NC STATE UNIVERSITY

ENGINEERING ONLINE

Lecture Notes

Course Number:	CSC 513
Instructor:	Dr. Singh
Lecture Number:	4

Outline

Challenges of Electronic Business
- Business Environments
- Service Engagements

Architecture in IT

Contracts and Governance

XML Concepts and Techniques

XML Modeling and Storage

Summary and Directions

The Evolution of IT

- **Applications:** Control of computations hidden in code; integration a nightmare
- **Workflows:** Control abstracted out; integration still difficult
- **Standards-driven orchestration:** Integration improved; limited support for autonomy
- **Messaging:** Integration simplified by MoM and transformations; limited support for autonomy
- **Choreography:** Model conversations over messages; limited support for autonomy
- **Governance:** Administer resources via interactions among autonomous parties

Technical Service

- Generally, an abstraction of a computational object
  - Traditional, as in web or grid services
  - Improved: Abstraction of a "capability"
- Well encapsulated, i.e., a black box
- Interface defined at the level of methods or messages

Service Engagement

An aggregation of business relationships

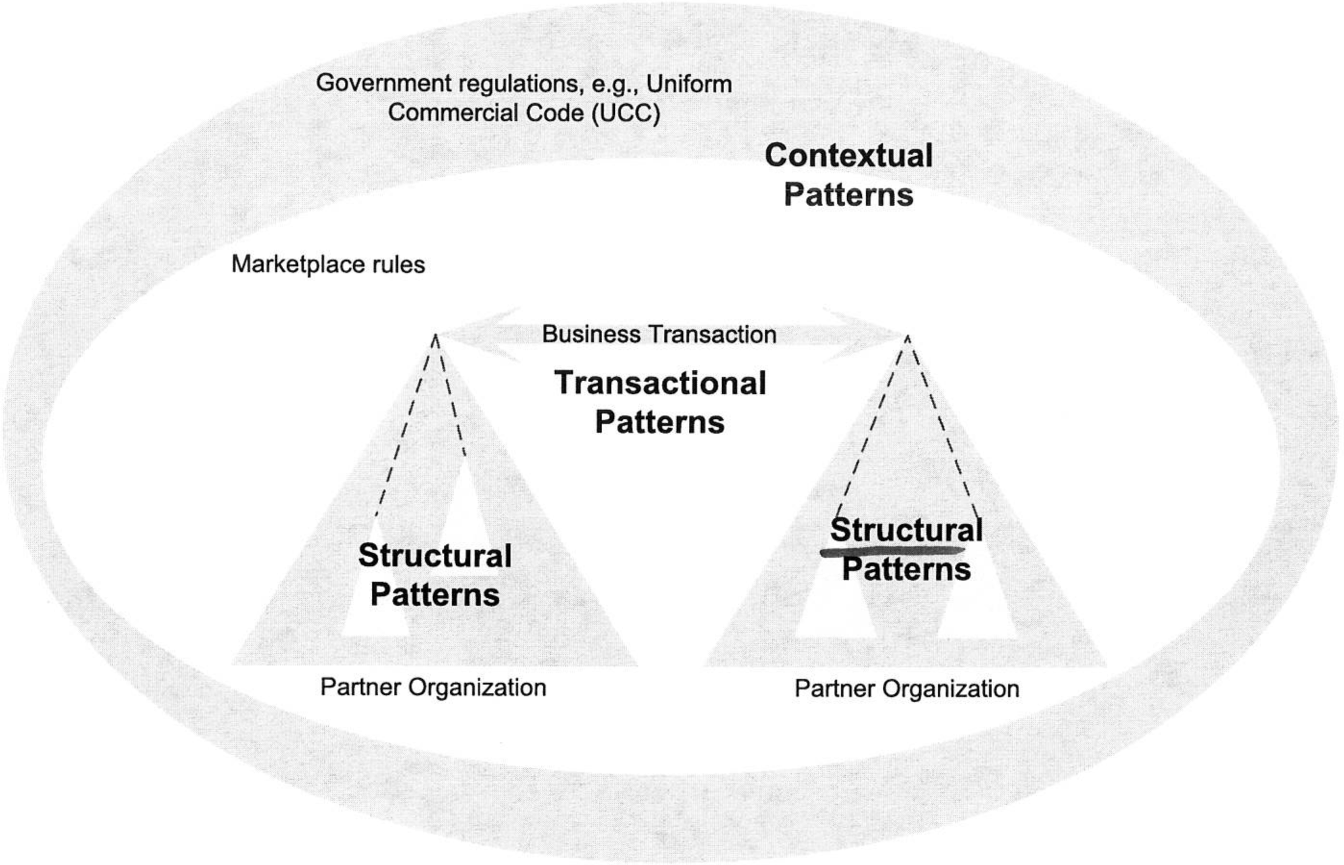
- Trillions of dollars worth of commerce conducted every year
- Characterized by
  - Independence of business partners
  - Coproduction
    - Participation by all, though not at the same level
    - Symmetric relationships: complementary capabilities and goals
  - Complex contracts among the partners
  - Participants are not black boxes

