Remote Database Support Contributes to Corporate Success and Greater Return on Investment

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Based on strategies we have successfully implemented at both Government and Commercial client sites, this white paper is intended to be a resource for:

- *Chief Information Officers*
- *Information Technology Managers*
- *Database Professionals*

1. A Growing Need for Database Support

All organizations have data – they cannot operate without it. Data comes in all forms, from employee files stored in file cabinets to complex data warehouses accessed by thousands of concurrent end-users. For decades, organizations have increasingly begun to realize how inefficient it is to store their data in hard copy format and process it manually. In the early 1990s, there seemed to be an increased awareness of the need for many organizations to investigate electronic data storage. Prior to that time period, electronic databases had already appeared and been in use in many Government and commercial organizations with large technology budgets. The mid-1990s brought forth an explosion of awareness and growth in technology with Web and database technologies. More database options were available, which made the database market more competitive. Major players in the market included Oracle, Microsoft, Sybase, IBM, and Informix. Today, the database market is even more competitive, people are better trained in database technologies, and the art of storing and managing electronic data has been refined. Greater understanding is derived from knowledge and past experiences, and now people are starting to understand the true importance of data in the enterprise. People are starting to realize how long it takes to collect data and build a useful database. People are also starting to fully realize the consequences of lack of database availability, poor performance, and data loss.

Figure 1.1 Relationships of Organizations, Customers, and Data

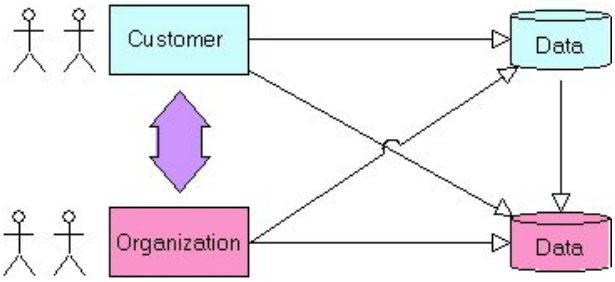


Figure 1.1 illustrates the basic relationship between an organization and its customer, and between people and data. Data is used by everyone in some form, and in many cases, critical data is shared between organizations and its customers. In most cases, organizations and customers are completely dependent on their data. Loss or unavailability of data equates to either drastically slowed production or cease of operations. In both cases, this means monetary penalties, loss of revenue, and potentially loss of customers.

2. A Growing Awareness of the Need to Manage Data and Databases

In most organizations, reliance on data is synonymous with the "live by the sword, die by the sword" philosophy. With data, organizations can operate more effectively. In fact, most cannot operate without data. Customer data can be maintained. Statistics can be analyzed. Trends can be used to influence product life, modifications, and targeted marketing. Certain data must be maintained for a certain amount of time, by law. Data helps organizations develop business plans, increase sales revenue, better serve customers, and measure results. Data is invaluable in the enterprise. Conversely, the consequences of data unavailability, data loss, data inaccuracy, and lack of data integrity are quite severe. In some cases, even temporary loss of data can cause an organization to shut down.

All too often, organizations have a database built and quickly forget about it. The database is left to run on its own and does so for a while. No one manages the database, validates the data, measures performance, guarantees availability, or plans for future growth. Worse yet, a backup and recovery plan has not been developed. In most cases, if a backup and recovery plan exists, it has not been tested – and the true test is when there is a database failure or loss of data. Then it is too late. In addition to backup and recovery planning, a disaster recovery plan (DRP) should also be developed and tested. DRPs are insurance policies for disasters such as fires, floods, hurricanes, tornados, theft, vandalism, and bombs. What will your organization do if there is a natural disaster? How will your organization continue to operate if there is a hard drive failure on your database server?

It's too late when you lose your database!

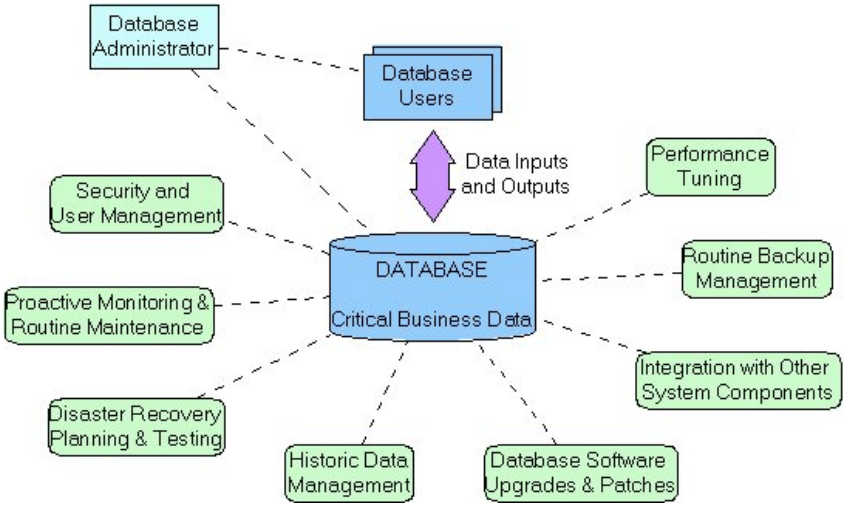
We are surprised by the number of clients we encounter that don't have a backup and recovery plan, or have not tested it and have no idea if it works.

Plan, design, and test!

Fortunately, more people and organizations today have been educated about the importance of data and consequences of data loss. Some have learned through training and others have learned through experience, the greatest teacher of all. Some organizations have recovered and others have not. Some organizations have had to pay steep fines and others have lost customers. A database cannot be ignored. It must be maintained like a machine, because it is a machine. It needs checked, oiled, and tuned on a regular basis.

The database administrator (DBA) is the mechanic for a database. The DBA is the patient's doctor and the investor's financial consultant. For every database that exists, a certain amount of routine maintenance must be accomplished. A large database environment may require a team of DBAs where a small database may require only a handful of man hours per year. What an organization must do is determine the level of DBA support required for its database and allocate resources to make sure the database is managed responsibly. Then, the greatest risk is investing a controlled amount of resources into DBA support and minimizing or eliminating the chance for database failure and data loss – the whole point of DBA support. A major objective for any IT manager is to balance the amount of resources invested into database support with the desired (and measured) results of DBA support.

