Decision Frameworks

> **Description:** Strategic guidance for choosing the right agent patterns, tools, and deployment options

Purpose: Master strategic decision-making for ADK implementation - when to use which patterns, tools, and deployment strategies.

Source of Truth: google/adk-python/src/google/adk/ (https://github.com/google/adk-python/tree/main/src/google/adk/) (ADK 1.15) + production case studies

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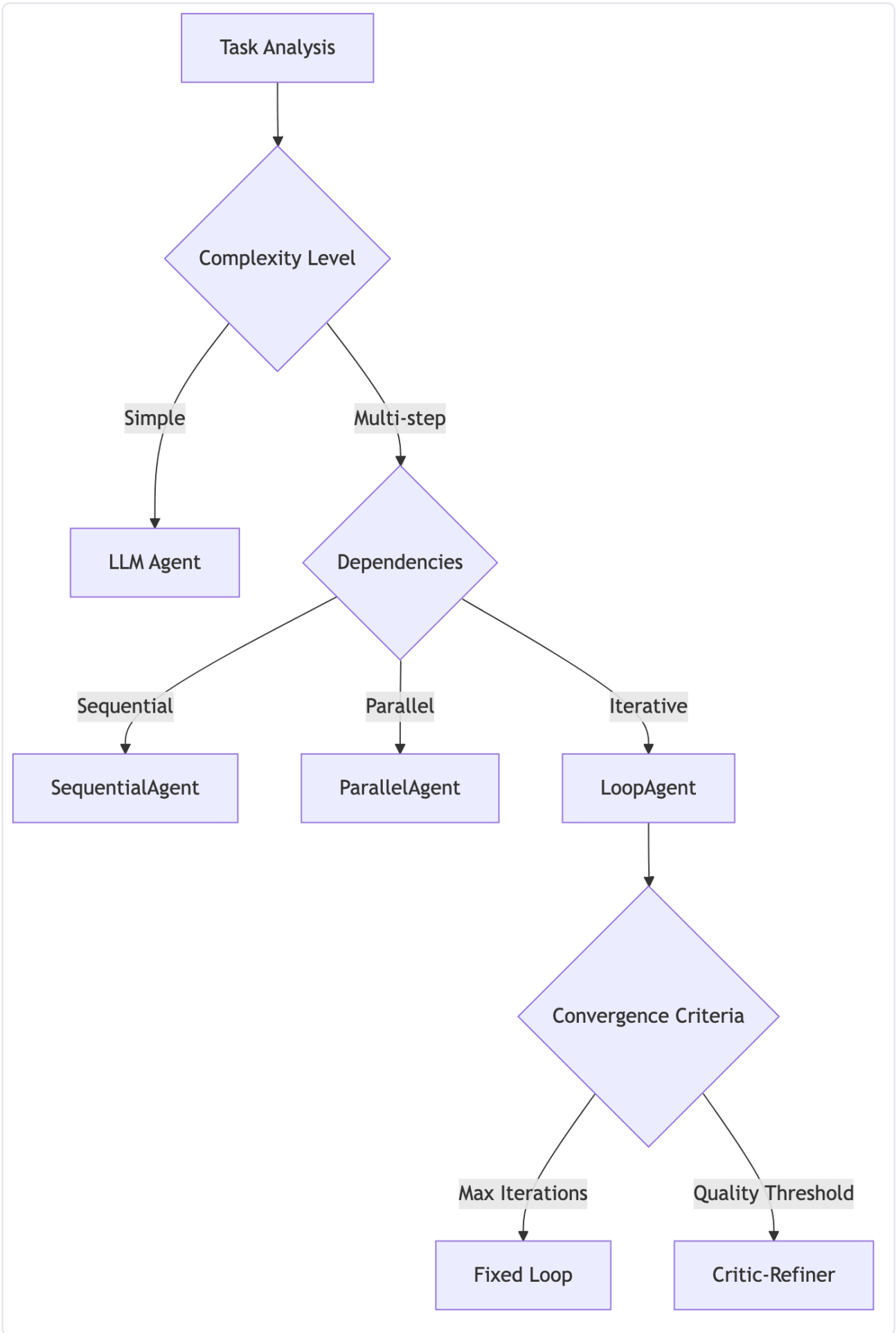
Pattern Selection Framework

