JUNE 30, 2025

Kowalski - Your Helpful AI Assistant

Christian Goll <cgoll@suse.com>
github.com/mslacken/kowalski

SUSE

Outline

Introduction

AI Tools

Kowalski Implementation

MCP and Kowalski

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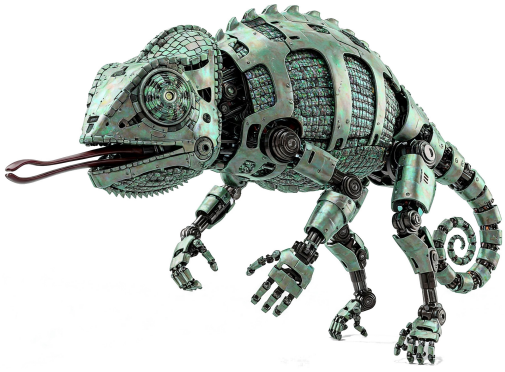
The Challenge: LLMs and System Configuration

Current state

- Large Language Models (LLMs) are powerful for general tasks.
- LLMs are already used for system configuration tasks
- Hallucinations and wrong tools likely to be presented



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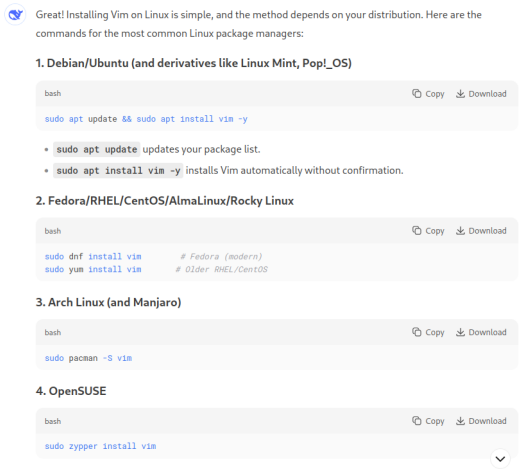
Example

- Answers with standard prompt are extensive
- User has to select the right one
- Sensitive information may be shared!



Great! Installing Vim on Linux is simple, and the method depends on your distribution. Here are the commands for the most common Linux package managers:

1. Debian/Ubuntu (and derivatives like Linux Mint, Pop!_OS)

bash — Copy — Download

```
sudo apt update && sudo apt install vim -y
```

- `sudo apt update` updates your package list.
- `sudo apt install vim -y` installs Vim automatically without confirmation.

2. Fedora/RHEL/CentOS/AlmaLinux/Rocky Linux

bash — Copy — Download

```
sudo dnf install vim        # Fedora (modern)
sudo yum install vim        # Older RHEL/CentOS
```

3. Arch Linux (and Manjaro)

bash — Copy — Download

```
sudo pacman -S vim
```

4. OpenSUSE

bash — Copy — Download

```
sudo zypper install vim
```

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Problem

- LLMs are created by training text completions on scraped sources
- LLMs don’t have any context

You know nothing, John Snow!

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Solution

- Context is needed for accurate solutions
- Should be easy to get context of actual system.

I know things!

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Introducing Kowalski: A Specialized AI Assistant

- Kowalski is designed to bridge the gap between LLMs and system configuration.
- It provides LLMs with highly relevant and context-aware information.
- Focus on extracting and utilizing knowledge from technical documentation, specifically SUSE/SLE docs.

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Question:

How do you get context-aware information?

Answer:

Use vector embeddings!

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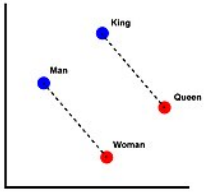
Vector Embeddings

Definition

Numerical representations of data (words, texts, etc.) in a vector space

Key Properties

- Capture semantic relationships (e.g. ”king” – ”man” + ”woman” ≈ ”queen”).
- Fixed-length
- Similar items cluster together in the vector space.



Example

```
"cat"   [0.2, -0.5, 0.7], "dog"   [0.3, -0.4, 0.6]
```

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Embedding details

Creation methods

GloVe

Uses global word co-occurrence statistics from a corpus.

Word2Vec

predicts surrounding words (or target word) using shallow neural networks.

