Transaction Control System On Various Techniques for Maintaining Consistency of Databases

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Abstract: - As Per Requirement of Application Transaction Perform on Database. These are Transaction must maintenance Consistency. This Paper explain Various Technique of Transaction for Maintenance Consistency.

Introduction:
The transaction as used in most data management systems generalizes to the network environment, that network systems should provide of a transaction as an abstraction which Eases the construction of programs in a distributed system. Transactions would provide the programmer with the following types of transparencies.
(1) Location Transparency. Although data are geographically distributed and may move from place to place, the programmer can act as if all the data were in one node.
(2) Replication Transparency. Although the same data item may be replicated at several nodes of the network, the programmer may treat the item as if it were stored as a single item at a single node.
(3) Concurrency Transparency. Although the system runs many transactions concurrently, to each transaction it appears as if it were the only activity in the system. Alternatively, it appears as if there were no concurrency in the system.
(4) Failure Transparency. Either all the actions of a transaction occur or none of them occur. Once a transaction occurs, its effects survive hardware and software failures.

They are Various Techniques of Transaction for Maintenance Consistency as given below

1 Semantic Data Control in Database Environment
A centralized & distributed database is a database distributed between several sites. The reasons for the data distribution may include the inherent distributed nature of the data or performance reasons. In a distributed database the data at each site is not necessarily an independent entity, but can be rather related to the data stored on the other sites. This relationship together with the integrity assertions on the data are expressed in the form of data constraints. Figure 1 shows a classification of the possible data constraints that can hold on a distributed database. Those constraints as an invariant, which must hold at any given time instance (static constraints) or during any time interval of prespecified length (dynamic constraints).

![Data Constraints Classification](image)
At the top level there are two types of constraints: dynamic and static. To check whether a static constraint holds, at any given time point, we need a static snapshot of the database instance. On the other hand, to verify whether a dynamic constraint holds, we need to have information about how the database instance evolves over time. An example of a dynamic constraint is: within every 5 minutes of the life of the database instance, something must happen, e.g., an update must occur. On an orthogonal plane, data constraints can be integrity or duplication. Integrity constraints are independent of how the data is distributed or duplicated. If an integrity constraint is based on a single collection of data objects and a single variable, it is called individual. Set constraints are those that are based on more than one data collections or on more than one variables. For example, in the distributed database shown in Figure 2, individual integrity constraints may include the primary key constraints on the tables R1 and R2, while a set integrity constraint may include a referential foreign key constraint between the two tables. Aggregate constraints are integrity constraints involving aggregate operators such as min, max, sum, count and average.

Note, that integrity constraints can be both dynamic and static. In particular a dynamic integrity constraint may state that if an update, which violates a constraint, is performed, a compensating update which restores the constraint should be performed within two minutes. On the other hand, static integrity constraints require the integrity constraint to be true at any given time instance.

![Figure 2 A Distributed database Example](image)

### 2 Real-Time Replication Control for Database System on Basis Algorithms

In real-time distributed database systems, timeliness of results can be as important as their correctness. The problems related to replication control such as the preservation of mutual and internal consistency become more difficult when timing constraints are imposed on transactions. Transactions must be scheduled to meet the timing constraints and to ensure data consistency. Real-time task scheduling can be used to enforce timing constraints on transactions, while concurrency control is employed to maintain data consistency. The integration of the two mechanisms is non trivial because of the trade-offs involved. Serializability may be too strong as a correctness criterion for concurrency control in database systems with timing constraints, for serializability severely limits concurrency. As a consequence, data consistency might be compromised to satisfy timing constraints.

