

Declarations

```
var foo string // declaration
with zero value
var foo int = 191 // declar -
ation with initial value
foo := 191 // shorthand
foo, bar := 191, 23 //
shorthand multiple
const c = "This is a consta nt"
const (
    width = 1920
    height= 1080
)
```

Types

Basic Types:

```
int, int8, int16, int32, int64
uint, uint8, uint16, uint32,
uint64, uintptr
float32, float64
complex64, complex128
byte // alias for uint8. ASCII
char. var a byte = 'a'
rune // alias for int32. Unicode
Char
string
bool
```

Composit Types

```
struct, array, slice, map,
channel
```

Interfaces

Describe behavior of data type

Functions

```
func main() { // main func
contains no params and no
returns
```

Functions (cont)

```
func foo(param0 int, param1,
param2 string, ...) (int,
string, ...) { // func can take
multiple params and return
multiple values
func foo() (res int, code int) {
// named return
    res = 2
    code = 3
    return
}
res, code := foo() // execute
func and store returned values
func foo(a, b, arg ...int) {} //
variable number of parameters
// factory
func add(a int) (func(b int)
int) { // return a function
    return func(b int) int {
        return a + b
    }
}
// defer - executed when func
exits
// When many defer's are
declared in the code, they are
executed in the inverse order.
func foo() {
    fmt.Pr int f("1 ")
    defer f() // function
deferred, will be executed latst
and print 3.
    fmt.Pr int f("2 ")
}
// The defer allows us to
guarantee that certain clean-up
tasks are performed before we
return from a function, for
example:
```

Functions (cont)

```
// Closing a file stream,
Unlocking a locked resource (a
mutex), log, ,losing a database
connection
// Tracing example
func foo() {
    cal lTr ace ("fo o")
    defer callUn tra ce( " -
foo ") // untracing via defer
    fmt.Pr int ln( "foo is
being execut ed")
}
// Debugging values
func foo(s string )(res int, err
error) {
    defer func() {
        log.Pr int -
f("f oo(%q) = >%d, %v", s, res,
err)
    }()
    return 5, nil
}
// No Method overload, But we
can overload receiver
func (a *Obj1) Add(b Int) Int
func (a *Obj2) Add(b Int) Int
```

Misc

Go doesn't have casting. Go uses
Conversion - bytes need to be
copied to a new
memory location for the new
repres ent ation.

Enums

```
const (
    ONE= iota
    TWO
    THREE
)
// Print file full path and line
where the code is executed
```

Misc (cont)

```
log.SetFlags(log.Llongfile)
    writeAMI := log.Println
    writeAMI()
// Size
size := unsafe.Sizeof(T{})
```

Interface

```
type ReadWrite interface {
    Read(b Buffer) bool
    Write(b Buffer) bool
}
type Lock interface {
    Lock()
    Unlock()
}
switch t := someVar.(type) {
case *Game:
    fmt.Printf("Game")
case *Unit:
    fmt.Printf("Unit")
default:
    fmt.Printf("Unexpected type")
}
type File interface {
    ReadWrite
    Lock
    Close()
}
// Check dynamic var if is of type
if v, ok := someVar.(T); ok {
    // ...
```

Interface (cont)

```
}
```

Fmt

TBA

String and Rune

```
s := "line one \n line two" //
interpreted string \n - newline
s := `line one \n line two` //
raw string. no interpretation.
no new line for \n
l := len(s) // get string length
strings pkg contains utilities
// HasPrefix, HasSuffix,
Contains, Index, LastIndex,
Replace,
// Count, Repeat, ToLower,
ToUpper, Trim, TrimSpace,
// Fields / Split, Join, Read,
ReadByte, ReadRune
strconv pkg contains conversion
utilities
// Itoa, Format Float, Atoi,
ParseFloat
v, err := strconv.Atoi(s)
! Go strings are immutable -
behave like read-only byte
slice.
// To insert /modify use:
rune unicode / byte (ASCII)
slice
bs := []byte(str)
bs[0] = bs[1]
str = string(bs)
```

Struct

```
type foo struct { // define new
type
    name string
    age int
}
var f foo // declare instance
and init to zero value
f := foo { // create type
instance with literal construction type
    name: "John",
    age: 30
}
f := struct { // declare a var
of unnamed type
    age: int
}{
    age: 35
}
// Composition
type s1 struct {
    age int
    name string
}
type s2 struct {
    secondName string
    s1
}
```

