Experience with Software Architectures and Configured Software Descriptions

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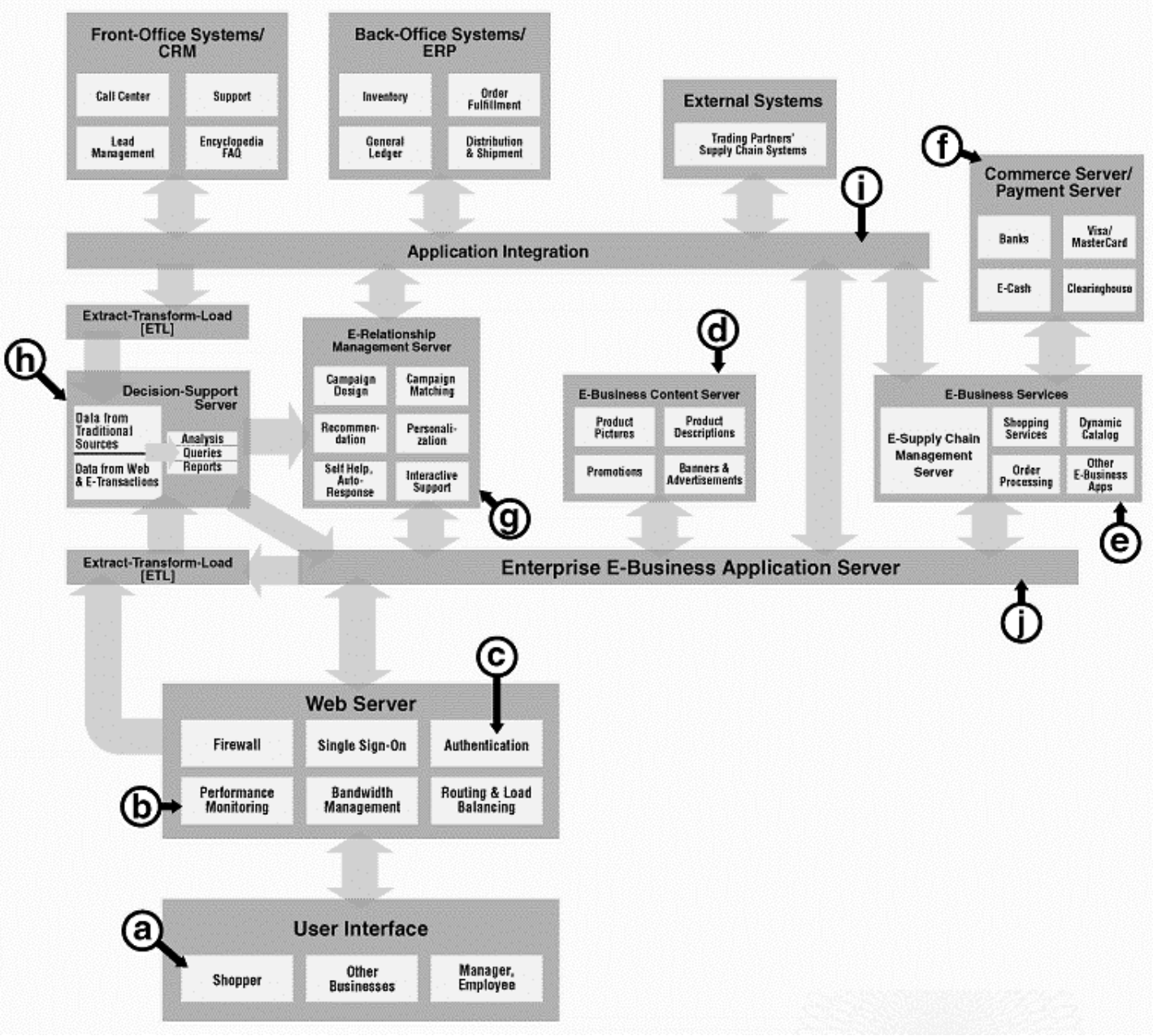
Overview

- *Conceptual* software architectures
- *Logical* software architectures
- *Concrete* software architectures
- *Configured* software *descriptions*
- *Hybrid* software *architectural descriptions*

Conceptual software architectures

- Pervasive, most common and widely used
- “Rendered “ as (un)directed attributed graph
  - box and arrow diagrams
- Generally fit on one page
- Useful for communication and first-order evaluation
- Can obscure architectural mis-matches