Business Service

Participant in a service engagement

- Characterized by transfer of value, not bits
- Typically long-lived with on demand enactments
- Instantiated on the fly (coproduction)
    - Unlike a product
    - Though may be constructed using products or about products

Conceptual Elements of a Service Engagement



- Transactional: main purpose and enactment, specifying value exchanged
- Structural: partnerships and contracts
- Contextual: setting of the engagement

Traditional Technical Approaches

Quite unlike a real-life service engagement

internal control

- Take participants flows (e.g., in BPEL, BPMN) as units of abstraction
  - Mix private policies and public interactions
  - Proprietary: may not be available for reuse
  - Context-laden: even when available, cannot be readily reused
- Focus on low-level (e.g., WS-CDL) or data-level meanings (e.g., OWL)
  - Ignore business-level significance of messages
  - Ambiguous; not verifiable

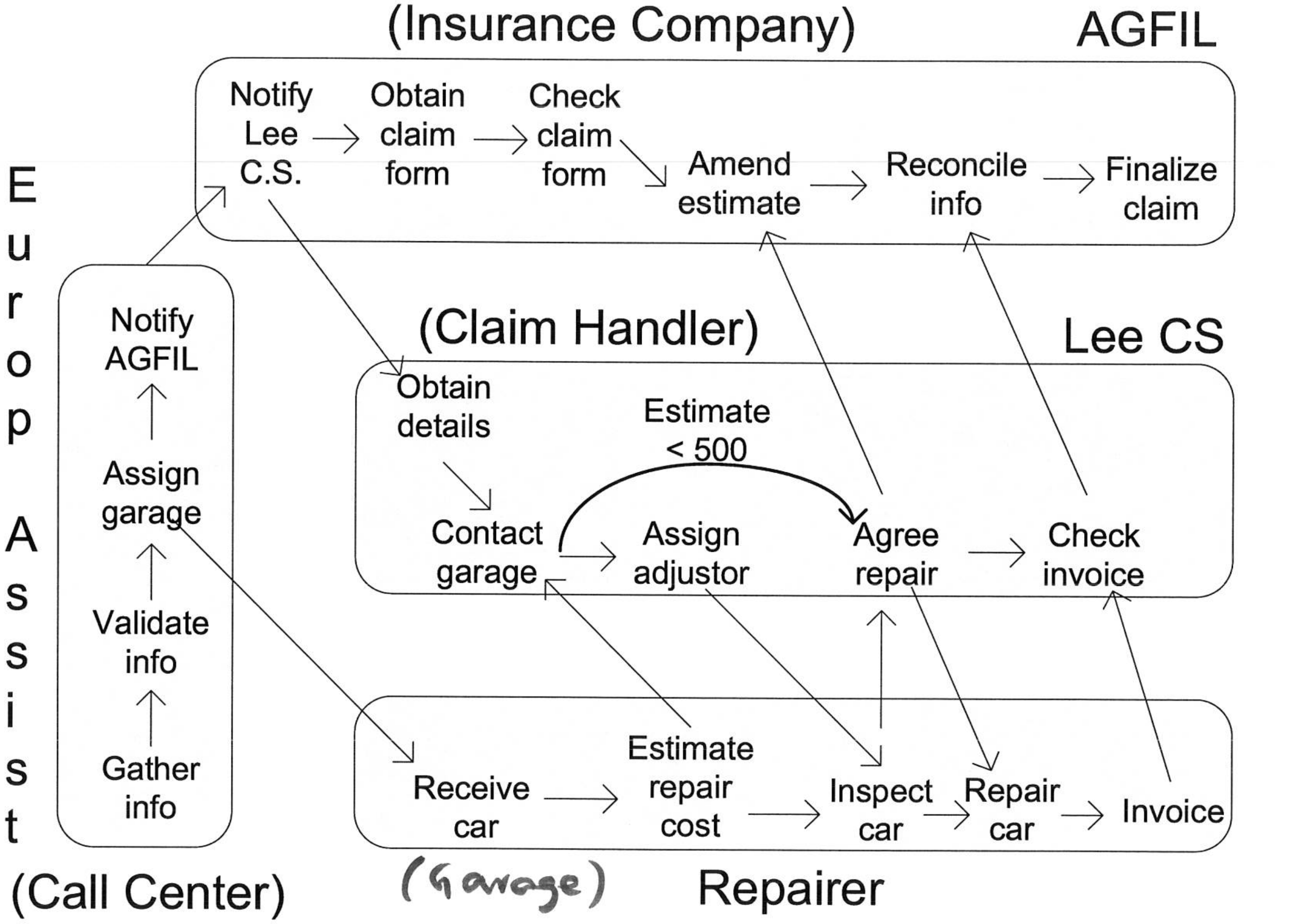
BPEL, BPMN, WS-CDL, OWL are well-known standards

