MEMORANDUM

To: Katalin Voros, Operations Manager
From: **Todd Merport**, Computer Systems Manager
Subject: 2009 Year-End Report
Date: 19 January 2010

I. INTRODUCTION

Computing operations have expanded this year to encompass both the Microlab and the Marvell Nanofabrication lab (Figures 1 and 2). The Mercury laboratory management software system was released last August, and in use by members qualified in the Nanolab. Accounting operations for the Microlab (about 10,000 monthly activities) are processed by the Mercury system as well. Bringing the Mercury system on-line was the major goal of our group last year. Members are now using it on a daily basis. We seem set for a successful run hopeful that we can approach the longevity and flexibility of the Microlab lab automation software, the Wand.

Of course the move to the new lab required concerted efforts and multitasking. Computing staff have deployed new lab terminals, enhanced the design and added content to the Marvell Nanofabrication Laboratory website, assisted staff with moving into Sutardja Dai Hall, assisted with telecom issues, and brought new servers on-line. Operations in the Microlab are still fully supported.

II. COMPUTER GROUP STAFF & THEIR PRIMARY DUTIES

Susan Calico, Information Systems Analyst II Microlab/IMPACT: Susan released the Nanolab web site last year. She is currently maintaining the site and making enhancements as required. Susan installs and maintains the anti-virus server and clients. Susan updates Windows servers and assists staff with updating their systems. Susan oversees the PBX database and data entry.

Madeleine Leullier, Computer Resource Specialist II (Supervised by Katalin Voros): Madeleine creates Unix and Windows accounts, gives direction to members regarding computer issues, manages the HP Design Jet plotter, and presents and maintains the computer group's orientation to new members. She also designs and posts documents on the Microlab and Nanolab web site using a variety of technologies.

Todd Merport, Applications Programmer IV Microlab: I maintain our Unix servers, write and modify applications, supervise, and do tasks necessary for the development and maintenance of Microlab and Nanolab Computer Systems.

Olek Proskurowski, Information Systems Analyst III: Olek's dedicated work on MercuryWeb and analysis of the Microlab accounting system were critical in the successful release of Mercury. He maintains the Apache/Tomcat/BIRT installation. He also helps with system administration and troubleshooting (especially difficult problems).

Changrui Yin, Information Systems Analyst III Microlab/IMPACT/BCAM: Changrui performs Windows system administration tasks, database application development, and web site design and maintenance. He manages the RUMS systems and oversees replication of lab equipment computers.

III. SYSTEM ADMINSTRATION

The Microlab and Nanolab use a variety of platforms, operating systems, and tools. Table 1 summarizes hardware (mainly non-equipment systems). Workstations for staff and terminals in the labs use Windows XP systems. Primary servers run on Solaris platforms with Apache 2.x. Windows servers are used for terminal, anti-virus, and web/database servers. Generally Solaris systems are used for key Microlab and Nanolab infrastructure services. Distribution of server tasks across multiple units permits less disruption if a server fails or requires maintenance. It also keeps systems from unnecessary dependencies or entanglement.

Mike Howard of EECS networking installed network equipment throughout Sutardja Dai Hall and IDF3 and IDF5 in the Nanolab. He solved many wiring issues with building contractors who installed CAT5e wiring. These efforts have provided for the Nanolab a solid foundation of 100, 1000Base-T active ports. The computer group participated in finalizing and testing telecom details and setup servers in the IDF 5 to support interlock control and facilities monitoring where RUMS2 is fully operational.

A production server for the Mercury system (database, web server, Mercury-Server, MercuryWeb) was purchased and brought on-line. Olek setup the Apache and Tomcat installations, compiled the Ingres database from source code on this system, and compiled, set up other software as needed. I implemented the Mercury-Server, sendmail, mail filtering, and the firewall.

Changrui installed several workstations for Microlab staff. He also brought online several new terminals in the Microlab. He manages various backup systems that have been very successful when restoration of equipment is necessary (most recently aln) from a corrupted disk or botched configuration. He has managed our anti-virus systems, lab terminals, and servers very successfully. The anti-virus system management has been passed down to Susan Calico this year. He has been very busy doing to sort of unheralded work required to keep staff and members working with minimal interruption.

