Module 8 – Web Services, API, Extensions

THEORY EXERCISEs

1. Payment Gateway Integration

Role of Payment Gateways in Online Transactions

A payment gateway acts as an intermediary between the customer, merchant, and bank. It:

- Captures payment details securely
- Encrypts sensitive information
- Authorizes transactions with the bank
- Transfers funds to the merchant’s account
  This enables safe and seamless online payments in e-commerce systems.

Comparison of Payment Gateways

- **PayPal**
  - Easy integration, widely trusted
  - Higher transaction fees
  - Supports international payments
- **Stripe**
  - Developer-friendly APIs
  - Supports subscriptions and custom workflows
  - Requires more technical setup
- **Razorpay**
  - Popular in India
  - Supports UPI, cards, wallets
  - Competitive pricing

Security Measures in Payment Gateway Integration

- SSL/TLS encryption
- Tokenization of card details
- PCI-DSS compliance
- Two-factor authentication (2FA)
- Fraud detection systems

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2. API with Header

What Are HTTP Headers?

HTTP headers are key-value pairs sent in requests and responses that provide metadata such as:

- Authentication details
- Content type
- Cache control
- Client or server information

They help the client and server understand how to process the request or response.

Setting Custom Headers in an API Request

Custom headers can be added to:

- Pass API keys or tokens
- Define request formats (e.g., JSON)
- Send user-specific data
  Example headers include:
- Authorization: Bearer <token>
- Content-Type: application/json

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3. API with Image Uploading

Common Image File Formats

- JPEG / JPG
- PNG
- GIF
- WebP
- BMP (less common)

Secure Image Upload Handling

- Validate file type and size
- Rename files to prevent overwriting
- Store files outside the public root
- Scan for malware
- Use HTTPS for file transfer
- Restrict executable file uploads

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4. SOAP and REST APIs

Key Characteristics of SOAP APIs

- Uses XML for messaging
- Strict standards and contracts (WSDL)
- Built-in error handling
- High security (WS-Security)
- More complex and heavier

Principles of RESTful API Design

- Uses HTTP methods (GET, POST, PUT, DELETE)
- Stateless communication
- Resource-based URLs
- Supports multiple data formats (JSON, XML)
- Lightweight and scalable

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5. Product Catalog

Key Components of a Product Catalog

- Product ID
- Name and description
- Images
- Price and discounts
- Category and attributes
- Inventory status

Ensuring Scalability

- Use database indexing
- Implement pagination
- Cache frequently accessed products
- Use microservices architecture
- Support bulk imports and updates

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6. Shopping Cart

Essential Features

- Add/remove/update products
- Quantity management
- Price calculation
- Tax and shipping calculation
- Persistent cart (save for later)
- Checkout integration

Importance of Session Management

Session management:

- Maintains cart data across pages
- Allows guest and logged-in users to shop

- Prevents data loss during navigation
- Ensures accurate order processing

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7. Web Services

Definition and Usage

Web services are software systems that allow communication between different applications over the internet using standard protocols. They are used for:

- Data sharing
- System integration
- Cross-platform communication

RESTful vs SOAP Web Services

- REST: Lightweight, faster, uses HTTP, flexible formats
- SOAP: Rigid structure, XML-based, highly secure

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8. RESTful Principles

Importance of Statelessness

Statelessness means:

- Each request contains all required information
- Server does not store client state
- Improves scalability and reliability
- Simplifies server design

Resource Identification

Resources are identified using unique URLs, such as:

- /users/1
- /products/45
  This ensures clarity, consistency, and easy access to data.

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9. OpenWeatherMap API

Types of Data Available

Using the **OpenWeatherMap API**, you can retrieve:

- Current weather conditions
- Forecast data
- Historical weather data
- Air pollution data
- Weather alerts

Authentication and Requests

- Register to obtain an API key
- Include the key in the request URL or headers
- Send requests using HTTP methods (mainly GET)
- Receive responses in JSON format

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10. Google Maps Geocoding API

What Is Geocoding?

Geocoding converts:

- Addresses → Latitude & Longitude
  Reverse geocoding does the opposite.

Applications in Web Applications

Using the **Google Maps Geocoding API**, developers can:

- Display store locations
- Enable address autocomplete
- Track deliveries
- Provide location-based services
- Improve user experience in maps and navigation