and performance of the systems is described in the submission to the Laboratories Scientific Portfolio Management process, and is summarized below:

TBA

The disk and tape storage needs of the Minos experiment are categorized below.

3.8.1 Raw Data

The Minos experiment records data related to the operation of the detector corresponding to the BNB and NuMI beam spills as well as additional data for calibration and for non-accelerator analysis topics. The Minos detector produces about 1.5 Terabyres per year of raw data.

Raw data is archived to Fermilab Enstore tape via dedicated Minos Dcache read/write pools, sized to retain all files on disk. A second copy of raw data is written to tapes in a different building at Fermilab. We keep another copy of Far data fies at the University of Minnesota.

3.8.2 Monte Carlo Simulation Files

Minos simulation files are produced offsite, and imported to standard Dcache/Enstore storage for reconstruction. Details are reviewed each year in the SCPPM process.

3.8.3 Production Data Analysis

Resources needed for production data is reviewed each year in the SCPPM process.

3.8.4 End User Data Analysis

3.8.4.1 Computing Sector Responsibilities

1. Install and maintain a central disk pool capable of serving Minos data to the GP Grid Farm, CPCF cluster, and other on-site Minos computers via data handling tools or NFS. Data serving rates must be sufficient to meet the demands of reconstruction and analysis on the GP Grid Farm, GPCF, and other on-site computers. It is expected that the majority of the data will be accessed via cache disk. BlueArc disk will primarily be used for user code and volatile test or analysis samples.
2. Install and maintain NFS-mounted disk serving software releases to the GPCF cluster, GP Grid Farm, and other on-site interactive machines, and machines with disk for building software releases. This will be complemented by a CVMFS repository that is used as the main code access on many of the systems at Fermilab and on grid sites and local clusters around the world.

3. Install and maintain project disk to support analysis activity. At present, this disk is provided as part of the GPCF plan.
4. Provide a tape data archive via Enstore. All raw detector data, processed data, and Monte Carlo data will be archived to tape.
5. Provide AFS or other centrally shared home area disk. Regular backups of this space will be performed.
6. Monitor performance of tape and disk storage systems.
7. Provide tools for archiving analysis data.

3.9 Scientific Databases

The Minos collaboration will utilize the standard Scientific Database Services. Scientific Databases and Database Hosting Services are both relevant to the support levels for the experiment systems. Unless otherwise stated the support level is 8x5 as stated in the Fermilab Foundation SLA.

The Minos experiment employs databases that are used to store information regarding the operation of the detectors and the conditions of beams. These databases are used by offline systems.

The only database unique to Minos is the Mysql conditions database.

3.9.1

The ECL database is used to operate the detectors 24x7, but Minos can tolerate short outages.

The Mysql Conditions database is used in Minos and Minerva offline analysis.

Minos also uses the IFBEAM and the SAM data management databases for offline analysis.

The IFBEAM monitoring web application is used in real-time and is important for detector operations.

Tickets for off-hours support for ECL database servers will be generated by the PPD Experimental Operations support organization (IFTBG).[16]

The general operational parameters for these sets of databases are summarized in the table below:

Table - Minos Database Properties

Database	Type	Access Types	Availability	Support

ECL	Postgres	CS Web App	24x7	12x7
SAM	Postgres	CS Custom App	24x7	12x7
IFBEAM	Postgres	CS Web App	24x7	24x7
CONDITIONS	MySQL	Root	24x7	12x7

3.9.2 Responsibilities

3.9.2.1 Computing Sector responsibilities

Install and maintain databases, database servers and applications needed to store and utilize the following mission critical data:

- Install and maintain the Minos conditions database
- Install and maintaint the standard ECL, IFBEAM and SAM services and supporting databases.

3.9.2.2 Minos responsibilities

- Manage the schema and enter the content of the Conditions database;
- Interfacing Minos software with the database applications;
- Ensuring that users are informed as to appropriate usage patterns, and otherwise assisting CS personnel in investigating and addressing operational issues.
- For cases in which there is no existing schema or database application, specify and document the requirements, the use cases and queries needed, etc., as requested by the CS.
- Provide time windows during which regular database maintenance may be performed and security patches applied in a manner consistent with Fermilab security policies.

3.9.2.3 Joint responsibilities

- Developing and approving the specifications for user access, the database applications and schemas.
- Participate in annual “Taking Stock” meetings to long-term operational issues and resource planning. CS will coordinate these meetings.

3.10 Scientific Frameworks

The Minos experiment requires support for the following packages:

- SoftRelTools as a legacy package for which no maintainence is expected
- ROOT analysis package.
- UPS/UPD

3.11 Simulation Software

The Minos collaboration relies on Genie for detector simulation.

4 Miscellaneous

This section is used for miscellaneous items not covered above.

5 References

[1] FNAL Foundation Service Level Agreement, CS-DocDB #4042
http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=4042

[2] Fermilab Policy on Computing http://security.fnal.gov/policies/cpolicy.html

[3]“Establishing Grid Trust with Fermilab”, CS-DocDB #3429 http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=4042

[4] The Fermilab Campus Grid (FermiGrid) Computing Policy Page
http://fermigrid.fnal.gov/policy.html

[5] The Open Science Grid http://www.opensciencegrid.org/

[6]“Technical Design Report for CD-2/3a,” Minos Document 2678-v8, October 8, 2007.

[7] Minos Minor Application Plan (in progress), Minos DocDB #4250.

[8] The following Minos documents describe the DAQ system requirements: DAQ Monitor (#3769), Data Concentrator Module (Software) (#3664), Data Logger (#3683), Data Quality Monitoring (#3799), Dispatcher (#3944), Event Builder (#1168), File Transfer System (#3786), Global Trigger (#2631), Spill Server (#4529), Message Logging System (#2332), Message Passing System (#1210), Resource Manager (#3678), Run Control (#1877). These documents are in the Minos-DocDB.

6 Document Revision History

Date	Version	Author(s)	Comments
2-Apr-2014	V0.00	Keith Chadwick	Template
9-Apr-2014	V0.1	Keith Chadwick	Import Minos information from prior MOU

7 Bibliography

1http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=4042

2Fermilab Policy on Computing http://security.fnal.gov/policies/cpolicy.html

3The Minos Technical Design Report http://Minos-docdb.fnal.gov:8080/cgi-bin/ShowDocument

4http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=4314

5http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=4315

6http://cd-docdb.fnal.gov:440/cgi-bin/ShowDocument?docid=4321

7http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=4773

8http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=4664

9http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=3716

10http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=4312

11http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=4311

12http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=4591

13http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=4313

14PPD support documentation to be completed

15http://cd-docdb.fnal.gov/cgi-bin/ShowDocument?docid=5032

16 PPD support documentation to be completed