

watsonx Orchestrate Lab 1b:

Building A Custom Skill

Objective

Sometimes, the out of the box skills might not be enough to achieve what you want to do. Or, your organization may have a custom tool, function, which you wish to incorporate into a workflow. In this lab, you will learn how to set up a custom skill using a custom-made Open API Script. The Open API specifications are connected to three agents – **“Get Historic Sales”**, **“Time Series Forecasting** and **“Calculate Reorder Quantity”** which we’ve created using a python code using watsonx.ai and crew.ai in the backend.

Use Case:

In this lab, you will learn how to configure custom skills for text2sql to retrieve historical sales and quantity data.

The high-level steps to accomplish this are as follows:

1. Create a new Skill using the custom Open API specification.
2. Enhance and Publish the Skill.
3. Add your custom skill to Skill Catalog.
4. Bringing in a ML Predictive Model
5. Add Skills to AI Chat
6. Test the Skills.

Configure Custom Skills Script

As we will be using a shared instance for this workshop, we will need to make slight modification to one of the custom skill script to avoid confusion and skills clashes.

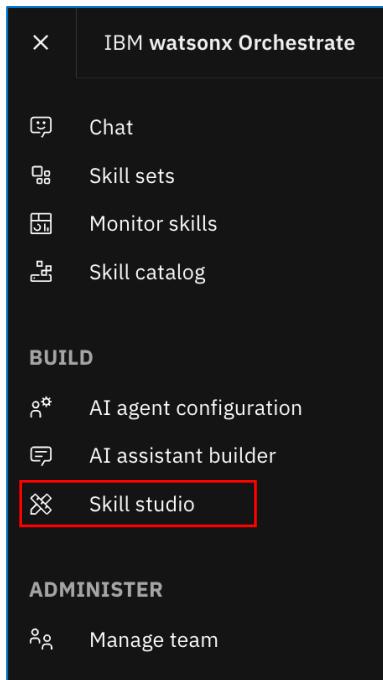
1. Download the text2sqlc_openapi.json custom skills script from [here](#).
2. Open up the script with a code editor or notepad and update the following
 - a. Update title to “[Your Name] Get Historic Sales”
 - b. Update description to “[Your Name] API that converts.....”
 - c. Update summary to “[Your Name] Text2SQL with Crew AI”
 - d. Update description to “[Your Name] Takes a natural language query...”
 - e. Update operationid to “[Your Name]processQuery” (**no spacing**)

```
{  
    "openapi": "3.0.0",  
    "info": {  
        "title": "SY Get Historic Sales",  
        "description": "SY API that converts natural language queries into SQL and executes them on a SQLite database.",  
        "version": "1.0.0"  
    },  
    "servers": [  
        {  
            "url": "https://text2sql-crewai.1so5wfkjkmeox.us-south.codeengine.appdomain.cloud/",  
            "description": "Deployment server"  
        }  
    ],  
    "security": [  
        {  
            "basicAuth": []  
        }  
    ],  
    "paths": {  
        "/query": {  
            "post": {  
                "summary": "SY Text2SQL with Crew AI",  
                "description": "SY Takes a natural language query, converts it into an SQL query, executes it, and returns the results.",  
                "operationId": "SY processQuery",  
                "requestBody": {  
                    "required": true,  
                    "content": {  
                        "application/json": {  
                            "schema": {  
                                "$ref": "#/components/schemas/Text2SQLRequest"  
                            }  
                        }  
                    }  
                }  
            }  
        }  
    }  
}
```

3. Save the script and we will now upload to WxO.
4. Due to time constraint, the rest of the custom skills have been configured within the tenant.

Configure Custom Skills

1. Go to Skill Studio from the top left hamburger menu



2. Create a new skill by using the option “Import API”

The image shows the Skill studio interface. At the top right, there is a "Create" button with a dropdown menu. The "Import API" option in this menu is highlighted with a red box. The main area displays a "Welcome to Skill studio" message and a "Skills and apps" tab. Below the tabs, there is a search bar labeled "Find a skill". A table lists skills with columns: Name, Step in the process, Status, Skill type, Author, and Last edited.

