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Note

Spring AI

Generative Artificial Intelligence con Java

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Note

Docker Model Runner

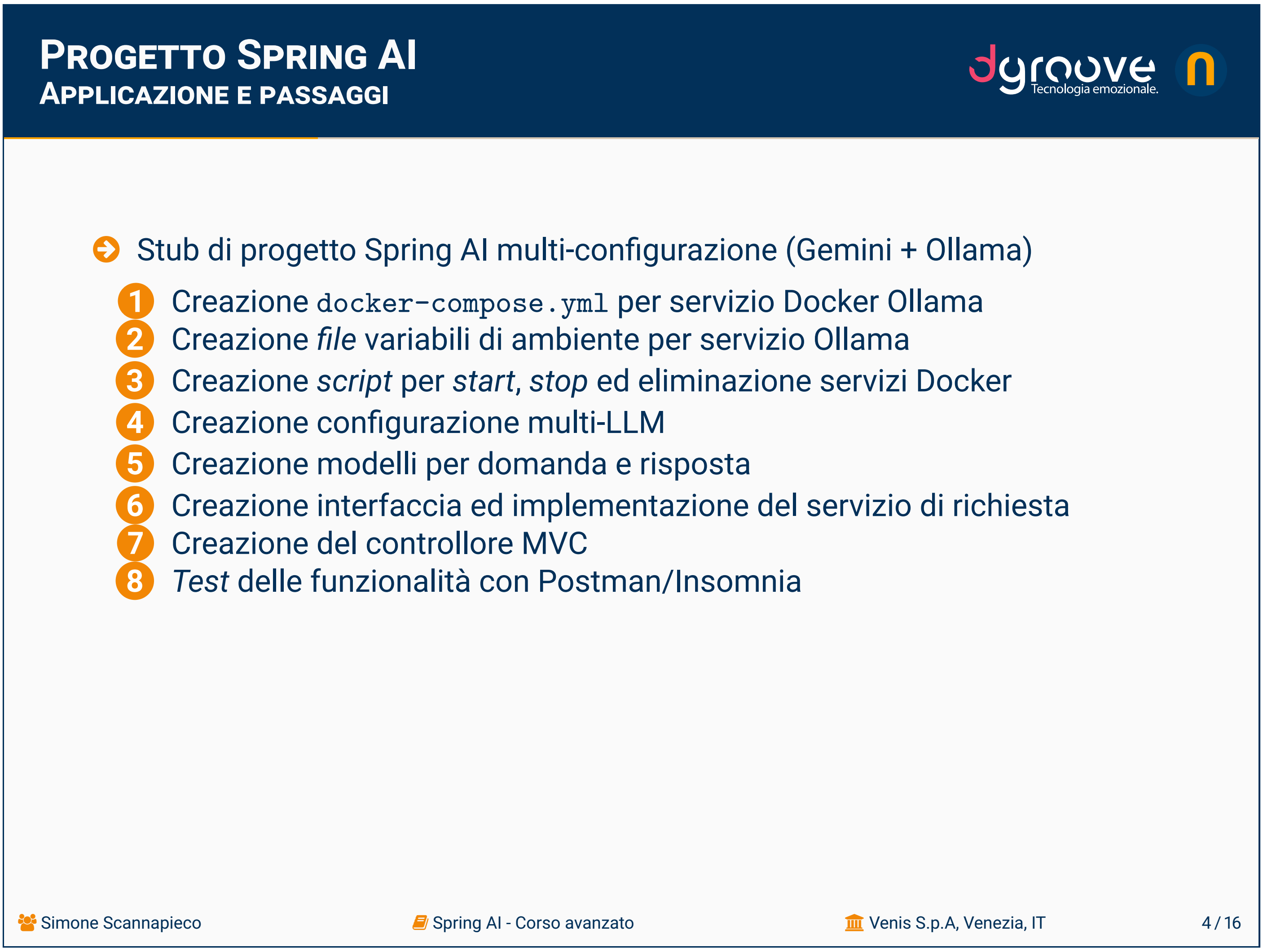
Note

Docker Model Runner
Descrizione

- Risposta di Docker ad Ollama
  - LLM in Docker *container* locali
  - Modelli AI generici dockerizzabili (WIP)
  - Docker mette a disposizione una serie di modelli *open source* scaricabili tramite Engine o Desktop

- `https://www.docker.com/blog/run-llms-locally/`
- `https://www.docker.com/blog/introducing-docker-model-runner/`