A Real-Life Service Engagement

Allianz

Operationally over-specified as interacting flows

(Ireland)



(Insurance Company) AGFIL

Notify Lee C.S. → Obtain claim form → Check claim form → Amend estimate → Reconcile info → Finalize claim

(Claim Handler) Lee CS

Obtain details → Contact garage → Assign adjustor → Agree repair → Check invoice

Estimate < 500

Europ Assist

Gather info → Validate info → Assign garage → Notify AGFIL

(Call Center)

Receive car → Estimate repair cost → Inspect car → Repair car → Invoice

(Garage) Repairer

BUSINESS - IT DIVIDE

value	bits
(contracts	flows

SEEK:

- HIGHER-~~E~~LEVEL ABSTRACTIONS
- COMPUTATIONALLY EFFECTIVE

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Challenges of Electronic Business

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Summary and Directions

Architecture in IT

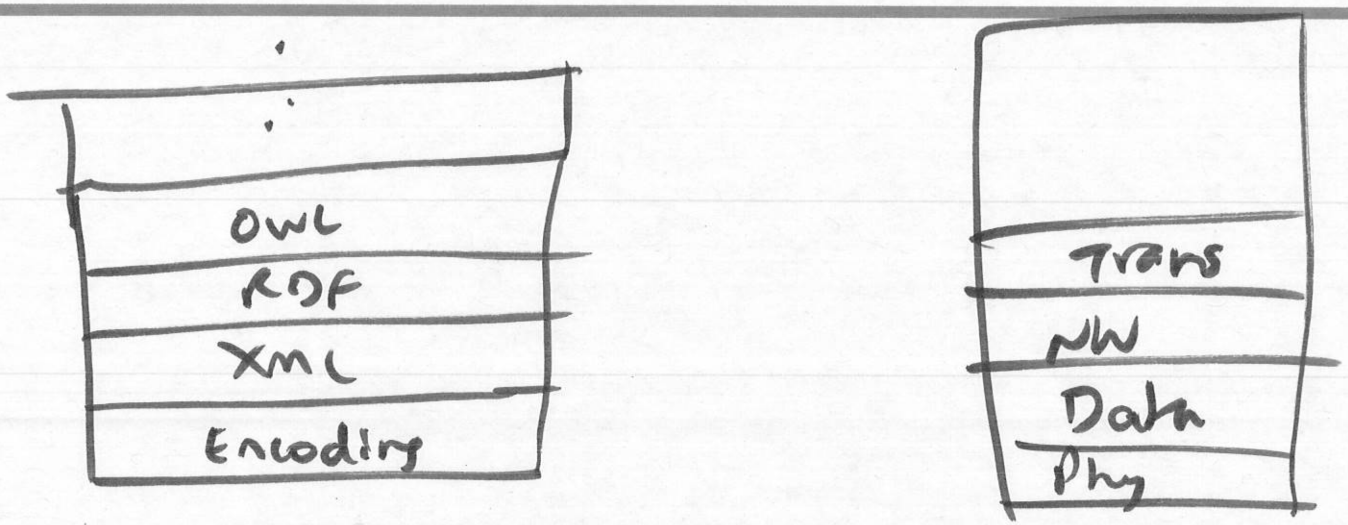
In the sense of information systems

- Important themes
  - Conceptualizing architecture
  - Enterprise architectures
  - Tiered architectures
  - Architecture as a basis for governance (next section)
- Not quite the same as conventional software architecture, though the topics are converging