3. Import the file text2sql_openapi.json from your local.

Add skills

Choose how you want to add skills and then select the skills you want to refer to from that source.

Choose the source

Select the skills

Choose the source

To discover new skills, connect to an app or refer to an OpenAPI file.

From an app

From a file

OpenAPI builder (experimental)

Import a skill file

Ensure your file is in the .json, or yaml format and no larger than 50 MB.

[Drag and drop files here or click to upload](#)

4. Select the Skill “[YourName] Text2SQL with Crew AI” and Add.

Add skills

Choose how you want to add skills and then select the skills you want to refer to from that source.

Choose the source

Select the skills

Choose skills

you can choose which skill to add here

0 out of 1 selected

Q

Skill

Description

Status



Text2SQL with Crew AI

Takes a natural language query...

⚠ Ready to add

After adding the skills, the status would be “Ready to publish” like as follows:

Welcome to Skill studio

Optimize productivity by using projects to build and manage skills like workflows, decisions, generative AI and others.

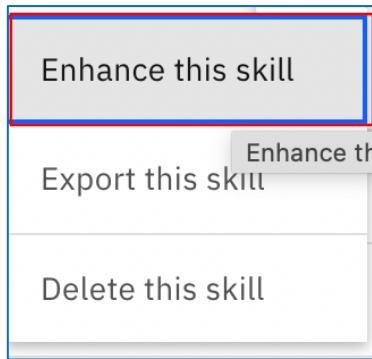
Create

Skills and apps

Skills

| Name | Step in the process | Status | Skill type | Author | Last edited |
|------------------------------|------------------------------|------------------|------------|----------------------|---------------|
| AG Text2SQL with Crew AI | Just 1 step away to be ready | Ready to publish | Imported | Ashutosh.G@ibm.com | March 28 2025 |
| Ashwin Text2SQL with Crew AI | Ready to use | Published | Imported | Ashwinmrao12@ibm.com | March 28 2025 |
| Reorder_Decision_Flow | Ready to use | Published | Project | sukyee@ibm.com | March 28 2025 |
| Get_Supplier_Flow | Ready to use | Published | Project | sukyee@ibm.com | March 28 2025 |
| Auto_AI | Ready to use | Published | Project | sukyee@ibm.com | March 27 2025 |
| Autonote_Prediction | Ready to use | Published | Project | sukyee@ibm.com | March 27 2025 |

- Now, Click on the menu of this skill (three dots in the last) once it has been imported successfully and then select “Enhance this Skill”.



You will see the following image:

Enhance the “AG Text2SQL with Crew AI” skill

Add details that will make people want to use this skill.

| Name | Input | Output | Security | Phrases | Next best skills |
|--------------|---|---------|----------|---------|------------------|
| Name* | AG Text2SQL with Crew AI | | | | |
| Description | AG Takes a natural language query, converts it into an SQL query, executes it, and returns the results. | 103/100 | | | |
| API version* | 1.0.0 | | | | |
| Categories | Add categories | | | | |
| App | AG_Get_Historic_Sales | | | | |

