

Introducing Online Education to Hypermedia

Guilherme Silveira

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who am I?

who am I?

- caelum.com.br founder

who am I?

- caelum.com.br founder
 - training, content creation, development

who am I?

- caelum.com.br founder
 - training, content creation, development
- since -50 years old working with education

who am I?

- caelum.com.br founder
 - training, content creation, development
- since -50 years old working with education
- “arquitetura e design de software”

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- caelum.com.br founder
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- “arquitetura e design de software”
- some work on rest

who am I?

- caelum.com.br founder
 - training, content creation, development
- since -50 years old working with education
- “arquitetura e design de software”
- some work on rest
- brazil

what is Caelum?

what is Caelum?

- 3 cities, 100 employees

what is Caelum?

- 3 cities, 100 employees
- brick and mortar education

what is Caelum?

- 3 cities, 100 employees
- brick and mortar education
- java, ruby, agile development

what is Caelum?

- 3 cities, 100 employees
- brick and mortar education
- java, ruby, agile development
- user groups

what is Caelum?

- 3 cities, 100 employees
- brick and mortar education
- java, ruby, agile development
- user groups
- qcon brazil, conexao java, other events

what is Brazil?



who is this guy?



what is Brazil?

what is Brazil?

- brazil: 5565 cities

what is Brazil?

- brazil: 5565 cities
- largest são paulo: 11 million

what is Brazil?

- brazil: 5565 cities
- largest são paulo: 11 million
- 20th: 800 thousand

what is Brazil?

- brazil: 5565 cities
- largest são paulo: 11 million
- 20th: 800 thousand
- largest in a specific state: 296 thousand

what is Brazil?

- brazil: 5565 cities
- largest são paulo: 11 million
- 20th: 800 thousand
- largest in a specific state: 296 thousand
 - fills 4 stadiums?

what is Brazil?

- brazil: 5565 cities
- largest são paulo: 11 million
- 20th: 800 thousand
- largest in a specific state: 296 thousand
 - fills 4 stadiums?
- non well distributed developers

what is Caelum Online?

what is Caelum Online?

- brazil: 5565 cities

what is Caelum Online?

- brazil: 5565 cities
 - thousands of coffee shops

what is Caelum Online?

- brazil: 5565 cities
 - thousands of coffee shops
- outside brazil: 10 cities

what is Caelum Online?

what is Caelum Online?

- online learning

what is Caelum Online?

- online learning
- online teaching

what is Caelum Online?

- online learning
- online teaching
- online practicing

agenda

agenda

- problems that an online educational platform faces

agenda

- problems that an online educational platform faces
- examples

agenda

- problems that an online educational platform faces
- examples
- existing systems, languages, databases

agenda

- problems that an online educational platform faces
- examples
- existing systems, languages, databases
- how to connect everything

agenda

- problems that an online educational platform faces
- examples
- existing systems, languages, databases
- how to connect everything
- really small services

traditional online learning

traditional online learning



FN-25

ASP.NET MVC: Qualidade no Desenvolvimento Web



11,11% concluído - 920 pontos



CS-17

Banco de dados e SQL



28,57% concluído - 6965 pontos



PM-89

Git: Trabalho em Equipe com Controle e Segurança



30% concluído - 5175 pontos



traditional online learning



FN-25

ASP.NET MVC: Qualidade no Desenvolvimento Web



11,11% concluído - 920 pontos



Explicação

Um problema muito comum que temos é controlar nossos gastos durante o ano, por exemplo, para compararmos quanto a mais gastamos em janeiro e dezembro nas festas de final de ano do que com o quanto gastamos durante período de férias de meio de ano com os gastos de supermercado.

Armazenar dados, para depois pesquisá-los e manipulá-los é uma necessidade comum no mercado de informática.

Uma possibilidade para realizar esse armazenamento de informações é através de planilhas eletrônicas, como o Excel onde podemos ter algumas colunas tais como dia, valor e motivo da compra. No entanto, apesar de ser um ambiente interessante, o Excel se torna complexo quando precisamos extrair e manipular suas informações. Se necessitarmos utilizar esses dados através de alguma aplicação ou sistema, isso pode se tornar ainda mais complexo, pois se necessário fazer a leitura dos arquivos do Excel para conseguirmos consultar as informações.



CS-17



PM-89

traditional online learning

The screenshot displays a video player interface. On the left, there is a sidebar with three course icons: 'ASP.net MVC FN-25', 'CS-17', and 'PM-89'. The main video area shows a blue sky and green hills background. A video player control bar at the bottom includes a play button, a progress bar with a '06:05' timestamp, and an 'HD' indicator. The video content shows a 'MySQL Server Instance Configuration Wizard' window. The window title is 'MySQL Server Instance Configuration Wizard'. The main text reads 'MySQL Server Instance Configuration' and 'Configure the MySQL Server 5.5 server instance.' Below this, it says 'Processing configuration ...'. There are four options with checkboxes: 'Prepare configuration' (checked), 'Write configuration file (C:\Arquivos de programas\MySQL\MySQL Server 5.5\my.i)' (checked), 'Start service' (unchecked), and 'Apply security settings' (unchecked). At the bottom of the window are 'Back', 'Finish', and 'Cancel' buttons. A mouse cursor is hovering over the 'Finish' button.

Apagar as luzes

traditional online learning

Atividade 1 de 6

Instale o servidor do MySQL em sua máquina e instale também o MySQL Workbench. Qual o sistema operacional em que você fez sua instalação? Sentiu que algo podia ser simplificado no processo de instalação? Lembre-se que você pode realizar o download de ambos em <http://mysql.com/downloads/mysql> e <http://mysql.com/downloads/workbench>.



Adriano

O processo é um simples next next next next.

Responder

Atividades 01 02 03 04 05 06

Apagar as luzes

machine learning

- + data
- + learning
- better results

collaborative filtering

- + data
- + learning
- better results

recommend movies

- amazon
- netflix
- ...

recommend daily news

- facebook
- twitter
- ...

recommend a friend?

- facebook
- twitter
- ...

recommend songs

- all those websites you know...

collaborative filtering

collaborative filtering

- recommend technologies that you should study

collaborative filtering

- recommend technologies that you should study
- recommend courses to attend

collaborative filtering

- recommend technologies that you should study
- recommend courses to attend
- recommend jobs to take

collaborative filtering

- recommend technologies that you should study
- recommend courses to attend
- recommend jobs to take
- recommend exercises to do

exercise difficulty

exercise difficulty

- MIT studies on CF and IRT

exercise difficulty

- MIT studies on CF and IRT
- CF is as good as IRT

exercise difficulty

- MIT studies on CF and IRT
- CF is as good as IRT
- our findings: we are not big data :(

exercise difficulty

- MIT studies on CF and IRT
- CF is as good as IRT
- our findings: we are not big data :(
- we can't infer difficulty on multiple choice so far

drop out rate

- can we detect them before they drop out?

how long for an
exercise?

how long for an exercise?

```
students = []  
students << [12, 150, 3, 15]  
students << [4, 170, 32, 25]  
students << [1, 10, 3, 25]  
students << [12, 20, 31, 15]
```

finishes under 3
months?

finishes under 3 months?

labels = [1, 1, 0, 0]

finishes under 3 months?

```
students = []  
students << [12, 150, 3, 15]  
students << [4, 170, 32, 25]  
students << [1, 10, 3, 25]  
students << [12, 20, 31, 15]
```

```
labels = [1, 1, 0, 0]
```


trains

trains

```
require 'libsvm'  
problem = Libsvm::Problem.new  
problem.set_examples(labels, alunos.map {|ary| Libsvm::Node.features(ary) })
```

trains

```
require 'libsvm'  
problem = Libsvm::Problem.new  
problem.set_examples(labels, alunos.map {|ary| Libsvm::Node.features(ary) })
```

```
parameter = Libsvm::SvmParameter.new  
parameter.cache_size = 4  
parameter.eps = 0.001  
parameter.c = 1
```

trains

```
require 'libsvm'  
problem = Libsvm::Problem.new  
problem.set_examples(labels, alunos.map {|ary| Libsvm::Node.features(ary) })
```

```
parameter = Libsvm::SvmParameter.new  
parameter.cache_size = 4  
parameter.eps = 0.001  
parameter.c = 1
```

```
model = Libsvm::Model.train(problem, parameter)
```

what about guilherme?

what about guilherme?

```
guilherme = [6, 140, 25, 10]
```

what about guilherme?

```
guilherme = [6, 140, 25, 10]
```

```
model.predict(Node.features(guilherme))
```

guess!

SVM

```
require 'libsvm'  
problem = Libsvm::Problem.new  
problem.set_examples(labels, alunos.map {|ary| Libsvm::Node.features(ary) })
```

SVM

```
require 'libsvm'  
problem = Libsvm::Problem.new  
problem.set_examples(labels, alunos.map {|ary| Libsvm::Node.features(ary) })
```



fake data

fake data

```
labels = [1, 1, 0, 0]
```

fake data

```
students = []  
students << [12, 150, 3, 15]  
students << [4, 170, 32, 25]  
students << [1, 10, 3, 25]  
students << [12, 20, 31, 15]
```

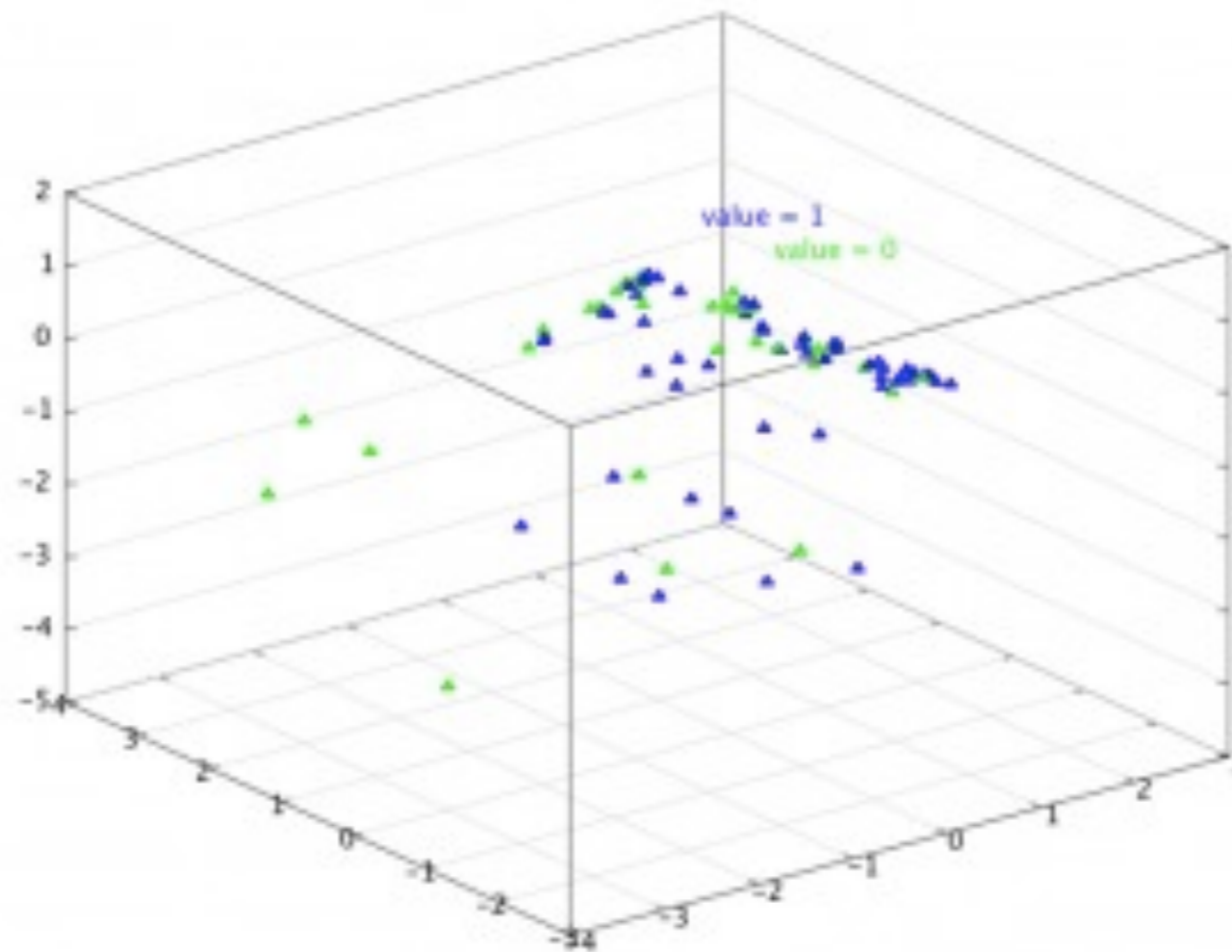
```
labels = [1, 1, 0, 0]
```

real data

2.81670	7.40000	0.63330	0
0.55000	21.65000	4.76670	0
1.25000	53.36670	43.05000	1
1.20000	36.10000	12.00000	0
0.83330	180.00000	22.41670	1
1.06670	180.00000	180.00000	0
1.33330	95.26670	42.83330	0
2.06670	180.00000	23.13330	0
5.51670	180.00000	10.78330	1
180.00000	180.00000	12.65000	1

real data

2.81670	7.40000	0.63330	0
0.55000	21.65000	4.76670	0
1.25000	53.26670	43.05000	1
1.20000			
0.83330			
1.06670			
1.33330			
2.06670			
5.51670			
180.00000			



real data

C
0.08

TRAIN ACCURACY%
93.18%

ACCURACY%
85.71%

SVM to classify (0, 1, ...)

teacher and tutor

- multiple choice answers
- open answers
- code answer

multiple choice

- sucks?
- is the best/easiest to test ability

Atividade 2 de 8

O que é mais importante ao estudar um padrão de projeto?



Mauricio

- Entender a motivação do padrão de projeto e qual problema ele resolve
- Conhecer o nome e em qual linguagem ele pode ser aplicado.
- Entender apenas a implementação

Responder

Atividades

01

02

03

04

05

06

07

08

open answers

- great
- is the hardest to test ability
- any natural language processing experts?

Atividade 1 de 8

Você já conhece padrões de projeto? Em sua opinião, o que é um padrão de projeto?



Mauricio


Sim. São soluções padronizadas e catalogadas para problemas recorrentes.

Responder

Atividades 01 02 03 04 05 06 07 08

code answers

- great
- is hard to test ability
- AST, auto correction, error margins

Atividade 3 de 8 Ver uma dica  Mauricio

Crie todo o mecanismo para flexibilizar a criação de diferentes estratégias de impostos, igual visto no vídeo. Crie a interface `Imposto`, e as estratégias `ICMS` e `ISS`. O `ISS` deve ser 6% do valor do orçamento, e o `ICMS` deve ser 5% do valor do orçamento mais o valor fixo de R\$ 50,00.

Crie a classe `Orcamento`, que tem como atributo um valor. Crie um construtor que recebe esse valor, e um getter para devolvê-lo.

Crie a classe `CalculadorDeImposto`, que recebe um `Orcamento` e um `Imposto`. Essa classe calcula o imposto usando a estratégia recebida e imprime o resultado na tela.

Cole aqui o código dos impostos e do `CalculadorDeImposto`.

```
[java]
public interface Imposto {
}
public class ICMS {
}
public class ISS {
}
//igual
```

[Responder](#)

Atividades 01 02 03 04 05 06 07 08

k-cluster

- another machine learning algorithm
- clustering

compare them...

- exercises
- students
- courses

and find...

and find...

- great exercises, not-so-great exercises

and find...

- great exercises, not-so-great exercises
- great students, not-so-great students

and find...

- great exercises, not-so-great exercises
- great students, not-so-great students
- great courses, not-so-great courses

common characteristics

common characteristics

height???

common characteristics

number of wrong answers

height???

common characteristics

number of wrong answers

time spent

height???

common characteristics

number of wrong answers

time spent

height???

number of exercises done

common characteristics

number of wrong answers

time spent

height???

number of exercises done

feedback given

common characteristics

number of wrong answers

time spent

height???

number of exercises done

feedback given

feedback rating

common characteristics

number of wrong answers

time spent

height???

number of exercises done

feedback given

feedback rating

likes

common characteristics

number of wrong answers

height???

time spent

number of exercises done

feedback given

feedback rating

likes

courses

common characteristics

number of wrong answers

height???

