CS155a: E-Commerce

Lecture 14: October 25, 2001

Introduction to XML

Acknowledgement: R. Glushko and A. Gregory

Some Acronyms Used In This Lecture

HTML = Hyper Text Markup Language

XML = Extensible Markup Language

EDI = Electronic Data Interchange

ERP = Enterprise Resource Planning

MRP = Materials Requirement Planning

The XML Revolution

- The Web was created to **publish information** for people.
  - "Eyes-only" was dominant design perspective
  - Hard to search
  - Hard to automate processing
- The Web is using XML to become a platform for **information exchange between computers (and people)**.
  - Overcomes HTML's inherent limitations
  - Enables the new business models of the network economy

Extensible Markup Language

- Instead of a **fixed set of format-oriented tags** like HTML, XML allows you to **create whatever set of tags are needed** for your type of information.
- This makes any XML instance **"self-describing"** and easily understood by computers and people.
- XML-encoded information is **smart enough to support new classes** of Web and e-commerce applications.

Why XML?

Sample Catalog Entry in HTML

```
<TITLE> Laptop Computer </TITLE>
<BODY>
<UL>
<LI> IBM Thinkpad 600E
<LI> 400 MHz
<LI> 64 Mb
<LI> 8 Gb
<LI> 4.1 pounds
<LI> $3200
</UL></BODY>
```

XML's Big Idea: Document Types

- Customer Profiles
- Vendor Profiles
- Catalogs
- Datasheets
- Price Lists
- Purchase Orders
- Invoices
- Inventory Reports
- Bill of Materials
- Payments
- Deposits
- Credit Reports
- Schedules
- Directories
- …whatever you need

In XML the formal definition of permitted elements, attributes, and the rules by which they combine is called a **Document Type Definition** or **DTD** or **schema**.

Catalog Entry in XML

```
<COMPUTER TYPE="Laptop">
   <MANUFACTURER>IBM</MANUFACTURER>
   <LINE> ThinkPad</LINE>
   <MODEL>600E</MODEL>
   <SPECIFICAIONS>
     <SPEED UNIT = "MHz">400</SPEED>
     <MEMORY UNIT="MB">64</MEMORY>
     <DISK UNIT="GB">8</DISK>
     <WEIGHT UNIT="POUND">4.1</WEIGHT>
     <PRICE CURRENCY="USD">3200</PRICE>
   </SPECIFICATIONS>
</COMPUTER>
```

Smart Processing with XML

- <COMPUTER> and <SPECIFICATIONS> provide logical containers for extracting and manipulating product information as a unit
  - Sort by <MANUFACTURER>, <SPEED>, <WEIGHT>, <PRICE>, etc.
- Explicit identification of each part enables its automated processing
  - Convert <PRICE> from "USD" to Euro, Yen, etc.

Traditional Business Models and Integration Requirements

Traditional models for electronic business are based on long-term, point-to-point, and tightly coupled relationships

- EDI is used here because high integration costs can be recovered over time
- Partners are more willing to invest in compatible IT infrastructure at each end or in middleware that creates a distributed application

