

La farm di ALICE a Trieste

Enrico Fragiaco

ALICE Trieste

Presentazione per il
Consiglio di Sezione - INFN
4 maggio 2004

Utilizzo della farm a Trieste

o Studio di eventi con charm nelle collisioni p-Pb con ALICE ad LHC (Raffaele Grosso)

o Studio degli ipernuclei Λ e Σ con FINUDA a DAΦNE (Stefano Piano)



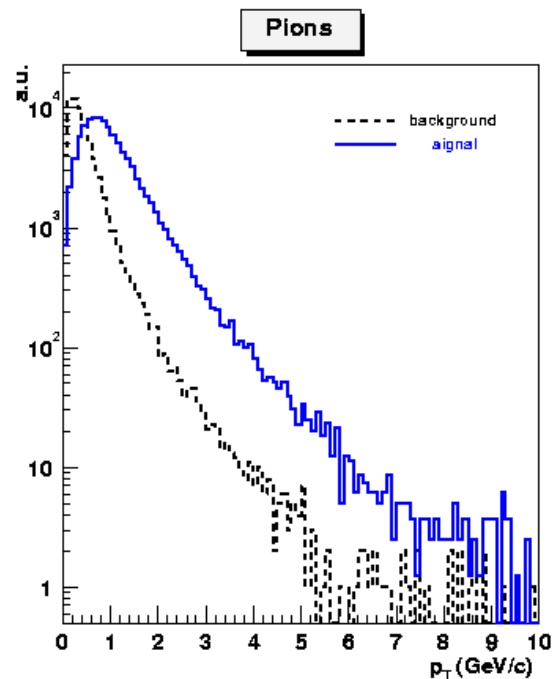
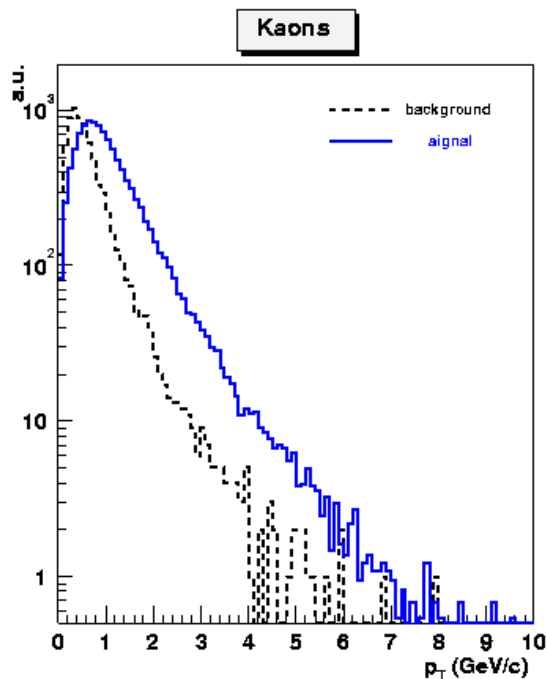
Charm@Trieste

- ✓ Studio del decadimento adronico $D^0 \rightarrow K^- \pi^+$
 - o Simulazione (fondo+segnale)
 - o Ricostruzione (tracciamento+vertici)
 - o Analisi (tagli)
- ✓ Obiettivi:
 - o Confronto con p-p e Pb-Pb
 - o Interazione multi-partonica (Daniele Treleani)

Richieste di cpu e m-storage

Generazione eventi	mass-storage	per processore	con la farm
2x10 ⁶ eventi di fondo	600 GB	200 giorni	10 giorni
10 ⁶ eventi di segnale D ⁰	140 GB	200 giorni	10 giorni
Ricostruzione			
Fondo	220 GB	26 giorni	1.3 giorni
Segnale	110 GB	20 giorni	1 giorno
Analisi	10 GB	1 giorno	1 ora
Totale	1000 GB	500 giorni	25 giorni