Preview

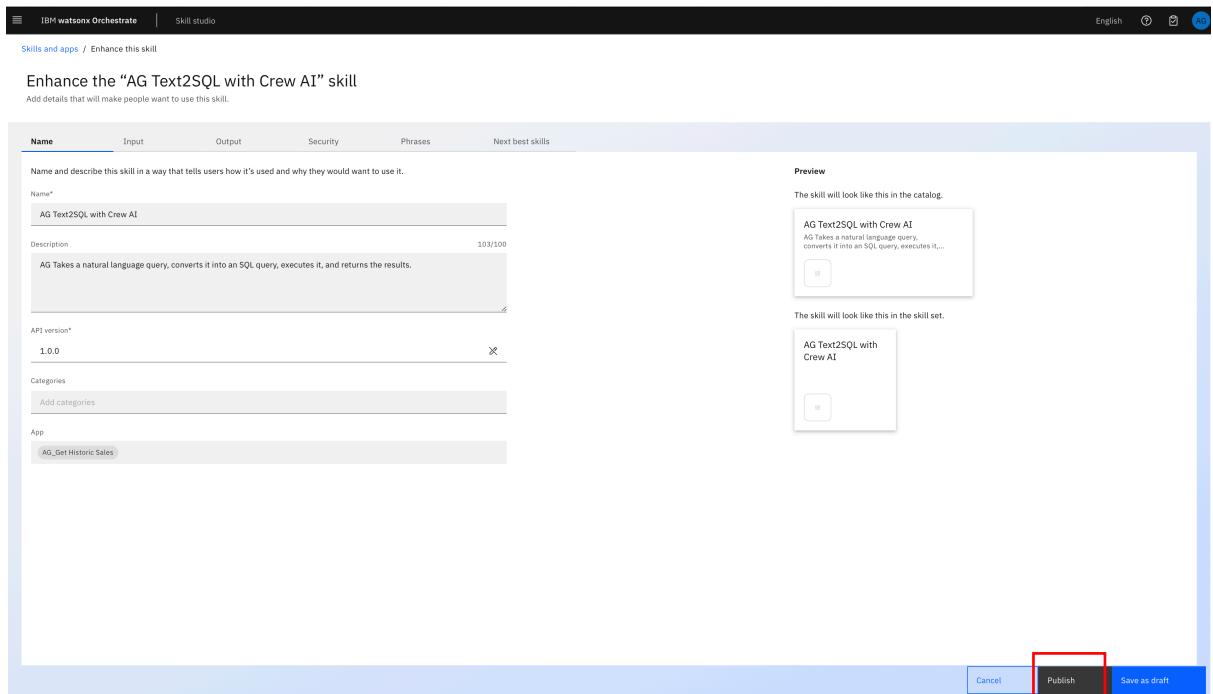
The skill will look like this in the catalog.

AG Text2SQL with Crew AI
AG Takes a natural language query, converts it into an SQL query, executes it, and returns the results.

The skill will look like this in the skill set.

AG Text2SQL with Crew AI

- Publish the Skill by clicking the “Publish” button.



After successfully publication, you can see how the status got change on the skill catalog window.

| Name | Step in the process | Status | Skill type | Author | Last edited |
|------------------------------|---------------------|-----------|------------|---------------------|---------------|
| AG Text2SQL with Crew AI | Ready to use | Published | Imported | Ashutosh.G@ibm.com | March 28 2025 |
| Ashwin Text2SQL with Crew AI | Ready to use | Published | Imported | Ashwinrao12@ibm.com | March 28 2025 |
| Reorder_Decision_Flow | Ready to use | Published | Project | sukyee@ibm.com | March 28 2025 |
| Get_Supplier_Flow | Ready to use | Published | Project | sukyee@ibm.com | March 28 2025 |

7. Go to **Skill Catalog** from the left-hand hamburger menu and search for “[YourName] Get Historic Sales”. Once you found, select the App.
****Sometimes the app takes a while to load. You can refresh the page if the search fails.**

The screenshot shows the 'Skill catalog' page in IBM Watsonx Orchestrate. A search bar at the top contains the query 'Get Historic Sales', which is highlighted with a red box. Below the search bar is a grid of 'Apps'. In the third column of the grid, there is a card for 'Get Historic Sales' with the subtext '1 skill'. This card is also highlighted with a red box. The rest of the grid contains various other apps like Salesforce, Microsoft Outlook, Slack, etc., each with their respective skill counts.

- Once you selected the app, now add the “[YourName] Text2SQL with Crew AI” skill by clicking on the “Add Skill” button.

