SAD AND VIEWS

OBJECTIVES

- describe contents of an SAD
- explain what are views and viewpoints
- can describe RUP 4+1 viewpoint set
- can describe viewpoint set Rozanski & Woods

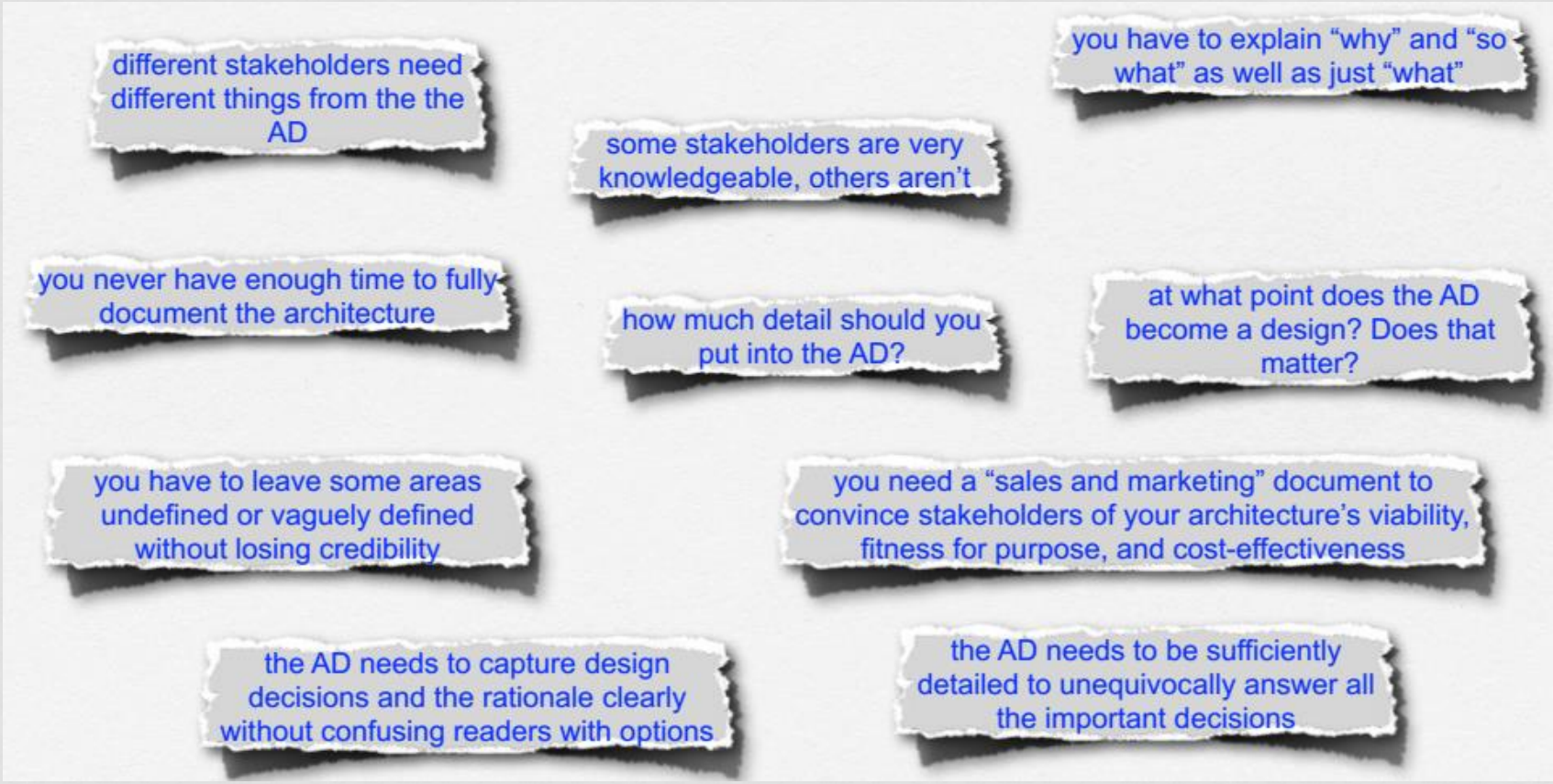
CONTENTS

- **Software Architecture Document (SAD)**
- views & viewpoints
- RUP 4+1 viewpoint set
- R&W viewpoint set

AD

- an Architectural Description (AD) is a set of products which documents an architecture in a way which is understandable by its stakeholders
- it should demonstrate that the architecture has met the concerns of stakeholders
  - concern : a requirement, an objective, an intention, or an aspiration which a stakeholder has
- the products in an AD include views, models, principles, constraints etc. (as we will discuss)
- the AD should show the overall picture, but also decompose into enough detail

CHALLENGES


different stakeholders need different things from the the AD
you have to explain "why" and "so what" as well as just "what"
some stakeholders are very knowledgeable, others aren't
you never have enough time to fully document the architecture
how much detail should you put into the AD?
at what point does the AD become a design? Does that matter?
you have to leave some areas undefined or vaguely defined without losing credibility
you need a "sales and marketing" document to convince stakeholders of your architecture's viability, fitness for purpose, and cost-effectiveness
the AD needs to capture design decisions and the rationale clearly without confusing readers with options
the AD needs to be sufficiently detailed to unequivocally answer all the important decisions

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OVERVIEW OF VIEWPOINTS

- architecture is about defining structures – not one but many
  - functional structure
  - information structure
  - concurrency structure
  - design time structure
  - …
- it's also very much about properties –we'll get to these later

DEALING WITH MANY STRUCTURES IS HARD

- organization of ideas
- understanding different aspects simultaneously
- separating concerns
- dealing with different aspects equally
- consistency

VIEWS AND VIEWPOINTS

- a view is a representation of the whole system, as seen through the prism of specific concerns
- views solve the problem that it is not possible to capture all the functional features and quality properties in a single model
- a view consists of one or more models that represent it
- using multiple views is essential for both designing and describing an architecture
- so that we can explain to the different stakeholders how their concerns are met

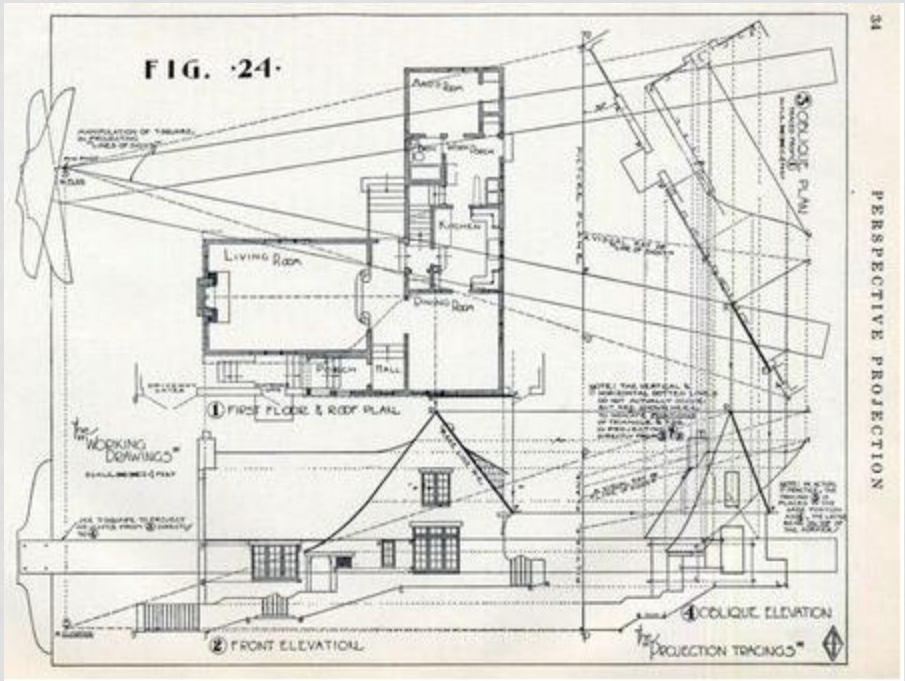
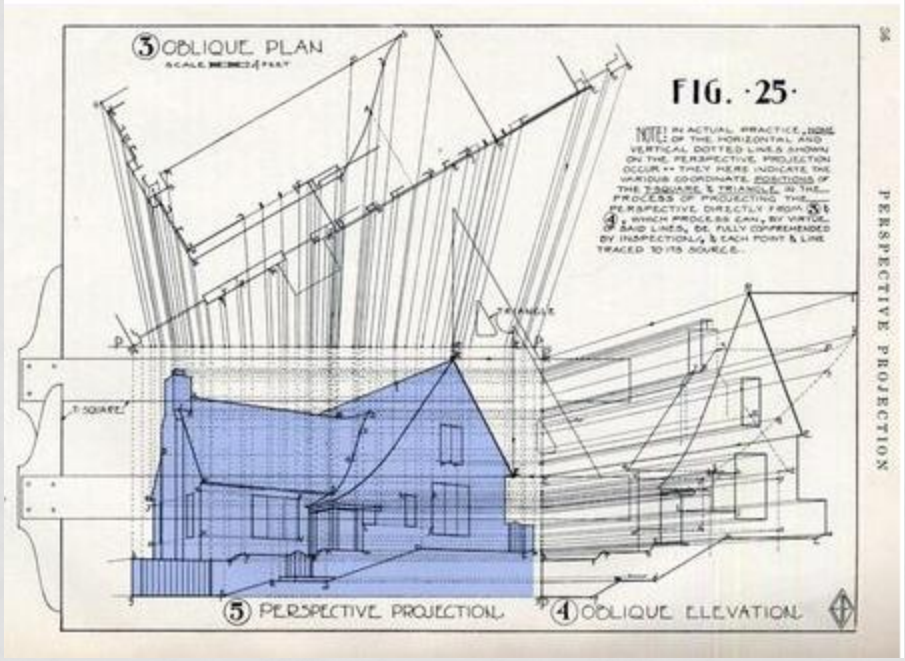
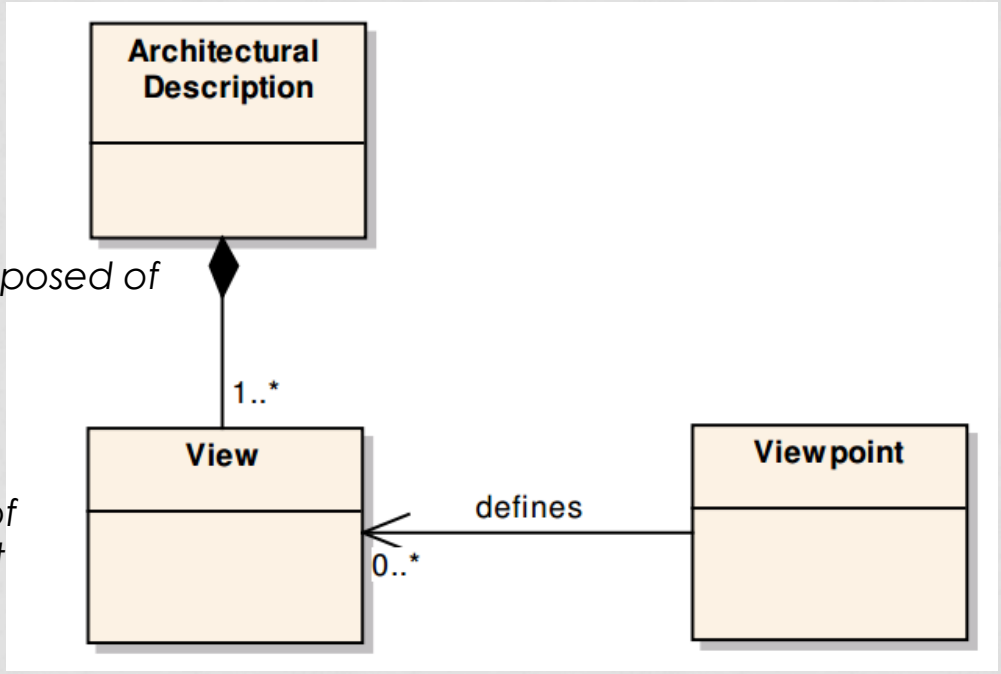


