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SPRING AI

GENERATIVE ARTIFICIAL INTELLIGENCE CON JAVA

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Corso avanzato per Venis S.p.A, Venezia, Italia

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CONCETTI AVANZATI

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- ## Interfaccia Chat Memory

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- ## Interfaccia per ogni *chat memory* advisor

Customizzazione *id* conversazione

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- 1 Creazione modello per richiesta domanda con *username*
- 2 Modifica interfaccia e implementazione del servizio di risposta
- 3 Modifica controllore MVC
- 4 Test delle funzionalità con Postman/Insomnia

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```
package it.venis.ai.spring.demo.model;

import java.util.Objects;
import java.util.UUID;

public record QuestionRequest(UUID id, String username, Question body) {

    public QuestionRequest(String username, Question body) {

        this(UUID.randomUUID(), username, body);

    }

    @Override
    public String username() {

        return Objects.requireNonNullElse(this.username, "default");

    }

}
```

[illegible]

```
package it.venis.ai.spring.demo.services;

import it.venis.ai.spring.demo.model.Answer;
import it.venis.ai.spring.demo.model.Question;
import it.venis.ai.spring.demo.model.QuestionRequest;

public interface QuestionService {

    Answer getGeminiAnswer(Question question);

    Answer getOllamaAnswer(Question question);

    Answer getOllamaDefaultAnswer(Question question);

    Answer getOllamaMemoryAwareAnswer(Question question);

    Answer getOllamaPerUserMemoryAwareAnswer(QuestionRequest request);

}
```

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```
package it.venis.ai.spring.demo.services;

...

@Service
@Configuration
public class QuestionServiceImpl implements QuestionService {

    private final ChatClient geminiChatClient;
    private final ChatClient ollamaChatClient;
    private final ChatClient ollamaMemoryChatClient;

    public QuestionServiceImpl(@Qualifier("geminiChatClient") ChatClient geminiChatClient,
                              @Qualifier("ollamaChatClient") ChatClient ollamaChatClient,
                              @Qualifier("ollamaMemoryChatClient") ChatClient ollamaMemoryChatClient) {

        this.geminiChatClient = geminiChatClient;
        this.ollamaChatClient = ollamaChatClient;
        this.ollamaMemoryChatClient = ollamaMemoryChatClient;
    }

    ...

    @Override
    public Answer getOllamaPerUserMemoryAwareAnswer(QuestionRequest request) {
        return new Answer(this.ollamaMemoryChatClient
            .prompt()
            .advisors(advisorSpec -> advisorSpec.param(ChatMemory.CONVERSATION_ID, request.username()))
            .user(request.body().question())
            .call()
            .content());
    }
}
```

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```
package it.venis.ai.spring.demo.controllers;

import org.springframework.web.bind.annotation.PostMapping;
import org.springframework.web.bind.annotation.RequestBody;
import org.springframework.web.bind.annotation.RestController;

import it.venis.ai.spring.demo.model.Answer;
import it.venis.ai.spring.demo.model.Question;
import it.venis.ai.spring.demo.model.QuestionRequest;
import it.venis.ai.spring.demo.services.QuestionService;

@RestController
public class QuestionController {

    ...

    @PostMapping("/ollama/ask/memory")
    public Answer getOllamaMemoryAwareAnswer(@RequestBody Question question) {

        return this.service.getOllamaMemoryAwareAnswer(question);
    }

    @PostMapping("/ollama/ask/memory/user")
    public Answer getOllamaPerUserMemoryAwareAnswer(@RequestBody QuestionRequest request) {

        return this.service.getOllamaPerUserMemoryAwareAnswer(request);
    }
}
```

[illegible]

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[illegible]

- ## Dipendenza di progetto

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Note

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```
@Autowired
JdbcChatMemoryRepository chatMemoryRepository;

ChatMemory chatMemory = MessageWindowChatMemory.builder().chatMemoryRepository(chatMemoryRepository)
    .maxMessages(10)
    .build();
```

- ```
spring:
 datasource:
 url: jdbc:postgresql:...
```

- ```
CREATE TABLE IF NOT EXISTS SPRING_AI_CHAT_MEMORY (
    conversation_id VARCHAR(36) NOT NULL,
    content TEXT NOT NULL,
    type VARCHAR(10) NOT NULL CHECK (type IN ('USER', 'ASSISTANT', 'SYSTEM', 'TOOL')),
    "timestamp" TIMESTAMP NOT NULL
);

CREATE INDEX IF NOT EXISTS SPRING_AI_CHAT_MEMORY_CONVERSATION_ID_TIMESTAMP_IDX
ON SPRING_AI_CHAT_MEMORY(conversation_id, "timestamp");
```

