

1. Introduction (**Jae, Patrice*)

In general: what time scale are we talking about? Two months, two years,???. Obviously we need a consensus. This is also important to have a consistent planning of the hardware, software and maybe even organization of data. My feeling is that these are not necessarily guaranteed. Just to mention two points: The time scale I am considering to have a preliminary version of these centers in place and working is by the end of Run IIa. This is minimum for this kind of system to be useful at all. Because having the system deployed and the data distributed in these centers at that time would allow expeditious analyses of data set in remote institutions.

Obviously the planned scheme comes at least close to the GRID ideas for LHC etc. Do we have the software for this already? A planning should take this into account and thus it appears very important to also include a discussion about the plans and realistic time scales for GRID computing within D0 and define the planning of the hardware architecture in a consistent manner. As you know very well, we do not have supporting software in place yet, other than SAM for some rudimentary level of "Grid" in data delivery and metadata system. There is a team at FNAL in place to coordinate and develop Grid software, improving current SAM to adapt to Grid computing. This is the area we, as the collaboration, will need to invest resources.

Another point is that there might be too little bandwidth between Europe and the Fermilab. I suggest to perform some studies. The outcome will certainly have important implications for an optimal distribution of data. As I understand, the Surfnet from and to NIKHEF provide larger bandwidths than most the US network. However, I do not clearly know what the bandwidths to other institutions are. The D0Grid testbed coordination should include such testing as part of the fundamental studies for preparation. As you might have seen, my back of the envelop calculation shows that we would need to transmit raw data at the rate of 1.4Mbytes/sec DC to each RACs, assuming there are 10 RACs. This also means that we will need at the level of 14Mbytes/sec or better for Run IIb and LHC experiments. The Surfnet should suffice this but others must be sufficiently improved to meet the need.

It is mandatory to have that an optimal access to the important data for the analysis at every institute at ANY time. My feeling is that the current draft aims at an ideal situation which may take some time to develop. What happens until then? Let me remind you that during the plenary meeting we discussed the need for an approach in several phases. I do not see this reflected in this draft

We certainly could include this phased approach into the implementation plan and time scale, though I was hoping to concentrate onto the specification of such centers in this document.

2. Operating Assumptions (**Jae, Lee*)

Instead of a monthly plan it might be more useful to state something about the expectations for the years ahead and the corresponding amount of data.

Yeah, that was what I was thinking as well, but given the uncertainty of the luminosity I am not quite sure how useful it would be. I think putting such profile of luminosity would help the readers of this document what they should take into account in reading it. I will collect these numbers and put them in.

3. Motivation for Regional Analysis Centers and Use Cases(**Chip, Jae*)

4. DØ Remote Analysis Model (DØRAM) Architecture(**Jae*)

5. Services Provided by the Regional Analysis centers (**Frank, Patrice, Lee, Iain, Chip*)

a. Data Delivery Services(**Lee*)

b. Data Reprocessing Services(**Frank*)

calibration runs, or run calibration programs (quasi) on-line.

c. Database access services(**Chip*)

d. MC Production and Processing (**Iain*)

e. MC Data Storage Services(**Iain*)

6. Data Characteristics (**Meena, Peter*)

To define the optimal distribution of the data we need more and better estimates about the number of users at the various places (e.g. on both sides of the Atlantic) and the need of data transfer. Based on such information we should then perform realistic studies on data transfer etc.. Also simulation tools like MONARC might be of help (we in Wuppertal did make MONARC studies in some other context, if requested we could try and apply it to the D0 needs and constraints).

Can one of you from Wuppertal give the D0RACE meeting a lecture on MONARC? Who do you think is good for this?

One may think of various schemes depending on the available resources and band width: World wide distribution without replications, all data available on each continent (some replication), specific data sets distributed according to the main needs of the various main RAC users (high level of replication).

As I mentioned before, the solution depends not only on how many people do what and where but also on the development of the proper software: which of these solutions should be realized at which stage depends also on the progress of the GRID infrastructure. Absolutely, but in writing this section we will have to assume that there is sufficient level of supporting Grid software in place, and of course, we will have to make it damn sure that it happens.

a. Raw data

Some significant (?) fraction of raw data must be transferred to these sites and permanently stored in their cache system for reprocessing.

How often do we expect reprocessing once stable running is achieved?

Note at LEP: about once a year – do we really need data in the cache at any time? It is not quite clear at this moment, I would presume it would be more frequent at the beginning, gradually become less frequent as our codes get more stable. It might not be practical, though, to think of re-processing data once every year, unless the total time for reconstruction is reasonable.

b. DSTs

These are the ones needed to develop new analysis algorithms at the cluster and track level and are therefore of high importance for the physics analyses.

We will have Serban telling us about DST and Thumbnails at this week's DORACE meeting, 9am Thursday, in 9th circle. We could get ISDN set up for all of us to participate, backing off from the planned VRVS.

c. Thumbnail

The thumbnail that constitutes to full data set statistics must be kept at these sites. These thumbnail data should be sufficient to provide significant data set for higher statistics refinement of analyses. Maybe ?

d. Specific Data Streams

The data volume can be significantly reduced if groups are focusing on specific physics topics. In this case RACs may limit the amount of reconstructed data to a well defined subset taking into account, however, a broad enough selection to reliably estimate the backgrounds. This requires some pre-studies as to:

- which kind of data should be safely stored
- what advantage in terms of speed and reliability one expects from such a focused analysis.

It should be up to the main users of a specific RAC to decide on which data they intend to store. This refers to both data and Monte Carlo simulation.

e. MC Data Tier

f. Data Replication

In case of data replication it is of utmost importance to guarantee that the same reconstruction versions are used for all RACs and that the results are identical (this requires some kind of certification procedure e.g. on a well defined subset). Also this implies that reprocessing has to be done in a centrally organized manner. No RAC by itself is allowed to replace an official data set with a privately (even if it is improvement) reprocessed version.

In case of an official reprocessing of the data sets it should be clearly defined by a central institution which RAC is to reprocess which data set. More than one reprocessing on any event has to be avoided.

7. **Requirements of Regional Analysis Centers**(*Bruno, Christian, Patrice, Frank)
8. **Recommended Sites and Justification**(*Christian + all for relevant parts)

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Could we get standardized informations (a table) for the various potential RACS on the existing and forseen infrastructure until 2007 **allocated to D0I think this is an excellent suggestion. I will put in a table for such summary.**

CPU (in terms of Specint95 e.g.), disk space, tapes, bandwidth to Fermilab, and within the region to be mainly served, number of users in this region.

Also it should be outlined if the center is used by other experiments and how much D0 specific person power is needed/available. Yes. I agree. However, this might not be possible until an MOUs are written between the experiment and the institutions.