IV. SOFTWARE

Development proceeded on many fronts in 2009 starting with the Mercury system, updating the Wand, and development of the Nanolab website.

Enhancements to the Wand

I set up triggers and tables in the Microlab database to track reservation inserts and deletes. Also, I wrote a program to test who is in the Microlab, check idle times, and broadcast global warning messages if it appears someone is working alone in the lab.

I implemented a test database and program to capture data from the tytalk daemon. Initial tests show tube data can be put into a variable character field (screen data) and retrieved properly. Each result is marked by date and tube number. This will be further developed this year when the tystars are brought on-line in the Nanolab.

RUMS2

Changrui set up a new installation of RUMS. It uses Labview, C#, IIS, and SQL Server. Changrui analyzed the current system and made coding changes to the various technologies in RUMS2 to create a new instance successfully.

Machine Shop Jobs System

Changrui added forms and coding to permit separate reports and queries for Nanolab related jobs.

New Development -- MERCURY

Mercury has several facets: the Mercury client (released as Mercury-1.0), the Mercury server, and MercuryWeb (see Figure 3). Aside from writing the java code in the netbeans environment, Olek created a mapping and synchronizing system to pull data from the Microlab activity table into the Mercury database and process the data with the Mercury accounting system such that one unified accounting system is used for the Microlab and Nanolab. Extensive ongoing testing comparing data from both systems has shown excellent results (within pennies). It is all the more remarkable since the Wand accounting system made its debut in 1986. Olek also implemented changes to the Mercury database for reservation rules (for the first time there is a form and definitions). Olek refined the Mercury client and server to improve client-server communication speed by a factor of two.

I updated the Mercury server's EquipmentManager and EControl classes to handle Hydra and ControlByWeb communications. These classes get properties set for equipment that will be enabled/disabled or require specialized resource queries from RUMS2. Figure 4 shows how data is entered for a Hydra connection.

Various programs required to run daily are in production: reservation reminders, calendars, and mail alias generation. I added some additional functions to Mercury client. Login and logout dialogs now warn labusers if no one is logged in or if they are the second to last member. Additional messages for login and logout prompts can be programmed by inserting fields into the messages table.

nanolab.berkeley.edu

Susan Calico designed and coded the new Marvell Nanolab web site. Susan quickly integrated the web pages into our Apache web server infrastructure and worked with staff to determine specifications and technical requirements. She wrote PHP programs for dynamic parts of the web site. She also developed a document conversion process so that laboratory manuals can be converted to PDF format. This simplifies the on-line posting, mailing, and printing of the lab manuals.

Equipment Control - Hydra

The equipment control system for the Marvell lab (designated as Hydra) has been deployed and operational. Aside from commands directly piped from the Mercury client, I wrote additional software to test channels, enable or disable sequences of channels, program front panel operations for manual override, and a database resynchronization function. The Hydra diagram shows a custom front panel sequence execution "ALL_ENABLE" that can be used when computer systems require bypassing. Jay Morford made valuable refinements to the Hydra relay box that permit the box to work with both AC and DC interlocks separately or at the same time. Michael Martin integrated the switch control unit in IDF 5 with the Nanolab's CAT3 wiring scheme. Olek's form on MercuryWeb for equipment properties allows simple entry of Hydra channel information. The example shows for a configuration for crestec that is wired through Slot 4, channel 7 on Hydra (Figures 4 and 5).

V. FUTURE PLANS

I think process monitoring and equipment communication (tystar, gcapc) tasks will parallel equipment moves or bringing new equipment on-line in the Nanolab. We are also queuing up requests for new features on MercuryWeb. Some fixes and re-arrangement of actions are required on Mercury client in addition to performance improvement (Olek made significant progress on that front already). Work will be needed on RUMS to upgrade to a supported OS. Some tasks such as new user creation and purchase orders now done on the Wand will move to MercuryWeb. This will likely require modifications and fixes to MercuryWeb as these new processes go live for the first time. Remote sites in Cory Hall will be hooked into Mercury instead of the Wand (novellus, jeol, autoprobe).

VI. SUMMARY

Major new systems were brought online in 2009 for the Nanolab while Microlab operational support continued uninterrupted. 2010 promises to be equally dynamic as new tools come online in the Nanolab and staff fully occupy Sutardja Dai Hall.

