The Role and Improvement of Databases in Emergency Prevention

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ABSTRACT

The number of emergency situations is increasing year by year. As a result of natural, man-made and environmental emergencies, about three thousand people die in our country every year, and more than ten thousand are injured in various degrees, and this figure is increasing. This shows the need to prevent and eliminate emergency situations. The following article describes the role of the database in preventing emergency situations and ways to improve it.

Keywords: | emergency situation; database of emergency situations; natural; man-made; ecological; database management system.

Introduction

Scientific and technical progress, a complex and perfect technological process. No matter how fast pictures are developed, some knots of the interrelationships between "Universe-Earth-Man-Society" still cannot be solved. One of these problems is emergency risks. If we summarize and analyze the events happening in different parts of our planet in the future, we will once again be sure that natural, man-made and ecological emergency situations are increasing year by year and covering large areas.

Literature Analysis and Methodology

Every year, up to 1.2 million people in the world die as a result of traffic accidents, and about 50 million become disabled. In traffic accidents, 60-65% of victims have severe polytrauma, which has a high mortality rate and requires emergency medical care at the scene.

The Global Assessment Report (GAR2022), released by the United Nations Office for Disaster Risk Reduction (UNDRR) in May ahead of the Global Platform for Disaster Risk Reduction, shows that every year between 350 and 500 Small and large-scale disasters have occurred. the last twenty years. The number of natural disasters is expected to reach 560 per year or 1.5 per day by 2030. It can be seen that the number and scale of emergency situations is increasing. One of the effective ways to prevent and eliminate these problems is to improve and effectively use the emergency forecasting and database.

Analyzing statistical data, India (45,197), China (10,356), Nigeria (8,950), Russia (7,057), and China (10,356) are the leading countries in terms of the number of fire deaths in the world in 2020. USA (3155) is going. In 2021, the top countries will retain their leadership. However, India (23265) had the highest decline with -22932. Also China (10498) +142, Nigeria (7132) -1718, Russia (6387) -670, USA (3183) +28.

In these statistics, Uzbekistan is also given, and the number of people who died from fire in 2020 was 461, and in 2021, it was 542. It can be seen that the number of dead has increased to 81.

World fire statistics show that more than 3.1 million fires occur in the world every year, and more than 20,000 people die in them. About 50% of fires occur in buildings and vehicles.

Spatial data storage, processing and management.

Data are the symbols that are entered into various systems that are necessary to create information that is important to us.

A database is an integrated set of information about a special object.

The geographic information base is simple and consists of geographic information related to a specific area and object. The term "spatial" is often used in the database. As we defined earlier, the term "spatial" refers to the geographical and non-geographic characteristics of a place. Today, many large companies use a Database Management System (DBMS) for data storage and file management. So, a database is an integrated collection of information about a particular object. A database offers the following advantages over traditional file-based data collection in geographic data collection:

• Saves space by keeping all data in one place.

• Maintenance costs are reduced as a result of proper organization of data and reduction of their duplication.

• Applications achieve information freedom, which allows many applications to work independently with the same information.

• User knowledge is easily shared on practical issues because the database remains immutable.

• Facilitation of data exchange facilitates the corporate image (view, obzor) between all types of users and data managers.

• Information standards will be created and their security will be ensured.

• MBBT is suitable for working with a large number of users at the same time with a large amount of information.

The single-user file method is convenient when using complex types of data and structures where special indexing and algorithms can be applied.

In recent years, the base of geographical information has been expanding a lot. For example, aerial photographs of the USA are 25 TeraBytes (TB), the United Kingdom is approximately 450 million vector objects, and these vectors are located in the MasterMap database, covering the whole of Britain. So,

MBBT is a computer program that gives permission (access) to effectively manage, store and access data. A simple and small database can be stored in standard files in computer memory. But for tens, hundreds, and thousands of users to use large volumes of data, MBBT is required, and this program ensures the integrity of the data in an integrated manner. To perform such functions, MBBT provides several features:

• A data model is a mechanism that digitizes geographic objects and stores them in a computer system. Any MBBT contains standard centered data, which is convenient for describing various types of objective data.

• Data download capability – MBBT uses a technique that loads data into a database. A simple technique is capable of loading standard data types (character, number, and date) in well-structured formats. Other types of non-standard data types can be downloaded by creating programs that convert them to standard.

• An index is a data structure that speeds up searching. All databases have a standard data indexing technique.

• Request language. The availability of this language is one of the advantages of MBBT. Because it involves querying and manipulating data in a standard system known as SQL.

• Security. A unique feature of MBBT is that data can be obtained in a controlled manner. This type of control includes restricting user access to any part of the database. For example, if a random GAT user is granted read-only access to data, an expert is also granted access to create, update, and delete that data.

