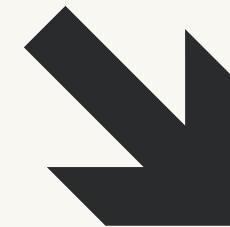
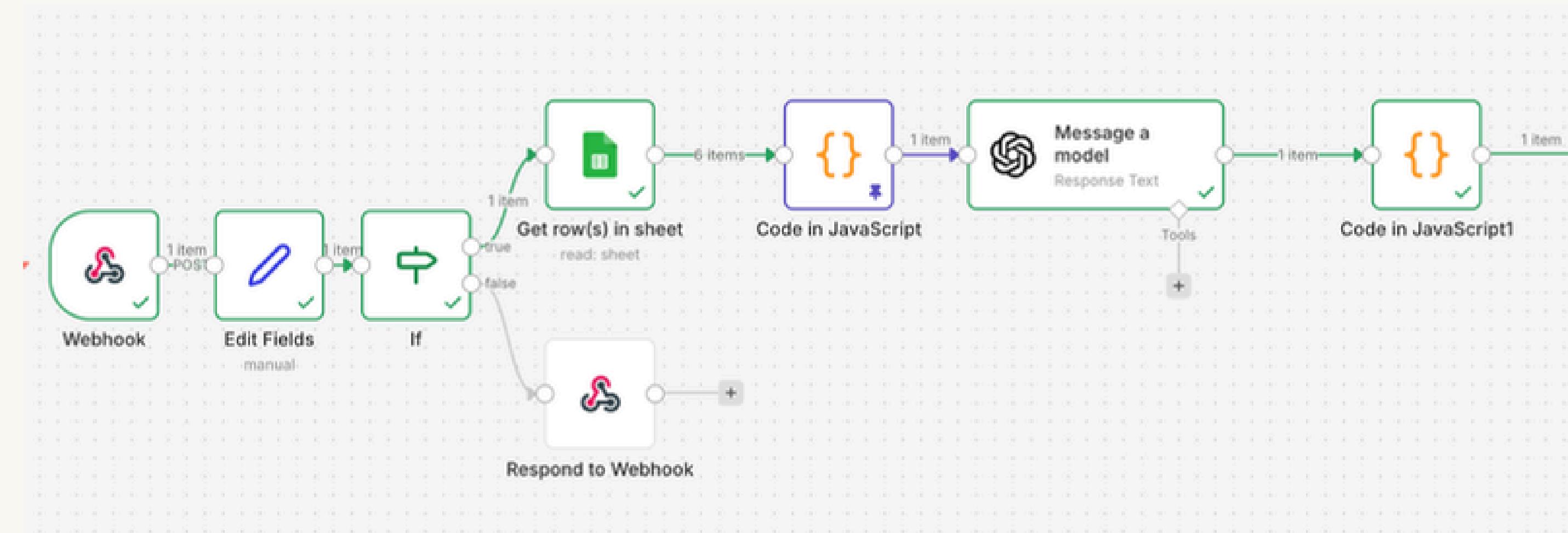


AI RAG Chatbot with Intent Classification & Lead Scoring



Built with n8n + OpenAI + Google Sheets



April Atkinson
“Architecture & Workflow Design Project”



Problem

- Chatbots often return unstructured text
- No deterministic validation
- No intent classification
- No lead prioritization
- No structured API response

I built a structured RAG workflow that transforms raw user input into validated, classified, and scored business output.



Design Principles

- Deterministic before probabilistic
- Structured contracts over free text
- Validation before model invocation
- Retrieval before reasoning

System Architecture

Interface Layer

- Webhook

Control Layer

- Schema normalization
- Validation guardrail

Retrieval Layer

- Knowledge lookup
- Context aggregation

Reasoning Layer

- Structured LLM output

Delivery Layer

- JSON parsing
- API response

Separated deterministic logic from probabilistic reasoning.

Validation and retrieval occur before model invocation to minimize hallucination and maximize control.



RAG-lite Knowledge Retrieval

- Google Sheets as structured knowledge base
- Topic + keyword matching
- Relevance ranking
- Context aggregation before LLM call

Instead of sending raw questions to the LLM, relevant knowledge snippets are injected as structured context.