VII. COMMENTS

OLEK PROSKUROWSKI

The first half of the year I spent preparing Mercury to be released for general use.

- Set up new server to host Mercury system, this included compiling Ingres database on the new server.
- Thoroughly tested all MercuryWeb functionality.
- Incorporated new features requested by Microlab staff; reservation rules and BFS upload being the most important.
- Migrated Wand data to Mercury database.
- Created a program to synchronize Wand and Mercury databases which greatly simplified keeping both systems in consistent state.

The second half of the year I spent mainly on supporting the new Mercury system.

- Fixed discovered bugs.
- Added many new features and enhancements. Speeding up Mercury client startup, adding visibility column to resources table and adding properties to locations and utilities being the most significant.
- Ran daily synchronization of Wand and Mercury databases.
- Resolved any discrepancies in monthly reports between Wand and Mercury.
- Assisted in creating monthly BFS upload.
- Trained Microlab members on new Mercury system.

Throughout the year, I also:

- Installed necessary security patches for apache web servers.
- Assisted Todd with system administration.

CHANGRUI YIN

Windows Servers Administration

I installed system security and recommended patches. Built the new Symantec Antivirus 10.1.800 server. Restored the compromised machine shop server in a few hours by using the Acronis restore software and UC backup. Built Rums2 and resolved the web graphs and email problems. Tightened security on web servers. Performed backups (cape, rums, rums2, mshop-server, microlab2, microlab3, Microlab5) and documentation.

Staff & Lab Computers Support

Build/rebuilt multiple staff computers. Setup staff windows accounts. Upgraded the Symantec Antivirus Client to the version 10.1.800 on 49 Windows computers and configured their firewall. Restored lab equipment computer, aln. Moved and setup staff computers in SDH. Repaired software/hardware problems on staff and lab computers.

Printer support

I installed several new printers and scanners. Moved printers from Cory to SDH. Fixed printing problems on staff computers and print servers. Assisted users with plotter problems.

Additionally, I assisted staff with Wand issues and various Unix problems.

Future projects

My future projects include building a new CAPE terminal server, upgrading RUMS and RUMS2 to Windows 2003 from Windows 2000, moving computers and printers to SDH Hall, monitoring patch status, backing up systems, and remotely installing or updating software.

SUSAN CALICO

Marvell NanoLab Website

Migration of shared information from the Microlab website to the Marvell NanoLab website and new information for the NanoLab have created a fully functioning NanoLab site. A News page announces progress in the NanoLab tool moves and preserves a thumbnail history of the move.

http://nanolab.berkeley.edu/

http://nanolab.berkeley.edu/news.html

A new Lab Manual, containing updated pages for equipment moved, will be standardized with a NanoLab template. Equipment manuals for the NanoLab tools and utilities have been posted.

http://nanolab.berkeley.edu/labmanual/labmantoc.html

Membership information shared by Microlab and NanoLab was updated and formatted for the NanoLab website, then linked also to the Microlab website. On the back end, single-source rate files automatically update rate information on multiple web pages.

http://nanolab.berkeley.edu/membership/membershipaf.shtml

http://nanolab.berkeley.edu/membership/membershipac.shtml

Phone lists for emergency contacts, lab phones, staff members, and 911 phone list were standardized and consolidated into a source spreadsheet.

As members move from Cory Hall to Sutardja Dai Hall, internal information on the new computer and office environment (where to get keys or find equipment manufacturer's manuals) was posted on the staff portion of the site.

https://microlab.berkeley.edu/MNL/staffportal.html

Print stylesheets print web-page content with lab contact information at the top, but strip out the web menus and banners. Processes and sources for website pages are documented, including menus, rotating sponsor display, tool move status display, and single-sourcing of data.

Anti-Virus Protection

Monitored eight servers and 40 workstation clients for anti-virus scanning and updating, and virus activity. Worked with staff to leave workstations on overnight (when scanning and updating are scheduled), achieving 97% current scanning and updates.

Detected several virus infections, determined the ongoing source of one serious infection that had repeatedly compromised several workstations, requiring them to be completely rebuilt. A server was also compromised in one attack.