• Controlled update. Data update control is carried out by a specially appointed manager specialist. It controls the number of users accessing the database.

• Data storage and recovery. It is important to protect against data loss caused by incorrect updates or accidental system crashes. Special storage and recovery programs in MBBT serve to prevent such a problem.

• Database management tools. Tasks such as creating the database structure, creating and using indexes, improving performance, saving and restoring, and controlling access for users

are performed by the administrator (administrator) using management tools.

Modern MBBT is equipped with standard and general-purpose devices designed to create and manage a database. These strokes are used to design the MBBT and build the user interface (to access and present information). So, to sum up the above points, MBBT is a collection of logically linked information designed to meet the needs of one or more users. This information is often displayed in database tables. A table is data elements (values) arranged along horizontal rows and vertical columns. Typically, columns contain names, while rows contain values. A table can have a specified number of columns and any number of rows. From the point of view of GAT, "Information base is a collection of records systematically entered into the computer, and special programs on the computer help to get answers to various questions." Each record is organized by data elements for better storage and identification. When a request is made, those notes are the answer for decision making.

A computerized software system designed to operate and respond to a database is called a database management system (DBMS). Any MBBT serves to make the process of obtaining information easy and convenient for the user. In addition, creating MB and managing it is one of the most important tasks of this system.

Database management means carrying out various management operations over the tables in the database. Such operations include:
• entering records;
• make a request;
• modification of notes;
• including deleting records.

The above operations allow the user to store, retrieve and update information in MB. In addition, the system should allow the user to create correlations between different tables.

The following types of MBBT are currently widely used in programming systems:
• Microsoft Access
• Oracle
• Sybase
• SQL Server
• DB 2
Typical duties of an MBBT include:

Identification of information. MBBT provides tasks that indicate the structure of data to software tools. These include the identification and modification of recorded information and various other tasks necessary for the information.

Information management. After the data structure is defined, data requirements are inserted, changed, or deleted. Tasks (functions) that perform these operations are part of MBB. These tasks are used in planned or unplanned information management:
• data storage;
• use and processing of data.

Database - MB (database) is a collection of data organized on the basis of specific rules and following the general principles of representation, storage and management. The rules for storing data in the database are organized on the basis of centralized management, adhering to security standards and integrity. In such a system, contradictions and duplication of information are avoided.

The system for creating MB and extracting data from it is implemented using the database management system (MBBT). MB can be installed on one or more computers, and data retrieval and reposting can be done between one or more computers. Due to the fact that mainly spatial data is stored in GAT, another name of this system (MB) is called Spatial database.

Digitization is the process of converting analog data into a digital form that can be stored in a computer system. A digitizer (digitizer), computer software, scanners, and other numbering devices are used in digitization.

Types of database

Databases (databases) contain structured information that is easy to use. They are divided into different types - in order to choose the right one, it is important to consider what kind of data should be stored there and the most convenient principle for working with them.

In general, it is impossible to say that some databases are better than others - each of them is suitable for solving certain tasks. There are open source databases that have scalability and

other advantages. It is better to choose such databases, how you can use them.

Relational databases

Examples are MySQL, Oracle DB, PostgreSQL. This is the most popular type of database where data is stored in the form of tables. Strings need a description of each property of the object and columns to retrieve certain properties from the string. Tables can be related to each other.

The relational model allows you to perform simple but different tasks. It is convenient to use if you need to connect data elements and manage them safely and reliably. Such tables can be created to store and process patient phone numbers, user logins and passwords, and to track inventory. At the same time, the database ensures the integrity of the data in different copies of the database at the same time.

Relational databases support SQL, as well as indexing, which allows you to find the information you need faster. A special advantage of such databases is the normalization of data: they are divided into different tables, so duplicate or empty cells are excluded. Database operations conform to an acid-based feature set that guarantees reliable performance. The disadvantages of the database include relatively low data access speed, poor support for unstructured data, complexity of scale, and the formation of many tables that are difficult to understand the structure of data.

Permanent databases

Examples are Redis, Apache Ignite, Tarantool. Data is stored in RAM. Data is processed quickly, so persistent databases are popular for providing the shortest response times. They help to manage telecommunications equipment, trade online or provide real-time service. In-memory databases support fast writing and fast reading. They mainly work with key-value records, but they can also work with columns.

To avoid data loss during an unexpected reboot, you should set a record with initial journaling on a non-volatile device. This may be due to the disadvantages of the in-memory database - it is necessary to invest in expensive infrastructure solutions to ensure continuous feeding. In addition, you must constantly copy data to hard media. Another disadvantage of the database is that it is an expensive scale.

Search databases

Example-Elastic. This type of database is needed for filtering information. You can call for any value you enter, including individual words. You can use full text search. Search databases scale well and are easy to log, bulk text values.