FIG. ·24·
34
PERSPECTIVE PROJECTION
LIVING ROOM
DINING ROOM
KITCHEN
PORCH
HALL
3 OBLIQUE PLAN
1 FIRST FLOOR & ROOF PLANS
for "WORKING DRAWINGS"
2 FRONT ELEVATION
4 OBLIQUE ELEVATION
for "PROJECTION TRACINGS"


3 OBLIQUE PLAN
FIG. ·25·
NOTE: IN ACTUAL PRACTICE, NONE OF THE HORIZONTAL AND VERTICAL DOTTED LINES SHOWN ON THE PERSPECTIVE PROJECTION OCCUR — THEY HERE INDICATE THE VARIOUS COORDINATE POSITIONS OF THE T-SQUARE & TRIANGLE IN THE PROCESS OF PROJECTING THE PERSPECTIVE DIRECTLY FROM 3 & 4, WHICH PROCESS CAN, BY VIRTUE OF SAID LINES, BE FULLY COMPREHENDED BY INSPECTION, & EACH POINT & LINE TRACED TO ITS SOURCE.
T-SQUARE
TRIANGLE
5 PERSPECTIVE PROJECTION
4 OBLIQUE ELEVATION
PERSPECTIVE PROJECTION

VIEWS AND VIEWPOINTS

- a viewpoint is a pattern or generalization of a view
- the viewpoint is the class (or template), the view is the instance
- models (e.g. diagrams) are the artifacts from which the view is made

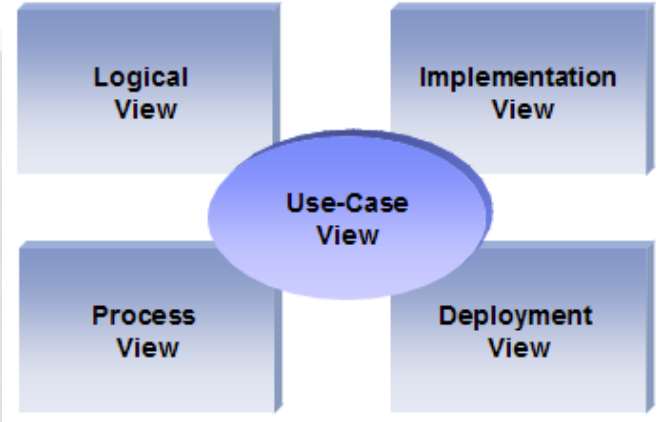


VIEWPOINT SETS

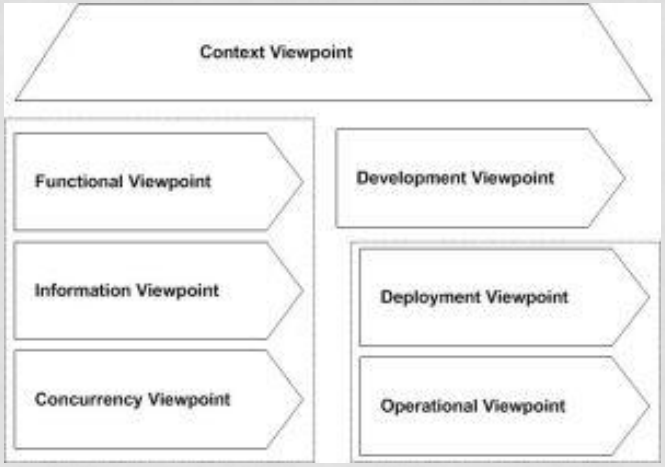
- there are many ‘standard’ viewpoint sets (catalogs) e.g.
  - RUP 4+1
  - Rozanski & Woods
  - RM-ODP
  - Siemens
  - SEI
  - Garland & Anthony

RUP VS. R&W

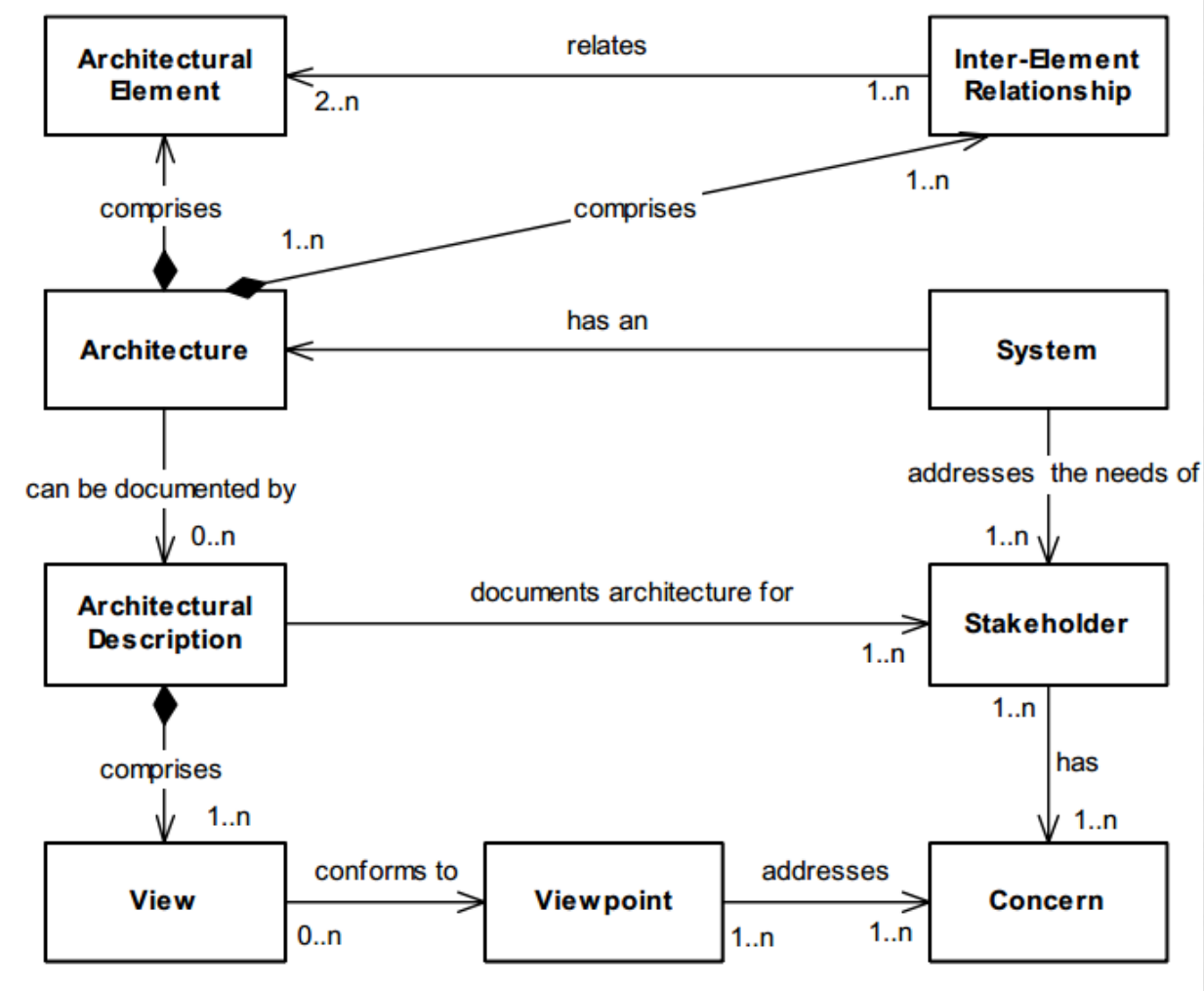
- RUP/Kruchten 4+1
  - best known approach
  - different interpretations exist
  - rather technically oriented
  - quality attributes less explicit



