

Modular Database System for Climatology, Meteorology and Environmental Sciences

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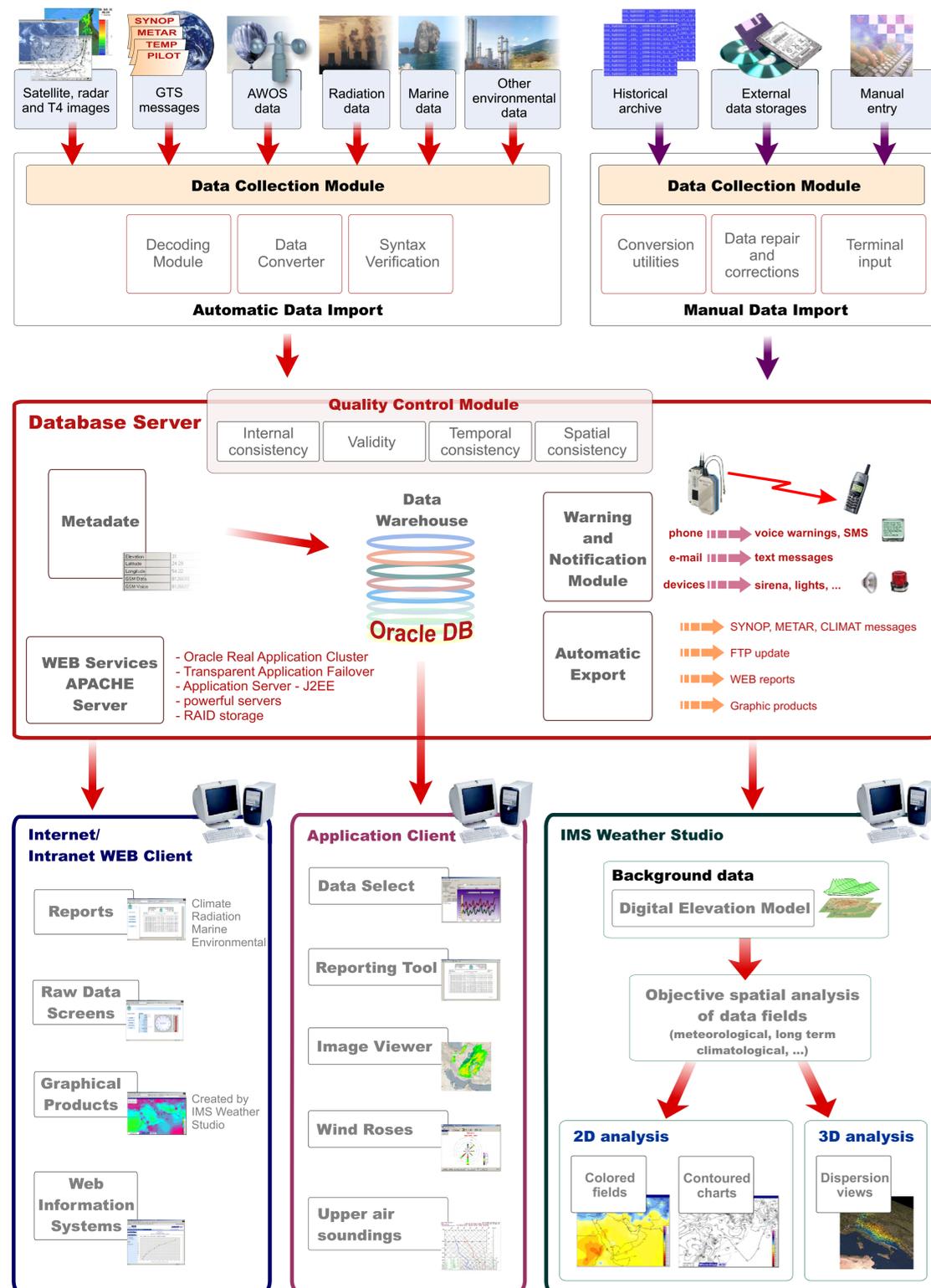
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Environmental Database Management System EnviDB serves for storage of data measured in environment. The highlighted features of the system are:

1. industrial standard database platform and widely supported operating system,
2. ability to migrate all historical existing data into uniform structure,
3. consolidation of separately stored data from meteorology, hydrology and other geosciences,
4. automation of the routine work during data analysis to the maximum extent possible.