The screenshot shows the details page for the 'Get Historic Sales' skill. At the top, it says 'Get Historic Sales (1)'. Below that is a 'Personal skills' section with a search bar. The main content area is titled 'Get Historic Sales' and contains a box for 'Text2SQL with Crew AI'. The box describes the skill: 'Converts natural language queries into SQL and executes them on a SQLite database.' A button labeled 'Added ✓' is highlighted with a red box. The entire screenshot is framed by a blue border.

- Connect the app by clicking on “Connect App” button.

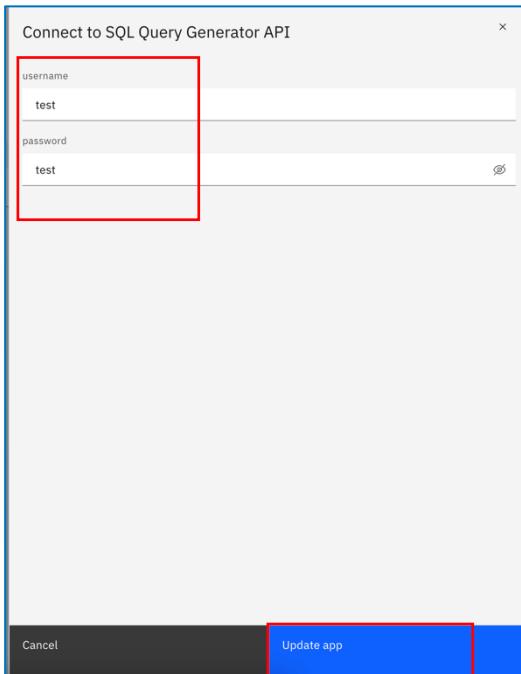
The screenshot shows the 'Get Historic Sales' skill details page again. The 'Text2SQL with Crew AI' skill box is visible, and the 'Added ✓' button is shown. In the top right corner of the page, there is a blue button labeled 'Connect app' with a gear icon, which is highlighted with a red box. The entire screenshot is framed by a blue border.

Use the following credentials to connect:

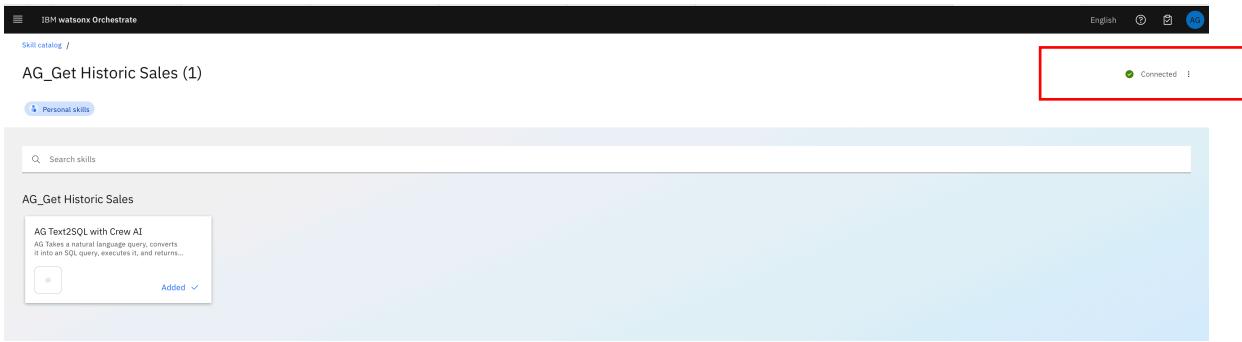
username: test

password: test

And then click on “Update App”/ “Connect App”.