Agent Type Decision Tree

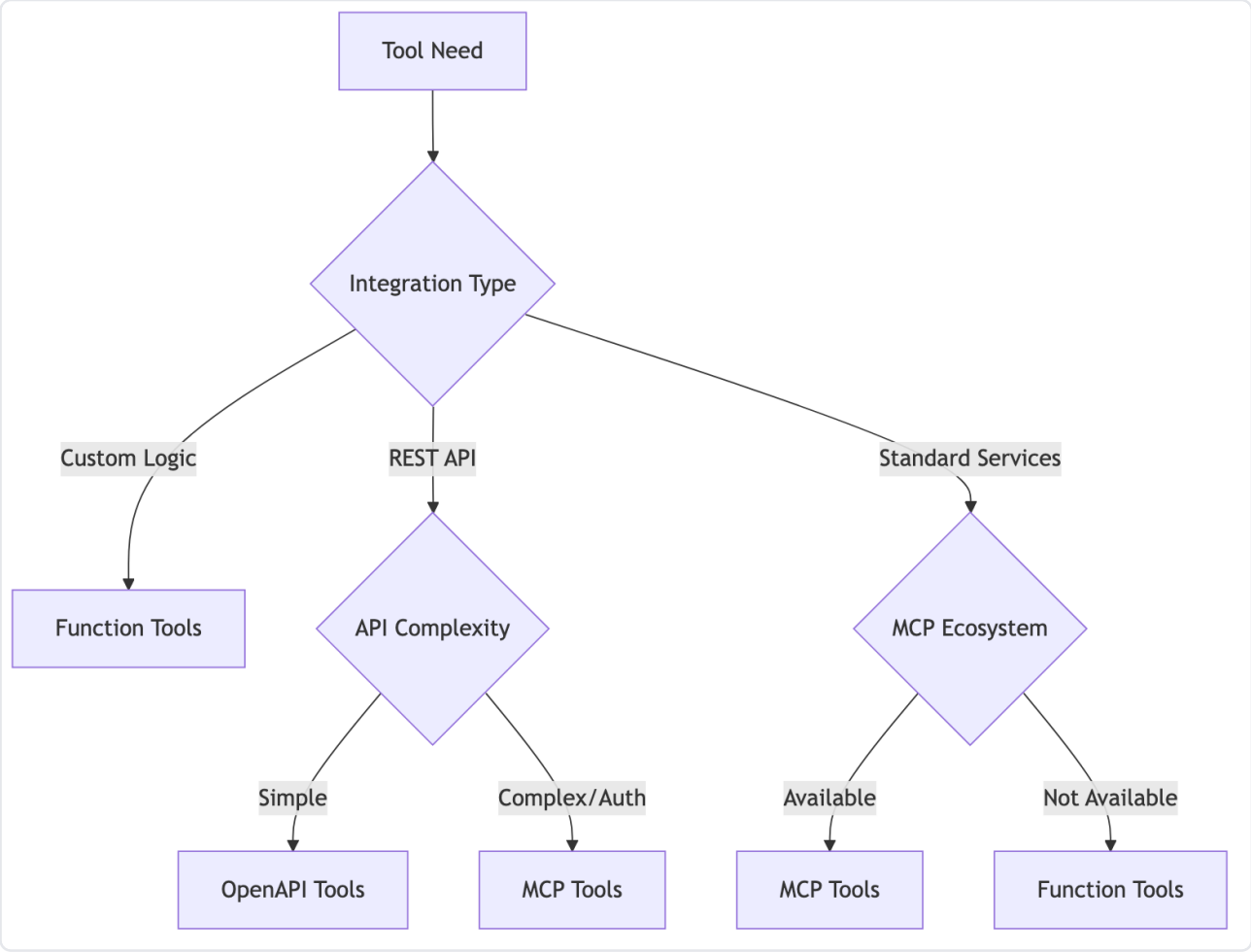

Task Analysis
Complexity Level
Simple
Multi-step
LLM Agent
Dependencies
Sequential
Parallel
Iterative
SequentialAgent
ParallelAgent
LoopAgent
Convergence Criteria
Max Iterations
Quality Threshold
Fixed Loop
Critic-Refiner

When to Use Each Agent Type

Agent Type	When to Use	Example Use Cases
LLM Agent	Single-step tasks, pure reasoning	Q&A, analysis, simple classification
SequentialAgent	Ordered dependencies, pipeline workflows	Data processing → analysis → reporting