Vector space search

- Searching nearest neighbors in high dimensional vector space isn't trivial
- Facebook created `faiss` library which does this job

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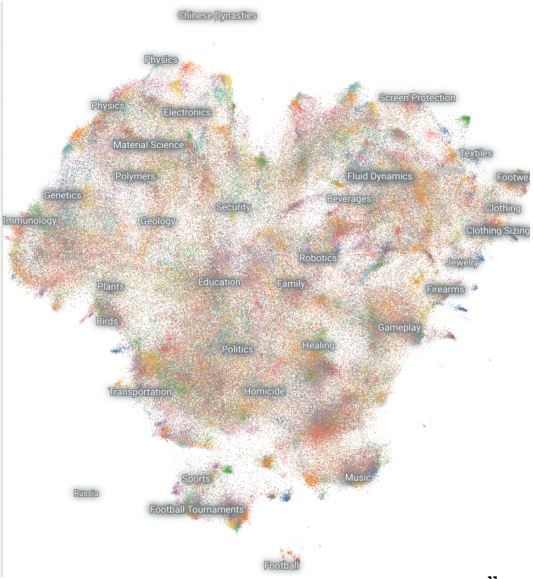
Embedding conclusions

- Use *Word2Vec* like embedding so that LLM and embedding can run on Ollama
- Creation embedding for documentation is computational expensive
- Embeddings are available with different OSS licenses, text lengths and embedding dimensions



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Question:

How do you run an LLM modell localy?

Answer:

Use Ollama!

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Ollama: Local AI Powerhouse

- Ollama is an Open-source framework for running LLMs locally
- Enables execution of models like LLaMA on consumer hardware

Efficiency

- Uses **quantization**—reduces model precision (e.g. 32-bit → 4-bit)
- Smaller model size + faster inference
- Minimal accuracy loss for significant performance gains

The LLaMA Foundation

- Meta's LLaMA was first major open weights model
- Proved smaller models could compete with proper training

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Advantages of separate Ollama instance

Pros

- GPU accelerated Ollama versions can be used
- Ollama can run as micro service
- Ollama can run on seperate server
- Embedding and LLMs are interchangeable

Contras

- Requires separate Ollama installation

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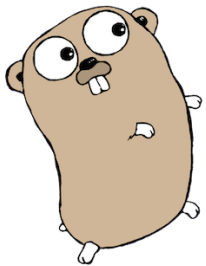
Why Go for Kowalski?

Python's Challenges in Production AI

- **Dependency Hell**
  - Python has a *long tail*—importing one package pulls in many others which have to be packaged
  - Increases deployment complexity
  - E.g. python-faiss is not available for the *oldest* python in Tumbleweed

Go's Advantages

- **Single Binary Deployment**
  - No dependency chains—statically linked executables
- **Compile Time Vendoring**
  - Dependencies are imported at compile time and not run time



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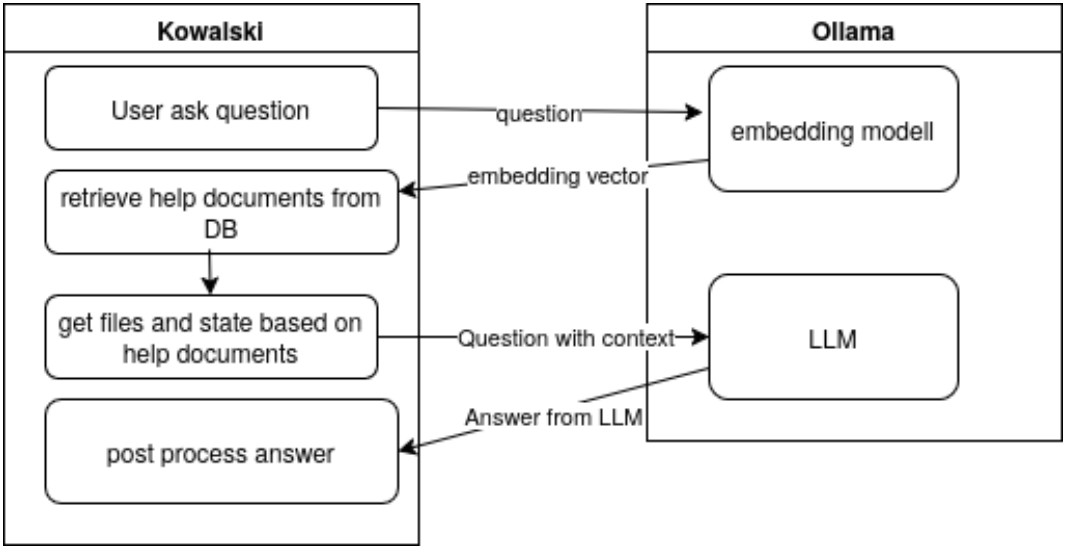
How does Kowalski work



