CERN DIRAC notes 96–34
December 4, 1996

STATUS OF DAQ

S.Trusov(INP MSU, Dubna branch)

As decided by the DIRAC collaboration the CASCADE based DAQ will be used for test runs and full scale experiment. Below is a brief report on the first use of the CASCADE-based system during the test run in November 1996.

The installation of CASCADE was done by J.Niewold (ECP CERN) with the assistance of Y.Perrin and J.Petersen (ECP CERN). The templates provided allowed us to develop codes for the data taking and monitoring tasks. The scheme of the hardware used is shown on Fig.1. The CERN group provided hardware and helped a lot also with some management problems.

The OS9 operation system was booted by the HP workstation in the FIC8234 VME processor board over the Ethernet link. The remote file system of the FIC8234 was mounted on the same HP workstation. The X-windows based user-interface process ran on the HP and allowed to control DAQ and to display the run status.

The monitoring process for the on-line data analysis ran on the second HP workstation. It requested and received events from CASCADE via Ethernet link, prepared histograms and wrote them on file. PAW was used to display the histograms, to fit them, and so on.

The data taking logics used the fact that the PS is a cycling accelerator. "Beginning of Spill" (BOS) signal was put in the CORBO trigger unit and caused the VME interrupt which was treated by CASCADE as the event arrival. So, we had only one superevent per accelerator spill.

The trigger signal from the test setup was put in the CAMAC input register as well as the "End of Spill" (EOS) signal. As soon as BOS causes the call of interrupt service routines, the program went in the loop and tested the LAM status of the input CAMAC register and while the trigger signals were received the events were read out and put in the buffer. At EOS signal arrival the program read-out the CAMAC units once per spill (scalers, for example), completed the filling of the buffer and transferred the obtained superevent to the other stages of CASCADE (to the recorder and the remote monitoring server if it was requested). The VME to CAMAC branch driver CBD 8210 and CCA2 CAMAC crate controller were used to read out the CAMAC units.

The Exabyte 8500 connected to FIC 8234 by SCSI bus was used as recorder.

The LeCroy TDCs 2277 were used for the measurements with drift chambers. This TDC allows to detect up to 16 hits for each of 32 inputs. The read-out of these units was performed in the Q-stop block transfer mode and the maximum data transfer rate was about 100 Kwords per second including the event building. This value may be considered as the upper limit for the data-taking rate as the read-out of different units word by word will request more time. The read-out rate will depend on the number of units, data format, the mode of data transfer but it seems that it will be acceptable for most of the test runs.

In the full scale experiment the readout of data will be performed by fast ECL bus or by dedicated units which will transfer the data to the VME buffer memories without

control of VME processor or host computer. The event building will be performed between accelerator spills only, as well as the data storage on the external recorders. So, the value of 100 Kwords/sec is not a limit for the future experiment.

We also met problems during the test run. The most unpleasant of this was that part of the data was lost due to the fact that Exabyte rewound the tape and started the recording from the beginning of tape. It is not clear what was the reason: some error in the Exabyte or incorrect actions of shift personnel. We will try to clarify this problem with the CASCADE team and find out how to escape it in the future. There are different ways which may be used for that and we hope that it will not be a problem.

Other problems concern mainly the user interface. We will need to perform some extensions for that as well as developing more advanced remote monitoring process. I hope that all groups can contribute in the on-line data handling of the tested detectors. The templates written in FORTRAN for event receiving and decoding will be provided by the on-line team.

I would like to mention something about slow control and monitoring problems. Who, when, how will develop the codes for the monitoring of high voltage supplies, magnet currents, gas flows and so on? Nobody knows at the moment. It is obvious that some part of that information must be written on the tape from time to time. So, it should be written in the frame of CASCADE or the slow control programs must have a possibility to communicate with CASCADE. It is not really a small job.

And the last problems. On 12 November M.Ferro-Luzzi, L.Afanasev and me from DIRAC side and C.Parkman and J.Niewold from the CASCADE team had a discussion on the problem of what kind of CASCADE system we will need in the future. During this discussion it was understood that it is not possible in the next year to have exactly the same system in Dubna, as there is no spare FIC8234 available. At present the CASCADE team are working for CASCADE installation on the LynX platform for PowerPC based VME processor board. The next year it will become the base line for CASCADE implementation. So, there is no sense is buying the old VME processor board now. The installation of CASCADE on the new platform will be finished in a few months. Hardware will be available for us not earlier than in the summer of next year and cold not be firmly promised. It was promised only that to the beginning of 1998 we will have the hardware which we would like to have for CASCADE. So, the two systems we could have only at the beginning of 1998. More than that, a license problem could arise as CERN buys the hardware and software for implementation in CERN. For outside use we should buy a new license. It seems that at the moment when we will have the second system in Dubna for the on-line development the main part of the job should have been done already. This leads to the requirement that the on-line team should spend more time in CERN and, of course, additional financial support will be needed for that.