ParallelAgent	Independent tasks, speed optimization	Multi-source data collection, parallel analysis
LoopAgent	Iterative refinement, quality improvement	Code review, content editing, optimization

🔧 Tool Selection Matrix

Function Tools vs OpenAPI vs MCP

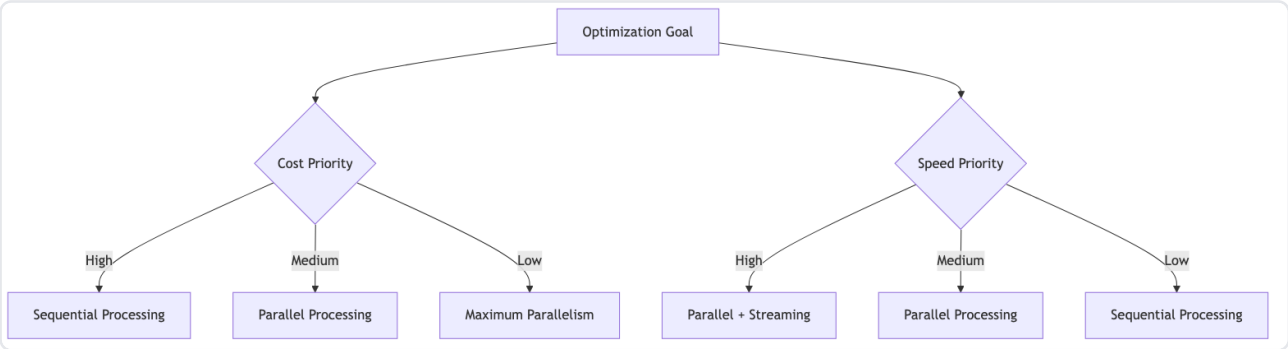


Tool Decision Criteria

Criteria	Function Tools	OpenAPI Tools	MCP Tools
Development Speed	Fastest	Medium	Slowest
Maintenance	Highest	Medium	Lowest
Flexibility	Maximum	Limited	Medium
Interoperability	None	Limited	Maximum
Security	Custom	API Keys	Built-in