- Rozanski & Woods
  - extension and refinement of Kruchten's set
  - aimed at modern, large scale, distributed information systems
  - renamed & evolved Logical, Process and Physical
  - added Information and Operational



CONCEPTS AND RELATIONSHIPS



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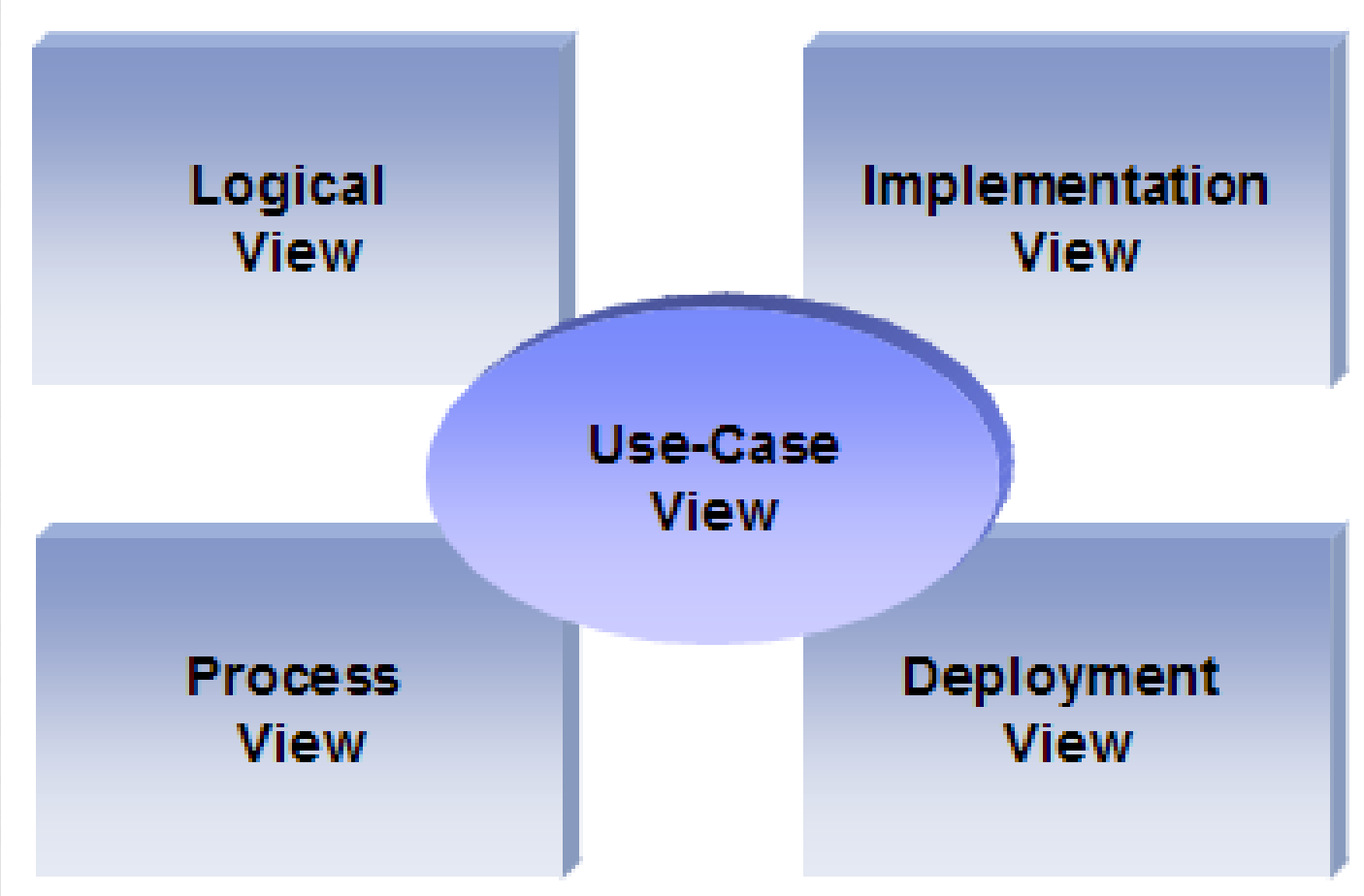
RUP 4+1 VIEWPOINTS



USE CASE VIEW

- key scenarios that drive the discovery, design and validation of the architecture
  - Use Case Diagram(s)
  - Use Case Descriptions

Buy a Product

Goal Level: Sea Level

Main Success Scenario:

1. Customer browses catalog and selects items to buy
2. Customer goes to check out
3. Customer fills in shipping information (address; next-day or 3-day delivery)
4. System presents full pricing information, including shipping
5. Customer fills in credit card information
6. System authorizes purchase
7. System confirms sale immediately
8. System sends confirming e-mail to customer

Extensions:

3a: Customer is regular customer
  .1: System displays current shipping, pricing, and billing information
  .2: Customer may accept or override these defaults, returns to MSS at step 6

6a: System fails to authorize credit purchase
  .1: Customer may reenter credit card information or may cancel

Figure 9.1 *Example use case text*

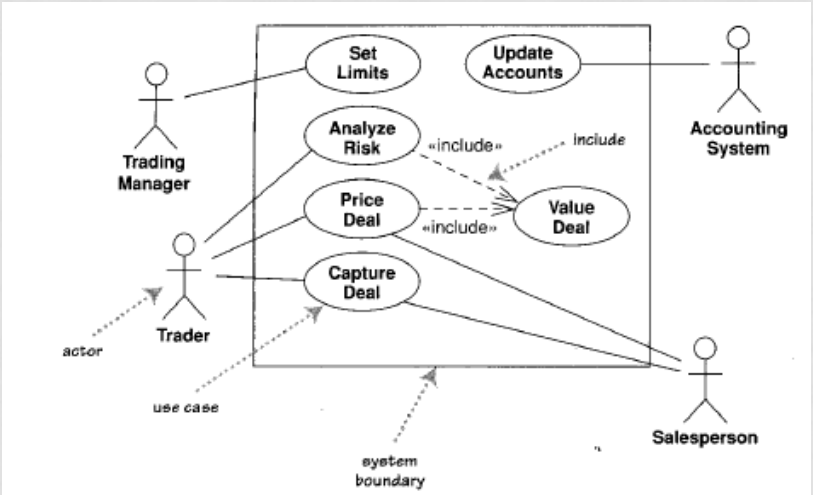
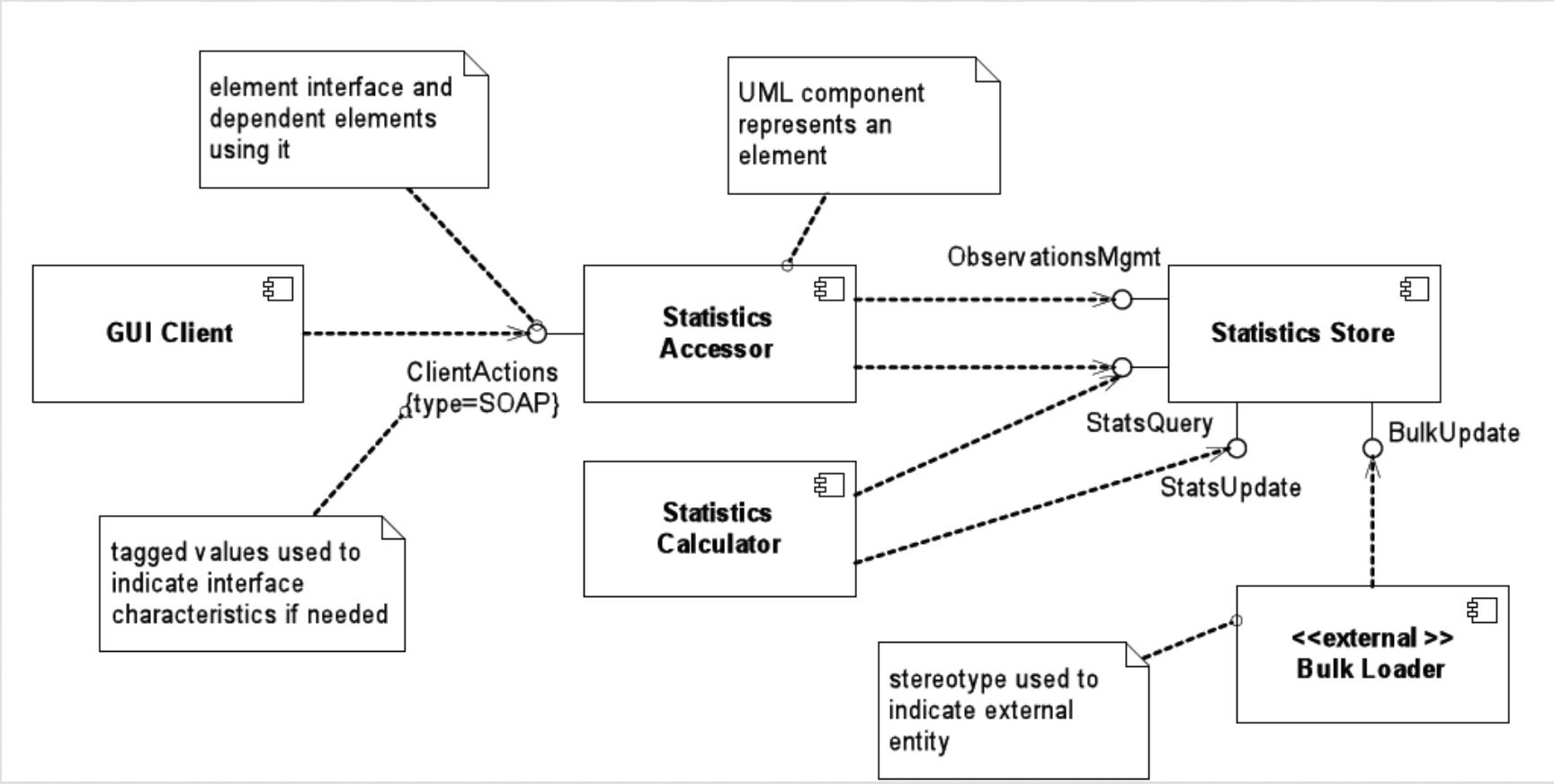


