KNEO 330 EdgeGPT Server User Manual

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0.20.9	Fix the database creation bugs	V0.20.9	Oscar Law	2025/03/12

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1 Introduction

The KNEO 330 is an EdgeGPT server powered by an NPU, tailored for Large Language Model (LLM) applications and offering 48 TOPS of AI computing performance. It features an all-metal body with fan-based cooling and boasts multiple peripheral interfaces for enhanced functionality. Compared to traditional GPU-based LLM inference, the KNEO 330 excels in cost-effectiveness, energy efficiency, and overall performance for Artificial Intelligence Generated Content (AIGC) applications. The system supports multiple-user access and functions like the chatbot with user-defined answers. Moreover, it is no longer limited to the text inputs for the knowledge base creation, it also supports embedded document (.pdf), video subtitle (.srt), and graphics (jpg/png) file formats. Finally, it allows the users to access the custom knowledge base through the private group.

The KNEO 330 comes with Kneron's proprietary edge chatbot software, designed primarily for answering questions and providing information. It functions similarly to an advanced offline virtual assistant. Key features and applications of this chatbot include:

1. **Q&A:** Support general inquiry for various areas: science, history, culture, technology, and more.
2. **Language Understanding:** Exhibits strong natural language processing abilities, enabling it to comprehend and respond to complex and abstract queries.
3. **Multiple Users Access:** Allow multiple users to access the machine without performance degradation.
4. **Parallel Processing:** Support multiple machines parallel processing to improve the overall performance
5. **Multiple Media Inputs:** Support additional embedded documents (docx/pdf), images (.jpg/.png), and video subtitles (.srt) inputs for the knowledge base creation
6. **Traditional Chatbot Support:** Offer the traditional Chatbot with user-defined answers using a new feature (i.e. Company QA)
7. **Rational Database:** Utilize a large language model (LLM) to assist with relational database manipulation (e.g., Company SQL) for multiple spreadsheet/sheet access.
8. **Knowledge Base Sharing:** Share the custom knowledge base through the private group (i.e. Company Organization)
9. **Text Generation:** In addition to answering questions, it can generate articles, craft stories, and produce creative content.

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10. **User Interaction:** Facilitates smooth conversations with users, offering helpful responses and suggestions based on database information. It can be applied in various fields such as education, customer support, HR, corporate training, and IT support.
11. **Chatbot Assistant:** Customize the chatbot for various financial, insurance, medical, teaching, and meeting assistants.
12. **Privacy and Security:** Provide data protection for user information, data, and privacy using offline mode.

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2 EdgeGPT Server

2.1 Product Overview

- KNEO 330 EdgeGPT Server

Figure 2-1 KNEO 330 EdgeGPT Server

- KNEO 330 EdgeGPT Server Interface[1]

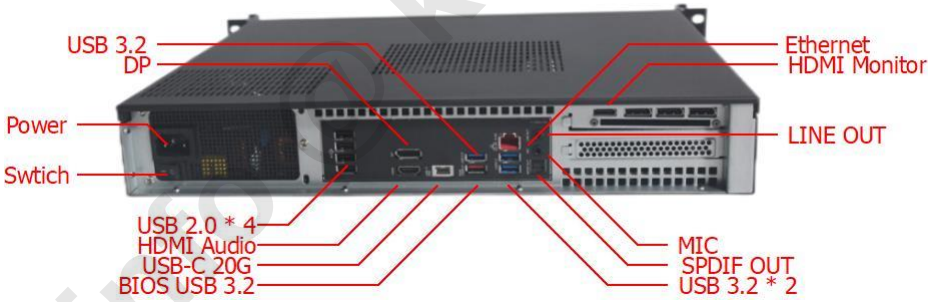

Figure 2-2 KNEO 330 EdgeGPT Server Interface

[1] Use only the top right HDMI port to connect to the monitor for display, while the other HDMI port is designated solely for audio connection only

The KNEO 330 EdgeGPT server is a standard equipment module[2] for data centers. Please consult IT professionals about installation. The KNEO 330 EdgeGPT server adopts an air-cooling system, it is recommended to leave space at the top to ensure proper airflow for cooling.

When the front panel ON/OFF button is activated (indicated by the blue light), it initiates the system in active mode. When the button is turned off, it initiates a soft shutdown, placing the system in standby mode without cutting off the power supply. Pressing the button wakes up the system. The back panel switch directly connects/disconnects the power supply. When the switch is off, the system is completely shut down even if the front panel ON/OFF button is pressed. It recommends the user turn off the ON/OFF button first followed by the back panel switch to move the system.

Product Parameters

CPU	Intel i5 10 cores 16 threads 4.6 GHz CPU
NPU	48 TOPS (INT8) equivalent
DRAM	32 Gb DDR4
Storage	2Tb SSD
Power	100-240V, 50/60Hz Avg 140W, Max 320W
Operating System	Ubuntu Linux
Size	428 x 350 x 66.6 mm (16.85 x 13.78 x 2.62 in)
Weight	7.3 kg (16.09 lb.)

Table 2-1 KNEO 330 Product Specification

2.2 Accessories List

Upon receiving the device, ensure that all accessories are included. Additional Ethernet and HDMI cables are necessary to connect the machine to the internet, and a monitor for system setup.

[2] There are multiple input/output data ports, including High-Definition Media Interface (HDMI), Universal Serial Bus (USB), Display Port (DP), LINE OUT (Audio Output), and Sony/Philips Digital Interface Output (SPDIF OUT)

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- KNEO 330 EdgeGPT Server
- One AC power cord

In addition, during use, you also need the following conditions:

- Display Monitor or TV with HDMI port.
- Network 100M/1000M wired network.

2.3 Hardware Configuration

Please follow the instructions to set up the KNEO 330 EdgeGPT server:

- Connect the power cable to the 100-240V 50/60Hz power cord.
- Connect the device and monitor with the HDMI cable.
- Plug the network cable into the Ethernet port and connect it to the network.
- Once powered on, the device will automatically start, and the default terminal is initialized. The administrator first logs in to the system with user ID: aiuser with password: aiuser, then types the command: ifconfig to display the server IP address shown in inet entry (i.e. 10.200.210.237) for web access

```
Welcome to Ubuntu 22.04.4 LTS (GNU/Linux 6.8.0-40-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

Expanded Security Maintenance for Applications is not enabled.

45 updates can be applied immediately.
7 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Fri Sep 13 14:23:45 2024 from 10.200.211.96
aiuser@kneron330:~$ ifconfig
eno1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.200.210.237  netmask 255.255.255.0  broadcast 192.168.200.255
        inet6 fe80::2979:5613:2a22:d58  prefixlen 64  scopeid 0x20<link>
```

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```
        ether 10:7c:61:74:cd:d0  txqueuelen 1000  (Ethernet)
        RX packets 9407575  bytes 698190452 (698.1 MB)
        RX errors 0  dropped 606829  overruns 0  frame 0
        TX packets 191990  bytes 117483916 (117.4 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 211475  bytes 86707283 (86.7 MB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 211475  bytes 86707283 (86.7 MB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

2.4 WEBUI Interface

2.4.1 Session Initialization

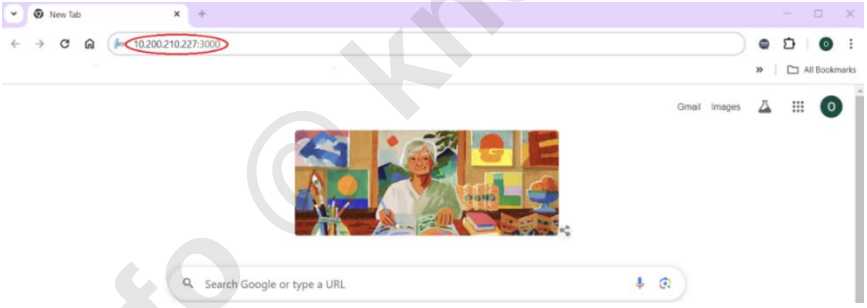

Figure 2-3 Browser Access

The user initiates web access using the WEBUI interface. For intranet access, it must employ the prefix: Hypertext Transfer Protocol Secure (i.e. HTTPS)[3], then enter the IP address (e.g., 10.200.210.237) followed by port 3000 in the browser, resulting in the web address (https://10.200.210.237:3000). For internet access, it enters the domain name (e.g., <domain.com>) with port 3000, resulting in the web

[3] HTTPS is the secure requirement to access the KNEO 330 EdgeGPT server

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address (https://<domain.com>:3000). The user must enter the IP address: (i.e. https://10.200.210.237:3000) to log in to the system.

2.4.2 User Registration

Figure 2-4 New User Sign-Up

The new users can create an account by selecting the Sign Up button on the login screen. In the pop-up menu, the new user enters the personal information, including username, email address, and password. The username can include letters, numbers, and the special characters "." and "_". After completing the form, the user can click the SIGN UP button to register the account. To log in to the KNEO 330, the users must use their email address, not their username. The username will display in the lower left corner after logging in.

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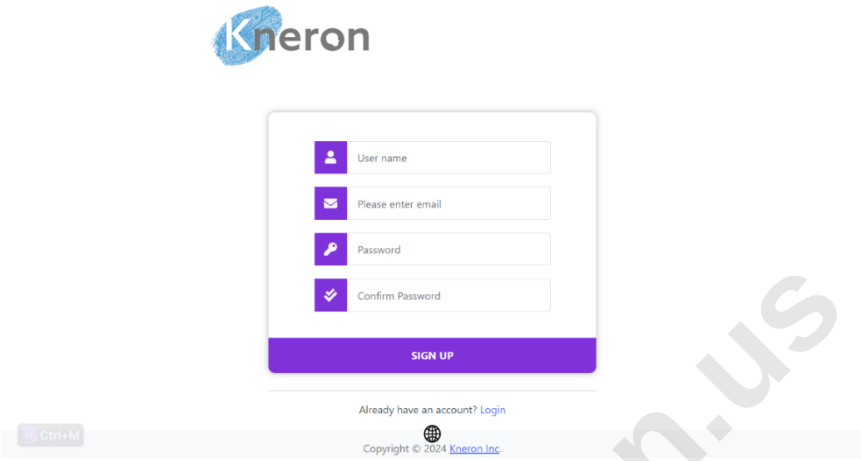

Figure 2-5 New User Registration

To reset the password, the user clicks on the username in the bottom left corner, which opens the User Settings menu. The user then enters their current password, followed by the new password, and clicks the SUBMIT button to complete the change.

2.4.3 Password Change

To change the password, the user clicks their username in the bottom left corner, which opens the User Setting menu. The user then inputs the current password, followed by the new one, and clicks the SUBMIT button to complete the change.

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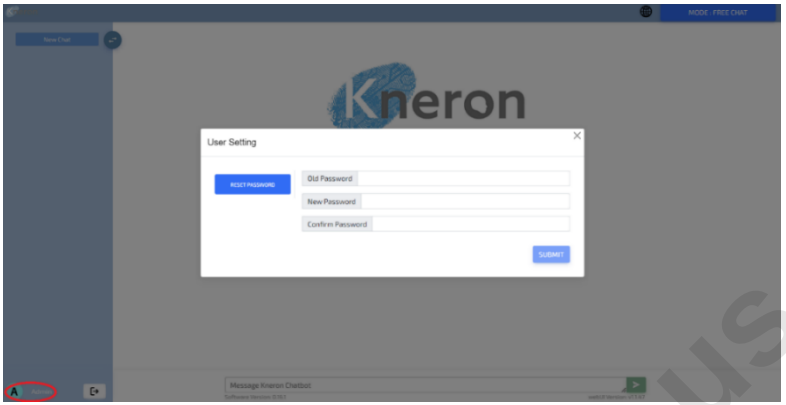

Figure 2-6 User Password Change

2.4.4 Free Chat Mode

The KNEO 330 offers two chat modes: Free Chat and Knowledge Base modes, which allow the user to switch between these modes using the buttons: Free Chat and Knowledge Base Q&A. Free Chat mode is the default mode which is used for general inquiries. The Knowledge Base mode allows the user to retrieve the correct answer directly from the custom database.

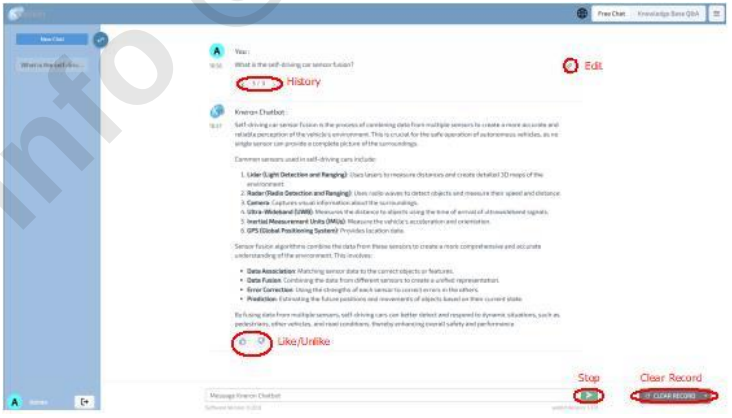

Figure 2-7 Free Chat Mode

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For the default Free Chat mode, the user enters the inquiry into the Message Kneron Chatbot box and presses the green arrow key, the response appears in the Dialogue Box. The chat history is shown under the New Chat section. The user edits the prompt using the edit icon and iterates the history with the history icon (< n/n >) where n indicates the times of modification, The user can stop the chat using the red stop button or clear the inquiry using the CLEAR RECORD button. The like/unlike icon is used for system statistical analysis.