time spent

number of exercises done

feedback given

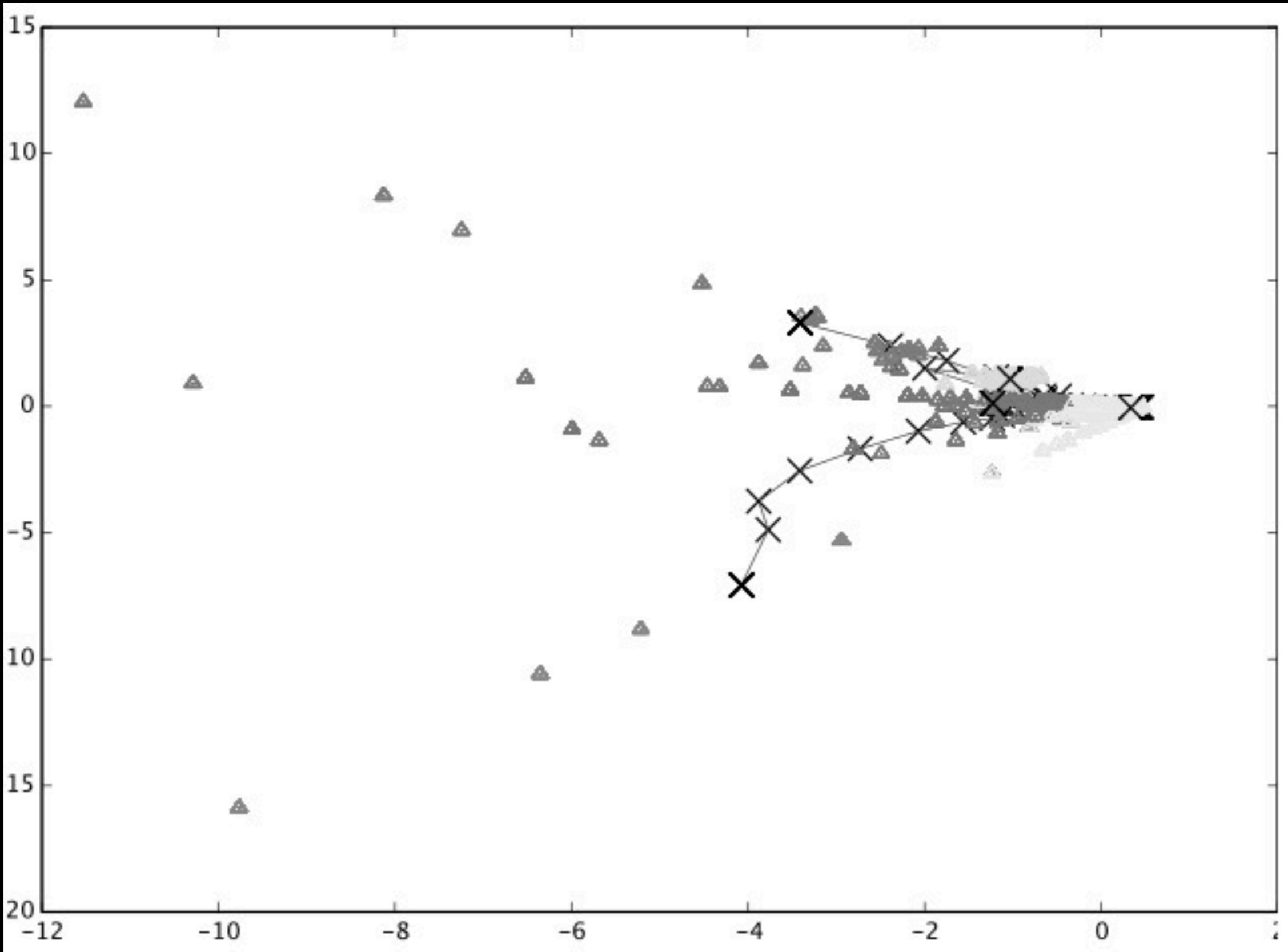
feedback rating

likes

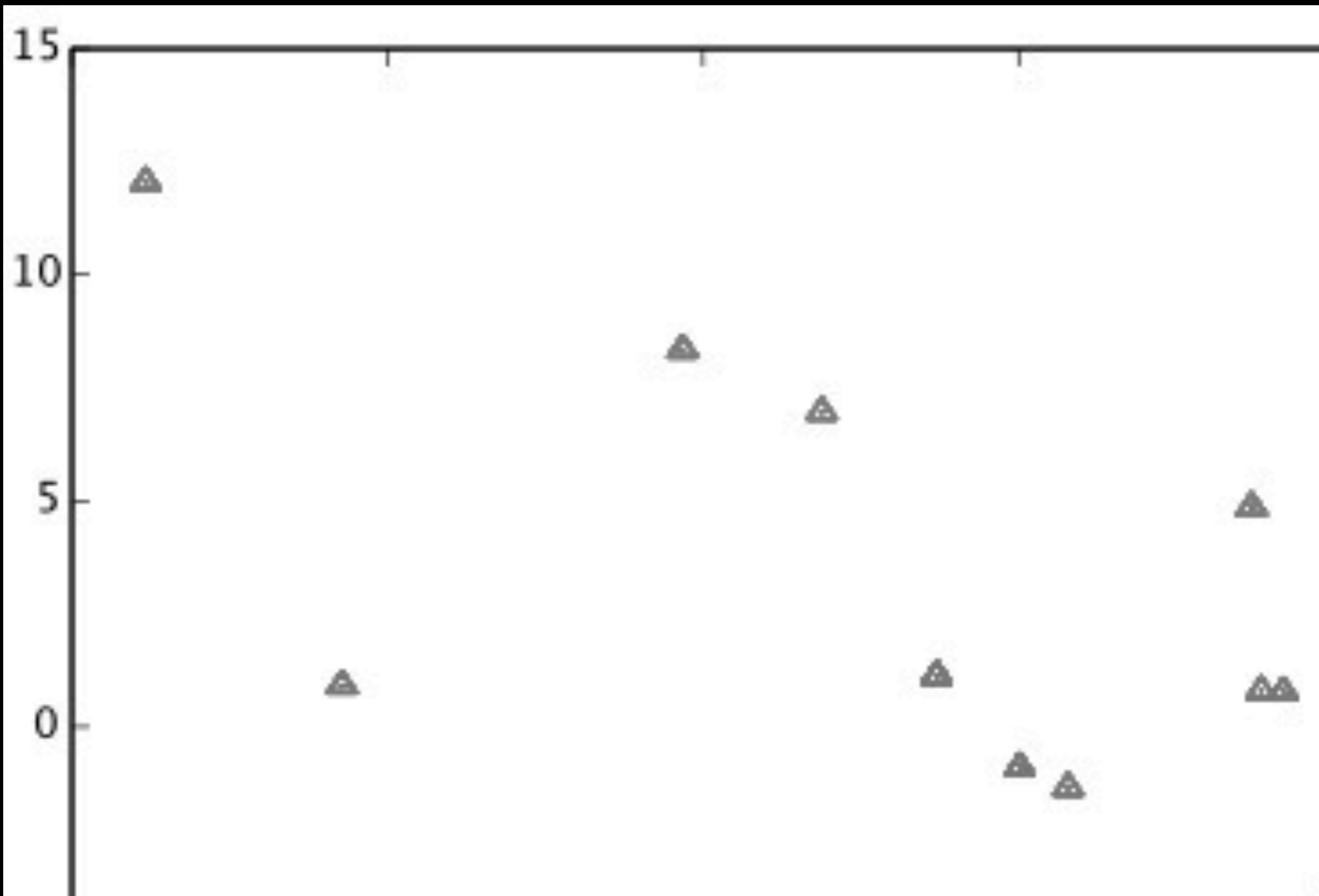
courses

quantidade de caracteres

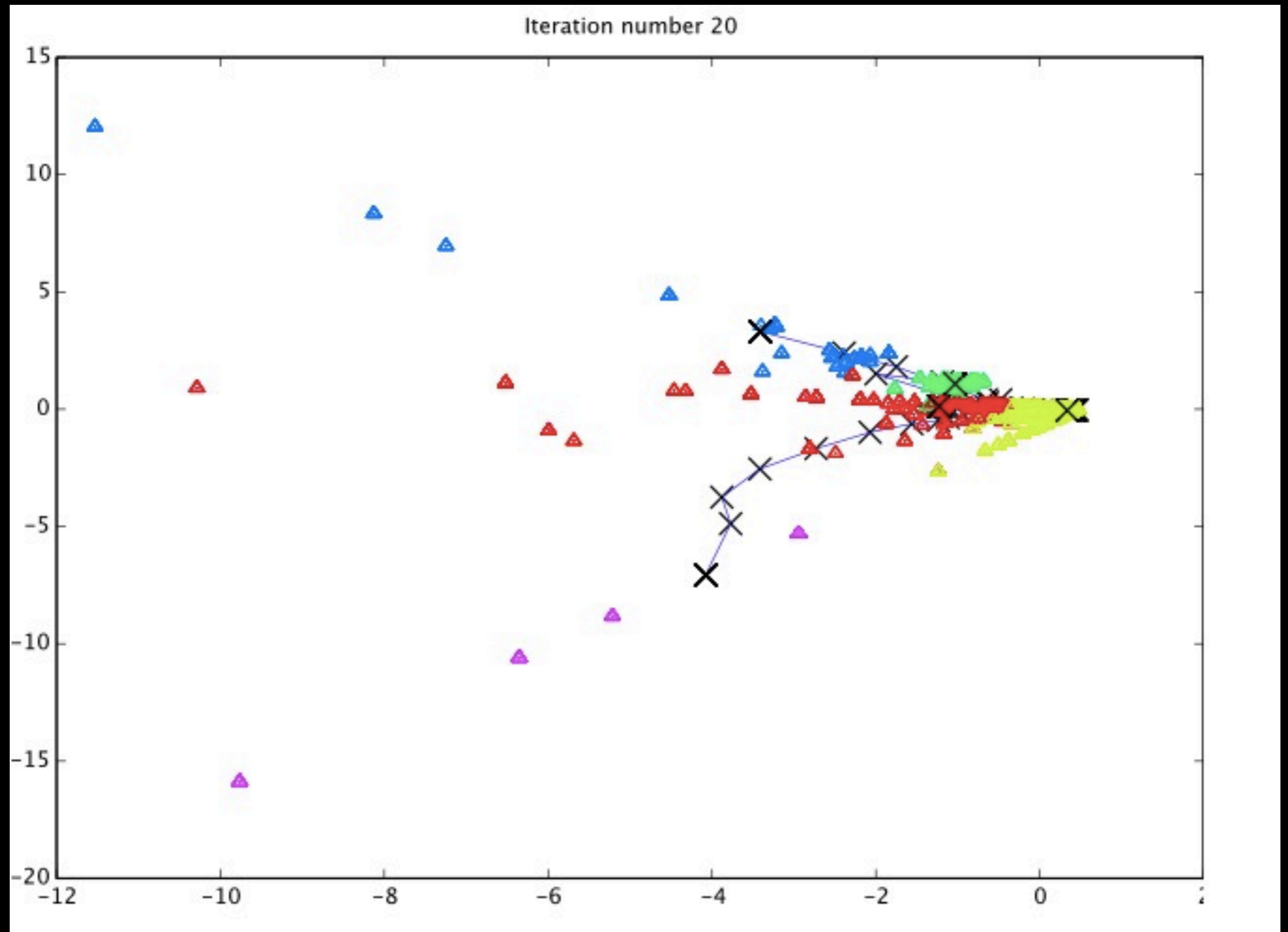
the 5D chart



they are here!



those are the groups



expected:

muitas perguntas,
muitos erros

poucos erros,
poucas perguntas

poucos erros,
poucas perguntas,
ajuda bastante

expected:

~~muitas perguntas,
muitos erros~~

poucos erros,
poucas perguntas

poucos erros,
poucas perguntas,
ajuda bastante

expected:

~~muitas perguntas,
muitos erros~~

~~poucos erros,
poucas perguntas~~

poucos erros,
poucas perguntas,
ajuda bastante

expected:

~~muitas perguntas,
muitos erros~~

~~poucos erros,
poucas perguntas~~

~~poucos erros,
poucas perguntas,
ajuda bastante~~

found:

found:

lots of questions,
less errors

found:

lots of questions,
less errors

more errors,
less questions

found:

lots of questions,
less errors

more errors,
less questions

more errors
less questions,
helped a lot

we have 5000
responsibilities

we have 5000 responsibilities

- data problems

we have 5000 responsibilities

- data problems
- user problems

we have 5000 responsibilities

- data problems
- user problems
- teacher problems

we have 5000 responsibilities

- data problems
- user problems
- teacher problems
- company problems

we have 5000
responsibilities

we have 5000 responsibilities

- we started with a small platform (mar2011)

we have 5000 responsibilities

- we started with a small platform (mar2011)
- we ended up with a huge payment, chat up to certificate playform (oct2012)

single responsibility principle

single responsibility principle

- why not apply it to the system itself?

single responsibility principle

- why not apply it to the system itself?
- + dependency injection

refactor, extract

===> exercise

refactor, extract

- constant

===> exercise

refactor, extract

- constant
- variable

===> exercise

refactor, extract

- constant
- variable
- method

===> exercise

refactor, extract

- constant
- variable
- method
- class

===> exercise

refactor, extract

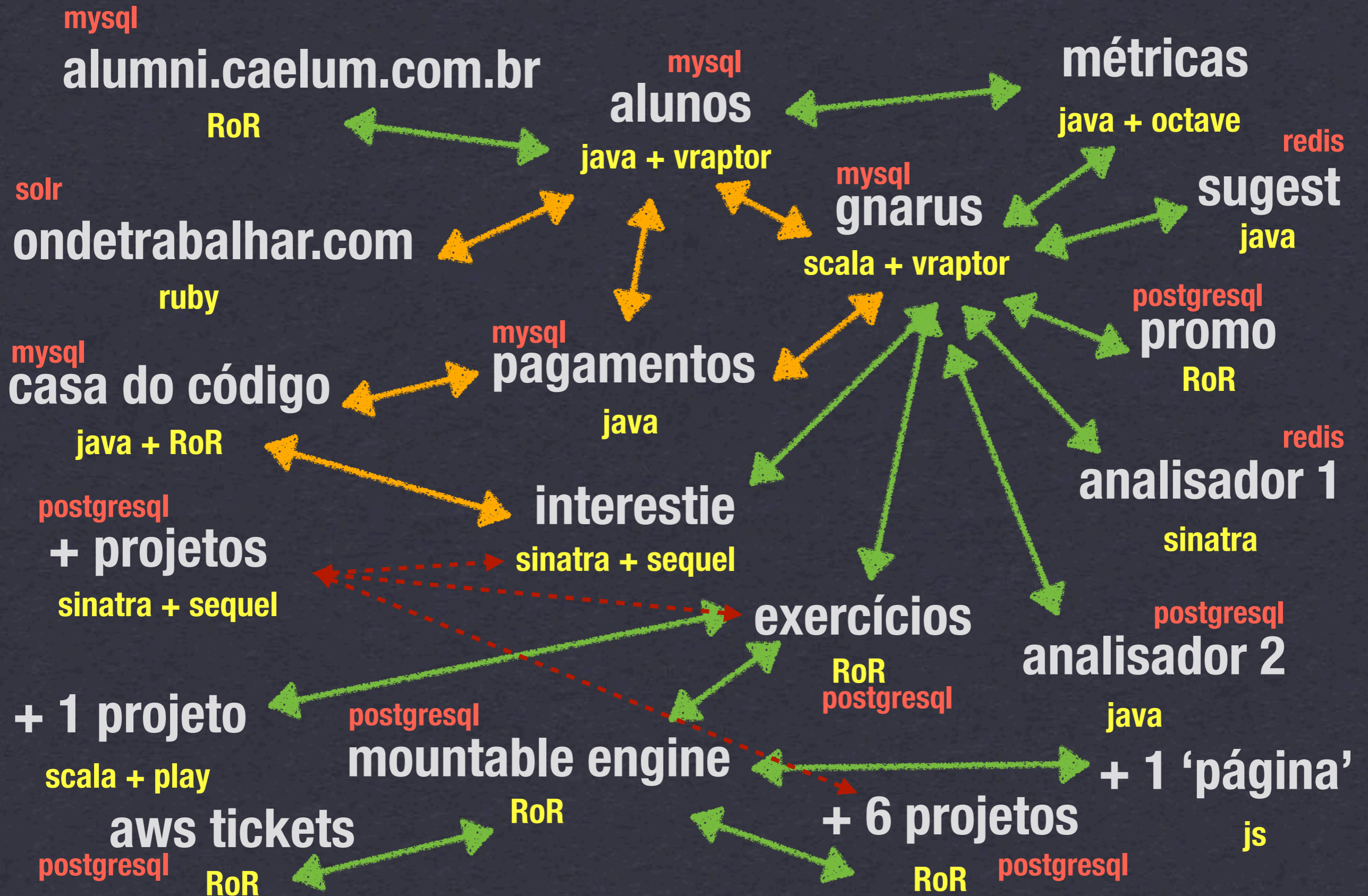
- constant
- variable
- method
- class
- library

===> exercise

refactor, extract

- constant
- variable
- method
- class
- library
- project ==> exercise

caelum systems



data analysis

- http
- octave/ruby/java (mahout)
- octave/mysql/postgre/redis

answer analysis

- http
- ruby/java
- mysql/postgre/redis

badges/gamification

- http
- ruby
- postgres

payment

- http
- java
- mysql/postgre

exercises

- how to deal with new types of exercises?
- group
- simulations
- auto-correction

introducing hypermedia:

simply return an URI

training platform

external exercise

new external exercise attempt

training platform

external exercise

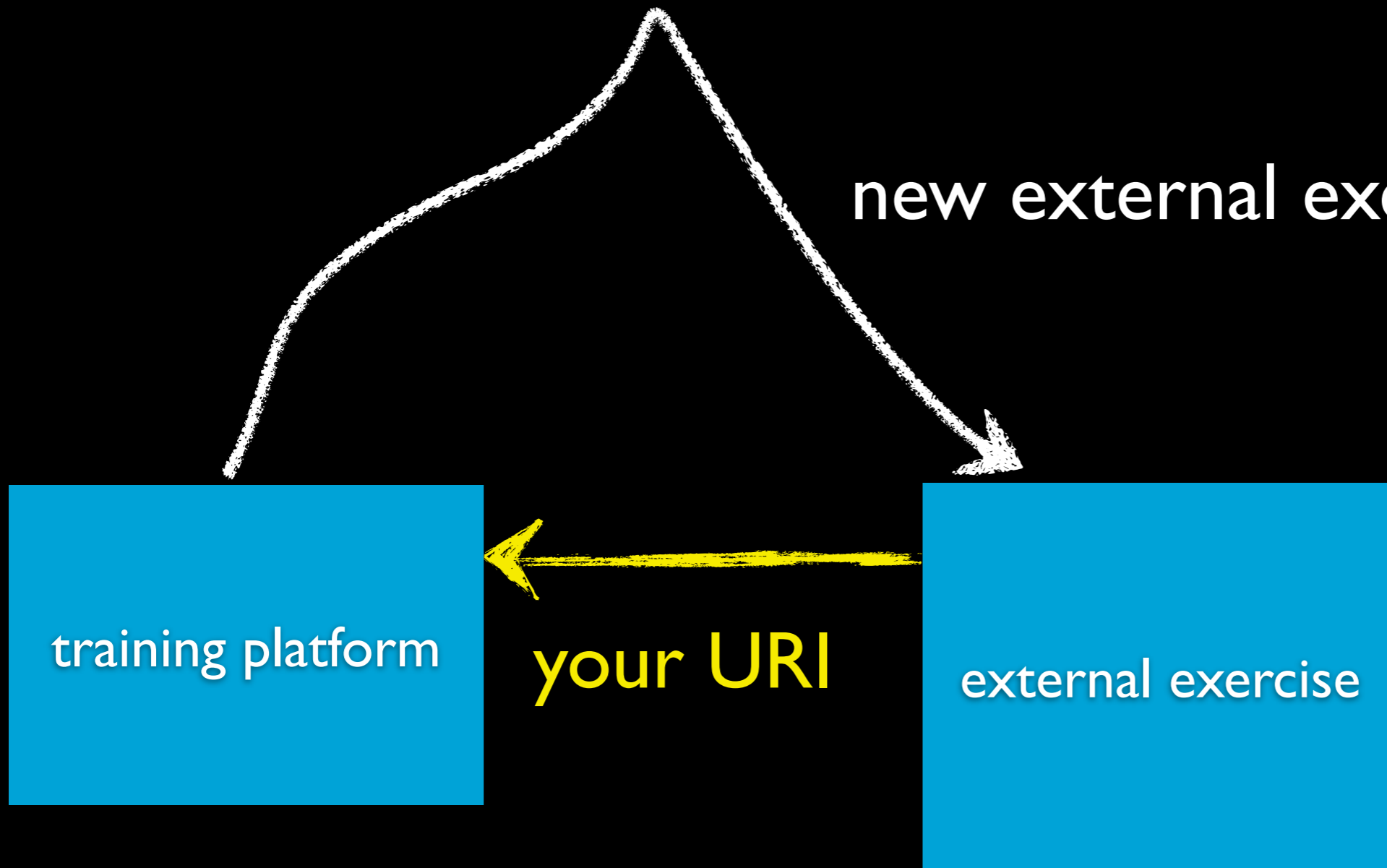
new external exercise attempt

training platform

external exercise

personal note: do not
draw splines again

new external exercise attempt



personal note: do not
draw splines again

RPG activity

- http
- javascript
- 200 lines of code
- anyone can trash and rewrite in any language (except perl?)

several autocorrectors

- ruby
- javascript
- sql

cloud partnership

cloud partnership

- do our training

cloud partnership

- do our training
- U\$ 20 coupon

cloud partnership

- do our training
- U\$ 20 coupon
- where do you write that code?

training platform

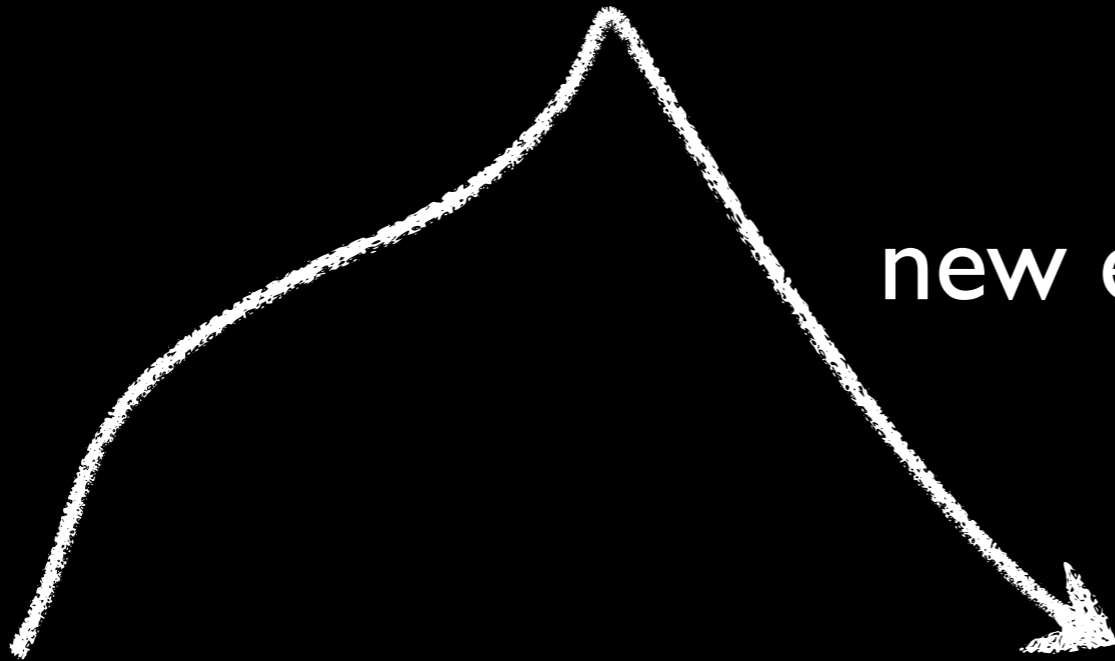
external exercise

new external exercise attempt

training platform

external exercise

new external exercise attempt



training platform

your URI

external exercise



coupon activity

- http
- ruby
- <100 lines of code

and then...



and then...

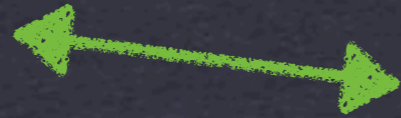


alunos
java + vraptor

and then...

alumni.caelum.com.br

RoR



alunos

java + vraptor



and then...



alumni.caelum.com.br

RoR

alunos

java + vraptr

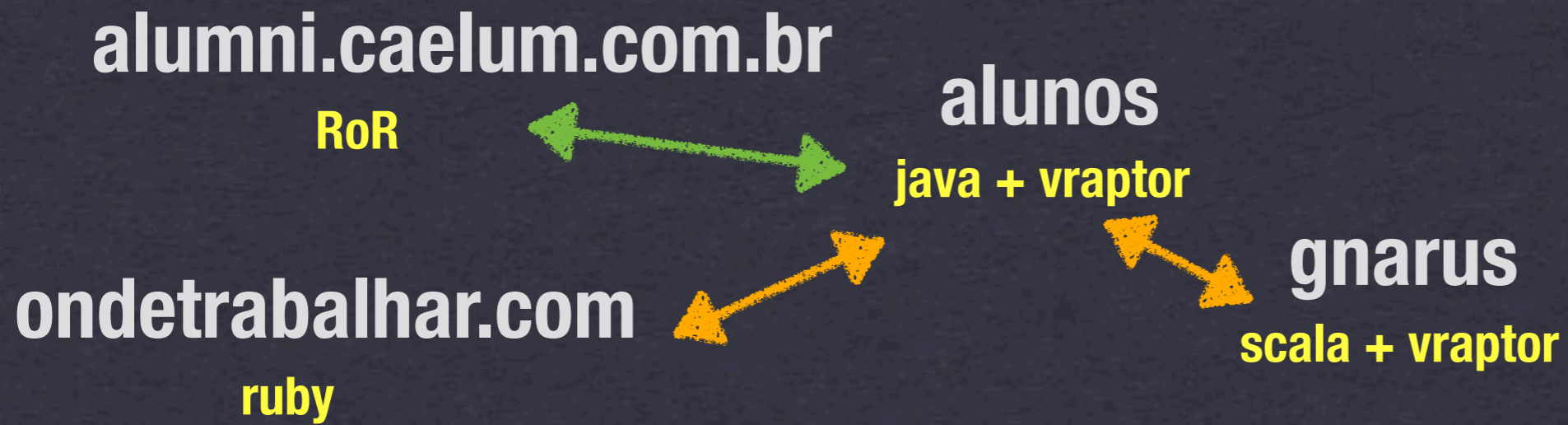


ondetrabalhar.com

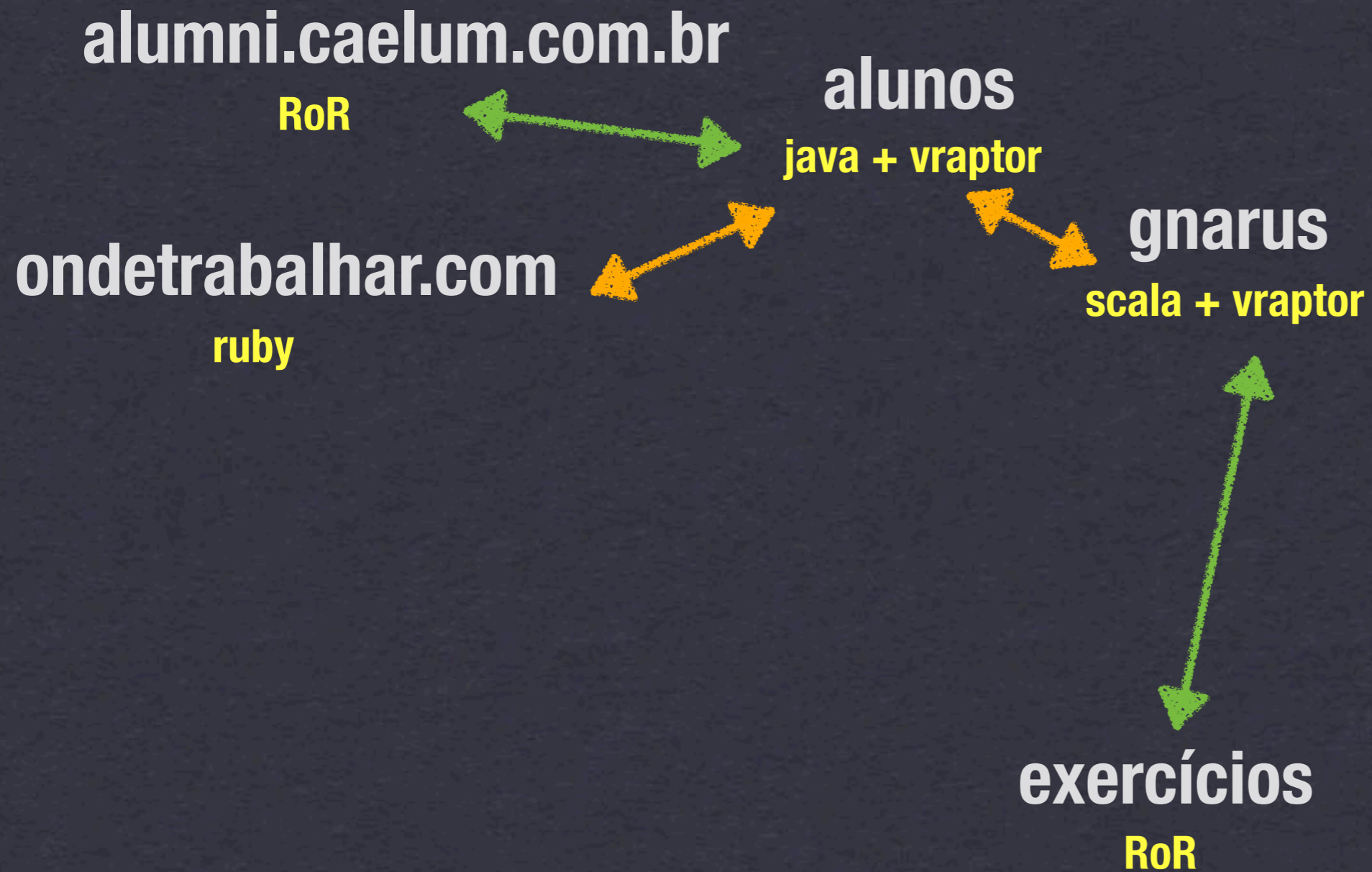
ruby



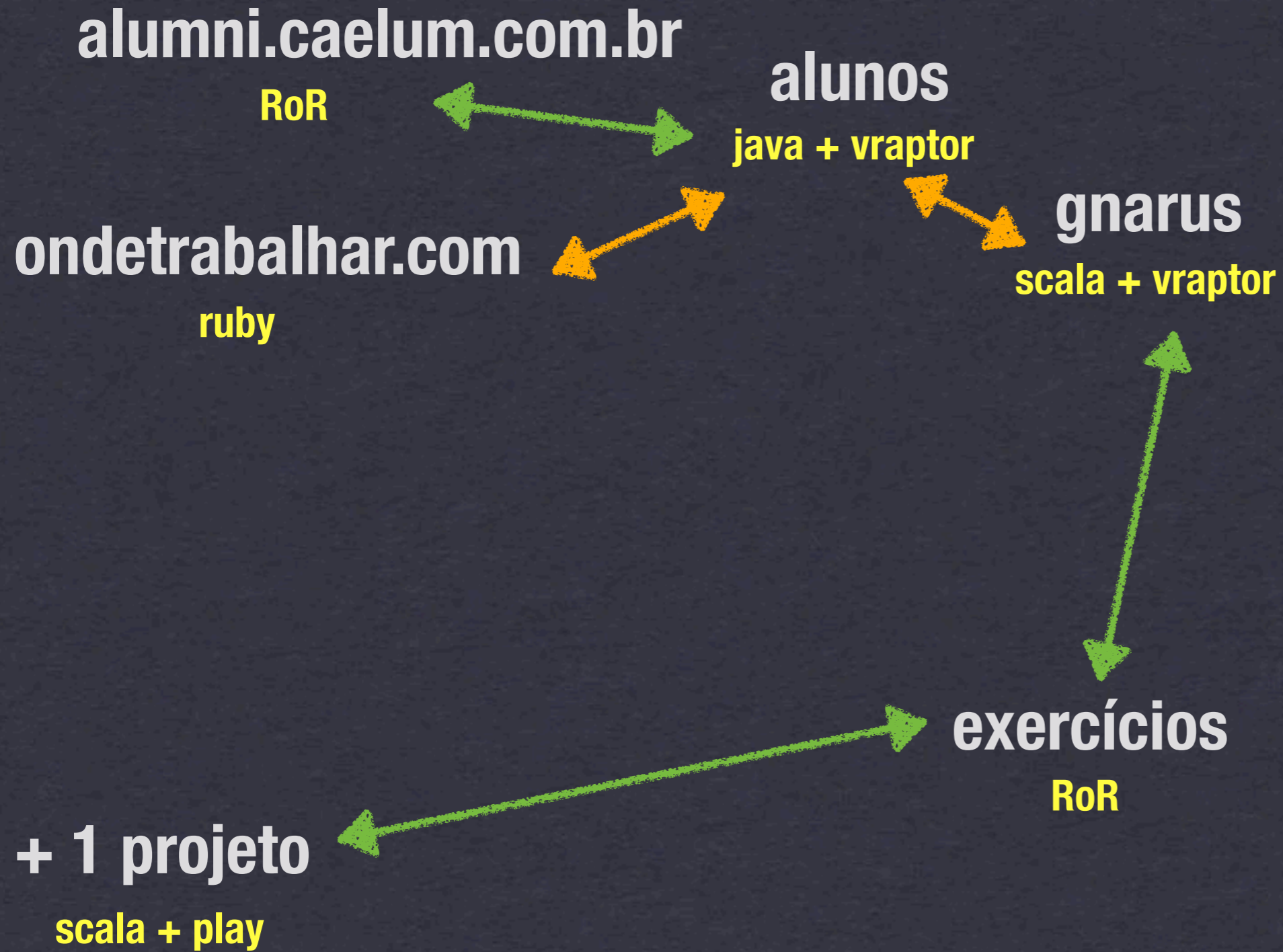
and then...



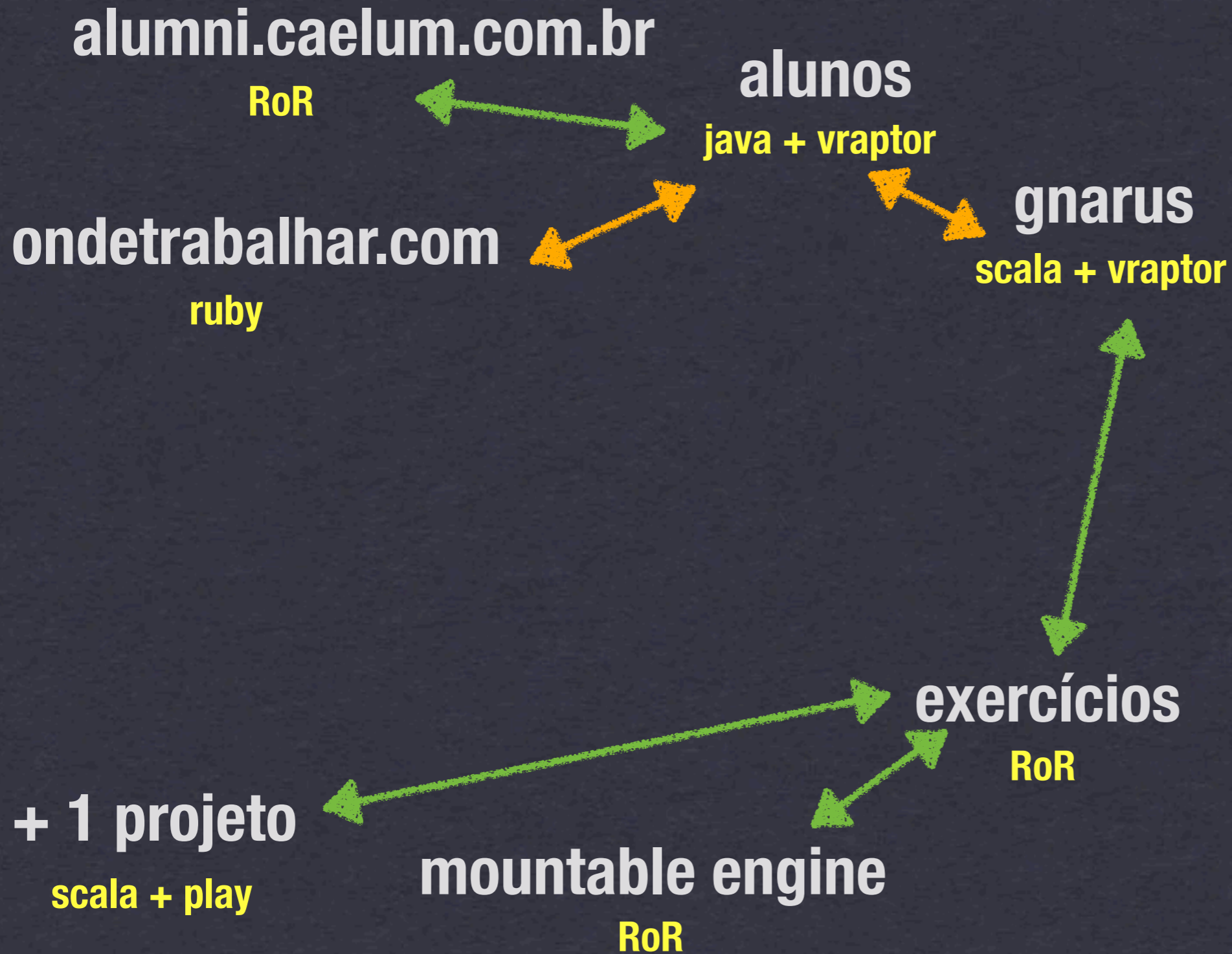
and then...



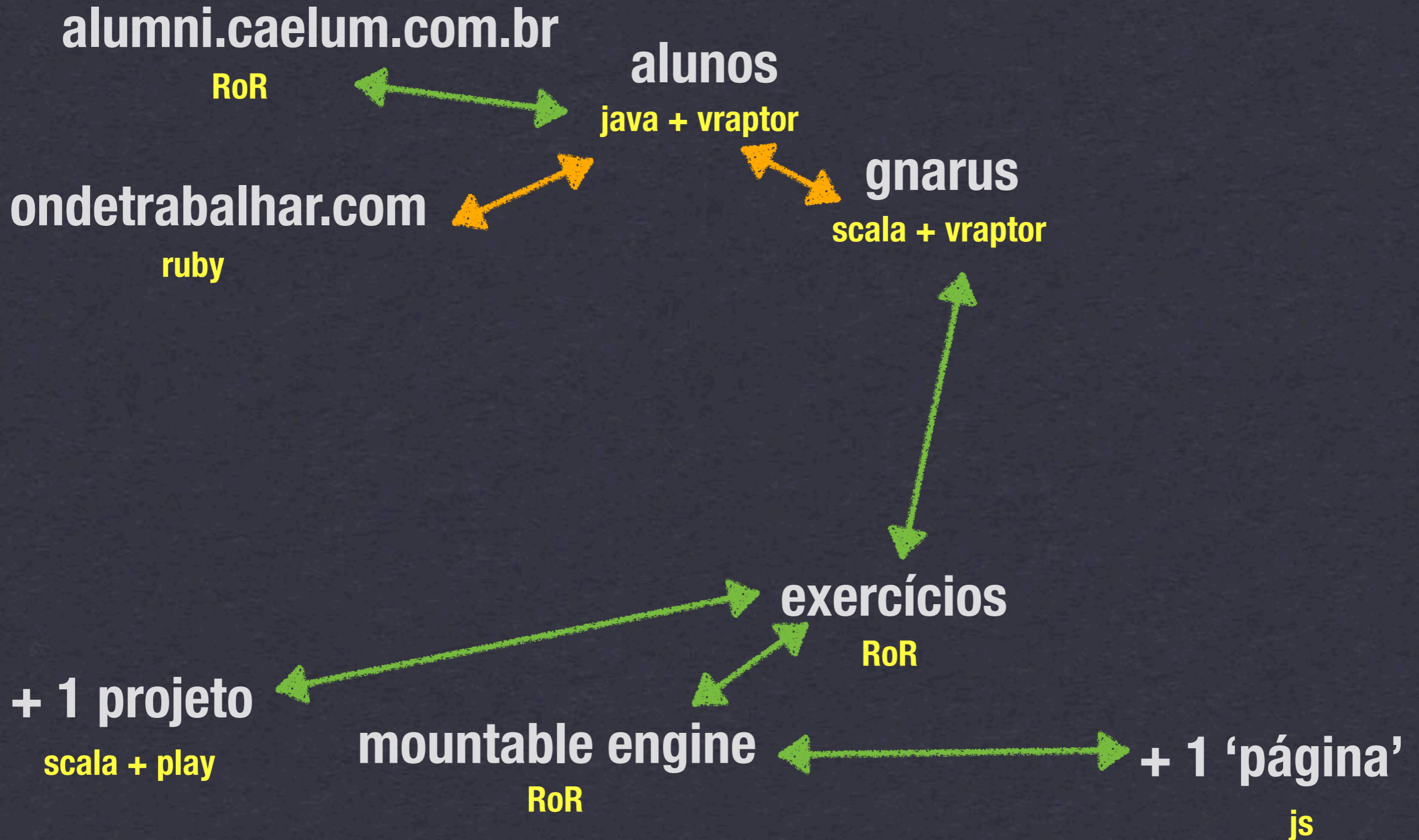
and then...



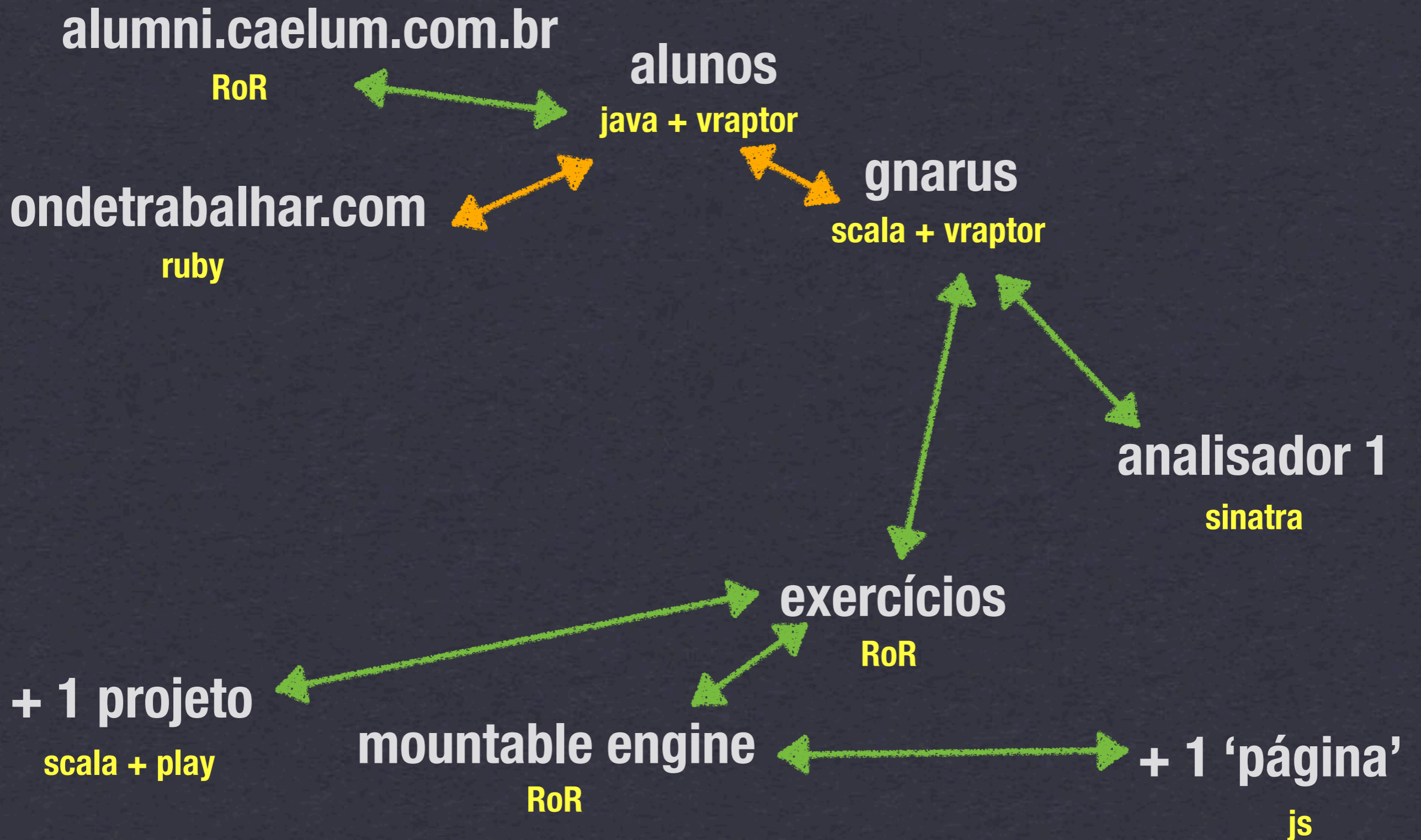
and then...



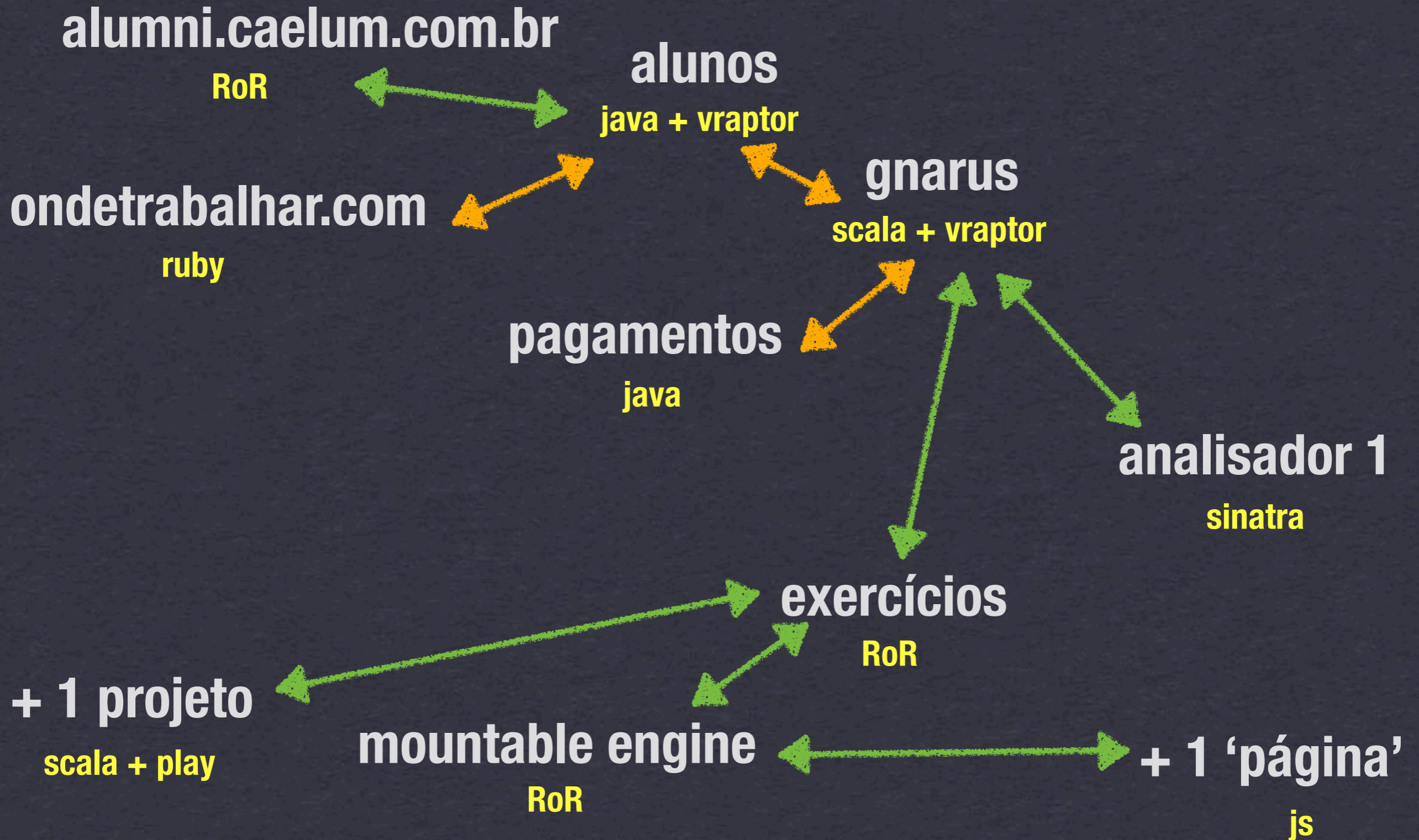
and then...



