



Lesson 3 - Building a RAG Agent with CrewAI

In this lesson, you will build a RAG agent with CrewAI . You will do that by integrating RagTool from crewai_tools with a CrewAI agent. RagTool provides a way to create and query knowledge bases from various data sources, and allows the agent to access specialized context. In this lesson, you will provide the RAG tool a pdf file containing details about insurance coverage provided by a private health insurer. By the end of the lesson, you will build an insurer agent specialized in answering queries related to health benefits. In the next lessons, you will wrap this agent in an ACP server and make it interact with other ACP agents.

◆ **To Access requirements.txt and the data files:** 1) click on the "File" option on the top menu of the notebook and then 2) click on "Open". For more help, please see the "Appendix - Tips, Help, and Download" Lesson.

3.1. Import Libraries

```
In [18]: from crewai import Crew, Task, Agent, LLM
         from crewai_tools import RagTool
```

```
In [19]: import warnings
         warnings.filterwarnings('ignore')
```

3.2. Define the Agent's Large Language Model

You'll now define the large language model that you will use for your CrewAI agent. `max_tokens` : maximum number of tokens the model can generate in a single response.

Note: If you will define this model locally, it requires that you define the API key in a `.env` file as follows:

```
# Required
OPENAI_API_KEY=sk-...

# Optional
OPENAI_API_BASE=<custom-base-url>
OPENAI_ORGANIZATION=<your-org-id>
```

```
In [20]: llm = LLM(model="openai/gpt-4", max_tokens=1024)
```

3.3. Define the RAG Tool

For the RAG tool, you can define the model provider and the embedding model in a configuration Python dictionary. You can also define the details of your vector database. If you don't specify the vector database, the RagTool will use Chroma (ChromaDB) as the default vector database in local/in-memory mode.

```
In [21]: config = {
    "llm": {
        "provider": "openai",
        "config": {
            "model": "gpt-4",
        }
    },
    "embedding_model": {
        "provider": "openai",
        "config": {
            "model": "text-embedding-ada-002"
        }
    }
}
```

You can then pass the `config` to the `RagTool`, and then specify the data source for which the knowledge base will be constructed. When embedding your data, the `RagTool` chunks your document into chunks and create an embedding vector for each chunk. You can specify the chunk size (`chunk_size`: number of characters) and how many characters overlap between consecutive chunks (`chunk_overlap`). You can also use the default behavior.

```
In [22]: rag_tool = RagTool(config=config,
    chunk_size=1200,
    chunk_overlap=200,
)
rag_tool.add("../data/Handbook of Information for Students 2025-26.pdf", data_
```

```
In [23]: rag_tool
```

```
Out[23]: RagTool(name='Knowledge base', description="Tool Name: Knowledge base\nTool Arguments: {'query': {'description': None, 'type': 'str'}}\nTool Description: A knowledge base that can be used to answer questions.", args_schema=<class 'abc.RagToolSchema'>, description_updated=False, cache_function=<function BaseTool.<lambda> at 0x7f472f21b2e0>, result_as_answer=False, summarize=False, adapter=EmbedchainAdapter(embedchain_app=<embedchain.app.App object at 0x7f47221eaa90>, summarize=False), config={'llm': {'provider': 'openai', 'config': {'model': 'gpt-4'}}, 'embedding_model': {'provider': 'openai', 'config': {'model': 'text-embedding-ada-002'}}})
```

3.4. Define the Insurance Agent

Now that you have the `rag_tool` defined, you define the CrewAI agent that can assist with insurance coverage queries.

```
In [24]: counselling_agent = Agent(  
    role="Senior College Counsellor Agent",  
    goal="Determine the best academic practices for a student in the PGDM Prog",  
    backstory="You are an expert counselling agent designed to assist with aca",  
    verbose=True,  
    allow_delegation=False,  
    llm=llm,  
    tools=[rag_tool],  
    max_retry_limit=5  
)
```

3.5. Define the Agent Task

Let's now test the insurance agent. For that, you need to define the agent task and pass to it the query and the agent.

```
In [25]: task1 = Task(  
    description='What is the criteria for receiving the Deans List Award?',  
    expected_output = "A comprehensive response as to the users question",  
    agent=counselling_agent  
)
```

3.6. Run the Insurance Agent

To run the agent, you need to pass the agent and the task to a Crew object that you can run using the `kickoff` method.

```
In [26]: crew = Crew(agents=[counselling_agent], tasks=[task1], verbose=True)  
task_output = crew.kickoff()  
print(task_output)
```

Crew Execution Started

Crew Execution Started

Name: crew

ID: 17a5f323-f65d-4bf2-9a53-4d0354abefe5

📦 Crew: crew

📦 Task: 45bf5845-fc1d-40c7-94bf-de607ecce148

Status: Executing Task...

◇ Crew: crew

└ ◇ Task: 45bf5845-fc1d-40c7-94bf-de607ecce148

Status: Executing Task...

└ ◇ Agent: Senior College Counsellor Agent

Status: In Progress

Agent: Senior College Counsellor Agent

Task: What is the criteria for receiving the Deans List Award?

◇ Agent: Senior College Counsellor Agent

Status: In Progress

Agent: Senior College Counsellor Agent

Thought: To answer this question, I'll need to access the knowledge base and search for the criteria for receiving the Dean's List Award.