⚡ Performance Optimization

Cost vs Speed Trade-offs

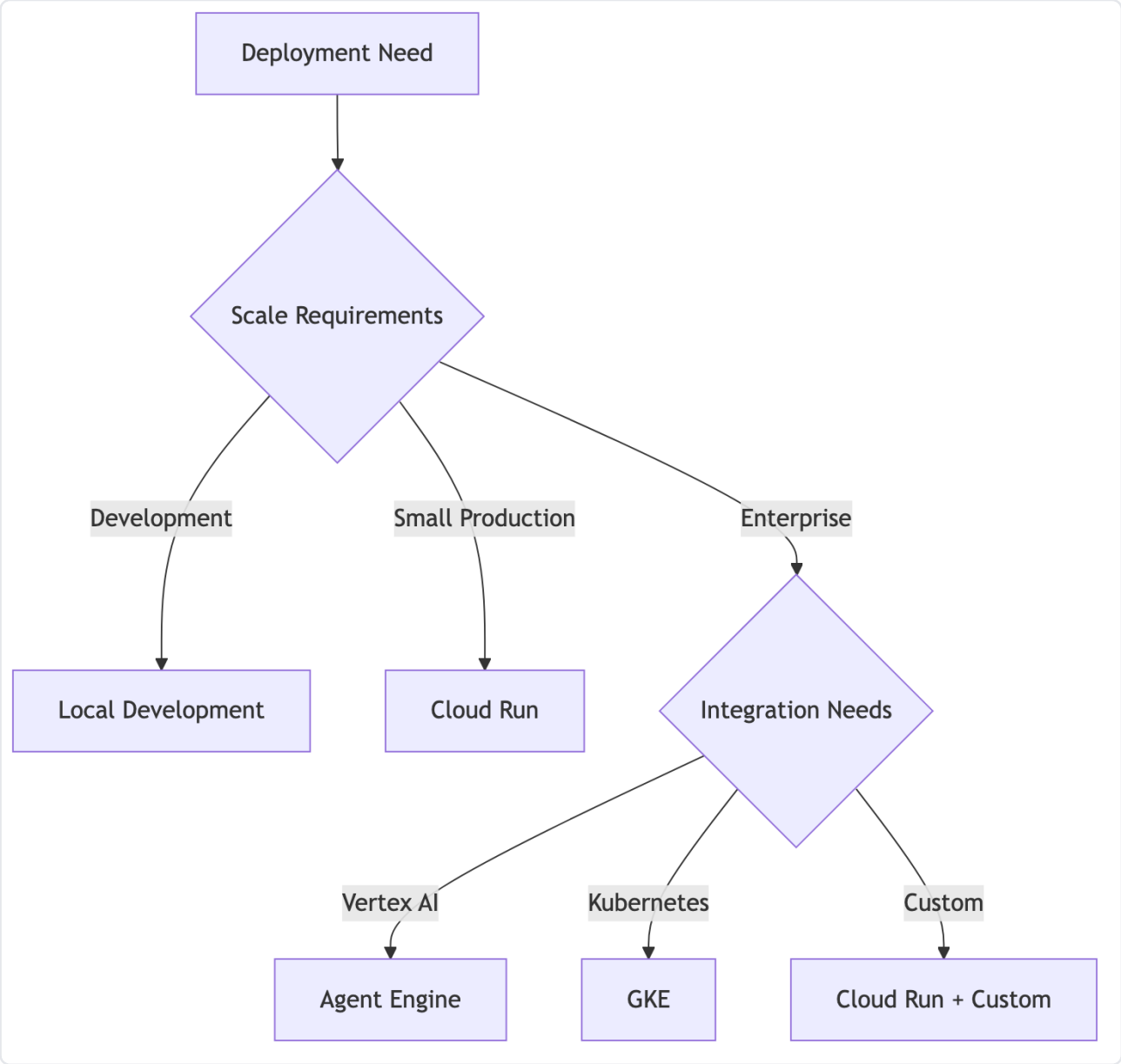


Model Selection Guide

Use Case	Recommended Model	Reasoning
Fast Responses	`gemini-2.0-flash`	Speed optimized, cost effective
Complex Reasoning	`gemini-2.0-flash-thinking`	Built-in chain-of-thought
Code Generation	`gemini-2.0-flash`	Strong coding capabilities
Multimodal	`gemini-2.0-flash`	Vision, audio, video support
Live Interaction	`gemini-2.0-flash-live`	Real-time streaming

