Database Management Systems

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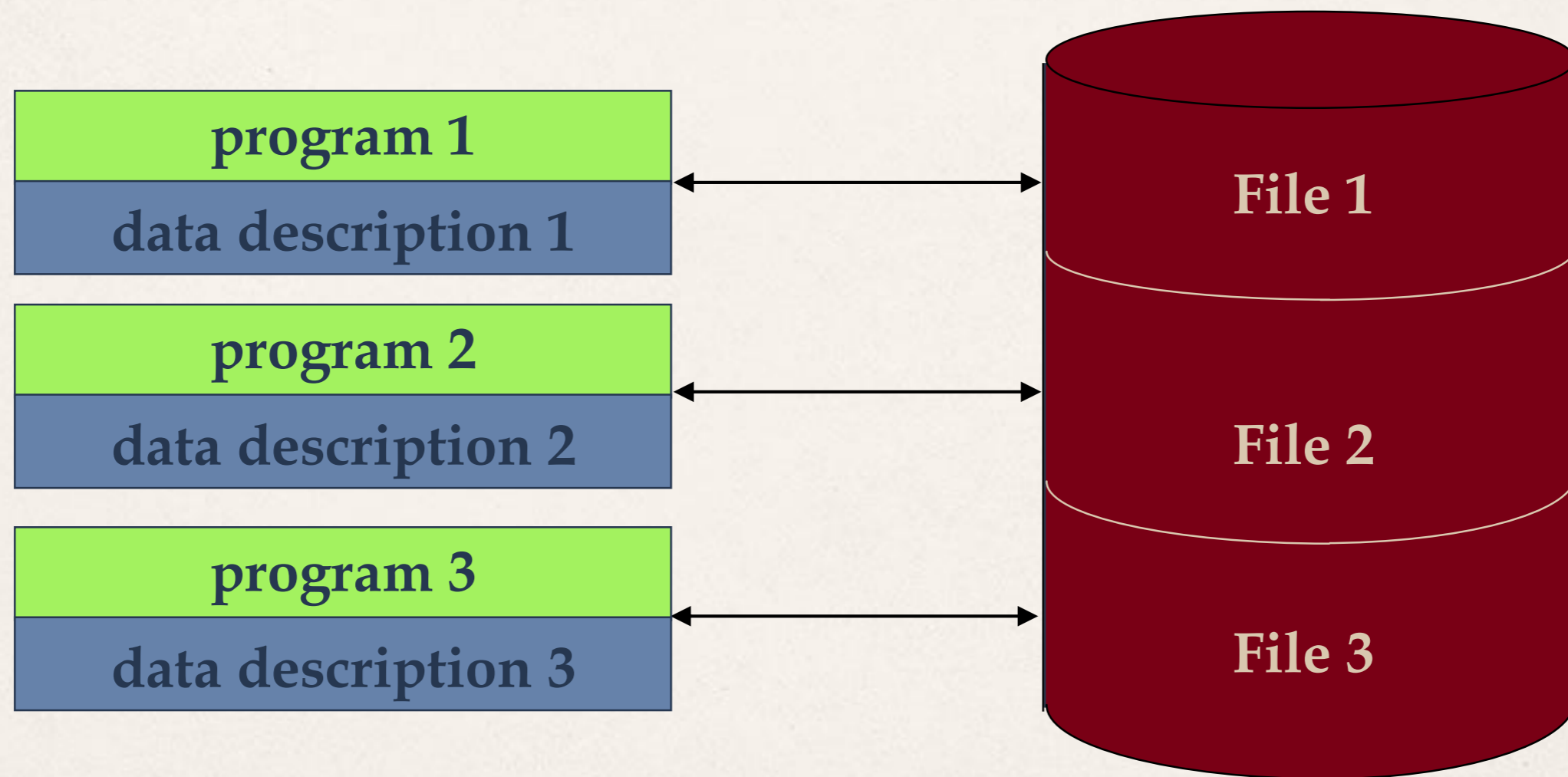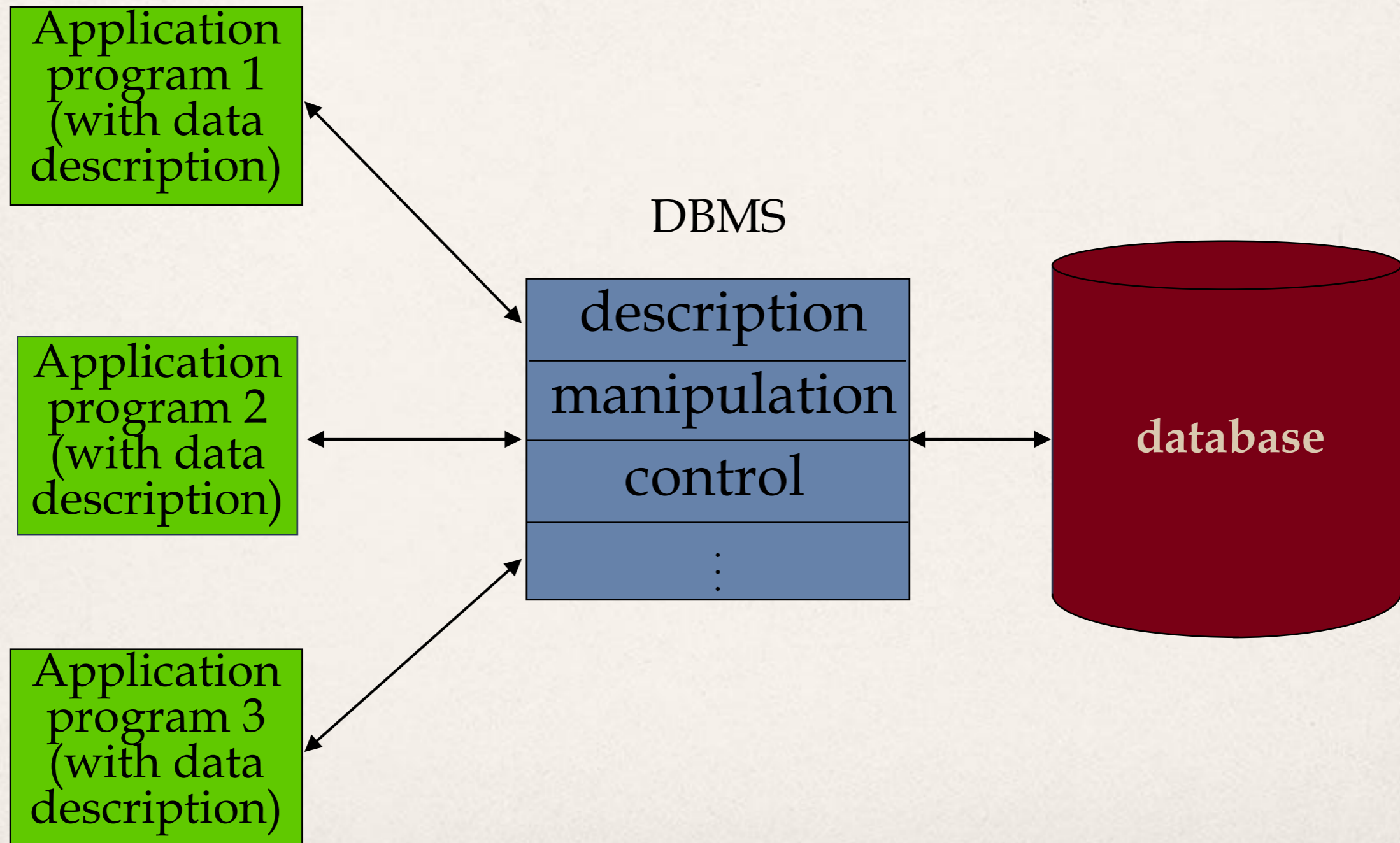Departments of IT and Computer Science

