Declare, verify and execute microservices-based process flows with Baker

Scale By the Bay 2017, San Francisco

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KENAMJU
Rudolph's
BAKERY

Symptoms of a Failing Application Architecture

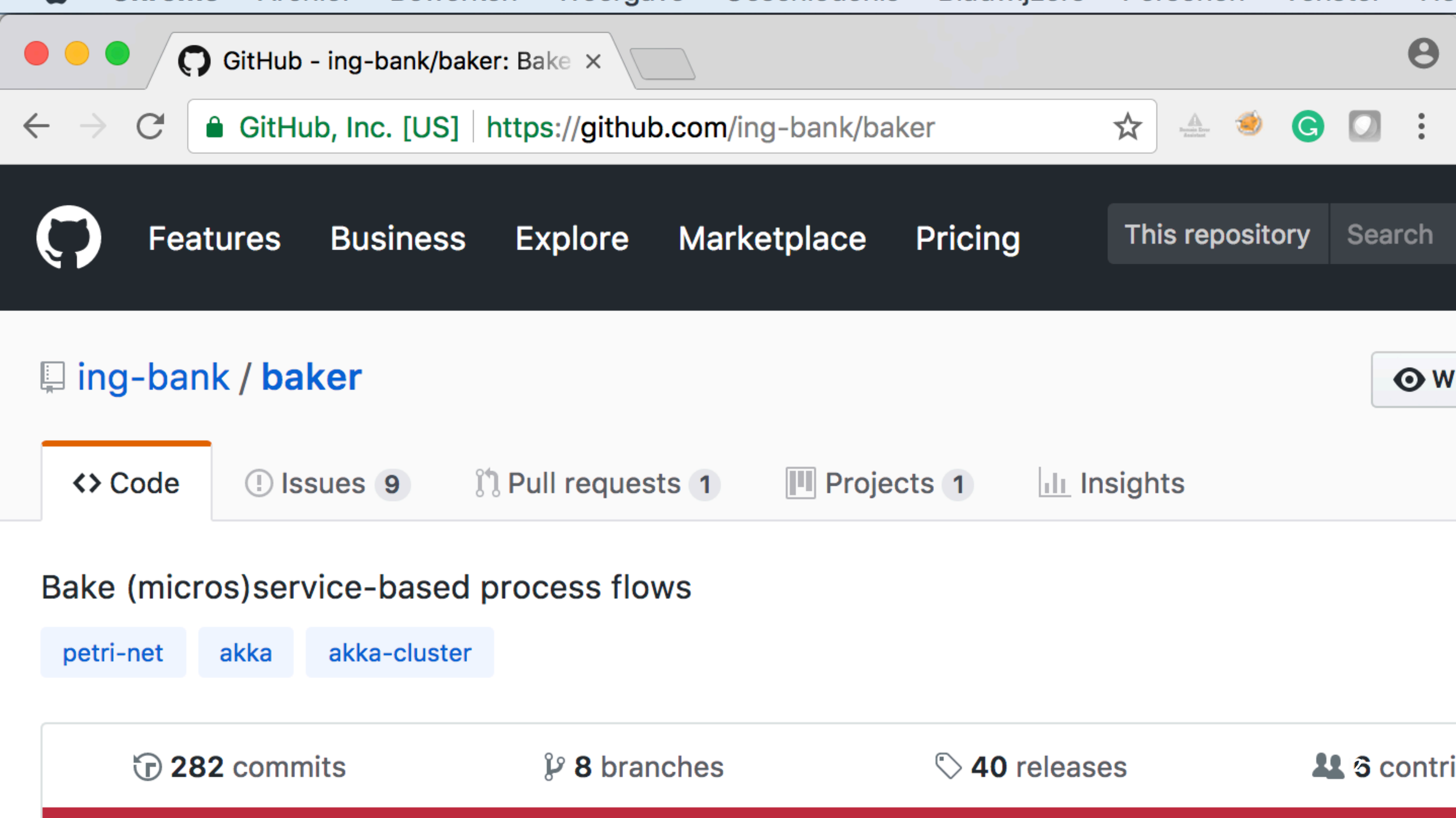

Afraid to change the application code


Functionality breaks unexpectedly


Slow time to market

How to turn this around?


GUAYABA
LICHI


GitHub - ing-bank/baker: Bake
GitHub, Inc. [US]
https://github.com/ing-bank/baker
Features
Business
Explore
Marketplace
Pricing
This repository
Search
ing-bank / baker
Code
Issues 9
Pull requests 1
Projects 1
Insights
Bake (micros)service-based process flows
petri-net
akka
akka-cluster
282 commits
8 branches
40 releases

