

# THE DEVELOPMENT OF A NEW OPERATIONAL DATABASE SYSTEM AT FINNISH METEOROLOGICAL INSTITUTE (FMI)

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**Summary:** A new meteorological information and visualisation system based on a sophisticated database management environment is under development at FMI. The heart of the system is a sophisticated database that includes all information necessary for weather forecasting and generation of end products for customers. The database is a link between all subsystems and if some data is edited in the database the changes will affect to other subsystems. The operational database management system is based on Oracle7 with NEONS interface. Most new software development is based on object oriented programming using C++ -language. The new features in the final workstation will include also graphical interaction with relevant data and generation as well as dissemination of end products.

## 1. INTRODUCTION

A new meteorological information and visualisation system based on a sophisticated database management environment is under development at Finnish Meteorological Institute (*Kilpinen, 1993*).

The project responsible for the actual work is called Weto (from words Weather Service Tools). The purpose of the work is to create a new workstation for weather service including new features for data editing and generation of different end product for customers.

The main effort at the beginning is directed to development of database and to applications for automatic generation of end products. The vision of the new system is presented in Fig. 1.

According to Fig. 1 the heart of the system is the database. It includes all information necessary for weather forecasting and generation of end products for customers. The database is a link between all subsystems and if some data is edited in the database the changes will affect other subsystems.

Object oriented programming and C++ programming language are used in development of visualisation and data editing software. Both own made and commercial class libraries are used. The final purpose is build a multiplatform system for visualisation.

## 2. THE NEW DATABASE SYSTEM

The old database for meteorological workstations at FMI is based on file names and the data is stored in central memory of the workstation to make the response time enough short.

The new system will be different. Oracle RDBMS (Relational Database Management System) will be used at the bottom. Some applications and data are already used operationally from that database. The applications have an object interface for the database or a normal SQL (Structured Query Language) interface.

As an additional layer above the Oracle database the French (further developed by METEO FRANCE) version of NEONS (Naval Environmental Operational Nowcasting System, *Jurkevics et. al.* 1990) has been tested. Both point data (BUFR) and grids (GRIB) have already been tested and the experiences are encouraging (see *Nyfors*, 1995).

Figure 2 presents the data flow of point observations from telecommunication computer to the test version of NEONS database. According to figure 2 part of the processes are running in VAX/VMS environment and part in UNIX system.

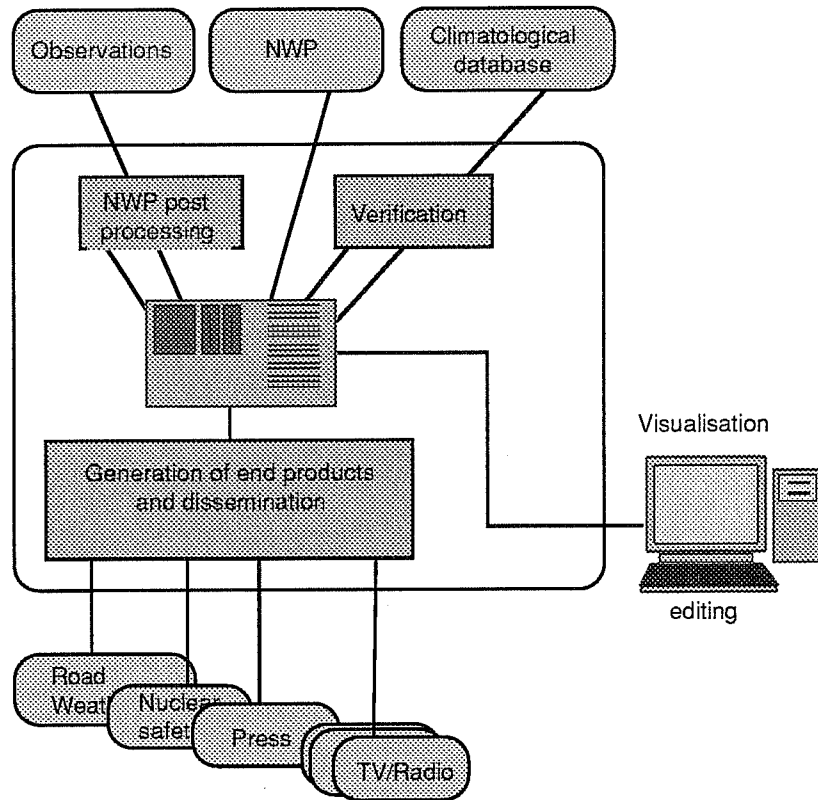


Figure 1. Vision of the future operational information and visualisation system at Finnish Meteorological Institute.

