PROPOSAL
HEP Batch Computing Facility based on a PC Farm

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Abstract

This proposal is devoted to realization and practical use a General Purpose Batch Computing Facility for HEP based on a PC farm.

Problem: Needs for high performance computing for a low cost per unit of power.

Introduction

Several facts can be taken into account:

- decreasing the financial resources in HEP;
- increasing the requirements for computing;
- existing of a cheap operating platform like Linux;
- cheap commodity hardware (PC);
- existing batch sytems CODINE, NQS, LSF, and others which are relatively easy available in many leading HEP laboratories;
- new languages: java;

We might consider General Purpose Computing Facility on a base of PC.

It is discussed PC farm consisting of N nodes (PCs) for batch processing with relatively weak communications between nodes. N might be considered in range from several PCs to probably 100 or more.

Reliability of an existing hardware is enough to support PC farm consisting of 100 nodes by one person (for hardware, operating system and general application software).

Scalability: we can increase a number of PCs to desired value in step by step mode.

The value about **400 Pentium Pro 200 MHz or 200 Pentium II 300 MHz** can be discussed as really achievable maximum of computing power (in case when four processor motherboards will be used).

One processor Pentium II 300 MHz is more than two times more powerful the R4400 200 MHz. That means the maximum computing power will be more than 30 SGI with 28 R4400 processors every SGI.

A number of SCSI ports and disk drives may be various and will reflect concrete needs in the discussed proposal.

Technical consideration

We can consider large installation like a constallation of simple farms (see Fig. 2).

However before realization of the large farm we should create pilot relatively small experimental Batch Computing Farm (see Fig. 1).

There are several technical questions which may be mentioned now:

- how to maintain and load one OS version in every computer;
- how to use one (or two) keyboard and monitor for a hundred computers;
- how to display the status of the whole large farm in compact and consistent manner.

It is possible to continue this list however those technical details will be solved later because good part of them are already solved in a range of previous projects (FNAL: computing farm, DESY: Hermes PC Farm, etc.). We also have to take into account that new equipment, software, prices are appeared every month.

Experimental Batch Farm

To test scalability and other parameters discussed proposal it required to deploy small Batch PC Farm consisting of at least 3 PCs.

Main aim: to get real experience in deploying the batch system (CODINE,LSF, etc) on small PC Farm and to collect user feedback, measurement the real farm parameters: comparing the execution time for selected jobs. It is planned such a farm will be used for simulation and microDST analysis.

In any case this pilot project will show for which type of calculations this farm will fits more.

To deploy such an experimental installation we need for things which should be bought or found out:

- two PCs:
  - Pentium II 300 MHz;
  - 512K cache;
  - 128MB main memory;
  - 4 GB EIDE disk drive;
  - videocard (on mother board);
  - no monitor;
  - Fast Ethernet card;
  - total price for one PC is about $2700;
- Hub Fast Ethernet: 3COM SuperStack II 100 TX (12 port RJ-45) - about $1100;
- APC SmartUPS 700 - about $400;
- Linux SUSE distribution;
- batch system (LSF,CODINE,etc);
- central PC:
  - Pentium II 300 MHz;
  - 512K cache;
  - 128MB main memory;
  - SCSI controller (wide);
  - two disk drives (4 GB + 27 GB) ;

- videocard at least 4 MB;
- two Fast Ethernet card;
- CD ROM;
- tape (?);
- monitor 17";
- total price for central PC is about $6K;

