EIAL-FPK ClearCase Administration:
Overall Plan for Year 2000
ClearCase Server Machine Upgrades

Preface

Purpose: To give the plan, both schedule and tasks, for the hardware and software upgrades that need to occur for the 3 ClearCase regions in EIAL in 2000. The upgrades involve installation of 4 or 5 new 64-bit N-class servers as VOB servers, moving other 64-bit machines into use as VOB servers, upgrading VOB servers to HP-UX 11.0, upgrading all ClearCase machines to ClearCase 4.0 and all VOB servers to *ClearCase database schema 54*, and re-using older VOB machines as additional view machines.

Audience: EIAL ES system administrators;
EIAL SCM ClearCase administrators;
UXSCM MultiSite Architect.

Terminology:

ES	The systems administrators in EIAL (Engineering Services).
UXSCM	The overall HP-UX ClearCase program.
SCM	EIAL ClearCase administrators and procedures.

Related FPK documents:
Tasks for Bringing a New ClearCase Server Online;
Notes on Migrating a VOB Server Using LVM;
EIAL-NJ ClearCase Hardware Inventory (spreadsheet);
EIAL-NJ SCM Comparison of HP Servers (spreadsheet).

Status: The Plan is in use now. As we progress through the summer, I am updating §1.4 and §2 to reflect changes and progress; since other sections are not always getting updated, if you read the document from start to finish now it may not make temporal sense.

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1. Introduction

In May 2000 we had a backlog of machine upgrades to get done, once we understood the exact procedure needed to reliably and safely move VOBs from one machine to another using LVM. We have the following new machines to use in this upgrade process:

- 3 N-class servers from our FY2000 budget that have arrived but have not been set up
- 1 or 2 additional N-class machines are budgeted for ordering in [34]Q2000
- 2 K-580's from 1999 (one is temporarily being used as `necmshub` since that workstation failed, and one is being used as Louie's IA build machine (`view5`) since the old `view4` failed and had to be recycled as a **jazz** B beta machine)

The 3 major software upgrades also occurring this year are:

- jazz A.07.06 to jazz B.00.00
- ClearCase 3.2.1 to ClearCase 4.0
- HP-UX 10.20 to HP-UX 11.0

The UXSCM Program management has requested that partner sites like ours have their VOB servers fully upgraded to ClearCase 4.0 by August 31, 2000. As of early June, the UXSCM Program had certified ClearCase 4.0 on HP-UX 11.0 for VOB servers only—they are still having subtle problems in the overall SCM/build/integration environment with that combination on view servers (Cupertino is running ClearCase 4.0 on HP-UX 10.20 for their view servers). There are 2 factors driving the need to upgrade our ClearCase VOB servers:

- ClearCase 4.0 has a new database schema (schema 54) that supports database files larger than 2 GB, and the size of some of the UXSCM VOBs requires this capability (and this in turn requires 64-bit machines)
- HP-UX 11.0 is needed to support the ability of the disk buffer cache to be larger than 1 GB, and the UXSCM program wants to use 8-16 GB of RAM on VOB servers to allow that cache to hold all of the database files for all of the VOBs on that server, thereby improving performance

So the initial requirement in the following sequenced set of machine moves is to make our VOB servers all 64-bit machines running HP-UX 11.0. (Note that a 64-bit machine has to have a PA-8*xxx* CPU chip—no PA-7*xxx* CPUs are 64-bit capable).

View servers in Cupertino are still, as of June, running HP-UX 10.20, though with ClearCase 4.0, because of unresolved issues with ClearCase 4.0 and makefiles on HP-UX 11.0. So, EIAL will also hold off on running HP-UX 11.0 on view servers until after the date scope of this document. *Note, however, that Doug has pointed out that all view servers in a region will have to (UXSCM requirement) move to ClearCase 4.0 at the same time, which means that the 11.0 upgrade for them may also need to be done quickly; this may not allow hardware musical chairs, but necessitate 10.20-to-11.0 upgrades.*