Figure 9.2 *Use case diagram*

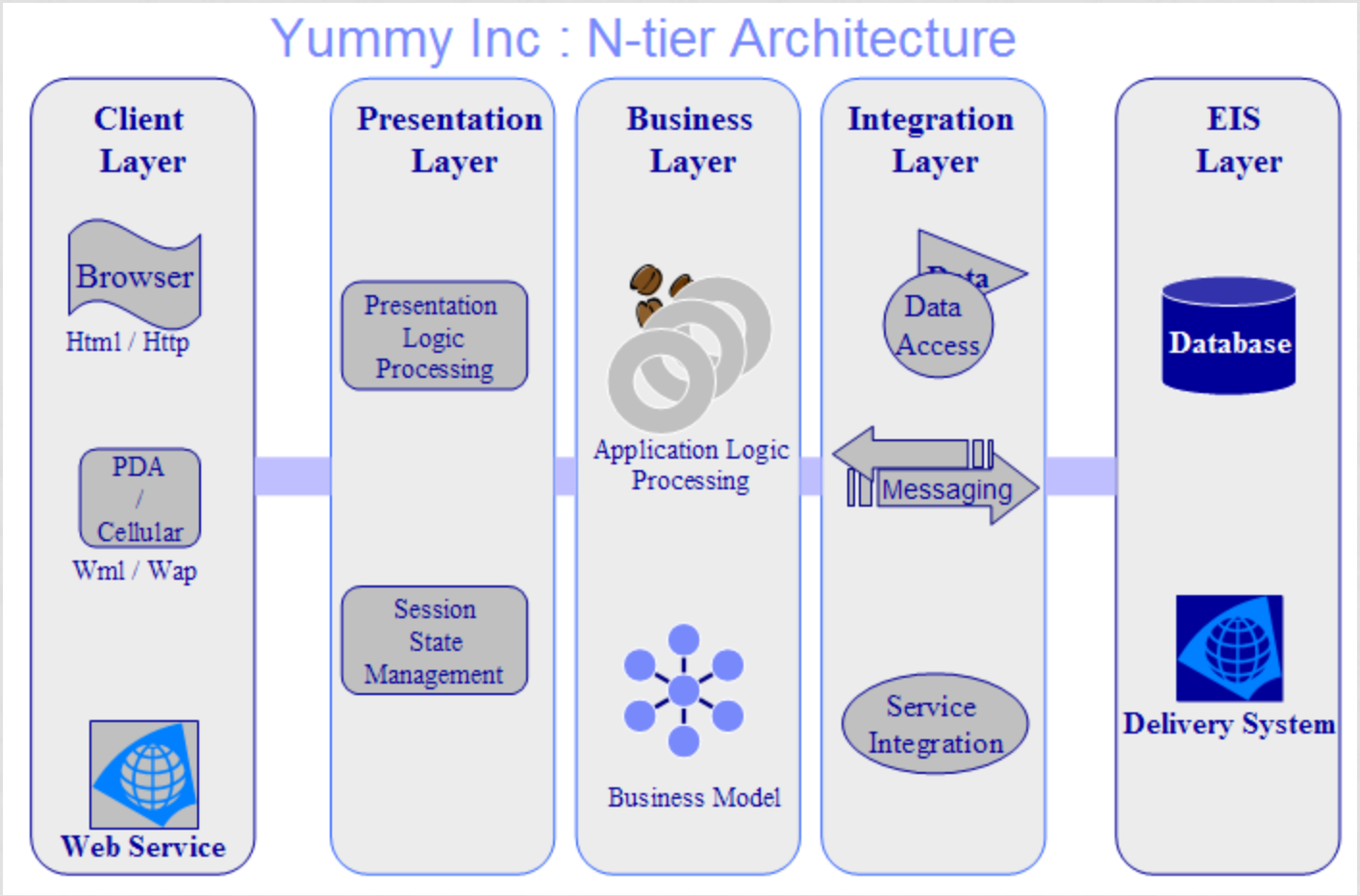
LOGICAL VIEW

- describes the functional structure and behavior of the system
- Fundamental pieces (components, classes, procedures, systems, interfaces)
- interaction using static diagrams
  - component diagram
  - can include class diagram and ERD
- subsystems, components, dependencies and interfaces
- layers & tiers
  - layers are organized on the level of abstraction (e.g. a server could have layers as domain logic & data access)
  - tiers are organized on the type of service (e.g. client, webserver, database server)
- may describe behavior by detailing significant use cases using sequence diagrams

LOGICAL VIEW



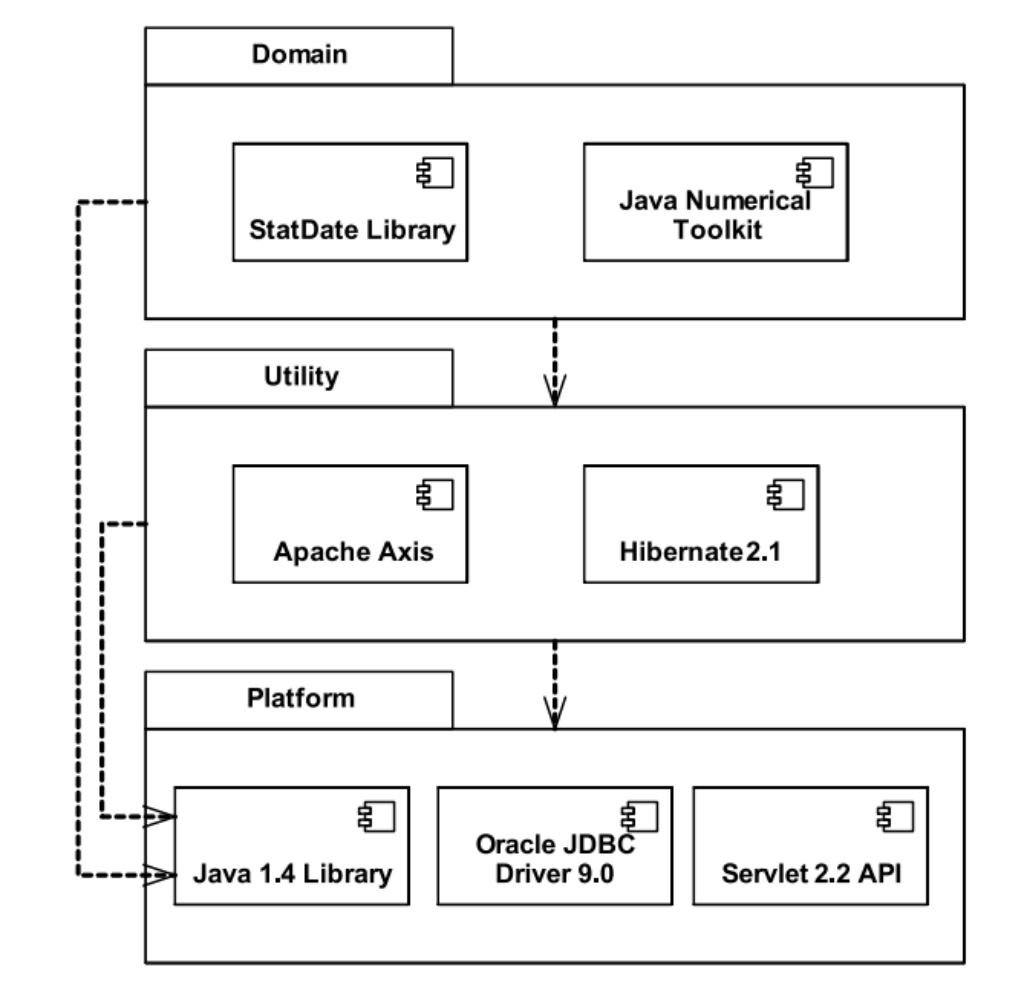
LOGICAL VIEW



IMPLEMENTATION VIEW

- describes the organization of the software modules and implementation details
  - package diagrams
  - file structures
  - frameworks, libraries, programming language(s)
  - development environment
  - database engine
  - OS
  - middleware

