Structuring your Go Project

By Ruba Zeibak

Why should we care?

“I don’t understand what is this code trying to do!”

“If I modify this part then I need to modify that part too!”

….

Why should we care?

The goal is to have a codebase that is loosely coupled and highly cohesive, so that **changes are easy, fast and safe** to make.

Things to consider

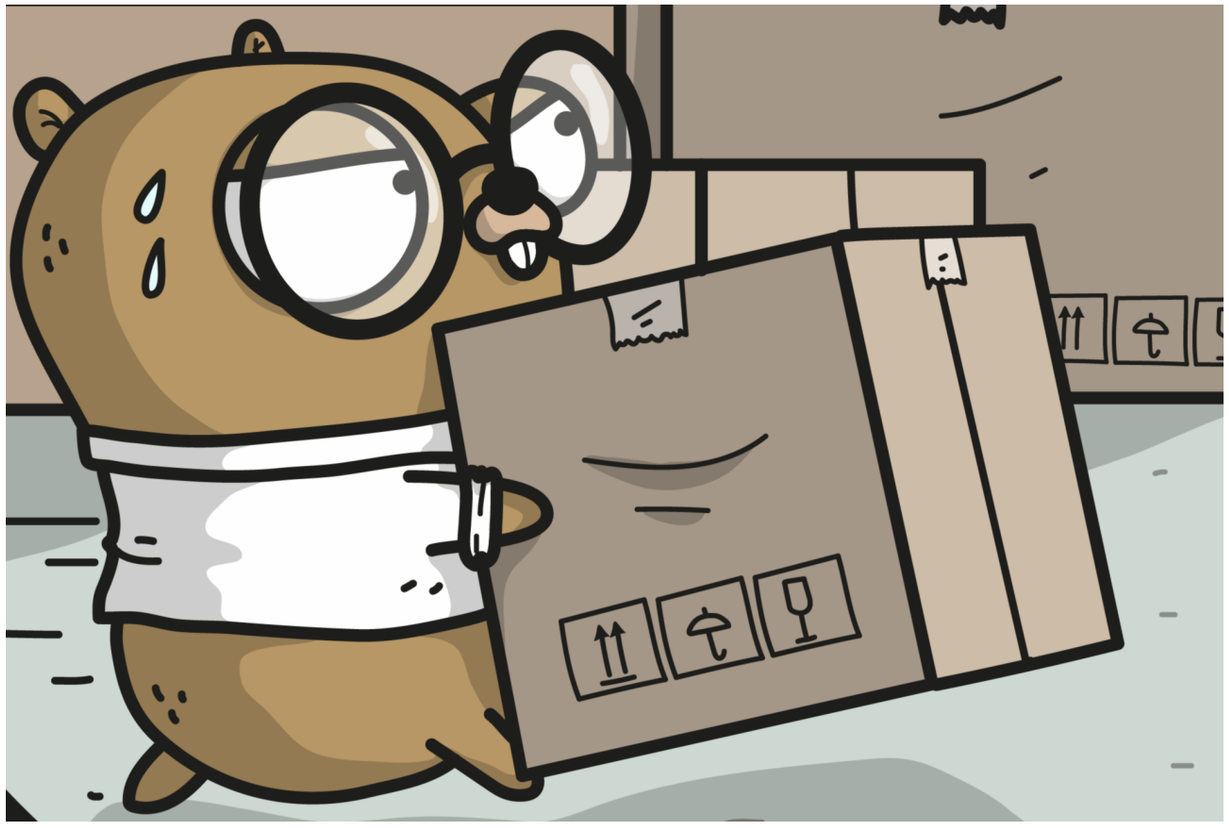
- Package Oriented Design
- Domain Driven Design
- Ports & Adapters Architecture
- Onion Architecture

Package Oriented Design

- In Go, each folder that contains source code is considered a package.
- All packages are “first class”, there are no sub-packages.
- Packaging is like micro services at the source code level.
- Two packages can’t cross-import each other.

Package Portability

- The more portable the package is, the lower the coupling.
- To be portable, packages must be designed with reusability in mind.



Package Purpose

- The more focused the package purpose is, the higher the cohesion.

- To be purposeful, packages must provide, not contain.

- Naming should showcase exactly that purpose.
  Good: http, fmt, io … These are packages that provide.
  Bad: utils, common …

Domain Driven Design

Domain-Driven Design is an approach to software development based on **making your software deeply reflect a real-world system** or process.