Security Patches and Updates

Reviewed announced product security updates and sent weekly notification and instructions to staff. Performed updates for four staff whose administrative computer rights had been revoked. Tutored with staff members who were not familiar with the updating process.

PBX / Phone System

Managed phone station assignment, setting up phone assignments for new staff members, clearing voicemail, and resetting passwords. Reset phone system display time. Determined and troubleshot trunk connection failure.

VIII. FIGURES & TABLES

Function	Platform	Operating System	Count	Responsible
Desktop	X86 Dell (Mostly)	Windows XP	45	scalico, changrui
Web, DB, Mail, Apps	UltraSparc	Solaris 10	4	merport, olek
Web, DB, Equipment Comm.	X86	Solaris 10	3	merport , olek
Web, LabView	X86 Dell	Windows 2000 Server	2	changrui, merport
Terminal Services	Xeon Dell	Windows 2003 Server	2	changrui, scalico
FileSystem, Web, Database, Anti-Virus	X86 Dell	Windows 2003 Server	3	changrui, scalico
Cad Workstation, EGLAS	UltraSparc	Solaris 9,10	3	merport, olek
Cad Workstation	X86 Dell	Windows XP	1	changrui, scalico
Thin /Thick Clients	Neoware/DELL	Windows CE/XP	34	changrui, scalico
Interlock Controllers	X86/Control By Web	LINUX	3	merport, olek
Interlock Controllers	Agilent 34980A	LINUX	1	merport , olek
Networked Printers	HP, Brother		11	changrui, scalico
Networked Equipment	Various	Various	10	changrui, merport
TOTAL:			122	

Table 1 - Hardware Summary

Function	Primary Technologies	Operating System	Responsible
MercuryClient,, MercuryServer	Ingres,Java	Solaris 10	merport, olek
MercuryWeb	Ingres, Java, Netbeans,Apache	Solaris 10	olek, merport
Wand	C,Ingres	Solaris 10	merport,olek
Wand on the Web	C, Ingres, Perl	Solaris 10	merport,olek
RUMS, RUMS2.	Labview, SQL Server	Win2k	changrui,merport
Mail Filter (microdomo)	Sendmail, perl	Solaris 10	merport, olek
PUMPS	SQL Server, IIS, .NET, Access	Windows 2003 Server	changrui, merport
Machine Shop Jobs	SQL Server, IIS, .NET	Windows 2003 Server	changrui, merport
GASES	SQL Server, IIS, .NET,Access	Solaris 9,10	changrui, merport
Mask Request	MySQL, Apache, PHP	Solaris10	merport , olek,
CAD (gds2tap)	C, csh	Solaris 10	merport, olek
Interlock Utilities (Hydra)	Perl, SCPI	Solaris 10	merport, olek
Nanolab Web Site	CSS	Solaris 10	scalico , leullier
Microlab WebSite	CSS	Solaris 10	leullier, scalico

