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## ISM 50 - Business Information Systems

### Lecture 10

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UC Santa Cruz  
May 3, 2007

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## Outline

- Announcements
  - Student Presentation
  - Client-Server Architecture
  - Student Presentation
  - The SUN N-Tier Architecture
  - Mid-term Feedback Survey
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## Announcements

- Midterm Tuesday!
    - Study guide posted
    - Review sessions:
      - Monday 5/7, 4-5PM, BE 316 (knock on the door)
      - Tuesday 5/8, 9-10:30AM, BE 314
  - Assignment 3 due today
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## Announcements

- Mid-quarter feedback
    - Today
    - Anonymous
    - Informal
      - Your instructor will use your comments in order to make adjustments, if needed
    - Your feedback is important!
      - Be honest and objective
      - Will be shared with class
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## Student Presentation

- Derek Moore
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## Client - Server Computing

## Recall - The Micro Era

- 1981 - IBM introduces its PC!
  - Rapidly adopted by the commercial market



- Others followed
  - 1983 - Compaq introduces first successful IBM-PC clone
  - 1983 - Apple introduces first personal computer with GUI
  - 1984 - DELL is founded

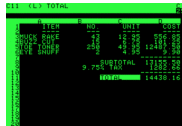
## Recall - The Micro Era

- The transition from mainframes to microcomputers was not easy!
- Easier to manage one central mainframe than a PC on every employees desktop!
- Data not Centralized
  - Replication of accounting and reporting functions
    - "The numbers on my PC are right, the ones on your PC are wrong!"
- Security Risks



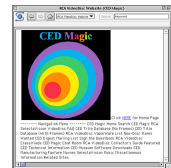
## Recall - The Micro Era

- The DP managers defied PCs
- The users liked them!
  - Users wanted the convenience of word processing, spreadsheets, etc...



## At the same time...

- Internet evolved
  - 1969 - ARPANET linked scientists
  - 1977 - TCP/IP used to link networks to ARPANET
  - 1984 - the term Internet comes into use (by scientists, military, hobbyists)
  - 1985 - NSF takes over management of Internet Backbone
  - 1990 - WWW (Tim Berners-Lee at CERN)
  - 1991 - HTML
- 1993 - First GUI WWW Browser
  - Mosaic Browser (Marc Andreessen and Eric Bina)



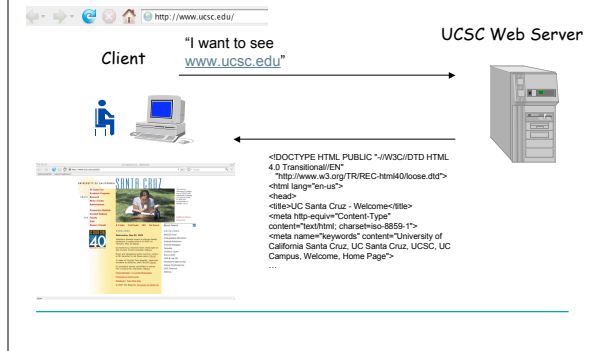
## Recall - The Network Era

- After chaos of Micro Era, organizations converged on **Client-Server networked architectures**
  - Based on Sun's model introduced in 1982
  - The **Client PC** allowed user to have direct access to her own computer
  - The **Server** housed organizational data

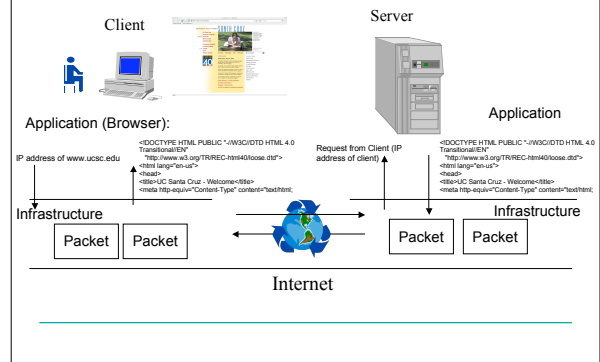
## Client-Server Architecture

- Suitable for information management applications
- Information is stored/published on a **server**
- **Users** sitting at **clients** generate requests
- The **server** responds to the clients' requests
- Each **client** displays the responses to the **user**
  
- One client may access many servers and one server is accessed by many clients
- Examples?

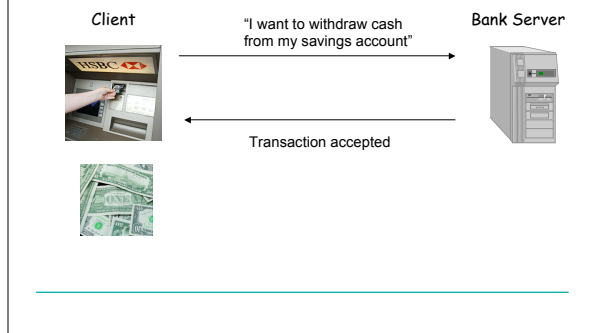
## Client-Server Example



## Client Server Example - Layers Revealed



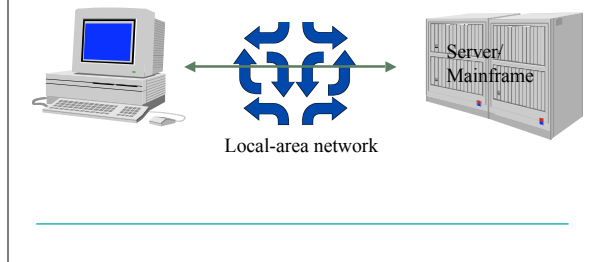
## Client-Server Example



## Client-Server Architecture

- Clients may come and go
- Servers must be always available!!!
- 2-tier Architecture

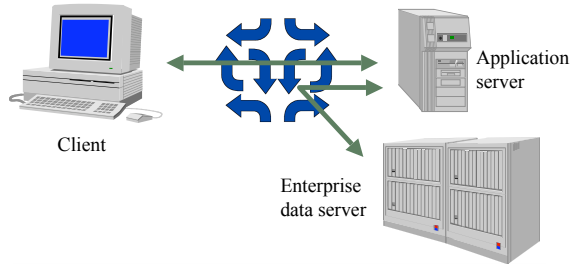
## Two-tier client/server



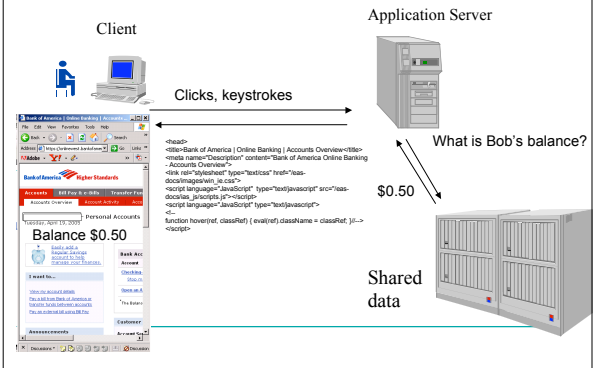
## 3-tier Client/Server Architecture

- Many organizational applications incorporate mission-critical databases
- Need to separate data from the applications that access them
  - Centralized storage
  - Security
  - Fault tolerance
  - Data shared across many applications
- 3 tiers:
  - 1: Client
  - 2: Application Server
  - 3: Enterprise Data Server (usually on a mainframe)

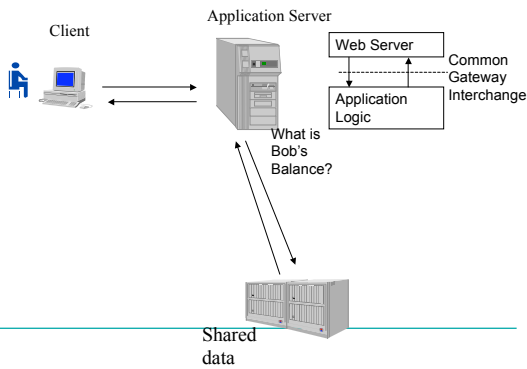
## Three-tier client/server



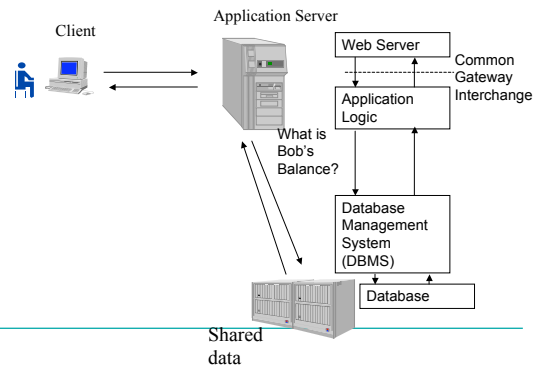
## 3-Tier Client Server Architecture example



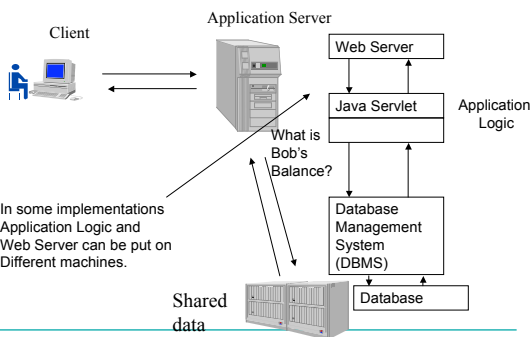
## 3-Tier Client Server Architecture example



## 3-Tier Client Server Architecture example



## 3-Tier Client Server Architecture example



## Relational Database

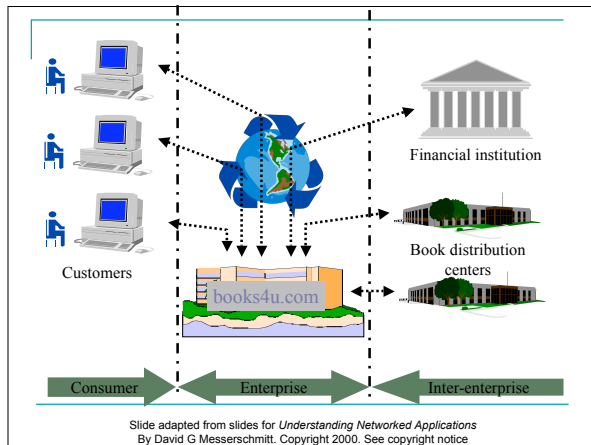
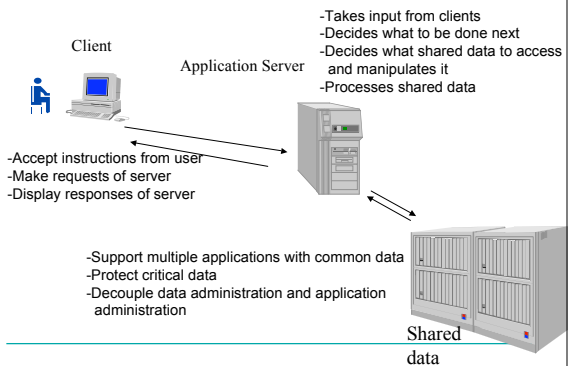
Customer	Balance	Customer Class
Alice	\$527	Silver
Bob	\$0.50	Bronze
Charles	\$1000000	Gold

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## DBMS Responsibilities

- Hide Changes in the Database hardware from the Application
- Standard operations on the data, including searches, such a search is called a *query*.
- **Middleware**: Separate Database Management from Applications, so that many applications can access the same data.
- Security, Integrity, Backup, fault tolerance, etc..

## 3-Tier Client Server Architecture in General



## Sun Case

- Jonathan Fook-Lung Hung

## Java Applets

- **Key feature of Java**
- **Applets**: chunks of Java code
  - Initially enabled animations on web pages
  - Later used to facilitate e-commerce applications, in cellular phones, etc.
- **Applets are downloaded through the browser**
  - Only what and when was needed
  - No need to keep a copy on client!
- **Servlets**: Applets that run on Webtop servers

## Sun N-Tier