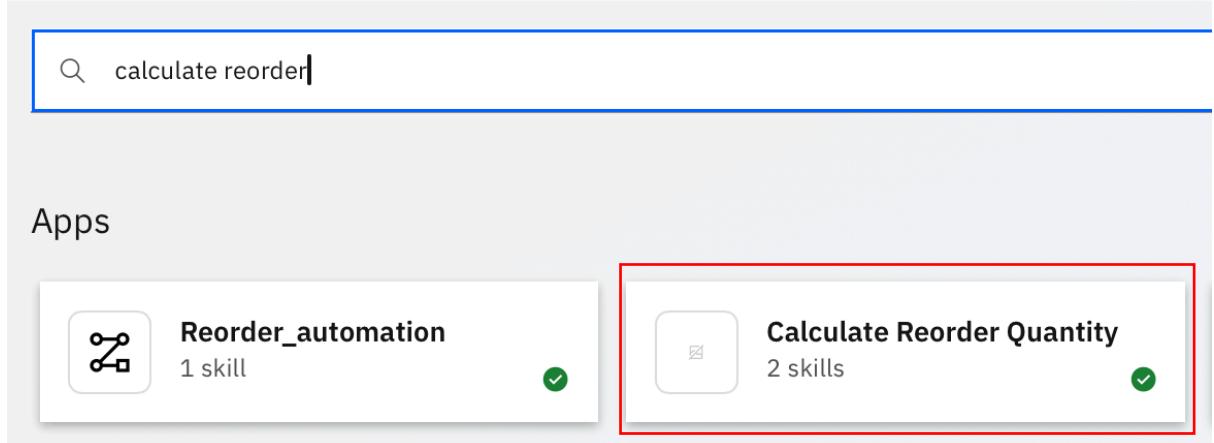


Now, you can see the following image:

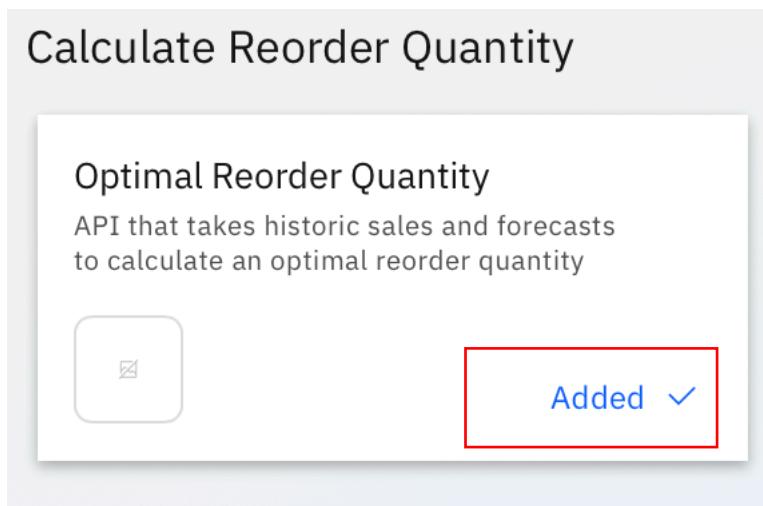


10. You will be able to see other custom skills within the catalog. These are preloaded and preconnected for all participants in the instance. So, you are required to add these skills one by one as we added “[YourName] Get Historic Sales”
 - a. Calculate reorder quantity
 - b. Salesforce custom skill
 - c. Supplier Research
 - d. TimeSeriesForecast

11. You will need to add these 4 skills into your personal skills. An example to add Calculate reorder quantity will be shown to you.
12. From **Skill Catalog**, search for Calculate reorder quantity app and click the tile.

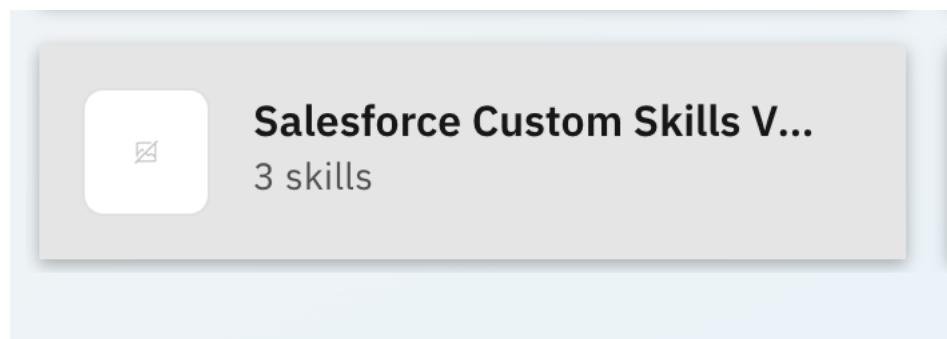


13. Add the skill.



14. Repeat for the other two custom skill and add all skills within the different app into your personal skill.

a. Salesforce Custom Skills



Salesforce Custom Skills Version2

Create a new order in Salesforce

An API for managing orders and price books in Salesforce.



