Database Systems
Lecture 2

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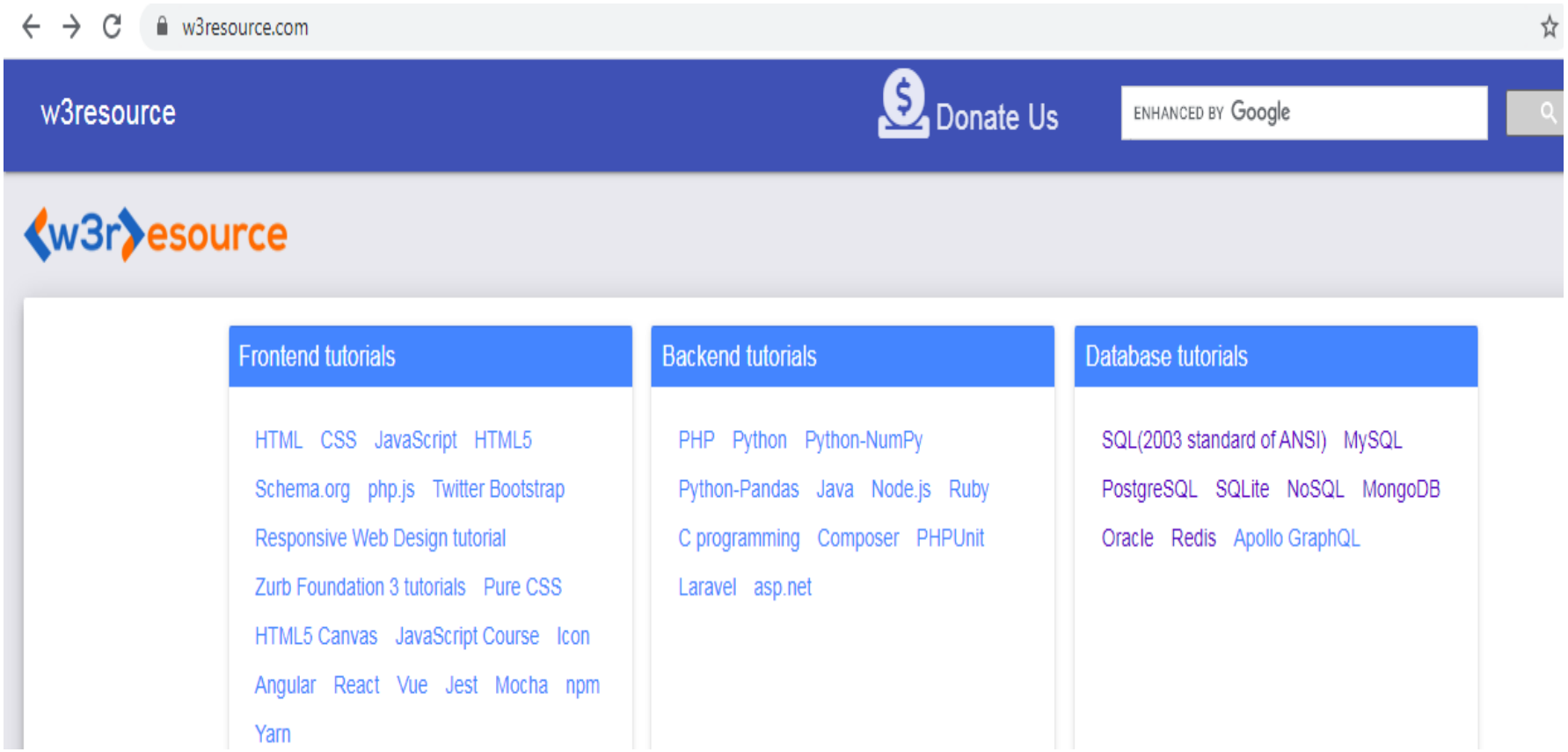
بسم الله الرحمن الرحيم