Table 2 - In-House Software

Computer Systems Infrastructure Cory Hall

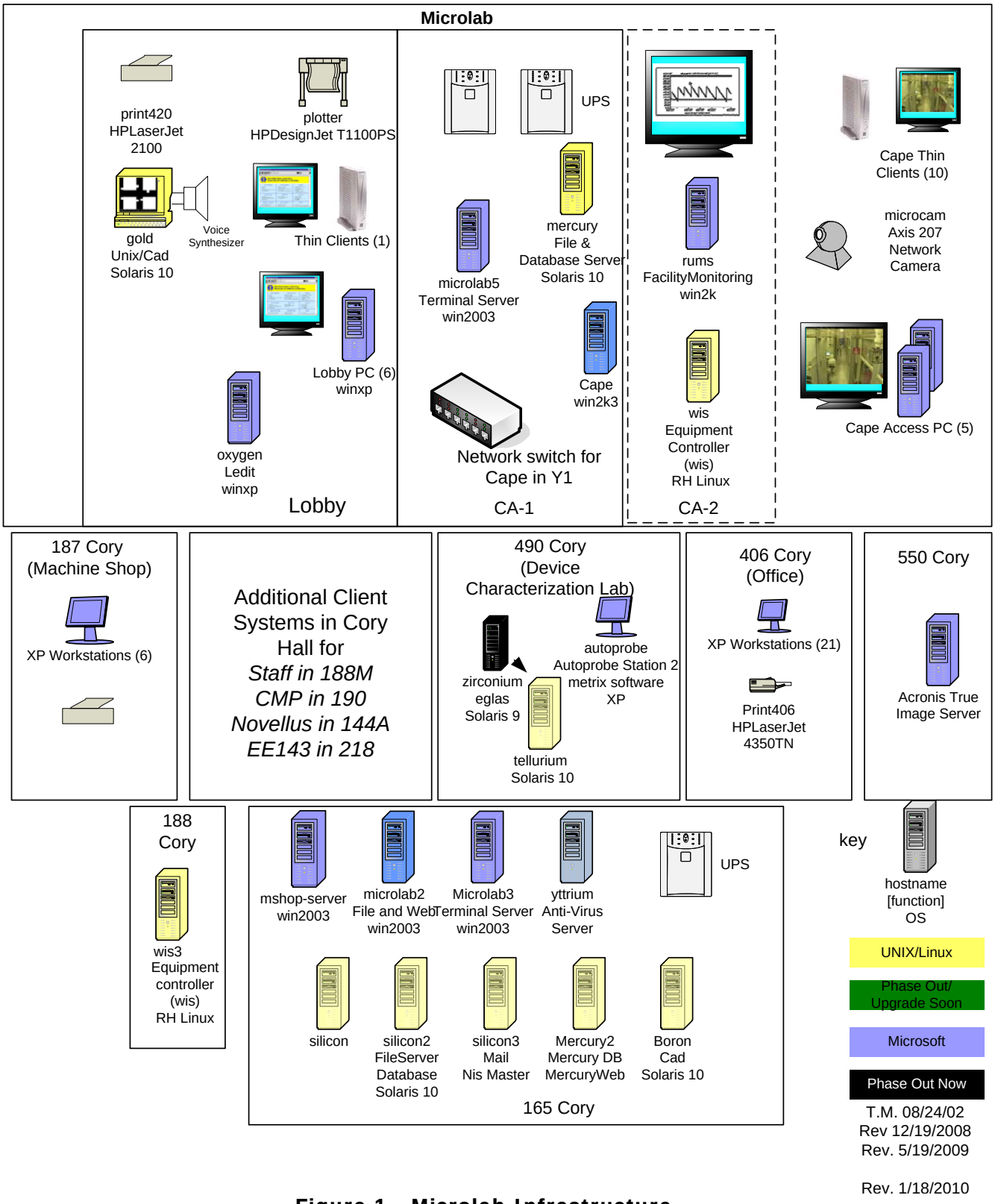

Figure 1 - Microlab Infrastructure