Add skill +

Create an order item in salesforce

An API for managing orders and price books in Salesforce.



Add skill +

Fetch all price books from salesfo...

An API for managing orders and price books in Salesforce.



Add skill +

b. Supplier Research



2. Supplier Research Agent API

1 skill



2. Supplier Research Agent API

Supplier Research

2. Supplier Research Agent API



Added ✓

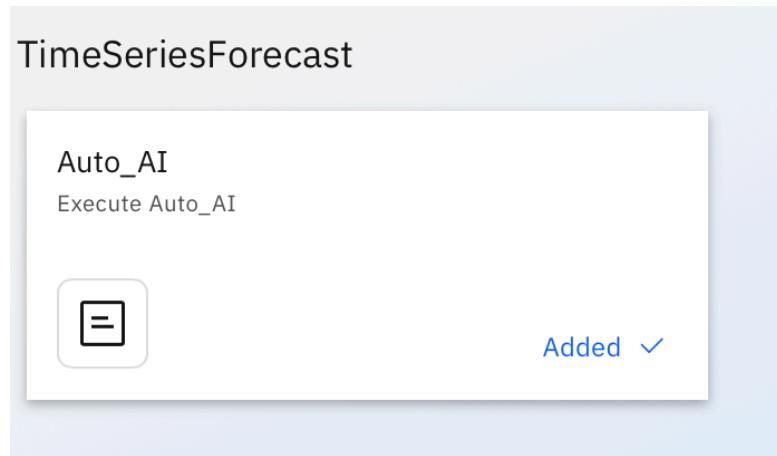
c. TimeSeriesForecast



TimeSeriesForecast

1 skill



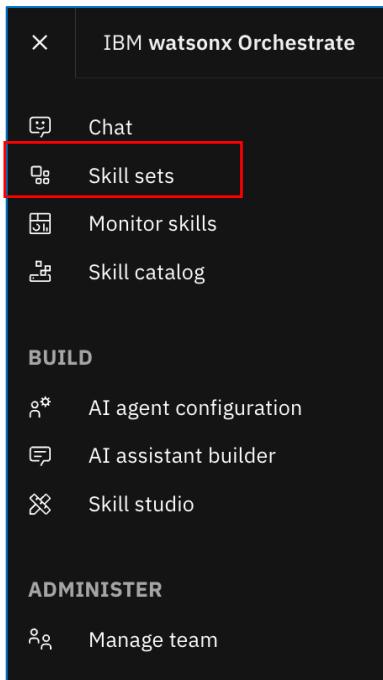


[READ ONLY] Configure AI Agent with Custom Skill

Note:

- For this workshop, we've given everyone admin rights. If you notice you're not one, feel free to contact the course owner.
- **For this workshop, we've added all apps and skills required. You can follow through the steps, but you DO NOT NEED to connect or add on the skills anymore.**
- **DO NOT** edit any skills credentials

1. Go to "Skill Sets" from the top left hamburger menu.



- From the dropdown menu under skill sets, select “Orchestrate Agent Skillset”

A screenshot of the "Orchestrate Agent Skillset" page. The "Skill sets" dropdown is set to "Orchestrate Agent Skillset". Below it, there are tabs for "Skills" (selected) and "Connections". The "Skills (24)" section lists various skills: Update an order, Get all contracts, Text2SQL with Crew AI, Approval_workflow, Get file content, and Get all folders. Each skill has an "App" icon next to it. A "Manage skills" button is located at the top right of the skill list.

