Data Server Hardware Configuration

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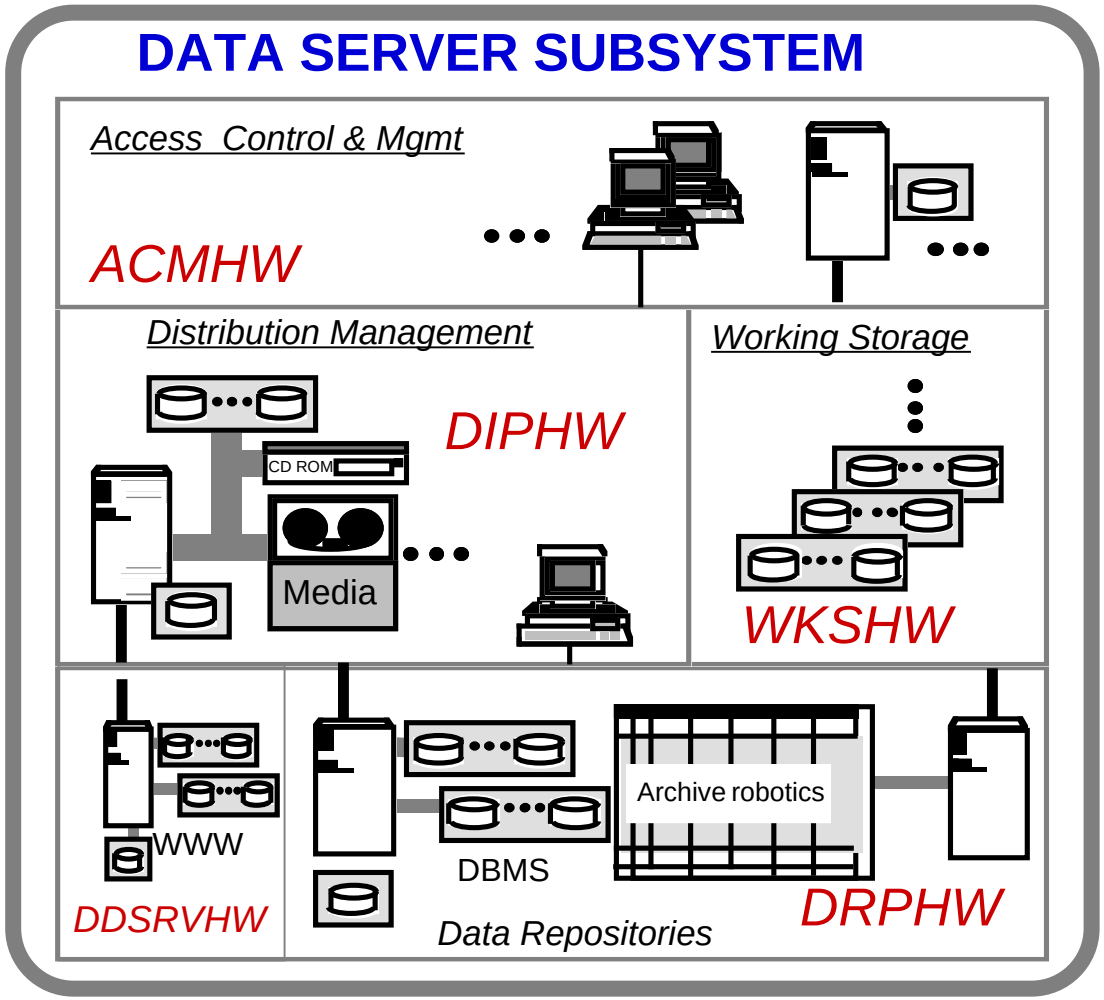
17 April 1996

