Database Administration

Dr. Peter Wolcott

When Databases Don't Work

'Database failure ate my data [...]
customer

We're working on it, says cloudy service [...]

By Gavin [...]

Salesforce outage persists a [...]

Irritated customers of the Sa[...]
show their displeasure.

RELAT[...]

SPILLED COFFEE? M[...]
100,000 U.S. AIR FOR[...]

Emory Healthcare D[...]
Breach: What Happe[...]

Misconfigured MongoDB and Similar Databas[...]

Marianne Kolbasuk McGee (HealthInfoSec) · February 28[...]

- Loss of data
- Time & Effort to restore
- Application failure
- Service delays
- Inability to interact with customers
- Loss of revenue
- Lawsuits, fines
- Loss of trust / reputation
- Theft of corporate information
- Business failure

Objectives of this Course

- Understand how contemporary database management systems work
- Understand how to perform a variety of database administration tasks
  - Principles
  - Procedures
  - Mechanics
- Learn practical Oracle skills

This Course Will Be Helpful to You if

- you want to become a database administrator
- you want to develop applications
- you plan to become involved in evaluating and architecting computing infrastructure
- you plan to manage IT operations
- you plan to do data modeling, or data administration

Class Overview

- DBA Responsibilities
- Roles in Database Administration
- Database Administration Tasks
- Database Administration Careers

A Day in the Life of a DBA…

- Planned
  - ☐ Reset user passwords
  - ☐ Migrate data from production to development dbs
  - ☐ Check alert logs
  - ☐ Review performance reports
  - ☐ Review possible projects
  - ☐ Read and learn
  - ☐ Create user accounts
  - ☐ Tune queries
  - ☐ Rebuild index
  - ☐ …

- Unplanned
  - ☐ "I get a chat message that an important web site is down"
  - ☐ "First import failed part way."
  - ☐ "Made myself a nice salami sandwich while waiting for the first query to return."
  - ☐ "Email and chat messages interrupt the two things I'm already doing."
  - ☐ …

Source: http://www.bobbydurrettdba.com/2013/10/01/ a-day-in-the-life-of-an-oracle-dba/ (exerpts)

What Is a DBA's Purpose in Life?

- Primary purpose
  - Make an organization's data available to the end users and decision-makers according to the organization's policies
- Supporting Responsibilities

Security & user management
System monitoring & tuning Storage management Backup & recovery
Capacity planning Software installation & upgrade Database design & implementation

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Security Administration

- Creating & managing the users
  - Roles & privileges
  - Serving users
- Monitoring user activity
  - Preventing & detecting unauthorized activity
- Security policy

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System Management

- Not limited to the database
- Monitoring activity
- Troubleshooting
- Performance monitoring & tuning
- Developing backup & recovery strategies
- Planning for the future
- Loading data

Database Design

- Logical database design
  - May serve advisory role
- Physical database design
- Creating databases
- Creating database objects
- Installing & upgrading software

Types of Database Jobs

- Systems Administrator
- Database Administrator
- Database Operator
- Architectural DBA

- Application DBA
- Database Programmer
- Database User
- Data Administrator

Each company has a different way of distributing the tasks these roles perform among its personnel.

Systems Administrator

- **Responsible for overall**
  - Operation of the system
  - Security of the system
  - Performance of the system
- **Database-relate responsibilities**
  - Installation of the DBMS software
  - Creation of the system catalog
  - Operating system & storage

Here, the "system" is the host operating environment for the DBMS.