Using tool: Knowledge base

Tool Input:

"{\"query\": \"criteria for receiving the Deans List Award in PGDM Program\"}"

Tool Output:

Relevant Content:

104 Appendix-XIII – Criteria and Evaluation Method for Various Academic Awards
R P Goenka Leadership (RPGL) Award Criteria Students across all PGDM Programs are eligible for this award. There are three major criteria to be considered: 1. Academic Excellence (30 percent): to be measured through CGPA 2. Internal Leadership (20 percent): to be measured through membership of Clubs/Committees 3. Special Achievements (50 percent): to be measured through the following: a. Winning/participating in events in and outside IMI Delhi b. Excellence in SIPs measured through CTCs (Converted PPOs and PPIs) c. and Publication of Research Paper. Evaluation Method The scoring of marks for each category will be in the following manner: 1. Academic Excellence: CGPA may be multiplied with 10 in order to get the score out of 100 and will be weighted using the weight decided. 2. Internal Leadership: • Secretary - 10 marks; • Joint Secretary - 7 marks; • POC of society - 7 marks; • Member of club/committee- 5

their CGPA at the end of the academic year, will be included in this list. Students on the Dean's List are recognized collectively without individual rankings. For a student to be eligible for being placed in the Dean's List after the completion of first year of the program a. the student should secure a CGPA of 7.0 or higher after the completion of the first year of the program; b. the student must not have secured a 'D' or 'F' in any course or 'NS' in compulsory workshop;

47 c. the student who has not appeared for any make up examination; d. the student must not have been penalized for resorting to unfair means in completing any of the evaluation component. For a student to be eligible for being placed in the Dean's List after the completion of second year of the program a. the student should secure a CGPA of 7.0 or higher at the end of second year of the program; b. the student should secure a CGPA of 7.0 or higher after the completion of the first year of the program; c. the student must not have secured a 'D' or 'F' in any course or an 'NS' in a compulsory workshop; d. the student who has not appeared for any make up examination; e. the student must not have been penalized for resorting to unfair means in completing any of the evaluation component. Students who are recognized for the Dean's List will be honored with a certificate and a commemorative plaque, a recognition they can cherish for a lifetime. First year students will be awarded the

◇ **Agent:** Senior College Counsellor Agent

Status: **In Progress**

└ ◇ **Thinking...**

◇ **Agent:** Senior College Counsellor Agent

Status: **In Progress**

Agent: Senior College Counsellor Agent

Final Answer:

The criteria for receiving the Dean's List Award in the PGDM Program are as follows:

- For the first year of the program:
 1. The student should secure a CGPA of 7.0 or higher after the completion of the first year of the program.
 2. The student must not have secured a 'D' or 'F' in any course or 'NS' in a compulsory workshop.
 3. The student who has not appeared for any make-up examination.
 4. The student must not have been penalized for resorting to unfair means in completing any of the evaluation components.
- For the second year of the program:
 1. The student should secure a CGPA of 7.0 or higher at the end of the second year of the program.
 2. The student should secure a CGPA of 7.0 or higher after the completion of the first year of the program.
 3. The student must not have secured a 'D' or 'F' in any course or an 'NS' in a compulsory workshop.
 4. The student who has not appeared for any make-up examination.
 5. The student must not have been penalized for resorting to unfair means in completing any of the evaluation components.

Students who are recognized for the Dean's List will be honored with a certificate and a commemorative plaque. These students are recognized collectively without individual rankings.

◇ **Crew:** crew

└ ◇ **Task:** 45bf5845-fc1d-40c7-94bf-de607ecce148

Status: **Executing Task...**

└ ◇ **Agent:** Senior College Counsellor Agent

Status: ◇ **Completed**

◇ **Crew:** crew

└ ◇ **Task:** 45bf5845-fc1d-40c7-94bf-de607ecce148

Assigned to: Senior College Counsellor Agent

Status: ◇ **Completed**

└ ◇ **Agent:** Senior College Counsellor Agent

Status: ◇ **Completed**

Task Completed

Name: 45bf5845-fc1d-40c7-94bf-de607ecce148

Agent: Senior College Counsellor Agent

Crew Execution Completed

Name: crew

ID: 17a5f323-f65d-4bf2-9a53-4d0354abefe5

The criteria for receiving the Dean's List Award in the PGDM Program are as follows:

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 4. The student must not have been penalized for resorting to unfair means in completing any of the evaluation components.
- For the second year of the program:
 1. The student should secure a CGPA of 7.0 or higher at the end of the second year of the program.
 2. The student should secure a CGPA of 7.0 or higher after the completion of the first year of the program.
 3. The student must not have secured a 'D' or 'F' in any course or an 'NS' in a compulsory workshop.
 4. The student who has not appeared for any make-up examination.
 5. The student must not have been penalized for resorting to unfair means in completing any of the evaluation components.

Students who are recognized for the Dean's List will be honored with a certificate and a commemorative plaque. These students are recognized collectively without individual rankings.

3.7. Resources

- [CrewAI Agents](#)
- [CrewAI Tasks](#)
- [CrewAI RagTool](#)
- [Short course on Multi Agents with CrewAI](#)

↓ **Download Notebooks:** 1) click on the "*File*" option on the top menu of the notebook and then 2) click on "*Download as*" and select "*Notebook (.ipynb)*".

In []: