The QuoteServices App Case Study: Zippy Microservice Structure & Functionality (Part 2)

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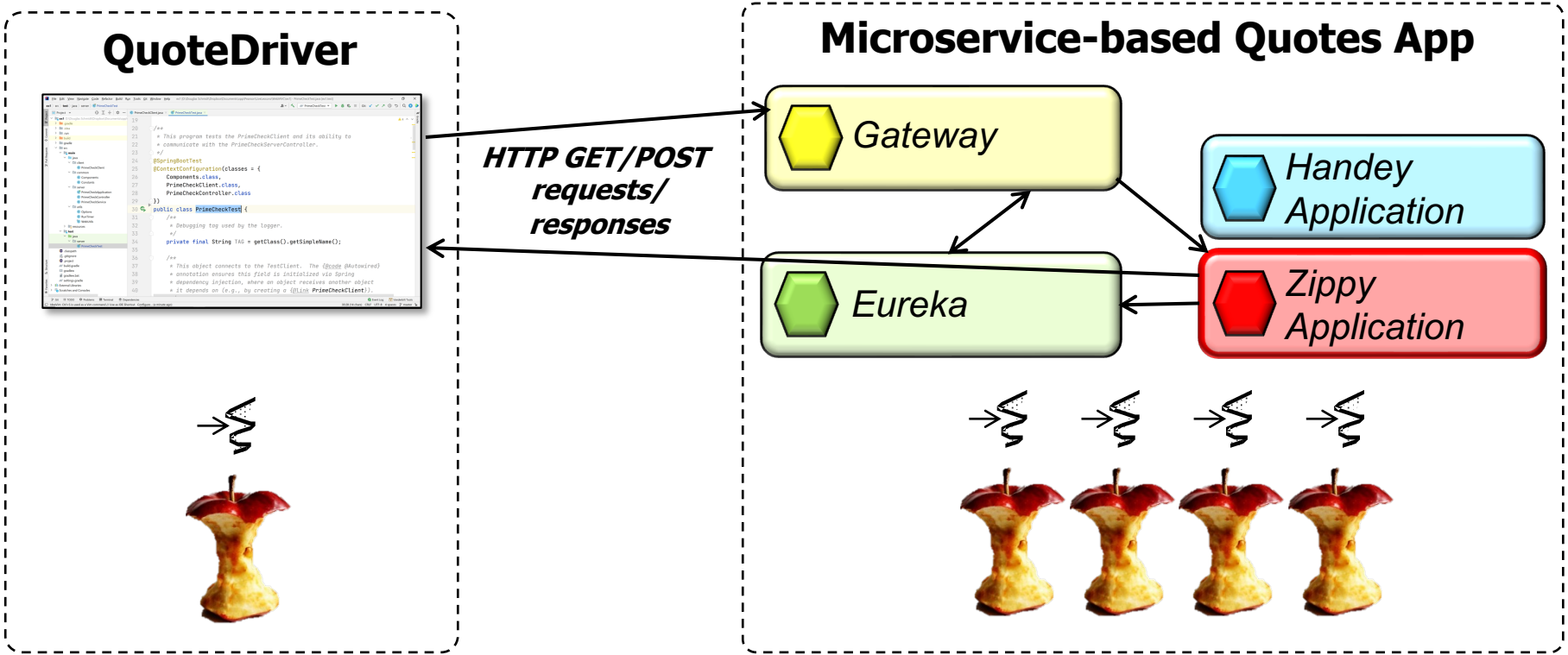
Learning Objectives in this Part of the Lesson

- Understand the structure & functionality of the JPAQuoteRepository & how it creates a custom SQL query with the Jakarta Persistence API (JPA)



We also give an overview of the Spring Data API

Overview of the Spring Data API

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- The Spring JPA Data API is a framework that simplifies development of data access layers in Spring-based apps

See www.baeldung.com/the-persistence-layer-with-spring-data-jpa

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- The Spring JPA Data API is a framework that simplifies development of data access layers in Spring-based apps
  - Developers write repository interfaces that define data access methods they need

Keyword	Sample	JPQL
NotLike	findByFirstnameNotLike	… where x.firstname not like ?1
StartingWith	findByFirstnameStartingWith	… where x.firstname like ?1 (parameter bound with appended %)
EndingWith	findByFirstnameEndingWith	… where x.firstname like ?1 (parameter bound with prepended %)
Containing	findByFirstnameContaining	… where x.firstname like ?1 (parameter bound wrapped in %)
OrderBy	findByAgeOrderByLastnameDesc	… where x.age = ?1 order by x.lastname desc
Not	findByLastnameNot	… where x.lastname <> ?1
In	findByAgeIn(Collection ages)	… where x.age in ?1
NotIn	findByAgeNotIn(Collection age)	… where x.age not in ?1
TRUE	findByActiveTrue()	… where x.active = true
FALSE	findByActiveFalse()	… where x.active = false
IgnoreCase	findByFirstnameIgnoreCase	… where UPPER(x.firstame) = UPPER(?1)