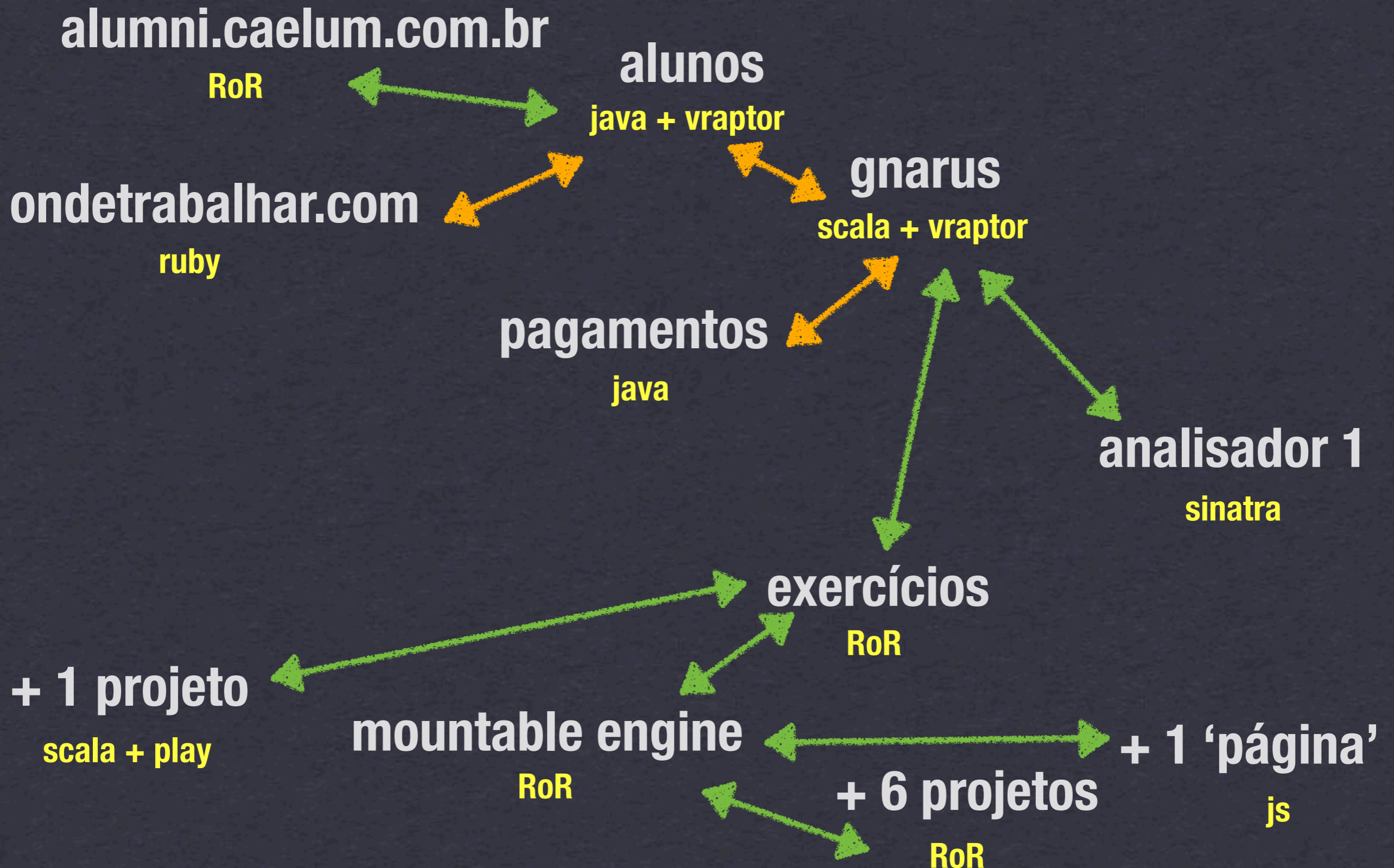
and then...



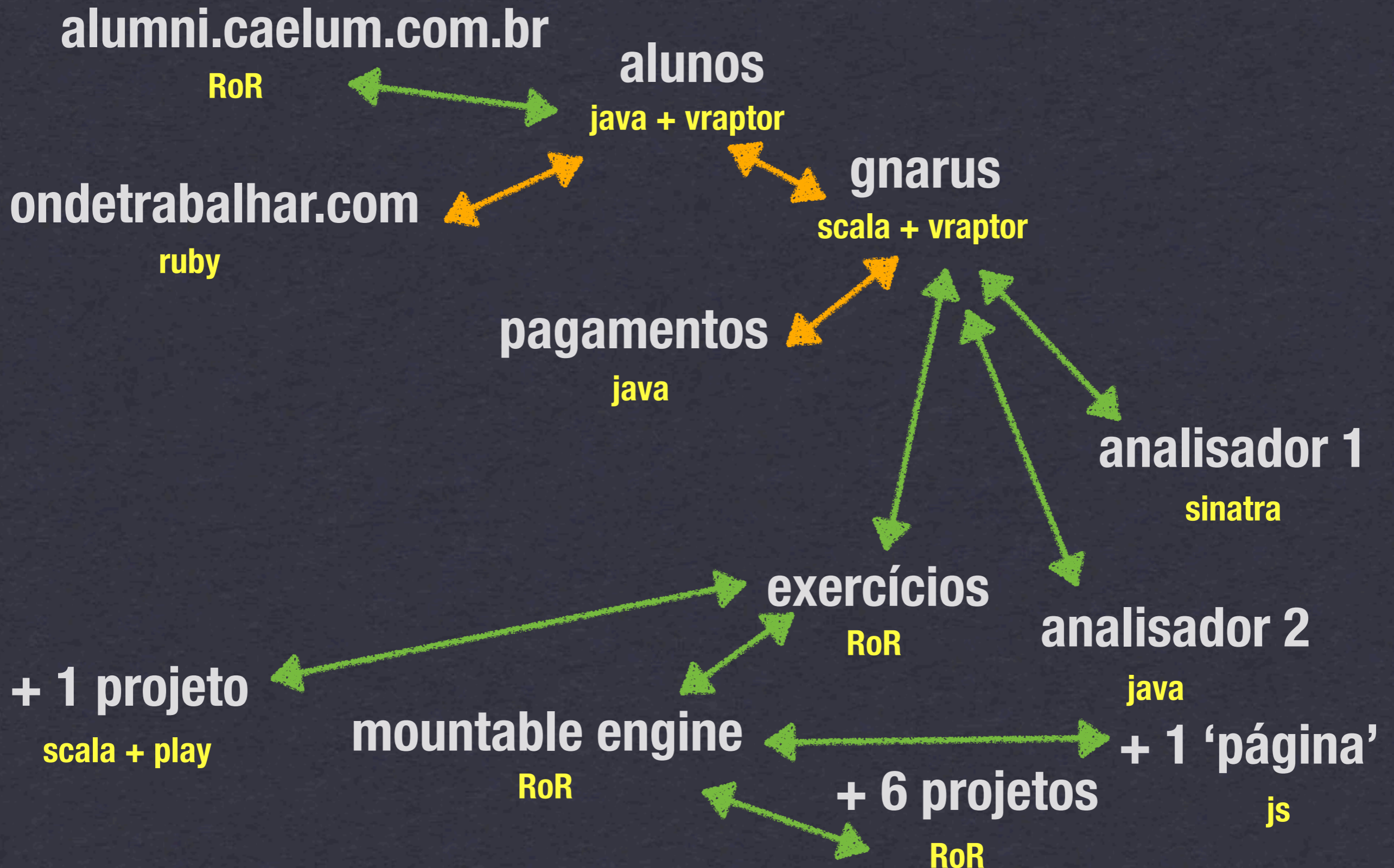
and then...



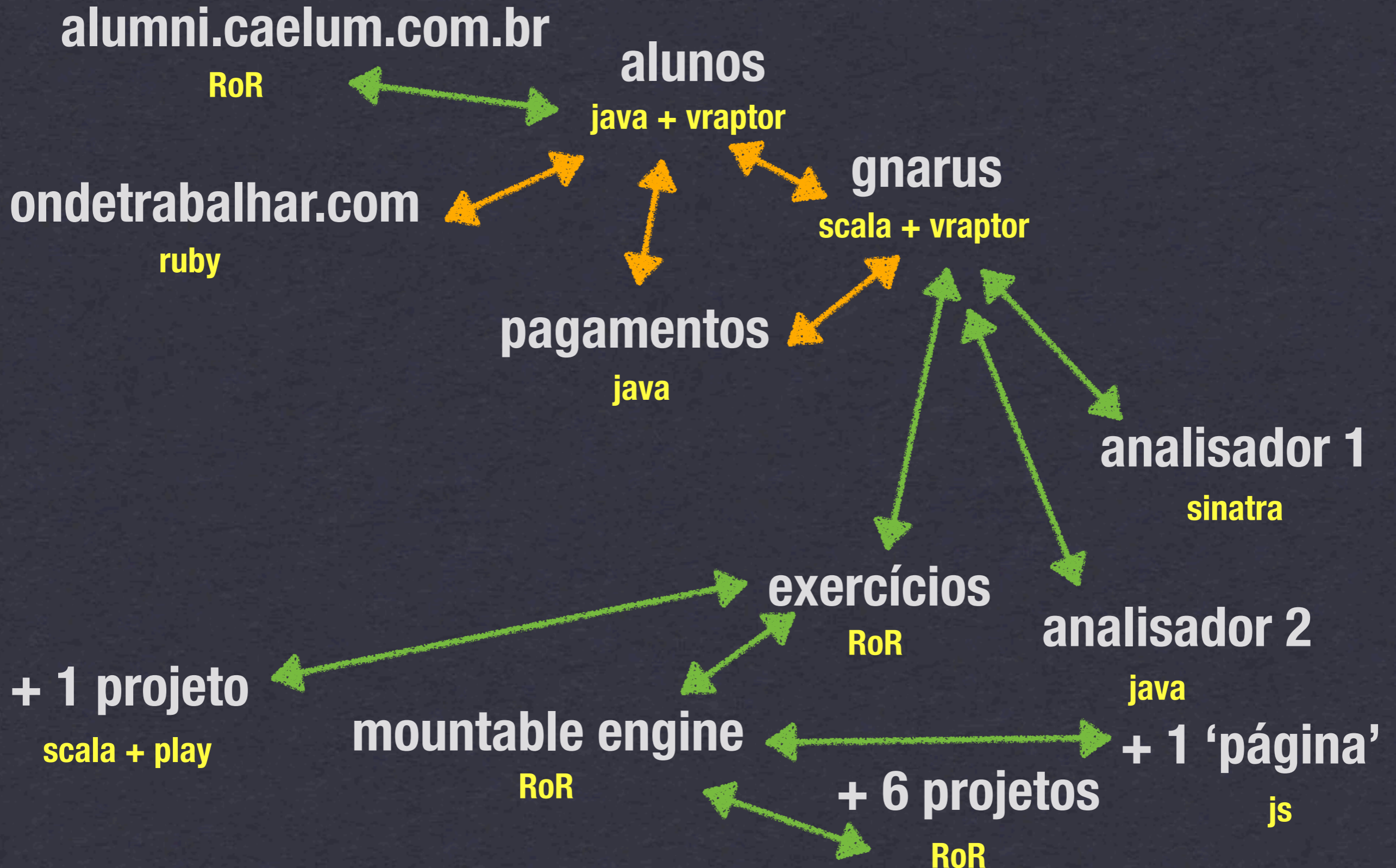
and then...



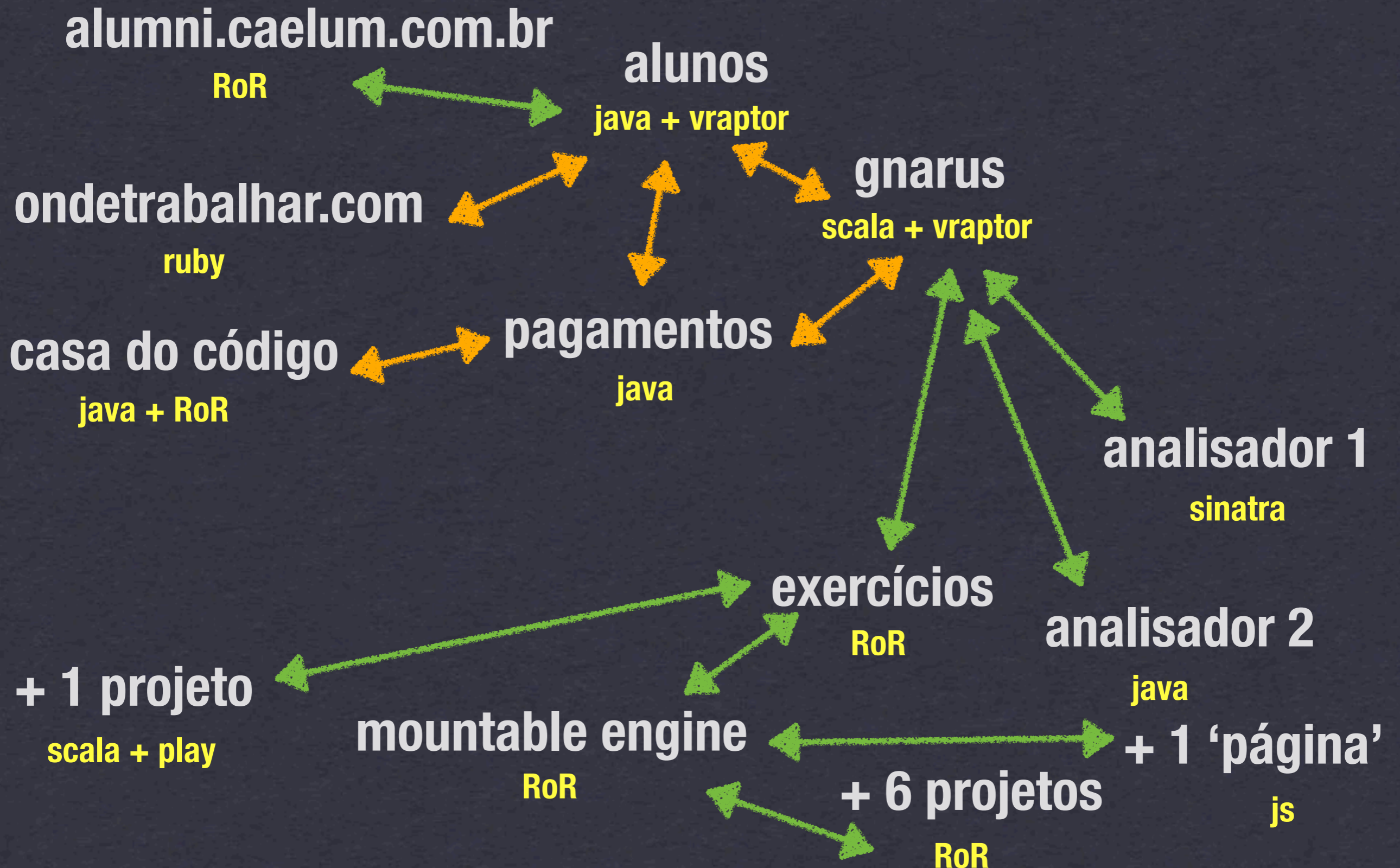
and then...



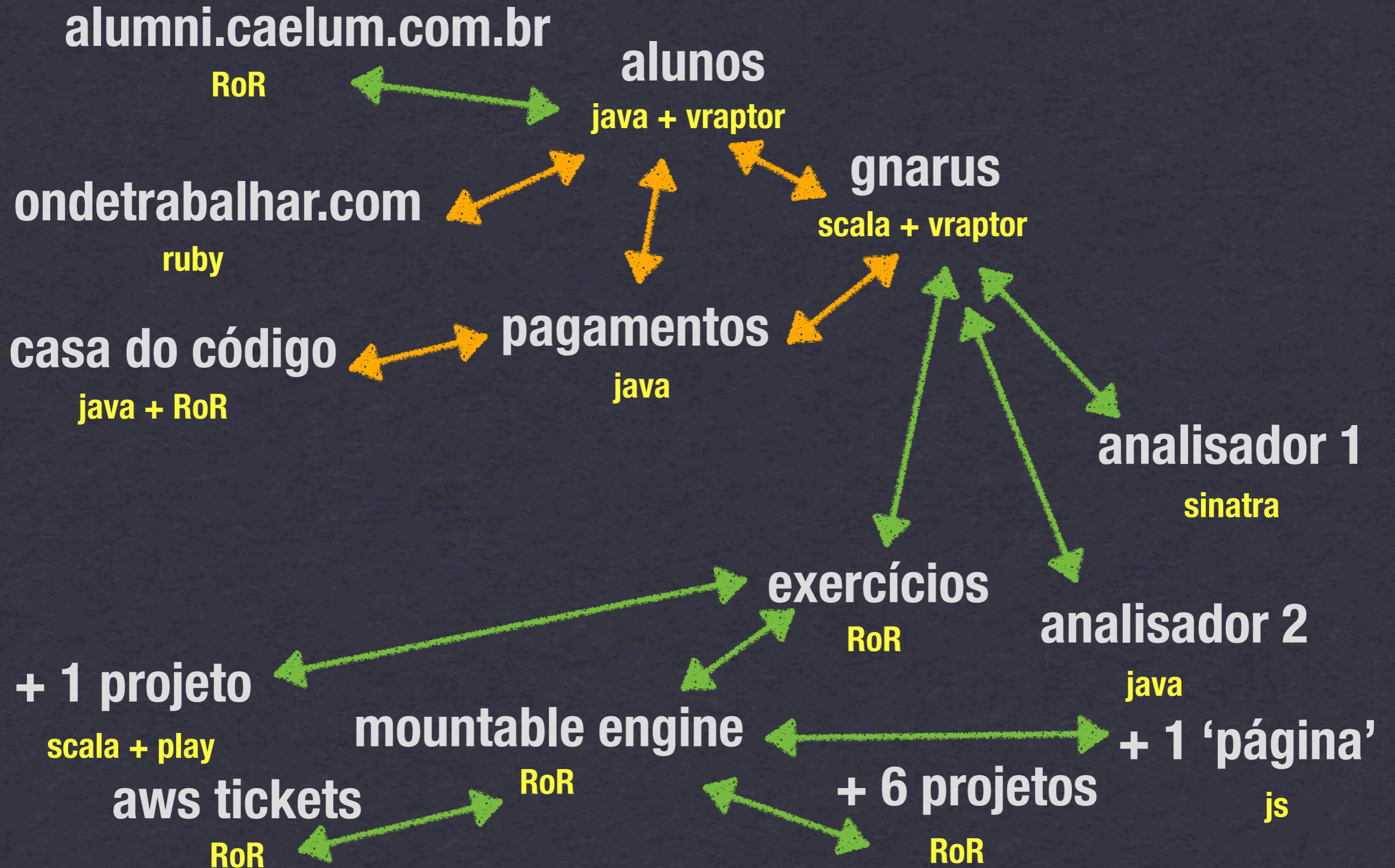
and then...



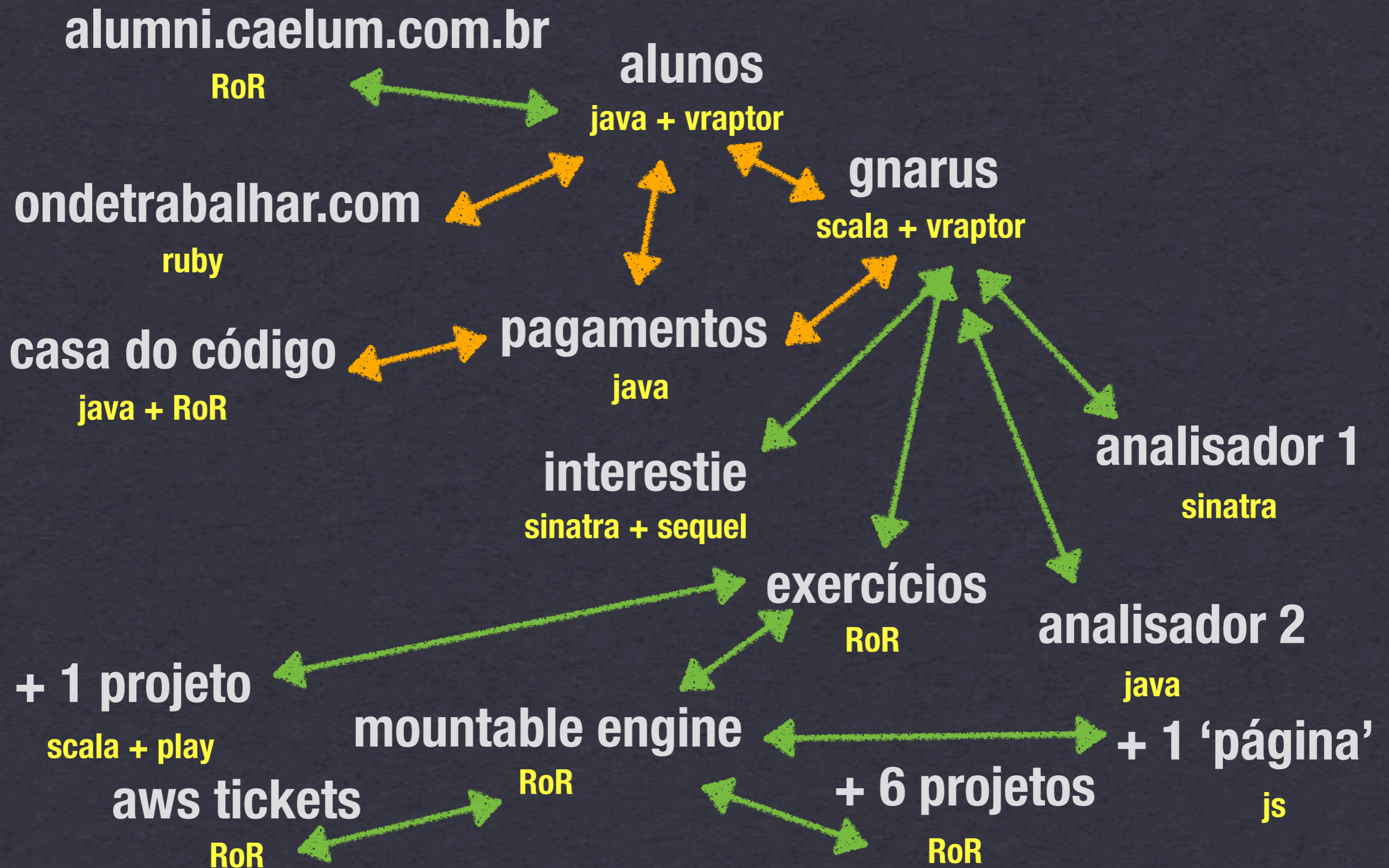
and then...