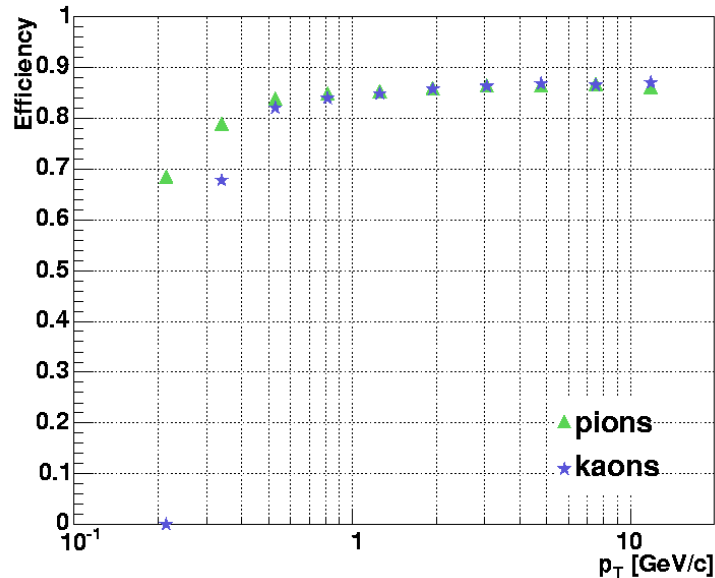
Distribuzioni del momento



Distribuzioni del momento trasverso delle "figlie" K e π per eventi di fondo e segnale.

Un primo taglio sugli eventi ricostruiti e' applicato a 500 MeV

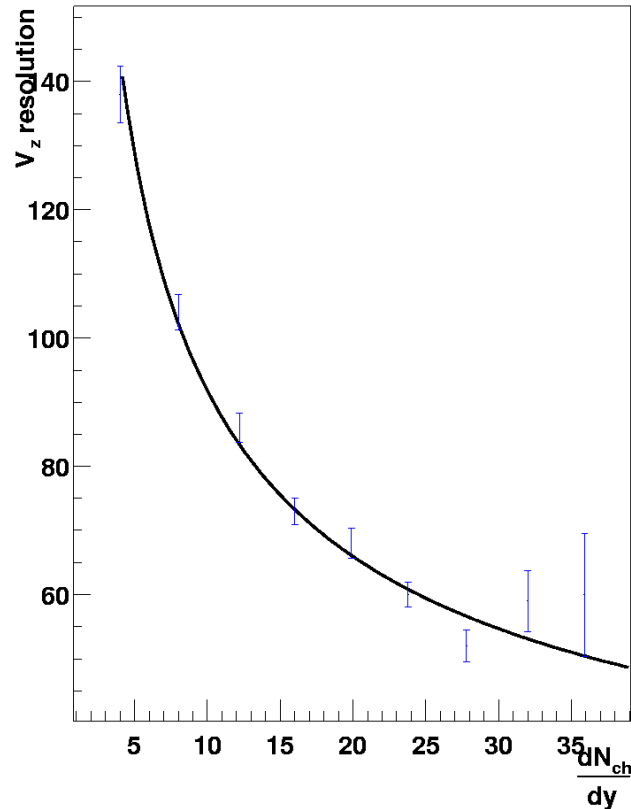
Efficienze



Efficienze di ricostruzione nell'Inner Tracking System per K e π in funzione del momento trasverso

Risoluzioni

multiplicity dependence of V_z resolution



Risoluzione (in μm) nella ricostruzione del vertice primario nella direzione del fascio.

La regione d'interesse per la D^0 in p-Pb e' ~ 20 particelle cariche per unita' di rapidita'

La risoluzione di $\sim 60 \mu\text{m}$ va confrontata con il $c\tau = 124 \mu\text{m}$ della D^0

