

Computer Science 202

Databases in Electronic Commerce

Objectives

- To learn the definition for e-commerce, and its importance in the current business environment.
- To learn some of the benefits and the disadvantages of e-commerce, as it currently exists.
- To learn the major security and privacy issues that relate to e-commerce.
- To learn how payments for purchases are handled in e-commerce.
- To learn the requirements for e-commerce databases.
- To learn the definition of XML and its importance in e-commerce.
- To learn how DTD and XSD documents fit into the e-commerce environment.

What is E-commerce ?

- Definition
 - Bring new products, services, or ideas to market
 - Support and enhance business operations (including sales of products/services over the Web)
- Generally identified with Internet use
- External evidence is corporate Web site
- Prime revenue source

E-Commerce Issues

- Changed business environment
- New economy
- Benefits
- Disadvantages

E-Commerce Benefits

- Ability to provide quick and convenient comparison shopping
- 24X7X365 operations
- Global access
- Lower entry barriers
- Increased customer market knowledge
- Customer Profiling

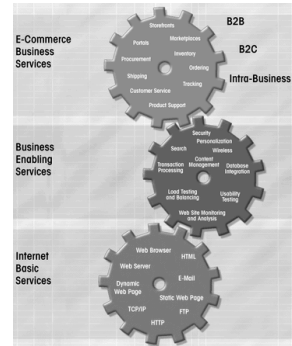
E-Commerce Disadvantages

- Hidden costs
- Technology is not perfect
- Thin profit margins
- Security
- loss of privacy
- service levels
- legal issues

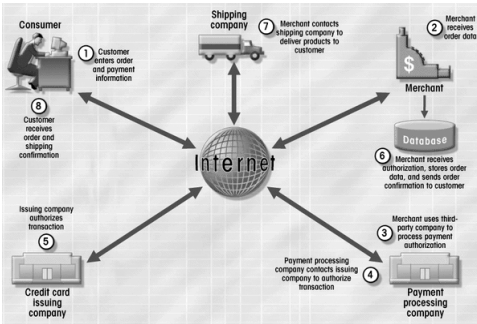
E-commerce Services



Overall E-Commerce Architecture



E-commerce Systems



Security

- Procedures and technology uses
 - Protection against accidental and intentional access
 - Warrantee identity of transaction's participants
 - Buyer
 - Seller
 - Protect transaction data from unauthorized modifications during Internet travel
 - Protect resources (data and computer)
 - Customers' personal data
 - Privacy issues
 - Property against criminal activities

Transaction Processing

- Digital Cash
 - Digital equivalent of hard cash
 - Digital certificates verify identity of transaction participants
 - Low transaction costs
 - Lack of customer acceptance
- Credit Card purchasing
 - Most common for online purchasing
 - Secure Electronic Transaction (SET)
- Electronic wallets

Database Design for E-Commerce

- Don't reinvent the wheel
- New application but uses the same design techniques
- E-Commerce DB should provide
 - Facilitate sales of products and services
 - Show products and services
 - Conduct basic sales transactions
 - Customer service
 - Product returns
 - Web customer profiling

Basic Logic

- ☛ Sell products
 - PRODUCT and CUSTOMER Tables
- ☛ Customer may place multiple orders
 - 1:M relationship between CUSTOMER and ORDER
- ☛ Order contains multiple lines
 - 1:M relationship between ORDER and ORDLINE
- ☛ Order lines refer to one product
 - 1:M between PRODUCT and ORDLINE

Business Logic

- ☛ Customer browses catalog by category
 - Each PRODUCT belongs to PRODTYPE
- ☛ Customer places products in shopping cart
 - SHOPCARD belongs to one CUSTOMER and references one or more PRODUCTS
- ☛ Customer checks out and enters credit card and shipping info
 - Added to ORDER
- ☛ After credit card authorization order created
 - SHOPCARD used to create ORDER with ORDLINES

Business Logic

- ☛ Merchant offers shipping options
 - SHIPOPTION stores details
- ☛ Merchant offers many payment options
 - PMTOPTION stores details
- ☛ States may have different tax rates
 - Stored in STATE and TAXRATE

eXtensible Markup Language -XML

- ☛ Meta-language
- ☛ Represents and manipulates data elements
- ☛ Facilitates exchange of structured documents over the Web
- ☛ World Wide Web Consortium (W3C) published standard
- ☛ Allows definition of meta-tags to describe data elements

XML Breakdown

- ☛ Allows definition of new tags
- ☛ Case sensitive
 - Tags must be well-formed
 - Proper nesting required
- ☛ Can use <!-- and --> to enter comments
- ☛ XML/xml prefixes reserved for XML tags only
- ☛ Not a replacement for HTML

XML example

```
<?xml version="1.0"?>
<ProductList>
  <Product>
    <P_CODE>23109-HB</P_CODE>
    <P_DESCRIPTION>Claw hammer</P_DESCRIPTION>
    <P_INDATE>08/19/2002</P_INDATE>
    <P_ONHAND>23</P_ONHAND>
    <P_MIN>10</P_MIN>
    <P_PRICE>5.95</P_PRICE>
  </Product>
  <Product>
    <P_CODE>23114-AA</P_CODE>
    <P_DESCRIPTION>Sledge Hammer, 12 lb.</P_DESCRIPTION>
    <P_INDATE>09/01/2002</P_INDATE>
    <P_ONHAND>8</P_ONHAND>
    <P_MIN>5</P_MIN>
    <P_PRICE>14.40</P_PRICE>
  </Product>
</ProductList>
```

