# If you know all these, then you know most things in GenAI

## Prompt Engineering

**Prompt Techniques**

1. Chain of Thought (CoT)
2. Few-Shot Chain of Thought (Few-Shot-CoT)
3. ReAct (Reasoning and Acting)
4. Tree of Thoughts (ToT)
5. Self-Consistency
6. Hypothetical Document Embeddings (HyDE)
7. Least-to-Most Prompting
8. Graph Prompting
9. Recursive Prompting
10. Generated Knowledge
11. Automatic Reasoning and Tool-Use (ART)
12. Automatic Prompt Engineer (APE)

## RAG

**Vector DB -** Pinecone, Weaviate, Qdrant, Chroma, Milvus, Vespa, LanceDB

**Embedding Models –** OpenAI's Embedding, Google's text-embedding-004, Huggingface Opensource Embedding Models

**RAG Techniques**

1. Basic RAG
2. Re-ranking RAG
3. Hybrid Search RAG
4. Multi-Index RAG
5. Query Expansion RAG
6. Adaptive RAG
7. Corrective RAG
8. Self Adaptive RAG
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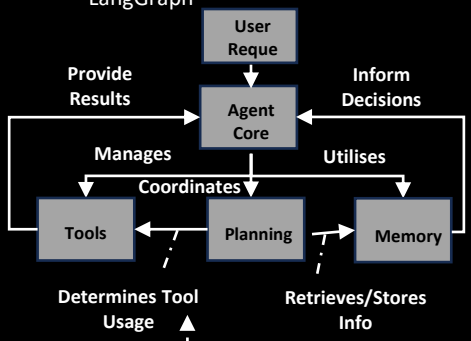
## Agents

LLM agents use large language models to handle complex queries, combining general and specialized knowledge, making them valuable across industries.

**Multi-Agentic Frameworks –** CrewAI, LangGraph

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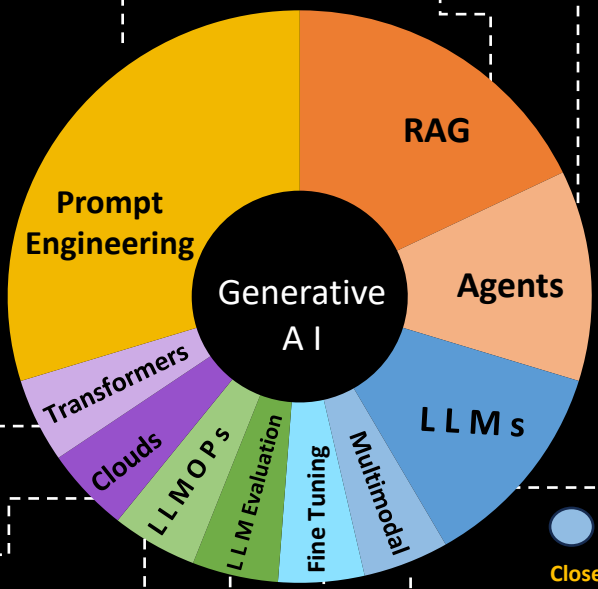
## Transformer Architecture

1. Self-Attention Mechanism
2. Positional Encoding
3. Multi-Head Attention:
4. Encoder-Decoder Architecture
5. Layer Normalization and Feed-Forward Layers
6. Pre-training and Fine-tuning
7. Scalability with Parallelization
8. Applications Across Domains




## LLMs

**Closed Source –** OpenAI o1, GPT-4o,GPT-4o Mini, Gemini 1.5/1 Pro, Gemini 1.5 Flash-8B, Claude 3.5 Sonnet, Claude 3.5 Haiku etc.

**Open LLMs –** DeepSeek-v3, DeepSeek-R1, DeepSeek distilled models, Meta's Llama 3.2 1B, & 3B, Llama 3.1 405B, Microsoft's Phi3.5-Mini, Google's Gemma 2, Ministral 3B & 8B, Huggingface based Opensource Models etc.

## Cloud Support

**Azure** – Azure OpenAI, Azure AI Studio, Azure Machine Learning

**AWS** – Amazon Bedrock, Amazon Sagemaker, Amazon Q

**Google** – Vertex AI

## Multimodal

**Closed Source –** GPT-4o, Gemini 1.5/1 Pro, Gemini 1.5 Flash-8B, Claude 3.5 Sonnet etc

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## LLMOPs

1. Model Deployment and Scaling
2. Monitoring and Logging
3. Versioning and Model Lifecycle Management
4. Cost Optimization
5. Feedback Loops and CI
6. Compliance and Security
7. Latency and Throughput Optimization
8. A/B Testing

## LLM Evaluation

1. BLEU (Bilingual Evaluation Understudy)
2. ROUGE (Recall-Oriented Understudy for Gisting Evaluation)
3. Perplexity
4. Exact Match (EM)
5. Human Evaluation Scores
6. Bias and Fairness Metrics
7. Toxicity Scores

## LLM Fine Tuning

1. Data Selection and Preprocessing
2. Transfer Learning and Domain Adaptation
3. Parameter-Efficient Fine-Tuning
4. Prompt Tuning and Instruction Fine-Tuning
5. Evaluation Metrics for Fine-Tuned Models
6. Safety and Bias Mitigation in Fine-Tuning
7. Hyperparameter Optimization

**LLM Frameworks (Across Layers) – LangChain/LlamaIndex**

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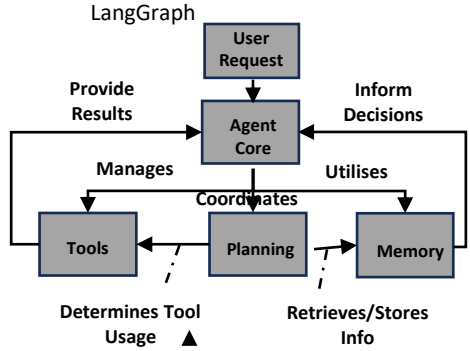


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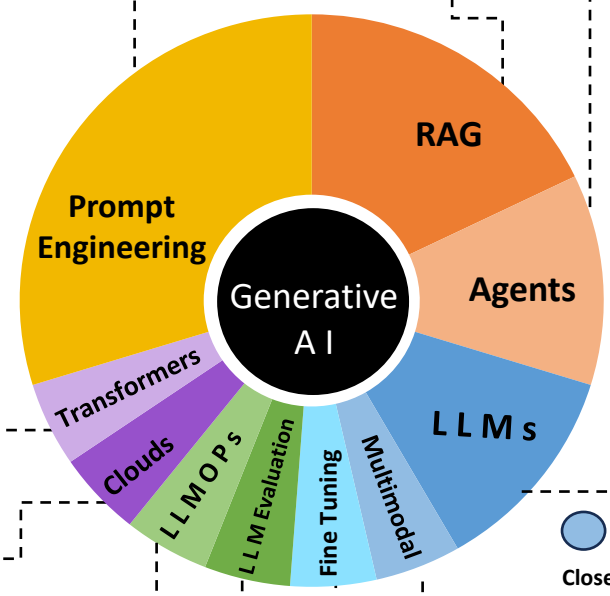


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