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Outline

- Background File Systems
- Database Management
- Motivation
- Distributed Computing
- What is a Distributed Database System?
- What is a DDBS
- Centralized DBMS on a Network
- Distributed DBMS Architecture
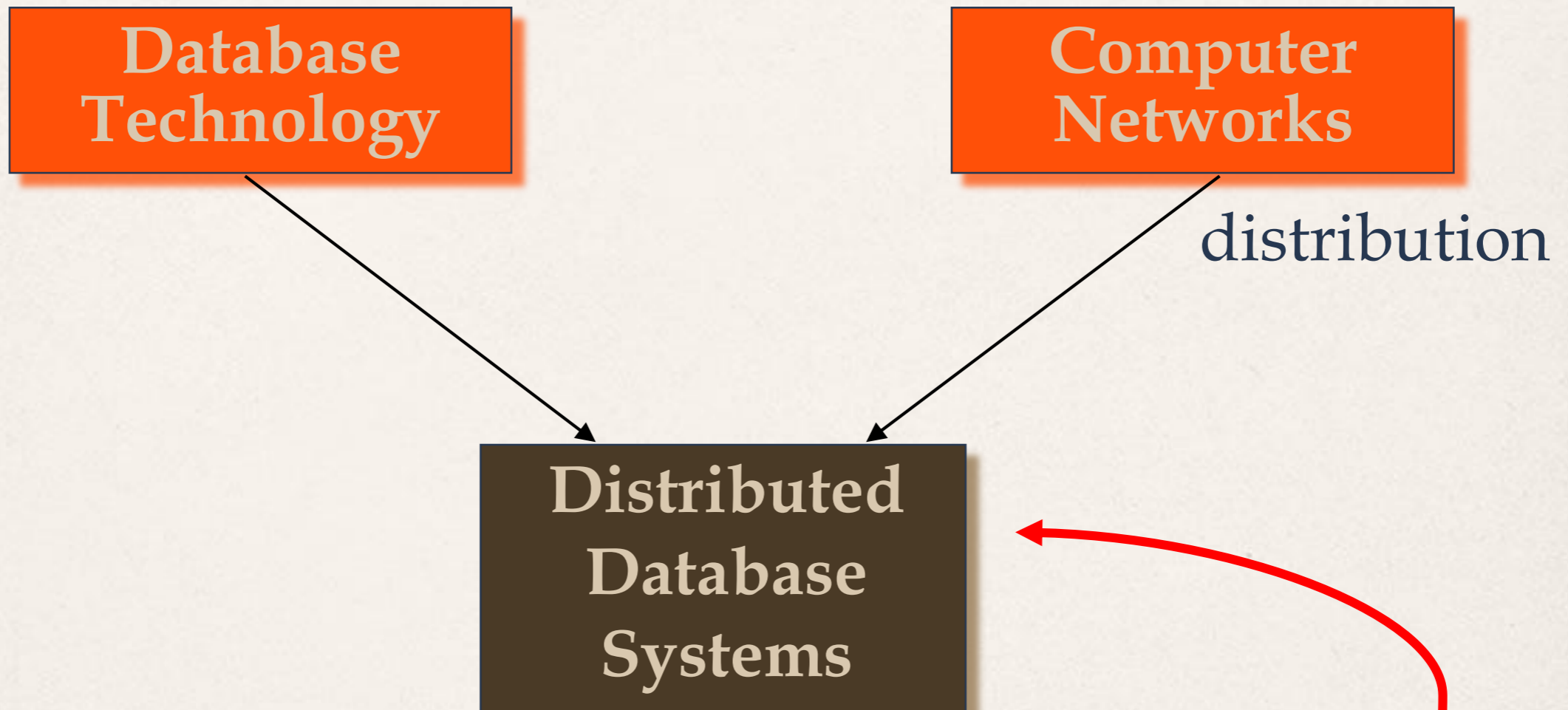- Generic DBMS Architecture

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Background File Systems

program 1
data description 1

program 2
data description 2

program 3
data description 3

File 1

File 2

File 3

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Database Management

Motivation

Database Technology

Computer Networks

distribution

Distributed Database Systems

Database Technology + Computer Networks =

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Distributed Computing

- A number of independent processing elements (not necessarily homogeneous) that are interconnected by a computer network and that cooperate in performing their assigned tasks.

- What is being distributed?
  - Processing
  - Function
  - Data
  - Control

What is a Distributed Database System?

A distributed database (DDB) is a collection of multiple, logically interrelated databases distributed over a computer network.

