System Integration

Mini Case Studies

Integration Models

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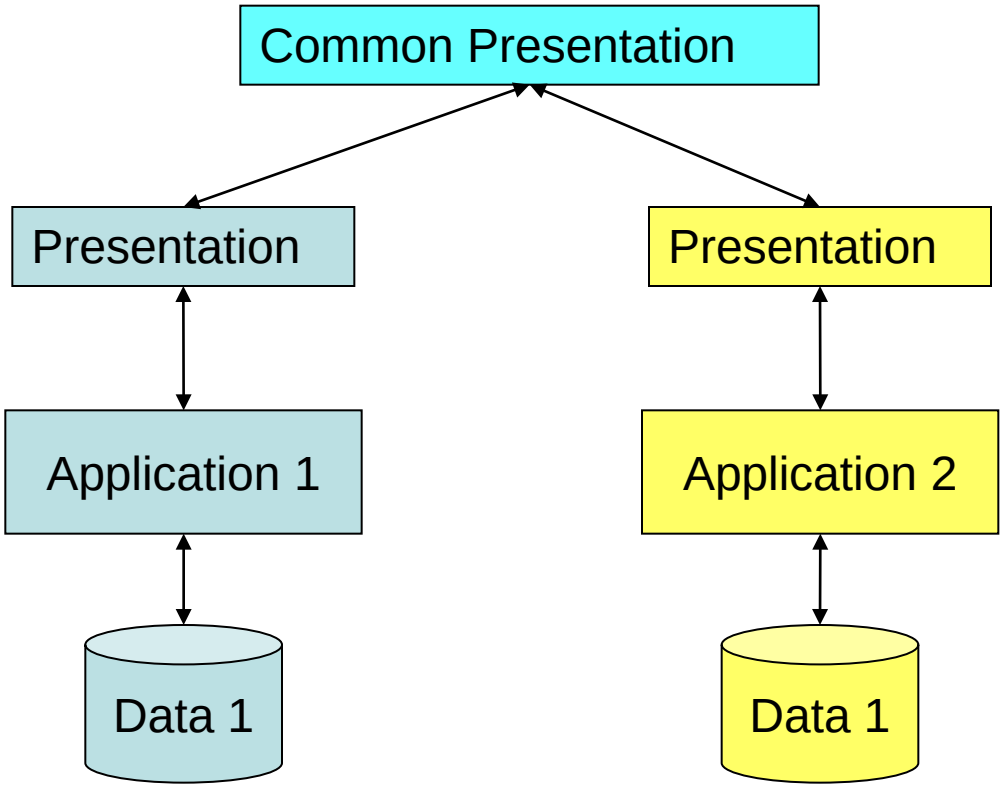
Lecture Objectives

- Understand three different types of integration models
- Understand the characteristics of these models
- Understand the advantages and disadvantages of each model

What does it mean to 'Integrate'?

- 3 Models of Integration
  - Presentation Integration – information is integrated through the user interface component
  - Data Integration – information is integrated through a middleware layer that has business intelligence
    - Similar to developing a third (independent) application to access the databases
  - Functional Integration – information is integrated among databases or data sources
- Coupling – defines the degree of integration

Presentation Integration



Characteristics of Presentation Integration

- Databases are independent – No coupling!
- Information presentation is through application API's
- Databases may have inconsistent information
- Primarily a display (i.e., read only)
- Examples of Presentation Integration models:
  - Executive dashboards
  - Operational status displays

When is it Appropriate to use the Presentation Integration Model

- Put a PC-based user interface on an existing terminal-based application
- Present and interface that the user perceives to be a single application
- Integrate with an application whose only useful and implementable integration is through its presentation
- Cannot access databases directly

