L.F. Bondar', B.A. Kosyrev, T.V. Saltanova

OCEAN SOUNDING DATABASE CREATION

V.I. Il'ichev Pacific Oceanological Institute, FEB RAS
No 43, Baltiyskaya St, Vladivostok, Russia, 690041
Tel: (4232) 312120; Fax: (4232) 312573;
*E-mail: **pacific@online.marine.su***

The results of creation of the base for information storage and operative use are described. Information is data of hydroacoustic experiments executed in the ocean by POI and other organizations. The work is being realized under support of RFFI (Project 99-07-90253).

The database under construction is intended for using for information search on executed experimental researches. Such search is necessary if a wide range of scientific and practical problems in the field of hydroacoustics and oceanology is under study. It is accepted that a basic information for the users is the experimental data on the hydroacoustic fields and on the underwater sound propagation laws, obtained by sounding water areas with various signals. POI and other organizations have a lot of accumulated experimental material of this kind.

The database architecture is assigned. The logical and physical models of the database are designed and normalized by using ERwin (CASE). Relational database of "client-server" architecture is formed using the local server InterBase. Acoustic information is performed as tables system. Working application for loading the database by information is constructed and debugged. Creation of the distributive is almost finished. Supplying of the database with the information is being carried out with the help of application created in the visual medium of design of the applications Borland C ++ Builder. The application excels not only in reliability, but also in possibility of the extension and modification. The modularity and flexibility of the architecture allows substituting separate sites, not creating the whole application anew. The caching of updates in the database increases efficiency of work. Structures of tables, indexes, triggers and stored procedures are adjusted. The first level of the information system is filled in by data; general queries to the database for execution of data selection by different keys are performed.

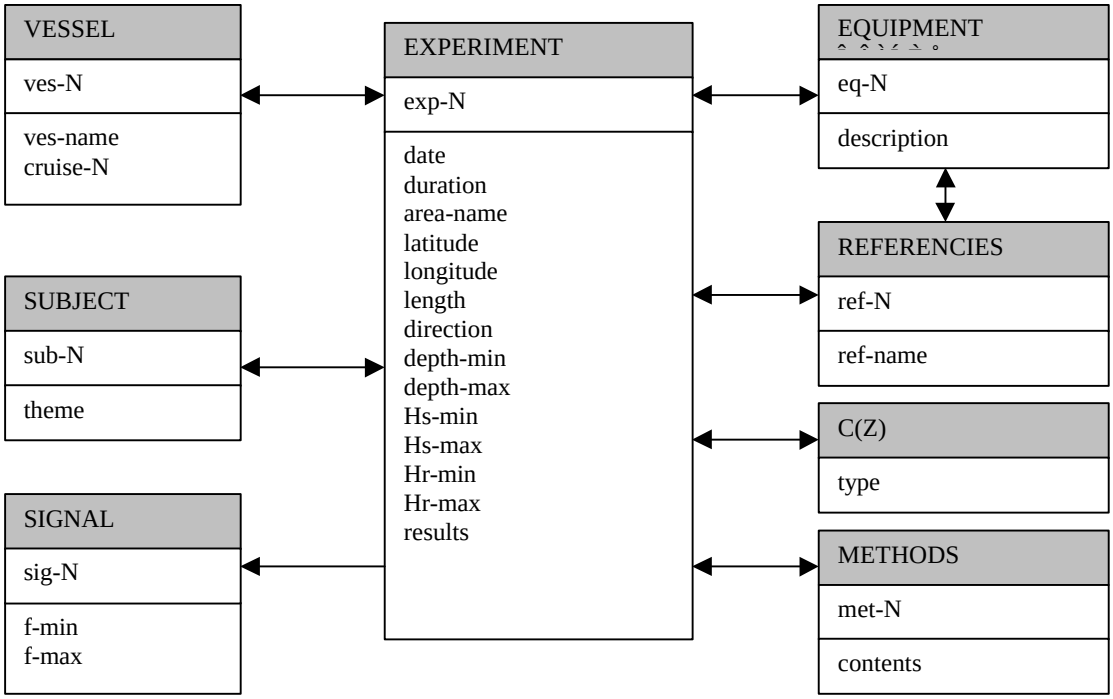

Fig. 1. A logic model of the database

The use of the local server InterBase allows transportation of application for a multi-user mode if a user has an access to the network and also ensures security of data and operative access. The

undoubted virtues of this "client-server" architecture are the decrease of the requirements to the computational capabilities of the customer's computer, network traffic decrease, and also the possibility of a centralized control of access to the database and the reliable protection from casual or intended distortions of the data. The wholeness and consistency of data is ensured by use of modern methods of database design.

The visual components of this media of programming allow creating the convenient for use software product, which doesn't demand special knowledge of the basic programming. The introduction of various keys in tables allows searching through the database convenient for the user. The simplified logic model of the database (Fig. 1) and the explanatory table are represented below. Fig. 2 illustrates an example of a user's operating the database.