Figure 2.1 Database Administration Responsibilities



As Figure 2.1 illustrates, many responsibilities fall in the database administrator's lap, each carrying a whole truckload of baggage. Table 2.1 below describes the impact on the organization of each major database administration responsibility mentioned above.

Table 2.1 Impact of Database Administration Responsibilities on the Organization

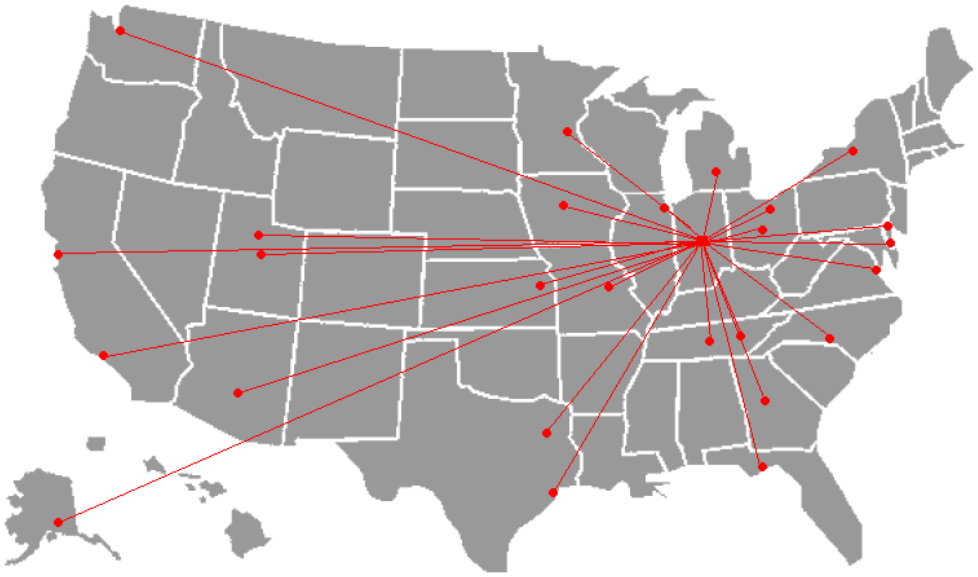
DBA Responsibility	Impact on the Organization
Security and user management	User accounts must be managed, database access controlled, and proper security mechanisms implemented to eliminate unauthorized access to data, hacking, and accidental data loss.
Proactive monitoring and routine maintenance	Databases must be proactively monitored for potential problems on a regular basis, maximizing database availability and performance.
Disaster recovery planning and testing	A solid disaster recovery plan must be in place and tested to allow for quick and easy restoration of data so the organization can continue to function.
Historic data management	Many organizations have a need to isolate historic data for storage and performance reasons.
Database software upgrades and patches	Upgrades and patches must be applied to the database software on a regular basis for bugs, security threats, and new features.
Integration with other system components	It is often necessary to integrate a database with application interfaces, other databases, Intranet, and the web.
Routine backup management	Backups must be taken properly and at the right frequency. Backup media must be carefully managed to enable recovery.
Performance tuning	Databases should be tuned to improve performance, lending to better productivity and an increased bottom line.

How are you doing at these things? Are you protecting your organization's data?

3. Understanding Remote Database Administration Support

Remote database administration (remote DBA) support is really no different than on-site DBA support. When managing database software, 99.9% of the time it does not matter if the database server is in your office, in a computer room in the same building, or in another state hosted by another organization or department within your organization. In a sense, all forms of database administration are remote unless you are directly logged into the console of the database server. The obvious difference is the length and width of the network pipe.

Figure 3.1 Consolidated and Remote Information Systems Management



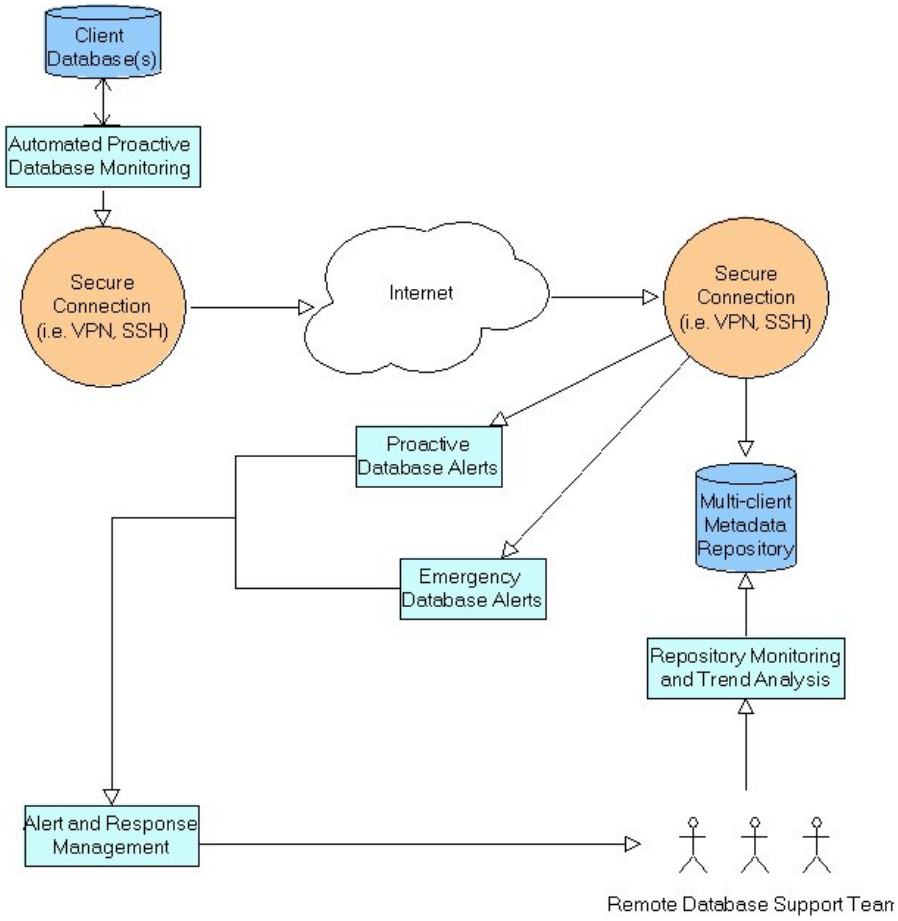
Twenty-six (26) client sites are shown in Figure 3.1. Without any form of consolidated or remote database support, twenty-six DBAs would be required. In a remote support scenario, we have found that a single DBA can easily support 5 to 10 clients while providing superior support. In some cases, a single DBA can effectively support up to 20 different clients (depending on factors such as the number and size of databases, concurrent users, database growth, and general database activity). This means that a single DBA can support anywhere between 5 and 20 times the number of clients than a full-time employee DBA can support. This means that a team of 26 skilled DBAs can easily support anywhere between 130 and 520 clients, not 26. This also means that the cost for database support can be spread across more clients, facilitating a stronger DBA team and deeper pool of database resources. Furthermore, most organizations find it difficult to recruit and keep good DBA talent, which results in poor database performance, decrease in an organization's production, and increased expenses due to turnover.