Architecture Conceptually

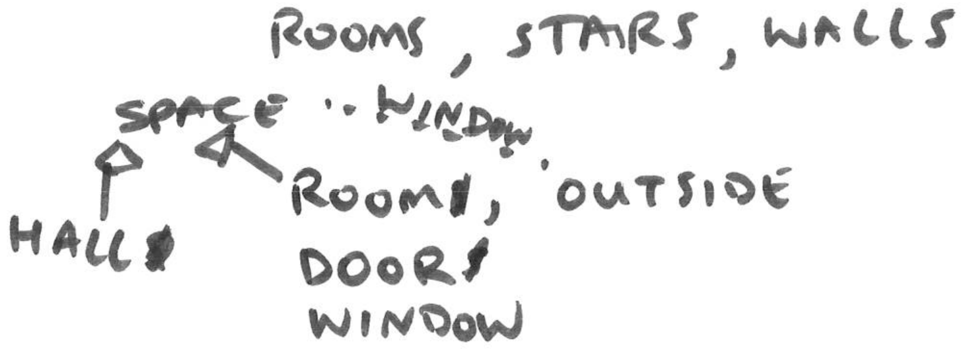
As opposed to the description of a system via a blueprint

- How a system is organized
- An over-used, vaguely defined term
    - Software architecture
    - Standards, e.g., Berners-Lee's "layer cake" and the networking standards
    - May include processes
        - That exercise the system
        - By which the system is built and maintained
        - By which the system is administered
    - May include human organizations

