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FEATURES OF DATABASE STRUCTURE DEVELOPMENT FOR THE "PETHEALTH" MOBILE APPLICATION

Abstract. The work is devoted to designing a database for the "PetHealth" mobile application. A three-stage approach (conceptual, logical, and physical modeling) was used to solve the problem of fragmentation of veterinary data. Key entities and their relationships were identified. The selected PostgreSQL DBMS provides a reliable and scalable foundation for data management.

Keywords: Database design, PostgreSQL, conceptual model, logical model, relational database, mobile application.

The veterinary sector in Ukraine lags behind the general digitization of medical services. Medical records for pets are often kept in separate local systems or on paper. This fragmentation makes it difficult to track an animal's medical history and plan visits. Researchers in the field of mobile health (mHealth) note that, despite its advantages, the sector faces challenges in standardization, data security, and usability, making reliable data design critically important [1].

The "PetHealth" mobile application project, the theoretical background for which was explored previously [2], aims to bridge this gap by creating a unified digital platform for owners and veterinary clinics. A central component is the database, which must efficiently manage profiles, pet data, appointment schedules, and medical histories.

The database design process followed a standard three-step approach to ensure a reliable and efficient structure:

1. Conceptual modeling. Identification of key entities in the subject area and high-level relationships between them.
2. Logical modeling. Detailing the data structure, attributes, and primary and foreign keys to implement relationships.
3. Physical modeling. Transformation of the logical model into a specific implementation for the selected DBMS.

This approach, which separates models into levels, allows for the systematic development of the project's information structure, which is key to successful implementation.

At the conceptual stage, the fundamental entities were defined: Owner, Pet, Clinic, Appointment, and Service. Key one-to-many relationships were also identified (for example, one Owner can have several Pets).

These entities and relationships were transformed into a formal logical model (relational schema). The generalized database structure showing the key tables and their relationships is shown in Fig. 1.

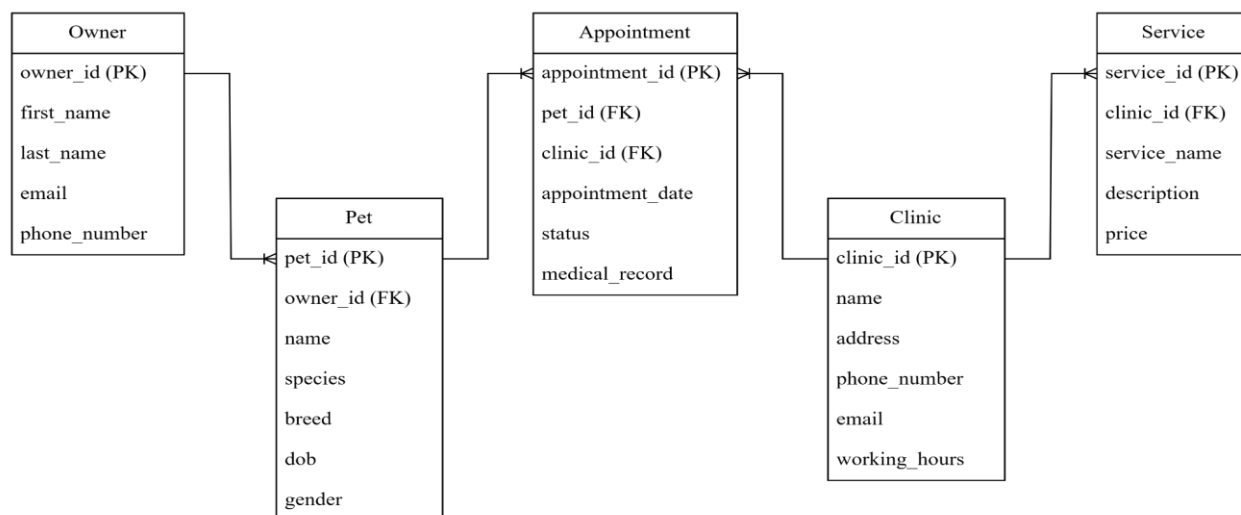


Fig. 1. Logical model of the "PetHealth"

The physical model defines the details of the implementation of the logical structure (Fig. 1) in the PostgreSQL DBMS environment.