A good DBA team can typically support between 5 and 20 times the number of clients in a remote support scenario.

Many clients can save at least 50% by implementing some form of remote support, and receive better service!

With a remote DBA support solution, it is common for the remote DBA to periodically visit the client site for critical meetings, planning, and critical reporting. The money saved with remote DBA support will offset any travel expenses. Software media can typically be loaded by any competent person on-site. Normally, the remote DBA has a technical or semi-technical point of contact at each client site for general communication, software media loading, hardware support, and so forth. However, network connectivity issues may pose a problem to the remote DBA if there are not backup connection methods. A typical remote DBA connection plan for a client might include a primary T1 connection, a secondary T1 or DSL, and a backup modem for dial-up access as a last resort. All methods can be secured using technologies such as Virtual Private Networking (VPN) and Secure Shell (SSH). Figure 3.2 below illustrates a basic infrastructure for remote database support.

Figure 3.2 Basic Remote Database Support Infrastructure



Of course, there are issues that must be recognized and dealt with in regard to remote support. Three of the predominant issues are:

- Reliable connectivity
- Secure connectivity
- Performance

Remote database support should be considered only if connection to the database server is reliable, secure, and performs well. Until these criteria can be satisfied, stick with on-site administration. Technically, the only times a DBA must be on-site are:

- Face-to-face meetings
- Load software media into the database server
- Persistent network connectivity issues

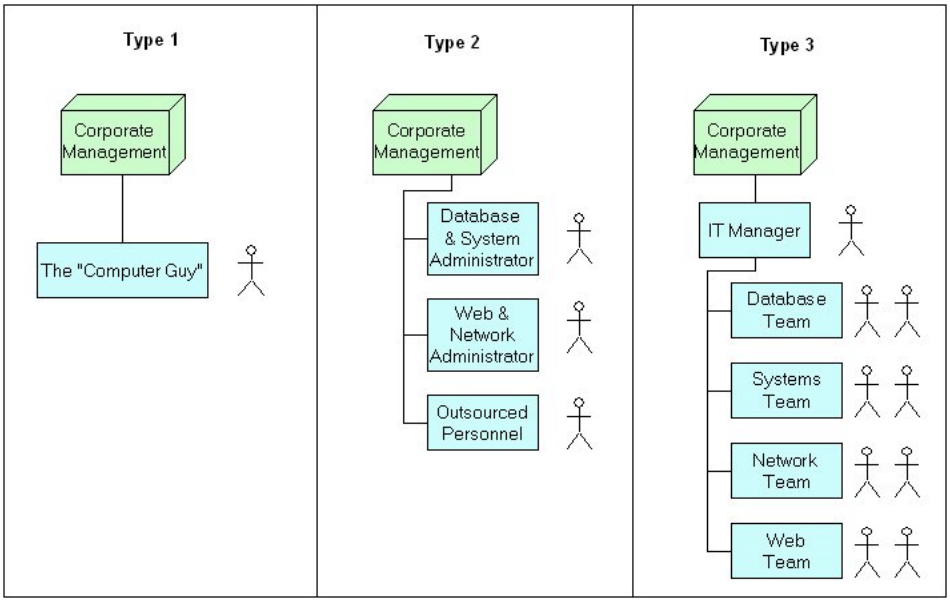
4. Staff Augmentation versus Complete Outsourcing

Database professionals should not feel threatened by the consolidation of information system management and the creation of a remote support infrastructure. There are two ways to take advantage of remote database support.

- Augmentation of current database staff
- Complete outsourcing of database support

First, let's examine three types of IT departments in an organization as shown in Figure 4.1.

Figure 4.1 Types of Information Technology Departments



You probably recognize the three types of companies that correspond to the three types of information technology departments shown in Figure 4.1.

Type 1. First, you have the very small company with a "computer guy." For most small and startup companies, budgets are limited and sometimes at best, you can afford someone that is knowledge and perhaps very good with computers in general. This type of person is versatile and handles everything from desktops and printers to servers and databases. If this is your organization and you have a good "computer guy", then you may not need nor be able to afford any other form of support. If this is your organization and you do not have a "computer guy", then you should seriously consider outsourcing not only your database support, but your IT support as a whole. It is very possible that you can obtain top notch support to meet all of your information technology needs at around the same cost, or potentially less, than the cost of someone with a well-rounded knowledge of technology who only rates himself a 4 out of a 10 for each IT area, including systems, database, web, network, and desktop.

Type 2. Then you have the organization that currently has technically proficient staff to support your database, system, network, and web environments. Your technical staff may be entry level, or may be comprised of senior staff members that are extremely knowledgeable. In Type 2 organizations, one common problem normally exists – workload. Budgetary constraints always exist (at least they should), therefore as an organization grows, workload increases and higher demands are often placed on technical staff than what they are able to handle. This is one of the best fits for remote database support, or any form of supplemental IT support for that matter. Routine database monitoring and maintenance can easily be outsourced to a qualified service provider. This supplements existing staff either for the long-term or until growth and revenue justify an increase in permanent staff. You may find that specialized tasks, such as routine database administration, can be outsourced as opposed to hiring new permanent staff to save costs and free existing staff to function in their daily activities more effectively.