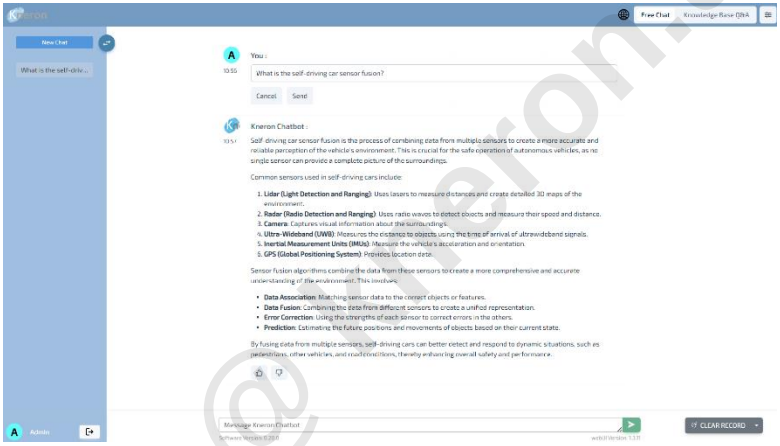

Figure 2-8 Prompt Edit

By clicking the edit icon, the user opens a window where the prompt can be modified. The Send button evaluates the prompt, and the Cancel button dismisses the inquiry.

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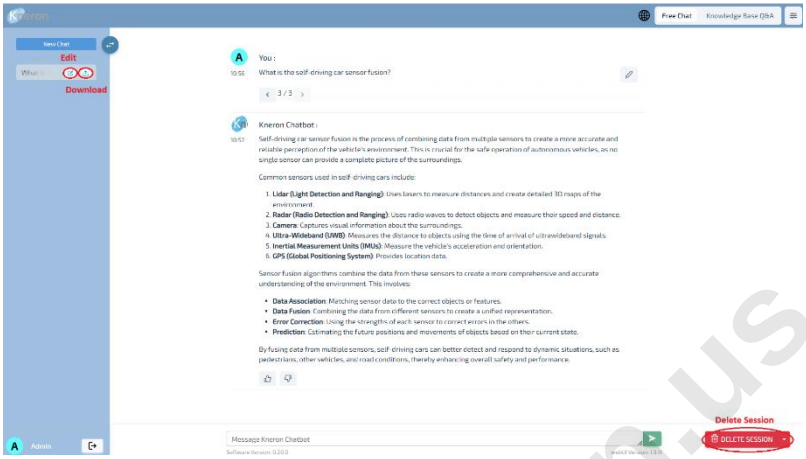

Figure 2-9 Chat Session

The user can click on the chat tag to reopen a chat session, and the chat tag can be modified by using the edit button. To download a chat session, the user clicks the download button; the session will be saved in JSON format and compressed into the local machine Download directory. Additionally, the user can select a chat session and click the DELETE SESSION button to remove it. A warning message will appear, prompting the user to confirm the deletion of the chat session from history.

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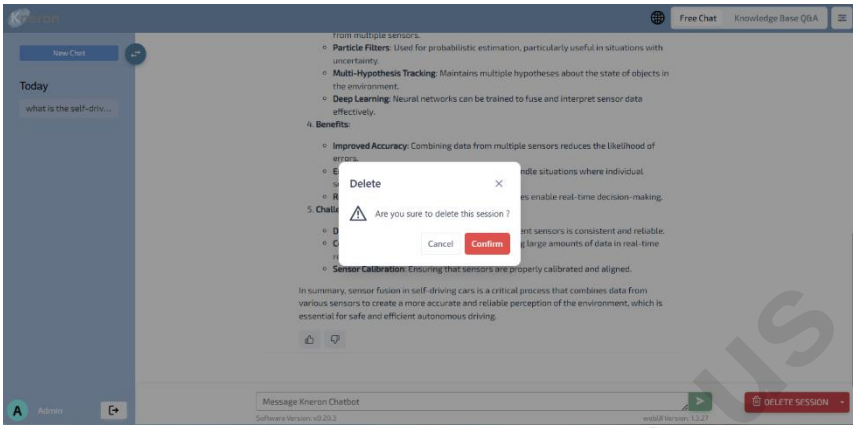

Figure 2-10 Chat Session Delete

The latest software adjusts the LLM parameters to control inquiry results. In Figure 2-11, the Update LLM Params offers two post-processing modes: Top P and Greedy. For Top P mode, the Temperature setting controls output diversity, with lower values producing more conservative and predictable results, while higher values lead to more varied and creative outputs. The range of temperature varies from 0 to 1. The default temperature is set to 0.5. The Top P mode generates random output based on the [Top P] slider, which can be adjusted between 0 and 1. Higher values result in more randomness. The default Top p is set to 0.3. Additionally, the Repetition Penalty prevents repeated outputs by applying a penalty, adjustable between 1 and 1.1. The default Repetition Penalty is set to 1. It recommends maintaining the default settings for general usage. Greedy mode typically generates the same outputs by selecting those with the highest matching probability, the range is also set between 1 and 1.1

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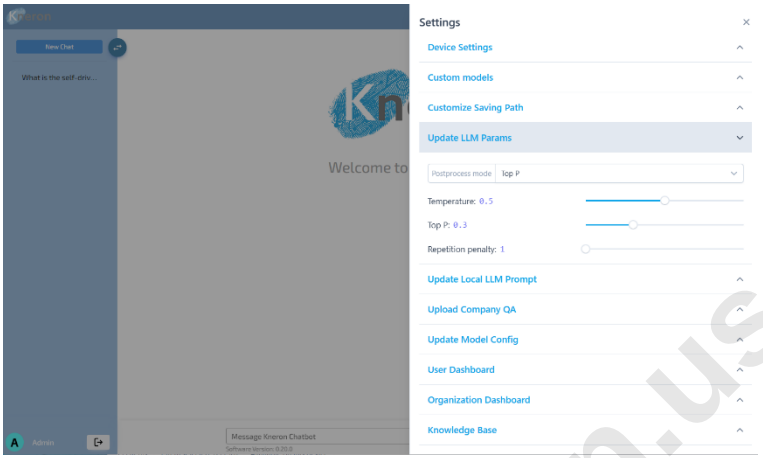

Figure 2-11 Chat Mode Setting

2.4.5 Knowledge Base Mode

The user can create a knowledge base to handle all the custom inquiries, the inputs can be either a single file or multiple files stored in a directory. The user clicks the MANAGEMENT button to pop up the management menu. The user then enters the name <user>/<database> (e.g., public/bda602) in the Knowledge Base List box[4] for knowledge base creation. There are two types of knowledge bases: public and personal. The public knowledge base is accessible to all users, while the personal knowledge base is shared only with invited users within the Company Organization. Next, the user clicks the Management button again and uploads the data[5] using the Drop files box and the Upload button. The user clicks the Confirm button on the Confirm Settings page, then the system automatically uploads the files to the system,

[4] The system will display an error message if the database name includes special characters.
[5] Multiple files are stored in a directory and compressed into a zip format before uploaded to the system.

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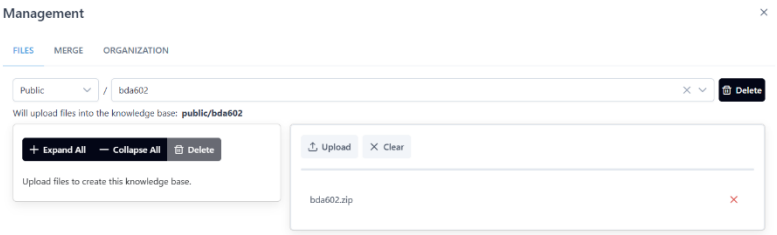

Figure 2-12 Create a Custom Knowledge Base

During the file upload process, the LLM parameters setting pops up. The user confirms the parameters. The EXTRACT_TABLE_OCR and EXTRACT_PAGE _OCR parameters are subject to change for document table and page extraction.

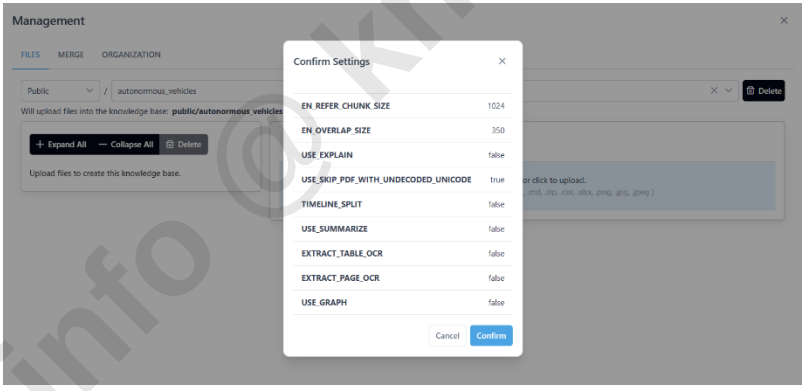

Figure 2-13 Confirm Custom Knowledge Base Creation

For uploading multiple files, the user can click + Expand All to display the files within the subdirectory and use - Collapse All to hide the list.

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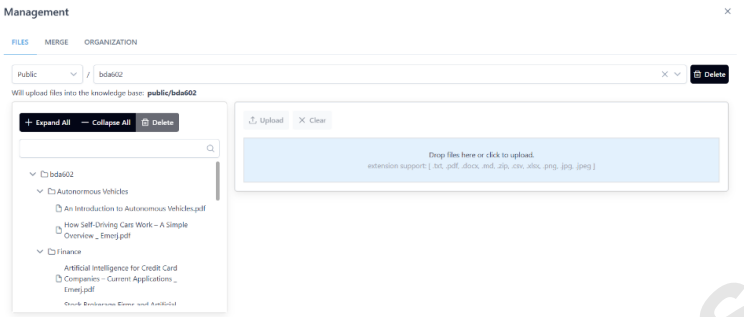

Figure 2-14 Custom Knowledge Base Directory List

The KNEO 330 supports multiple file formats, including .txt (text), .pdf (portable document format), .docx (Microsoft Word Document), .xlsx (Microsoft Excel Worksheet)[6], .csv (Microsoft Excel Comma Separated Value File)[7], .md (Markdown-formatted text), .jpg/.jpeg (Joint Photographic Experts Group), .png (Portable Network Graphic) and .zip (compressed files). File names should not contain special characters such as space, (), {}, or []. Depending on the file size, uploading may take a few minutes or longer. The administrator can create databases in both public and user directories, whereas general users can create databases only within their user directory.

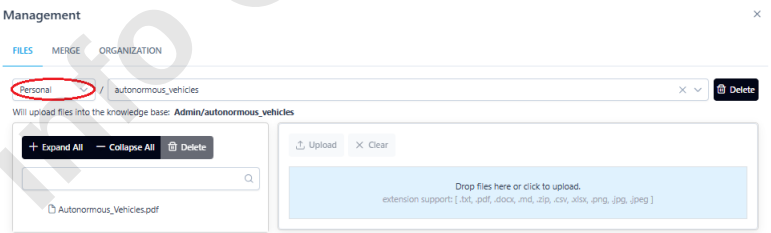

Figure 2-15 Share Custom Knowledge Base

[6] The system supports the Microsoft Excel Worksheet with multiple sheets
[7] When saving the spreadsheet in ".csv" format on a UNIX/LINUX system, please choose “Save cell formula instead of calculated values." option

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The user can share a custom knowledge base with others in a private group[8] during the database creation process. Once the database is created, the user clicks the ORGANIZATION button, selects the desired knowledge base from the Knowledge Base List, chooses the appropriate organization from the Selected Organizations menu, and presses the ADD button. This allows the knowledge base to be shared with private group users. Additionally, the user can remove the knowledge base from the group by using the REMOVE KNOWLEDGE BASE FROM ORGANIZATIONS option. A symbol (+ or x) is associated with the organization name. During removal, the user should ensure the symbol is set to +.

