Database Design

1-4

Major Transformations in Computing

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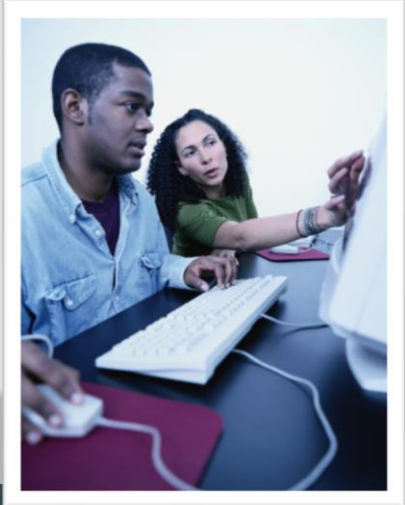
What will shopping habits will be like in the next 20 years?
Will we shop online for all our goods and services? How will today's local small businesses compete? Are there businesses that won't ever need a database or visibility on the Internet?

Objectives

- This lesson covers the following objectives:
  - List the major transformations in computing that have occurred since the 1970's
  - Define and give an example of these terms: hardware, operating system, software
  - Identify examples of businesses that use database software and explain how it is essential to their success
  - Explain the overall mission of the Oracle Corporation

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Purpose

- History provides perspective for where we are today in information technology

- If we know where we have come from, it is easier to understand where we are today, and where we are likely to go in the future

- Your first job upon graduation may not exist 20 years later!

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Key Terms

- Hardware:
  - the physical "bits and pieces" of a computer: keyboard, screen, mouse, disk drive, memory, etc.
- Software:
  - programs (sets of instructions) which tell the hardware what to do
- Operating system:
  - a software program which directly controls and manages the hardware: Microsoft Windows, Linux, etc.
- Application:
  - a software program which carries out specific tasks on behalf of computer users

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Hardware - workstation (desktop) computer, mainframe, monitor, keyboard, iPad
Operating systems - Windows, Linux, Mac OS X
Applications - games, MSOffice, Macromedia Flash, Adobe Photoshop, etc.

Key Terms

- Client:
  - a workstation or desktop computer including a screen, keyboard, and mouse
  - Clients interact directly with human computer users
- Server:
  - a more powerful computer that accepts work requests from clients, executes each request, and sends the results back to the client

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Key Terms

- Every time you request information from a Web page, your client computer sends the request to a database on the server

- The server retrieves the data from the database, converts it into useful information, and sends the information back to the client

- If you pursue a career in IT, you will hear and use these terms nearly every day!

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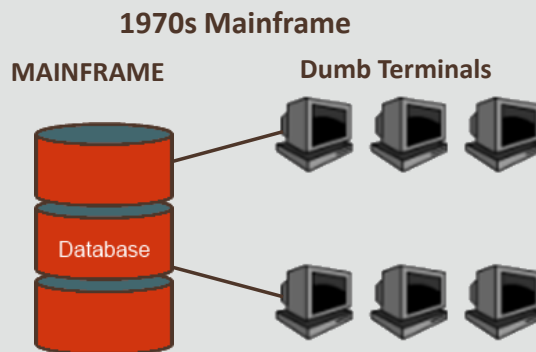Major Transformations in Computing

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In a 2-tier system, clients communicate directly with servers.
In a 3-tier system, clients communicate with a third computer in the middle, which forwards the requests to the servers. The middle-tier computer is often called an application server or web server

History of Computer Systems

- 1970s
  - The database software resided in the mainframe computer
  - Almost all of the computer processing was done on these large mainframe computers
  - Some of these computers were larger than your classroom!

1970s Mainframe

**MAINFRAME**   **Dumb Terminals**

Database

One disadvantage of this system is that if the mainframe computer fails, no work can be done.

History of Computer Systems

- Smaller computers, or "dumb terminals," were used to access the large mainframe and execute commands