Type 3. Finally, you have the organization with a large IT department with a complete staff of qualified technical professionals. One of the most beneficial goals to achieve for a large organization is to consolidate IT operations as much as possible. Consolidation usually involves centralizing hardware and software management at a primary location, with a backup location for disaster recovery. In a consolidated environment, technical support staff can either work out of a common location, or be spread throughout corporate offices. The key is communication and management of workload. As you refer back to Figure 3.1, you might realize that you too have an organization with multiple locations. Be sure to identify workload, expected information system availability, and cost-effective and performance-based staffing requirements for your IT department. Implementing a consolidated or remote support solution could save your organizations thousands or millions of dollars. Do the math and assess the risks.

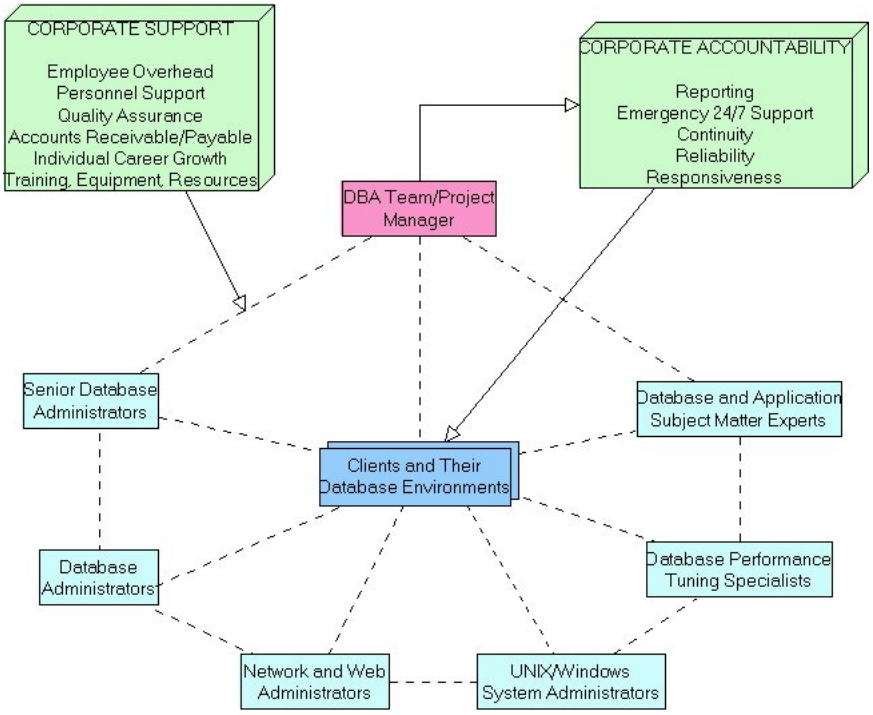
5. Advantages of Remote DBA Support

Remote DBA is most advantageous when consolidating information technology resources and full-time DBA support is not necessarily required by a company. There are two major advantages of remote DBA support. They are:

- Cost savings. Money is saved by not having to staff a full-time DBA for part-time DBA work. Money that would normally be spent to staff the full-time DBA can be invested towards additional resources, or simply be absorbed back into the company, showing a greater net profit. For example, 50 hours per month (as apposed to 160) may be spent providing proactive database monitoring and routine DBA support. A company only pays for hours in excess of 50 per month as needed. This allows the recurring cost of DBA support to be kept to a minimum while maintaining the availability of additional DBA support as needed. So basically, an organization is able to pay only for what it needs. Investment is based on specific business requirements, not salary requirements of a qualified DBA that will likely be hammered by employment offers from different firms.

- Better quality support. When an organization out-sources remote database support, the remote database support company takes on the burden of recruiting/maintaining DBA staff, funding employee benefits, office space, equipment, employee training and other related costs of having an employee. Furthermore, a remote DBA company should be able to provide a DBA staff with depth and diverse database knowledge. Ideally, the company requiring remote DBA support would have access to all of the resources of the company providing remote DBA services, not just a single employee.

Figure 5.1 Benefits of Outsourced Remote Database Support



At first, it may not appear that Figure 5.1 reflects the benefits of remote database support. As you study the figure, the number of advantages just might amaze you.

First, focus on the components surrounding the "Clients and Their Database Environments." Organizations typically have limited database support personnel and resources. And of those limited resources, the quality may vary drastically. Consider that any organization which implements a remote database support solution with a successful service provider will have access to virtually an unlimited number of not only database experts, but system, web, application, and network experts. Ideally, an organization has a primary point of contact for remote database support. If properly implemented, support will go beyond the primary DBA. There will be multiple backup DBAs, subject matter experts on hand, emergency support will be immediate, and your database environment will be handled more efficiently and cost-effectively than ever before.

The obvious benefits of remote database support involve costs and levels of support directly related the support staff. Now consider corporate support and overhead. With permanent employees, the following overhead is implied:

- Hiring costs
- Benefits
- Taxes
- Paid time off (unavailability)
- Equipment
- Training costs
- Turnover costs (after they get trained and experienced)

Remote database support can be used to supplement existing staff, or in place of hiring permanent staff. There is a growing need for qualified database administrators and a low supply. This means that database administrators, once trained, will leave employment for more money in many cases. Therefore, the challenges to most organizations are:

- Finding qualified database administrators
- Keeping them challenged
- Keeping them

A good remote database service provider can attract and retain excellent DBAs. Service providers can pay a premium for DBA talent because a good DBA can support multiple clients, whereas a permanent employee DBA can only support one client, his employer. In return, remote database service providers can offer competitive rates to clients, providing expert database support at a fraction of the cost of a client hiring a full-time DBA. The client only purchases the level of support required. Think of an accounting firm. How many organizations can afford to hire a full-time accountant? Of those that can, how many do you think are able to retain their accountants in the long run?

The mindset of keeping database talent in-house most often results in more money spent, lack of continuity, and a lower level of support.

