

E160 DAQ –

Requirements:

- ~1000 channels of TDC (1ns min resolution)
Main E160 Detector package
- ~300 channels of ADC
Beam Diagnostics, Compton Polarimeter
- ~700 Kilobytes data per second (at 120 Hz) to storage

Solution:

Use existing ESA DAQ system. System requires several upgrades. Reliability/maintainability issues associated with the existing hardware/software platforms of the Real-Time DAQ and the slow controls monitoring drive these upgrades: e.g. VMEexec and the MVME166 Real-Time CPUs, and the VAX/Jorway interface to monitoring/control hardware.

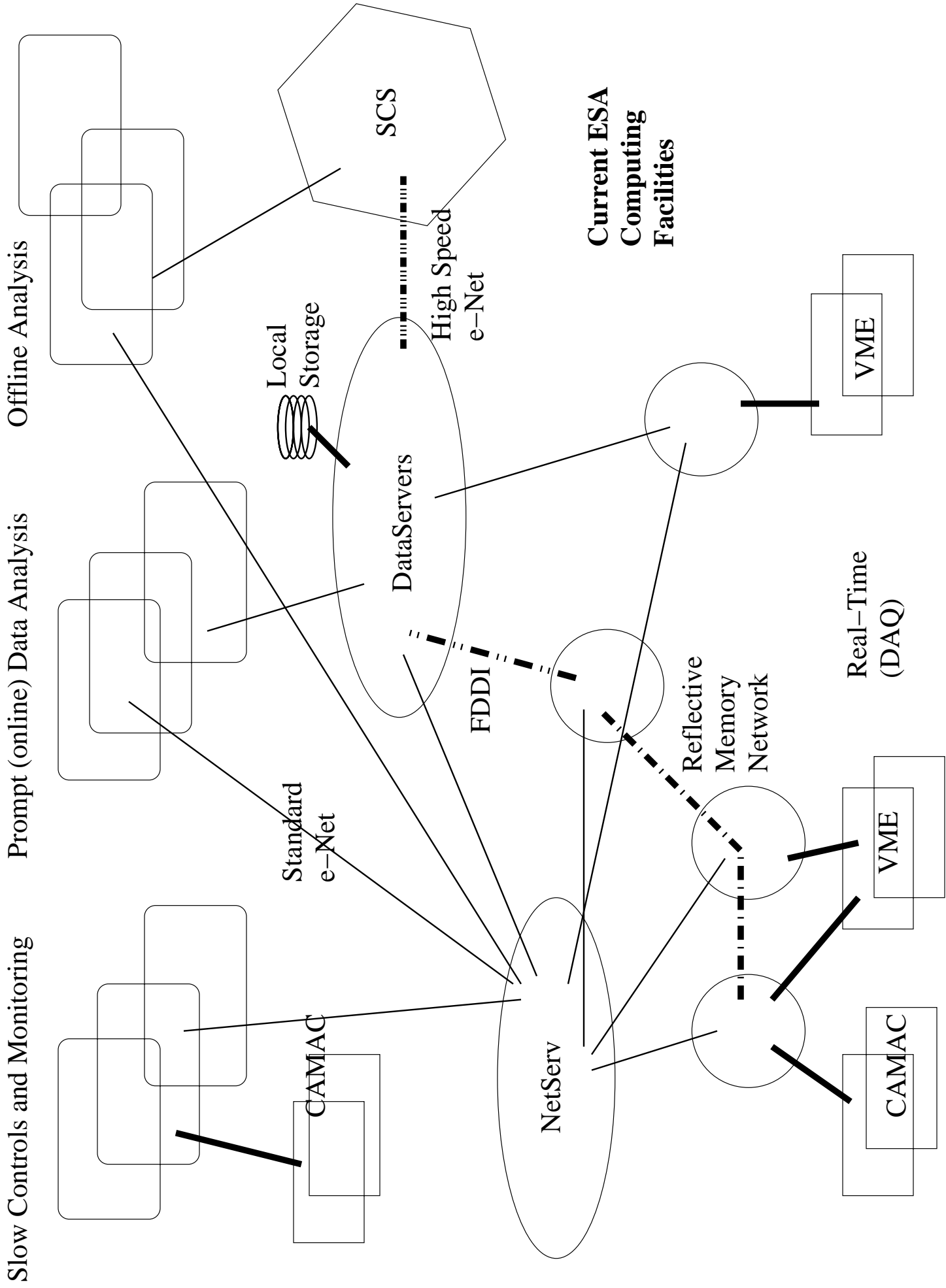
Note: The existing ESA DAQ system has already had the data storage portion upgraded to include local RAID storage and integration of latest SCS long term storage solution (“mstore”).