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File ./resources/schema/schema-h2.sql

```
CREATE TABLE SPRING_AI_CHAT_MEMORY (
    conversation_id VARCHAR(36) NOT NULL,
    content LONGVARCHAR NOT NULL,
    type VARCHAR(10) NOT NULL,
    "timestamp" TIMESTAMP DEFAULT CURRENT_TIMESTAMP NOT NULL
);

CREATE INDEX SPRING_AI_CHAT_MEMORY_CONVERSATION_ID_TIMESTAMP_IDX
ON SPRING_AI_CHAT_MEMORY(conversation_id, timestamp DESC);

ALTER TABLE SPRING_AI_CHAT_MEMORY ADD CONSTRAINT TYPE_CHECK CHECK (type IN ('USER', 'ASSISTANT', 'SYSTEM', 'TOOL'));
```

Note

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2 Impostare i corretti parametri dell'applicativo

File application.yml

```
spring:
  ai:
    chat:
      ...
      memory:
        repository:
          jdbc:
            initialize-schema: always # always, never, embedded (default)
            schema: classpath:/schema/schema-h2.sql
    ...
datasource:
  url: jdbc:h2:file:./db/chatmemory
  driver-class-name: org.h2.Driver
  username: user
  password: pwd
h2:
  console:
    enabled: true
...

```

File pom.xml

```
<dependency>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-devtools</artifactId>
  <optional>true</optional>
</dependency>

<dependency>
  <groupId>com.h2database</groupId>
  <artifactId>h2</artifactId>
  <scope>runtime</scope>
</dependency>
```

Note

[illegible]

- 1 Modifica al `pom.xml` per dipendenze Spring AI JDBC, H2 e *devtools*
- 2 Modifica ad `application.yml`
- 3 Creazione schema H2
- 4 Modifica ai *bean* `ChatClient` per Ollama
- 5 Test delle funzionalità con Postman/Insomnia

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```

...
<dependency>
  <groupId>org.springframework.ai</groupId>
  <artifactId>spring-ai-starter-model-chat-memory-repository-jdbc</artifactId>
</dependency>
<dependency>
  <groupId>com.h2database</groupId>
  <artifactId>h2</artifactId>
  <scope>runtime</scope>
</dependency>
<dependency>
  <groupId>org.springframework.boot</groupId>
  <artifactId>spring-boot-devtools</artifactId>
  <optional>true</optional>
</dependency>
...

```

Note

[illegible]

```
spring:
  ai:
    chat:
      ...
      memory:
        repository:
          jdbc:
            initialize-schema: always # always, never, embedded (default)
            schema: classpath:/schema/schema-h2.sql
      ...
datasource:
  url: jdbc:h2:file:./db/chatmemory
  driver-class-name: org.h2.Driver
  username: user
  password: pwd
h2:
  console:
    enabled: true
...

```

[illegible]

Schema H2

```
CREATE TABLE SPRING_AI_CHAT_MEMORY (
    conversation_id VARCHAR(36) NOT NULL,
    content LONGVARCHAR NOT NULL,
    type VARCHAR(10) NOT NULL,
    "timestamp" TIMESTAMP DEFAULT CURRENT_TIMESTAMP NOT NULL
);

CREATE INDEX SPRING_AI_CHAT_MEMORY_CONVERSATION_ID_TIMESTAMP_IDX
ON SPRING_AI_CHAT_MEMORY(conversation_id, timestamp DESC);

ALTER TABLE SPRING_AI_CHAT_MEMORY ADD CONSTRAINT TYPE_CHECK CHECK (type IN ('USER', 'ASSISTANT', 'SYSTEM', 'TOOL'));
```

Note

[illegible]

```
package it.venis.ai.spring.demo.config;

...

@Configuration
public class MemoryChatClientConfig {

    ...

    /**
     * Bean to store messages into relational DBs. This is done
     * under the hood when the corresponding .pom dependency is added.
     * The system infers the type of DB through properties in application
     * .properties/.yml file.
     */
    @Autowired
    JdbcChatMemoryRepository jdbcChatMemoryRepository;

    /**
     * Custom bean for chat memory, based on the (auto-)configured chat memory repository.
     * Done under-the-hood via Spring auto-configuration with maxMessages = 20.
     */
    @Bean
    public ChatMemory chatMemory(@Qualifier("jdbcChatMemoryRepository") ChatMemoryRepository chatMemoryRepository) {
        return MessageWindowChatMemory.builder()
            .chatMemoryRepository(chatMemoryRepository)
            .maxMessages(20)
            .build();
    }

    ...
}
```

Note

[illegible]

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