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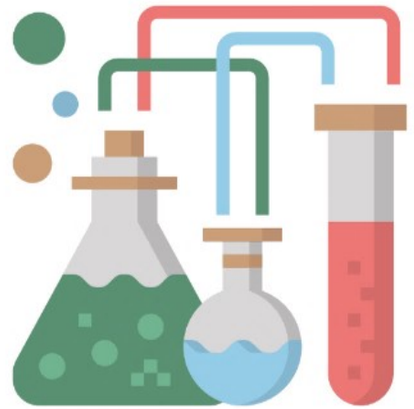
Let's get started!

WHAT IS SOFTWARE TESTING ?

A process of **analyzing a software item** to **detect the differences** between existing and required conditions (i.e., defects) and to **evaluate the features** of the software item.



(Menurut standar ANSI / IEEE 1059)

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PURPOSE OF TESTING

- Preventing **Regression**
- Confidence Level in **Refactoring**
- Improve **Code Design**
- Code **Documentation**
- Scaling The **Team**

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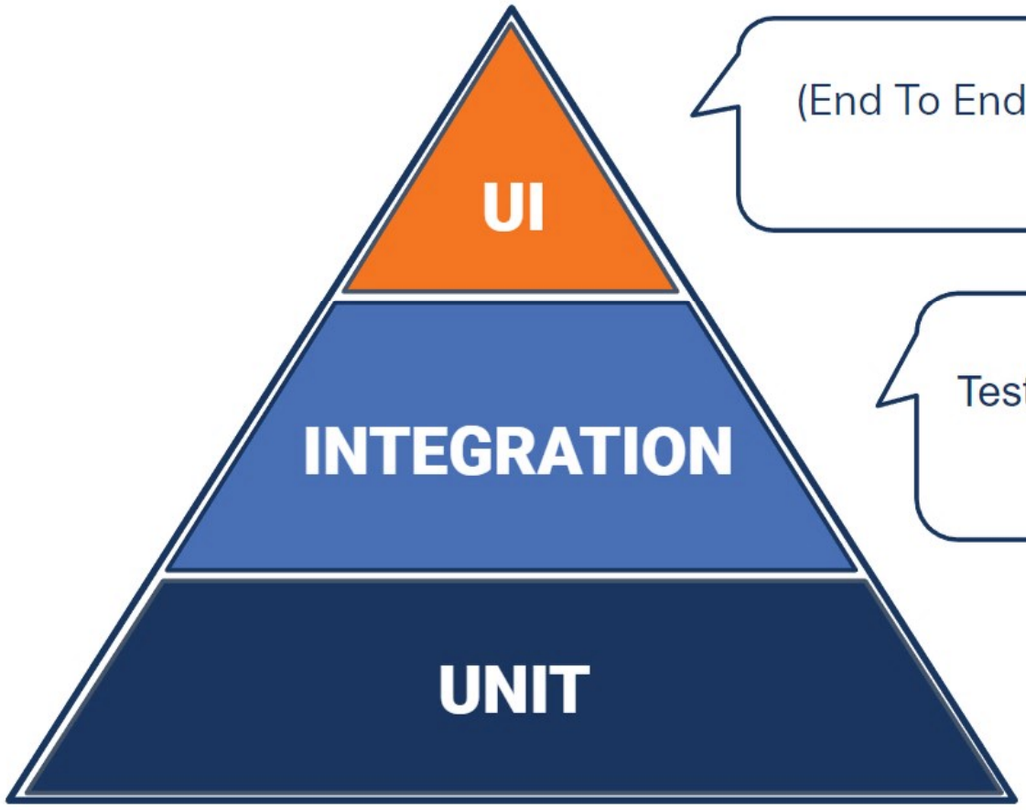
LEVEL OF TESTING



(End To End) Test the interaction between The overall through the user Interface

Tests a specific modules or sub-system through the api

Tests the smallest testable part (single logical operation) of an application through methods

FRAMEWORK

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Based on your programming language

YOU MUST CHOOSE

unit testing **framework**.

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Framework provides tool,
and structure necessary
to run **Testing**
efficiently.