NOTE: In July 1999, our FY2000 budget planned for 6 N-class machines to replace our 6 VOB server machines; but in 1Q00, we lost the 6th N-class in a budget cut, and the plan dropped to 5 new N-class. We ordered the first 3 N-class machines assuming our VOB servers were the overloaded machines; but this is not necessarily the case. From preliminary usage of the Glance software in April and May, it appears to me that the view servers in general are more heavily loaded. Thus, even though we need the N-class servers for VOB servers because of the I/O bandwidth and their 64-bit CPUs, we may need to add additional view servers from the recycled machines, or add CPU's to them. Also, the first 3 N-class machines were ordered with 8 GB of RAM; we are reducing our 2H00 plans from 2 N-class to 1, all in 3Q00, and making the 4th and last N-class one with much more RAM (32 GB). This will allows us to spread the total N-class RAM across the first 3 machines as well, giving us 14 GB per machine. This will be closer to what we really need for keeping the ClearCase database files in the disk buffer cache.

We may reduce the HP region from 3 to 2 VOB servers, if our N-class machines can handle the load; this will help alleviate the floor space shortage we currently have in our production lab. However, moving some VOBs from one machine to another has to be done with `tar` and thus during downtime; given the aggressive schedule we are laying out in this document, I expect that until August, we will just replace the 32-bit VOB servers with 64-bit machines on a 1-to-1 basis, since that can be done with the LVM procedure. The movement of VOBs can be done after the August 31 deadline.

1.1. ClearCase Database Schema 54 and UXSCM Program-Wide Risk

Note that Rational officially says that all of the VOB replicas in a VOB family (i.e., `/ux/kern` at all UXSCM sites, from Cup to NJ to Richardson, etc.) must be running the same database schema. But Cupertino has upgraded already to schema 54 while other sites have not—a situation clearly not "supported" by Rational. In practice, this is OK until a transaction in Cupertino occurs that causes a VOB to pass the 2-GB size gets replicated to sites like NJ. If this occurs, then the UXSCM program MultiSite partner sites get "disconnected" (details would be TBD) from Cupertino until they upgrade—clearly, this would cause a major disruption in our HP-UX on IA work! *This is a risk that UXSCM management has chosen to take, but it is the hammer over our heads to get our upgrades done!*

1.2. Overview of the Timing of Each Upgrade

The overall order of the hardware and software upgrades is as follows:

1st. The **jazz** B release can run with ClearCase 3.2.1 or ClearCase 4.0, and with either HP-UX 10.20 or HP-UX 11.0, and it is a world-wide roll driven by Cupertino, so it is going first (June 17 weekend).

2nd. The N-class machines cannot run 10.20 and so they must be (re-)installed with HP-UX 11.0.

3rd. ClearCase 4.0 gives you a choice, when it is being installed, of installing support for database schema 53 or 54, and it is not clear the effect of re-installing it only to get schema 54. Also, if you install schema 54, you must immediately upgrade (reformat) any VOBs on that machine. So, we will install ClearCase 3.2.1 initially on the new 11.0 machines, and get the process of moving the VOBs from older machines using the LVM process with the AutoRAIDs out of the way first.

4th. Once a VOB server has been moved to a 64-bit machine running 11.0 and all is well, we will install ClearCase 4.0 and reformat the VOBs in a single downtime for that machine. *The license/registry server in each region must be upgraded first! (and the 3.2-based Doug script for measuring real DB size must be turned off 1st!).*

1.3. Overview of Schedule

Given the UXSCM mandate for having our VOB servers upgraded to ClearCase 4.0 by August 31, we have to manage our tasks vs. the time. Here are the parameters:

- There are 13 weeks and 13 weekends in June, July, and August.
- We have 6 current VOB servers to upgrade to 64-bit machines (perhaps we will be reducing 6 VOB servers to 5, it appears now, consolidating the 3 `njlsrc[123]` K-class machines onto 2 N-class machines).
- We then have 6 (5?) VOB servers (with a current total of 242 VOBs across the 3 regions) to convert from the 3.2.1 database format to the 4.0 database format.