Note



Progetto Spring AI
Applicazione e passaggi

- Stub di progetto Spring AI multi-configurazione (Gemini + Ollama)
  1. Creazione `docker-compose.yml` per servizio Docker Ollama
  2. Creazione *file* variabili di ambiente per servizio Ollama
  3. Creazione *script* per *start*, *stop* ed eliminazione servizi Docker
  4. Creazione configurazione multi-LLM
  5. Creazione modelli per domanda e risposta
  6. Creazione interfaccia ed implementazione del servizio di richiesta
  7. Creazione del controllore MVC
  8. *Test* delle funzionalità con Postman/Insomnia

Note

Progetto Spring AI

Servizio Docker Ollama - I

File `docker-compose.yml`

```yaml
services:
  spring-ai-llm-gpu:
    image: ollama/ollama:${OLLAMA_VERSION:-latest}
    hostname: spring-ai-llm
    container_name: spring_ai_llm
    environment:
      OLLAMA_HOST: "${OLLAMA_HOST:-0.0.0.0}:${OLLAMA_PORT-11434}"
      OLLAMA_DEBUG: ${OLLAMA_DEBUG:-false}
      OLLAMA_FLASH_ATTENTION: ${OLLAMA_FLASH_ATTENTION:-false}
      OLLAMA_KEEP_ALIVE: ${OLLAMA_KEEP_ALIVE:-"5m"}
      OLLAMA_MAX_LOADED_MODELS: ${OLLAMA_MAX_LOADED_MODELS:-1}
      OLLAMA_NUM_PARALLEL: ${OLLAMA_NUM_PARALLEL:-1}
    expose:
      - ${OLLAMA_PORT:-11434}
    deploy:
      resources:
        reservations:
          devices:
            - driver: nvidia
              count: all
              capabilities: [gpu]
    volumes:
      - spring_ai_llm:/root/.ollama
    restart: unless-stopped
    profiles: [llm-gpu]

...
```

Note

Progetto Spring AI
Servizio Docker Ollama - II

File `docker-compose.yml`

```
...

  spring-ai-llm-cpu:
    image: ollama/ollama:${OLLAMA_VERSION:-latest}
    hostname: spring-ai-llm
    container_name: spring_ai_llm
    environment:
      OLLAMA_HOST: "${OLLAMA_HOST:-0.0.0.0}:${OLLAMA_PORT-11434}"
      OLLAMA_DEBUG: ${OLLAMA_DEBUG:-false}
      OLLAMA_FLASH_ATTENTION: ${OLLAMA_FLASH_ATTENTION:-false}
      OLLAMA_KEEP_ALIVE: ${OLLAMA_KEEP_ALIVE:-"5m"}
      OLLAMA_MAX_LOADED_MODELS: ${OLLAMA_MAX_LOADED_MODELS:-1}
      OLLAMA_NUM_PARALLEL: ${OLLAMA_NUM_PARALLEL:-1}
    expose:
      - ${OLLAMA_PORT:-11434}
    volumes:
      - spring_ai_llm:/root/.ollama
    restart: unless-stopped
    profiles: [llm-cpu]

volumes:
  spring_ai_llm:
    name: spring_ai_llm
```