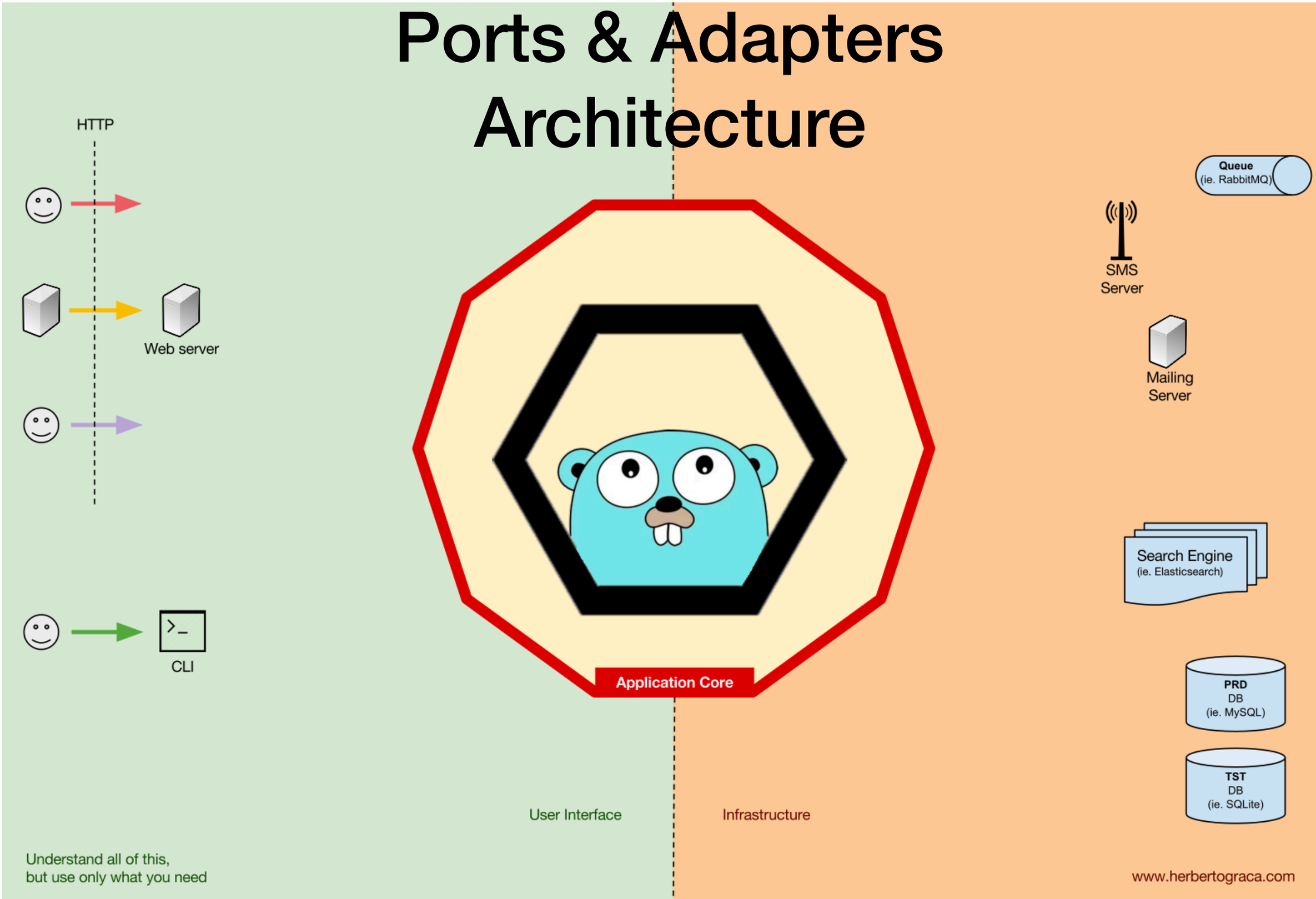
DDD Principles

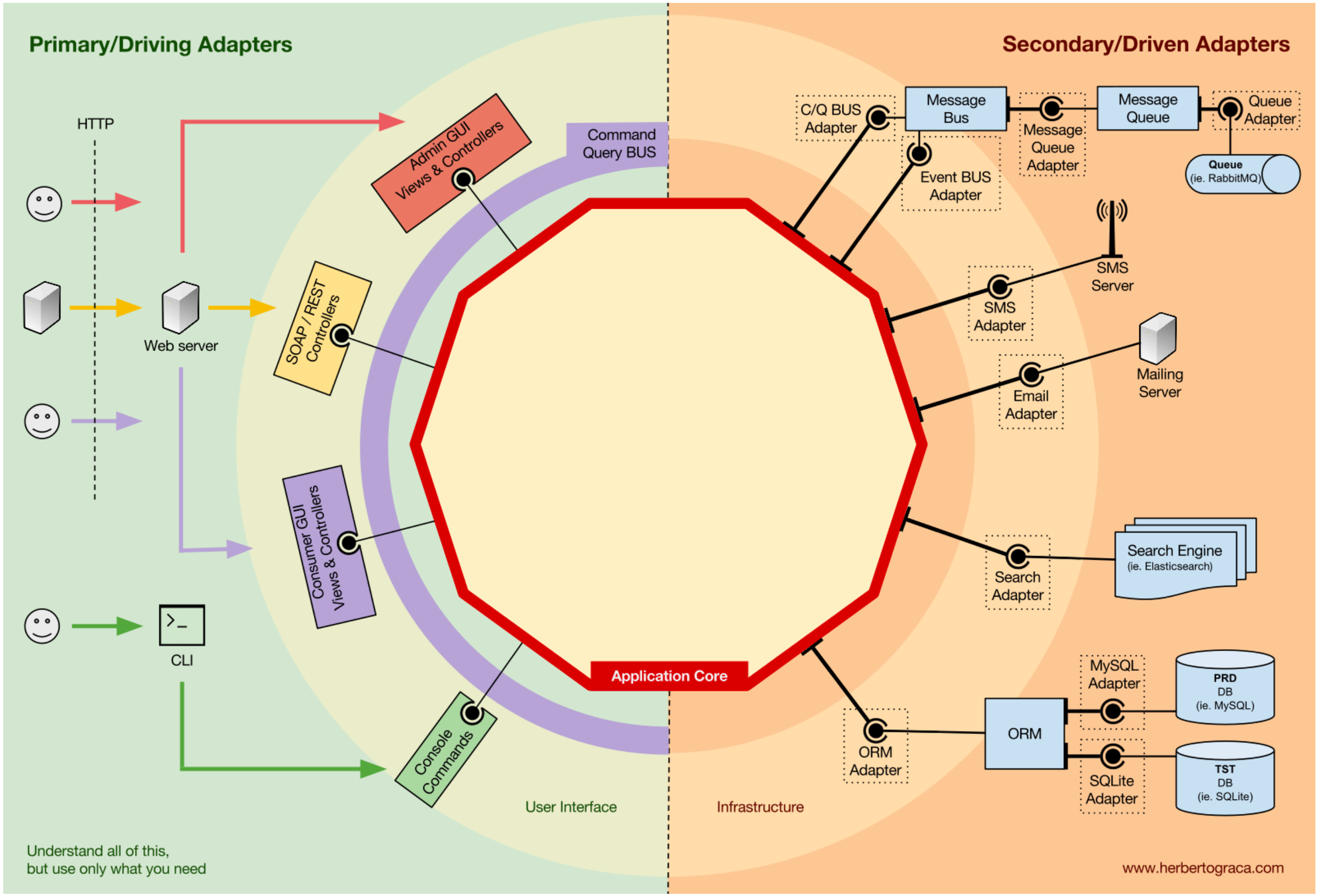
- Focus on the core domain and domain logic.
- Base complex designs on models of the domain.
- Constantly collaborate with domain experts, in order to improve the application model and resolve any emerging domain-related issues.

Core Business Logic

The key is to structure your code in such a way that it has the inputs and outputs abstracted to protect the core business logic.

