AMS-02 COMPUTING RESOURCES IN ITALY

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AMS Analysis Meeting

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ITALY COMPUTING RESOURCES FOR AMS

- **Concentration** of the computing power on **one regional center** (IGSDS)
  - IGSDS established in 2004
  - presented in Apr-2005 at TIM

- Universities (BO, MI, PI, PG, RM) will access the regional center via the Italian High Speed Internet for Research (GARR)

- The regional center is located within the LHC's Tier1 at Bologna (CNAF) which provides a reliable environment:
  - INFN IT infrastructure & personnel
  - strong user authentication (based on certificates)
  - grid-based arch. for incoming data
  - grid-less arch. for outgoing data

CNAF

AMS resources today: 99 kSI2K ≈ 50 core 2GHz, 70 TB disk,
70 TB tape

yearly plan (agreed with INFN) : disk = reconstructed data + MC
tape = raw data
CPU = as per request

CNAF actual capacity :
8000 KSI2K, 2000 TB disk, 1700 TB tape

ITALIAN GROUND SEGMENT DATA STORAGE

- It hosts a Master Copy of the **"raw" AMS-02 data → Tape**

- It will host also a whole copy of the up-to-date **reconstructed data and MC simulations → Disks**

- Data stored on different storage layers: disks and tapes

- It also provides AMS-02 dedicated **computing** power for:
  - **MC production**: contributed to ~ 20% of MC production
  - **Remote Re-run of the data reconstruction**
    - feasibility of this has been proved and presented in 2009 when a full set of cosmic data has been successfully reconstructed, sent to CERN and there validated
  - **Data Analysis facility** for the Italian collaboration.

- Data transfer from **CERN** to **CNAF** (and vice versa) is performed using so-called "**Milano Data Transfer**" programs and infrastructure
  - developed and maintained by INFN Milano-Bicocca
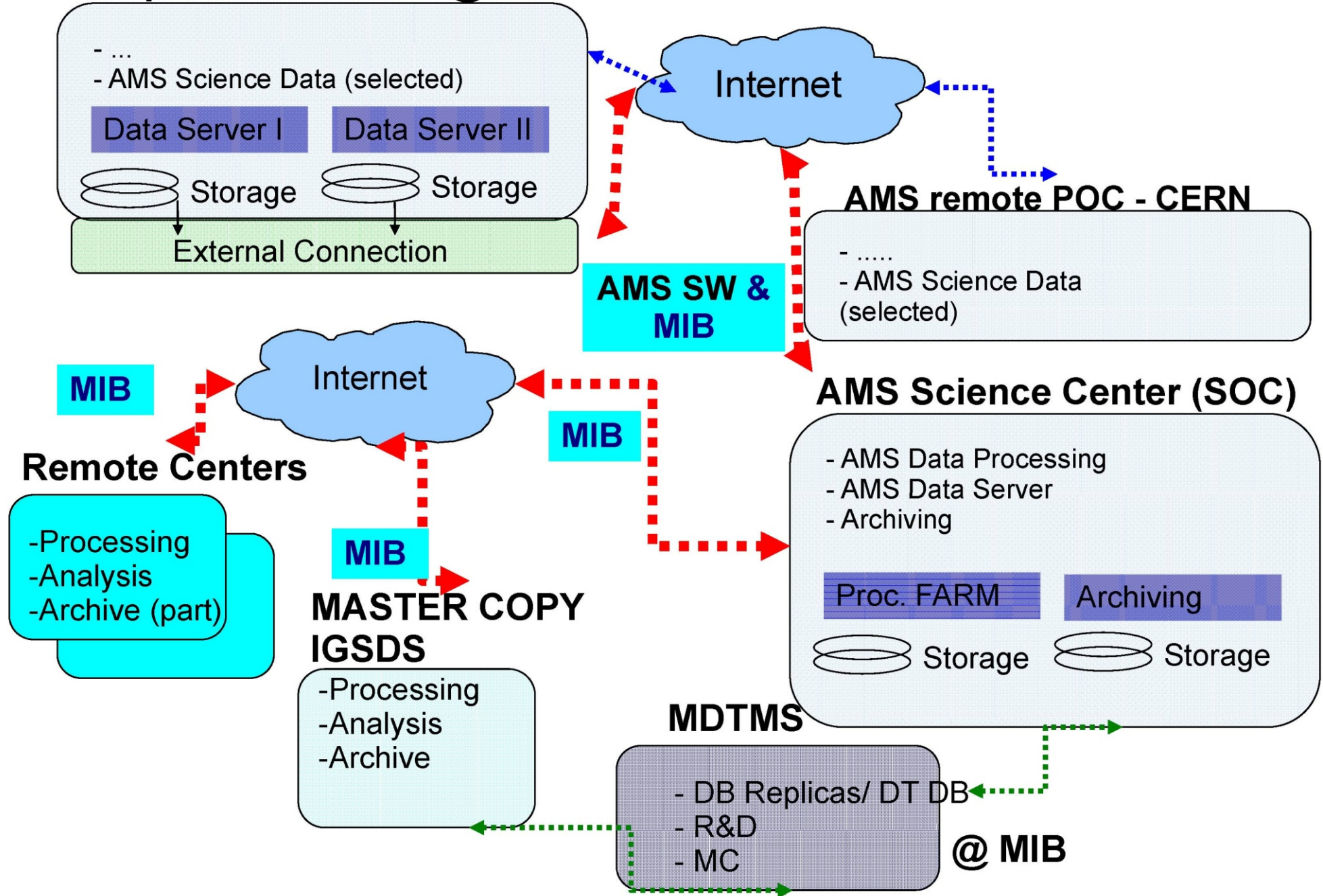
DATA TRANSFER SOC ↔ IGSDS

- Fully multi-threaded system which moves data across sites.
 Data-set consistency & integrity based on RDBMS and checksums.

  - DB's replicated at INFN-MIB

- In production for MC, RAW and REC data since 2006.

- In total 81 TB of data have been copied CERN → CNAF

- **Measured throughput CERN → CNAF: 115 Mbit/sec**

- Same arch. used for DT CNAF → CERN for locally produced MC/REC

- **Measured throughput CNAF → CERN: 120 Mbit/sec**

- Runs on servers at Bld-892 provided, managed and maintained
 by INFN-MIB and at CNAF on system managed/maintained by CNAF personnel

- The same architecture has been deployed at other sites and
checked with stress tests → it can be made available for other sites

CONCLUSIONS

- The Resources at CNAF are foreseen to be yearly incremented as the AMS-02 flight data are arriving to ground

- The well proven data transfer system will made the data promptly available at CNAF

- An access scheme to the data for the Italian collaborators is now under design

ASI SCIENCE DATA CENTER (ASDC)

- ASI is currently defining the support for data analysis thru the ASI Science Data Center

- ASDC, a facility of the Italian Space Agency (ASI), is a multi-mission science operations, data processing and data archiving center that provides support to several scientific space missions (BeppoSax, Chandra, AGILE, FERMI)

- Resources at ASDC (100 TB / 30 nodes dual Xeon E5520) could be dedicated to specific analyses profiting of data archives from other missions.

- Not clear, as of today, when the resources will be available.