SOLID PageObjectS

Remigiusz Dudek

Introduction

Remigiusz Dudek

Senior QA Engineer at Klika Tech co.

- Test Warez 2019: Architecture driven QA
- Test Warez 2018: Testing hexagonal Architecture
- Test Warez 2017: Consumer Driven Contracts
- Test Warez 2016: From CI to CD
- Test Warez 2015: 7 Cardinal Sins of automted testing

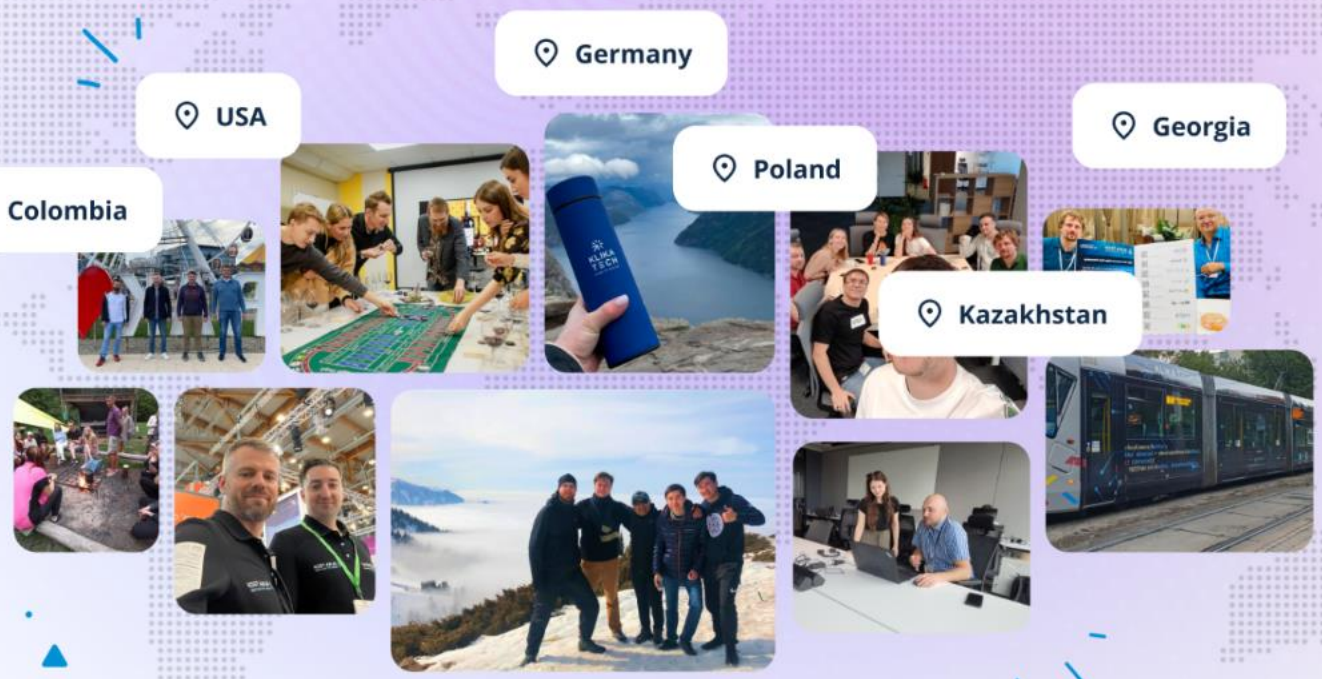
WHO WE ARE

Klika Tech is an **IoT & cloud** product and solutions development company with 335 employees in 8 countries.

aws partner network

Advanced
Consulting Partner

- IoT Competency
- Digital CX Services Competency
- DevOps Competency
- AWS IoT Core
- Amazon API Gateway
- AWS CloudFormation
- AWS IoT GreenGrass
- AWS Lambda



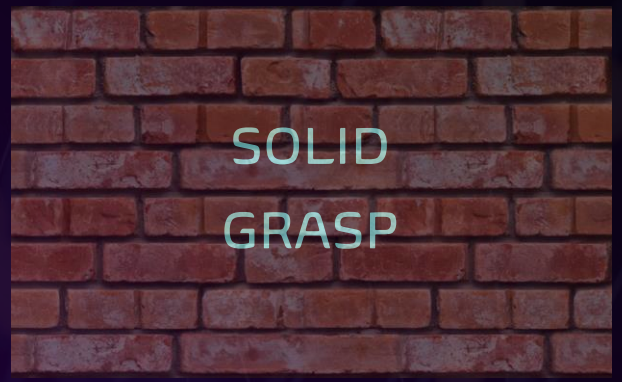
Rules of Engagement

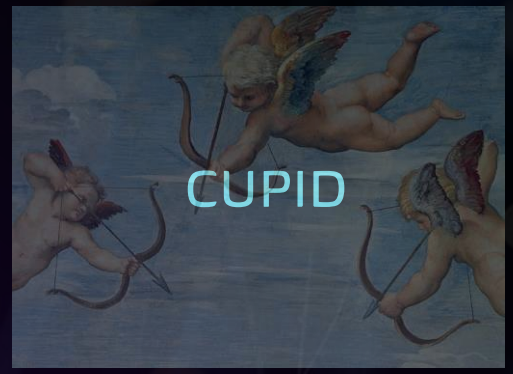
- Mutual respect
- Constructive critique
- Solution questioning
- Safe environment for trying new things

Overview

Given OO paradigm how to create a SOLID solution you'd LOVE to work with.