🚀 Deployment Strategy Matrix

Environment Selection

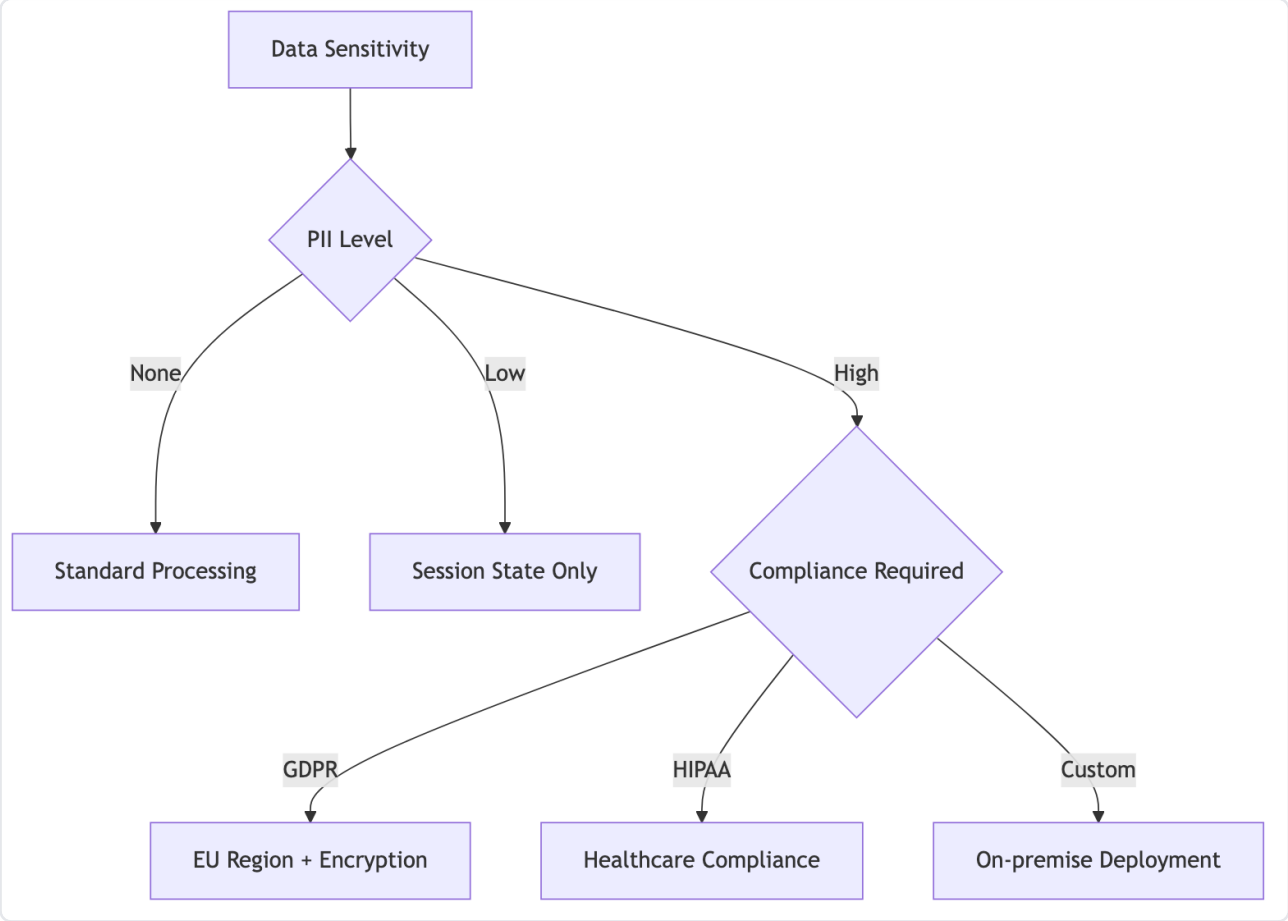


Deployment Decision Factors

Factor	Local	Cloud Run	Agent Engine	GKE
Setup Time	Fastest	Fast	Medium	Slowest
Scaling	Manual	Automatic	Automatic	Automatic
Cost	Free	Pay-per-use	Pay-per-use	Infrastructure
Customization	Maximum	Limited	Limited	Maximum
Monitoring	Basic	Basic	Advanced	Advanced