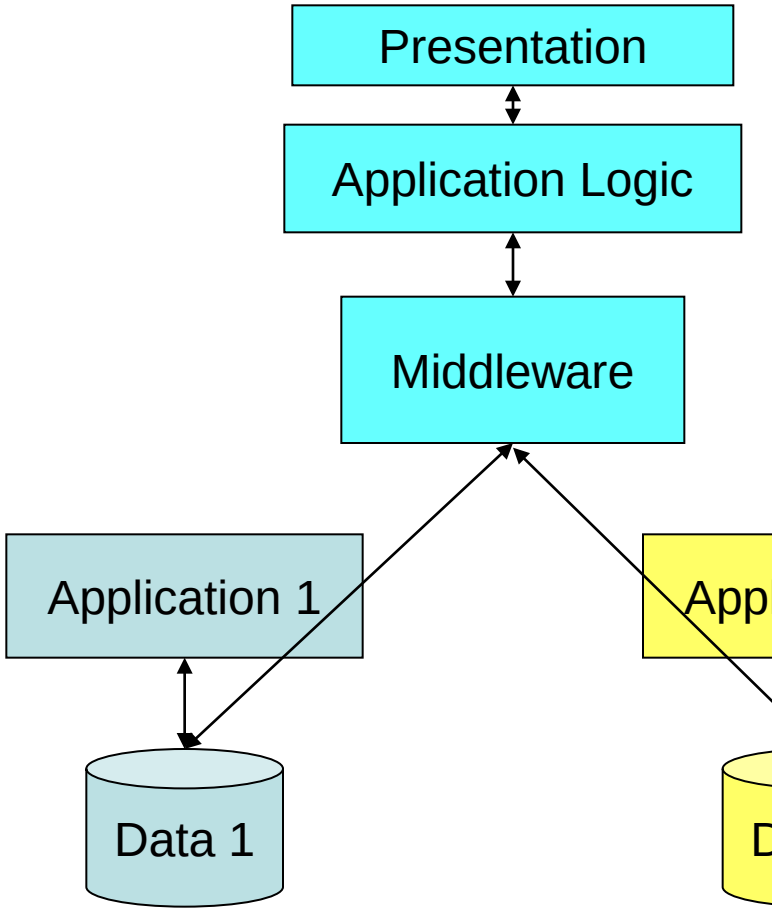
Presentation Model Advantages

- Easiest to implement of all the models
- Information presentation often meets user need for information
- Reuse is maximized, Web-based technologies useful
- Legacy applications unaffected

Presentation Model Disadvantages

- Maintenance can be difficult
  - Changes in underlying databases may affect GUI
  - Data sources may not be able to change to meet requirements
- Data may be inconsistent
- Inability to access underlying applications may constrain functionality
- API's may not fully support information requirements

Data Integration Model



Batch File Transfer
Database Gateway
ODBC
OLAP
Data Transformation

Characteristics of the Data Integration

- Data is accessed directly from all data sources
- Middleware technology is used to facilitate data services – increasingly coupled
- Business intelligence application is often used to retrieve/update and present information
- Information can be updated in both data sources
- Existing application interfaces are not used

When is the Data Integration Model Appropriate?

- Combine data from multiple sources for analysis and decision making
- Provide multiple applications with a common source of information
- Allows data to be extracted from one source and reformatted and updated in another database

