

Centre de Calcul IN2P3

A computing service centre,
national & HEP-centric (= deeply
coupled to one research
community).

Centre de Calcul de l'IN2P3
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F-69622 VILLEURBANNE

<http://cc.in2p3.fr>

<http://annuaire.in2p3.fr>

Main customers =
40+ physics experiments

created 1973 : CCPN, Paris

Moving 1986 : CC-IN2P3, Lyon

<http://www.cnrs.fr>



<http://www.in2p3.fr>



QuickTime™ et un
décompresseur TIFF (non compressé)
sont requis pour visionner cette image.

Le Centre de Calcul

One **computing resource centre** common to IN2P3-CNRS & DSM-CEA

National : 20 HEP laboratories,
40 expériences (PP, PN, Astro),
2500-3000 users

National : open to Biology
(~ 6 groups).

Grids : R&D, know-how,
grid culture dissemination

International : Tier-1 /
Tier-A status

Annual Budget :
~ **6 M€** (2005)
Plus ~ 2,5 M€ salaries

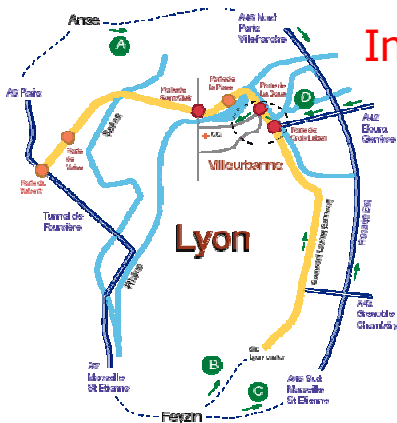
LHC, BABAR, D0,
Auger, HESS, Virgo,
Antares,

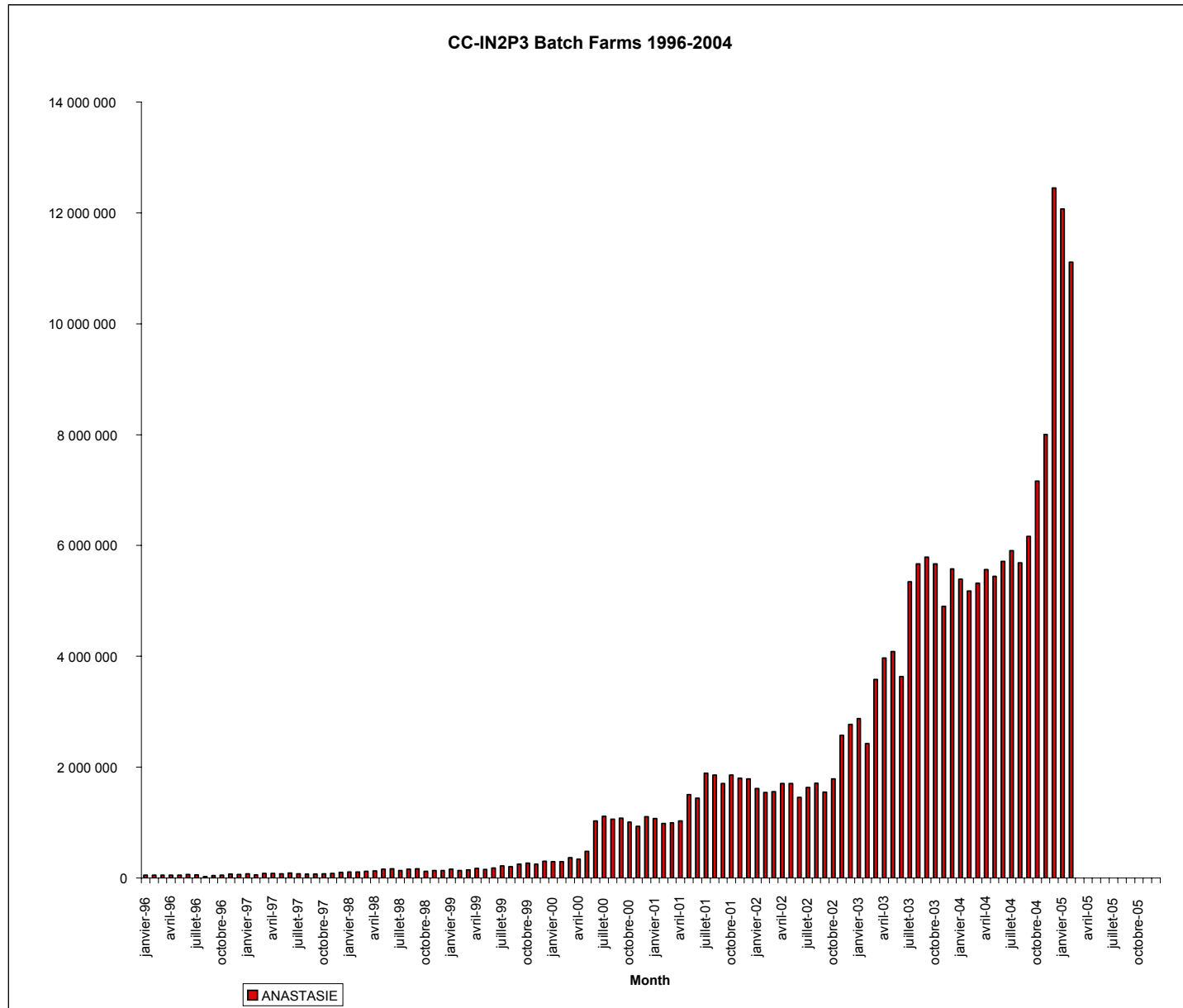
~**60 people**
(45 computer
engineers)

