



# CrewAI Agent Workflows Snowflake Native Application

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# BlendX CrewAI Agent Workflows

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## Overview

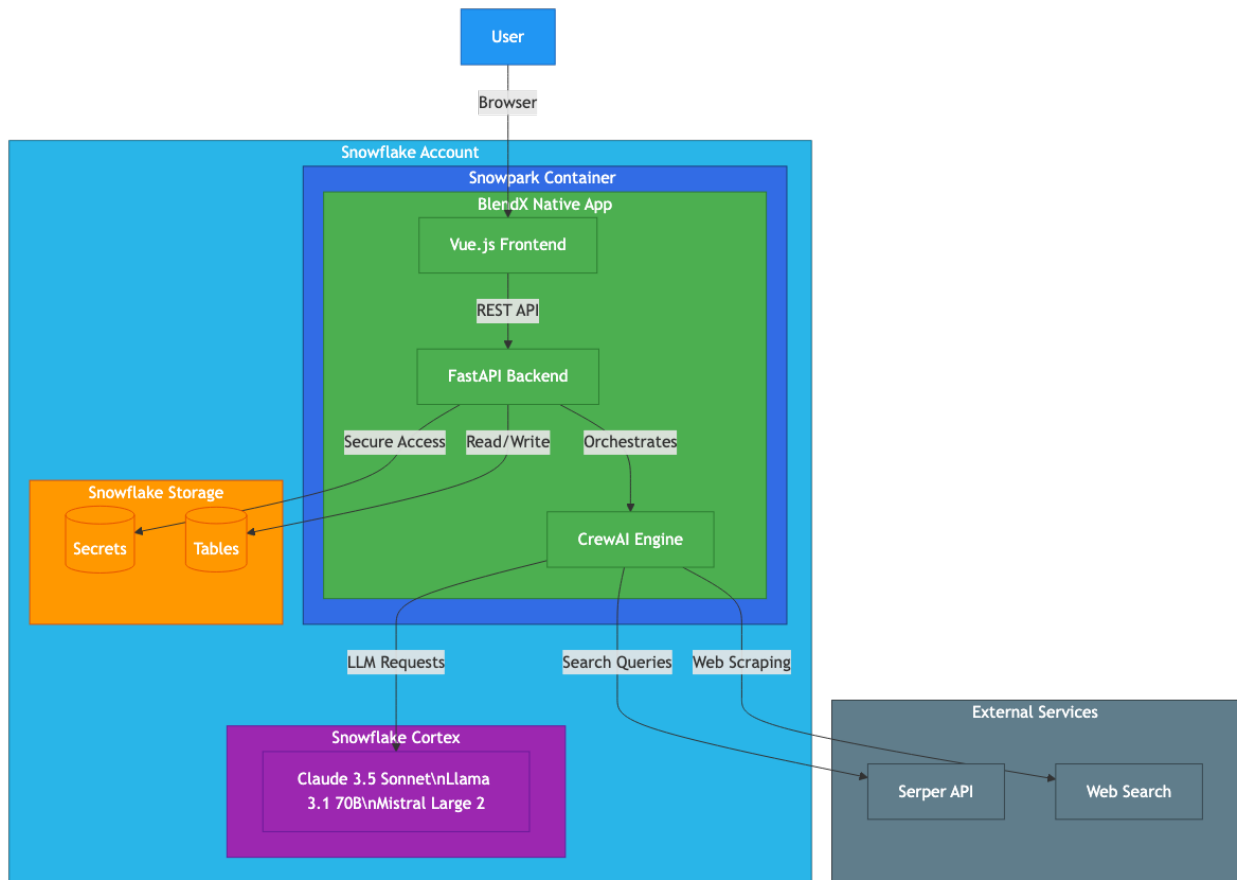
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BlendX Snowflake Native Application enables you to run CrewAI agent workflows directly within your Snowflake environment, powered by Snowflake Cortex LLMs.

## Key Features

- **Multi-Agent AI Workflows:** Run sophisticated multi-agent AI workflows using the CrewAI framework
  - **Snowflake Cortex Integration:** Powered by Snowflake Cortex LLMs - no external API keys required for LLM access
  - **Natural Language Workflow Generator:** Create complex workflows using plain English descriptions
  - **External Tool Integration:** Web search capabilities via Serper API
  - **Secure Execution:** Runs within Snowpark Container Services (SPCS)
  - **Built-in Secret Management:** Through Snowflake references
  - **Interactive Web Interface:** For generating and monitoring workflows
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# Architecture



## Installation

### Step 1: Install the Application

Click "Get" in the Snowflake Marketplace to install the application in your Snowflake account.

