

Database Administration:

The Complete Guide to Practices and Procedures

Chapter 2

Creating the Database Environment



Agenda

- Defining the Organization's DBMS Strategy
- Installing the DBMS
- Upgrading DBMS Versions and Releases
- Database Standards and Procedures
- DBMS Education
- Questions

Defining the DBMS Strategy

- If possible, deliberate on the requirements for DBMS usage at your organization
- Many times, organizations do not put much thought and planning into the DBMS procurement process
- The DBMS decision becomes part of a project
- New project = New DBMS
- This is not really a good strategy

The DBMS Landscape

- Choosing a DBMS
 - vendor, platform, and architecture of DBMS



Mainframe (z/OS)
Windows Server
Unix



AIX
Sun Solaris
HP-UX
Linux
others?



Others (VSE, VMS, MPE, OS/400, etc.)



Desktop OS

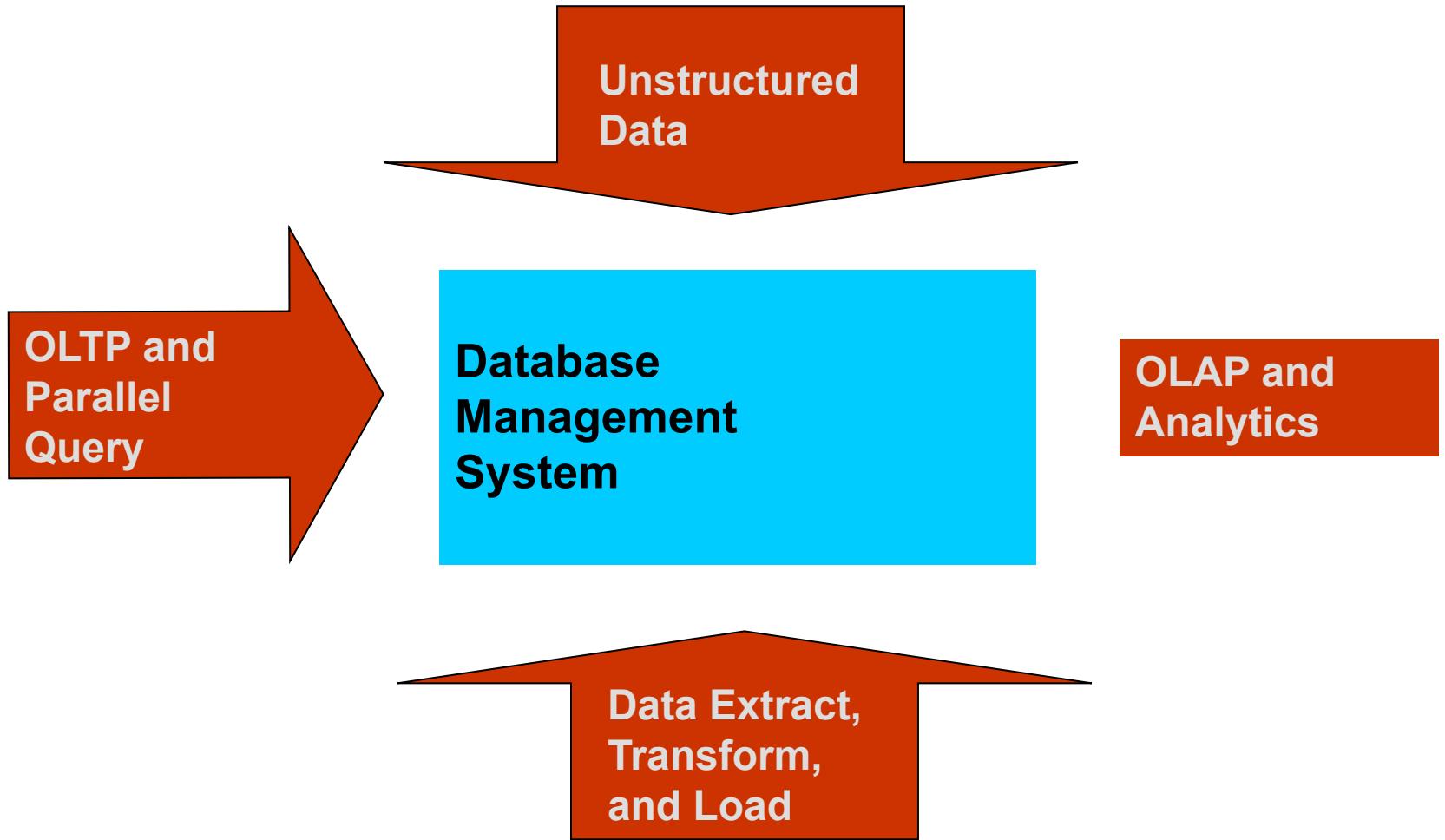
Windows XP/ Vista / 7
Linux
Mac OS



DBMS Decision Factors

- Operating System Support
- Organization Type
- Benchmarks (*TPC, homegrown*)
- Scalability
- Availability of Tools
- Availability of Technicians (*DBAs, Programmers, SAs, etc.*)
- Cost of Ownership
- Release Schedule (*Versions, Releases*)
- Reference Customers

DBMS Features and Complexity



DBMS Architectures

- Enterprise
- Departmental
- Personal
- Mobile
- Cloud



Enterprise DBMS

- Designed for scalability and high performance
- Support for very large databases
- Runs on a high-end machine
 - Mainframe
 - Server (Unix, Linux, Windows Server)
- All the “bells & whistles”
- High cost

Departmental DBMS

- Sometimes referred to as a workgroup DBMS
- Small- to medium-sized
- Runs on Unix, Linux, or Windows
- Delineation between departmental and enterprise can be a fuzzy line
- Lower cost than enterprise DBMS

Personal DBMS

- Single user
- Low to medium power PC
- Examples
 - Microsoft Access
 - Oracle Database Personal Edition
 - DB2 Personal Edition
- Not useful for large applications or shared work
- Low cost

Mobile DBMS

- Runs on a smart phone or pervasive device
- Specialized version of a departmental or enterprise DBMS
- Remote users, not usually connected to the network
- Data can be synchronized