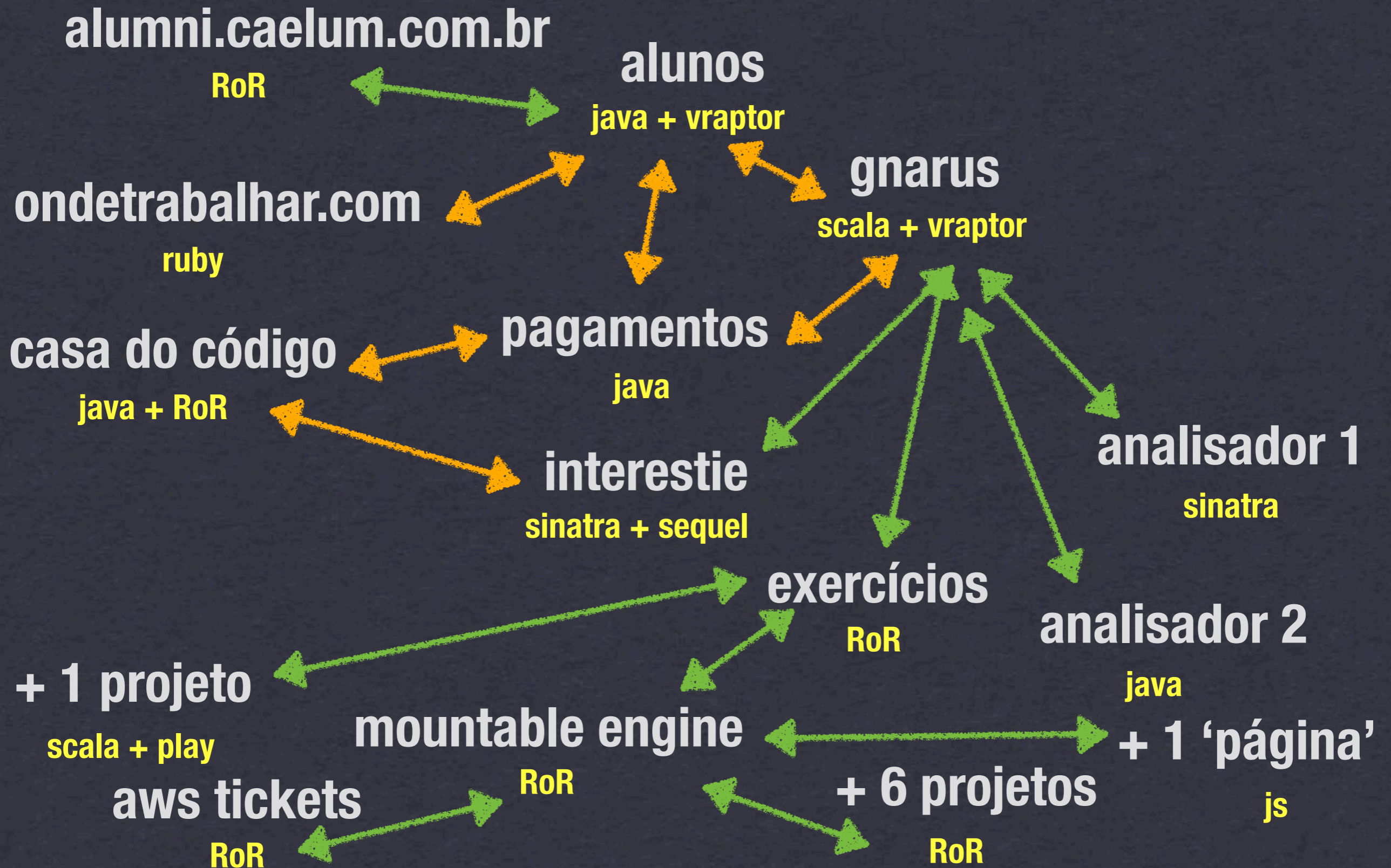
and then...



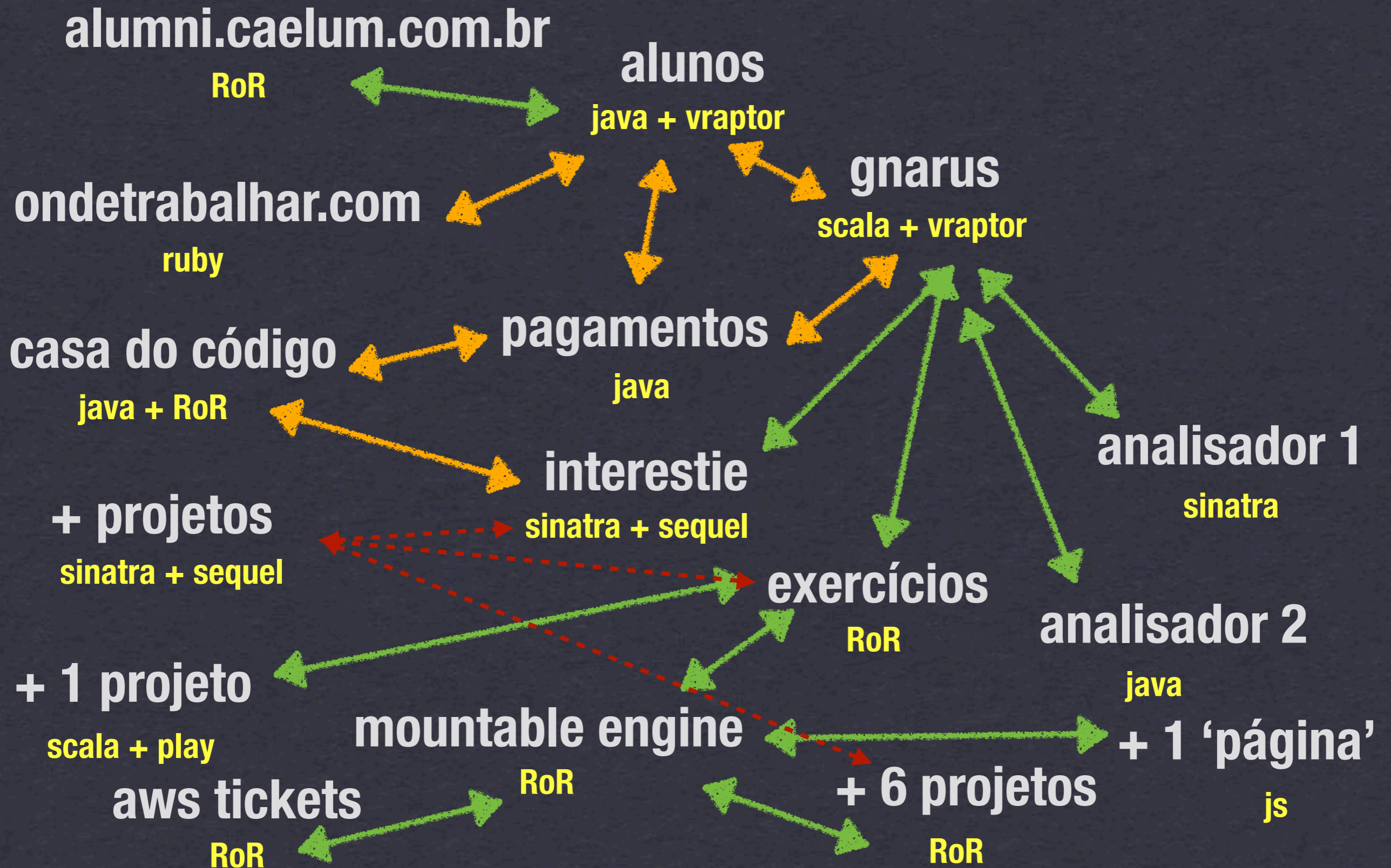
and then...



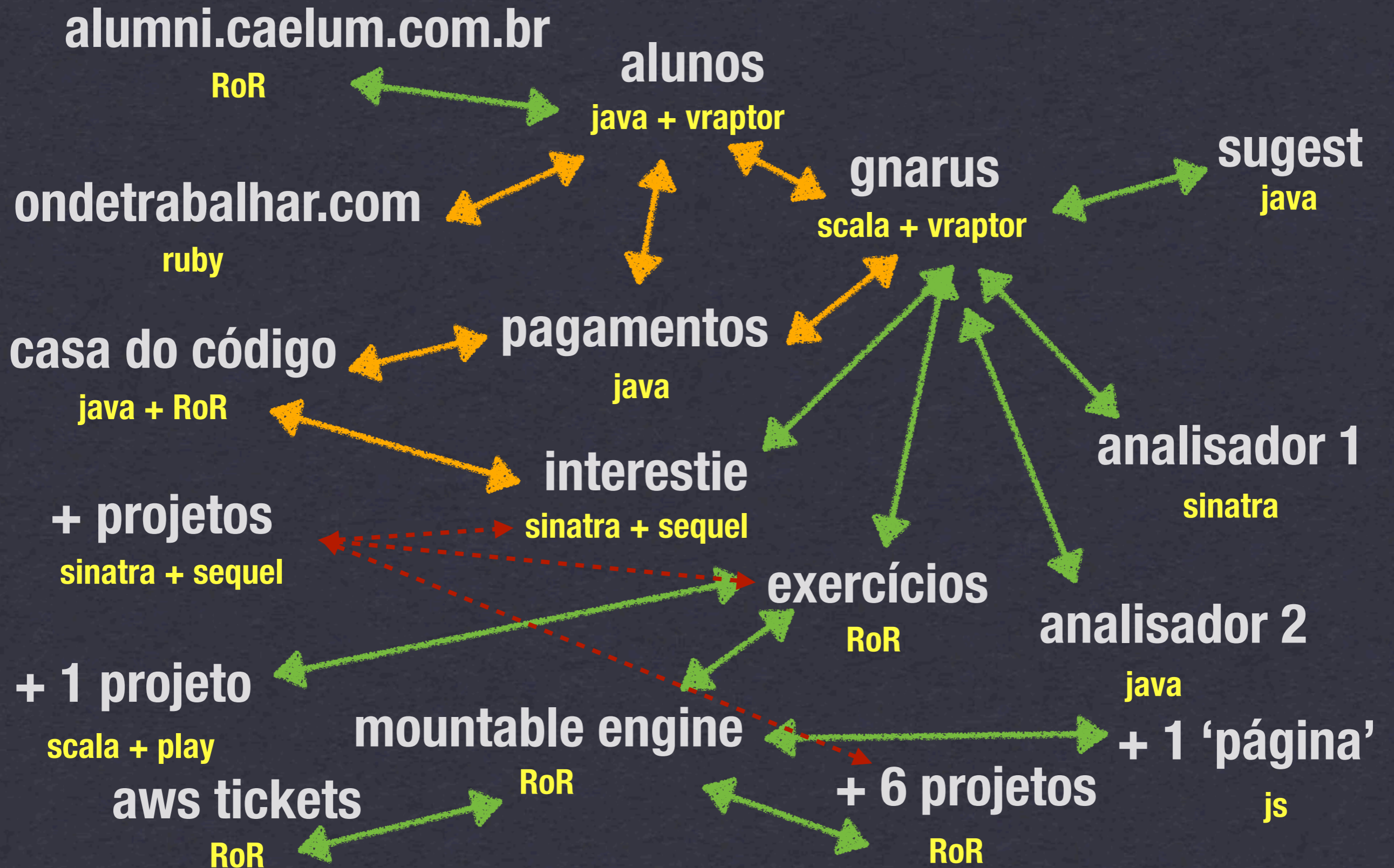
and then...



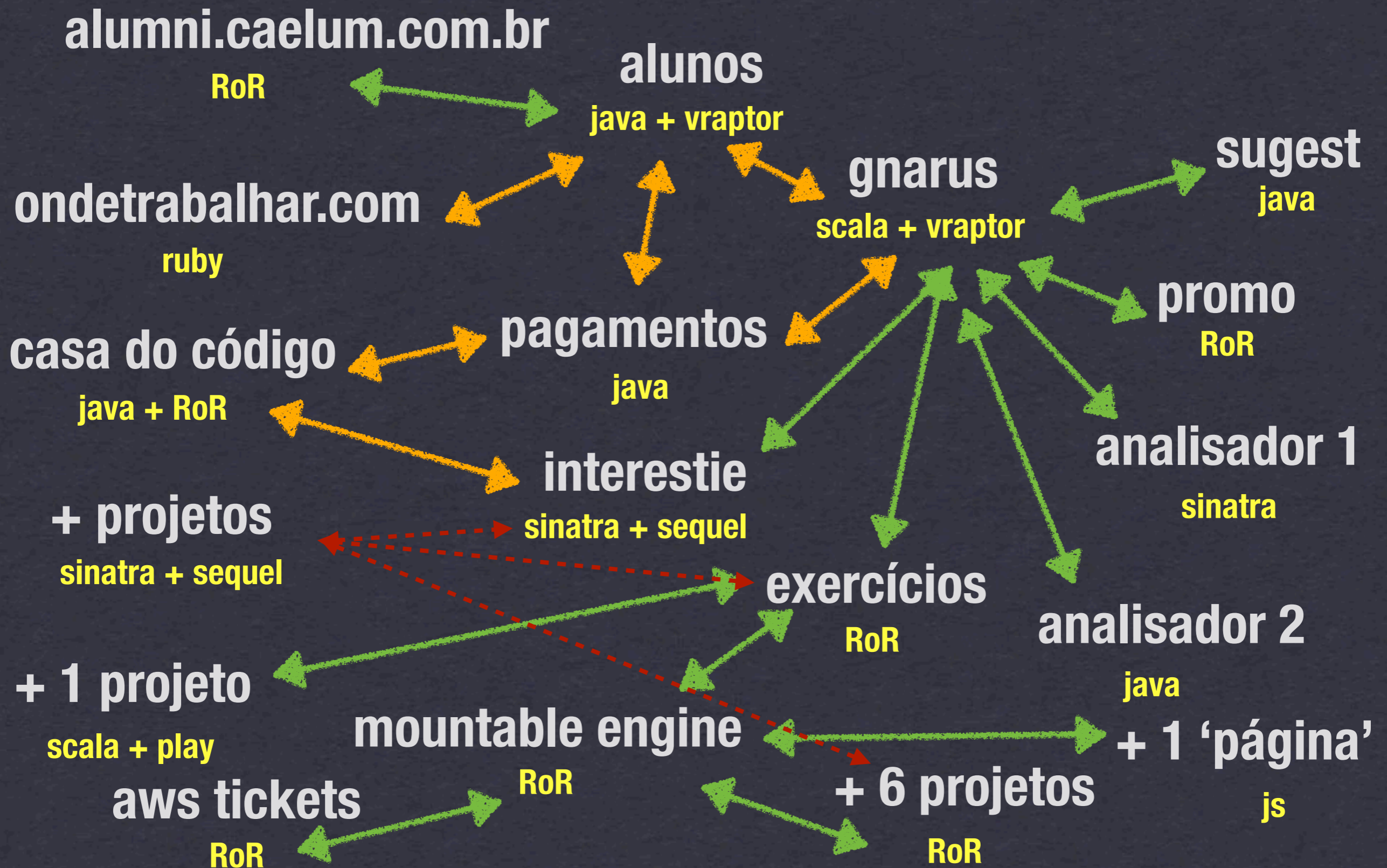
and then...



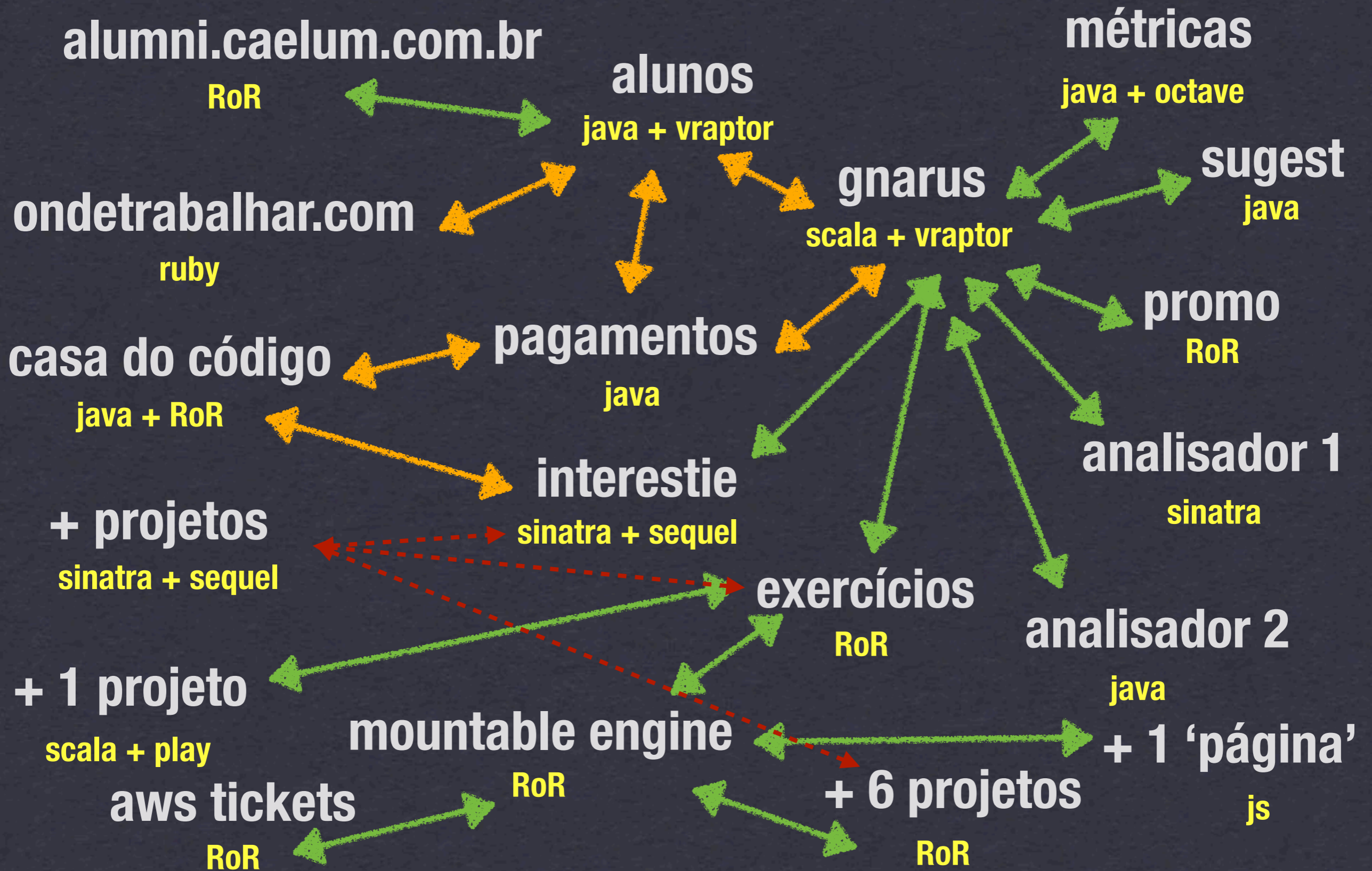
and then...



