

Mathieu Desnouveaux

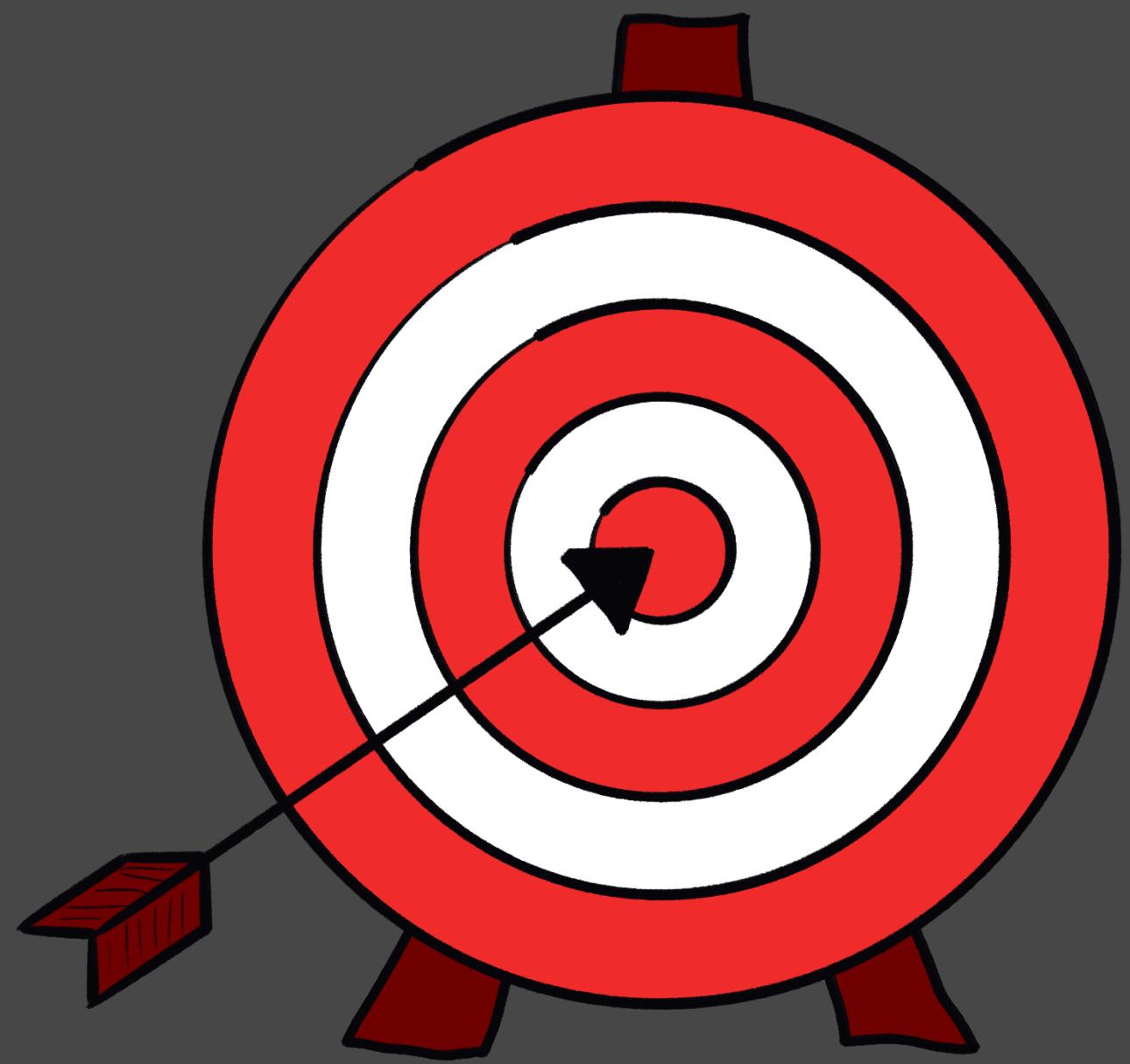
Photo de [Kelsy Gagnebin](#) sur [Unsplash](#)

Optimisation De la Pagination Multi-Source

Pour le Suivi des Virements



« On ne
mélange pas
les torchons et
les serviettes »

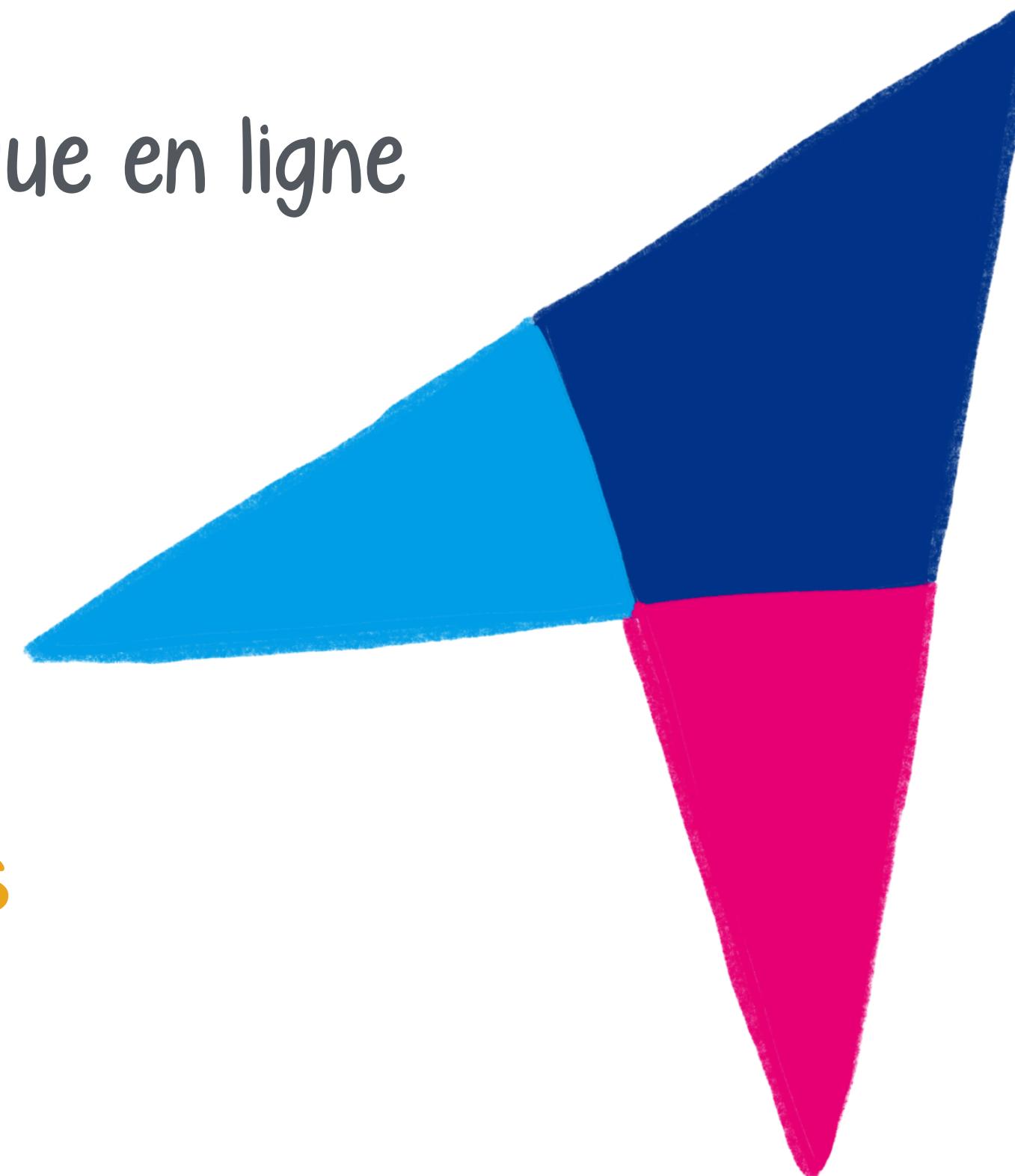


Maintenir la cohérence de la pagination et
des données d'une page à l'autre même si
les données ne sont pas toutes similaires

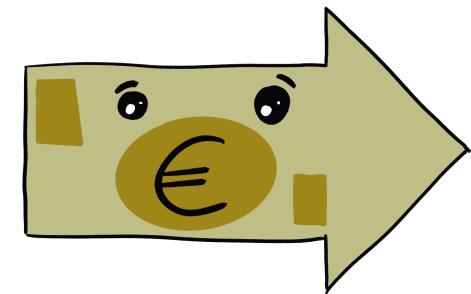


Leader sur la banque en ligne

7,5 millions de clients



350 000 virements par jour



900 000 appels à l'api de suivi
de virement par jour



BoursoBank

On recrute

Suivi de virement



Consulter les virements exécutés



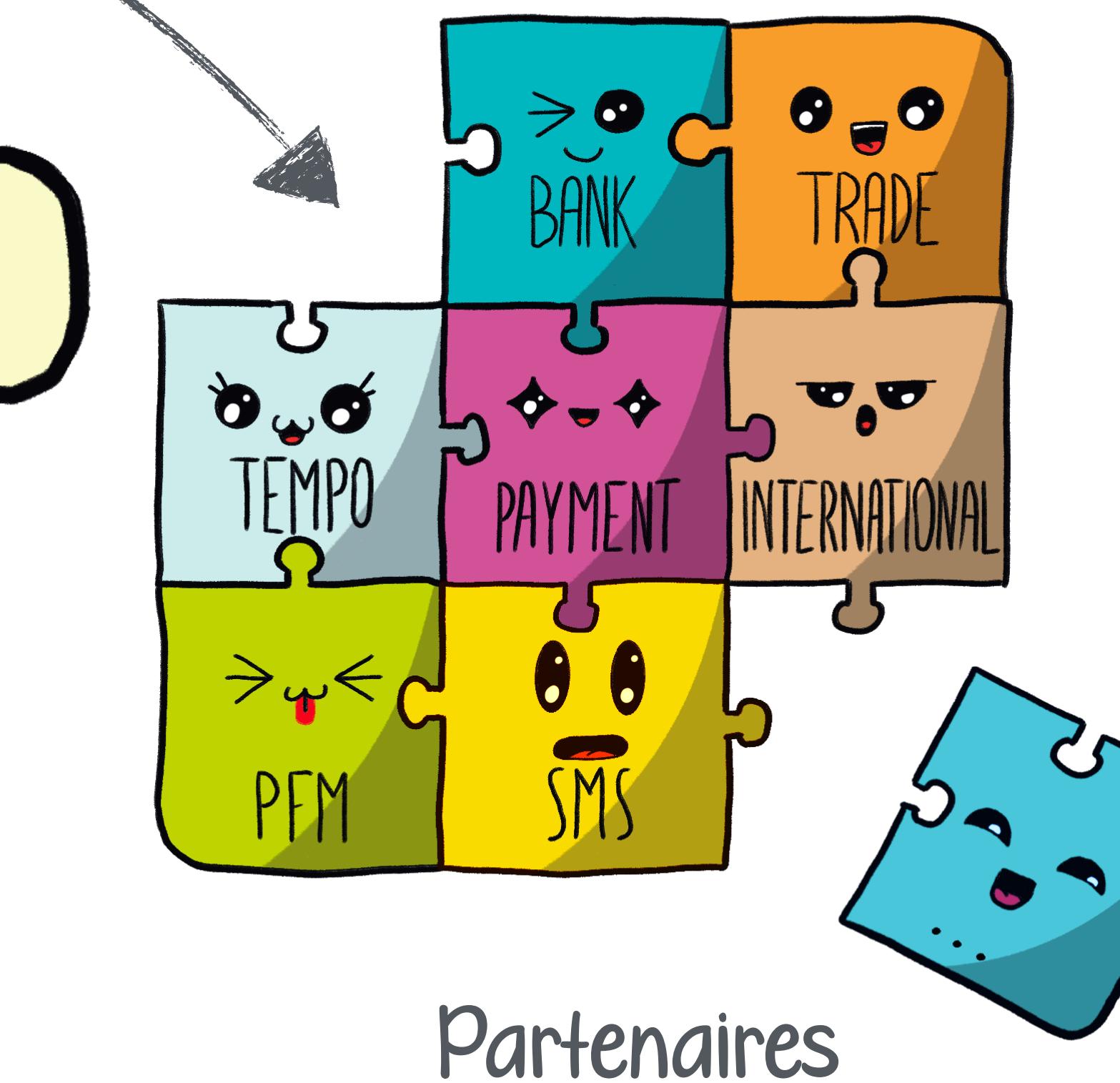
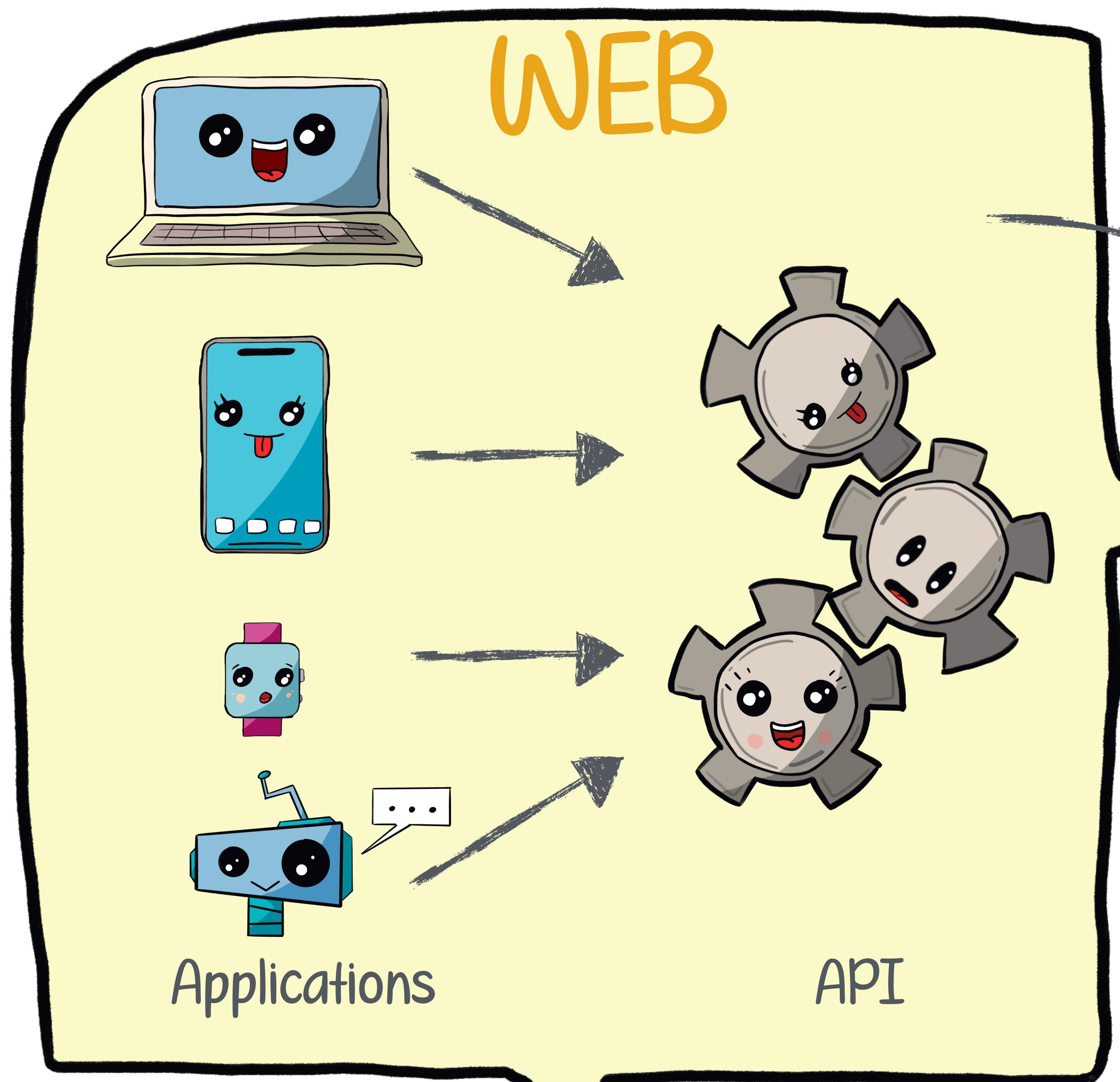
Vérifier le statut d'un virement



Annuler / Modifier / Dupliquer un virement



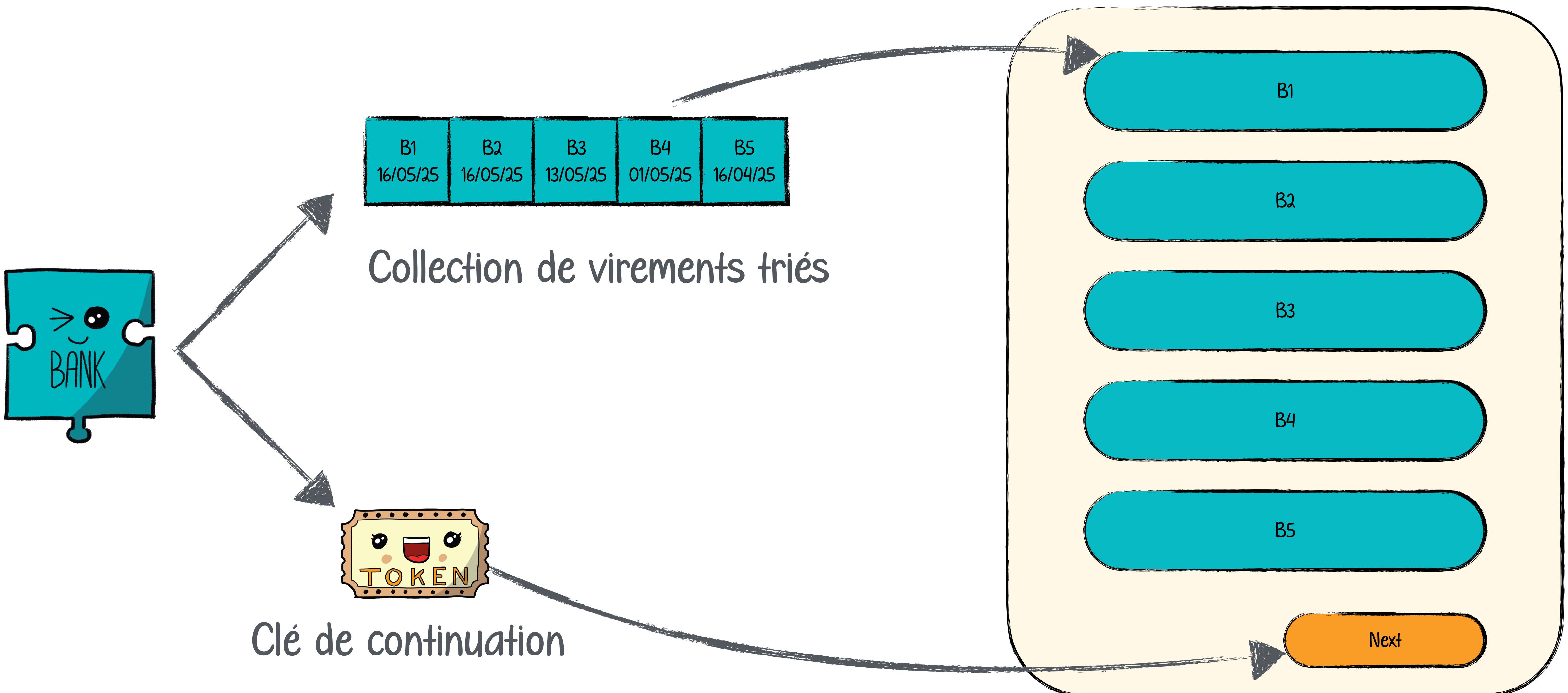
Obtenir une preuve de virement



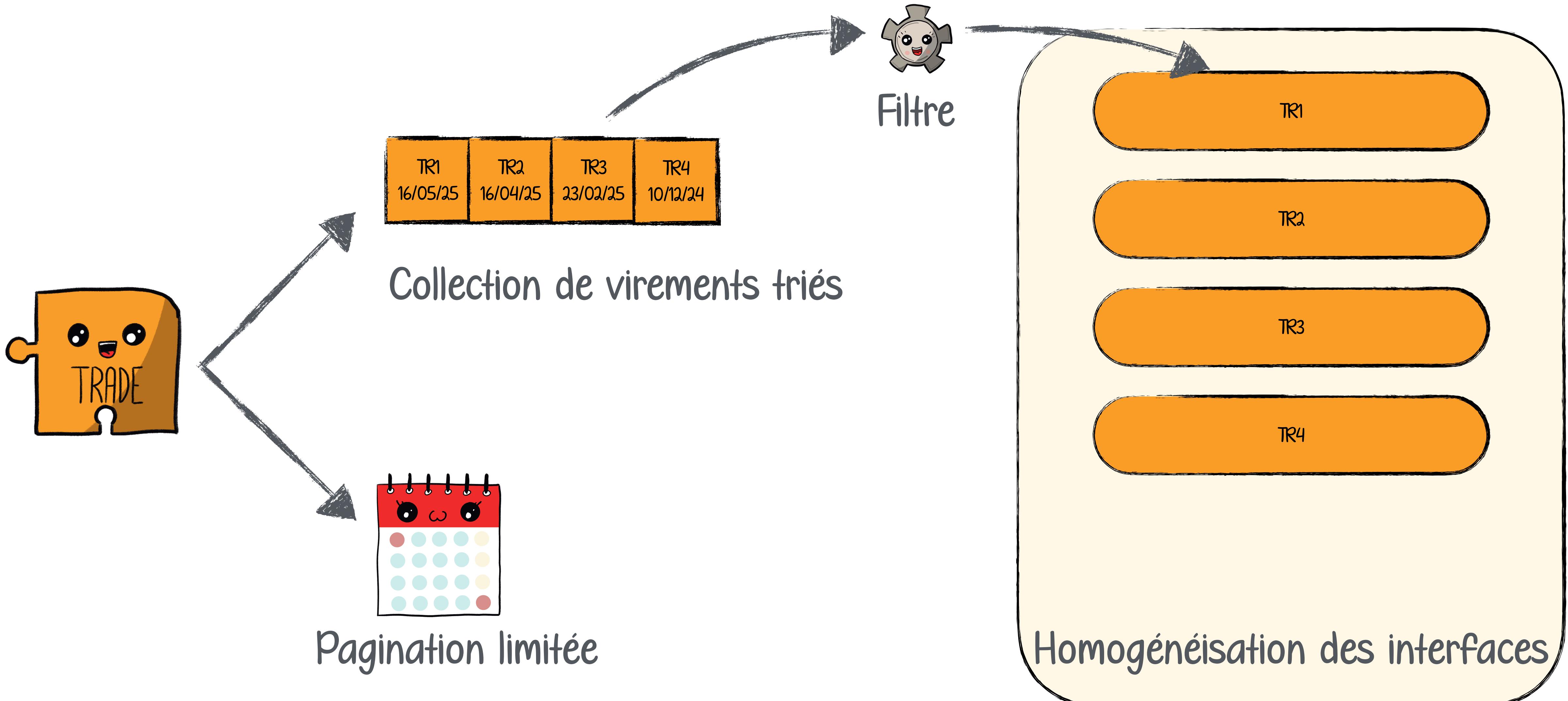
Évolution du suivi de virement depuis 20 ans



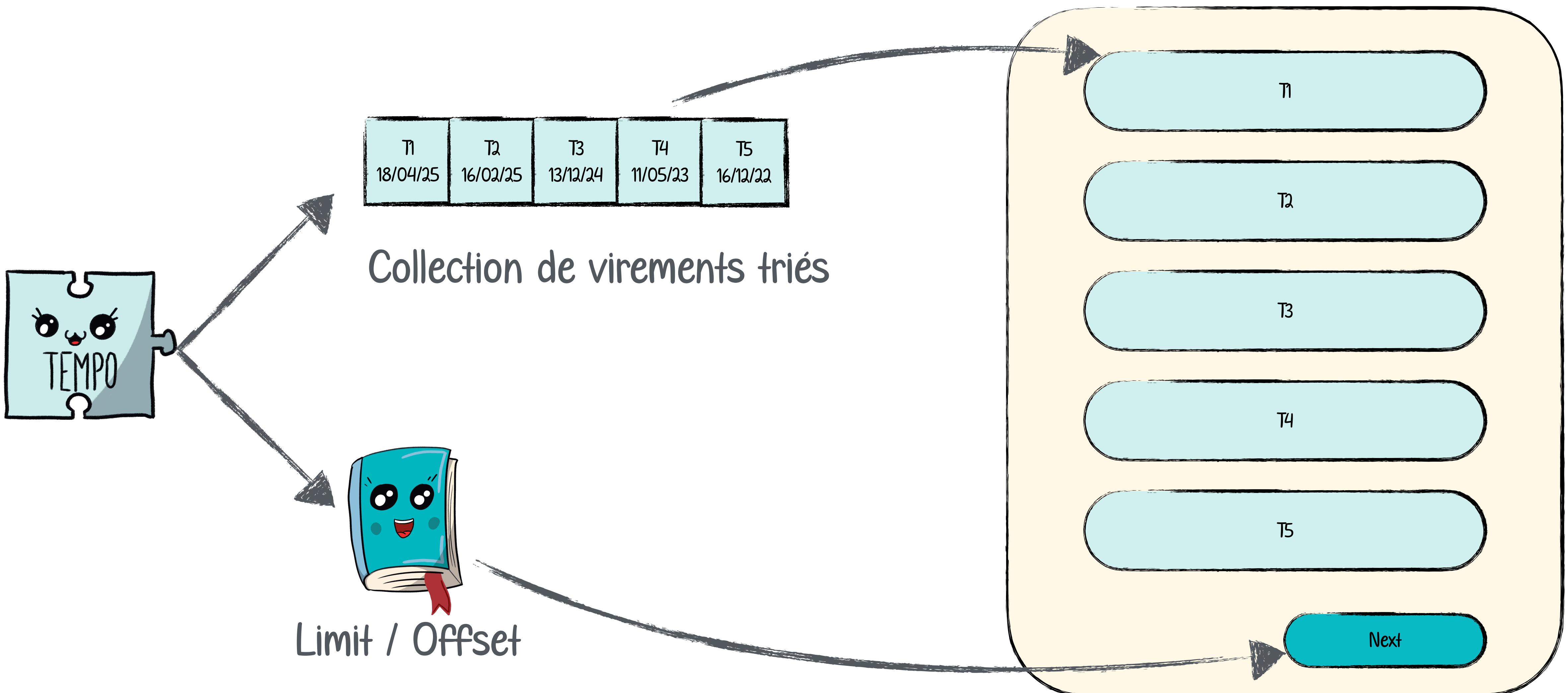
Au début, un seul partenaire



Ajout d'un second partenaire



Ajout d'un troisième partenaire





Des Contraintes de Pagination



Mélanger les données



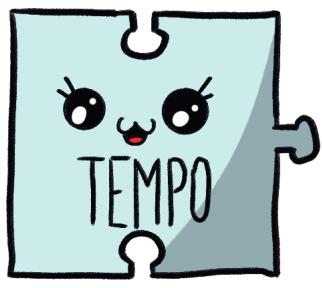
Masquer l'origine des données

Mélange des données

Premier appel



B1 16/05/25	B2 16/05/25	B3 13/05/25	B4 01/05/25	B5 16/04/25
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T1 18/04/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22
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Second appel