Computer Systems Infrastructure Sutardja Dai Hall

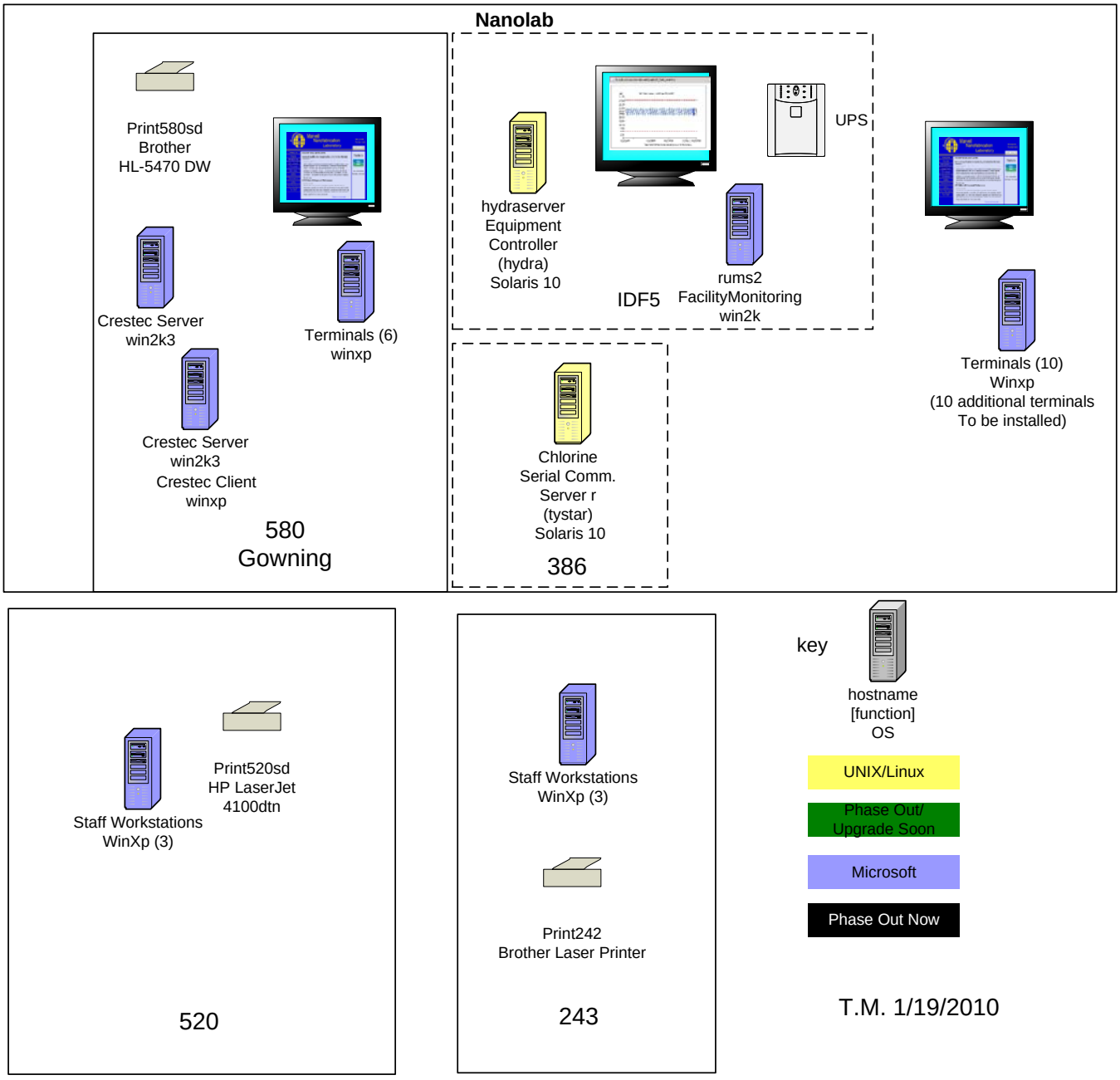

Figure 2 - Nanolab Infrastructure