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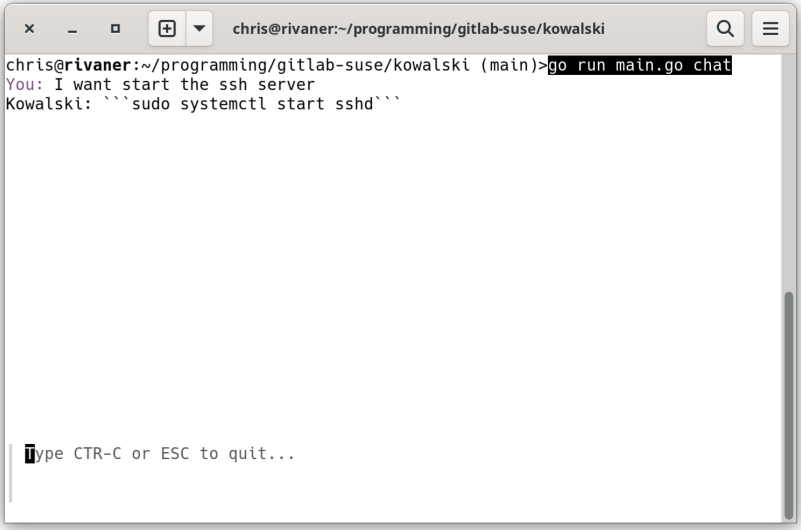
How does it look like?



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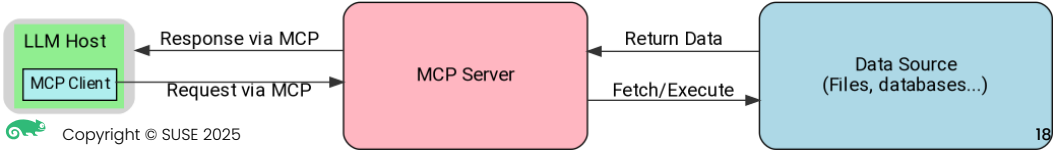
Model Context Protocol (MCP) - the other kid in town

What is MCP?

- open standard for AI-tool integration by Anthropic (Nov 2024)
- replace custom connectors with a **universal interface** for LLMs.
- enable seamless access to files, functions, and contextual prompts.

Why MCP?

- **Pre-MCP**: Vendor-specific APIs led to fragmentation.
- **MCP**: Open standard adopted by OpenAI, Google DeepMind and OSS tools
- Inspired by **Language Server Protocol (LSP)**, uses **JSON-RPC 2.0**.



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MCP and Kowalski

MCP advantanges

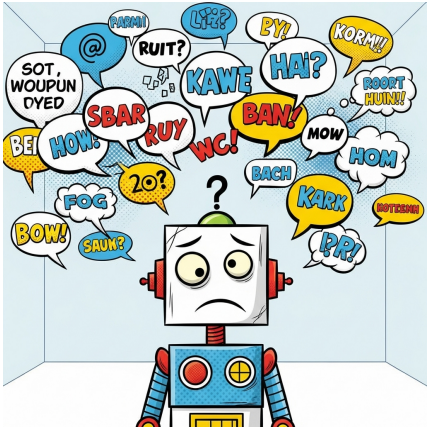
- industry standard, get's a lot of traction
- specialized LLMs are created for this purpose

MCP disadvantages

- LLMs still rely on inherent knowledge
- whole thinking process takes longer as LLM needs to ask MCP server first

Solutions

- Kowalski acts as a MCP server
- Kowalski uses MCP services



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Help wanted!

https://github.com/kowalski-org/kowalski

EVERYONE

- Requests for Kowalksi under `/evalutations/foo.yaml`
- Just needs a name and a prompt!

Every other aspect

Also help needed!

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Availability

Source

- Install `python-fais-devel` for science:machinelearning
- `go mod vendor`
- `go build kowalski.go`

- Get documentation and embeddings

- Clone documentation repo
- Create embeddings with `kowalski database add …`
- Grab a coffee

RPM package

Get package with embeddings from `science:machinelearning`
https://build.opensuse.org/project/show/science:machinelearning

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Packaging caveats

LLMs

- LLMs with OSS licenses are available
- Are they binary blobs?
- There is no realistic chance to build them on your own
- You can finetune them

Embedding creation

- Creating embedding is compute expensive for the complete documentation
- Is done with a `github` runner
  - Embedding model can downloaded online
  - Microsoft pays the compute bill

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Kowalski

Thank your, for you attention!

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