PostgreSQL was chosen for physical implementation. This DBMS is known for its reliability, compliance with ACID (Atomicity, Consistency, Isolation, Durability) standards, scalability, and powerful feature sets, which are crucial for processing sensitive medical data and ensuring its integrity.

Key decisions in physical design included:

Data types: Appropriate types were selected for each attribute, such as SERIAL for auto-increment primary keys, VARCHAR for text fields, DATETIME for date and time of admission, and DECIMAL for prices. *Constraints:* PRIMARY KEY, FOREIGN KEY, NOT NULL, and UNIQUE constraints were implemented to ensure data integrity. *Relationships:* Relationships with foreign keys were defined with the ON DELETE CASCADE option. This ensures that related records are automatically deleted.

The systematic design process has created a solid foundation for the "PetHealth" system. The relational database created on PostgreSQL effectively organizes information, ensures data integrity, and provides scalability. The visualized structure (Fig. 1) confirms the readiness of the data architecture to implement the stated functionality and solve the problem of veterinary data fragmentation.

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<i>Danylo Rybachok, Andrii Yarmilko. ARCHITECTURAL PARADIGMS FOR CONTESTED ENVIRONMENTS: A COMPARATIVE ANALYSIS OF MONOLITHIC AND MICROSERVICE DESIGNS FOR MODERN MILITARY LOGISTICS</i>	296
<i>Bohdan Semonov, Sergiy Pogorilyy. SEMANTIC ENRICHMENT OF SOURCE CODE IDENTIFIERS THROUGH AUTOMATIC ABBREVIATION EXPANSION FOR COMMIT MESSAGE GENERATION</i>	299
<i>Oleksandr Timinskyi, Denys Liashenko. ANALYSIS OF THE DEVELOPMENT DIRECTIONS OF COMPUTER SCIENCE MODELS IN THE FIELD OF IT PROJECT MANAGEMENT</i>	303
<i>Oleksandr Timinskyi, Artem Yurechko. COMPARATIVE ANALYSIS OF IT PROJECT MANAGEMENT METHODOLOGIES IN THE DEVELOPMENT OF WEB- AND CONTENT-ORIENTED SYSTEMS</i>	307
<i>Diana Vashchilina, Olena Vashchilina, Anastasiia Nikolaienko. STRUCTURING EDUCATIONAL IT PROJECTS WITH NPM WORKSPACES</i>	311
<i>Oleksii Vedmiediev. ASPECTS OF PROACTIVE ORGANIZATIONAL DEVELOPMENT OF CONSTRUCTION PROJECT TEAMS WHEN IMPLEMENTING VALUE HARMONIZATION WITH THE IT CONTEXT</i>	314
<i>Oleksandr Voitenko, Valerii Hudov. DAMPEN-TURBULENCE MODELS OF PROJECT PORTFOLIO MANAGEMENT TEAM OF A GENERAL CONTRACTING ORGANIZATION AND THEIR IT SUPPORT</i>	318
<i>Oleg Zhulkovskyi, Inna Zhulkovska, Anastasiia Shevchenko. OPTIMIZING NUMERICAL THERMAL SIMULATIONS THROUGH DATA-LEVEL PARALLELISM</i>	322
<i>Vadym Ziuziun, Tetiana Danilina. FEATURES OF DATABASE STRUCTURE DEVELOPMENT FOR THE "PETHEALTH" MOBILE APPLICATION</i>	324
<i>Vadym Ziuziun, Oleksii Korytnyi. RISK CONTROLING AND MONITORING SOFTWARES THAT CONSIDER HUMAN BIAS AS A MAJOR RISK</i>	326
<i>Vadym Ziuziun, Yuliia Koziuk. KEY CHALLENGES AND RISK MITIGATION STRATEGIES FOR UKRAINIAN IT STARTUPS DURING THE WAR</i>	328
<i>Vadym Ziuziun, Daria Shcherbak. MANAGEMENT OF QUALITY IN AN IT PROJECT DURING THE DEVELOPMENT OF THE ECOLOGICAL WEB APPLICATION "СМАЧХОГО"</i>	330