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List of

(https://en.wikipedia.org/wiki/List_of_unit_testing_frameworks)

unit testing **framework**.

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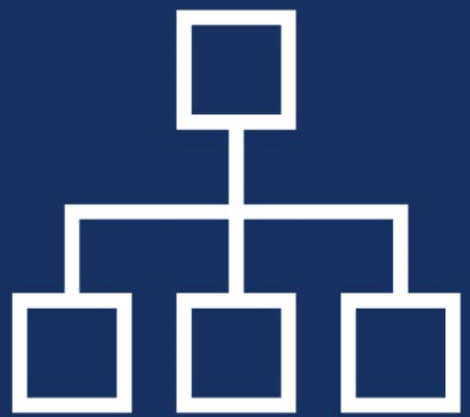

STRUCTURE

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2 usual pattern :

1. **Centralize** your test file inside tests folder.
2. Save test file **together** with production file.

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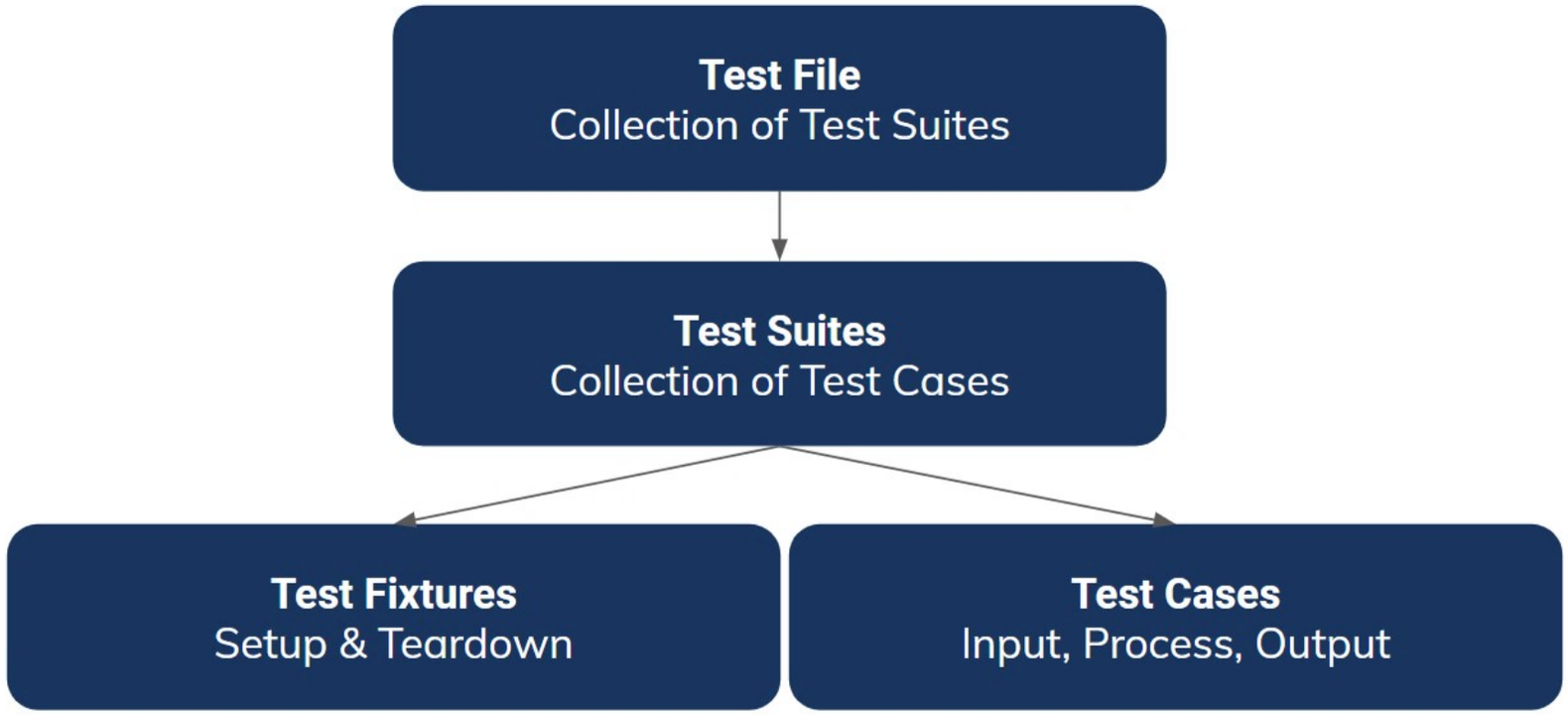