Array

```
var foo [7]int // create zero
value array length of 7
foo := [3]int{10, 20, 30} //
define array length of 3 with
values
```



Array (cont)

```
foo := [...]int{10, 20} //
// compiler calculate length of the
// array
foo := [10]string{3: " Three",
4: " Four"}
foo[1] = 193 // write value
a := foo[1] // read value
```

Time

```
t := time.Now()
// Duration, Since, Location,
// Format
t := time.Now().UTC()
fmt.Println(t.Format("01
Jan 2022 18:34")) // 12 Oct 2022
01:23
```

Slice

Slice - is a data structure with 3 fields:

1. * - a pointer to the underlying array
2. len - the length of the slice (indexable by len)
3. cap - capacity of the slice (how long a slice can become)

```
var s []string // zero value slice
var s []string = arr[start : end] // slice from array
s := []int{1,2,3} // literal
s := make([]string, len, cap)
// create with make
```

Multidimensional

```
screen := [][]int{}
var screen [w][h]int
screen[2][5] = 1 // write
v := screen[2][5] // read
s = s[1:] // cut 1st element
s = s[:len(s)-1] // cut last element
```

Slice (cont)

```
s = s[3:5] // cut slice - new
// one from 3rd inclusive to 5th
// exclusive
```

COPY

```
func copy(dst, src []T) int
s := copy(sTo, sFrom)
```

ADD/append

```
func append(s []T, x ...T) []T
s = append(s, "add Value") //
// append value
s = append(s1, s2...) // append
// slice
```

OPERATIONS

```
// Delete at index i (from i to
// j)
s = append(s[:i], s[i+1:]...)
s = append(s[:i], s[j:]...)
// Insert a value/ range at
// index i
s = append(s[:i], append([]string{"value ToInsert"},
s[i:]...)...)
s = append(s[:i], append([]string{"value ToInsert",
" value2 ToInsert"},
s[i:]...)...)
s = append(s[:i], append(s2,
s[i:]...)...) // insert existing
// slice s2
// Stack
val, s = s[len(s)-1:], s[:len-
(a)-1] // Pop
s = append(s, val) // Push
// Queue
val, q = q[1:], q[1:] // Dequeue
q = append([]string{"value"}, q...) // Enqueue
// Swap
s[j], s[i] = s[i], s[j]
Sort
sort pkg. ex: sort.Strings(s)
```

Maps

```
var m map[string]int // zero
// value - nil
m := make(map[string]int) //
// short
m := map[int]string{1:"One",
2:"Two"}
m[key] = val
val := m[key]
if _, ok := m[key]; ok { // if
// key is present
}
delete(m, key) // delete record
// we can range on map with key,
// value
len(m) // get length
// Unlike arrays, maps grow
// dynamically to accommodate new
// key-values that are added;
// they have no fixed or maximum
// size. However, you can
// optionally indicate
// an initial capacity cap for
// the map, as in:
m := make(map[string]int,
cap) // m := make(map[string]
// int, 100)
```

Bytes

TBA

Control Structures (if, switch)

```
If
if x < 0 {
return err
} else if x == 0 {
f.Close()
} else {
a = 5
}
// Pattern to use with
// true/false condition
if n % 2 == 0 {
```



Control Structures (if, switch) (cont)

```

        return " eve n"
    }
    return " odd "
    // with initialization
    statement
    if val := getVal ue(); val > max
    {
        return err
    }
Switch
switch var1 {
case " a":
    f()
case " b", " c", " d": //
multiple values
    f2()
default:
    f3()
}
switch a,b := 3, 4; { // with
initialization
case a > 0: fallth rough// to
execute next
case b < 3:
    f()
}
// switch with multiple
conditions
switch {
case i < 0:
    f1()
case i == 0 && a > 3:
    f2()
case i > 0:
    f3()
}

```

Loop

```

For
for i := 0; i < 100; i++ {}
for i, j := 0, N; i < j; i, j =
i+1, j-1 { } // multiple
counters
// nested
for i:=0; i<5; i++ {
    for j:=0; j<10; j++ {
    }
}
// While like
for i < 5 {
    i += 1
}
// infinite loop
for { } // another form: for
true { }
//range
for i, val:= range str {
    fmt.Pr int f("C har acter on
position %d is: %c \n", i, val)
}
// we can use break and continue
to skip execution
// there is also goto and label

```

