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Step 1: Map java class to database collection so that it becomes **"DATABASE MANAGED ENTITY"**

1. To let spring data mongo template know how to map this class to a database collection and create the collection accordingly, update the Book class for respective annotations:

```
package com.boot.demo.sprinbootdemo.entity;

import org.springframework.data.annotation.Id;
import org.springframework.data.mongodb.core.mapping.Document;

// tells to treat this class as database collection.
@Document(collection="books")
public class Book {
```

```
// Used for primary key identifier
   @Id
// Used to map bookid property of java with _id as primary key of mongo db
  @Field("_id")
   private int bookid;
   // rest remains the same
 }
```

Step 3: MongoRepository

1. Spring boot provides an interface that takes care of basic CRUD operations
   [GOOD NEWS!!! – NO NEED TO WRITE SQL QUERIES 😊]

   Just extend the interface and we get the most relevant CRUD methods for standard data access available in a standard DAO.

```
package com.boot.demo.sprinbootdemo.repo;

import org.springframework.data.mongodb.repository.MongoRepository;
import java.util.List;

public interface BookRepo extends MongoRepository<Book, Integer> {}
```

2. MongoRepository<T,ID> is interface where
   T : represents the database managed entity name
   ID: represents the type of identifier.

Step 4: service layer

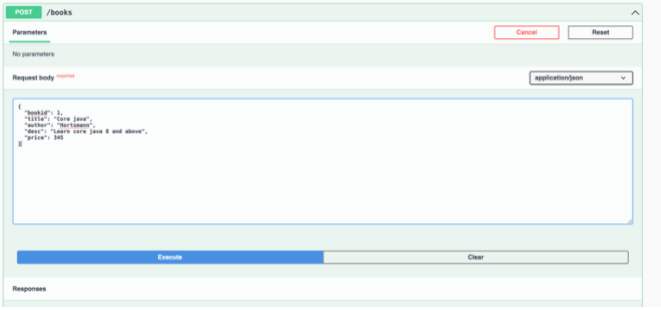
1. Create BookServiceRepo class to perform business operations on the book table as follows:

```
package com.boot.demo.sprinbootdemo.service;

import com.boot.demo.sprinbootdemo.entity.Book;
import com.boot.demo.sprinbootdemo.repo.BookRepo;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Service;
import java.util.List;

@Service
public class BookServiceRepo {
   @Autowired
   private BookRepo bookRepo;

   public long getTotalBookCount(){
      return bookRepo.count();
   }
public List<Book> getAllBooks(){
      return bookRepo.findAll();
   }
   public Book addNewBook(Book book){
      if(bookRepo.existsById(book.getBookid()))
         throw new EntityExistsException("Cannot add "+book.getBookid()+" already exists");
      return bookRepo.save(book);

   }
   public Book updateBook(Book book){
      if(!bookRepo.existsById(book.getBookid()))
         throw new EntityNotFoundException("cannot update "+book.getBookid()+" does not exist");
      return bookRepo.save(book);
   }
   public boolean deleteBook(int id){
      if(!bookRepo.existsById(id))
         throw new EntityNotFoundException("cannot delete "+id+" does not exist");
      bookRepo.deleteById(id);
      return true;
   }
   public List<Book> getBooksByAuthor(String author){
      return null;
   }
```

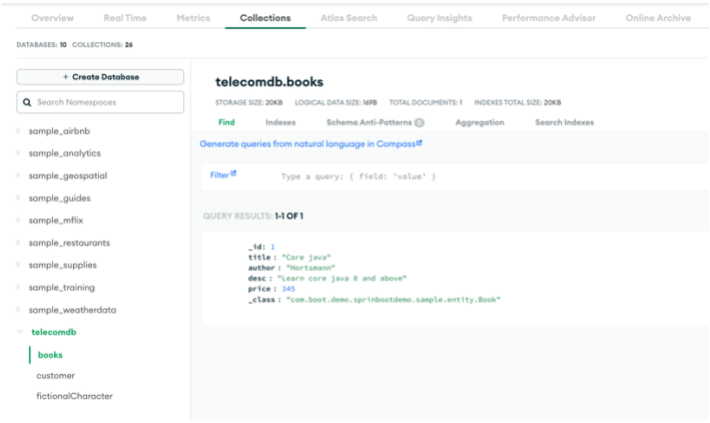
```
    public Book getBookById(int id){
      if(!bookRepo.existsById(id))
         throw new EntityNotFoundException(id+" not found");
      return bookRepo.findById(id).get();
    }
}
```

2. Just update the BookRestController class Autowired dependency from **BookService to BookServiceRepo**; everything should work as before. Just that this time it is communicating with a database and not stale data.
   MAKE SURE TO EITHER ADD SOME DATA MANUALLY OR VIA POST REQUEST

3. **From swagger when you make a post request to BookRestController api, it saves data in mongodb database as follows:**