🔒 Security & Compliance

Data Handling Strategy

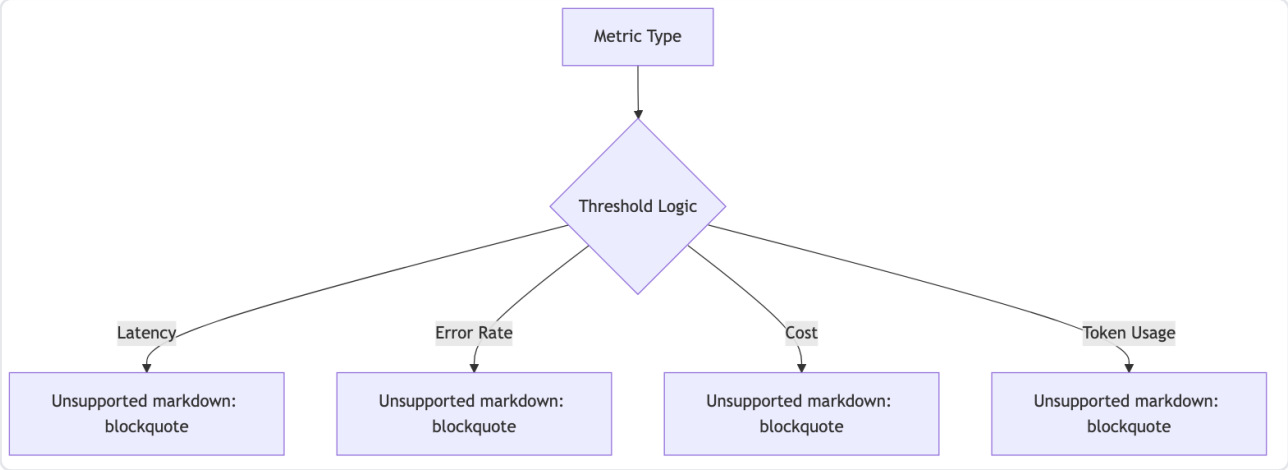


State Scope Guidelines

Data Type	Recommended Scope	Retention	Encryption
User Preferences	`user:`	Permanent	Always
Session Context	`session:`	Session	Optional
Temporary Data	`temp:`	Request	Optional
Application Config	`app:`	Permanent	Always
Sensitive PII	`user:`	Permanent	Required

📊 Monitoring & Observability

Alert Thresholds



Key Metrics to Monitor

- **Performance**: Latency, throughput, error rates
- **Cost**: Token usage, API costs, infrastructure costs
- **Quality**: Task completion rates, user satisfaction
- **Reliability**: Uptime, error recovery, fallback success

🎯 Implementation Checklist

Pre-Production Validation

- [ ] Agent configuration tested with realistic data
- [ ] Tool integrations verified end-to-end
- [ ] Error handling covers all failure modes
- [ ] Performance benchmarks meet requirements
- [ ] Security review completed
- [ ] Cost estimates validated
- [ ] Monitoring and alerting configured
- [ ] Rollback plan documented

Production Readiness

- [ ] Load testing completed
- [ ] Disaster recovery tested
- [ ] Documentation updated
- [ ] Team training completed
- [ ] Support processes established
- [ ] Compliance requirements met

🎯 Key Takeaways

1. **Pattern Selection**: Match agent types to task complexity and dependencies
2. **Tool Choice**: Balance development speed vs long-term maintenance
3. **Performance**: Optimize for cost, speed, or quality based on priorities
4. **Deployment**: Choose environment based on scale and customization needs
5. **Security**: Use appropriate state scopes and encryption for data sensitivity
6. **Monitoring**: Establish clear thresholds and comprehensive observability

🔗 **Next**: Follow structured Learning Paths (learning-paths.md) to master ADK development.

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Source: Google ADK Training Hub