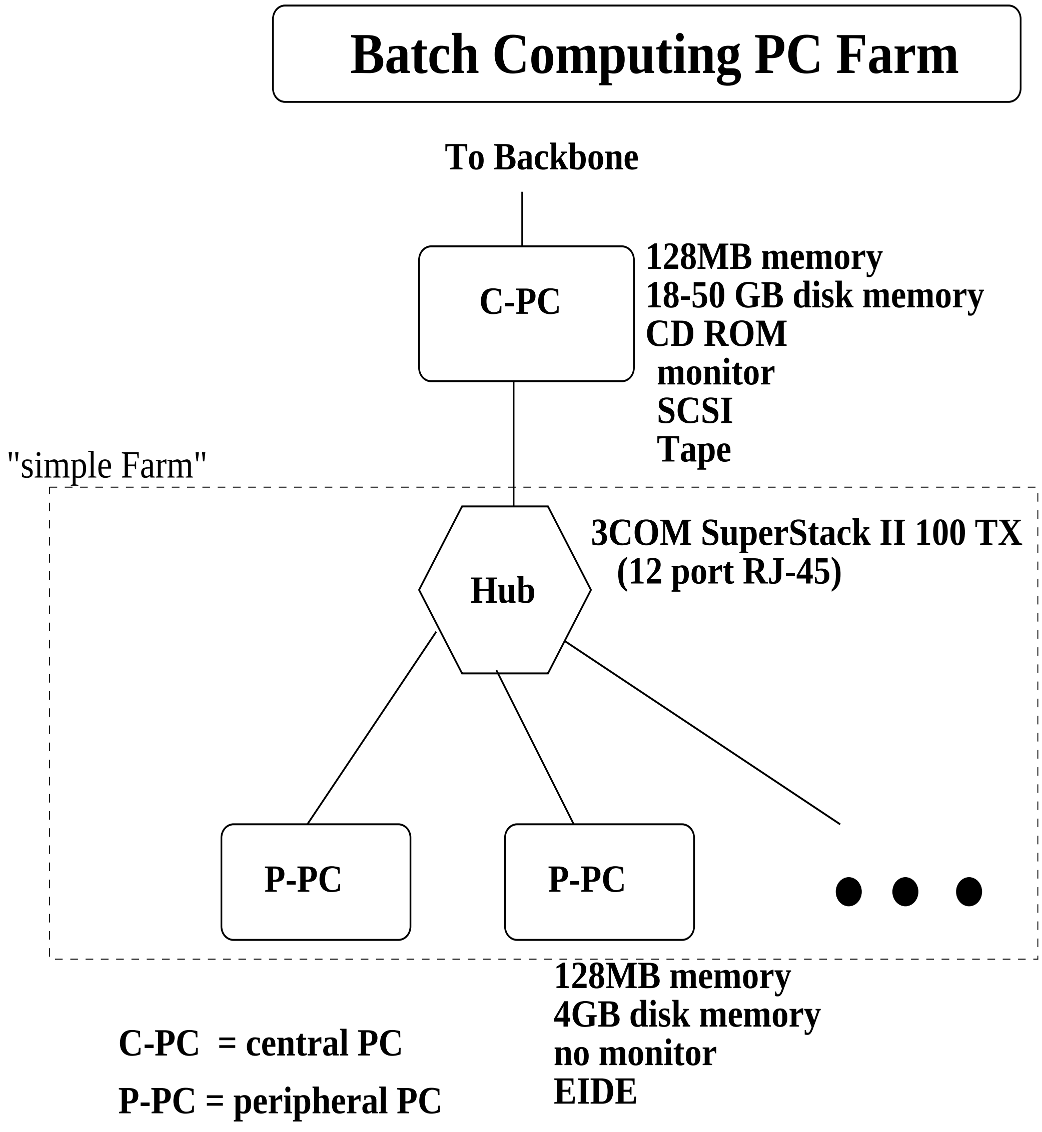
- total price for experimental installation is about $12900 for the start installation.

Things which should be done:

- hardware ordering and deploying;
- software installation and tuning:
  - Linux;
  - CERN Program Library;
  - gnu stuff and other standart de facto utilities;
  - www page(s) which will reflect the work progress;
  - batch software;
- measurement of execution time for the selected jobs and other parameters;
- organizing the user access (over Internet as well).