See www.baeldung.com/spring-data-derived-queries

Overview of the Spring Data API

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- The Spring JPA Data API is a framework that simplifies development of data access layers in Spring-based apps
  - Developers write repository interfaces that define data access methods they need
  - Spring automatically generates the SQL queries to implement those data access methods
    - It reduces boilerplate code needed to implement persistence & data access layers in a Java application

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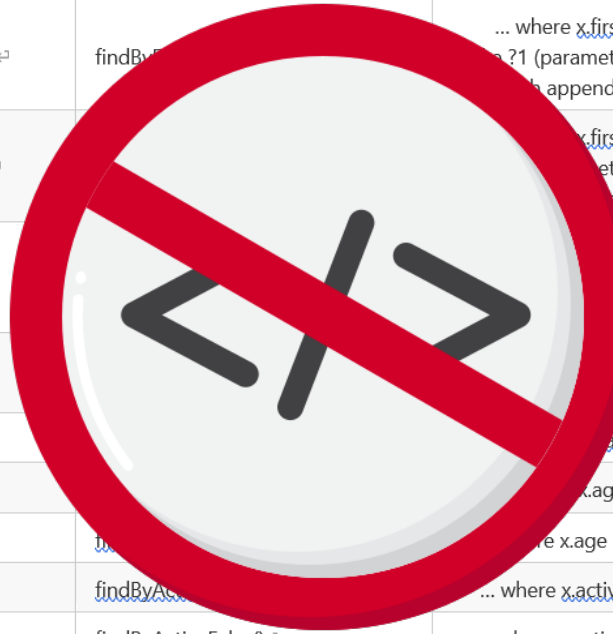

See en.wikipedia.org/wiki/Low-code_development_platform

Motivating the Need for a Custom SQL Query

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- There are limitations to combos of Spring Data API keywords that are supported via the JPA

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Motivating the Need for a Custom SQL Query

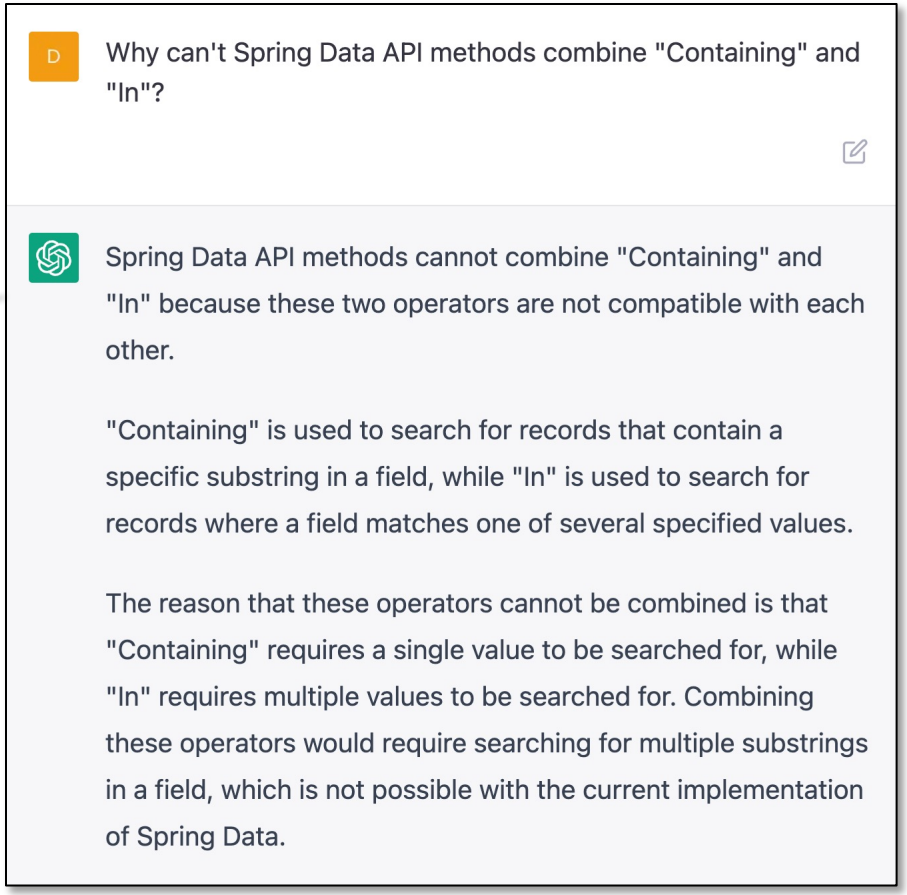
- There are limitations to combos of Spring Data API keywords that are supported via the JPA
  - e.g., combining "Containing" & "In" is not possible

```
ex4 – JPAQuoteRepository.java [ex4.microservices.main]
ex4 › microservices › src › main › java › edu › vandy › quoteservices › m
QuoteDriver.java | JPAQuoteRepository.java

 */
@Repository
public interface JPAQuoteRepository
        extends JpaRepository<Quote, Integer> {
    List<Quote> findByQuoteContainingInIgnoreCase(List<String> queries);

    Method 'findByQuoteContainingInIgnoreCase(java.util.List<java.lang.String>)' is never used
    Cannot resolve property 'containing'
    Safe delete 'findByQuoteContainingInIgnoreCase(List<String>)'  More actions...

    /**
     * Find all {@link Quote}
     * {@code query} {@link String} (ignoring case).
     *
     * @param query The {@link String} to search for
     * @return A {@link List} of {@link Quote} objects that match the
     *         {@code query}
     */
    List<Quote> findByQuoteContainingIgnoreCase(String query);

}

Git | TODO | Database Changes | Problems | Terminal | Endpoints | Services | Profiler | Build | Logcat | Dependencies | App Inspection
* daemon started successfully (9 minutes ago)
19:47  CRLF  UTF-8  4 spaces  master
```