A distributed database management system (D–DBMS) is the software that manages the DDB and provides an access mechanism that makes this distribution explicit to the users.

Distributed database system (**DDBS**) = DDB + D–DBMS
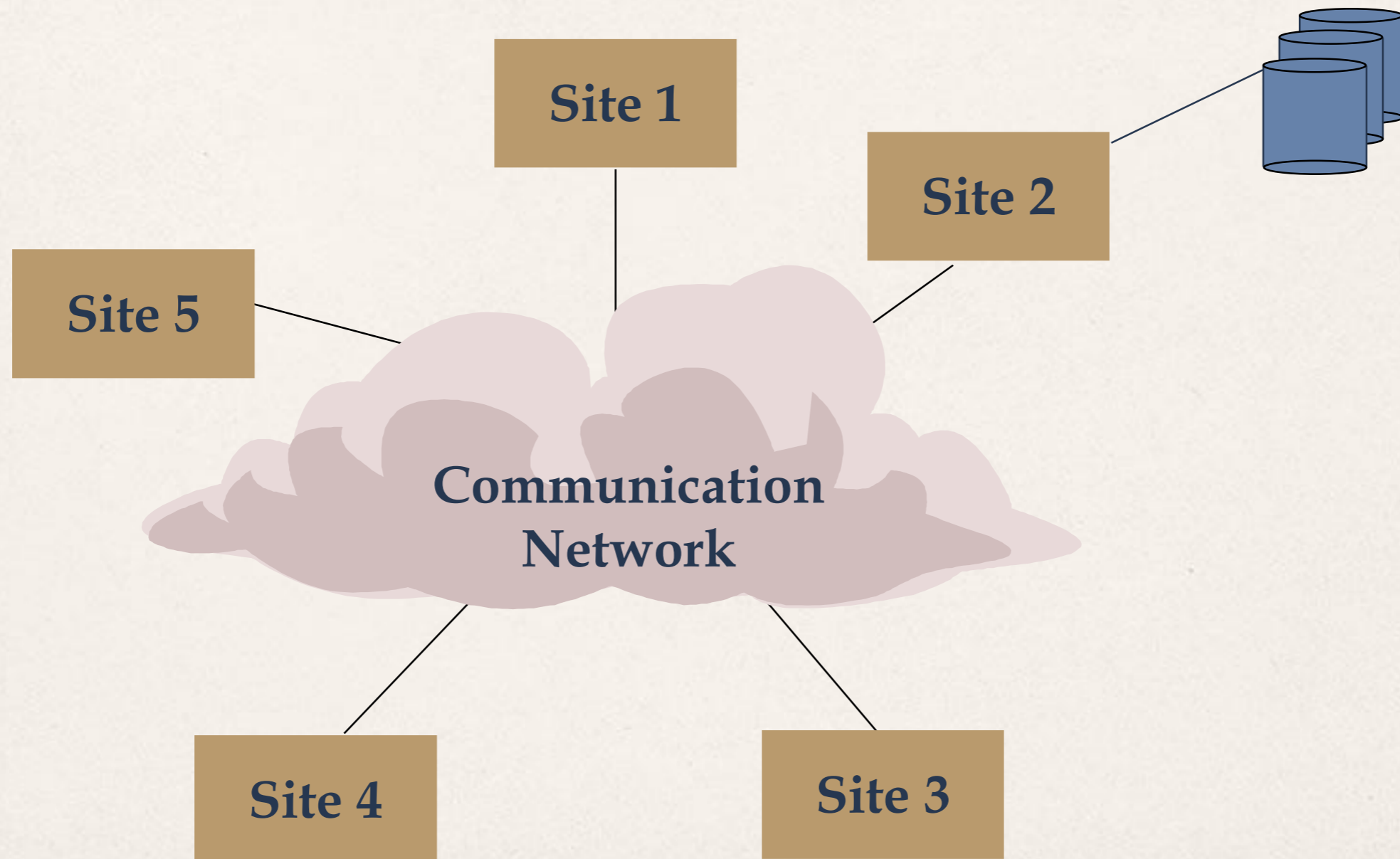
What is not a DDBS?