Once the custom knowledge base is created, the user clicks the cross symbol in the top right corner and returns to the knowledge base inquiry page. The knowledge base name appears in the Knowledge Base List box, and loaded files are displayed in the Files in the Knowledge Base box. **The Knowledge Base must be selected before inquiries.**

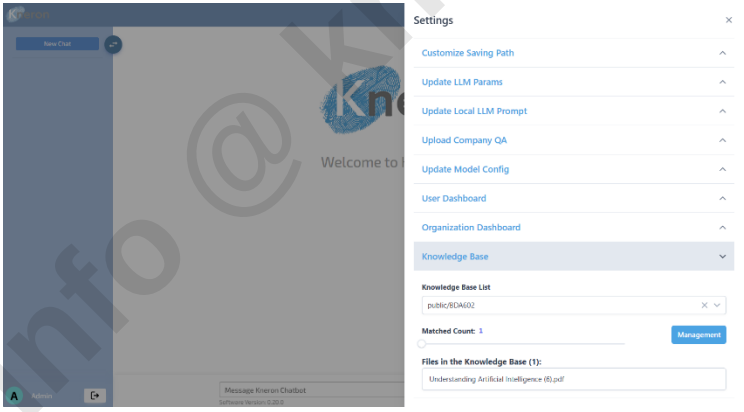

Figure 2-16 Manage Custom Knowledge Base

The user can select different databases from the Files in the Knowledge Base box for inquiry, enter a prompt into the Message Kneron Chatbot, and adjust the

[8] Please refer to Chapter 2.4.6 Company Organization, it describes how to set up the private group and invite the users to join

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Matched Count: [n] sliding bar (where n is 1, 2, 3, 4, or 5) [9] to access more matching results. Based on the matched count, the system displays the related document with its position in percentage and arranges them according to the match relevance.

Additionally, the user clicks the source [n], which directs to the original page source and allows the user to validate that the results are correct and accurate. The OPEN SOURCE [n] displays the document source for further examination. The user cross-references the document with other sources and ensures the data is properly cited.

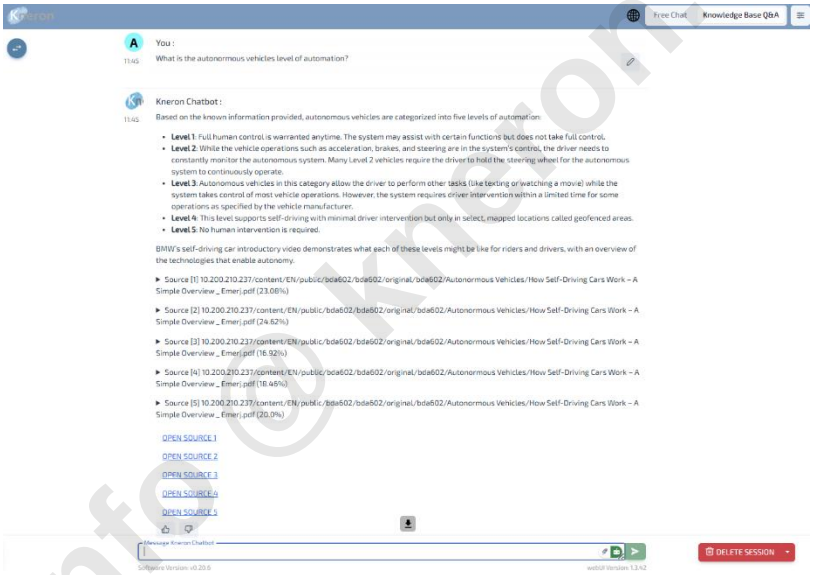

Figure 2-17 Knowledge Base Inquiry

[9] It recommends setting the Matched Count to 5 if the USE_GRAPH option (Retrieval-Augmented Generation - RAG) is turned on. It improves the knowledge base matching accuracy.

The pop-up menu offers two additional functions: merge and delete. To merge two databases, it first clicks the MERGE button, a new pop-up menu shows how to merge from one database to another.

Figure 2-18 Merge Custom Knowledge Base

To delete the database and files, the user selects the knowledge base and then clicks Delete button to remove the database from the file system. The user can also highlight an individual file from the directory list to delete.

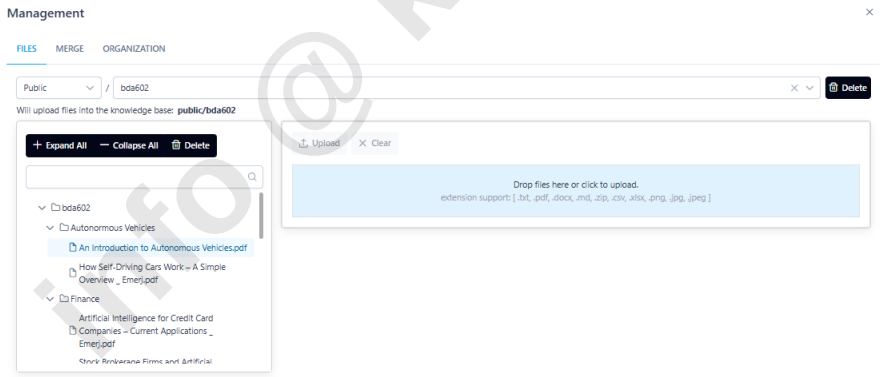

Figure 2-19 Delete Single/Multiple Files or Custom Knowledge Base

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The user can configure the knowledge base model through the Update Model Config submenu, which includes KNOWLEDGE _BASE_CREATION and KNOWLEDGE_BASE_QA.

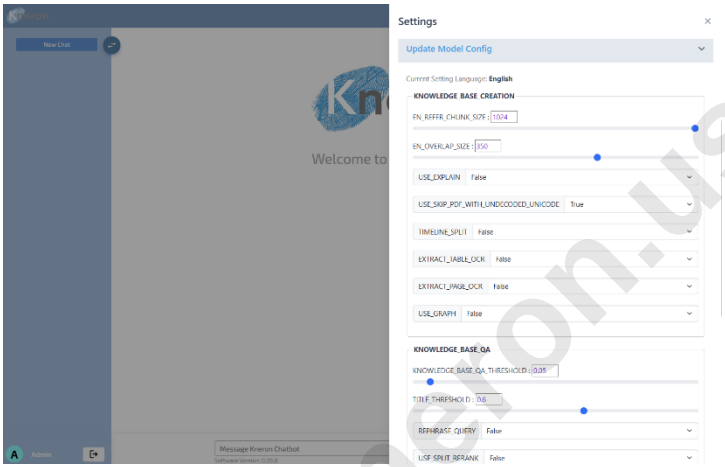

Figure 2-20 Knowledge Base Creation Configuration

The user can optimize the model through the option: KNOWLEDGE_BASE_ CREATION, which improves performance by adjusting the chunk size (number of characters) using EN_REFER_CHUNK_SIZE[10]. It refers to the amount of processing data ranging from 0 to 1024 during the reasoning. The chunk size can effectively manage memory usage and improve processing efficiency. Reducing the chunk size increases accuracy with longer processing time. The processing chunks are linked together through the overlap controlled by EN_OVERLAP_ SIZE. It refers to the number of words or phrases shared between two or more text segments during the processing. It recommends setting the overlap to approximately 15% to 25% of the chunk size. Overlap can preserve contextual information to achieve better accuracy with more computational resources. The overlap size must be less than half of the chunk size.

[10] The prefix EN refers to the English setting and ZH is used for the Traditional Chinese one

USE_EXPLAIN connects the keyword to relevant information during knowledge base creation, offering a more detailed explanation when answering questions. The USE_SKIP_PDF_WITH_UNDECODED_UNICODE option is used to prevent Unicode errors in the PDF files, it bypasses PDF files with undefined Unicode characters for knowledge base creation. TIMELINE_SPLIT is the input file option that allows the system to process the video SubRip Subtitle (.SRT) file[11], and then build the knowledge base. The Subtitle file consists of the index, timestamp, and content for sequential data handling.

KNEO 330 offers additional enhanced features: EXTRACT_TABLE_OCR, EXTRACT_PAGE_OCR, and USE_GRAPH to extract data from the different sources in the PDF files, those features improve the overall inquiry accuracy. EXTRACT_TABLE_OCR extracts the embedded table and utilizes the table contents to address inquiry. EXTRACT_PAGE_OCR focuses on the embedded image, which converts the uploaded PDF document into an image and extracts information using OCR. While users can access the data from the embedded images, a downside is that extracting information from images takes more time during the knowledge base creation. USE_GRAPH applies the Retrieval-Augmented Generation (RAG) approach to combine the LLM model with the relevant database to generate the response. It improves the overall accuracy and relevance with the drawback of long processing time.

[11] The SubRip Subtitle (SRT) format is a plain-text file format used for video subtitles. It contains a sequence of subtitles, each with an index, start, and end timecodes (formatted as hours, minutes, seconds, and milliseconds), and the corresponding subtitle text with an empty line separating the entries. The timecodes ensure that each subtitle appears at the correct moment in the video. The basic format is listed as below:

1
00:00:05,000 --> 00:00:10,000
Hello, welcome to Kneron.

2
00:00:12,000 --> 00:00:15,000
This is an example of an SRT file.

The user can enhance the accuracy of inquiries by adjusting the KNOWLEDGE_BASE_QA_THRESHOLD and TITLE_THRESHOLD. KNOWLEDGE_BASE_QA_THRESHOLD improves the matching between inquiries and sources. A higher threshold makes it easy to match inquiries with the source, but the drawback is that it is less accurate. TITLE_THRESHOLD is the matching option that enhances the matching process by using the file names of the knowledge base.

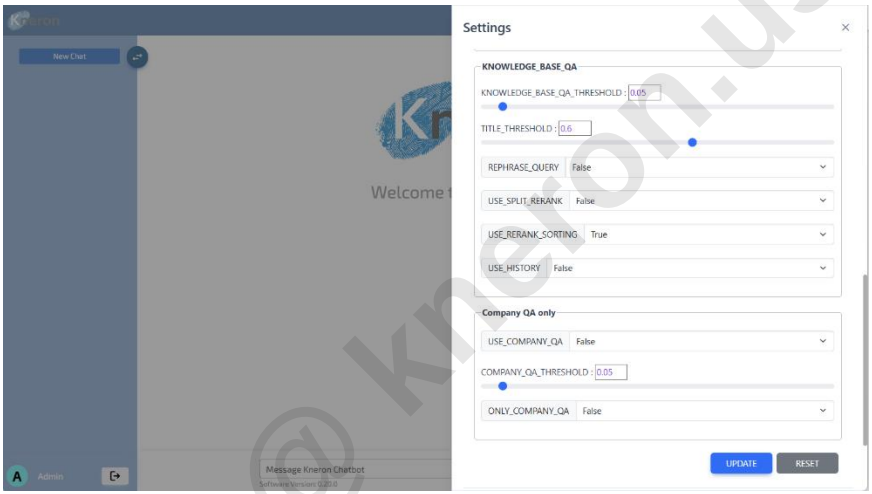

Figure 2-21 Knowledge Base QA Configuration

The user can improve the accuracy through the search using REPHRASE_QUERY, USE_SPLIT_RERANK, USE_RERANK_SORTING, and USE_HISTORY. REPHRASE_QUERY allows the system to rephrase the inquiry. USE_SPLIT_RERANK is set to TRUE, which divides and ranks content within the same document for accuracy improvement. Alternatively, USE_RERANK_SORTING is set to TRUE to sort and rank across different sources with longer processing time. The key difference between USE_SPLIT_RERANK and USE_RERANK_SORTING is that the former focuses on a single source (the same document), while the latter applies to multiple sources (various documents).

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Moreover, the USE_HISTORY utilizes past inquiry history to improve the accuracy of current results.

Enabling both USE_SPLIT_RERANK and USE_RERANK_SORTING may slow down operations. The user can toggle these options to balance accuracy and inquiry speed.

2.4.6 Knowledge Base Image Inquiry

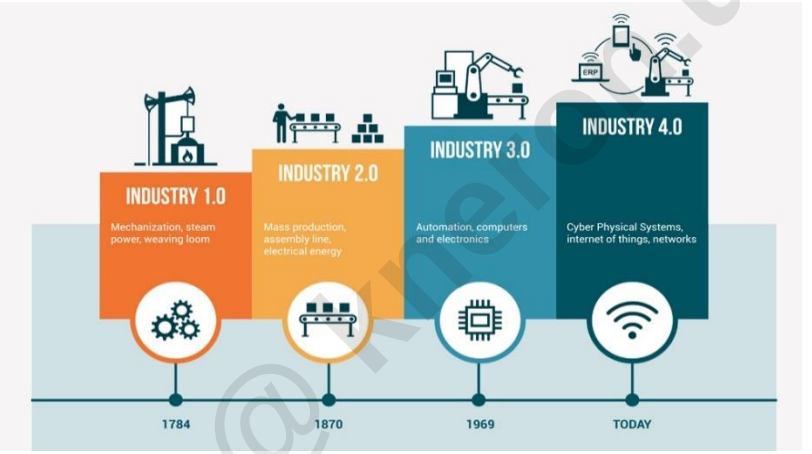

Figure 2-22 4th Industrial Revolution[12]

KNEO 330 allows users to upload images into a knowledge base for further exploration. The user must enable the EXTRACT_PAGE_OCR option in the Update Model Config by setting it to True and then creating the knowledge base. For example, the knowledge base is created using the image of the 4th Industrial Revolution in Figure 2-22, then inquires the system with the prompt "What is the

[12] Albert Chun-Chen Liu, Oscar Ming Kin Law, and Iain Law, Understanding Artificial Intelligence: Fundamentals and Applications, Wiley, 2022.

3rd Industrial Revolution?" It analyzes the image and provides the detail response related with the prompt.