We will install HP-UX 11.0 but not ClearCase 4.0 onto the N-class before they go into production. Then, the movement of VOBs using LVM mirroring will happen during the work week, with the downtime for "breaking the mirror" occurring on a Friday night downtime, giving us some slack into the weekend if we have problems. Then a week or two later, after the new machine has been running OK with the moved VOBs using ClearCase 3.2.1, we will install ClearCase 4.0 and reformat the VOBs, also on a Friday-into-the weekend downtime.

We will attempt to minimize the number of downtimes per region, and to do several regions at once if that makes sense.

1.4. Summary of Machine Upgrades and Exchanges

The following table is a summary of the machine upgrades *and exchanges* (using an old VOB server for a view server, etc.) in the sequence we need to do them. For notation purposes, the N-class machines are named `nclass1` through `nclass4`, and the K-580 machines have their current use names, `necmshub` and `view5` (it appears that we will not have to re-use the `view5` machine for a VOB server in this round and that Louie can keep it as his IA build machine).

Note that we need to move the non-`/ux` VOBs off the machines where the `/ux` VOBs are, since all VOBs on one machine must be running with the ClearCase 4.0 schema or not, and we cannot let other labs' little VOBs get in our way (they may be going to ClearCase 4.0, but why take the chance, and they may change their mind in the future). This is why `njlsrc2` is being recycled to a new life as `nonuxvob`.

#	Iteration	Current Name (as of June 1, 2000) *(italics if it had a previous use)*	Model	CPU	Current Use	New Use	New Name *(italics if replaced machine is to be re-used)*	New OS	Comments
1		aclass1	A180	?	*new*	hub	*necmshub*	11.0	**DONE**
2	2	*necmshub*	K580	PA8200	hub	VOB	*njlsrc2*	11.0	**DONE**
3		nclass1	N4000-36	PA8500	*new*	VOB	*njlsrc1*	11.0	38 GB of VOBs on njlsrc1
4		nclass2	N4000-36	PA8500	*new*	VOB	*htcvob1*	11.0	73 GB of VOBs on htcvob1
5		nclass3	N4000-36	PA8500	*new*	VOB	*njlsrc3*	11.0	85 GB of VOBs on njlsrc3; 10 GB non-vg01 VOBs
6	2	*njlsrc1*	K580	PA8200	VOB	VOB	*necvob2*	11.0	52 GB of VOBs on necvob2
7		nclass4	N4000-36	PA8500	*new*	VOB	*necvob1*	11.0	34 GB of VOBs on necvob1
8	2	*njlsrc2*	K420	PA7200	VOB	VOB	nonuxvob	11.0	re-install disks and OS; for 6 non-/ux VOBs (mostly Java; 7 GB)
The machine "re-uses" below here are NOT subject to the August 31 deadline. Note that we have to install HP-UX 10.20 on view machines (with ClearCase 4.0) until the UXSCM team works out makefile issues.									
9	2	*htcvob1*	K420	PA7200	VOB	view	Extra view servers or nightly build machines: nectools, build2, htcview2, view6?	10.20	re-install disks and OS
10	2	*njlsrc3*	K420	PA7200	VOB	view		10.20	re-install disks and OS
11	2	*necvob1*	K420	PA7200	VOB	view		10.20	re-install disks and OS
12	2	*necvob2*	K420	PA7200	VOB	view		10.20	re-install disks and OS
13		*aclass3*	A180	?	*new*	hub	*htcmshub*	11.0	install shipping_server only

The week of July 10, we decided to do `necvob1` and `htcvob1` first, before `njlsrc1` and `njlsrc3`, to reduce the number of downtimes for the HP region. But I am keeping the number of the order of machine upgrades here, to reduce the level of confusion in the schedule table on the next page.

1.5. Risks and Dependencies

I believe the primary risk in the above schedule is getting the LVM-based procedure for moving VOBs between machines worked out, refined, documented, verified, and operationally proven. I have started a document, *Notes on Migrating a VOB Server Using LVM*, that captures the information for doing this that we have gathered from talking to Cupertino folks and reading documentation, but it needs to be finished and tested on some test machines. This is my primary job now other than this plan.