Note

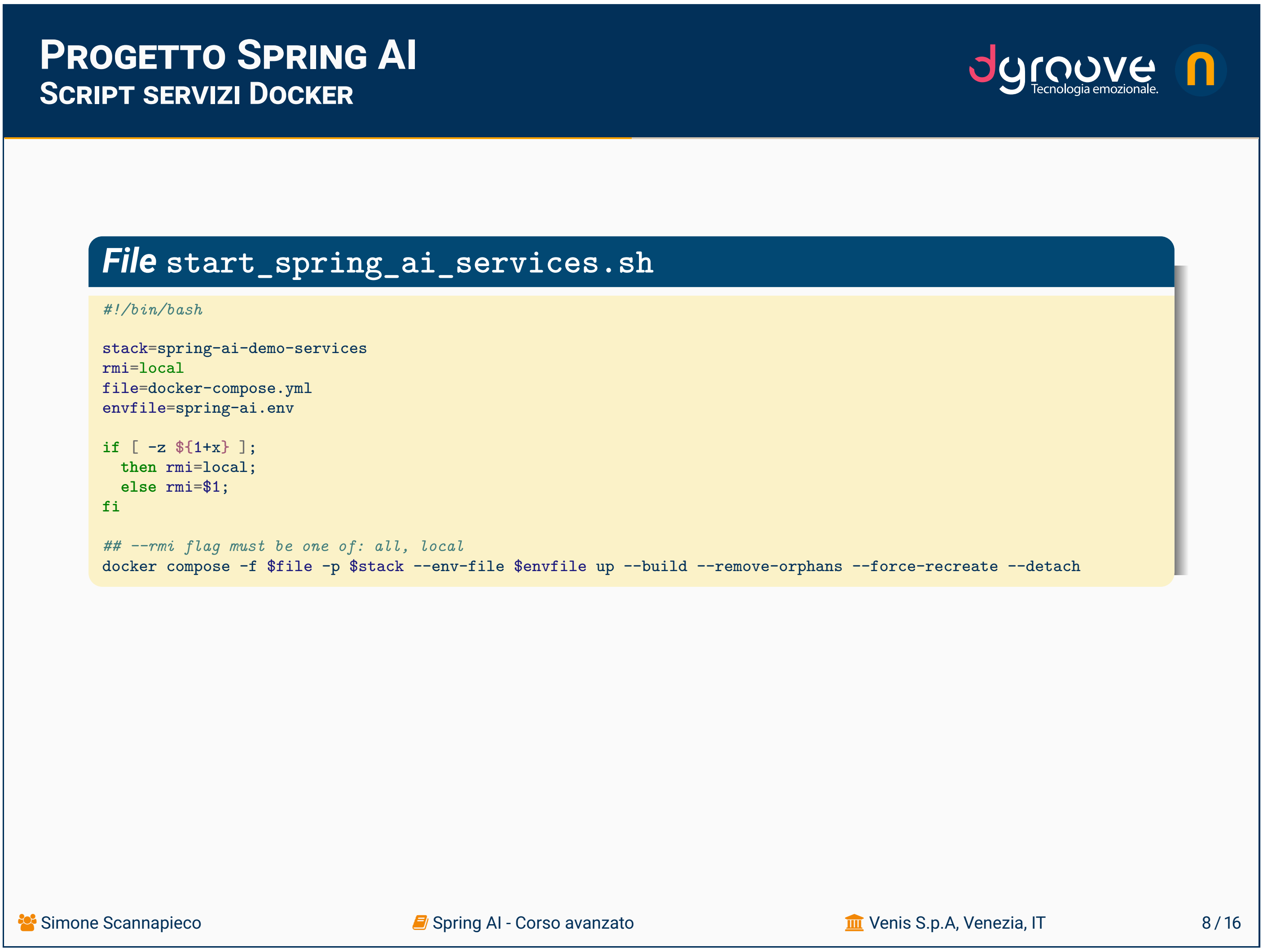
Progetto Spring AI

Variabili di ambiente servizio Docker Ollama

File spring-ai.env

```
# MODE:
# "llm-cpu" --> Large Language Model in cpu mode
# "llm-gpu" --> Large Language Model in gpu mode
MODE=llm-cpu
COMPOSE_PROFILES=${MODE}
LOG_LEVEL=WARNING                                                                    # default: WARNING

# Ollama configuration
#OLLAMA_VERSION=0.1.39                                                                # default: latest
OLLAMA_HOST=spring-ai-llm                                                            # default: 0.0.0.0
OLLAMA_PORT=11434                                                                      # default: 11434
OLLAMA_DEBUG=false                                                                     # default: false
OLLAMA_FLASH_ATTENTION=false                                                           # default: false
OLLAMA_KEEP_ALIVE="5m"                                                                  # default: "5m"
OLLAMA_MAX_LOADED_MODELS=2                                                                 # default: 1
OLLAMA_NUM_PARALLEL=1                                                                      # default: 1
```

Note



Progetto Spring AI
Script servizi Docker

File `start_spring_ai_services.sh`

```bash
#!/bin/bash

stack=spring-ai-demo-services
rmi=local
file=docker-compose.yml
envfile=spring-ai.env

if [ -z ${1+x} ];
  then rmi=local;
  else rmi=$1;
fi

## --rmi flag must be one of: all, local
docker compose -f $file -p $stack --env-file $envfile up --build --remove-orphans --force-recreate --detach
```