OOP/OOD





OOP

„making code easy to read, makes it easier to write“ by R. C. Martin

Domain Driven Rules

- Always optimize code for readability
- Use Domain laguage
- API should tell the story, should lead you by your hand
- Idempotency

OOP

„when you focus on what's important, everything else falls into place“

OOP

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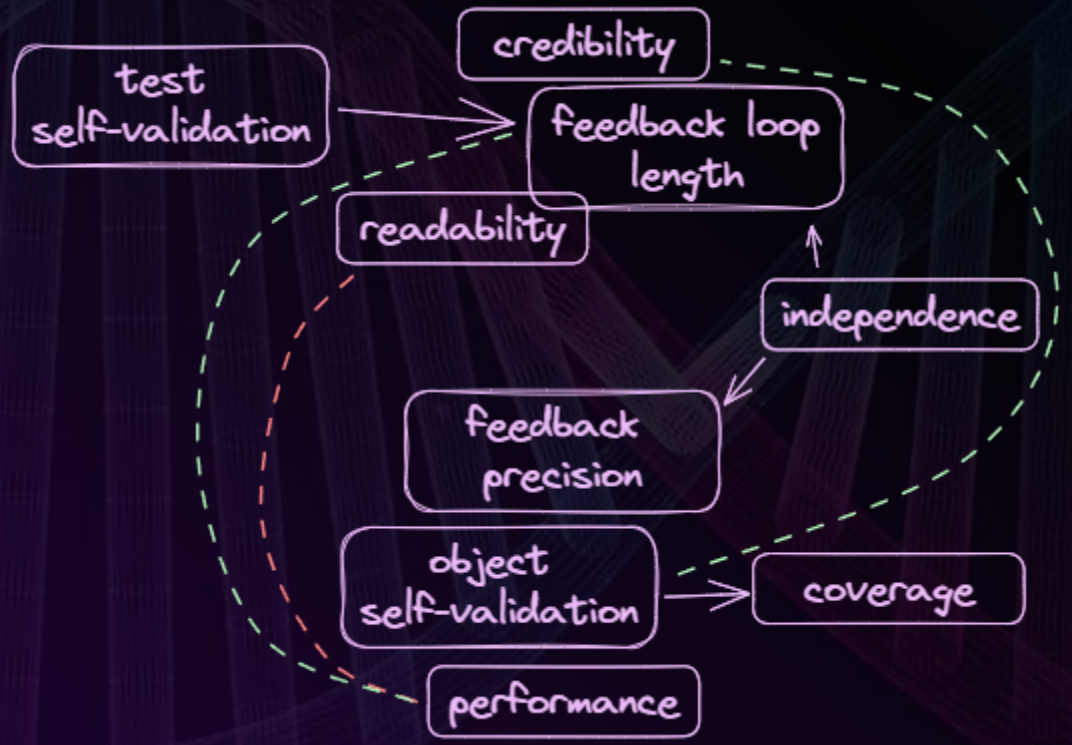
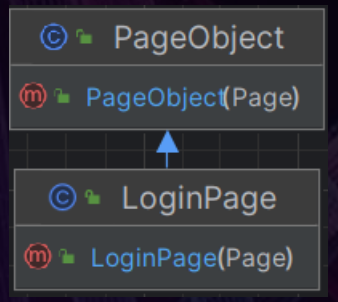


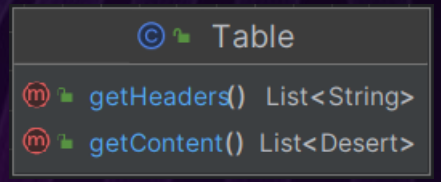
OOP

„Any fool can write code that a computer can understand. Good programmers write code that humans can understand“ by M. Fowler



OOP

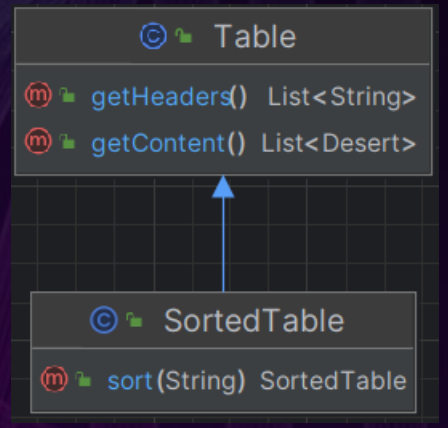
„You can‘t build a great building on a weak foundation“



Dessert (100g serving)	Calories	Fat (g)	Carbs (g)	Protein (g)
Frozen yoghurt	159	6	24	4
Ice cream sandwich	237	9	37	4.3
Eclair	262	16	24	6
Cupcake	305	3.7	67	4.3
Gingerbread	356	16	49	3.9

OOP

„You can‘t build a great building on a weak foundation“



Nutrition

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Marshmallow	318	0	81	2

Rows per page: 5 1–5 of 13

OOP

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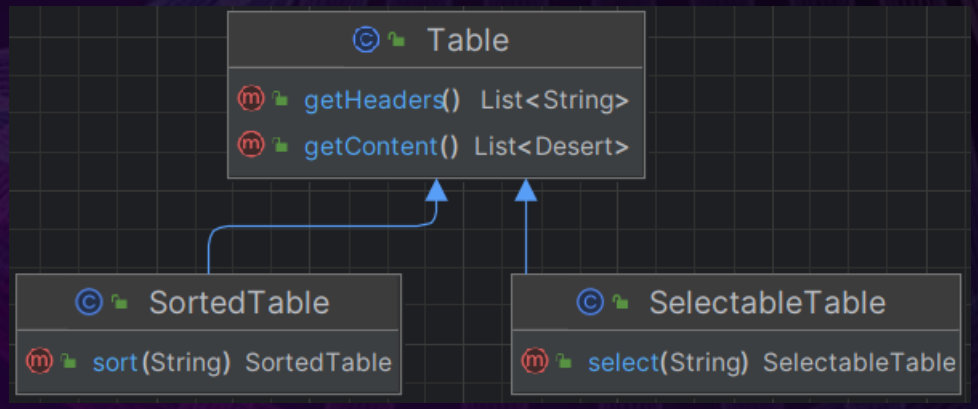