- A **timesharing** computer system

- A Widely or narrowly coupled multiprocessor system

- A database system which resides at one of the nodes of a network of computers - this is a centralized database on a network node
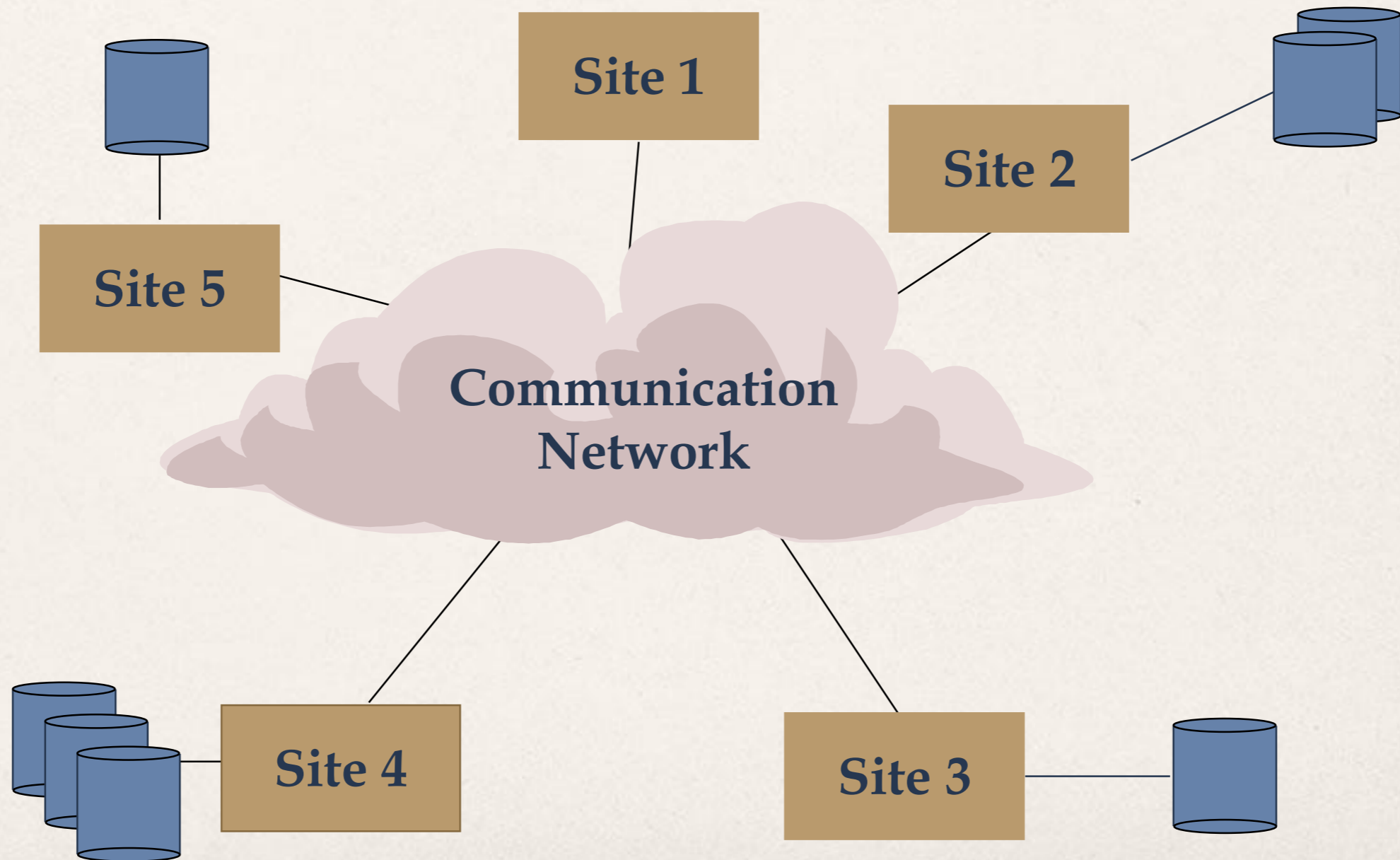
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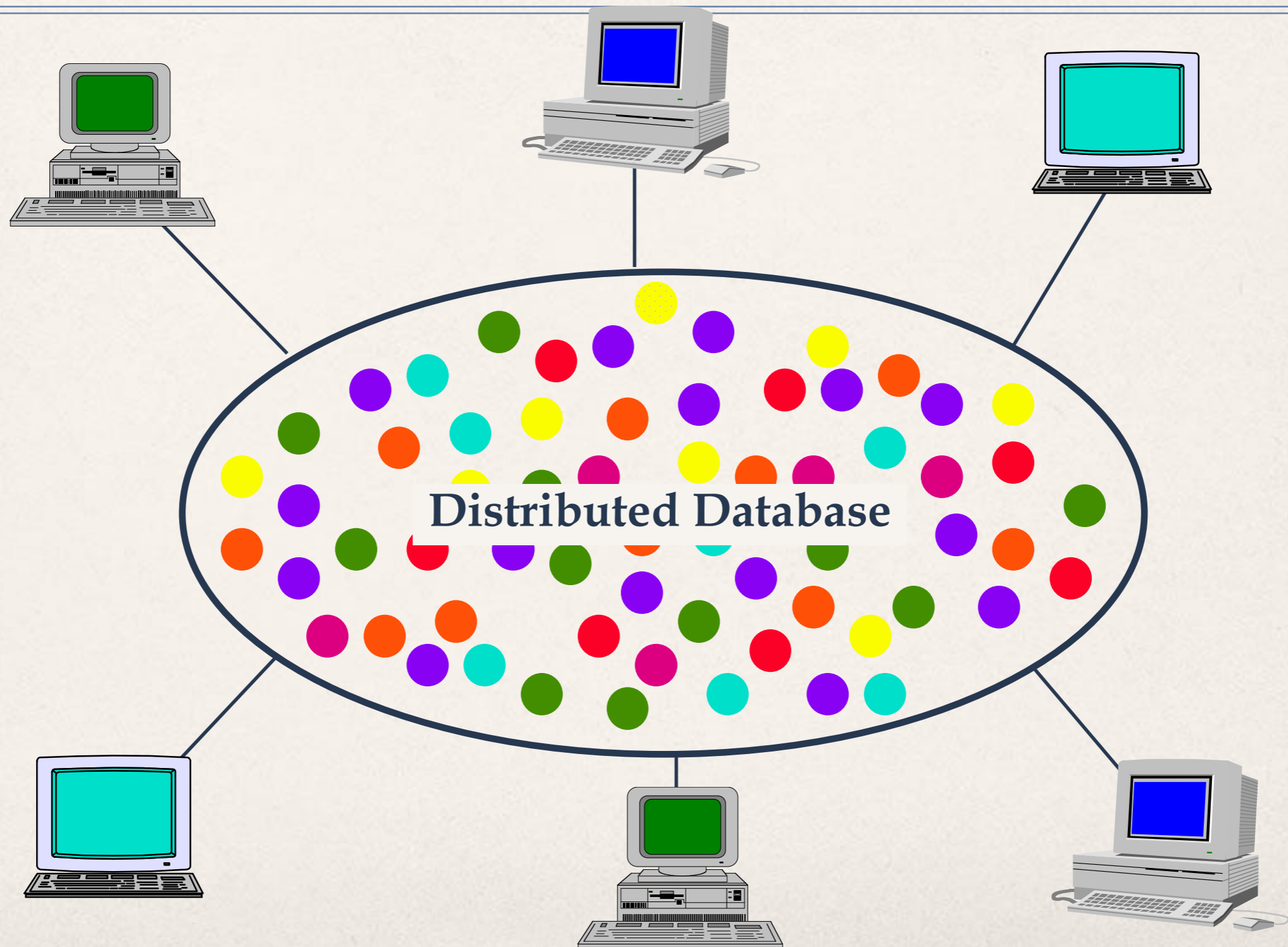# Centralized DBMS on a Network