The XML DTD

- File with .dtd extension to describe XML elements
- Provides composition of database's logical model
- Defines syntax rules for each XML document
- Defines valid tags

XML DTD Example

```

<!ELEMENT ProductList (Product+)
<!ELEMENT Product (P_CODE, P_DESCRIP, P_INDATE?, P_ONHAND, P_HIH?, P_PRICE)
<!ELEMENT P_CODE (NPCDATA)
<!ELEMENT P_DESCRIP (NPCDATA)
<!ELEMENT P_INDATE (NPCDATA)
<!ELEMENT P_ONHAND (NPCDATA)
<!ELEMENT P_HIH (NPCDATA)
<!ELEMENT P_PRICE (NPCDATA)

[?xml version="1.0"?
<!DOCTYPE ProductList SYSTEM "ProductList.dtd"
(ProductList)
(Product)
(P_CODE>23109-HB</P_CODE)

```

DTD Application

```

OrderData.dtd
<!ELEMENT OrderData (ORD_ID, ORD_DATE, CUS_NAME, ORD_SHIPTO, ORD_PROD, ORD_TOT)+
<!ELEMENT ORD_ID (NCDATA)
<!ELEMENT ORD_DATE (NCDATA)
<!ELEMENT CUS_NAME (NCDATA)
<!ELEMENT ORD_SHIPTO (NCDATA)
<!ELEMENT ORD_PROD (P_CODE, P_DESCRIP, P_QTY, P_PRICE)+
<!ELEMENT P_CODE (NCDATA)
<!ELEMENT P_DESCRIP (NCDATA)
<!ELEMENT P_QTY (NCDATA)
<!ELEMENT P_PRICE (NCDATA)
<!ELEMENT ORD_TOT (NCDATA)

OrderData.xml
<?xml version="1.0"?
<!DOCTYPE OrderData SYSTEM "OrderData.dtd"
<OrderData>
  <ORD_ID>1234</ORD_ID>
  <ORD_DATE>12/18/2002</ORD_DATE>
  <CUS_NAME>1234 ASIA</CUS_NAME>
  <ORD_SHIPTO>1234 Crown Rd, Chicago, IL 34564 </ORD_SHIPTO>
  <ORD_PROD>
    <P_CODE>23109-HB</P_CODE>
    <P_DESCRIP>New Hammer</P_DESCRIP>
    <P_QTY>1</P_QTY>
    <P_PRICE>9.99</P_PRICE>
  </ORD_PROD>
  <ORD_PROD>
    <P_CODE>23114-NA</P_CODE>
    <P_DESCRIP>New Hammer, 12 lb.</P_DESCRIP>
    <P_QTY>1</P_QTY>
    <P_PRICE>14.99</P_PRICE>
  </ORD_PROD>
  <ORD_TOT>18.98</ORD_TOT>
</OrderData>

```

XML Schema

- Advanced data definition language used to describe structure of XML documents
- Checks for database types
- Validates data for out-of-range values
- XML Schema Definition (XSD) file uses syntax like XML document

Formatting XML

- Specifies rules for display of XML data
- Two parts
 - Extensible Style Language Transformation (XSLT)
 - General mechanism to extract and process data from one XML document and transform within another
 - XSL style sheets
 - Defines presentation rules applied to XML elements
 - Describes formatting options for different XML elements
- Limited browser support

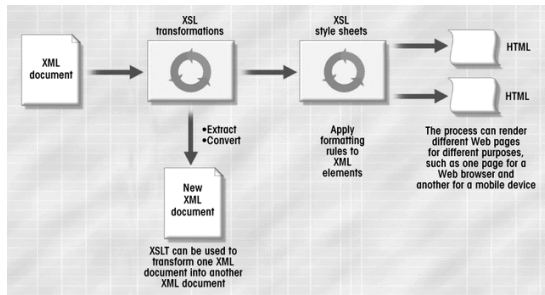
XML Schema Example

```

<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
<xsd:element name="OrderData" type="Order"/>
<xsd:complexType name="Order">
  <xsd:element name="ORD_ID" type="xsd:string"/>
  <xsd:element name="ORD_DATE" type="xsd:date"/>
  <xsd:element name="CUS_NAME" type="xsd:string"/>
  <xsd:element name="ORD_SHIPTO" type="xsd:string"/>
  <xsd:element name="ORD_PROD" type="productlist"/>
  <xsd:element name="ORD_TOT" type="xsd:decimal"/>
</xsd:complexType>
<xsd:complexType name="productlist">
  <xsd:element name="product" type="aproduct" minOccurs="1" maxOccurs="unbounded"/>
</xsd:complexType>
<xsd:complexType name="aproduct">
  <xsd:element name="P_CODE" type="xsd:string" use="required"/>
  <xsd:element name="P_DESCRIP" type="xsd:string" use="required"/>
  <xsd:element name="P_QTY" type="xsd:positiveInteger" use="required"/>
  <xsd:element name="P_PRICE" type="xsd:decimal" use="required"/>
</xsd:complexType>
</xsd:schema>

```

XSLT Application Example



XML Applications

- B2B exchanges
- Legacy system integration
- Web page development
- Database support
- Database meta-dictionaries
- XML databases
- XML services ('Web services')