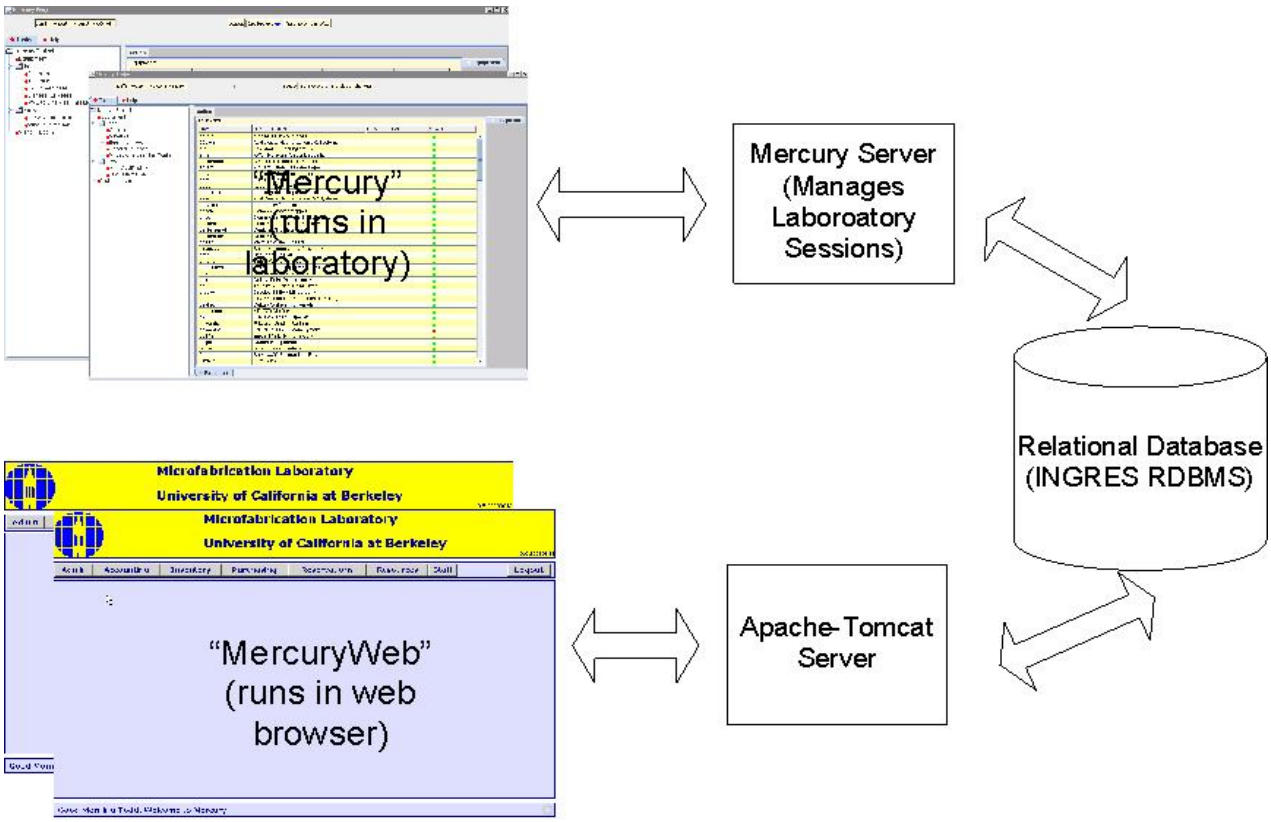

Figure 3 - Simplified Mercury Architecture

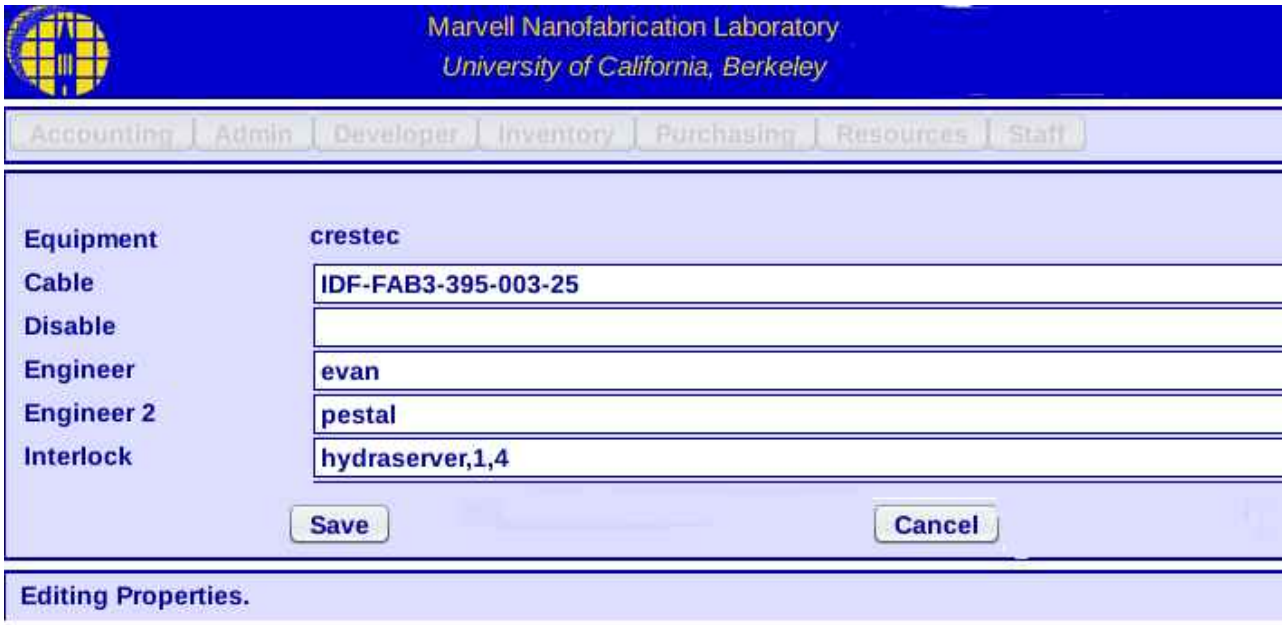

