

# Skill Requirements for Database Administrators

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**요약** 데이터베이스관리자 (Data Base Administrator)는 데이터베이스시스템을 설계하고 유지보수 하는데 있어서 중요한 역할을 수행한다. DBA는 정보기술 분야에서 그 수요가 매우 높은 직업이고 정보시스템을 개발하고 유지보수 하는데 있어서 중요하다. 하지만, DBA에 대한 연구는 많이 없었다. Fortune 500대 기업의 웹사이트에 올라온 구인광고를 수집하고 분석함으로써 본 연구는 오늘날의 DBA에게 요구되는 스킬들을 조사하였다.

**핵심주제어** : 데이터베이스관리자, 스킬, Fortune 500, 구인광고

**Abstract** Database Administrators (DBA) play a role in designing and maintaining database systems. It is one of the Information Technology (IT) jobs in high demand and is important in developing and maintaining Information Systems (IS). Little research has been conducted on the skill requirements for a DBA. By collecting and analyzing job ads posted on the websites of Fortune 500 companies, we investigated the skill requirements needed for today's DBA.

**Key Words** : Database Administrator, Skill, Fortune 500, Job Ads

## 1. Introduction

Identifying skill requirements for IT professionals has been a main theme in IS research. Most studies in this area have been conducted by investigating IT jobs such as programmer, programmer/analyst, systems analyst, and IT manager, but little research has been conducted on the job DBA even though the DBA played a very important, necessary role in IS development and management.

Many researchers and practitioners have investigated the skill requirements for IT professionals. Such jobs as programmer/analyst [22], systems/analyst [1], and IT managers [10, 15] were primary concerns for researchers. Although these efforts have proven beneficial,

the rapidly-changing nature of IT trends, coupled with the Internet's role in changing the nature of IT jobs, requires periodical review of necessary IT skills in order to identify those that are the most up-to-date.

Today's organizations cannot help relying on their databases in order to create, control, and manage large amounts of data. Database is one of the most important knowledge areas [14]. As a person responsible for managing an organization's Database Management Systems (DBMS) in an organization, the DBA has played the role of designing and maintaining database systems. A survey of IS faculties revealed that DBA was identified as the second predominant job type following systems analyst [13]. Furthermore, just like other IT jobs, such as systems analyst or programmer, DBA is one of the IT jobs reportedly in short supply [4,

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24]. However, little research on the skill requirements for DBA has been conducted. By collecting and analyzing job ads from Fortune 500 companies, we investigate the skills needed for today's DBA.

## 2. Research Question

Two questions posed by this research were (1) skills required for today's DBA and (2) the impact of the Internet on DBAs.

### (1) What skills are required for today's DBA?

IT skill researchers have consistently attempted to answer this question by comparing the importance of behavioral skills with that of technical skills. For instance, a number of studies have dealt with systems analysts by identifying the relative importance of behavioral skills as compared to technical skills [e. g., 6, 7, 22]. Most empirical studies on systems analysts revealed that behavioral skills were more important than technical skills [2, 25, 18]. However, technical skills are also important to systems analysts. For example, Green [8] addresses that "systems analysts value behavioral skills, such as diplomacy, politics, and sales more importantly, while users attribute greater importance to technical skills, such as programming" (p. 127). Further, a recent study conducted by Wade and Parent [23] reveals that webmasters are required to possess technical skills over behavioral skills.

DBA is responsible for the planning, implementation, configuration, and administration of corporate databases. By simply looking at the job title, DBA is a person who plays a very technical role in developing and managing IS, but it is still questionable whether DBAs have to possess behavioral skills. Further, the

results from a survey of 148 faculty members tell us that individual and team/interpersonal skills are the most important requirements for database analyst [13]. This study also attempts to compare the relative importance of behavioral skills to technical skills.

### (2) What are the new skill sets the Internet has brought to DBA?

Both practitioners [e. g., 12, 17] and academic researchers [e. g., 5, 9, 14] have consistently asserted that the knowledge and skill requirements for IT professionals are changing rapidly. Two forces are driving IT professionals to update their knowledge and skills. One is the changing business environment such as the strategic use of IT, strategic alliance, and business process reengineering [14]. The other driving force is the new technological paradigm such as relational databases in the mid-1980s, object-oriented techniques in the early 1990s, and the Internet in the late 1990s.

Keen [11] notes that new technologies and their use are forcing IT professionals to meet new expectations about their roles within organizations. The Department of Labor [3] points out that companies with open IT positions are looking for workers capable of implementing "hot" new technologies. New technology such as the Internet has created new IT job titles like webmaster. An interesting question is how major IT trends such as e-commerce influence today's career orientations [21]. From this perspective, we pose another research question, "Did the Internet and computer network make an impact on skill requirements for today's DBA?"

## 3. Data

Data were the job ads on Fortune 500 corporate websites. A few authors have attempted to use job ads for IT skill research [e. g., 16, 22]. Job ads reflect reality better than, at least as much as, other sources such as surveys and interviews because job ads come directly from employers willing to identify qualified candidates who meet the job description.

