# Mastering Go

1. **Introduction to Go**
   * What is Go?
   * History and Background
   * Installing Go
   * Setting Up the Go Workspace
   * Writing Your First Go Program

* **Go Language Basics**
  + Syntax and Structure
  + Variables and Data Types
  + Constants
  + Operators
  + Control Flow Statements
    - if, else, switch
    - Loops (for, range)
  + Arrays and Slices
  + Maps
  + Pointers
* **Functions**
  + Defining and Calling Functions
  + Function Parameters and Return Values
  + Multiple Return Values
  + Variadic Functions
  + Anonymous Functions and Closures
  + defer, panic, and recover
* **Packages and Modules**
  + Understanding Packages
  + Importing Packages
  + Creating Custom Packages
  + Go Modules and Dependency Management
* **Structures and Methods**
  + Defining Structs
  + Methods and Receivers
  + Embedding and Composition
  + Tags and Metadata
* **Interfaces**
  + Defining Interfaces
  + Implementing Interfaces
  + Empty Interface and Type Assertions
  + Interface Best Practices
* **Error Handling**
  + The error Type
  + Creating Custom Errors
  + Error Wrapping and Unwrapping
  + Best Practices for Error Handling
* **Concurrency in Go**
  + Introduction to Goroutines
  + Synchronization with WaitGroups
  + Communication with Channels
    - Unbuffered vs. Buffered Channels
    - Channel Directions
  + Select Statement
  + Mutexes and Race Conditions
  + Concurrency Patterns
* **Advanced Topics**
  + Reflection
  + Generics (Type Parameters)
  + The context Package
  + Building and Using Plugins
  + Interfacing with C Code
* **Testing and Benchmarking**
  + Writing Unit Tests
  + Table-Driven Tests
  + Code Coverage Analysis
  + Benchmarking Functions
  + Profiling Performance
* **File I/O and Data Serialization**
  + Reading and Writing Files
  + Working with CSV Files
  + JSON Encoding and Decoding
  + XML Processing
  + Working with YAML and TOML
* **Networking and Web Programming**
  + The net Package
  + Building HTTP Clients and Servers
  + WebSockets
  + RESTful APIs
  + Middleware and Routing
  + Web Frameworks Overview
* **Database Interaction**
  + SQL Database Connectivity (database/sql)
  + ORM Libraries (GORM, SQLBoiler)
  + NoSQL Databases (MongoDB, Redis)
  + Transactions and Error Handling
* **Web Development**
  + Templates and HTML Rendering
  + Form Handling and Validation
  + Session Management
  + Security Practices (CSRF, XSS Protection)
* **Microservices and Distributed Systems**
  + Introduction to Microservices
  + RPC and gRPC
  + Message Queues and Streaming
  + Service Discovery
  + Circuit Breakers and Load Balancing
* **Deployment and Operations**
  + Building Executables
  + Cross-Compilation
  + Environment Configuration
  + Logging and Monitoring
  + Containerization with Docker
  + Orchestration with Kubernetes
* **Performance Optimization**
  + Profiling Tools (pprof, trace)
  + Memory Management
  + Optimizing Goroutines and Channels
  + Caching Strategies
* **Security in Go**
  + Secure Coding Practices
  + Encryption and Decryption
  + Secure Authentication
  + Handling Sensitive Data
* **Go Tools and Ecosystem**
  + Formatting and Linting (go fmt, golint)
  + Dependency Management (go mod)
  + Static Analysis Tools
  + Popular Go Libraries and Frameworks
  + IDEs and Editor Support
* **Best Practices and Design Patterns**
  + Code Organization
  + Error Handling Strategies
  + Concurrency Patterns
  + Testing Methodologies
  + Architectural Patterns in Go
* **Community and Resources**
  + Official Documentation and Tutorials
  + Go User Groups and Meetups
  + Contributing to Open Source
  + Staying Updated with Go Releases
* **Case Studies and Projects**
  + Building a CLI Application
  + Developing a Web Service
  + Implementing Microservices
  + Real-Time Applications with Go
* **Future of Go**
  + Upcoming Features and Proposals
  + Evolving Best Practices
  + Go in the Industry

#software/languages/go-lang