0,8 PetaOctet used
60 tape reader units,
36000 cartridges
DB, hierarchic system

~ **1600 cpu's**, 1,4 M SI2K
(~3-4 Teraflops effective)
~ 100 TB disk

- Network & QoS
- Projects et **many services** "à la carte"





Le Centre de Calcul

• 3 base Services :

1 - computing, > 1500 processors in farms, ~3,5 TeraHz or 1,3 M SI2K (100% Unix, 99% Linux, Majority SL3). Doubling every year for the past 10 years.

Efficiency (effective/peak) >80%, or 3 Teraflops effective.

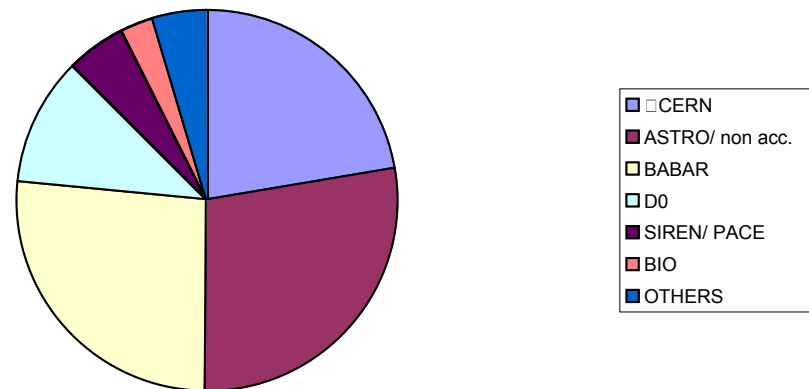
2 - Storage (100 TB disk, 800 TB cartridges, scalable to 7 PB, served by ~100 processors), with the HPSS system.

Average monthly traffic tape-disk in 2004 ~ 0,5 Gbps (70 MB/s)

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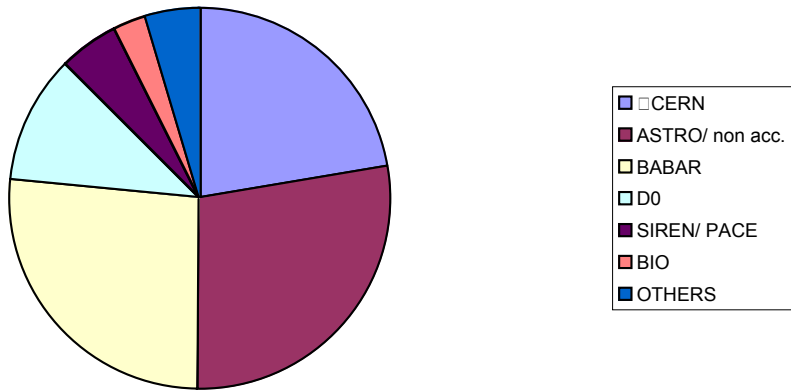
3 - Network (LAN+WAN):
WAN = 20 labs + Fr Xptal site
access to Internet, QoS.