B6 15/04/25	B7 12/04/25	B8 13/03/25	B9 21/02/25	B10 14/02/25
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T6 23/11/22	T7 11/02/21
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Mélange des données

Premier appel



B1 16/05/25	B2 16/05/25	B3 13/05/25	B4 01/05/25	B5 16/04/25
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T1 18/04/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22
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Second appel

B6 15/04/25	B7 12/04/25	B8 13/03/25	B9 21/02/25	B10 14/02/25
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T6 23/11/22	T7 11/02/21
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En gardant le même nombre d'éléments par page

Première page

B1 16/05/25	B2 16/05/25	B3 13/05/25	B4 01/05/25	T1 18/04/25
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Seconde page

B6 15/04/25	B7 12/04/25	B8 13/03/25	B9 21/02/25	B10 14/02/25
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On perd des données entre deux pages

Mélange des données

Premier appel



B1 16/05/25	B2 16/05/25	B3 13/05/25	B4 01/05/25	B5 16/04/25
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T1 18/04/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22
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Second appel

B6 15/04/25	B7 12/04/25	B8 13/03/25	B9 21/02/25	B10 14/02/25
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T6 23/11/22	T7 11/02/21
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En mélangeant toutes les données de chaque source

Première page

B1 16/05/25	B2 16/05/25	B3 13/05/25	B4 01/05/25	T1 18/04/25	B5 16/04/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22
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Seconde page

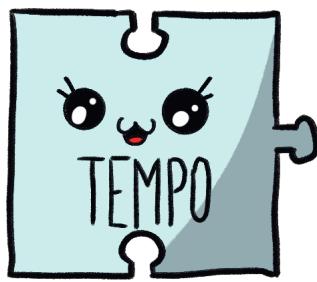
B6 15/04/25	B7 12/04/25	B8 13/03/25	B9 21/02/25	B10 14/02/25	T6 23/11/22	T7 11/02/21
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Mélange des données

Premier appel



B1 16/05/25	B2 16/05/25	B3 13/05/25	B4 01/05/25	B5 16/04/25
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T1 18/04/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22
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Second appel

B6 15/04/25	B7 12/04/25	B8 13/03/25	B9 21/02/25	B10 14/02/25
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T6 23/11/22	T7 11/02/21
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En mélangeant toutes les données de chaque source

Première page

B1 16/05/25	B2 16/05/25	B3 13/05/25	B4 01/05/25	T1 18/04/25	B5 16/04/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22
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Seconde page

B6 15/04/25	B7 12/04/25	B8 13/03/25	B9 21/02/25	B10 14/02/25	T6 23/11/22	T7 11/02/21
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On manque de cohérence entre les données

Paramètre de pagination

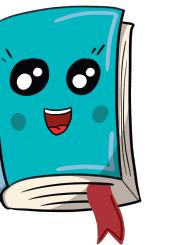
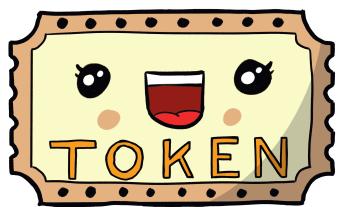
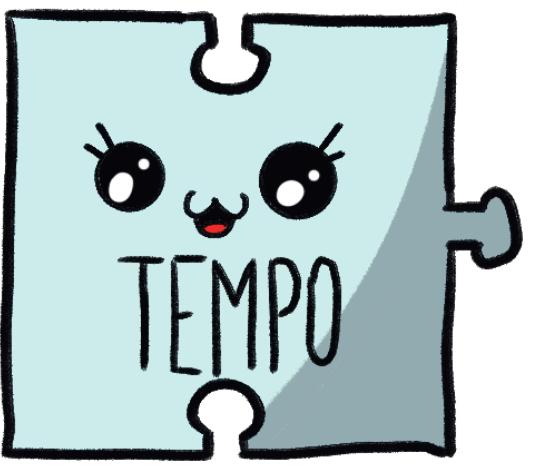
Page 1, pas de paramètre de pagination

```
https://mon.apel.api/cashtransfer/history
```

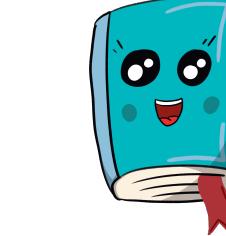
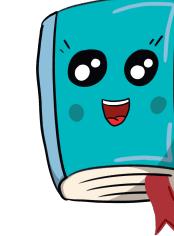
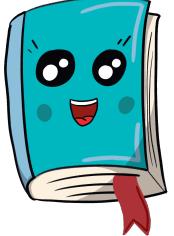
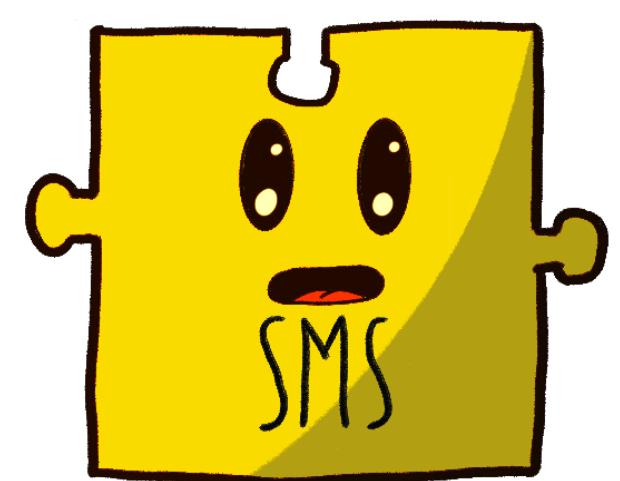
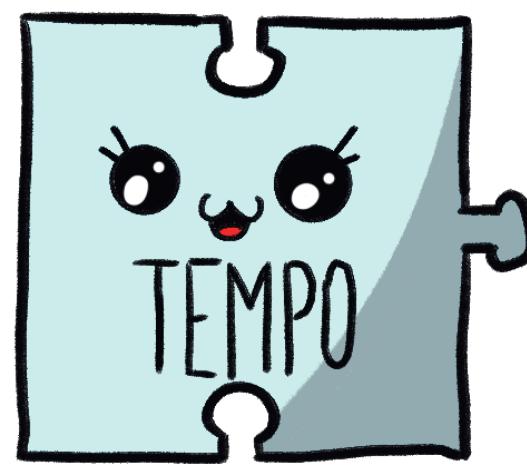
Page 2, des paramètres de pagination explicites pour chaque source

```
https://mon.apel.api/cashtransfer/history?  
pagination-source1=token&pagination-source2=limit-offset
```

Plusieurs sources



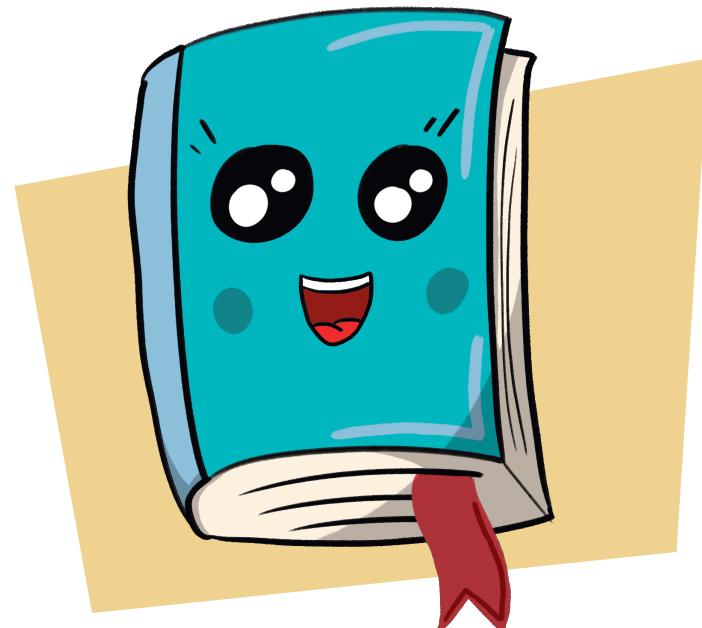
Plusieurs sources



Des méthodes de Pagination



Des méthodes de pagination

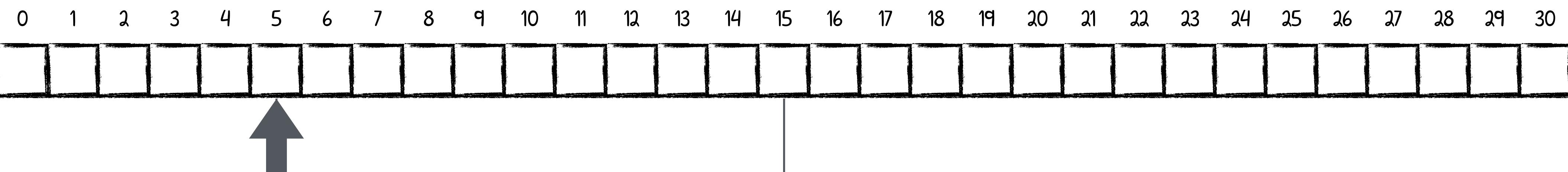


Limit/Offset Pagination

Limit : nombre d'éléments à retourner

Offset : décalage depuis le début de la liste

Ordre



Offset 5

Limit 10

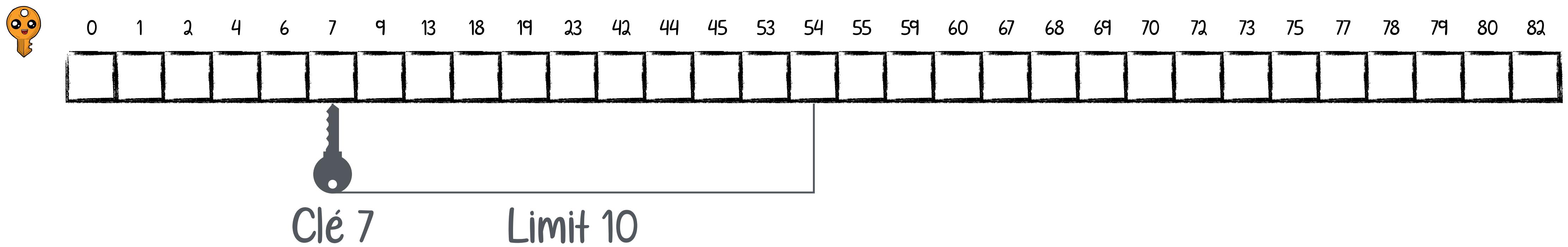
Des méthodes de pagination



Keyset Pagination

Limit : nombre d'éléments à retourner

Clé : Index identifiant la position dans la liste



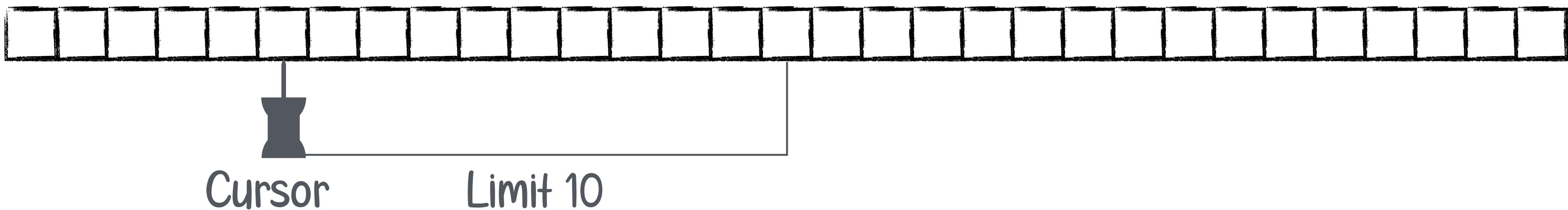
Des méthodes de pagination



Cursor-based Pagination

Limit : nombre d'éléments à retourner

Curseur : Pointeur complexe identifiant
la position dans la liste



Des méthodes de pagination



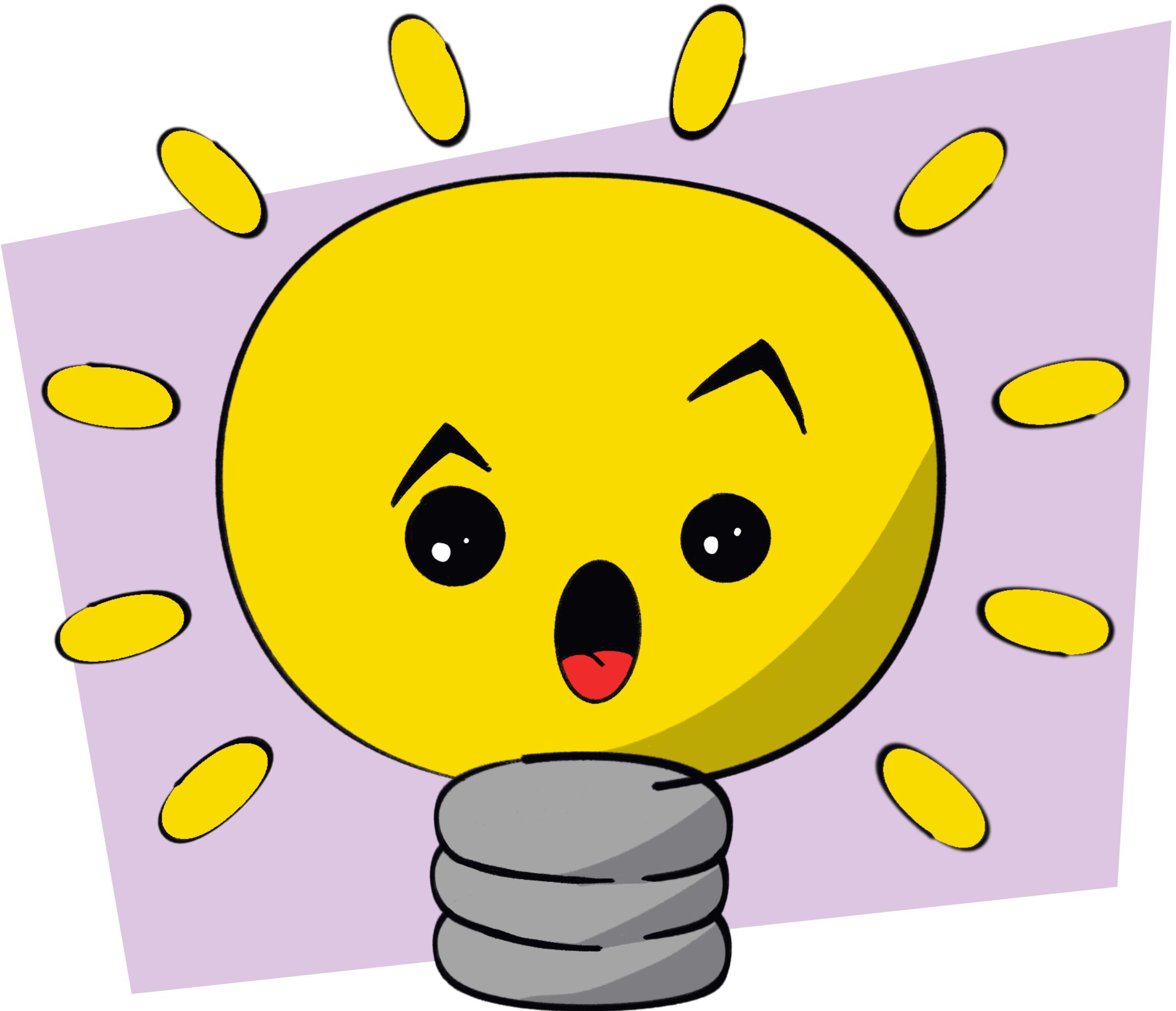
Token-based Pagination

Limit : nombre d'éléments à retourner

Token : Pointeur chiffré identifiant
la position dans la liste



Pagination de plusieurs sources

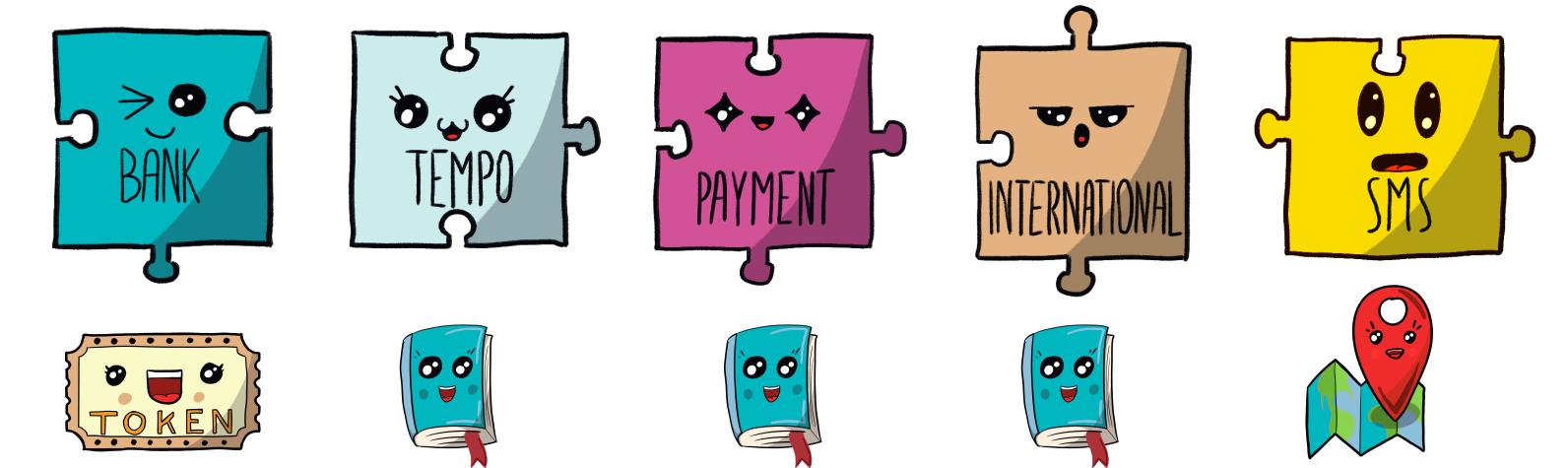


Rappel des Spécifications



5 sources de données

Chacune avec leurs propres API & Pagination



Virements triés par date quelque soit la source



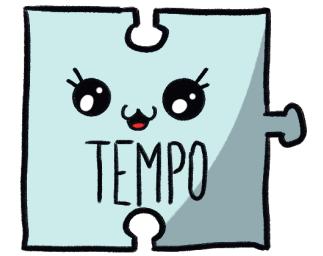
Origine masquée



Liste des Sources



Format Fixe



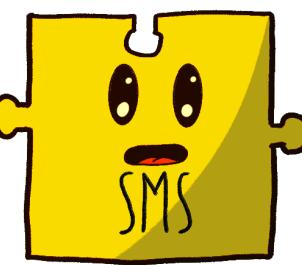
SOAP



REST



REST



SQL

```
<?php
```

```
enum Source implements SourceInterface
{
    case Bank;
    case Tempo;
    case Payment;
    case International;
    case Sms;
}
```

Contrainte forte : toutes les sources renvoient leurs données triées de la même manière

Source retriever



```
<?php
```

```
interface RetrieverInterface
{
    public function fetchSourcePage(PageParameterInterface $pageParameter):
SourcePageInterface;
}
```



Gère une source



Exécute les appels au partenaire



Gère la pagination de la source



Formate les virements

Source page

Source



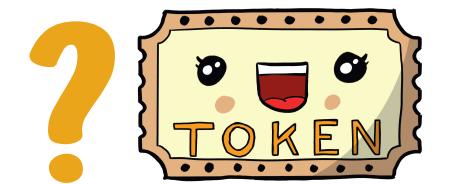
Courant



Collection

B1 15/05/25	B2 15/05/25	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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Suivant



```
<?php
```

```
interface SourcePageInterface
{
    public function getSource(): SourceInterface;
    /**
     * @return array<ItemInterface>
     */
    public function getCollection(): array;
    public function getCurrentPageParameters(): PageParameterInterface;
    public function getNextPageParameters(): ?PageParameterInterface;
}
```

Item de Virement

Montant
Compte émetteur
Bénéficiaire
Libellé
Date
Statut

```
<?php

interface ItemInterface
{
    public function isMoreRecentThan(ItemInterface $item): bool;

    // Cash transfer properties
}
```

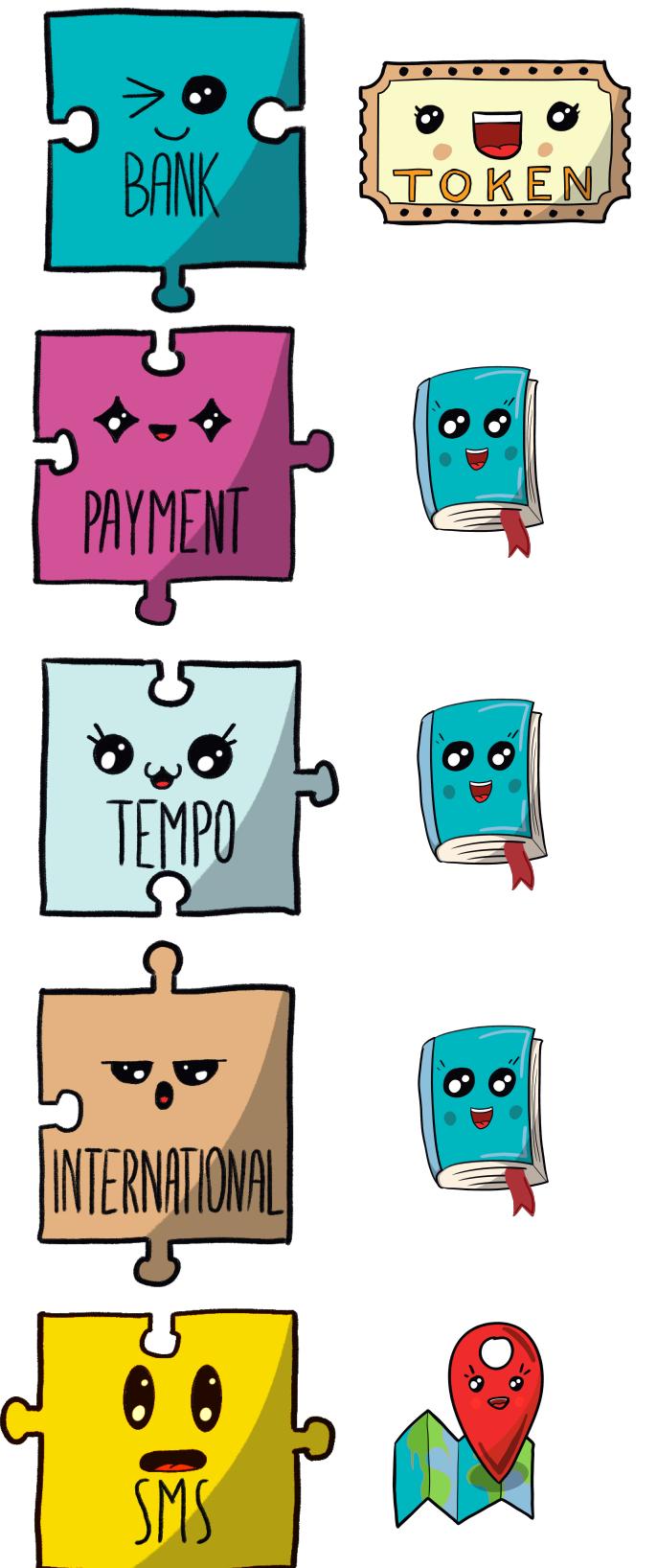
Initialisation de la pagination

Source



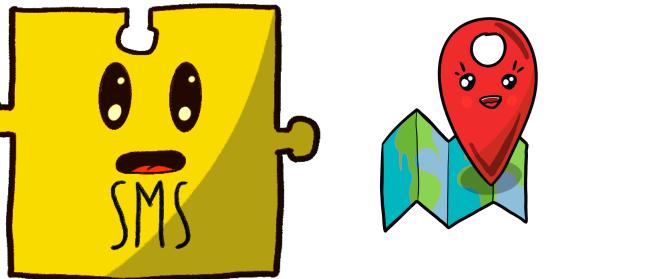
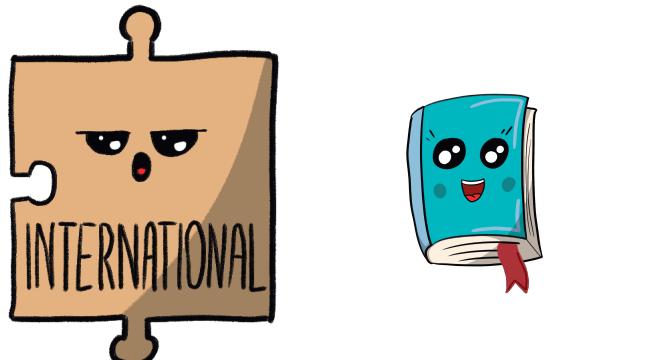
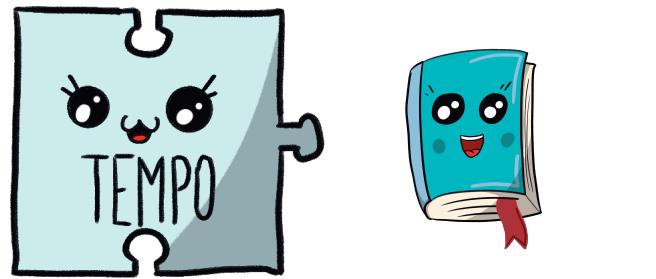
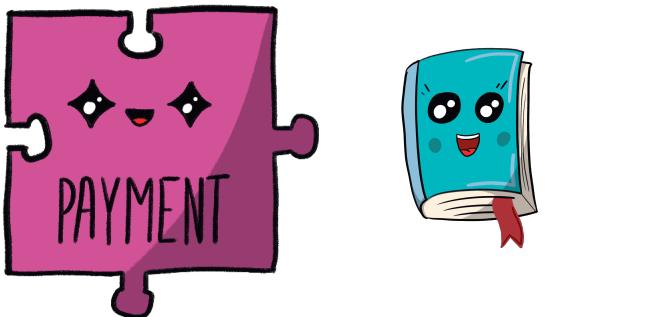
Initialisation de la pagination