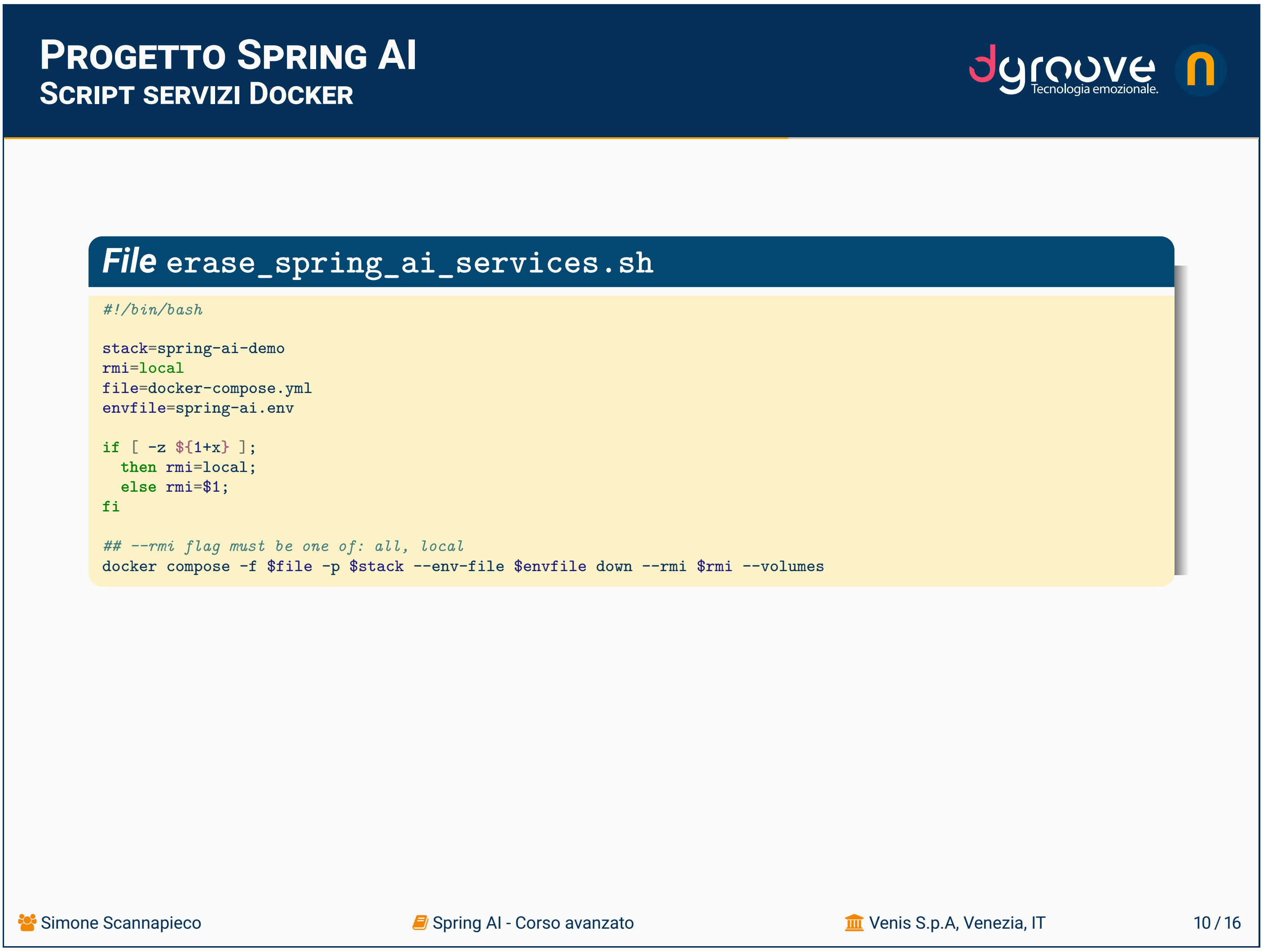
Note

Progetto Spring AI
Script servizi Docker

File `stop_spring_ai_services.sh`

```bash
#!/bin/bash

stack=spring-ai-demo-services
rmi=local
file=docker-compose.yml
envfile=spring-ai.env

if [ -z ${1+x} ];
  then rmi=local;
  else rmi=$1;
fi

## --rmi flag must be one of: all, local
docker compose -f $file -p $stack --env-file $envfile down --rmi $rmi
```