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OOP

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Composition over inheritance

- Inheritance = A is B
- Composition = A is composed of B

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OOP

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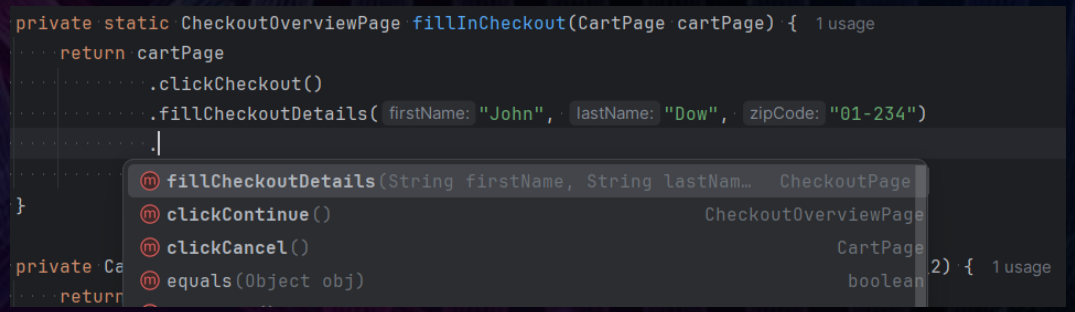
Fluent API

- Pros
  - Intuitiveness – design leads by hand
  - Encapsulation – protected from implementation details
- Caveats
  - Directions of flow
  - Flow breakers – getters – convention needed



SOLID

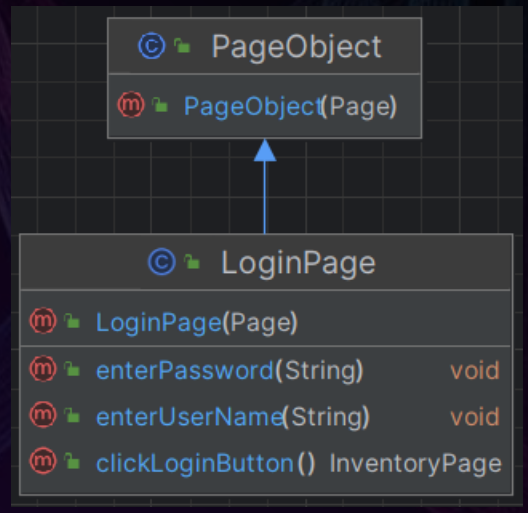
„The price of greatness is responsibility“ by W. Churchill

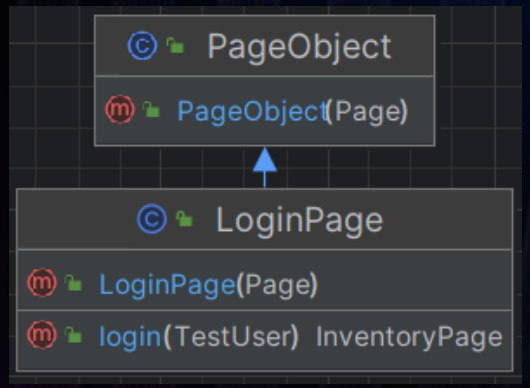
Single responsibility

- Translates business interface to object interface

.VS.