Table. The definitions of the data, accepted in the database

Parameter	Description	Unit of meas.	Example
EXPERIMENT	Set of general parameters of the experiment		
date	Date of experiment start		01.09.89
duration	Duration of experiment realization	day	11.5 = 11days and 12 hours
area-name	Name of the ocean, sea, etc, where area of measurements is located.		Pacific ocean
latitude	Central point of the area latitude. "+" = N, "–" = S	degree	–10.5 = 10°30' S
longitude	Central point of the area longitude. "+" = E, "–" = W	degree	175.25 = 175°15' E
length	Length of the area of measurements	km	3972 = 3972 km
direction	Direction of sound propagation from the sound source to the receiver. If the direction is not predetermined then "360" is put in	degree	0 = to the north 135 = to the south-east
depth-min	Minimum depth in the study area	m	150 = 150 m
depth-max	Maximum depth in the study area	m	5000 = 5000 m
Hs-min	Minimum horizon of the source	m	145.5 = 145.5 m
Hs-max	Maximum horizon of the source	m	146 = 146 m
Hr-min	Minimum horizon of the receiver	m	155.5 = 155.5 m
Hr-max	Maximum horizon of the receiver	m	165.5 = 165.5 m
results	The results of carried out experiment. As a rule – text, plots, tables		
C(Z)	Characteristics of the vertical distributions of sound velocity (SVD) in the study area		
type	I, II, III, IIIa and IV types of SVD, commonplace in hydroacoustics		I
SIGNAL	Parameters of the studied signals		
sig-type	Signal type		tone impulse
f-min	Minimum frequency of the signal	Hz	100 = 100 Hz
f-max	Maximum frequency of the signal	Hz	1000 = 1000 Hz
EQUIPMENT	Characteristics of the equipment used for measurements		
description	Equipment description. As a rule - text, plots, tables		
VESSEL	Set of parameters, characterizing the vessel taking part in the experiment		
ves-name	Vessel name		“Vityaz”
cruise N	Cruise number		8
METHODS	Characteristics of the methods of investigation		
contents	Brief description of the methods		Towing of the emitter.

			Stationary sound path
SUBJECT	Characteristics of the subject of studies		
theme	Brief description of the studies subject		The oceanic front influence on the sound propagation
REFERENCIES	Materials presenting the description of the experiment or the equipment applied		
ref-name	Titles of the books, papers available at Journals, etc.		L.F. Bondar' et al., Investigation of fluctuations of acoustic signal phase, Acoust. Journ., 1996, vol.42, no.1, p.25-31.

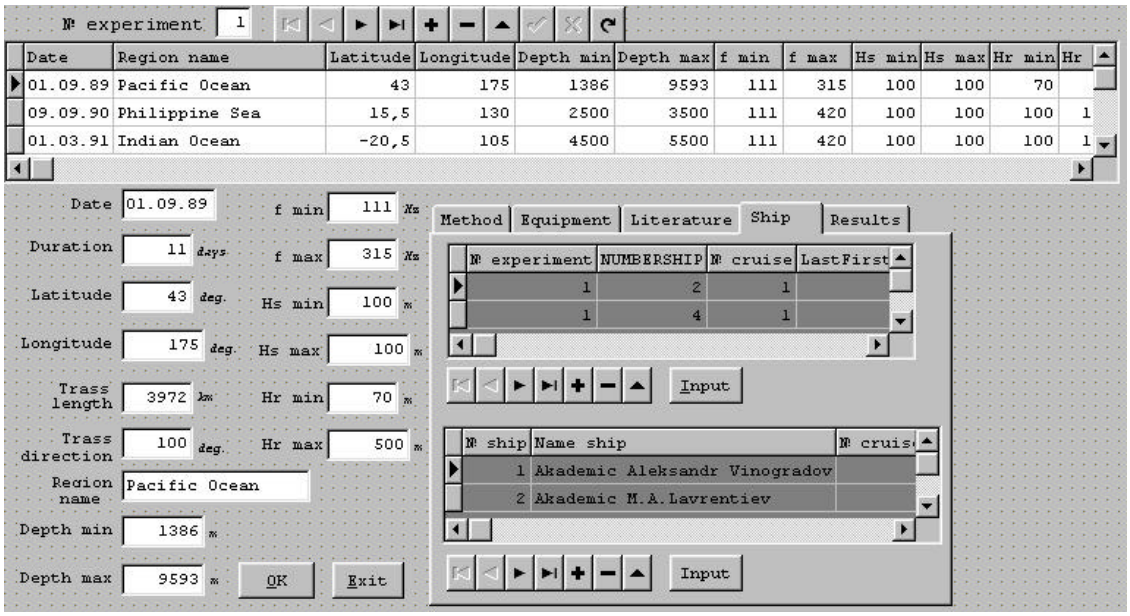

Fig. 2. An example of using the database

The two-sided arrows in Fig. 1 specify the relationship between the tables (entities) of a M : M (many-to-many) type. The titles of entities are shaded. The second string of each entity contains a primary key.

Fig. 2 shows that a user has the choice: to read out the information in a table form (top of an image) or with the help of thematic pages or to do it simultaneously.

Practically all main data describing experiments, which are listed in the tables (attributes of entities in Fig. 1), can be the keys to the data selection in the database. These data were taken with allowance for possible extension of specification of the database, for example, supplying it with the information on the measurements of noise in the ocean.

Directions of further work are the following: searching and preparation of information; loading the database with the data; creation of new queries to the system; development of the graphic interface; creation of convenient user service; development of the reports of various levels of complication obtained in an outcome of database operation; creation of a final version of the application and the distributive. Generally the development of this database should be completed in 2000.