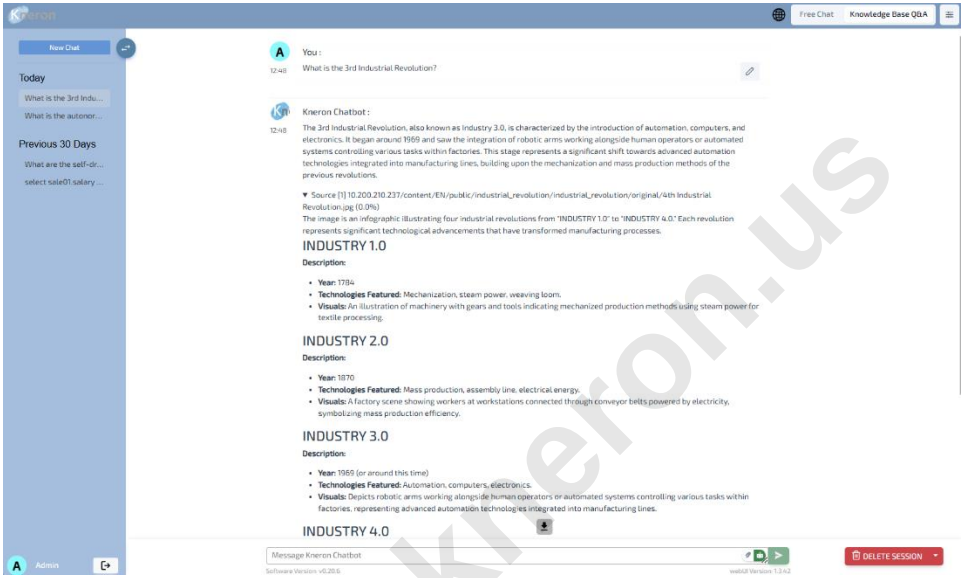

Figure 2-23 Knowledge Base Image Inquiry

In addition to providing the answer, the user clicks the source and offers a comprehensive description of the objects in the image.

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2.4.7 Company SQL

	A	B	C	D	E	F	G	H	I
1	ID	First Name	Last Name	Gender	Position	Salary	Bonus	Income	
2	1	John	Smith	Male	Director	$100,000	$15,000	$120,000	
3	2	Mary	Johnson	Female	Manager	$75,000	$10,000	$90,000	
4	3	James	Davis	Male	Manager	$80,000	$12,000	$95,000	
5	4	Emily	Brown	Female	Saleman	$50,000	$5,000	$57,500	
6	5	Robert	Miller	Male	Saleman	$55,000	$5,000	$62,500	
7	6	Jennifer	Wilson	Female	Saleman	$45,000	$4,000	$50,000	
8	7	Michael	Taylor	Male	Saleman	$55,000	$6,000	$62,000	
9	8	Elizabeth	Anderson	Female	Saleman	$50,000	$4,500	$55,000	
10	9	Daniel	Thomas	Male	Saleman	$45,000	$4,500	$50,000	
11	10	Olivia	Moore	Female	Saleman	$50,000	$4,500	$55,000	
12									

Company +

Figure 2-24 Company SQL Spreadsheet

KNEO 330 offers a new feature: the relational database using Company SQL, which leverages a large language model (LLM) to manage the database through Structured Query Language (SQL) with multiple spreadsheets/sheets. Initially, the user creates the knowledge database using a spreadsheet, but it only supports the Excel Worksheet (.xlsx), not the Excel Separated Value file (.csv). The sample spreadsheet format[13] is shown in Figure 2-24. The first row contains the label keywords, while the column entries correspond to these keywords. The user can manipulate the database using general sentences, and the basic commands are demonstrated to access the database using the label keywords.

- The label keywords are specified in the first row
- The corresponding column contents are organized under these label keywords

This document presents the SQL commands, covering basic commands (i.e. lists, display, show, total, sort, select), arithmetic functions (addition, subtraction, multiplication, division), and logical operations (not, equal, greater, less). It advises users to use the symbol “ to specify labels (e.g., “label”) and ‘ to represent

[13] If the spreadsheet format is invalid, it may lead to incorrect Company SQL data.

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the values (e.g. “item”). The Large Language Model (LLM) model may interpret different inputs inconsistently

The user can display the database content using the keywords list, display, print, show, or select. KNEO 300 outputs all the items in the spreadsheet. The user can specify each item's case-sensitive name.

Syntax: LIST <item> <order> <option>

Syntax: DISPLAY <item> <order> <option>

Syntax: SHOW <item> <order> <option>

Syntax: SELECT <item> <order> <option>

Syntax: GET <item> <order> <option>

where

item:	the database item name
order:	sort order (i.e. ascending and descending)
option:	display option (i.e. once)

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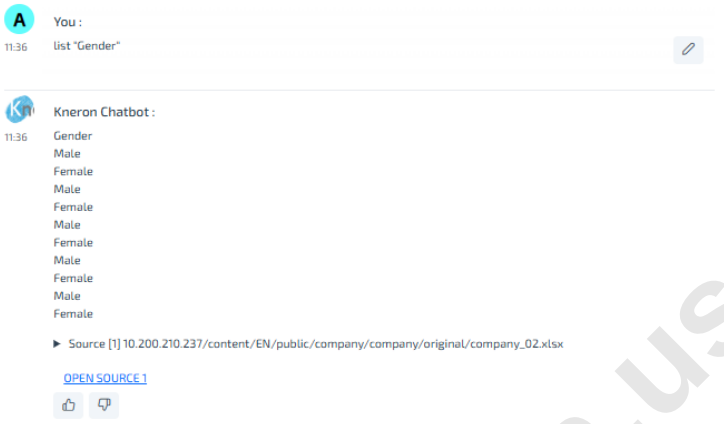

Figure 2-25 Company SQL List Command

Figure 2-26 Company SQL Display Command

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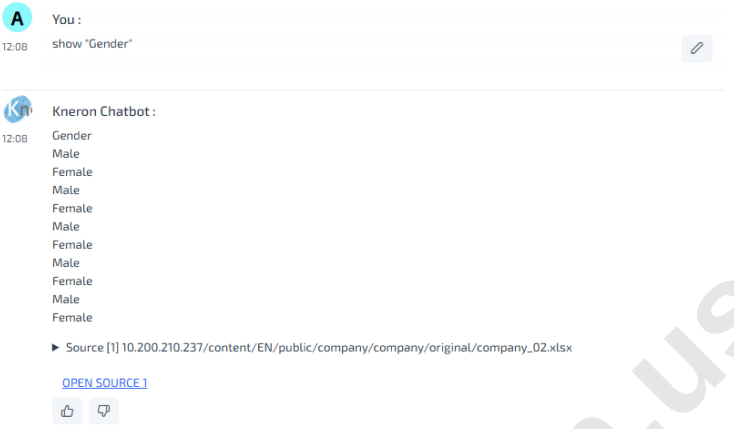

Figure 2-27 Company SQL Show Command

Figure 2-28 Company SQL Select Command

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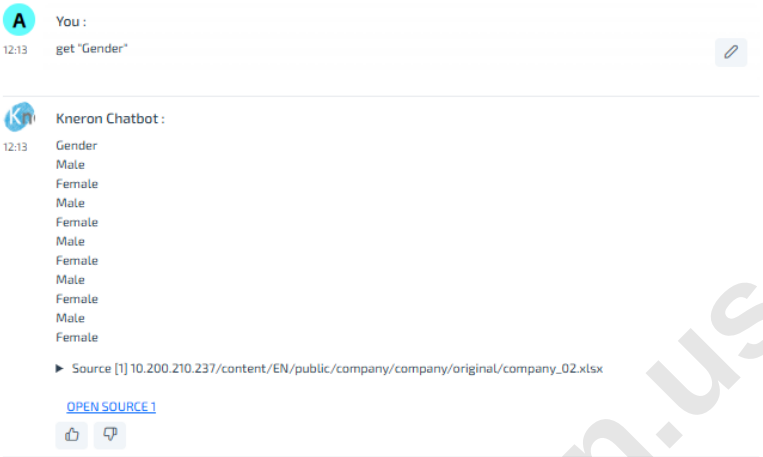

Figure 2-29 Company SQL Get Command

The user can limit the output to display once

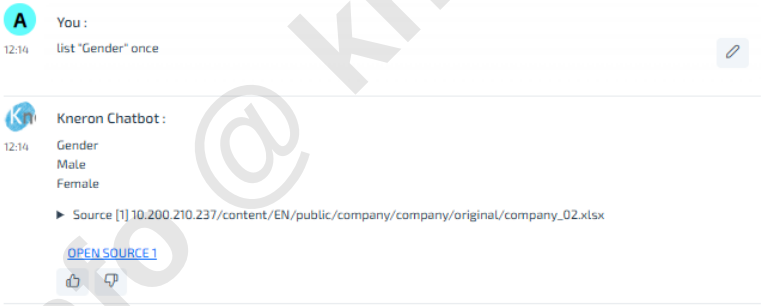

Figure 2-30 Company SQL List Once

The user can use the name to display[14] the database item:

[14] The user can display all the items using the commands, display, print, show, and select

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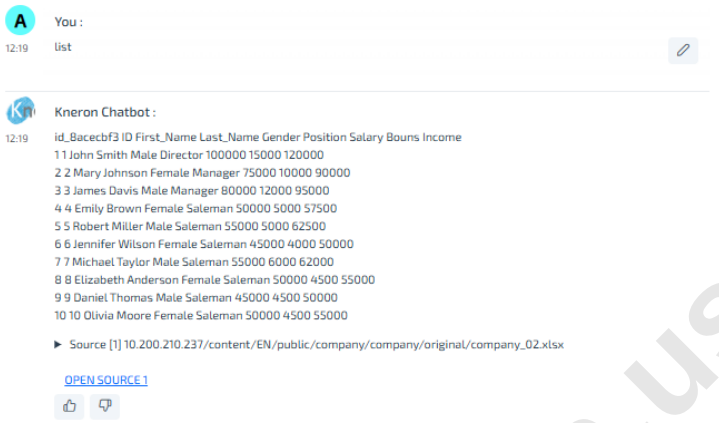

Figure 2-31 Company SQL List Content Command

Figure 2-32 Company SQL List Items Command

The user can sort the output in ascending or descending order.

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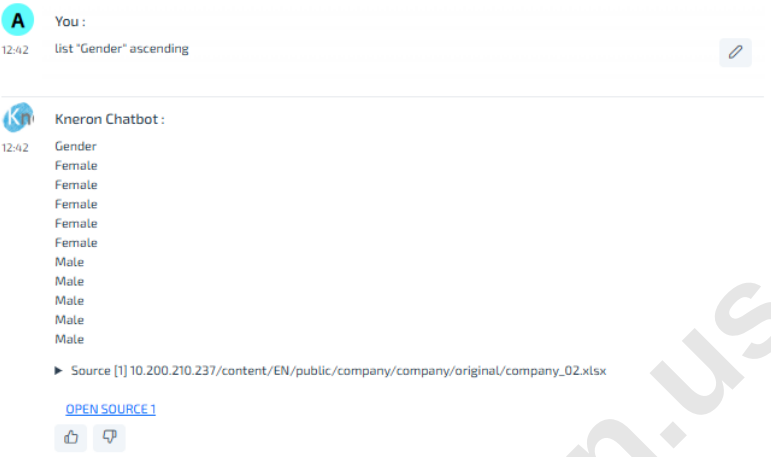

Figure 2-33 Company SQL List (Ascending) Command

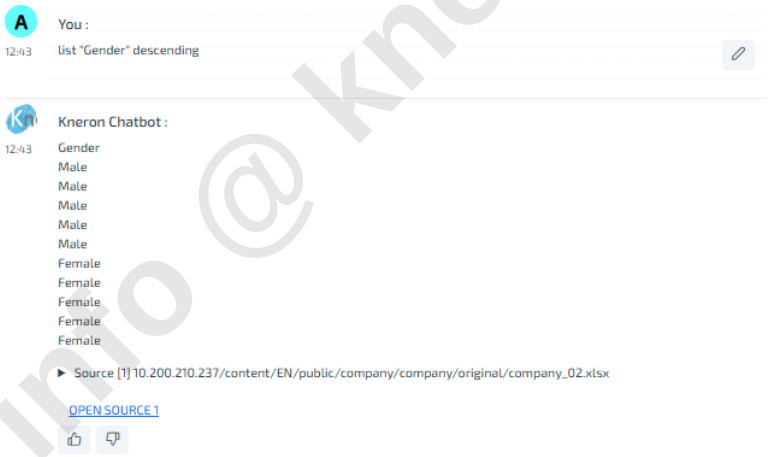

Figure 2-34 Company SQL List (Descending) Command

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The user outputs multiple columns, the order is based on the prompt description[15].