Source Courant



Initialisation de la pagination

Source Courant



Collections

B1 15/05/25	B2 15/05/25	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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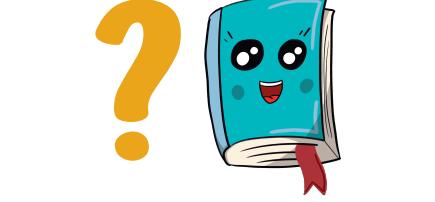
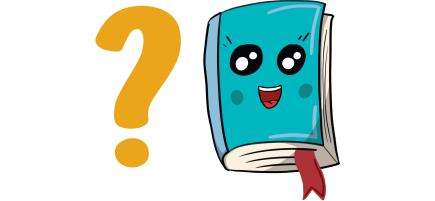
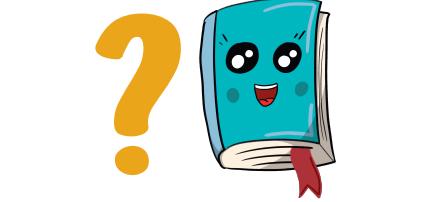
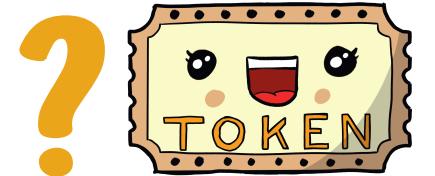
P1 16/05/25	P2 16/05/25	P3 13/05/25	P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
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T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21
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I1 07/05/25	I2 29/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
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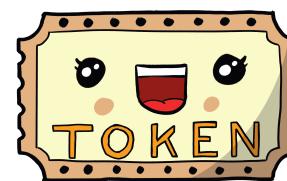
S1 13/05/25	S2 10/05/25	S3 06/05/25
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Suivant



Initialisation de la pagination

Source Courant Offset

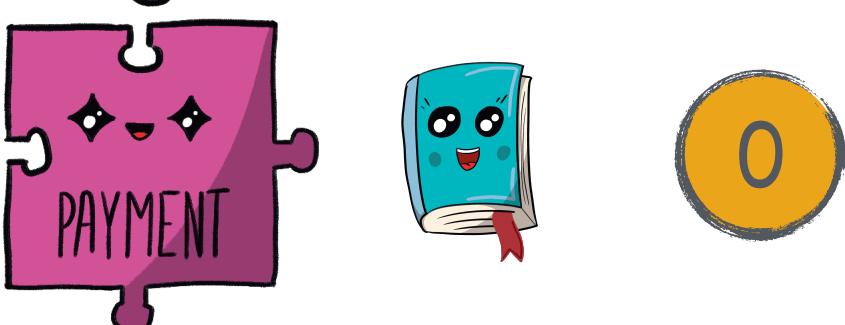
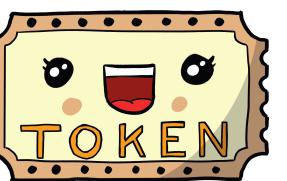
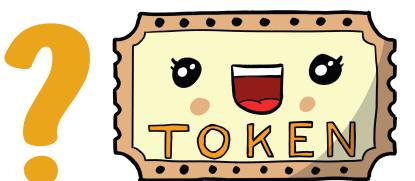


0

Collections

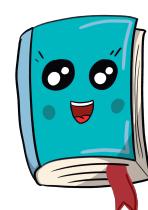
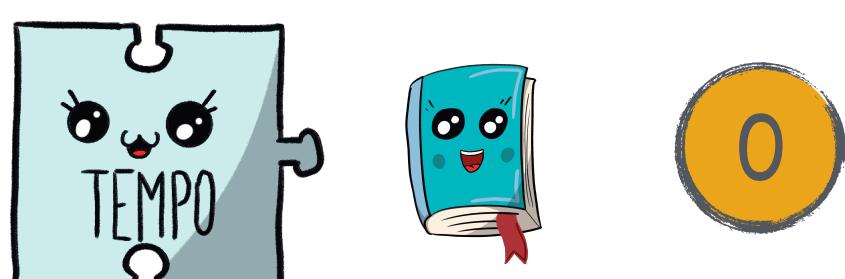
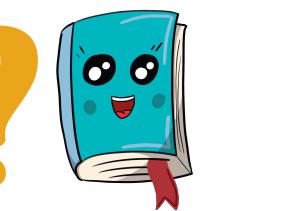
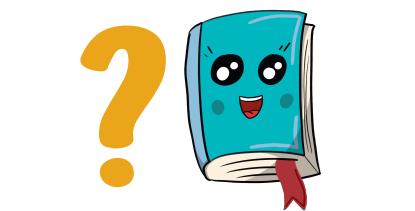
B1 15/05/25	B2 15/05/25	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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Suivant



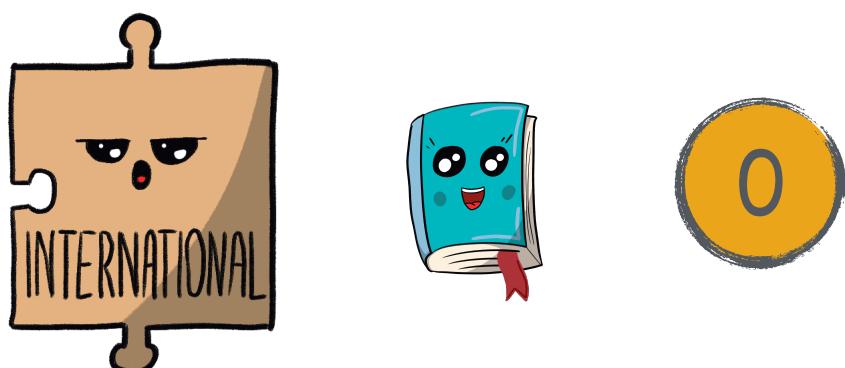
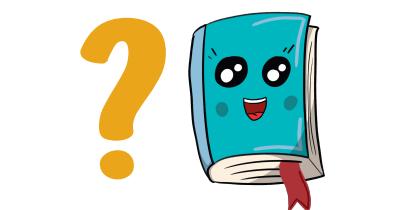
0

P1 16/05/25	P2 16/05/25	P3 13/05/25	P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
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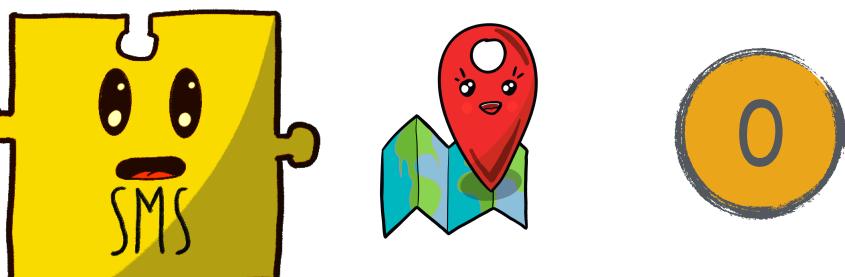
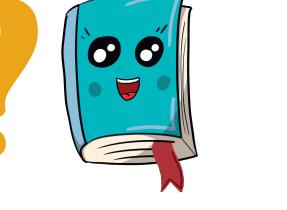
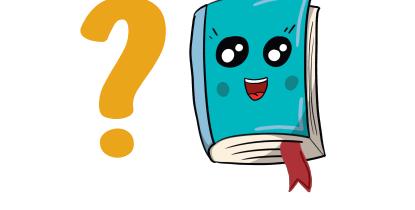
0

T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21
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I1 07/05/25	I2 29/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
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S1 13/05/25	S2 10/05/25	S3 06/05/25
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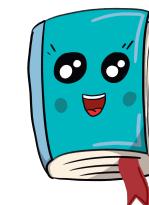
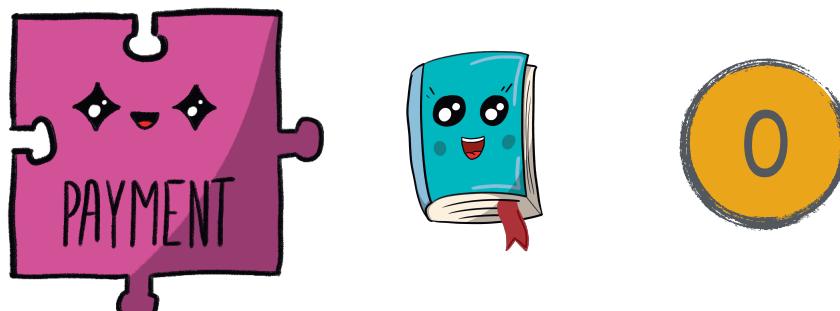


Collection finale

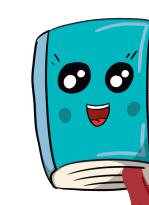
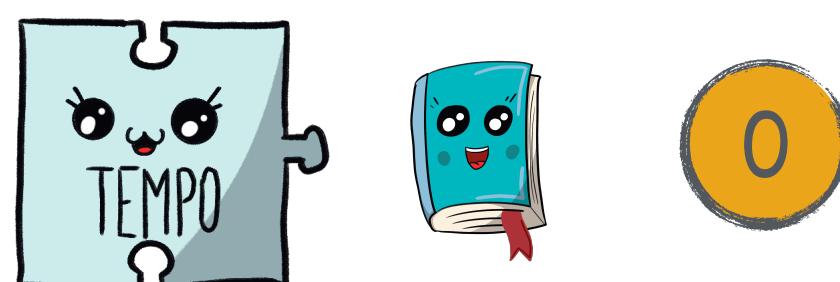
Source Courant Offset



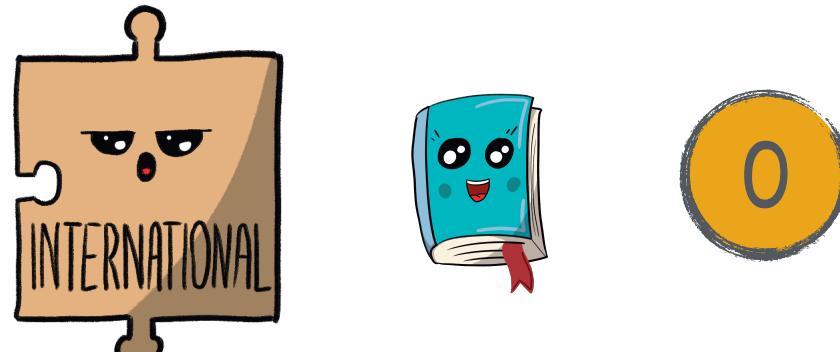
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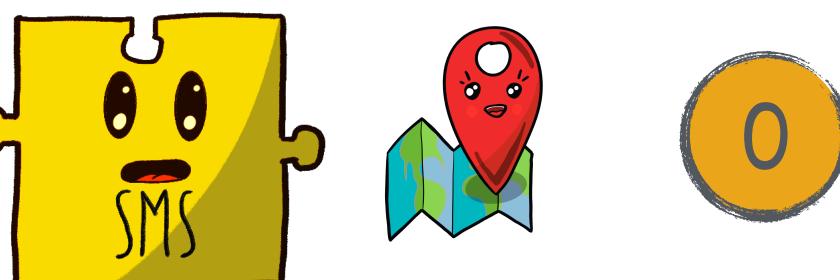
0



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Collections

B1 15/05/25	B2 15/05/25	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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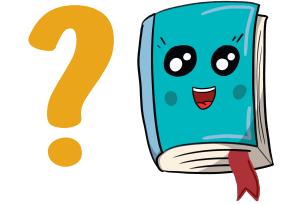
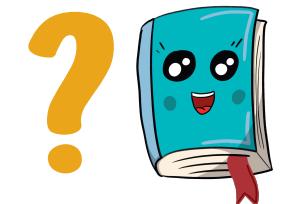
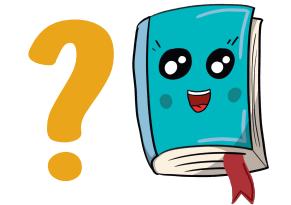
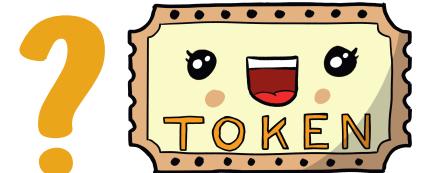
P1 16/05/25	P2 16/05/25	P3 13/05/25	P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
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T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21	
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I1 07/05/25	I2 29/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
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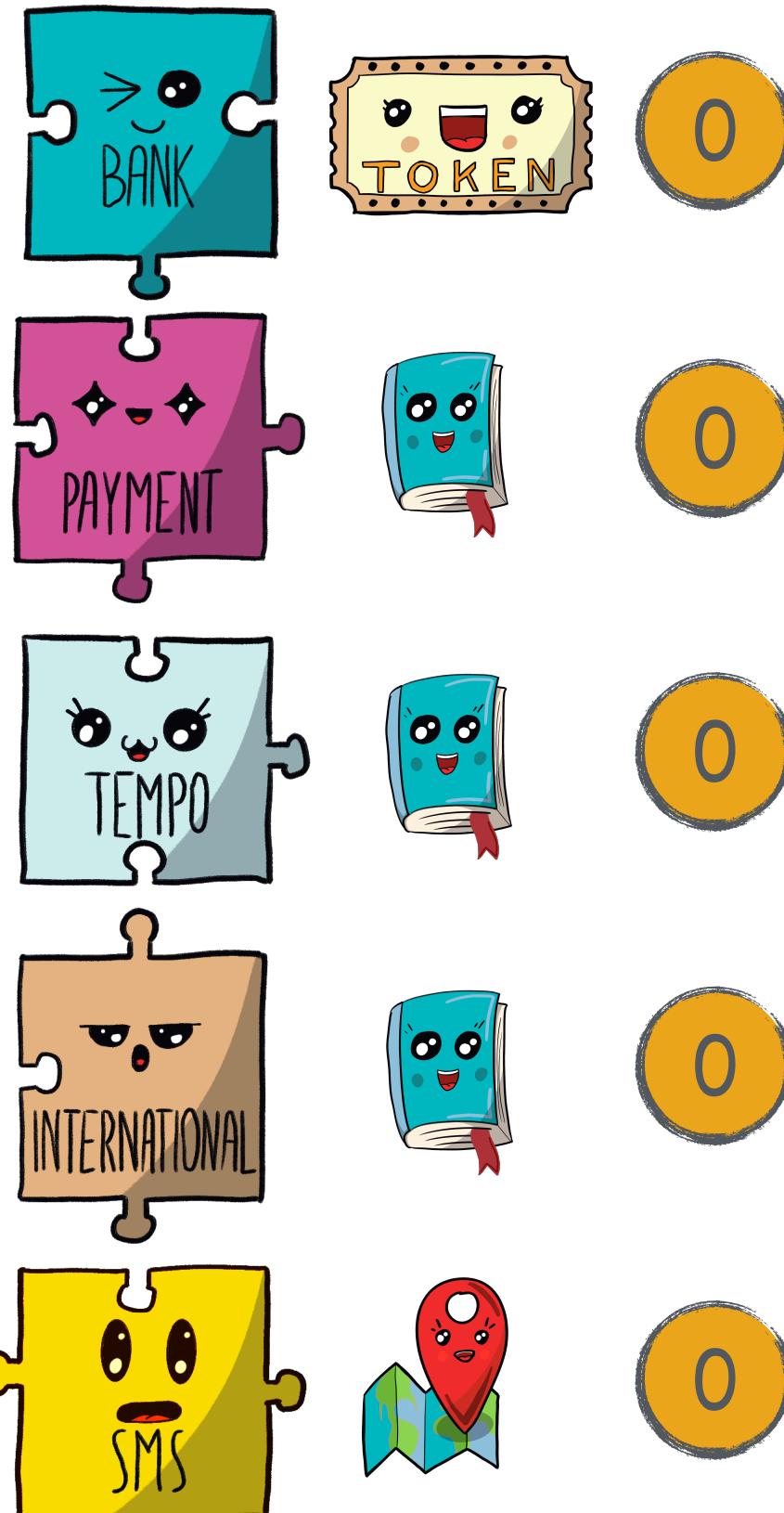
S1 13/05/25	S2 10/05/25	S3 06/05/25
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Suivant



Collection finale

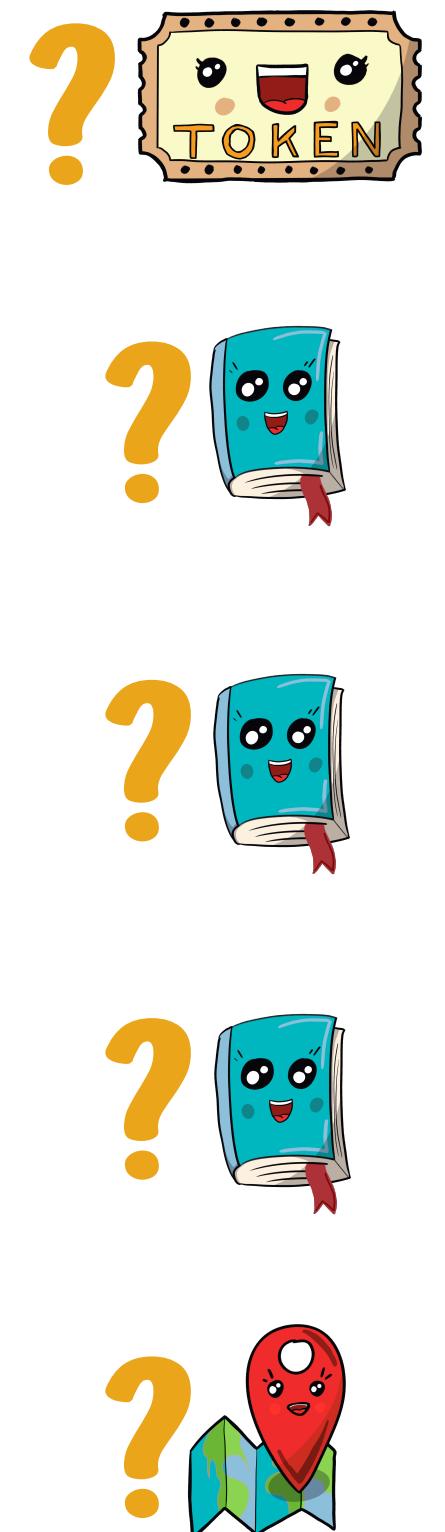
Source Courant Offset



Collections

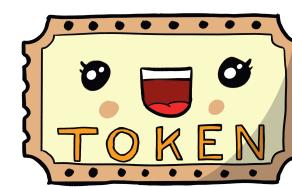
B1 15/05/25	B2 5/05/25	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
P1 16/05/25	P2 16/05/25	P3 13/05/25	P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25
T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21		
I1 07/05/25	I2 19/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
S1 13/05/25	S2 10/05/25	S3 06/05/25							

Suivant

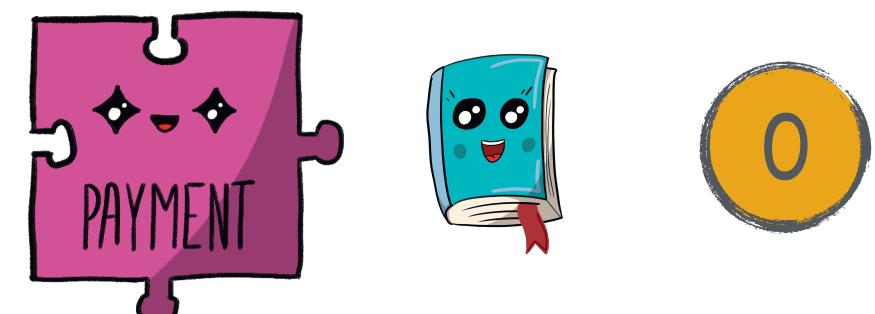


Collection finale

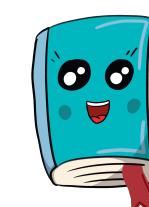
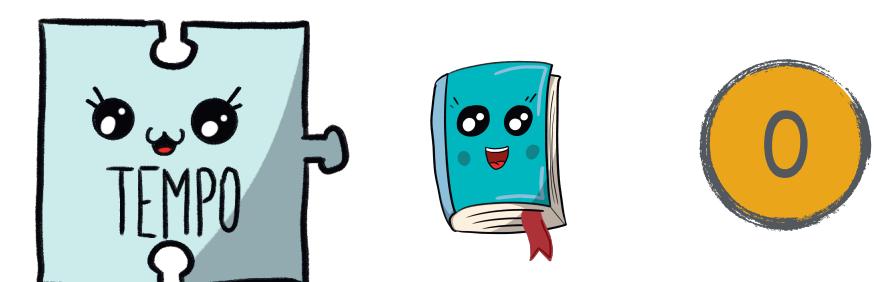
Source Courant Offset



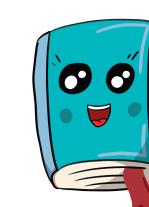
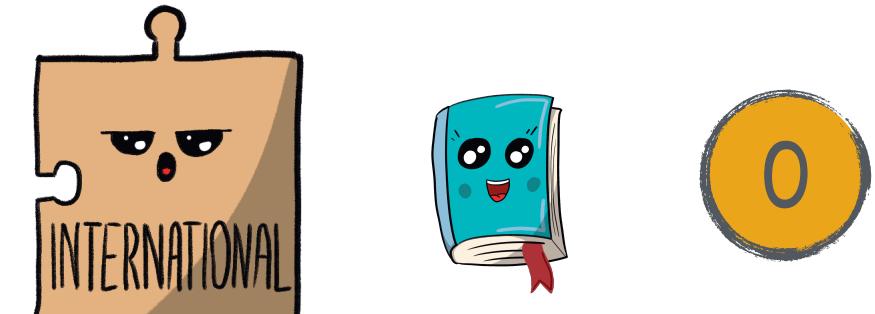
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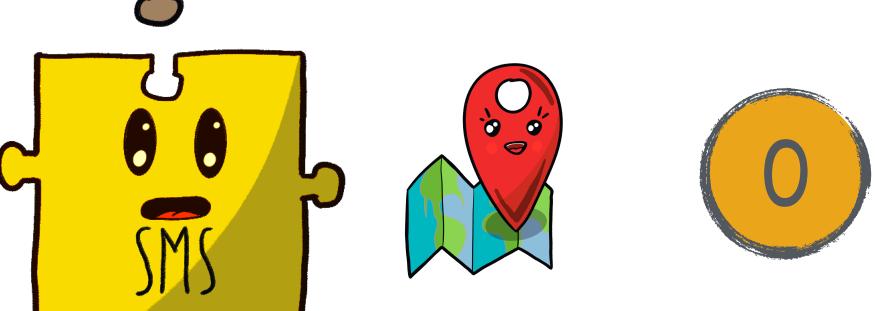
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Collections

B1 15/05/25	B2 15/05/25	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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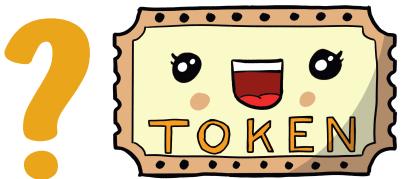
P1 16/05/25	P2 16/05/25	P3 13/05/25	P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
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T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21	
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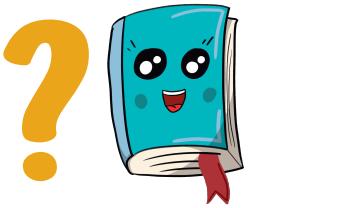
I1 07/05/25	I2 09/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
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S1 13/05/25	S2 10/05/25	S3 06/05/25
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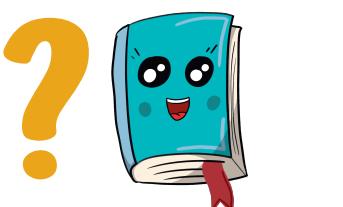
Suivant



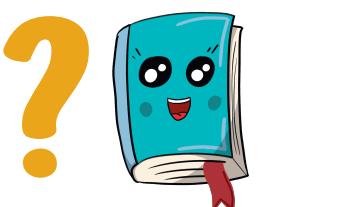
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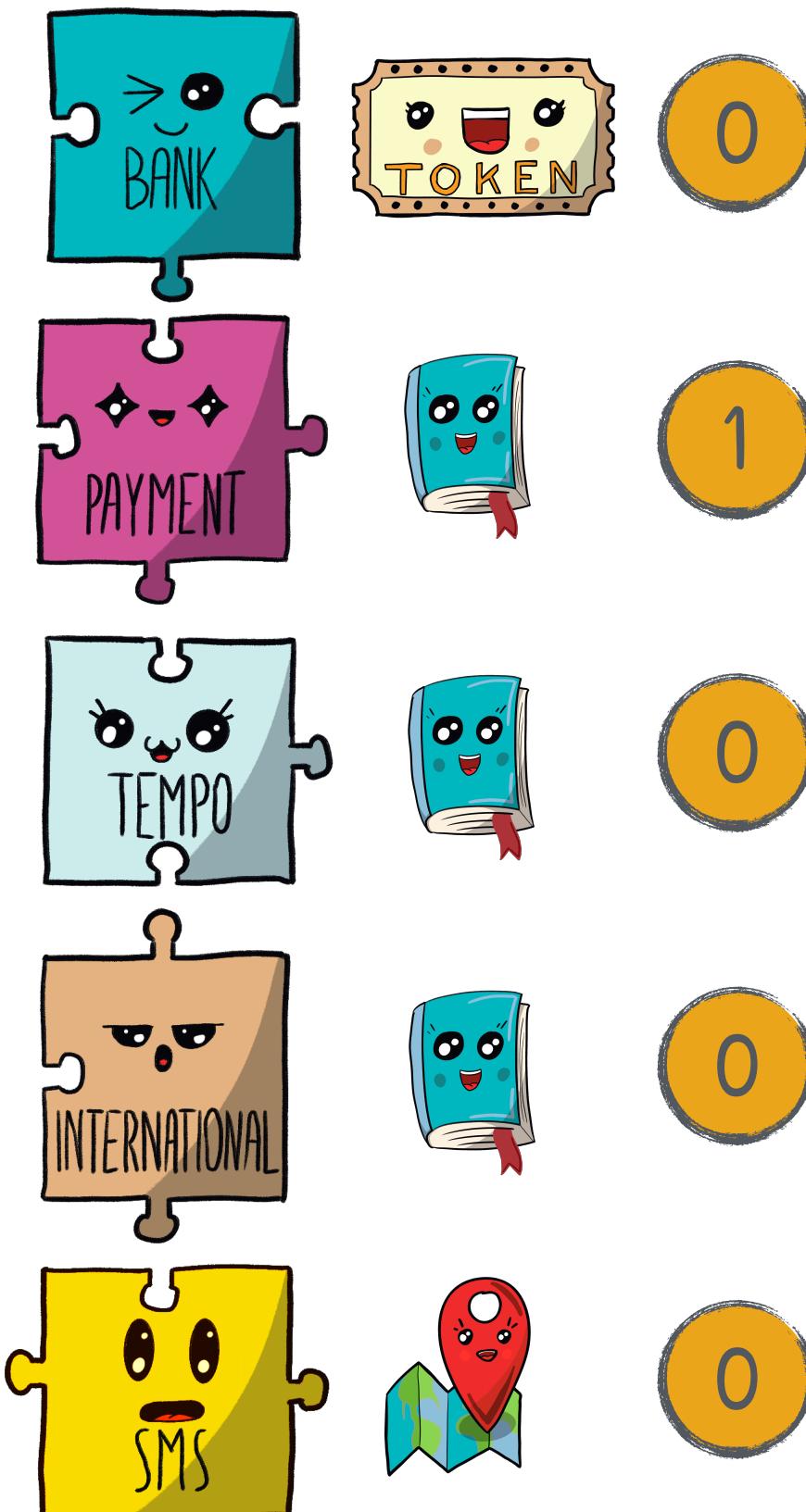
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Collection finale