Making Money in B2B

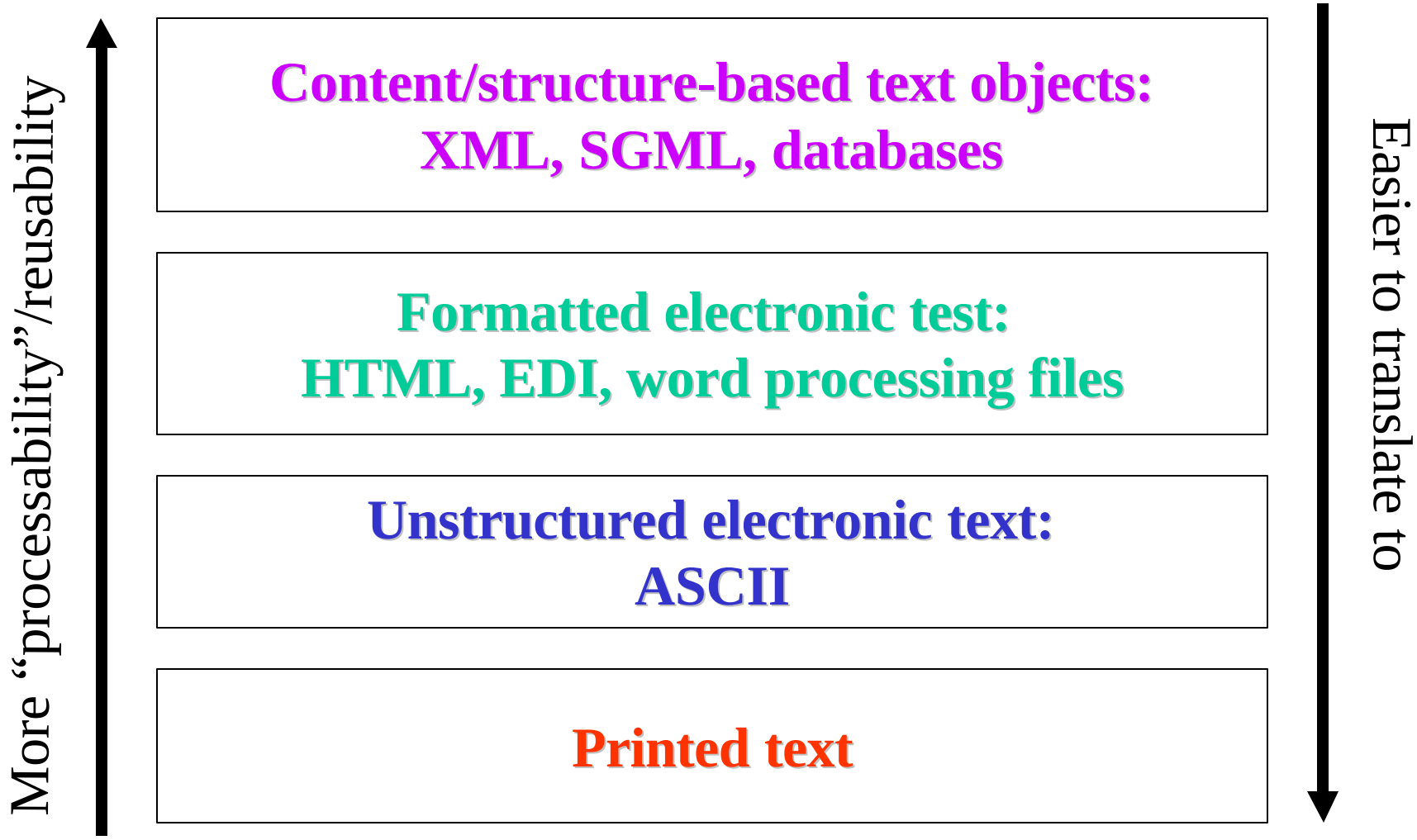
- Licenses and support
  - Traditional model, works for technology providers to B2B marketplaces
- Equity
  - But only if the B2B company can IPO

- **XML has little to say about this**

Making Money in B2B

- Transaction fees
  - What counts as a transaction?
  - Who pays the fees – buyers or suppliers?
- Market efficiency
  - Driving costs out of supply chain for all participants
  - Exploit & refine existing business relationships & experience
- **XML is crucial to these concerns**