6. Disadvantages of Remote DBA Support

There are not that many disadvantages to remote database support as long as the solution is carefully researched and applied to an organization. However, remote DBA support may not be for every organization. For organizations requiring full-time DBA support, particularly if multiple DBAs are required, it may be more cost-effective to hire employees as opposed to outsourcing its database support. Even in this scenario, it often makes sense to supplement your current staff with outsourced database experts. An obvious disadvantage of using a remote DBA solution is that the DBA will not be seen on a daily basis. However, a reputable remote DBA company should ensure that its DBAs are easily accessible to clients, and that backup DBAs are provided. Teleconferences and on-site visits can be scheduled as required by the client company to bridge any potential communication gaps.

7. The Importance of Security in Remote DBA Support

Security is of utmost importance when considering a remote DBA support solution. If a remote DBA company cannot guarantee secure connectivity and data protection, outsourcing remote DBA support should not be considered. If your organization has security vulnerabilities, a remote DBA solution should not be considered, under any circumstances, until vulnerabilities are identified and resolved. Important security considerations include:

- Secure connectivity. Mechanisms such as virtual private networks (VPN), high speed internet connections, SSL, PKI, and firewalls should be considered.

- Authentication. Users must be authenticated. User accounts should be tightly managed and passwords should be cryptic and changed regularly.

- Background checks and clearances. Some organizations have sensitive data. When appropriate, background checks, background investigations, and security clearances should be considered.

8. Defining Requirements for Remote DBA Support

When defining requirements for DBA support, a number of considerations exist. The ultimate question that needs to be answered is “how many DBAs, or DBA man hours, will be required?” The number of DBAs or DBA man hours depends on factors such as like core hours of operation, required availability, requirement of 24/7 support, existing performance issues, forecasted database growth, and special needs such as backup and recovery planning, software installations, software upgrades, database application projects, and data migrations. DBAs should be available during core hours of operation without question. If 24/7 support is required, what is the contingency plan if the primary DBA is unavailable? What is the actual workload for DBA support?

Perhaps a full-time DBA is required, or only a few man hours per month are required for proactive monitoring and routine maintenance with the option to access DBAs for special projects and emergencies. If DBA support is planned carefully, your organization's monthly recurring cost can be minimized, while maximizing the level of support you are receiving from a person or DBA support company.

Table 8.1 Remote Database Support Options

*E	Support Option	Advantages	Drawbacks
0	No DBA support	No cost.	No database support, database ignored, data not protected, serious risk of data loss, cost of data loss could be devastating.
1	Call-in DBA support for problems	Pay on demand, no contract.	Pay higher rates than routine support, customers with contracts take precedence.
2	On-site full-time DBA support, company employee	DBA on-site and easily accessible face to face, warm and fuzzy, database receiving constant attention.	High employee maintenance costs, fear of turnover and lack of support, lack of backup support, single employee has knowledge limitations, may be paying for more DBA support than necessary.
3	On-site full-time DBA support, outsourced company	Contractor responsible for continuity, reliability, turnover, employee costs, database receiving constant attention, not as worried about turnover based on depth of contractor.	Possible lack of backup support depending on depth of contractor, single employee has knowledge limitations depending on contractor depth, may be paying for more DBA support than necessary.
3	Remote DBA support, proactive and routine	Company pays contractor only for level and amount of DBA support needed, contractor responsible for continuity, reliability, turnover, employee costs, database receiving constant attention, not as worried about turnover based on depth of contractor, DBA can be available on-site if needed, overall investment of DBA support is significantly lower.	Some companies prefer to "see" their DBA all the time.

*E – Effectiveness is rated on a scale of 0-3, with 3 being the most effective. Effectiveness takes into consideration overall cost, turnover, hidden expenses to the company, continuity of service, employee training, and general costs associated with hiring, firing, and transition. Effectiveness is also rated according to the quality of service provided to the company for the investment.

Factors to consider when identifying the amount of DBA support required include:

- Size of database
- Complexity of database
- Number of databases
- Type of database
- Neighboring databases and applications
- Concurrent user activity
- Criticality of database
- Expected availability
- Required emergency response time

9. What to Look For When Outsourcing Remote DBA Support

Quite simply, you need a reliable and experienced company that can perform when outsourcing remote database support. Preferably, it should be a company you know or one that has a good reputation. For companies that you do not know, it can be difficult to determine their trustworthiness, but your lack of knowledge can be offset by a company's past performance, client referrals, credentials, qualifications of staff, years in business, and company financial standing (Dun and Bradstreet – www.dnb.com, company financials).

When outsourcing remote DBA support, important factors to strongly consider include:

- Fast and reliable connectivity such as T1, DSL
- Security methods in place such as VPN, PKI, firewalls
- Financial standing, not in debt, able to attract/retain qualified staff
- Depth of staff, backup DBAs available, number of DBAs
- Diverse database knowledge (versions, systems, tuning, subject matter experts on staff)
- Sharp communication skills between other technicians and clients
- Credentials of company and staff DBAs
- Qualifications, education, and experience of staff DBAs
- Past performance of company providing remote DBA support
- Client references upon request
- Ability to guarantee continuity of service
- Ability to guarantee reliability of service
- Technical writing ability for reports and documentation
- 24/7 availability, backup contact plan, responsiveness
- Strong project management and quality assurance plans
- Cost

10. Disaster Recovery Planning

All database support efforts may be rendered meaningless if solid backup and recovery/disaster recovery plans (BR/DRP) do not exist. BR/DRP plans must be well planned, tested, and implemented – then periodically tested. All too often, companies ignore the need for a BR/DRP, then when a database failure or disaster occurs, chaos reigns.