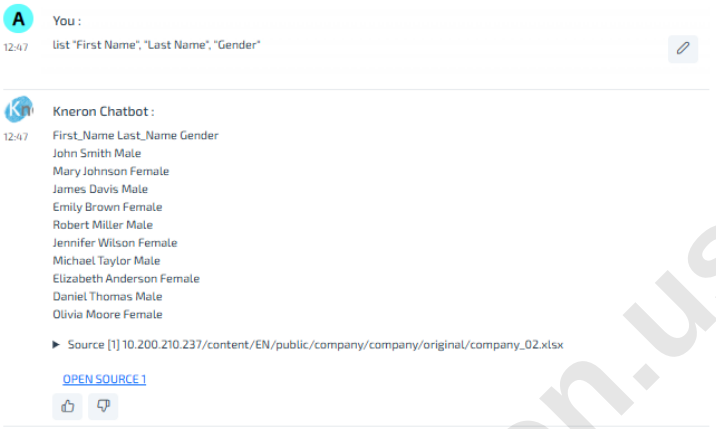

Figure 2-35 Company SQL List Multiple Column

The user can select the database item with a multiple-column display[16]

Syntax: List <item> DISPLAY|SHOW <item> …

Syntax: SELECT[17] <item> LIST|DISPLAY|PRINT|SHOW|LIKE[18] <item> …

where

item: the database item name

[15] The user can output similar multiple columns using the commands, display, print, and show
[16] The simple keywords: and/or are permitted to use in the operation
[17] SELECT is also used to access multiple spreadsheets and sheets, that is explained later.
[18] LIKE selects the substring for the comparison

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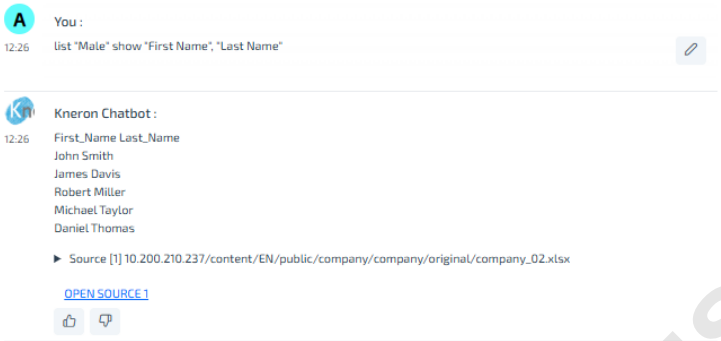

Figure 2-36 Company SQL Select (List) Multiple Items Command

Figure 2-37 Company SQL Select Multiple Items Command

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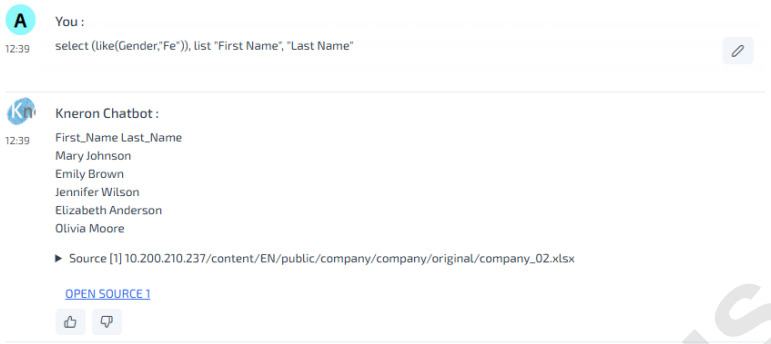

Figure 2-38 Company SQL Select Like Item Command

The user organizes the database items using the sort commands and displays the results in ascending and descending orders.

Syntax: SORT <item> <order>

where

<item>: the database item name

<order>: sort order (i.e. ascending and descending)

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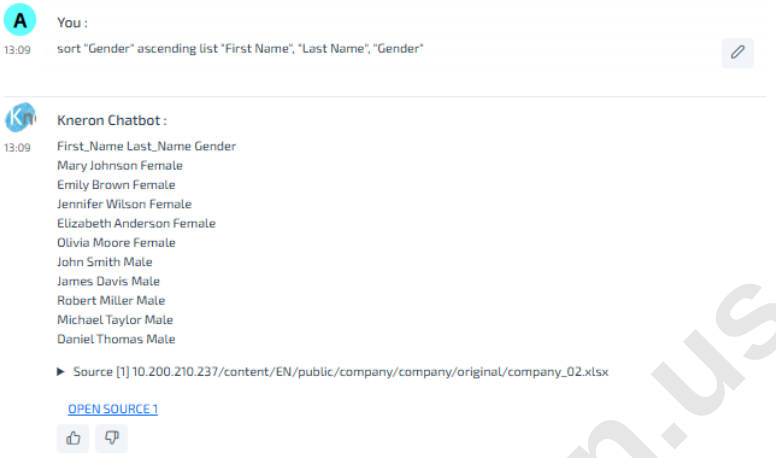

Figure 2-39 Company SQL Sort (Ascending) Command

Figure 2-40 Company SQL Sort (Descending) Command

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The user counts the database items

Syntax: COUNT <label>| <item>

where

object: item type

item: item name

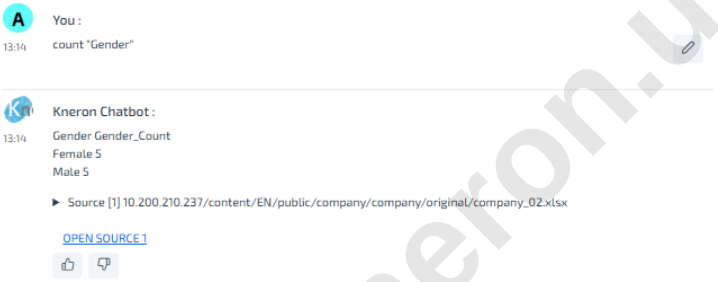

Figure 2-41 Company SQL Count Label Command

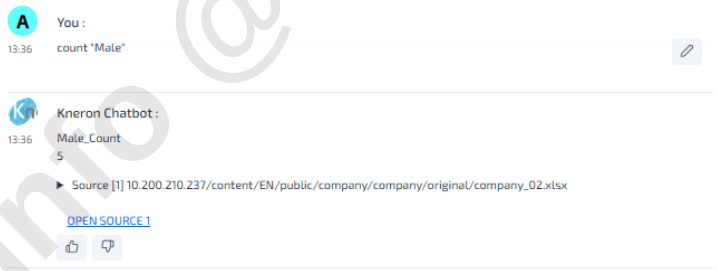

Figure 2-42 Company SQL Count Item Command

The user calculates the column value of database objects (i.e. amount) using the command: total and then displays the results.

Syntax: TOTAL <object | item>

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where

object: item type

item: item name

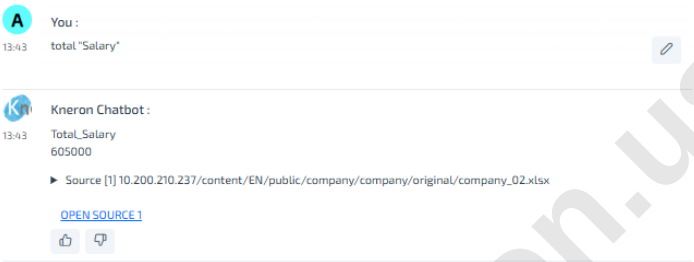

Figure 2-43 Company SQL Total Command

The user performs simple arithmetic operations[19] using the syntax, addition: +, add, plus, sum, subtraction: -, sub, minus, diff, multiplication: *, mul, times, and division, -, div.

Syntax: + (operation)

Syntax: ADD (<object | operation>)

Syntax: PLUS (<object | operation>)

Syntax: SUM (<object | operation>)

Syntax: - (operation)

Syntax: SUB (<object | operation>)

Syntax: MINUS (operation)

Syntax: DIFF (operation)

[19] Perform the arithmetic operations on individual items, it prefers to use the arithmetic symbols: +, -, *, / because the LLM interprets differently for the commands: plus, minus, times, div etc.

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Syntax: * (operation)

Syntax: TIMES (<object | operation>)[20]

Syntax: / (operation)

Syntax: DIV (operation)

Syntax: ** (operation)

Syntax: ^ (operation)

where

object: item type

operation: basic arithmetic operations

Figure 2-44 Company SQL Add (+) Command

[20] TIMES also functions as COUNT to count the number of the items

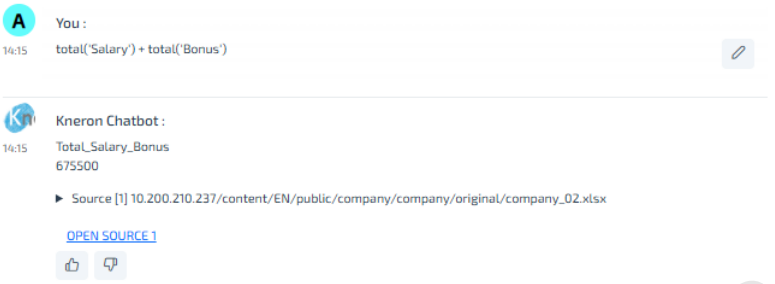

Figure 2-45 Company SQL Add (+) Results Command

Figure 2-46 Company SQL Add Results Command

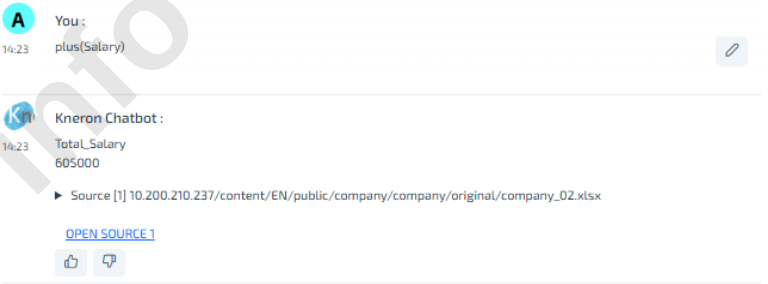

Figure 2-47 Company SQL Plus Command

info @ kneron.us

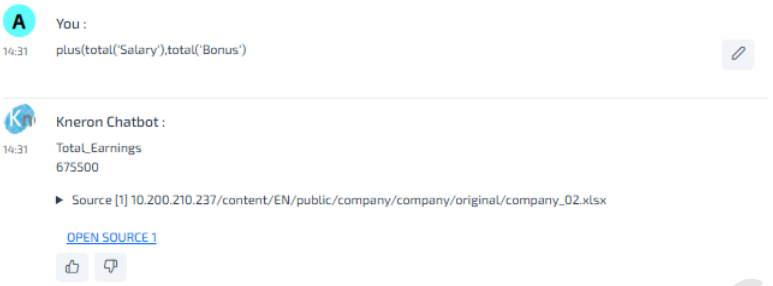

Figure 2-48 Company SQL Plus Results Command

Figure 2-49 Company SQL Sum Command

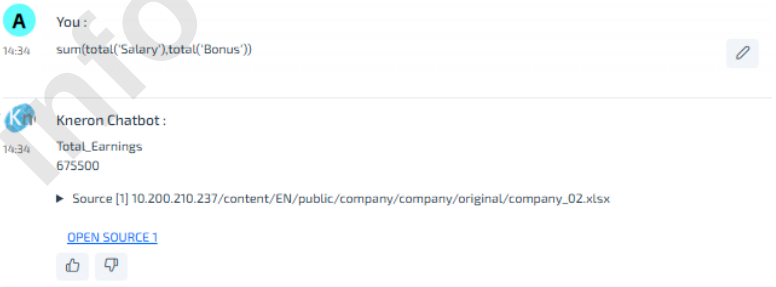

Figure 2-50 Company SQL Sum Results Command

info @ kneron.us

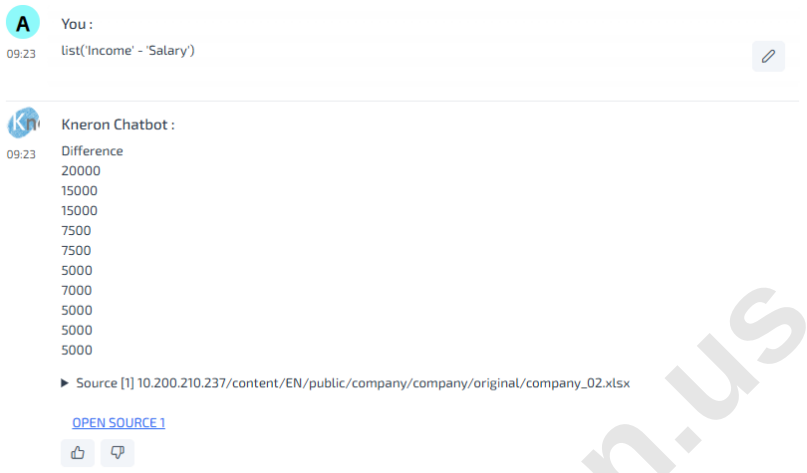

Figure 2-51 Company SQL Sub (-) Command

Figure 2-52 SQL Sub Command

info @ kneron.us

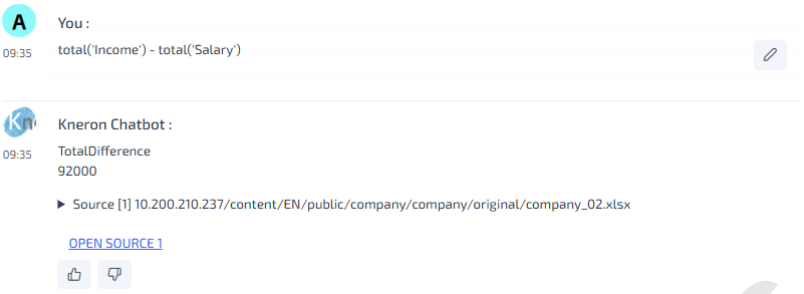

Figure 2-53 Company SQL Sub (-) Results Command

Figure 2-54 Company SQL Minus Results Command

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Figure 2-55 Company SQL Diff Results Command

