DeepWiki langchain-ai/local-deep-researcher

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Overview

Relevant source files

Purpose and Scope

Local Deep Researcher is a LangGraph-orchestrated web research assistant that uses local LLMs to conduct iterative, autonomous research on user-provided topics. The system integrates with local LLM providers (Ollama, LMStudio) and multiple search APIs to generate comprehensive research summaries with citations.

This document provides a high-level technical overview of the system architecture, core components, and capabilities. For detailed project structure and dependencies, see Project Structure. For comprehensive deployment information, see Deployment. For step-by-step usage instructions, see Usage Guide.

System Architecture

The Local Deep Researcher implements a state machine-driven research workflow using LangGraph to orchestrate interactions between LLM providers, search APIs, and content

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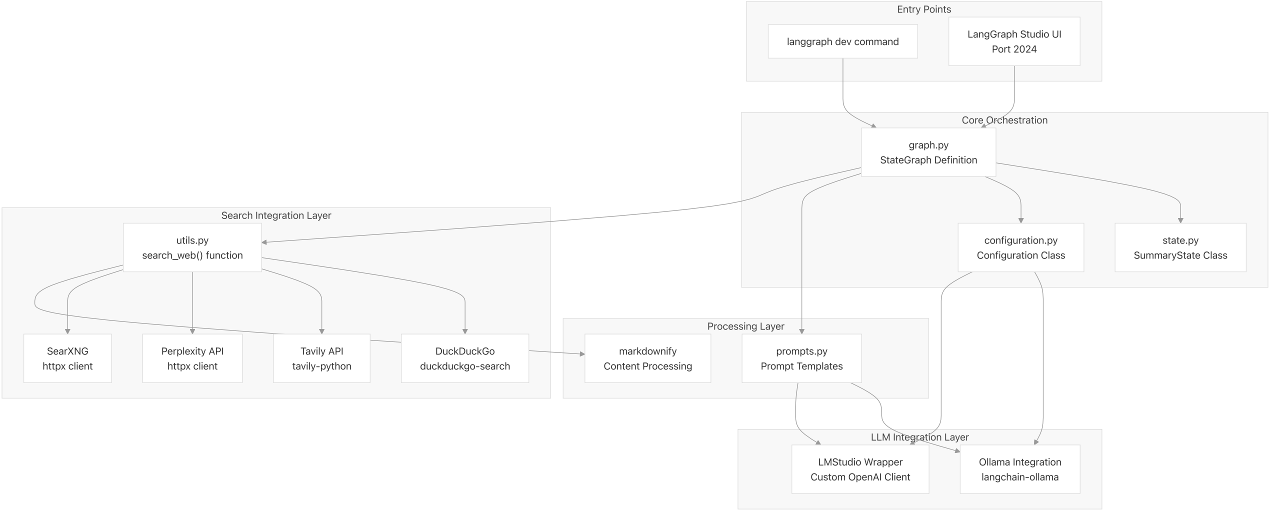

Sources: README.md 1–221 langgraph.json pyproject.toml

Research Workflow State Machine

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Core Workflow Process

The system implements an iterative research methodology inspired by IterDRAG, using a configurable loop to progressively build comprehensive research summaries.

Research Loop Components

Component	Code Location	Purpose
Query Generation	`prompts.py` templates	Convert research topic into targeted search queries
Web Search	`utils.py:search_web()`	Execute searches across configured APIs
Content Summarization	`prompts.py` templates	Extract relevant information from search results
Gap Analysis	`prompts.py` reflection templates	Identify knowledge gaps for follow-up research
State Management	`state.py:SummaryState`	Track progress and accumulate findings

Configuration-Driven Behavior

The system uses a three-tier configuration hierarchy:

1. **Environment Variables** (highest priority) - `.env file`
2. **LangGraph Studio Configuration** - Runtime UI settings