**Epsilon-serializability** (ESR) is a correctness criterion that enables asynchronous maintenance of mutual consistency of replicated data. A transaction with ESR as its correctness criterion is called an *epsilon-transaction* (ET). An ET is a query ET if it consists of only reads. An ET containing at least one write is an update ET. Query ETs may see an inconsistent data state produced by update ETs. The metric to control the level of inconsistency a query may return is called the *overlap*. It is defined as the set of all update ETs that are active and affecting data objects that the query seeks to access. If a query ET’s overlap is empty, then the query is serializable. The overlap of an active query transaction Q can be used as an upper bound of error on the degree of inconsistency that may accumulate.
Among several replica control methods based on ESR, chosen the ordered updates approach. The ordered updates approach allows more concurrency than 1SR in two ways. First, query ETs can be processed in any order because they are allowed to see intermediate, inconsistent results. Second, update ETs may update different replicas of the same object asynchronously, but in the same order. In this way, update ETs produce results equivalent to a serial schedule; these results are therefore consistent. There are two categories of transaction conflicts that examine: conflicts between update transactions and conflicts between update and query transactions. Conflicts between update transactions can be either RW conflicts or WW conflicts. Both types must be strictly resolved. No correctness criteria can be relaxed here, since execution of update transactions must remain 1SR in order for replicas of data objects to remain identical. Conflicts between update and query transactions are of RW type. Each time a query conflicts with an update, say that the query overlaps with this update, and the overlap counter is incremented by one. If the counter is still less than a specified upper bound, then both operation requests are processed normally, the conflict is ignored, and no transaction is aborted. Otherwise, RW conflict must be resolved by using the conventional 1SR correctness criteria of the accommodating algorithm. The performance gains of the above conflict resolution policies are numerous. Update transactions are rarely blocked or aborted in favor of query transactions. They may be delayed on behalf of other update transactions in order to preserve internal database consistency. On the other hand, query transactions are almost never blocked provided that their overlap upper bound is not exceeded. Finally, update transactions attain the flexibility to write replicas in an asynchronous manner.

A real-time replication control algorithm, based on the majority consensus approach, he use of ESR correctness criteria to control the inconsistency of query transactions and the mechanism for conflict resolution of real-time transactions.

3. Transaction Management using Coordinator
Oracle constructs a session tree for the participating nodes. The session tree describes the relations between the nodes participating in any given transaction. Each node plays one or more of the following roles:
1. Client: A client is a node that references data from another node.
2. Database Server: A server is a node that is being referenced by another node because it has needed data. A database server is a server that supports a local database.
3. Global Coordinator: The global coordinator is the node that initiated the transaction, and thus, is the root of the session tree. The operations performed by the global coordinator are as follows:
   • In its role as a global coordinator and the root of the session tree, all the SQL statements, procedure calls, etc., are sent to the referenced nodes by the global coordinator.
   • It instructs all the nodes except the COMMIT point site, to PREPARE
     • If all sites PREPARE successfully, then the global coordinator instructs the COMMIT point site to initiate the commit phase
     • If one or more of the nodes send an abort message, then the global coordinator instructs all nodes to perform a rollback.
4. Local Coordinator: A local coordinator is a node that must reference data on another node in order to complete its part. The local coordinator carries out the following functions (Oracle8):
   • Receiving and relaying status information among the local nodes
   • Passing queries to those nodes
   • Receiving queries from those nodes and passing them on to other nodes
   • Returning the results of the queries to the nodes that initiated them.
5. Commit Point Site: Before a COMMIT point site can be designated, the COMMIT point strength of each node must be determined. The COMMIT point strength of each node of the distributed database system is defined when the initial connection is made between the nodes. The COMMIT point site has to be a reliable node because it has to take care of all the messages. When the global coordinator initiates a transaction, it checks the direct references to see which one is going to act as a COMMIT point site. The COMMIT point site cannot be a read-only site. If multiple nodes have the same COMMIT point strength, then the global coordinator selects one of them. In case of a rollback, the PREPARE and COMMIT phases are not needed and thus a COMMIT point site is not selected. A transaction is considered to be committed once the COMMIT point site commits locally.
4 Transaction Management using Schema
The primitives issued by a distributed transaction are begin-transaction, read, write, execute, and commit or abort. They are processed according to the schemes outlined below. The algorithms As below:
Begin-transaction: Upon invocation of this operation, the global transaction manager (GTM) writes a begin-transaction record in the log, interprets the request, and decides which nodes are going to be accessed to complete the transaction. Next, it initializes a run-time global table for the transaction. This table has a column for each anticipating node. The header of the column is the identifier of the called node. Then, it issues a local-begin-transaction primitive to all participating nodes. The local transaction managers (LTMs) of these nodes respond by writing a local-begin-transaction record in the log and creating and initializing new columns in their run-time local tables. Each of the elements and at most "ax" elements in r2 related to tl. Note that this is a simple but important generalization of the 'referential integrity' of SQL by specifying minimal and maximal cardinalities.