Figure 2-56 Company SQL Mul (*) Command

info @ kneron.us

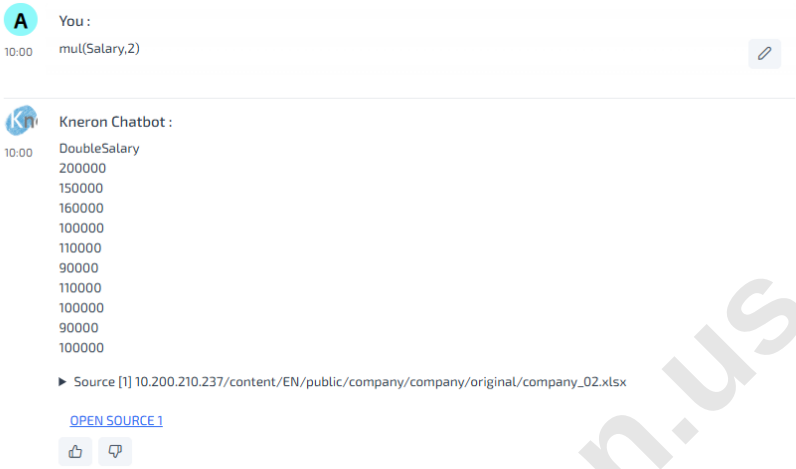

Figure 2-57 Company SQL Mul Command

Figure 2-58 Company SQL Times (Count) Command

info @ kneron.us

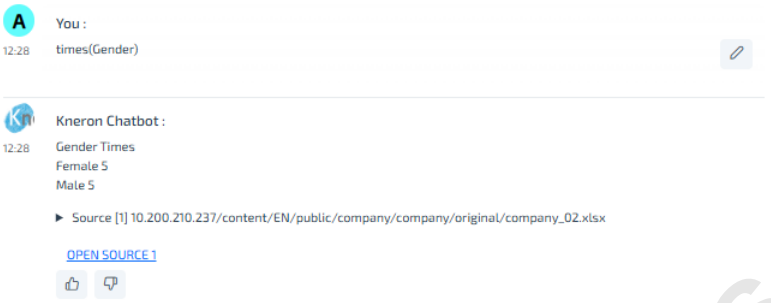

Figure 2-59 Company SQL Times II (Count) Command

Figure 2-60 Company SQL Times Command

info @ kneron.us

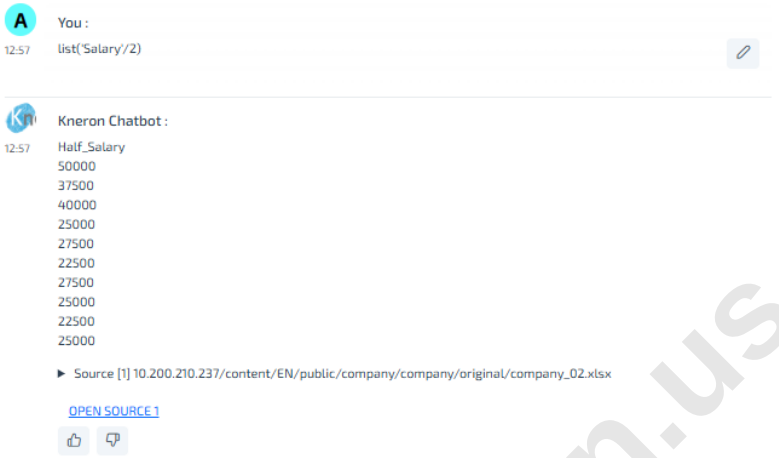

Figure 2-61 Company SQL Div (/) Command

Figure 2-62 Company SQL Div (/) Results Command

info @ kneron.us

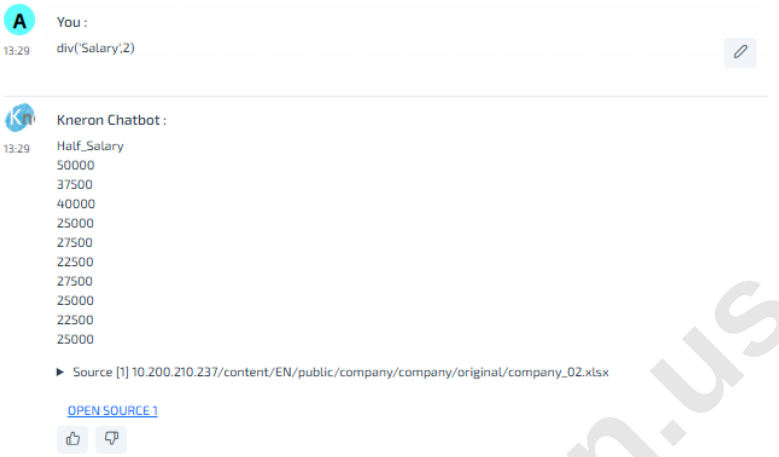

Figure 2-63 Company SQL Div Command

Figure 2-64 Company SQL Power (**) Command

info @ kneron.us

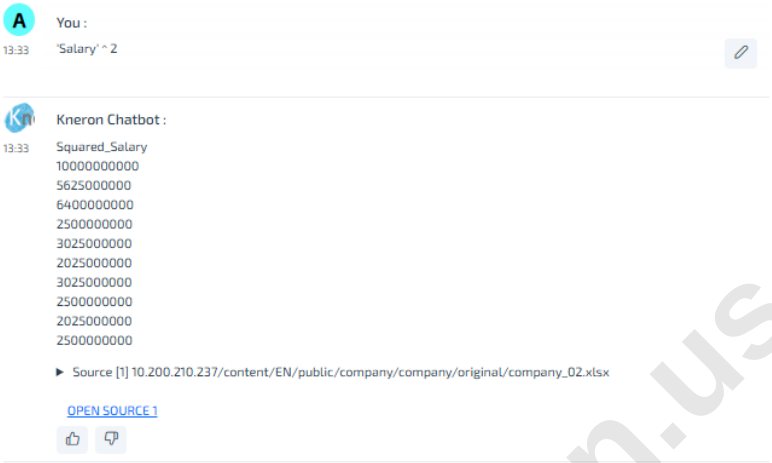

Figure 2-65 Company SQL Power (^) Command

The user executes the logical operations (i.e. greater/larger, less/smaller, equal, not, between) with the database objects.

Syntax: IF	<logical operations>
Syntax: SELECT	<logical operations>
Syntax: AND	<logical operations>
Syntax: OR	<logical operations>
Syntax: BETWEEN	<logical operations>
Syntax: >	<item> <actions>
Syntax: >=	<item> <actions>
Syntax: GREATER THAN	<item> <actions>
Syntax: LARGER THAN	<item> <actions>
Syntax: <	<item> <actions>
Syntax: <=	<item> <actions>

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Syntax: LESS THAN <item> <actions>

Syntax: SMALLER THAN <item> <actions>

Syntax: == <item> <actions>

Syntax: EQUAL <item> <actions>

Syntax: NOT <item> <actions>

where

item: item name

actions: basic actions

Figure 2-66 Company SQL IF Command

info @ kneron.us

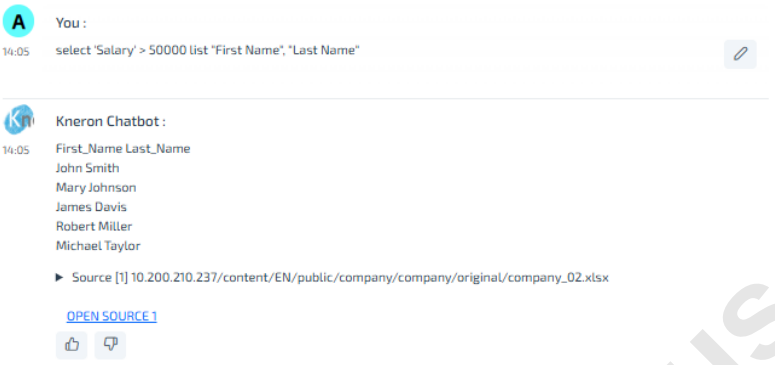

Figure 2-67 Company SQL Greater (>) Command

Figure 2-68 Company SQL Greater and Equal (>=) Command

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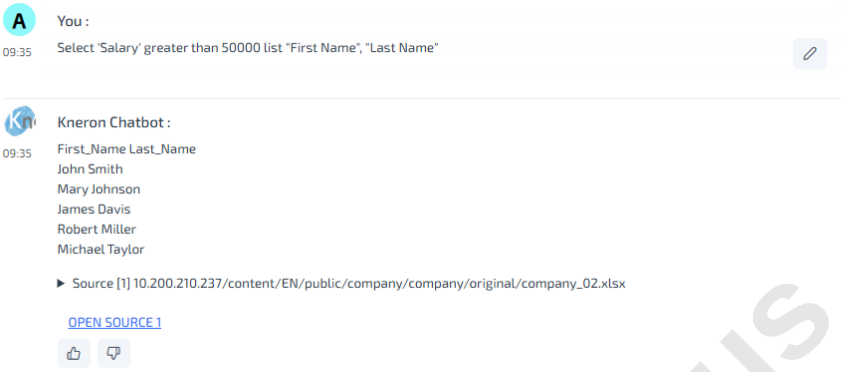

Figure 2-69 Company SQL Greater Command

Figure 2-70 Company SQL Larger Command

info @ kneron.us

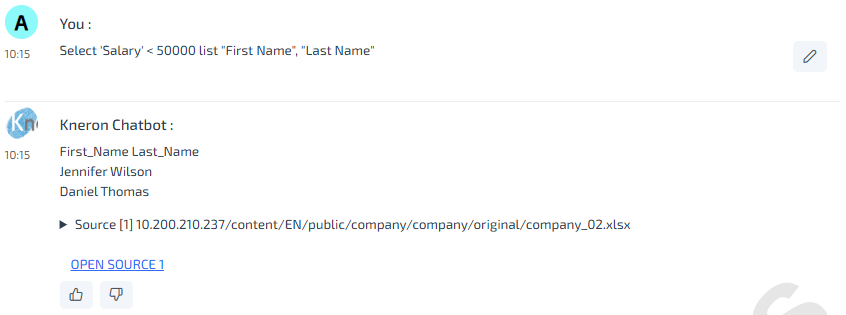

Figure 2-71 Company SQL Less (<) Command

Figure 2-72 Company SQL Less and Equal (<=) Command

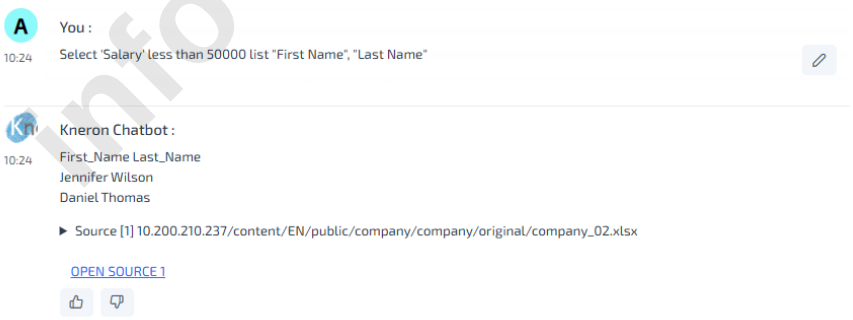

Figure 2-73 Company SQL Less Command

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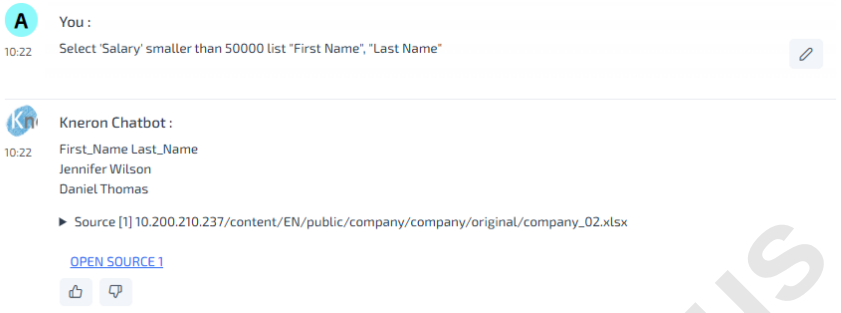

