Resources chapter from the LCG TDR

Resources

Assuring stable and efficient access to computing resources, which are distributed in a truly global fashion, is an enormous technological undertaking. Its complexity is well documented in the preceding chapters of this document. Aligning the resource planning of over 100 institutions in more than 20 countries, involving more than 25 funding agencies with widely different budgeting procedures is not an easy task either.

The Memorandum of Understanding for Collaboration in the Deployment and Exploitation of the Worldwide LHC Computing Grid (MoU) defines the procedures to enable funding agencies to pledge resources and follow-up on their delivery. The MoU, through various annexes, lists the Tier-1 and Tier-2 centres represented in the collaboration, defines the service levels to be provided at CERN and the Tier-1 and Tier-2 centres, and gives the resource planning at each centre over a five year period.

These annexes will be updated at most twice per year for the spring and autumn meetings of the C-RRB. It is anticipated that the resources for the coming year will be committed at each autumn meeting, in time to allow acquisition and installation to be completed in time for the accelerator running period.

Only the data contained in the copies of the MoU signed by the funding agencies constitute pledged commitments, but provisional planning data provided by the representatives of the centres are maintained on the web.

- Current list of Tier-1 centres (http://lcg.web.cern.ch/LCG/C-RRB/Tier-1/ListTier1Centres.pdf)
- Current list of Tier-2 centres (http://lcg.web.cern.ch/LCG/C-RRB/Tier-2/ListTier2Centres.pdf)
- Current planning of computing capacities for the Tier-0 and the Tier-1s (http://lcg.web.cern.ch/LCG/planning/phase2_resources/draft_LCG_Tier0-1Res.pdf)
- Current planning of computing capacities for the Tier-2s (http://lcg.web.cern.ch/LCG/planning/phase2_resources/draft_LCG_Tier2Res.pdf)

The following table summarises the requirements of the experiments for capacity at CERN, at external Tier-1 centres, and in Tier-2 centres in the years 2007-2010. The requirements for the first full year of data taking (2008) are compared with the current capacity planned at CERN and in the regional centres. Note that the site planning data has been prepared assuming that the ALICE experiment would run for only a limited period in 2008, whereas the ALICE requirements in Section 2 of the TDR now assume a full four week run in 2008. All of the Tier-1 centres have provided resource planning estimates for 2008, but only a small subset of the 39 Tier-2 centres and "federations" currently identified have provided such data.

Summary of Resource Requirements and 2008 Planning

		Requirements - all experiments				Current planned capacity		
CPU (MSI2K)		*2007*	*2008*	*2009*	*2010*	*2008*	*% of requirements*	*notes*
	CERN Total	10.0	25.3	34.5	53.7	20.0	79%	*1, 2*
	CERN Tier-0	*6.9*	*17.5*	*22.4*	*32.8*	*12.3*	70%	
	CERN T1/T2	*3.1*	*7.8*	*12.1*	*20.9*	*7.7*	99%	
	All external Tier-1s	19.2	55.9	85.2	142.0	47.1	84%	*1*
	All Tier-2's	23.6	61.3	90.4	136.6	15.8	26%	*3*
	Total	**53**	**143**	**210**	**332**	**83**	58%	
Disk(TB)								
	CERN Total	2,200	6,600	9,200	12,600	5,700	86%	*1*
	CERN Tier-0	*400*	*1,300*	*1,400*	*1,800*	*1,100*	85%	
	CERN T1/T2	*1,800*	*5,300*	*7,800*	*10,800*	*4,600*	87%	
	All external Tier-1s	9,300	31,200	45,400	72,100	21,700	70%	*1*
	All Tier-2's	5,200	18,800	32,400	49,200	3,300	18%	*3*
	Total	**17,000**	**57,000**	**87,000**	**134,000**	**31,000**	54%	
MSS (TB)								
	CERN Total	4,900	18,000	31,100	45,600	15,300	85%	*1*
	CERN Tier-0	*3,400*	*13,600*	*23,600*	*34,500*	*12,000*	88%	
	CERN T1/T2	*1,500*	*4,400*	*7,500*	*11,100*	*3,300*	75%	
	All external Tier-1s	9,300	34,700	60,800	92,200	24,700	71%	*1*
	Total	**14,000**	**53,000**	**92,000**	**138,000**	**40,000**	75%	

Notes
1. CERN and Tier-1 planning has not been reviewed after the announcement that ALICE assumes a full period of data taking in
2. At CERN all ALICE processing requirements are assimilated in the Tier-0
3. Planning for Tier-2s available only from France, Japan, Spain, Switzerland and UK

Estimates of the cost of providing the resources planned for the CERN facility (Tier-0, Tier-1 and analysis facility) have been made, as described in an earlier section of this TDR. The current cost estimates exceed the planning budget presented at the Computing Resource Review Board by about 10%. The funding allocated to this budget in the CERN Medium Term Plan at present will cover only about 70% of these estimated costs. On the other hand, the funding for the personnel required at CERN through to the end of 2008 is already in the CERN Medium Term Plan.

The financial and human resources required at the various centres to provide the planned capacity are not visible to the project – the MoU deals only with capacity and service levels.