Search databases can be used to track price optimization, identify errors in ticket booking software, and solve many other tasks. The database can store billions of documents. The search is fast. Disadvantages of the system are poor analytical support and limited access to the database (can only be used for mass additions).

Wide-column databases

Examples-Cassandra, Google BigTable, HBase. Wide-column databases can handle large amounts of data faster than traditional relational databases. Data is stored on the hard disk or in the form of key-value records on the hard disk. Wide-column databases allow fast and rapid key reading.

Databases are well scaled and suitable for organizing store catalogs, fraud detection mechanisms. They are convenient for managing large amounts of data on many shared servers in a distributed system. Disadvantages of the database is that it works in a key-value format and lacks analytical support.

Columnar databases

Examples are Clickhouse, Vertica. In this type of database, data is stored in columns rather than rows. Access to content is done without keys. When using columnar databases, use a bulk insert to prepare data for fast reading through the columns. Columnar database has analytical support and convenient Zoom capability.

Such databases are used in places where it is necessary to request information about certain columns - in systems of retail trade and financial transactions. The main disadvantage of the database is only one: it is suitable only for mass additions.

Documented databases
Examples are CouchDB, Couchbase, MongoDB. If you need to merge tables in databases to get the database, then these databases are good for storing large amounts of data. They support JSON. You can create a complex value for any key and immediately insert the entire data structure into a single record. Upon request, samples can contain parts of many documents without fully loading them into RAM.
Documented bases have nothing to do with schema. They support OLTP-friendly and complex types. Such databases prefer to be used in content management systems, document search, and publishing. The three disadvantages of a database are lack of good analytical support and transactional support, as well as scaling difficulties.

Computing databases
Examples-OrientDB, Neo4j. data is stored as graphs, that is, models with nodes and connections. They have a very flexible, logical structure. Nodes serve to store the essence of data, and ribs serve to maintain relationships between entities that can be controlled.
Graph databases are used to solve bioinformatics problems, as well as to store related information about people for modeling social networks. These types of databases do not scale, and their second disadvantage is the need to use a special query language, SPARQL, which differs from SQL.

In-memory databases
(IMDB – In-memory Database). An in-memory database is a database management system that relies primarily on fast memory to store computer data. It is allocated in the MBBT background, where the disk storage mechanism is used. Examples of such MBs are Redis, Tarantool, Apache Ignite.
The main advantages of such MB are that IMDBs are faster than disk-based MBBTs in terms of writing and reading from the disk, IMDB data can be efficiently stored on the hard disk. Disk-based DMBBT typically does not work very well with hard drives and may require an SSD (or other fast storage such as SAS or flash memory). Disadvantages include IMDB generally not

performing well across multiple CPU cores, IMDB crashing if not all data fits in RAM, etc.

Define the database for your tasks
As we mentioned above, it all depends on the tasks you perform. You need to determine what features your database should have.
You should start with the following factors availability of analytical access to the database; the number of tables or records you want to keep;
the need to use poles;
it is possible to access tables filtered by columns or rows;
you need to write or read online.
Before creating a digital database of emergency situations, we need to study what type of database should be used and which type can meet our requirements. Relational database, persistent database, search database, Wide Column Database, Columnar Database, Documented Database, Computational Database, In-Memory Database are the most effective databases today. Relational database is the most effective one for us now. is the base. It is clear that every programmer or user who has worked with databases has started working with this type of database. This program has attracted the attention of many users due to its popularity and widespread use. Such MB allows to store data in relational tables with specific columns of certain types. Relational tables are very convenient for normalization and aggregation.
The advantages of the relational model are the simplicity and ease of understanding by the user, the fact that the only data structure used is the "table", the complete independence of the data, the changes in the program when the relational database changes are minimal, the organization of queries is that there is no need to know the special organization of the database in the external memory in order to do and write the application software.

Results
Improving the database of emergency situations is important and urgent. To improve the database, the most effective databases today were studied. Of these, the Relational Database

was found to be the most effective for the emergency database.

Conclusion

In our country, effective protection of the population and territories from various natural and man-made emergency situations, ensuring peaceful and peaceful life of people is one of the urgent tasks. For this purpose, a strong legal base has been created, and civil protection is being improved in accordance with the requirements of the time. In addition, emergency situation monitoring, forecasting and necessary preventive measures are being implemented consistently.

Today, information is the most valuable and most important. Therefore, several scientific studies are being conducted to improve the database of emergency situations. There are many types of databases, and we need to choose the one that fits our field and is convenient to use. Of the databases I've reviewed above, I've found the Relational Database to be the most effective for emergencies.

Suggestions. Use of satellite system in emergency monitoring. Improving the system of training and education of qualified specialists. Using ArcGIS software in flood risk mapping. Using a Relational Database for Emergency Database Management.

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