Lecture 2

File Processing Systems vs Database Management Systems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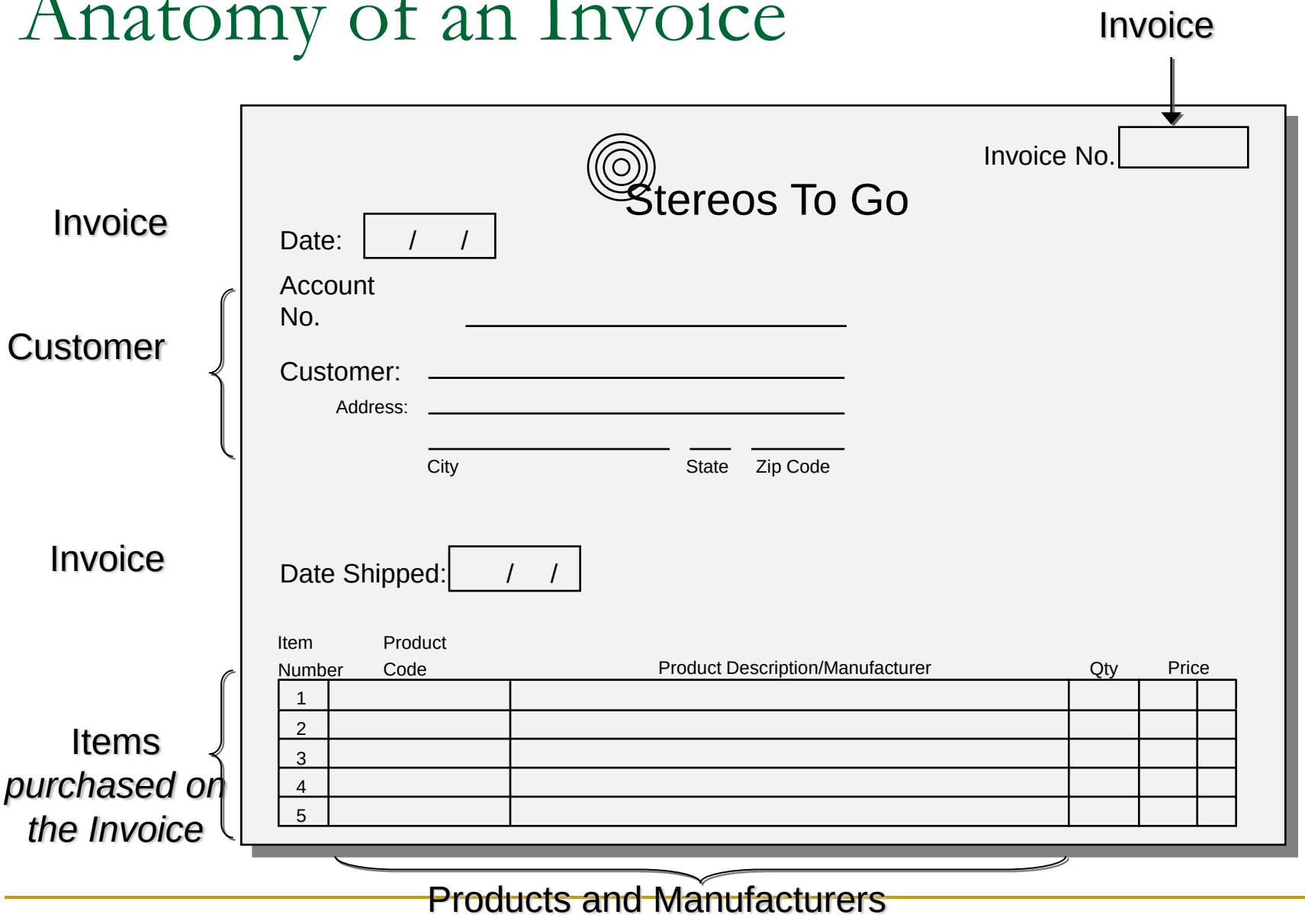
Invoice No.