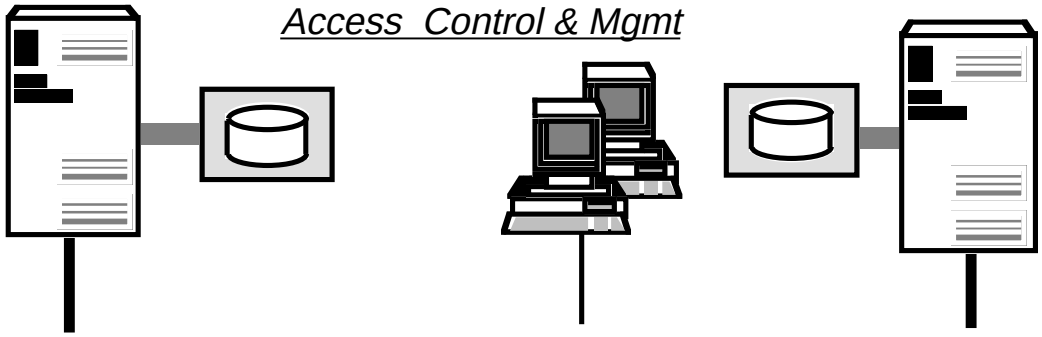
Data Server Hardware Configuration

- **Data Server Subsystem Hardware Configuration Items**
- **Hardware Design Methodology**
- **Release B Hardware Design Drivers**
- **Hardware Design**
- **Recoverability**
- **Conclusion**

Data Server Subsystem Hardware Configuration Items



ACMHW Configuration



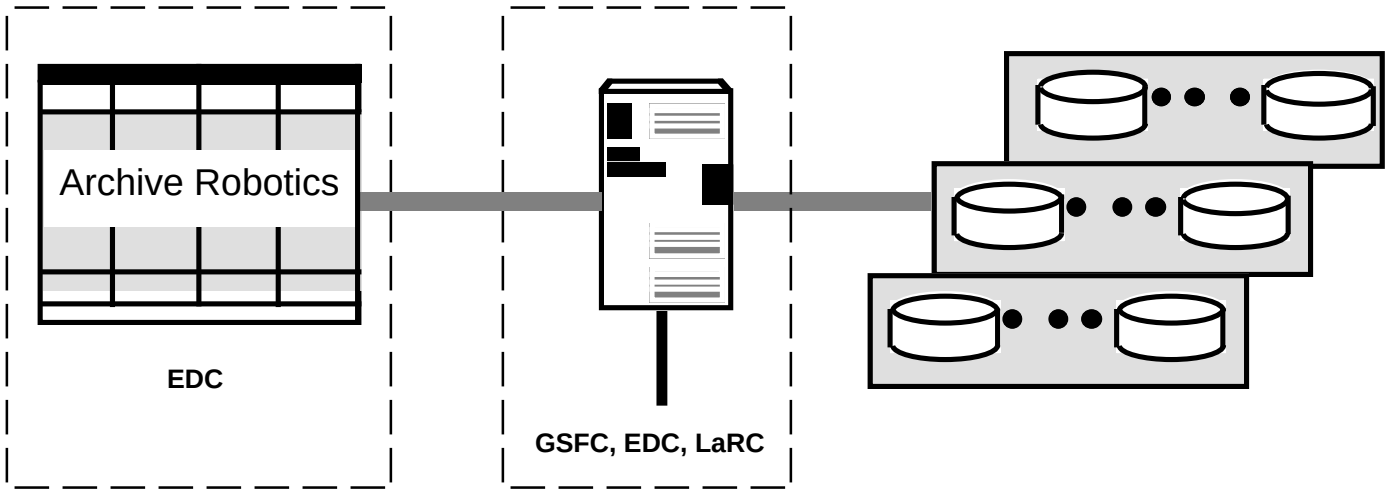
Functions

- **Primary External Access Point via EBNet Link**
- **Electronic User Pull Area**
- **Science Data Server, Browse Data Support, Subsetting Support**
- **Supports System Infrastructure Monitoring and Administration**
- **Supports a DBMS for managing user pull area**