As websites are now used to post job ads, every website of a Fortune 500 company was visited to collect job ads for DBAs. It was not only because Fortune 500 companies make huge investment into IT, but also because they lead the demand and supply of labor. For the purpose of equally weighted data points, only one job ad from each company was downloaded for the content analysis of DBA job requirements. We found fifty-three companies that posted job ads for DBAs. Because three job ads did not contain enough content to be analyzed, the job ads that contained fewer than ten phrases were discarded. In turn, fifty DBA job ads from fifty different companies were used for our analysis.

#### 4. Findings

Most previous studies on IT skills use skill categories that were predefined for their

research. This study adopted the category developed by Todd, et al. [22]. As shown in Table 1, the number of phrases related to software is much higher than the number of phrases about social or management skills. To provide more meaningful information to IT professionals and students interested in DBA jobs, the analysis level from the skill categories was lowered to specific skill requirements as suggested by Todd et al. [22].

To provide more meaningful information to IT professionals and students interested in DBA jobs, the analysis level from the skill categories was lowered to specific skill requirements as suggested by Todd et al. [22]. By lowering the level of analysis, this study attempted to find the specific requirements for each category. Table 2 shows the various requirements for technical skills that ranged from DB and DBMS to operating systems and computer networks.

Through the analysis of DBA skill requirements as shown in Tables 1 and 2, the two research questions posed earlier in this paper could be answered. First, the results reveal that DBAs are technically-oriented even though DBAs are also required to possess behavioral skills such as communication and teamwork. However, the specific technical requirements are very complex and multi-dimensional while the behavioral skills are relatively simple. Second, the impact of the

<Table 1> Number of Phrases in Job Ads for DBA

Skill Category	Average Number of Phrases per Ad	Total Number of Phrases
Hardware	0.82	41
Software	16.50	825
Functional	1.58	79
Management	2.12	106
Social	3.52	176
Problem Solving	1.80	90
Development Methodology	2.78	139

<Table 2> Specific Skill Requirements for DBA

Skill Set	Skill Requirements	Number of Ads
Database Related Skills	DB design & Implementation (Data Modeling; Normalization; Relational Database)	41
	Data warehouse (Data mining; Data Mart)	11
	Structured Query Language	26
DBMS Related Skills	DB2	10
	DBMS Management (install/patch/backup/recovery/archive/migration/purge/ troubleshooting/maintenance/tuning/upgrade)	45
	DB security (user access control)	19
	Oracle	29
	MS-SQL Server	4
	Microsoft-Access	4
	Sybase	6
Applications/ Programming Skills	Application Development Support	13
	CASE Tools (e.g., ERWin)	9
	Microsoft-Office (Excel; Word; Powerpoint)	5
	Programming	16
	Scripts (e.g., Perl, Korn, Shell)	13
Network / Operating Systems	Network Experience/Knowledge	20
	- Architecture (Mainframe Computing; Distributed Computing; Client/Server; LAN)	15
	- Internet (Web-based Operation; Domain Name Service)	10
	OS Experience/Knowledge	29
	- Unix	16
	- NT	7
Business Function Related Skills	Customer Relationship Management	7
	Understanding User Requirements & Business Functions/Processes	33
	Industry Specific Experience / Knowledge	13
	Project management (Scheduling, Prioritizing, Budgeting, Supervising)	24
General Behavioral Skills	Adaptive to change (Enthusiastic, Flexible, Self-Motivated, Willingness to learn)	14
	Interpersonal Skill	38
	- User training	9
	- Leadership (Mentoring, Delegation, Judgment)	14
	- Teamwork	22
	- Oral Communication (Verbal, Presentation)	30
	- Written Communication (Manual; Documentation)	15
Problem solving (Analytical skill, Well-Organized, Creative)	18	
Other Technical Skills	PC H/W & S/W Installation and maintenance	9
	Development Methodology (SDLC)	4
	Systems integration	9
	QA(Quality Assurance)	8
	Keep up with IT trend	16

Internet on skill required for today's DBA was not very obvious since only ten companies mentioned the skills related to computer networking. It should be noted, however, that network experience was required by a number of companies (40%).

In addition to these two proposed research questions, more interesting outcomes can be drawn from the results. First, the DBMS market is dominated by Oracle almost 60% job ads (29 out of 50) require their new DBA to possess Oracle experience. In fact, Morrison and Morrison [19, 20] emphasize that students need to be taught by using client/server based DBMS like Oracle. Second, it is obvious that DBAs need to know about operating systems, such as Linux, Unix, and Windows-NT. This result can be explained by the fact that DBMS runs on multi-user operating systems. Third, another surprising result was that project management skills were mentioned by almost half the companies in the sample. Fourth, many companies (16 out of 50) wanted their DBAs to remain current with IT trends. This result indicates that the job nature of a DBA is very flexible and changing.

## 5. Conclusions

Through the analysis of DBA job ads posted on 50 corporate websites, we concluded that technical skills are more multi-dimensional and complex than behavioral skills. This study is expected to provide more meaningful information to those who want to prepare themselves for a DBA job.

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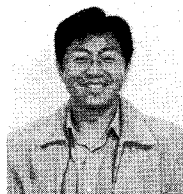
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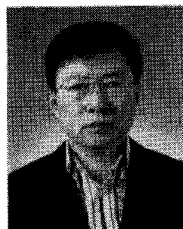
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