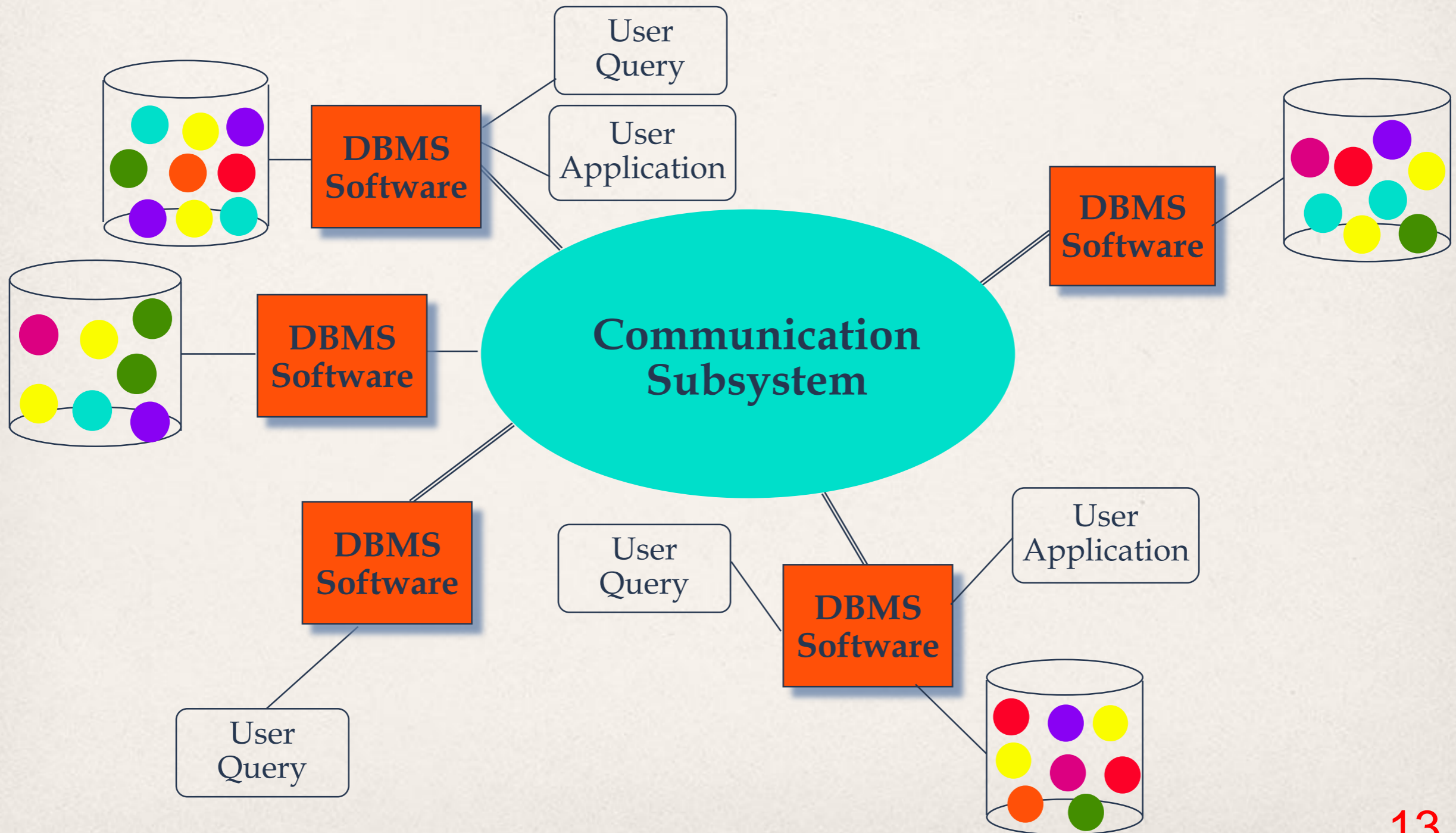# Distributed DBMS Environment

Distributed DBMS Promises

❶ Explicit management of distributed, fragmented, and replicated data

❷ Improved reliability/availability through distributed transactions

❸ Improved performance

❹ Easier and more economical system expansion

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Distributed Database - User View

Distributed Database

Distributed DBMS - Reality

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Architecture

- Defines the structure of the system

  → components identified

  → functions of each component defined

  → interrelationships and interactions between components defined

Generic DBMS Architecture

Users

External Schema
- External view
- External view
- External view

Conceptual Schema
- Conceptual view

Internal Schema
- Internal view