Document Ingestion & Classification

Problem Statement

Enterprises generate hundreds of thousands of unstructured documents daily—PDFs, Word files, scanned images, emails. Manual sorting and routing is:

- **Slow & Costly:** Human reviewers become a bottleneck.

- **Error-Prone:** Mis-tagged contracts slip through compliance gaps.

- **Unscalable:** Growing volume overwhelms static workflows.

Goal: Build an AI-powered MAS that automatically ingests, extracts, classifies, and routes documents at scale—reducing manual work, cutting errors, and providing full visibility on processing status.

2. Solution Overview

We decompose the pipeline into four collaborating agents on the opensource agentic framework. Each agent reasons over its inputs, may leverage Generative AI/LLMs for hard NLP tasks, and emits structured events. A central Message Bus connects them; stateful agents track progress per document. Here we are give example agents and its reasoning.

Agent	Inputs	Outputs	Reasoning / Generative AI Use
Ingestor Agent	File-share events, email hooks, upload API calls	Raw document payload + metadata event (doc.received)	• **Reasoning:** Decide priority based on sender, file size, or folder. • **LLM-Optional:** Summarize email bodies to extract subject/context.
Extractor Agent	doc.received event; document binary	Text + structured entities (doc.text, doc.entities)	• **OCR/NLP:** Use OCR engines → LLM to clean up noisy text. • **Entity Extraction:** LLM prompts to pull dates, parties, amounts.
Classifier Agent	Extracted text & entities	Document type label + confidence (doc.type, score)	• **Model Inference:** Fine-tuned classifier (or LLM zero-shot) to tag invoice/contract/etc. • **Reasoning:** If low confidence, flag for human review.
Router Agent	Classified document event (doc.type)	Delivery commands (ERP API call, DMS upload, email alert)	• **Routing Logic:** Map types → systems (e.g. invoice → accounting ERP). • **Fallback Reasoning:** If target system down, enqueue retry or send Slack alert.

3. Web UI Design

A webUI gives both operators and admins live visibility into every document's journey:

3.1 Operator Dashboard

1. **Upload/Ingestion Panel**

   o Drag-and-drop or "Connect Mailbox" button.

2. **Workflow Progress Bar**

   o Nodes:

      1. **Ingested**

      2. **Extracted**

      3. **Classified**

      4. **Routed**

   o Each lights up with timestamp as agents complete their steps.

   o Hover reveals details (e.g. "OCR took 3.2s," "Type=Contract (94% confidence)").

3. **Document List & Status**

   o Table of recent docs with columns: Name, Type, Status, Last Updated.

   o Click row to expand the live progress bar and metadata panel.

4. **Manual Overrides**

Buttons to "Re-extract," "Re-classify," or "Route to…" if human intervention is needed