- Next, select the Connections tab and search for “[YourName] Get Historic Sales” and “connect / Edit” connection.

Skill sets

Orchestrator Agent Skillset

Skills Connections

These are the applications that are used by the skills in team skill set. Application connections are required to execute skills. Set preference at an application level to enable skills to either use personal or team credentials.

| Application | Number of skills | Credential type | Connected by | Action |
|---------------------|------------------|-----------------|------------------------|--|
| GenAIAutomation_NEW | 3 | Member | - | ⋮ |
| Get Historic Sales | 1 | Team | Tannavi.Snehal@ibm.com | Edit connection Delete connection |
| Get product Details | 1 | Not specified | - | ⋮ |
| get_email_outlook | 1 | Member | - | ⋮ |
| GitHub | 11 | Not specified | - | ⋮ |

Items per page: 5 | 41-45 of 141 items | 9 of 29 pages | ⏪ ⏴ ⏵ ⏹

4. Connect the app by clicking on “Connect App” button and provide the following credentials, if it is not connected earlier:

username: **test**

password: **test**

Once successfully connected, select “AI Agent Configuration” from the left hand hamburger menu and then select “Apps and Skills” respectively.

IBM Watson Orchestrate

Skillset

Chat

Skill sets AI agent configuration

Monitor skills

Skill catalog

BUILD

AI agent configuration

AI assistant builder

Skill studio

ADMINISTER

Manage team

These are the applications that are used by the skills in team skill set. Application connections are required to execute skills. Set preference at an application level to enable skills to either use personal or team credentials.

| Number of skills | Credential type | Connected by | Action |
|------------------|-----------------|---------------------|---|
| 1 | Team | Ashutosh.G@ibm.com | ⋮ |
| 1 | Team | Ashwinrao12@ibm.com | ⋮ |

of 2 items | 1 of 1 page | ⏪ ⏴ ⏵ ⏹

The screenshot shows the 'AI agent configuration' screen in IBM Watsonx Orchestrate. On the left, a sidebar lists navigation options: Model settings, System prompt, Starter prompts, Agents, Assistants, Apps and skills (which is selected and highlighted with a red box), and Embed chat. The main content area has a heading 'Apps and skills let your team connect to data and complete tasks in other applications'. Below this, there's a sub-section titled 'Why add apps and skills?' with a link. A table displays various applications and their associated skills. The table has columns for 'Box' (with a 'Visible' toggle), 'Calculate Reorder Quantity', 'chinese_demo', 'chinese_demo', and 'chinese_demo'. Rows include entries like 'CWA_2', 'GenAIAutomation', and 'Demo Skills'. A search bar at the top of the table allows filtering by skill name.

5. Search for “[YourName] Get Historic Sales” and click on it. You will see “Text to SQL with CrewAI” skill there and add this “Text to SQL with CrewAI” skill to AI Chat.

This screenshot continues from the previous one, showing the 'AI agent configuration' screen. The 'Apps and skills' section is still active. The user has selected the 'AG_Get_Historic_Sales' application from the list. The application details are shown: 'AG Text2SQL with Crew AI' and 'From AG_Get_Historic_Sales'. There is also a 'Visible' toggle switch which is turned on. The 'Back to all apps' link is visible above the application details.

6. Click on “back to all apps” and Search for “TimeSeriesForecast”. You will see the following screen. Click on “Add skill” for adding “Auto_AI”, if not added.

The screenshot shows the 'AI agent configuration' page in IBM Watsonx Orchestrate. On the left, a sidebar lists navigation options: Model settings, System prompt, Starter prompts, Agents, Assistants, Apps and skills (which is selected and highlighted in blue), and Embed chat. The main content area has a header 'Apps and skills let your team connect to data and complete tasks in other applications'. Below this is a sub-header 'Why add apps and skills? ⓘ'. A search bar at the top right includes a 'Hidden' toggle switch, a help icon, and a search input field. A list of skills is displayed under the heading 'TimeSeriesForecast @timeseriesforecast'. The first skill listed is 'Auto_AI' from 'TimeSeriesForecast', which has a percentage icon and a status indicator 'Added ✓'.