SYNOP bulletins are copied from VMS system in alpha numeric format to UNIX environment. When the data goes from NEONS to Oracle the data is in BUFR format. The pipe between telecommunication computer (VMS) and the NEONS server is not yet working. In the final implementation both NEONS and Oracle RDBMS shall operate in a single server. The pre-processing (opening) of SYNOP messages shall also be done in UNIX environment in future.

Forecasted fields from HIRLAM and ECMWF (original and post-processed) are also stored operationally in NEONS database.

NEONS software has been ported to Silicon Graphics and WindowsNT platforms but the final operational platform will probably be Digital's Alpha.

Oracle and NEONS (version of Meteo France) have been proved to be a steady basis for further development.

### 3. DEVELOPMENT OF APPLICATIONS

The final goal is that all graphical software is running on multiple platform. This makes us possible to utilise the existing hardware and to minimise investment requirements The first graphical application is a meteogram software for Macintosh. Versions for Windows/PC and UNIX will be done later. In the future most applications are made for Windows/PC and UNIX platforms.

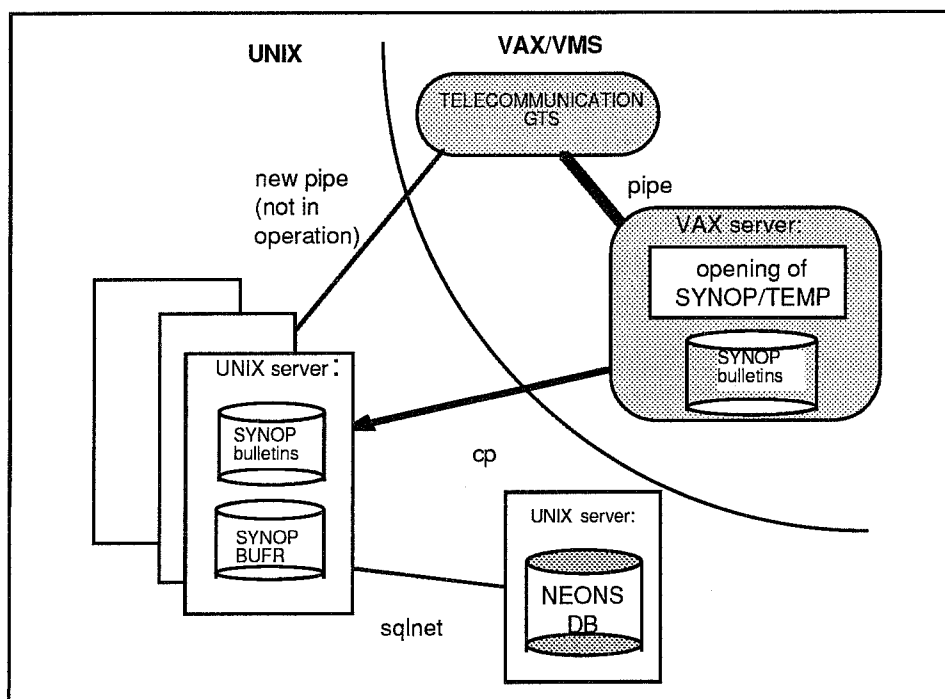


Figure 2. The flow of SYNOP data from telecommunication computer to NEONS database.

Off shore wind forecasts for telephone is the first operational application that fully applies the vision of Figure 1. The database is not yet, however, been realised using NEONS. The forecaster edits the first guess winds that may be direct model output of NWP or the previous forecast by the forecaster. The data is stored to database and then the final text forecasts and speeches for telephone callers are generated by the computer. The customers have also access to real time observations.

The system for automatic generation of TAF's (Terminal Aerodrome Forecast) (Kilpinen, 1994) also applies METAR observations from the new database. At the moment NEONS layer is not yet used in this application. METVIEW has also been implemented at FMI and will be linked to the new NEONS database in the future.

In the future more effort is directed to development of visualisation and editing software as well as to software for generation of end products. Finally the control and generation of most end products and their verification should be made by the system.

## ACKNOWLEDGEMENTS

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## 4. REFERENCES

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