Google Sheets as structured knowledge base



Knowledge Base Sheet (RAG-lite)						
	A	B	C	D	E	F
1	id	topic	question_patterns	answer_snippet	source	priority
2	pricing_001	pricing	price,pricing,cost,plan,subscription	Our pricing depends on team size and required integrations. For a quote, share your company size and use case.	pricing_faq	10
3	demo_001	sales	demo,call,meeting,book	Yes—happy to do a demo. Please share your email, company, and what you want to automate.	sales_playbook	10
4	integrations_001	integrations	integrate,integration,api,hubspot,salesforce,zapier	We support integrations via API and common tools. Tell me which systems you use (e.g., HubSpot, Salesforce) and the workflow you want.	integrations_faq	9
5	security_001	security	security,soc2,gdpr,compliance,data	We can support GDPR-aligned workflows. For security/compliance requirements, share your constraints and we'll confirm what's supported.	security_faq	9
6	support_001	support	help,issue,problem,broken,error	Sorry about that—tell me what you tried, what happened, and any error message. I'll help troubleshoot or escalate.	support_playbook	8
7	fallback_001	fallback	“”	I can help—are you asking about pricing, integrations, security, or support?	fallback	1

Structured LLM Output

```
{  
  "answer": "...",  
  "follow_up_question": "...",  
  "intent": "integration inquiry",  
  "lead_score": 7  
}
```

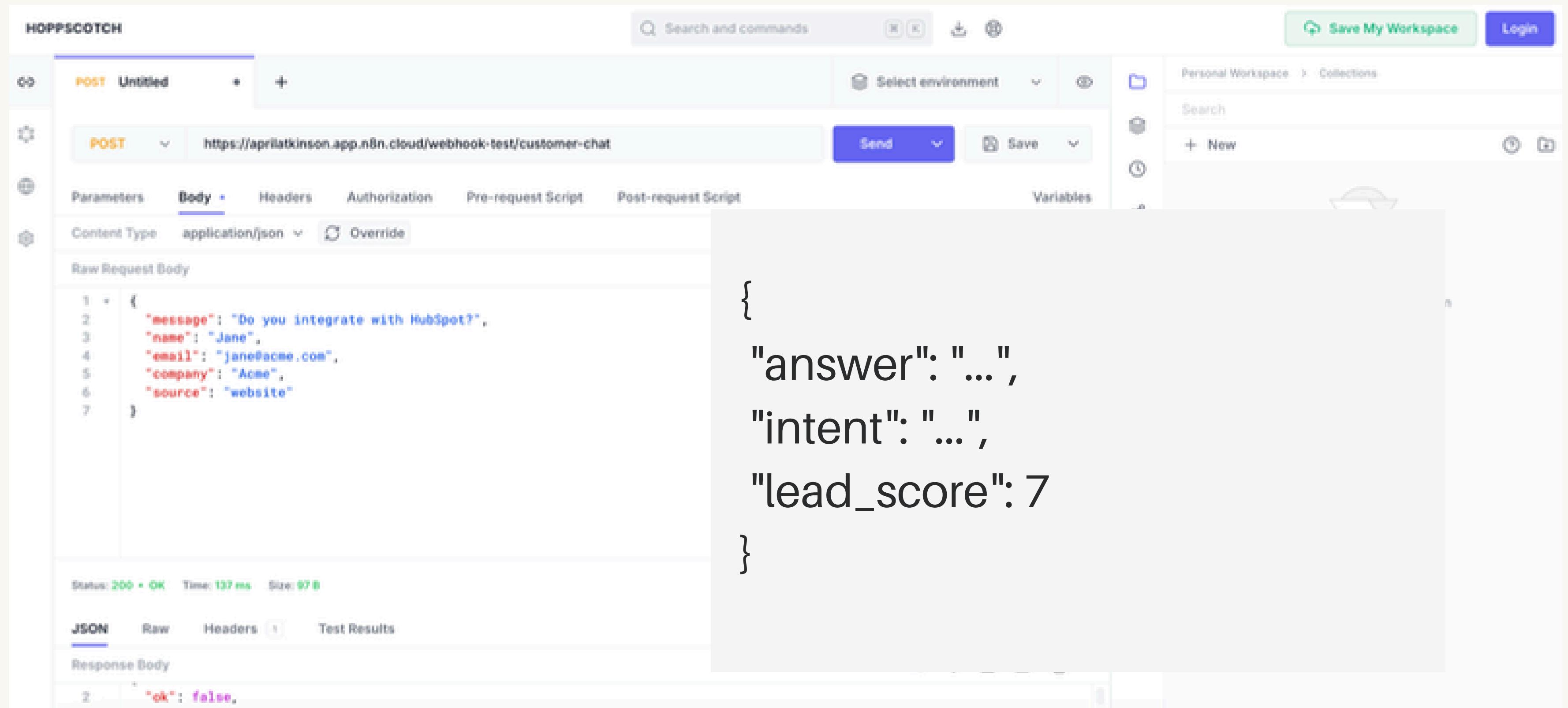
- Forced JSON output format
- Intent classification
- Lead scoring
- Deterministic downstream automation

