SpringBoot

# Auditing in SpringBoot (spring data envers)

3. Annotate entity classes with

@Audited  
@EntityListeners(AuditingEntityListener.**class**)

@Data  
@NoArgsConstructor  
@AllArgsConstructor  
@Builder  
@Entity  
@Table(name = **"employee"**)  
@Accessors(chain = **true**)  
@Audited  
@EntityListeners(AuditingEntityListener.**class**)  
**public class** Employee **extends** BaseEntity{  
 @Id  
 @GeneratedValue(strategy = GenerationType.***IDENTITY***)  
 **private** Long **id**;  
   
 @Column   
 **private** String **name**;  
  
 @Column   
 **private** Double **salary**;  
  
 @Column   
 **private** String **city**;  
  
 @OneToOne(fetch = FetchType.***LAZY***,cascade = CascadeType.***ALL***)   
 **private** Account **account**;  
  
 @OneToMany(fetch = FetchType.***LAZY***, cascade = CascadeType.***ALL***, orphanRemoval = **true**)  
 @JoinColumn(name = **"employee\_id"**)  
 @NotAudited  
 **private** List<Document> **documentList**;  
  
}

Here

@Audited - When you annotate a JPA entity class with **@Audited**, Hibernate Envers will automatically track changes to instances of that entity, allowing you to maintain a history of modifications over time.

@EntityListeners - These listeners can be useful for tasks like auditing, validation, or custom behavior that needs to be triggered in response to entity state changes

**@NotAudited :** If you dont want the relationship to be audited mark it as *org.hibernate.envers.NotAudited*

4. Extend your Repository with RevisionRepository

**public interface** EmployeeRepository **extends** RevisionRepository<Employee, Long, Long>, JpaRepository<Employee, Long>, EmployeeRepositoryCustom,  
 QuerydslPredicateExecutor<Employee>,  
 QuerydslBinderCustomizer<QEmployee> {  
  
 @Override  
 **default void** customize(QuerydslBindings bindings, QEmployee root) {  
 bindings.bind(String.**class**).first((StringPath path, String value) -> path.containsIgnoreCase(value));  
 }  
}

*RevisionRepository has following methods to get Version history*

Certainly, here are the common methods you might find in a **RevisionRepository** for querying and retrieving historical data using Hibernate Envers, presented in a table format:

| **Method Signature** | **Description** |
| --- | --- |
| **findRevision(Number revision)** | Retrieves a specific revision. |
| **findRevisions(Class<T> entityClass, ID id)** | Retrieves all revisions for a specific entity with the given ID. |
| **findRevisions(Class<T> entityClass)** | Retrieves all revisions for a specific entity class. |
| **findRevisionsBetween(Class<T> entityClass, fromDate, toDate)** | Retrieves all revisions for a specific entity class that occurred between two given timestamps. |
| **findRevisionsByEntityIdAndRevisionNumber(Class<T> entityClass, ID id, Number revision)** | Retrieves a specific revision of an entity with the given ID. |

That’it . once you ran the application you can see both entity tables & audit tables get created in the DB.

Getting History API Example

//Controller

@ApiOperation(**"Get Employee Version History By Id"**)  
@GetMapping(**"/{id}/history"**)  
**public** List<EmployeeDto> getEmployeeHistoryById(@PathVariable(**"id"**) Long id, Pageable pageable) {  
 **return employeeService**.getEmployeeHistoryById(id, pageable);  
}

//service

@Override  
**public** List<EmployeeDto> getEmployeeHistoryById(Long id, Pageable pageRequest) {  
 **if** (!**employeeRepository**.findById(id).isPresent()) {  
 **throw new** EntityNotFoundException(Employee.**class**, id);  
 }  
 List<EmployeeDto> employeeHistoryDtoList = **null**;  
 **try** {  
 Pageable pageable = PageRequest.*of*(pageRequest.getPageNumber(), pageRequest.getPageSize(), RevisionSort.*desc*());  
 Page<Revision<Long, Employee>> employeeRevisions = **employeeRepository**.findRevisions(id, pageable);  
  
 employeeHistoryDtoList = employeeRevisions.stream().map((p) ->  
 **employeeMapper**.toDto(p.getEntity())  
 ).collect(Collectors.*toList*());  
  