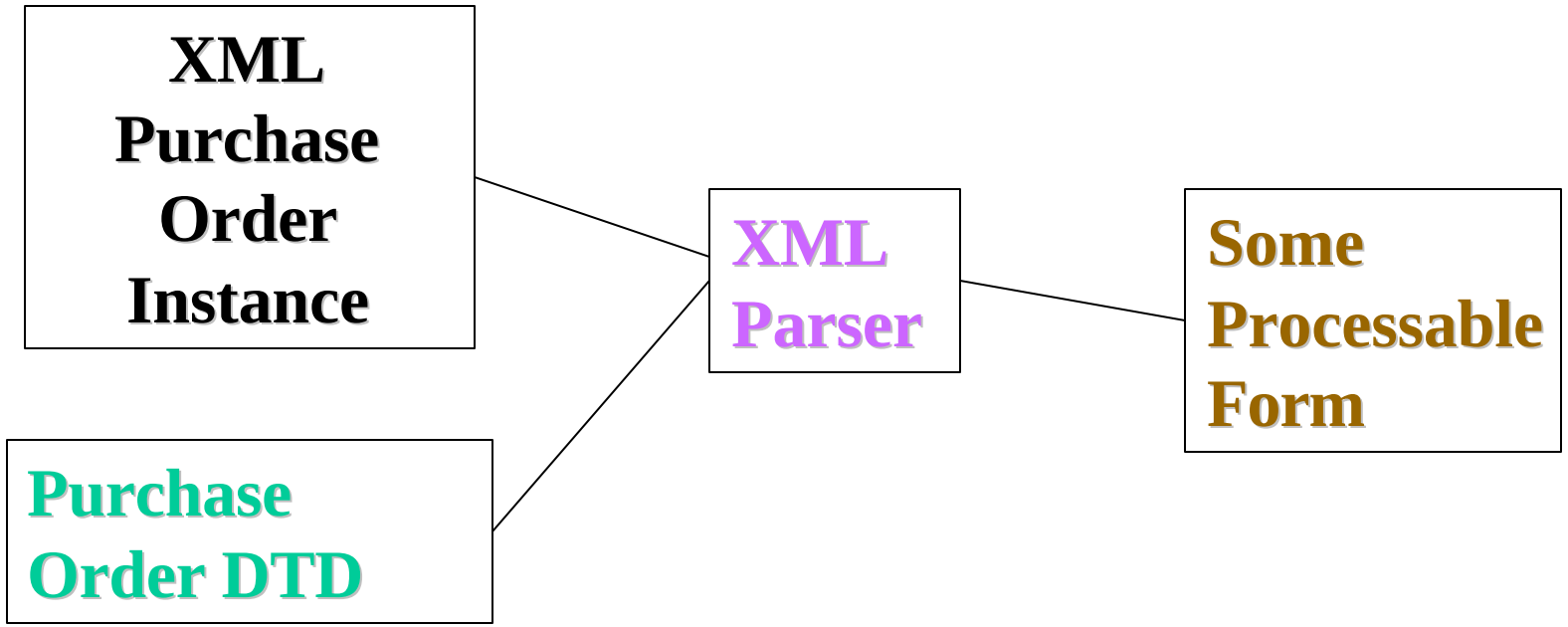
XML and Information "IQ"



DTDs, Parsers, and Validation

- From any **DTD**, an **XML parser** can be generated that:
  - reads a document instance (the XML data stream);
  - identifies the markup in it; and
  - creates a **processable form** of some kind that is used by an application.
- The parser can also test the XML document for conformance with the rules of the DTD.
  - A document instance that follows the rules of the DTD is "valid."