Equipment

- **Server Host and Host Attached Disk Storage**
- **Operator Workstations**

WKSHW Configuration



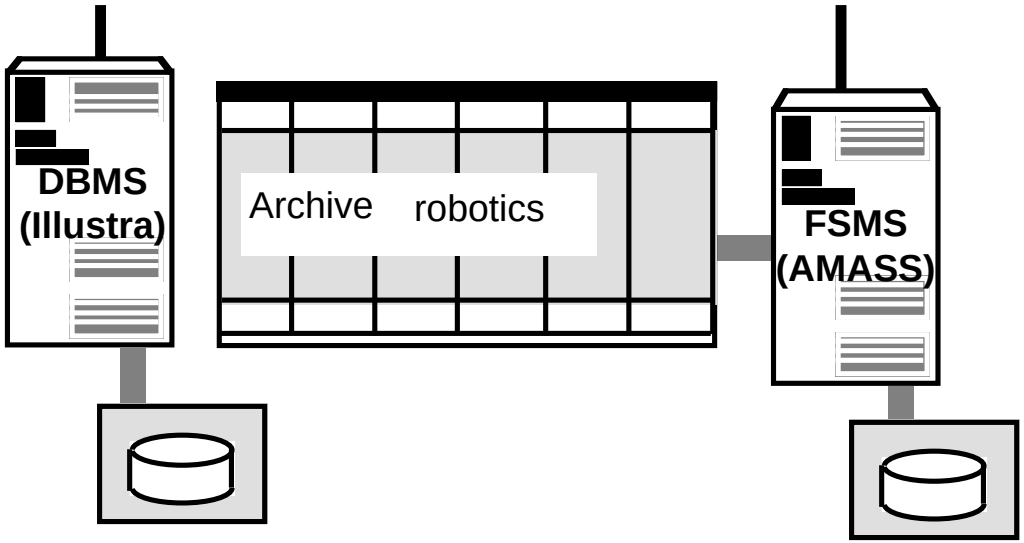
Functions

- **Provides a Temporary Storage Buffer to Data Server Data Flows**
- **Houses Interim Processing Data**

Equipment

- **Redundant Array of Independent Disks (RAID)**
- **Server Hosts (GSFC, EDC, LaRC)**
- **Automated Tape Libraries (EDC only)**

DRPHW Configuration



Functions

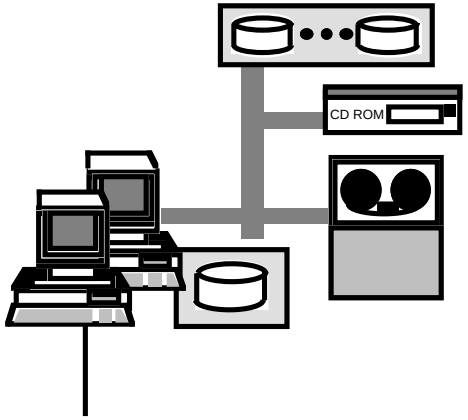
- **Permanent storage, maintenance, and retrieval of data**

Equipment

- **Server Hosts and Host Attached Disk**
- **Automated Tape Libraries**
- **DBMS Server**

DIPHW Configuration

Distribution Management



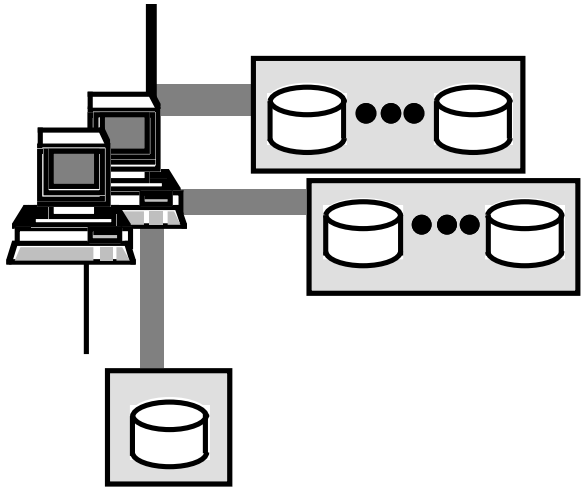
Functions

- **Hard-media distribution**
- **Hard-media data ingest**

Equipment

- **Heterogeneous Mix of Distribution Devices**
- **Facsimile and Printers**
- **Workstations and Associated Disk Storage**

DDSRVHW Configuration



Functions

- **Ingest, Storage and Distribution of the ECS Document Collection**
- **Resident COTS Software:** **Illustra Document Repository**
  Netscape Server
  TOPIC Text Search Engine

Equipment

- **WWW Server and Associated Disk Storage**

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Hardware Design Methodology

- **Evolutionary Process From Release A**
- **Steady State Modeling determined the hardware design of the Data Repository and Working Storage**
- **Static Modeling of the Technical Baseline supplied Processing Data Flows and Interim Data Flows**
- **Dynamic Modeling Results established transaction patterns and specific data flow multipliers**

Hardware Design Methodology (cont.)