- Translates GUI widgets into object interface





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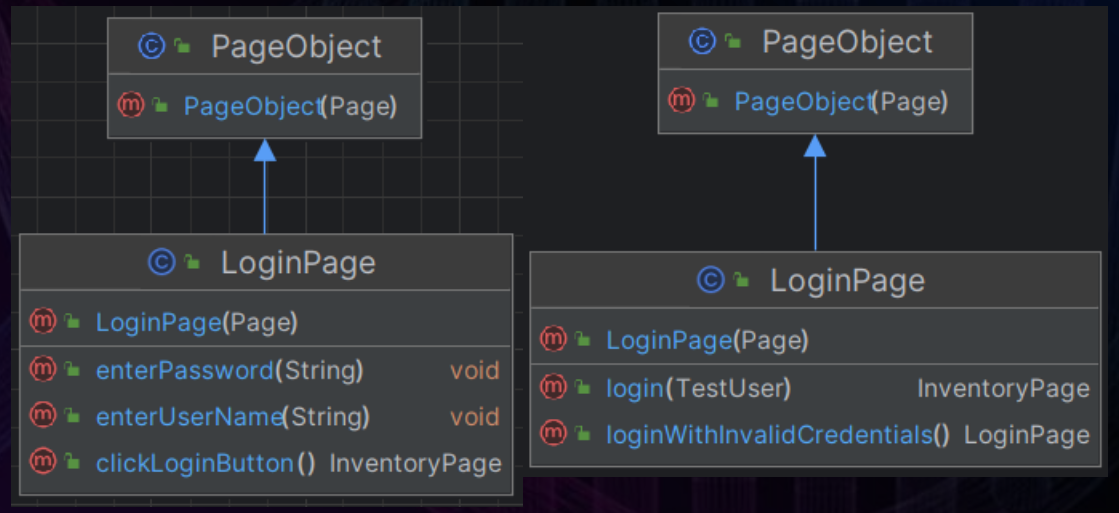
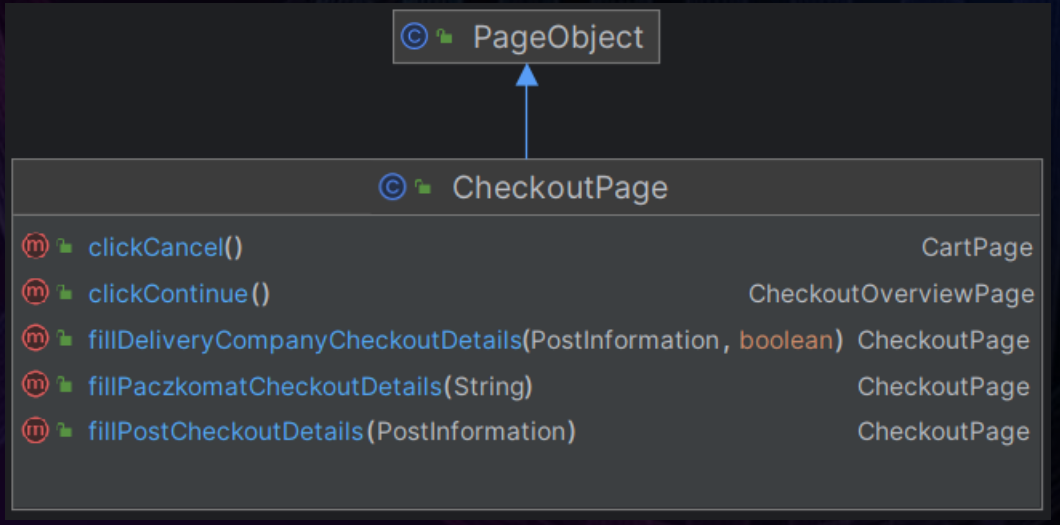


SOLID

„Close your eyes, it helps openning your mind"