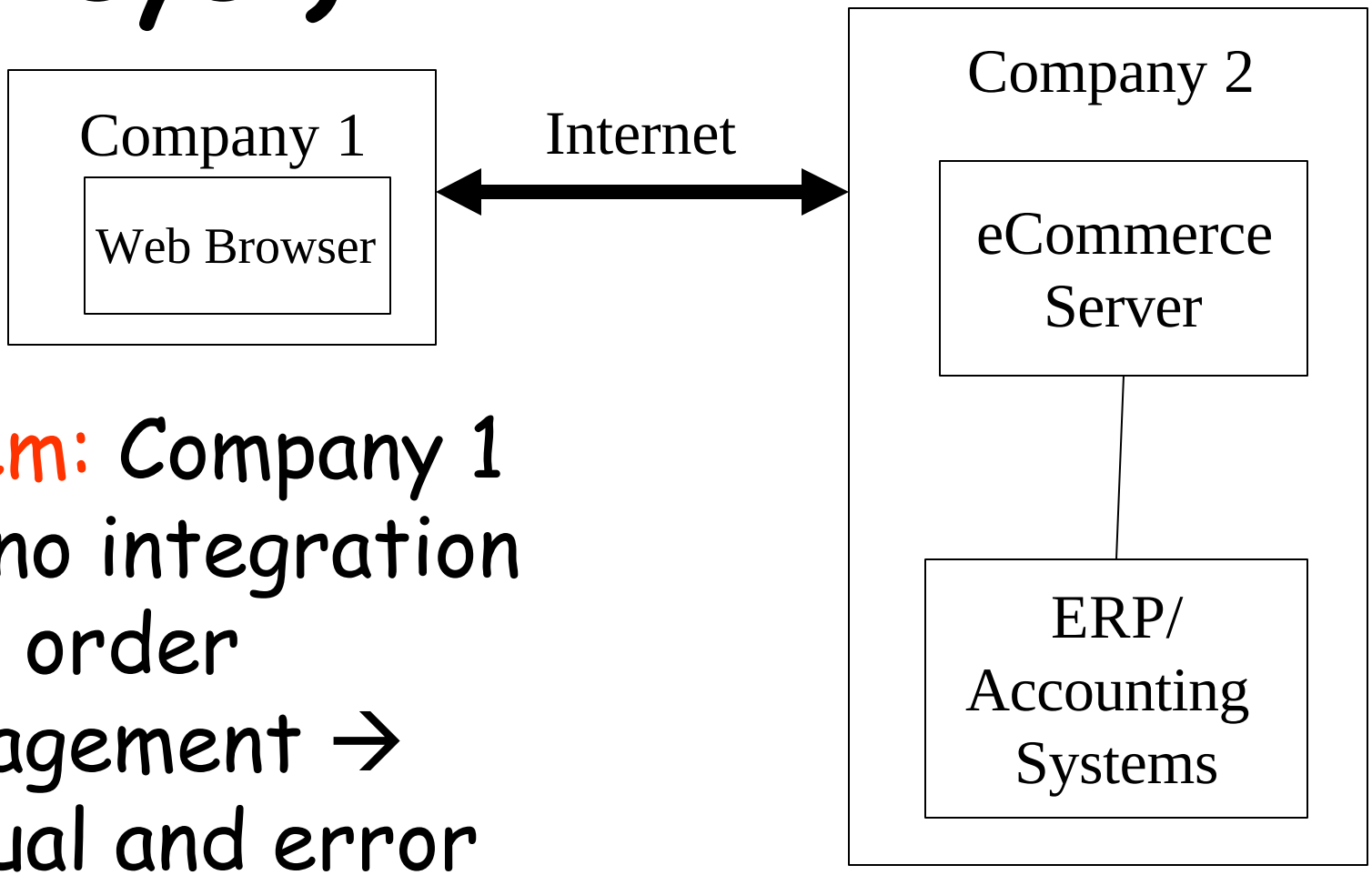
DTDs And Validation



XML Schemas in Electronic Commerce

- Essential to treat **dates**, **monetary amounts**, etc. as **datatypes** to enable validation
- Schema **inheritance** and **extension mechanisms** allow custom versions of same document to co -exist
  - Software can distinguish extensions from standard document and decide whether or not extensions can be safely ignored
  - Trading partners can customize messages for specialized needs while standard message maintains backward compatibility

Connecting with HTML ("by eye")



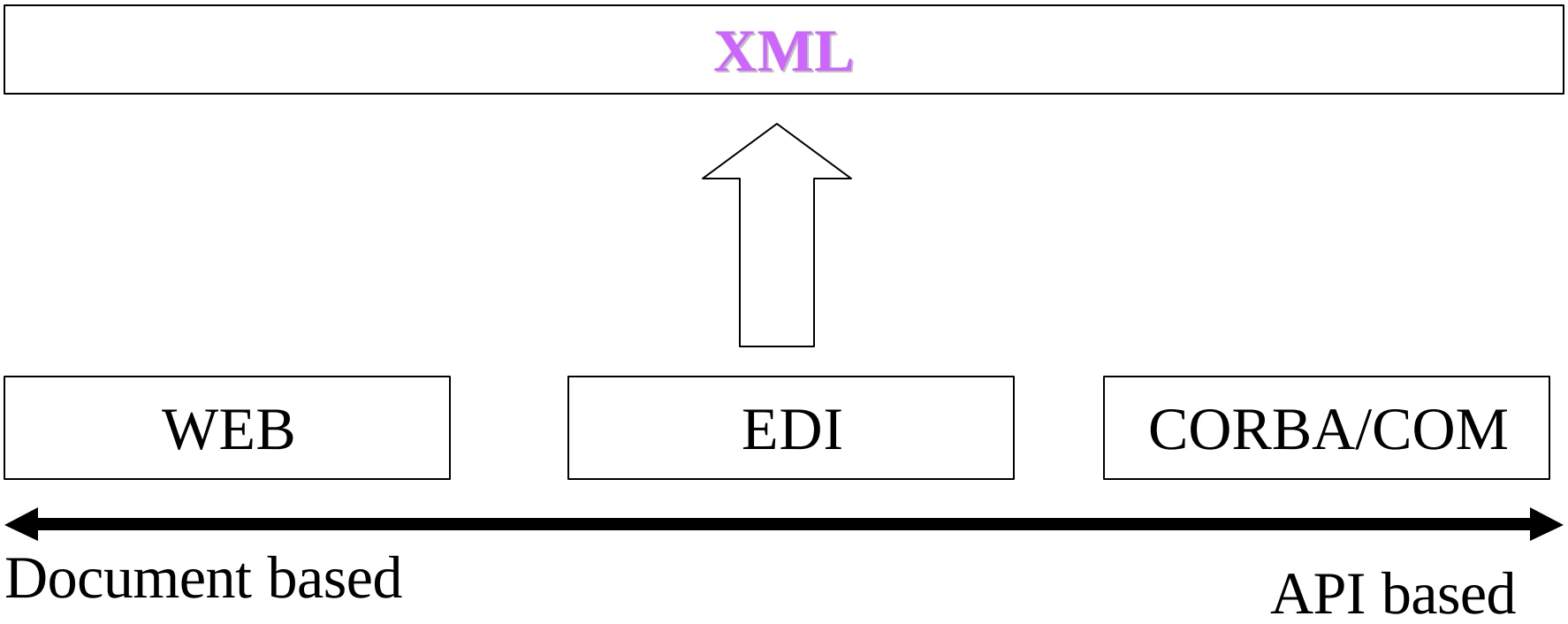
Problem: Company 1 has no integration with order management → manual and error prone data entry