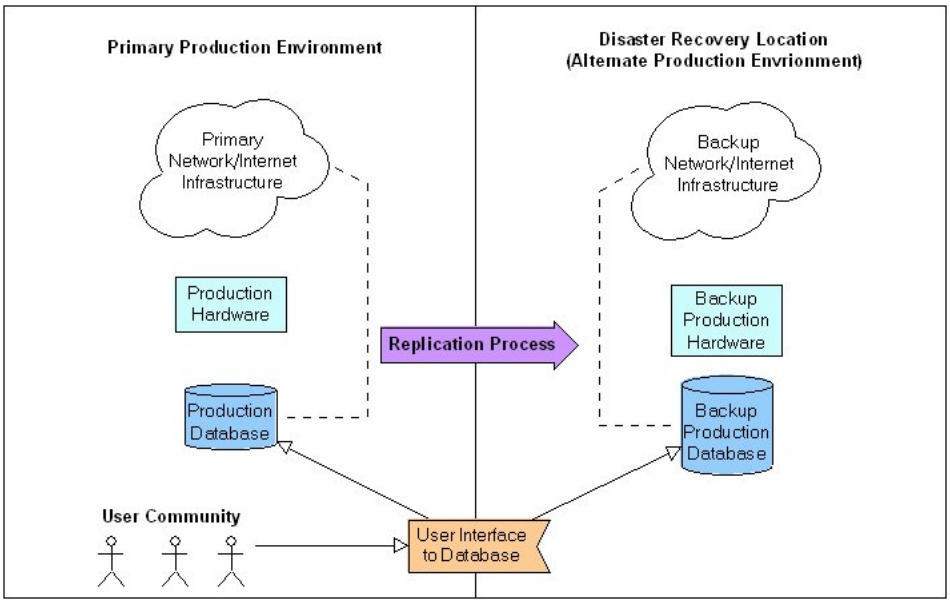
Early in the planning of any database support effort, an initial assessment of a database environment should be conducted. At a minimum, the initial assessment should include:

- General health check of the database
- Basic performance analysis
- Analysis of current backup and recovery procedures
- Analysis of current disaster recovery plan
- Recommendations for proactive monitoring
- Recommendations for automating routine monitoring tasks

After initial assessment, the priority of tasks should be handled in the following general order:

- Stabilize the database environment if problems exist that affect production
- Ensure that a basic backup and recovery plan is in place to enable recoverability of data
- Establish procedures and scripts for routine proactive monitoring
- Fine tune and *test* backup and recovery/disaster recovery plans
- Handle other immediate needs or special projects
- Conduct performance monitoring and begin recommendations for tuning

Figure 10.1 Disaster Recovery Plan Architecture



11. Cost Analysis of Remote Database Administration Support

Average DBA salaries in the selected major cities below include taxes, benefits, insurance, and HR overhead. Data was researched using www.monster.com.

Table 11.1 Average Costs for Database Administrators in Various Cities

City	Average Total DBA Salary with Benefits (Bonus, FICA Taxes, 401K, Disability, Healthcare, Pension, Time Off)
Birmingham, AL	$107,505
Indianapolis, IN	$111,408
Washington, D.C.	$117,841
Richmond, VA	$110,776
New York, NY	$128,280
Chicago, IL	$120,250
Atlanta, GA	$111,408
Cincinnati, OH	$111,725
Dayton, OH	$112,885
Columbus, OH	$111,725
Houston, TX	$115,206
Dallas, TX	$113,835
Phoenix, AZ	$110,459
San Francisco, CA	$129,204
Orlando, FL	$107,611
Los Angeles, CA	$124,165
St. Louis, MO	$113,835
Kansas City, KS	$111,936
Denver, CO	$116,156
Seattle, WA	$117,632
Salt Lake City, UT	$108,666
Boston, MA	$121,655
Pensacola, FL	$102,020
Detroit, MI	$122,659
Average Cost to Organizations of All Cities Listed	**$114,952 per Year $9,579 per Month**

Table 11.1 reflects what organizations are spending for full-time database administration support, when in many cases, full-time database support may not be required. The figures in Table 11.1 do not include training costs, recruiting costs, bonuses and other incentive pay, office space, equipment, and other administrative overhead that corresponds to managing full-time employees.

Tables 11.2 and 11.3 use the data from Table 11.1 to estimate costs for full-time database support versus remote database support based on various levels of support. Table 11.2 deals with regular business hour support and Table 11.3 deals with 24/7 emergency on-call support.

Table 11.2 Savings Provided by Remote Database Support – Business Hours

SAVINGS BASED ON NUMBER OF HOURS OF SUPPORT (BUSINESS HOURS)						
Actual Support Required per Day	**Time per Month**	**FT DBA Cost per Month ***	**Premium RDBA Rates**	**RDBA Cost per Month**	**Monthly RDBA Savings**	**Yearly RDBA Savings vs. (1) FT DBA**
30 minutes	10 hours	$9,579	$90/hour	$900	$8,679	$104,148
1 hour	20 hours	$9,579	$90/hour	$1,800	$7,779	$93,348
1.5 hours	30 hours	$9,579	$85/hour	$2,550	$7,029	$84,348
2 hours	40 hours	$9,579	$85/hour	$3,400	$6,179	$74,148
3 hours	60 hours	$9,579	$85/hour	$5,100	$4,479	$53,748
4 hours	80 hours	$9,579	$75/hour	$6,000	$3,579	$42,948
5 hours	100 hours	$9,579	$75/hour	$7,500	$2,079	$24,948
6 hours	120 hours	$9,579	$70/hour	$8,400	$1,179	$14,148
7 hours	140 hours	$9,579	$65/hour	$9,100	$479	$5,748
8 hours	160 hours	$9,579	$65/hour	$10,400	($821)	($9,852)

* FTE DBA Cost per Month is estimated based all expenses related to one (1) full-time DBA employee. Expenses include based salary, bonuses, benefits, insurance, and taxes. These figures do not include other direct costs such as office space, equipment, training, and HR overhead.

It is interesting to note that many organizations do not require full-time database support. It is equally surprising that many organizations do not require more than 4 hours per day of actual database support, but they are paying for full-time support. According to Table 11.2, an organization can pay a premium rate for remote database support and save around $42,948 per year while being guaranteed reliable support and not having to worry about hidden costs associated with employing a full-time DBA.

Some organizations that employ a full-time DBA that has a part-time need for database support give the DBA additional tasks. For example, the DBA might also support hardware, systems, and network. What this does is dilute the DBA's knowledge of database management and ability to be a top performer. Consequently, the organization often ends up paying the software vendor or external consultant to support its full-time staff.

With remote database support, you pay a premium rate for expert database professionals who can usually perform at least twice as good as employees who may be very intelligent, but are spread too thin with other tasks and cannot specialize in and come to a deeper understanding of their organization's database environment.

A well-planned and balanced remote database support solution is irrefutably cheaper in the long run and more effective for most organizations.

With outsourced database support, hidden costs such as recruiting, administrative overhead, employee training, and turnover costs do not exist.

