

Les associations entre entités avec JPA

Contrôles des relations entre entités avec JPA.

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JPA offre une prise en charge complète pour la gestion des relations entre entités de différents types, que ce soit en mode un-vers-un (OneToOne), un-vers-plusieurs (OneToMany), ou plusieurs-vers-plusieurs (ManyToMany). Ces relations peuvent être configurées de manière unidirectionnelle ou bidirectionnelle.

1 One To One (1-1)

Dans certaines situations, lors de la modélisation orientée objet, il est nécessaire d'associer deux classes dans une relation un-à-un, mais en gardant une seule relation.

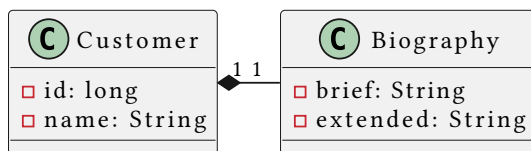


Figure 1. – Un Customer a une Biography

```
No JDBC connection available.
Set system properties
'jdbc.url' (and optionally
'jdbc.user'/'jdbc.password'), or
provide a Connection in the kernel
environment.
```

Figure 2

Pour cela JPA propose des annotations spécifiques :

@Embeddable: Cette annotation indique que les membres d'une classe Java peuvent être persistés en tant qu'attributs de la classe qui les utilise. En d'autres termes, elle spécifie qu'une classe peut être utilisée comme composant réutilisable dont les propriétés peuvent être incorporées dans une autre entité.

@Embedded: Utilisée au niveau d'un membre de classe annoté avec **@Embeddable**, cette annotation indique que le membre annoté doit être intégré dans la relation. Cela signifie que les propriétés de la classe annotée avec **@Embeddable** seront incluses dans la table de la classe qui les utilise.

```
Error: failed to read file /
home/jovyan/work/examples/github/ebpro/
sample-hellojpa/src/main/java/fr/
univtln/bruno/demos/jpa/hello/samples/
ex_biography/Biography.java: /home/jo-
vyan/work/examples/github/ebpro/sample-
hellojpa/src/main/java/fr/univtln/bruno/
demos/jpa/hello/samples/ex_biography/
Biography.java
```

Figure 3. – Embeddable.java

```
Error: failed to read file /
home/jovyan/work/examples/github/ebpro/
sample-hellojpa/src/main/java/fr/
univtln/bruno/demos/jpa/hello/samples/
ex_biography/Customer.java: /home/jo-
vyan/work/examples/github/ebpro/sample-
hellojpa/src/main/java/fr/univtln/bruno/
demos/jpa/hello/samples/ex_biography/
Customer.java
```

Customer.java

On peut donc rendre persistente une instance de Customer associé à une instance de Biography.

```
import fr.univtln.bruno.demos.jpa.hello.samples.ex_biography.Customer;
try (EntityManager entityManager =
emf.createEntityManager()) {
    entityManager.getTransaction().begin();

        Customer customer =
Customer.of("Jim");
customer.setBiography(Biography.builder()
.brief("bla")
.extended("bla bla")
.build());
entityManager.persist(customer);

entityManager.getTransaction().commit();
}
```

dans une seule relation

```
No JDBC connection available.
Set system properties
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provide a Connection in the kernel
environment.
```

Figure 4

2 One to Many (1-N)

PlantUML 1.2026.0

This version of PlantUML is 277 days old, so you should consider upgrading from <https://plantuml.com/download>

[From string (line 6)]

```
@startuml
class Order {
    - id: long
    - date: LocalDateTime
}
class Line {
Syntax Error? (Assumed diagram type: class)
```

Figure 5. – Une Order a plusieurs Line

```
Error: failed to read file /home/jovyan/work/
examples/github/ebpro/sample-hellojpa/
src/main/java/fr/univtln/bruno/demos/
jpa/hello/samples/ex_associations/
ex_onetomany_b/Line.java: /home/jo-
vyan/work/examples/github/ebpro/sample-
hellojpa/src/main/java/fr/univtln/bruno/
demos/jpa/hello/samples/ex_associations/
ex_onetomany_b/Line.java
```

```
Error: failed to read file /home/jovyan/work/
examples/github/ebpro/sample-hellojpa/
src/main/java/fr/univtln/bruno/demos/
jpa/hello/samples/ex_associations/
ex_onetomany_b/Order.java: /home/jo-
vyan/work/examples/github/ebpro/sample-
hellojpa/src/main/java/fr/univtln/bruno/
demos/jpa/hello/samples/ex_associations/
ex_onetomany_b/Order.java
```

```
No JDBC connection available.
Set system properties
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'jdbc.user'/'jdbc.password'), or
provide a Connection in the kernel
environment.
```

Figure 6

2.1 Avec deux entités

Dans le cas général, l'attribut de type `Collection<T>` est annoté avec `@OneToMany`.