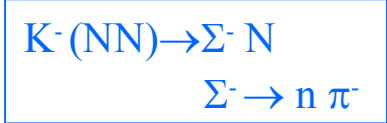
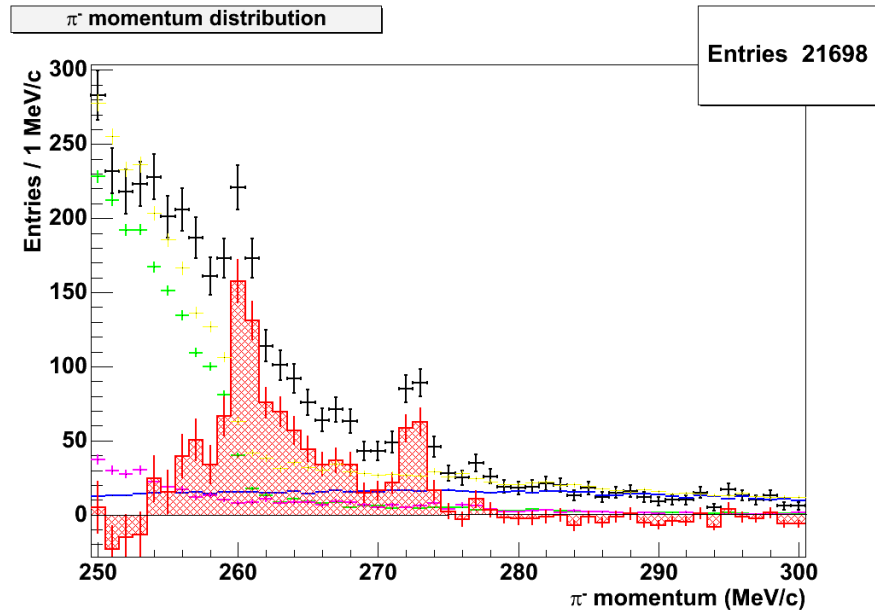
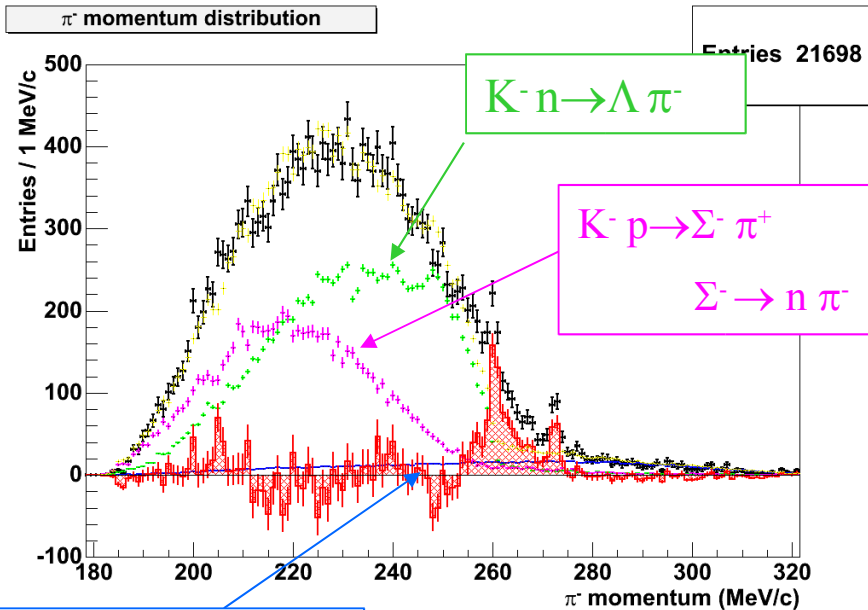
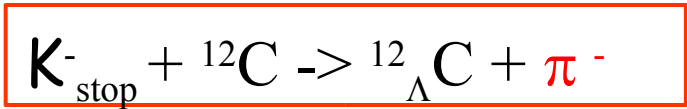
Ipernuclei@Trieste

- o Studio della formazione e decadimento degli ipernuclei Λ e Σ su ^{12}C , ^6Li , ^7Li , ^{27}Al , ^{51}V
 - ✓ Simulazione del fondo
 - ✓ Ricostruzione degli eventi simulati
 - ✓ Ricostruzione dei dati
 - ✓ Sottrazione del fondo