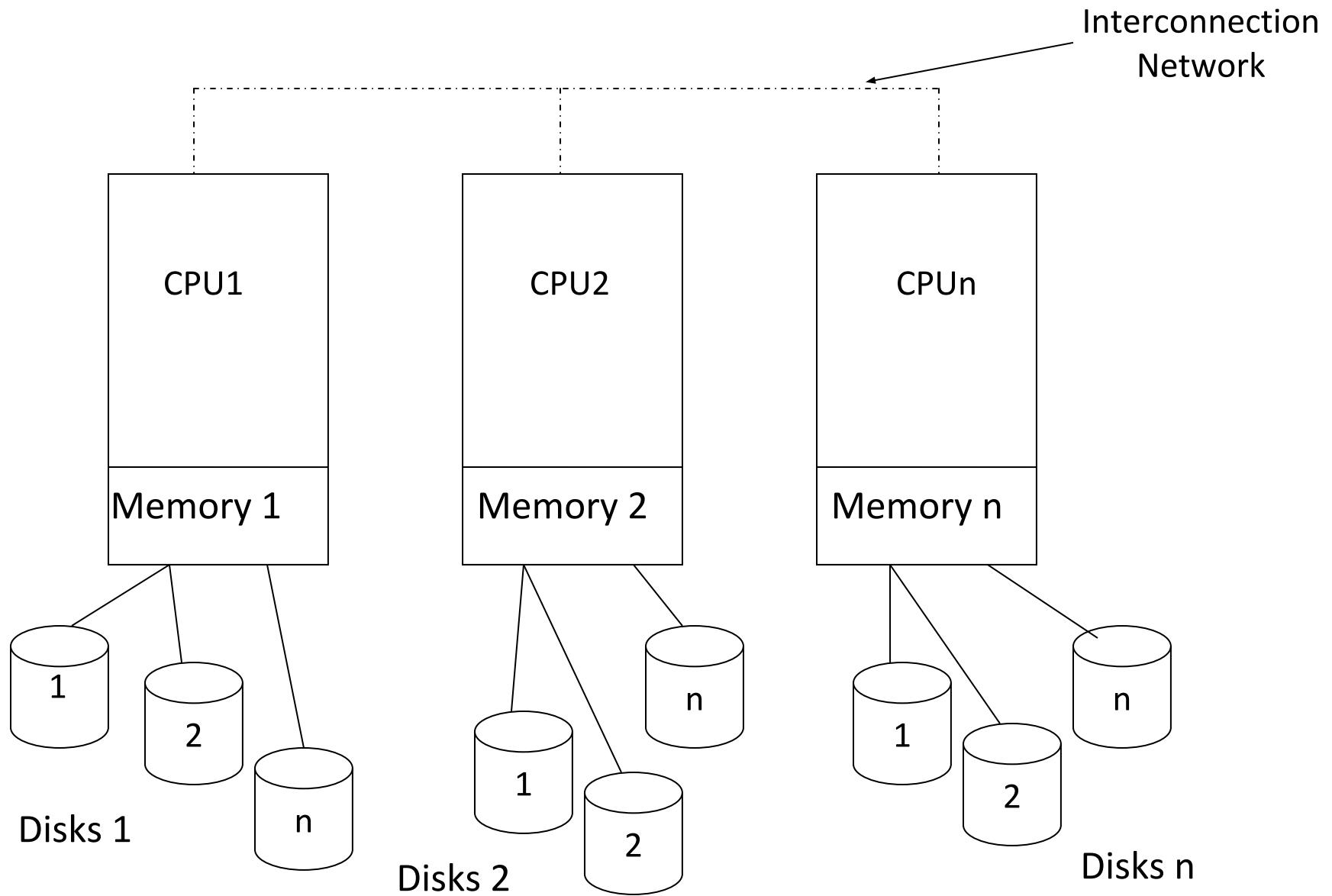
Cloud Database Systems

- A cloud database system delivers DBMS services over the Internet.
- The tradeoff:
 - Trusting a cloud provider to store and manage your data in return for minimizing database administration and maintenance cost and effort.
- Utilizing cloud database systems can enable organizations, especially smaller ones without the resources to invest in an enterprise computing infrastructure, to focus on their business instead of their computing

