## Exercise 1 - Build Your First Agent in Joule Studio

1. Log in to Joule Studio

Navigate to [Joule Studio](https://ai-agent-beta-build-default-eu12-ai165.eu12.build.cloud.sap/index.html).

Log in with the username [B-AI165-XXX@education.cloud.sap](mailto:B-AI165-XXX@education.cloud.sap) where XXX is your workstation's printed number, for example 002, 018 and 038.

Use the password that was provided to you before.

If requested, Select the identity provider containing "ondemand.com" in its name.

1. Activate the Private Environment

This will be needed to test the agent later on. Navigate to the Control Tower (in the menu to the left) and click on the Environments tile.

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Click the button in the top right corner to activate the Private Environment.

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1. Create a new project to work on it

Return to the Lobby (again in the menu to the left) and create a project of type "Joule Agent and Skill".

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Select “Joule Agent and Skill” and click next.

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Include your workstation number in the project name to ensure uniqueness, for example "018 - Business Partner Invoicing".

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Click on “Review” and “create” button in the last screen.

1. Build the Business Partner Invoicing Agent

Open the project if it hasn't opened already. Click the Create button to the right and select “Joule Agent”.

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Name it “Business Partner Invoicing Agent”, leave the identifier unchanged and use the following as description: "An AI Agent working with records about business partners."

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We now need to instruct the Agent what its focus should be and how it should perform its tasks by provide thing expertise, instructions, any additional context for the Joule agent to operate.   
  
Copy the initial prompt and settings from the [template](https://github.com/SAP-samples/teched2025-AI165/blob/main/exercises/ex1/agent-template.md) over to your agent to get started.

Add one sentence at the start of the Additional Context section of the agent prompt – “The first step is to always go through the records of known BP below”. This should instruct the agent to always go through the records of known business partners below in the prompt first.

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Provide the below settings:

* Model Thinking Steps = Medium
* LLM Provider = OpenAI
* Base Model = GPT4o Mini
* Advanced Model = GPT4o

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For the Advanced configuration, Agent step processing, please select the checkbox “Pre-processing”. This enables the agent to do the pre-processing steps direct Instructions, decomposition and Planning.

The agent needs to have at least one tool to test it in the next step. Click Add Tool and select “Calculator”.

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Name it "Calculator" and give it the following description: "Calculator to do math". Click on “Add”.

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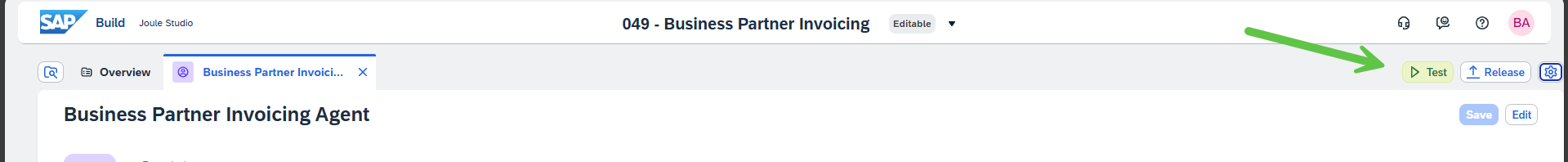
Save your project by clicking on the “Save” button top right hand corner.

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1. Test the agent

Click the green Test button in the top right corner. A test package of your agent will be deployed. This might take a minute.



In the popup, accept the value of the environment. It should match with your assigned User ID.

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Test the agent by asking:

"Provide information about the business partner called Cymbal Direct." This business partner is in the records.

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Try using the prompt "Provide information about the business partner called Siiidneeey Promo." The agent would either be unable to process this request or infer that you probably meant Sydney Promotions

Does the agent behave as expected? If not, try the same question one more time first. If the issue persists, go through the (timeline) logs to see where the issue might be and ask the speakers for help.

1. Create Joule Skill to externalize business partner information

In a realistic scenario the data about the business partners wouldn't be part of the prompt, but come from another service/system. This is the purpose of the Joule Skill that you will create next.