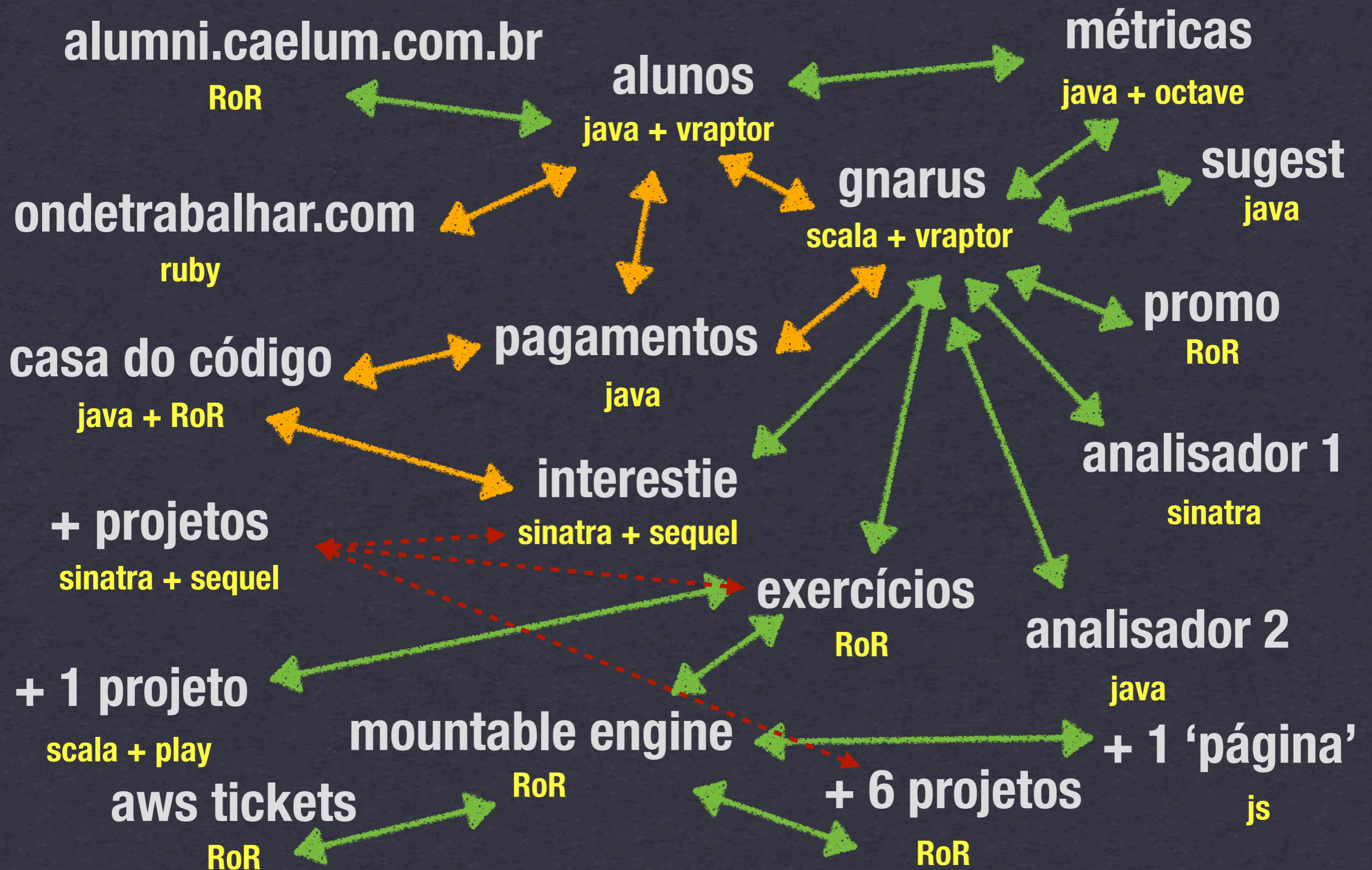
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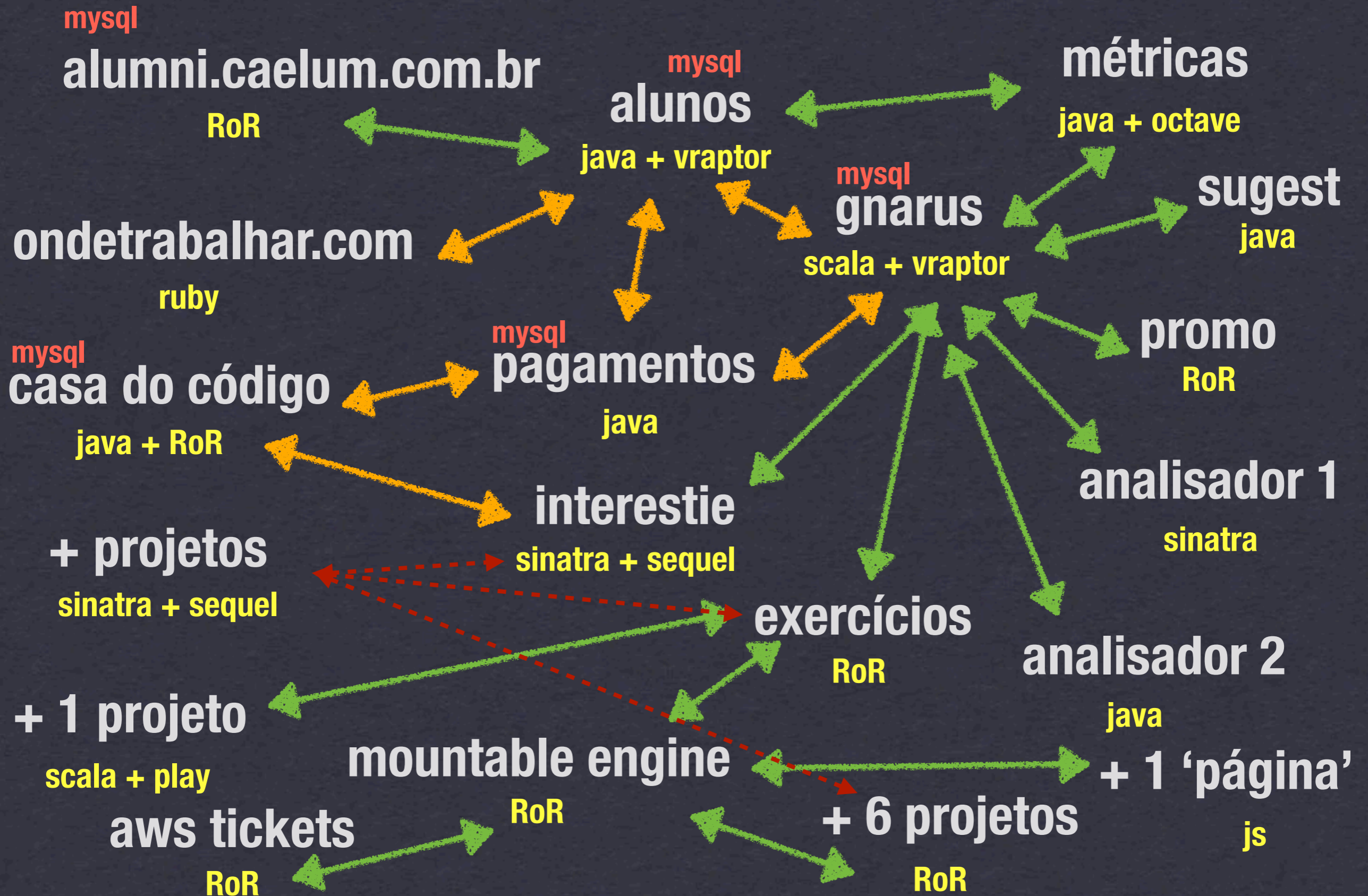
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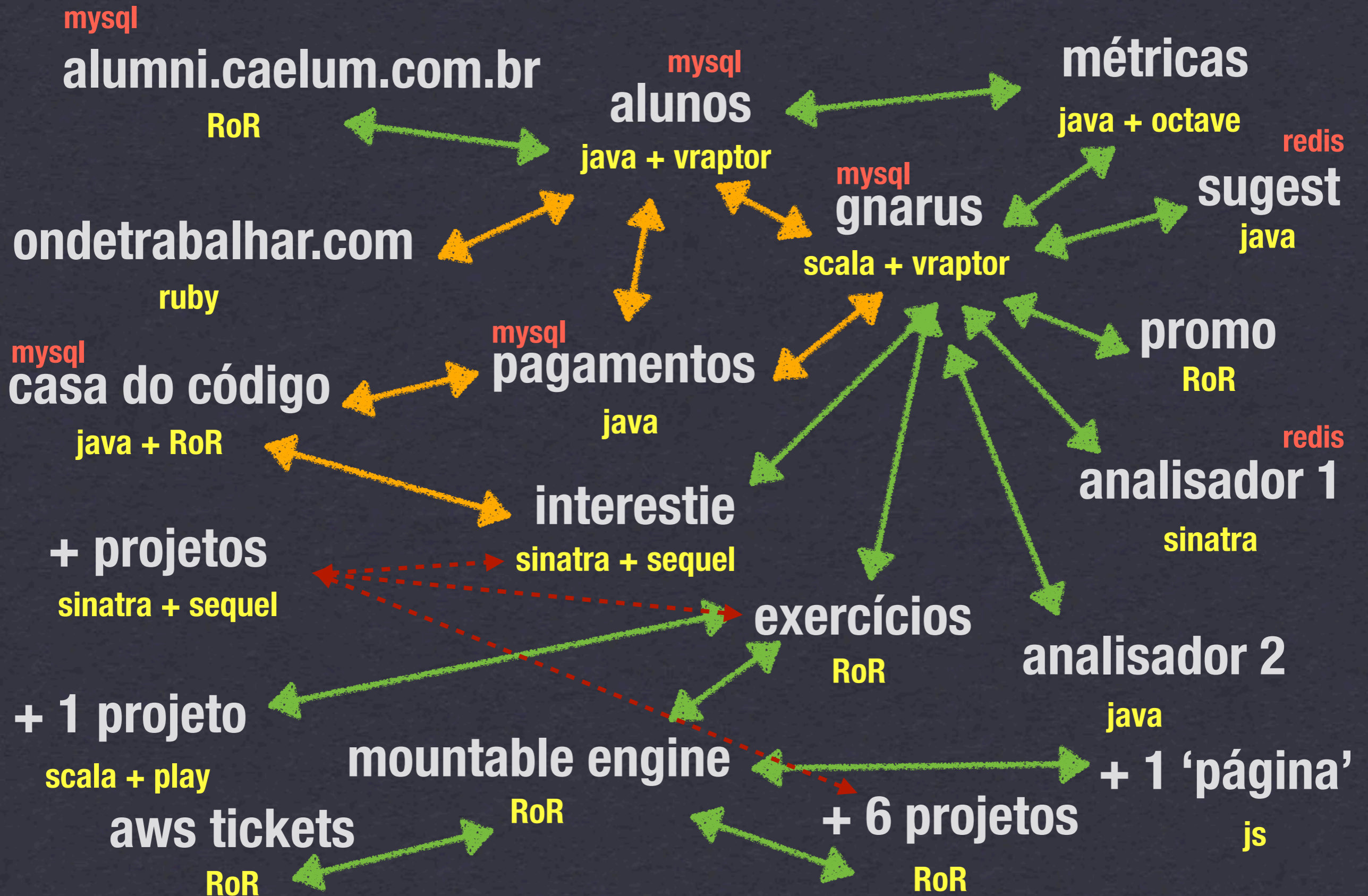
and then...



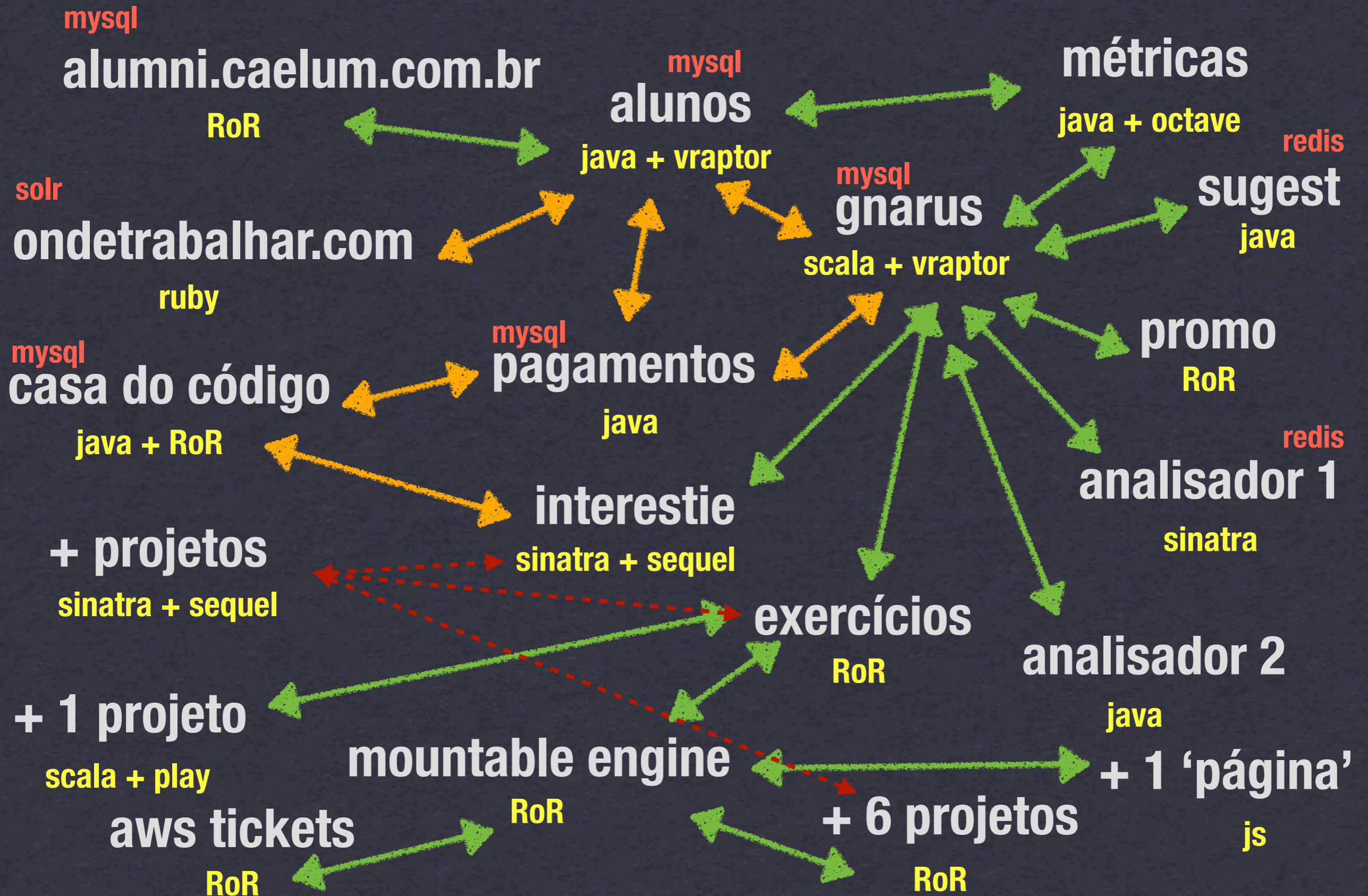
and then...



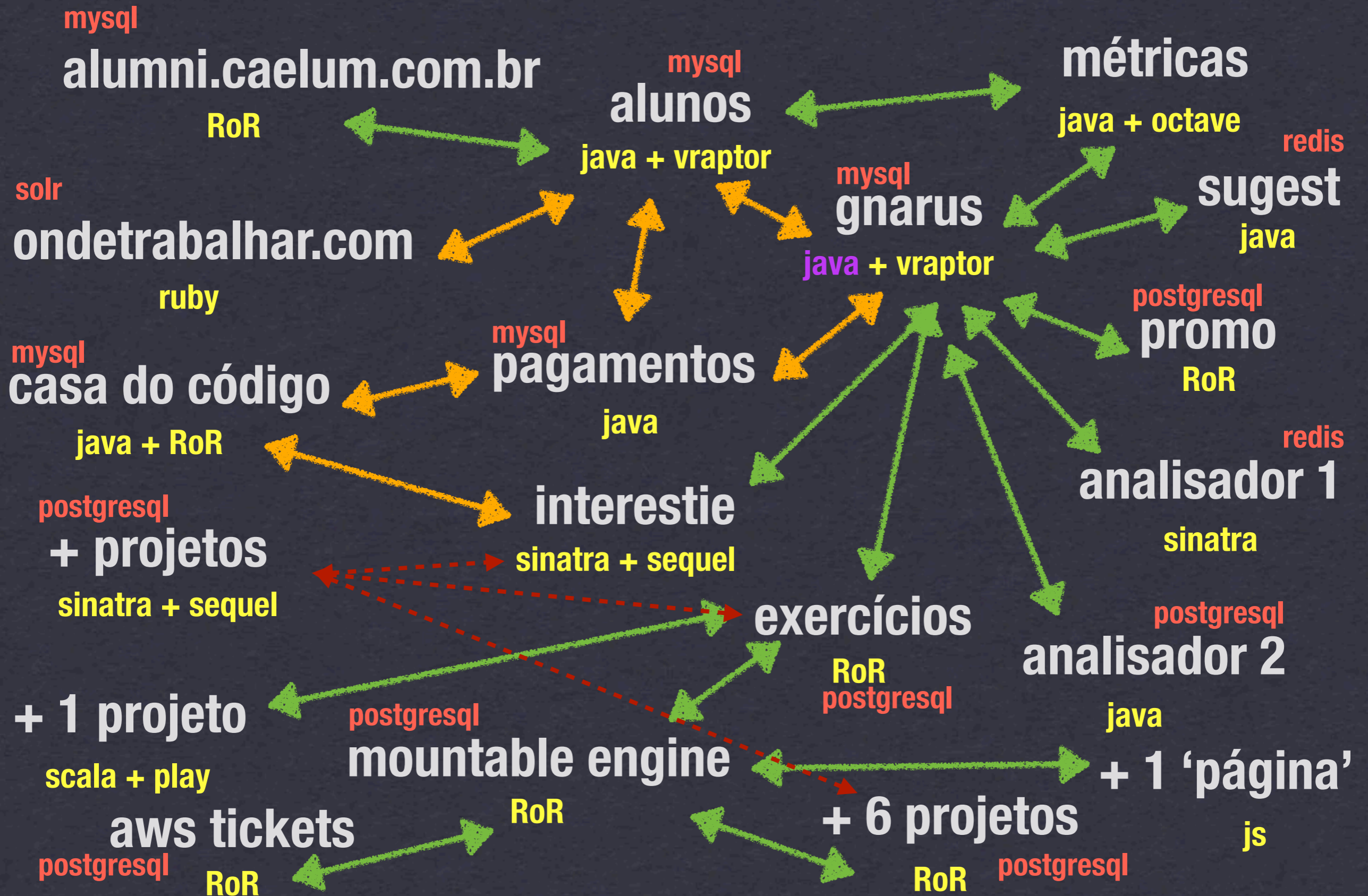
and then...



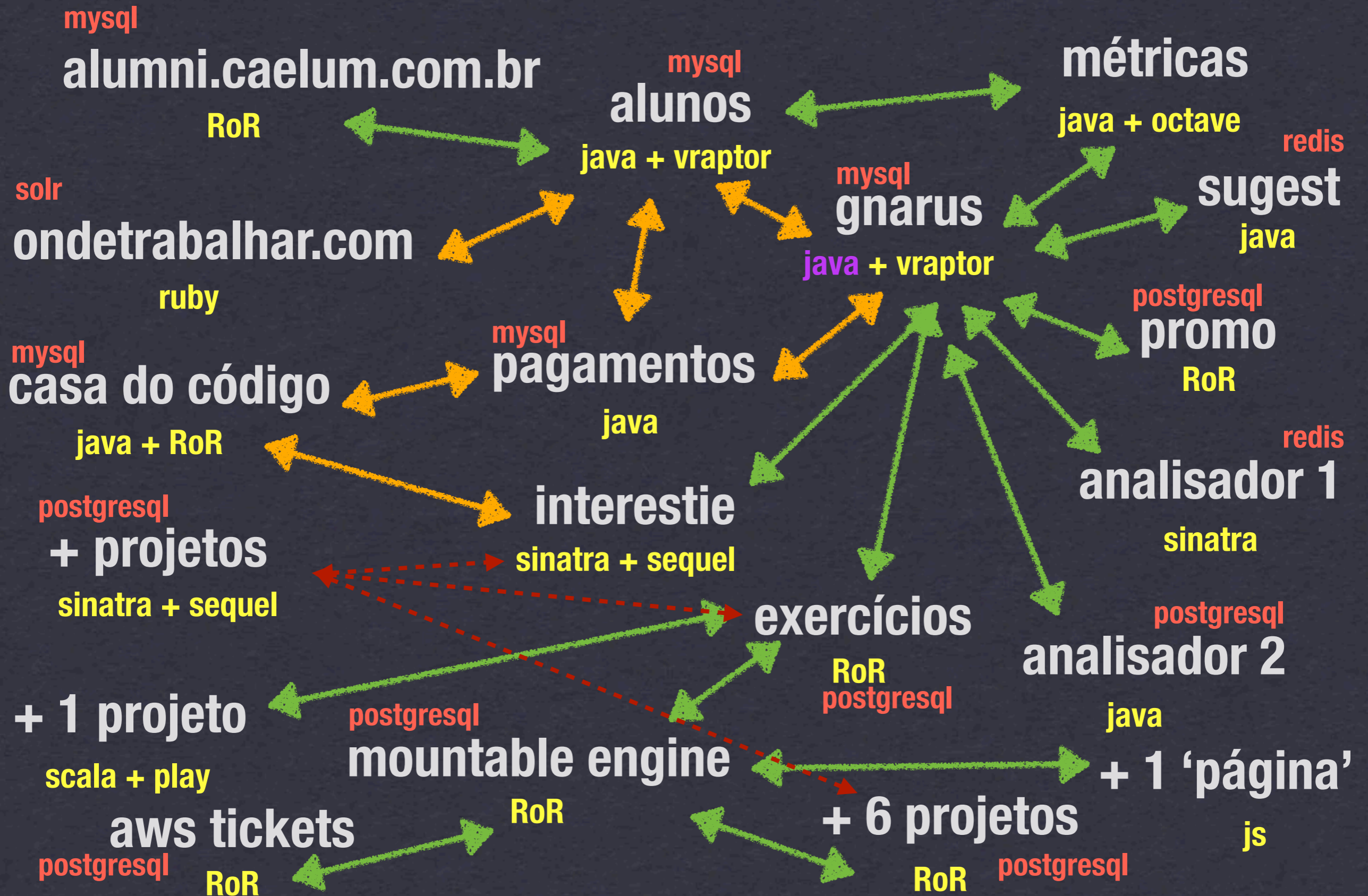
and then...