- **Data Rate Analysis**
- **Transaction and Rate Mitigation using Modeling Results**
- **Data Accumulation Analysis**

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Release B Hardware Design Drivers

- Data Rates
- Volume Accumulations
- Interim Products' Volumes and Rates
- Transaction Patterns
- Archival Media Considerations

Design Drivers - Steady State Data Rates* (in MB/sec)

SITE	TOTAL INPUTS TO THE ARCHIVE	TOTAL OUTPUTS FROM THE ARCHIVE
GSFC	12.19	39.39
LaRC	8.61	6.48
EDC	10.93	9.98
NSIDC	1.18	5.84
JPL	0.71	1.81
ASF	0.98	1.37

*** Static Analysis of the Technical Baseline**

Design Drivers - Volume Accumulation*

SITE	Epoch k (June 1999) [TB]	Year 2003 [TB]
GSFC	179.30	2,206.00
LaRC	49.44	485.00
EDC	194.64	1,061.00
NSIDC	6.02	40.70
JPL	7.46	18.80
ASF	1.11	2.50

*** Nominal Accumulations**

Design Drivers - Interim Products

- **Interim Products require non-permanent storage**
- **Interim Products are intermediate products used in generating final, permanently archived, products**
- **The main component of this accumulation of data is in support MODIS L3 processing (all the Interims produced between subsequent L3 processing campaigns)**
- **Maximum lifetime of an Interim Product is 90 days**

Design Drivers - Interim Products Steady State Data Rates* (in MB/sec)

SITE	INTERIM PRODUCTS INPUT TO WKS	INTERIM PRODUCTS OUTPUT FROM WKS
GSFC	11.20	2.60
LaRC	7.80	7.20
EDC	19.00	41.00
NSIDC	0.20	negligible
JPL	negligible	negligible
ASF	negligible	negligible

*** Static Analysis of the Technical Baseline**

Design Drivers - Interim Products

SITE	PEAK ACCUMULATION [GB]
GSFC	158.50
LaRC	314.80
EDC	6,403.00
NSIDC	negligible
JPL	0.71

- **Impact:**
  - **At LaRC and GSFC additional quantities of disk are required at the WKS level**
  - **At EDC high access rate ATLs (STK Powderhorns with Timberline linear drives) are added at the WKS level**

Design Drivers - High Transaction Rates in the Permanent Archive

- **Impact**
  - **Use of faster Robotic devices (STK) at GSFC and EDC in combination with the Helical Scan D3 tape drives (due to high volume accumulation)**
  - **STK technology is being integrated with AMASS FSMS at this time**

Design Drivers - Media

DSS is transaction driven at all sites

- **High performance linear scan tape drives (10 GB), except GSFC and EDC**
- **EMASS Robotics, except GSFC and EDC**

DSS is also capacity driven at GSFC & EDC

- **High performance helical scan tape drives (50 GB)**
- **STK Robotics**

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Data Server Subsystem
EDC Hardware

HW CI	Equipment	Quantity
ACMHW		
Admin. Workstations	SUN Ultra	2 ea.
APC Hosts	22 CPU SGI Challenge XL, 6 GB local disk, 2 GB RAM	1 ea.
	12 CPU SGI Challenge XL, 6GB local disk, 1 GB RAM	1 ea.
APC Disk	682.5 GB of RAID Disk	
WKSHW		
	10 CPU SGI Challenge XL, 6 GB local disk, 1 GB RAM	1 ea.
	6 CPU SGI Challenge XL, 6 GB local disk, 512 MB RAM	1 ea.
	421 GB RAID	
	STK Powderhorn ATLs with 16 3490e tape drives	2 ea.
DRPHW		
FSMS Server Host	6 CPU SGI Challenge XL, 6 GB local disk, 512 MB RAM	1 ea.
AMASS Cache	50 GB RAID Disk for AMASS cache (total of 300 GB RAID)	
ATL Robotics	STK Powderhorn with 16 D3 drives per ATL	2 ea.
Tape Media	D3 50 GB cartridges	8,042 ea.
DBMS Server	2 CPU SGI Challenge XL, with 20 GB shared disk	2 ea.
DIPHW		
Staging Server Host	Sun Ultra 4-slots, with access to 310GB RAID disk	2 ea.
Peripherals:	8 mm tape drives (with stackers)	12 ea.
	4mm tape drives (with stackers)	12 ea.
	6250 tape drive	1 ea.
	CD ROM drive and jukebox	20 ea.
	FAX	1 ea.
	3480/3490 outboard drives	4 ea.
	printer	2 ea.
DDSRVHW		
WAIS/http Data Server	CPU SMP Server - SUN Ultra 4-slot, 6 GB local disk, 256 MB RAM	2 ea.
Data Server Disk	6 GB mirrored in two machines	