The screenshot displays the Microsoft Bot Framework Composer interface, which is a visual editor for building conversational bots. The left side shows a navigation pane with various project items, such as 'Create a template', 'Create a bot', 'Bot catalog', 'Bot store', 'Bot builder', and 'Bot insights'. The main workspace is divided into several sections:

- Properties**: A panel on the left containing properties like 'Conversation to connect with', 'Default account', 'Resource', 'Page', 'Description', 'Message & Model', and 'Model'.
- Messages**: A central area where messages are added sequentially. The first message is a 'Text' message with the text 'Do you integrate with Nutshell?'. The second message is a 'Text' message with the text 'We are a simple lead capture solution'. The third message is a 'Text' message with the text 'User'.
- Reply**: A section at the bottom for defining replies. It includes a 'Reply' button, a 'Reply to user' dropdown set to 'user_message', a 'Contact' dropdown set to 'user_contact', and a 'Text' input field containing 'User question: Do you integrate with Nutshell? Contact: Please integrate with Nutshell integration API'.
- Add Message**: A button to add another message to the conversation.
- Empty Output**: A switch to enable or disable empty output.
- Connect your own custom file links to this node in the canvas**: A note about connecting external files.
- Built-in Flows**: A section for built-in flows, currently empty.
- My properties**: A table showing properties like 'id', 'name', 'type', 'value', and 'last update'.
- Options**: A section for bot options.

On the right side, there is a large JSON representation of the bot's state and configuration, which includes details about the conversation, message history, and various properties and variables used in the bot's logic.

Production-Ready API Response (test)



The screenshot shows the Hopscotch API testing tool interface. A POST request is being sent to the URL <https://aprilatkinson.app.n8n.cloud/webhook-test/customer-chat>. The request body is a JSON object:

```
{
  "message": "Do you integrate with HubSpot?",
  "name": "Jane",
  "email": "jane@acme.com",
  "company": "Acme",
  "source": "website"
}
```

The response body is also a JSON object:

```
{
  "answer": "...",
  "intent": "...",
  "lead_score": 7
}
```

The status bar at the bottom indicates: Status: 200 - OK, Time: 137 ms, Size: 97 B.

<https://hoppscotch.io/>

The screenshot shows the Hoppscotch interface. A POST request is being sent to <https://aprilatkinson.app.n8n.cloud/webhook-test/customer-chat>. The request body contains the following JSON:

```
1  {
2   "message": "Do you integrate with HubSpot?",
3   "name": "Jane",
4   "email": "jane@acme.com",
5   "company": "Acme",
6   "source": "website"
7 }
```

The response status is 200 OK, time 5877 ms, size 71B.

OUTPUT

1 item

```
[{"user_message": "do you integrate with hubspot?", "matched_topics": ["integrations", "pricing", "sales"], "context": "Topic: integrations\\nAnswer: We support integrations via API and common tools. Tell me whasystems you use (e.g., HubSpot, Salesforce) and the workflow you want.\\n\\nTopic: pricing\\nAnswer: Our pricing depends on team size and required integrations. For a quote, share your company size and use case.\\n\\nTopic: sales\\nAnswer: Yes--happy to do a demo. Please share your email, company, and what you want to automate.", "kb_hits": [{"row_number": 4, "id": "integrations_001", "topic": "integrations", "question_patterns": "integrate,integration,api,hubspot,salesforce,zapier", "answer_snippet": "We support integrations via API and common tools. Tell me whasystems you use (e.g., HubSpot, Salesforce) and the workflow you want.", "source": "integrations_faq", "priority": 9, "score": 13}, {"row_number": 2, "id": "pricing_001", "topic": "pricing", "question_patterns": "pricing,price,offer,discount", "answer_snippet": "Our pricing depends on team size and required integrations. For a quote, share your company size and use case.", "source": "pricing_faq", "priority": 8, "score": 12}]}]
```

Potential Expansion

- Vector search instead of keyword matching
- Supabase logging
- Multi-intent routing
- Guardrail / compliance layer
- Conversation memory

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Thank you!