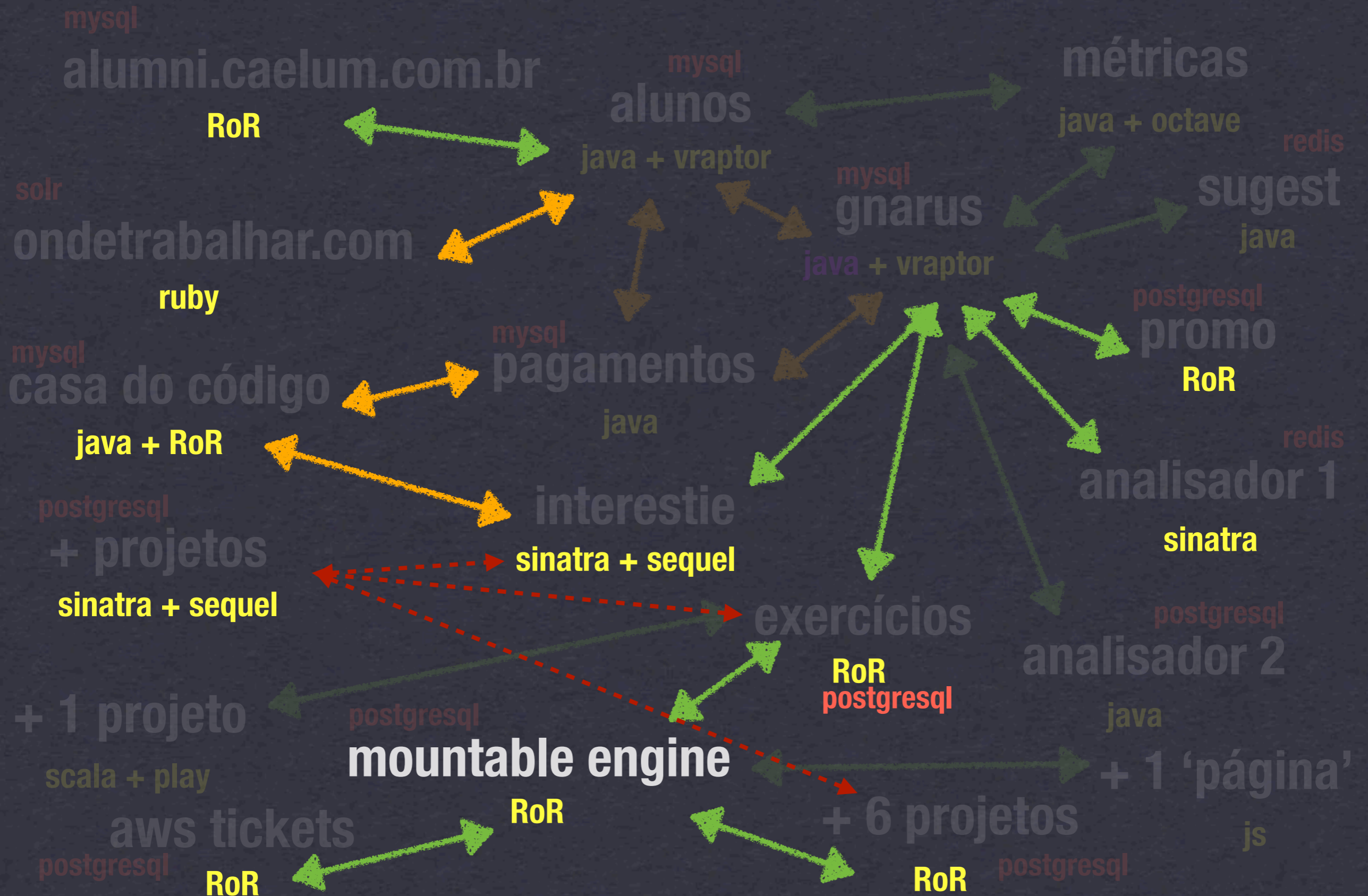
and then...



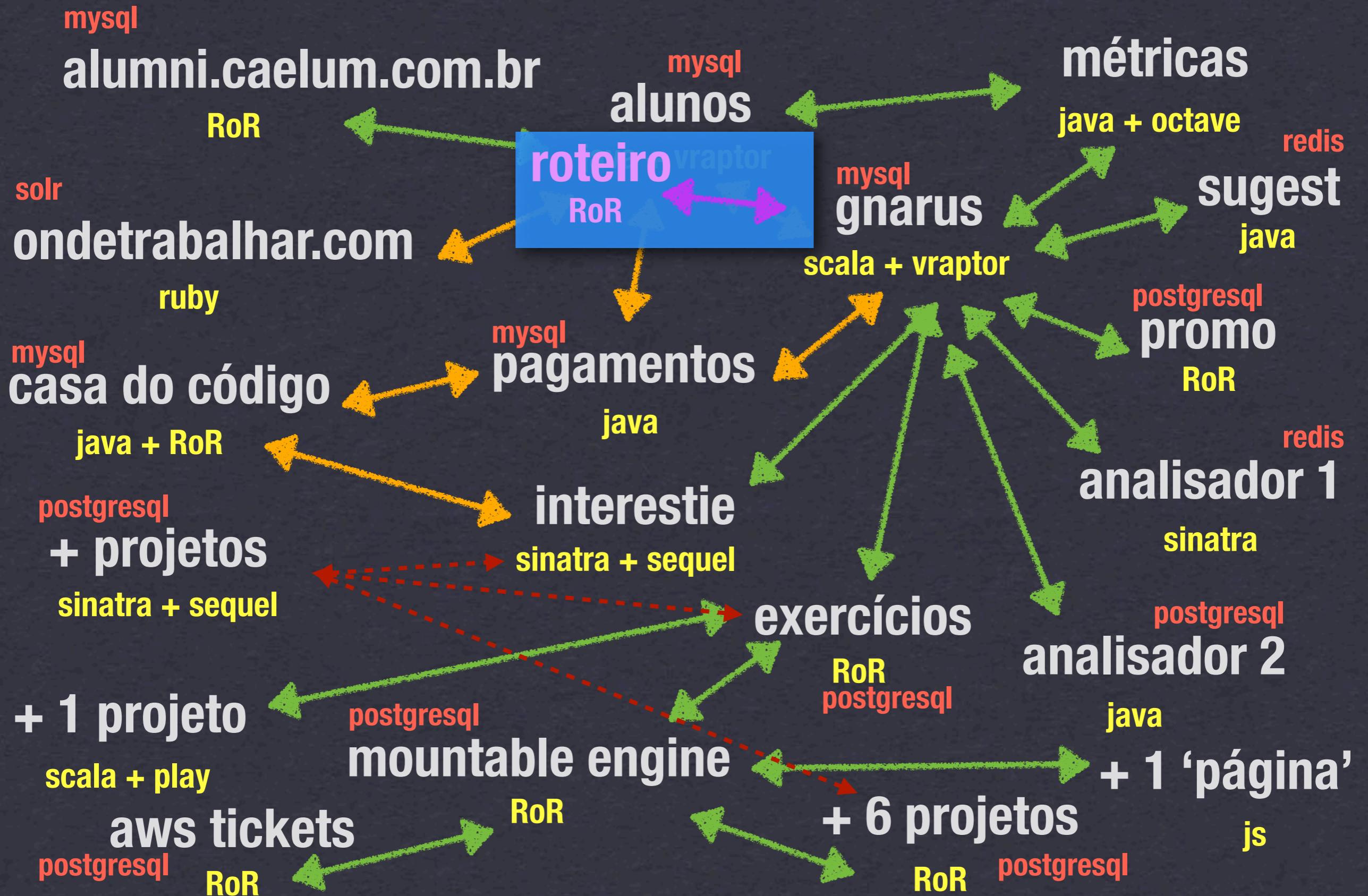
did you see it?



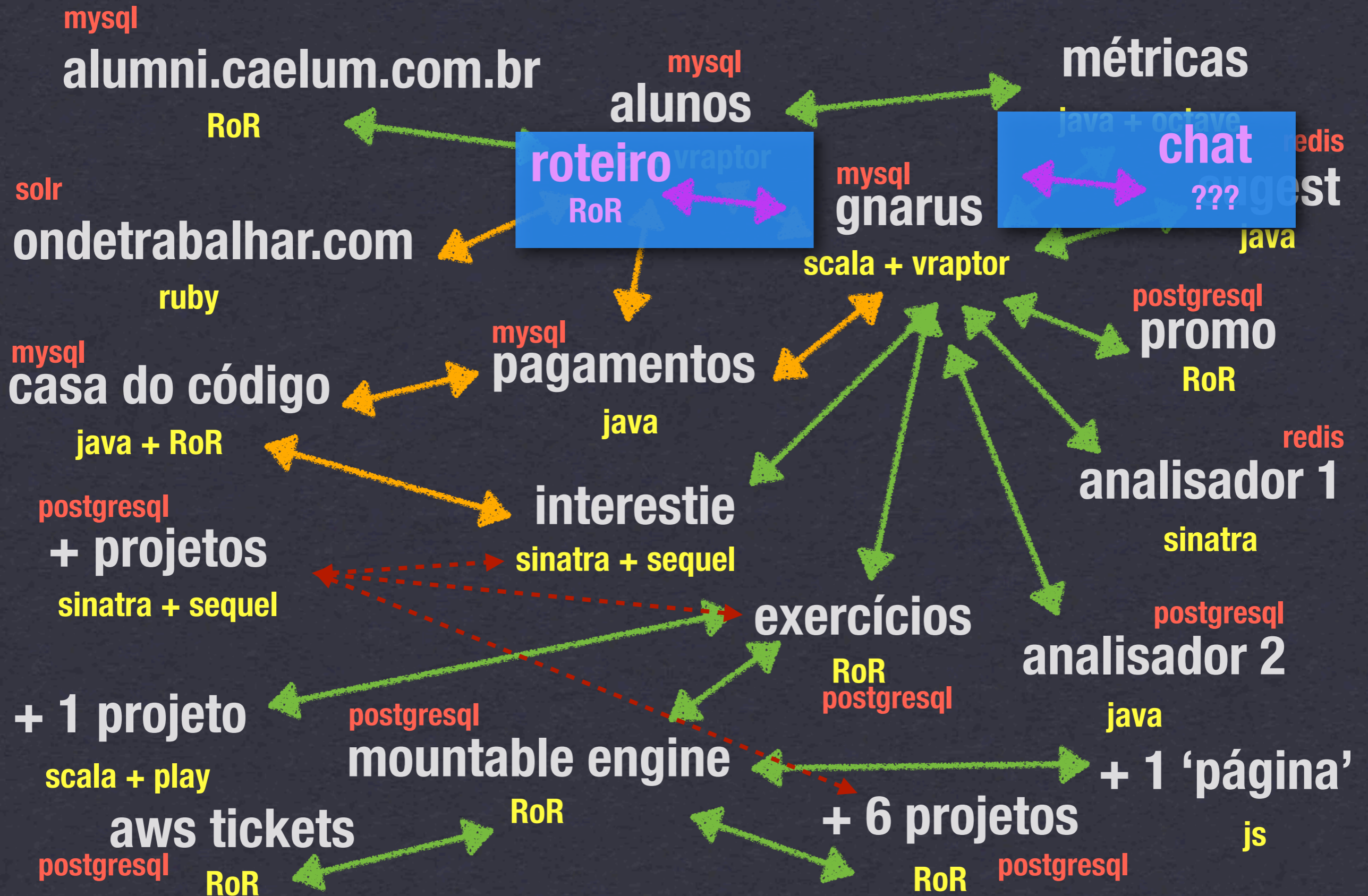
did you see it?



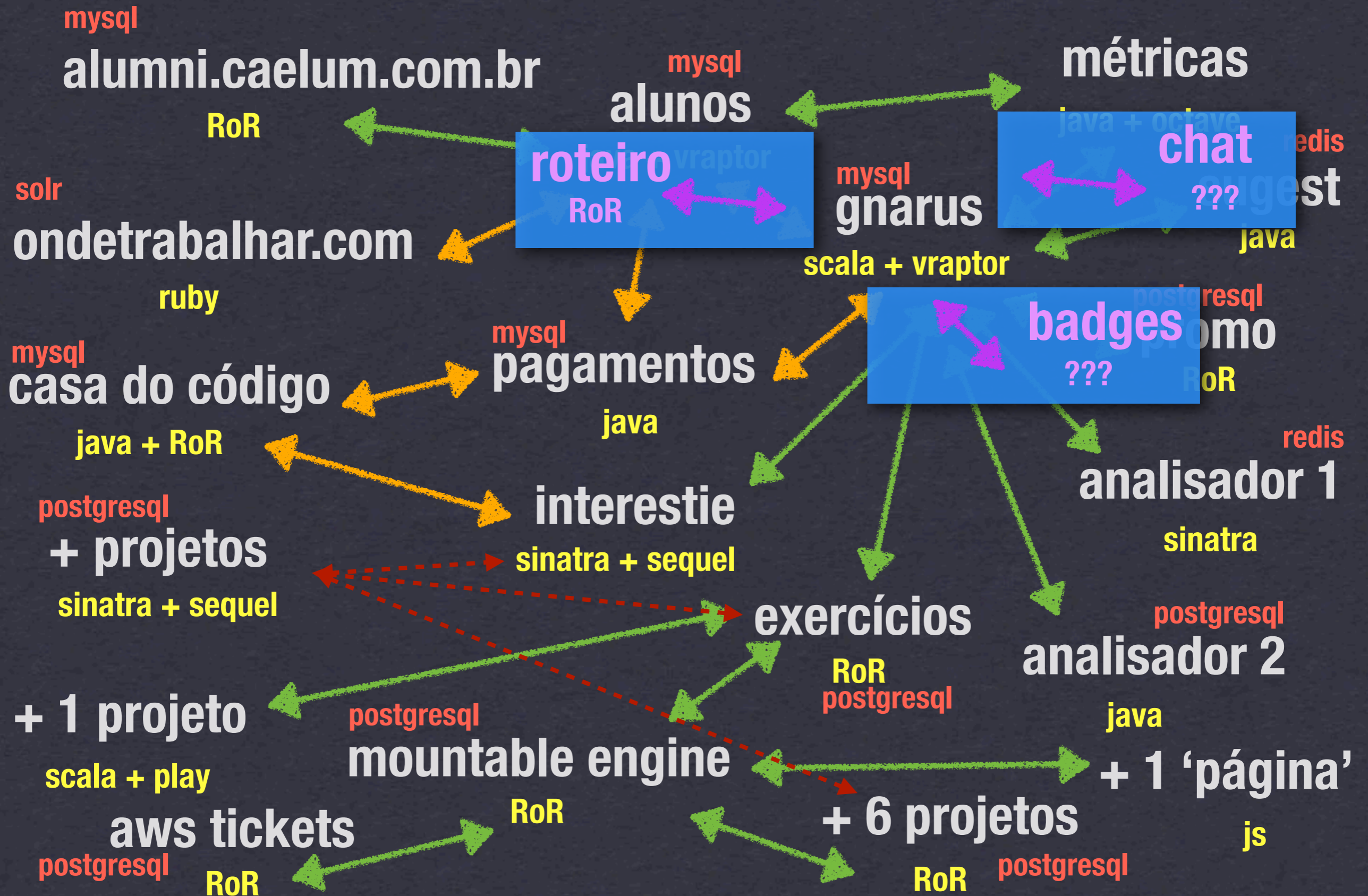
october 2012



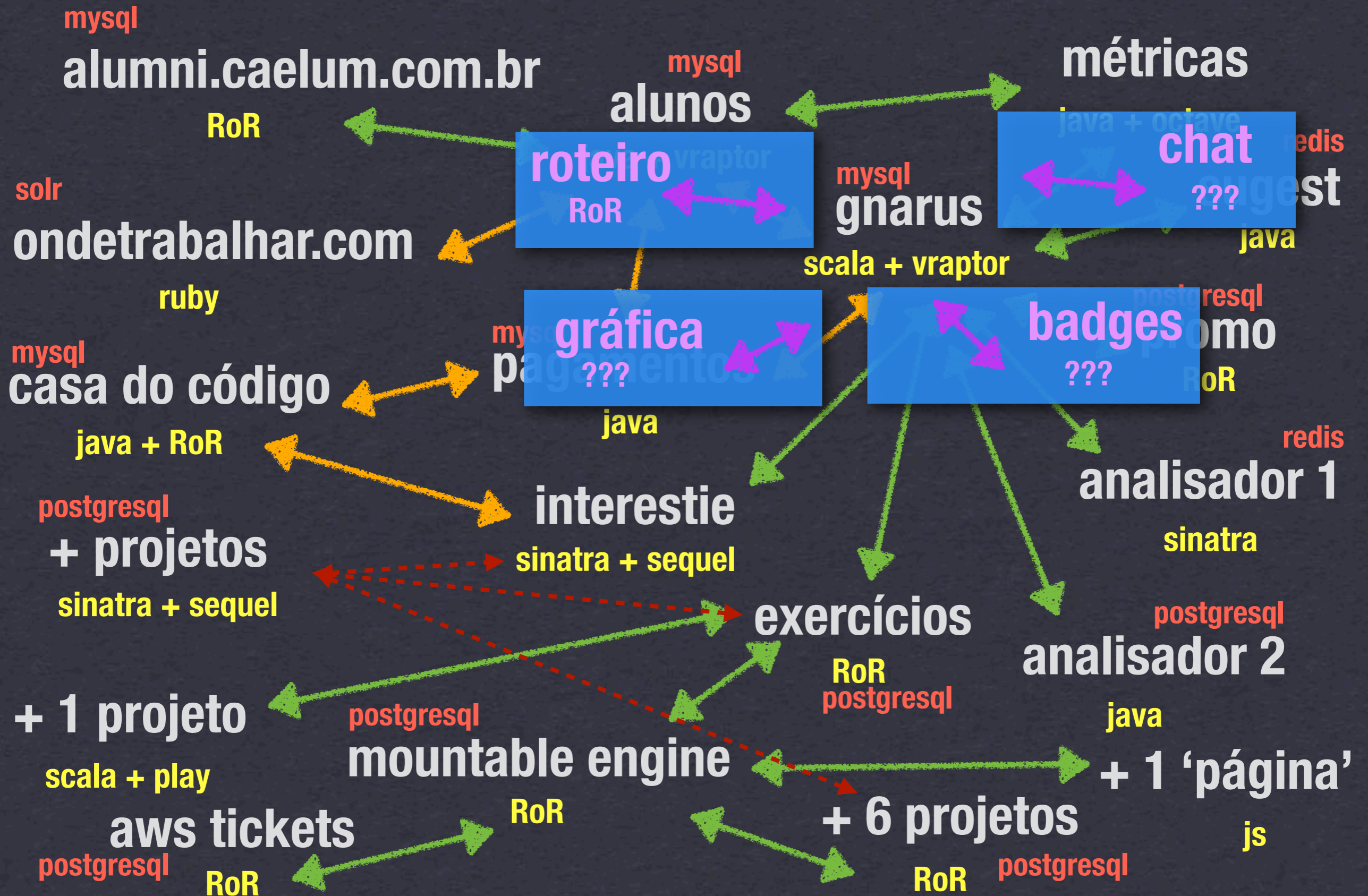
october 2012



october 2012



october 2012



what we did

what we did

- refactor, extract project

what we did

- refactor, extract project
- single responsibility micro projects

what we did

- refactor, extract project
- single responsibility micro projects
- dependency injection (dumb entry point configuration)

10s of projects

10s of projects

- small teams (1-4 devs)

10s of projects

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- lots of micro projects (1-20 classes)

10s of projects

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- lots of micro projects (1-20 classes)
- 2 medium projects (20-200 classes)

10s of projects

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- 2 medium projects (20-200 classes)
- 1 big legacy project (500 classes) - bigger team

10s of projects

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- lots of micro projects (1-20 classes)
- 2 medium projects (20-200 classes)
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- micro services

really small services

really small services

- small service, medium project

really small services

- small service, medium project
- micro teams

really small services

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- micro teams
- if someone dies, the cost allows you to drop the code, start again

really small services

- small service, medium project
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- protocol and communication is simple and stable

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limitations

but are we not in the replicated era?

limitations

- protocol change ==> hell

but are we not in the replicated era?

limitations

- protocol change ==> hell
- client project needs user data ==> replicated data

but are we not in the replicated era?

limitations

- protocol change ==> hell
- client project needs user data ==> replicated data
- other problems that we have no idea

but are we not in the replicated era?

avoid

- multiple projects, same representation

enforcing

- small projects, specialized representations

communication changes/evolution

communication changes/evolution

- avoid

communication changes/evolution

- avoid
- avoid

communication changes/evolution

- avoid
- avoid
- avoid

communication changes/evolution

- avoid
- avoid
- avoid
- avoid

communication changes/evolution

- avoid
- avoid
- avoid
- avoid
- backward compatible

communication changes/evolution

- avoid
- avoid
- avoid
- avoid
- backward compatible
- feel the pain

“How can I evolve my service since it’s going to break compatibility?” - unknown SOA’er

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If it **breaks** compatibility you can not “not break compatibility” - basic reasoning