5. Database Transactions on basis Integrity Constrain
For the embedding language assume a programming language. It includes most of the usual constructs, arithmetic expressions, assignment statements, jumps, conditional-, repeating- and compound- statements. In addition it is necessary to describe the database operations. Each database application has a data model as a basis. We will restrict our discussion to the relational model and SQL as database language. The interesting operations are INSERT, DELETE, UPDATE and SELECT, which we currently restrict to the untested versions. However, we admit arithmetic expressions, comparison operators, logical connectors and aggregate functions (count, sum, avg, min, max). These constructs are sufficient for most of the transaction programs. Consistency constraints are much more powerful than those mentioned in the SQL standard proposal. They include the same constructs as the predicates in the SQL statements. In addition the existential and the universal quantifier are possible.
The calculus used for the integrity constraints is an extension of predicate calculus extended by some formulas of a nested predicate calculus. This is necessary for constraints including aggregate functions. For example, integrity constraints corresponding to multiple tuples of more than one relation often have a form like: This says that for each element tl of relation rl there exist at least "in"
The index of an array is often not known at execution time. This makes it impossible to decide, whether predicates containing different indices like 'a[i]=ab]' are the same.

0 Procedure Calls:
There are two methods to handle procedure calls; the first one is the inline substitution. Using this approach, all procedure calls are replaced by the program code. This method significantly increases the number of executable paths. The second possibility is to check the procedures separately and to replace all procedure calls by their path conditions.

0 Selection of Paths:
Often it is impossible to execute all paths, because of the complex structure of the program. Restricting the number of paths checked, on the other hand, reduces the quality of the result.

6 Database Transactions on basis Object
The schemas of three databases: DB1, DB2, and DB3, which are located in different sites and used to store the personal information at the same school. The global schema is constructed by integrating these three component schemas. The schemas only include the class composition hierarchies without the class hierarchy. The missing data mainly come from the existence of missing attributes for the constituent classes. The missing attributes for a class can be divided into primitive missing attributes and complex missing attributes according to their types of being primitive or complex attributes. A predicate which involves a nested attribute of the range class is called a nested predicate. The nested attributes are represented by path expressions in a query. Consider the queries containing one range class, whose predicates contain nested predicates combined in conjunctive form. The range class is the root class of the composition hierarchy involved in the predicates; the other classes specified in the hierarchy are named branch classes for the query. The constituent classes of a root class and a branch class are called local root classes and local branch classes, respectively.

The following three phases are necessary for processing the queries involving missing data.

0 phase 0: this phase examines the GOid mapping tables to find the isomorphic objects which can provide the missing data. In other words, this is the step for looking up the assistant objects. For the localized approach, the task for checking the assistant objects is also included in this phase.

0 phase I: this phase integrates the information of one object and its isomorphic objects. For the localized approach, it means the step for certifying the local maybe result--i. And the unsolved items.

0 phase P: this phase does the predicate evaluation. It is possible that, the concerned predicates are local predicates when the localized approach is applied.

The centralized approach follows the 0→I→P order for executing the three necessary phases. The procedures executed in the global processing site and each component database are as follows.