HTML's Limitations for Integration

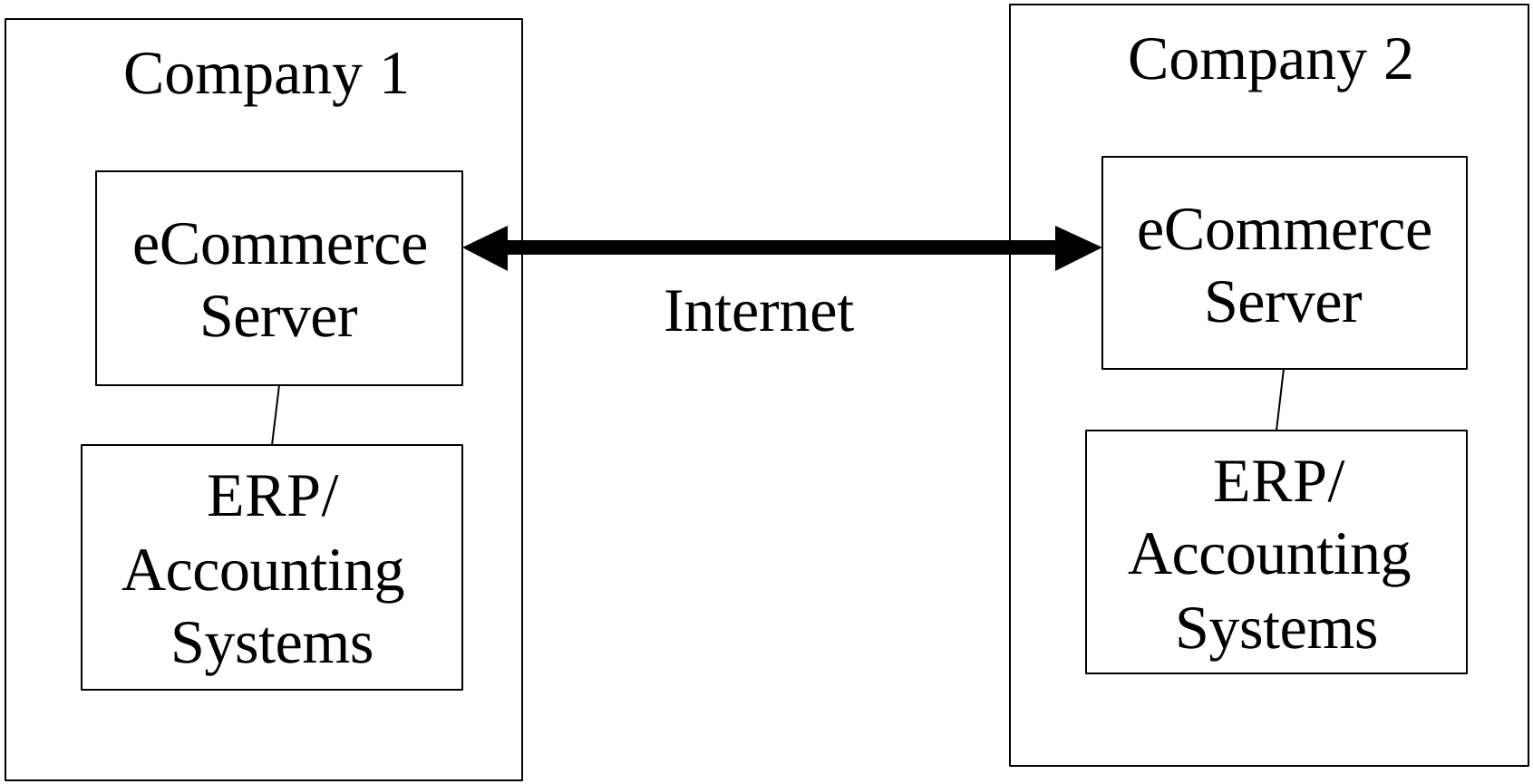
- The Web was created as a **publishing medium**, **not as an e-commerce platform**
- HTML, the Web's language for encoding information, is **format-oriented** and meant to be understood "by eye"
  - Simple structures: headings, lists, links
  - Browsers are "hard wired" to render HTML as web pages
- **No content-based encoding** means that HTML can't be effectively searched or processed by business applications