The meeting with C.Parkman and J.Niewold resulted in the following schedule of DAQ development:

1997 — one OS9 based system will be used for test runs and one LynX based system will be provided to make the transition to LynxOS. The time the when LynX based system will be available was not fixed. It is hoped that it will be in the summer.

1998 — one LynX based system of some sort will be available for the full scale experiment. Details on the hardware will be discussed with J.Niewold.

We are not in an easy situation. The time for the on-line software development is not as much as we expected. It will require, as it was mentioned before, the additional efforts from the on-line team. Of course, some part of the job may be done in the home institutes but only a small part because for the on-line software development it is necessary to have the hardware.

In the conclusion I would like say that I am very thankful to J.Niewold, Y.Perrin, J.Petersen and C.Parkman for the work done for us, for their very kind relation to our experiment and very useful discussions. I hope that this cooperation will be successfully continued in the future.

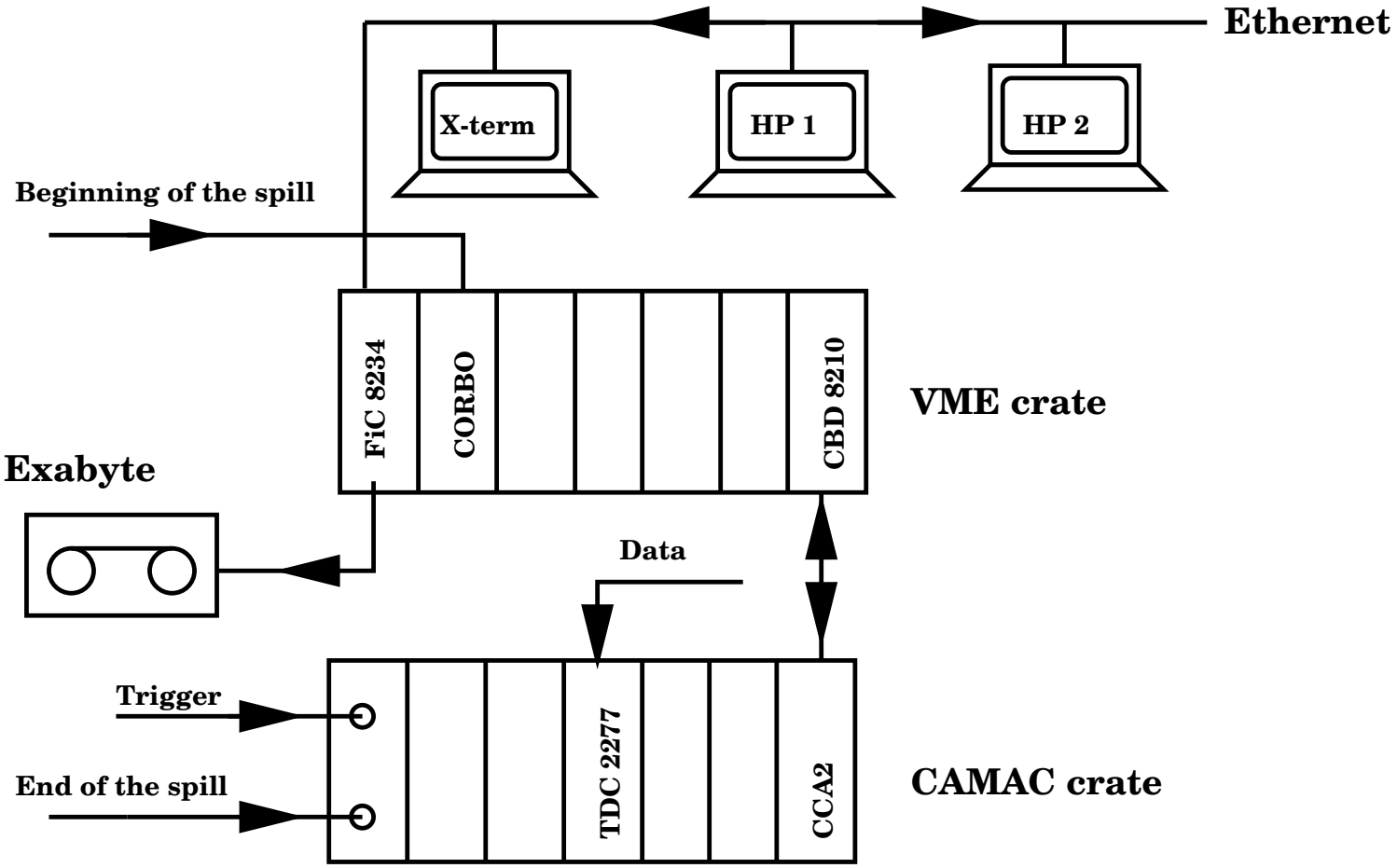
Ethernet
X-term
HP 1
HP 2
Beginning of the spill
FiC 8234
CORBO
CBD 8210
VME crate
Exabyte
Data
Trigger
End of the spill
TDC 2277
CCA2
CAMAC crate

Fig. 1