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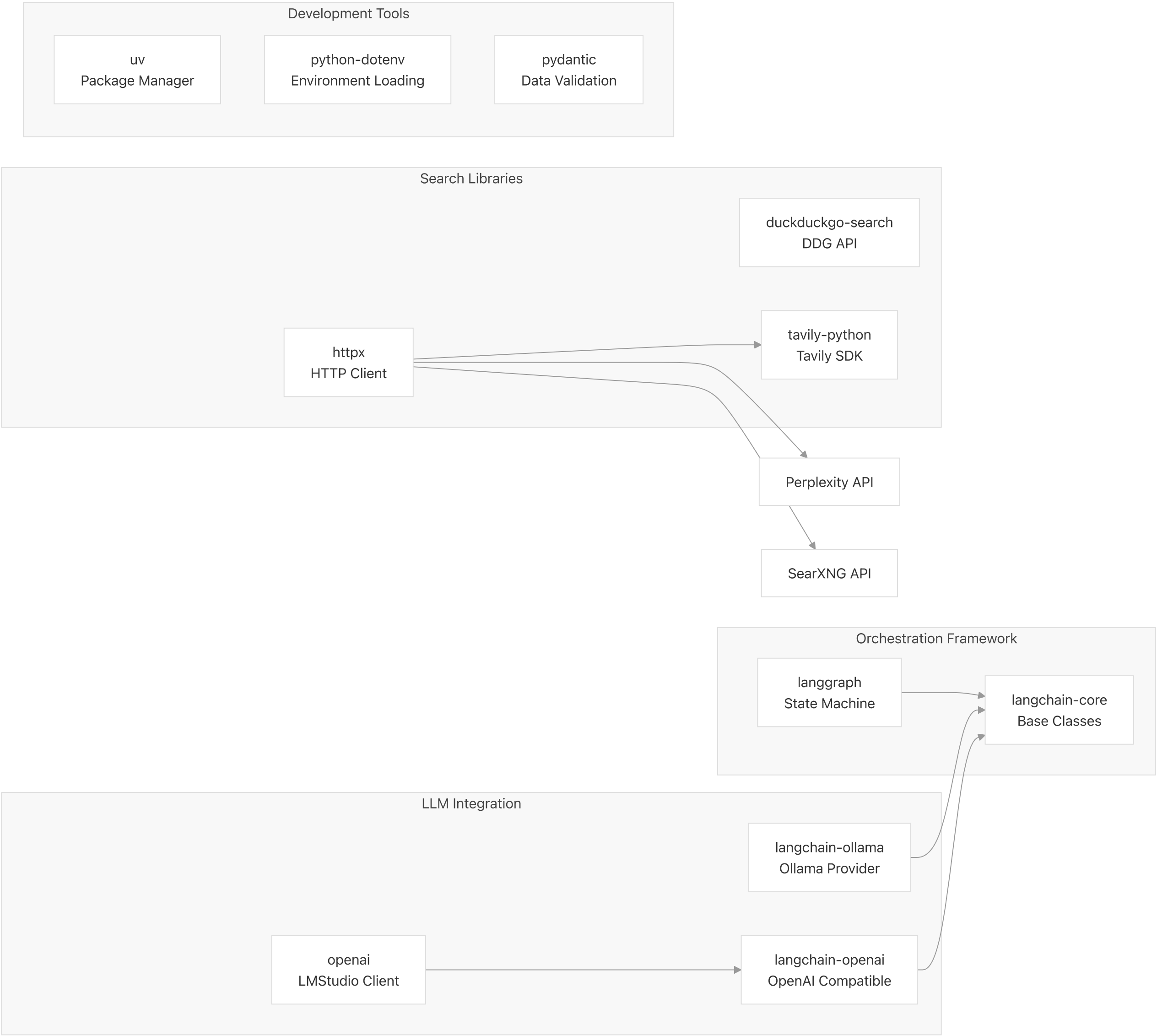
- `SEARCH_API` : Choice of `duckduckgo` , `tavily` , `perplexity` , or `searxng`
- `MAX_WEB_RESEARCH_LOOPS` : Iteration limit (default: 3)
- `FETCH_FULL_PAGE` : Content depth control for DuckDuckGo searches

Sources: README.md 30–82 README.md 135–141 configuration.py

Technology Stack

Core Framework Dependencies



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Multi-Provider LLM Support

The system supports both local and cloud-based LLM providers through standardized interfaces:

- **Ollama Integration**: Direct connection to local Ollama service at `http://localhost:11434`
- **LMStudio Integration**: OpenAI-compatible API wrapper for LMStudio at `http://localhost:1234/v1`
- **Fallback Mechanisms**: Automatic handling of models with limited JSON support

Search API Abstraction

Unified search interface supporting multiple providers:

- **DuckDuckGo**: No API key required, optional full-page content fetching
- **Tavily**: Commercial search API with structured results
- **Perplexity**: AI-powered search with Sonar API integration
- **SearXNG**: Self-hosted metasearch engine support

Deployment Flexibility

- **Development Mode**: `langgraph dev` command with hot reload
- **Production Deployment**: Multi-architecture Docker containers
- **CI/CD Pipeline**: Automated GitHub Actions workflows for container builds

Sources: README.md 35-82 README.md 193-221 Dockerfile

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