CPU sharing at CC-IN2P3 (2004)



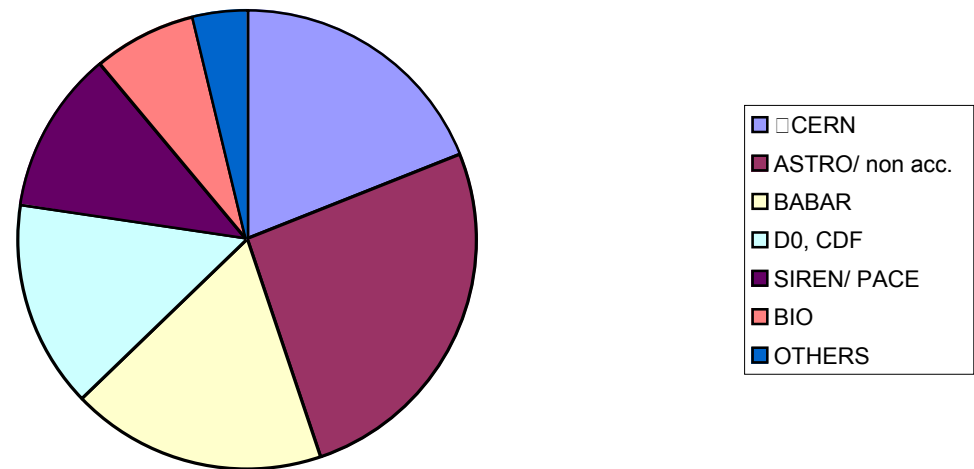


CPU sharing at CC-IN2P3 (2004)



LHC experiments are still far from reaching the target share of $\sim 2/3$.

CPU sharing at CC-IN2P3 (2005)



CC-IN2P3, Cost estimates per experiment in 2004

EXPERIMENT	2004 resources			2004 COST (€), estimate 1				% of total, ratio		
	CPU 2004 (k SI2K h)	DISK TB	MSS TB	CPU	DISK	MSS	TOTAL	COST	CPU	% COST / % CPU
BABAR	1027500	45	277	574 743	1 388 340	1 042 074	3 005 157	43%	26%	1,64
LHC (4 expts)	758800	5,74	108	424 443	177 090	406 296	1 007 829	14%	19%	0,75
D0	416750	5,4	136	233 114	166 601	511 632	911 346	13%	11%	1,23
AUGER	277500	2,5	40	155 223	77 130	150 480	382 833	5,5%	7,1%	0,77
HESS	280000	0,7	20	156 621	21 596	75 240	253 457	3,6%	7,1%	0,51
PHENIX	14500	1,3	31	8 111	40 108	116 622	164 840	2,4%	0,4%	6,38
EROS	8400	1,1	30	4 699	33 937	112 860	151 496	2,2%	0,2%	10,13
VIRGO	123500	0,55	16	69 081	16 969	60 192	146 242	2,1%	3,1%	0,66
SIREN	200000	0,01	0	111 872	370	0	112 242	1,6%	5,1%	0,32
BIO	104400	1	2	58 397	30 852	7 524	96 773	1,4%	2,7%	0,52
NEMO	130000		5,5	72 717	0	20 691	93 408	1,3%	3,3%	0,40
ARCHEOPS	118100	0,07	0,5	66 061	2 160	1 881	70 101	1,0%	3,0%	0,33
DIRAC	85000	0,03		47 546	987	0	48 533	0,7%	2,2%	0,32
Other ASTRO+nu	157500	5,08	22	88 099	156 728	82 764	327 591	4,7%	4,0%	1,17
All other exp.	222530	1,52	12	124 475	46 772	45 144	216 390	3,1%	5,7%	0,55
TOTAL	3 924 480	70	700	2 195 200	2 159 640	2 633 400	6 988 240	100,0%	100,0%	1,00

The last column is one parameter to measure the computing model of the experiment.