Centralized Approach (CA)
The centralized approach follows the 0→I→P order for executing the three necessary phases. The procedures executed in the global processing site and each component database are as follows.

Global Processing Site
Step CA-G1: To materialize each global class involved in the query, outerjoin is used over join attribute GOid to integrate the objects in the constituent classes (phase 0 and phase I).
Step CA-G2: Evaluate the predicates on the materialized global classes (phase P).

Component Database
Step CA-C1: When receiving the request from the global processing site, retrieve and send out all objects in the local root class and local branch classes of the query.

Basic Localized Approach (BL)
The basic localized approach for explaining the concept of the localized approach. The execution order for the necessary phases is P→0→I. The tasks of the global processing site and the component databases are described as follows.

Global Processing Site
Step BL-G1: For each component database containing the local root class, produce a local query against the local root class. The predicates remain unchanged at this step. Then send the local queries to the component databases and wait for the response.
Step BL-G2: According to the certification rule, certify the local results using the results of checking the assistant objects (phase I). Get the final certain results and maybe results.

**component database**

Case 1: receive the local query sent from the global processing site

Step BL-C1: Only evaluate the local predicates in the local query if the missing data is involved in the original predicates (phase P).

Step BL-C2: Examine GOid mapping tables to find the LOids of the assistant objects for the unsolved items of the local maybe results. The LOids of the assistant objects and the corresponding unsolved predicates are sent to the other associated component databases for further checking (part of phase 0).

The local results are then sent back to the global processing site.

Case 2: receive the request from other component databases for checking the assistant objects.

Step BL-C3: Retrieve the objects for the LOid list of the assistant objects and evaluate the appended unsolved predicates. The LOids of the satisfied objects are sent back to the global processing site (phase 0).

7. **Database Transactions on basis Prewrite operation**

A prewrite operation before an actual write operation is executed on design objects to increase the potential concurrency. A prewrite operation makes available the model of the design that the object will have after the design is finally produced. A prewrite operation does not make the design but only provides the model or the picture of the design (including its dimensions, colour combination etc.) a transaction intends to make in future. Once the prewrite design of a transaction is announced, the associated transaction executes a precommit operation. After the transaction has finally produced the design (for which the prewrite design has been announced), it commits. A read transaction can read the prewrite design before the precommitted transaction has produced that design. The prewrite design is made available for reads after the associated transaction has executed a precommit but before it has been committed. Hence, prewrites increase concurrency as compared to the environment where only read and write operations are allowed on design objects.

Once a transaction has announced a precommit, it is not allowed to abort. This is due to the following reasons. First, it will help in avoiding cascading aborts since the prewrite design has been made available before the transaction has finally produced the design and committed. Second, it is desirable for a longduration transaction so that it does not lose all the design work at finishing stage in case there is an abort or a system failure. To accomplish this, a precommit operation is executed only after all the prewrite log records are stored on stable storage. Once write operations start, each write log is also stored on stable storage. Thus, in case of a failure after pre-commit, there is no need of executing rollback (undo) operations. The recovery algorithm has to at the most redo those operations (using the prewrite logs and the write logs) whose effects are not there on stable storage. The failed transaction then can restart from the state as exists at the time of failure. If a transaction aborts before executing all prewrite operations and a precommit, it is rolled back by discarding all the announced prewrites In engineering design applications, by introducing prewrite designs, shortduration transactions can access the model or picture or the working copy of the design held by a long transaction.
Reads are allowed to access the sketches once they are prewritten but before they are actually made. Therefore, using prewrites, one can have a system consisting of short and long transactions without causing delay for short-duration transactions. Thus, prewrites help in increasing the throughput of the system by making the response of the system faster for read-only operations. For read-only transactions, the picture or the model of the design to be produced is important rather than the finally completed design. In the production, the dimension or certain colour combinations of the design may vary from the prewrite version of the design, however, the read-only transactions are not affected. In our algorithm, the user transactions explicitly mention a prewrite operation before an actual write. Also, user transactions explicitly mention whether it wants to access the prewrite design (we call it pre-read operation) or the final design (we call it read operation). That is, the existence of a prewrite is visible to the scheduler, data manager (DM) and to user transactions. The user transaction submits prewrite, pre-read, write and read for the design objects it wants to access. Once a transaction is submitted to the Data Manager (DM), the DM analyses the received transaction. If the transaction has a prewrite operation, the DM will store the announced design for the object in the prewrite buffer. If the transaction has a preread operation, the DM will return the corresponding prewrite design from the prewrite buffer. If the operation is a read, it returns the final produced design from the write-buffer. In our algorithm, two versions of the same design may be available for reading. The first version is the final design released for manufacturing or the last design checked for correctness. The other is the most recent working copy of the design (prewrite design). However, after the final version of the design is produced, prewrite version of the design will be no longer available. That is, after the final design is released, a read transaction can not access its prewrite design. Also, the independent writing on these two different versions of design are also not allowed.