Simplify

Domain Specific Language for orchestration flows

Declarative

Easy to change

Reuse

Recipes

Interactions

Ingredients

Events

Communicate

Visualize your code

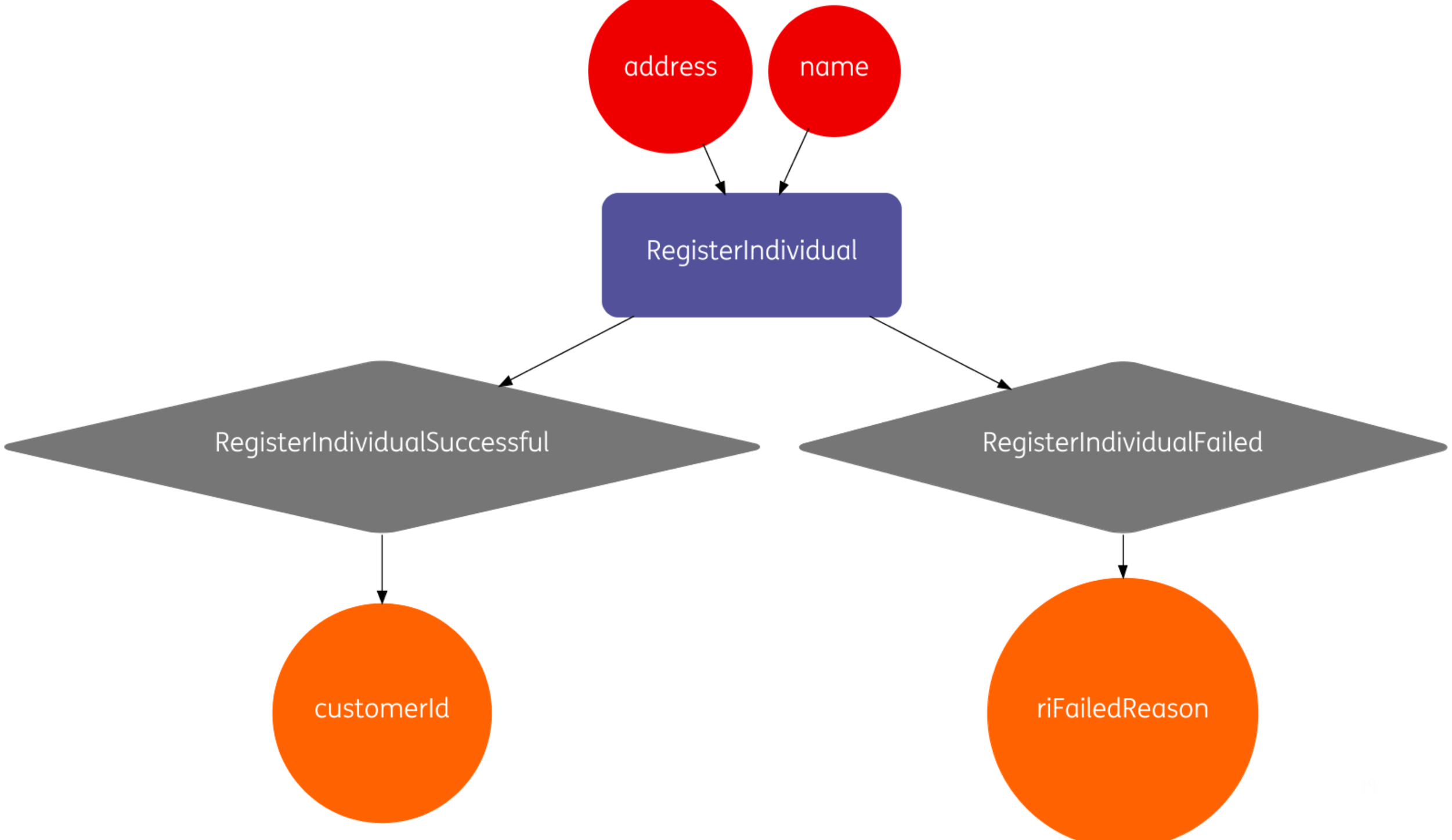
Non-IT understand as well

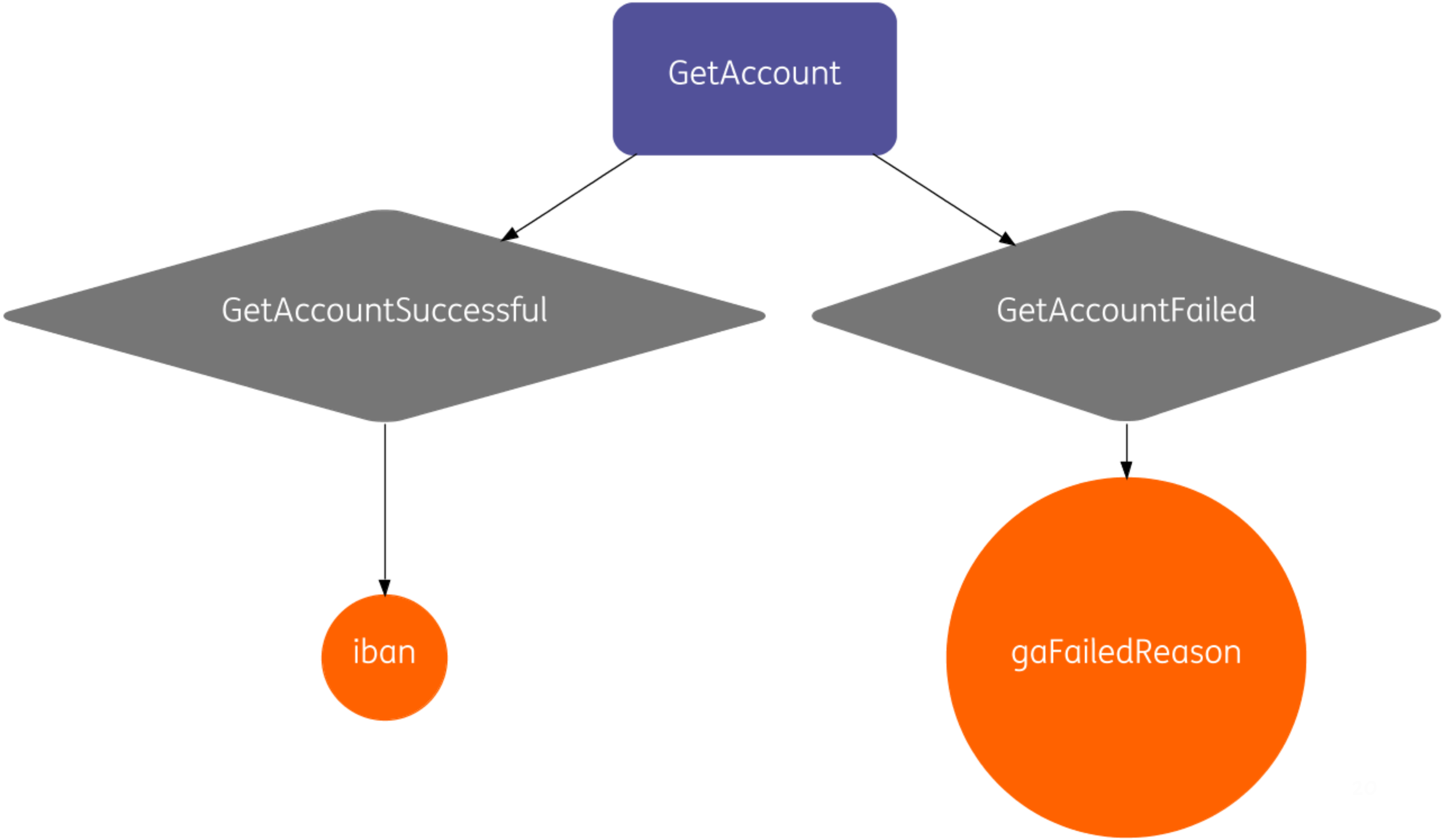
Reason About Comfortably

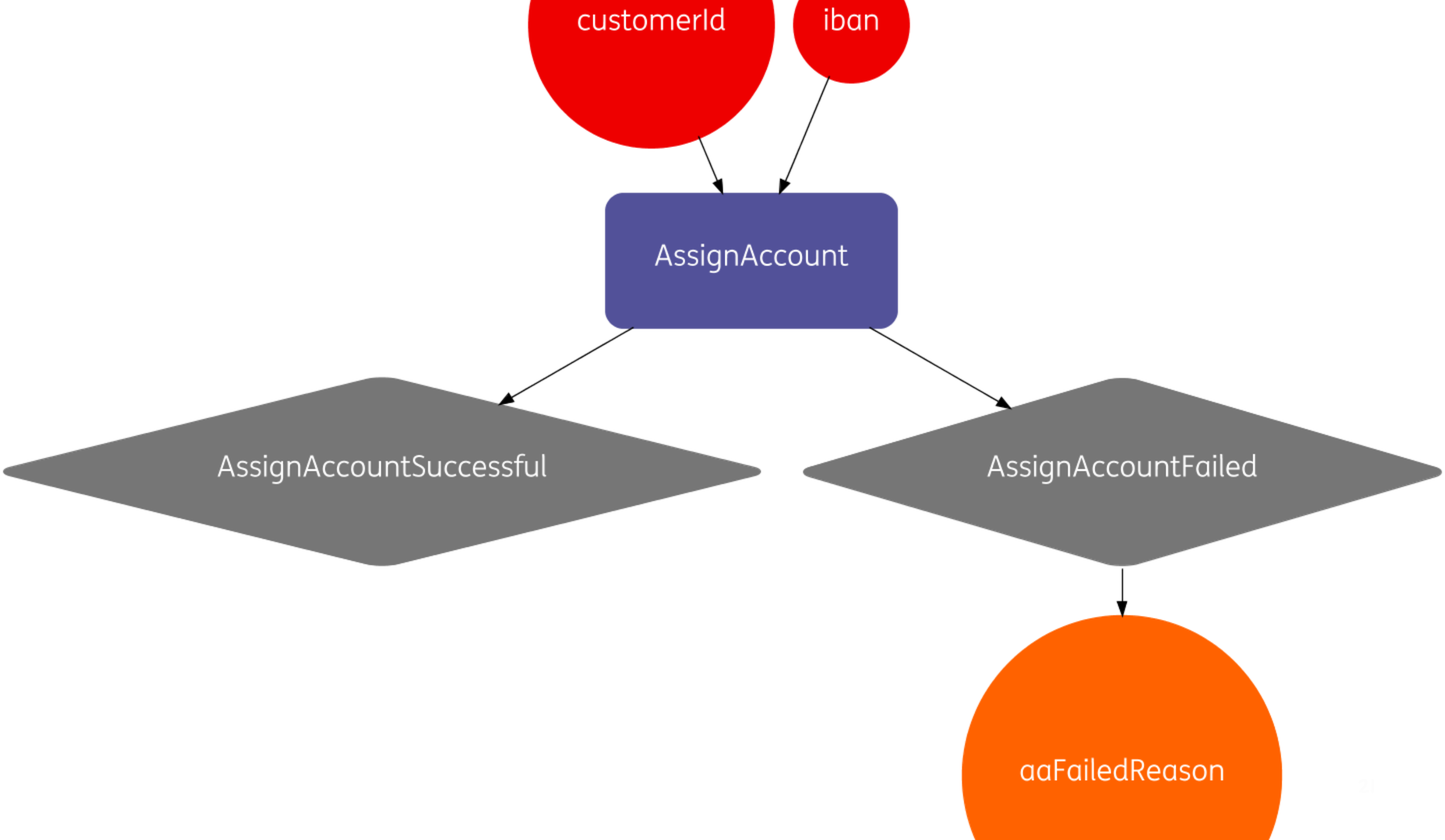
Design-time

```
public interface RegisterIndividual extends Interaction {
    @FiresEvent(oneOf = {RegisterIndividualSuccessful.class,
            RegisterIndividualFailed.class})
    RegisterIndividualOutcome apply(
            @ProcessId String processId,