XML as Internet-Friendly Integration Technology

… exchange data in an application and vendor neutral format



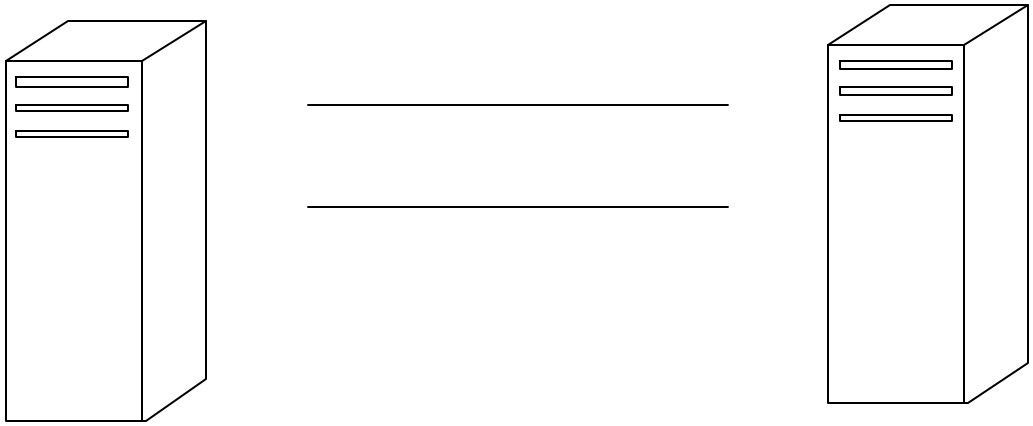
Connecting using XML



Benefit: XML can be processed automatically with huge cost savings

Problem: Company 1 and Company 2 have to agree on document format

Business Processes are XML Document Exchanges



If you send me a **request** for a **catalog**, I will send you a catalog

If you send me a **purchase order** and I can fill it, I will send you a **purchase order response**

Significance of XML Document Exchange Architecture

- **Document exchange** is a natural way to think about doing business.
- Easy to provide **"open" marketplace** with 3rd party buying and selling apps
- Easy to add and maintain services
- Document exchange between marketplaces is fundamentally the same as within a marketplace.
- Services can be reused across marketplaces.

Functions of "Market Makers" in a Document Exchange Architecture

- Specifying document standards
- Routing documents between participants
- Providing standard interfaces for sharing services (registration, logistics, taxation, payment, etc.)

XML is Part of the Solution

- XML has the potential to enable **a standards-conforming, open and extensible architecture** for electronic commerce.
- XML standards could enable **ubiquitous connectivity and interoperability** and create the **network effects** of "describe once, {sell, buy} anywhere" and reusable marketplace services.