EnviDB database integrates measurements from fields of climatology, operative meteorology, hydrology, oceanography, aeronautical climatology, mountain meteorology and avalanches prediction, radioactivity monitoring. Completed with technological data EnviDB serves in crisis management. The fields are naturally reflected in **EnviDB modules**:

- Climatological Database CLDB
- Aeronautical Climatological Database A-CLDB
- GTS communication Database GTSDDB
- Radiation Database RMSDB
- Air and Water Quality Management Database AQMS
- Seismological Database SemsDB
- Hydrological Information System HydroMIS



System based on **Oracle database** works on multiple platforms and offers several cold or hot backup possibilities.

Data, that can be stored in EnviDB are measured by modern sensors, traditional devices, distance methods or are interpolated/simulated by appropriate models.

The database has capability of **automatic import** from automatic stations or other devices working in automatic mode like weather radar. The data are subject of quality checks that can be performed automatically.

During each installation, we encounter the task to move existing **data formats** to unified database format. The formats include: spreadsheets e.g. .xls files, ASCII text files, .dbf files, CLICOM files. Highly experienced staff analyses the data formats and creates conversion utilities. Manual Data Entry application with customizable entry forms is standard component of the EnviDB, so key entering from paper forms is left on the institute staff.

Accent is given on **metadata** structures containing descriptive textual or graphical information:

1. Station Geography

- station and region name, standard WMO, ICAO, hydrological and other identifiers, geographic location, vegetation description, possibility of graphical information storage (maps, documents, scan copies).

2. Observation Description

- extensive description of each observed element at each station (unit, accuracy, beginning/end of observation, instrument/sensor and its documentation, observation scheme/type description) and history of each element observations.

Data processing includes quality control with range, consistency, temporal, spatial checks completed with more complex checks in PL/SQL language and station communication/performance statistics. The suspicious or erroneous data are kept in database, but are flagged with appropriate error code and displayed in different manner to data operator, who has the sufficient access rights to correct it. Operator can be notified automatically when database detects (persistent) receipt of erroneous data.

Output products are normals, variety of predefined reports (textual or graphical), wind roses, and products defined by users themselves. With GIS based IMS Weather Studio, spatial analyses of long term values are graphically presented over a map of studied area. A unique data mining tool 'Select' is dedicated for most of users, it requires no knowledge of database structure or SQL language. On the other side, system is open for direct access using SQL language, and data are accessible from spreadsheet programs or statistical packages.

Web interfaces provide:

- access to database from web browser
- this access is platform independent
- access from distant office connected to internet (secure web communication insures data safety)

Web interfaces are intuitive and with the above mentioned advantages are becoming an ideal tool for data users within distributed institution. The web access can easily cooperate with on-line costing system for data requesters outside the institution and freely available data can be published on the Internet.

Several examples of existing system applications are given:

CLDB + RMSDB

- meteorological data (AWS)
- radiation data (stationary gamma probes)
- radiation data (mobile campaign measurements)
- upper air meteorological data
- upper air radiation profiles
- alarms on exceeded radiation thresholds
- combined reports and graphs (e.g. dose rate + precipitation)

CLDB + Oceanographic DB

- surface meteorological data (AWS)
- marine meteorological (moored buoys)
- oceanographic data for different depths (moored buoys)
- ocean water quality data (moored buoys)

CLDB + A-CLDB

Climatological data from national climatological network:

- rescued from paper forms
- imported from spreadsheets
- imported from CLICOM
- from manual observations
- from AWS

Aeronautical climatological data from airports:

- from different runways