1.6. Notes on Doing the More Detailed Plan

Here are some notes I am making as I get ready to do a more detailed plan for the above:

- There are some VOBs on non-`vg01` volume groups that will have to be moved using `tar` or similar mechanisms. Time needs to be allowed for these:

Machine	VG	VOB	size
`njlsrc3`	`/dev/vg02`	`obj`	9,000 MB
`njlsrc3`	`/dev/vg00`	`bebc_ros_s32`	1,000 MB

Note that 8 of the VOBs on `jlsrc3` are still on HFS file systems and will be moved to VxFS during the upgrade. This cannot be done with LVM, since it would just copy the HFS file system structures…

Schedule *[to verify, follow steps for each machine!]*

Days	Dates	Machine/OS install or re-install CMH	Install FPK setup & ClearCase 3.2.1 TG	LVM Mirroring of VOBs TG	Breaking the mirror and cutover CMH/TG	Install ClearCase 4.0 & reformat VOBs TG	Other Tasks CMH/TG
Mon-Tue	6/12-13	DONE aclass1(1)					
Wed-Thu	6/14-15	DONE 6/21: nclass1(3)					DONE: 6/26 aclass1→ *necmshub*(1)
weekend	6/16-18						DONE: *(jazz B install)*
Mon-Tue	6/19-20	DONE 6/28: necmshub(2)					
Wed-Thu	6/21-22						*11.0 patch depot on NEC, Hitachi*
weekend	6/23-25						
Mon-Tue	6/26-27						
Wed-Thu	6/28-29		DONE 6/29: necmshub(2); nclass1(3)	DONE 6/29: njlsrc2 → necmshub(2)			
weekend	6/30-7/2 [*Tim leaves on vacation 7/2, until 7/8*]				DONE 6/30: njlsrc2 → necmshub(2)		
Mon-Tue	*7/03-04* [*Terry on vacation 7/1-6*]	Holiday	Holiday	Holiday	Holiday	Holiday	
Wed-Thu	*7/05-06*						
weekend	*7/07-09*						
Mon-Tue	*7/10-11* [*Doug R. on vacation 7/10-16*]	DONE 7/13: nclass2h(4) newsrc1(7)					
Wed-Thu	*7/12-13* [*Doug R. on vacation 7/10-16*]		DONE 7/14: nclass2h(4) newsrc1(7)				
weekend	*7/14-16* [*Doug R. on vacation 7/10-16*]						
Mon-Tue	*7/17-18*						
Wed-Thu	*7/19-20*	nclass1(3) nclass3(5)					prep for njlsrc3 HFS/vg02 moves
weekend	7/21-23				nclass2h → htcvob1(4) newsrc1 → necvob1(7)	necvob1(7) (get some timing data)	
Mon-Tue	7/24-25	old-src1(6)	nclass1(3) nclass3(5)				
Wed-Thu	7/26-27	aclass3(13)		nclass1(3) nclass3(5)			
weekend	7/28-30				nclass1→ njlsrc1(3); nclass3→ njlsrc3 (5)	Maybe: HP region CC4.0 upgrade?	
Mon-Tue	7/31-8/1	old-src2(8)	old-src1(6)				aclass3→ htcmshub (1)
Wed-Thu	8/02-03		old-src2(8)	old-src1(6)			
weekend	8/04-06				old-src1→ necvob2(6)	njlsrc1? njlsrc2? njlsrc3? necvob2 htcvob1\\\	move non-/ux VOBs to nonuxvob (old-src2) machine
Mon-Tue	*8/07-08*	old-htcvob1(9)					
Wed-Thu	*8/09-10*		old-htcvob1(9)				old-htcvob1→ htcbuild(9)
weekend	*8/11-13*						
Mon-Tue	*8/14-15*	old-njlsrc3(10)	old-njlsrc3(10)				old-njlsrc3→ build2(10)
Wed-Thu	*8/16-17*						
weekend	*8/18-20*						
Mon-Tue	*8/21-22*	old-necvob1(11)					
Wed-Thu	*8/23-24*		old-necvob1(11)				old-necvob1→ build2(11)