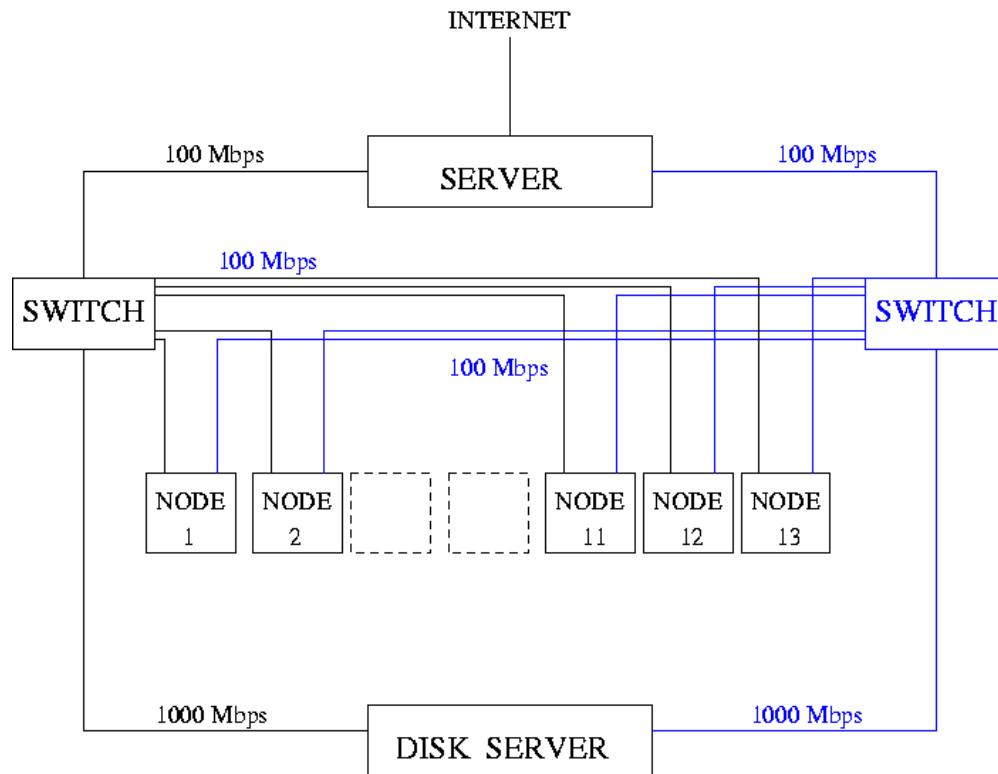
Richieste di cpu e m-storage

Simulazione eventi di fondo	mass-storage	per processore	con la farm
10x10 ⁶ eventi x 8 target	1.4 TB*	140 giorni	7 giorni
Ricostruzione			
Eventi simulati	38 GB	220 giorni	11 giorni
Dati di FINUDA	860 GB**	80 giorni	4 giorni
Totale	2.3 TB	440 giorni	22 giorni

Ipernuclei@Trieste



Architettura di rete



One NIC connected to the first switch, the second NIC to the second switch

Server connected to Internet through a 100 Mbps connection

Effective transfer rate to CERN ~10 Mbps

Caratteristiche

- ✓ 1 server, 1 disk-server, 18 client bi-processore
- ✓ RedHat 7.2 vs. Gentoo
- ✓ **Channel bonding** (doubled bandwidth e redundancy)
- ✓ **Firewall** (packet filtering con iptables) (Andrea Barisani)
- ✓ **DNAT e SNAT** (Destination and Source Network Address Translation)
- ✓ **Mosix** e OpenMosix (automigration dei job)

Caratteristiche hardware

The Beowulf philosophy was adopted. This means commodity hardware components and free operating system and software.

1 server:

mother-board: Tyan Tiger 230T;

2 processors: Pentium III, 1000 MHz;

memory: SDR 512 MBytes, 133 MHz, ECC registered;

hard disk: UltraStar 36 GBytes;

3 ethernet cards: 3C905B-TX, 10/100 Mbps (2 cards for channel bonding, 1 card for outside connection);

cd burner: Plextor 12x10x32;

dvd burner: Pioneer DVRA03 (used as backup unit);

cd driver: Pioneer 305S (used to read cd's in place of the cd burner);

13 dual-processor nodes:

mother-board: Tyan Tiger 230T;

2 processors: Pentium III, 1000 MHz;

memory: SDR 512 MBytes, 133 MHz, ECC registered;

hard disk: IBM 41 GBytes;

2 ethernet cards: 3C905B-TX, 10/100 Mbps (channel bonding);

5 dual-processor nodes:

mother-board: MSI KT4;

2 processors: AMD XP 2400+, 2000 MHz;

memory: SDR 512 MBytes, 133 MHz, ECC registered;

hard disk: IBM 60 GBytes;

1 disk server

mother-board: STL2;

2 processors: Pentium III, 1000 MHz;

memory: SDRAM DIMM 256 MBytes, 133 MHz, ECC registered;

22 hard disks: 2 **EIDE** 20 GBytes, 20 Western Digital WD800BB;

2 ethernet cards: 1 3C996T, 10/100 Mbps, 1 Pro100+ 82559RJ on board.