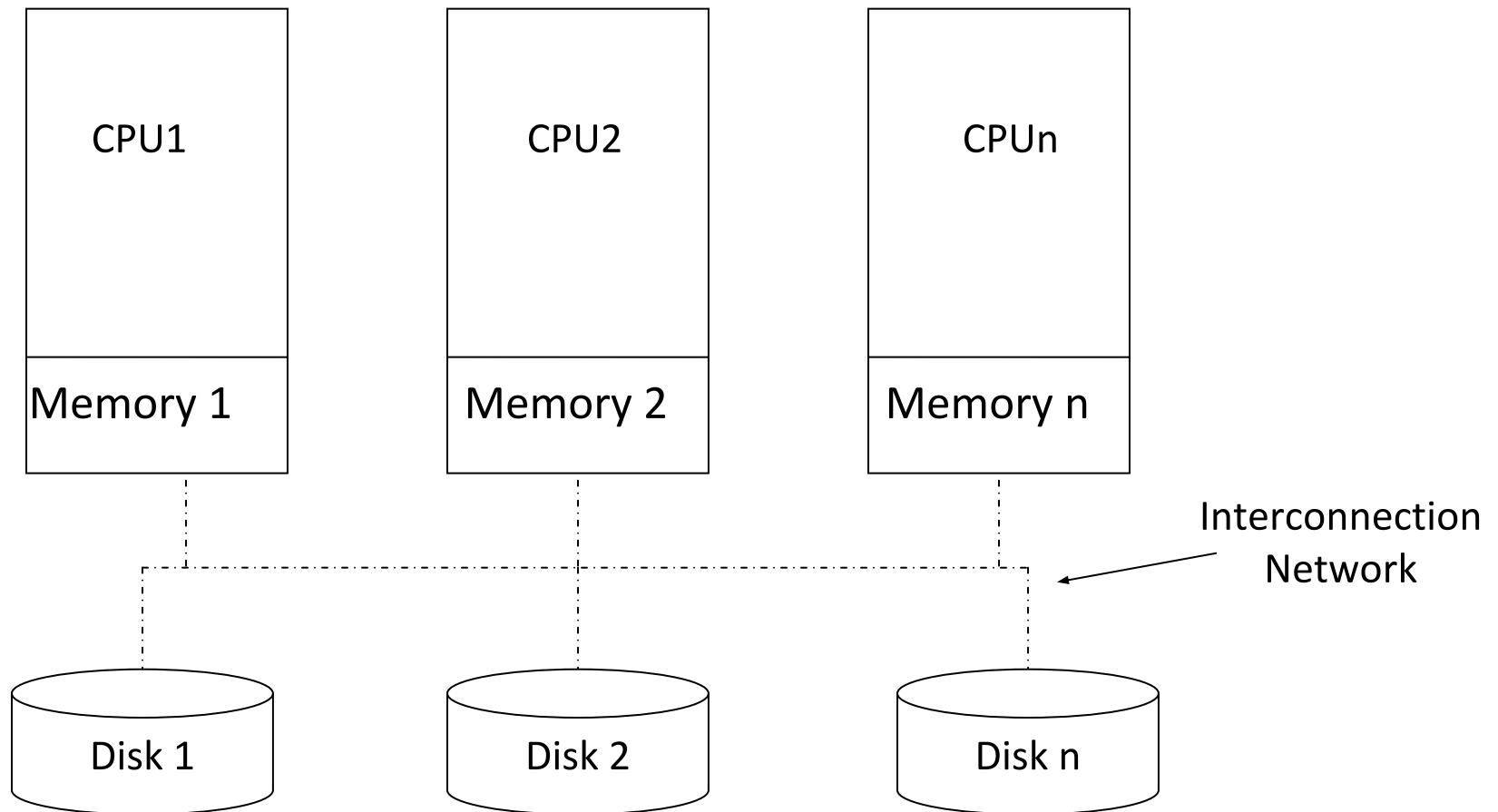
DBMS Clustering

- Where multiple independent systems work together as a single, highly available system
- Failover support

Shared-Nothing



Shared-Disk



Shared-Disk vs. Shared-Nothing

Shared-disk	Shared-nothing
Quick adaptability to changing workloads	Can exploit simpler, cheaper hardware
High availability	Almost unlimited scalability
Performs best in a heavy read environment	Works well in a high-volume, read-write environment
Data need not be partitioned	Data is partitioned across the cluster