1			
2			
3			
4			
5			

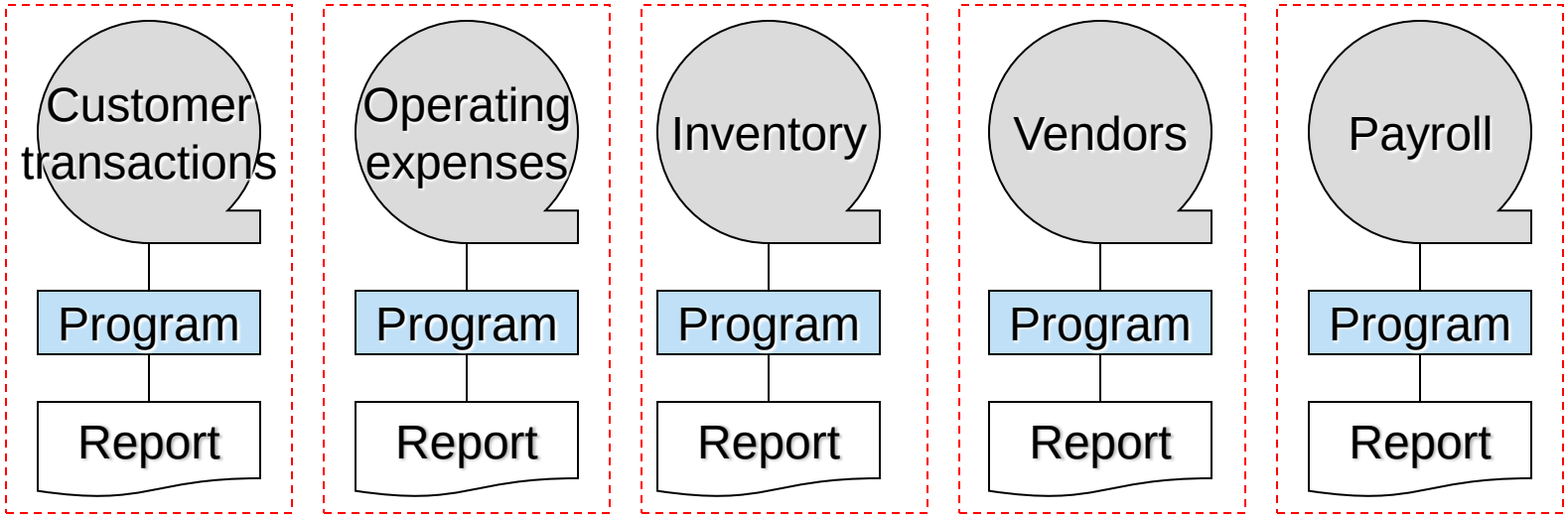
Anatomy of an Invoice



Traditional File-Based System

- Definition:

  "A collection of application programs that perform services for the end-users such as the production of reports. Each program defines and manages its own data."