Ports & Adapters Architecture

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Understand all of this,
but use only what you need
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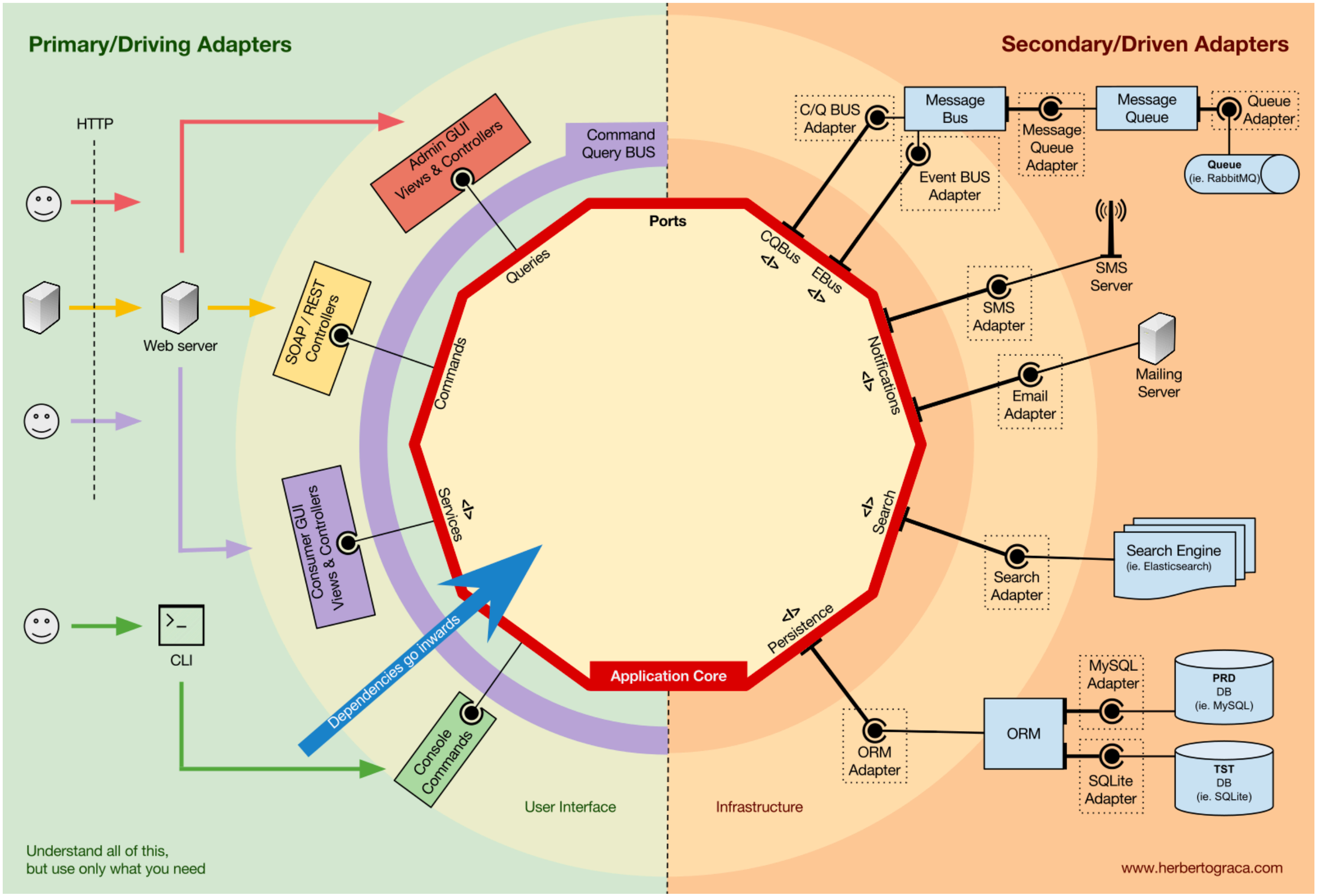