Guidance

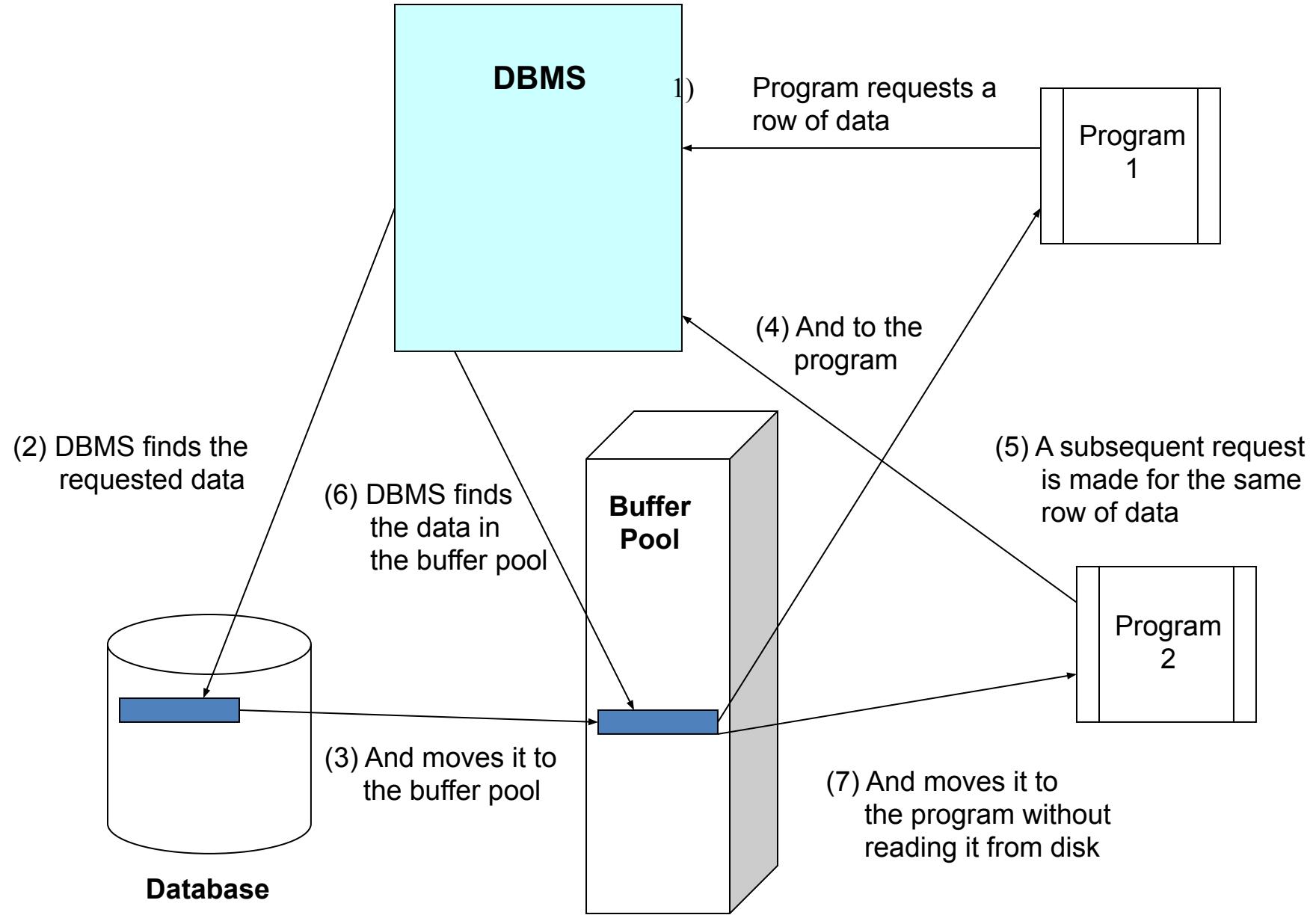


- Understand your organization's needs
 - Short-term
 - Longer-term
- Avoid DBMS proliferation
- Require ROI before procurement
- Every DBMS requires DBA support
- The fewer DBMS products installed, the less complicated database administration becomes

Installing the DBMS

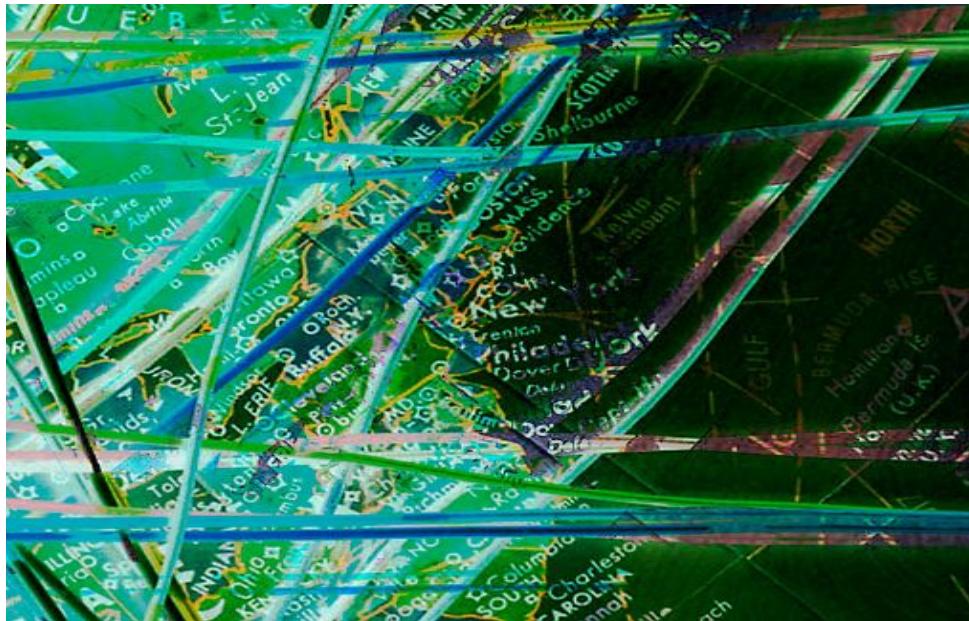
- Hardware Requirements
 - CPU (version/speed), firmware, memory, etc.
- Storage Requirements
 - DBMS (catalog, logs, work files, etc.)
 - System, Applications
- Memory Requirements
 - Data buffers and cache (see next slide for details)
 - Program cache
 - Etc.
- Software Requirements
 - Allied Agents (TP, MQ, middleware)
 - Languages and Compilers
- Configuration