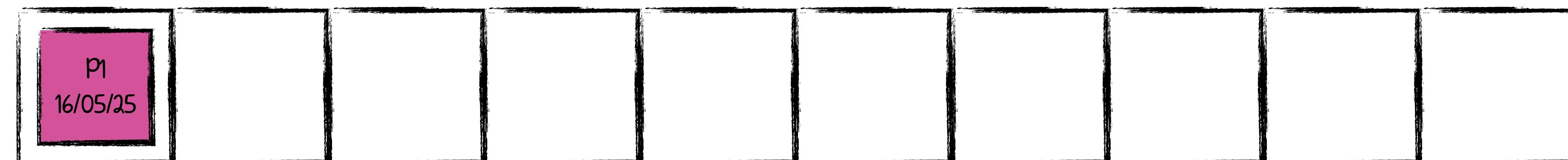
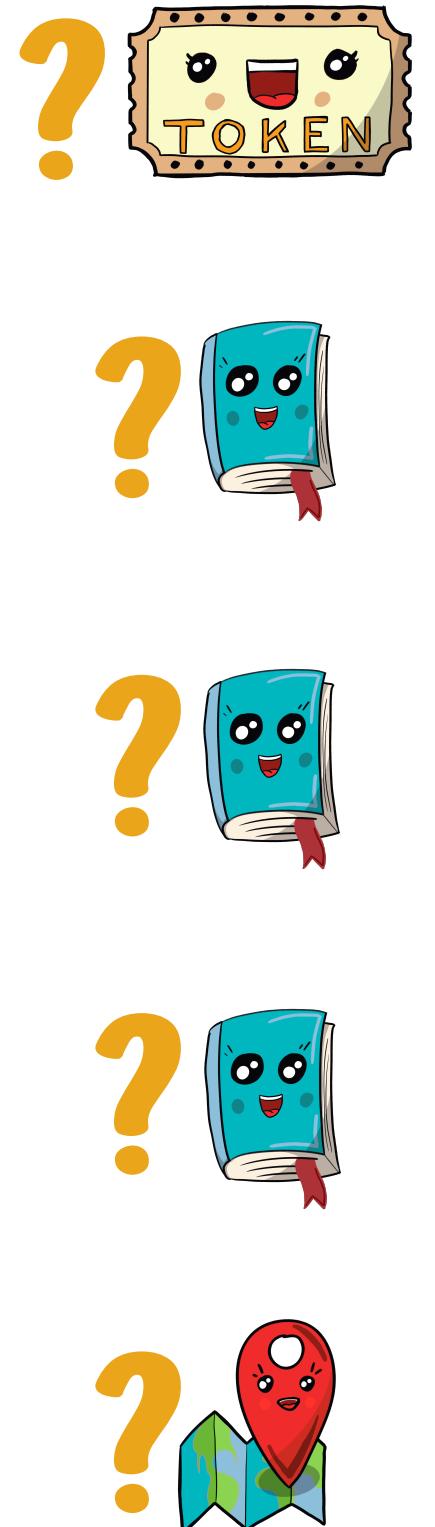
Source Courant Offset



Collections

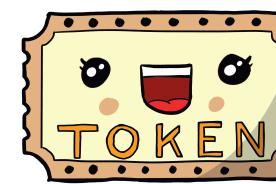
B1 15/05/25	B2 15/05/25	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
P2 16/05/25	P3 13/05/25	P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21		
I1 07/05/25	I2 09/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
S1 13/05/25	S2 10/05/25	S3 06/05/25							

Suivant

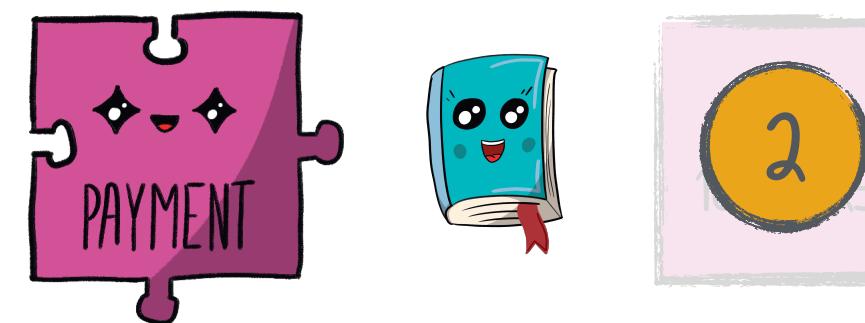


Collection finale

Source Courant Offset

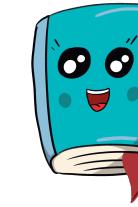
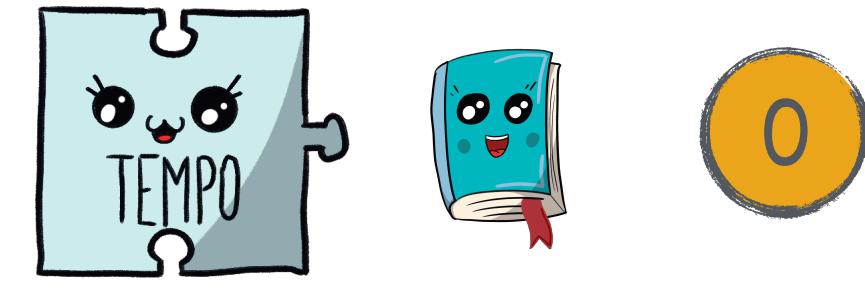


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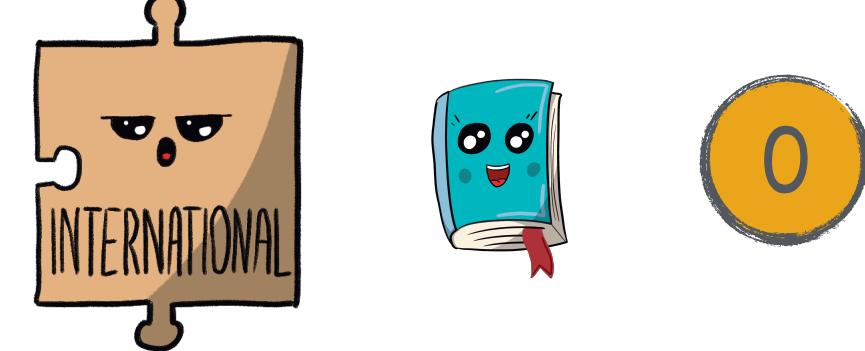


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16/05/25

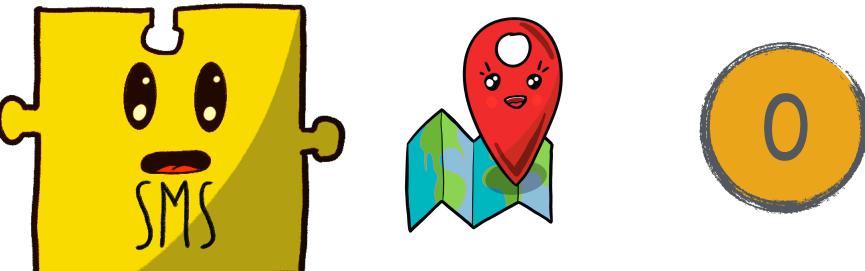
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Collections

B1 15/05/25	B2 15/05/25	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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P3 13/05/25	P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
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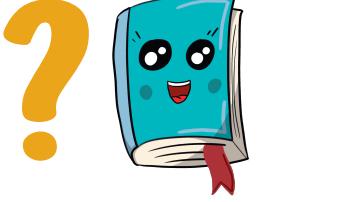
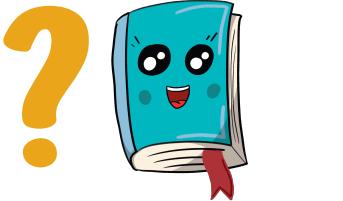
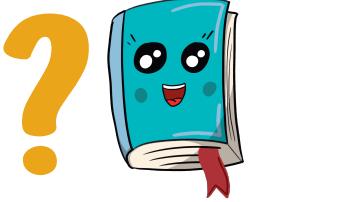
T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21
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I1 07/05/25	I2 09/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
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S1 13/05/25	S2 10/05/25	S3 06/05/25
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p1 16/05/25	p2 16/05/25								
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Suivant

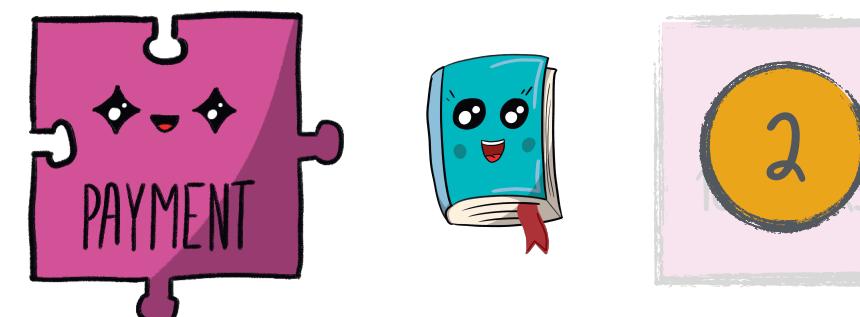


Collection finale

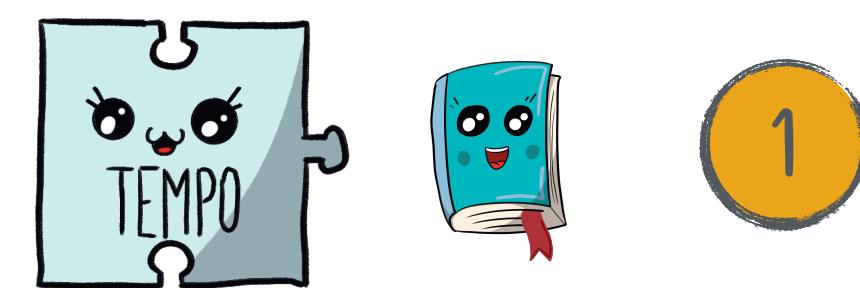
Source Courant Offset



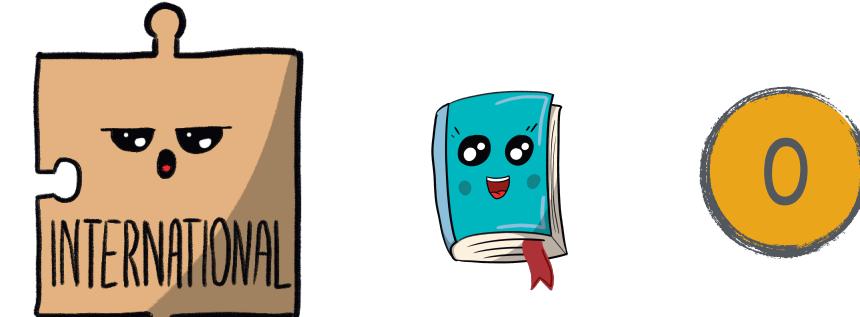
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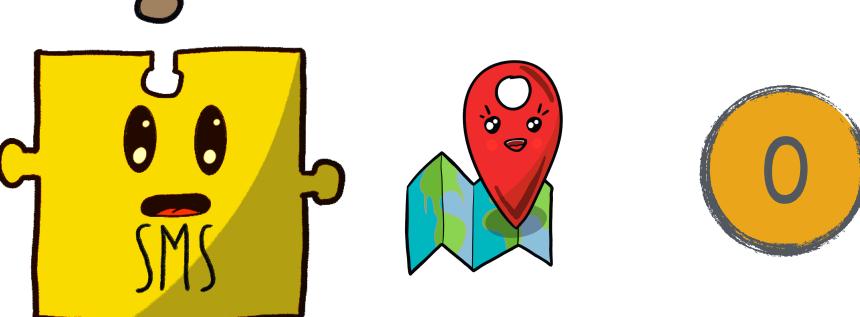
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Collections

B1 15/05/25	B2 15/05/25	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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P2 16/05/25	P3 13/05/25	P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
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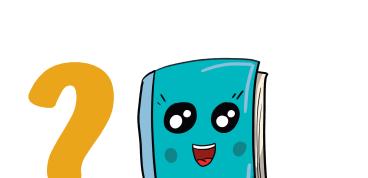
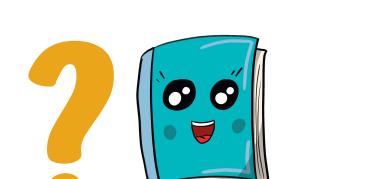
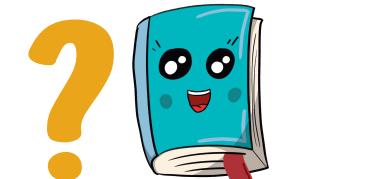
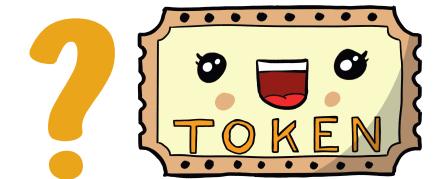
T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21
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I1 07/05/25	I2 09/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
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S1 13/05/25	S2 10/05/25	S3 06/05/25
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P1 16/05/25	P2 16/05/25	T1 16/05/25							
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Suivant

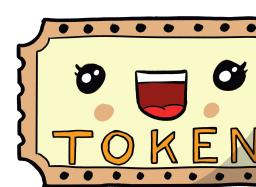


Collection finale

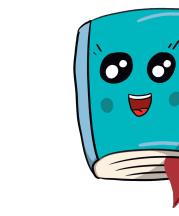
Source Courant Offset

Collections

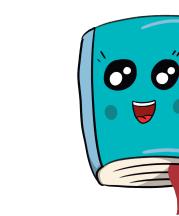
Suivant



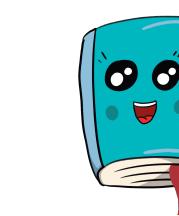
3	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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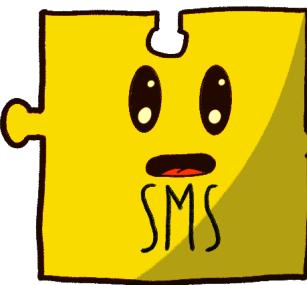
4	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
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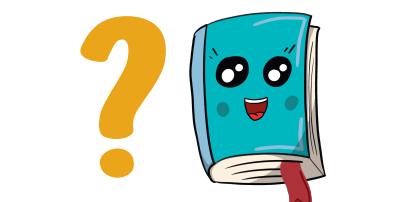
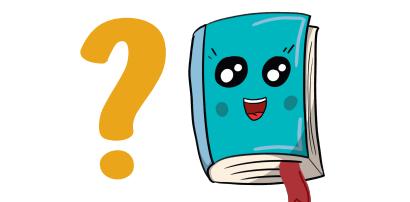
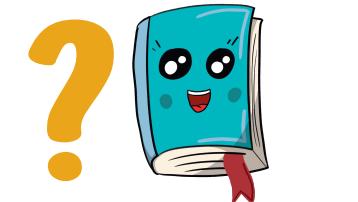
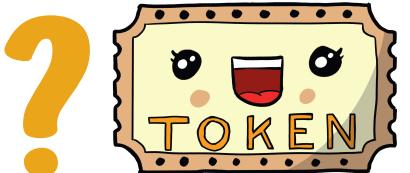
1	T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21
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0	I1 07/05/25	I2 19/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
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2	S2 10/05/25	S3 06/05/25
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p1 16/05/25	p2 16/05/25	T1 16/05/25	B1 15/05/25	B2 15/05/25	B3 14/05/25	p3 13/05/25	S1 13/05/25	S2 10/05/25	p4 09/05/25
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Génération du token

Source Courant Offset

			B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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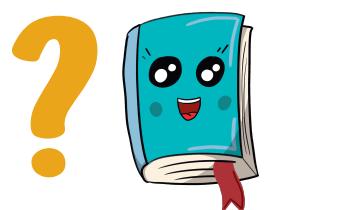
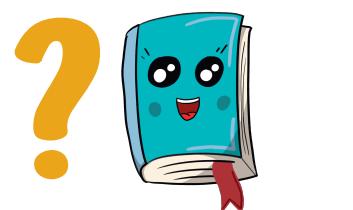
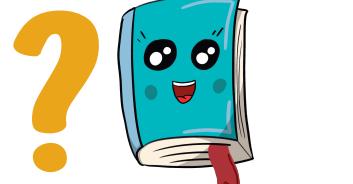
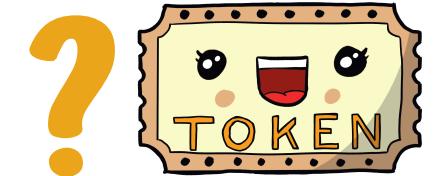
			P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
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			T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21
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			I1 07/05/25	I2 29/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
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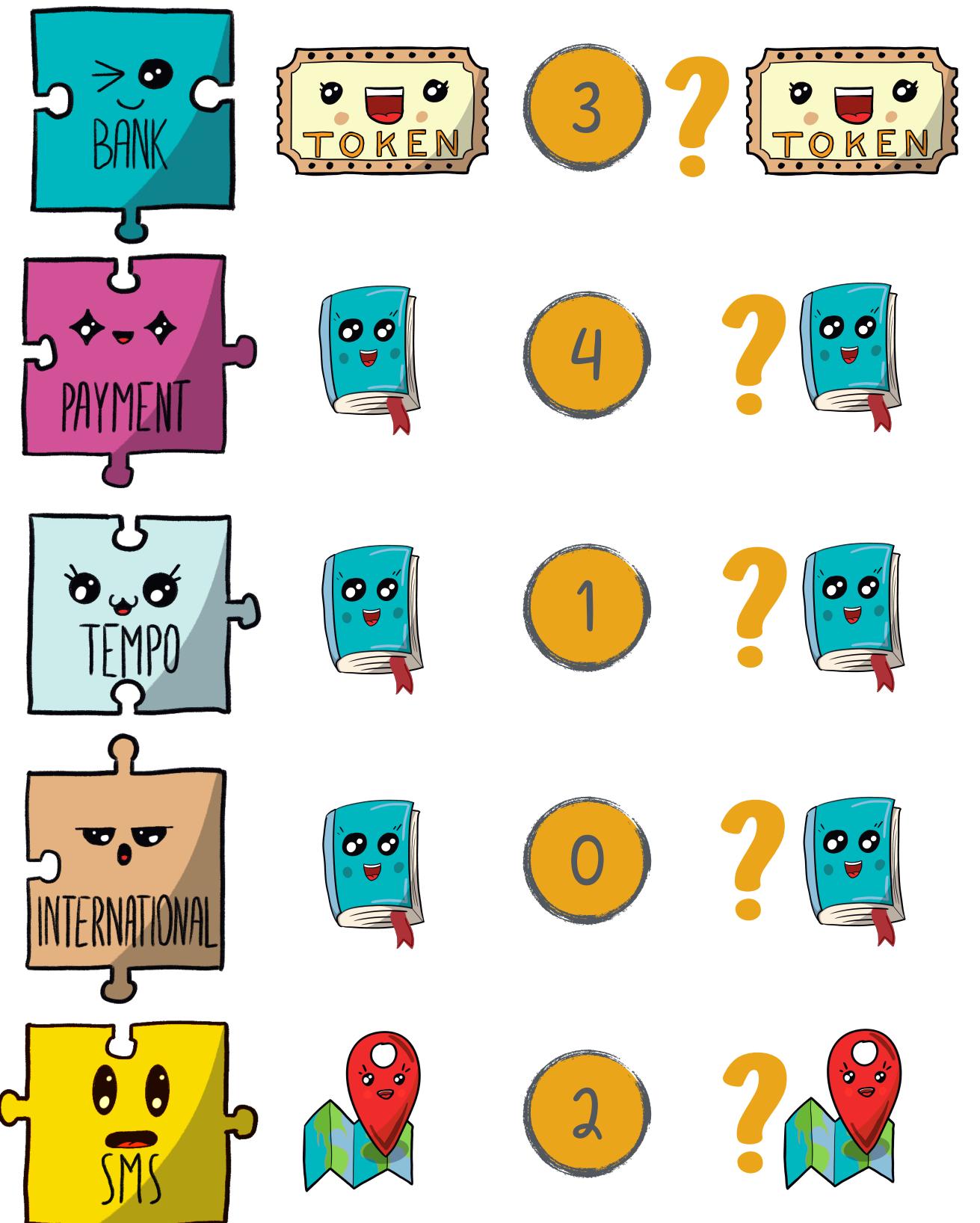
			S1 10/05/25	S2 06/05/25
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Suivant



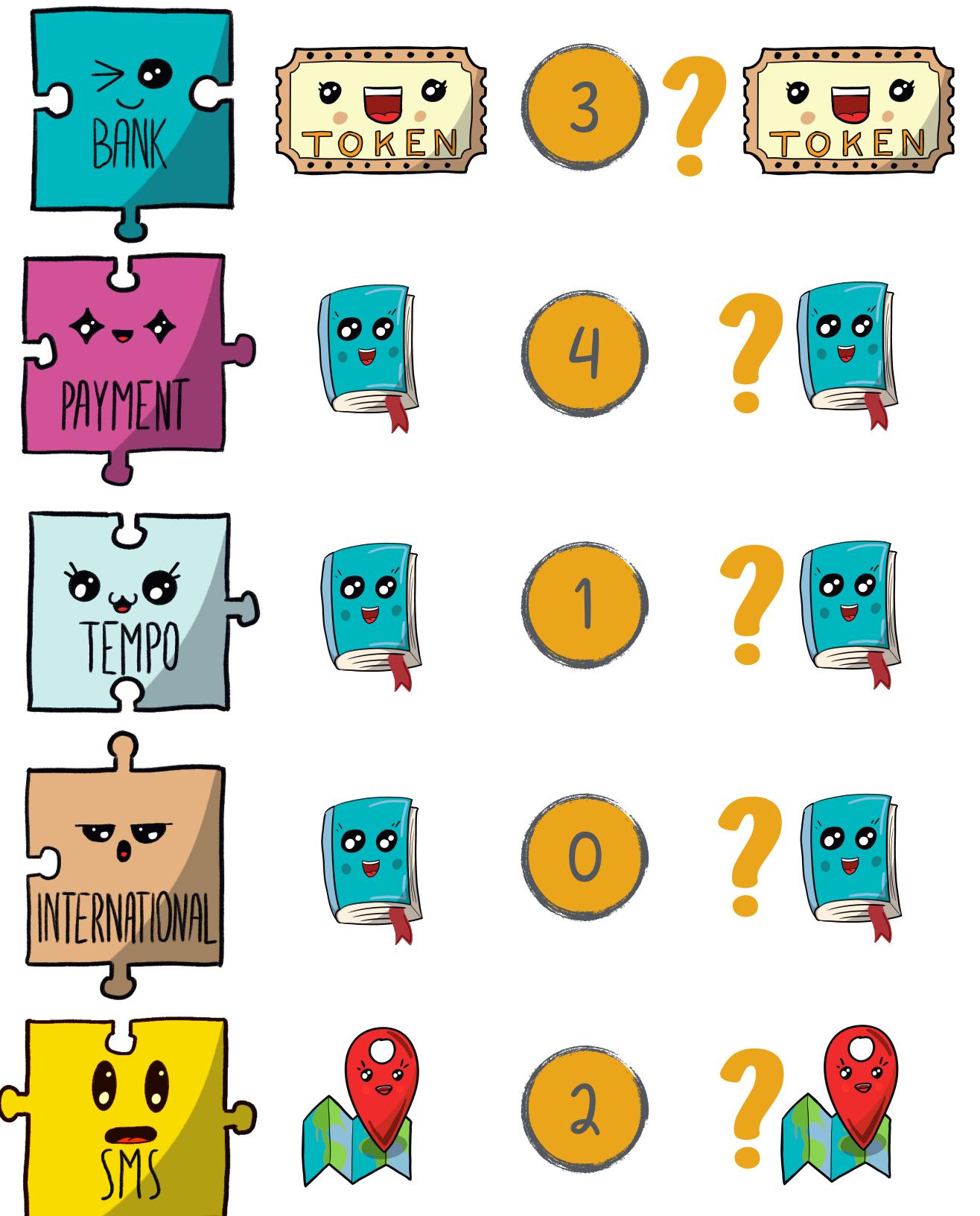
Génération du token

Source Courant Offset Suivant



Génération du token

Source Courant Offset Suivant



Chiffrement



Curseur multi source



```
<?php

interface CursorInterface
{
    /**
     * @var array<SourcePageInterface>
     */
    public array $sourcePages {
        get;
    }

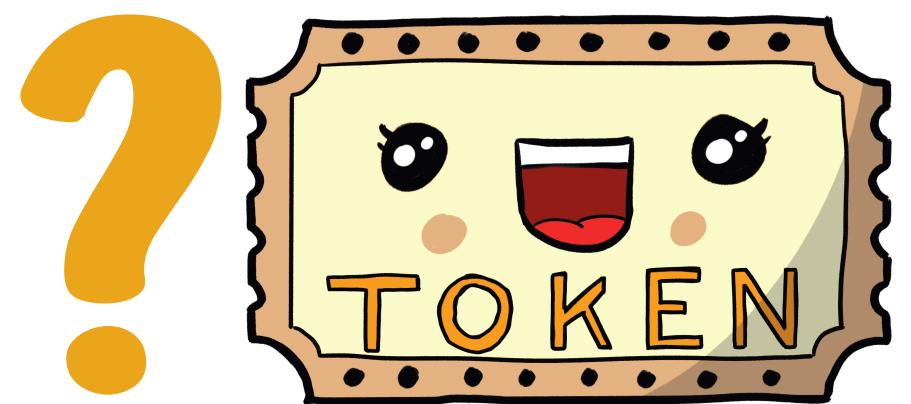
    public function findFirstItem(): ItemInterface;
    public function updateSource(SourcePageInterface
        $sourcePage): void;
    public function deleteSource(SourcePageInterface
        $sourcePage): void;
    public function tokenize(): string;
}
```

Compiled page

Collection

P1 16/05/25	P2 16/05/25	T1 16/05/25	B1 15/05/25	B2 15/05/25	B3 14/05/25	P3 13/05/25	S1 13/05/25	S2 10/05/25	P4 09/05/25
----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------

Suivant



```
<?php
```

```
interface CompiledPageInterface
{
    /**
     * @return array<ItemInterface>
     */
    public function getCollection(): array;
    public function getNextToken(): ?string;
}
```

Seconde page

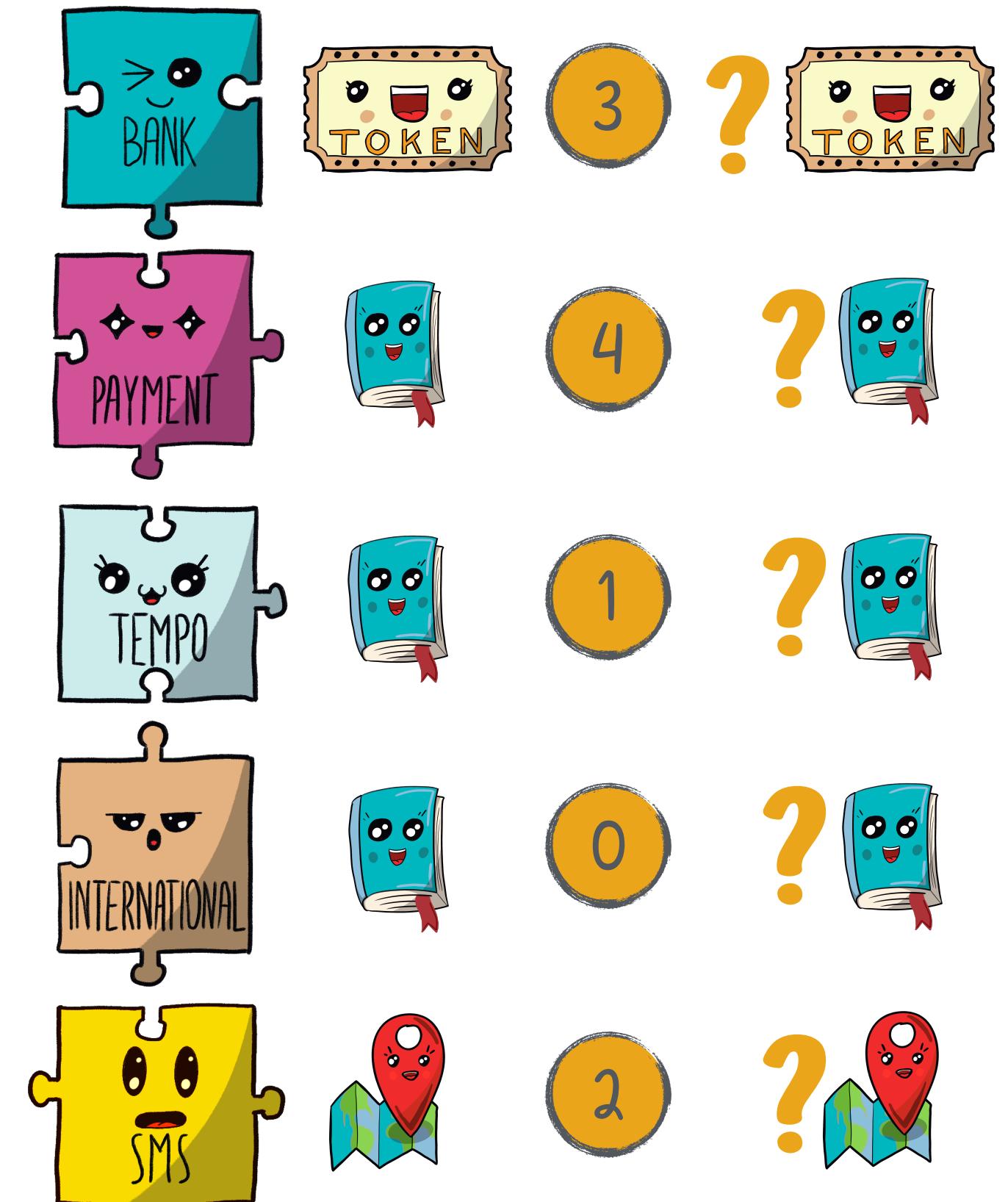


Seconde page



Déchiffrement

Source Courant Offset Suivant



Seconde page

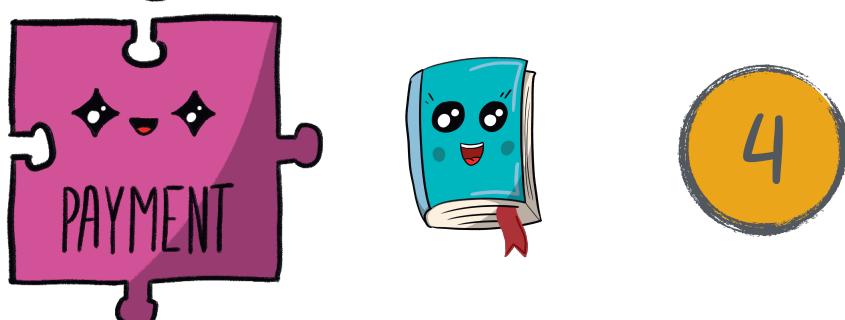
Source Courant Offset

Suivant



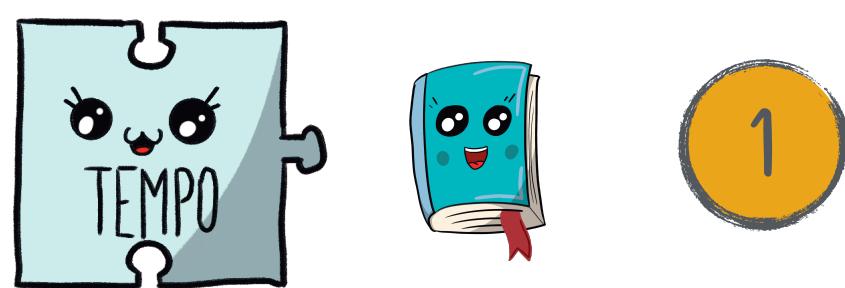
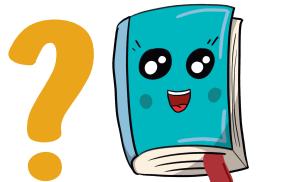
3

B1 15/05/25	B2 15/05/25	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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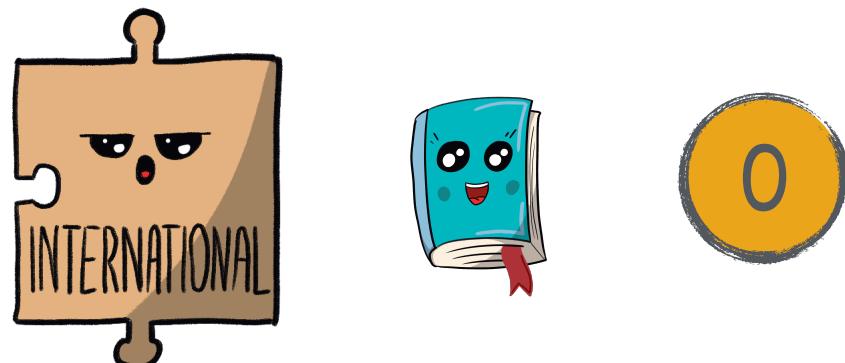
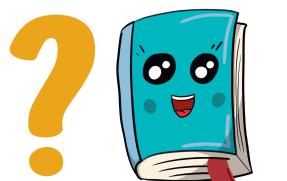
4

P1 16/05/25	P2 16/05/25	P3 13/05/25	P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
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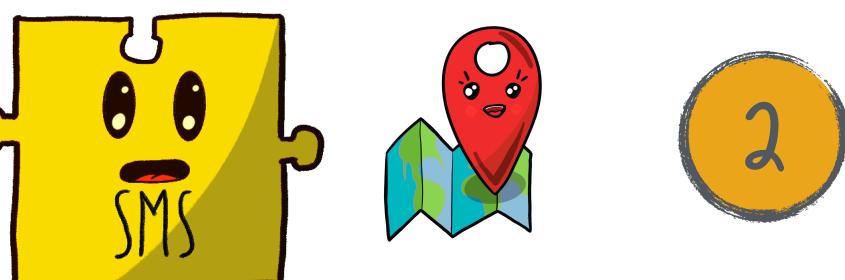
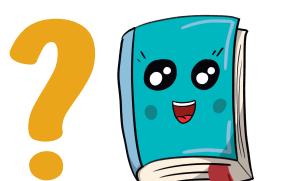
1

T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21		
----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	--	--



0

I1 07/05/25	I2 29/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
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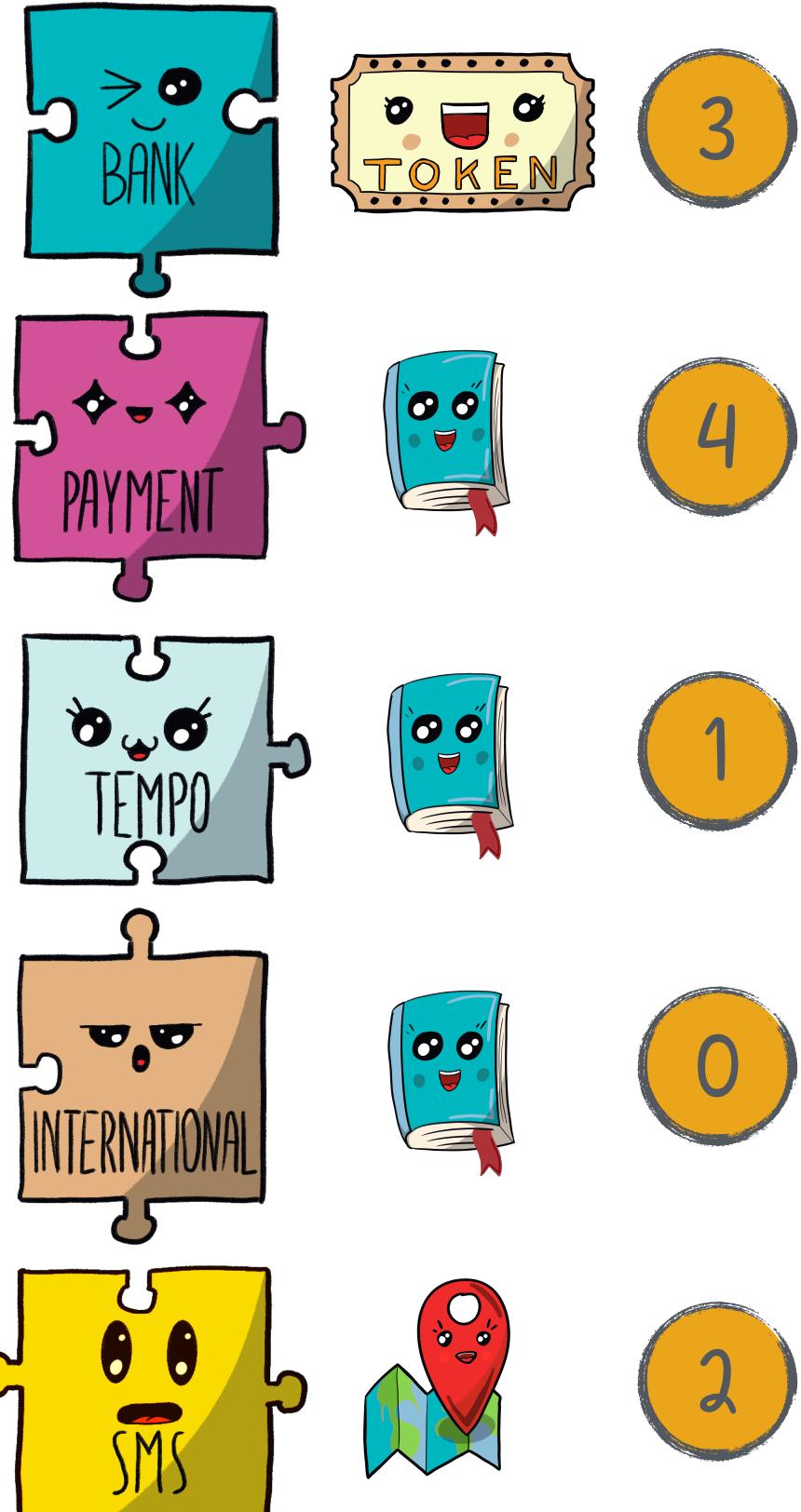
2

S1 13/05/25	S2 10/05/25	S3 06/05/25
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Seconde page

Source Courant Offset



Collections

B1 15/05/25	B2 15/05/25	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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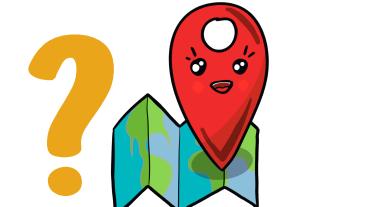
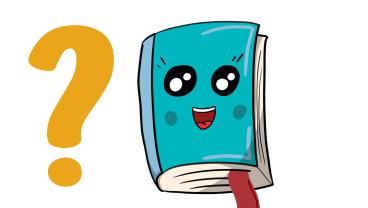
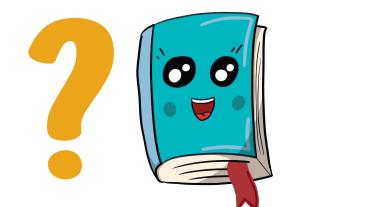
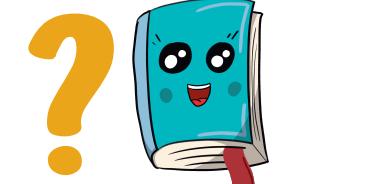
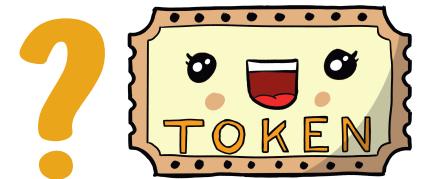
P1 16/05/25	P2 16/05/25	P3 13/05/25	P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	-----------------	-----------------

T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21
----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------

I1 07/05/25	I2 29/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	-----------------

S1 13/05/25	S2 10/05/25	S3 06/05/25
----------------	----------------	----------------

Suivant



Seconde page

Source Courant Offset

Collections

Suivant



3	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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4	P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
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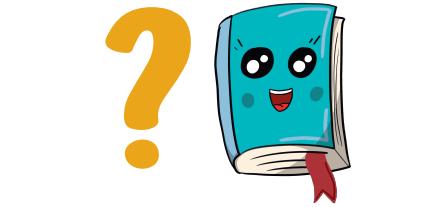
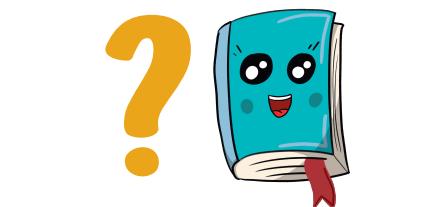
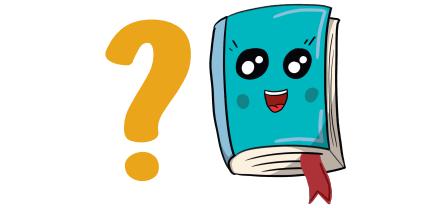
1	T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21
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0	I1 07/05/25	I2 19/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
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2	S2 10/05/25	S3 06/05/25
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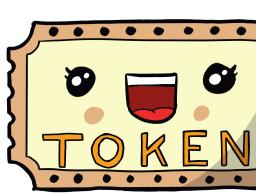


Seconde page

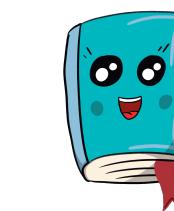
Source Courant Offset

Collections

Suivant



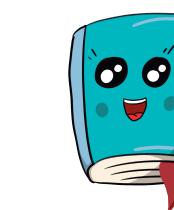
3	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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4	P4 09/05/25	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
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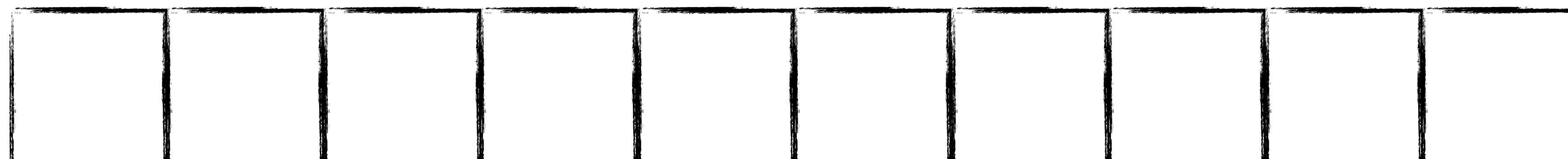
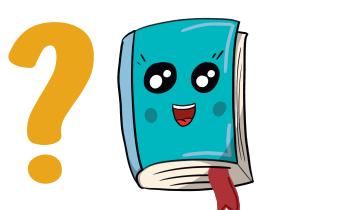
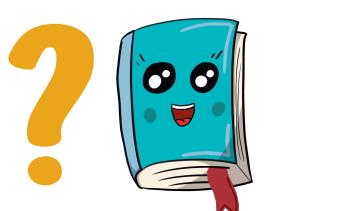
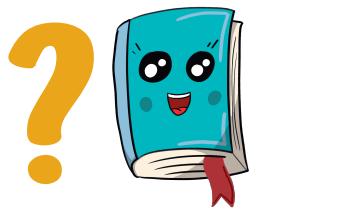
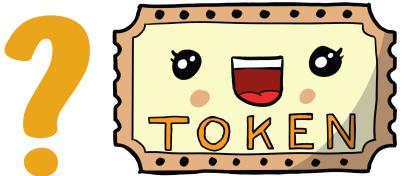
1	T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21
---	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------



0	I1 07/05/25	I2 19/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
---	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	----------------	-----------------



2	S2 10/05/25	S3 06/05/25
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Seconde page

Source Courant Offset

Collections

Suivant



3	B3 14/05/25	B4 01/05/25	B5 16/04/25	B6 12/04/25	B7 01/04/25	B8 13/03/25	B9 31/03/25	B10 12/03/25
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5	P5 09/05/25	P6 21/04/25	P7 17/04/25	P8 11/04/25	P9 30/03/25	P10 30/03/25	P11 18/03/25
---	----------------	----------------	----------------	----------------	----------------	-----------------	-----------------



1	T1 16/05/25	T2 16/02/25	T3 13/12/24	T4 11/05/23	T5 16/12/22	T6 18/04/22	T7 06/02/22	T8 31/12/21
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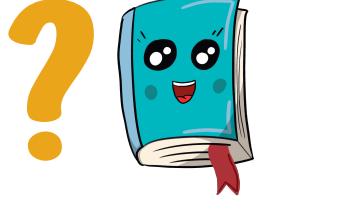
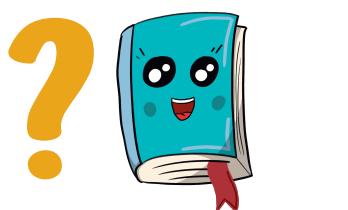
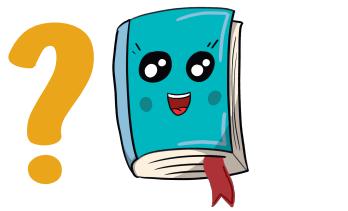
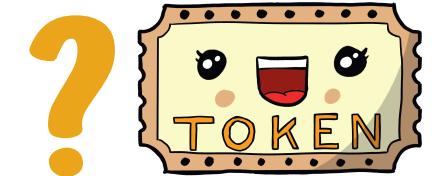
1	I1 07/05/25	I2 29/04/25	I3 16/04/25	I4 10/12/24	I5 01/12/24	I6 08/11/24	I7 14/10/24	I8 13/10/24	I9 11/09/24	I10 30/08/24
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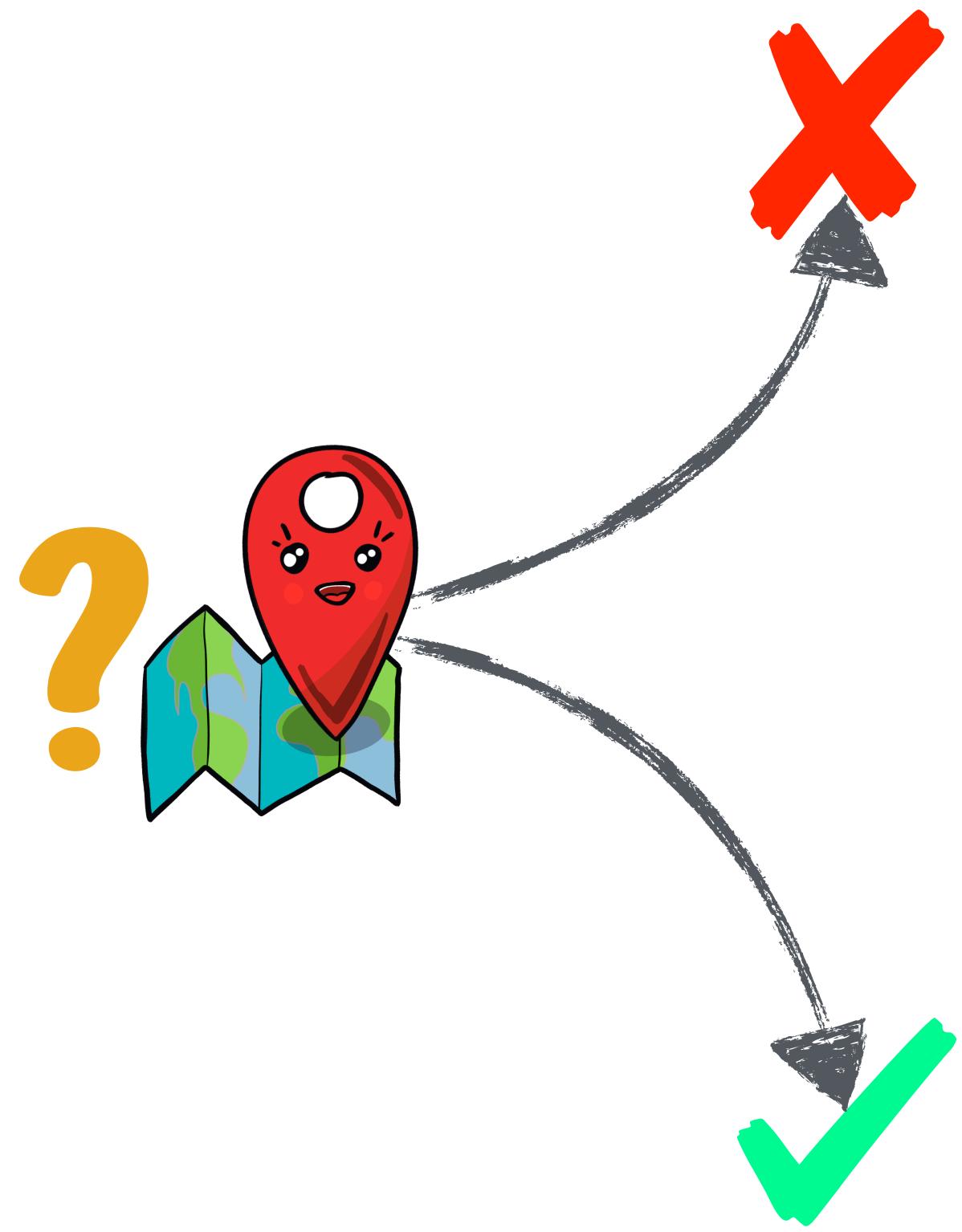
3	06/05/25
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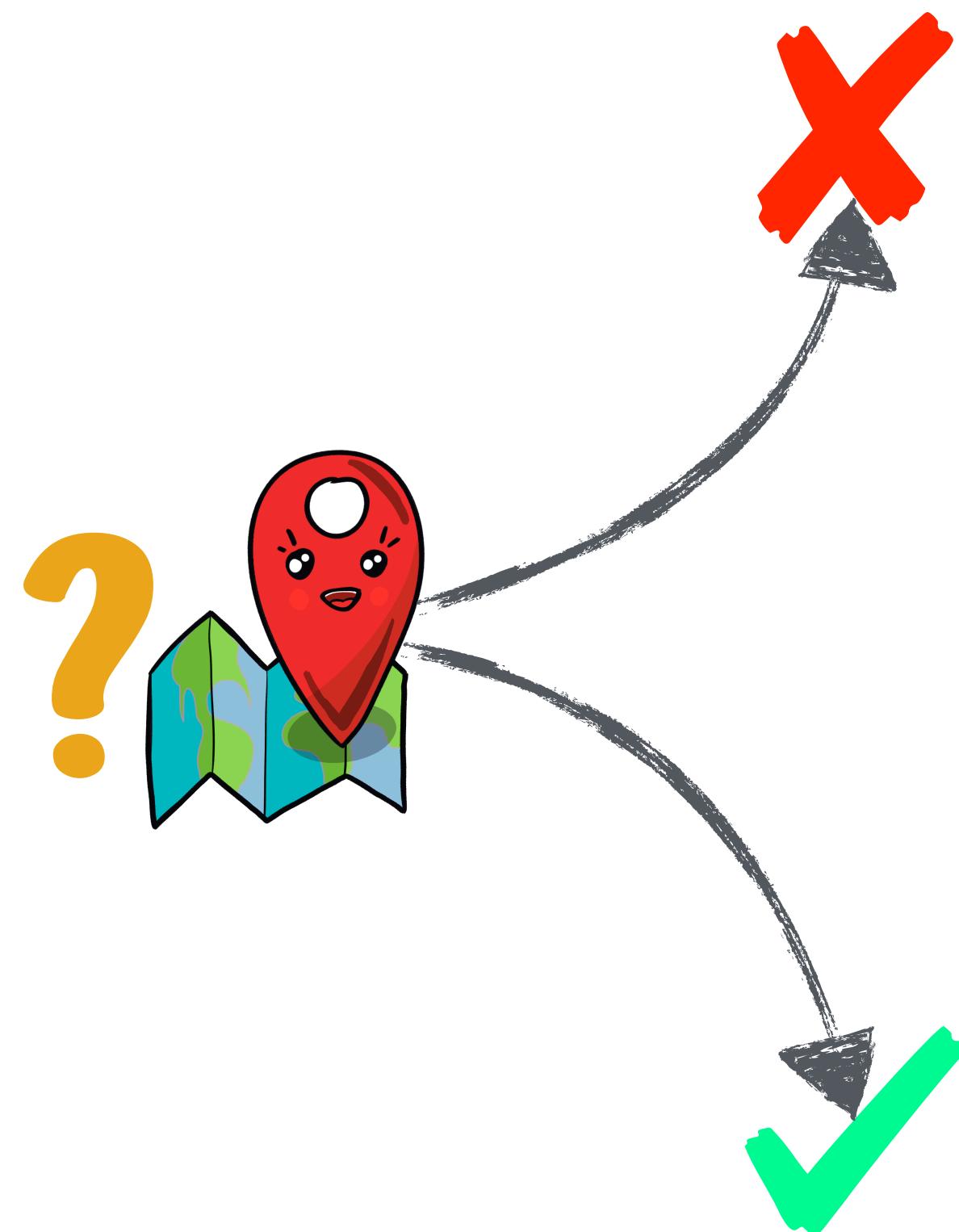
P5 09/05/25	I1 07/05/25	S3 06/05/25							
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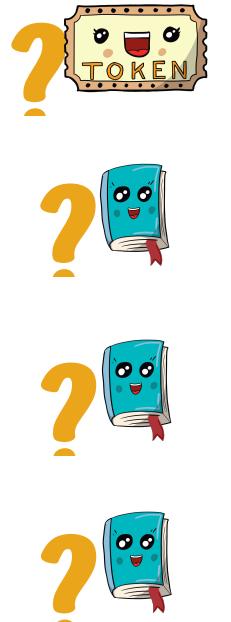
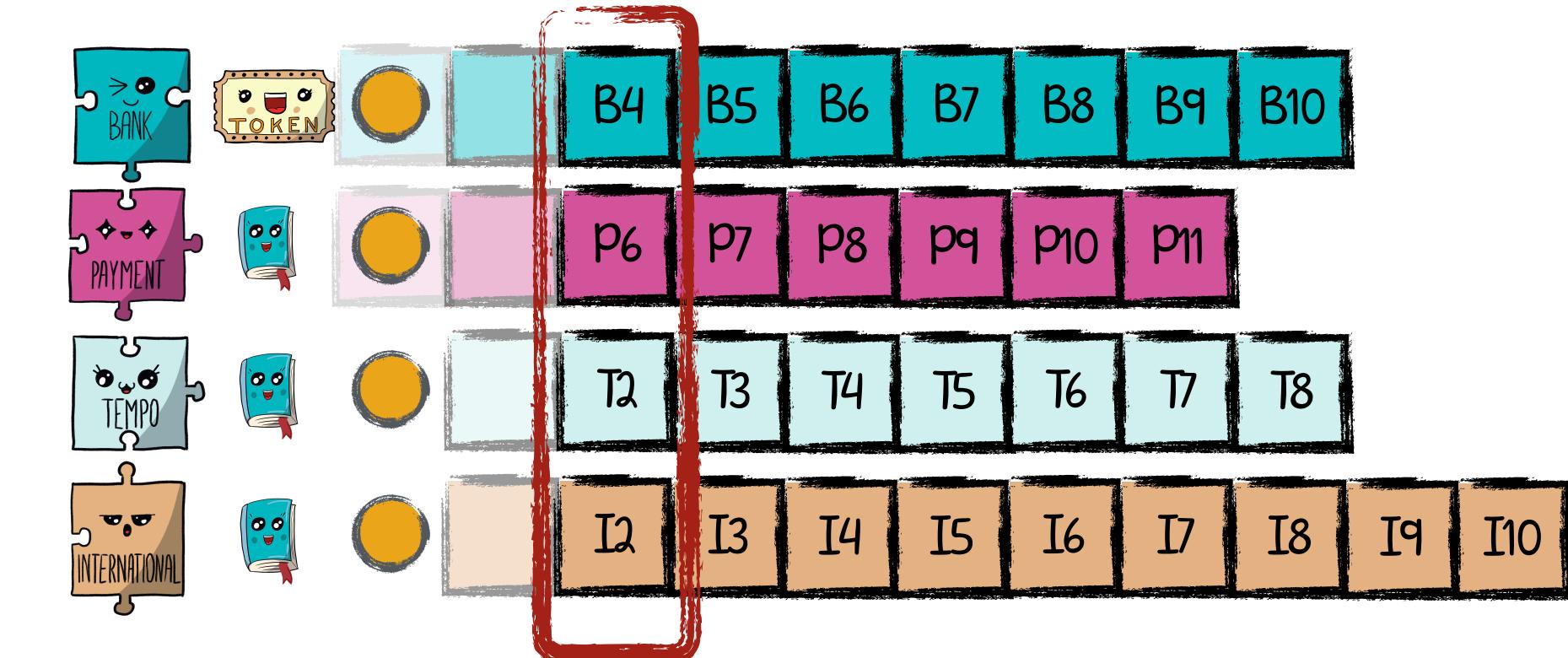
Seconde page



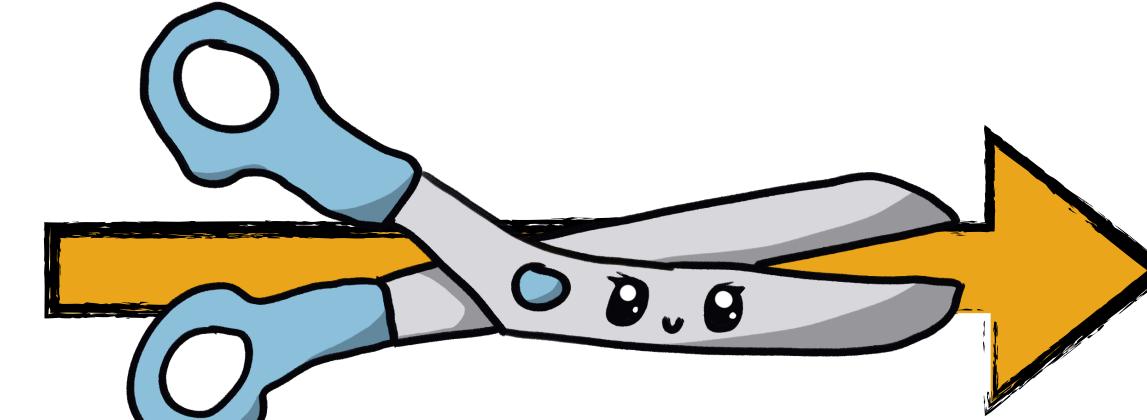
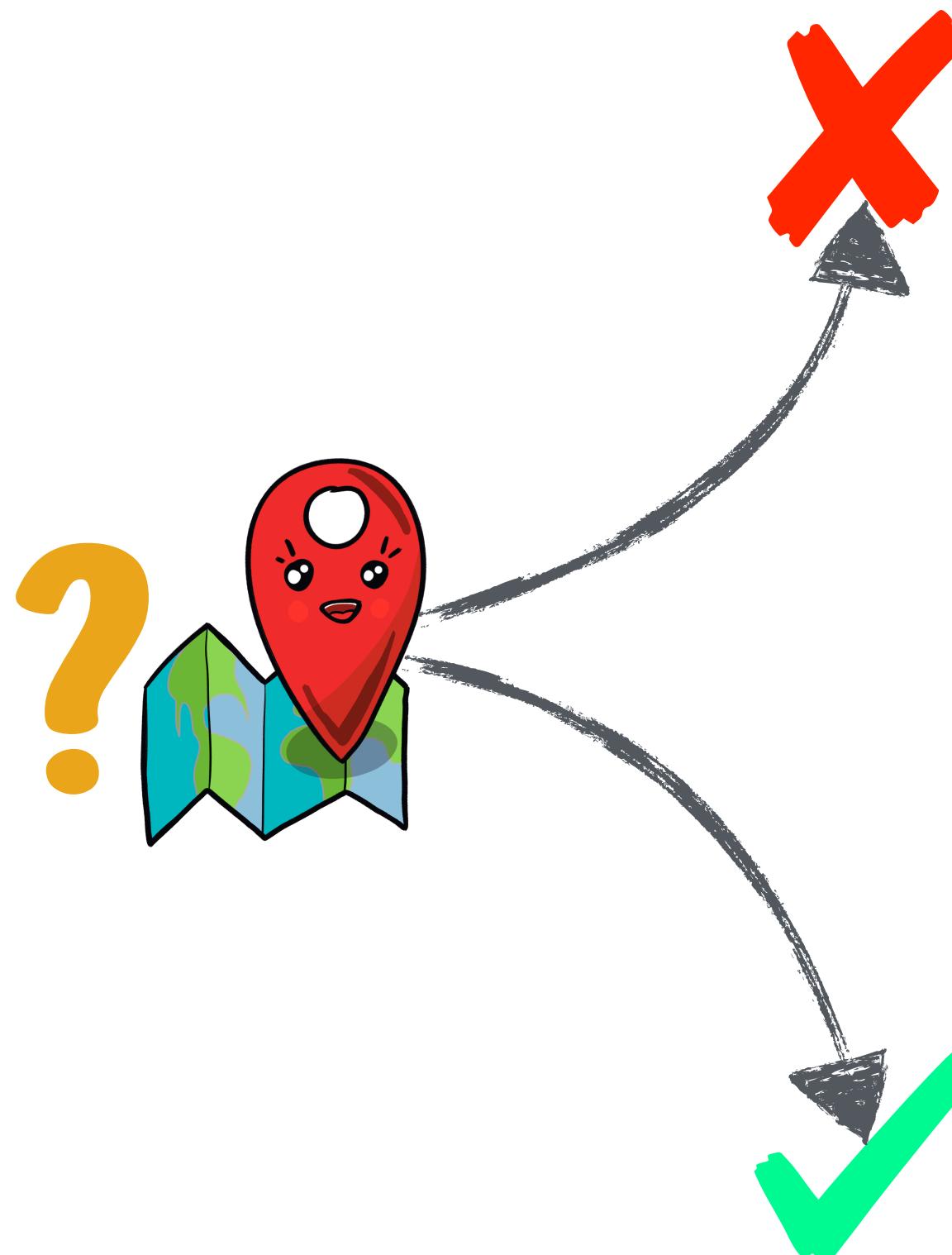
Seconde page



On oublie la source
dans le curseur

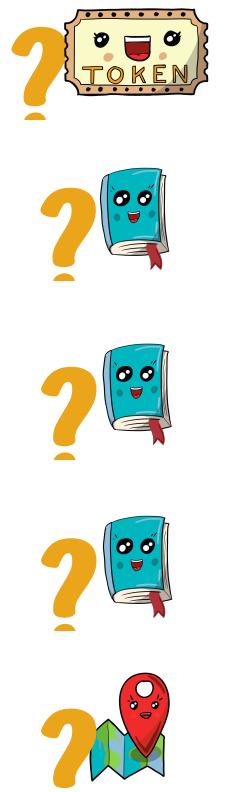
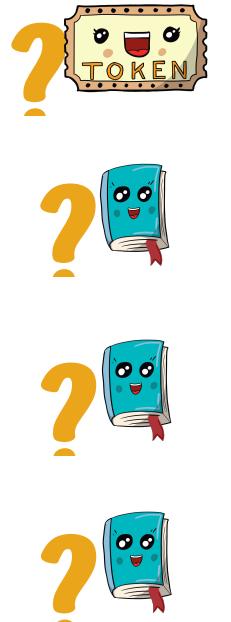
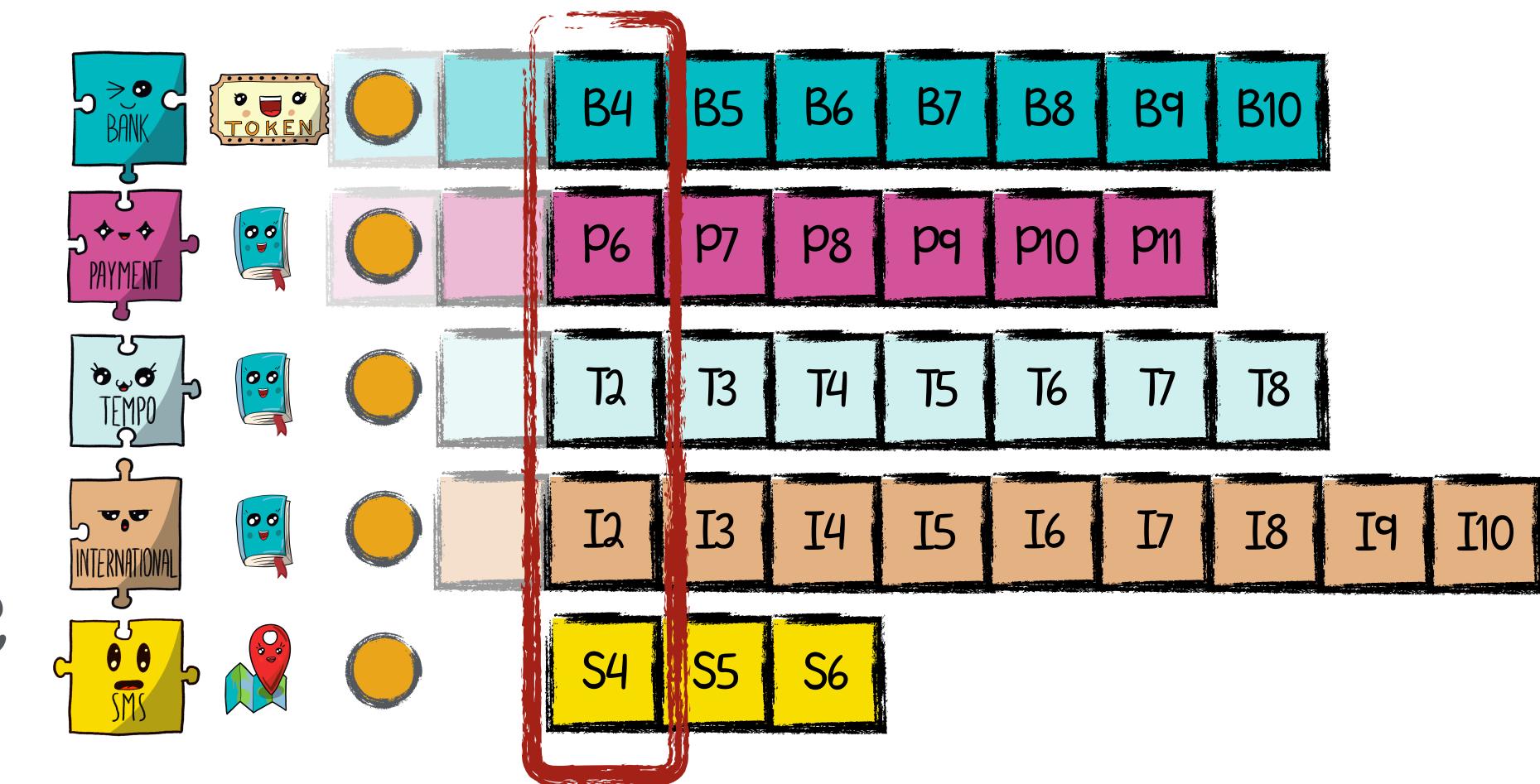
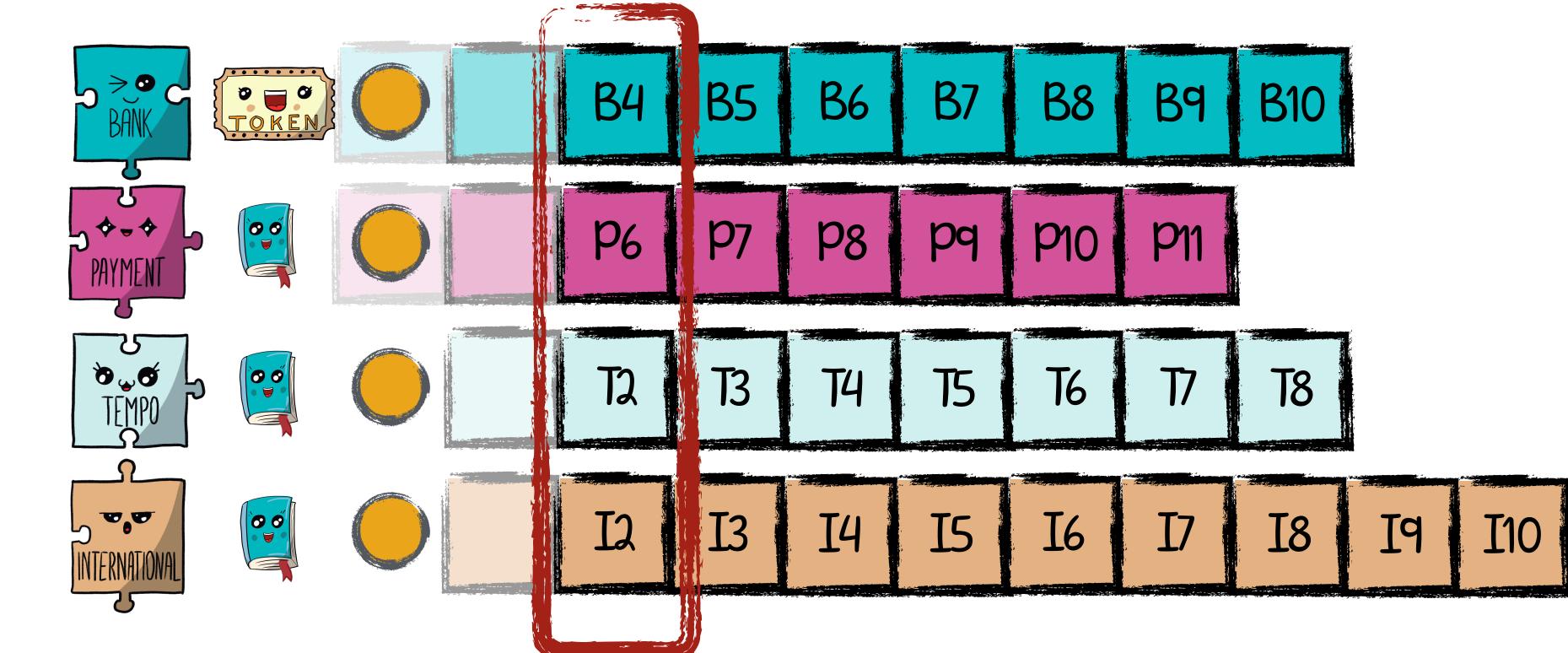


Seconde page



On oublie la source
dans le curseur

On appelle la page suivante
de la source



```
<?php

class MultiSourcePaginator
{
    public function paginate(CursorInterface $cursor): CompiledPageInterface
    {
        /** @var array<ItemInterface> $finalCollection */
        $finalCollection = [];
    }
}
```

```
<?php

class MultiSourcePaginator
{
    public function paginate(CursorInterface $cursor): CompiledPageInterface
    {
        /** @var array<ItemInterface> $finalCollection */
        $finalCollection = [];

        // fetch initials sources collections
        $this->initiate($cursor);
    }
}
```

```
<?php

class MultiSourcePaginator
{
    public function paginate(CursorInterface $cursor): CompiledPageInterface
    {
        /** @var array<ItemInterface> $finalCollection */
        $finalCollection = [];

        // fetch initials sources collections
        $this->initiate($cursor);

        // Loop to fill every spot for the current page
        for ($i = 0; $i < $this->itemByPage; $i++) {
        }
    }
}
```

```
<?php

class MultiSourcePaginator
{
    public function paginate(CursorInterface $cursor): CompiledPageInterface
    {
        /** @var array<ItemInterface> $finalCollection */
        $finalCollection = [ ];

        // fetch initials sources collections
        $this->initiate($cursor);

        // Loop to fill every spot for the current page
        for ($i = 0; $i < $this->itemByPage; $i++) {
            // check if every source is filled, fetch them otherwise
            $this->consolidate($cursor);
        }
    }
}
```

```
<?php

class MultiSourcePaginator
{
    public function paginate(CursorInterface $cursor): CompiledPageInterface
    {
        /** @var array<ItemInterface> $finalCollection */
        $finalCollection = [];

        // fetch initials sources collections
        $this->initiate($cursor);

        // Loop to fill every spot for the current page
        for ($i = 0; $i < $this->itemByPage; $i++) {
            // check if every source is filled, fetch them otherwise
            $this->consolidate($cursor);
            // Search for the current spot item
            $finalCollection[ ] = $cursor->findFirstItem();
        }
    }
}
```

```
<?php

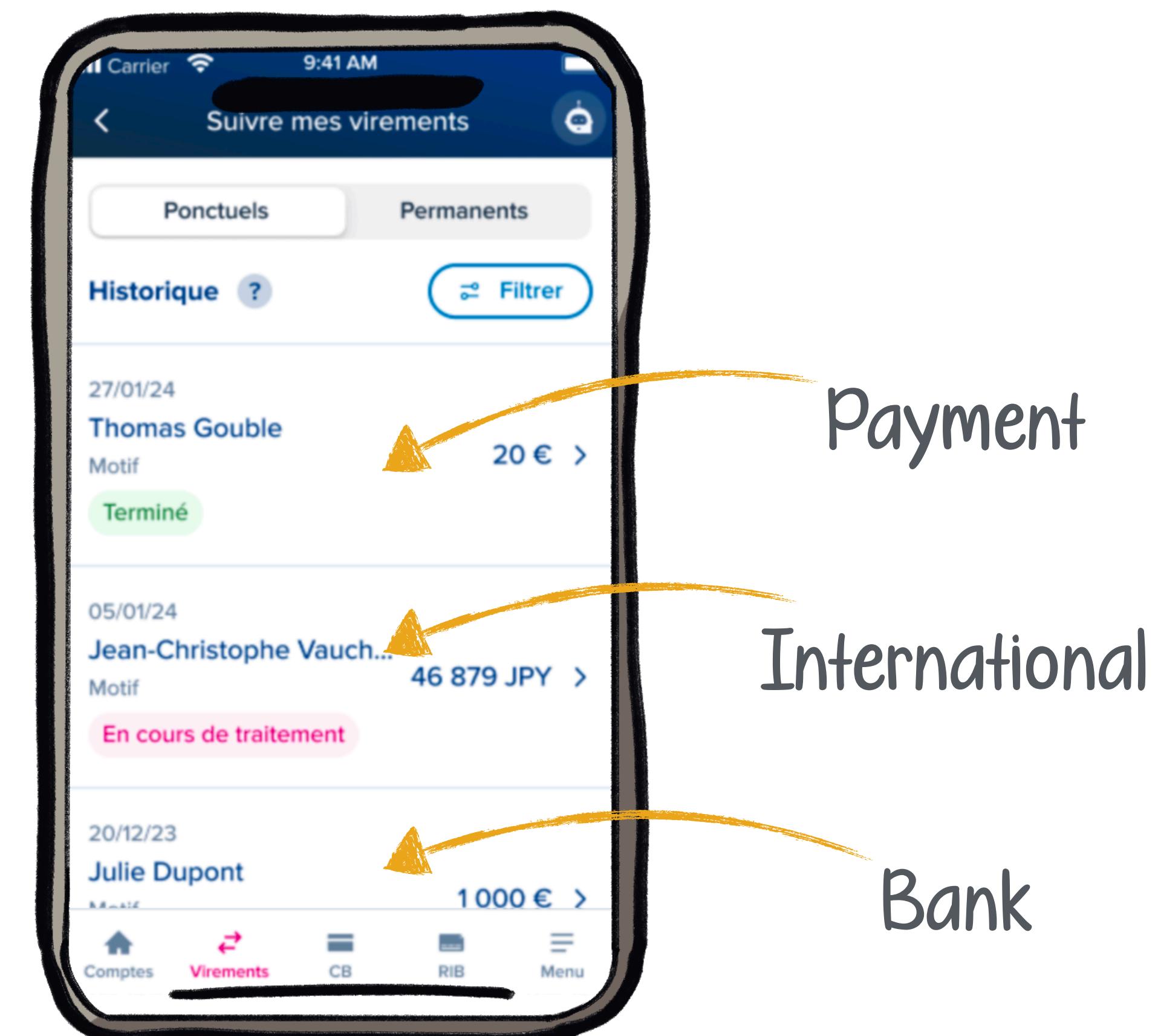
class MultiSourcePaginator
{
    public function paginate(CursorInterface $cursor): CompiledPageInterface
    {
        /** @var array<ItemInterface> $finalCollection */
        $finalCollection = [];

        // fetch initials sources collections
        $this->initiate($cursor);

        // Loop to fill every spot for the current page
        for ($i = 0; $i < $this->itemByPage; $i++) {
            // check if every source is filled, fetch them otherwise
            $this->consolidate($cursor);
            // Search for the current spot item
            $finalCollection[ ] = $cursor->findFirstItem();
        }

        return new CompiledPage(
            collection: $finalCollection,
            nextToken: $cursor->tokenize()
        );
    }
}
```

En terme d'interface

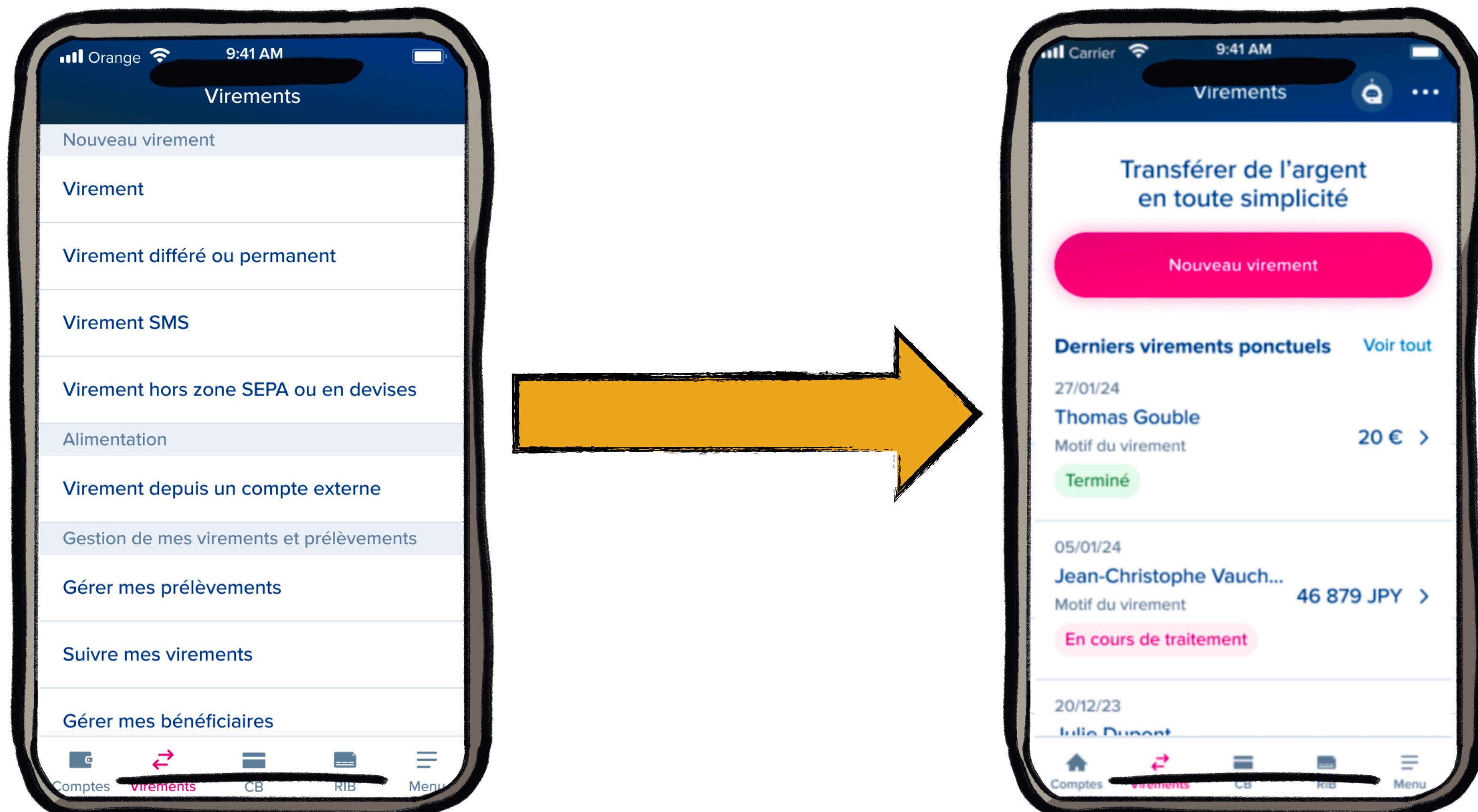


+ Infinite Scroll

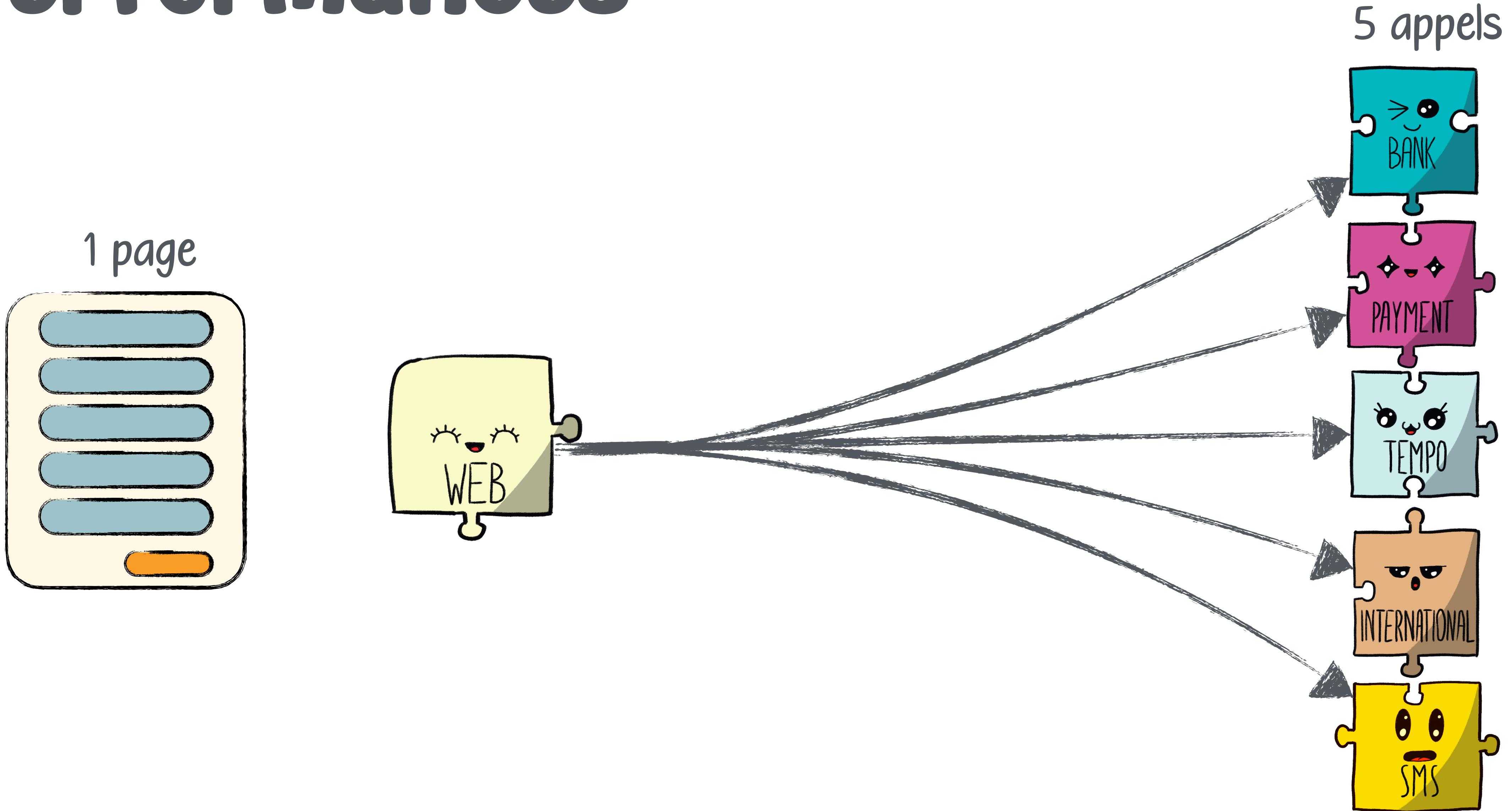


Performances

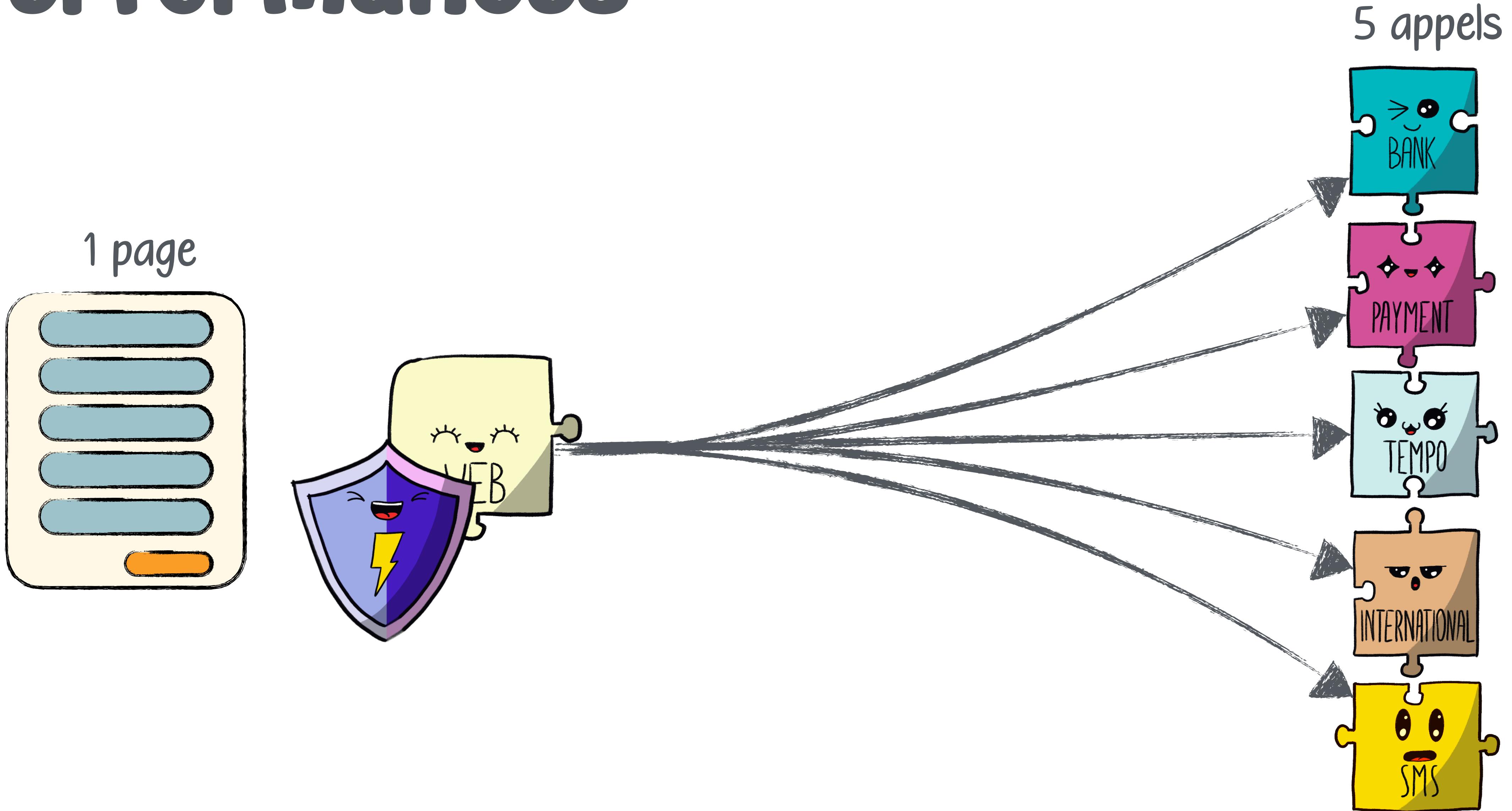
Changement d'interface



Performances

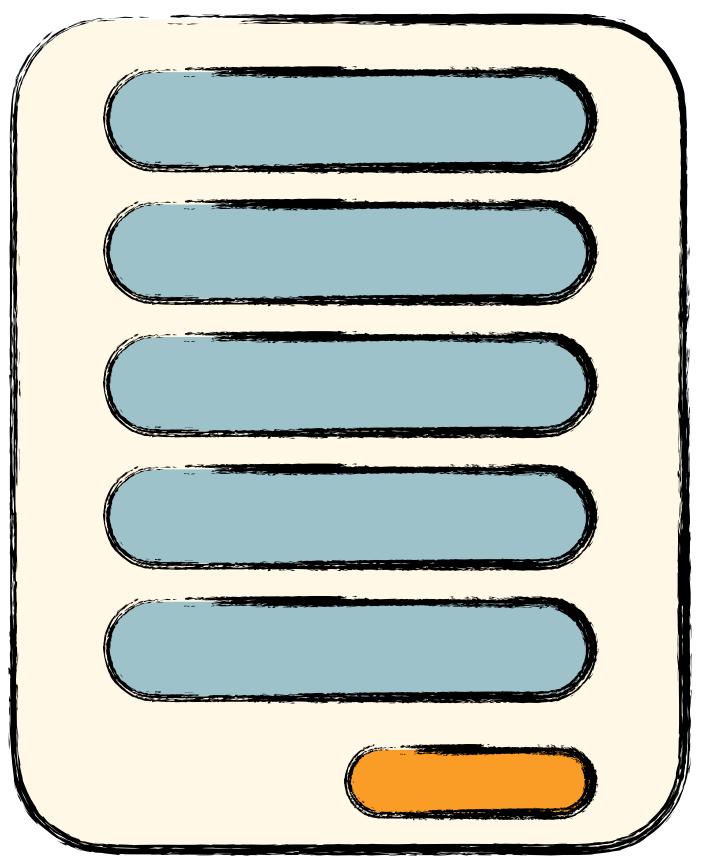


Performances

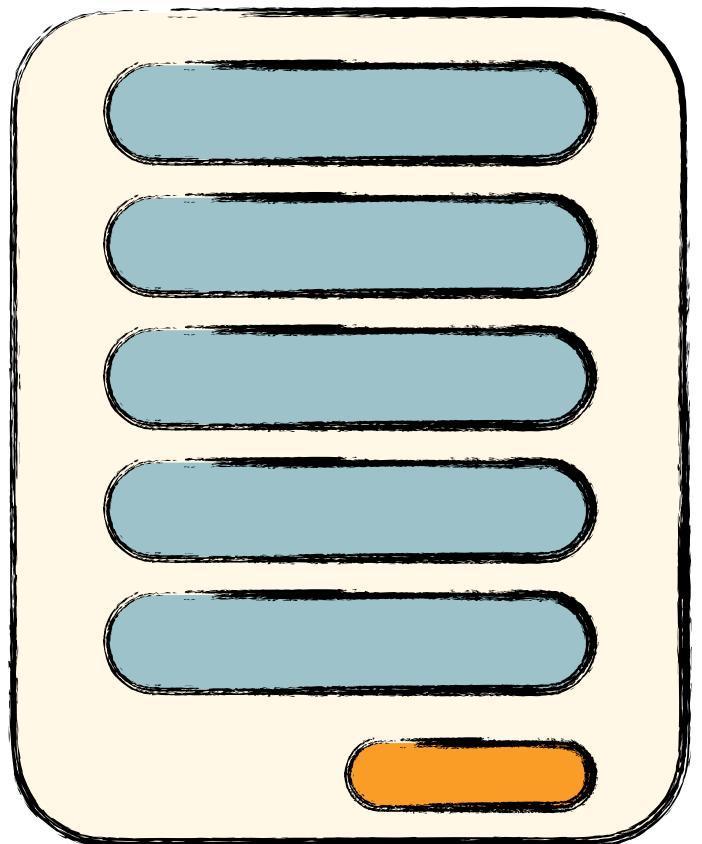


Performances

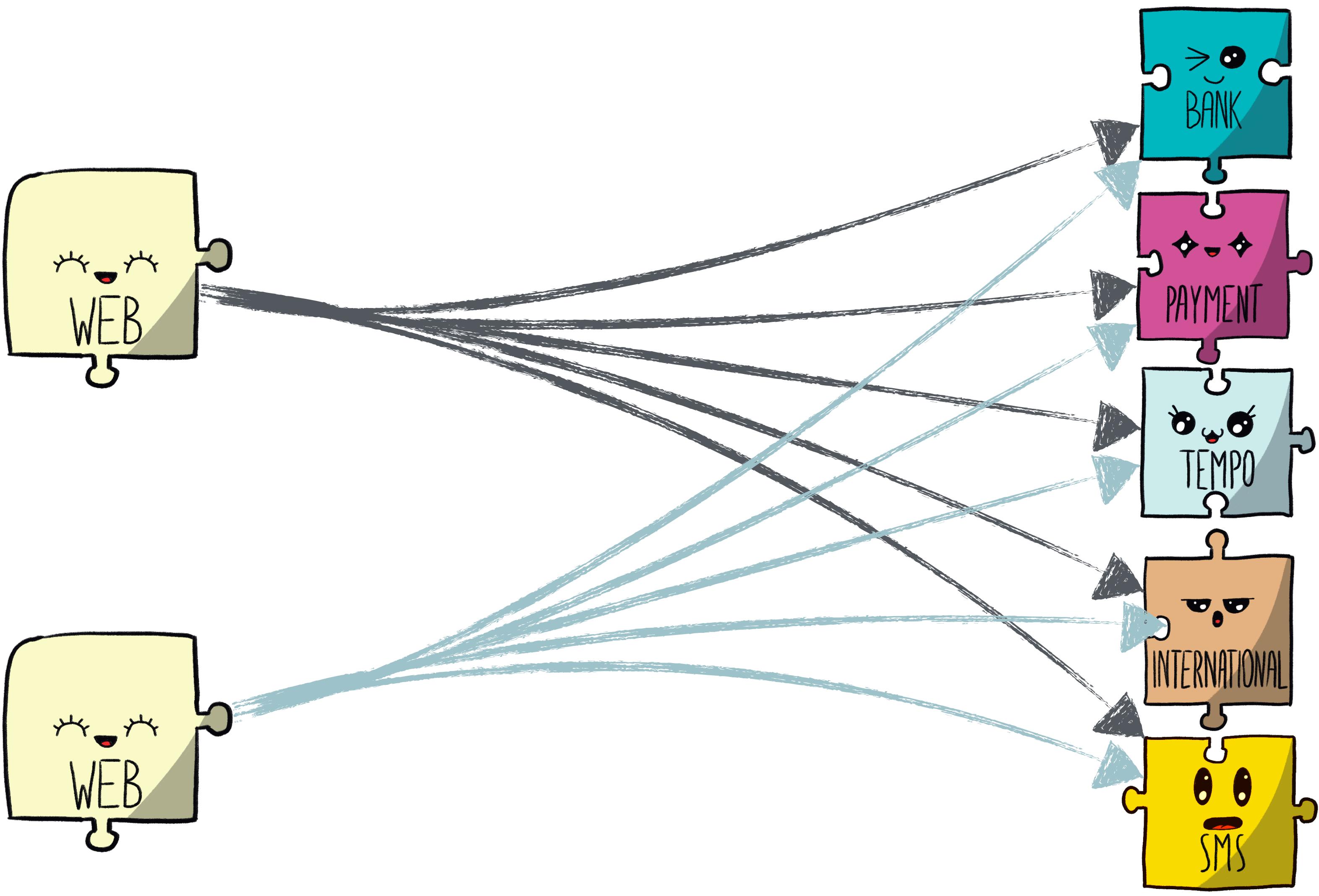
Page 1



Page 2

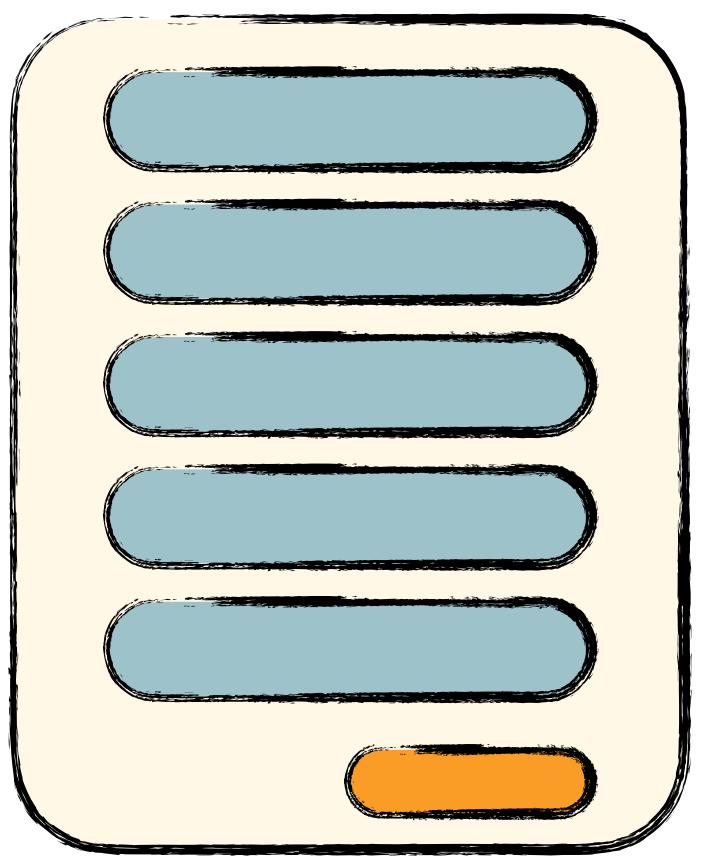


Les mêmes appels

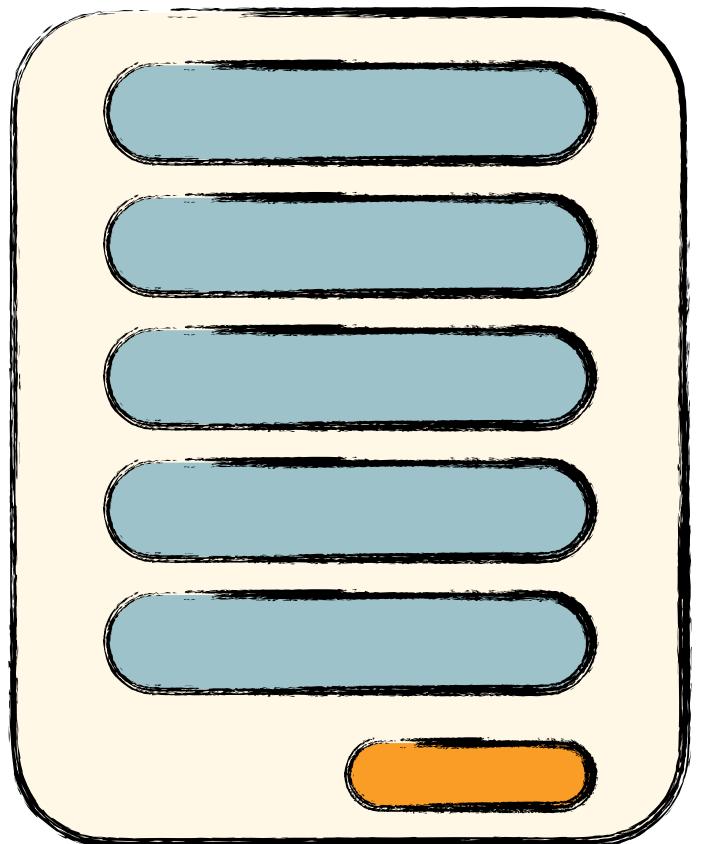


Performances

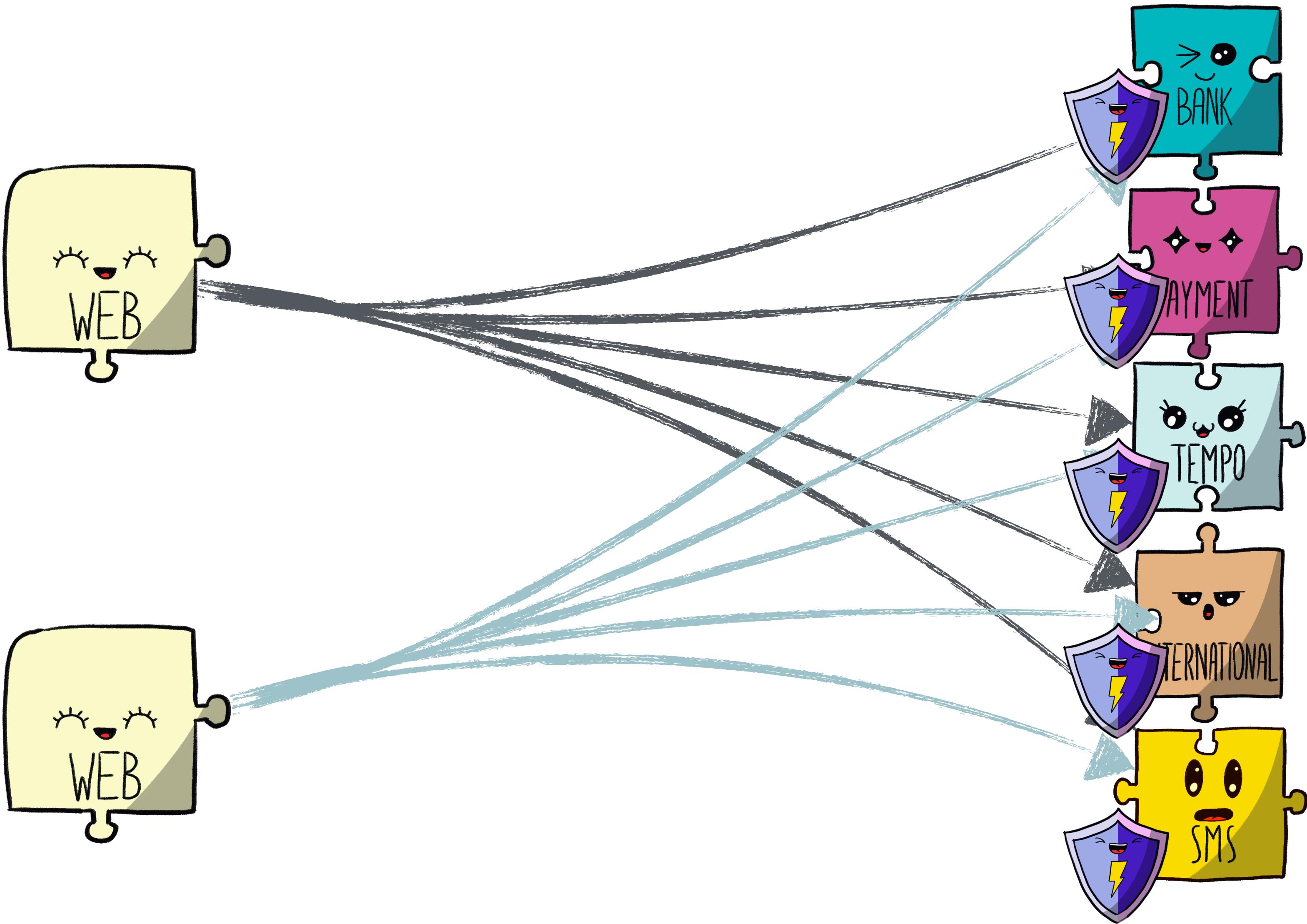
Page 1



Page 2



Les mêmes appels



Performances



Données persistantes

Cache long*

Invalidation lors de l'ajout de données par le web



Évolution possible par les partenaires

Réglage de durée en fonction de la capacité d'évolution du partenaire

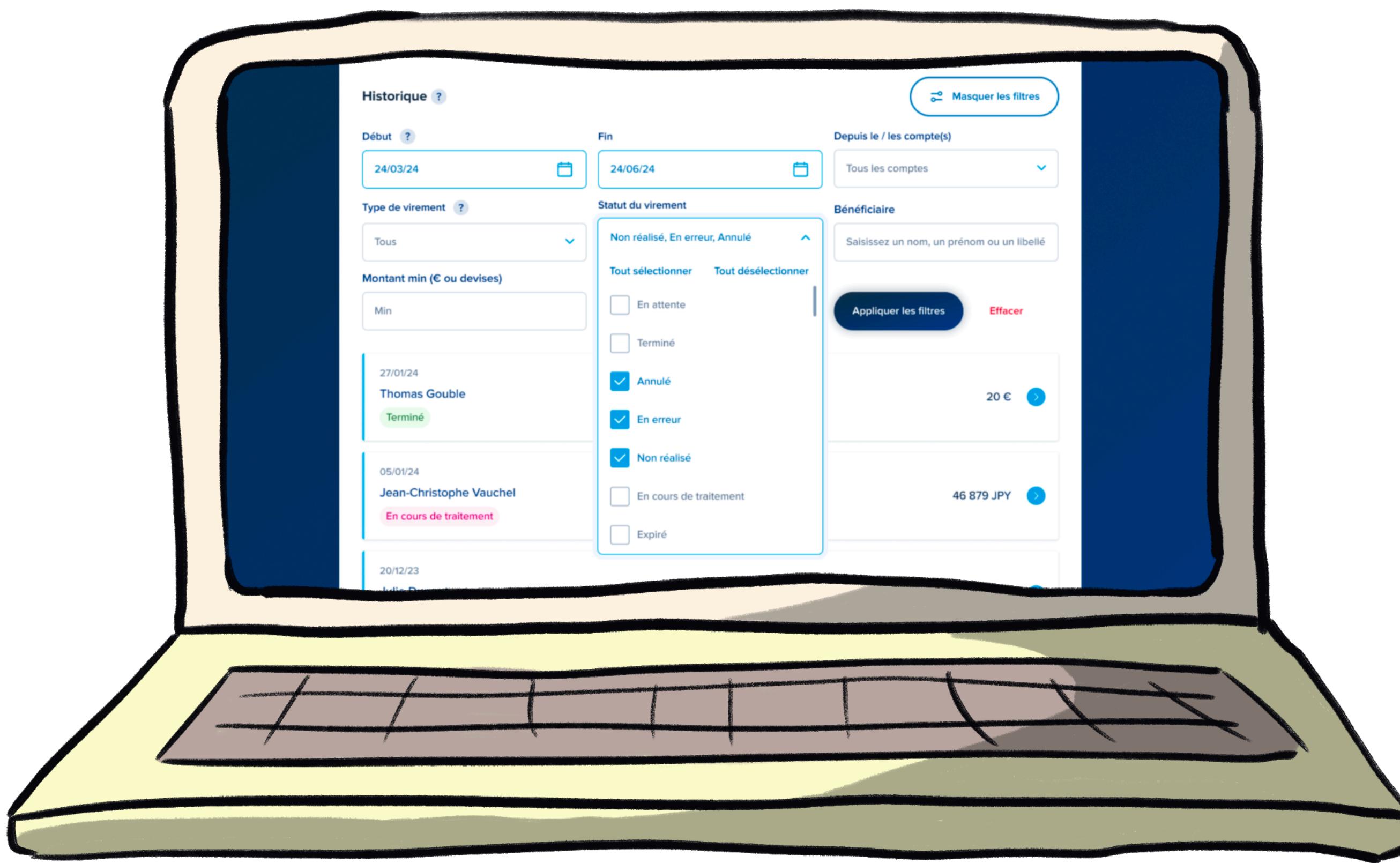


Évolutions & Réutilisations

Évolution de la solution



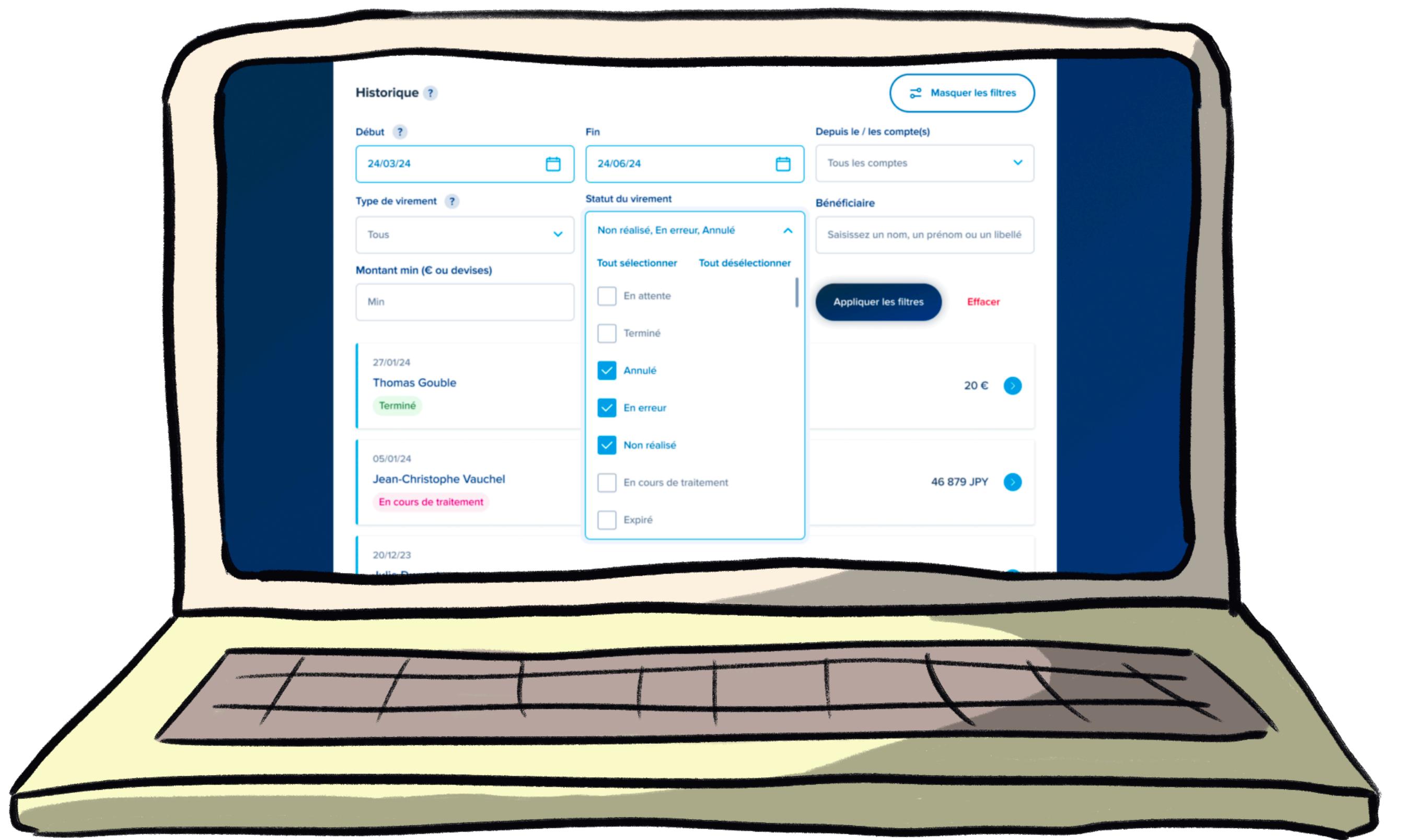
Ajout de filtre de recherche



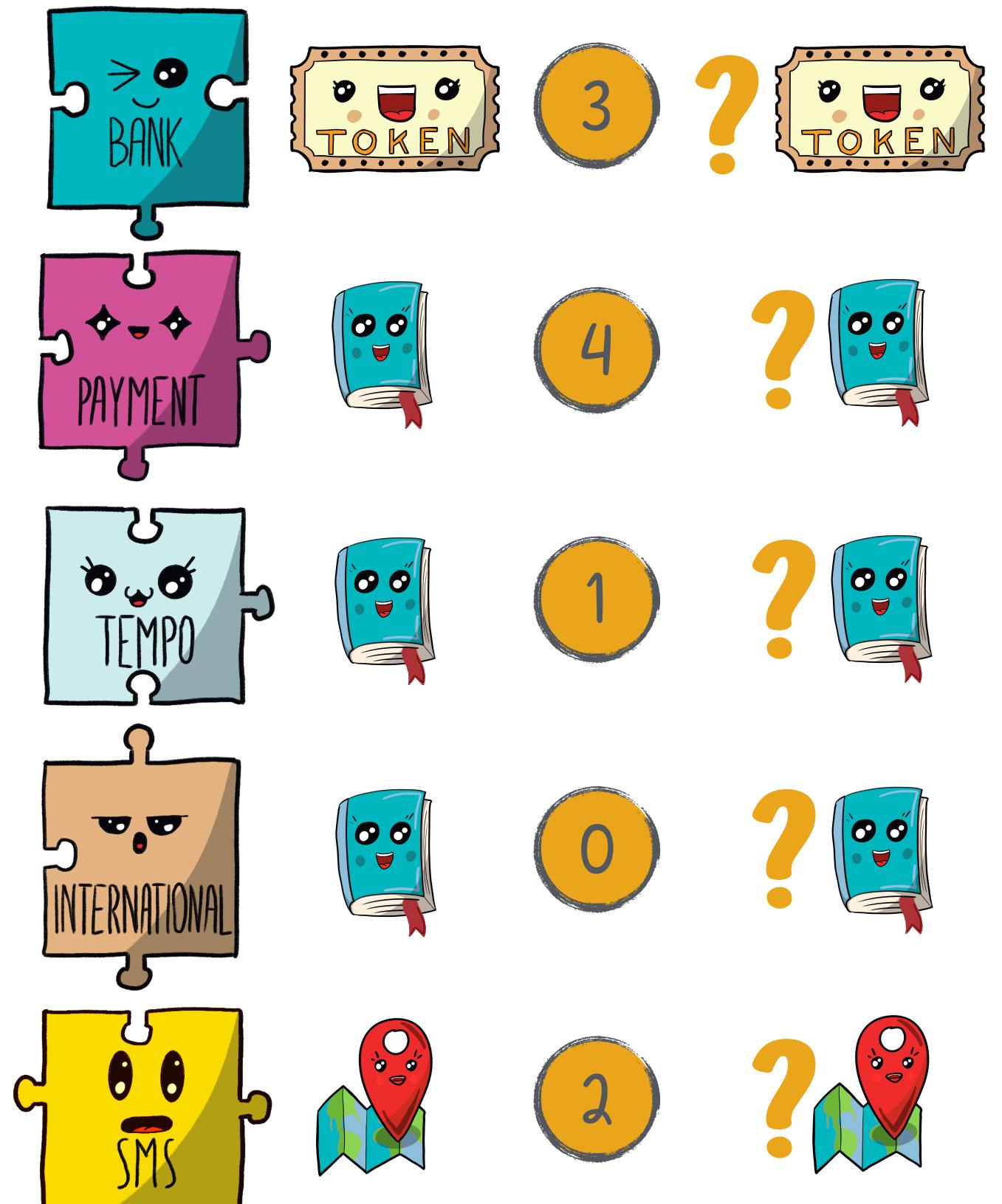
Évolution de la solution



Ajout de filtre de recherche



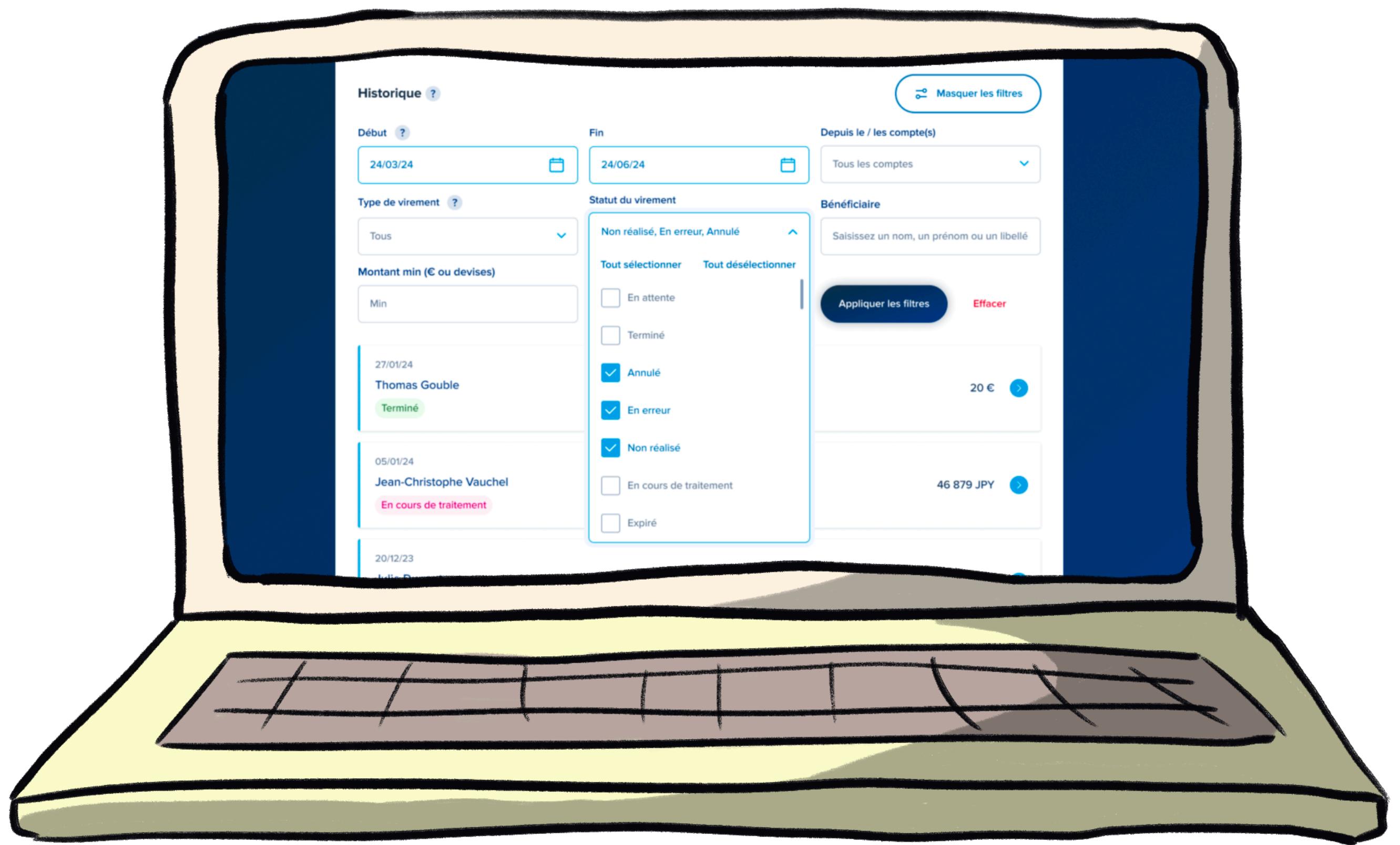