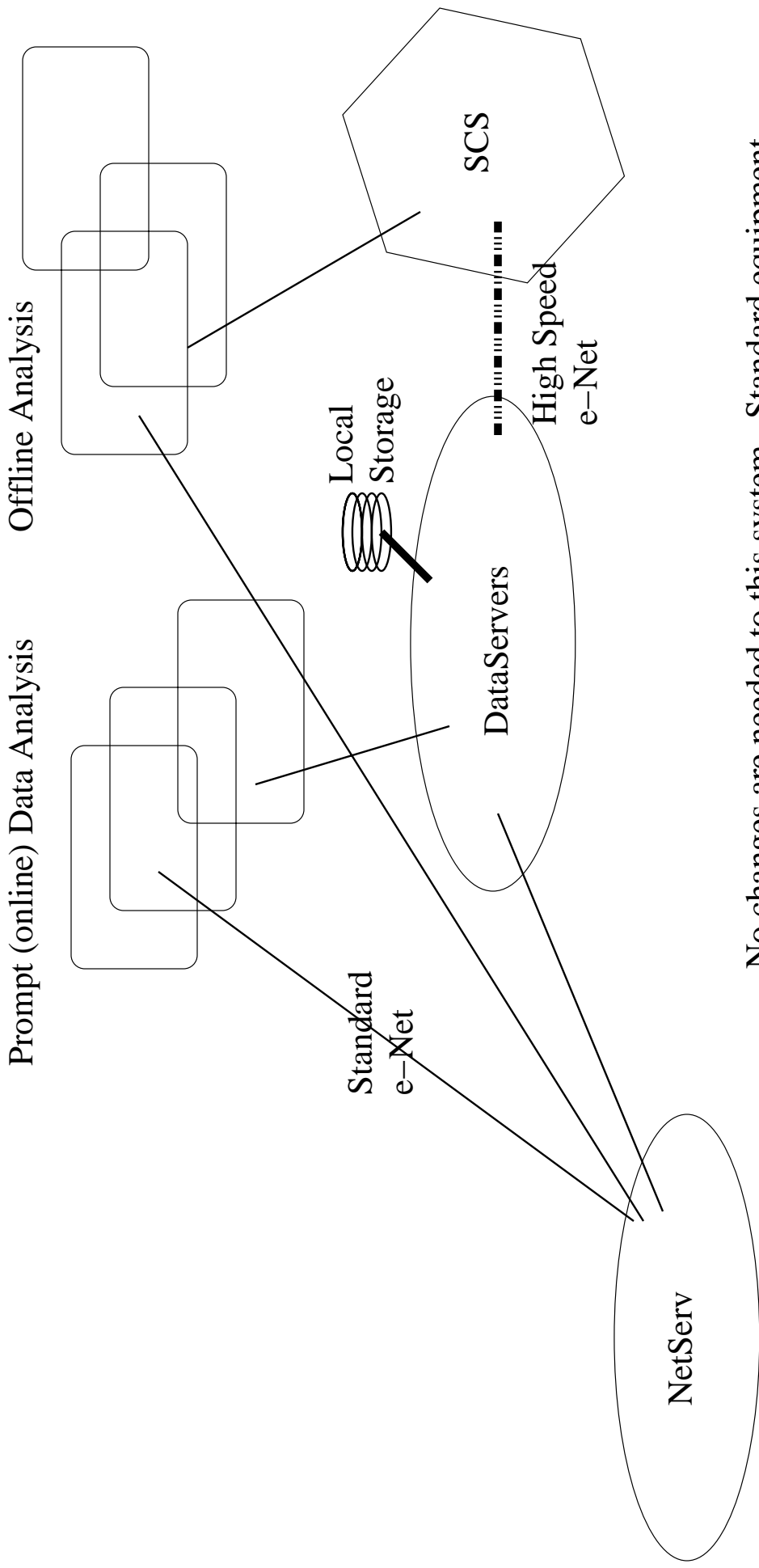
Resources and Time requirements:

Approximately \$500,000 in hardware costs, with \$150,000 associated with new VME based TDCs and ADCs.