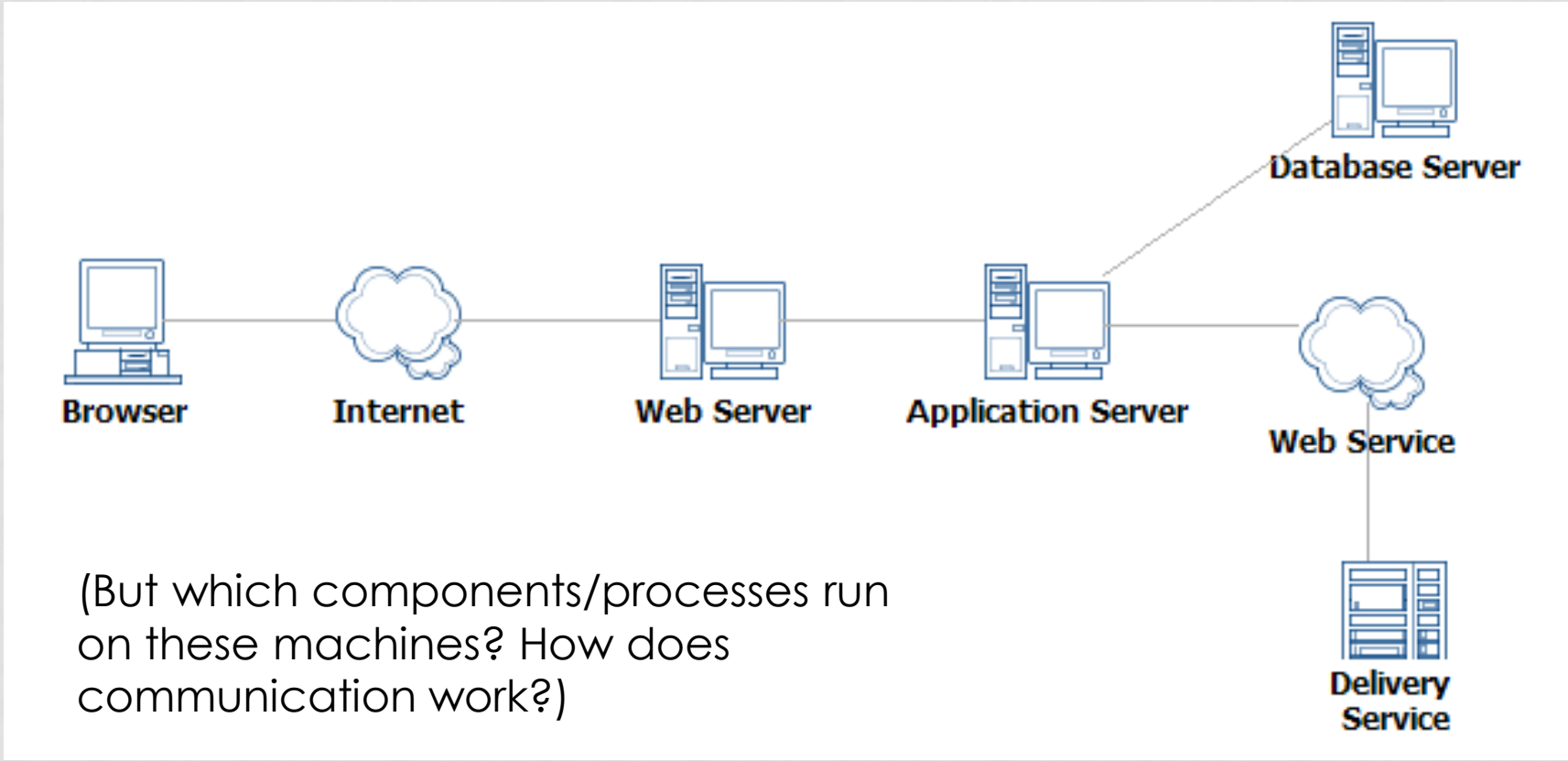
IMPLEMENTATION VIEW



DEPLOYMENT VIEW

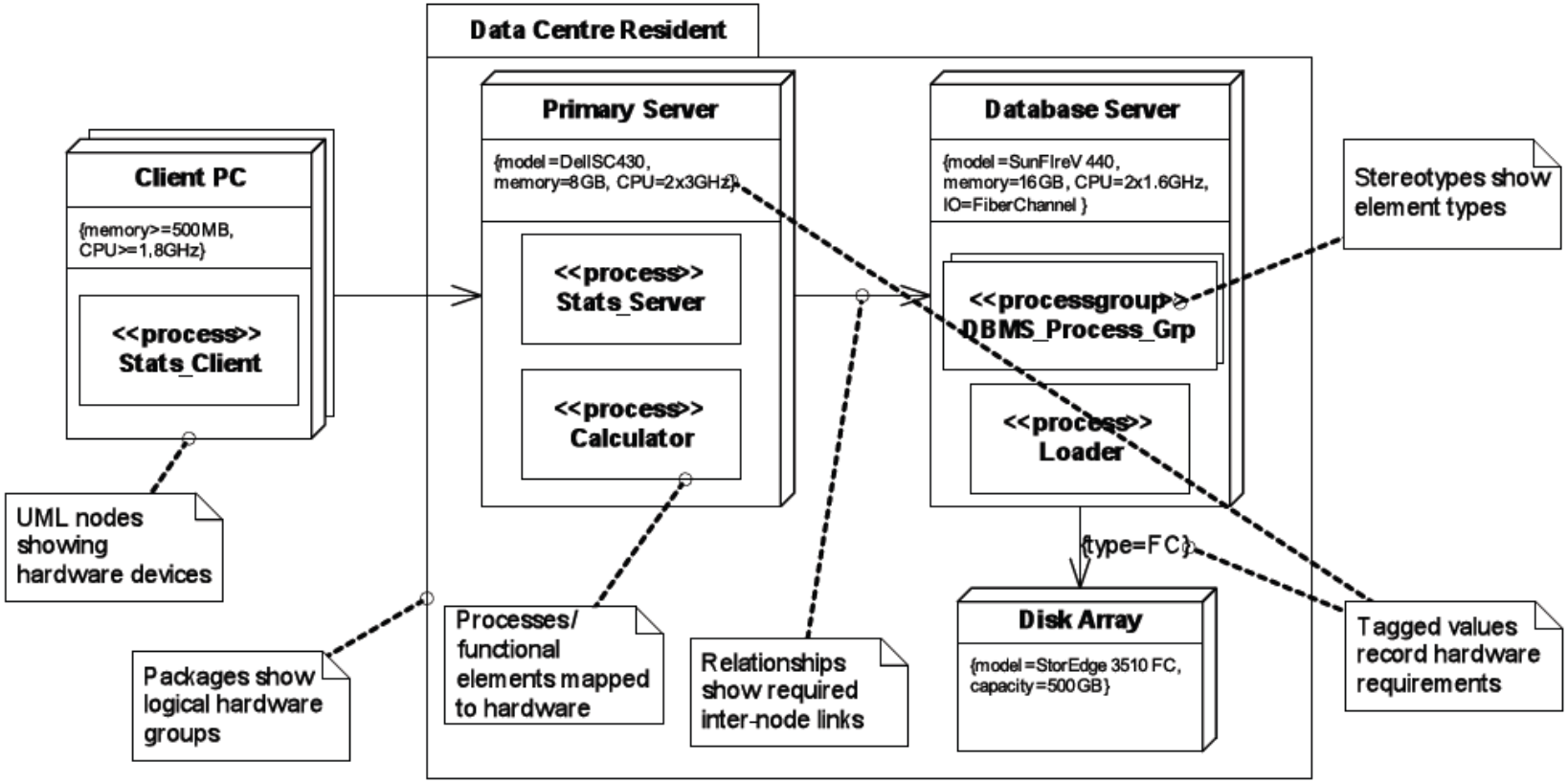
- shows how the run-time entities are mapped on the execution platform and the HW
  - mapping of deployable components onto processors
- hardware configuration
- network configuration
- ways of communication
- protocols used
- …

DEPLOYMENT VIEW



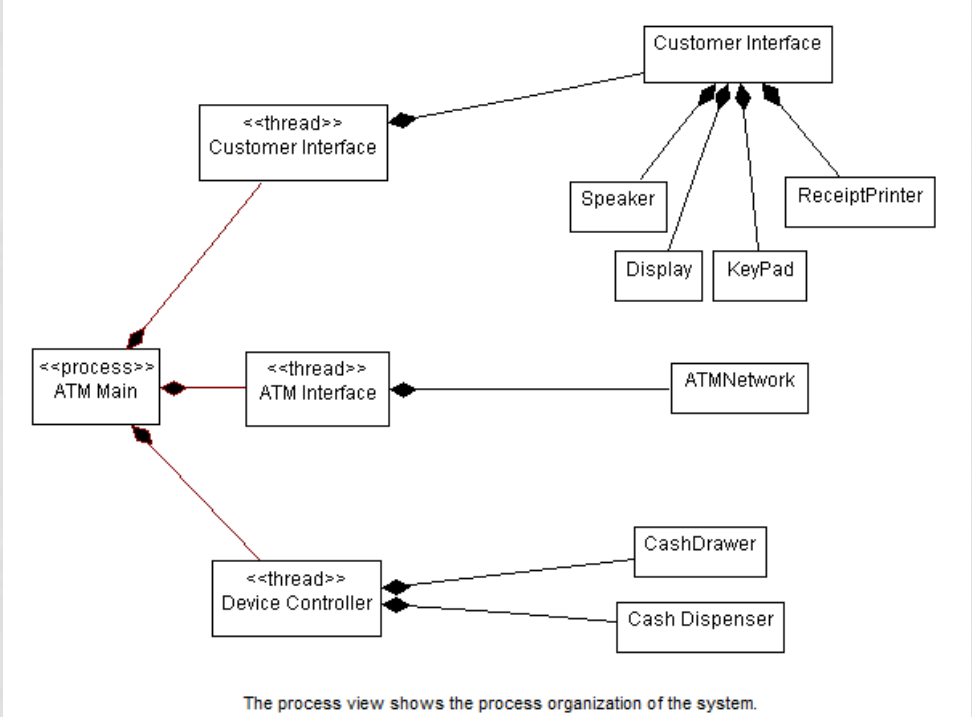
(But which components/processes run on these machines? How does communication work?)