- The terminals depended on the mainframe and displayed the results only after the processing was completed in the mainframe
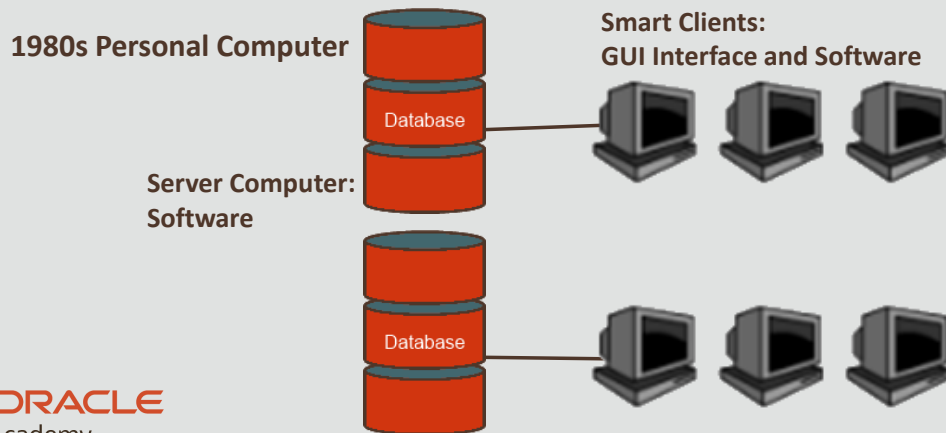
- They were not capable of much processing on their own

1970s Mainframe

MAINFRAME   **Dumb Terminals**

Database

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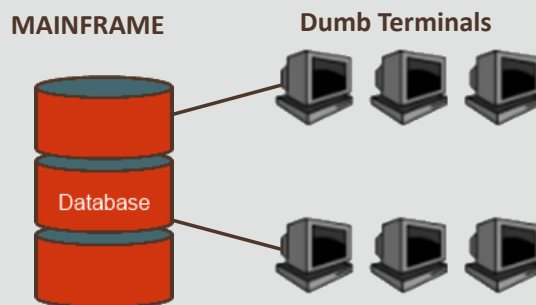
History of Computer Systems

- 1980s
  - As personal computers (PCs) became faster and widely available, processing moved from the mainframes to the desktop

1980s Personal Computer

Smart Clients:
GUI Interface and Software

Database

Server Computer:
Software

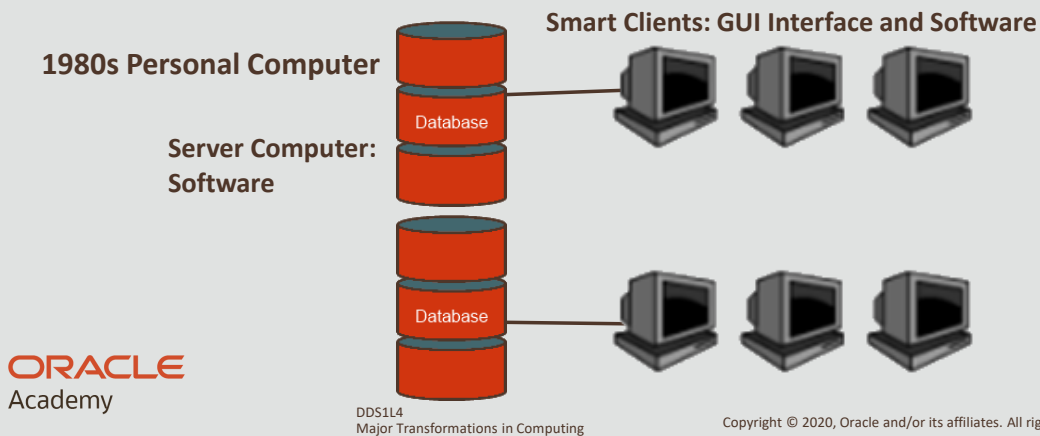Database

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History of Computer Systems

- 1980s
  - Because the PCs had their own software and were capable of doing some processing on their own, they came to be known as "smart clients" or "workstations"