7. Go back to all aps and Search for “Calculate Reorder Quantity” and add the “Optimal Reorder Quantity” skill to AI Chat as we did earlier for others.

The screenshot shows the configuration interface for the 'Calculate Reorder Quantity' app. At the top, there is a 'Back to all apps' link. Below it, the app name 'Calculate Reorder Quantity' and its handle '@calculatereorderquantity' are shown. A search bar with a 'Visible' toggle switch and a help icon is present. A list of skills is shown under the heading 'From Calculate Reorder Quantity'. The first skill listed is 'Optimal Reorder Quantity', which has a percentage icon and a status indicator 'Added ✓'. A red box highlights the 'Back to all apps' link and the 'Added ✓' status indicator.

Now, we are done with the adding skills. Let's check how the agent is behaving now with our queries.

Test custom skills

Go to Chat window from top left hamburger menu and try the following queries:

1. What is the sales figure for Xtralife for the last 3 months?

Note: The agent will prompt the query again to double check. The response may take some time to populate.

Watsonx 7:55 PM
Please confirm:
query: What is the sales figure for Xtralife for the last 3 months?

| month year | total figure |
|------------|--------------|
| 2025-02 | 430000 |
| 2025-01 | 410000 |
| 2024-12 | 400000 |

Items per page: 10 ✓ 1 – 3 of 3 items [1 2 of 1] < >

- What is the quantity sold last year this month for Xtralife? (Activating @gethistoricsales)

Watsonx 8:01 PM
Please confirm:
query: 2. What is the quantity sold last year this month for Xtralife?

| month year | total figure |
|------------|--------------|
| 2024-03 | 1000 |

Items per page: 10 ✓ 1 – 1 of 1 items [1 2 of 1] < >

- What is the forecasted sales and quantity for the next 3 months?
When prompted to enter value for lastMonthSales and lastMonthQuantity, you can enter any value. Ensure lastMonthSales is much larger than lastMonthQuantity.
(response from @timeseriesforecastautoai)

You 5:59 PM

3. What is the forecasted sales and quantity for the next 3 months

watsonx 5:59 PM

Enter a value for lastMonthSales

You 6:01 PM

What is the forecasted sales and quantity for the next 3 months

watsonx 6:01 PM

Enter a value for lastMonthSales

You 6:01 PM

5000000

watsonx 6:01 PM

Enter a value for lastMonthQuantity

You 6:01 PM

2000

watsonx 6:01 PM

Please confirm:
lastMonthSales: 5000000
lastMonthQuantity: 2000

Yes

No

You 6:02 PM

Yes

watsonx 6:02 PM

sales : 3032086
quantity : 2169

4. Let's increase the complexities in the query. Ask the following query.
What should be the optimal reorder quantity if my current inventory has 1000 units, last month sales was 3400 units and forecast for the next month is 3107 units? (Generating from @calculatereorderquantity)

Here, you can see how the system is first extracted the relevant information and prompt to the user to check again and later generate the response with reasoning.

You 8:06 PM

What should be the optimal reorder quantity if my current inventory has 1000 units, last month sales was 3400 units and forecast for the next month is 3107 units?

watsonx 8:06 PM

Please confirm:
forecast: 3107
historic_data: 3400
current_inventory: 1000

Yes

No

You 8:06 PM

Yes

watsonx 8:07 PM

reasoning : The optimal reorder quantity is calculated based on the shortfall between the forecasted demand and the current inventory, supplemented by a safety stock that is 10% of the historic sales. This approach ensures sufficient stock to meet the forecasted demand while minimizing excess inventory and considering the risk of stock shortages based on historic sales trends.

reorder_quantity : 2447

Type something...



This is the end of the Lab 1.b