Accessories

KVM **Belkin Omniview** (allows using 1 monitor-keyboard-mouse for all computers);

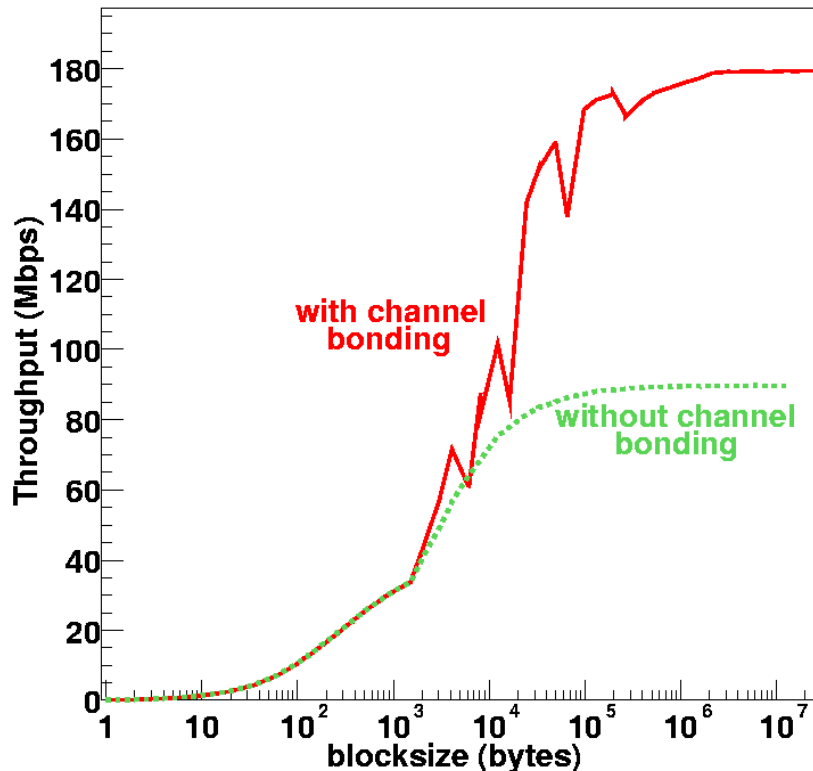
Caratteristiche software

The Beowulf philosophy was adopted. This means commodity hardware components and free operating system and software.

RedHat Linux 7.2 installed with the following features:

- ✓ kernel 2.4.18;
- ✓ networking and nfs support;
- ✓ C, C++, g77 compilers and libraries (gcc 2.96, libc-2.2.4, g77 0.5.26);
- ✓ X11 with development libraries;
- ✓ ntpd as time synchronizer;
- ✓ rsync (**cloning**)

Test (1/3)



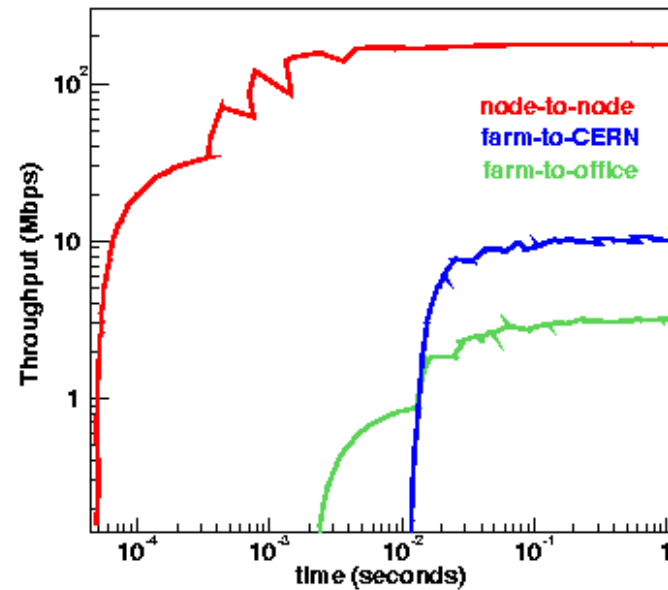
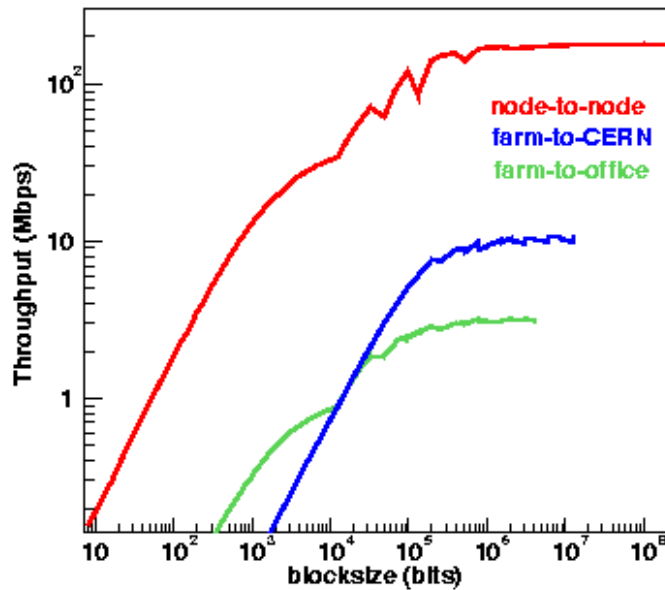
Network tests.