Still within the same project, go back to the project overview. Click again the Create button and select Joule Skill.

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Name it get-business-partners, keep the identifier and use the following as description: "A skill to retrieve the records of known business partners."

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This will open a new tab for you to configure your Joule skill.

Select the step “Trigger” and in general properties, Turn off "Allow skill to be started directly by a user"

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Click the plus button under the Start node and select “Call Action”.

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Click on “Browse All Actions”

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Select "Invoke function getBusinessPartners" to add it as a new step/node.

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Select the newly added node. In the general properties, we need to select the Destination Variable. Create a new Destination Variable.

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Name it “BUSINESS\_PARTNERS\_SERVICE” and click on “Create” button.

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Ensure the Destination variable is selected as shown below.

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We need to define the output of this Joule skill. Click on “Start” node and in the parameters properties, click on the the configure button next to “Skill Outputs”.

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Define a Skill Output named businessPartners in the Start node. Click on “Add Output” and provide the below details.

* Name: businessPartners
* Description: the known business partners
* Type: get\_getGetBusinessPartners\_200\_output\_schema

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Click on “Apply”.

Select the “End” node. Set the value of the Skill Output in the End node to the result of the previous "Invoke function getBusinessPartners" step. Click on the text box in the Skill Outputs and it will provide another menu to select the skill content. Ensure the results of the previous step is mapped as shown below.

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Check for any errors in the Design Console to the bottom of the page. Save your changes.

1. Add Joule Skill as tool to agent

Navigate to the definition of your Business Partner Invoicing Agent. We will now add the newly created Joule Skill to this agent. Click the Add Tool button near the bottom of the page, select Joule Skill and select the get-business-partners Skill to add it as a tool to the agent.

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Remove the business partner information from the Additional Context section of the agent prompt. Change the first sentence of the Additional Context section to instruct the agent to always use the tool "get-business-partners" first to retrieve the records of the business partners.

*The first step is always to use the "get-business-partners" tool to retrieve the records of BP. After going through the records:*

*- If there is at best a close match (when it comes to the name) for the BP in the records, just use that one.*

*### Final Answer*

*Be verbose and explain the reasoning behind what you're doing, following a professional tone.*

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1. Retest the agent

Click on the “Save” button. We are now ready to test this agent. Click the green Test button to deploy a test package and test the agent.

You will be asked to set the Destination Variable BUSINESS\_PARTNERS\_SERVICE. Set it to the destination with the same name BUSINESS\_PARTNERS\_SERVICE

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Ask the agent for the same information about the business partners as you did in the previous test in step 5 of this exercise.

Does the agent still behave as expected and answer as before?

## Exercise 2 - Discover and Invoke Agent via A2A

This exercise is focused on providing information on how remote agents expose their capabilities and how client agents can discover and invoke them for A2A collaboration.

You will be using tools like Power Shell to make API calls to invoke agents. Even if you don’t complete this exercise, you can continue to the next exercise and get to see how A2A works.

1. Open the Agent Card in your Browser - Agent Card (the link will be in the Github page)

Notice how the path in the URL is .well-known/agent-card.json. The Agent Card can always be found under this path. Identify the:

* Capabilities of the agent
* URL to invoke the agent later on
* Mandatory information that the agent needs to create a new ticket in ServiceNow

Agent Cards are JSON documents that act as digital resumes for AI agents, describing their capabilities, skills, and how to communicate with them. They are a fundamental part of the A2A protocol, which enables different AI agents to discover and collaborate with each other by allowing them to understand what each other can do without needing to know the internal implementation details.