RUNNER

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Tool that run the test file

Use watch mode

(if there is change in codebase, automatically run test again, make TDD more efficient)

Choose a runner that can run fastest

MOCKING

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Your test case
need to be
INDEPENDENT

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YOU DO NOT TO TEST

- 3rd party modules
- Database
- 3rd party api or other external system
- Object class that you have test in other place

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You **need** to **create**

MOCK OBJECT

(n) fake object that simulate behaviour of real object

*) terms : fakes, spies, stubs, mocks

COVERAGE

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Coders need to

make sure

whether they have created enough tests.

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Coverage tool analyzes application code while tests are *running*.

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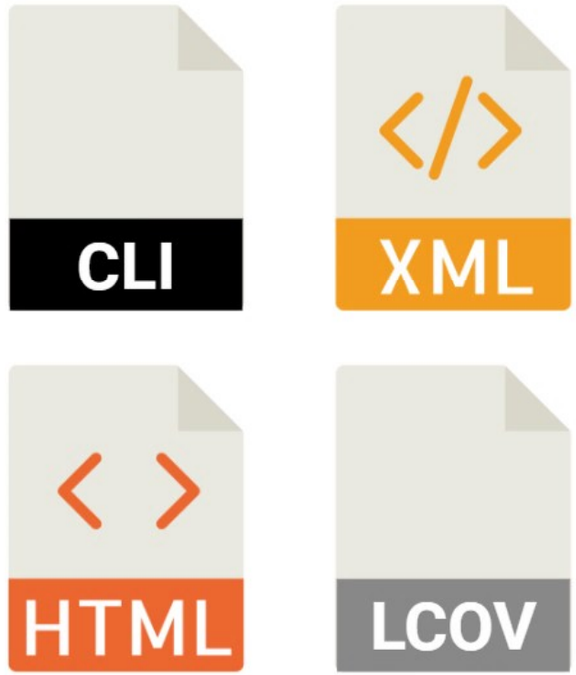
COVERAGE REPORT

- Function
- Statement
- Branch
- Lines

REPORT FORMAT



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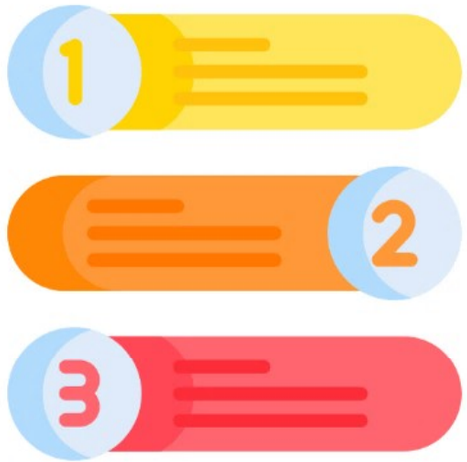
Use format that tool like

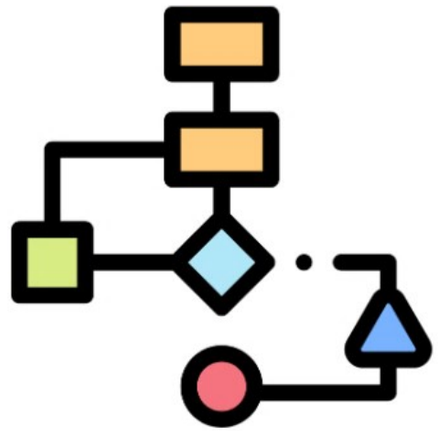
(static code analyzer)

able to **read it**.



Simple steps to test

Create a new test file in Go!