4. **Check mongodb whether local or on cloud:**



5. **Likewise test for other methods as well.**

Step 5: Custom method:

1. By default the MongoRepository provides all CRUD operations using the primary key. If we want to fetch data by a column other than primary key ex:
   db.collection.find({author: '' ''})

2. Spring boot provides with conventions to follow for custom methods to execute custom queries:
   https://docs.spring.io/spring-data/mongodb/reference/mongodb/repositories/query-methods.html

3. Just add below method in BookRepo file to fetch all books by author.
   List<Book> findByAuthor(String author);

4. Update below method in BookServiceRepo class as follows:
```
public List<Book> getBooksByAuthor(String author){
    return bookRepo.findByAuthor(author);
  }
```
5. Test using url http://localhost:8081/books?author=<authorname> and now you should get list of books by authors.

6. Apart from custom methods, you can also write mongodb queries. Make below changes:
   a. Add below in BookRepo:

```
@Query("{price : {$gt: ?0}}")                    // SQL Equivalent : SELECT * FROM BOOK where price<?
 //@Query("{ price : { $gte: ?0 } }")            // SQL Equivalent : SELECT * FROM BOOK where price>=?
  //@Query("{ price : ?0 }")                     // SQL Equivalent : SELECT * FROM BOOK where price=?
    List<Book> getBooksByPrice(Integer price);
```

   b. Update BookServiceRepo class by adding below method:

```
public List<Book> getBooksByPriceGreaterThan(int price) {
    return bookRepo.getBooksByPrice(price);
  }
```

   c. Update BookRestController getBooks() method as follows:

```
@GetMapping
  public List<Book> getBooks(@RequestParam(required = false) String author,
                    @RequestParam(required = false) Integer price){
    logger.info("GET All books if author is null or get books by author : "+ author);
    if(author!=null )
      return bookService.getBooksByAuthor(author);
    if(price != null)
      return bookService.getBooksByPriceGreaterThan(price);
    return bookService.getAllBooks();
  }
```

Step 6: OneToOne:

1. MongoDB database collections have no concept of relationships using primary and foreign key.

2. Create below 2 classes and you will notice @Document is only added on FictionalCharacter but not on Wand class as wand will be an object within FictionalCharacter class.

2.1.

```
package com.boot.demo.sprinbootdemo.entity;
package com.boot.demo.sprinbootdemo.sample.entity;
import lombok.AllArgsConstructor;
import lombok.Data;
import lombok.NoArgsConstructor;
import org.springframework.data.annotation.Id;
@Data
@AllArgsConstructor
@NoArgsConstructor
public class Wand {
   @Id
   @GeneratedValue(strategy = GenerationType.IDENTITY)
   private int id;
   private String wood;
   private String core;
   private String length;

}
```

```
package com.boot.demo.sprinbootdemo.entity;

import lombok.AllArgsConstructor;
import lombok.Data;
import lombok.NoArgsConstructor;
import org.springframework.data.annotation.Id;
import org.springframework.data.mongodb.core.mapping.Document;

@Document
@Data
@AllArgsConstructor
@NoArgsConstructor
public class FictionalCharacter {

   @Id
   private int id;
   private String name;
   private String house;
   private Wand wand;
```

```
    private String bio;
    private String imageurl;

}
```

Step 7: Repo Layer:

1. Create Repos for character and wand as follows:

```
package com.boot.demo.sprinbootdemo.repo;

import com.boot.demo.sprinbootdemo.entity.Wand;
import com.boot.demo.sprinbootdemo.entity.Wand;
import org.springframework.data.mongodb.repository.MongoRepository;

public interface WandRepo extends JpaRepository<Wand, Integer> {
}
```

```
package com.boot.demo.sprinbootdemo.repo;

import com.boot.demo.sprinbootdemo.entity.FictionalCharacter;
import org.springframework.data.mongodb.repository.MongoRepository;

import java.util.List;

public interface CharacterRepo extends MongoRepository<FictionalCharacter,Integer > {

    public List<FictionalCharacter> findAllByHouse(String house);
    public FictionalCharacter findByName(String name);
    public boolean existsByName(String name);
}
```

Step 8: Service Layer:

1. Lets create CharacterService class for the business login layer.
2. **Update the class for spring specific annotations.**

```
package com.boot.demo.sprinbootdemo.service;

import com.boot.demo.sprinbootdemo.entity.FictionalCharacter;
import com.boot.demo.sprinbootdemo.entity.Wand;
import com.boot.demo.sprinbootdemo.repo.CharacterRepo;
import com.boot.demo.sprinbootdemo.repo.WandRepo;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Service;

import java.util.List;

public class CharacterService {

    private CharacterRepo characterRepo;

    public long getCount(){
        return this.characterRepo.count();
    }
    public List<FictionalCharacter> getCharacterByHouse(String house){
        return characterRepo.findAllByHouse(house);
    }
    public List<FictionalCharacter> getAllCharacters(){
        return characterRepo.findAll();
    }
    public FictionalCharacter getCharacterByName(String name){
        if(!characterRepo.existsByName(name))
            throw new EntityNotFoundException(name+" not found");
        return characterRepo.findByName(name);
    }
    public FictionalCharacter getCharacterById(int id){
        if(!characterRepo.existsById(id))
            throw new EntityNotFoundException(id+" not found");
        return characterRepo.findById(id).get();
    }
public FictionalCharacter addNewCharacter(FictionalCharacter character){
        if(characterRepo.existsById(character.getId()))
```

```
            throw new RuntimeException("cannot insert "+character.getId()+" already exists");
        return characterRepo.save(character);
    }
    public FictionalCharacter updateCharacter(FictionalCharacter character){
        if(!characterRepo.existsById(character.getId()))
            throw new RuntimeException("cannot update "+character.getName()+" does not exist");
        return characterRepo.save(character);
    }
    public void deleteCharacter(int id){
        if(!characterRepo.existsById(id))
            throw new RuntimeException("cannot delete "+id+" does not exist");
        FictionalCharacter character = characterRepo.findById(id)
                .orElseThrow(()->new RuntimeException("Could not delete character"));
        characterRepo.delete(character);
    }
}
```

Step 9: Controller Layer:

1. Let create CharacterController class for the REST API endpoints and here you will also be introduced to logger.

2.
```
package com.boot.demo.sprinbootdemo.rest;

import com.boot.demo.sprinbootdemo.entity.FictionalCharacter;
import com.boot.demo.sprinbootdemo.service.CharacterService;
import org.slf4j.Logger;
import org.slf4j.LoggerFactory;
import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.http.ResponseEntity;
import org.springframework.web.bind.annotation.*;

import java.util.HashMap;
import java.util.List;
import java.util.Map;

@RestController
@RequestMapping("/api/characters")
@CrossOrigin(origins = "*",methods = {RequestMethod.DELETE, RequestMethod.GET, RequestMethod.PUT,
RequestMethod.POST})
public class CharacterController {

    Logger logger = LoggerFactory.getLogger(CharacterController.class);
    @Autowired
    private CharacterService characterService;

    @GetMapping
    public List<FictionalCharacter> getAllCharacters(@RequestParam(defaultValue = "all") String house){
        logger.info("GET All Characters for house {}", house);
      if(house.equals("all")) {
          List<FictionalCharacter> ob = characterService.getAllCharacters();
          System.out.println(ob.size());
          return ob;
      }else{
          List<FictionalCharacter> ob = characterService.getCharacterByHouse(house);
          System.out.println(ob.size());
          return ob;
      }
    }
    @GetMapping("/id/{id}")
    public ResponseEntity<Object> getCharacterById(@PathVariable int id){
        try {
            FictionalCharacter ob = characterService.getCharacterById(id);
            return ResponseEntity.ok(ob);
        }catch (EntityNotFoundException e){
            Map<String, String> errorMap = new HashMap<>();
            errorMap.put("error", e.getMessage());
            return ResponseEntity.badRequest().body(errorMap);
        }
    }
    @GetMapping("/name/{name}")
    public ResponseEntity<Object> getCharacterByName(@PathVariable String name){
        try {
            FictionalCharacter ob = characterService.getCharacterByName(name);
            return ResponseEntity.ok(ob);
        }catch (EntityNotFoundException e){
```

```
            Map<String, String> errorMap = new HashMap<>();
            errorMap.put("error", e.getMessage());
            return ResponseEntity.badRequest().body(errorMap);
        }
    }
@PutMapping
    public ResponseEntity<Object> updateCharacter(@RequestBody FictionalCharacter character){
        try {
            FictionalCharacter ob = characterService.updateCharacter(character);
            return ResponseEntity.ok(ob);
        }catch (RuntimeException e){
            Map<String, String> errorMap = new HashMap<>();
            errorMap.put("error", e.getMessage());
                return ResponseEntity.badRequest().body(errorMap);
     }
 }


    @DeleteMapping("/{id}")
    public ResponseEntity<Object> deleteCharacter(@PathVariable int id){
        Map<String, String> map = new HashMap<>();
        try {
            characterService.deleteCharacter(id);
            map.put("message", "Delete successful");
            return ResponseEntity.ok(map);
        }catch (RuntimeException e){
            map.put("error", e.getMessage());
            return ResponseEntity.badRequest().body(map);
        }
     @PostMapping()
    public ResponseEntity<Object> addCharacter(@RequestBody FictionalCharacter character){
        try{
            FictionalCharacter ob = characterService.addNewCharacter(character);
            return ResponseEntity.ok(ob);
        }catch (RuntimeException e){
            Map<String, String> errorMap = new HashMap<>();
            errorMap.put("error", e.getMessage());
            return ResponseEntity.badRequest().body(errorMap);
        }
    }
}
```

3. Please test the above API from swagger.