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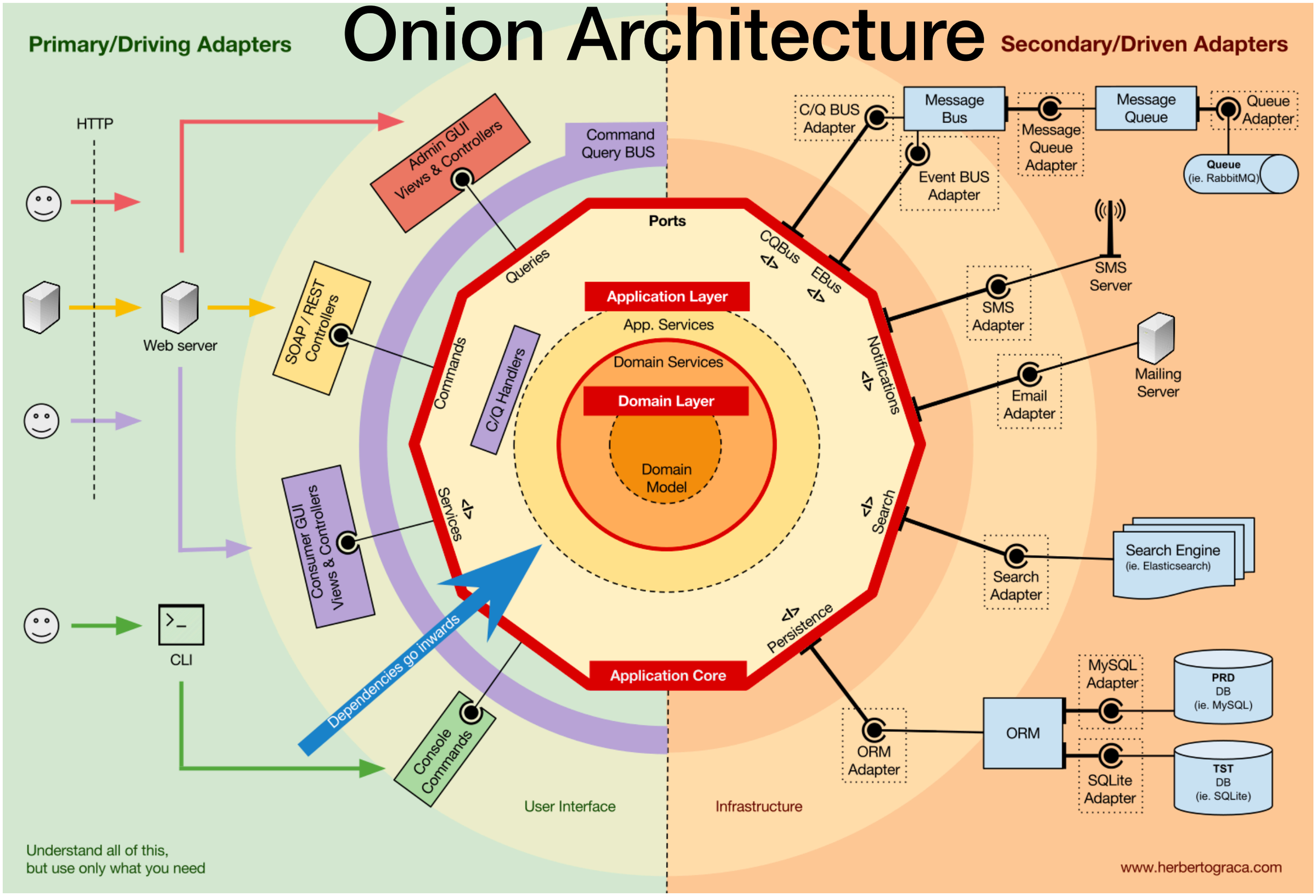
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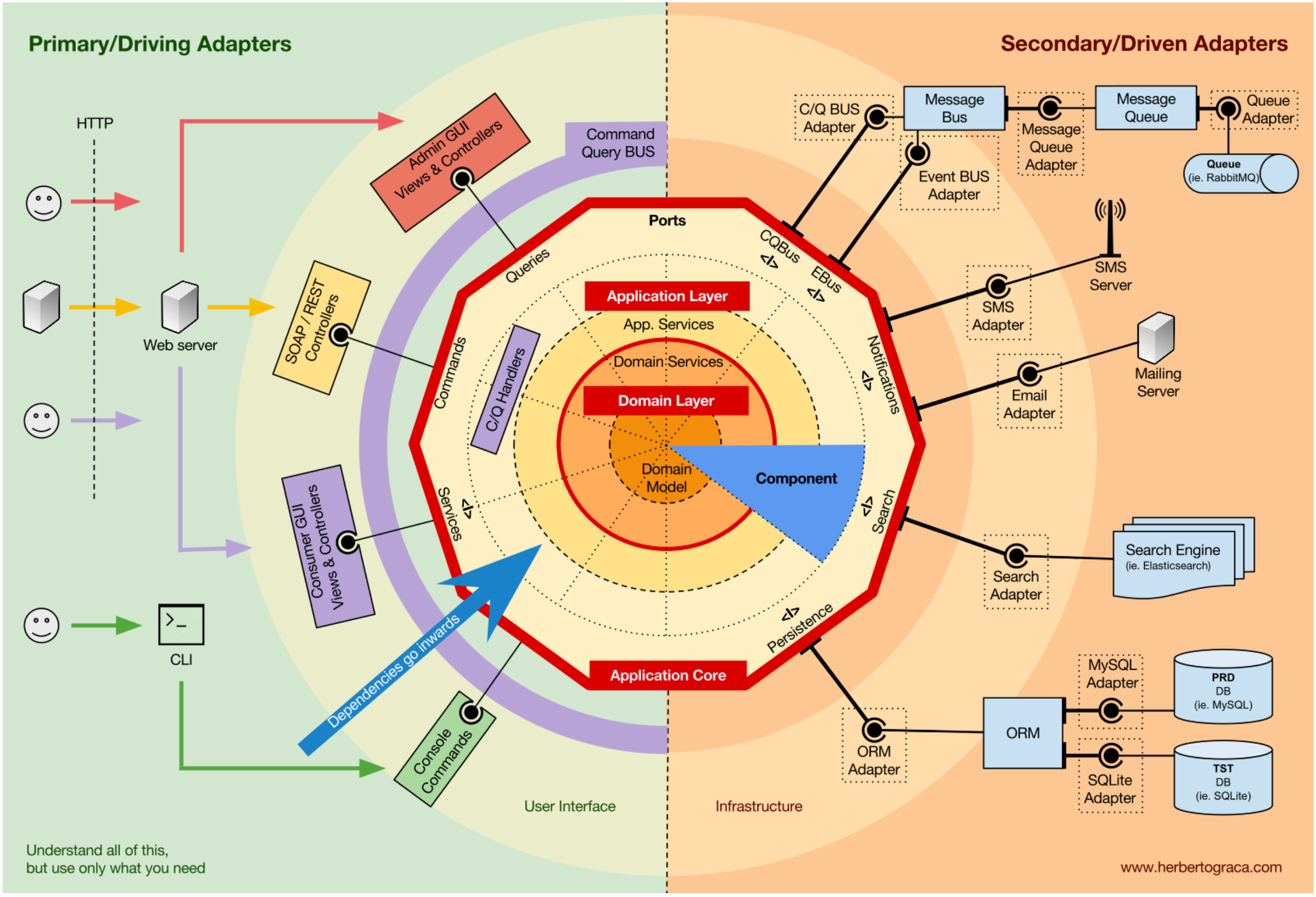
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Enough with the Principles, let’s go back to Go