Note



Progetto Spring AI
Script servizi Docker

File `erase_spring_ai_services.sh`

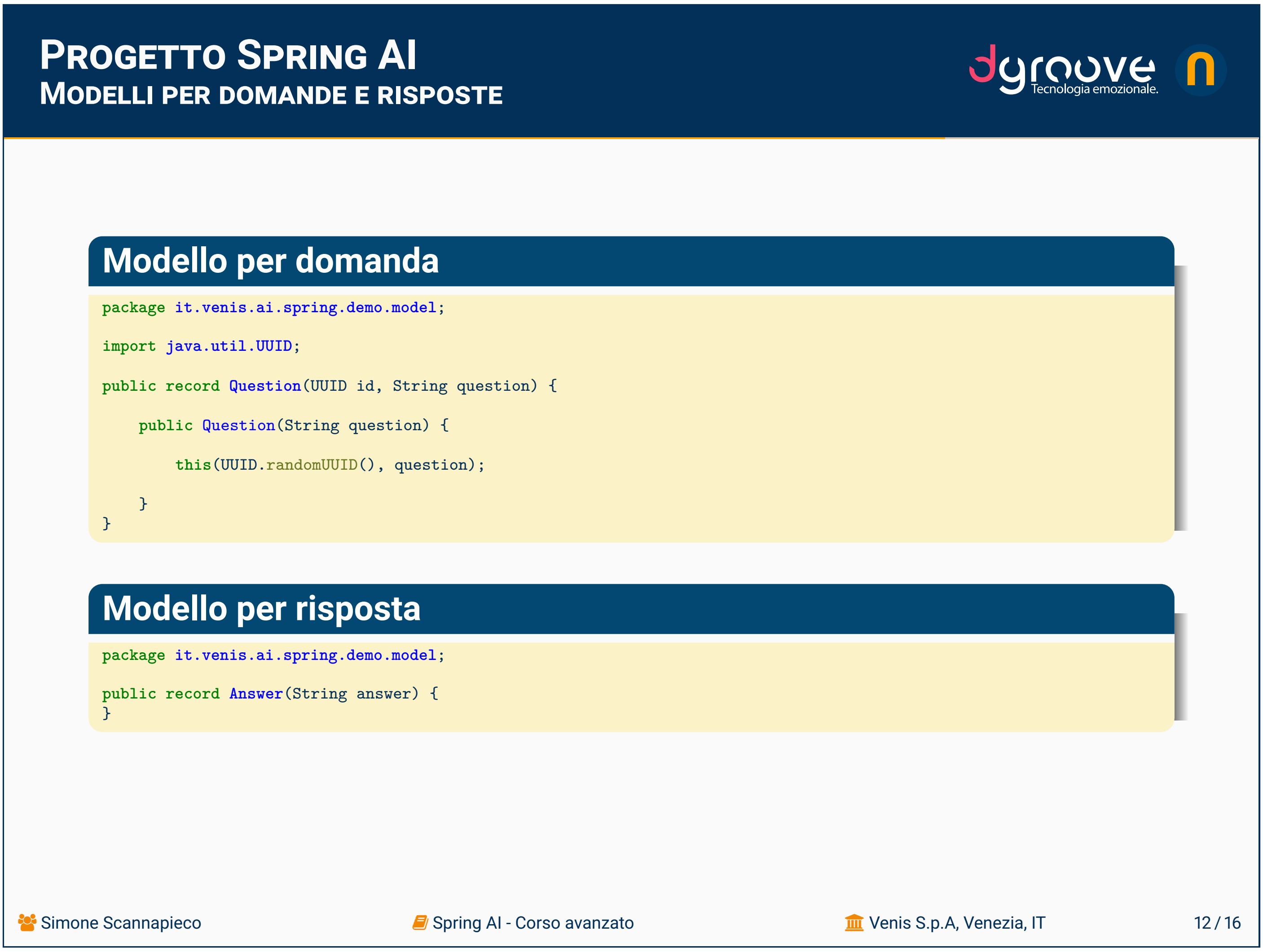
```bash
#!/bin/bash

stack=spring-ai-demo
rmi=local
file=docker-compose.yml
envfile=spring-ai.env

if [ -z ${1+x} ];
  then rmi=local;
  else rmi=$1;
fi

## --rmi flag must be one of: all, local
docker compose -f $file -p $stack --env-file $envfile down --rmi $rmi --volumes
```

Note

Configurazione Gemini + Ollama

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

import org.springframework.ai.chat.client.ChatClient;
import org.springframework.ai.ollama.OllamaChatModel;
import org.springframework.ai.openai.OpenAiChatModel;
import org.springframework.context.annotation.Bean;
import org.springframework.context.annotation.Configuration;
import org.springframework.context.annotation.Primary;

@Configuration
public class ChatClientConfig {

    @Bean
    @Primary
    public ChatClient openAiChatClient(OpenAiChatModel openaiChatModel) {
        return ChatClient.create(openaiChatModel);
        /*
         * or:
         * ChatClient.Builder chatClientBulder = ChatClient.builder(openaiChatModel);
         * return chatClientBulder.build();
         */
    }

    @Bean
    public ChatClient ollamaChatClient(OllamaChatModel ollamaChatModel) {
        ChatClient.Builder chatClientBulder = ChatClient.builder(ollamaChatModel);
        return chatClientBulder.build();
        /*
         * or:
         * return ChatClient.create(ollamaChatModel);
         */
    }