### Step 2: Grant Privileges

When prompted, grant the following privileges:

Privilege	Purpose
IMPORTED PRIVILEGES ON SNOWFLAKE DB	Access to Cortex LLMs
CREATE COMPUTE POOL	Create SPCS compute resources
BIND SERVICE ENDPOINT	Expose web interface
CREATE WAREHOUSE	Create warehouse for processing
EXECUTE MANAGED TASK	Run scheduled tasks
CREATE EXTERNAL ACCESS INTEGRATION	Connect to external APIs

### Step 3: Configure Serper API (Optional)

For web search capabilities, create a secret with your Serper API key:

```
CREATE DATABASE IF NOT EXISTS secrets_db;
CREATE SCHEMA IF NOT EXISTS secrets_db.app_secrets;

CREATE SECRET IF NOT EXISTS secrets_db.app_secrets.serper_api_key
  TYPE = GENERIC_STRING
  SECRET_STRING = '<your_serper_api_key>';
```

Get your API key from: <https://serper.dev>

### Step 4: Grant Cortex Permissions

```
-- Grant Cortex user role to the application
GRANT DATABASE ROLE SNOWFLAKE.CORTEX_USER TO APPLICATION <your_app_name>;

-- Grant imported privileges on Snowflake database
GRANT IMPORTED PRIVILEGES ON DATABASE SNOWFLAKE TO APPLICATION
<your_app_name>;
```

### Step 5: Activate and Start

1. Click "Activate" in the application page
2. Configure references (Serper secret if using web search)
3. Start the application:

```
CALL <app_name>.app_public.start_app('<pool_name>', '<warehouse_name>');
```

## Step 6: Access the Application

Get the application URL:

```
CALL <app_name>.app_public.app_url();
```

Open the URL in your browser to access the web interface.

## Using the Natural Language Generator

The NL Generator allows you to create complex AI workflows using plain English descriptions.

### How It Works

1. **Describe your workflow** in natural language
2. The AI **classifies** your request as either a Crew or Flow
3. A **YAML configuration** is generated automatically
4. A **visual diagram** is created using Mermaid
5. **Execute** the workflow directly in Snowflake

### Workflow Types

Type	Description	Best For
<b>Crew</b>	Parallel or independent task execution	Multiple agents working on separate topics
<b>Flow</b>	Sequential, dependent workflows	Step-by-step processes where output feeds into next step

## Example Requests

### Sequential Flow (Research → Analysis → Report)

Create a workflow to research the latest Snowflake AI features, then analyze how they compare to competitors like Databricks and AWS, and finally generate a comprehensive market analysis report.

### Parallel Crew (Independent Analysts)

Create a team of analysts to review customer feedback. One analyst should focus on sentiment analysis of product reviews, another should identify common feature requests, and a third should categorize support tickets by issue type.

### Simple Research Task

Search for recent news about artificial intelligence in healthcare and create a summary report highlighting the top 3 breakthroughs.

## Generated Output

The NL Generator produces:

1. **YAML Configuration**: Complete CrewAI workflow definition
2. **Rationale**: Explanation of the workflow design
3. **Mermaid Diagram**: Visual representation of the workflow

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## Workflow Configuration

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### Agent Configuration

Agents are defined with the following properties:

```
agents:
  - role: "Research Analyst"
    goal: "Gather and analyze market data"
    backstory: "Expert researcher with 10 years experience"
    tools:
      - crewai_tools: ["SerperDevTool", "WebsiteSearchTool"]
    llm:
      provider: "snowflake"
      model: "claude-3-5-sonnet"
      temperature: 0.7
    allow_delegation: false
```

## Available Tools

Tool Type	Syntax	Description
CrewAI Native	<code>crewai_tools: ["SerperDevTool", "WebsiteSearchTool"]</code>	Built-in CrewAI tools

## Task Configuration

```
tasks:
  - name: "Market Research Task"
    description: "Research market trends for ${input}"
    agent: "Research Analyst"
    expected_output: "Comprehensive market analysis report"
    tools:
      - crewai_tools: ["SerperDevTool"]
    context: []
```

## Flow Methods (for Flow type)

```
flow_methods:
  - name: "run_research"
    type: "start"
    action: "run_crew"
    crew: "Research Crew"
  - name: "run_analysis"
    type: "listen"
    listen_to: ["run_research"]
    action: "run_crew"
    crew: "Analysis Crew"
```