CAEN V792AC ADCs will be used, have two on hand.
CAEN V890 TDCs will be used. CAEN has started production, will have a first production model to examine later this summer. Delivery is 6 months after order received.

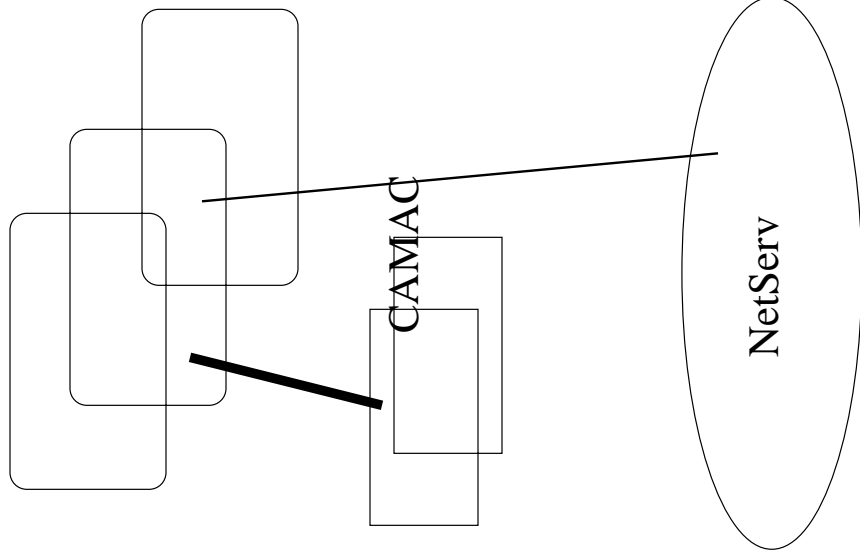
Approximately 4 man-years of EFD FTE labor and 2 man-years of Collaboration FTE labor are required to implement the upgrades and make experiment dependent changes.





No changes are needed to this system. Standard equipment maintenance/software upgrades will be done as needed. The Solaris Workstation running the DataServers will be upgraded to latest/fastest module prior to run (part of the VAX cluster replacement).

Slow Controls and Monitoring



Current configuration is a mix of computers:

Solaris Workstations
Linux Workstations
Windows/LabVIEW Workstations
VAX Cluster (has interface to CAMAC)