1980s Personal Computer

**Smart Clients:
GUI Interface and Software**

Database

**Server Computer:
Software**

Database
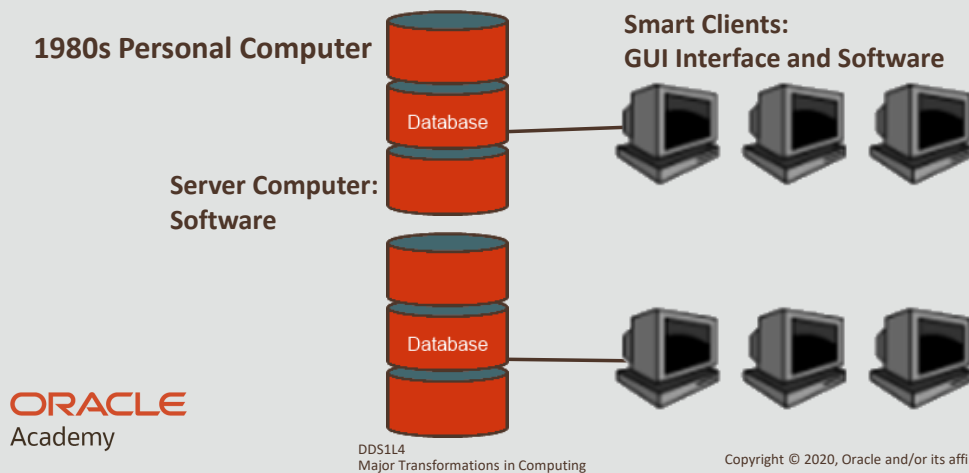
History of Computer Systems

- 1980s
  - Having the processing power within the client machine ushered in a wave of graphical user interface (GUI) applications
  - Many of the common applications today (Word, Excel, PowerPoint) were born during this era

Smart Clients: GUI Interface and Software

1980s Personal Computer

Database

Server Computer: Software

Database

Contrast a GUI application (like anything on the Internet) with a non-GUI application that is just all text. Displaying graphics requires more memory and processor speed (for example video games). The earliest PCs were not equipped with enough "muscle" for GUI interfaces.
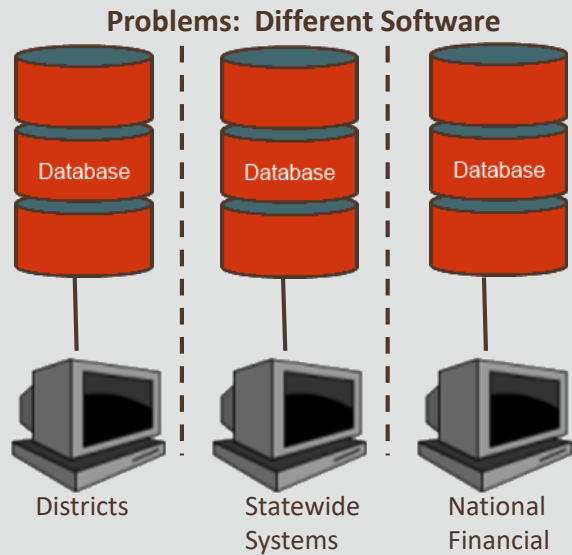
The Problem of Isolated, Nonintegrated Systems

- Having multiple applications on multiple client workstations created new problems

- In this example, different software on different systems requires integration

- This is usually troublesome and expensive

Problems: Different Software

Districts

Statewide Systems

National Financial

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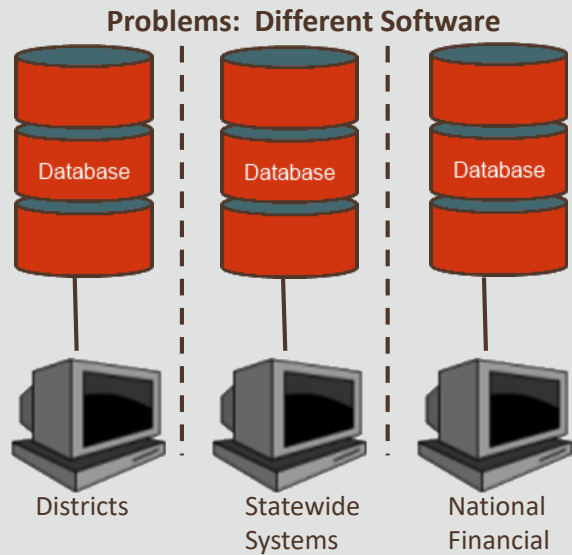
The Problem of Isolated, Nonintegrated Systems

- If an upgrade is made to a software application, each and every server plus each and every client must be upgraded

Problems: Different Software

Districts | Statewide Systems | National Financial

This is a problem that a lot of companies face if they have disparate systems that evolved separately.

The Problem of Isolated, Nonintegrated Systems

- Think of a school district updating school grades on one system and attendance on another

