Romanian Complex Data Center for Dense Seismic network

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Since 2002 the National Institute for Earth Physics (NIEP) developed its own real-time digital seismic network: consisting of 96 seismic stations of which 35 are broadband sensors and 24 stations equipped with short period sensors and two arrays earthquakes that transmit data in real time at the National Data Center (NDC) and Eforie Nord (EFOR) Seismic Observatory. EFOR is the back-up for the NDC and also a monitoring center for Black Sea tsunamis.

Seismic stations are equipped with Quanterra Q330 and K2 digitizers, broadband seismometers (STS2, CMG40T, CMG 3ESP, CMG3T) and acceleration sensors Episensor Kinemetrics (+ / - 2G).

SeedLink who is a part of Seiscomp2.5 and Antelope are software packages used for acquisition in real time (RT) and for data exchange. Communication of digital seismic stations to the National Data Center in Bucharest and Seismic Observatory Eforie Nord is assured by 5 providers (GPRS, VPN, satellite radio and Internet communication).

For acquisition and data processing at the two centers of reception and processing is used AntelopeTM 4.11 running on 2 workstations: one for real-time and other for offline processing and also a Seiscomp 3 server that works as back-up for Antelope 4.11

Both acquisition and analysis of seismic data systems produced information about local and global parameters of earthquakes, in addition Antelope is used for manual processing (association events, the calculation of magnitude, creating a database, sending seismic bulletins, calculation of PGA and PGV , etc.), generating ShakeMap products and interacts with global data centers.

In order to make all this information easily available across the Web and also lay the grounds for a more modular and flexible development environment the National Data Center developed tools to enable centralizing of data from software such as Antelope which is using a dedicated database system (Datascope, a database system based on text files) to a more general-purpose database, MySQL which acts like a hub between the different acquisition and analysis systems used in the data center while also providing better connectivity at no expense in security.

Mirroring certain data to MySQL also allows the National Data Center to easily share information to the public via the new application which is being developed and also mix in data collected from the public (e.g. information about the damages observed after an earthquake which intern is being used to produce macroseismic intensity indices which are then stored in the database and also made available via the web application). For internal usage there is also a web application which using data stored in the database displays earthquake information like location, magnitude and depth in semi-real-time thus aiding the personnel on duty.

Another usage for the collected data is to create and maintain contact lists to which the datacenter sends notifications (SMS and emails) based on the parameters of the earthquake.

For future development, amongst others the Data Center plans to develop the means to crosscheck the generated data between the different acquisition and analysis systems (e.g. comparing data generated by Antelope with data generated by Seiscomp).