 } **catch** (DataAccessException ex) {  
 ex.printStackTrace();  
 }  
 **return** employeeHistoryDtoList;  
}

//Repository

**public interface** EmployeeRepository **extends** RevisionRepository<Employee, Long, Long>, JpaRepository<Employee, Long>, EmployeeRepositoryCustom,  
 QuerydslPredicateExecutor<Employee>,  
 QuerydslBinderCustomizer<QEmployee> {  
  
   
 **default void** customize(QuerydslBindings bindings, QEmployee root) {  
 bindings.bind(String.**class**).first((StringPath path, String value) -> path.containsIgnoreCase(value));  
 }  
}

Errors

org.springframework.dao.InvalidDataAccessApiUsageException: Service is not yet initialized; nested exception is java.lang.IllegalStateException: Service is not yet initialized

* Make sure audit tables are created in DB or not
* Make sure **integration.envers.enabled**: true should be TRUE

# MapStruct – All Secnarios

**package** com.employee.api.v1.model.mapper;  
  
  
**import** com.employee.api.v1.model.dto.AccountDto;  
**import** com.employee.api.v1.model.dto.DocumentDto;  
**import** com.employee.api.v1.model.dto.EmployeeDto;  
**import** com.employee.dao.entity.Account;  
**import** com.employee.dao.entity.Document;  
**import** com.employee.dao.entity.Employee;  
**import** org.mapstruct.\*;  
  
**import** java.util.Date;  
**import** java.util.List;  
  
  
*/\*\*  
 \** ***@author*** *Satya Kaveti  
 \*/*@Mapper(componentModel = **"spring"**, unmappedTargetPolicy = ReportingPolicy.***IGNORE***)  
**public interface** EmployeeMapper **extends** BaseMapper {  
 @Mapping(target = **"createdDate"**, source = **"createdDate"**, qualifiedByName = **"dateToLong"**)  
 @Mapping(target = **"modifiedDate"**, source = **"modifiedDate"**, qualifiedByName = **"dateToLong"**)  
 **void** toEntity(EmployeeDto employeeDto, @MappingTarget Employee target);  
  
  
 @Mapping(target = **"createdDate"**, source = **"createdDate"**, qualifiedByName = **"longToDate"**)  
 @Mapping(target = **"modifiedDate"**, source = **"modifiedDate"**, qualifiedByName = **"longToDate"**)  
 EmployeeDto toDto(Employee entity);  
  
 AccountDto mapEntityToDtoAccount(Account account);  
  
 Account mapDtoToEntityAccount(AccountDto accountDtos);  
  
  
 List<DocumentDto> mapEntityListToDtoListForDocument(List<Document> document);  
  
 List<Document> mapDtoListToEntityListForDocument(List<DocumentDto> documentDtos);  
  
  
 DocumentDto mapEntityToDtoDocument(Document document);  
  
 Document mapDtoToEntityDocument(DocumentDto documentDtos);  
   
 @Named(**"longToDate"**)  
 **default** Date mapLongToDate(Long value) {  
 **if** (value == **null**) {  
 **return null**;  
 }  
 **return new** Date(value);  
 }  
  
 @Named(**"dateToLong"**)  
 **default** Long mapDateToLong(Date date) {  
 **if** (date == **null**) {  
 **return null**;  
 }  
 **return** date.getTime();  
 }  
}

Same Property name mapping

* Same property with different name but same datadtype
* Property with different datatype (Long- Date)
* List <Objects> inside class
* Inner Object level lists

# SpringBoot Querydsl Guide

Done:

<https://medium.com/@satyacodes/querydsl-with-springboot-a7817f45d557>

Querydsl is a framework that enables the construction of statically typed SQL-like queries through its fluent API. Spring Data modules offer integration with Querydsl through QuerydslPredicateExecutor.

The **Querydsl** is a third-party library that lets us define type-safe queries. It also makes query generation relatively easy through its fluent DSL APIs. In general, the native SQL or the Java Persistence Query Language (JPQL) does not provide any means to validate the correctness of the queries at compile time. Any query syntax or other issues are detected at run time and cause the application to fail.

Maven integration

Add the following dependencies to your Maven project:

<dependency>  
 <groupId>com.querydsl</groupId>  
 <artifactId>querydsl-apt</artifactId>  
 <version>${querydsl.version}</version>  
 <scope>provided</scope>  
</dependency>  
  
<dependency>  
 <groupId>com.querydsl</groupId>  
 <artifactId>querydsl-jpa</artifactId>  
 <version>${querydsl.version}</version>  
</dependency>

1.querydsl-apt dependency is the annotation processing tool (APT) that processes the annotations in source files. This tool generates the so-called Q-types.

The Q-type classes are directly related to the entity classes of the application, but these classes are prefixed with the letter **Q**. For instance, if we have a Users class marked with the @Entity annotation in the application, then the generated Q-type will reside in a QUsers.java source file.

2.querydsl-jpalibrary is the Querydsl which is designed to be used together with the JPA application. Similarly, Querydsl has support for other data stores such as MongoDB withquerydsl-mongodbmodule. Refer to<http://www.querydsl.com/>for more details.

And now, configure the Maven APT plugin:

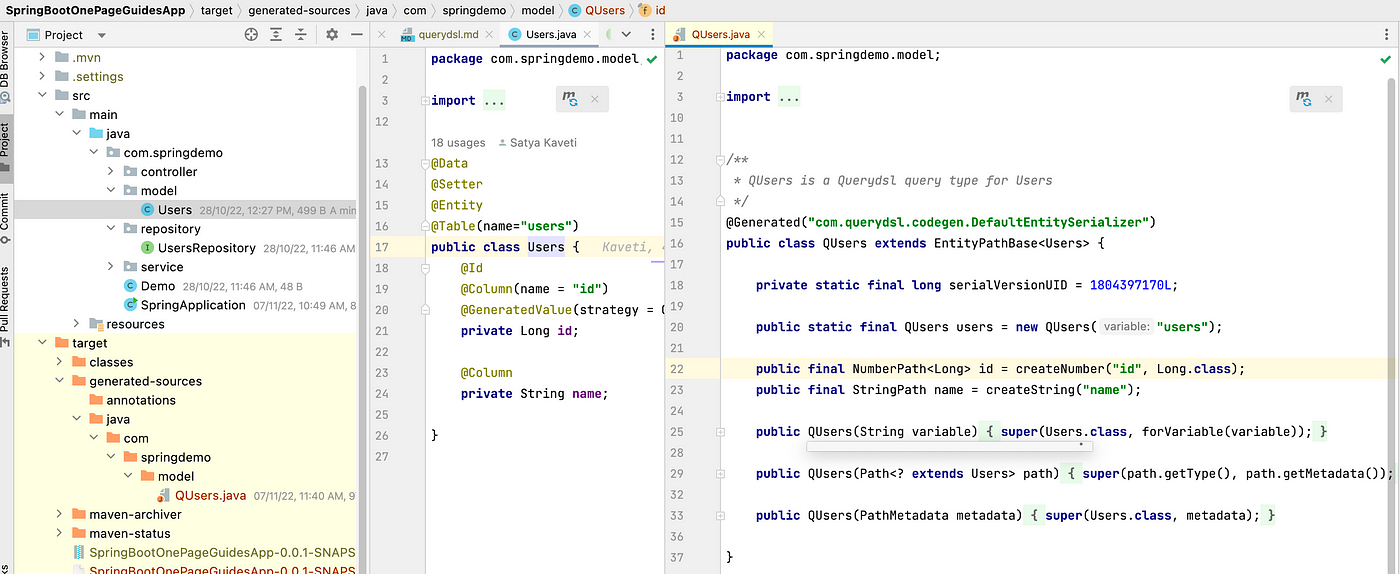
<project>  
 <build>  
 <plugins>  
 ...  
 <plugin>  
 <groupId>com.mysema.maven</groupId>  
 <artifactId>apt-maven-plugin</artifactId>  
 <version>1.1.3</version>  
 <executions>  
 <execution>  
 <goals>  
 <goal>process</goal>  
 </goals>  
 <configuration>  
 <outputDirectory>target/generated-sources/java</outputDirectory>  
 <processor>com.querydsl.apt.jpa.JPAAnnotationProcessor</processor>  
 </configuration>  
 </execution>  
 </executions>  
 </plugin>  
 ...  
 </plugins>  
 </build>  
</project>

This plugin makes sure that the Q-types are generated automatically during the process goal of Maven build. The output directory is the folder where the the Q-types are generated

The JPAAnnotationProcessor finds domain types annotated with the javax.persistence.Entity annotation and generates query types for them.

If you use Hibernate annotations in your domain types you should use the APT processor com.querydsl.apt.hibernate.HibernateAnnotationProcessor instead.

Run mvn clean install and you will get your Query types generated into target/generated-sources/java.



we have Users.java as Entity class

@Data  
@Setter  
@Entity  
@Table(name="users")  
public class Users {  
 @Id  
 @Column(name = "id")  
 @GeneratedValue(strategy = GenerationType.IDENTITY)  
 private Long id;  
  
 @Column  
 private String name;  
  
 @Column  
 private Double salary;  
}

Let us now create the UsersRepository interface which extends JpaRepository and the QuerydslPredicateExecutor

public interface UsersRepository extends JpaRepository<Users, Long> , QuerydslPredicateExecutor<Users> {  
   
}

TheQuerydslPredicateExecutor interface provides several overloaded methods that lets us allow executing Querydsl predicates. Following are the methods of QuerydslPredicateExecutor:

public interface QuerydslPredicateExecutor<T> {  
 Optional<T> findOne(Predicate predicate);  
 Iterable<T> findAll(Predicate predicate);  
 Iterable<T> findAll(Predicate predicate, Sort sort);  
 Iterable<T> findAll(Predicate predicate, OrderSpecifier<?>... orders);  
 Iterable<T> findAll(OrderSpecifier<?>... orders);  
 Page<T> findAll(Predicate predicate, Pageable pageable);  
 long count(Predicate predicate);  
 boolean exists(Predicate predicate);  
}

The methods in the **QuerydslPredicateExecutor** takes a Predicate and also provides an option to use pagination, sorting, ordering and so on.

we have Controller and save call will save 10 Users

@RestController  
@RequestMapping("/api")  
public class UsersController {  
  
 @Autowired  
 private UsersService service ;  
  
 // display list of users  
 @GetMapping("/all")  
 public List<Users> listUserss(Model model) {  
 System.out.println(" ===> listUserss");  
 return service.getAllUserss();  
 }  
  
 @GetMapping("/addall")  
 public String addDummyUsers() {  
 System.out.println(" ===> listUserss");  
 for(int i=0; i<10; i++){  
 Users user = new Users();  
 user.setName(nameGen());  
 user.setSalary(salaryGen());  
 System.out.println("added : "+user);  
 service.saveUser(user);  
 }  
 return "Users added";  
 }  
  
 @GetMapping("/querysln")  
 public String querysln() {  
 System.out.println(" ===> querysln");  
 return service.querySln();  
 }  
 private String nameGen()  
 {  
 String AlphaNumericStr = "ABCDEFGHIJKLMNOPQRSTUVWXYZSATYA";  
 StringBuilder s = new StringBuilder(6);  
 int i;  
 for ( i=0; i<8; i++) {  
 int ch = (int)(AlphaNumericStr.length() \* Math.random());  
 s.append(AlphaNumericStr.charAt(ch));  
 }  
 return s.toString();  
 }  
 private Double salaryGen()  
 {  
 Random r = new Random();  
 int low = 5000;  
 int high = 90000;  
 int result = r.nextInt(high-low) + low;  
 return Double.parseDouble(result+"");  
 }  
}

A screenshot of a computer

Description automatically generated

We use EntityManager and UsersRepository to create Querydsl queries. ServiceImpl method

public String querySln() {  
 QUsers users = QUsers.users;  
  
 String result = "";  
  
 System.out.println(" -- users having salary greater than 10000 order by salary --");  
 result = result + "-- users having salary greater than 10000 order by salary --";  
 //BooleanExpression implements Predicate  
 //goe='greater than or equals'  
 BooleanExpression booleanExpression = QUsers.users.salary.goe(10000);  
 OrderSpecifier<Double> orderSpecifier = QUsers.users.salary.asc();  
 Iterable<Users> users1 = repository.findAll(booleanExpression, orderSpecifier);  
 for (Users user : users1) {  
 result = result + "\n " + user;  
 }  
  
 System.out.println(" -- users salary between 3000 and 5000 --");  
 result = result + "\n \n \n -- users salary between 3000 and 5000 --";  
 BooleanExpression booleanExpression2 = QUsers.users.salary.between(30000, 50000);  
 Iterable<Users> users3 = repository.findAll(booleanExpression2);  
 for (Users user : users3) {  
 result = result + "\n " + user;  
 }  
 System.out.println(" -- find users YNDFBTUG --");  
 result = result + "\n \n \n-- find users YNDFBTUG --";  
 BooleanExpression booleanExpression3 = QUsers.users.name.eq("YNDFBTUG");  
 Optional<Users> opt = repository.findOne(booleanExpression3);  
 result = result + "\n " + opt.get();  
  
 return result;  
 }

Sample Employee Pagable with SearchCriteria

public Page<EmployeeDto> findEmployee(Pageable pageRequest, SearchCriteriaDTO searchCriteria) {  
 QEmployee qEmployee = QEmployee.Employee;  
   
 BooleanBuilder builder = new BooleanBuilder();  
 builder.and(qEmployee.status.eq("PERMENENT");  
   
 if(!StringUtils.isEmpty(searchCriteria.getEmployeeId())) {  
 builder.and(qEmployee.employeeId.eq(searchCriteria.getEmployeeId()));  
 }  
   
 if(!StringUtils.isEmpty(searchCriteria.getRole())) {  
 builder.and(qEmployee.role.eq(searchCriteria.getRole()));  
 }  
   
 if(!StringUtils.isEmpty(searchCriteria.getName())) {  
 builder.and(qEmployee.name.containsIgnoreCase(searchCriteria.getName()));  
 }  
   
 JPAQuery<Employee> query = new JPAQuery<>(entityManager);  
 query.from(qEmployee);  
 query = query.where(builder);  
 Long totalCount = query.fetchCount();  
   
 query.offset(pageRequest.getOffset());  
 query.limit(pageRequest.getPageSize());  
 query.orderBy(qEmployee.reportId.desc());  
   
 List<Employee> employeeLst = query.fetch();  
 Type listType = new TypeToken<List<EmployeeDto>>() {}.getType();   
   
 ModelMapper modelMapper = mapperUtil.getEmployeeMapper();  
   
 List<EmployeeDto> returnValue = modelMapper.map(EmployeeLst, listType);  
 Page<EmployeeDto> result = new PageImpl(returnValue, pageRequest, totalCount);  
 return result;  
 }

Example Pageable search results with Employee Entity- Complete flow from Controller to Backend Repository

\*/  
//1. Controller   
//==========================================  
public class EmployeeController {  
  
 @Autowired  
 private final EmployeeService employeeService;  
  
 @ApiOperation("Returns a page of all Employee list")  
 @ApiResponses(value = {@ApiResponse(code = 200, message = "Success"), @ApiResponse(code = 400, message = "Bad Request"), @ApiResponse(code = 500, message = "Internal Server Error"), @ApiResponse(code = 403, message = "Unauthorized")})  
 @PostMapping("/search")  
 public Page<EmployeeSearchResultsDto> searchAllEmployee(Pageable pageRequest, @RequestBody EmployeeSearchDto searchCriteria) {  
 return employeeService.searchAllEmployee(pageRequest, searchCriteria);  
 }  
}  
  
  
//==========================================  
//2.Service Class  
//==========================================  
 public Page<EmployeeSearchResultsDto> searchAllEmployee(Pageable pageRequest, EmployeeSearchDto searchCriteria) {  
 return employeeRepository.employeeSearchCriteria(pageRequest, searchCriteria);  
 }  
  