Data Server Subsystem
GSFC Hardware

HW CI	Equipment	Quantity
ACMHW		
Admin. Workstations	SUN Sparc 20/50	2 ea.
APC Hosts	16 CPU SGI Challenge XL, 6 GB local disk, 1 GB RAM	1 ea.
	8 CPU SGI Challenge XL, 6 GB local disk, 512 MB RAM	1 ea.
	764 GB RAID disk	
WKSHW		
	10 CPU SGI Challenge XL, 6 GB local disk, 1 GB RAM	1 ea.
	6 CPU SGI Challenge XL, 6 GB local disk, 1GB RAM	1 ea.
	558.5 GB, minimum RAID disk	
DRPHW		
FSMS Server Host	6 CPU SGI Challenge XL, 6 GB local disk, 512 MB RAM	3 ea.
AMASS Cache RAID	200 GB	
ATL Robotics	STK Powderhorn	5 ea.
Tape Drives	16 D3 drives per each of the four ATLs	64 ea.
	12 D3 drives in one ATL	12 ea.
Tape Media	D3 50 GB cartridges	6,942 ea.
DBMS Server	2 CPU SGI Challenge XL, 30 GB shared disk	2 ea.
DIPHW		
Staging Server Host	SUN Ultra 4-slot, with access to 480 GB of Disk	2 ea.
Peripherals:	8 mm tape drives (with stackers)	15 ea.
	4mm tape drives (with stackers)	15 ea.
	6250 tape drive	1 ea.
	CD ROM drive and jukebox	25 ea.
	FAX	
	3480/3490 outboard drives	4 ea.
	printers	2 ea
DDSRVHW		
WAIS/http Data Server	CPU SMP Server - SUN Ultra 4-slot, 6 GB local disk, 256 MB RAM	2 ea.
Data Server Disk	6 GB mirrored in two machines	

Data Server Subsystem
LaRC Hardware

HW CI	Equipment	Quantity
ACMHW		
Admin. Workstations	Sun Ultra	2 ea.
APC Hosts	10 CPU SGI Challenge XL, 6 GB local disk, 1 GB RAM	1 ea.
	6 CPU Challenge XL, 6 GB local disk, 512 MB RAM	1 ea.
	480 GB RAID disk	
WKSHW		
Workstation Hosts	6 CPU SGI Challenge XL, with 6 GB local disk, 512 MB RAM	1 ea.
	4 CPU Challenge XL, 6 GB local disk, 256 MB RAM	1 ea.
	415 GB RAID disk	
DRPHW		
FSMS Server Host	6 CPU SGI Challenge XL, 6 GB local disk, 512 MB RAM	
	4 CPU SGI Challenge XL, 6 Gb local disk, 256 MB RAM	
	100 GB RAID disk	
ATL Robotics	AMASS AML Model 2 Tall Quadro Tower system, 2 robot arms	3 ea.
Tape Drives	3590 (NTP) drives	30 ea.
Tape Media	3590 tape cartridges	5,571 ea.
DBMS Server	2 CPU SGI Challenge XL, with 12 GB shared disk	2 ea.
DIPHW		
Staging Server Host	4 CPU Sun Ultra 4-slot, 6 GB local disk, 256 MB RAM access to 235 GB of RAID	2 ea.
Peripherals:	8 mm tape drives (with stackers)	10 ea.
	4mm tape drives (with stackers)	10 ea.
	6250 tape drive	1 ea.
	CD ROM drive and jukebox	16 ea.
	FAX	1 ea.
	3480/3490 outboard drives	4 ea.
	printer	2 ea.
DDSRVHW		
WAIS/http Data Server	CPU SMP Server - SUN Ultra 4-slot, 6 GB local disk, 256 MB RAM	2 ea.
Data Server Disk	6 GB mirrored in two machines	

Data Server Subsystem
JPL Hardware

HW CI	Equipment	Quantity
ACMHW		
Admin. Workstations	SUN Ultra	2 ea.
APC Hosts	6 CPU SGI Challenge Ls, 6 GB local disk, 45 GB RAID	2 ea.
WKSHW		
	6 GB local disk, 60 GB of RAID	
DRPHW		
FSMS Server Host	6 CPU SGI Challenge L, 6 GB local disk, 512 MB RAM	1 ea.
FSMS Server Host	4 CPU SGI Challenge L, 6 GB local disk, 256 MB RAM	1ea.
	60 GB RAID	
ATL Robotics	EMASS ABBA/E; 1 robotic arm, 1 Quadro Tower	1 ea.
Tape Drives	3590 drives	5
Tape Media	3590 tape cartridges (10 GB each)	1, 709
DBMS Server	2 CPU SGI Challenge XL, 10 GB shared disk	2 ea.
DIPHW		
Staging Server Host	SUN Ultra 4-slot, with access to 23 GB of RAID Disk	2 ea.
Peripherals:	8 mm tape drives (with stackers)	2 ea.
	4mm tape drives (with stackers)	2 ea.
	6250 tape drive	1 ea.
	CD ROM drive and jukebox	2 ea.
	FAX	
	3480/3490 outboard drives	2 ea.
	printers	2 ea
DDSRVHW		
WAIS/http Data Server	CPU SMP Server - SUN Ultra 4-slot, 6 GB local disk, 256 MB RAM	2 ea.
Data Server Disk	6 GB mirrored in two machines	