One file, one application

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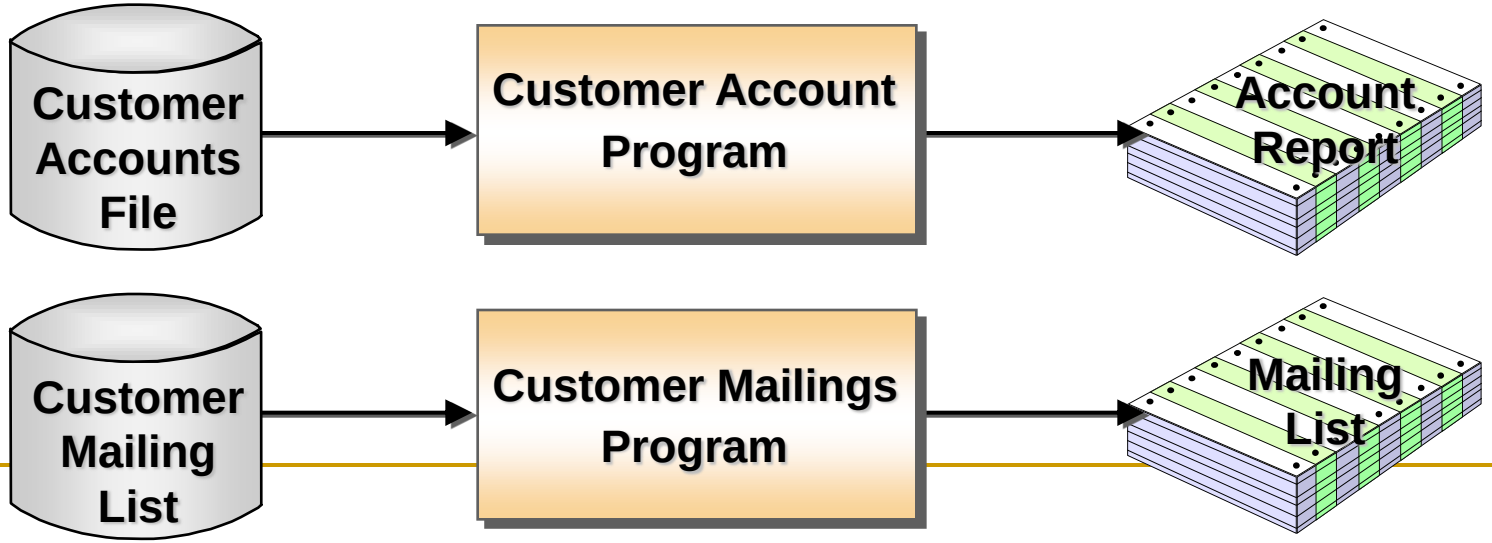


File-Based Systems

- Records contain *logically related* data
- Limitations:
  - Separation and isolation of data (*one file, one program*)
  - Duplication of data
    - Loss of data integrity - uncertainty of the *correct* version of data and no consistency
  - Data dependence - application program *defines* the data
  - Incompatibility of file formats
  - Fixed queries of application programs - little flexibility in meeting changing information needs

Data Redundancy

- Customer Order File
  - Invoice number
  - Customer account number
  - Customer name, address, city, state, zip code
  - Order date
  - Product code, product description, price, unit
- Customer Account File
  - Account Number
  - Customer name, mailing address, city, state, zip code
- Customer Mailing List File
  - Customer name, mailing address, city, state, zip code

Data Abstraction

- Separation between the data's structure (definition) and the application programs

COBOL

```
FD Master-File.
01  Master-Record.
      05  ID                          PIC X(10).
      05  Customer-Fname    PIC X(25).
          .
          .
          .
```

Tightly binds the data file and program

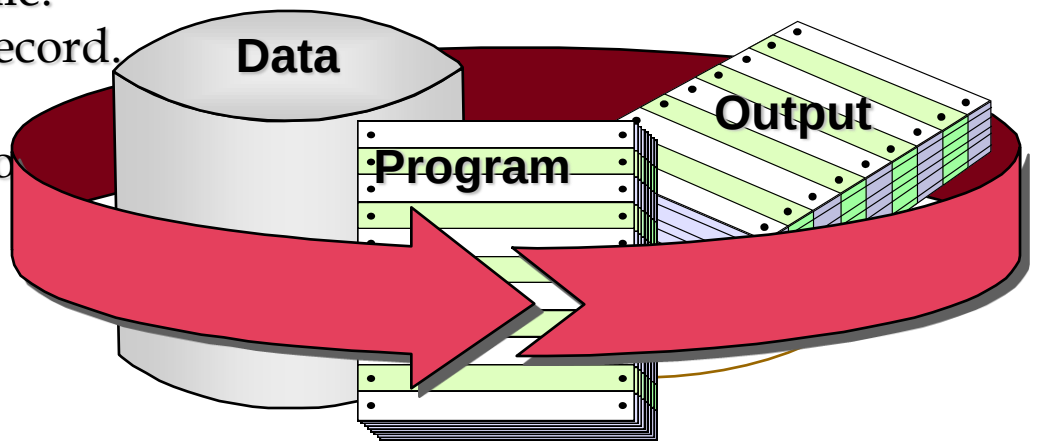
Data Abstraction

- Separation between the data's structure (definition) and the application programs