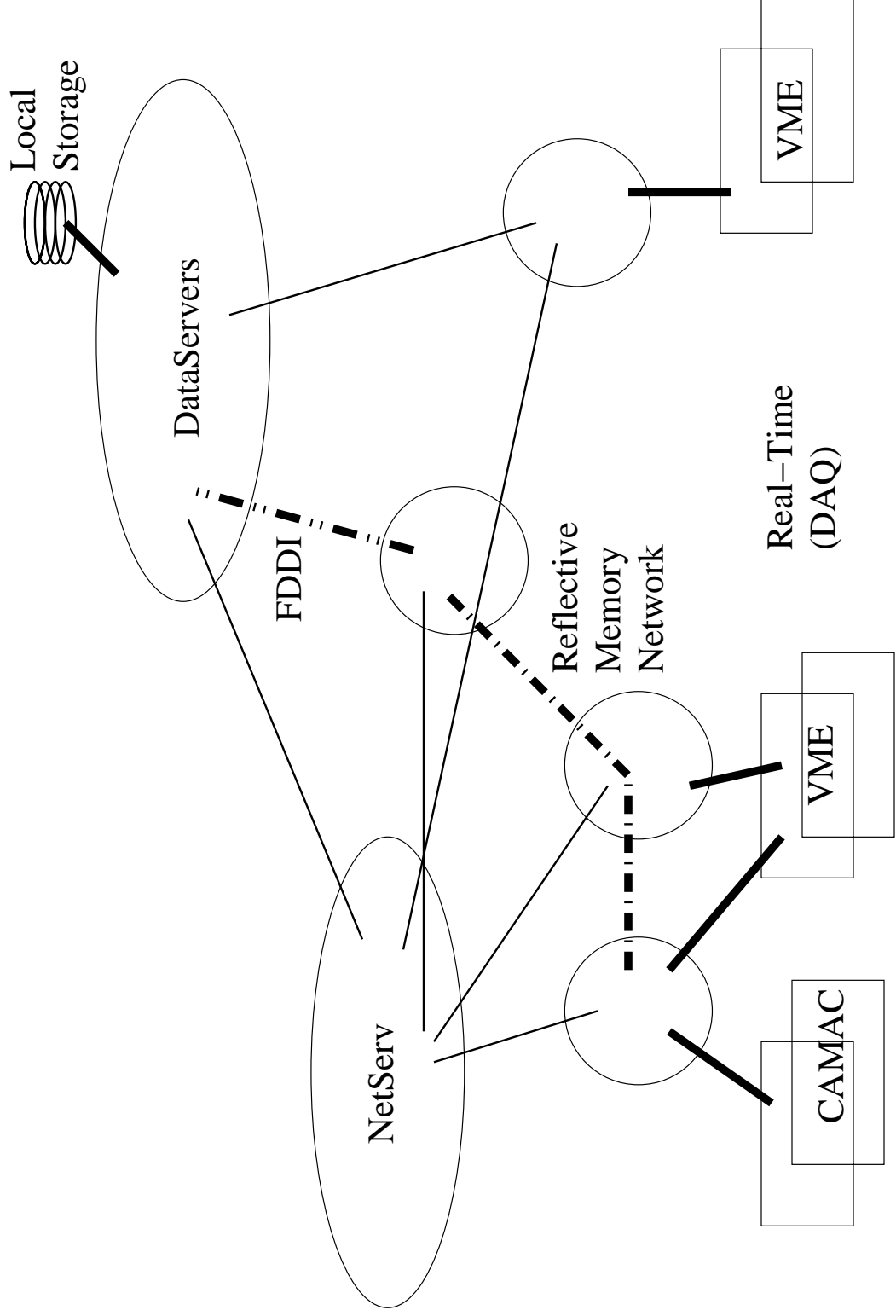
Problem is the VAX Cluster. The current Cluster machines are no longer supported as configured by OpenVMS. Current Cluster machine hardware is not supported by HP/Compaq and cannot be upgraded. After market spare parts hard to find.

Solution: Replace the VAX Cluster with additional Solaris Workstations and Linux Workstations (8 each).

A Linux Workstation with a GPIB interface will provide for slow controls. GPIB based controllers exist for CAMAC. Additional GPIB based devices are available for voltage monitoring and digital input/output.

Zen Szalata will oversee this upgrade. Assistance from collaborators for writing monitoring programs requested.

The Real-Time system has multiple problems:
 Real-Time OS (vmeExec) no longer supported.
 Real-Time CPUs (MVME166) no longer supported.
 CAMAC interfaces no longer supportable (proprietary MVME166 bus).
 CAMAC hardware no longer supportable (LeCroy abandoned HEP).
 The FDDI link between the Real-Time and the DataServers is no longer supported under Solaris.
 Motorola Real-Time development platform hardware and software are no longer supported.