Connecting the DBMS

- The DBMS does not operate in a vacuum
- Understand and test the connection of the DBMS to other system software and hardware



Installation Verification

- Test that the DBMS has been properly installed
- Use vendor-supplied programs and installation verification procedures
- Build your own
 - Sample SQL: SELECT, INSERT, UPDATE, and DELETE statements issued against sample databases
- Test all required connections
 - Transaction processors, drivers, etc.

Upgrading the DBMS

- Analysis of New Features
 - Check all Requirements
 - Hardware and Software (see Installation Checklist)
- Planning the Upgrade
 - Impact to system, applications
 - Scheduling
- Fallback Strategy
- Migration Verification

**Every 18 to 24
months...**

Version vs. Release

- Version
 - Major; many changes and new features
- Release
 - Minor; fewer changes and new features

Deciding When to Upgrade

Rewards of Upgrade	Drawbacks of Upgrading
New features and functionality are only available in the new version/release	An upgrade to the DBMS usually involves some level of disruption to business operations.
Purchased applications may require specific version functionality	Other disruptions can occur, such as having to convert database structures
New DBMS releases usually deliver enhanced performance and availability	The cost of an upgrade can be a significant barrier to DBMS release migration
DBMS vendors will often provide better support and respond to problems faster for a new release of their software	A new DBMS release will generate SQL access paths that perform worse than before
Production migration to a new DBMS release will align the test and production database environments, thereby providing a consistent environment for development and implementation	Supporting software products may lack immediate support for a new DBMS release
Cost savings. The DBMS vendor may charge less for the maintenance of the DBMS if it is up-to-date.	New DBMS releases may cause features and functions to change.

Database Standards & Procedures

- Naming Conventions (in conjunction with DA)
 - Standard abbreviations (in conjunction with DA)
- Roles & Responsibilities (in conjunction with DA and SA)
- Programming Guidelines (in conjunction with App Dev)
- Database Guidelines
 - Security (in conjunction with Security Admin or SA)
 - Migration & Turnover Procedures
 - Design Review Guidelines
 - (in conjunction with DA, SA, App Dec)
 - Operational Support (in conjunction with Operations)
- Communication Standards

Roles and Responsibilities

Task	DBA	DA	SA	Management	Operations	Applications	End Users
DBMS budget	X		X	P		X	X
DBMS installation	P		X		X	X	X
DBMS upgrade	P		X	X	X	X	X
Database usage policy	P	X		X			
Capacity planning	X		P	X	X	X	
Data modeling and analysis	X	P					X
Metadata policy	X	P					
Governance and compliance	X	X	X	X			P
Database design	P	X				X	
Database creation	P						
System performance	X		P				
Database performance	P		X			X	
Application performance	X		X				P
Backup and recovery	P		X		X	X	
Disaster recovery	P		X		X		

DBMS Education

At a minimum, the following courses should be made available:

- *DBMS Overview*: a one-day management level class that covers the basics of DBMS
- *Data Modeling and Database Design*: a thorough course covering conceptual, logical, and physical database design techniques for DAs and DBAs
- *Database Administration*: in-depth technical classes for DBAs, SAs, and systems programmers
- *Introduction to SQL*: an introductory course on the basics of SQL for every DBMS user
- *Advanced SQL*: an in-depth course on complex SQL development for DBAs and programmers
- *Database Programming*: an in-depth course for application programmers and systems analysts that teaches students how to write programs that use the DBMS

Questions