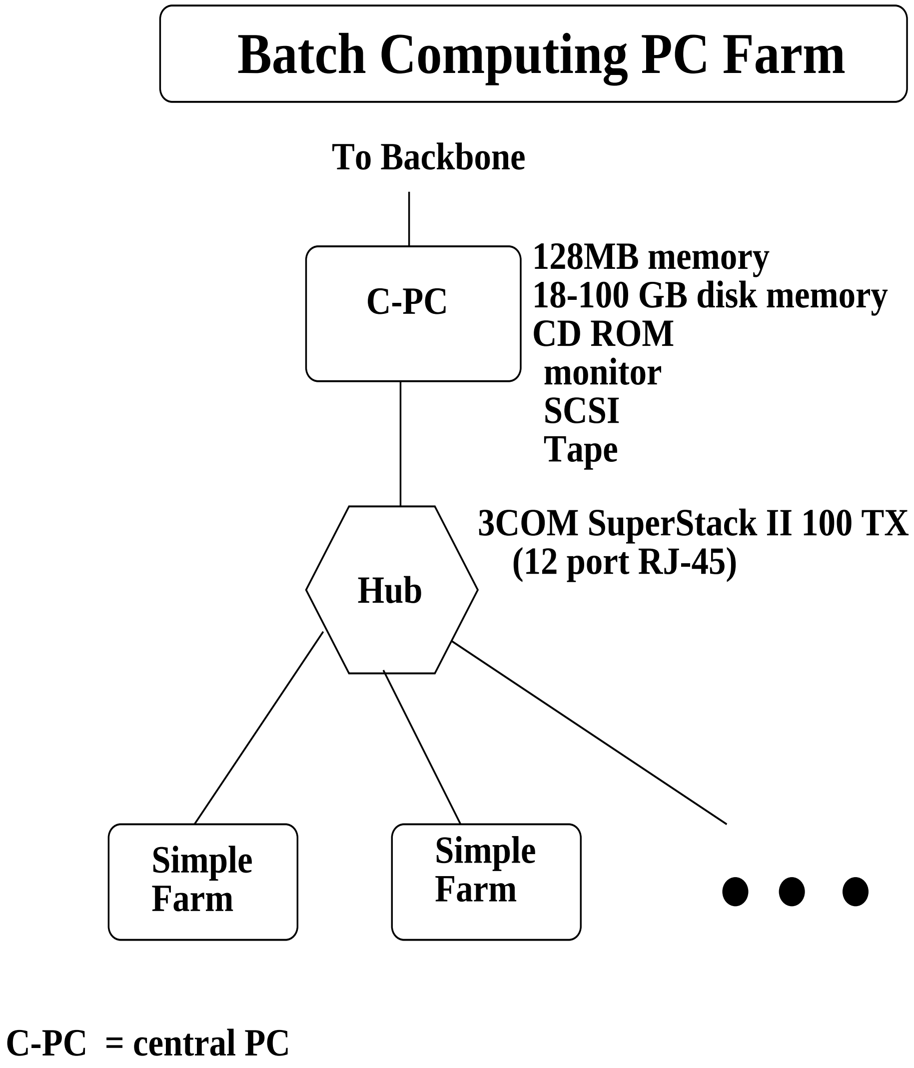
Schedule:

Week	**Job**
0	Project start
4	Hardware delivery at PNPI
6	Linux + CERNlib + other programs, libraries, utilities
8	Start User access
10	Report paper about first results



a) experimental Farm

Fig. 1. Experimental Batch Computing PC Farm.



b) Batch Computing Farm

Fig. 2. A Scheme of the Batch Computing PC Farm.

Spending:

What	Who
ManPower	PNPI
space to deploy	PNPI
equipment	?
batch system	?
Linux SUSE	?

Final remarks

A tape cartridge may be used to transport the data to discussed computing facility from other places where such data are produced. It is not clear yet (27 Oct 1997) which tape drive type will be more suitable for that. Seemingly most useful to have the same cartridge type (and density) which is used in tape robot at CERN DESY, FNAL, or BNL.

For the pilot installation uniprocessor configuration is discussed. However it is easy to imagen how to upgrade it to two or four processor configuration.