8 Database Transactions on basis Domain

A methodology for learning across different application domains. Across domain learning involves generalizing elements for example, from Airline, Railway, and Busline domainsDto a higher-level node, such as Transportation as shown in Fig. 3. Whenever common knowledge is generalized and a higher level node is created, the hierarchical structure of the ADB is reorganized. To illustrate, consider the example shown in Fig. 4. The original structure of the ADB is shown on the left where the Service node has four children nodes: Airline, Railway, Car-Rental, and Video-Rental. By comparing these nodes, the first two have certain similarities between them, so a new node, called Transportation, is created to capture the common

Concurrency Control Algorithm

the conflicting and nonconflicting operations in our model. The following operations on the same design object conflict:

1. Two prewrites conflict since two prewrite design for the same object can not be announced at the same time in the same prewrite-buffer. It produces a prewrite-prewrite type of the conflict.
2. A prewrite operation conflicts with a pre-read operation since pre-read returns the value from the prewrite-buffer whereas prewrite changes the contents of the prewrite-buffer. Therefore, it will generate a conflict of the type pre-read and prewrite.
3. Two writes conflict since both of them will modify the same design object at the same time. This will generate a write-write type of the conflict.
4. A write operation conflicts with a read operation since the read returns the value from the write-buffer, and a write changes its contents. Therefore, it will generate a conflict of the type read and write.

The following operations, in general, do not conflict:

1. A pre-read operation (to read a prewrite design) and a write operation do not conflict. A write operation operates on the write-er whereas a pre-read operation on the prewrite-buffer.
2. A prewrite and write conflict do not conflict as prewrite and writes operate on their respective buffers.
3. A read and prewrite do not conflict as they operate on different buffers; read operates on write-buffer whereas prewrite operates on the prewrite-buffer.

the ordered-shared locks are acquired. Once the prewrite-lock of T2 is converted to the write-lock, the two write operations of the transactions are executed in the order their write-locks are acquired. Another improvement over is that transaction Tz can commit before T1. In the transactions with ordered-shared locking are allowed to commit in the order they obtained their locks.
elements. Similarly, a new node called Rental is created so that the common elements between Car-Rental and Video-Rental can be stored at the appropriate level of generality. However, the creation of these two new nodes results in the Service node being split into two subnodes. In general, whenever a few nodes are grouped into higher level nodes, the parent node is split into lower level nodes. This reorganization is automatic and ensures that the design knowledge is always stored at the proper level of generality.

Thus, for the reorganization of the hierarchical structure to occur, we need the ability to compare two nodes at the same level and determine if they have enough common elements for propagation and creation of a new node. A number of challenges are involved in making a comparison across different application domains.

Fig. 3. Learning across application domains.

