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# **Auditing**

# **Basics**

Spring Data provides sophisticated support to transparently keep track of who created or changed an entity and when the change happened. To benefit from that functionality, you have to equip your entity classes with auditing metadata that can be defined either using annotations or by implementing an interface. Additionally, auditing has to be enabled either through Annotation configuration or XML configuration to register the required infrastructure components. Please refer to the store-specific section for configuration samples.

# (i) NOTE

Applications that only track creation and modification dates are not required do make their entities implement AuditorAware.

# **Annotation-based Auditing Metadata**

// ... further properties omitted

We provide @CreatedBy and @LastModifiedBy to capture the user who created or modified the entity as

well as @CreatedDate and @LastModifiedDate to capture when the change happened.

An audited entity JAVA class Customer { @CreatedBy private User user; @CreatedDate private Instant createdDate;

As you can see, the annotations can be applied selectively, depending on which information you want to capture. The annotations, indicating to capture when changes are made, can be used on properties of type JDK8 date and time types, long, Long, and legacy Java Date and Calendar.

Auditing metadata does not necessarily need to live in the root level entity but can be added to an embedded one (depending on the actual store in use), as shown in the snippet below.

Audit metadata in embedded entity

```
JAVA
class Customer {
 private AuditMetadata auditingMetadata;
 // ... further properties omitted
class AuditMetadata {
 @CreatedBy
  private User user;
 @CreatedDate
  private Instant createdDate;
```

# In case you do not want to use annotations to define auditing metadata, you can let your domain class imple-

**Interface-based Auditing Metadata** 

ment the Auditable interface. It exposes setter methods for all of the auditing properties.

**AuditorAware** 

In case you use either @CreatedBy or @LastModifiedBy, the auditing infrastructure somehow needs to become aware of the current principal. To do so, we provide an AuditorAware<T> SPI interface that you have to implement to tell the infrastructure who the current user or system interacting with the application is. The generic type T defines what type the properties annotated with @CreatedBy or @LastModifiedBy have to be.

The following example shows an implementation of the interface that uses Spring Security's Authentication object:

Implementation of AuditorAware based on Spring Security

```
JAVA
class SpringSecurityAuditorAware implements AuditorAware<User> {
 @Override
  public Optional<User> getCurrentAuditor() {
    return Optional.ofNullable(SecurityContextHolder.getContext())
            .map(SecurityContext::getAuthentication)
            .filter(Authentication::isAuthenticated)
            .map(Authentication::getPrincipal)
            .map(User.class::cast);
```

tom UserDetails instance that you have created in your UserDetailsService implementation. We assume here that you are exposing the domain user through the UserDetails implementation but that, based on the Authentication found, you could also look it up from anywhere.

The implementation accesses the Authentication object provided by Spring Security and looks up the cus-

# ReactiveAuditorAware When using reactive infrastructure you might want to make use of contextual information to provide

Authentication object:

@CreatedBy or @LastModifiedBy information. We provide an ReactiveAuditorAware<T> SPI interface that you have to implement to tell the infrastructure who the current user or system interacting with the application is. The generic type T defines what type the properties annotated with @CreatedBy or @LastModifiedBy have to be. The following example shows an implementation of the interface that uses reactive Spring Security's

JAVA

JAVA

Implementation of ReactiveAuditorAware based on Spring Security class SpringSecurityAuditorAware implements ReactiveAuditorAware<User> {

```
@Override
   public Mono<User> getCurrentAuditor() {
     return ReactiveSecurityContextHolder.getContext()
                  .map(SecurityContext::getAuthentication)
                  .filter(Authentication::isAuthenticated)
                  .map(Authentication::getPrincipal)
                  .map(User.class::cast);
The implementation accesses the Authentication object provided by Spring Security and looks up the cus-
```

here that you are exposing the domain user through the UserDetails implementation but that, based on the Authentication found, you could also look it up from anywhere. There is also a convenience base class, AbstractAuditable, which you can extend to avoid the need to manually implement the interface methods. Doing so increases the coupling of your domain classes to Spring Data,

tom UserDetails instance that you have created in your UserDetailsService implementation. We assume

which might be something you want to avoid. Usually, the annotation-based way of defining auditing metadata is preferred as it is less invasive and more flexible. **General Auditing Configuration** 

### Spring Data JPA ships with an entity listener that can be used to trigger the capturing of auditing information. First, you must register the AuditingEntityListener to be used for all entities in your persistence contexts

inside your orm.xml file, as shown in the following example: Example 1. Auditing configuration orm.xml XML

<persistence-unit-metadata> <persistence-unit-defaults> <entity-listeners>

@Entity

```
<entity-listener class="....data.jpa.domain.support.AuditingEntityListener" />
       </entity-listeners>
     </persistence-unit-defaults>
   </persistence-unit-metadata>
You can also enable the AuditingEntityListener on a per-entity basis by using the @EntityListeners
annotation, as follows:
```

## @EntityListeners(AuditingEntityListener.class) public class MyEntity {

(i) NOTE The auditing feature requires spring-aspects.jar to be on the classpath.

Example 2. Activating auditing using XML configuration

With orm.xml suitably modified and spring-aspects.jar on the classpath, activating auditing functionality

is a matter of adding the Spring Data JPA auditing namespace element to your configuration, as follows:

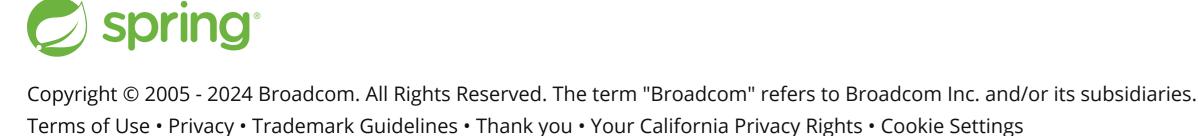
```
<jpa:auditing auditor-aware-ref="yourAuditorAwareBean" />
As of Spring Data JPA 1.5, you can enable auditing by annotating a configuration class with the
```

on the classpath. The following example shows how to use the @EnableJpaAuditing annotation: Example 3. Activating auditing with Java configuration JAVA

@EnableJpaAuditing annotation. You must still modify the orm.xml file and have spring-aspects.jar

```
@Configuration
   @EnableJpaAuditing
   class Config {
     @Bean
     public AuditorAware<AuditableUser> auditorProvider() {
       return new AuditorAwareImpl();
If you expose a bean of type AuditorAware to the ApplicationContext, the auditing infrastructure auto-
```

matically picks it up and uses it to determine the current user to be set on domain types. If you have multiple implementations registered in the ApplicationContext, you can select the one to be used by explicitly setting the auditorAwareRef attribute of @EnableJpaAuditing.





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