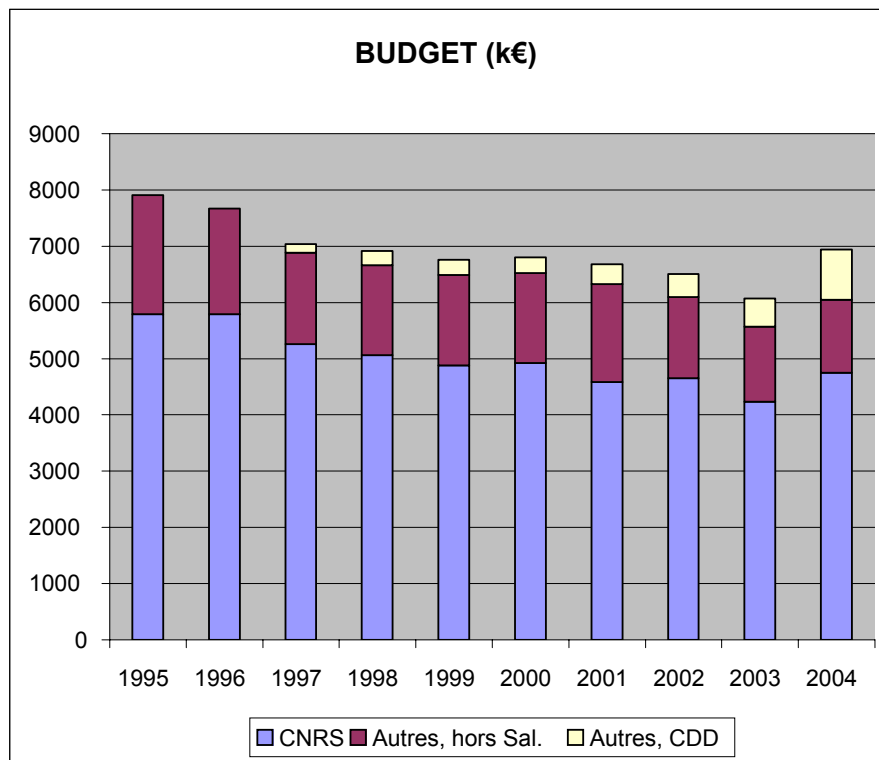
eg. Babar cost has been **43%** of CC while using **26%** of CPU. Should CPU be the only parameter, one should weigh it down with **1.64**

<input type="checkbox"/> Babar, LHC, D0	2203050	56,1	521	1 232 300	1 732 031	1 960 002	4 924 333	70%	56%	1,26
<input type="checkbox"/> ASTRO+neutrino	1095000	10	134	612 500	308 520	504 108	1 425 128	20%	28%	0,73
<input type="checkbox"/> others	626 430	4	45	350 400	119 089	169 290	638 779	9%	16%	0,57