            @RequiresIngredient("name") String name,
            @RequiresIngredient("address") String address
    );
}
```

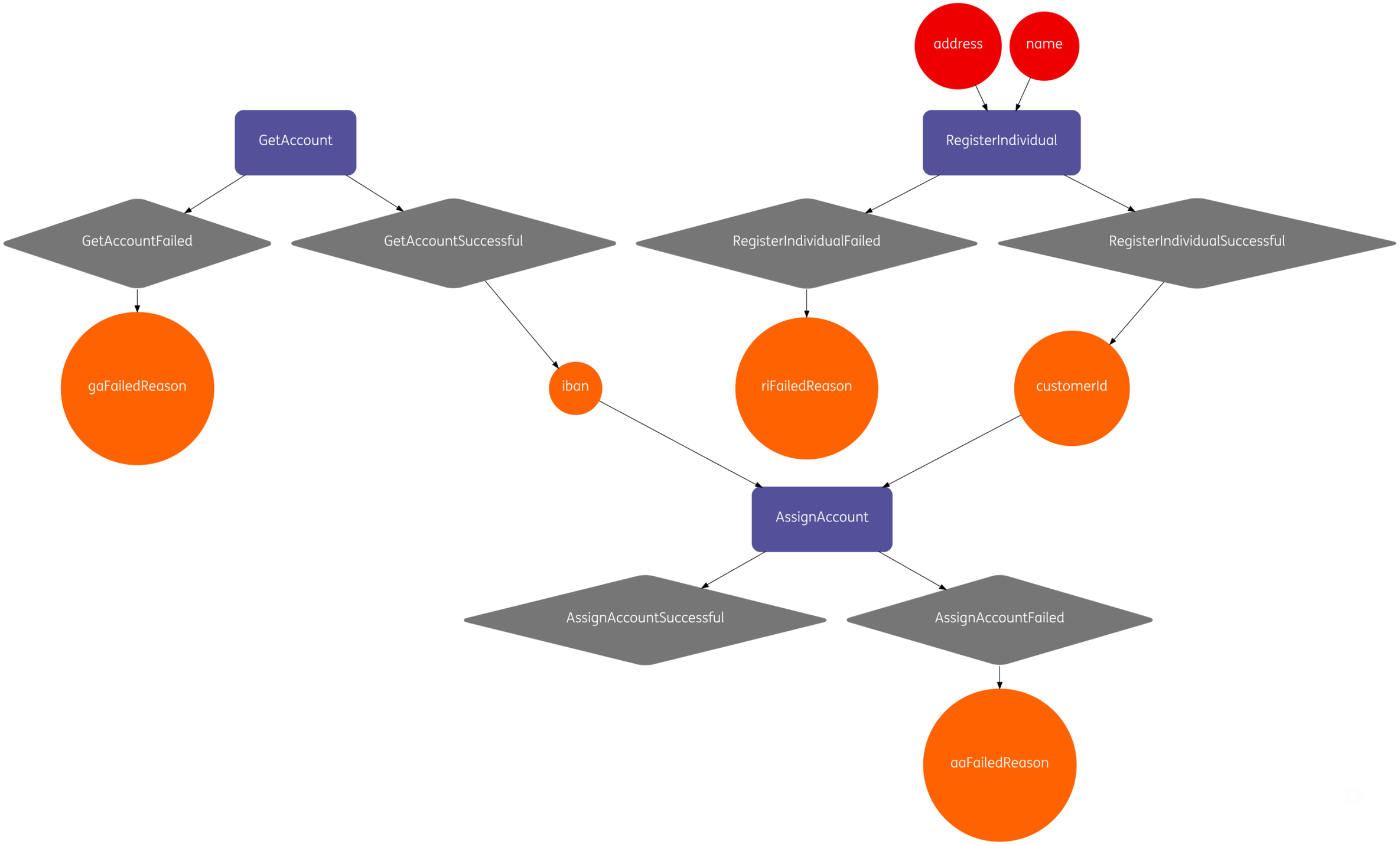
```
public interface RegisterIndividual extends Interaction {
    @FiresEvent(oneOf = {RegisterIndividualSuccessful.class,
            RegisterIndividualFailed.class})
    RegisterIndividualOutcome apply(
            @ProcessId String processId,
            @RequiresIngredient("name") String name,
            @RequiresIngredient("address") String address
    );
}
```


address
name
RegisterIndividual
RegisterIndividualSuccessful
RegisterIndividualFailed
customerId
riFailedReason