}
```

Note



Progetto Spring AI
Modelli per domande e risposte

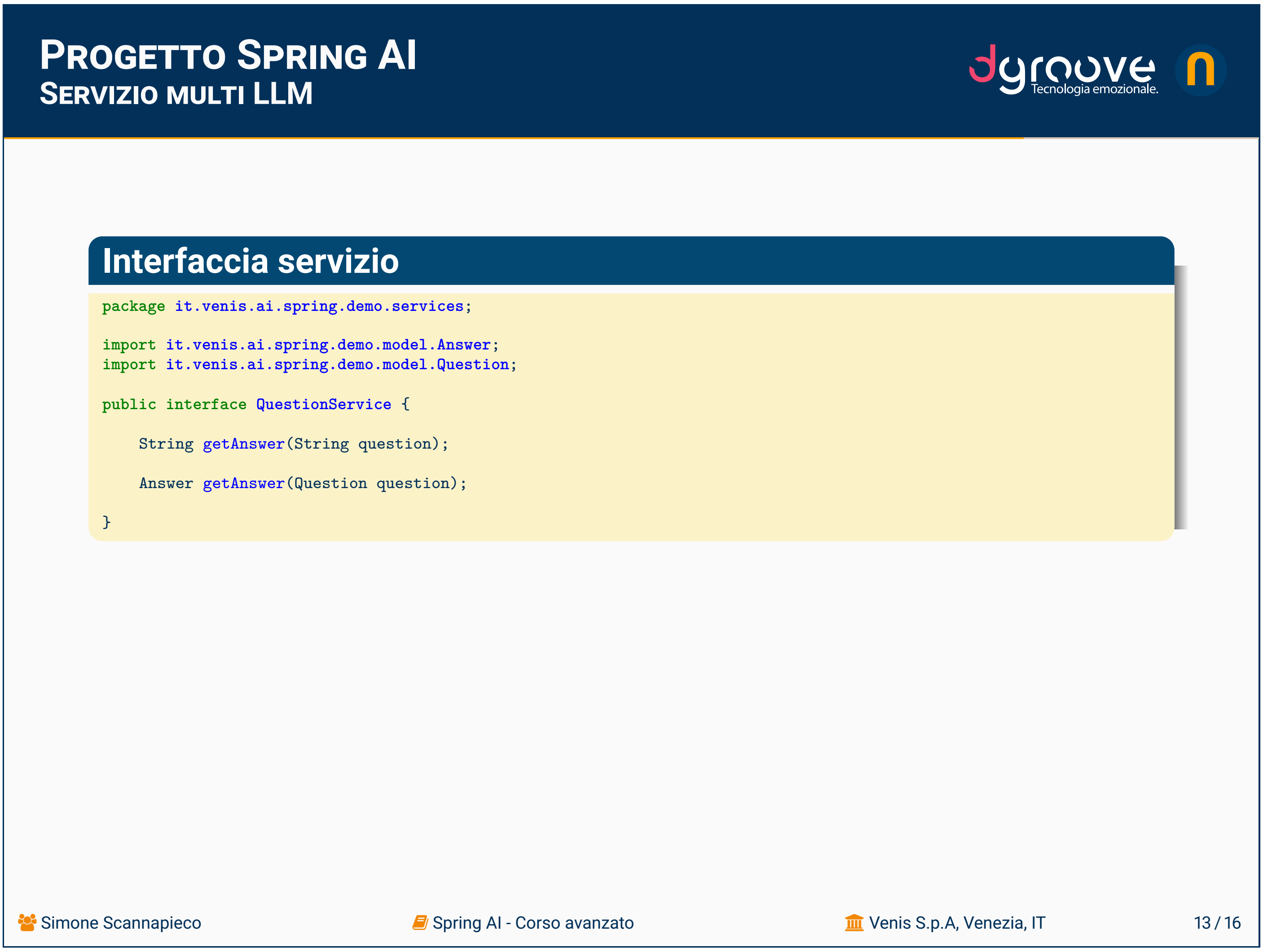
Modello per domanda

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

import java.util.UUID;

public record Question(UUID id, String question) {

    public Question(String question) {

        this(UUID.randomUUID(), question);

    }
}
```