Database Administrator

- Responsible for the database itself
    - Creates database objects in support of applications
    - Makes structural changes to the database
    - Manages security of the database
    - Monitors database performance and tunes database
    - Plans for and executes failure recovery policies and procedures
    - Runs system utilities
    - Prepares test environment for application developers
    - Prepares applications for production use
    - Assists with the installation of vendor written applications (e.g. Peoplesoft, SAP, etc.)
    - Researches, implements, and deploys various tools to the database administration and application development staff (productivity, query, data access, etc.)
    - Assists application support teams with query tuning

Database Operator

- **Responsible for many day-to-day tasks**
    - Make backups
    - Import or load data
    - Perform recovery operations
- **May not be authorized to see the data unless specifically given such authorization**

Architectural DBA

- Works closely with applications development people, data modelers, data administrators
  - Determines optimal physical design of database
  - Advises on logical database design

Application DBA

- Provides foundation for applications
  - Writes stored procedures
  - Writes other foundational code for applications
  - Optimizes queries

Database Programmer

- Responsible for the creation of applications that use the database
  - Write applications
  - Write queries
  - Compile, test applications
  - Write stored procedures

Database User

- Uses the database to solve business problems
  - Runs business applications
  - Creates or requests reports
  - May occasionally create own queries

Data Administrator

- Responsible for the data at a logical level
  - Data modeling
  - Manages business rule implementation
  - Works to establish policy regarding data integrity

DBA Education and Training

- DBAs provide training
  - Disseminate vendor information to developers and users as appropriate
  - Train backup DBAs, and other staff
- DBAs receive training
  - Attend classes, workshops, conferences
  - Subscribe to and read technical journals
  - Subscribe to and participate in Internet listservs and usenet groups.
  - Maintain network of connections
  - Oracle Certification Program (OCP)

The DBA Career Path

- The Junior DBA
  - Spend time learning the basics
    - Building and maintaining databases
    - Creation and management of user accounts
    - Daily database management tasks
- Experienced DBA
  - Develop/test backup plans
  - Automation of routine tasks
  - Tune databases
  - Perform developer and user support functions
  - Learn, learn, learn

- Senior DBA
  - Plan, coordinate, migrate databases
  - Advise management
  - Plan & implement site-wide disaster & recovery
  - Manage and train supporting personnel
  - Solve exciting and unusual problems no-one else can!
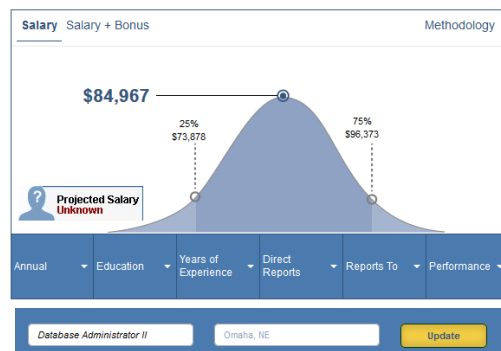 - Learn, learn, learn & plan, plan, plan

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What Are They Paying DBAs?

Database Administrator II Omaha, NE

Salary Salary + Bonus		Methodology
$84,967		
25% $73,878		75% $96,373
Projected Salary Unknown		
Annual	Education	Years of Experience	Direct Reports	Reports To	Performance
Database Administrator II	Omaha, NE	Update

Core Compensation	Median	% of Total
Base Salary	$84,967	70.5%
Bonuses	$2,120	1.8%
Value of Benefits		
Social Security	$6,662	5.5%
401K/403B	$3,135	2.6%
Disability	$784	0.7%
Healthcare	$6,592	5.5%
Pension	$5,486	4.6%
Time Off	$10,718	8.9%
Total Compensation	**$120,465**	**100%**

SOURCE: Salary.com, 2019

Will You Like Being a DBA?

- DBAs work unconventional hours
  - When there's a problem, work around the clock
  - Things could go wrong at any time
  - Lots of work gets done during low load periods (at night and on weekends)
- DBAs are problem solvers and detail oriented
- DBAs love to learn
- DBAs don't mind being 'invisible', but must be able to communicate with all kinds of (stressed) people
- DBAs have a unique, and broad perspective within the organization
- DBAs love tolerate take-out food

Summary

- Database Administration: Ensuring organizations stay alive and flourish by ensuring that users and decision-makers have appropriate access to data
- DBA activities revolve around security management, system management, and database design
- DBAs need many different skills
- The pay is good, the lifestyle is, er, distinctive…