GetAccount
GetAccountSuccessful
GetAccountFailed
iban
gaFailedReason


customerId
iban
AssignAccount
AssignAccountSuccessful
AssignAccountFailed
aaFailedReason

```
public Recipe get(){
    return new Recipe("Demo").
            withInteractions(
                    of(AssignAccount.class),
                    of(GetAccount.class),
                    of(RegisterIndividual.class));
}
```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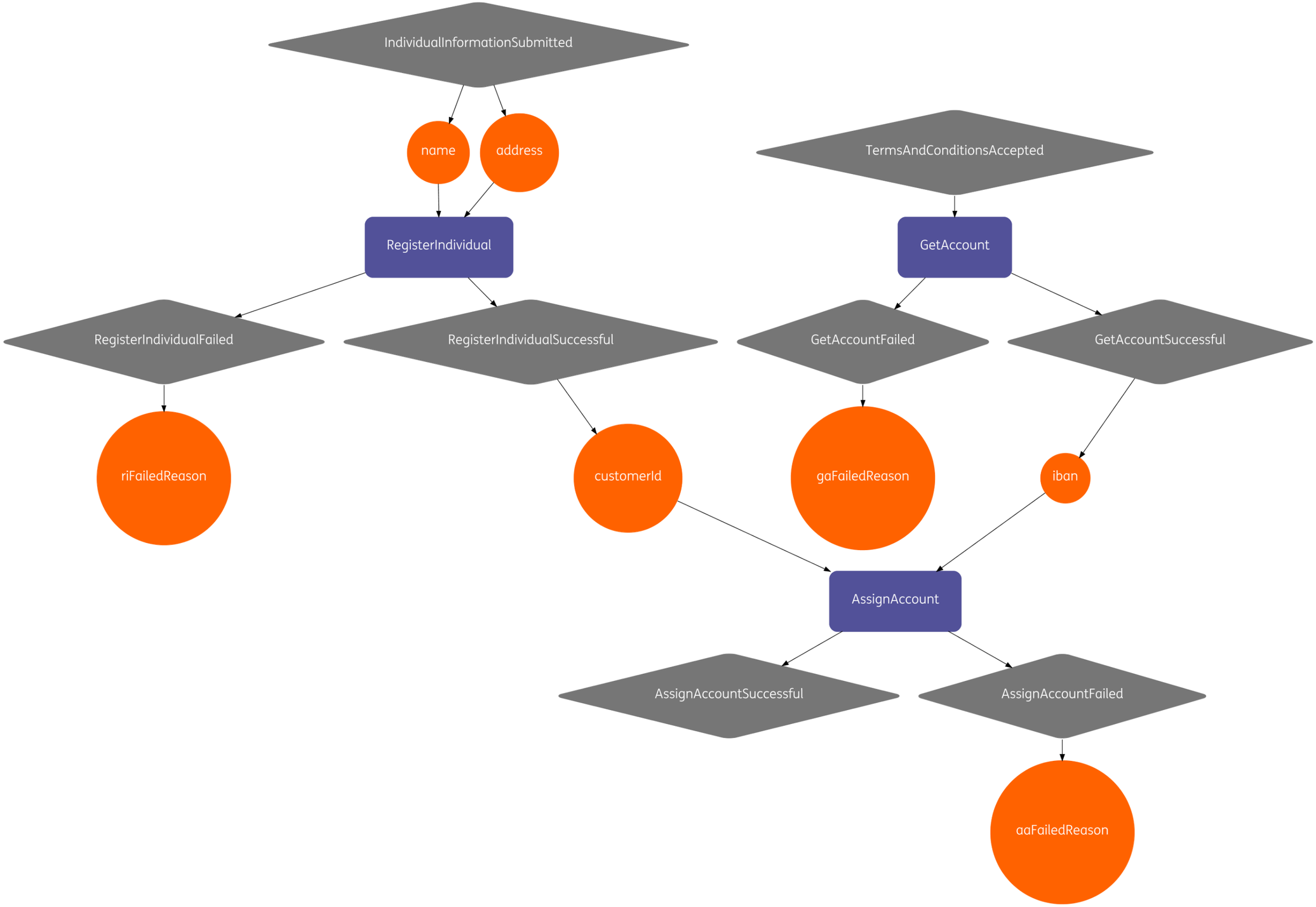
RegisterIndividual
GetAccountFailed
GetAccountSuccessful
RegisterIndividualFailed
RegisterIndividualSuccessful
gaFailedReason
iban
riFailedReason
customerId
AssignAccount
AssignAccountSuccessful
AssignAccountFailed
aaFailedReason

```
return new Recipe("Demo").
        withInteractions(
                of(AssignAccount.class),
                of(GetAccount.class).
                        withRequiredEvent(TermsAndConditionsAccepted.class),
                of(RegisterIndividual.class)).
        withSensoryEvents(
                TermsAndConditionsAccepted.class,
                IndividualInformationSubmitted.class);
}
```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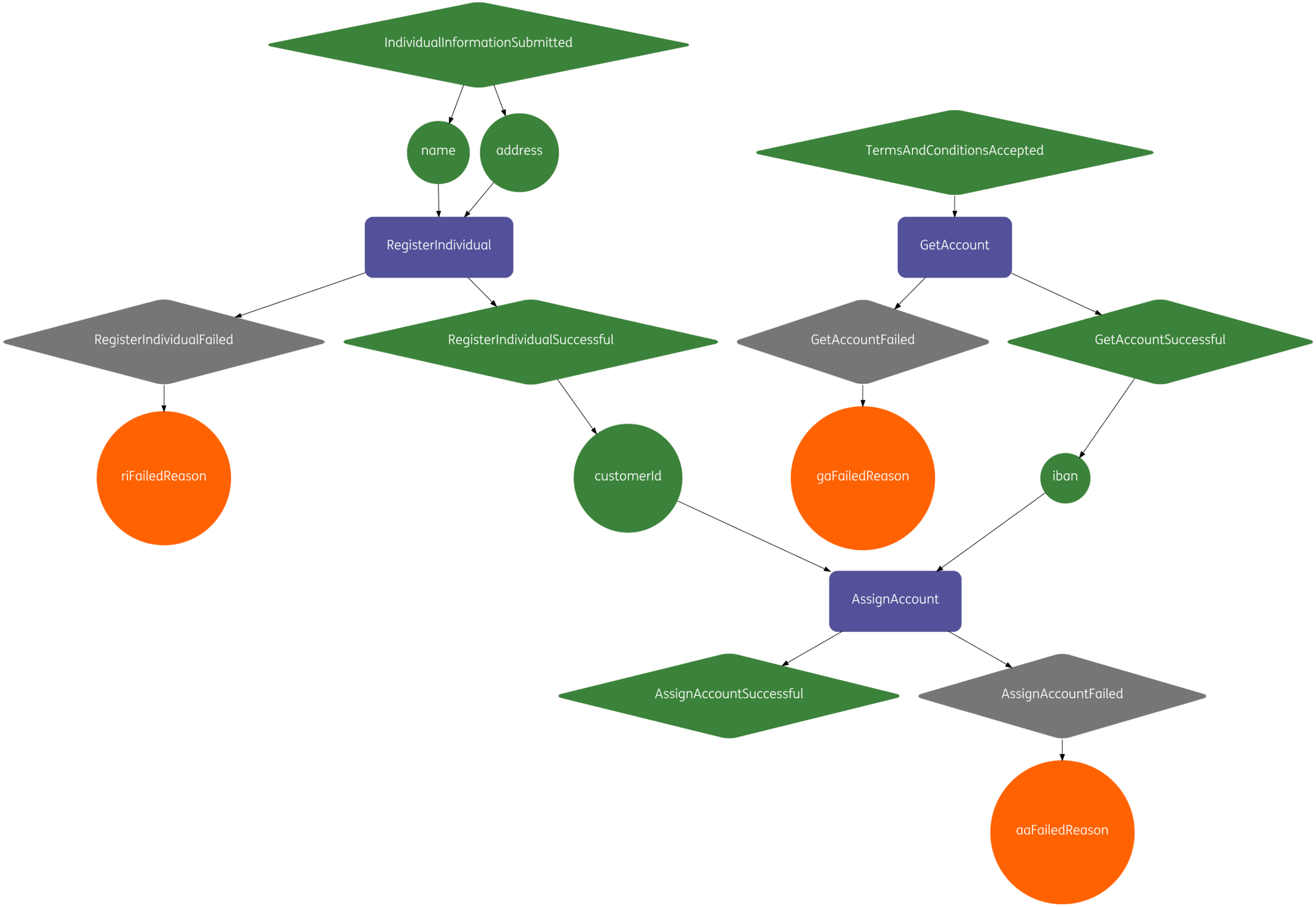
customerId
TermsAndConditionsAccepted
GetAccount
GetAccountFailed
GetAccountSuccessful
gaFailedReason
iban
AssignAccount
AssignAccountSuccessful
AssignAccountFailed
aaFailedReason