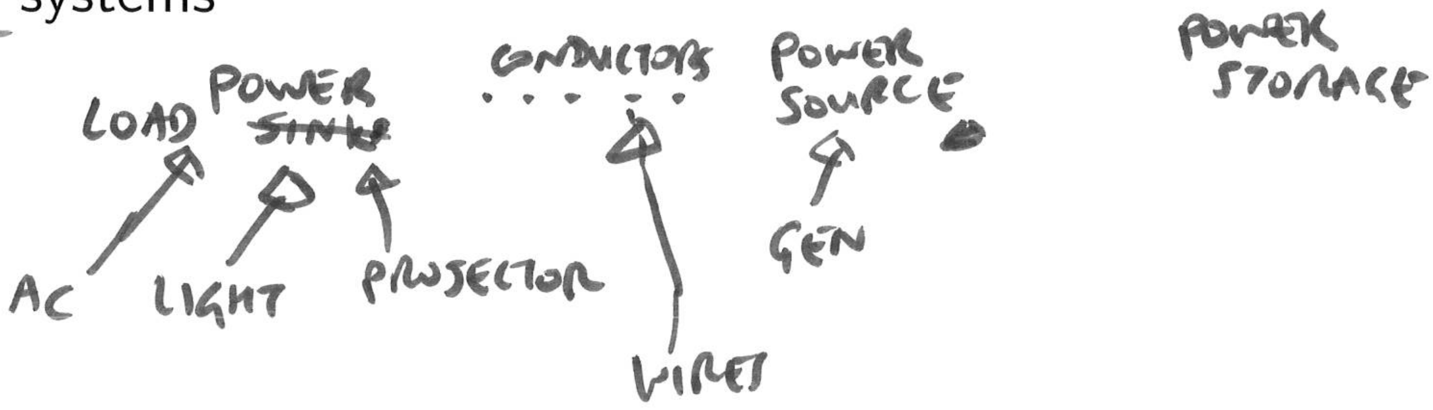

OWL
RDF
XML
Encoding
Trans
NW
Data
Phy

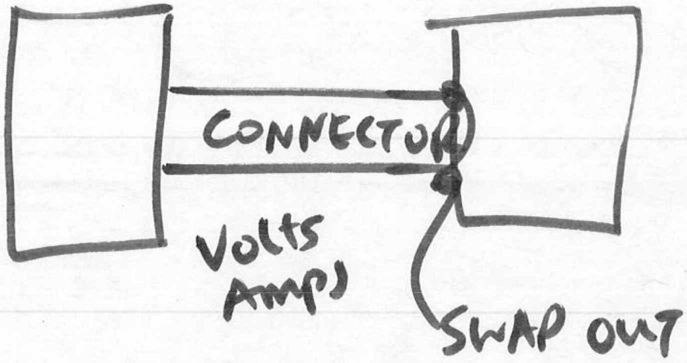
Exercise: Examples of Architecture

Identify the main components and interconnections



- Buildings
- Plumbing
- Power systems





Volts
Amps
Info

Understanding Architecture: 1

(Description) of a system in terms of modules
Conception

⊻

Components

what

how put together

- Two main ingredients of a system
  - Components
  - Interconnections
- *Openness* entails specifying the interconnections cleanly
  - Physical components disappear
  - Their logical traces remain
- *Information environments* mean that the interconnections are protocols

Understanding Architecture: 2

- Components and interconnections are not sufficient to characterize an architecture
- Two additional ingredients of an architecture

  HARD REQ

  - Constraints on the components and interconnnections
  - Patterns involving the components and interconnnections
- *Openness* entails the constraints
  - Do not apply on the physical components directly

Exercise: Examples of Architecture

Identify the main constraints and key patterns

REQ
- # People
- Height
- Material
- ELEVATORS

Room

CONSTRAINT

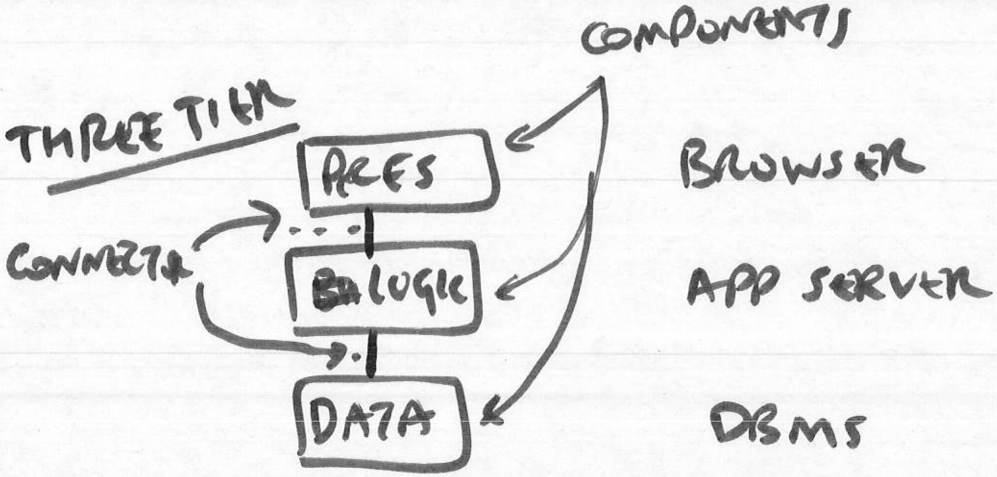
A ROOM MUST HAVE AT LEAST ONE DOOR

- Buildings
- Plumbing
- Power systems

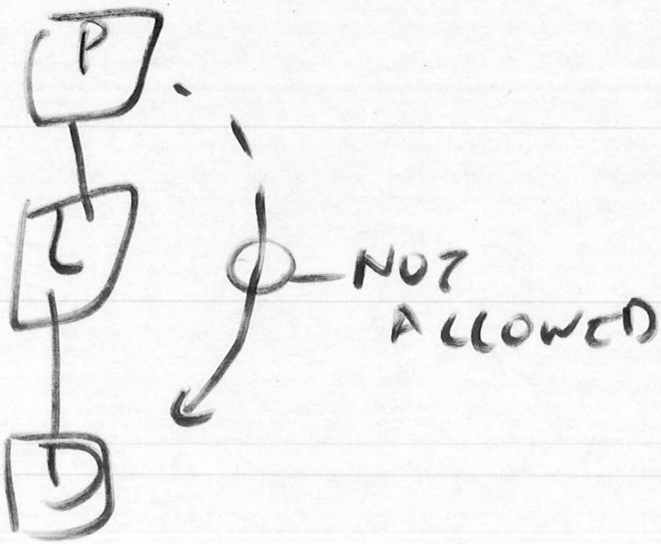
PATTERN

DOORS CONNECT ROOMS TO HALL BUT NOT ROOMS TO ROOMS

THREE TIER



CONSTRAINTS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