

# BUSINESS INTELLIGENCE AGENT

## Problem Interpretation:

The goal was to build an AI agent capable of answering founder-level business intelligence questions by dynamically integrating with monday.com boards containing:

- Work Orders (execution data)
- Deals (sales pipeline data)

The system must handle:

- Messy real-world data
- Cross-board querying
- Missing or inconsistent formats
- Conversational interaction
- Executive-level insight generation

I interpreted the core requirement as:

Build a resilient, analytics-first intelligence layer over monday.com data that converts raw board data into decision-ready business insights.

## Key Architectural Decisions

### A. Tech Stack

- Frontend: Streamlit (hosted on Streamlit Cloud)
- Data Layer: monday.com API (Read-only via API token)
- Processing: Pandas
- Visualization: Matplotlib
- Hosting: Streamlit Cloud (no local dependency)

### Why?

- Streamlit allows rapid conversational UI.
- Pandas handles messy data efficiently.
- monday.com API ensures dynamic data access (no CSV hardcoding).
- Easy deployability within 6-hour constraint.

### B. No External LLM Used

The system uses rule-based NLP routing instead of OpenAI or paid LLM APIs.

### Reason:

- Cost constraints
- Time limitation
- Predictable business queries

- Focus on data intelligence rather than generative AI

This makes the system deterministic, faster, and easier to debug.

If extended, I would integrate an LLM for semantic query understanding.

## **Handling Messy Business Data**

The dataset contained:

- Inconsistent month naming
- Missing numeric fields
- Mixed casing
- Empty status columns

### **Implemented Resilience:**

- Automatic sector column detection
- Automatic revenue column detection
- Month normalization (e.g., April, apr, APR)
- Graceful fallback messages when columns not detected
- Zero-safe aggregation handling

This ensures the agent does not break under imperfect data conditions.

## **Business Intelligence Capabilities**

The agent supports:

### **Pipeline Intelligence**

- Total deal count
- Total pipeline value
- Sector dominance
- Concentration risk detection

### **Revenue Intelligence**

- Total revenue snapshot
- Sector-wise revenue breakdown
- Month-wise revenue breakdown
- Quarter filtering (Q1–Q4)

### **Leadership Update**

Combines:

- Pipeline summary
- Concentration analysis
- Revenue overview
- Executive-ready formatting

This transforms raw data into strategic insights rather than just numbers.

## Trade-offs Made

Decision	Trade-off
Rule-based NLP	Less flexible than LLM
First numeric column detection	Assumes consistent structure
Static quarter mapping	Not auto-detecting fiscal calendar
Read-only integration	No write-back capability

Given the 6-hour timeline, I prioritized reliability and clarity over full semantic AI capability.

## How I Interpreted "Leadership Updates"

I interpreted leadership updates as:

A concise executive summary combining pipeline scale, risk exposure, and revenue footprint in board-ready language.

So I built a function that synthesizes:

- Deal count
- Pipeline size
- Sector concentration
- Financial exposure

This produces structured, professional messaging suitable for CXO-level review.

## What I Would Improve With More Time

If extended beyond 6 hours:

1. Replace rule-based NLP with LLM semantic parsing.
2. Add natural-language date detection (e.g., "this quarter" dynamically).
3. Add trend visualization (YoY, QoQ).
4. Add anomaly detection (e.g., sudden drop in billing).

5. Add user authentication & multi-board selection.
6. Add caching strategy with refresh button.
7. Add risk heatmap visualization.

## **Security & Deployment**

- API token stored securely in Streamlit Secrets
- No token exposure in frontend
- Hosted publicly without requiring local setup
- Fully testable via shared link

## **Final Outcome**

The solution successfully:

- Connects dynamically to monday.com
- Handles messy real-world data
- Answers founder-level BI questions
- Provides contextual executive insights
- Remains stable under incomplete records
- Is deployable and scalable

## **Conclusion**

This solution demonstrates:

- Business intelligence thinking
- Data resilience engineering
- Practical system design under time constraint
- Executive-oriented reporting capability

The agent converts operational data into strategic clarity.