Motivating the Need for a Custom SQL Query

- There are limitations to combos of Spring Data API keywords that are supported via the JPA
  - e.g., combining "Containing" & "In" is not possible

Here's ChatGPT's explanation of why these methods can't be combined



Good luck finding even this explanation with a Google search..

Structure & Functionality of the MultiQueryRepository

Structure & Functionality of the MultiQueryRepository

- The MultiQueryRepository defines an interface for creating a custom query

```
public interface MultiQueryRepository {
   ...
```

This interface defines the means to perform multiple queries at once on the Quote database

See microservices/src/main/java/edu/vandy/quoteservices/common/MultiQueryRepository.java

Structure & Functionality of the MultiQueryRepository

- The MultiQueryRepository defines an interface for creating a custom query

```
public interface MultiQueryRepository {
   ...

  List<Quote> findAllByQuoteContainingIgnoreCaseAllIn
                  (List<String> queries);
}
```

Find a List of Quote objects in the database containing all of the queries (ignoring case)

This method can't be generated automatically by the Spring Data API

Structure & Functionality of the MultiQueryRepository

- The MultiQueryRepository defines an interface for creating a custom query

```
public class MultiQueryRepositoryImpl
        implements MultiQueryRepository {
    ...

}
```

Applies the "Repository Implementation" pattern

See docs.spring.io/spring-data/jpa/docs/current/reference/html/#repositories.custom-implementations

Structure & Functionality of the MultiQueryRepository

- The MultiQueryRepository defines an interface for creating a custom query

```
public class MultiQueryRepositoryImpl
        implements MultiQueryRepository {
    @PersistenceContext
    private EntityManager entityManager;
    ...

}
```

This field defines a database session that provides the main API for performing CRUD operations & querying the database

See docs.oracle.com/javaee/7/api/javax/persistence/EntityManager.html

Structure & Functionality of the MultiQueryRepository

- The MultiQueryRepository defines an interface for creating a custom query

```
public class MultiQueryRepositoryImpl
       implements MultiQueryRepository {
   ...
 List<Quote> findAllByQuoteContainingIgnoreCaseAllIn
                  (List<String> queries) {
     var criteriaBuilder = entityManager.getCriteriaBuilder();
     var criteriaQuery = criteriaBuilder
       .createQuery(Quote.class);
     var quote = criteriaQuery.from(Quote.class);
     var idExpression = criteriaBuilder
        .lower(quote.get("quote"));
     var andPredicate = ...
     return getQueryResults(criteriaQuery, andPredicate);
  ...
```

Find Quote objects containing all queries (ignoring case)

See upcoming lesson on "*Implementing the Zippy Microservice*"

End of the QuoteServices App Case Study: Zippy MicroService Structure & Functionality (Part 2)