DEPLOYMENT VIEW



PROCESS VIEW

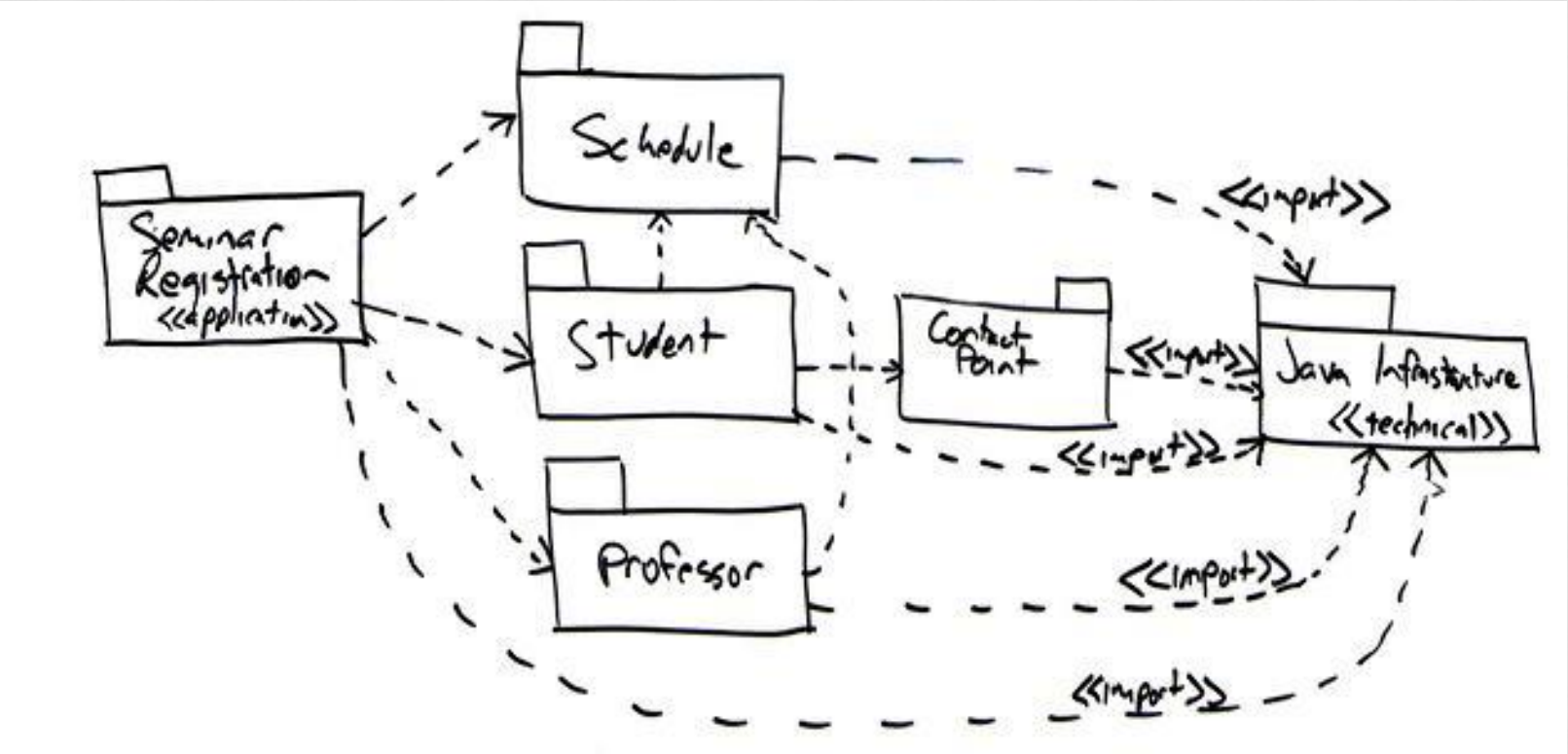
- threads & processes
- inter-process communication (IPC)
- scheduling aspects
- shared resources, synchronisation
- the least used view



QUIZ

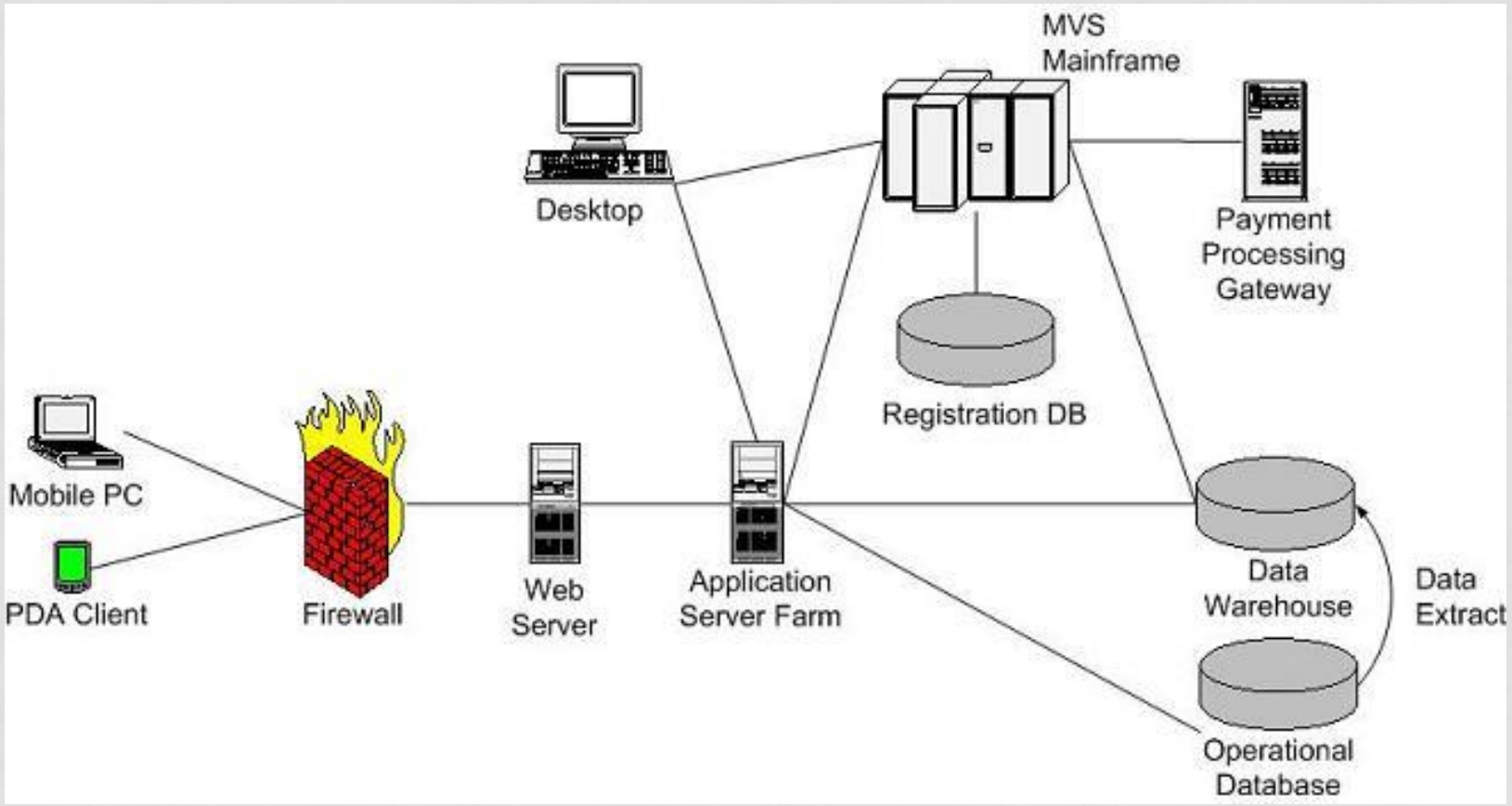
To which views would the following diagrams belong?

WHICH VIEW?