  
//==========================================  
//3.Repository Class which extends EmployeeRepositoryCustom,  
// - QuerydslPredicateExecutor<Employee>,  
// - QuerydslBinderCustomizer<QEmployee>  
//==========================================  
public interface EmployeeRepository extends RevisionRepository<Employee, Long, Long>, JpaRepository<Employee, Long>, EmployeeRepositoryCustom,  
 QuerydslPredicateExecutor<Employee>,  
 QuerydslBinderCustomizer<QEmployee> {  
  
 @Override  
 default void customize(QuerydslBindings bindings, QEmployee root) {  
 bindings.bind(String.class).first((StringPath path, String value) -> path.containsIgnoreCase(value));  
 }  
}  
  
  
  
//==========================================  
//4.EmployeeRepositoryCustom  
//==========================================  
public interface EmployeeRepositoryCustom {  
  
 Page<EmployeeSearchResultsDto> employeeSearchCriteria(Pageable pageRequest, EmployeeSearchDto searchCriteria);  
}  
  
  
  
//==========================================  
//5.Pagable Implementation EmployeeRepositoryCustomImpl  
//==========================================  
@Repository  
@Slf4j  
public class EmployeeRepositoryCustomImpl implements com.employee.dao.repository.EmployeeRepositoryCustom {  
  
 @PersistenceContext  
 private EntityManager entityManager;  
  
 @Autowired  
 private EmployeeSearchResultMapper employeeSearchResultMapper;  
  
  
 @Override  
 public Page<EmployeeSearchResultsDto> employeeSearchCriteria(Pageable pageRequest, EmployeeSearchDto searchCriteria) {  
  
 QEmployee qEmployee = QEmployee.employee;  
 BooleanBuilder builder = new BooleanBuilder();  
 applySearchCriteria(searchCriteria, qEmployee, builder);  
  
 JPAQuery<Employee> query = new JPAQuery<>(entityManager);  
 query = query.from(qEmployee);  
 query = query.where(builder);  
 Long totalCount = query.fetchCount();  
 query.offset(pageRequest.getOffset());  
 query.limit(pageRequest.getPageSize());  
 PathBuilder<Employee> entityPath = new PathBuilder<>(Employee.class, "employee");  
  
 for (Sort.Order order : pageRequest.getSort()) {  
 PathBuilder<Object> path = entityPath.get(order.getProperty());  
 query.orderBy(new OrderSpecifier(Order.valueOf(order.getDirection().name()), path));  
 }  
 List<Employee> result = query.fetch();  
 List<EmployeeSearchResultsDto> employeeDtoResult = employeeSearchResultMapper.toEmployeeSearchResultsDtoList(result);  
 return new PageImpl<>(employeeDtoResult, pageRequest, totalCount);  
  
 }  
  
  
 private void applySearchCriteria(EmployeeSearchDto searchCriteria, QEmployee qEmployee, BooleanBuilder builder) {  
 try {  
  
 if (Objects.nonNull(searchCriteria.getName()) && StringUtils.isNotBlank(searchCriteria.getName())) {  
 builder.and(qEmployee.name.containsIgnoreCase(searchCriteria.getName()));  
 }  
 if (Objects.nonNull(searchCriteria.getSalary())) {  
 builder.and(qEmployee.salary.eq(searchCriteria.getSalary()));  
 }  
 if (Objects.nonNull(searchCriteria.getCity()) && StringUtils.isNotBlank(searchCriteria.getCity())) {  
 builder.and(qEmployee.city.containsIgnoreCase(searchCriteria.getCity()));  
 }  
 } catch (Exception ex) {  
 log.error("Exception Occurred while getting search results", ex);  
  
 }  
 }  
  
}  
  
  
//==========================================  
//6.Search Results Mapper  
//==========================================  
@Mapper(componentModel = "spring")  
public interface EmployeeSearchResultMapper {  
  
 List<EmployeeSearchResultsDto> toEmployeeSearchResultsDtoList(List<Employee> employeeEntityList);  
  
 EmployeeSearchResultsDto toEmployeeSearchResultsDto(Employee employee);  
  
}

# SpringBoot Dynamic Task Scheduling

<https://satyacodes.gitlab.io/SpringBoot-Task-Scheduling-Guide.html>

<https://satyacodes.medium.com/springboot-task-scheduling-guide-dfbce8ae0019>