Figure 2-74 Company SQL Smaller Command

Figure 2-75 Company SQL Equal (==) Command

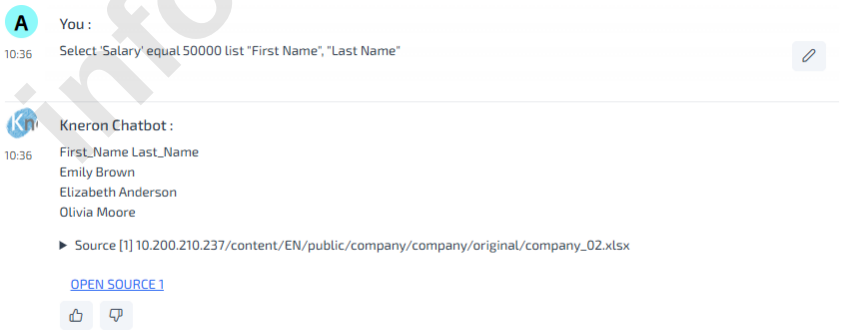

Figure 2-76 Company SQL Equal Command

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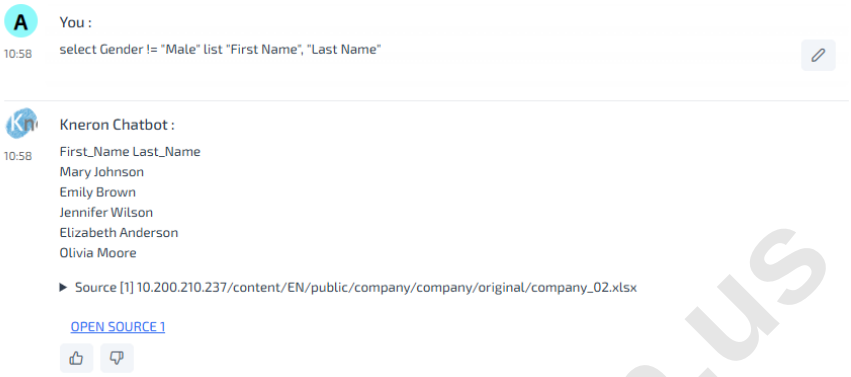

Figure 2-77 Company SQL Not (!) Command

Figure 2-78 Company SQL Not Command

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The user selects the range of the database objects using the keywords: between and from:

Syntax: BETWEEN <range> <operation>

Syntax: FROM <range> <operation>

where

range: items range

actions: basic actions

Figure 2-79 Company SQL Between Commands

Figure 2-80 Company SQL Range Commands

The user can select the max/min value of the object (i.e. amount)

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Syntax: MIN(object)

Syntax: MAX(object)

where

object: item type

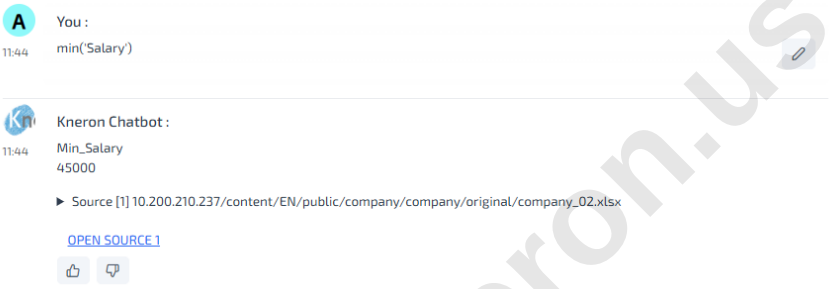

Figure 2-81 Company SQL Min Command

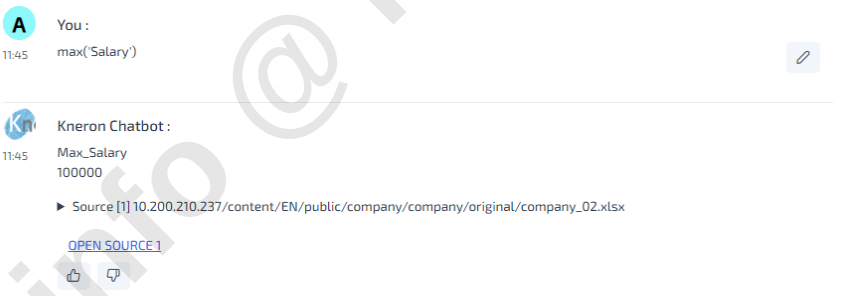

Figure 2-82 Company SQL Max Command

Company SQL can also average the column value of the object (i.e. amount)

Syntax: AVERAGE(object)

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Syntax: AVG(object)

where

object: item type

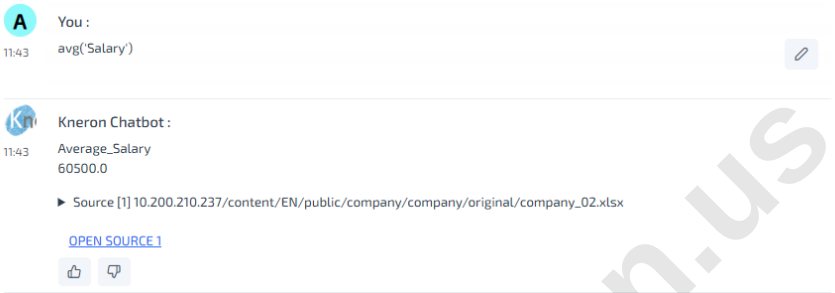

Figure 2-83 Company SQL Average Command (I)

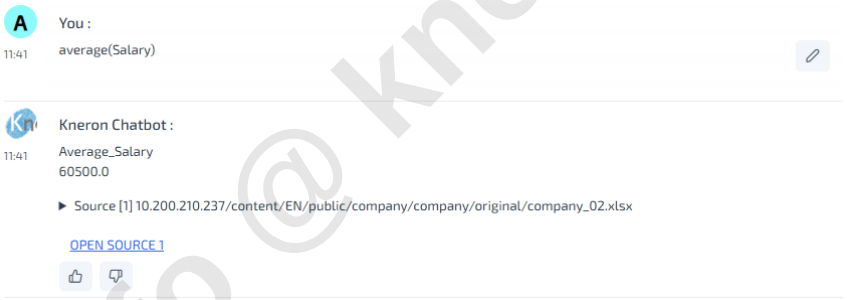

Figure 2-84 Company SQL Average Command (II)

Company SQL displays the date along with the time tag "00:00:00". The user can use the substring command to extract the date only

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	A	B	C	D	E	F	G
1	Invoice	Date	Product	Volume	Price	ID	
2	1	1/22/2024	A	3	$5,000	3	
3	2	2/12/2024	B	2	$3,000	1	
4	3	2/28/2024	C	2	$4,000	7	
5	4	3/21/2024	A	1	$5,000	4	
6	5	4/8/2024	D	3	$4,500	1	
7	6	4/18/2024	B	2	$3,000	6	
8	7	5/15/2024	D	2	$4,500	5	
9	8	6/9/2024	A	1	$5,000	9	
10	9	7/12/2024	D	1	$4,500	2	
11	10	8/26/2024	C	3	$4,000	10	
12	11	9/29/2024	C	2	$4,000	8	
13	12	10/10/2024	A	2	$5,000	2	
14	13	11/17/2024	D	3	$4,500	1	
15	14	11/25/2024	B	1	$3,000	2	
16	15	12/11/2024	A	1	$5,000	3	
17							

Invoice

Figure 2-85 Company SQL Spreadsheet (Date)

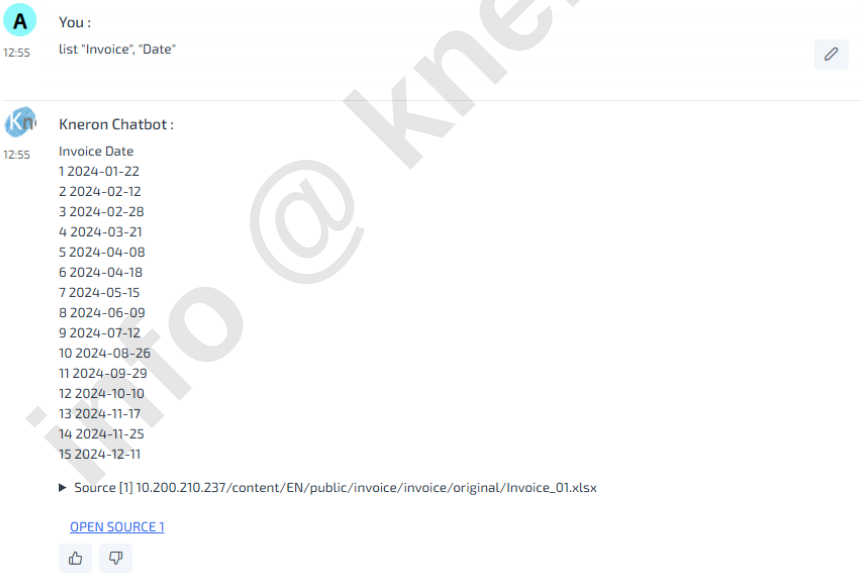

Figure 2-86 Company SQL Date Format

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The user can search the data transaction using the command:

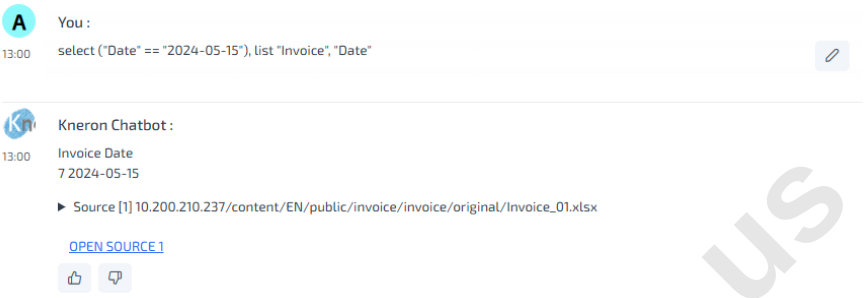
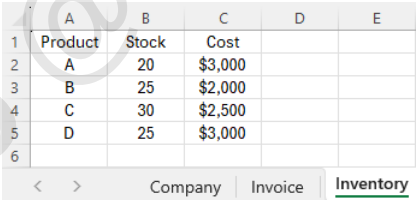


Figure 2-87 Company SQL Date Search Command

Company SQL supports multiple spreadsheets and sheets for relational database inquiry. The user first creates the knowledge base and loads it with the spreadsheets where the spreadsheet can contain several sheets. The user can access the content using the following commands:



	A	B	C	D	E
1	Product	Stock	Cost		
2	A	20	$3,000		
3	B	25	$2,000		
4	C	30	$2,500		
5	D	25	$3,000		
6					

Company | Invoice | Inventory

Figure 2-88 Company SQL Spreadsheet with Multiple Sheets

Syntax: spreadsheet(sheet)

Syntax: spreadsheet.sheet

where

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spreadsheet: spreadsheet name

sheet: sheet name

In the example, the user accesses the spreadsheet: database with the sheet name: Company

Figure 2-89 Company SQL Multiple Spreadsheet/Sheet Command (I)

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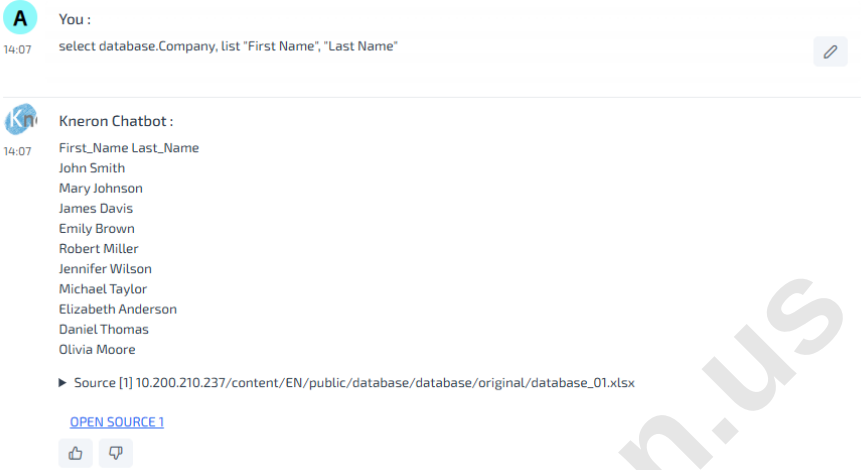

Figure 2-90 Company SQL Multiple Spreadsheets/Sheets Command (II)

Syntax: SELECT <spreadsheet.sheet1>, <spreadsheet.sheet2> FROM <spreadsheet.sheet1> JOIN <spreadsheet.sheet2> ON <sheet1.item> == <sheet2.item>, <action>

where

spreadsheet: spreadsheet name

sheet: sheet name

item: item name

action: operations

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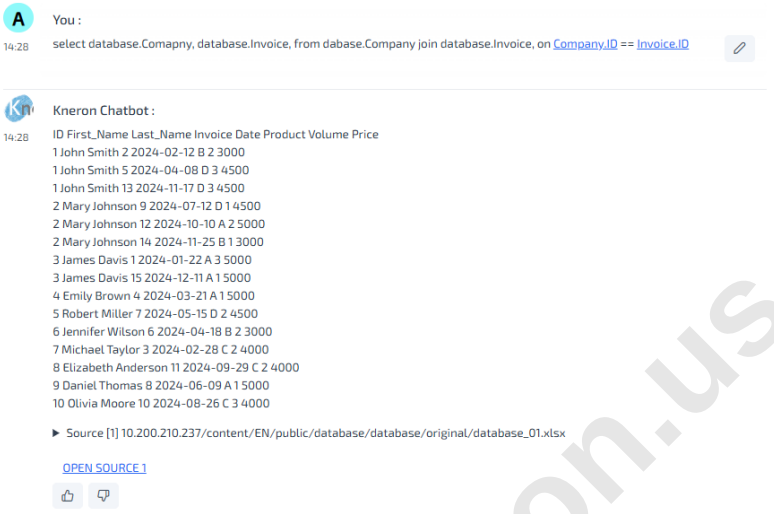