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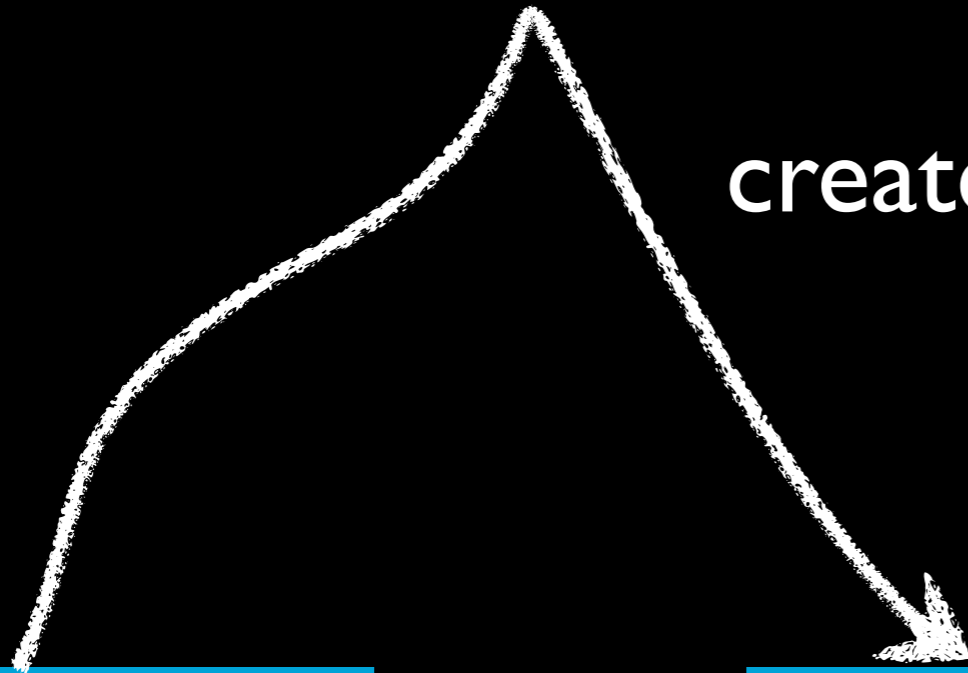
“buy our product” - wise vendor

training platform

payments

3rd party provider

create payment

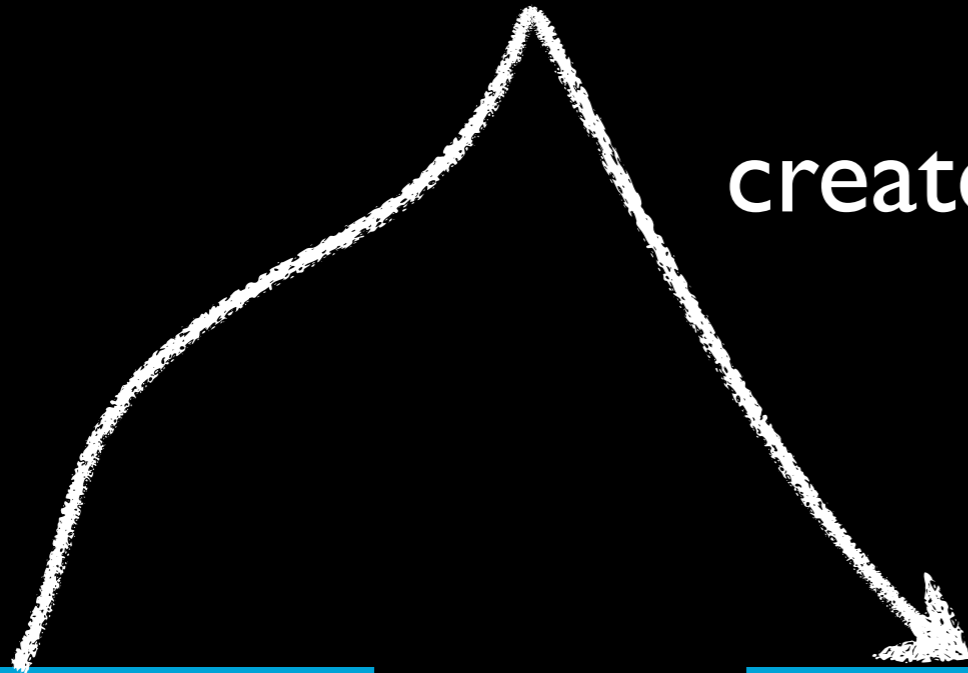


training platform

payments

3rd party provider

create payment



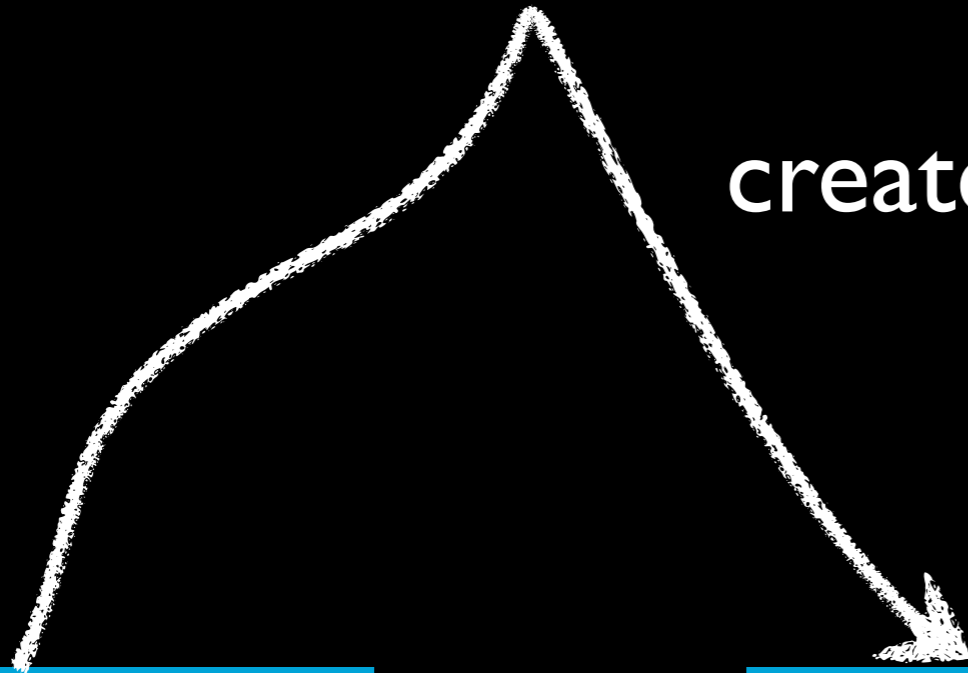
training platform

payments



3rd party provider

create payment



training platform



payments

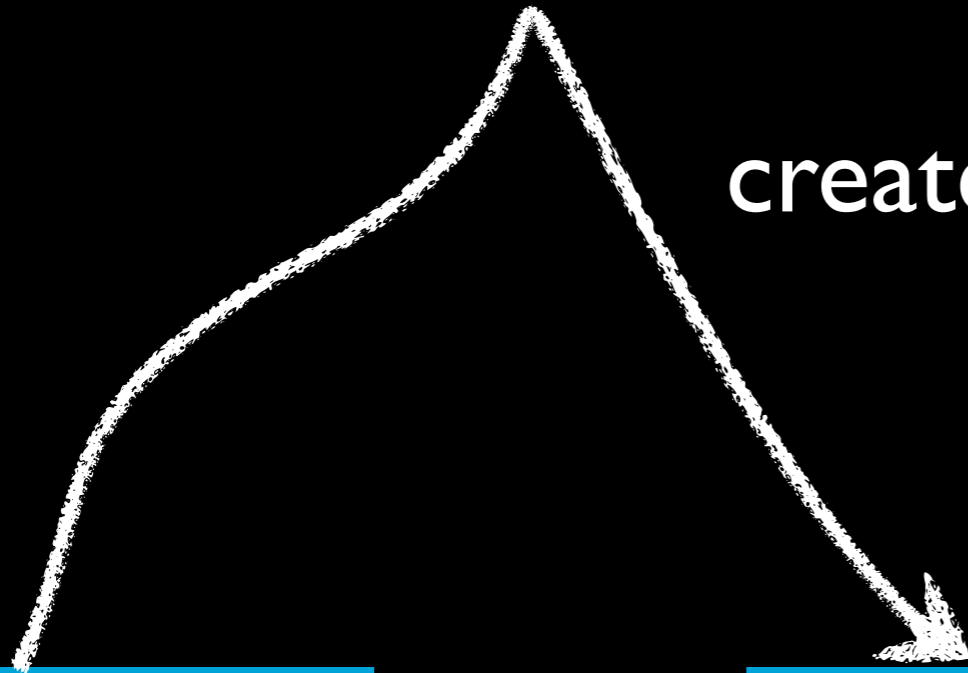


3rd party provider



check status

create payment



training platform



payments



3rd party provider

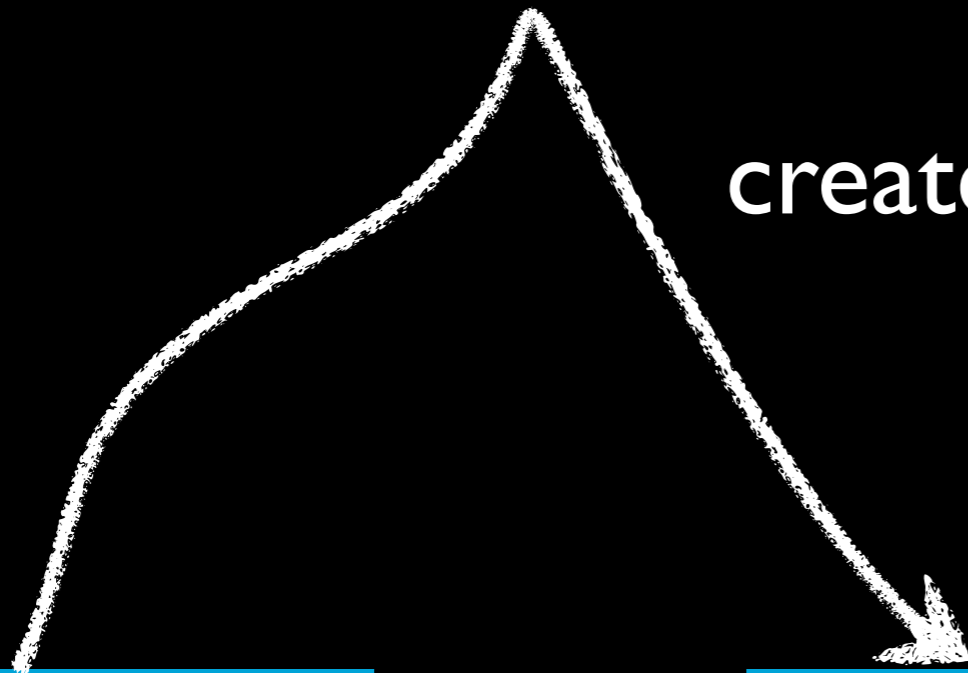


check status



cancel order

create payment



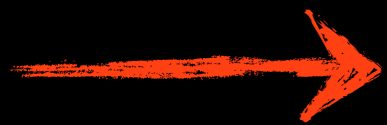
training platform



payments



3rd party provider



cancel item

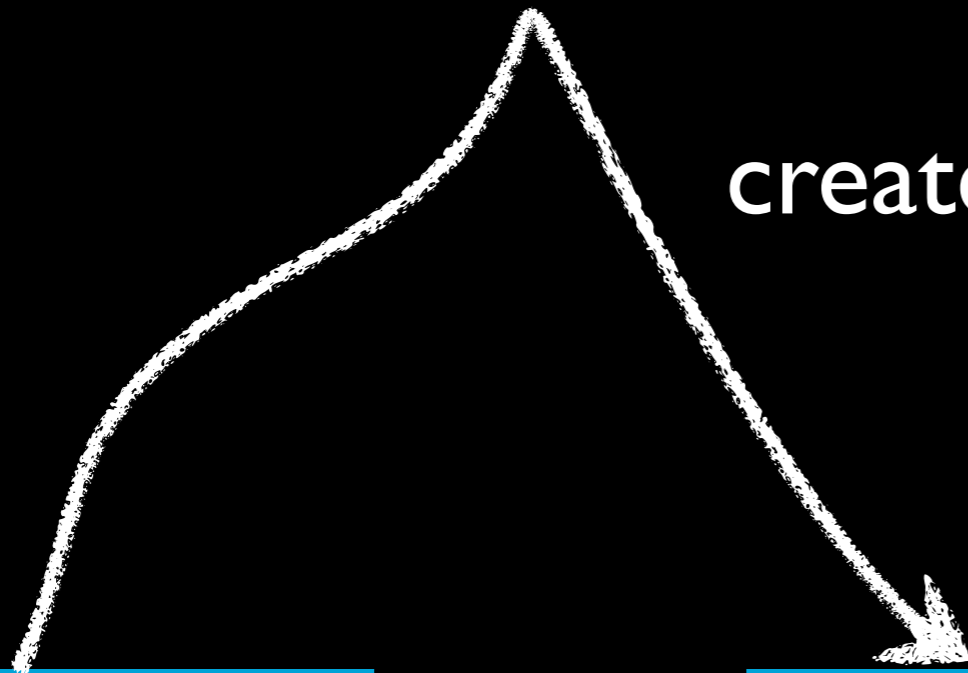


check status



cancel order

create payment



training platform

payments

3rd party provider



cancel item

do A, B, C



check status

cancel order



every new feature between the 2nd and 3rd system means a protocol change between the 1st and the 2nd

introducing hypermedia:

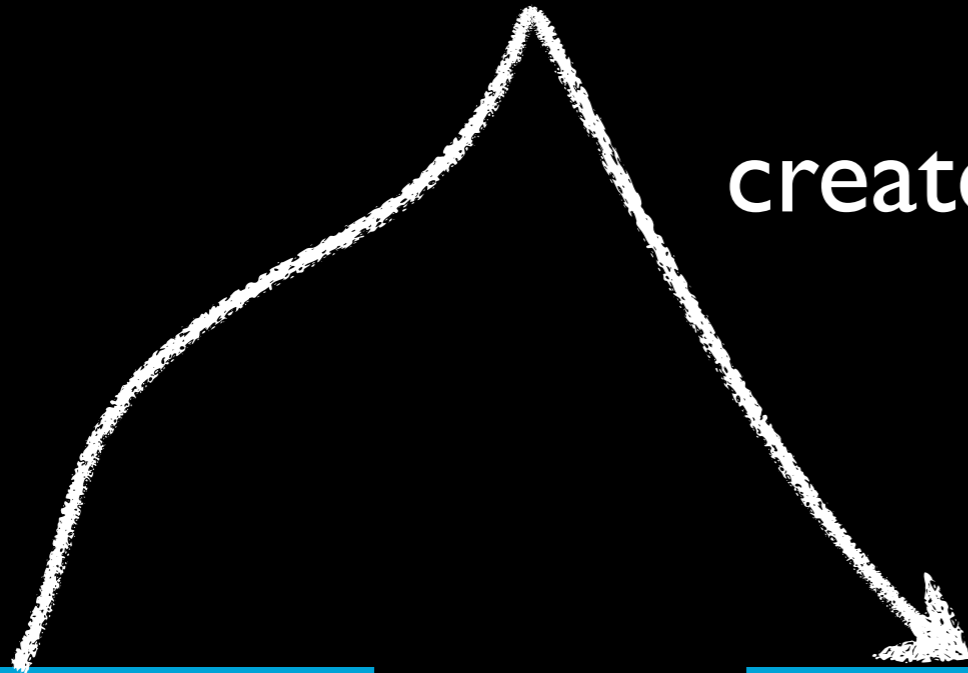
simply return an URI

training platform

payments

3rd party provider

create payment

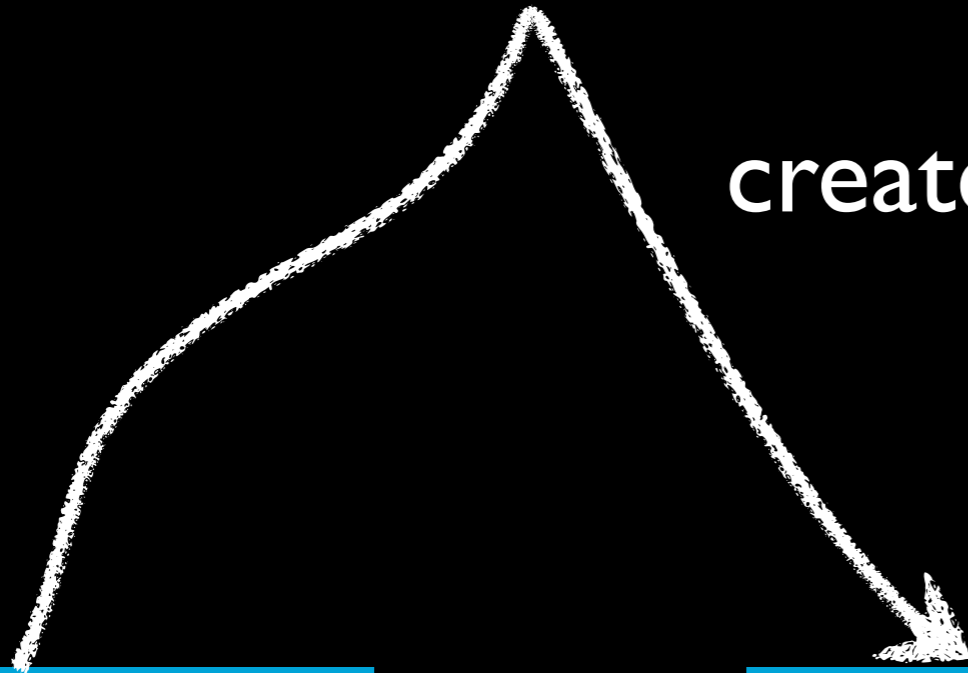


training platform

payments

3rd party provider

create payment



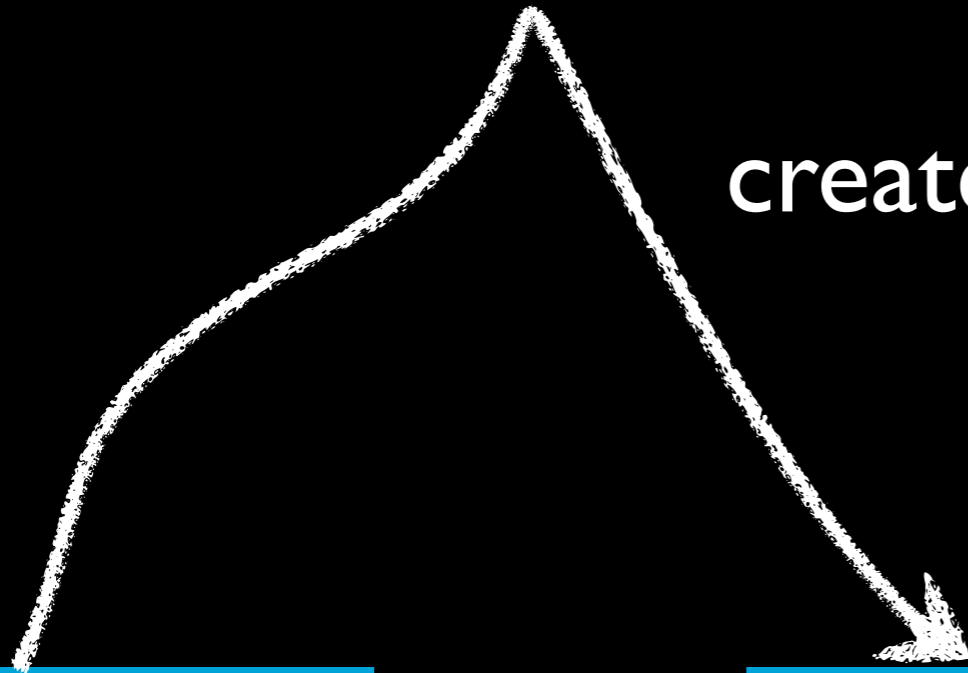
training platform

payments



3rd party provider

create payment



training platform

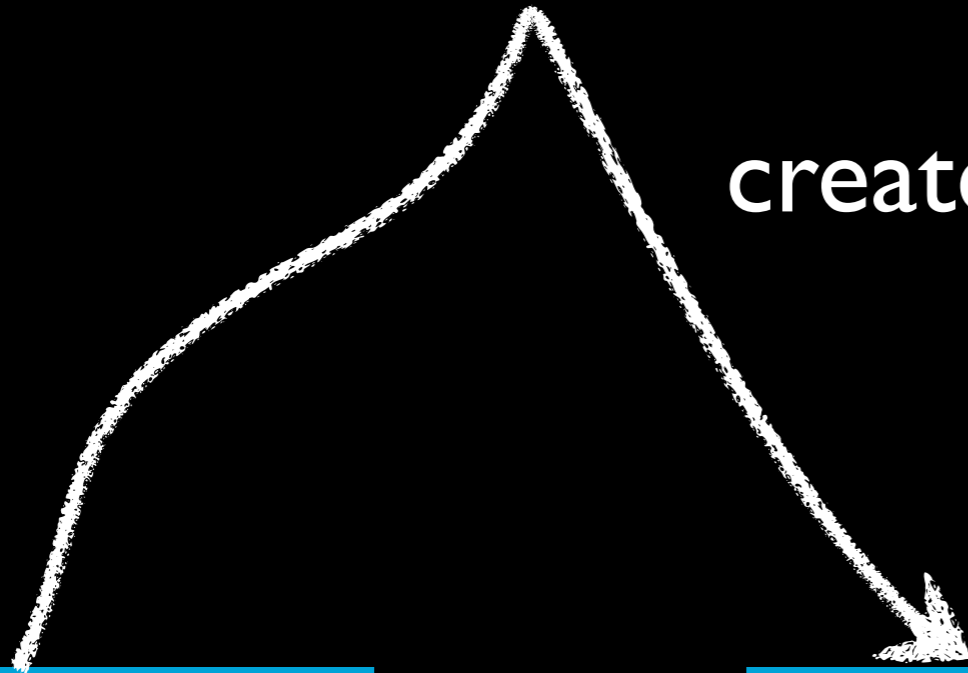
payments

3rd party provider



your URI

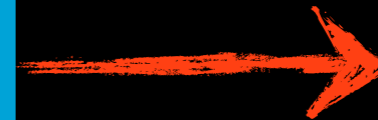
create payment



training platform

payments

3rd party provider



your URI

changes to the 2nd system are not reflected on
the 1st anymore

what we are trying to do

what we are trying to do

- change the online learning experience, but how?
- KIS: keep it stupid, not simple
- micro teams, throw away if necessary
- protocol and communication are stupid and stable

what it allows

what it allows

- simple
- small stable communication
- unstable projects
- teams that come and go
- knowledge transfer
- freedom to try and trash

the end

Introducing Online Education to Hypermedia

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