NetPIPE has been used as performance tool. It answers questions such as "how soon will a given data block of size k arrive at its destination? What is the effective maximum throughput and saturation level? How quickly will a small (< 1 kbyte) control message arrive?".

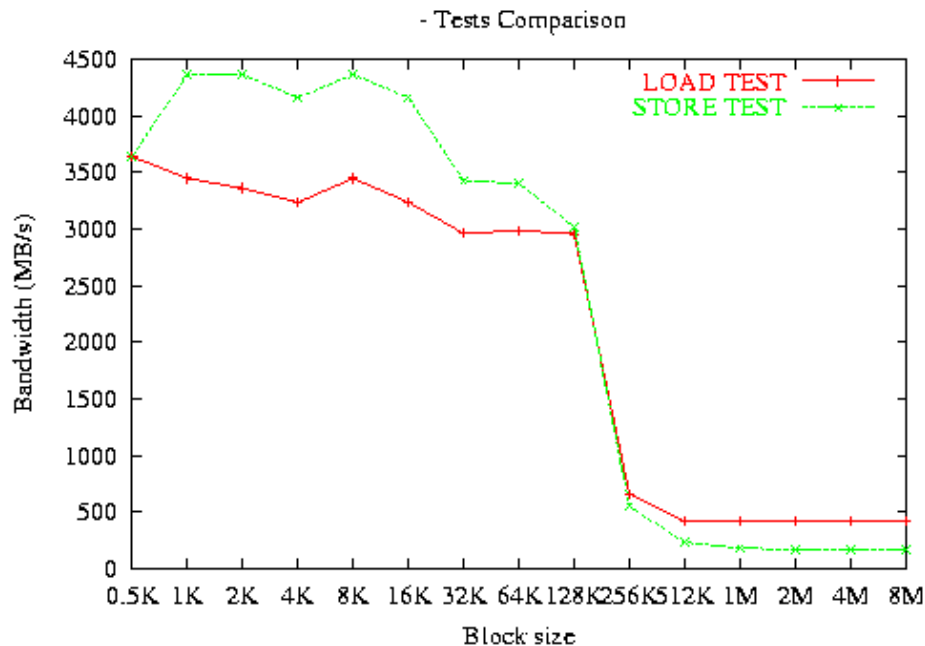
Throughput = transfer speed, in bits per second

Throughput versus transfer block size gives the **throughput graph**,

Test (2/3)



Test (3/3)



Memory test

Memperf has been used as performance tool. It measures the memory bandwidth varying the block size which provides information of the throughput.

Riferimenti

- ✓ E.Fragiacomo et al., Alice Internal Note "Tests of a Beowulf farm for ALICE" - ALICE-INT-2003-026
- ✓ www.ts.infn.it/experiments/alice/alroot/farm/
- ✓ S.Bagnasco et al., "ALICE Multi-site Data Transfer Tests on a Wide Area Network" - submitted to "Future Generation Computer Systems"

Prospettive

- ✓ Grid (AliEn e LCG)
- ✓ Farm di Sezione
- ✓ CERN Enterprise Linux 3 (CEL3)
- ✓ Mass-storage