Run-time

```
//for each process instance, bake the recipe
baker.bake(processId);
//notify Baker when events occur
baker.processEvent(processId, new SensoryEvents.IndividualInformationSubmitted(name, address));
baker.processEvent(processId, new SensoryEvents.TermsAndConditionsAccepted());

//retrieve ingredients stored in the accumulated state
assert(baker.getIngredients(processId).get("customerId").equals(customerId));
assert(baker.getIngredients(processId).get("iban").equals(iban));

//retrieve all events that have occurred
Set<String> occurredEvents = new HashSet<>(
        baker.getEvents(processId).getEventNameList()
);
```


IndividualInformationSubmitted
name
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RegisterIndividual
RegisterIndividualFailed
RegisterIndividualSuccessful
riFailedReason
customerId
TermsAndConditionsAccepted
GetAccount
GetAccountFailed
GetAccountSuccessful
gaFailedReason
iban
AssignAccount
AssignAccountSuccessful
AssignAccountFailed
aaFailedReason

Under the Hood

Why Scala?

- Best fit for developing DSLs[1] on the JVM
- Compile-time recipe validation
- Type safety

[1] https://martinfowler.com/books/dsl.html

Why Akka?

- Event Sourcing[2] (events can be replayed)
- Persistent actors (with Cassandra)
- Distributed actors across machines (with cluster sharding)

[2] http://martinfowler.com/eaaDev/EventSourcing.html

Best Practices

Short-lived vs. long-running flows

State is taken care of:

- Cassandra for persistent storage
- Ingredients encrypted by default
- State recovered automatically

Run Baker inside of your API

"Smart endpoints and dumb pipes"

When failure occurs:

- Baker retries technical failures with exponential backoff
- Works well with **idempotent** services
- Deal with functional failure in your recipe

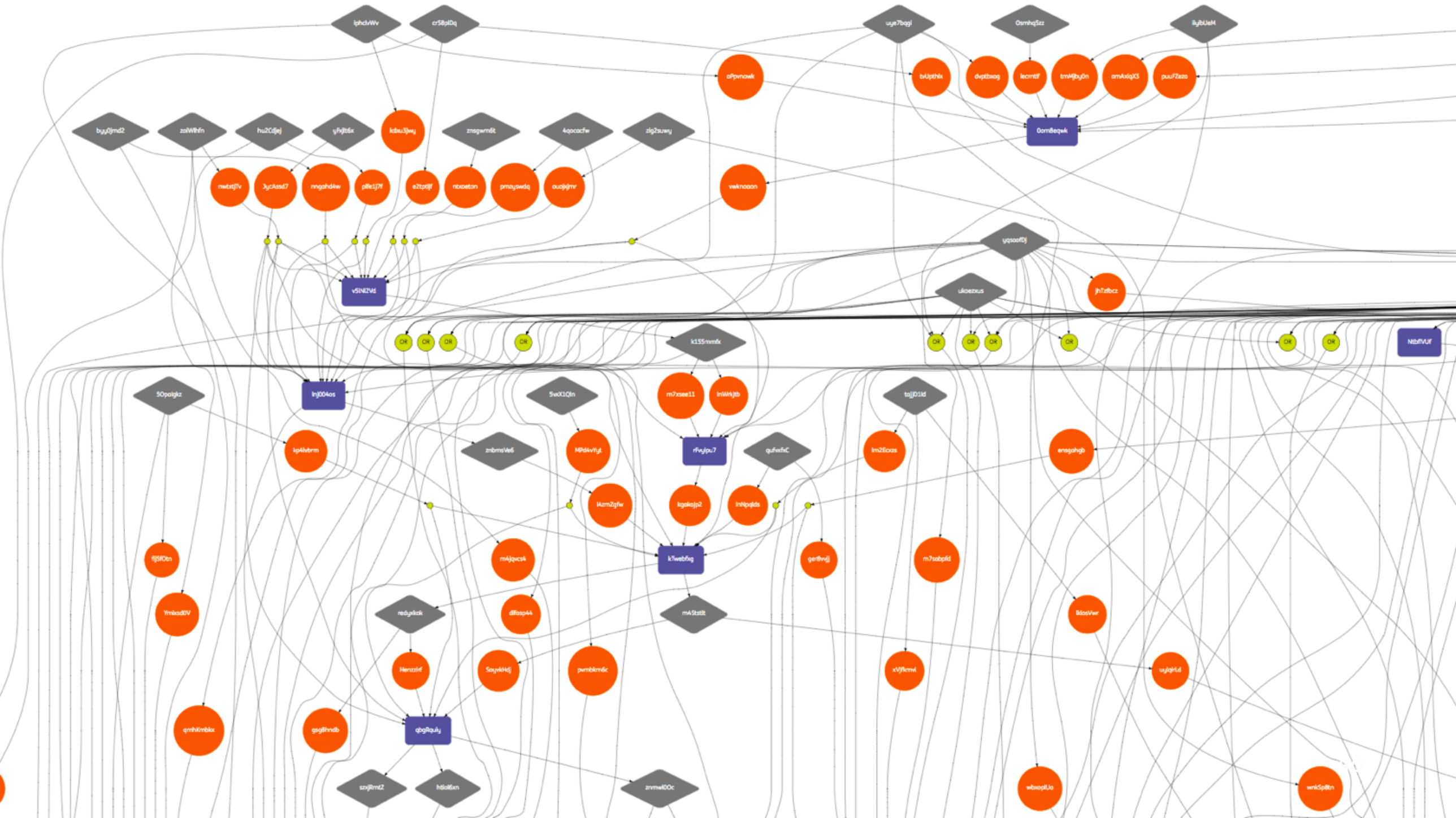
Baker Capability Matrix:

- Investigate not one, not two, but **all business processes** in your company
- Where do you see re-use?
- Map using MoSCoW[4] to give importance (M = 10, S = 5, C = 2, W = 1)

[4] https://en.wikipedia.org/wiki/MoSCoW_method

Checking Account	Savings Account	Customer Onboarding
Verify Identity	Verify Identity	Verify Identity
Register Individual	Register Individual	Register Individual
Open *Checking* Account	Open *Savings* Account	n/a
Issue Debit Card	n/a	n/a
Send Message	Send Message	Send Message
Register Product Owner	Register Product Owner	n/a


https://github.com/ing-bank/baker


ipheVWv
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puuFZezo
0orn8eqwk
bygOjmd2
zoiWfnfn
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znsgwm6t
4qocacfw
zig2suwy
nwtxtJ7v
JycAasd7
nngahd4w
plfe1j7f
e2tptJjf
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kgakajp2
lnNpqlds
fIJ5fOtn
Ymlxsd0V
m4Jqvcs4
k1webfxg
ger8vvjj
m7sabpfd
redyxkak
dlfasp44
m43tstlt
8dasVwr
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Sayvk4dj
pwnbkm6c
xVjflrmvl
uylqirLd
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gsg8hndb
qbgRquky
szxjRmtZ
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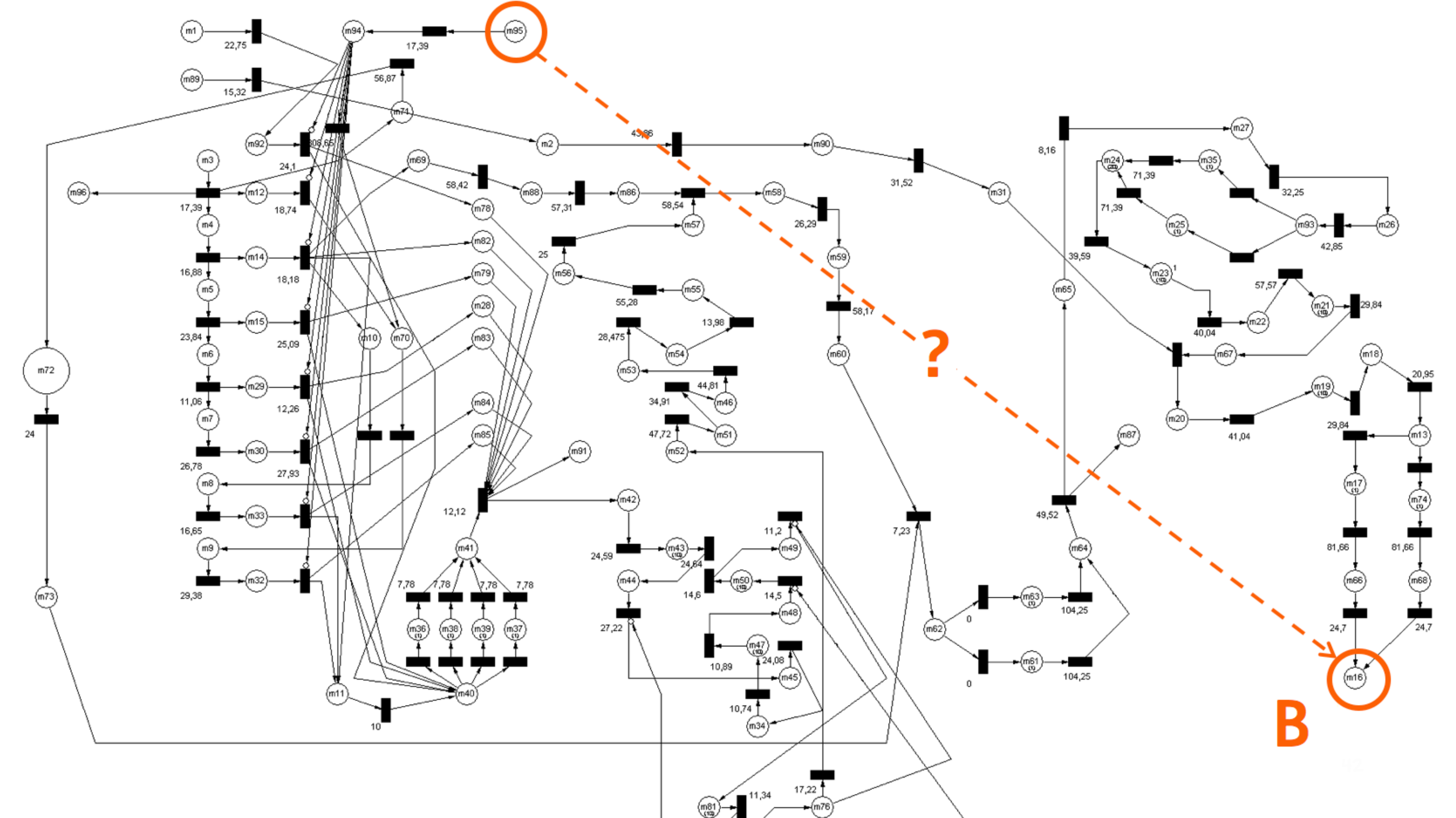
wnkSp8tn

Why Petri net?[3]