Front-Office Systems/ CRM
Call Center
Support
Lead Management
Encyclopedia FAQ
Back-Office Systems/ ERP
Inventory
Order Fulfillment
General Ledger
Distribution & Shipment
External Systems
Trading Partners' Supply Chain Systems
Application Integration
Commerce Server/ Payment Server
Banks
Visa/ MasterCard
E-Cash
Clearinghouse
Extract-Transform-Load [ETL]
Decision-Support Server
Data from Traditional Sources
Data from Web & E-Transactions
Analysis
Queries
Reports
E-Relationship Management Server
Campaign Design
Campaign Matching
Recommen-dation
Personali-zation
Self Help, Auto-Response
Interactive Support
E-Business Content Server
Product Pictures
Product Descriptions
Promotions
Banners & Advertisements
E-Business Services
E-Supply Chain Management Server
Shopping Services
Dynamic Catalog
Order Processing
Other E-Business Apps
Extract-Transform-Load [ETL]
Enterprise E-Business Application Server
Web Server
Firewall
Single Sign-On
Authentication
Performance Monitoring
Bandwidth Management
Routing & Load Balancing
User Interface
Shopper
Other Businesses
Manager, Employee
a
b
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Logical software architectures

- Described in a MIL/ADL
  - Components/connectors may have complex properties like pre/post-conditions
  - Formal properties beyond the skill of average software developers (especially in future!)
- Successful MIL/ADLs for very large systems will need to be light and automatically extracted from implementations

Concrete software architectures

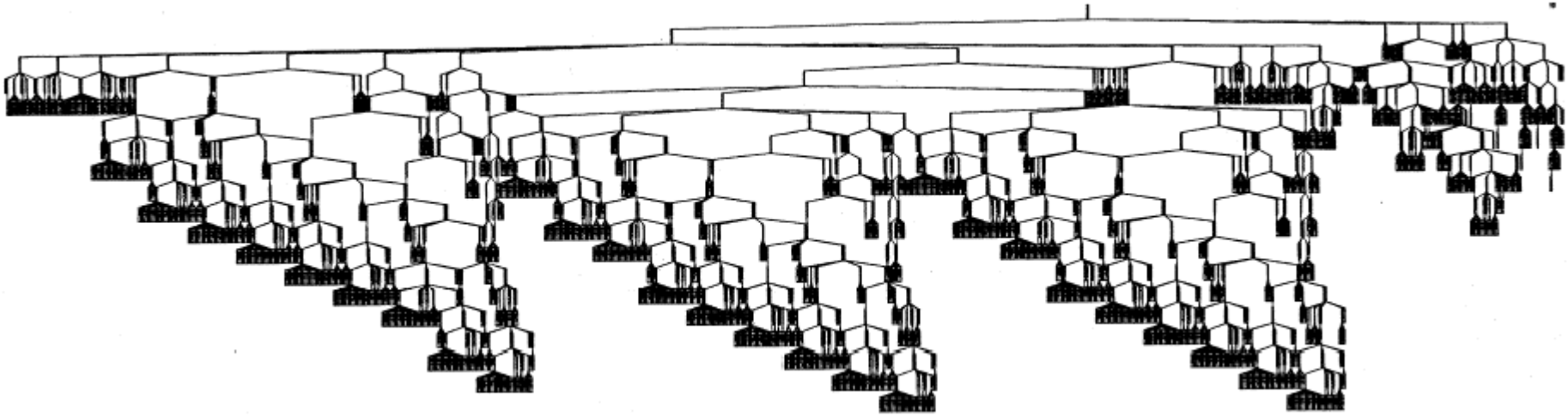
- Address configurations of executable software components
  - compile-time, run-time, reachable run-time
- Involve multiple languages and associated information
  - repository (user_id, access control, timestamp, host_id), versions, pragmas, registries, initialization and configuration files, etc.

Concrete software architectures

- Multiple concrete architectures associated with single logical architecture
- Multiple logical architectures can be derived from single concrete architecture
- Concrete software architectures not well understood in all forms

Configured software descriptions

- Software *production* artifacts: software products, processes, network infrastructure, development organizations, documents, etc.
  - Each has its own architecture and configuration
  - Development of each impinges on others
- Software architectural design and configuration management address *the same problem with different abstractions*



Software Process Architecture: Decomposition View (Scacchi 1999)

Hybrid software architectural descriptions

- Composition and integration of *multiple* software system architectures and configured software descriptions
  - Software *acquisition* architecture: software production architecture for *virtual system acquisition* across network of virtual enterprises
  - VSA incrementally builds software system architectures that use models, simulations and programs as components