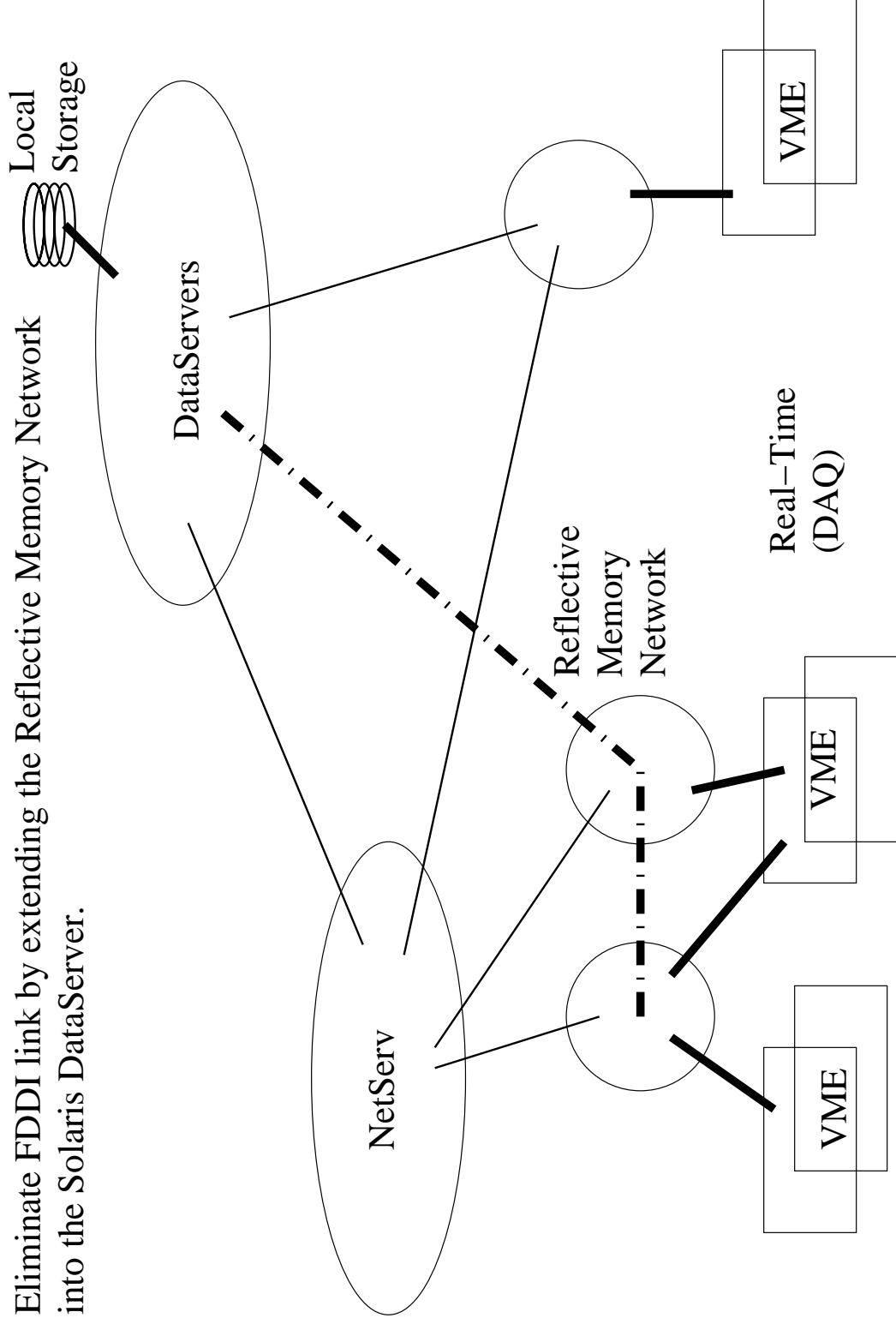
Solution:

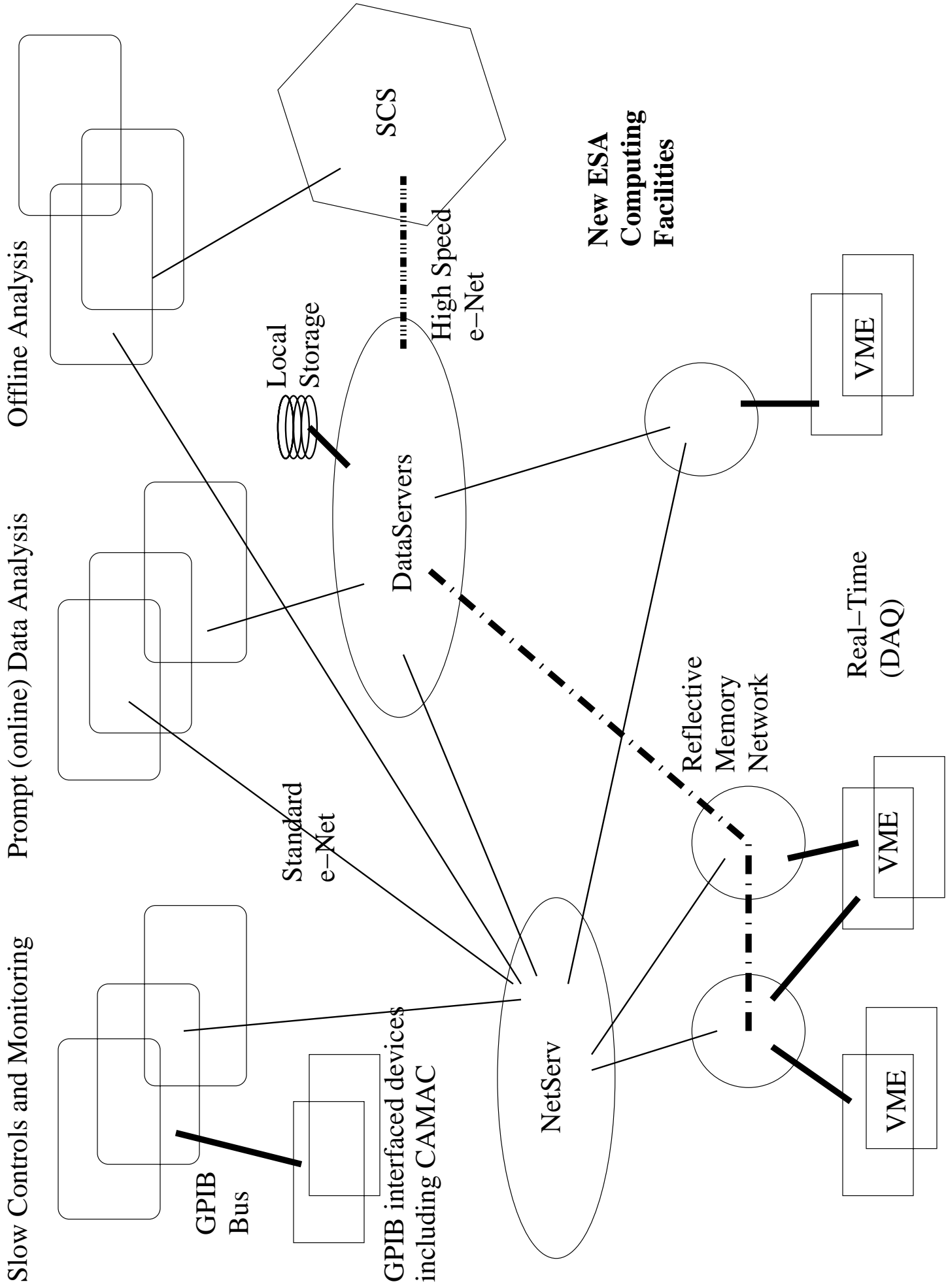
Replace Real-Time OS with VxWorks. VxWorks is supported at SLAC. Both Linux and Solaris development platforms supported. SLAC has a site-license with seats for ESA program.

Replace Real-Time CPUs with MVME177s. These are at least twice as fast as current CPUs.

Abandon CAMAC, use all VME based TDCs, ADCs, and Scalars.

Eliminate FDDI link by extending the Reflective Memory Network into the Solaris DataServer.





Project	%FTE FY03	M&S FY03 (in K\$)	%FTE FY04	M&S FY04 (in K\$)
Slow Controls & Monitoring				
VAX replacement	5	\$12	5	\$12
Linux-GPIB Control Program	10		10	
GPIB Hardware	10	\$30	10	\$15
Goniometer Control Program	60		10	
Magnet Control Program	60		20	
Experiment Control Program	20		40	
Other Monitoring Programs	20		30	
Maintenance	10	\$10	10	\$10
Prompt & Offline Analysis				
Software Infrastructure	20		30	
Maintenance	10	\$5	10	\$5
Real-Time				
CPU Replacement		\$40		
FDDI -> Reflective Memory	5	\$10		
Trigger electronics	10	\$20	20	
Signal Conditioning electronics	10	\$70	20	
Cables/connectors	10	\$25	20	\$15
VME Crates		\$40		\$10
VxWorks Implementation	10			
DAQ Code port	50			
Acquisition Hardware	5	\$150		CAEN V792AC ADCs and V890 TDCs
Hardware/E160 DAQ specific code	20		10	
Maintenance	5	\$10	10	\$15
Totals:	350	\$422	255	\$82

SLAC Personnel:	%FTE available to E160	
Perry Anthony	25	25
Zen Szalata	70	70
Physicist/Programmer	85	85
ERULF (students)	20	20
Totals:	200	200
Labor needed from Collaboration:	150	55