by Unknown

Open Close principle

- The goal of the design is to protect us from variability of the world



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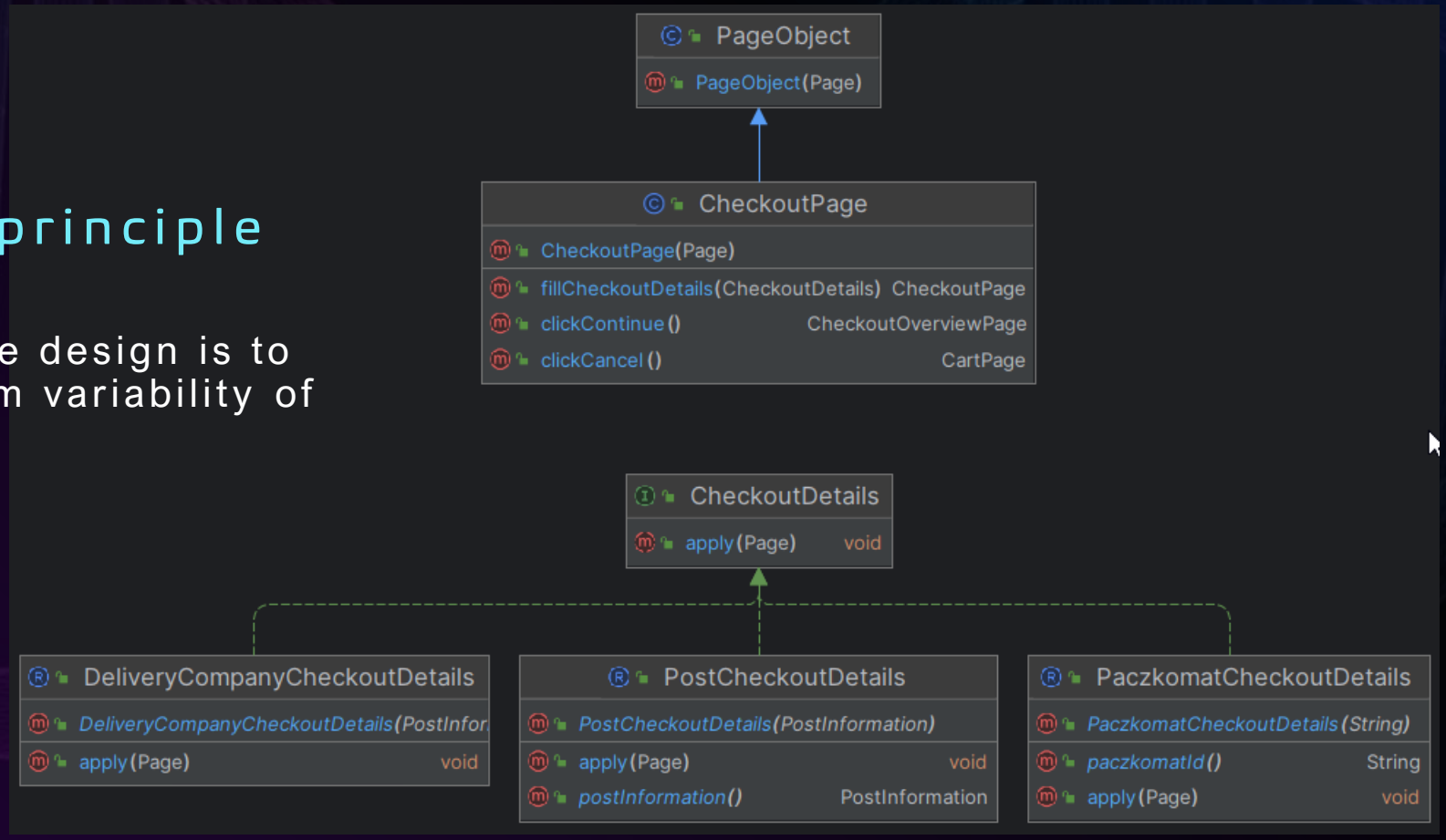
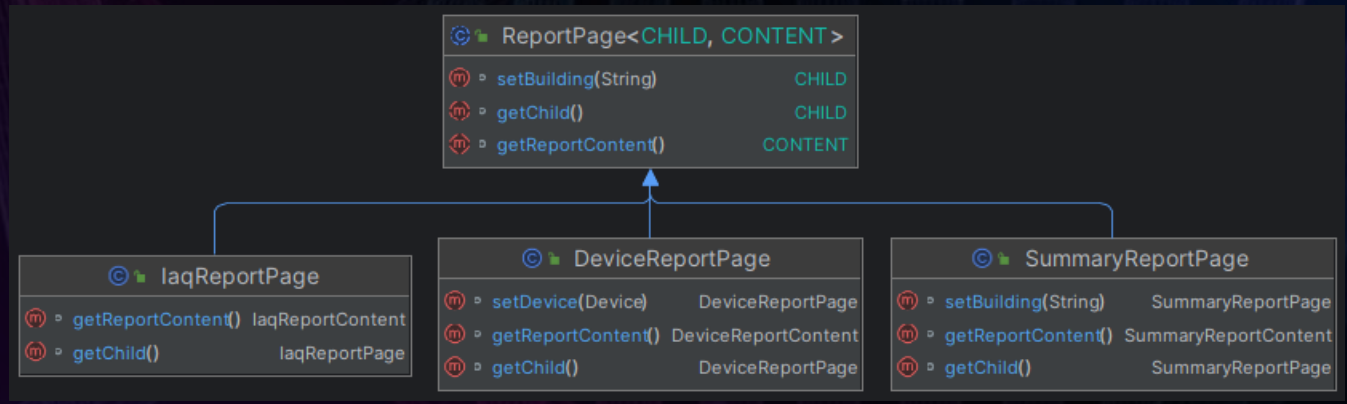