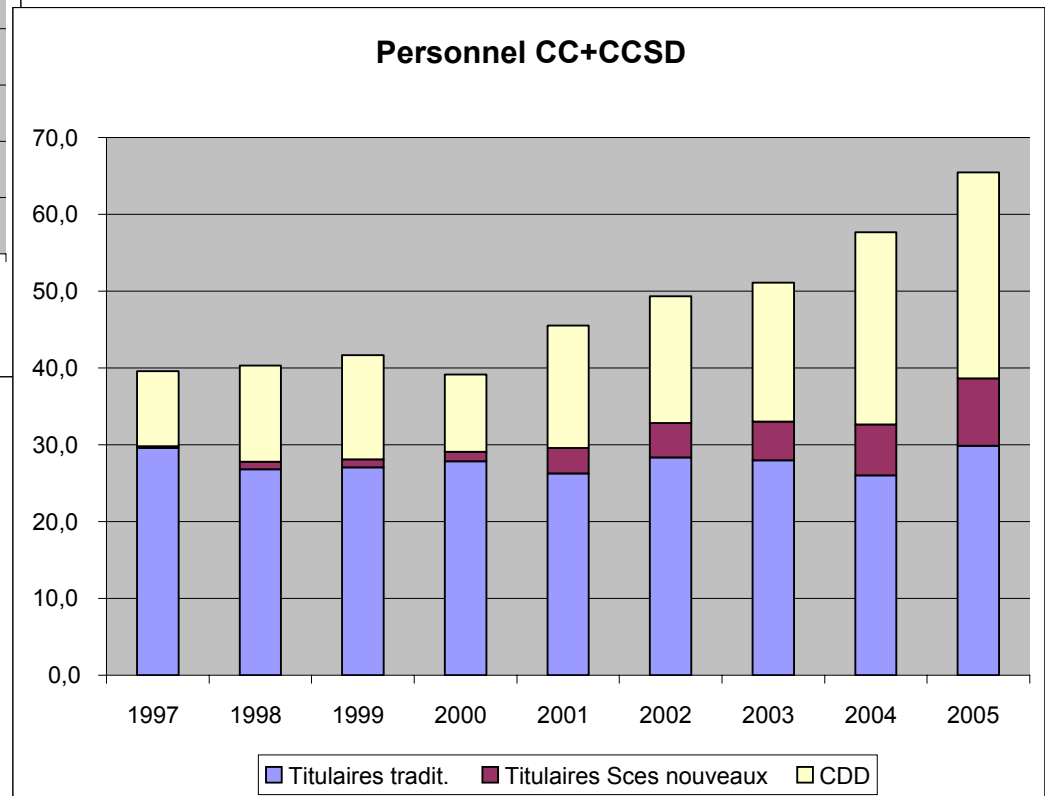
LHC sharing :

ATLAS	287800	1,25	47	160 984	38 565	176 814	376 363	37,3%	37,9%	0,98
CMS	175900	2,32	23	98 392	71 577	86 526	256 494	25,5%	23,2%	1,10
ALICE	112300	1,95	10	62 816	60 161	37 620	160 598	15,9%	14,8%	1,08
LHC-B	182800	0,22	28	102 251	6 787	105 336	214 375	21,3%	24,1%	0,88
LHC (4 expts)	758800	5,74	108	424 443	177 090	406 296	1 007 829	100,0%	100,0%	1,00

- **Other services :**
 - Data Base, Software & OS (licences, support, maintenance),
 - Website hosting (~150)
 - Many types of mutualized services (photothèque, mail, forums, PCs, visioconf & webcast for our community + others, EDH service, collaborative tools, etc..),
 - Data Back-up, hosting servers for external clients
 - hosting network nodes : Renater, RMU, Amplivia, Lyonix.
 - Software tools, grid development and testing, **grid services**,
 - Separate unit created for electronic scientific Publishing service
 - Specific Human support for some clients (large experiments + Biology)
 - hotline ("user support"), security, computing schools et al.,
- **All Services on a "best effort++" basis 24h/24.**



+ 2M€ salaries



Plans are to be a T1 + a T2 to host an analysis facility
(≥ 2 other T2 are planned out of the ~ 10 EGEE.fr sites).

Rough estimates are :

CC Today	CC 2008	<u>LCG@cc</u> 2008
1,4 MSI2K	16 MSI2K	10-12
0.1 PB disk	3 PB	2 PB (tender 2005: 0.25 PB more)
0.8 PB tape	6-8 PB	4-6 PB
60-65 people	65 people	~ 40 (stabilize most fixed-term people)

(what experiments are calling disk could well be a mixture of cache disk & tape with a good hierarchical system)

CC is hosting a CIC, ROC, GOC, see: <http://cic.in2p3.fr/>
Infrastructure? heavy AC (air conditioning) work underway (started in 2004, reschuffle the room 2005-2006)

CC-in2p3 is deeply involved into the operational aspects, through EGEE SA1
(~ 10 people are paid by EU here).

Le Centre de Calcul

Questions ??



Else:

lunch, then visit of the computer room.