Figure 4 - Equipment Properties Editing on MercuryWeb

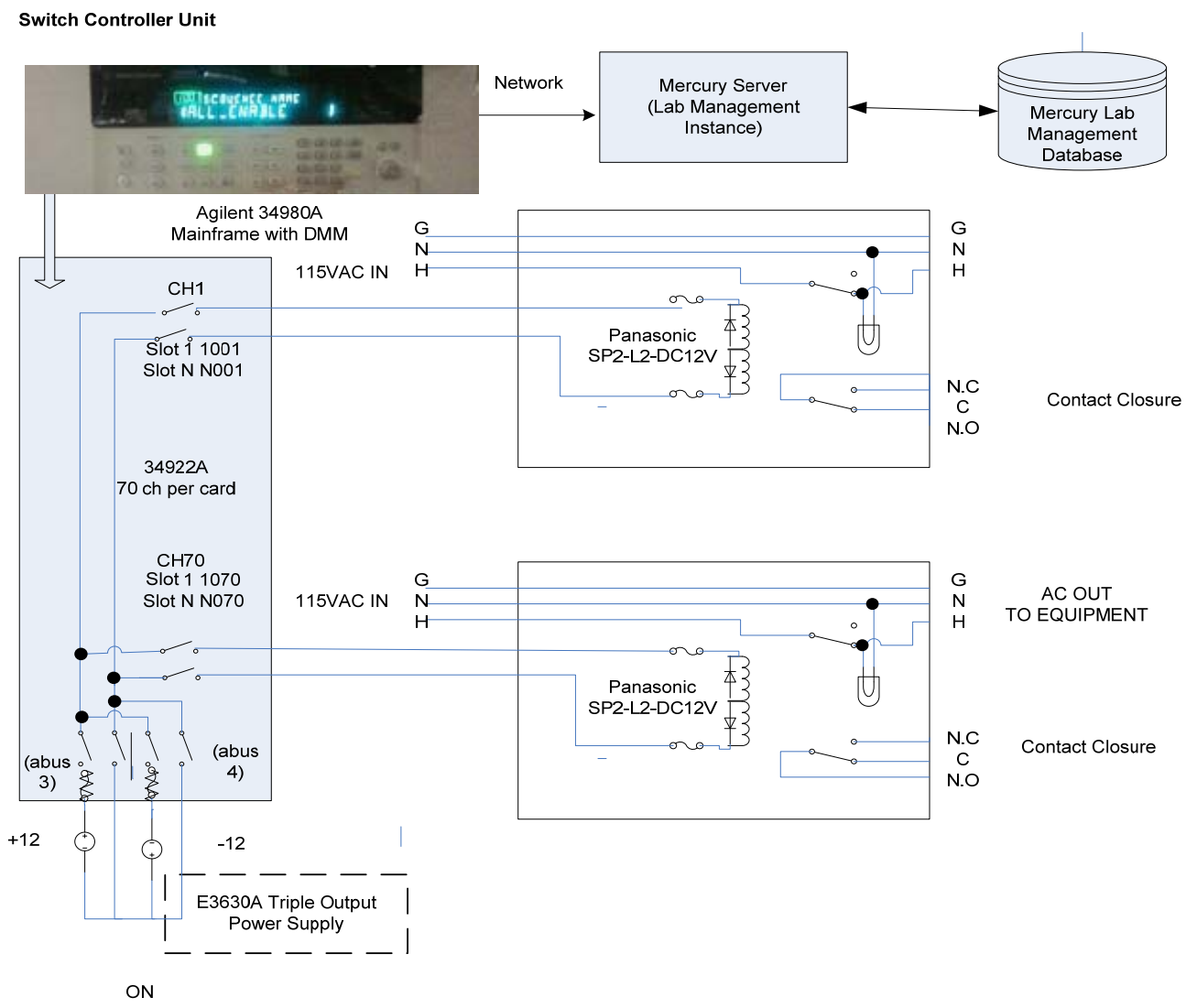

Figure 5 - Hydra Equipment Control