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## LLM Configuration

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### Default Provider

All workflows use Snowflake Cortex by default:

```
llm:
  provider: "snowflake"
  model: "claude-3-5-sonnet"
  temperature: 0.5
```

### Available Models

Provider	Models
Snowflake	claude-3-5-sonnet, llama3.1-70b, mistral-large2

### Temperature Guidelines

Temperature	Use Case
0.1 - 0.3	Code generation, data analysis, consistent outputs
0.5 - 0.7	General tasks, balanced creativity
0.7 - 1.0	Creative writing, brainstorming

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## Testing the Application

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### Test Buttons

The application includes built-in test buttons:



Button	Purpose
TEST CORTEX	Verify Snowflake Cortex LLM connectivity
TEST LITELLM	Test LiteLLM integration
TEST SECRETS	Verify secret configuration
TEST SERPER	Test Serper API connectivity
RUN TEST CREW	Execute a basic CrewAI workflow
RUN TEST EXTERNAL TOOL	Run workflow with web search

## Verification Steps

1. Click **TEST CORTEX** - Should return a response from the LLM
  2. Click **TEST SECRETS** - Should show SERPER\_API\_KEY status
  3. Click **TEST SERPER** - Should return search results (if configured)
  4. Click **RUN TEST CREW** - Should complete a basic workflow
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## Workflow History

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### Viewing History

1. Click **Load History** in the chat header
2. Browse previously generated workflows
3. Click any workflow card to view details

### Saving Workflows

1. After generating a workflow, click **Save**
2. Enter a descriptive name
3. The workflow is saved to your history

## Workflow Details

Each saved workflow includes: - Title and creation date - Status (COMPLETED, PENDING, FAILED) - Type (run-build-crew or run-build-flow) - Rationale - YAML configuration - Mermaid diagram

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## Troubleshooting

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### Common Issues

#### "Cortex test failed"

**Cause:** Missing Cortex permissions

**Solution:**

```
GRANT DATABASE ROLE SNOWFLAKE.CORTEX_USER TO APPLICATION <your_app_name>;  
GRANT IMPORTED PRIVILEGES ON DATABASE SNOWFLAKE TO APPLICATION  
<your_app_name>;
```

#### "Serper test failed"

**Cause:** Missing or invalid Serper API key

**Solution:** 1. Verify secret exists: `SHOW SECRETS IN SCHEMA secrets_db.app_secrets;` 2. Recreate if needed with valid API key

#### "Error rendering diagram"

**Cause:** Invalid Mermaid syntax in generated chart

**Solution:** The application will display an error message. Try regenerating the workflow.

#### Workflow stuck in "PENDING"

**Cause:** Long-running LLM processing

**Solution:** Wait up to 2-3 minutes. If still pending, check compute pool status.

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## Compute Costs

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Usage of this application incurs Snowflake compute costs for:

Resource	Description
SPCS Compute Pool	Container runtime for the application
Snowflake Cortex	LLM token usage
Warehouse	Query processing

### Cost Optimization Tips

1. Use smaller compute pool sizes for testing
  2. Stop the application when not in use
  3. Use lower temperature settings to reduce token usage
  4. Batch similar workflows together
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## Security

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### Data Privacy

- All data processing occurs within your Snowflake account
- No data is transmitted to the application provider
- LLM processing uses Snowflake Cortex (data stays in Snowflake)

### External Connections

If configured, the application may connect to:

Service	Purpose	Data Sent
Serper API	Web search	Search queries only

## Secret Management

- API keys are stored as Snowflake Secrets
  - Secrets are accessed via secure references
  - Never exposed in logs or outputs
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## API Reference

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### Start Application

```
CALL <app_name>.app_public.start_app('<pool_name>', '<warehouse_name>');
```

### Stop Application

```
CALL <app_name>.app_public.stop_app();
```

### Get Application URL

```
CALL <app_name>.app_public.app_url();
```

### Check Application Status

```
CALL <app_name>.app_public.service_status();
```

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## Support

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### Getting Help

- [Documentation](#): This guide
- [Issues](#): Contact support@blend360.com

## Reporting Issues

When reporting issues, please include: 1. Error message (if any) 2. Steps to reproduce 3. Workflow YAML (if applicable) 4. Browser and version

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*BlendX CrewAI Agent Workflows - Powered by Snowflake Cortex*