Figure 2-91 Company SQL Relational Database Command

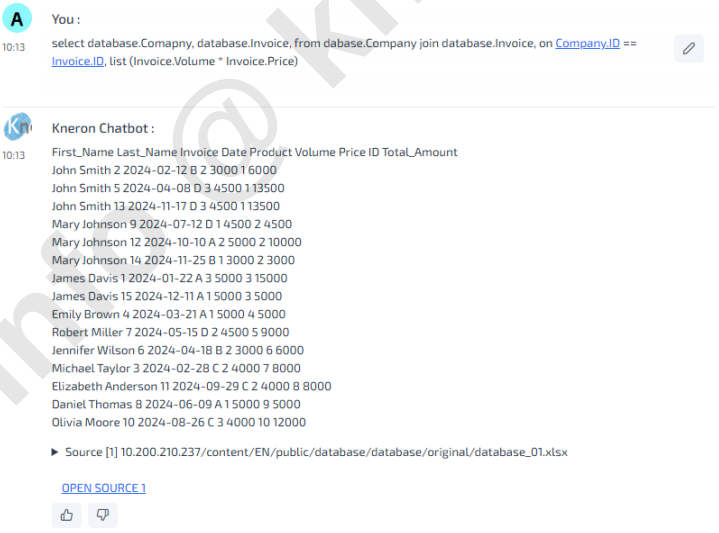

Figure 2-92 Company SQL Relational Database Operation

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2.4.8 Company QA

	A	B
1	Questions	Answers
2	Who is the first American president?	George Washington
3	Who is the longest British ruler?	Queen Elizabeth II
4	When is the Boston tea party?	December 16, 1773.
5	Which countries are the axis in the World War 2?	Germany, Italy and Japan
6	Who first landed on the moon?	Neil Armstrong
7	Why the first industrial revolution was so important?	The First Industrial Revolution (1760-1840) revolutionized manufacturing, transportation, and communication, laying the groundwork for modern industrial society.
8	What is the nobel prize ?	The Nobel Prize is a prestigious international award recognizing outstanding contributions in Physics, Chemistry, Medicine, Literature, Peace, and Economic
9	Who is the first black American president?	Barack Obama
10	What were the four important inventions in the ancient China?	Paper, Printing, Gun Powder, and the Compass
11	What was the most famous Pyramid?	The Great Pyramid of Giza, also known as the Pyramid of Khufu

Figure 2-93 Company QA Spreadsheet

Company QA provides a standard one-to-one question-and-answer conventional chatbot feature. It allows users to set questions with predefined answers using a spreadsheet in the Knowledge Base. The system supports multiple spreadsheets, and the matching is based on the input order. The search engine searches for the results from the first spreadsheet to the last one until it finds the answer. The system supports the spreadsheet in .xlsx (Microsoft Excel Worksheet)[21] and .csv (Microsoft Excel Comma Separated Value File). The user can input a new spreadsheet to overwrite the old one for inquiries. An example of the input file is shown in Figure 2-93. The first row includes comments indicating that column A contains questions and column B contains answers. The actual questions and their corresponding answers begin from the second row onward.

- The comments are defined in the first row (i.e. row 1), which is ignored during the processing
- The questions are defined in the first column (i.e. col A)
- The answers are defined in the second column (i.e. col B)

[21] Company QA only supports the Microsoft Excel Worksheet with single sheet only

The user can directly load the spreadsheet into the system using the Upload Company QA in Figure 2-94 and drag the spreadsheet into the box, then click the button UPLOAD FILES to upload the spreadsheet to the system.

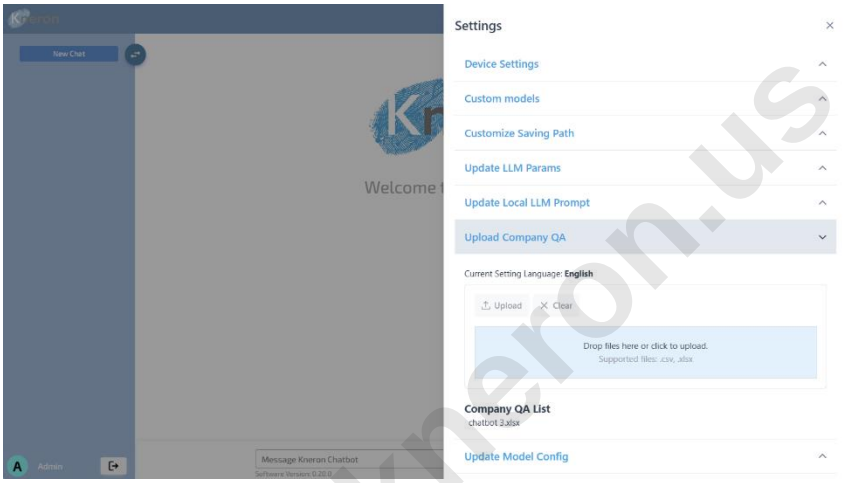

Figure 2-94 Company QA Spreadsheet Upload

The system replies to the inquiry based on the Company QA spreadsheet shown in Figure 2-95.

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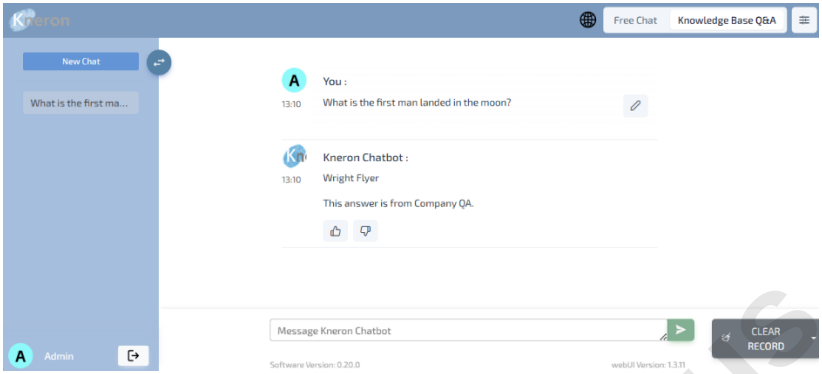

Figure 2-95 Company QA Inquiry

2.4.9 Company Organization

The KNEO 330 enables users to share custom knowledge bases within a private group using the special feature, called Company Organization. The Company Organization allows users to create a knowledge base to share with others. The administrator first creates the group using the Organization Dashboard in Figure 2-96 and then includes the users in the private group. While all users can access and share the knowledge base, only the creator can modify it.

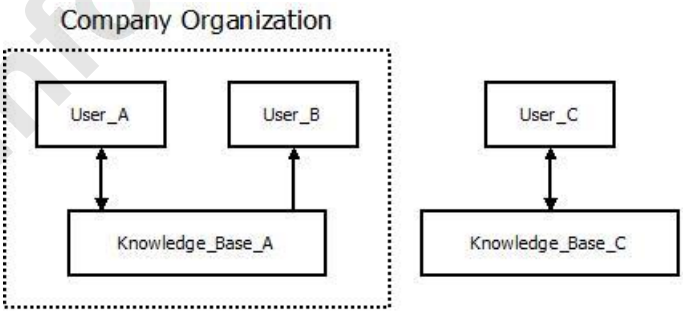

Figure 2-96 Company Organization

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The administrator assigns the role of moderator[22] to the user. The moderator can invite other users to the private group. Only the database creator can modify the knowledge base. The group members can access the information but not make any changes.

All users in the private group must log out and log back into the system to activate their access rights. Without doing this, other users will not be able to access the new knowledge base.

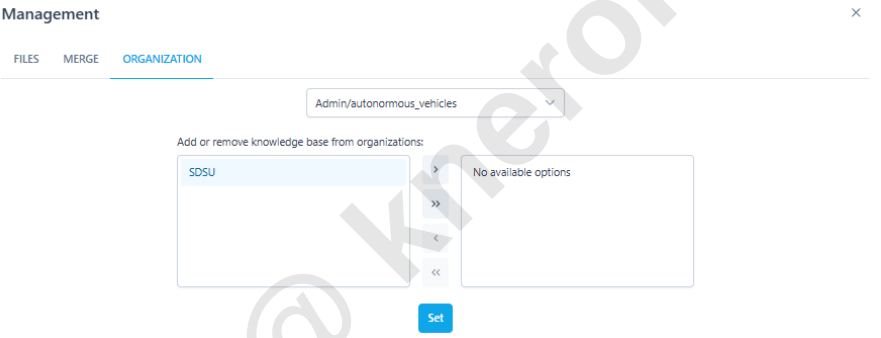

Figure 2-97 Share Custom Knowledge Base

The knowledge base must be first added to the organization. The owner begins by clicking the ORGANIZATION button and selecting the knowledge base to be included. The left panel displays available organizations, while the right panel shows the selected organization. The user can use the > / >> buttons to add the knowledge base and the < / << buttons to remove it from the selected organization.

[22] The user must join the organization to access the knowledge base and change the role to the moderator

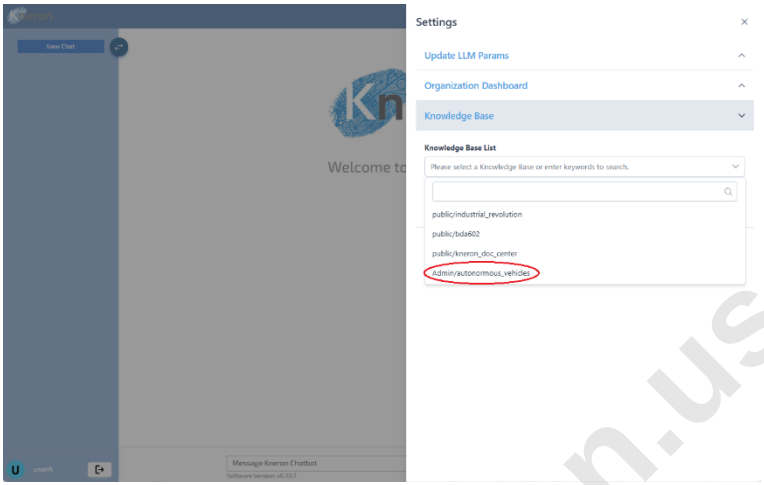

Figure 2-98 Select Shared Custom Knowledge Base

If another user wants to access the custom knowledge base, they first select the database from the Knowledge Base List and then ask a question from the shared database. The custom knowledge base will not appear in the Knowledge Base List if it is not shareable.

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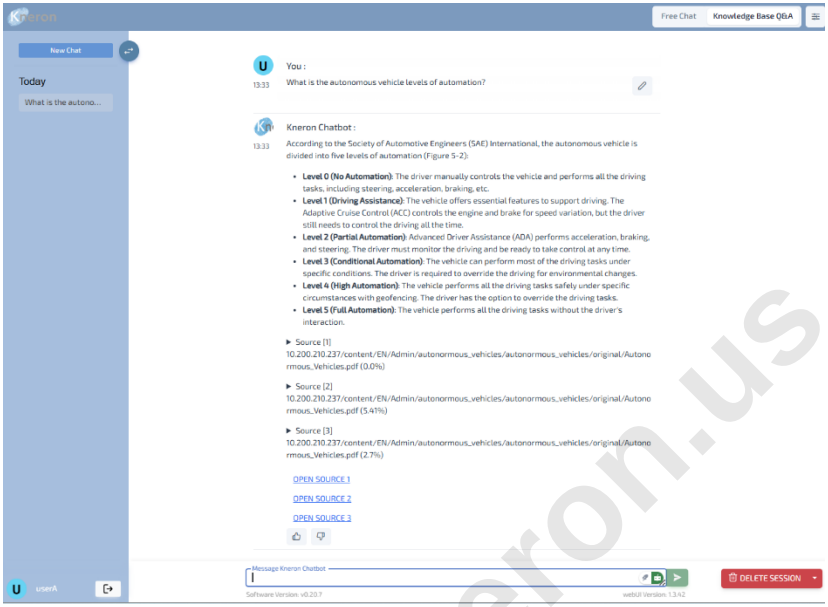

Figure 2-99 Access Shared Custom Knowledge Base

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3 Company SQL Functions/Keywords

The user can manipulate the knowledge base using a list of Company SQL symbols, keywords, and functions as follows:

+
-
*
**
/
==
>
>=
<
<=
ADD
AND
AVERAGE
AVG
BETWEEN
COUNT
DIFF
DISPLAY
DIV
EQUAL
FROM
GET
GREATER
IF
LARGER
LESS
LIST
MAX

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MIN
MINUS
MUL
NOT
OR
PLUS
PRINT
RANGE
SELECT
SHOW
SMALLER
SORT
SUB
SUBSTRING
SUM
TIMES
TOTAL

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info @ kneron.us