[3] https://en.wikipedia.org/wiki/Petri_net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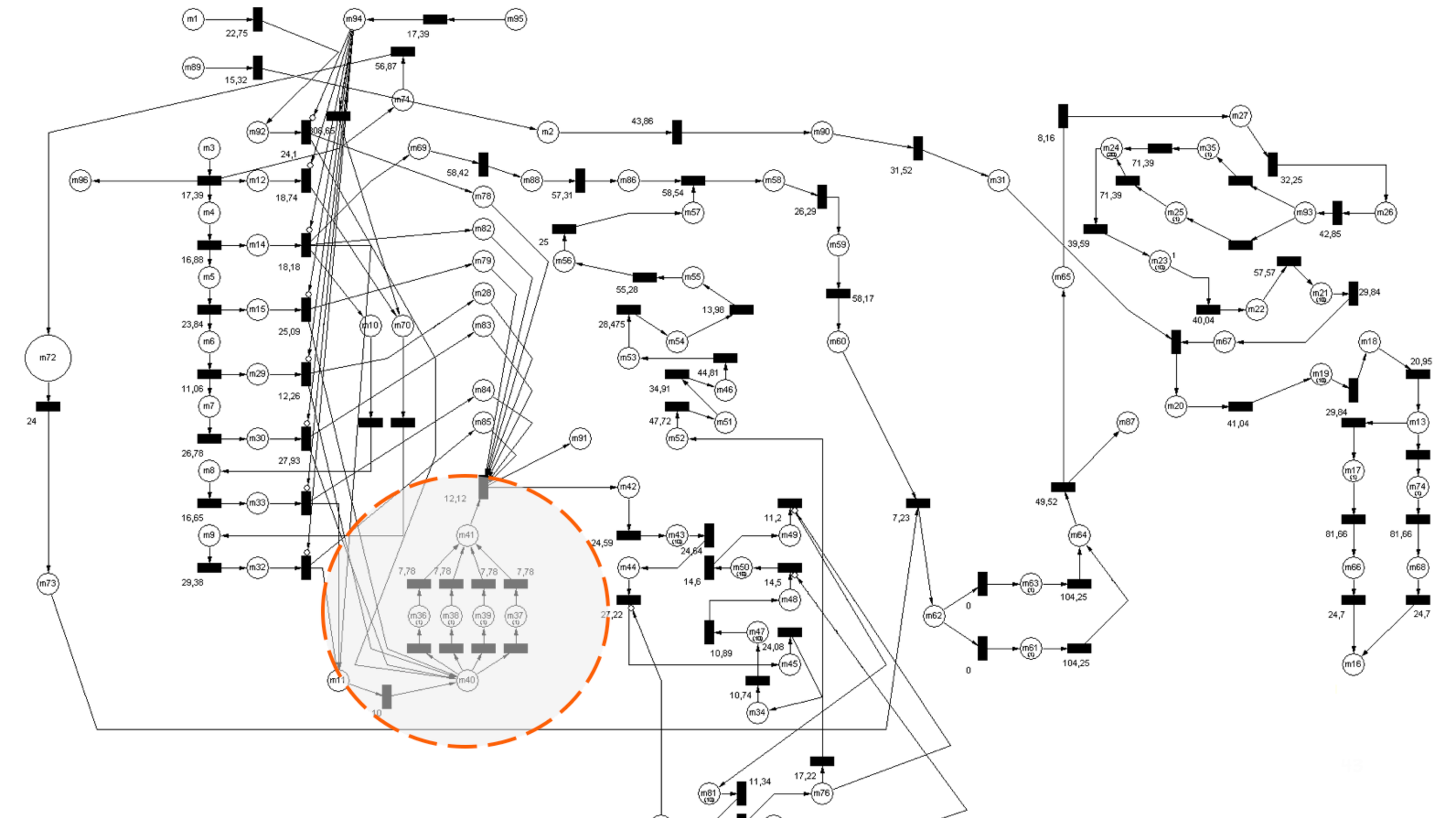
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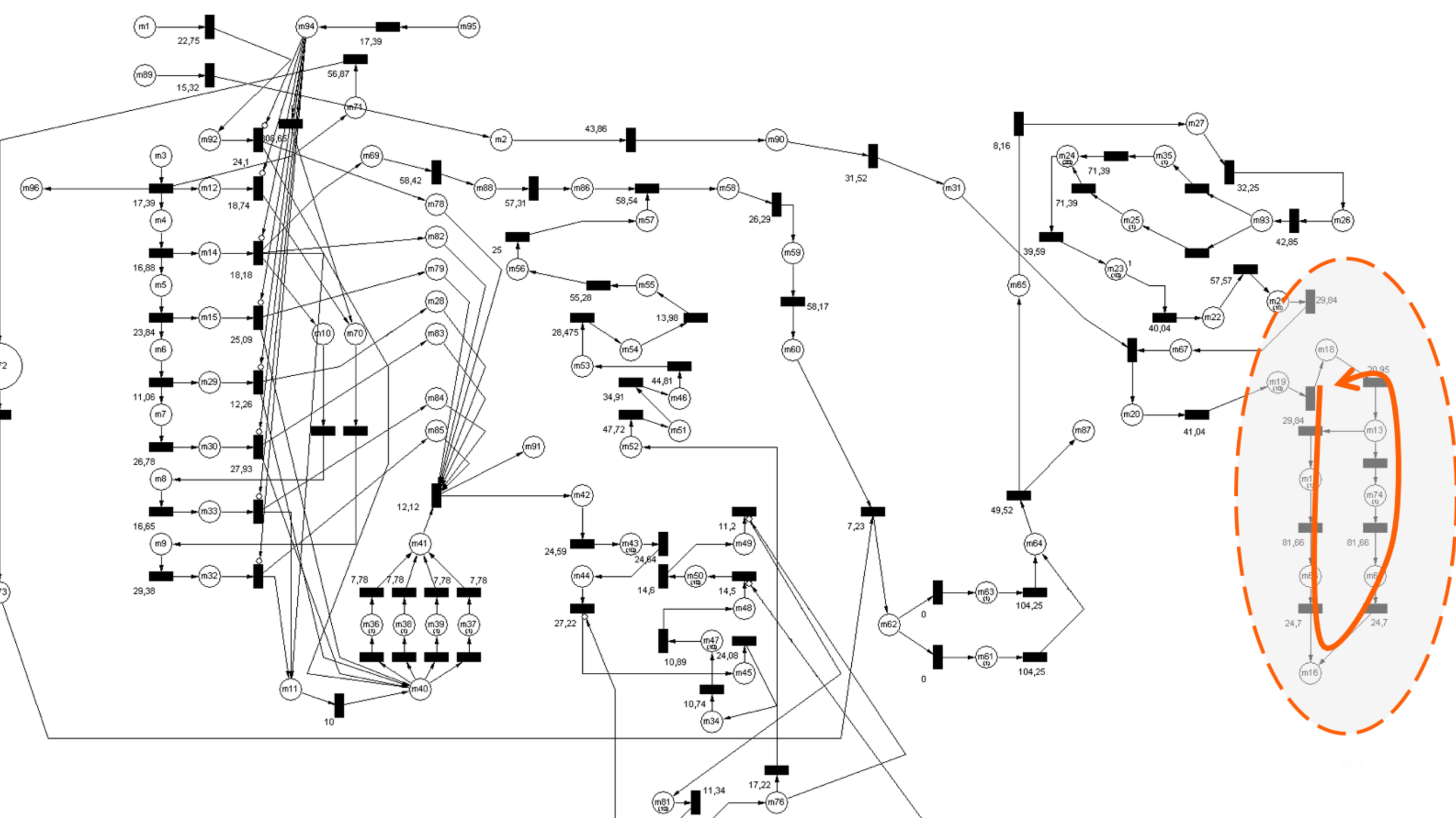
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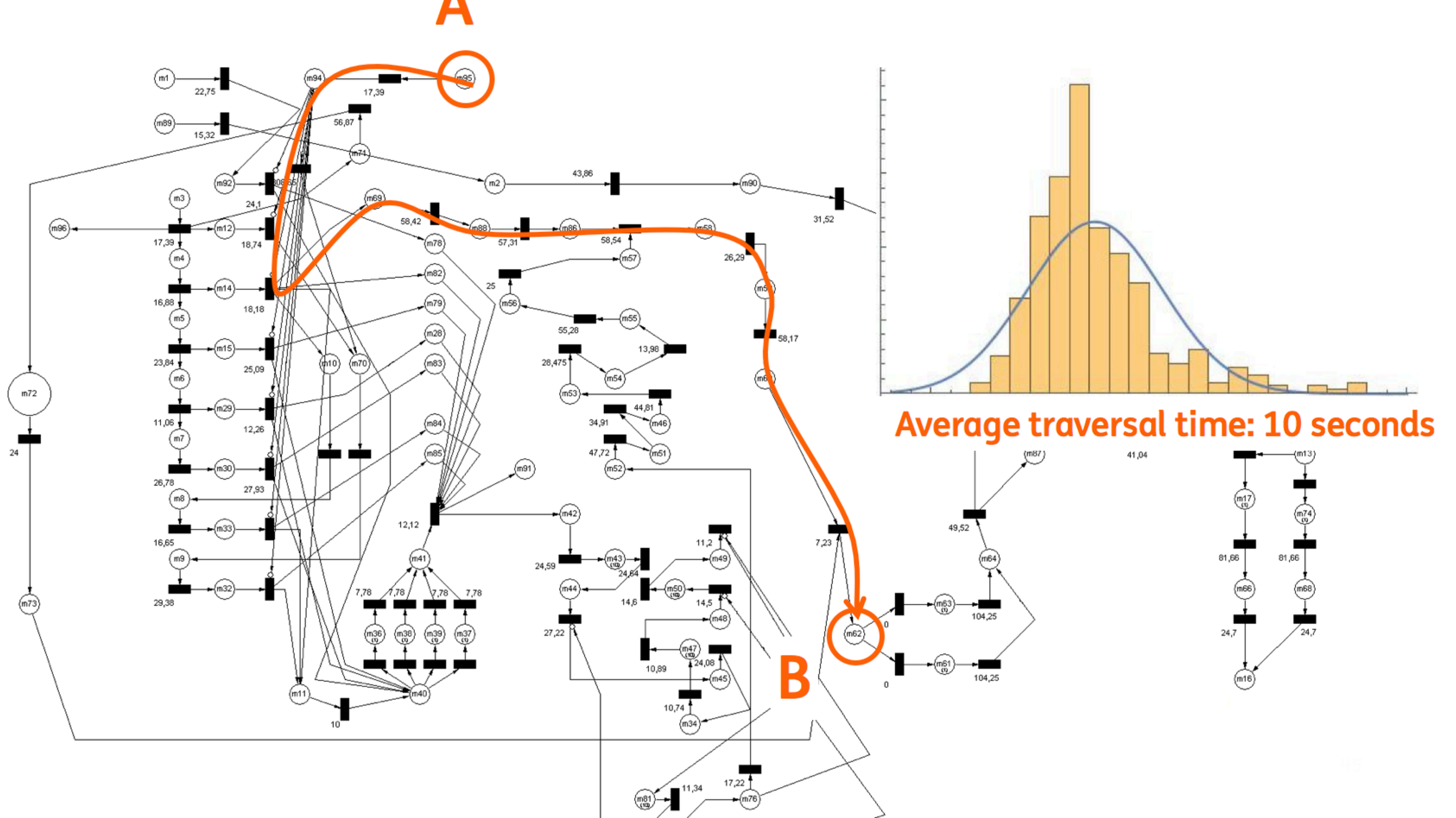
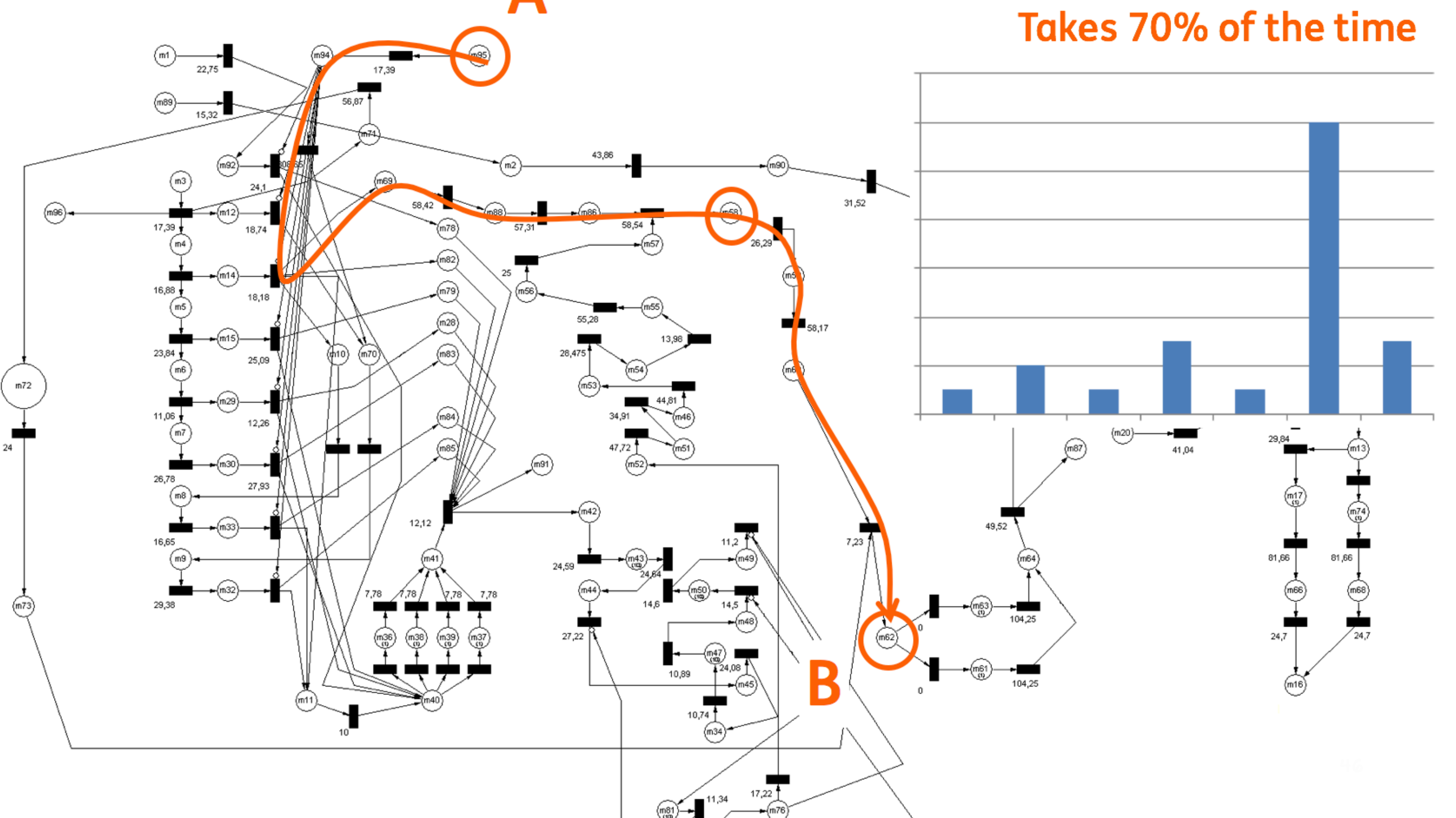

A
B
Average traversal time: 10 seconds


A
Takes 70% of the time
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I love cooking food and for the rest of the talk I'll be using analogies from there. It's very **similar to our industry**: long hours, hard work, and delivering experiences to our customers.

Have you been woken up at 3 o'clock in the morning on a **Saturday morning** after a night of partying, having to go to the war room and resolve an application incident. I've been there. When I remember the cold of the **airconditioners**, it still **makes me shiver.**

If we are building microservices or a monolith or any type of application in general we are **serving business logic to our clients.** So no matter what, we cannot escape the **architectural discussion.** If we are not careful of how we architect our applications we end up serving a bad meal to our clients.