Algorithm: Across Domain Learning

**Input:** Entities and Relationships from Domains $A$ and $B$.

**START**

**Step 1.** Choose the largest possible clusters $\sigma_A$ and $\sigma_B$ (with the same number of entities in each cluster) from domains $A$ and $B$, respectively. Let $n$ be the number of entities in a cluster.

**Step 2.** For all entities $A_i \in \sigma_A$ and $B_j \in \sigma_B$, calculate $d_E(A_i, B_j)$ from Equation (1). Solve the assignment problem to find the best $(A_i, B_j)$ pairings. Reorder the entities in $\sigma_B$ so that $A_i$ is paired with $B_i$.

**Step 3.** Solve the simultaneous equations in Equation (4) to obtain $d(A_i, B_i)$.

**Step 4.** Calculate the inter-cluster distance as:

$$d(\sigma_A, \sigma_B) = \frac{1}{n} \sum_{i=1}^{n} d(A_i, B_i).$$

If $d(\sigma_A, \sigma_B) < t_{\text{Same}}$, then go to Step 6. Otherwise, choose another cluster pair $(\sigma_A, \sigma_B)$ (with $n$ entities each) that has not been compared before. If no such pair exists, choose clusters with less number of entities and reset $n$ to the number of entities.

**Step 5.** If $n \geq 2$, then go to Step 2. Otherwise, STOP.

**Step 6.** Create a new node as a parent of $A$ and $B$. For all $i \leq n$, if $d(A_i, B_i) < t_{\text{Same}}$, propagate the generalization of $A_i$ and $B_i$ as an entity to the new node. Propagate all the relationships among the propagated entities. STOP.

**END.**
shown in Fig. . Comparing the domains Airline and Railway, a higher-level node (say, Transportation) could be created with entities Operator (a generalization of Pilot and Engineer), Equipment (a generalization of Airplane and Train), Company (a generalization of Airline and Railway), and Passenger (a generalization of Freq_Flyer), and the relationships between them. This generic model would be used to reason about subsequent transportation applications. For example, a bus company should have Driver and Bus entities, specializations of Operator and Equipment, respectively. The system would provide the generic names; the more specific terms, such as Driver and Bus, could then be elicited from a user.

The learning process involves analyzing entities and relationships from different domains to discover general facts that can be propagated to a higher-level node in the hierarchical organization of common knowledge. It is necessary to judge what facts are general and whether there is enough knowledge to warrant the formation of a new node. Our approach to making such judgments is similar to cluster analysis, where a set of objects is partitioned into disjoint subsets (called clusters) based on a distance measure. When comparing two domains, find the largest cluster (subschema) from one domain whose distance from a corresponding similar cluster (subschema) of another domain falls below a threshold. The common elements (entities and relationships) of these clusters are then propagated to form a new node. The process of clustering involves estimating the closeness between two clusters. We use a distance measure similar to the one used, to judge the closeness between two clusters. The distance between two clusters is calculated as an average of the distances of their corresponding elements (entities). The distance between two entities, in turn, is calculated as an average of the distances of the elements of the entities.

9 Database Transactions on basis Architecture

The Shared Information Platform(SIP) is an effective way to settle the information bottleneck of freeway construction. The abroad studies of ITS pay much attention to information technology, system integration and integrated information platform. The domestic studies of Shared Information Platform focus on two aspects, one is the traffic information system(TIS), the other is the urban transportation system(UTS). The Shared Information Platform of Freeway Transportation (SIPFT) is the sub-platform of SIP for transportation (SIPT).

The shared information of SIPFT is the data which need to be organized and stored by the database system, including static traffic information, dynamic traffic information and other relevant information of management information system. The input information of database system involves a large number of highway attribute data and complex spatial data. The mass data of GIS and the attribute data of traffic information constitute the core of platform database. According to the construction of national freeway information system, the above-mentioned information belongs to different management department and application system, and the corresponding databases are built with different management functions. Such as the database of charge system, the database of monitoring system, the database of highway project, the database of maintenance system, the database of disaster emergency management system and so on. Based on the user's request of data from different sources.