SOLID

„Trap is only a trap if you don't know about it, if you know about it, it's a challange"

Liskov substitution

- Principle of no setting traps for yourself

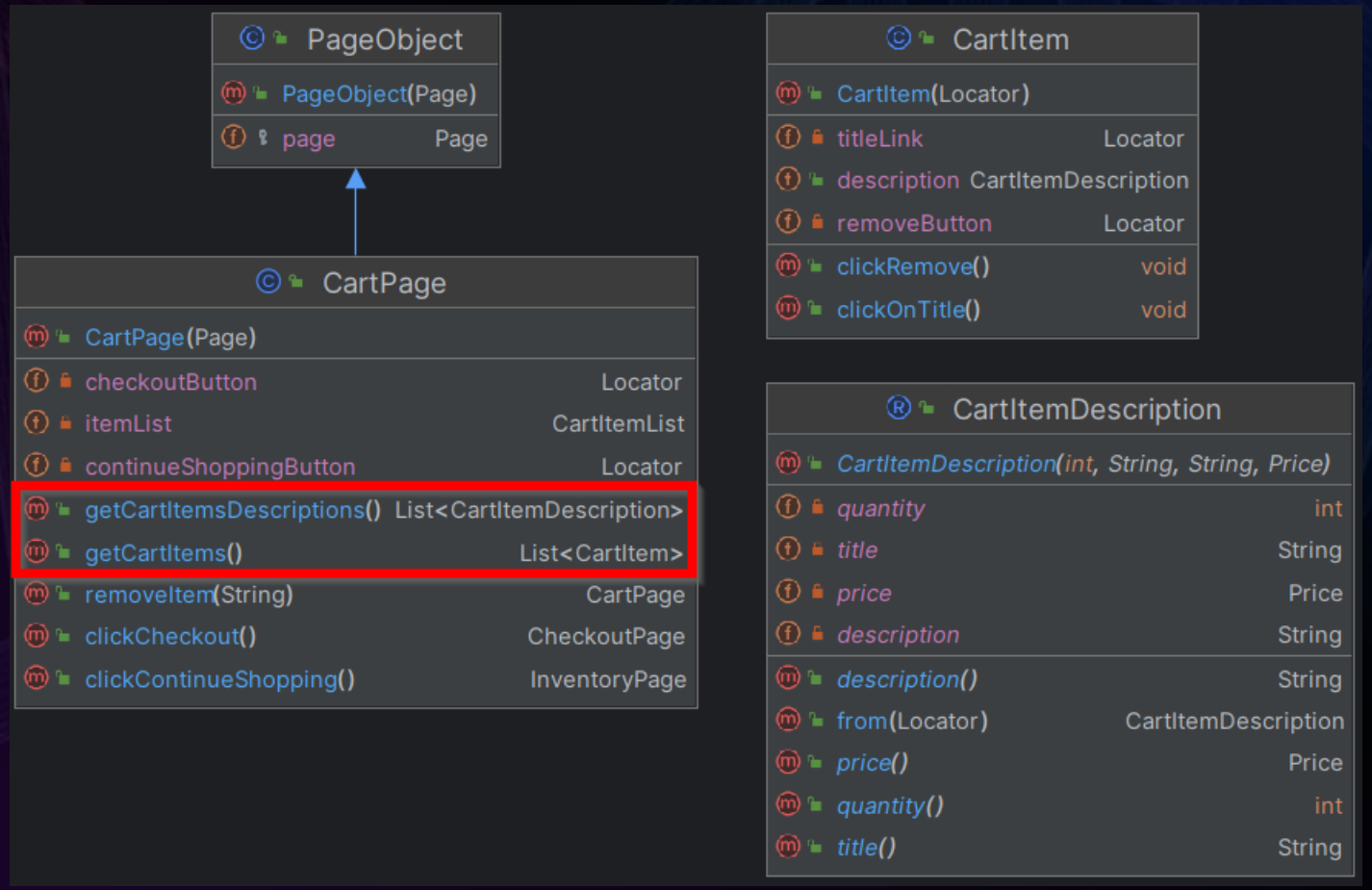


SOLID

„Everything is possible, but everything is not necessary“
by A. Part

Inteface segregation

- Expose only what is required

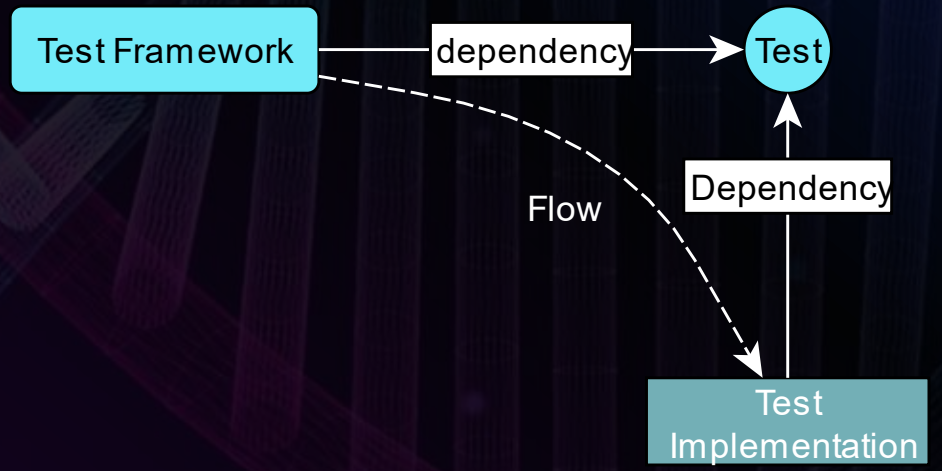


SOLID

„The happiness is to enjoy the present, without anxious dependence upon the future“ by Seneca

Dependency Inversion

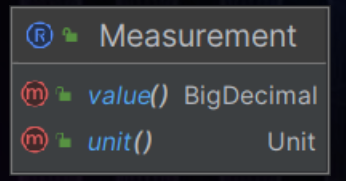
- Don’t depend on concretes, depend on abstraction
- High-level module should not depend on low-level module



GRASP

„We are drowning in information but starved for knowledge“
by John Naisbitt

- We need to implement adding functionality



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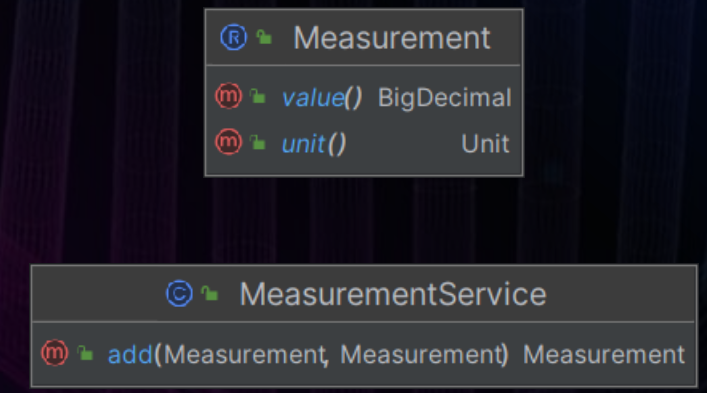
- We need to implement adding functionality
  - Separate service



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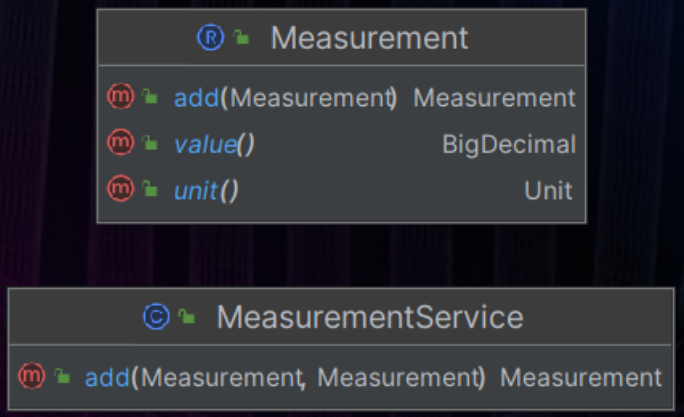
- We need to implement adding functionality
  - Separate service
  - `add()` method in `Measurement`