Source Courant Offset Suivant



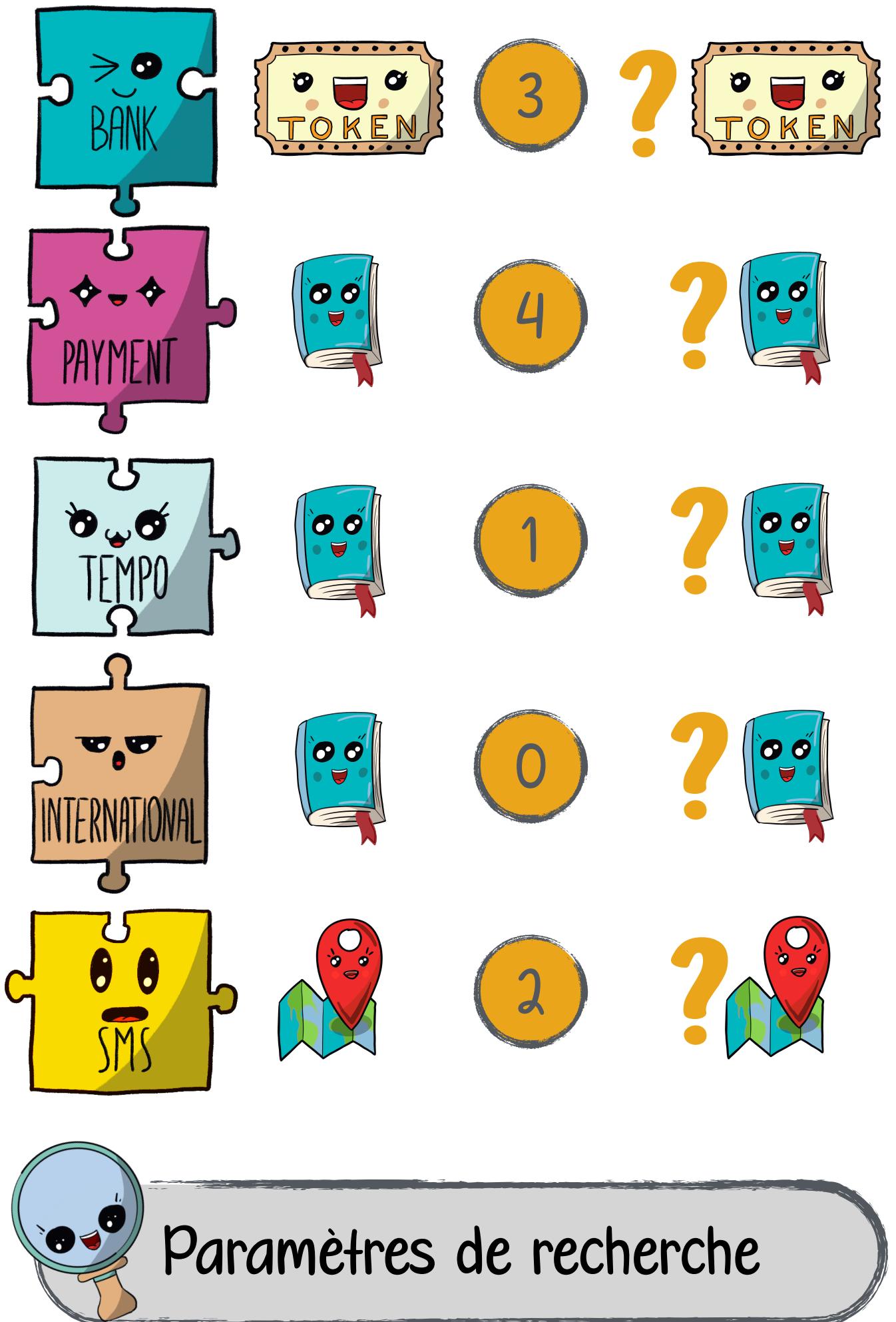
Évolution de la solution



Ajout de filtre de recherche



Source Courant Offset Suivant



Réutilisation de la solution



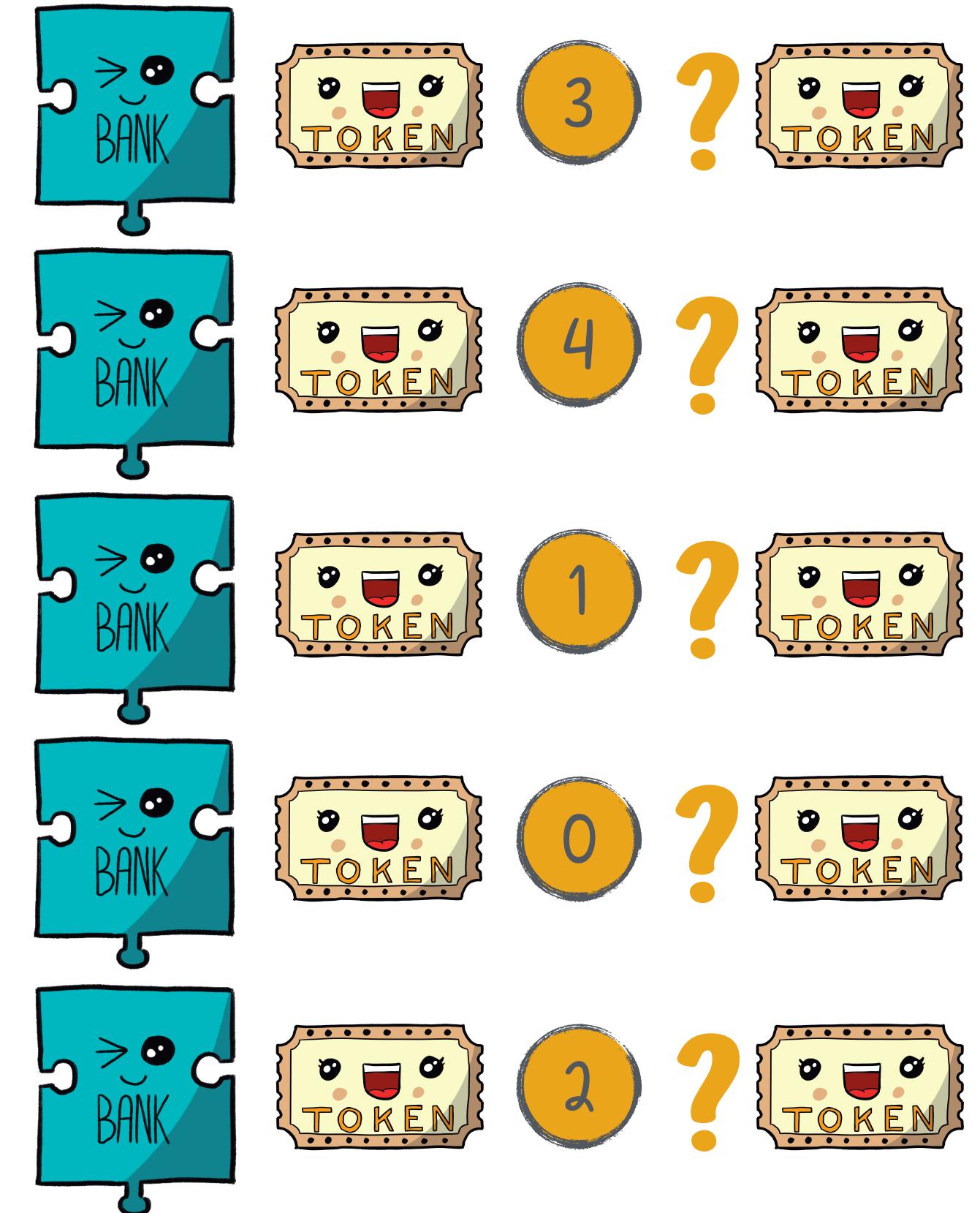
Liste des opérations sur plusieurs comptes

Réutilisation de la solution



Liste des opérations sur plusieurs comptes

Source Courant Offset Suivant



Paramètres de recherche

Réutilisation de la solution



Liste des opérations sur plusieurs comptes

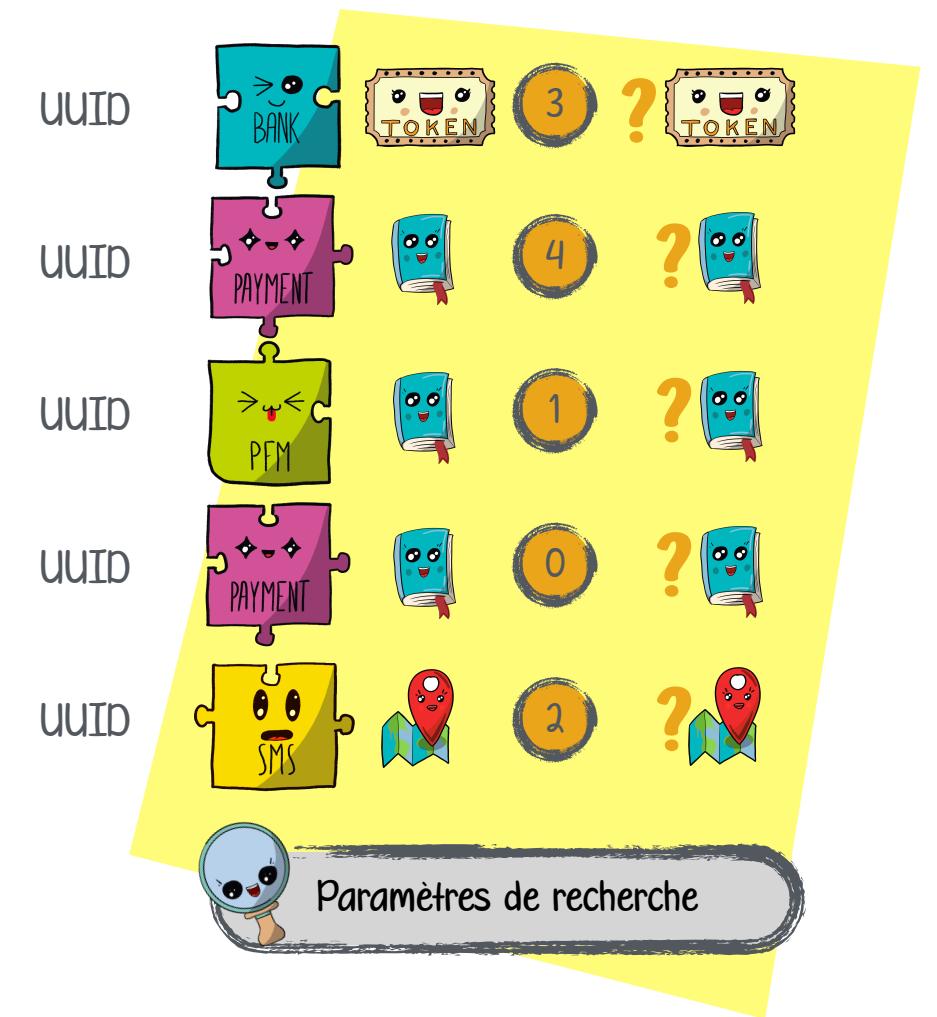
Identifiant Source Courant Offset Suivant



Réutilisation de la solution



Liste des documents



Conclusion

- Mélanger les données
- Masquer l'origine des données
- Cohérence des pages

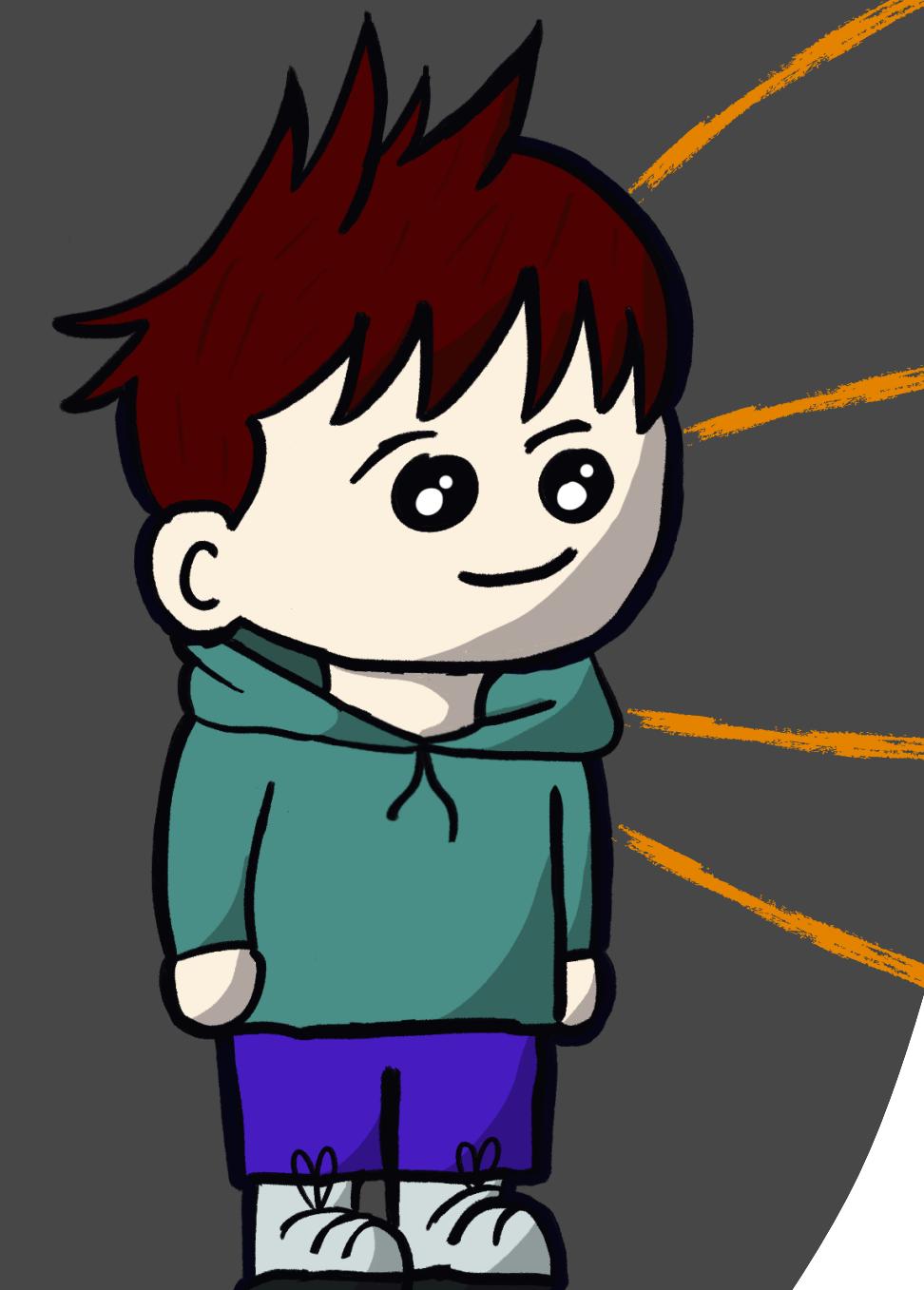
Conclusion

- Mélanger les données
- Masquer l'origine des données
- Cohérence des pages
- Donner fard à ma grand mère

Mathieu Desnouveaux



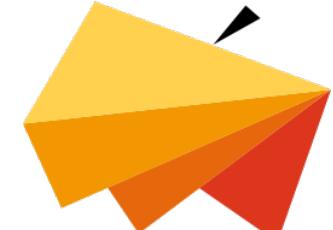
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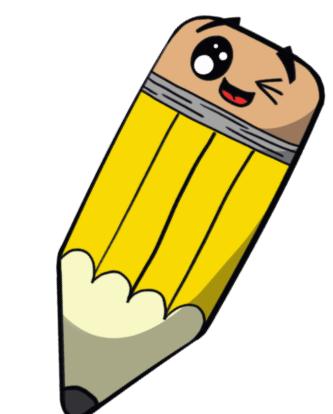
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