Modello per risposta

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

public record Answer(String answer) {
}
```

Note



Progetto Spring AI
Servizio multi LLM

Interfaccia servizio

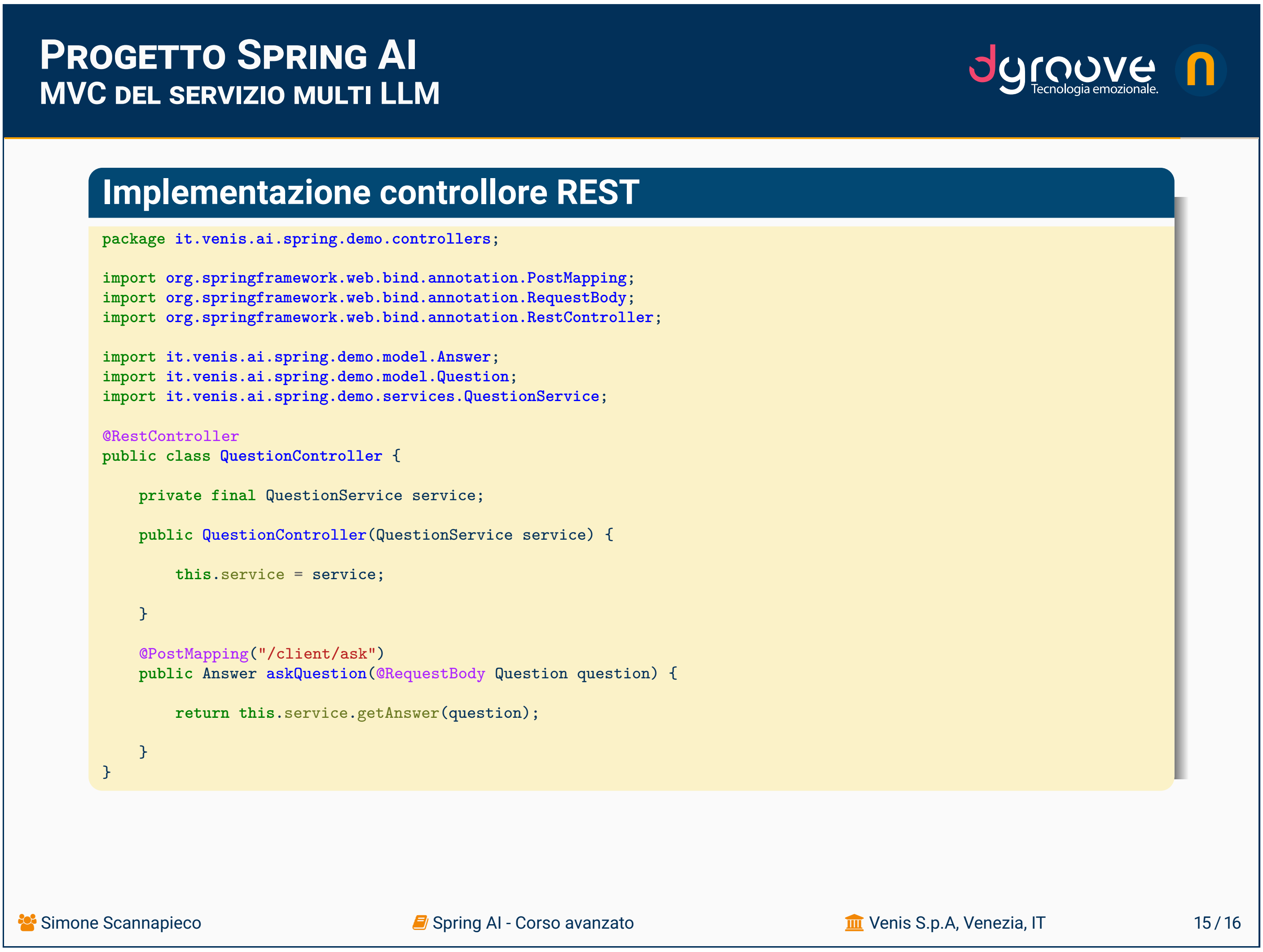
```java
package it.venis.ai.spring.demo.services;

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

public interface QuestionService {

    String getAnswer(String question);

    Answer getAnswer(Question question);

}
```

Note

Implementazione servizio

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

import org.springframework.ai.chat.client.ChatClient;
import org.springframework.beans.factory.annotation.Qualifier;
import org.springframework.context.annotation.Configuration;
import org.springframework.stereotype.Service;

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

@Service
@Configuration
public class QuestionServiceImpl implements QuestionService {

    private final ChatClient chatClient;

    public QuestionServiceImpl(@Qualifier("ollamaChatClient") ChatClient chatClient) {
        this.chatClient = chatClient;
    }

    @Override
    public String getAnswer(String question) {
        return this.chatClient.prompt()
                .user(question)
                .call()
                .content();
    }

    @Override
    public Answer getAnswer(Question question) {
        return new Answer(getAnswer(question.question()));
    }

}
```