GRASP

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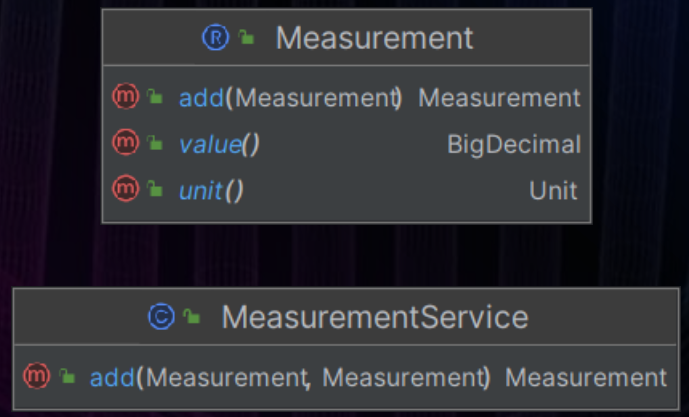
- We need to implement adding functionality
  - Separate service
    - Flexibility in terms of adding new complex operations (e.g. unit conversion)
    - Requires additional conventions to quickly find available operations
  - `add()` method in `Measurement`
    - fluent API – leads you by hand
    - `DTO` hell



GRASP

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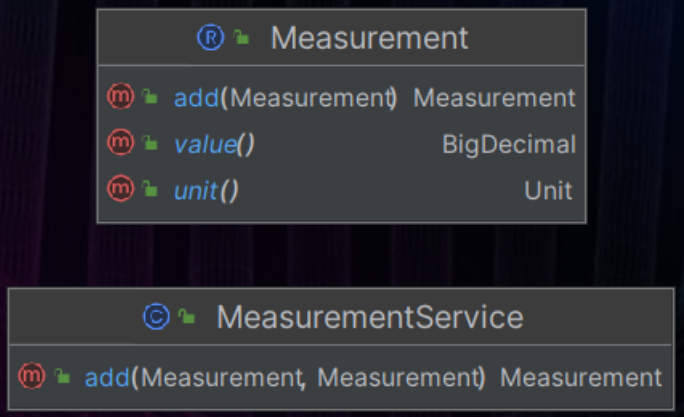
Information expert

- How to assign responsibilities?
- Assign it to the class that has all the information to fulfill it



GRASP

„I'm the creator of my reality"
by Annette Funicello

Creator

- Who should create object `Desert`?

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GRASP

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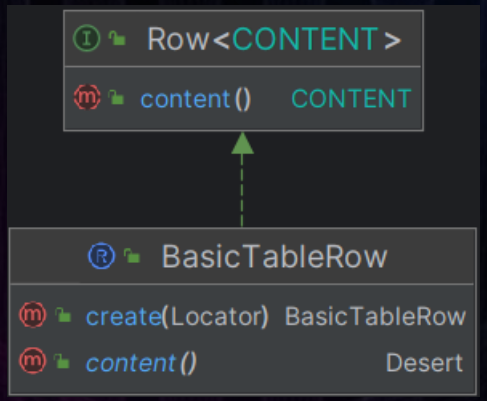
Creator

- Who should create object A?
- The one who:
  - Compositely aggregates objects of type A
  - Closely uses objects of type A
  - Have initializing information for type A



GRASP

„In all fighting (...) indirect methods will be neeeded in order to secure victory“
by Sun Tzu

Indirection

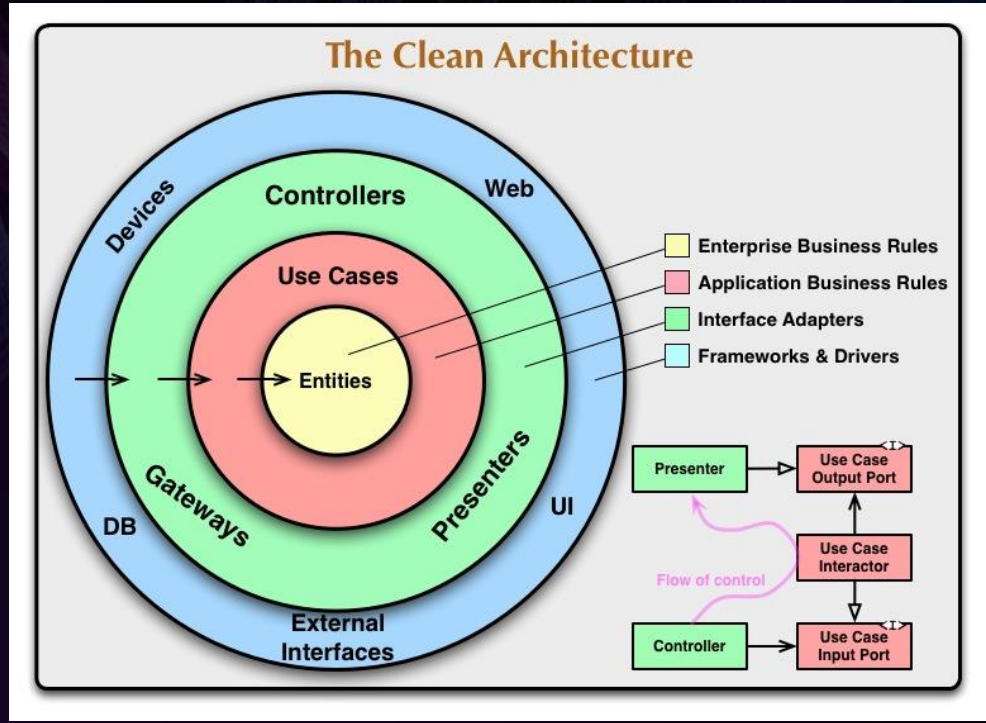
- How not to couple objects?
- Design object responsible for handling interactions between other objects

GRASP

„What consumes your mind, controls your life“
by Anonymous

Controller

- Who should be responsible for handling an input system event?