COBOL

```
FD Master-File.
01  Master-Record.
      05  ID
      05  Custo
            .
            .
            .
```

Tightly binds the data file and program



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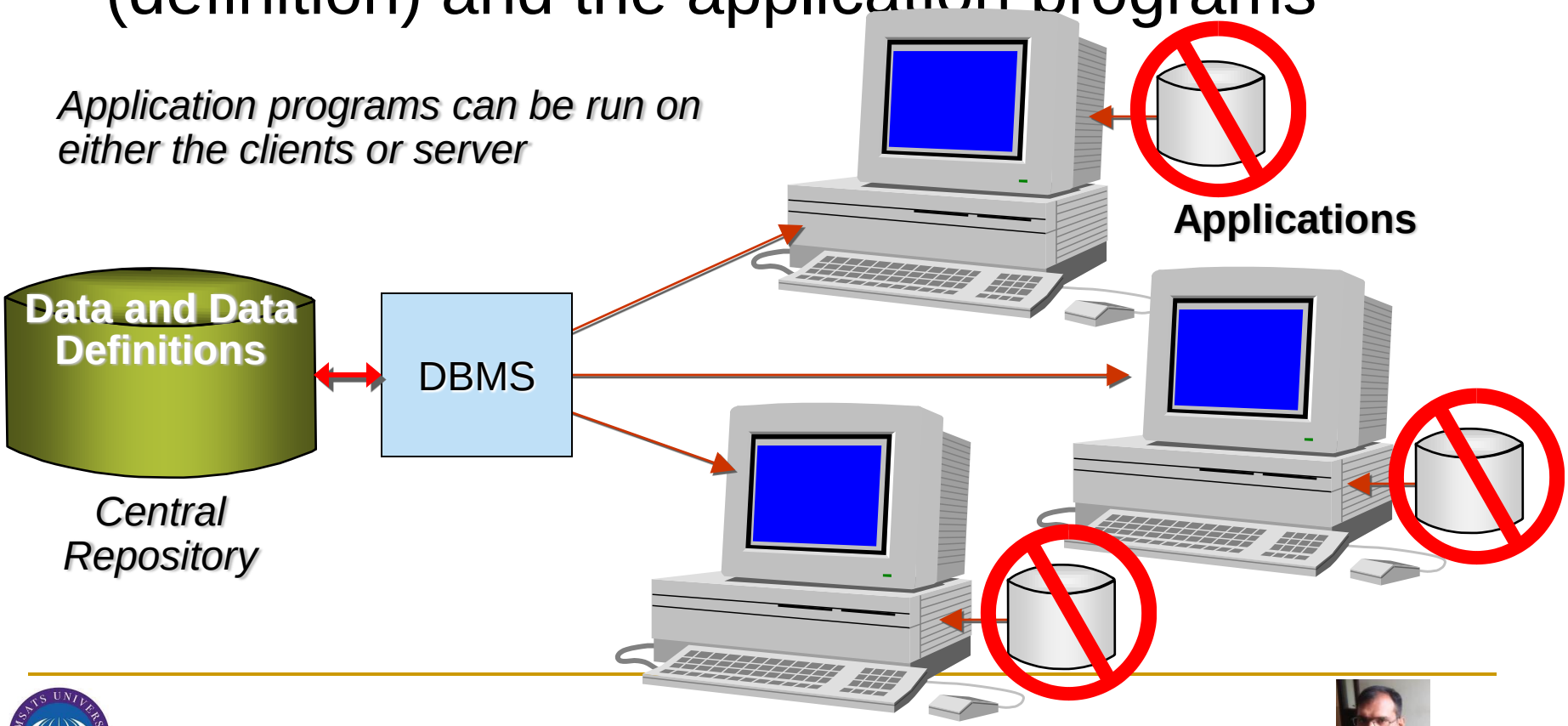
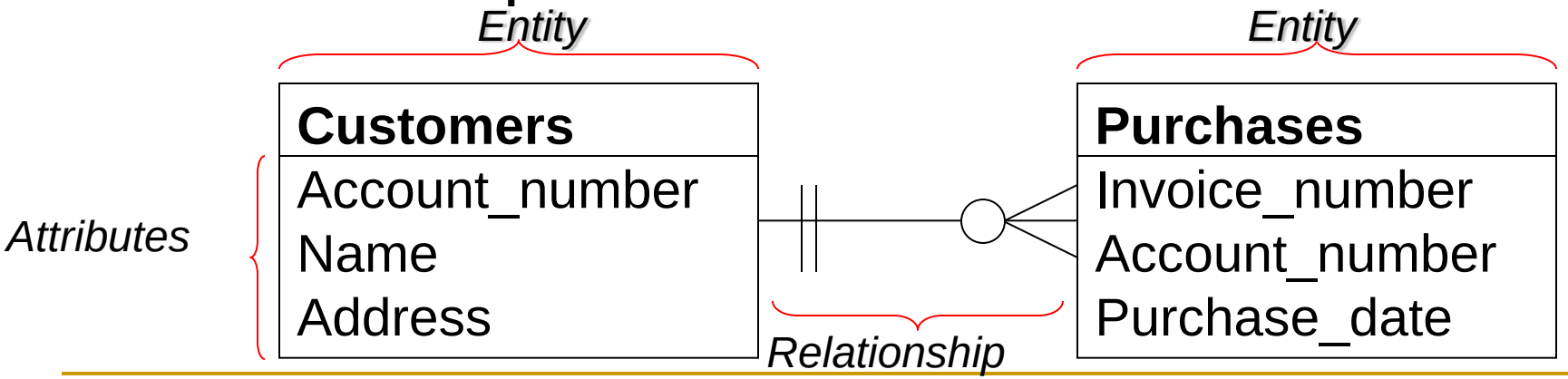
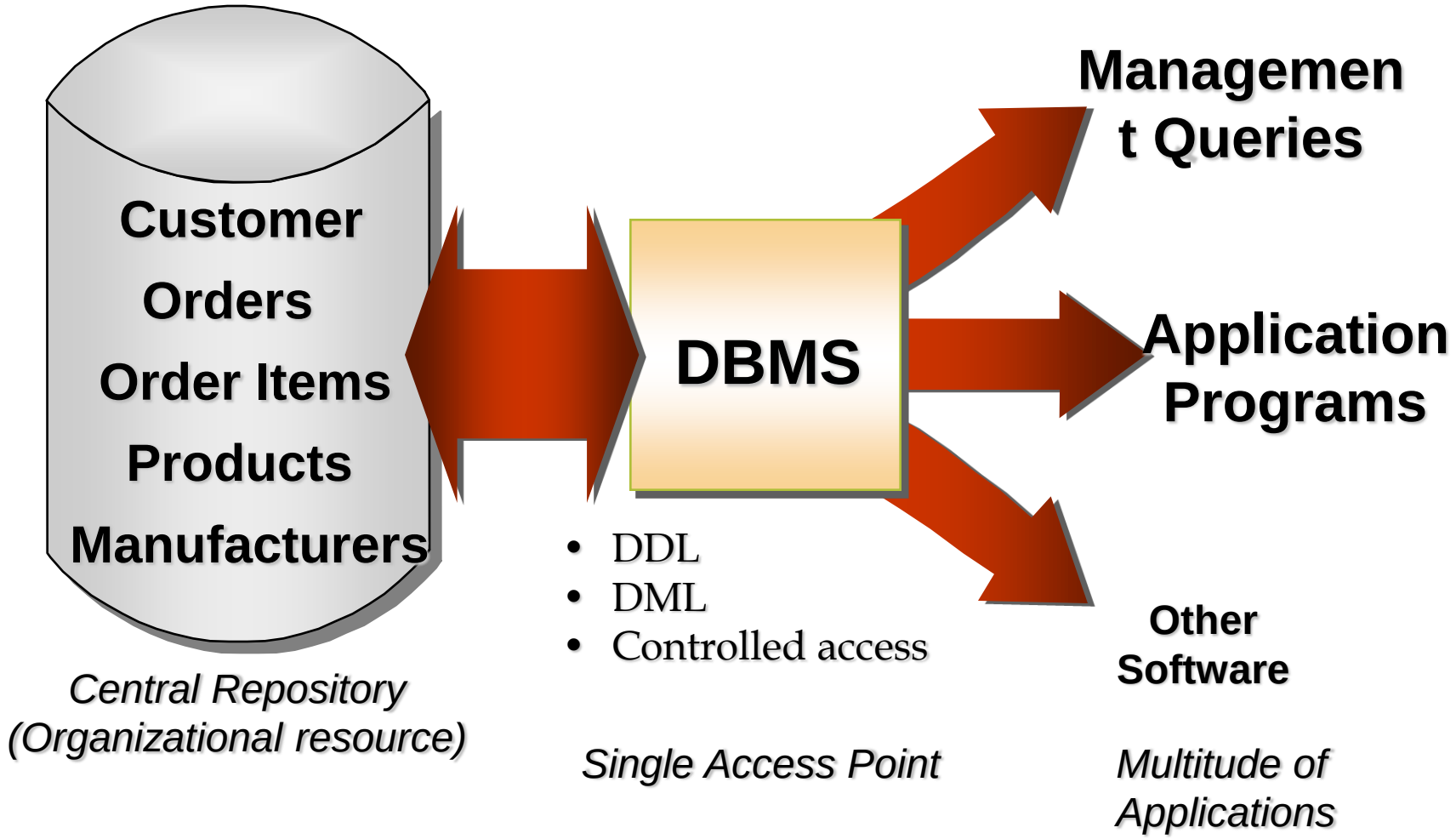