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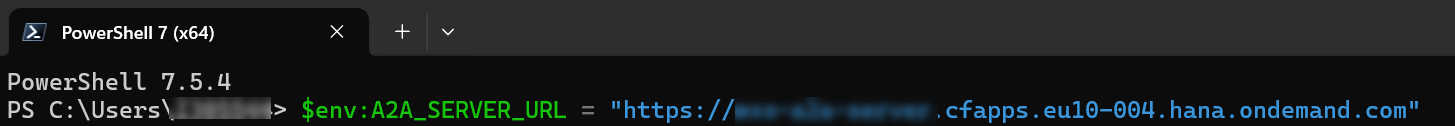
You can read more about the A2A protocol specifications [here](https://a2a-protocol.org/latest/topics/what-is-a2a/) along with the [core concepts and supported operations](https://a2a-protocol.org/latest/specification/).

1. Open PowerShell 7 (x64), the terminal emulator

You will be executing the curl commands throughout this exercise in PowerShell. Now, run the command below to instruct the agent to create a ServiceNow ticket.

Prepare the following:

Set the A2A\_SERVER\_URL environment variable in PowerShell to the service/invoke URL from the Agent Card: $env:A2A\_SERVER\_URL = "..."



Update the sentence in the message payload to include the mandatory fields for ticket creation: short description and priority. Use 2 (high) for the priority. You can copy the command first to Visual Studio Code and edit it there.

Notice that configuration.blocking is set to true, so the request waits for the agent to return the created ticket details. It can take a few seconds to get the response.

curl --request POST `

--url $env:A2A\_SERVER\_URL `

--header 'Content-Type: application/json' `

--data @'

{

"jsonrpc": "2.0",

"id": 1,

"method": "message/send",

"params": {

"message": {

"role": "user",

"parts": [

{

"kind": "text",

"text": "Open a ticket, short description is Network issues. Set the priority as High"

}

],

"messageId": "1"

},

"configuration": {

"blocking": true

}

}

}

'@

You should get a response with the state as completed.

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1. Handle long-running tasks with asynchronous invocation and polling

In many real-world cases the agent will perform work that takes more time (validations, external API calls, or multi-step processing). To avoid blocking your client:

Set the configuration.blocking is set back to false, so the server returns an immediate acknowledgement.

The acknowledgement typically contains a task identifier (taskId) and a task status you can poll.

You can continue other work locally and poll the task status periodically until completion.

Submit a long-running task (non-blocking). We'll simply leave out the short description of the ticket, so that the agent cannot complete the task just yet.

curl --request POST `

--url $env:A2A\_SERVER\_URL `

--header 'Content-Type: application/json' `

--data @'

{

"jsonrpc": "2.0",

"id": 1,

"method": "message/send",

"params": {

"message": {

"role": "user",

"parts": [

{

"kind": "text",

"text": "Create a ticket with priority 2"

}

],

"messageId": "2"

},

"configuration": {

"blocking": false

}

}

}

'@

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1. Poll the current status of the task. Make sure to replace TASK\_ID with the task id from the previous response.

curl --request POST `

--url $env:A2A\_SERVER\_URL `

--header 'Content-Type: application/json' `

--data @'

{

"jsonrpc": "2.0",

"id": 2,

"method": "tasks/get",

"params": {

"id": "TASK\_ID"

}

}

'@

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1. The agent says it requires an additional input. It asks to provide the correct priority and it would also need a short description to create a ticket. Provide it and reference again the previous task id. This way the agent knows the request is related to the same task.

curl --request POST `

--url $env:A2A\_SERVER\_URL `

--header 'Content-Type: application/json' `

--data @'

{

"jsonrpc": "2.0",

"id": 3,

"method": "message/send",

"params": {

"message": {

"role": "user",

"parts": [

{

"kind": "text",

"text": "The short description is: Problem in chair not in computer."

}

],

"messageId": "3",

"taskId": "TASK\_ID"

}

}

}

'@

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1. Poll the task status again to know if the ticket was created successfully this time around.

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## Exercise 3 - Agent Collaboration via A2A

1. Inspect the A2A Router Service

Navigate to Actions (in the menu to the left under Connectors) in Joule Studio and click on the item "A2A Router Service".

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Review the following components of the action “Invoke action triggerA2A”

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The Input section has “task” and the Output section returns “taskId” & “agentResponse”.