GRASP

„Who plays together stays together“
by Anonymous

Low Coupling

- How much two components <x> each other
  - are connected to
  - rely on
  - know about
  - depend on

- Coupling levels
  - **Content coupling (e.g. I know your internals)**
  - **Temporal coupling (e.g. order matters)**
  - **Global data (e.g. static)**
  - **Control (e.g. pass boolean flag to change behavior)**
  - **Stamp (e.g. entire data structure is shared)**
  - **Data (e.g. share data throu parameters)**
  - **Message (e.g. pub-sub)**
  - **No coupling**

GRASP

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Low Coupling

$$C = 1 - \frac{1}{d_i + 2 \times c_i + d_o + 2 \times c_o + g_d + 2 \times g_c + w + r}$$

- d_i - #input params
- c_i - #input control params
- d_o - #output params
- c_o - #output params
- g_d - #global data vars
- g_c - #global control vars
- w - #fan-out
- r - #fan-in

- Coupling levels
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GRASP

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High cohesion

- How much elements inside module belong together?
- How much methods belong to fields?

- Coupling levels
- **Coincidental (e.g. utils class)**
- **Logical (e.g. all controllers in one dir)**
- **Temporal (e.g. ex handling)**
- **Procedural (e.g. there is a certain procedure to follow)**
- **Informational (e.g. operate on the same data)**
- **Sequentional (e.g. output -> input)**
- **Functional (e.g. all is required to achieve goal)**
- **Perfect (atomic)**

GRASP

„Everything morphs, nothing stands still“
by Heraclitus (almost)

Polymorphism

- Variations in behaviou should be placed in child classes

GRASP

„Protection ans security are only valuable if they don‘t cramp life excessively“
by Carl Jung

Protected variations

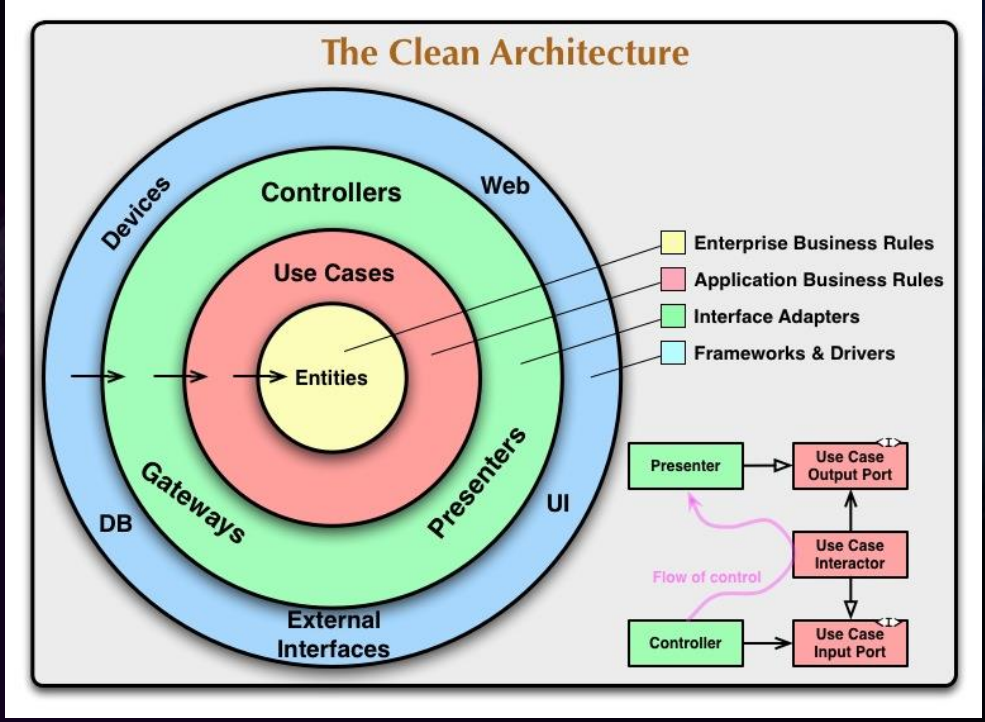
- Wrap instability of the world into an interface and use polymorphism

GRASP

„Don't blame the world. Find a solution."
by Sri Chinmoy

Pure fabrication

- A class „fabricated" for the sake of the solution, not derived from problem space



CUPID

„Forever is composed of nows“ by Emily Dickinson

Composable

- Small surface area
- Intention revealing
- Minimal dependencies
- „Fits in your head”

CUPID

„Efforts and courage are not enough without purpose and direction“
by J.F Kennedy

UNIX philosophy

- Do one thing and do it well
- Single purpose vs responsibility

CUPID

„The best way to predict the future is to create it“
by A. Lincoln

Predictable

- The principle of least astonishment
- No side effects
- Repeatability / Reliability
- Observable

CUPID

„There should be one – and preferably only one – obvious way to do it“
by The Zen of Python

Idiomatic

- Empathy
- Code format / Dir structure
- „There should be one (...) obvious way to do it”

CUPID

„The biggest problem in communication is the illusion that it has taken place“
by G. B. Shaw

Domain based

- Ubiquituous language
- Domain driven dir structure (Clean architecture)

Thank you

Remigiusz Dudek

remigiusz.dudek@gmail.com