L'attribut optionnel `mappedBy` indique le nom de l'attribut correspondant dans le type `T` si l'on souhaite une relation bi-directionnelle. L'autre entité (de Type `T`) est alors annotée avec `@ManyToOne`

```
Error: failed to read file /home/jovyan/work/
examples/github/ebpro/sample-hellojpa/
src/main/java/fr/univtl/bruno/demos/
jpa/hello/samples/ex_associations/
ex_onetomany_a/Order.java: /home/jo-
vyan/work/examples/github/ebpro/sample-
hellojpa/src/main/java/fr/univtl/bruno/
demos/jpa/hello/samples/ex_associations/
ex_onetomany_a/Order.java
```

```
Error: failed to read file /home/jovyan/work/
examples/github/ebpro/sample-hellojpa/
src/main/java/fr/univtl/bruno/demos/
jpa/hello/samples/ex_associations/
ex_onetomany_a/Line.java: /home/jo-
vyan/work/examples/github/ebpro/sample-
hellojpa/src/main/java/fr/univtl/bruno/
demos/jpa/hello/samples/ex_associations/
ex_onetomany_a/Line.java
```

```
06:46:09.185 [IJava-executor-0]
INFO notebook -- Order(id=1,
date=2026-10-14T06:46:09.030881)
[Line(id=3, product=Pen, price=1.0),
Line(id=2, product=Paper,
```

```
price=5.0), Line(id=1,
product=Scissor, price=8.0)]
```

```
No JDBC connection available.
Set system properties
'jdbc.url' (and optionally
'jdbc.user'/'jdbc.password'), or
provide a Connection in the kernel
environment.
```

Figure 7

```
No JDBC connection available.
Set system properties
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provide a Connection in the kernel
environment.
```

Figure 8

3 Many to Many (N-M)

L'annotation `@ManyToMany` en Java Persistence API (JPA) est utilisée pour modéliser une relation many-to-many entre deux entités. La table d'association sera alors générée et utilisée implicitement.

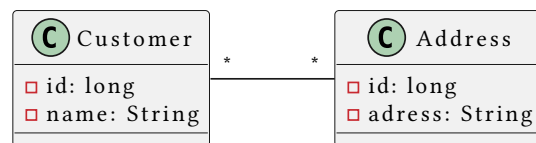


Figure 9. – Un Customer a plusieurs adresses (qui peuvent être associées à d'autres)

```
No JDBC connection available.
Set system properties
'jdbc.url' (and optionally
'jdbc.user'/'jdbc.password'), or
provide a Connection in the kernel
environment.
```

Figure 10

Error: failed to read file /home/jovyan/work/examples/github/ebpro/sample-hellojpa/src/main/java/fr/univtl/bruno/demos/jpa/hello/samples/ex_associations/ex_manytomany/Customer.java: /home/jovyan/work/examples/github/ebpro/sample-hellojpa/src/main/java/fr/univtl/bruno/demos/jpa/hello/samples/ex_associations/ex_manytomany/Customer.java