Table 11.3 Savings Provided by Remote Database Support – 24/7 Emergency On-call

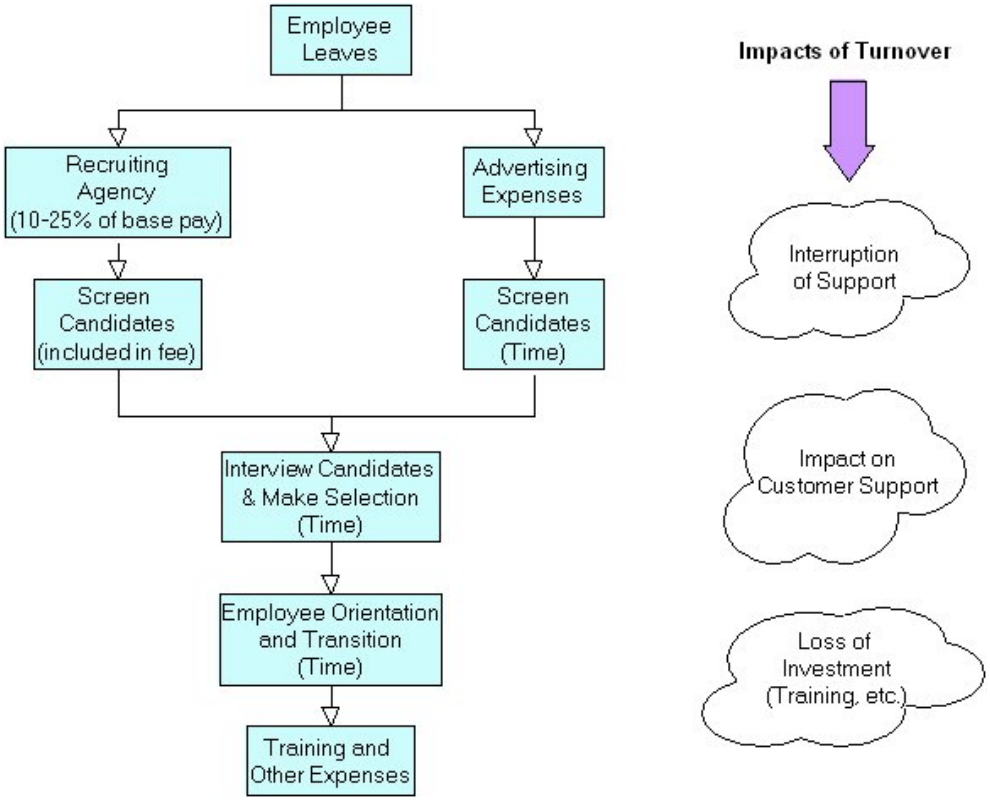
PROACTIVE MONITORING WITH EMERGENCY SUPPORT						
Actual Support Required per Day	**Time per Month**	**FT DBA Coverage per Month (Est. 2) ***	**Premium RDBA Rates**	**Cost per Month**	**Monthly RDBA Savings**	**Yearly RDBA Savings vs. (2) FT DBA**
30 minutes	10 hours	$19,158	$200/hour	$2,000	$17,158	$205,896
1 hour	20 hours	$19,158	$200/hour	$4,000	$15,158	$181,896
1.5 hours	30 hours	$19,158	$180/hour	$5,400	$13,758	$165,096
2 hours	40 hours	$19,158	$180/hour	$7,200	$11,958	$143,496
3 hours	60 hours	$19,158	$150/hour	$9,000	$10,158	$121,896
4 hours	80 hours	$19,158	$150/hour	$12,000	$7,158	$85,896
5 hours	100 hours	$19,158	$130/hour	$13,000	$6,158	$73,896
6 hours	120 hours	$19,158	$130/hour	$15,600	$3,558	$42,696
7 hours	140 hours	$19,158	$120/hour	$16,800	$2,358	$28,296
8 hours	160 hours	$19,158	$120/hour	$19,200	($42)	($504)

* FTE DBA Cost per Month is estimated based all expenses related to two (2) full-time DBA employees. It normally takes at least two (2) DBAs to provide 24/7 emergency on-call support in addition to normal proactive database maintenance. Expenses include based salary, bonuses, benefits, insurance, and taxes. These figures do not include other direct costs such as office space, equipment, training, and HR overhead. For 24/7 emergency on-call DBA support, expected response time usually ranges from 30 minutes to 2 hours upon notification by client.

With remote database support and a 24/7 emergency on-call option, much of what an organization is paying for is availability. You are not looking at only database availability, but personnel availability to support the database under any circumstance during any time of the day, to include holidays and weekends. One of the biggest issues with a database that requires 24/7 support is database availability (which is exactly why 24/7 support is required). 24/7 support usually means the database must be available and performing well 24 hours per day, 7 days per week. This means that database downtime is both a luxury and necessity to database administrators. All database maintenance must be carefully planned and scheduled around times of peak database activity. Ideally, maintenance should occur when no users are trying to access the database. Sometimes this is impossible, so the next step is to identify the times of lowest user traffic. This usually ends up being after midnight, especially on weekends.

Then you have unplanned database situations that occur. Let's call these situations emergencies, because they are. The database is unavailable or performing slowly. Maybe there is a security threat. Maybe there is a database failure and immediate recovery is necessary. Database administrators must be available at a moments notice for critical production databases, and it is difficult for any organization to offer this solution with any less than two full-time DBAs. With a remote database support solution, organizations can either augment their existing database support staff to guarantee DBA availability, or completely outsource the support to an organization that has an extensive staff of expert database professionals who can respond to and handle any database emergency at a moment's notice. Plus, the organizations investment is a balance between paying for availability while paying only for the level or amount of database support needed.

Figure 11.1 Replacing a Database Administrator



As with any employee, there are attrition costs to consider with database support. Since the demand for good database talent is high and the supply is relatively low, organizations must compensate database professionals well. Typically, a good DBA can take a job with another organization and easily get a significant pay increase. So you either have to pay your people excellent up front (only to still get outbid), or be prepared for turnover costs. It is difficult to keep a good DBA employed, but companies that specialize in database support can attract them and know what they need to pay their DBAs to minimize attrition, thereby providing their customers with continuity and better overall support.