http://www.agilemodeling.com/artifacts

WHICH VIEW?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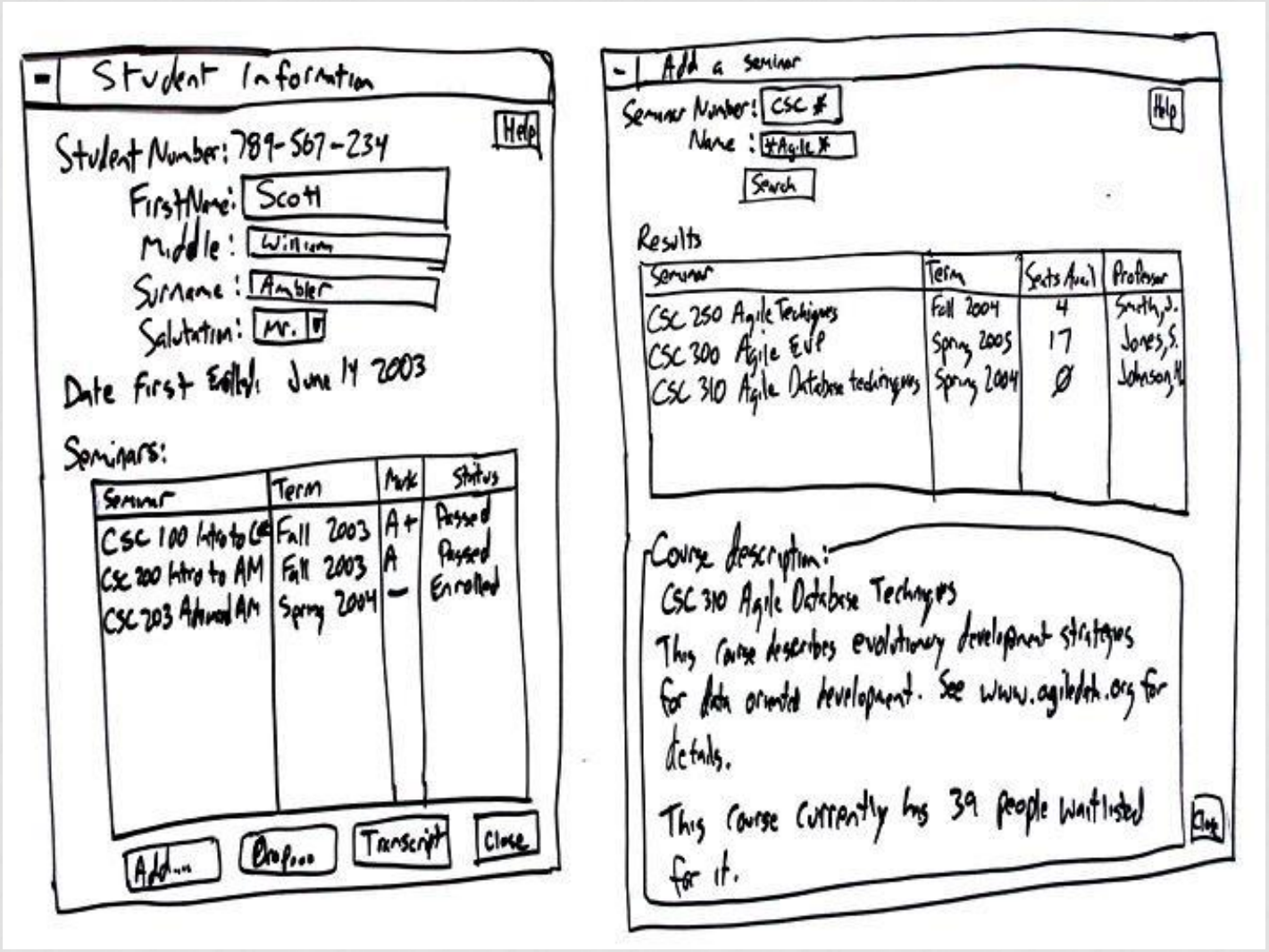
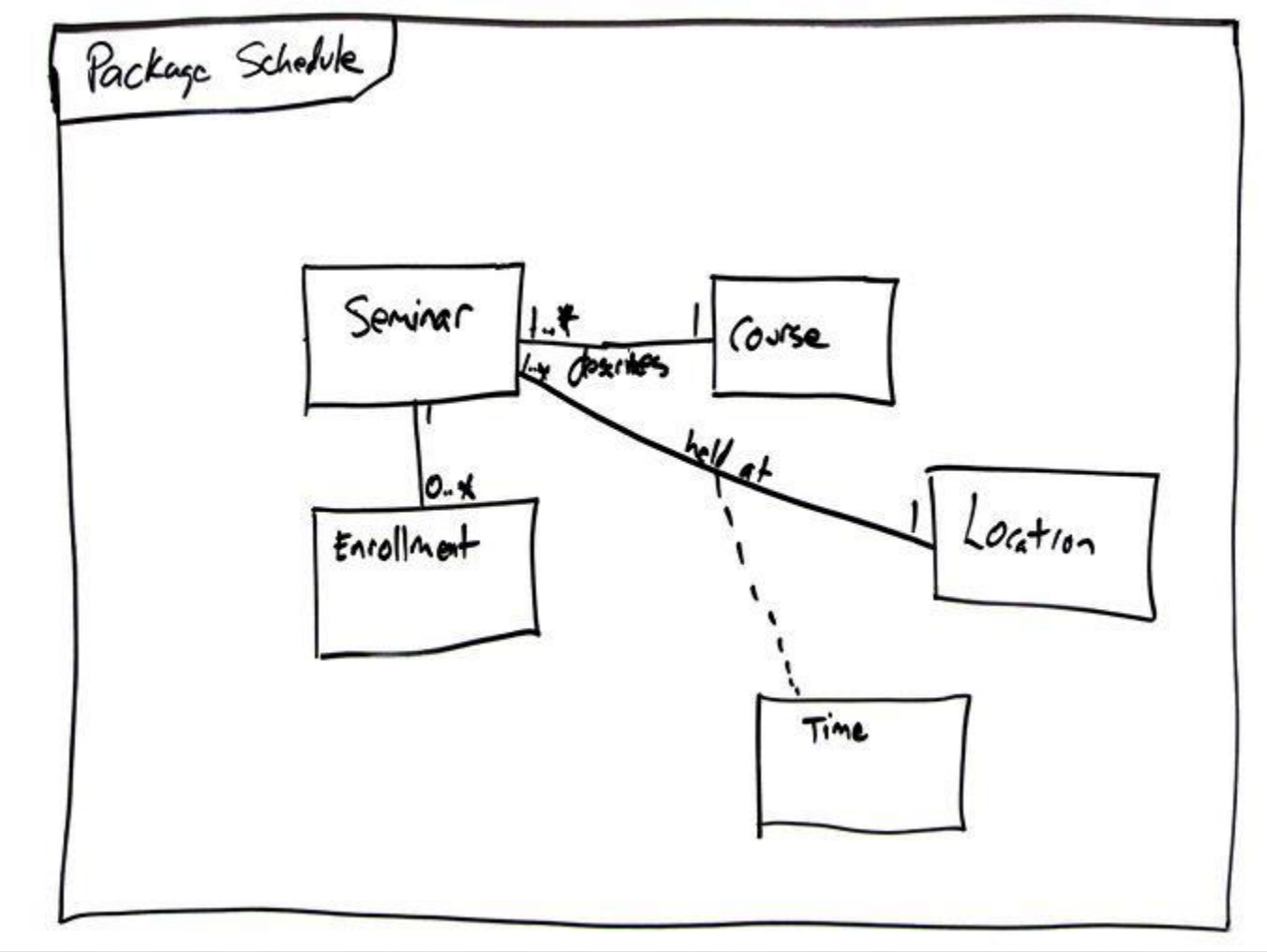
Mainframe
Desktop
Payment
Processing
Gateway
Registration DB
Mobile PC
PDA Client
Firewall
Web
Server
Application
Server Farm
Data
Warehouse
Data
Extract
Operational
Database

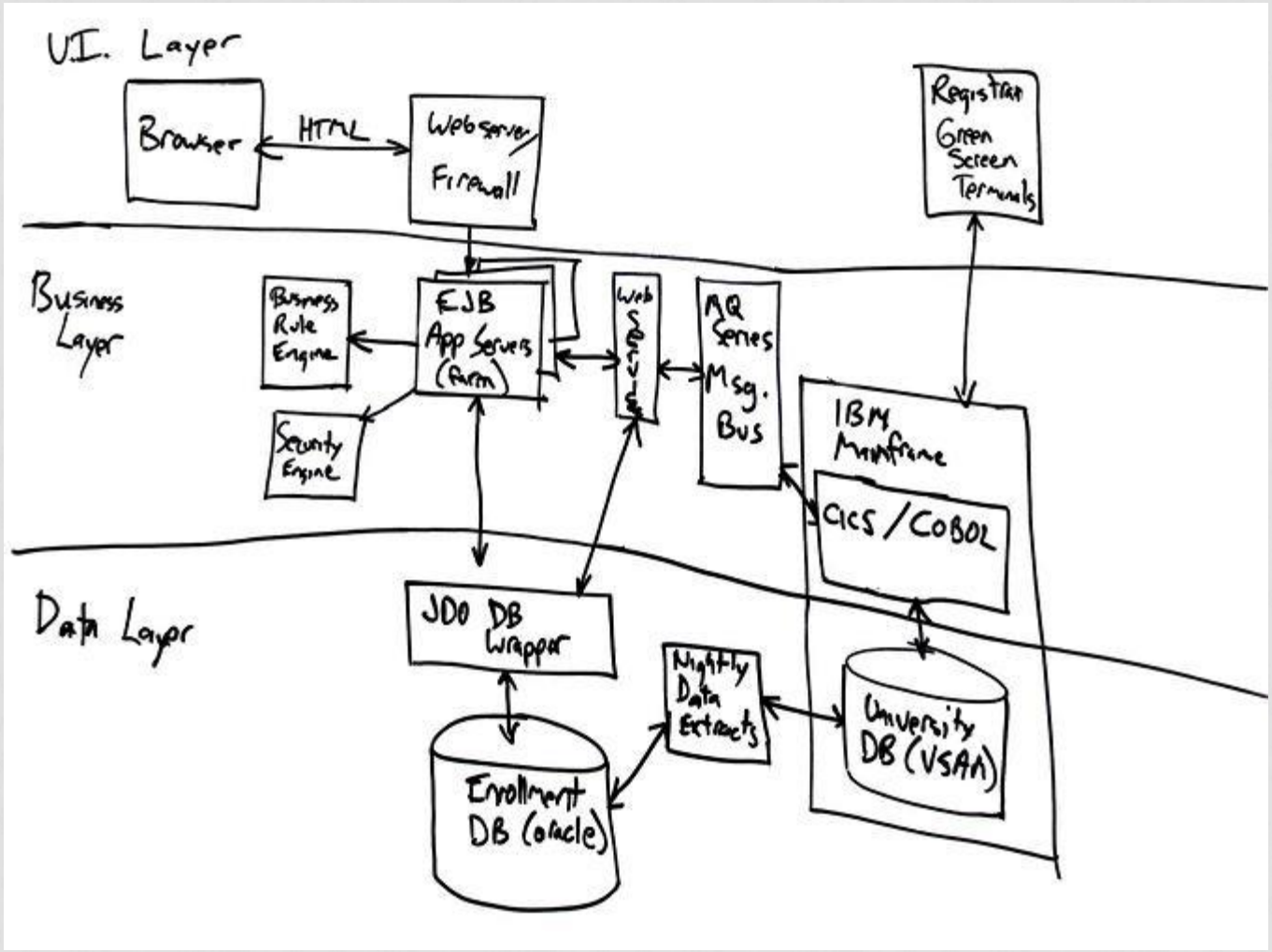
WHICH VIEW?