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1. name ending library_test.go (e.g. user_test.go)
2. Location File:
   a. same folder, same package
   b. same folder, different package

Create package file

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-code editor

```
# lib/calculate/calculate.go
package calculate

func Additon(a, b int) int {
  result := a + b
  return result
}
```

Write a test function

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1. Name : **Test & Capitalised Word**
2. Should have the signature func TestXxx(t *testing.T)

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-code editor

```
# lib/calculate/calculate_test.go
package calculate

import (
  "testing"
)

func TestAdditon(t *testing.T) {
  if Additon(1, 2) != 3 {
    t.Error("Expected 1 (+) 2 to equal 3")
  }
  if Additon(-1, -2) != -3 {
    t.Error("Expected -1 (+) -2 to equal -3")
  }
}
```

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Understand what you just made!

- More than one test function!
- Follow the Rule Testing in Go

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-terminal

```
$ go test ./lib/calculate -cover
```

-terminal

```
$ go test ./lib/calculate
-coverprofile=cover.out && go tool cover
-html=cover.out
```

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Unit Test
REST API
Function

Config

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-code editor

```go
var DB *gorm.DB

func InitDB() {

    config := map[string]string{
        "DB_Username": "root",
        "DB_Password": "123ABC4d.",
        "DB_Port":     "3306",
        "DB_Host":     "127.0.0.1",
        "DB_Name":     "training",
    }

    connectionString := fmt.Sprintf("%s:%s@tcp(%s:%s)/%s?charset=utf8&parseTime=True&loc=Local",
        config["DB_Username"],
        config["DB_Password"],
        config["DB_Host"],
        config["DB_Port"],
        config["DB_Name"])

    var e error
    DB, e = gorm.Open(mysql.Open(connectionString), &gorm.Config{})
    if e != nil {
        panic(e)
    }
    InitMigrate()
}

func InitMigrate() {
    DB.AutoMigrate(&models.Users{})
}
```

Controllers DB

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-code editor

```go
func GetUsers() (interface{}, error) {
   var users []models.Users

   if e := config.DB.Find(&users).Error; e != nil {
       return nil, e
   }
   return users, nil
}
```

userControllers

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-code editor

```go
package controllers

func GetUserControllers(c echo.Context) error {
    users, e := database.GetUsers()
    if e != nil {
        return echo.NewHTTPError(http.StatusBadRequest, e.Error())
    }
    return c.JSON(http.StatusOK, map[string]interface{}{
        "status": "success",
        "users":  users,
    })
}
```

Write a test function for echo

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1. Setup Echo (Method, Params, etc)
2. Call function rest api in package controller
3. Create test function

TestUserControllers

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-code editor

```
package controllers

func InitEcho() *echo.Echo {
   // Setup
   config.InitDB()
   e := echo.New()

   return e
}

func TestGetUserControllers(t *testing.T) {

   var testCases = []struct {
       name                 string
       path                 string
       expectStatus         int
       expectBodyStartsWith string
   }{
       {
           name:                 "berhasil",
           path:                 "/users",
           expectBodyStartsWith:
"{\"status\":\"success\",\"users\":[",
           expectStatus:         http.StatusOK,
       },
     }
```

-code editor

```
e := InitEcho()
   req := httptest.NewRequest(http.MethodGet, "/", nil)
   rec := httptest.NewRecorder()
   c := e.NewContext(req, rec)

   for _, testCase := range testCases {
       c.SetPath(testCase.path)

       // Assertions
       if assert.NoError(t, GetUserControllers(c)) {
           assert.Equal(t, http.StatusOK, rec.Code)
           body := rec.Body.String()
           // assert.Equal(t, userJSON, rec.Body.String())
           assert.True(t, strings.HasPrefix(body,
testCase.expectBodyStartsWith))

       }
   }
```

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RUN
WITH REPORT
COVERAGE
ALL PACKAGE

-terminal

```
$ go test -v -coverpkg=./...
-coverprofile=profile.cov ./…

$ go tool cover -func profile.cov
```

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“Quality is never an accident; it is always the result of intelligent effort.”

~ John Ruskin

Thankyou !