In Go different folders have different functionalities

golang-standards / **project-layout**

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Standard Go Project Layout

go | golang | project-template | standards | project-structure

54 commits | **1** branch | **0** releases | **6** contributors | View license

Branch: **master** | New pull request | Create new file | Upload files | Find File | Clone or download

kcq Style guideline for Go packages reference — Latest commit 5699db3 9 days ago

api	more references	last year
assets	assets dir notes	9 months ago
build	build config file location clarification	3 months ago
cmd	more references	last year
configs	more notes and notes in major directories	last year
deployments	more notes and notes in major directories	last year
docs	more references	last year
examples	more references	last year
githooks	more notes and notes in major directories	last year
init	more notes and notes in major directories	last year
internal	internal package use clarifications	6 months ago
pkg	more pkg examples	5 months ago
scripts	more references	last year
test	more details around the testdata directory	last year
third_party	more notes and notes in major directories	last year
tools	more references	last year
vendor	added a reference for a vendoring tool	last year
web	more notes and notes in major directories	last year
website	added website directory	9 months ago
.gitignore	empty repo	2 years ago
LICENSE.md	empty repo	2 years ago
Makefile	initial directory layout	2 years ago
README.md	Style guideline for Go packages reference	9 days ago

CMD

The different binaries of the application

PKG

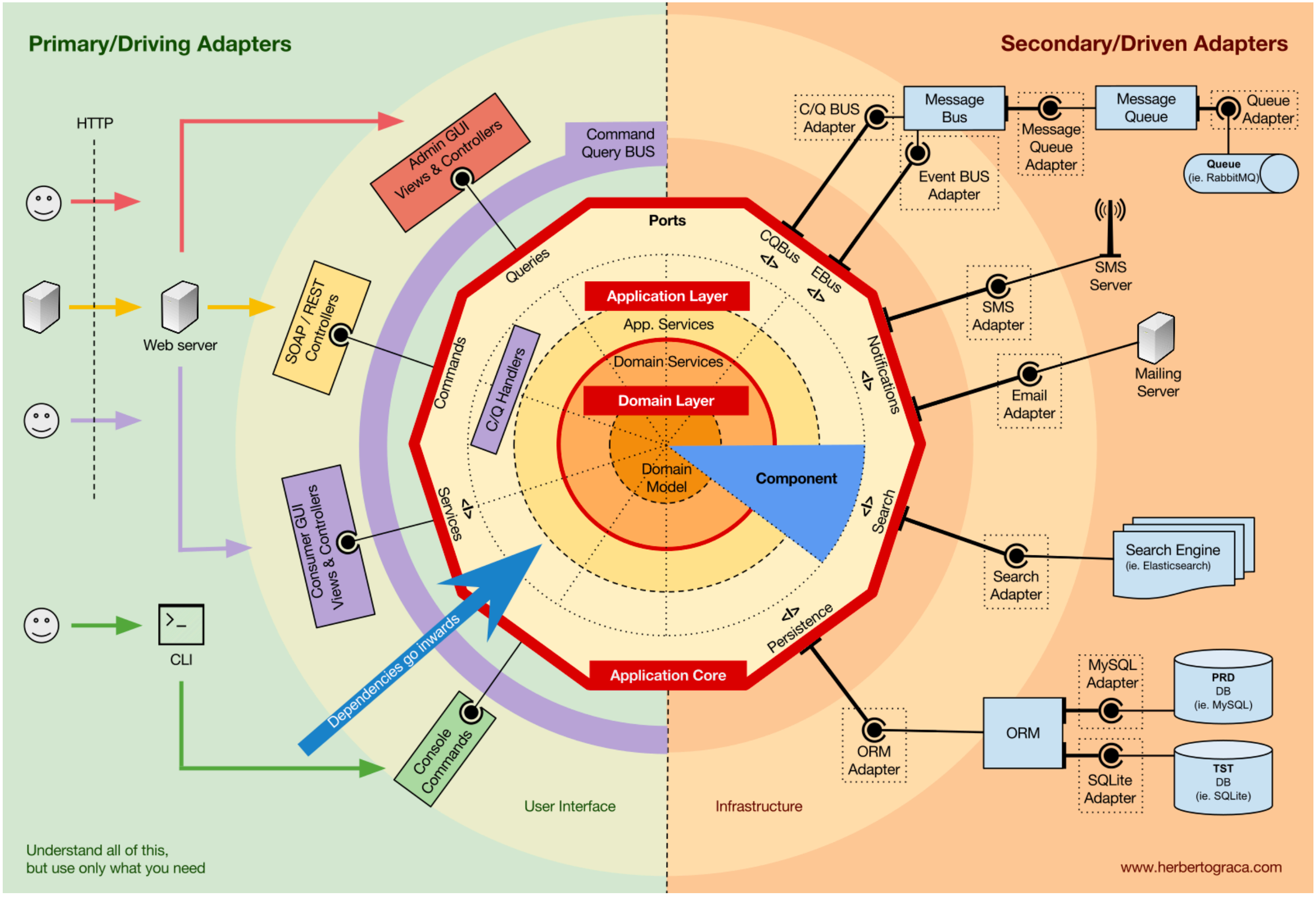
Where you put your public libraries

INTERNAL

Where you put your private packages

External Packages

VENDOR - imported 3rd party packages.
Third_party - modified 3rd party packages.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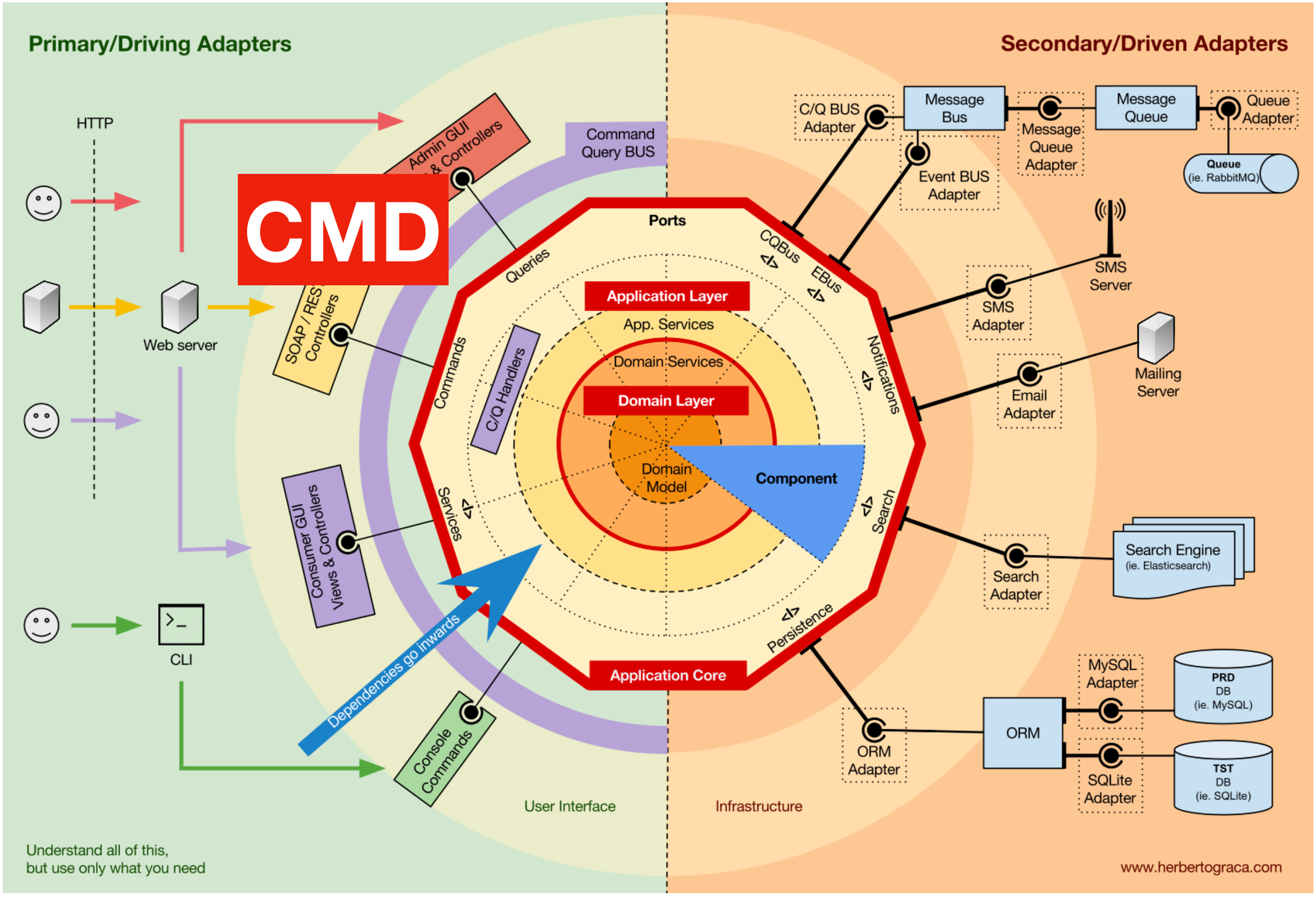
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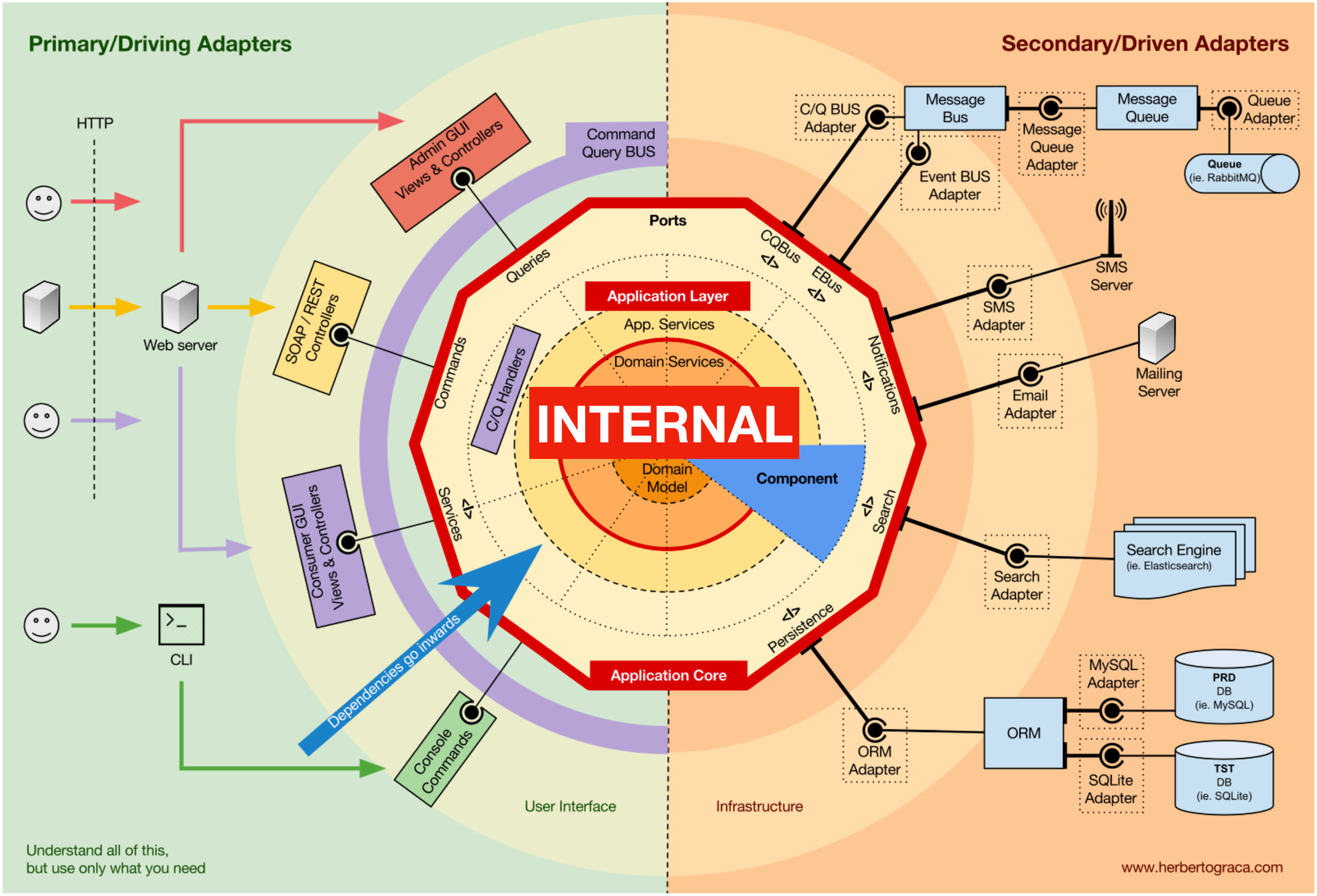
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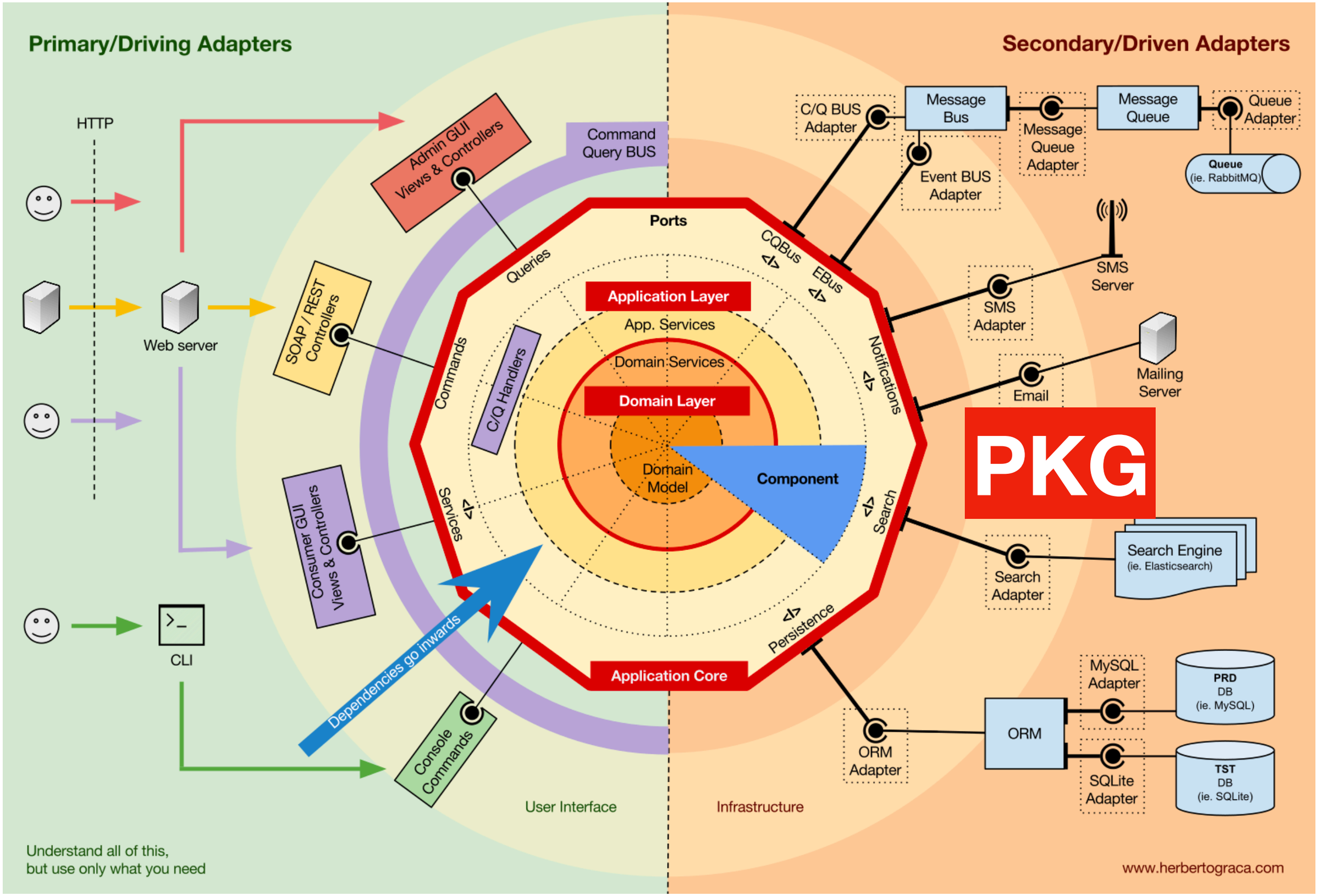
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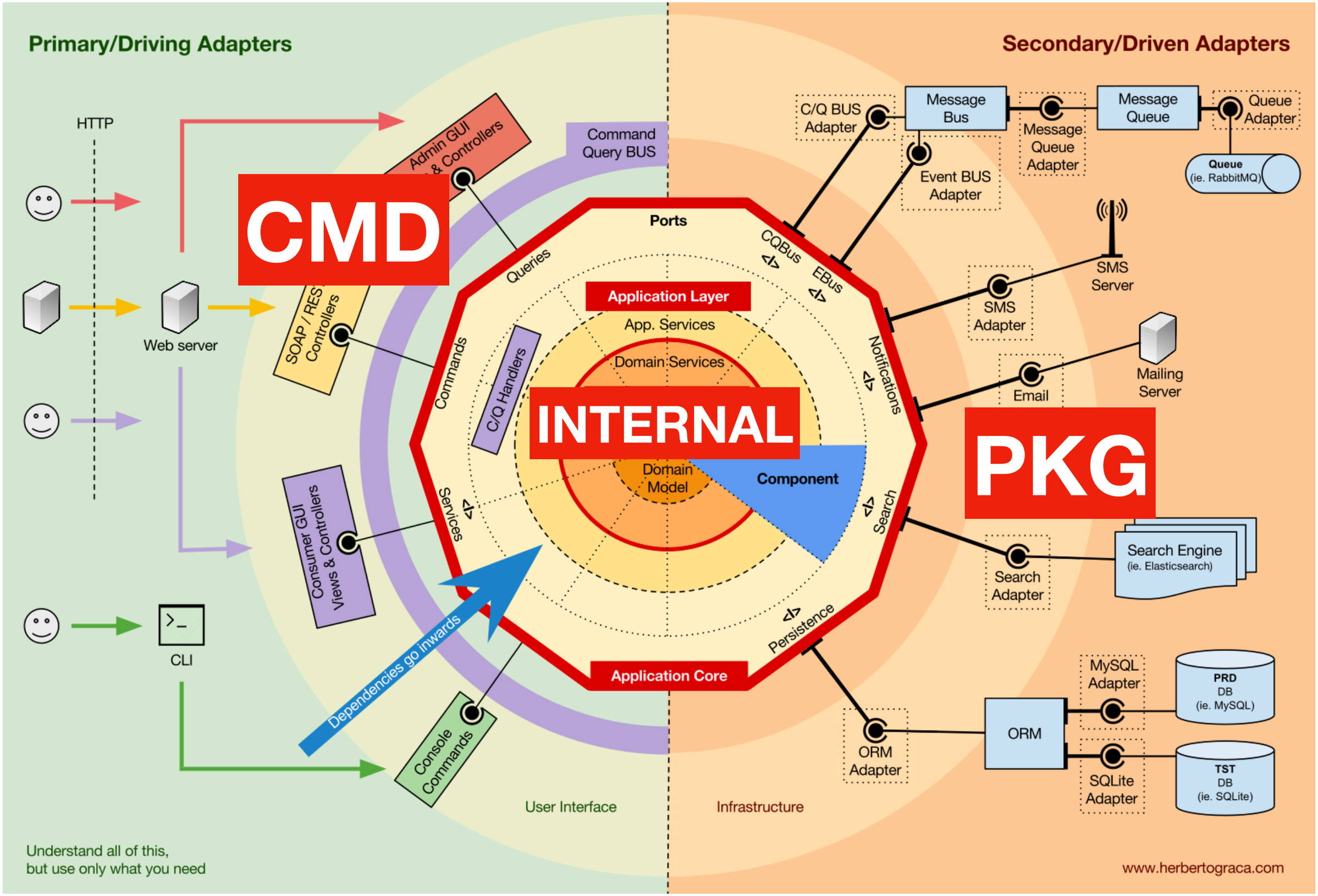
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Have I answered the question??