Error: failed to read file /home/jovyan/work/examples/github/ebpro/sample-hellojpa/src/main/java/fr/univtl/bruno/demos/jpa/hello/samples/ex_associations/ex_manytomany/Address.java: /home/jovyan/work/examples/github/ebpro/sample-hellojpa/src/main/java/fr/univtl/bruno/demos/jpa/hello/samples/ex_associations/ex_manytomany/Address.java

```
06:46:11.299 [IJava-executor-0] WARN
o.a.h.c.p.ResponseProcessCookies --
Invalid cookie header: "set-cookie: __cf_bm=
h.FVmmMj0vgvrI7A3DN8fVfgrrWU3Zcbu59VzNsDM
HttpOnly; SameSite=None; Secure;
Path=/;
Domain=repo.maven.apache.org;
Expires=Wed, 14 Oct 2026 07:16:11
GMT". Invalid 'expires' attribute:
Wed, 14 Oct 2026 07:16:11 GMT
06:46:11.443 [IJava-executor-0] WARN
o.a.h.c.p.ResponseProcessCookies --
Invalid cookie header: "set-cookie: __cf_bm=
hbvsJh4Rhn8bTutmFhwQ727WfwnnGAXX7EHpAYtqp
HttpOnly; SameSite=None; Secure;
Path=/;
Domain=repo.maven.apache.org;
Expires=Wed, 14 Oct 2026 07:16:11
GMT". Invalid 'expires' attribute:
Wed, 14 Oct 2026 07:16:11 GMT
06:46:11.493 [IJava-executor-0] WARN
o.a.h.c.p.ResponseProcessCookies --
Invalid cookie header: "set-cookie: __cf_bm=
HttpOnly; SameSite=None; Secure;
```

```
Path=/;
Domain=repo.maven.apache.org;
Expires=Wed, 14 Oct 2026 07:16:11
GMT". Invalid 'expires' attribute:
Wed, 14 Oct 2026 07:16:11 GMT
06:46:11.545 [IJava-executor-0] WARN
o.a.h.c.p.ResponseProcessCookies --
Invalid cookie header: "set-cookie: __cf_bm=128d0YvULSTL
YkKo_RQ7Y3ATtnQhIIo1S2PjKiq0A7mld9QL9ma98El.C8JyAyDbpF
HttpOnly; SameSite=None; Secure;
Path=/;
Domain=repo.maven.apache.org;
Expires=Wed, 14 Oct 2026 07:16:11
GMT". Invalid 'expires' attribute:
Wed, 14 Oct 2026 07:16:11 GMT
06:46:11.598
[BasicRepositoryConnector-
repo.maven.apache.org-0-0] WARN
o.a.h.c.p.ResponseProcessCookies --
Invalid cookie header: "set-cookie: __cf_bm=cXIGX51kM_8S
F3PINLMCtHI7kD.EKBai5UDnZ8B0G9VdAGWXTwLXhzlw0mJENfyR0L1
HttpOnly; SameSite=None; Secure;
Path=/;
Domain=repo.maven.apache.org;
Expires=Wed, 14 Oct 2026 07:16:11
GMT". Invalid 'expires' attribute:
Wed, 14 Oct 2026 07:16:11 GMT
06:46:11.653
[BasicRepositoryConnector-
repo.maven.apache.org-0-2] WARN
o.a.h.c.p.ResponseProcessCookies --
Invalid cookie header: "set-cookie: __cf_bm=yMBjH_GGjHok
tDFGRrTh_8WI2iWsyatSy_dvkWVJEKrrbE6H3MpcZZZuGcy2Yp_3hk
HttpOnly; SameSite=None; Secure;
Path=/;
Domain=repo.maven.apache.org;
Expires=Wed, 14 Oct 2026 07:16:11
GMT". Invalid 'expires' attribute:
Wed, 14 Oct 2026 07:16:11 GMT
06:46:11.653
[BasicRepositoryConnector-
repo.maven.apache.org-0-1] WARN
o.a.h.c.p.ResponseProcessCookies --
```

```
Invalid cookie header: "set-cookie: __cf_bm=
HttpOnly; SameSite=None; Secure;
Path=/;
Domain=repo.maven.apache.org;
Expires=Wed, 14 Oct 2026 07:16:11
GMT". Invalid 'expires' attribute:
Wed, 14 Oct 2026 07:16:11 GMT
06:46:11.655
[BasicRepositoryConnector-
repo.maven.apache.org-0-3]      WARN
o.a.h.c.p.ResponseProcessCookies --
Invalid cookie header: "set-cookie: __cf_bm=f2_Nvj4Sc0qQIwhqi8buEIbDP5oPlxy54HtuBNjTOM-1791960371
nDVW_a_0gMfqURZBmKvsLRA3gLv_mFLM2XlPv518en04P4oiWYbbflsvp71rMB5SanEuJH5pXYH864_bSb2teanL_Om5i6usz
HttpOnly; SameSite=None; Secure;
Path=/;
Domain=repo.maven.apache.org;
Expires=Wed, 14 Oct 2026 07:16:11
GMT". Invalid 'expires' attribute:
Wed, 14 Oct 2026 07:16:11 GMT
```

```
No JDBC connection available. ttuq5I-1791960371
Set system properties
'jdbc.url' (and optionally
'jdbc.user'/'jdbc.password'), or
provide a Connection in the kernel
environment.
```

Figure 13

```
No JDBC connection available.
Set system properties
'jdbc.url' (and optionally
'jdbc.user'/'jdbc.password'), or
provide a Connection in the kernel
environment.
```

Figure 11

```
No JDBC connection available.
Set system properties
'jdbc.url' (and optionally
'jdbc.user'/'jdbc.password'), or
provide a Connection in the kernel
environment.
```

Figure 12