SYSTEM DESIGN
A. Idea of System Design
1) Construction process
As we all know, Domestic freeway infrastructure is in a period of large-scale development, the new road and the corresponding sub-system platform continue to emerge. However, the construction technology of the SIP is not mature, which need more accumulation of experience. So, the database system of platform can not be realized in one step, the way of progressive stages and gradually improving should be adopted.

2) Information processing
GIS integrates database technology and computer graphics technology, possesses powerful function of data management and space analysis, and can provide support with space property for data mining, information service and decision-making. Freeway traffic information contains a lot of geographic data, therefore, the database system of platform should be a spatial database system based on GIS.
3) Database organization

The data of SIPFT has the following characteristics: the information sources and users are geographically dispersed, but the management is relatively concentrated. The function module of sub-system is local control and decentralized management, but platform is overall control and management. In addition, the data of SIPFT meets the characteristics of the distributed database systems, which is logically and dispersed physically. Consequently, the distributed database is adopted to organize the database of SIPFT, which is in line with the management ideas and management methods of SIP.

4) Integration of heterogeneous database

The information of SIPFT is derived from different subsystems, for this reason, the database design, data structure, and communication way of those subsystems are different.

Because the databases of sub-systems can not be changed when the database of platform is build, the federated database system (FDBMS) can be used to resolve such a heterogeneous distributed database. The FDBMS, under the premise of maintaining the independent management of sub-systems, realizes the integration of the heterogeneous database.

5) Integration model

Part of the databases of domestic freeway information systems are relatively mature, so, the integrated model of platform database should combine distributed database with the comprehensive database of commanding center. The distributed database of new information systems and the comprehensive database should be built using top-down approach, On the contrary, the distributed database of the existing system should be federated into platform using down-top approach.

The model of multi-level structure and co-existence is applied to the integrated database of SIPFT. The shared information which is frequently used should be storaged by the comprehensive database of commanding center. The less used shared information as well as the unshared information should be storaged by the distributed database, the stored location and the updated time of those informations are recorded in the comprehensive database, which can be extracted when they need to be queried or used. This system model, not only supporting the independent sub-system but also supporting the sub-system coordinating with each other, achieves the integration of heterogeneous database and the sharing of traffic information, at the same time, the specific management of the sub-system is maintained. The comprehensive database and heterogeneous distributed database can be connected by LAN or WAN.

The comprehensive database includes spatial database (SDB), spatial database management system.
(SDBMS) and spatial database engine (SDE). Among those, SDE plays the role of middleware. Because the development of information system of domestic highway is in its infancy, the comprehensive database can be built from scratch. The construction of database can be overall planned in accordance with the unified thinking. The heterogeneous distributed database of the subsystem can be local visited. In order to realize the mutual visit of the sub-systems, interface server needs to be installed. Through the development of uniform standards for information, the comprehensive database can be connected well with the database of sub-system. The mature database of sub-system can be federated into SIP using down-top approach and the new database using top-down approach.

A. Frame of Database System

Based on the space database of GIS, linked by mobile communication and network communication, the present system integrates the related systems seamlessly, including vehicle location tracking system, electrical and mechanical equipment management system, emergency response system, information publication system, traffic flow analysis system and network charge system. The overall structure of database system is shown in Fig. 5.

Figure 5. Overall structure of database system

B. Data Classification of Platform

The platform data can be divided into non-spatial data and spatial data according to data features. Spatial data includes topographic maps, route data, and facilities locations of traffic engineer and so on. Non-spatial data includes the information of electrical and mechanical equipment management, network charge, real-time location of vehicle tracking, road maintenance and office automation.

Conclusion:
All above Techniques suggested the convenient way of Transaction view of databases as per requirements of user to enhanced the Performance.
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