Data Server Subsystem
NSIDC Hardware

HW CI	Equipment	Quantity
ACMHW		
Admin. Workstations	SUN Ultra	2 ea.
APC Hosts	6 CPU SGI Challenge Ls, 6 GB minimum local disk	2 ea.
	87 GB RAID disk	
WKSHW		
	20 GB RAID disk	
DRPHW		
FSMS Server Host	6 CPU SGI Challenge L, 6 GB local disk, 512 MB RAM	1 ea.
	4 CPU SGI Challenge L, 6 GB local disk, 256 MB RAM	1 ea.
	20 GB RAID disk	
ATL Robotics	2 robot arms EMASS AML/2 with large Quadro Tower	1 ea.
Tape Drives	3590 (NTP) Tape drives	8 ea.
Tape Media	3590 tape cartridges	1,326 ea.
DBMS Server	2 CPU SGI Challenge DM, 10 GB shared disk	2 ea.
DIPHW		
Staging Server Host	SUN Ultra 4-slot, with access to 135 GB of Disk	2 ea.
Peripherals:	8 mm tape drives (with stackers)	2 ea.
	4mm tape drives (with stackers)	2 ea.
	6250 tape drive	1 ea.
	CD ROM drive and jukebox	3 ea.
	FAX	
	3480/3490 outboard drives	2 ea.
	printers	2 ea
DDSRVHW		
WAIS/http Data Server	CPU SMP Server - SUN Ultra 4-slot, 6 GB local disk, 256 MB RAM	2 ea.

Data Server Subsystem
ASF Hardware

HW CI	Equipment	Quantity
ACMHW		
Admin. Workstations	Sun Ultra	2 ea.
APC Hosts	6 CPU SGI Challenge Ls, 76 GB of RAID disk	2ea.
WKSHW		
	60 GB RAID	
DRPHW		
FSMS Server Host	6 CPU SGI Challenge Ls	2 ea.
FSMS Server Host	4 CPU SGI Challenge Ls	2 ea.
	60 GB of RAID	
ATL Robotics	EMASS AML/E with Hex Tower storage unit, robot arm	12 TB capacity (NTP)
Tape Drives	3590 (NTP) Drives	5ea.
Tape Media	3590 (NTP) Tape Cartridges 10 GB ea.	359 ea.
DBMS Server	2 CPU SGI Challenge XLs, with 12 GB of shared disk	2 ea.
DIPHW		
Staging Server Host	SUN Ultra 4-slot, with access to 120 GB of Disk	2 ea.
Peripherals:	8 mm tape drives (with stackers)	3 ea.
	4mm tape drives (with stackers)	3 ea.
	6250 tape drive	1 ea.
	CD ROM drive and jukebox	5 ea.
	FAX	
	3480/3490 outboard drives	2 ea.
	printers	2 ea
DDSRVHW		
WAIS/http Data Server	CPU SMP Server - SUN Ultra 4-slot, 6 GB local disk, 256 MB RAM	2 ea.
Data Server Disk	6 GB mirrored in two machines	

Data Server Subsystem
ORNL Hardware

HW CI	Equipment	Quantity
ACMHW		
Admin. Workstations	Sun Ultra	2 ea.
APC Hosts	4 CPU SGI Challenge L, 6 GB local disk, 256 MB RAM	2 ea.
	100 GB RAID disk	
DRPHW		
DBMS Server	2 CPU SGI Challenge L, with 10 GB shared disk	2 ea.
DDSRVHW		
WAIS/http Data Server	CPU SMP Server - SUN Ultra 4-slot, 6 GB local disk, 256 MB RAM	2 ea.
Data Server Disk	6 GB mirrored in two machines	

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Recoverability

Static Modeling Projection of System Recoverability:

- **Recovery within the 24 hours period after failure**
- **Mean Down Time = 2 Hours (Level 3 requirement)**
- **Max Down Time = 4 Hours (Level 3 requirement)**
- **Recover via limiting reprocessing and/or user pull service until fully recovered**

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