12. Off-shore Support

Some service providers employ an off-shore support solution. What this means is that you are outsourcing your database support to a company who in turn is outsourcing to or hiring employees in another country to support you database environment. A common off-shore location is India. The recognizable benefit is that is costs less to train and pay database support staff in some countries than it may in your home country. The immediate impact is that your organization might appear to experience huge savings for database support. However, there are several other factors to consider that reside below the surface to ensure the best decision is made.

Considerations	Comments
Trust	Most organizations do not tend to trust any person on the outside with the keys to their databases – let alone a group of individuals in another country whom they will probably never meet. When you have administration access to a database, you can see anything and do anything. The DBA has full control of the database environment.
Security	Most Federal government organizations require database administrators to be citizens and have a thorough background investigation or security clearance. Granted this is government data, but there is a reason.
Language barriers	Many off-shore technical staff may speak your language, but how effectively can they communicate? Is there a good understanding? Are you talking on the same level? Is the intended message of each communication being preserved? Organizations in the same country that speak the same native language often have communication problems. Misunderstood directions could lead to database downtime or even permanent data loss.
Responsiveness	How quickly will off-shore staff be able to respond to queries, reporting needs, and emergency situations? Sometimes there is no dollar amount that can be placed on availability.
Time Zones	Be sure to consider different time zones, when your staff will be working versus the times the off-shore staff will be working. This may also affect responsiveness and availability.
Understanding of Business	How important is it for your technical staff to understand your business processes? Usually, it is important for your technical staff to understand the big picture in order to provide better support. For example, what direct or indirect impacts might a seemingly simple database change have on daily business operations?
On-site visits	Sometime, on-site visits are important. How often do you foresee the need for face-to-face time? How quickly will off-shore staff be able to react? Will off-shore staff be capable of coming on-site if necessary? What would be the additional costs?
Economic impact	Off-shore support may provide initial lower costs, but that means loss of local jobs, which means less money being reinvested back into the local economy, which implies a long-term adverse impact on many local organizations.

13. Summary

Effective database support and data management are real needs of any organization today. There is no question about the importance of data in the enterprise. Awareness of protecting data is becoming widespread, and there is a smorgasbord of solutions for managing information systems. The question most organizations need to raise is "How much should we pay for database support?"

- A small percentage of organizations need a full-time accountant
- A small percentage of organizations need a full-time attorney
- Most organizations outsource payroll processing
- Many organizations outsource HR management

All of these organizations are paying for the level of support required to make them successful. Information system management is no different. The problem is that so many organizations, CIOs, and IT managers are unaware of the actual requirements in which to employ to provide effective database management.

Organizations face many challenges and upon realization of the criticality of their data, are willing to pay a premium for database support. The alternative could result in database unavailability, poor performance, data loss, lack of customer support, loss of customers, and ultimately the inability for the organization to continue to operate.

A major challenge organizations face is finding, employing, training, and keeping expert database talent. Some organizations are able to attract and retain good talent for a number of reasons, but most experience significant turnover or the inability to afford good talent due to budgetary constraints.

Remote database administration and support is an excellent solution for any organization, whether existing database staff is augmented, or the entire IT department is outsourced. Remote database support offers the following major benefits:

- Access to database experts
- Access to a deep pool of database experts
- Continuity of service
- Investment matches actual need for database support
- High availability of database support staff
- Lower costs due to employee overhead
- Existing staff can be supplemented for expert knowledge (i.e. tuning experts)
- IT operations can be consolidated, lowering overall costs
- Database can be continually monitored cost-effectively
- Immediate 24/7 emergency on-call support is more affordable

14. About the Author and Perpetual Technologies, Inc.

Ryan Stephens is the President and CEO of Perpetual Technologies, Inc., and has been in the database field for over 15 years. Ryan has served in several database-related roles including project manager, database administrator, programmer/analyst, and technical instructor. Ryan was the lead author on the following books: Database Design, Teach Yourself Beginning Databases in 24 Hours, Teach Yourself SQL in 24 Hours, Teach Yourself SQL in 21 Days, and SQL Functions Programmer's Reference. Ryan was also a contributing author for Oracle Unleashed 2nd Edition, Oracle Development Unleashed, and Oracle8 Server Unleashed. Questions and comments can be sent to the author at ryan@perptech.com.

Perpetual Technologies, Inc. (PTI – www.perptech.com) is an information technology service provider, specializing in on-site and remote database administration, database development, and custom application development. PTI has been serving government and commercial organizations since 1997, and was recognized as Indianapolis' 5th fastest growing privately held company in 2004 and the fastest growing technology company in 2004.

The core strength of PTI is providing professional and experienced on-site and remote database administration with a strong emphasis on customer service and employee loyalty. PTI was founded by two Oracle DBAs, having experience supporting mission-critical databases for large commercial and government organizations. Currently, PTI has about thirty full-time DBAs on staff. Our DBA team includes experts in Oracle, DB2, Sybase, SQL Server, and open-source databases such as MySQL. Specialized expertise of our DBA team includes subject matters experts in performance tuning, backup and recovery, applications, data warehousing, and business intelligence. PTI also employs systems, networking, web, and application development experts. Many members of our technical team are published authors, having authored the following technical articles and books in addition to the ones mentioned in the author's biography: Oracle Application Server 10g, Oracle DBA on Unix and Linux, Oracle 10g Database, and UNIX Primer Plus. Our staff members have also given technical presentations at trade shows and have taught numerous database classes for Indiana University, Vincennes University, and Ivy Tech State College. PTI provides on-site and remote database administration support for various Government and commercial clients. One of our premiere clients is the Defense Finance and Accounting Service (DFAS – www.dfas.mil), the largest financial institution in the world and one of the largest Oracle database implementations in the world. PTI has successfully supported DFAS since 1997 and contributed to DFAS' missions by delivering reliable, timely, and cost-effective service. PTI employs several subject matter experts formerly employed by Oracle Corporation, Oracle Certified Professionals, published authors, college-approved instructors, and experts with database, system, network, web, and application development technologies. PTI's staff members hold various levels of Department of Defense approved background investigations and security clearances up to Top Secret.