System Design Concepts Checklist

Architecture Basics

- Functional Requirements

- Non-functional Requirements

- Monolith vs Microservices

- Layered Architecture

- Client-Server Model

- API Design (REST, GraphQL, gRPC)

Scalability & Performance

- Horizontal vs Vertical Scaling

- Load Balancing

- CDN (Content Delivery Network)

- Rate Limiting

- Throttling

- Backpressure

- Connection Pooling

- Latency vs Throughput

Data Management

- Database Design (Relational vs NoSQL)

- Normalization & Denormalization

- Indexing

- Caching (Redis, Memcached)

- Data Sharding

- Replication

- Partitioning

- CAP Theorem

- Consistency Models (Strong, Eventual, etc.)

- Database Federation

- Query Optimization

Messaging & Event Systems

- Message Queues (RabbitMQ, Kafka, SQS)

- Pub/Sub Model

- Event-Driven Architecture

- Event Sourcing

- CQRS (Command Query Responsibility Segregation)

Resilience & Reliability

- Circuit Breaker Pattern

- Failover & Redundancy

- Retry Mechanisms

- Health Checks

- Disaster Recovery

- Service Mesh

Deployment & Infrastructure

- CI/CD

- Blue-Green Deployment

- Rolling Deployments

- Canary Releases

- Infrastructure as Code (Terraform, CloudFormation)

- Containerization (Docker)

- Orchestration (Kubernetes)

Security

- Authentication (OAuth, JWT)

- Authorization (RBAC, ABAC)

- Encryption (At-rest, In-transit)

- API Security (Rate limiting, CORS, API Keys)

- Firewalls & Network Security

Monitoring & Observability

- Logging

- Monitoring

- Metrics

- Tracing (Distributed Tracing with Jaeger/Zipkin)

- Alerting