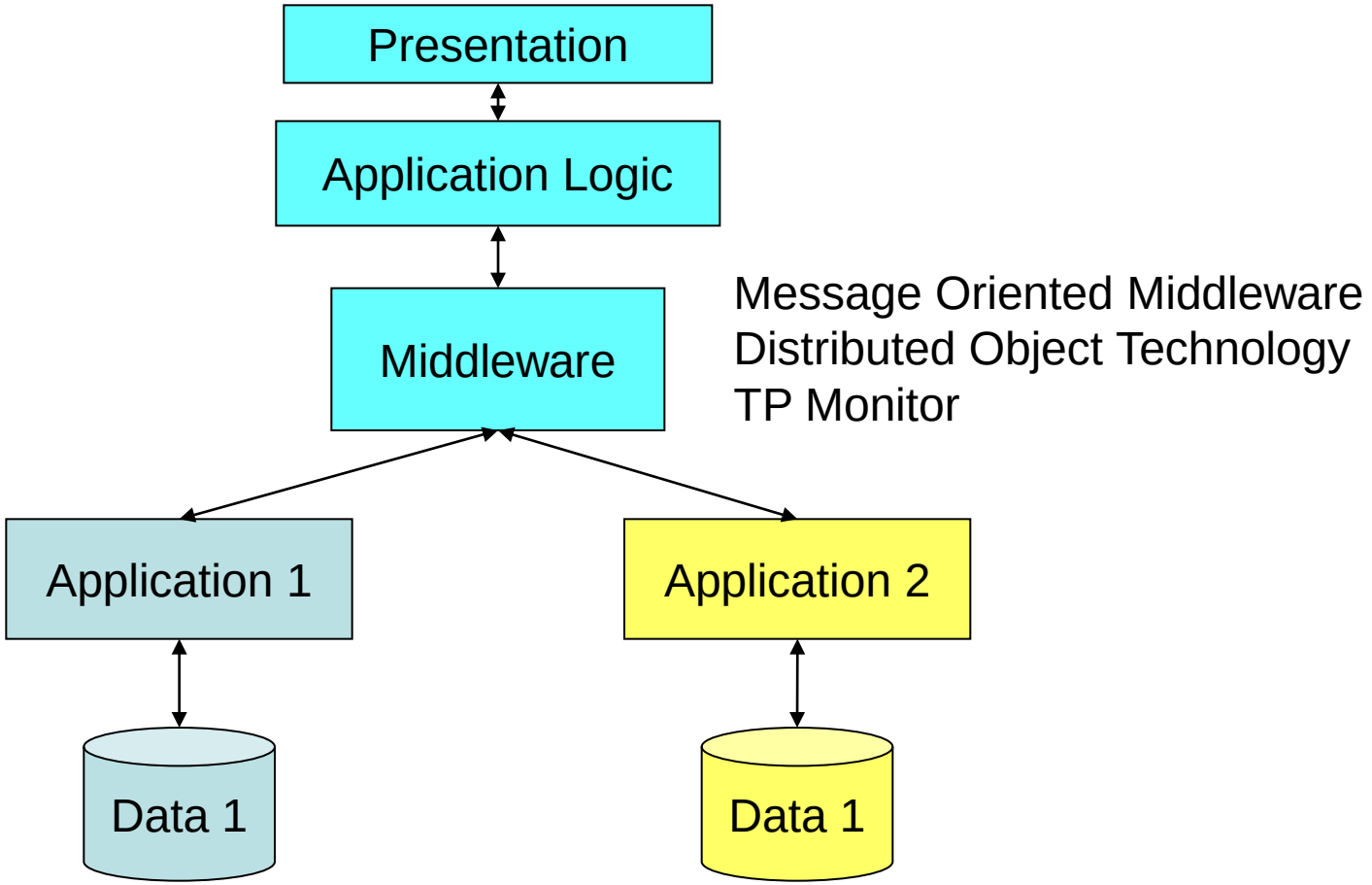
Data Model Advantages

- Can access all data elements in the DB
- Increase customization over presentation model
- Can update data if necessary
- Legacy applications unaffected

Data Model Disadvantages

- Maintenance can be difficult
- Data may be inconsistent
- Inability to access business logic in legacy applications may constrain available functionality
- Redundant code possible

Functional Integration Model



Characteristics of Functional Integration

- *Application Logic* is available to the presentation layer from legacy applications
- Data consistency
- Update capability with the integrated applications
- Some sort of middleware is necessary to manage all integrated applications
- The most coupled of integration styles

When is the Functional Model Appropriate?

- Data consistency is important – integration through the code of an application where the purpose is to access or update data

- Multi-step processes must be coordinated – an action is properly processed across all relevant application in the correct order of precedence

- Plug-and-play components –
  - Interfaces are formed using a consistent set of rules
  - The definitions of the actions are consistently applied

Functional Model Advantages

- Complete access to all data and business logic
- Can create the most customized solution
- Can update legacy applications if necessary
- Data is consistent in the *system*

Functional Model Disadvantages

- Maintenance task increases in complexity
- The most difficult to implement
- Data may be inconsistent
- Legacy applications may be affected

Heuristic 2

Build and maintain options as long as possible in the design and implementation of complex systems. You will need them.

Heuristic 3

Simplify, Simplify, Simplify

Summary

- Three types of integration models:
  - Presentation Model
  - Data Model
  - Functional Model
- These models do not constitute a rigid integration design model, rather many integrated systems are a combination of styles
- Each model has advantages and disadvantages
- The integration style should be selected based on the user requirements and constraints
- Think about the heuristics when selecting an integration style