#### CNAF 9/11& recovery

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#### **CNAF** incident

# CNAF's DC drowned

On November 9th 2017 ~7am water break in the data center.

- One of the main Bologna clean water pipes broke
- The road outside the building also damaged
- Dirty water flooded the DC
- Water heated by electricity
- Power system completely broken
- 2 lower units of both computing and storage units went underwater
- the rest got steam



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#### DC front gate



Water + steam in the DC



After the place was declared safe to enter

#### Outside







# Recovery

- IT services (non scientific computing) immediately moved outside CNAF
- Data center dried over the first week-end
- Activated a temporary power line (60 kW) after 1 week
- The General IP connectivity restored few days after the flood
- Cleaning from dust and mud completed during the first week of December
- Core switches tested and upgraded to 100 Gbit (Dec 15)
- Recovery of first electrical line (1.4 MW) completed before Christmas
- In the meantime activity to recover wet IT equipment
- IT components to be replaced have been ordered
- Temporary UPS (300 kW) + GE in place since Jan 12
- 3 chillers (out of 6) in operation since Jan 15

#### Effect on EEE

# EEE remote computing

The CNAF incident had a greatly effected many of the remote computing services:

- No data transfer from schools
- No DQM
- No shift reports
- No large data analysis possible

### EEE @ ReCaS

- The plan to restore CNAF DC was on a "long" time scale
- On Nov 30th there was the ICD, on Dec 6th there was the Erice Conference
- We started to look for a backup solution and finally we asked to Bari ReCaS for resources in their cloud.
- On the 16th of November, EEE cloud tenant was created and provided by ReCaS. The allocated resources were:
  - -CPU: 8
  - -RAM: 16 GB
  - -DISK: 2 TB
  - -IP: one IP address for the monitor page
- We allocated all the resources in a single instance which was able to run all the essential services (data transfer, reconstruction, db, monitor/web). But we didn't replicate the Elog.
- we started to configure EEE services not all the code was available on github so we needed to re-write some pieces of code (DB).
- On the 5th of December, the monitor page became accessible (the backup endpoint for data transfer was already running)

# The monitor page in Bari ReCaS

Progetto Extreme Energy Events - La Scienza nelle Scuole



MUSEO STORICO DELLA FISICA E CENTRO STUDI E RICERCHE ENRICO FERMI

Ultimo aggiornamento: ore 10:15 - mercoledì 24 gennaio 2018 [by e3monitor]

EEE Home Page Connectivity Report

#### [EEE Monitor] Back from the abyss of the waters... [EEE Monitor] ... running in ReCas - Bari [EEE Monitor] Start of RUN4: October 2, 2017 [EEE Monitor] RUN 4 - Data Taking - Day number: 115 Total number of candidate tracks (X^2<10) in this database: 3805274751

Questa tabella mostra la situazione dei telescopi in acquisizione:

In verde sono indicati i telescopi in presa dati e trasferimento nelle ultime 3 ore e con parametri di acquisizione ragionevoli nell'ultimo run analizzato. In giallo sono indicati i telescopi in cui trasferimento e/o acquisizione sono sospesi da più di 3 ore o con tracce (X^2<10) minori di 10 Hz nell'ultimo run analizzato. In rosso sono indicati i telescopi in cui trasferimento e/o acquisizione sono sospesi da più di due giorni o con tracce (X^2<10) minori di 5Hz nell'ultimo run analizzato.

School	Day	Time	Name of the last trasferred File	Number of Files trasferred today	Name of the last File analyzed by DQM	DQM daily report	RATE of Triggers for the last Run in DQM	RATE of Tracks for the last Run in DQM	Link DQM
ALTA-01 [Event Display]	sab 20 gennaio	08:39	ALTA-01-2018- 01-20-00001.bin	0	ALTA-01-2018- 01-19-00019.bin	20/01 [History]	30.0	26.0	ALTA-01
<b>ANCO-01</b> [Event Display]	mer 24 gennaio	10:00	ANCO-01-2018- 01-24-00022.bin	23	ANCO-01-2018- 01-24-00012.bin	24/01 [History]	16.0	11.0	ANCO-01
<b>AREZ-01</b> [Event Display]	mer 24 gennaio	10:00	AREZ-01-2018- 01-24-00022.bin	26	AREZ-01-2018- 01-24-00020.bin	24/01 [History]	32.0	28.0	AREZ-01
<b>BARI-01</b> [Event Display]				0		*	-2.0	-2.0	BARI-01
<b>BOLO-01</b> [Event Display]	mer 24 gennaio	10:00	BOLO-01-2018- 01-24-00027.bin	29	BOLO-01-2018- 01-24-00026.bin	24/01 [History]	31.0	28.0	BOLO-01
BOLO-02 [Event Display]	mer 24 gennaio	10:00	BOLO-02-2018- 01-24-00035.bin	37	BOLO-02-2018- 01-24-00033.bin	24/01 [History]	45.0	42.0	BOLO-02

### Cloud@CNAF-FE

On December 18th, Cloud@CNAF moved to Ferrara

- All EEE storage safely moved and operated in Ferrara before Christmas
- Data integrity has been checked
- EEE cloud system up and running since ~Dec 20th
- Data transfer towards CNAF restored and data synchronised from schools
- One machine did not start properly (eee-web), recovered from an old backup
  - intense work needed to restore all functionalities
- We restored the last web services (Elog) on Jan 19th
- Run4 shift reports up to this date were lost
- On Jan 25th the official monitor and Elog links pointed back to the CNAF's address
- Reconstruction of all data acquired during the CNAF downtime has been completed

### We want to thank

- Bari ReCaS staff (in particular Stefano Nicotri) for providing resources and precious support during the whole problematic phase.
- CNAF cloud staff for restoring services in Ferrara in a very short time scale when the data center was not ready to host machines.
- all EEE people involved in the effort (as mentioned we had a lot of activity during the last period: ICD, Erice).

#### Conclusions

- No EEE data were lost during the CNAF incident
- All services have been recovered successfully
- All interventions were almost transparent
- Run4 elog posts were lost
- Some downtime is expected when the CNAF DC will be up again (≥ March 15th 2018)