To test the action, select the Test tab, select the destination A2A\_ROUTER\_SERVICE under Connectivity -> Destination, and enter one of the messages that you used with curl in exercise 2 as the value for the task input. Then click the Test button to the right. It takes a few seconds to get the response.

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Review the underlying [code](https://github.com/SAP-samples/teched2025-AI165/blob/main/business-partner-invoicing/srv/a2a-router.ts) of the triggerA2A endpoint that is called. Notice how it's invoking the same ServiceNow Ticketing Agent from exercise 2.

1. Lets wrap the triggerA2A action in a new Joule Skill. This Skill will act as the integration between the Business Partner Invoicing Agent and the ServiceNow Ticketing Agent via the A2A protocol.

Navigate back to the Lobby (in the menu to the left) and click again on your own project. Create a new Joule Skill.

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Name it "ServiceNow Ticketing Agent". Provide description as “A skill to talk to the ServiceNow Ticketing Agent, which can create tickets in ServiceNow."

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The new Joule skill will open up in a new tab. Select the “Trigger step” and in the general properties, turn off the "Allow skill to be started directly by a user".

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Add a new step/node after the Start node that invokes the triggerA2A action. Click on the “+” icon below start node and select “ Call Action”

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Select “Browse all Actions” and search for “invoke action triggerA2A” and add to the action.

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Click on the “Start” step. Lets define the a Skill Input & Output in the Parameter section.

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For the Skill Inputs, add Input and create a entry with name “task” and description “the task for the agent”. Click on the apply button to save your changes.

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Repeat the same steps for Skill Outputs. Click on the “Add Output” twice and create the below two entries.

Name: taskId

Description: id of the task

Required: Yes

Name: agentResponse

Description: the agent response

Required: Yes

Apply your changes.

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Click on the step “Invoke action triggerA2A”. Create a new Destination Variable.

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Provide the name as “A2A\_Router\_Service”

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Ensure its selected as the Destination Variable

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Navigate to the “Inputs” of this step and click on the textbox for “task”. This will open up a pane to select the skill content. Bind this field to the “task” configured in the Skill Inputs.

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Click on the “End” step. In the Skill Outputs properties, bind the agentResponse & taskId to the results of the previous step (as shown below)

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Click on the Save button.

1. We need to add this newly created Joule Skill to enable agent collaboration. This will need to be added as a tool to the existing Business Partner Invoicing Agent.

Navigate to “Business Partner Invoicing Agent” and add the Joule Skill created above.

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**Update the instructions of the agent with the below**

*You can work on three kinds of tasks:*

*1. Provide information about BP which are in the records of known BP.*

*2. Create tickets in ServiceNow to add a new BP to the records.*

**Update the additional context of the agent with the below**

*The first step is always to use the "get-business-partners" tool to retrieve the records of BP. After going through the records:*

*- If there is at best a close match (when it comes to the name) for the BP in the records, just use that one.*

*- If the BP is clearly not in the records, use the tool "ServiceNow Ticketing Agent" to add it. As tool input use "Create a ticket in ServiceNow with priority 2 (high) and the short description: Please add BP to the records of known BP.", but fill in the BP.*

*- Simply assume any invoices and their IDs, which the user mentions, exist. However, to attach the invoice to the BP the BP has to exist in the records. If it is just say something like "The invoice has been attached to the BP". Again, fill in the BP.*

*### Final Answer*

*Be verbose and explain the reasoning behind what you're doing, following a professional tone.*

*Include the ticket number in the final response if you created a ticket in ServiceNow.*

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Save your changes.

1. Test the agent collaboration end to end

Click again the Test button to deploy a test package. Select the destination variables accordingly and continue.

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Ask it to provide information of a known Business Partner.

*Provide information about the business partner called Cymbal Direct*

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Ask it to provide you with information on a business partner that is clearly not in the records of known business partners.

*Provide information about the business partner called Fraser Rise*

Verify in the (timeline) logs that there is a step about creating the ticket.

Find again the raw response from the agent in the logs.