Organizing Data

- Entity - distinct object (i.e., person, place, thing, concept or event)
- Attribute - describes some aspect of the entity (object)
  - Property of the entity
- Relationship - association between entities



Stereos to Go Database



Components of a Database Environment

- Hardware
- Software: DBMS, application program and query software
- Data: Organized in a schema, partitioned into subschemas
- Procedures: Govern the design, access and use of the database
- People: Administrators (DA, DBA), designers (logical and physical), application developers and users (novice and *high-powered*)

Advantages of the Database Approach

- Control of data redundancy
- Data consistency
- Greater informational gain, *more information from the same amount of data*
- Sharing data, *organizational resource (i.e., shared resource)*
- Improved data integrity, *validity and consistency*
- Improved access and security
- Enforcement of standards

Advantages of the Database Approach

- Economy of scale, *centralization and consolidation*
- Balancing of conflicting requirements, *DBA oversees data and data definitions*
- Improved data accessibility and responsiveness
- Increased productivity
- Improved maintenance through data independence
- Increased concurrency
- Improved backup and recovery services

Disadvantages of the Database Approach

- Complexity
- Size

Dedication of resources including technology and people infrastructures

- Cost of DBMS
- Additional hardware costs
- Cost of conversion
- Performance
- Higher impact of failure
- In a production environment, processing can be *slow*