- When a student graduates, all this information needs to be brought together

Problems: Different Software

Districts

Statewide
Systems

National
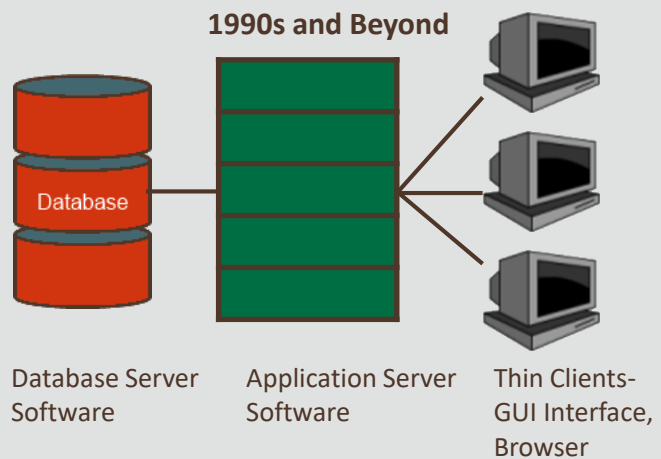Financial

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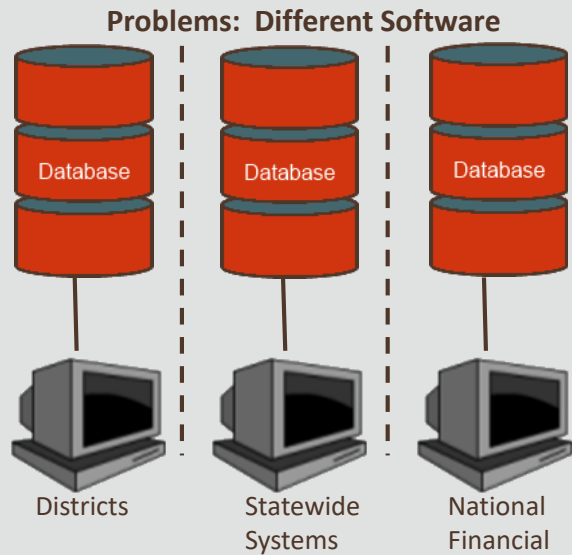
The Problem of Isolated, Nonintegrated Systems

- Without an integrated system, this can be a painful process, especially if there are thousands of students who attend thousands of days of school!

- Who will pull all that data together?

- How?

Problems: Different Software

Districts

Statewide Systems

National Financial
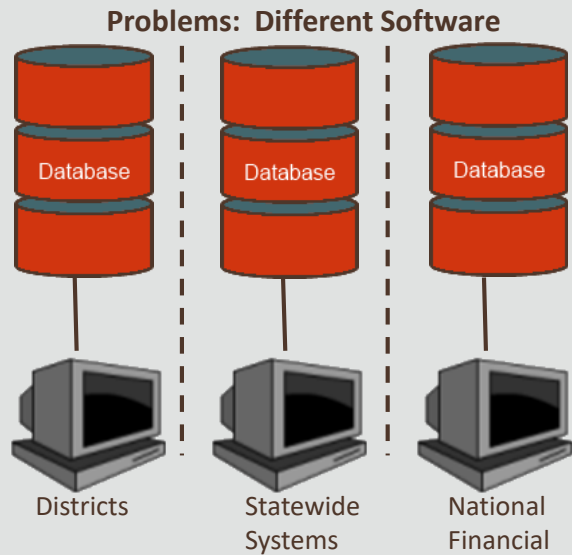
1990s and Beyond

- Oracle's mission is to use the Internet and fast processing servers to meet the needs of organizations in storing data and producing information

1990s and Beyond

Database Server Software

Application Server Software

Thin Clients-GUI Interface, Browser

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1990s and Beyond

- The software that manages the data is on the database server
- It performs processing for storage and retrieval

1990s and Beyond

Database Server Software

Application Server Software

Thin Clients- GUI Interface, Browser

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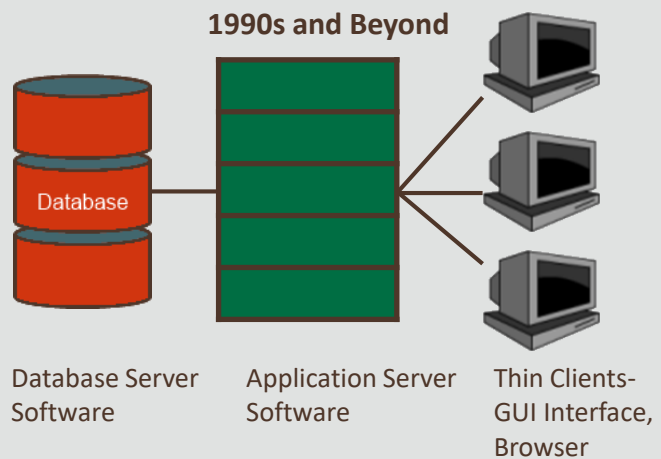
1990s and Beyond

- Applications for business operations sit on the application server

- It interacts with, processes, develops, or manipulates the data for document creation

1990s and Beyond

Database Server Software   Application Server Software   Thin Clients- GUI Interface, Browser

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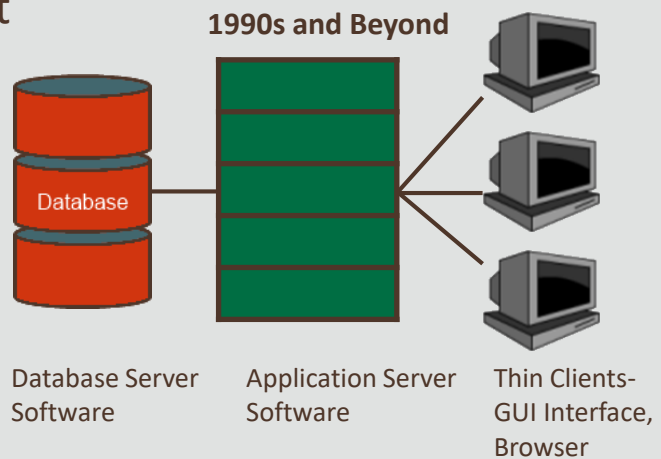
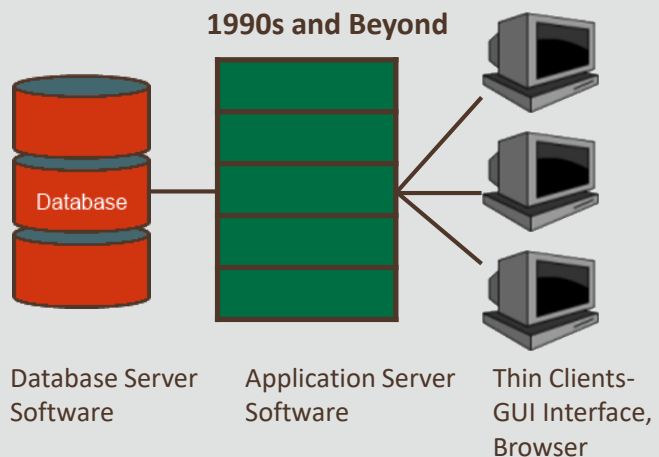# 1990s and Beyond

- Clients provide access to and visual display of the information on the servers

- Clients can have applications of their own, but the essential business applications are accessed from the clients using an Internet browser

1990s and Beyond

Database Server Software | Application Server Software | Thin Clients- GUI Interface, Browser

An example would be a program that manages human-resource data or school records. Ideally, client users only need a browser to use the application, which then accesses the database. Advances in processing power allow this type of transaction to take place quickly and efficiently.

This allows changes or upgrades to be made on the servers once instead of having to change and maintain many software applications on many client machines.
The slide shows only one database server and one application server, but there could be several of these.

Grid Computing: A New Model

- In the grid-computing model, all of an organization's computers in different locations can be utilized just like a pool of computing resources

- Grid computing builds a software infrastructure that can run on a large number of networked servers

DATABASE powers the Web
NEWS
SPORTS
ENTERTAINMENT
HOROSCOPES
Database
PICTURES
MOVIES
WEB USERS
CHAT ROOMS
GAMES

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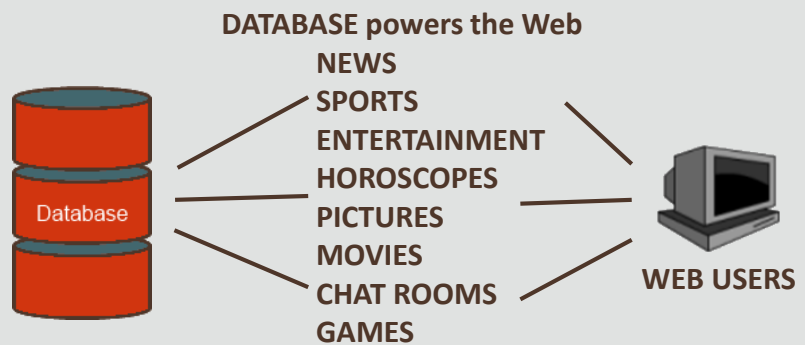# Grid Computing: A New Model

- A user makes a request for information or computation from his workstation and that request is processed somewhere in the grid, in the most efficient way possible

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WEB USERS

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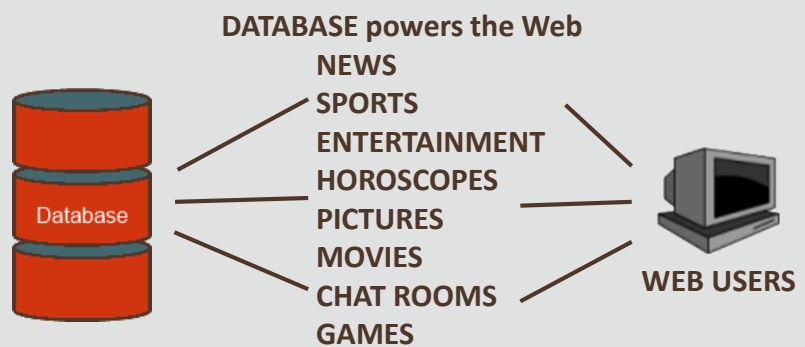Major Transformations in Computing

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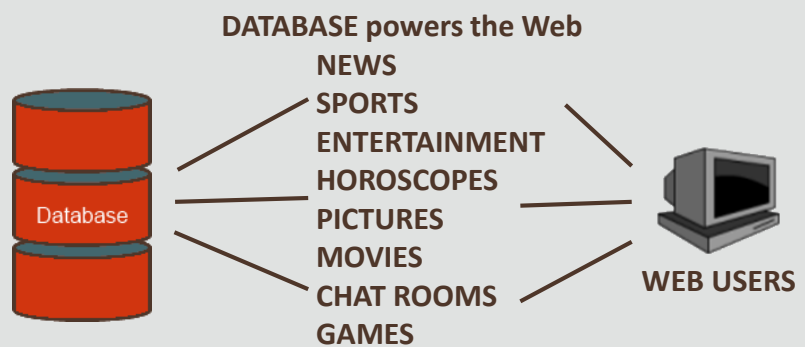
Grid Computing: A New Model

- Grid computing treats computing as a utility, like the electric company
- You don't know where the generator is or how the electric grid is wired
- You just ask for electricity and you get it

DATABASE powers the Web
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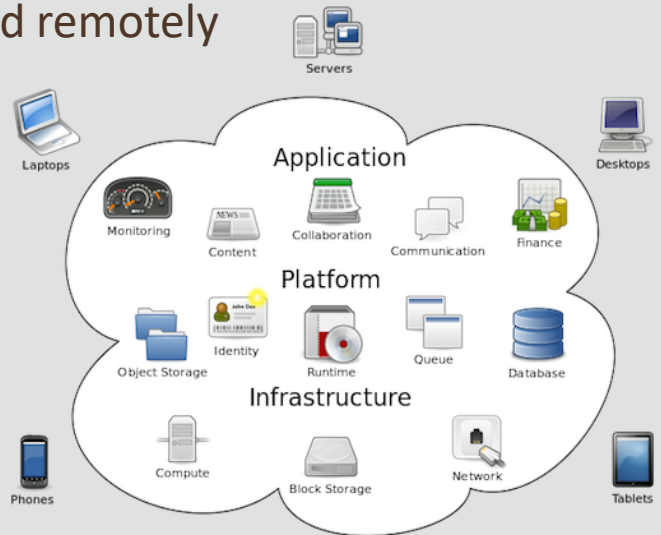
Database

WEB USERS

Grid Computing: A New Model

- Grid Computing improves performance and reliability for Oracle's system structures using database servers, application servers, and client browsers

DATABASE powers the Web
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Database

WEB USERS

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Cloud Computing:

- Cloud computing allows businesses to access software and hardware from a cloud provider

- These services are located remotely and delivered to users using web technologies

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Databases support the operation of businesses across all sectors of industry, including:

- Finance and Banking
  - Maintaining customer records and transaction details
- Retailing
  - Stock control
- Telecommunications
  - Call logs
- Airline
  - Travel reservations

Behind the scenes, computers are working to display the information on the web. For example amazon.com: if you have previously purchased something from them, they "know" you the next time you visit the site. They make recommendations based on products you bought before. Where is all this information stored? Answer: in a database

Terminology

- Key terms used in this lesson included:
  - Application
  - Client
  - Grid computing
  - Hardware
  - Infrastructure
  - Operating system

Terminology

- Key terms used in this lesson included:
  - Server
  - Software
  - Cloud Computing

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Major Transformations in Computing

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Summary

- In this lesson, you should have learned how to:
  - List the major transformations in computing that have occurred since the 1970's
  - Define and give an example of these terms: hardware, operating system, software
  - Identify examples of e-businesses that use database software and explain how it is essential to their success
  - Explain the overall mission of the Oracle Corporation

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