Student Information
Help
Student Number: 789-567-234
First Name: Scott
Middle: William
Surname: Ambler
Salutation: Mr.
Date First Enrolled: June 14 2003
Seminars:
Seminar
Term
Mark
Status
CSC 100 Intro to C#
Fall 2003
A+
Passed
CSC 200 Intro to AM
Fall 2003
A
Passed
CSC 203 Advanced AM
Spring 2004
—
Enrolled
Add...
Drop...
Transcript
Close
Add a seminar
Seminar Number: CSC #
Name: %Agile%
Search
Help
Results
Seminar
Term
Seats Avail
Professor
CSC 250 Agile Techniques
Fall 2004
4
Smith, J.
CSC 300 Agile EUP
Spring 2005
17
Jones, S.
CSC 310 Agile Database techniques
Spring 2004
0
Johnson, M.
Course description:
CSC 310 Agile Database Techniques
This course describes evolutionary development strategies for data oriented development. See www.agiledata.org for details.
This course currently has 39 people waitlisted for it.
Close

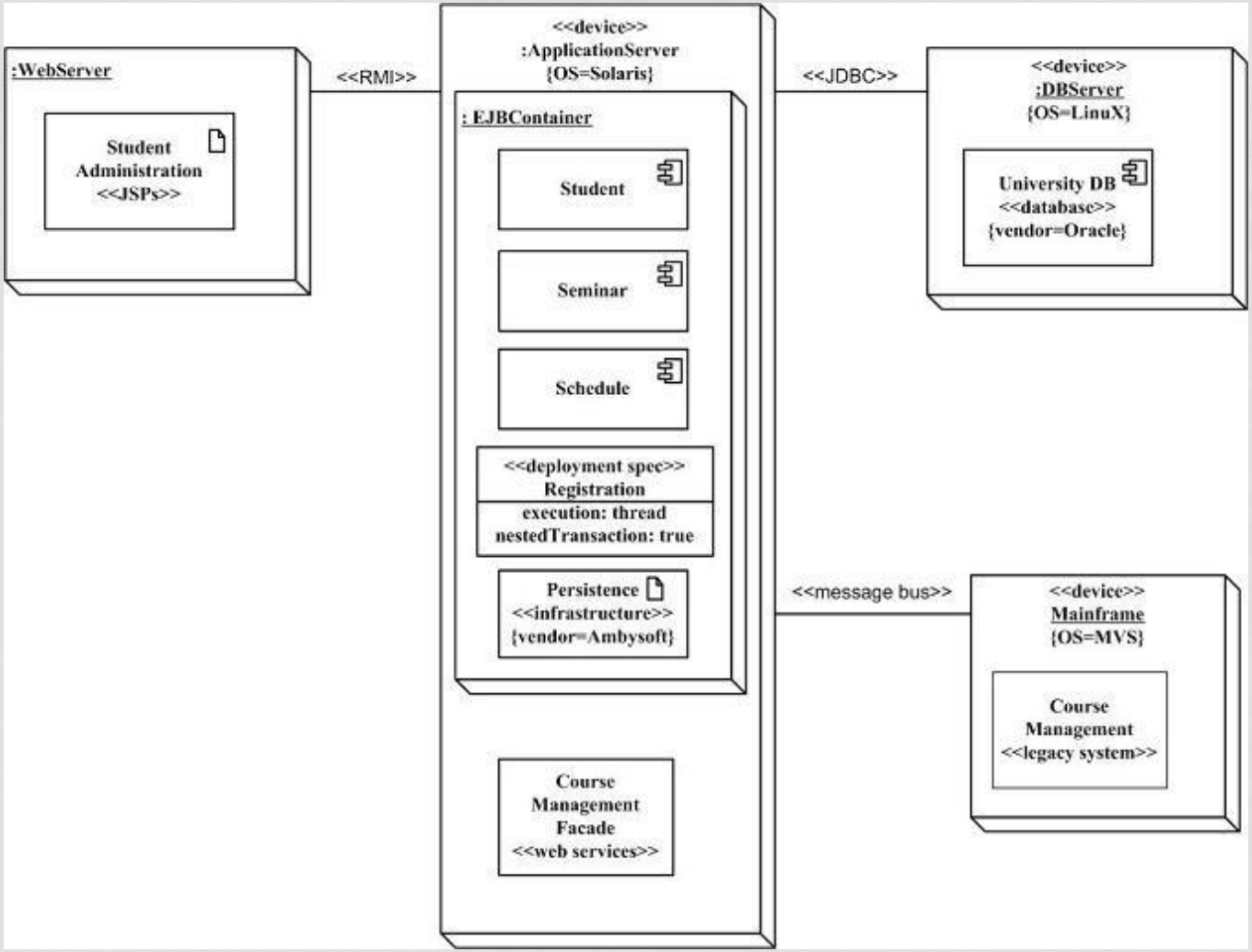
WHICH VIEW?


Package Schedule
Seminar
1..*
1
Course
1..*
0..*
Enrollment
held at
1
Location
Time

WHICH VIEW?


UI. Layer
Browser
HTML
Web server
Firewall
Registrar
Green Screen Terminals
Business Layer
Business Rule Engine
EJB App Servers (farm)
Web Services
MQ Series Msg. Bus
Security Engine
IBM Mainframe
CICS / COBOL
Data Layer
JDO DB Wrapper
Nightly Data Extracts
University DB (VSAM)
Enrollment DB (oracle)

WHICH VIEW?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<<RMI>>
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: EJBContainer
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Mainframe
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Course Management
<<legacy system>>

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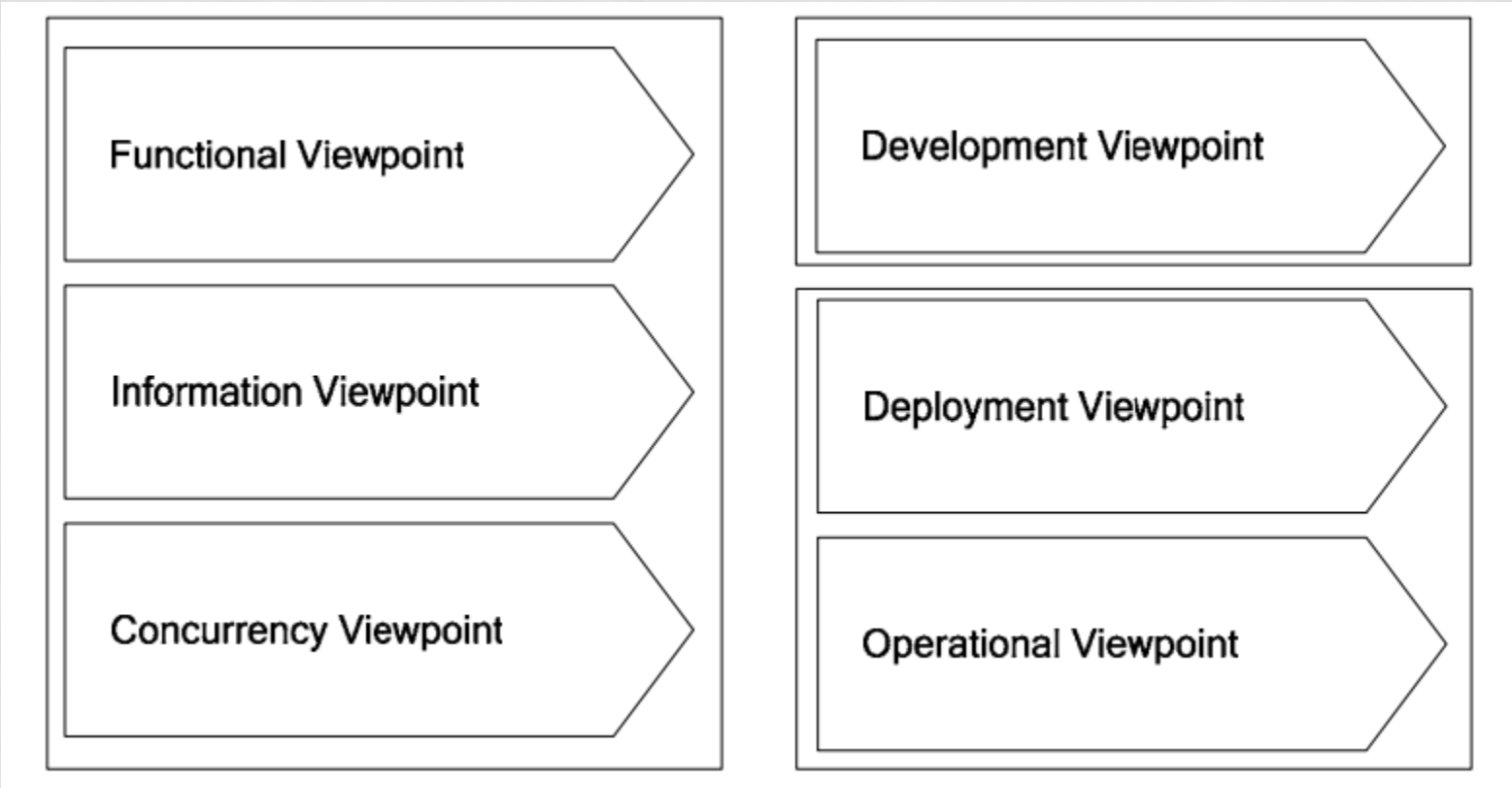
- **R&W viewpoint set**

R&W VIEWPOINT SET



R&W COMPARED WITH RUP

- Information
  - the way that the architecture stores, manipulates, manages, and distributes information
  - the objective of this analysis is to answer the big questions around content, structure, ownership, transaction, latency, references, and data migration
  - ERD, data ownership model
- Operational
  - how the system will be operated, administered, and supported when it is running in its production environment
  - Installation, migration and backout strategies
  - monitoring and control
  - operation configuration management
  - support model : responding to problems
- Logical → Functional
- Process → Concurrency
- Development = Development
- Physical = Deployment

SO WHAT'S NEXT?

- in the assignments you will be asked to reverse-engineer the architecture of an existing system.
- you will create a SAD based on RUP 4+1
- you will apply UML
- there will be additional questions about views and viewpoints
- next week we will use R&W's viewpoint-set

- http://www.viewpoints-and-perspectives.info/home/resources/ see "Templates and Reference Material"
- http://www.artechra.com/media/speaking/2010/OOP2010-Top10Mistakes.pdf