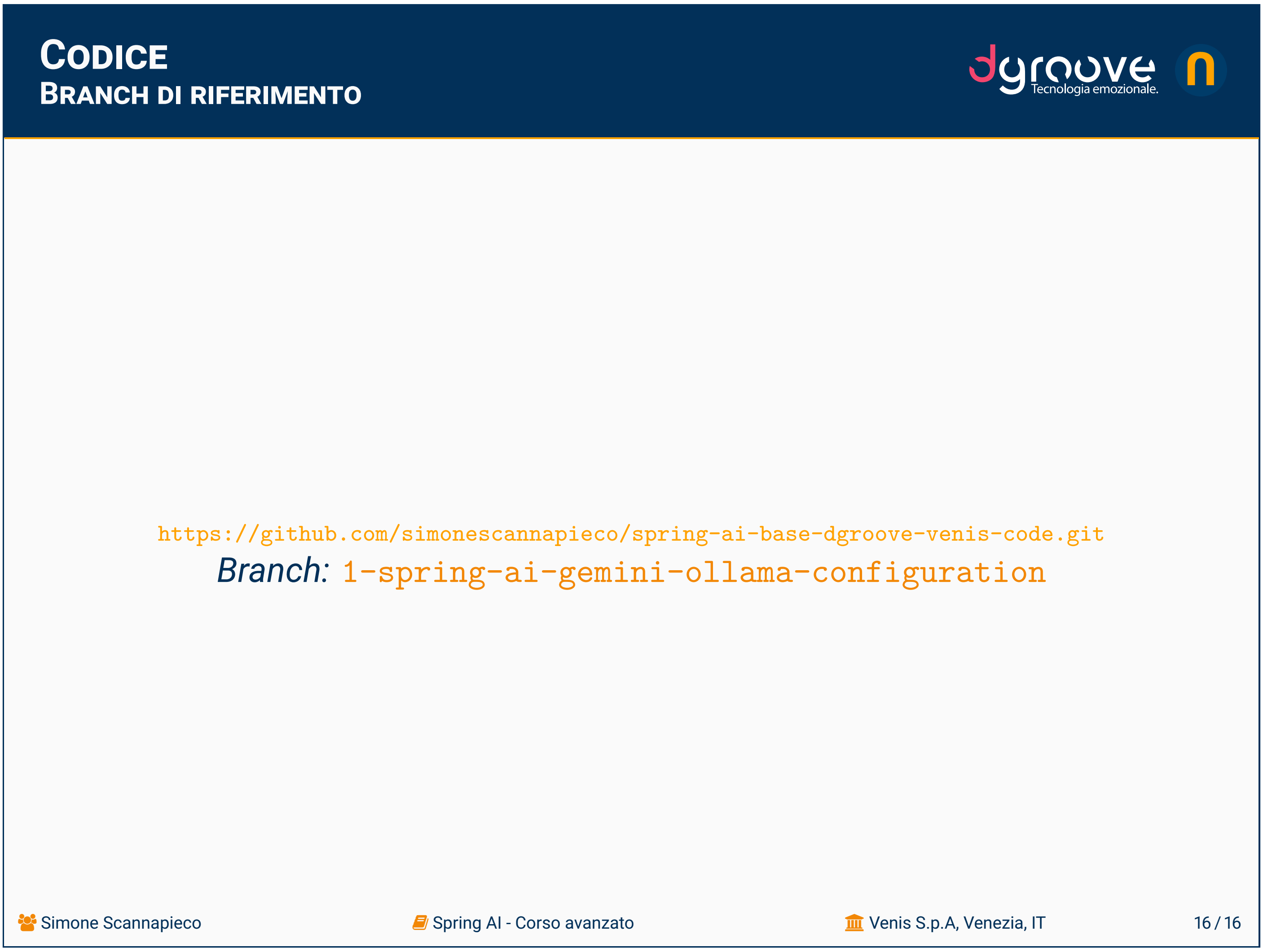
Note



Implementazione controllore REST

```java
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.services.QuestionService;

@RestController
public class QuestionController {

    private final QuestionService service;

    public QuestionController(QuestionService service) {

        this.service = service;

    }

    @PostMapping("/client/ask")
    public Answer askQuestion(@RequestBody Question question) {

        return this.service.getAnswer(question);

    }
}
```

Note



Codice
Branch di riferimento

`https://github.com/simonescannapieco/spring-ai-base-dgroove-venis-code.git`

Branch: `1-spring-ai-gemini-ollama-configuration`

Note