A Look into the Community

kr / fs

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Package fs provides filesystem-related functions. http://godoc.org/github.com/kr/fs

5 commits | 2 branches | 1 release | 2 contributors | BSD-3-Clause

Branch: main | New pull request | Create new file | Upload files | Find File | Clone or download

kr add go.mod — Latest commit 1455def on May 6, 2018

LICENSE	init	6 years ago
Readme	init	6 years ago
example_test.go	init	6 years ago
filesystem.go	Add FileSystem and WalkFS	6 years ago
go.mod	add go.mod	last year
walk.go	Add FileSystem and WalkFS	6 years ago
walk_test.go	remove Stop method	6 years ago

Readme

```
Filesystem Package

http://godoc.org/github.com/kr/fs
```

gomods / athens

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A Go module datastore and proxy https://docs.gomods.io

golang dependencies package-control proxy-server dependency-manager package-manager go-modules goproxy go athens proxy

695 commits | 6 branches | 6 releases | 98 contributors | MIT

Branch: master | New pull request | Create new file | Upload files | Find File | Clone or download

marwan-at-work and arschles download: expand redirect tests (#1287) Latest commit dea04b1 2 days ago

.circleci	run chart install test only if it is needed (#1229)	last month
.github	removing the triage issue template (#1217)	last month
charts/athens-proxy	Adds S3 storage configuration to Helm chart (#1272)	13 days ago
cmd/proxy	downloadProtocol: support multi-proxy environments with DownloadFile (#...	12 days ago
docs	downloadProtocol: support multi-proxy environments with DownloadFile (#...	12 days ago
pkg	download: expand redirect tests (#1287)	2 days ago
scripts	removed flag from test command (#1257)	21 days ago
test	run chart install test only if it is needed (#1229)	last month
.dockerignore	Cleanup Dockerfiles (#437)	10 months ago
.drone.yml	Set build-args - VERSION (#1261)	21 days ago
.gitattributes	normalize all line endings for the repo (#269)	11 months ago
.gitignore	ignoring vscode local settings dir (#1076)	4 months ago
CODE_OF_CONDUCT.md	Add Code of Conduct (#707)	9 months ago
CONTRIBUTING.md	link to first-contributions docs (#833)	8 months ago
DEVELOPMENT.md	fixed typos (#1262)	20 days ago

docker / cli

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The Docker CLI

docker cli

6,290 commits | 4 branches | 38 releases | 632 contributors | Apache-2.0

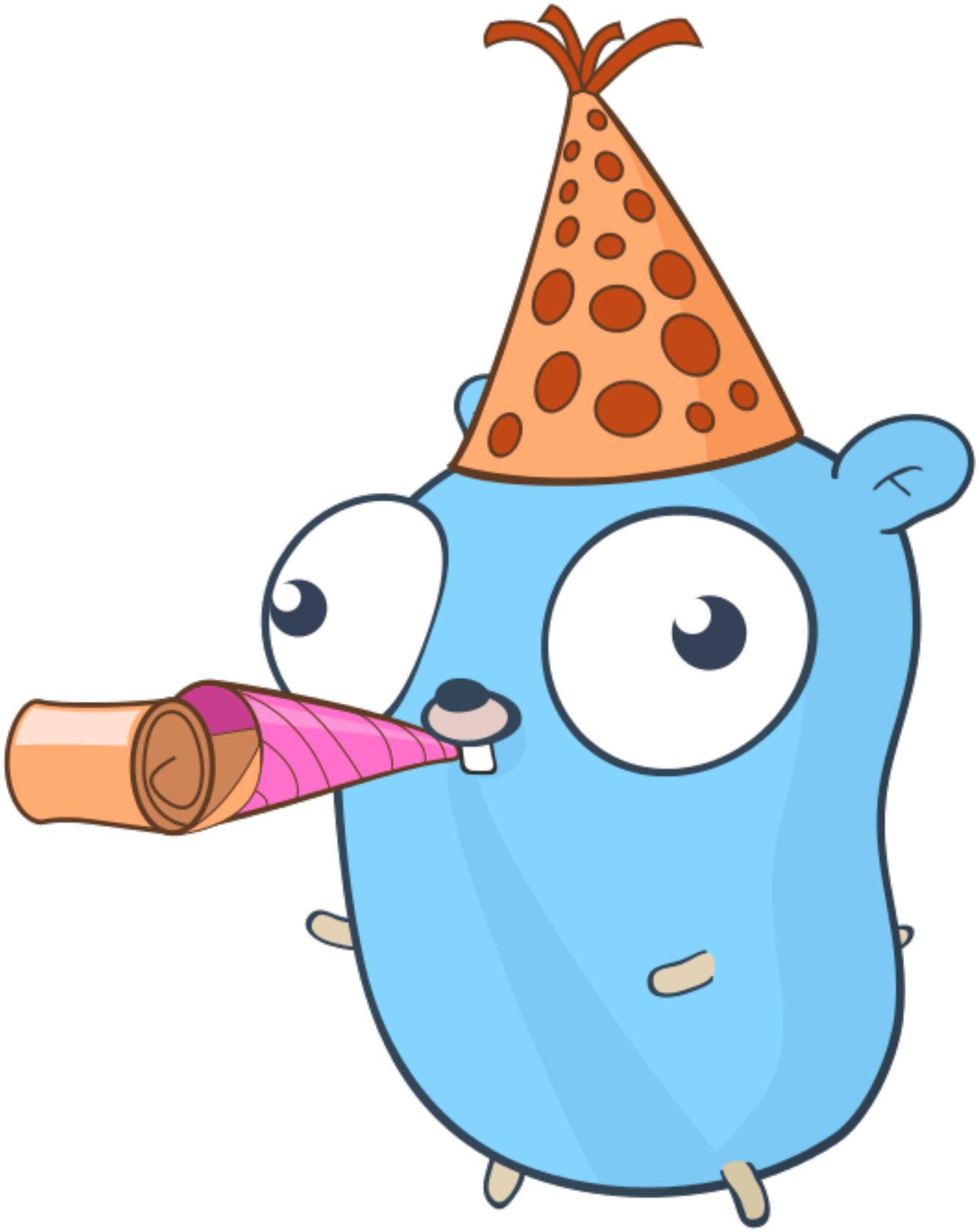
Branch: master | New pull request | Create new file | Upload files | Find File | Clone or download

vdemeester Merge pull request #1941 from tao12345666333/bump-golang-1.12.6 ... Latest commit d7f806f 7 days ago

.github	Remove myself from codeowners 😅	5 months ago
cli-plugins	cli-plugins: add test names for easier debugging	29 days ago
cli	Fix detection of invalid context files when importing	14 days ago
cmd/docker	Use command.Cli instead of command.DockerCli	2 months ago
contrib/completion	Merge pull request #1868 from albers/completion-context-create--from	last month
dockerfiles	Bump golang 1.12.6	8 days ago
docs	Fix PowerShell codehint for rouge	last month
e2e	e2e: add a test for `context ls`	last month
experimental	Fix link to Kubernetes blog	6 months ago
internal	context: produce consistent output on `context create`.	last month
kubernetes	Use underlying `NewKubernetesConfig` directly from compose-on-kuberne...	last month
man	Add exit status to docker exec manpage	4 months ago
opts	Refactor network parsing, add preliminary support for multiple networks	3 months ago
scripts	Support GOARM and windows .exe in binary target	2 months ago
service/logs	Update tests to use gotest.tools 👷	last year
templates	Update tests to use gotest.tools 👷	last year
types	Remove unused helath check func	9 months ago
vendor	vendor: update net and sys	18 days ago
.dockerignore	make go build and docker build operations faster	2 years ago

Recap

- Maintainability = low coupling + high cohesion
- Focus on the Domain
- Abstract the inputs and outputs
- Adjust structure to fit your application’s needs



References

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- Herberto Graça - Onion Architecture
- Robert C. Martin - The Clean Architecture
- Kat Zien - GopherCon UK 2018: How do you structure your Go apps?
- Joel Holmes - Go Hex Arch
- William Kennedy - Package Oriented Design
- William Kennedy - Design Philosophy On Packaging
- Kyle C. Quest - Go Project Layout